INTERNATIONAL ATOMIC ENERGY AGENCY
DIVISION OF RADIATION, TRANSPORT AND WASTE SAFETY

WASTE SAFETY STANDARDS COMMITTEE
(WASSC)

13 – 16 November 2017

IAEA HEADQUARTERS, VIENNA, AUSTRIA

REPORT OF THE FORTY-FOURTH MEETING
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W.1 GENERAL ISSUES

W.1.1 Opening of the Meeting

The 44th WASSC meeting was opened by Mr Andrew Orrell, Head of the Waste and Environmental Safety Section (WES/NSRW). Mr Orrell welcomed all participants and provided an overview on the news in the areas of interest which had occurred since the previous meeting in June 2017.

Concerning ARTEMIS – the Integrated Review Service for Radioactive Waste and Spent Fuel Management, Decommissioning and Remediation – the first two missions took place: in July, a review of the national decommissioning programme in Italy; and in October, a review of the national programme of Poland, which was requested under the European Waste Directive.

During the IAEA General Conference in September, the 20th anniversary of the adoption of the Joint Convention was celebrated as a Side Event. Representatives from five Contracting Parties shared their experiences, highlighting the role of the Convention as the only legally binding international instrument for safely managing spent fuel and radioactive waste on a global scale.

The Waste and Environmental Safety Section has recently launched a new project on Regulatory Preparedness for Geological Disposal. In this context, a Technical Meeting on the Interaction and Roles of Regulators and Operators in the Licensing Process for the Development of Safe Geological Disposal Facilities was held last week here in Vienna. The meeting was attended by 21 participants from 17 Member States. The new project will discuss key themes and principles relating to regulatory preparedness for the oversight of deep geological repository programmes.

A Technical Meeting on Application of the Graded Approach to Safety for Management of NORM Residues was held in June with 23 participants representing 16 Member States and the ICRP. The meeting aimed to collect practical examples of the implementation of the graded approach to NORM residue management. In addition, the participants’ feedback on challenges in the use of the Draft Safety Guide DS459 on Management of Radioactive Residues from Uranium Production and Other NORM Activities was collected. As an outcome of the meeting, the participants developed an Annex for DS459, dealing with on the practical application of the graded approach to the management of NORM residues.

Finally, a Technical Meeting on the second phase of the Agency’s Programme on Models and Data for Radiological Impact Assessment, known as MODARIA II, was conducted in early November. 140 participants from 40 Member States assisted and carry out the activities of the meeting, which included technical discussions, working group sessions and training events. All seven working groups established under MODARIA II met jointly which allowed enabling cooperation between them to address cross-cutting topics.

Mr Orrell again thanked all members and observers for their interest in and contribution to the work of WASSC and looked forward to a productive meeting. In this context, he recalled that this is the final meeting of the Waste Safety Standards Committees during the Seventh Term, and that Mr Geoff Williams is stepping down, having served seven years as the Chair of the Committee. On behalf of the
Secretariat and all WASSC members, Mr Orrell thanked him for his outstanding service to the Agency and the Member States, and wished him all the best for the future.

W.1.2 Chairman’s Introduction

The WASSC Chairman, Mr Geoff Williams, welcomed members and in particular participants attending a WASSC meeting for the first time. He highlighted various topics in the agenda and wished all participants a successful and productive meeting.

W.1.3 Adoption of the Agenda

The Agenda of the 44th WASSC meeting (see Annex II) was adopted without changes. The list of participants is contained in Annex IV.

W.1.4 Administrative Arrangements

Ms Sandra Geupel, Coordinator of WASSC (WES/NSRW) announced the administrative arrangements for the meeting. Ms Geupel also welcomed all WASSC members, in particular those delegates attending a WASSC meeting for the first time and those participating on behalf of WASSC members, and announced the regrets received. Ms Geupel also referred to the fact that WASSC meetings adhered to the Agency’s paperless meeting policy and that all the presentations would be made available by the end of the day in the dedicated WASSC web folder.

W.1.5 Report from the 42nd and 43rd WASSC meeting

The reports from WASSC-42 and WASSC-43 were posted on the WASSC-44 website prior to the meeting. No comments from WASSC members were received. Both reports were adopted.

W.1.6 Status of actions arisen from the 43rd WASSC meeting

Ms Geupel presented the current status of actions arising from the previous meeting, WASSC-43. All have been implemented since the last meeting.

W.2 GENERAL SAFETY STANDARDS ISSUES

W.2.1 Update on the Status of the NSS-OUI Platform (Nuclear Safety and Security Online User Interface)

Mr Dominique Delattre (SSDS/NSOC) provided a presentation on the latest status of development of the new IT platform “NSS-OUI” (Nuclear Safety and Security Online User Interface) in NUCLEUS. The presentation updated information provided at the six previous meetings of the Committees in November/December 2014, June 2015, November 2015, June 2016, November 2016, and June 2017.

NSS-OUI is a content management system and knowledge management system. It allows the management of relationships between requirements and associated guidance, including safety reports and TECDOCs. In addition, the system has advanced search and navigation capabilities (search by
publication or by requirement). The platform will be used in the future as part of the review and revision process for both Safety Standards and Nuclear Security Series publications.

Mr Delattre publicized the brochure and self-learning elements of the platform. He informed the participants that all Safety Standards are to be re-published in January 2018 in HTML format, in order to allow comments to be made on the documents. He pointed out that only members of the Commission on Safety Standards (CSS) and the Safety Standards Committees will be granted access to make comments, so all comments from Member States will have to be channelled through them. Mr Delattre demonstrated how to register on the homepage of the NSS-OUI platform. He encouraged WASSC members to register and to get acquainted with the relevant features that the platform encompasses.

The Safety Glossary used in NSS-OUI is the 2016 Edition; only those Safety Standards which use its definitions will be tagged. The Security Glossary is to be placed on the test server and tagged.

W.3 REVIEW OF IAEA SAFETY STANDARDS

W.3.1 Waste Safety Standards – Status and future steps

Ms Geupel presented the current status of the Waste Safety Standards (WSS). She noted where to find a copy of the latest status of Safety Standards online. The following WSS are planned to be submitted for approval at WASSC-45 (July 2018):

- DS459, Management of Radioactive Residues from Uranium Production and Other NORM Activities (Step 11);
- DS468, Remediation Process for Areas Affected by Past Activities and Accidents (Step 11);
- DS489, Storage of Spent Nuclear Fuel (Step 11).

In addition, the following WSS is planned to be presented at the same meeting for feedback on need of revision:


W.4 REVIEW OF DOCUMENT PREPARATION PROFILES (DPPS) FOR IAEA SAFETY STANDARDS


Mr David Bennett (WES/NSRW) introduced the document and provided justification for the revision of the Safety Guide SSG-1.

SSG-1 was published in 2009 and is the oldest valid Safety Guide on disposal. Since 2009, the underlying Safety Requirements have been revised, and several relevant General and Specific Safety Guides have been published. In addition, significant further R&D has been done on the borehole disposal concept in the last years. Licensing and implementation of borehole disposal of disused
sealed radioactive sources (DSRS) is planned to begin in Malaysia and Ghana in 2018. Many other Member States are actively interested in developing plans for borehole disposal of DSRS.

It is, therefore, timely to update the guidance on borehole disposal. At the 43rd WASSC meeting in June 2017, Committee members requested the Secretariat to initiate the revision of SSG-1.

The objective of revising SSG-1 is to align it with the current Safety Requirements (GSR Part 5 and SSR-5) and Safety Guides. The document will provide guidance on the development, operation, closure and regulatory control of borehole disposal facilities for DSRS and small volumes of low and intermediate level radioactive waste to meet the safety requirements. It will cover both predisposal management and disposal (operational and post-closure safety) and their various interdependencies. Borehole disposal of other waste types (e.g. spent fuel, high-level waste) will not be covered.

The target publication date for the revised Safety Guide is the second quarter of 2021.

Prior to the WASSC meeting, 4 comments were received from the USA. The Secretariat agreed with the intent of all of the comments. Two were implemented directly as suggested; another one was implemented with a slight modification to ensure accuracy. It was not necessary to make changes for the last comment, on completeness, because the topics identified in the comment were already covered in the DPP.

In response to a question from Israel, Mr Bennett clarified that DS512 will cover the disposal of all categories of DSRS. In response to a question from the United States, Mr Bennett confirmed that safety/security interface and application of a graded approach will be addressed in DS512.

Ms Borislava Batandjieva-Metcalf, WASSC observer from the European Commission, proposed to include TECDOC-1368, Safety considerations in the disposal of disused sealed radioactive sources in borehole facilities (2003), in the list of references. In addition, she raised the question whether DS512 is on single or multiple borehole disposal facilities. Mr Bennett stressed that the revised SSG-1 will be flexible with regard to the number of facilities.

DS512 was approved by WASSC for submission to the CSS.

**Action:** The Secretariat to submit the DPP for the draft Safety Guide Borehole Disposal Facilities for Radioactive Waste (DS512) to the CSS for endorsement.

**W.5 DOCUMENTS FOR INFORMATION / DISCUSSION**


Mr David Bennett (WES/NSRW) introduced the proposal and provided background on its development. There are many requirements for Member States to have policies and strategies (P&S) in place for nuclear safety as well as for the safety of radioactive waste management and spent fuel management. The key requirements in this regard are:

- GSR Part 1 (Rev. 1), Requirements 1 and 10;
- GSR Part 3, Requirements 10 and 49;
- GSR Part 5, Requirement 2;
- GSR Part 6, Requirement 8.
Currently, however, there is little guidance available that is specifically dedicated to waste safety in support of the above requirements. Member States often request assistance and more detailed guidance on establishing P&S in the areas of radioactive waste and spent fuel management, decommissioning, and environmental remediation. At present, the IAEA does not have corresponding guidance in the form of an international consensual publication as it does for many other aspects of waste safety.

There are three relevant IAEA Nuclear Energy Series publications:

- **NW-G-1.1, Policies and Strategies for Radioactive Waste Management** (2009);
- **NW-G-2.1, Policies and Strategies for the Decommissioning of Nuclear and Radiological Facilities** (2011);

These publications, however, are largely focused on technical options for different wastes, rather than safety, and give little guidance to Member States on how to meet the relevant safety requirements. Moreover, they do not refer to the current IAEA Safety Standards, and do not constitute international consensual publications.

The information accessible in the IAEA’s Radiation Safety Information Management System (RASIMS), Thematic Safety Area 4 “Public and Environmental Radiological Protection”, illustrates that the national safety infrastructure for radioactive waste management, decommissioning, and environmental remediation is poorly developed in many Member States. If this is not improved, it will create new legacy issues and pose potential risks to human health and the environment. It may also reinforce a very negative image in the public’s mind of development of nuclear energy and application of nuclear technology.

There are various interactions of the Agency with Member States on P&S:

- Peer reviews of national arrangements (e.g. IRRS, ARTEMIS, WATRP);
- Discussion during international meetings;
- Training during workshops and missions.

From these interactions, it became obvious that the Member States have very different starting points, needs, understanding, resources, and levels of organizational development; and that Member States often ask for more guidance on policy and strategy development and implementation. It is also important to address the right audiences (i.e. regulators and operators, but also policy makers and legal staff) and topics (not just technical aspects, but high-level issues such as leadership and management, education and training, economic and societal factors).

Finally, Mr Bennett presented an analysis of three possible options how to proceed:

1. **Do nothing**
   - not a solution to the perceived ‘gap’ in the IAEA Safety Standards series;
   - would not respond to Member States requests for more guidance;
   - would not be in line with the message IAEA is passing to Member States that the development and implementation of P&S on radioactive waste management is one of the first objectives.

2. **Develop a new Safety Requirement**
   - this could consolidate requirements on P&S, but would cause duplication, and would not necessarily enable the provision of more detailed guidance.
(3) Develop a new Safety Guide

– allows guidance to be provided on aspects of the Safety Fundamentals (SF-1) and the General Safety Requirements;
– Secretariat suggests one new Safety Guide (rather than three) because of the logical links between the three subject areas, and to minimize the number of new Safety Standards.

Discussion

The presentation was followed by a lively discussion.

China, Ukraine and the United States expressed their support for developing a Safety Guide on P&S.

The United States recommended to review the National Reports for the Sixth Review Meeting of the Joint Convention as a valuable source of information to identify potential gaps. Furthermore, the United States raised the question whether the Safety Guide would serve all kinds of national programmes, regardless of their size and the status of development of the country. In his response, Mr Andrew Orrell (Section Head WES/NSRW) pointed out that the Safety Guide needs to reconcile that the regulatory framework is prescriptive in some countries, and performance-based in other countries, and that the related approaches are quite different.

Czech Republic was not convinced that a Safety Guide is needed in addition to the existing publications in the IAEA Nuclear Energy Series. Should a Safety Guide be developed, NE staff has to be involved in the process, to avoid any conflicts or inconsistencies with their documents. Also, interference with the EU Waste Directive 2011/70/EURATOM should be avoided.

Hungary requested to clarify the link between the EU Waste Directive and the new Safety Guide.

The United Kingdom stated that the development of the DPP would be a good opportunity to target, in addition to regulators, other interested parties (policy makers, legal staff, operators, …), and to involve them in the development process. The regulators in the United Kingdom do not develop P&S.


W.5.2 DS489 Draft Safety Guide: Storage of Spent Nuclear Fuel (Revision of SSG-15 by Amendment) – Review of Member States’ Comments

This presentation was cancelled by the Secretariat on short notice, due to pending internal comments on DS489 by the Division of Nuclear Installation Safety (NSNI).

W.5.3 DS459 Draft Safety Guide: Management of Radioactive Residues from Uranium Production and Other NORM Activities (Revision of WS-G-1.2) – Update on the Status and Issues for Discussion

Mr Zhiwen Fan (WES/NSRW) presented the current status of development of the Draft Safety Guide DS459 to the Committee. In June 2011, WASSC-31 concluded that the Safety Guide WS-G-1.2 (published in 2002) was to be revised in the light of new requirements and developments. WASSC-32
and the CSS endorsed the DPP in 2011 and 2012, respectively. The main input considered for the revision are the recently published relevant Safety Requirements and Safety Guides and current practices and experiences in Member States, but also a number of international conferences and workshops on naturally occurring radioactive material (NORM) held in 2013 and 2014.

Mr Fan explained the background for developing the Safety Guide. DS459 will focus on residues generated from uranium production and other NORM activities. It will apply for newly generated residues and new facilities (including from operation, decommissioning and remediation). The Safety Guide will take into consideration the needs of a new audience with rather weak awareness of radiation safety in NORM activities. It will consider the less developed knowledge and experience to NORM residues compared with those for radiation sources and the nuclear fuel cycle.

Seven Consultancy Meetings have been held between mid-2012 and mid-2016 to develop and discuss drafts of the guide. Progress reports on DS459 were provided at WASSC-38 (November 2014) and WASSC-40 (November 2015). In the course of development of the Safety Guide, the title proposed in the DPP – Management of Radioactive Residues from Mining, Mineral Processing, and other NORM related Activities – has been changed into Management of Radioactive Residues from Uranium Production and Other NORM Activities (endorsed at WASSC-38) to better meet the scope of the Safety Guide.

The current draft of the Safety Guide includes the following sections: 1. Introduction; 2. Overview of NORM residues; 3. Governmental, legal and regulatory framework; 4. Protection of people and the environment; 5. System for regulatory control; 6. Strategies for NORM residue management; 7. The safety case and safety assessment for NORM residues management; and 8. Safety consideration for long-term management of NORM residues. Additional information is provided in three appendices and four annexes. Mr Fan noted that DS459, due to its scope and nature, is a complex Safety Guide, and to address in-situ leaching adequately, a specific Safety Report is being developed.

DS459 was submitted to Member States for comments (SPESS Step 8) in August 2016. In total, 275 comments from 11 Member States were received. Among them, 248 (90%) have been fully accepted and accepted with modifications, and 27 (10%) rejected.

Mr Fan informed the Committee that a Technical Meeting on Application of the Graded Approach to Safety for Management of NORM Residues was held from 19–23 June 2017 in Vienna. 23 participants, representing 16 Member States and the ICRP, attended. The purpose of the meeting was to provide a forum for sharing information and exchanging knowledge and experiences among the participating Member States in relation to management of NORM residues, with a particular focus on the application of a graded approach. The following recommendations were made by the participants:

- Developing a report that collates the methods for characterization and safety assessments for NORM residues in Member States and identify good practices;
- Providing advice on a standard way of determining impacts from radon (more particularly the decay products of radon) in relation to NORM;
- Consider the challenge of the relationship between dose limits, exemption criteria and dose constraints and provide further clarification where appropriate in relation to NORM and NORM residues.
- Guidance setting out when it is appropriate to use blending as a management option for NORM residues through collecting and reviewing practices that may occur in Member States.

Mr Fan addressed the following issues in the process of further development of the Safety Guide, based on the comments received from Member States:

- Activity limit requiring a radiological risk assessment;
• Application of specific clearance;
• Application to existing facilities and activities.

Mr Fan briefed the Committee on planned activities supporting the application of DS459:

• A TECDOC on Application of the Graded Approach to the Safe Management of Naturally Occurring Radioactive Material Residues is currently being developed;
• There is a Secretariat’s proposal for developing a document to provide information and practices in Member States dealing with decommissioning of NORM related facilities;
• A Technical Meeting on Safety Assessment for Long Term Management of Radioactive Residues from Uranium Production will take place from 18–22 June 2018 in Vienna;
• A Technical Meeting on the Establishment of a Regulatory Forum for Safe Management of Uranium and Naturally Occurring Radioactive Material Residues will be held from 12–16 November 2018 in Vienna. It will serve as a platform to enhance knowledge sharing and communication.

Finally, Mr Fan outlined the path forward. Following incorporation of Member States’ comments and feedback of the Technical Meeting on Application of the Graded Approach to Safety for Management of NORM Residues, DS459 will undergo technical editing before it will be submitted for the second review by WASSC and RASSC.

No questions were raised to the presentation.

W.5.4 DS505 Draft Safety Guide: Source Monitoring, Environmental Monitoring and Individual Monitoring for Protection of the Public and the Environment – Information on plans how to revise RS-G-1.8

In her presentation, Ms Tamara Yankovich (WES/NSRW) depicted the plans to develop the revision of the Safety Guide Environmental and Source Monitoring for Purposes of Radiation Protection (RS-G-1.8) which was published in 2005. The revision is expected to provide more detail regarding existing and emergency exposure situations than the current draft which is very much focused on planned exposure situations. A Consultancy Meeting in March 2016 identified the following key issues to be covered in the revised document:

1. Consistency with more recently published safety standards, including in relation to the use of terminology and the application to different exposure situations;
2. Use of monitoring data to assess doses to the public and to flora and fauna;
3. Development of harmonized monitoring programmes that demonstrate protection of people and the environment;
4. Application of the graded approach;
5. Reporting requirements;
6. Data management and quality management; and
7. Communication and consultation with interested parties.

The revised Safety Guide will address the planning and implementation of characterization and monitoring to verify compliance with regulatory requirements. It will address the use of source monitoring, environmental monitoring and individual monitoring for the purposes of assessment of radiological impacts to the public and the environment. The target audience is regulatory bodies, operating organizations, decision-makers and others responsible for developing monitoring strategies,
for planning and implementing monitoring, and for interpreting monitoring data in relation to planned, existing or emergency exposure situations.

The key issues to be addressed in the new Safety Guide relate to the characterization and monitoring for planned, emergency and existing exposure situations, using the graded approach. This includes

1. Source monitoring and environmental monitoring of discharges for authorized facilities and activities;
2. Source monitoring, environmental monitoring and individual monitoring for unplanned and uncontrolled releases;
3. Individual monitoring of members of the public in emergency and existing exposure situations; and
4. Interpretation of results, including those for dose assessment.

Ms Yankovich outlined the proposed structure and content of the document, including possible annexes and appendices. The target publication date for the revised Safety Guide is the end of 2021.

Out of the scope of DS505 is the monitoring
- of non-radiological contaminants or physical stressors;
- of disposal facilities (addressed in the Safety Guide SSG-31, Monitoring and Surveillance of Radioactive Waste Disposal Facilities);
- of workers and the workplace;
- of emergency workers and helpers;
- for the purposes of protection of patients; and
- for security purposes.

Ms Yankovich emphasized that, in view of the cross-cutting nature of DS505, it would be beneficial to receive input from other international organizations during its development. This approach will ensure cohesiveness, harmonization between recommendations and guidance provided to Member States by international organizations and non-governmental organizations. Possible organizations with mutual interests in DS468 include UNEP, UNSCEAR, FAO, ICRP, and ICRU.

In the subsequent discussion, WASSC members welcomed the proposal for co-sponsorship of DS505.

From 3–7 December 2018, a Technical Meeting to discuss the development of DS505 will take place.

**W.5.5 DPP DS513 Draft Safety Guide: Leadership, Management and Culture for Safety (Revision and combination of GS-G-3.1 and GS-G-3.5)**

Ms Helen Rycraft (NSNI) introduced the document, which is to be a Safety Guide to accompany the Safety Requirements publication GSR Part 2 Leadership and Management for Safety (2016). There are currently five Safety Guides under GS-R-3 (the predecessor of GSR Part 2), which focus on management systems:

- GS-G-3.1, Application of the Management System for Facilities and Activities (2006);
- GS-G-3.2, The Management System for Technical Services in Radiation Safety (2008) – Will be superseded and replaced shortly by GSG-7 (ex DS453), which is in the process of publication;


GSR Part 2 also covers leadership and safety culture, for which guidance is needed. Two Safety Guides, GS-G-3.1 and GS-G-3.5, will be merged to comply with the long-term structure of IAEA Safety Standards, to incorporate the lessons learned from the Fukushima-Daiichi NPP accident, and to give guidance to all nuclear installations, facilities and activities. The new Safety Guide will also cover those parts of GS-R-3 which are not in GSR Part 2 and INSAG-27 *Ensuring Robust National Nuclear Safety Systems – Institutional Strength in Depth*. DS513 will be developed under four workstreams:

• Chapter 1 – Guidance on generic requirements of GSR Part 2 → Requirements 1, 6 and 7;

• Chapter 2 – Leadership and Culture for Safety → Requirements 2 and 12;

• Chapter 3 – Management for Safety → Requirements 3 to 11;

• Chapter 4 – Measurement, Assessment and Improvement → Requirements 13 and 14.

The target audience will be operators and regulators who have responsibility for management, leadership and culture for safety development inside their organization.

The DPP was developed by a Consultancy Meeting in October 2017; two more Consultancies are to be run in May 2018 and July 2018. The target publication date for the revised Safety Guide is the end of 2021.

Discussions arose on the intended target audience for this Safety Guide (operators and regulators). WASSC members pointed out that flexibility is needed to encompass the various models and organizations which are within the scope of DS513.

The United Kingdom raised the question how topics such as radioactive waste management and decommissioning will be covered in DS513. Ms Rycraft affirmed that the development of DS477 and DS513 will be closely coordinated, in order to maintain consistency between both Safety Guides.

### W.6 STRATEGIC ISSUES

#### W.6.1 Self-Assessment of WASSC against the Terms of Reference for the Safety Standards Committees

As agreed during the 43rd WASSC meeting in June 2017, a self-assessment questionnaire was developed, following the common structure established by the IAEA Secretariat, and made available to all WASSC members and observers in autumn 2017. 6 filled questionnaires\(^1\) were sent back to the WASSC Chair and the WASSC Scientific Secretary prior to the 45th WASSC meeting. The summary of feedback and comments received was collated by the Chair.

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\(^1\) WASSC membership for the four-year term 2014‒2017 lists 51 representatives as member or corresponding member, and 7 observers from International Organizations.
Mr Williams summarized the content of the draft WASSC Self-Assessment Report, which had been uploaded to the WASSC-44 web page and distributed to the meeting participants. He emphasized the idea, scope and usefulness of this self-assessment and the methodology followed (based on a survey distributed to WASSC members and observers) to collect the results and overall conclusions. He concluded that there have been many ideas raised and they should be implemented and considered on an ongoing basis. Aspects with relevant impact in the WASSC activities – such as the usefulness of joint meetings with other Committees, the organization of Topical Sessions, and the importance of proper consideration of the interface between safety and security – should be taken into consideration in the development of the agenda for upcoming meetings. Other, more specific recommendations stemming from self-assessment will be taken into account by WASSC Chair and Scientific Secretary on a continuous basis.

WASSC members discussed the input and finally agreed on the feedback and comments presented in the table. The discussion clarified the comments made by members, areas for improvement, and the results and conclusions drawn by the Chair. There final version of the WASSC Self-Assessment Report was approved and it will be included as an Appendix to the WASSC Four Year Report, which is to be submitted to CSS and DDG-NS.

**Action:** The Secretariat to include the WASSC Self-Assessment Report as an Annex in the WASSC Four Year Report 2014 – 2017.

**W.6.2 WASSC Four Year Report 2014 – 2017**

Ms Geupel presented the structure and contents of the Four Year Report (2014–2017) of the Waste Safety Standards Committee, highlighting aspects related to work methodology, conclusions drawn from the work done, and aspects to be taken into account regarding the way forward of the Committee. She also mentioned the fact that the draft report should be updated to include the outcome of the 44th WASSC meeting. The report was considered approved, pending of consideration of the changes to be made to include the discussions and actions stemming from WASSC-44.

**Action:** The Secretariat to finalize the WASSC Four Year Report 2014 – 2017 and to post it on the WASSC-44 web page.

**W.6.3 Information on the next term of Safety Standards Committees**

Ms Geupel provided relevant information on the upcoming term of the Safety Standards Committees (SSCs).

The four-year term will cease on 31 December 2017. By this date, the current memberships in all 5 SSCs will expire. The next term will run from January 2018 – December 2020 (3 years). A Note Verbale will be sent to Member States soon, requesting nominations for all 5 SSCs in parallel. Separate invitation letters will be sent to International Organizations (observers).

Member States should indicate in each case whether the nominee is expected to be a member who could attend the meetings or is being nominated as a ‘corresponding member’. On the basis of the nominations received, DDG-NS will officially appoint the new SSC members and observers. Chairs for SSCs will also be appointed by DDG-NS at that time, designating one person among the nominees from Member States. The newly appointed Chairs of SSCs will be asked to participate in the 43rd CSS meeting (11 – 13 April 2018), together with their predecessors.
W.6.4 Perspectives on the Entombment Option for Decommissioning

The General Safety Requirements publication GSR Part 6 Decommissioning of Facilities (2014) identifies two decommissioning strategies – immediate dismantling and deferred dismantling. In addition, para. 1.10 of GSR Part 6 mentions entombment – sometimes also referred to as ‘In-situ decommissioning’ or ‘On-site disposal’ – in which all or part of the facility is encased in a structurally long-lived material. The same paragraph unequivocally clarifies that entombment

• Is not a decommissioning strategy;
• Is not an option for a planned permanent shutdown;
• Is a solution only under exceptional circumstances.

GSR Part 6, however, does leave open to interpretation the notion of ‘exceptional circumstances’. Mr Rowat raised the question what type of exceptional circumstances would present a situation that would justify entombment. In rare circumstances, where a complete loss of control might occur (e.g. war, social or political instability), entombment might be the only means to expeditiously secure a site against intrusion and looting. Even under these circumstances, however, entombment should be a last option.

Mr Rowat recalled the established process for decommissioning of nuclear installations. He pointed out that the amount of radioactive waste and other materials generated during the decommissioning of a facility is usually much larger than during its operation. Optimal for decommissioning is to have disposal facilities available to accept radioactive wastes from decommissioning and to have disposition routes for the other kinds of materials that arise during decommissioning. Also in the absence of disposal routes, however, decommissioning can still proceed. In this case, arrangements have to be made for longer term storage of radioactive waste. ‘Concentrate and contain’ is a core principle for both decommissioning and radioactive waste management.

Worldwide, entombment has been used a limited number of times – mostly in cases relating to the legacy of the Cold War. The examples known generally fall into the following categories:

1. Facilities located within large contaminated sites where there are other facilities and where the sites will require long-term institutional control;
2. Locations where the inventories were very low, and the institutional control periods required to reach unrestricted release were short (i.e. less than 50 years). It is not clear whether these are simply applications of decay storage.

Mr Rowat presented entombment applications from 5 Member States (Canada, Estonia, Iraq, Russian Federation, and United States). Examples for entombment outside of the nuclear sector are rare. Technically, any facility can be dismantled and decommissioned if enough resources are provided.

Further, Mr Rowat underlined the numerous implications of entombment:

• It is not favourable for waste minimization. A lot of clean concrete is used for an entombment project – clean material that becomes intermingled with contaminated materials.
• It offers little/no clearance and recycling.
• It can leave behind materials that have the potential to deliver acute doses – implications for long-term care and maintenance, and security?
• It is largely irreversible. It makes future retrievals difficult and forecloses on the use of new technologies.
• It would re-purpose a facility that was designed for another purpose to become de facto a disposal facility.
• It does not eliminate the need for potential interventions/corrective actions in the future.
• It does not align well with the “waste hierarchy” and the principles established in the IAEA Safety Fundamentals (SF-1).
• Sites cannot be re-used.
• It imposes a burden on future generations, as the costs for control of the site (monitoring, security, regulatory supervision) will be there for many years.
• If widely practiced, it would represent a major departure from decades-long practice.
• It would also represent a departure from the ‘Concentrate and contain’ principle.
• It conveys the message that nuclear power is not a sustainable technology.
• “Social licence” (public acceptance) of a new facility on a given site includes understanding that this facility will be there for a certain period of time, but that in the end it will disappear. For entombment, however, the radioactivity and facility structures will not disappear but remain for a long time – this change implies that a new “social licence” is needed.

Finally, the following conclusions were drawn by Mr Rowat:

• Entombment is not decommissioning, since it precludes dismantling, waste minimization, clearance, recycling, and release of sites for re-use.
• Widespread application of entombment would lead to a proliferation of sites with permanent objects that require long-term institutional controls, which is not consistent with avoiding transfer of undue burdens to future generations, nor with the ‘Concentrate and contain’ principle.
• Entombment, if implemented widely, would alter decades long practice for decommissioning and radioactive waste management.

Discussion

The presentation was followed by a comprehensive and vigorous discussion. The statements provided by WASSC representatives can be summarized as follows:

Canada:
It is up to the proponent to propose a decommissioning option. Natural Resources Canada is responsible for the policy for decommissioning, not the Canadian Nuclear Safety Commission (CNSC). CNSC’s regulatory framework for decommissioning is performance-based and not prescriptive, and decision is made on a case-by-case basis. A framework for stringent environmental impact assessment is in place. Financial guaranteed is required for decommissioning.

Canadian Nuclear Laboratories (CNL), as a wholly-owned subsidiary of Atomic Energy of Canada Limited (AECL), is managing AECL’s legacy radioactive waste. Entombment is being proposed by CNL for the Whiteshell Reactor-1 (a research reactor located at the Whiteshell Laboratories site in Manitoba) and the Nuclear Power Demonstration reactor (a prototype demonstration reactor located in Ontario). In both cases, CNL has not yet submitted its licensing application or safety case in support of entombment for regulatory review. Environmental assessments are currently underway for the proposed entombment of both reactors.

United Kingdom:
There are very challenging legacy sites to be decommissioned in the next decades in the UK (e.g. Dounreay, Sellafield). Although advantage is taken of decay storage, entombment should be considered, due to its specificities, as a kind of disposal rather than decommissioning.
United States:
The regulations for decommissioning of nuclear installations in the United States are currently being revised, so that entombment is not an option anymore. Entombment is acceptable only under exceptional circumstances.

France:
Entombment is not applicable for non-exceptional circumstances (e.g. commercial NPPs). Entombment, if widely applied, would seriously weaken the confidence of the public in the sustainability of nuclear power.

Germany:
Both decommissioning options in line with GSR Part 6 have been applied in the past in Germany. Three nuclear installations are currently in safe enclosure: the research reactor FR-2 in Karlsruhe (closure in 1981); the research reactor FRN in Neuherberg (closure in 1982); and the thorium high-temperature reactor THTR-300 in Hamm-Uentrop (closure in 1988). With the entry into force, in June 2017, of the Act on the Reorganisation of Responsibility in Nuclear Waste Management, safe enclosure is no longer considered as an option for decommissioning of NPPs. All NPPs are to be dismantled immediately.

Russian Federation:
It should be on the Member States to decide on the notion of the term ‘exceptional circumstances’.

W.7 REPORTS FROM WASSC MEMBERS AND INTERNATIONAL ORGANIZATIONS

W.7.1 Feedback from Mexico

Mr Roberto Alejandro Suárez Alvarado (Nuclear Safety and Safeguards National Commission), WASSC member representing Mexico, presented an overview on recent regulatory developments and the use of IAEA Safety Standards in the country.

His presentation covered the following topics:

- Legal, regulatory and institutional framework for radioactive waste management;
- Radioactive waste management facilities in Mexico;
- Actions in course and achievements;
- Identified challenges.

Mr Suárez highlighted that the IAEA has recently approved two technical cooperation projects with Mexico for the two-year period 2018–2019:

- Strengthening the capacities of the Mexican regulatory body (review of the actual legal framework; development of lacking standards and regulations; training, etc.); and
- Characterization of NORM arising from the oil extraction industry.

The following challenges were identified by the presenter:

- Approval of the national policy and strategy for the safe management of SF and RW;
- Update of the national inventory of RW;
• Characterization of the historical wastes;
• Effective independence of the regulatory body;
• Perform a comprehensive review of the radioactive waste management activities and the regulatory framework for the management of spent fuel and radioactive waste;
• Create a central organisation in charge of the radioactive waste management;
• Initiate the project for the design, construction and operation of a national repository for low-level and intermediate-level radioactive wastes;
• Appropriate management of NORM;
• Pending accession of Mexico to the Joint Convention.

W.7.2 Feedback from Switzerland

Mr Olivier Beffort (ENSI), WASSC member representing Switzerland, presented an overview on the use of IAEA Safety Standards in the country.

His presentation covered the following topics:

- Nuclear facilities in Switzerland;
- Legal and regulatory framework for radioactive waste management;
- Radiological protection legislation (RP Act and Ordinance; Secondary Ordinances);
- Nuclear energy legislation (NE Act and Ordinance; Secondary Ordinances);
- Regulatory body for safety (ENSI);
- Examples of ENSI Guidelines.

Mr Beffort summarized that, while the IAEA Safety Standards are considered as the actual state of the art for nuclear installations and for radiation protection purposes, they are usually not applied directly as is, but (especially in the case of the Safety Fundamentals and the Safety Requirements) they are incorporated accordingly directly or indirectly (i.e. on the basis of derived standards) into the nuclear energy and the radiological protection legislation.

During the process of the issuing or revision of regulatory guidelines, ENSI is striving to take into account and implement all relevant IAEA Safety Standards. This is done in the process by benchmarking the draft of a new or revised guideline against the relevant standards.

The implementation of the WENRA Safety Reference Levels in the Swiss legal and regulatory system (which are derived directly from the IAEA Safety Standards) is reviewed on a regular basis. The IRRS mission to Switzerland (2011) and the follow-up mission (2015) gave evidence of the broad coverage of the IAEA Safety Standards within the Swiss legislation as well as within the subsidiary regulatory guidelines of ENSI.

W.7.3 Feedback from Ukraine

Mr Volodymyr Berkovskyy (Ukrainian Radiation Protection Institute), WASSC member representing the Ukraine, presented on legacy issues, recent developments, and application of international safety standards in his country.

His presentation covered the following topics:

- Nuclear installations in the Ukraine;
- Strategy for radioactive waste management in the Ukraine;
- State Waste Management Facilitates “Radon”;
- Policy and strategies for spent fuel management in the Ukraine;
- Status of the Chernobyl NPP and the Chernobyl Exclusion Zone;
- Residual radioactive material after the Chernobyl NPP accident;
- 2017 draft Chernobyl strategy;
- Challenges for the management of radioactive material in existing exposure situations.

W.7.4 Recent Activities of the OECD/NEA

Mr Vladimir Lebedev, Radioactive Waste Management Policy Specialist representing the OECD/NEA, briefed the participants on recent and upcoming activities of the NEA.

In his presentation, it was highlighted that the NEA has two new member countries: Argentina (as of 1 September 2017) and Romania (as of 15 October 2017). On 7 June 2017, the accessions of both countries to the NEA were formalised with official exchange of letters between each country and the Secretary General of the OECD.

Mr Lebedev noted that a new Division on Radiological Protection and Human of Aspects of Nuclear Safety has been established by the NEA, to support its member countries in their efforts to enhance focus and attention on human aspects impacting nuclear safety that have been highlighted as critical elements leading to all past nuclear power plant accidents. This sector also includes issues associated with effective public communication and stakeholder engagement regarding nuclear safety, waste management and related issues. The staff serves the Committee on Radiological Protection and Public Health (CRPPH).

Upon recommendation of the Radioactive Waste Management Committee (RWMC), a new standing technical committee is planned to be established in 2018, in order to improve the ability of the NEA to assure strategic focus on the decommissioning of nuclear facilities and on the management of legacies from past activities. The Committee on Decommissioning of Nuclear Installations and Legacy Management (CDLM) is proposed to lead NEA activities in the areas of decommissioning of nuclear installations and legacy management:

- To continue the ongoing work on decommissioning and dismantling of various nuclear facilities (reactors, radioactive waste and spent fuel storage facilities, reprocessing facilities) and reactor types;
- To continue the work in the area of legacy management, particularly to address the management of legacy waste, waste sites and releases of legacy sites.

Under the umbrella of the Integration Group for Safety Case (IGSC), a new working group – the Crystalline Club – has been created in 2017. The key objective of the Crystalline Club is to promote
the exchange of information and share state-of-the-art approaches/methods to improve understanding of crystalline rocks as a host rock for a high-level radioactive waste repository. Membership comprises 24 institutions from 7 countries (Canada, Czech Republic, Germany, Japan, Russia, Spain, and United States).


Furthermore, a number of new publications of interest to WASSC members have been issued by the NEA in 2017:


Finally, Mr Lebedev announced three upcoming international events organized by the NEA:


**W.8 STATUS AND FEEDBACK REPORTS BY THE SECRETARIAT**


Ms Monika Skrzeczkowska (WES/NSRW) presented a progress report on ARTEMIS, the Integrated Review Service for Radioactive Waste and Spent Fuel Management, Decommissioning and Remediation Programmes.

ARTEMIS is an integrated service based on IAEA Safety Standards and international good practices. It also takes into account other relevant documents, such as TECDOCs, Safety Reports, and Nuclear
Energy Series publications. Experiences and lessons learned from other IAEA review services, for example IRRS and INIR missions, are considered as well.


Topics: Policy and framework; Strategy and programme; Concepts, plans and technical solutions; Inventory; Safety; Costs and financing; Expertise, training and skills; Other topics as needed.

Ms Skrzeczkowska highlighted the graded approach used in organizing ARTEMIS peer reviews, especially in terms of size of the review team and duration of the mission, which are corresponding to the factual size of the national programme.

The Secretariat is striving for flexibility in type, shape and form of reference material and outcomes of self-assessment – no templates are available so far. The composition of the review team will be discussed and agreed with the counterpart in the Member State.

An ARTEMIS Workshop was held from 10–13 April 2017 in Vienna and co-sponsored by the European Commission. The event was attended by 96 participants from 49 Member States. The main objectives of the workshop were:

- To present the ARTEMIS review service, its objectives and benefits for the Member States;
- To share some experience from previous reviews of IAEA in the field;
- To present current interest for ARTEMIS reviews;
- To discuss potential needs for reviews in Member States.

Ms Skrzeczkowska presented the current schedule of ARTEMIS missions. In the domain “national policy, framework and strategy”, 4 missions are planned for 2018 (Bulgaria, France, Luxembourg, Spain) and another 3 for 2019 (Germany, Estonia, Latvia). In the domain “disposal”, 3 missions are planned (Australia, Ghana, Malaysia).

A mechanism for collecting feedback from ARTEMIS missions has meanwhile been established with the objective to further improve the review service in methodological and operational aspects. Feedback is collected from

- Experts, including Team Leader – during the entire review process;
- Member State Counterpart(s) reviewed – after finalizing the report;
- IAEA Coordinators – debrief after return from mission.

Version 2 of the ARTEMIS Guidelines will be issued until end of 2017. It will contain descriptions of all six peer review domains. The ARTEMIS Platform on the Global Nuclear Safety and Security Network (https://gnssn.iaea.org/main/ARTEMIS) will be improved further.

Finally, Ms Skrzeczkowska highlighted the importance of placing an official request well in advance, and encouraged the Member States to do so at their earliest convenience.

W.8.2 Update on the Joint Convention

Ms Sandra Geupel (JC Coordinator, WES/NSRW) presented an update of the activities under the Joint Convention. Since the Fifth Review Meeting, the number of Contracting Parties to the Joint Convention has increased from 69 to 76.
Ms Geupel highlighted the schedule for the Sixth Review Cycle and the provisional timetable of the Sixth Review Meeting, which will be held from 21 May to 1 June 2018 in Vienna.

In order to mark the 20th anniversary of the adoption of the Joint Convention (on 5 September 1997), a side event was organized by the IAEA on 18 September 2017, in the margins of the 61st IAEA General Conference. All Member States were invited to attend. During the event, several experts involved in the drafting and review process of the Joint Convention, together with representatives of five Contracting Parties to the Joint Convention – Canada, Cuba, Finland, Ghana and Japan – shared their views with a broader audience on the JC history, review process and prospects.

Two Regional Promotional Workshops are planned to be organized in the fourth quarter of 2017:

- JC & CNS Workshop for Latin American and Asian countries (Vienna, 21–23 November 2017);
- JC Workshop for African countries (Morocco, 5–7 December 2017).

W.8.3 New IAEA Initiatives/Projects within the Radioactive Waste and Spent Fuel Management Unit

Ms Alena Zavazanova (WES/NSRW) gave a presentation on new IAEA projects within the Radioactive Waste and Spent Fuel Management Unit. She highlighted the following projects:


The overall purpose of the project is to increase understanding of and to develop guidance on, the types of preparation that a regulatory body should consider at the different stages of a programme leading to geological disposal of radioactive waste and spent fuel. The specific objectives of the project are:

- Share information and learn from geological disposal programmes;
- Develop an understanding of the evolution of the roles and oversight of the regulatory body through the development and implementation of geological disposal programmes;
- Identify what competences would be needed within the regulatory body in order to act as an independent and credible authority throughout all the stages of a geological disposal programme;
- Develop guidance on how to address the early interaction between the regulatory body and the prospective licensee in preparation for the initial licensing stage (e.g. pre-licensing);
- Develop guidance on regulatory judgments and decisions in the presence of uncertainties, particularly in initial licensing decisions.

The deliverable of the project will be a report identifying key themes and principles relating to regulatory preparedness for the oversight of deep geological repository programmes. The duration of the project is 2 years. A Consultancy Meeting took place from 3–7 July 2017 to discuss the project and to prepare the terms of reference. The first Technical Meeting was held from 6–10 November 2017 in Vienna.

2) Working Group on Liabilities and Long-Term Responsibilities for all Phases of Development of a Geological Repository

A Consultancy Meeting is planned for the first quarter of 2018 to evaluate the feasibility and the next steps for launching a project on that topic. It will involve legal experts as well as geological
disposal experts from advanced countries in this field. Subsequently, a Technical Meeting will be organized from 27–31 August 2018 in Vienna.

W.8.4 Any other business

There were no additional items for discussion.

W.8.5 Dates of future meetings

The Secretariat confirmed the following dates for the WASSC meetings in 2018:

- 45th WASSC meeting: 2–6 July 2018;

W.8.6 Conclusion of the 44th WASSC meeting

Mr Williams thanked all the WASSC members and observers for their important contributions provided during the meeting and the fruitful discussions held not only at this meeting but during the entire four-year term of WASSC. He reminded the participants that this meeting was the last one in the Seventh Term of WASSC, which covers the period 2014–2017, and that a new Chairperson will take over for the Eighth Term.

W.8.7 Closure

The 44th WASSC meeting was closed by the Chair, Mr Williams, who wished all participants a safe trip back home.
RW.1 OPENING

RW.1.1 Opening of the Joint Session

The joint session of RASSC and WASSC was opened by the Director of the Division of Radiation, Transport and Waste Safety (NSRW), Mr Peter Johnston. He welcomed all participants and drew attention to a number of past and future events that are of interest to both Committees.

Mr Johnston informed the Committees that the Commission on Safety Standards (CSS) had approved the two DPPs – one dealing with clearance, and the other with exemption – to revise the Safety Guide Application of the Concepts of Exclusion, Exemption and Clearance, also known as RS-G-1.7. The three new Safety Guides dealing with protection of the environment – DS429, DS432 and DS442 – are progressing through the publications process and the United Nations Environment Program (UNEP) has been invited to cosponsor all three documents.

The CSS also discussed the UNSCEAR report Attributing Health Effects to Ionizing Radiation Exposure and Inferring Risks, on which RASSC previously developed a position paper. The CSS has now asked the Secretariat to arrange a consultancy meeting of experts aiming to discuss the reports’ impact on the IAEA Safety Fundamentals, which were published in 2006 and therefore predate the 2007 ICRP Recommendations. The CSS is also asking the Safety Standards Committees to determine which safety standards currently under development or already published could be strengthened with respect to retrospective attribution of health effects and prospective inference of risk.

Another important issue relates to radioactivity in food and drinking water in non-emergency situations. The Agency has recently initiated a project to harmonize guidance on radioactivity in food and drinking water in non-emergency situations. This is an issue of interest, particularly to RASSC, and is likely to be a regular agenda item for the Committee over the next few years.

The project on Coordination Group for Uranium Legacy Sites, known as CGULS, is focused on the development of a Strategic Master Plan for environmental remediation of uranium legacy sites in Central Asia. During the IAEA General Conference in September, the heads of the regulatory bodies from Kyrgyzstan, Tajikistan and Uzbekistan, along with representatives of the European Commission and the European Bank for Reconstruction and Development, signed a joint statement that outlines that the signatories will support and contribute to a coordinated approach to remediation of uranium legacy sites in Central Asia.

Mr Johnston referred to the International Conference on Radiation Protection in Medicine which will be held at the Agency’s Headquarters in Vienna from 11 to 15 December this year. This conference will provide the radiation protection community with the opportunity to evaluate progress in implementing the “Bonn Call for Action” as well as identifying new challenges from the increasing and varied applications of ionizing radiation in medical diagnosis and treatment.

Finally, Mr Johnston noted that this is the final meeting of the Safety Standards Committees during this four-year term and that both Gustavo Massera and Geoff Williams will be stepping down, having served seven years as the Chairs of RASSC and WASSC respectively. He thanked them for their sterling service to the Agency and to the Member States and wished them well in the future.
RW.1.2 Chairmen’s Introduction

Mr Gustavo Massera (RASSC Chairman) and Mr Geoff Williams (WASSC Chairman) thanked Mr Johnston for his opening remarks. They also welcomed all newly appointed and existing members and observers of RASSC and WASSC to the Joint Session.

It was agreed that Mr Massera would chair the morning session and Mr Williams would chair the afternoon session.

RW.1.3 Adoption of the Agenda

The Agenda of the Joint Session (see Annex III) was approved and adopted without changes. The Chairs noted that a number of the presenters had other commitments and asked for flexibility in the order in which agenda items were taken. This was agreed by the Committees.

RW.1.4 Administrative Arrangements

The Scientific Secretaries drew attention to the location of the emergency exits, introduced the administrative support staff for the meeting and summarized the administrative arrangements, including the joint hospitality event.

RW.2 GENERAL SAFETY STANDARDS ISSUES

RW.2.1 Report of the Meetings of the Chairs and of the Commission on Safety Standards

Mr Dominique Delattre, Head of the Safety Standards and Security Guidance Development Section (NSOC), updated the Committees on the discussions and decisions at the most recent meeting of the Commission on Safety Standards (CSS), and on the overall status of safety standards.

All of the Safety Requirements, with the exception of SSR-1 which is currently under review by Member States, have been published. Since the last CSS meeting, one Safety Requirements and three Safety Guides were published. A further 11 safety standards have been endorsed by the CSS and are awaiting publication. Additional staff has been assigned to assist with clearing the backlog in the Publishing Section. Currently there are 131 safety standards published and a further 58 are at various stages of development – most of these are revisions of current documents.

At its meeting in November 2017, the CSS endorsed one Safety Requirements and one Safety Guide as well as seven DPPs. The CSS also considered the recommendations of the Working Group considering the implications of the UNSCEAR report Attributing Health Effects to Ionizing Radiation Exposure and Inferring Risks for the development of IAEA Safety Standards (see item RW 2.2) and discussed the concept of institutional strength-in-depth as set out in the INSAG-27 report Ensuring Robust National Nuclear Safety Systems – Institutional Strength in Depth. The meeting was also informed of the latest development of the NSS-OUI platform and agreed on the process to finalize its mid-term report.

In response to a question from the International Labour Organization (ILO), Mr Delattre accepted the need for more timely publication of safety standards. He noted that we are currently in a transition phase while the backlog is cleared and, in addition, some Safety Guides have been prioritized based on
their importance. He also noted that one of the three Safety Guides dealing with the environment has been delayed awaiting confirmation of co-sponsorship by UNEP.

The Ukraine commented on the DPP DS505 for the revision of *Environmental and Source Monitoring for Purposes of Radiation Protection* (RS-G-1.8), which was approved by the CSS. In relation to post-closure monitoring for disposal, this is already covered in the Safety Guide *Monitoring and Surveillance of Radioactive Waste Disposal Facilities* (SSG-31) and therefore does not need to be repeated in DS505.

**RW.2.2 ** **CSS Opinion regarding the UNSCEAR Report “Attributing Health Effects to Ionizing Radiation Exposure and Inferring Risks”**

Mr Dominique Delattre reminded the Committees that RASSC had previously developed a paper on the UNSCEAR report *Attributing Health Effects to Ionizing Radiation Exposure and Inferring Risks* for the development of the safety standards. RASSC’s view was that there were no immediate concerns with the content of the safety standards, but some potential future problems were identified. The CSS subsequently established a Working Group to further consider this matter.

The CSS Working Group met on 30–31 October 2017 and developed a set of recommendations for consideration by the CSS³. The Working Group noted that the safety standards are prospective and regulatory in nature. It considered that the safety standards could benefit from more explanatory material and that this can help eliminate misunderstandings and misuse. As an example, the standards do not use collective dose to attribute health effects, but the reasons for that are not explained. It is also not clearly stated that the linear no-threshold model reflects the practical application of science for regulatory purposes, even though there is no direct scientific evidence at the levels of dose which are regulated.

The CSS accepted the recommendation from the Working Group that the IAEA Safety Fundamentals (SF-1) should be reviewed from the viewpoint of attribution of health effects and inference of risk. The CSS is also asking the Committees to review all current safety standards, including those under development, to identify those which might be strengthened in this regard.

It is planned to organize a Consultants’ Meeting in early 2018 to address the review of the IAEA Safety Fundamentals. Mr Delattre indicated that it had been agreed to include one representative of both RASSC and WASSC in the meeting and he asked any members interested in participating to inform the Secretariat.

Czech Republic, Ukraine and WHO all questioned the purpose of this project, asking what specifically needs to be changed and why such changes are necessary. Mr Delattre replied that at this stage only a review is taking place; the intention is to better explain the background to the standards and not necessarily change the standards themselves. Specifically, the CSS has not identified any of the ten safety fundamentals that need to be changed on the basis of the UNSCEAR report.

Czech Republic commented that the intention seems to be to assist the public to better understand the safety standards. Several communication documents already exist and most efforts to educate the public have been unsuccessful. Mr Delattre noted that the intention of providing explanatory information was primarily to prevent misuse of the safety standards by professionals and regulators rather than by the general public.

The United Kingdom thanked the Secretariat for the helpful explanations of the intent of the CSS and of the proposed Consultants’ Meeting. Furthermore, the United Kingdom proposed that the

³ A copy of the report and recommendations from the CSS Working Group is available on the Committees website.
development of a stand-alone document that explains the fundamentals of radiation protection, and which would thereby underpin all safety standards, should be considered.

The WHO commented that evaluating the scientific knowledge on which the safety standards are based is the responsibility of UNSCEAR, whose findings are subsequently used by ICRP to develop the System of Radiological Protection. The proposal from the CSS to develop explanatory material underpinning the safety standards would seem to run contrary to this established framework. Mr Delattre indicated that there was no intention to change the current framework and the sharing of responsibilities between IAEA, ICRP and UNSCEAR.

Ukraine commented that radiation protection is based on prospective assessment and that we do not have the tools to address retrospective assessments – extensive work would be required to develop such tools. Such a discussion raises the issue of the appropriateness of effective dose as an indicator of risk. ICRP added that prospective inference is the business of radiation protection and we cannot take the tools developed for prospective assessments and apply them to retrospective assessment.

On the question of the use of the concept of collective dose, the United States asked how it is proposed to be used for comparative purposes in the safety standards. Mr Delattre commented that the ICRP uses the concept of ‘representative individual’ for this purpose and this approach is also the basis of the requirements and guidance in the IAEA safety standards. ICRP added that its Task Group TG 79 on Effective Dose is preparing a document on the concept of effective dose. This document also discusses the use of collective dose. A draft for consultation is expected to be available shortly on the ICRP homepage.

There were no further comments or questions and the Chair thanked the Committees for their comments.

**RW.3 IAEA SAFETY STANDARDS FOR APPROVAL**

**RW.3.1 DS471 Draft Safety Guide: Radiation Safety of X-Ray Generators and Other Radiation Sources Used for Inspection Purposes and for Non-Medical Human Imaging**

Mr Haridasan Pappinisseri (RSM/NSRW) presented the draft Safety Guide *Radiation Safety of X-Ray Generators and Other Radiation Sources Used for Inspection Purposes and for Non-Medical Human Imaging* (DS471) on behalf of the Technical Officer, Ms Olga German. He noted that the International Basic Safety Standards (GSR Part 3) contains requirements in relation to human imaging for non-medical purposes in order to strengthen the regulatory control over such practices. This issue has also been addressed in ICRP 125 published in 2014.

The Safety Guide addresses two different types of exposures: (1) those carried out by medical personnel using medical radiological equipment (referred to as category 1 exposures); and (2) those carried out by non-medical staff (referred to as category 2 exposures). This has resulted in some duplication of text in the different sections, but this was recognized and agreed as part of the approval process for the DPP.

The document includes recommendations and guidance on protection and safety for X-ray generators and other types of radiation sources that are used for inspection purposes and for non-medical human imaging, and also addresses the occupational exposure of workers, members of the public and exposure of persons while undergoing non-medical human imaging procedures. Medical exposures and nuclear security aspects are outside the scope of the document, for which the target audience is operators, radiation protection officers, regulatory bodies and equipment suppliers.
A total of 201 comments were received from 12 Member States, of which 180 were accepted. A Technical Meeting held in Vienna in January 2017 recommended some further additions and changes to the text. Mr Pappinisseri referred to one comment in particular, asking that the text be extended to include the non-medical imaging of animals. The Secretariat considered this to be out of scope, but that it could be addressed in the safety report *Radiation Protection in Veterinary Medicine* currently being drafted (see agenda item R4.1 of the RASSC-only session in the RASSC-43 meeting report).

As part of the review process by the Committees, an additional 11 comments were received and the resolution table was posted on the website in advance of the meeting. The text was approved by EPReSC but will also be reviewed by TRANSSC and NSGC.

The United States asked that further consideration be given to its comment on para. 2.174 that seeks to clarify the respective roles and responsibilities of the operator/licensee and the regulatory body when dealing with disused sealed sources. On the same point, Czech Republic asked that the responsibility of the regulatory body be clearly stated in any rewording of 2.174.

Finland expressed its support for the document, noting that it is a relatively new concept that is not well understood and for which there are many grey areas. Finland proposed that a TECDOC be developed to support implementation of the Safety Guide. This was supported by WHO. The Chairman noted that this was an issue for RASSC and deferred further discussion to the RASSC-only session.

Belgium recalled that non-medical exposures of animals was not discussed at the time the decision was made to prepare a safety report on veterinary medicine and that this should be further considered. Mr Miroslav Pink (Section Head RSM/NSRW) noted that the Safety Guide DS471 was developed to assist with implementation of specific requirements in GSR Part 3, and that the exposure of animals is not covered in these requirements. However, he agreed that this should be further discussed the following day in relation to the safety report on veterinary medicine. Czech Republic stated that it did not support inclusion of animal exposures in DS471.

The Chairman asked the Secretariat to meet with both the United States and Czech Republic to agree changes to the text of para. 2.174. As this was primarily an issue for RASSC to resolve, it was agreed that a final decision on the text could be made by RASSC the following day in the RASSC-only session. There were no other comments from RASSC or WASSC and, subject to agreement on the amended text of para. 2.174, the Committees approved the draft Safety Guide for submission to the CSS for endorsement.

**Action:** Subject to agreement on a revised text for para. 2.174, the Secretariat to submit the draft Safety Guide *Radiation Safety of X-Ray Generators and Other Radiation Sources Used for Inspection Purposes and for Non-Medical Human Imaging* (DS471) to the CSS for endorsement.


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4 An amended text was subsequently agreed by RASSC – see agenda item R8.1 of the RASSC-only session in the RASSC-43 meeting report.
The DPP was approved in June 2013 but preparation of the document was put on hold pending the publication in June 2016 of the Safety Requirements Leadership and Management for Safety (GSR Part 2). The document has been developed through six Consultants’ Meetings and is now considered ready for submission to Member States for comment.

The document is applicable to management systems for all types of radioactive waste, all radioactive waste management facilities and activities (excluding transport) and the related processes and activities such as waste characterisation, clearance, safety case development and licensing. It also covers all steps in the lifetime of a waste management facility (i.e. siting, design, construction, operation, closure and institutional control) or activity. The target audience is primarily regulators and operators of waste management facilities and activities, but DS477 will also be of interest to the suppliers of nuclear safety related products and to others interested in the safe management of radioactive waste.

Following posting on the Committees’ website, a total of 193 comments were received. Some additional late comments were received from France. Many of these were editorial in nature and could be accepted. More substantive comments included:

1. The title of the Safety Guide should be changed to The Management System for Radioactive Waste Management.

2. The Safety Guide should be restructured to deal separately with the management systems for pre-disposal and for disposal. Mr Bennett noted that such a change would not be consistent with the previous decision that combining the two existing Safety Guides and following the structure of GSR Part 2 would allow the interdependencies to be properly addressed.

3. Submission of the text for review by Member States should be delayed until other relevant guides (specifically GS-G-3.1, Application of the Management System for Facilities and Activities and GS-G-3.5, The Management System for Nuclear Installations) are revised. Mr Bennett noted that the DPP for the combination and revision of these two Safety Guides (DS513) has not yet been submitted to the Committees and acceptance of this comment could result in a further delay of up to three years.

4. More prominence should be given to the text dealing with application of the graded approach.

5. Reference needs to be made to the NEA work on preservation of records, knowledge and memory and to the hierarchy of hazard controls.

The WASSC Chair expressed some concern at the acceptance of late comments and noted that these could be considered at the same time as comments received from Member States. He also considered that the proposed change to the title was significant and should only be accepted if there were strong arguments to support the change. France apologized for the late submission of its comments, noting that all of them were of an editorial nature. France also noted the importance of memory retention and welcomed the amendments made in this regard.

The United States understood the reasons given for not restructuring the document at this stage, but still considered that some restructuring could bring greater clarity to the document and assist with the application of a graded approach. Restructuring of the document was also supported by the European Nuclear Installations Safety Standards Initiative (ENISS), noting that stakeholder involvement issues are very different in the predisposal and disposal phases.

Japan underlined the importance of ensuring consistency with all other Safety Guides dealing with management systems. Belgium noted that the document is inconsistent in the use of the terms ‘senior management’ and ‘operator’ and referred specifically to the need to consider amending para. 4.107 in this regard.

Both the United Kingdom and Australia stated they did not support the proposed change to the title of the document.
Mr Gerard Bruno (Unit Head RWSFM/NSRW) noted that the Secretariat had developed the document in line with the mandate given by the Committees, which is consistent with the long-term policy of reducing the total number of safety standards. To separate the documents at this stage would introduce a significant delay. Those paragraphs more relevant to pre-disposal and those more relevant to disposal can be clarified after the period of Member States comments. The WASSC Chair endorsed these comments.

The Committees agreed that no further amendments should be made to the document at this time and that the proposed change to the title should not be accepted. There were no further comments from the Committees and the draft Safety Guide *The Management System for the Predisposal and Disposal of Radioactive Waste* (DS477) was approved for submission to Member States for comment.

**Action:** The Secretariat to submit the draft Safety Guide *The Management System for the Predisposal and Disposal of Radioactive Waste* (DS477) to Member States for comment.


Mr Palmiro Villalibre (NSNI) gave a presentation summarizing this draft Safety Guide. He stressed the need for revision, mentioning that the current Safety Guide GS-G-4.1, issued in 2004, provides guidance to outdated Safety Requirements (such as GS-R-1, NS-R-1, NS-R-2, and NS-R-3).

The revision takes into account the feedback from the use of GS-G-4.1, the practices in Member States regarding the Safety Analysis Report for current reactors designs (new structure and content), as well as the lessons learned from the Fukushima Daiichi NPP accident (i.e. design robustness against extreme external hazards; safety margins for internal and external hazards; identification of and safety analysis for design extension conditions (DECs); identification of event sequences and accident scenarios to be ‘practically eliminated’).

The DPP for DS449 has been approved by the CSS in November 2015. In January 2017, DS449 was submitted to Member States for 120-day review. Approximately 300 comments were received from 16 Member States. Prior to the meeting, another 140 comments have been submitted by members of Safety Standards Committees. There are no unresolved comments or issues remaining. Technical editing of DS449 had already been completed by Technical Editors.

Mr Villalibre pointed out that EPreSC approved the draft, but requested some substantial changes in Section 19, dealing with emergency preparedness and response.

No questions were raised to the presentation, and DS449 was approved by RASSC and WASSC for submission to the CSS for endorsement.

**Action:** The Secretariat to submit the draft Safety Guide *Format and Content of the Safety Analysis Report for Nuclear Power Plants* (DS449) to the CSS for endorsement.


In his presentation, Mr Palmiro Villalibre (NSNI) summarized the history of the draft and mentioned the requirements which are supported by DS491. SSG-2 was published in 2009 to provide guidance on how to meet the requirements in NS-R-1 and GSR Part 4. The current revision of SSG-2 was initiated mainly

- To provide recommendations in accordance with the safety requirements established in SSR-2/1 (Rev. 1) and GSR Part 4 (Rev. 1), both published in early 2016;
• To take into account feedback and lessons learned from the TEPCO Fukushima Daiichi NPP accident and other sources, as well as recent experience with Deterministic Safety Analysis (DSA) included in safety analysis reports for current reactor designs in the Member States;
• To ensure consistency with current IAEA safety standards.

With respect to the implications from Fukushima Daiichi NPP accident, specific aspects included in DS491 are:

• Section 3: Identification and categorization of postulated initiating events and accident scenarios
  – Identification of Design Extension Conditions (DEC);
  – Event sequences and accident scenarios to be ‘practically eliminated’;
• Section 7: DSA for plant states and accident scenarios
  – DSA for DEC without significant fuel degradation;
  – DSA for DEC with core melting;
  – DSA in support of ‘practical elimination’ of certain conditions.

The scope of SSG-2 remains essentially unchanged. Applications of DSA to several areas – e.g. NPP design by the designer, periodic safety review, plant modifications and severe accident management guidelines – will be provided in an Annex to DS491.

The DPP was approved by NUSSC/RASSC/WASSC in November 2014 and by the CSS in April 2015. Three Consultancy Meetings have been held in the period 2015–2016 to develop and discuss the draft. DS491 was submitted to Member States for comments in August 2016. In total, 387 comments from 16 Member States were received. Member States comments were resolved in a Consultancy Meeting held in January 2017. The table of resolutions was posted on the IAEA website in April 2017.

A further set of 45 comments were received from Committee members review at SPESS Step 11. All comments have been addressed and resolutions provided.

Technical Approval of DS491 was given by WASSC and NUSSC in June 2017. Editorial review by IAEA’s Technical Editors has yet not been completed at that time. Such “technical approval” step was added in a way around the bottleneck of technical editing, in the hope of speeding up Step 11 approval once the document is submitted formally to the Committees following technical editing.

There were no questions or comments to this presentation. DS491 was approved by RASSC and WASSC for submission to the CSS for endorsement.

**Action:** The Secretariat to submit the draft Safety Guide *Deterministic Safety Analysis for Nuclear Power Plants* (DS491) to the CSS for endorsement.

**RW.4 OTHER SAFETY STANDARDS ISSUES**

**RW.4.1 Radiation Protection: Optimization vs Minimization of Dose**

Mr Bernd Lorenz, RASSC observer from the European Nuclear Installations Safety Standards Initiative (ENISS), made the case that optimization in radiation protection has become an exercise in reducing doses, with little or no attention given to the associated economic costs. Mr Lorenz suggested cut-off values of 1 mSv/a for optimizing occupational exposure and 100 μSv/a for optimizing public exposure; if these values are not exceeded, then no optimization would be necessary.
The concept of ALARA (as low as reasonably achievable) was first introduced in ICRP 26. All of the emphasis in implementation was placed on “as low as”, and very little attention was given to “reasonably achievable”. Given that the linear no-threshold (LNT) model is a theory developed to assist regulators and there is little or no direct evidence of any health impact below doses of around 100 mSv, the emphasis on further reducing doses does not seem either reasonable or necessary. Nowadays, the fear of radiation seems to play a dominant role in decision-making and the drive to reduce even further the doses from any given practice.

ICRP 103 further developed the ALARA principle, stating that “the likelihood of incurring exposure, the number of people exposed, and the magnitude of their individual doses should all be kept as low as reasonably achievable, taking into account economic and societal factors.” Mr Lorenz argued that this change is primarily focussed on societal aspects and that economic factors are still not appropriately considered. In addition, the wording in Requirement 11 of GSR Part 3, which states that registrants and licensees need to “ensure” that protection and safety is optimized, is also unhelpful. He was also critical of the approach to optimization in the European BSS (Council Directive 2013/59/EURATOM).

Mr Lorenz noted that what is optimal today, may not be optimal tomorrow and what is optimal for one person may not be optimal for others. What you can do may not be what you need to do, you may not have the resources to do what others do, and technical developments do not always represent a gain for radiation protection. Furthermore, different stakeholders are driven by different ambitions and goals. Thus, while optimization is a key cornerstone of radiation protection, it is also its weakest point and its practical implementation is fraught with challenges.

Mr Lorenz commented that international documents agree that optimization is a process, that it is forward-looking and that it is iterative. The process needs to address the needs and interests of the various stakeholders and decisions need to be taken jointly. However, the costs of current dose reduction efforts are excessive and are difficult to justify. The different attitudes and approaches to natural and man-made radionuclides are also problematic in terms of optimization and ALARA.

In summary, the problems with optimization are that ALARA has become more and more sophisticated and optimization is seen a process with no end. In reality, cost-benefit-analysis is not helpful and too often decisions are based on political considerations, not on objective criteria with regard to the real risk. Mr Lorenz argued that the system needs to be simplified and suggested that a cut-off for optimization of doses, occupational and public, would be of benefit. Radiation protection would then be about simple, common sense measures that really do help.

The ICRP stated that it normally refers to the LNT as a “practical model” rather than a “hypothesis”. It added that it considers optimization to be one of the strengths, rather than one of the weaknesses, of the System of Radiological Protection. Optimization is a strength because it is difficult, it makes us think and makes us discuss, which is a better option than setting numbers. However, ICRP accepted that current practice in application of the optimization principle is far from ideal, with political considerations often dominating.

Czech Republic noted that optimization is a topic for never-ending discussion. It is reasonable to expect variability from country to country as optimization depends in part on available resources. It is not only the fault of the regulator that doses are being reduced: sometimes these reductions are driven by societal considerations and pressure. Czech Republic added that, in the past, it had legally-established cut-off values for optimization set at 1 mSv/a for workers 50 μSv/a for the public. Application of this approach was not entirely satisfactory and is now being replaced by dose constraints.

The WASSC Chair commented that optimization is an area where practical use can be made of the previous discussion on attribution of health effects. He added that WASSC needs to communicate better on health risks in the relevant Safety Guides.
IRPA drew attention to its report “Is the System of Protection ‘Fit for Purpose’ and Can It Be Readily Communicated?” which is available on the RASSC website. IRPA added that several ethical issues are involved in decision-making on optimization, namely reasonableness, dignity, prudence and beneficence. Beneficence is about getting the best possible value for society; as more money is spent on radiation protection, there is less available for reducing other risks.

France commented that the Société Française de Radioprotection (SFRP) had reviewed the practicalities of optimization in relation to three different areas: the nuclear industry, medical exposures and existing exposure situations. The conclusion reached was that it is difficult to achieve real optimization and the answer to what is reasonable is best resolved through discussion with stakeholders.

The United Kingdom considered that the role of the regulator was not to be as good as you can be, but to be good enough. One has to accept that sometimes doses can go up if it is in the common good. This is the strength of optimization and in dealing with each situation on a case-by-case basis.

The Chairman thanked Mr Lorenz for a stimulating presentation that generated considerable interest and discussion.


Ms Tamara Yankovich (WES/NSRW) presented a progress report on the draft Safety Guide Remediation Process for Areas Affected by Past Activities and Accidents (DS468), which is intended to replace the Safety Guide WS-G-3.1 published in 2006. The revised Safety Guide will reflect the relevant requirements in Section 5 of GSR Part 3 and takes into account lessons learned from the Fukushima Daiichi NPP accident. WASSC-33 and the CSS endorsed the DPP for DS468 in 2012.

The objectives of DS468 are to provide guidance on implementing the requirements established in GSR Part 3 on remediation of

- Areas contaminated by residual radioactive material arising from past activities that were never subject to regulatory control or were subject to regulatory control but not in accordance with the requirements of the existing IAEA and national safety standards; and
- Areas affected by a nuclear or radiological emergency, after the release and deposition have finished and adequate information is available to initiate remedial actions.

The presentation of Ms Yankovich aimed to provide a summary of key Member States comments, and to give an overview of the approach taken to address them.

Key comments of Member States related to:

(a) An update of Figure 1 depicting the remediation process; and

(b) The need for additional guidance on recovery of communities.

In regard to item (a), Figure 1 has been updated to include a “Detailed Investigation”, as an additional step. In addition, more clarification has been provided on when to set reference levels within the remediation process. The example in Annex III on how to apply the principles of justification and optimization in setting reference levels was clarified, in accordance with Member States comments. Additional Annexes were added to provide examples of how to apply Figure 1 for (1) an area that was affected by the Chernobyl accident; (2) a former nuclear weapons testing site; and (3) a phosphate mining legacy site. Criteria need to be developed at key decision points during the remediation process.
In regard to item (b), Member States noted that the remediation process is only one part of the process of recovery of communities. The need for additional guidance on recovery, involving the process of rebuilding, restoring and rehabilitating affected communities, was highlighted.

For existing exposure situations, it is necessary:

- To conduct characterization of the situation to determine key exposure pathways and the corresponding doses;
- To decide on screening criteria that can be used to determine whether there may be an issue that requires further assessment;
- To determine next steps, which may include:
  - More detailed investigation to determine the scope of the issue and possible next steps to address it; or
  - A decision to leave the situation “as is”, applying restrictions to minimize dose; or
  - A decision to leave the situation “as is”, without the application of restrictions.

Additional important Member States comments and their proposed resolutions can be summarized as follows:

- More “prominence” on physical, non-radiological risks and other factors, as part of justification and optimization
  → The level of detail needed to appropriately address this comment is being considered. Additional references are being added to Annex V “Relevant Literature” with more detailed examples on how to apply the justification and optimization processes, taking account of prevailing circumstances.
- Need to highlight knowledge management for remediation and recovery
  → Text has been added to para. 2.6 on the governmental, legal and regulatory framework, to capture the importance of knowledge management.
- Suggestion to add case studies on how to apply the remediation process for different types of existing exposure situations
  → Three new Annexes have been added, including case studies on: (1) Post-accident site; (2) Site impacted by past nuclear weapons testing; and (3) Legacy site (phosphate mining), respectively.
- Need for a glossary of terms
  → DS468 is intended to be used in conjunction with the IAEA Safety Glossary (2016 Edition); therefore, key definitions are being included in the text or in footnotes.

Due to the broad international interest in remediation, a number of other international organizations and non-governmental organizations are also developing recommendations and guidance on this topic. It would, therefore, be beneficial to receive input from them during the development of DS468. This approach will ensure consistency and harmonization of recommendations and guidance provided to Member States in this area. Possible organizations with mutual interests in DS468 include UNSCEAR, ICRP, ICRU, OECD/NEA and others.

Ms Yankovich informed the audience that more detailed guidance on post-accident recovery, supporting the guidance in DS468, is planned to be provided in a Safety Report and a TECDOC, both of which are currently under development in the Agency.
The planned next steps are: (1) Finalization of text to incorporate comments from RASSC and WASSC during the joint session; (2) Submission of DS468 for technical editing; (3) A Technical Meeting to gain input on DS468 from other international organizations and non-governmental organizations; and (4) Request for co-sponsorship of DS468 by other international organizations and non-governmental organizations.

The presentation was followed by a vigorous discussion.

RASSC and WASSC members broadly supported a potential co-sponsorship of DS468 by other international organizations. Chris Clement, RASSC observer from the ICRP, pointed out that the ICRP, in line with its status as non-governmental organization, has never co-sponsored an IAEA safety standard so far, but that ICRP could potentially provide input during the process to gain input from international organizations and non-governmental organizations to ensure consistency between DS468 and relevant ICRP documents. Mr Ferid Shannoun, RASSC and WASSC observer from UNSCEAR, proposed UNEP (instead of UNSCEAR) as potential co-sponsor.

Mr Geoff Williams raised the question of whether the attribution of health effects is addressed in DS468 in line with the UNSCEAR report Attributing Health Effects to Ionizing Radiation Exposure and Inferring Risks. Ms Yankovich replied that this topic is dealt with in the draft Safety Guide Arrangements for the Termination of a Nuclear or Radiological Emergency (DS474).

Ms Borislava Batandjieva-Metcalf, WASSC observer from the European Commission, noted that the term ‘recovery’ is not defined in DS468. In her response, Ms Yankovich clarified that a definition has been introduced in DS468 to address Member States comments. The definition is in line with the usage of the term in DS474 and in the 2015 Report of the Director General on the Fukushima-Daiichi Accident.

**RW.5    DPPS FOR APPROVAL**

**RW.5.1  DPP DS509 Draft Safety Guide: Revision by amendment of 8 Specific Safety Guides on Research Reactors (NS-G-4.1 to NS-G-4.6, SSG-10 and SSG-37)**

Mr David Sears (NSNI) delivered a presentation explaining that all Safety Guides related to research reactors need to be revised for a variety of reasons: (1) the recent publication of the new Safety Requirements SSR-3 on Safety of Research Reactors; (2) feedback from the use of the document by Member States; (3) operating experience feedback from the IAEA Incident Reporting System for Research Reactors (IRSRR); and (4) experience gained from Integrated Safety Assessment for Research Reactors (INSARR) missions.

The approach to revising the Safety Guides on research reactors was developed in consultation with experts from Member States during a Consultancy Meeting, and agreed within NSNI. The approach was based on an assessment of the new requirements in SSR-3 and a gap analysis of the scope and content of the existing Safety Guides. The outcome was to revise the 11 Safety Guides in three groups according to:

- Depth of revisions needed;
- Extent of technical interlinkages;
- Experience from the revision by amendment of Safety Guides for NPPs.

New requirements in SSR-3 are related to: (1) Subcritical assemblies; (2) Preparation for decommissioning; and (3) Interfaces between safety and security. In addition, requirements related to management for safety and verification of safety, site evaluation, general design requirements,
treatment of accident conditions, safety analysis and defence-in-depth were significantly modified. Furthermore, some information contained in NS-R-4 was not carried over to SSR-3 because it was more suitable for inclusion in Safety Guides.

The scope and structure of the 8 inter-related Safety Guides, notably

- **NS-G-4.1, Commissioning of Research Reactors (2006);**
- **NS-G-4.2, Maintenance, Periodic Testing and Inspection of Research Reactors (2006);**
- **NS-G-4.3, Core Management and Fuel Handling for Research Reactors (2008);**
- **NS-G-4.4, Operational Limits and Conditions and Operating Procedures for Research Reactors (2008);**
- **NS-G-4.6, Radiation Protection and Radioactive Waste Management in the Design and Operation of Research Reactors (2008);**
- **SSG-10, Ageing Management for Research Reactors (2010); and**
- **SSG-37, Instrumentation and Control Systems and Software Important to Safety for Research Reactors (2015)**

will remain essentially unchanged after their revision by amendment.

Prior to the meeting, 29 comments were received from members of Safety Standards Committees and NSGC, specifically from France, Germany, Japan and Korea. The comments were mainly regarding prioritization; combining documents to enhance the efficiency of the review process; allocation of work load to Member States; and references to guides/requirements for NPPs. All comments were addressed and resolutions were discussed with the reviewers. There are no unresolved comments.

There were no questions or comments from RASSC and WASSC, and the DPP was approved for submission to the CSS for endorsement.

**Action:** The Secretariat to submit the DPP for the revision by amendment of the 8 inter-related Safety Guides NS-G-4.1 to NS-G-4.6, SSG-10 and SSG-37 (DS509) to the CSS for endorsement.

**RW.5.2 DPP DS510 Draft Safety Guide: Revision of 2 interrelated Specific Safety Guides on Research Reactors (SSG-20 and SSG-24)**

Mr David Sears (NSNI) introduced the DPP for the revision by amendment of two inter-related Safety Guides – **Safety Assessment for Research Reactors and Preparation of the Safety Analysis Report (SSG-20) and Safety in the Utilization and Modification of Research Reactors (SSG-24).** Both publications were issued in 2012. Mr Sears explained that this DPP was related to the process addressed in his previous presentation. The scope and structure of the two Safety Guides will remain essentially unchanged after their revision by amendment.

Prior to the meeting, 13 comments were received from members of Safety Standards Committees and NSGC, specifically from France, Germany and Japan. The comments were mainly regarding prioritization and combining documents to enhance the efficiency of the review process and to minimize work load to Member States; to add references; and to provide further clarification. All comments were addressed and resolutions were discussed with the reviewers. There are no unresolved comments.
There were no questions or comments from RASSC and WASSC, and the DPP was approved for submission to the CSS for endorsement.

**Action**: The Secretariat to submit the DPP for the revision by amendment of the Safety Guides SSG-20 and SSG-24 (DS510) to the CSS for endorsement.

**RW.5.3 DPP DS511 Draft Safety Guide: Use of a Graded Approach in the Application of the Safety Requirements for Research Reactors (Revision of SSG-22)**

Mr David Sears (NSNI) delivered a presentation about the DPP for the revision of the Safety Guide *Use of a Graded Approach in the Application of the Safety Requirements for Research Reactors (SSG-22)*, which was related to the process addressed in his two previous presentations.

The analysis showed that SSG-22, which was published in 2012, needs to be revised in its entirety due to its heavy reliance on outdated references to individual paragraphs of NS-R-4 and a lack of guidance related to new requirements in SSR-3, particularly subcritical assemblies, design extension conditions, and interfaces between nuclear safety and nuclear security. The revision will also incorporate the experience on application of SSG-22 in Member States and ensure coherency and consistency with other IAEA safety standards. The scope and structure of the revised Safety Guide remains essentially unchanged with the exception that the section on site evaluation will be deleted (because guidance is available elsewhere) and a new section on interfaces between safety and security will be added.

Prior to the meeting, 13 comments were received from members of Safety Standards Committees, specifically from Germany and Japan. The comments were mainly regarding compiling changes in an addendum, deleting sections and adding clarifications. All comments were addressed and resolutions were discussed with the reviewers. There are no unresolved comments.

There were no questions or comments from RASSC and WASSC, who approved the DPP for submission to the CSS for endorsement.

**Action**: The Secretariat to submit the DPP for the revision by amendment of the Safety Guide SSG-22 *Use of a Graded Approach in the Application of the Safety Requirements for Research Reactors (DS511)* to the CSS for endorsement.

**RW.6 NUCLEAR SECURITY SERIES DOCUMENTS FOR CLEARANCE**


Mr Donald Dudenhoeffer (NSNS) introduced the document. The objective of NST045 is to provide guidance on developing, implementing and integrating computer security as a key component of nuclear security covering Nuclear Security Series publications NSS 13, NSS 14 and NSS 15. The key issue to be addressed in this publication is how to define and assign responsibilities for computer security.

The DPP was approved in June 2014. The draft was subsequently developed through five Consultancy Meetings and one Technical Meeting, which were convened from November 2014 to June 2016. NST045 was developed in close coordination with the following documents:

- NST057, *Nuclear Security Recommendations on Computer Security: Appendices to NSS No. 13, No. 14, No. 15*; and
NSS No. 17 *Computer Security at Nuclear Facilities* will be superseded and replaced by NST045 and NST047, respectively.

Mr Dudenhoeffer explained the difference between two terminologies:

- The term ‘sensitive information assets’ is defined in NSS No. 20 *Objective and Essential Elements of a State’s Nuclear Security Regime* as any equipment or components that are used to store, process, control or transmit sensitive information.
- The term ‘sensitive digital assets’ is used in NST045 to identify those sensitive information assets that are computer-based and need computer security measures for their protection.

A total of 481 comments were received from 13 Member States, of which 393 were accepted in full or with modifications. Mr Dudenhoeffer explained the basis on which comments were rejected.

Prior to the meeting, another 115 comments have been submitted by members of NSGC and Safety Standards Committees, specifically from France, Germany, Russian Federation and IEC. The majority of comments addressed terminology issues and clarification of concepts. 95 comments were accepted in full or with modifications. Rejected comments consisted mainly of terminology/concepts that were previously defined in higher level or other NSS documents.

There were no questions or comments on the presentation. RASSC and WASSC cleared the draft for publication.

**Action:** The Secretariat to submit the draft Implementing Guide *Computer Security for Nuclear Security* (NST045) for publication.

**RW.6.2 NST 051 Draft Implementing Guide: Security during the Lifetime of a Nuclear Facility**

Mr Douglas Shull (NSNS) introduced the draft implementing guide *Security during the Lifetime of a Nuclear Facility* (NST051). The DPP was approved in November 2014 and the document has been developed through a series of seven Consultants’ Meetings and one Technical Meeting.

The document is intended to be applicable to all nuclear facilities, including NPPs, and covers all phases in the facility lifetime from concept to decommissioning. Concepts and guidance developed may also be used to apply to other facility types, such as those using radioactive materials. The target audience is governments, competent authorities and operators.

During the period of 120-day review, a total of 275 comments were received from nine Member States. Of these, 214 were accepted and 61 were rejected. The main reasons for rejection of comments were conflict with other NSS documents, detail that was considered unnecessary or not applicable to this document, and duplication of text already included in other sections.

Subsequently 11 comments were received from RASSC. These were all accepted, either as proposed or in modified form. All were of an editorial nature. A further nine editorial comments from EPreSC were also accepted. No comments were submitted by WASSC.

There were no further questions or comments and RASSC and WASSC cleared the draft for publication.

**Action:** The Secretariat to submit the draft Implementing Guide *Security during the Lifetime of a Nuclear Facility* (NST051) for publication.
RW.7 CLOSING OF THE MEETING

RW.7.1 Conclusion of the Joint Session

Mr Massera and Mr Williams thanked the members and observers of both Committees for their active participation in the meeting and for their valuable contribution to the discussions.

RW.7.2 Closing

The joint RASSC/WASSC session was closed by the Chairs, Mr Massera and Mr Williams.
### ANNEX I.
LIST OF ACTIONS ARISING FROM THE 44TH WASSC MEETING

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<tbody>
<tr>
<td><strong>W 4.1</strong></td>
<td>The Secretariat to submit the DPP for the draft Safety Guide <em>Borehole Disposal Facilities for Radioactive Waste</em> (DS512) to the CSS for endorsement.</td>
</tr>
<tr>
<td><strong>W 6.1</strong></td>
<td>The Secretariat to include the WASSC Self-Assessment Report as an Annex in the WASSC Four Year Report 2014 – 2017.</td>
</tr>
<tr>
<td><strong>W 6.2</strong></td>
<td>The Secretariat to finalize the WASSC Four Year Report 2014 – 2017 and to post it on the WASSC-44 web page.</td>
</tr>
<tr>
<td><strong>RW 3.1</strong></td>
<td>Subject to agreement on a revised text for para. 2.174, the Secretariat to submit the draft Safety Guide <em>Radiation Safety of X-Ray Generators and Other Radiation Sources Used for Inspection Purposes and for Non-Medical Human Imaging</em> (DS471) to the CSS for endorsement.</td>
</tr>
<tr>
<td><strong>RW 3.2</strong></td>
<td>The Secretariat to submit the draft Safety Guide <em>The Management System for the Predisposal and Disposal of Radioactive Waste</em> (DS477) to Member States for comment.</td>
</tr>
<tr>
<td><strong>RW 3.3</strong></td>
<td>The Secretariat to submit the draft Safety Guide <em>Format and Content of the Safety Analysis Report for Nuclear Power Plants</em> (DS449) to the CSS for endorsement.</td>
</tr>
<tr>
<td><strong>RW 3.4</strong></td>
<td>The Secretariat to submit the draft Safety Guide <em>Deterministic Safety Analysis for Nuclear Power Plants</em> (DS491) to the CSS for endorsement.</td>
</tr>
<tr>
<td><strong>RW 5.1</strong></td>
<td>The Secretariat to submit the DPP for the revision by amendment of the 8 inter-related Safety Guides NS-G-4.1 to NS-G-4.6, SSG-10 and SSG-37 (DS509) to the CSS for endorsement.</td>
</tr>
<tr>
<td><strong>RW 5.2</strong></td>
<td>The Secretariat to submit the DPP for the revision by amendment of the Safety Guides SSG-20 and SSG-24 (DS510) to the CSS for endorsement.</td>
</tr>
<tr>
<td><strong>RW 5.3</strong></td>
<td>The Secretariat to submit the DPP for the revision by amendment of the Safety Guide SSG-22 <em>Use of a Graded Approach in the Application of the Safety Requirements for Research Reactors</em> (DS511) to the CSS for endorsement.</td>
</tr>
<tr>
<td><strong>RW 6.1</strong></td>
<td>The Secretariat to submit the draft Implementing Guide <em>Computer Security for Nuclear Security</em> (NST045) for publication.</td>
</tr>
<tr>
<td><strong>RW 6.2</strong></td>
<td>The Secretariat to submit the draft Implementing Guide <em>Security during the Lifetime of a Nuclear Facility</em> (NST051) for publication.</td>
</tr>
</tbody>
</table>
## Agenda of the WASSC ALONE Session

### 44th Meeting of the Waste Safety Standards Committee (WASSC)

**Monday, 13 November 2017, 14:00 – 17:30**  
**Wednesday, 15 November 2017, 9:00 – 17:30**  
**Thursday, 16 November 2017, 9:00 – 12:30**

**VIC, Meeting Room M5, M Building, Ground Floor**

<table>
<thead>
<tr>
<th>W 1</th>
<th>General Issues</th>
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<tbody>
<tr>
<td><strong>W 1.1</strong> Opening of the Meeting</td>
<td>Mr A. Orrell, WES Section Head</td>
</tr>
<tr>
<td><strong>W 1.2</strong> Chairman’s Introduction</td>
<td>Mr G. Williams</td>
</tr>
<tr>
<td><strong>W 1.3</strong> Adoption of the Agenda</td>
<td>For approval Mr G. Williams</td>
</tr>
<tr>
<td><strong>W 1.4</strong> Administrative Arrangements</td>
<td>Ms S. Geupel</td>
</tr>
<tr>
<td><strong>W 1.5</strong> Reports from the 42nd and 43rd WASSC meeting</td>
<td>For approval Mr G. Williams / Ms S. Geupel</td>
</tr>
<tr>
<td><strong>W 1.6</strong> Status of actions arisen from the 43rd WASSC meeting</td>
<td>For information Ms S. Geupel</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>W 2</th>
<th>General Safety Standards Issues</th>
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</thead>
<tbody>
<tr>
<td><strong>W 2.1</strong> Update on the Status of the NSS-OUI Platform (Nuclear Safety and Security Online User Interface)</td>
<td>For information Mr D. Delattre</td>
</tr>
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<thead>
<tr>
<th>W 3</th>
<th>Review of IAEA Safety Standards</th>
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<tbody>
<tr>
<td><strong>W 3.1</strong> Waste Safety Standards – Status and future steps</td>
<td>For information Ms S. Geupel</td>
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<thead>
<tr>
<th>W 4</th>
<th>Review of Document Preparation Profiles (DPPs) for IAEA Safety Standards</th>
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<tbody>
<tr>
<td><strong>W 4.1</strong> DPP DS512 Draft Safety Guide: Borehole Disposal Facilities for Radioactive Waste (Revision of SSG-1) (also for NSGC)</td>
<td>For approval for submission to CSS Mr D. Bennett</td>
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</table>
### Documents for Information / Discussion

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<thead>
<tr>
<th>W 5</th>
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<tbody>
<tr>
<td><strong>W 5.1</strong></td>
<td>A Safety Guide on Policy and Strategy for the Safety of Radioactive Waste and Spent Fuel Management, Decommissioning, and Environmental Remediation</td>
<td>For information and discussion</td>
</tr>
<tr>
<td><strong>W 5.2</strong></td>
<td>DS489 Draft Safety Guide: Draft Safety Guide: Storage of Spent Nuclear Fuel (Revision of SSG-15 by Amendment) – Review of Member States’ Comments</td>
<td>For information and discussion</td>
</tr>
<tr>
<td><strong>W 5.3</strong></td>
<td>DS459 Draft Safety Guide: Management of Radioactive Residues from Uranium Production and Other NORM Activities (Revision of WS-G-1.2) – Update on the Status and Issues for Discussion</td>
<td>For information and discussion</td>
</tr>
<tr>
<td><strong>W 5.4</strong></td>
<td>DS505 Draft Safety Guide: Source Monitoring, Environmental Monitoring and Individual Monitoring for Protection of the Public and the Environment – Information on plans how to revise RS-G-1.8</td>
<td>For information and discussion</td>
</tr>
<tr>
<td><strong>W 5.5</strong></td>
<td>DPP DS513 Draft Safety Guide: Leadership, Management and Culture for Safety (Revision and combination of GS-G-3.1 and GS-G-3.5) (also for NUSSC)</td>
<td>For information</td>
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### Strategic Issues

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<tr>
<th>W 6</th>
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<tr>
<td><strong>W 6.1</strong></td>
<td>Self-Assessment of WASSC against the Terms of Reference for the Safety Standards Committees</td>
<td>For information and discussion</td>
</tr>
<tr>
<td><strong>W 6.2</strong></td>
<td>WASSC Four Year Report 2014–2017 and Priority issues for the next term</td>
<td>For information and discussion</td>
</tr>
<tr>
<td><strong>W 6.3</strong></td>
<td>Information on the next term of Safety Standards Committees</td>
<td>For information</td>
</tr>
<tr>
<td><strong>W 6.4</strong></td>
<td>Perspectives on the Entombment Option for Decommissioning</td>
<td>For information and discussion</td>
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### Reports from WASSC Members and International Organizations

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<th>W 7</th>
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<tbody>
<tr>
<td><strong>W 7.1</strong></td>
<td>Feedback from Mexico</td>
<td>For information</td>
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<tr>
<td><strong>W 7.2</strong></td>
<td>Feedback from Switzerland</td>
<td>For information</td>
</tr>
</tbody>
</table>
W 7.3 Feedback from the Ukraine  For information  Mr V. Berkovskyy
W 7.4 Recent Activities of the OECD/NEA  For information  Mr V. Lebedev

W 8  Status and Feedback Reports by the Secretariat

W 8.1 Progress report on ARTEMIS – Integrated Review Service for Radioactive Waste and Spent Fuel Management, Decommissioning and Remediation Programmes  For information  Ms M. Skrzeczkowska
W 8.2 Update on the Joint Convention  For information  Ms S. Geupel
W 8.3 New IAEA Initiatives/Projects within the Radioactive Waste and Spent Fuel Management Unit  For information  Ms A. Zavazanova

W 9  Closing of the Meeting

W 9.1 Any other business  Ms S. Geupel / Mr G. Williams
W 9.2 Dates of future meetings  Mr G. Williams
  WASSC-45: 2–6 July 2018
  WASSC-46: 19–22 November 2018
W 9.3 Conclusions of the 44th WASSC meeting  Mr G. Williams
W 9.4 Closure  Mr A. Orrell

| EPResc 6 | 11 – 14 June 2018 |
| EPResc 7 | 19 – 22 November 2018 |
| NSGC 12 | 27 November – 1 December 2017 |
| NSGC 13 | 11 – 14 June 2018 |
| NUSSC 44 | 27 November – 1 December 2017 |
| NUSSC 45 | 25 – 29 June 2018 |
| NUSSC 46 | 26 – 30 November 2018 |
| RASSC 44 | 4 – 8 June 2018 |
| RASSC 45 | 29 October – 1 November 2018 |
| TRANSSC 35 | 11 – 15 December 2017 |
| TRANSSC 36 | 4 – 8 June 2018 |
| WASSC 45 | 2 – 6 July 2018 |
| WASSC 46 | 19 – 22 November 2018 |
## ANNEX III.

**AGENDA OF THE JOINT RASSC/WASSC SESSION**

**Tuesday, 14 November 2017, 9:00 – 17:30**

**VIC, Meeting Room M2, M Building, Second Floor**

<table>
<thead>
<tr>
<th>RW 1</th>
<th>Opening of the Meeting</th>
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<tbody>
<tr>
<td>RW 1.1</td>
<td>Opening of the Joint Session</td>
</tr>
<tr>
<td>RW 1.2</td>
<td>Chairmen’s Introduction</td>
</tr>
<tr>
<td>RW 1.3</td>
<td>Adoption of the Agenda</td>
</tr>
<tr>
<td>RW 1.4</td>
<td>Administrative Arrangements</td>
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<table>
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<tr>
<th>RW 2</th>
<th>General Safety Standards Issues</th>
</tr>
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<tbody>
<tr>
<td>RW 2.1</td>
<td>Report of the Meetings of the Chairs and of the Commission on Safety Standards</td>
</tr>
<tr>
<td>RW 2.2</td>
<td>CSS Opinion regarding the UNSCEAR Report “Attributing Health Effects to Ionizing Radiation Exposure and Inferring Risks”</td>
</tr>
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<table>
<thead>
<tr>
<th>RW 3</th>
<th>IAEA Safety Standards for Approval</th>
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<tbody>
<tr>
<td>RW 3.1</td>
<td><strong>DS471</strong> Draft Safety Guide: Radiation Safety of X-Ray Generators and Other Radiation Sources Used for Inspection Purposes and for Non-Medical Human Imaging (also for EPReSC, TRANSSC and NSGC)</td>
</tr>
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<td>RW 3.2</td>
<td><strong>DS477</strong> Draft Safety Guide: The Management System for the Predisposal and Disposal of Radioactive Waste (Revision and combination of GS-G-3.3 and GS-G-3.4) (also for NUSSC, TRANSSC and NSGC)</td>
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<td>RW 3.3</td>
<td><strong>DS449</strong> Draft Safety Guide: Format and Content of the Safety Analysis Report for Nuclear Power Plants (Revision of GS-G-4.1) (also for NUSSC, EPReSC and NSGC)</td>
</tr>
<tr>
<td>RW 3.4</td>
<td><strong>DS491</strong> Draft Safety Guide: Deterministic Safety Analysis for Nuclear Power Plants (Revision of SSG-2) (also for NUSSC and EPreSC)</td>
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| RW 4 | **Other Safety Standards Issues** |
| RW 4.1 | Radiation Protection: Optimization vs Minimization of Doses | For discussion | B. Lorenz |
| RW 4.2 | **DS468** Draft Safety Guide: Remediation Process for Areas Affected by Past Activities and Accidents (Revision of WS-G-3.1) – Review of Member States’ Comments | For discussion | T. Yankovich |

| RW 5 | **DPPs for Approval** |
| RW 5.1 | **DPP DS509** Draft Safety Guide: Revision by amendment of 8 Specific Safety Guides on Research Reactors (NS-G-4.1 to NS-G-4.6, SSG-10 and SSG-37) (for all SSCs and NSGC) | For approval for submission to CSS | Mr D. Sears |
| RW 5.2 | **DPP DS510** Draft Safety Guide: Revision of 2 interrelated Specific Safety Guides on Research Reactors (SSG-20 and SSG-24) (for all SSCs and NSGC) | For approval for submission to CSS | Mr W. Kennedy |
| RW 5.3 | **DPP DS511** Draft Safety Guide: Use of a Graded Approach in the Application of the Safety Requirements for Research Reactors (Revision of SSG-22) (also for NUSSC, TRANSSC and NSGC) | For approval for submission to CSS | Mr A. Shokr |

<p>| RW 6 | <strong>Nuclear Security Series Documents for Clearance</strong> |
| RW 6.1 | <strong>NST 045</strong> Draft Implementing Guide: Computer Security for Nuclear Security (for all SSCs and NSGC) | For publication | Mr D. Dudenhoeffer |
| RW 6.2 | <strong>NST 051</strong> Draft Implementing Guide: Security during the Lifetime of a Nuclear Facility (for all SSCs and NSGC) | For publication | Mr D. Shull |</p>
<table>
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<tr>
<th>RW 7</th>
<th>Closing of the Meeting</th>
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<tbody>
<tr>
<td>RW 7.1</td>
<td>Conclusions of the Joint Session</td>
</tr>
<tr>
<td>RW 7.2</td>
<td>Closing</td>
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**Tuesday, 14 November 2017, at 18:00**

Reception for participants of the RASSC / WASSC Joint Session  
(VIC Restaurant, Mozart Room)
ANNEX IV.
LIST OF PARTICIPANTS

Radiation Safety Standards Committee (RASSC)

Argentina
Mr Gustavo Massera
CHAIR

Australia
Mr Alex Kalaiziovski
(Alternate)

Belgium
Mr Lodewijk Van Bladel

Brazil
Mr Ricardo Gutterres

Czech Republic
Ms Karla Petrova

Egypt
Mr Mohammed Ezz El Din

Finland
Ms Ritva Bly

France
Mr Jean-Luc Godet

Germany
Mr Axel Boettger

Hungary
Mr Arpad Vincze

Indonesia
Mr Yus Rusdian Ahmad

Ireland
Mr David Fenton

Israel
Mr Jean Koch

Japan
Mr Hidenor Yonehara
(Alternate)

Korea, Republic of
Mr Jai Kwong Chang

Lithuania
Mr Albinas Mastauskas

Netherlands
Ms Miriam Tijmans

Norway
Mr Sindre Overgaard

Pakistan
Ms Ameena Bano

Poland
Mr Szymon Kawa
(Alternate)

Russian Federation
Mr Sergey Mikheenko

Slovakia
Mr Vladimir Jurina

South Africa
Mr John Pule

Spain
Ms Carmen Álvarez García

Sweden
Ms Ann-Christin Haegg

Switzerland
Mr Andreas Leupin

United Kingdom
Ms Susan McCready-Shea
(Alternate)

United States of America
Mr Daniel Collins

Advisors

France
Mr Jean-Francois Lecomte

Germany
Ms Annemarie Schmitt-Hannig

Japan
Mr Hori Akio

Japan
Mr Isao Kawaguchi

Japan
Mr Fujita Kenichi

Korea, Republic of
Mr Min-Chul Song

Korea, Republic of
Ms Ki-Won Jang

Russian Federation
Mr Anton Kuryndin

United States of America
Ms Cindy Flannery
**United Nations Organizations**

<table>
<thead>
<tr>
<th>Organization</th>
<th>Representative</th>
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<tbody>
<tr>
<td>FAO</td>
<td>Mr Carl Blackburn</td>
</tr>
<tr>
<td>ILO</td>
<td>Mr Shengli Niu</td>
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<tr>
<td>ILO</td>
<td>Mr Michael Gaunt</td>
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<tr>
<td>PAHO</td>
<td>Mr Pablo Jimenez</td>
</tr>
<tr>
<td>UNSCEAR</td>
<td>Mr Ferid Shannoun</td>
</tr>
<tr>
<td>WHO</td>
<td>Ms Maria Perez</td>
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**International Organizations**

<table>
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<tr>
<th>Organization</th>
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<tbody>
<tr>
<td>EC</td>
<td>Mr Stefan Mundigl</td>
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<tr>
<td>ISO</td>
<td>Mr Yann Billarand</td>
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<td>OECD/NEA</td>
<td>Mr Eduard Lazo</td>
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**Other Organizations**

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<th>Organization</th>
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<tbody>
<tr>
<td>ENISS</td>
<td>Mr Bernd Lorenz</td>
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<tr>
<td>HERCA</td>
<td>Ms Karla Petrova</td>
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<td>ICRP</td>
<td>Mr Chris Clement</td>
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<td>IRPA</td>
<td>Mr Roger Coates</td>
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<td>ISSPA</td>
<td>Mr Wolfgang Fasten</td>
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<td>WNA</td>
<td>Ms Binika Shah</td>
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**Waste Safety Standards Committee (WASSC)**

<table>
<thead>
<tr>
<th>Country</th>
<th>Representative</th>
<th>Role</th>
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<tbody>
<tr>
<td>Australia</td>
<td>Mr Geoff Williams</td>
<td>CHAIR</td>
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<tr>
<td>Belgium</td>
<td>Mr Walter Blommaert</td>
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<tr>
<td>Brazil</td>
<td>Mr Marco Aurélio Leal</td>
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<tr>
<td>China</td>
<td>Mr Guoan Ye</td>
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<td>Czech Republic</td>
<td>Mr Peter Lietava</td>
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<td>Denmark</td>
<td>Mr David Ulfbeck</td>
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<td>Egypt</td>
<td>Mr Yasser Selim</td>
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<td>Finland</td>
<td>Mr Jaako Leino</td>
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<td>Hungary</td>
<td>Mr Istvan Lazar</td>
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<tr>
<td>Iran, Islamic Republic of</td>
<td>Mr Hossein Sadeghloo</td>
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<td>Israel</td>
<td>Mr Roni Hakmon</td>
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<td>Italy</td>
<td>Mr Mario Dionisi</td>
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<td>Korea, Republic of</td>
<td>Mr Hyeong Ki Shin</td>
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<td>Lithuania</td>
<td>Mr Vidas Paulikas</td>
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<td>Mexico</td>
<td>Mr Roberto Alejandro Suárez Alvarado</td>
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<td>Norway</td>
<td>Mr Ronny Lystad</td>
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<td>Poland</td>
<td>Ms Barbara Zielinska</td>
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<td>Russian Federation</td>
<td>Mr Andrei Sobolev</td>
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<tr>
<td>South Africa</td>
<td>Ms Vanessa Maree</td>
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<tr>
<td>Spain</td>
<td>Ms Julia López de la Higuera</td>
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<td>Sweden</td>
<td>Mr Bengt Hedberg</td>
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<td>Switzerland</td>
<td>Mr Olivier Beffort</td>
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<tr>
<td>Ukraine</td>
<td>Mr Volodymyr Berkovskyy</td>
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<tr>
<td>United Kingdom</td>
<td>Ms Denise Varley</td>
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<td>United States of America</td>
<td>Mr John Tappert</td>
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**Alternates/Advisors**

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<tr>
<th>Region</th>
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<tr>
<td>Bulgaria</td>
<td>Mr Nikolay Grozev</td>
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<tr>
<td>Canada</td>
<td>Ms Shirley Oue</td>
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<tr>
<td>China</td>
<td>Mr Xinhua Liu</td>
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<td>China</td>
<td>Mr Qiaoze Zhang</td>
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<tr>
<td>France</td>
<td>Mr Christophe Serres</td>
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<tr>
<td>Germany</td>
<td>Mr Markus Archinger</td>
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<td>Germany</td>
<td>Mr Kai Möller</td>
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<td>Germany</td>
<td>Mr Lars Schnelzer</td>
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<tr>
<td>India</td>
<td>Mr Darshit Mehta</td>
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<tr>
<td>Japan</td>
<td>Mr Yuji Goto</td>
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<tr>
<td>Japan</td>
<td>Mr Tatsuya Kijima</td>
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<tr>
<td>Japan</td>
<td>Mr Hirokazu Tachikawa</td>
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<tr>
<td>Japan</td>
<td>Mr Taiki Yoshii</td>
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<tr>
<td>United States of America</td>
<td>Mr Rateb Abu-Eid</td>
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