Joint Meeting of the
38th Nuclear Safety Standards Committee
37th Radiation Safety Standards Committee / 38th Waste Safety Standards Committee

26-27 November 2014

Agenda Item NRW 6.7
DS448 Predisposal Management of Radioactive Waste from Nuclear Reactors (Safety Guide)

Monika Kinker, WES/NSRW
Preparation History

- DPP Approved by October 2010 CSS
- 2011 – 2013 document under development
- 3Q 2013 approved by SSCs for submittal to MS
- Posted for MS comments (Dec 2013) 366 MS comments
- CS held in June 2014
  - Expert from South Africa
- CS held in July 2014
  - Experts from Canada, Germany, United Kingdom, USA)
  - Focus on General vs Facility–Specific Safety Provisions
- Posted for Committee Comments (Oct 2014) (WASSC, RASSC, NUSSC, NSGC) 145 SSC comments
Objectives & Scope

**Objective:** Provide operators, regulators & government bodies with recommendations on predisposal management of RW at nuclear power plants (NPPs) and nuclear research reactors, taking into consideration of general safety matters applicable to all facilities, including need for holistic and optimized RWM programmes

**Scope:**

- Predisposal management of RW at nuclear power plants and research reactors, from generation to (but not including) disposal
- All waste types (EW, VSLW,…, HLW)
- All steps (generation, pretreatment, treatment, conditioning, storage, transport)
- All facility lifecycle phases (siting, design, construction, commissioning, operation, shutdown, and decommissioning)
Current Structure

1. Introduction
2. Protection of Human Health & Environment
3. Roles & Responsibilities
4. Integrated Approach to Safety
5. Safety Case & Safety Assessment
6. General Safety Considerations

Appendices
1. Key Properties & Characteristics of Waste Packages & Spent Nuclear Fuel Declared as Waste
2. Facility-Specific RWM Programme
3. Examples of Hazards Associated with RWM Activities at Nuclear Reactors

Annexes
1. Example of a Generic RWM System in a Nuclear Reactor
2. Example of RWM System of a Pressurized Water Reactor (Partial Flow Condensate Polishing)
3. Example of a RWM System of a Pressurized Water Reactor (Full Flow Condensate Polishing)
Preparation

- DPP Approved by October 2010 CSS
- 2011 – 2013 document under development
- 3Q 2013 approved by SSCs for submittal to MS (comments due Dec 2013)
  - 373 MS comments
- Consultancies held in June, July 2014
  - Experts from Canada, Germany, United Kingdom, USA
  - Focus on General vs Facility–specific Safety Provisions
- Posted for Committee Comments
  (NSGC, **WASSC**, RASSC, NUSSC)
  - 145 SSC comments
Member State Comments
MS Comments on DS448

- 373 Comments from 16 Countries, ENISS

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IAEA
Resolution of MS Comments: General

• General Comment:
  • DS447 and DS448 should be merged into a single Safety Guide. If IAEA chooses to retain 2 separate guides, a check for consistency and completeness between DS447 and DS448 is needed.

• General Comment:
  • The stated objectives, scope & guidance are appropriate, are adequately and are expressed clearly and coherently.

• Resolution:
  • Document reviewed for consistency in discussions on general safety provisions (Ch’s 2,3,4); Chapter 6 reviewed for completeness and facility-specific guidance
Resolution of MS Comments: General

• General Comment (Bel):
  • Attention should be paid to the fact that some definitions given in GSR Part 3 and 5 are slightly different from the Glossaries (and are prevailing on those mentioned in the IAEA Glossaries).

• Resolution:
  • DS448 provides guidance on application of GSR Parts 5 and 3, these terms take precedence over Safety Glossary (which generally refers to SS’s)
    • Examples: waste acceptance criteria; waste generator vs waste management organization
    • Ch 1 “The operating organization is the generator of radioactive waste and includes inter alia, operators of facilities for the predisposal management of radioactive waste, & organizations carrying out decommissioning activities [GSR Part 5].”
Resolution of MS Comments: Categorization of spent ion exchange resins

Comment (Jap, Ger):

With regard to the categorization of spent ion exchange resins, there are several inconsistencies in this document.

• Paras 6.12 & 6.15, resins are considered as typical source of solid waste generated during the operation of a nuclear reactor.
• Para 6.48, however, states that spent ion exchange resins are usually flushed out as slurry and subsequently managed as liquid waste.
• Para 6.72 recommends provisions for storing spent ion exchange resins as a measure to be considered in the design for the management of solid waste.

Per TECDOC-1504* “Innovative waste treatment and conditioning technologies at NPPs” (2006) and TECDOC-1579* “New developments and improvements in processing of ‘problematic’ RW” (2007), spent ion exchange resins are managed as liquid (wet) waste.
Resolution of MS Comments: Categorization of spent ion exchange resins

Proposal: Spent ion exchange resins added to lists of typical solid and liquid waste, additional texts added for clarification:

“6.50 Spent ion exchange resins are usually flushed out as slurry and subsequently managed as liquid waste until the resin can be separated from the carrier liquid, although some operators retain the resins as a dry solid. ”

“Footnote 7: Although ion exchange resins are in fact solids, they are managed along with the carrier liquid as liquid waste in most applications. Resins are eventually separated from the carrier liquid during treatment and conditioning.”

*TECDOCs added as References
“Siting and Design

6.77 “The design of the reactor and the associated waste management facility of heat generating waste should incorporate systems (e.g. a system for monitoring and controlling the temperature) that are capable of maintaining the temperature of the waste within acceptable limits in all stages of predisposal management of radioactive waste, both in operational states (i.e. normal operation and anticipated operational occurrences) and under accident conditions (i.e. design basis accidents and design extension conditions).”

Specific Comment ACCEPTED
General Comment shared w WASSC
Safety Committee Comments
(WASSC, RASSC, NUSSC, NSGC)
## Comments from NSGC, WASSC, NUSSC, RASSC

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- 85% Accepted
- 13% Accepted with modification
- 2% Rejected
Safety Committee Comments
(WASSC, RASSC, NUSSC, NSGC)
2 Comments received from 1 MS (France)

1 General comment on DS447 and DS448:
• Req’s 5, 21 of GSR Part 5 are in fact security recommendations. In consistency with the IAEA definitions of the NSS and SS they belong to the Nuclear Security Series instead of the SSs
  no change proposed

1 Specific comment:
• “4.03 …publications of the IAEA Nuclear Security Series [10, 11][11, 12].

NGSC agreed

...Request to add Ref. to Nuc Sec Fundamentals accepted
Safety Committee Comments
(WASSC, RASSC, NUSSC, NSGC)
Meeting of WASSC38

Topics for Discussion

- Resolution of MS Comments
  
  *WASSC agreed w resolution of MS Comments*

- Resolution of NSGC Comments

  *WASSC agreed w resolution of NSGC Comments*

- Resolution of SSC Comments

  *WASSC agreed w resolution of SSC Comments; unresolved issues to be addressed*
Resolution of SSC Comments

- Majority of comments were editorial in nature or for clarification; further improving the document
- General comments and comments which were rejected were discussed with the WASSC
- Open items were discussed with SSC representatives, resolutions proposed
General comments

- There is no need to separate DS448 and 447. Especially with the concept of graded approach.  
  no change proposed

- DS447 and DS448 should be checked for consistency in wording and completeness.  
  no (additional) change proposed

- To avoid some repetitions, specific recommendations related to waste that have no disposal available may be regrouped in a specific chapter SSs  
  no change proposed
General Comment

- It was very difficult to correlate comment resolution table to new text. For instance Canada comment 21 on previous par. 3.20 does not fit at all with new 3.20. Finland comment n.4 on 6.30 actually fits with new 6.32. ENISS comment n.17 on previous 6.82 that seems accepted cannot traced at all.

Response:

- Some changes have been superseded during harmonization of the documents

  no (additional) change proposed
Resolution of Comments: WASSC/NUSSC/RASSC

Comment (Jap NUSSC)

- **Title** should be changed to: Predisposal Management of Radioactive Waste from Nuclear Reactors-Power Plants

Reason

- Nuclear Reactors is ambiguous (sp). Be consisted with NPPs’ requirements such as SSR-2/1 and 2/2
- In addition to this, the scope is described focused (sp) on NPPs
Response

- While the term “nuclear reactor” is not defined in the Safety Glossary, the term is generally understood to include NPPs and RRs.
- The DPP and SG (title, objective and scope) clearly state that the focus of the SG is on NPPs and Research Reactors (RRs).
- While many (general, step/lifecycle) safety provisions applicable to other types of reactors, the SG was not intended to address transportable reactors (e.g. ships, icebreakers, submarines, “space machines”).
- Recalling the NUSSC28 decision to put on hold DS435 DPP Safety of Small and Medium, Transportable and Floating NPPs (2009)

No change proposed
Resolution of Comments: WASSC/NUSSC/RASSC

General Comments (Ger, US)

- The current version of DS448, which has been improved considerably compared with the previous version, represents a major step towards the completion of the Safety Guide. Nevertheless, there still remains a need for further improvements.

- DS448 current version has been improved substantially from the previous draft revision. Apparently, it has been harmonized with DS447 with minimization of overlaps and redundancies as practicable. In addition, the illustrative figures and flow diagrams presented in Appendix 4 are quite helpful to understand sources of waste generation and generic waste treatment processes.
Comment:
• Add some explanation of “thermal treatment” elsewhere.

Proposal:
• Added Para 6.32, referring to IAEA-TECDOC-1527. Elsewhere, replaced “thermal treatment” with “incineration”
• Although various thermal treatment techniques exist, incineration is the most commonly used

Comment:
• Specificity of spent sealed sources predisposal management should be identified.

Response:
• Disused/spent SRS are not typical sources of RW generated by NPPs/RRs. Spent SRS from radiological facilities dealt with in Radiation SSs (RS-G-1.10, DS434). WS-G-2.7 (DS454) addresses management of spent/disused SRS generated at research facilities
Resolution of Comments: WASSC/NUSSC/RASSC

Proposal: Add text to Para 6. (Conditioning) Spent sealed sources

Spent sealed sources

6.69 Spent or disused sealed sources can involve potentially serious hazards and should be segregated from other waste. Spent or disused sealed sources should not be subjected to compaction, shredding or incineration.

6.70 As a general principle, spent or disused sealed sources should not be removed from their primary containers, nor should the container be physically modified. Spent and disused sealed sources should be kept in their shielding. When the shielding is contaminated, it should be decontaminated or overpackaged to avoid the further dispersal of contamination.

6.71 Special attention should be given to the handling and storage, as well as the monitoring of surface and airborne contamination of spent or disused sealed sources with a potential for leakage.

6.72 Spent or disused sealed radioactive sources should be conditioned, unless the half-life of radionuclides contained in them is short enough to enable removal from regulatory control in a reasonably short period (for example two to three years).
Resolution of Comments: WASSC/NUSSC/RASSC

Comment:

• It is proposed to ensure consistence between paras. 1.1, 1.15, 6.13, 6.16, App.3 concerning the consideration of SNF declared as RW.

Response:

• SNF management in the SNF pool is addressed in NS-G-1.4 (NPP) (and subsequent revision) and NS-G-4.3 (Research Reactor)
• SNF dry storage is addressed in SSG-15

Proposal:

• 1.15: “This Safety Guide is not specifically intended to cover the management of SNF as long as it remains a part of the operational activities of a NPP or research reactor. Management of SNF in facilities that are collocated with a NPP or research reactor is addressed in Safety Guide SSG-15 [8] and NS-G-1.4, Design of Fuel Handling and Storage Systems in Nuclear Power Plants [33] and NS-G-4.3, Core Management and Fuel Handling for Research Reactors [34].”
Comment:
Ensure coherency w DS452 (Decommissioning of Nuclear Facilities, except Facilities using NORM and Medical, Industrial, Research and Disposal Facilities) in relation to discussion on public involvement

Response:

DS448

“3.12 The government should consult interested parties (i.e. those who are involved in or are affected by radioactive waste management activities) on matters relating to the development of national policies and strategies that affect the management of radioactive waste, and should take due account of the concerns of the public. Communication with and involvement of the public is very important for decision making.”

“3.22 The responsibilities of the operating organization of a radioactive waste management facility typically include:…communicating with relevant interested parties and the general public;”
Resolution of Comments: WASSC/NUSSC/RASSC

DS452 (*suggested changes for DS448 in redline/strikeout*)

**Sec. 7 Planning of Decommissioning During Lifetime of Installation**

**Sec. 3 Responsibilities (RB, Operator, Public Involvement) OR Public Involvement**

7.45. According to national requirements, interested parties may be involved in the licensing process for decommissioning, as well as in the process for termination of decommissioning license by providing comments before decisions are taken by the RB and prior to granting or terminating a decommissioning license.

7.46. Experience shows that interested parties focus their attention mainly on the selected RW management decommissioning strategy and its justification, the nature and extent of planned disposal, dismantling works, the management and long term storage of RW on-site, the facility installation end state, especially in the case of restricted reuse, and on the socio-economic impacts.
Resolution of Comments: WASSC/NUSSC/RASSC

7.47. Public inquiries or consultations should be organized by the RB with participation of the licensee to provide to the interested parties an opportunity to give comments on the RWM strategy final decommissioning plan and appropriate supporting documents, in accordance with national regulations. These inquiries should be held primarily with the local communities from the area of the facility nuclear installation to be decommissioned. It is considered a good practice if the licensee establishes and supports public outreach programmes, independent of the RB, to provide opportunities for community involvement and enhancing public understanding and trust of the RW management decommissioning approach and process.

7.48. The results of the public inquiries and consultations of interested parties should be made public to show how the comments have been addressed by the RB during the licensing process for decommissioning, if and when applicable.
Technical Editing

• DS448 should refer to DS447, and indicate that it supersedes NS-G-2.7 (SG: RP & RWM in the Operation of NPPs, 2002)
• WA criteria vs. requirements (keeping in mind comments on situation where no disposal facility exists)
• Review with relevant Secretariat to ensure consistency with SS’s under development or that have been since approved (GSR Part 3, GSR Part 6, DS442 rev. to WS-G-2.3)
• Appendices (USNRC) would be better as annexes, as they provide examples from a particular MS
• Outstanding small editorial issues fixed during pub.
Next Step

• SG for clearance for submission to Commission on Safety Standards for approval for publication