

**Draft Safety Guide: (DS546) Ageing Management and Maintenance of Packages for the Transport of Radioactive Material**  
**STEP 11 Second review of draft by review Committees**

COMMENTS BY REVIEWERS Iran-TRANSSC, Japan-TRANSSC, WNTI-TRANSSC, China-RASSC, South Africa-NUSSC				RESOLUTION			
Comment Nr.	Para /Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
SA-S11-1 (NUSSC)	general	no comment	MS comments seem to have been adequately addressed. Quality is good enough.	x			Thank you, much appreciated.
WNTI -S11-2 (TRANSSC)	1.6	1.6. This Safety Guide covers all packages containing radioactive material (i.e. excepted packages, Type IP-1, Type IP-2 and Type IP-3 <del>packages</del> , Type A packages, Type B(U) and Type B(M) packages, and Type C packages, including packages containing fissile material or uranium hexafluoride (UF <sub>6</sub> )), as defined in the Transport Regulations.	In accordance with para. 231 in SSR-6, and with the editing used throughout SSR-6, "packages" is not needed after Type IP-3.	x			
Iran-S11-1 (TRANSSC)	2.1/3	The effects of ageing mechanisms on packaging components, radioactive contents and package safety functions depend on the <u>environmental</u> and operational conditions to which they are exposed <u>during the service life of package</u>	Environmental & service life of package should be considered.			x	"environmental" conditions are already mentioned in the opening sentence of para 2.1. The service life in connection with graded approach is mentioned in the second sentence and it is considered that it covers the intentions of the comment.
WNTI -S11-3 (TRANSSC)	2.9 (d)	(d) Inspection and maintenance during storage should be such that they can be conducted on the loaded packagings. Where it is not possible to directly inspect and maintain the loaded packaging during storage (e.g. if the primary container of the package is enclosed within a shielded overpack or shielded vault during the storage period), alternative means should be used to assess ageing effects. (...).	A comma after the text between brackets would make the reading easier.	x			

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JPN-S11-1 (TRANSSC)	3.3	3.3. For some packages it might be appropriate for the package designer to define an expected service life in terms of number of years of use or number of shipments. <u>The expected service life may be updated based on the actual transport experiences and the results of the investigations and maintenance activities.</u>	As it is an option for the designer to define the service life based on the initially intended operational conditions, it is helpful to add the service life is updatable on the actual service conditions.			x	It is considered that the proposed concept will work for a design where there are limited number of packages, or they are with limited number of users. However, if multiple users in multiple countries are there, it is not clear how the feedback will work. Further as a consequence, with every revision of PSDR (with every design approval renewal) there might be new design life. It is considered that revised PSDR takes into account some of these factors already; and data generated after use of the package may be used in future designs.
WNTI -S11-4 (TRANSSC)	3.5 (a) (vii)	(vii) Storage configuration (e.g. <b>storage location</b> , vertical or horizontal position, on a concrete pad or a floor, storage frame).	It is important to consider the storage facility location (e.g. inland or costal site, temperature) for the ambient condition. It is recognized that the text between brackets is a list of examples and that does not need to be comprehensive. However, we think that the storage location is an important example. It is also recognized that the same kind of information is available in para. 3.5 (a) (i), but this paragraph applies only to empty packagings.		3.5 [...] (a) General external and internal conditions: (i) General conditions (e.g. humidity, temperature, chemical and biological factors) <b>at storage location and</b> during loading, shipment and unloading;		Comment was accepted and it was considered more suitable to capture storage facility location in general conditions in point (a) (i) rather than in configuration point (vii)  See also JPN-S11-02 (TRANSSC)

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JPN-S11-02 (TRANSSC)	3.5 (a) (vii)	Storage configuration (e.g. vertical or horizontal position, on a concrete pad or a floor, storage frame <u>or storage location</u> ,).	The storage location is also important for the ageing during storage (e.g. inland or coastal site, ambient temperature).		3.5 [...] (a) General external and internal conditions: (i) General conditions (e.g. humidity, temperature, chemical and biological factors) <b>at storage location and</b> during loading, shipment and unloading;		Comment was accepted and it was considered more suitable to capture storage facility location in general conditions in point (a) (i) rather than in storage configuration mentioned in point (vii)  See also WNTI -S11-4 (TRANSSC)
WNTI -S11-5 (TRANSSC)	3.6 (b) (i)	(i) Crevice corrosion: localized corrosion in joints, connections and other small, close-fitting regions that develop <b>in</b> local aggressive environments.	Clarification.			x	It is considered that the introduction of 'in' changes the meaning of the sentence. It is intended to indicate that this type of corrosion develops in aggressive environments localised in the components of the packaging, not that it is due to the packaging being located in an aggressive local environment.
Iran-S11-2 (TRANSSC)	3.6 (b) (vii)	<b>Add New bullet under 3.6 (b) as follows:</b> (vii). combined effects of ageing mechanisms	Para 3.6 (b) addresses individual mechanisms but lacks analysis of combined interactions (e.g., radiation + humidity + mechanical stress) that could accelerate ageing.  Example: Microbiologically influenced corrosion combined with mechanical stress may lead to sudden failure.			x	It is considered that the list in para 3.6 contains examples or relevant ageing mechanisms and the combination of any of those is implicit. Drafting new text, not linked with MS comments, is not foreseen in step 11 of SPESS process.

Comment Nr.	Para /Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
WNTI -S11-6 (TRANSSC)	3.6 (c)	(c) (...). Stress corrosion cracking is highly chemically specific; in that certain alloys are likely to undergo this type of corrosion only when exposed to certain chemical environments.	Replacing the comma by a semicolon would make the reading easier.		(c) (...). Stress corrosion cracking is highly chemically specific; in that certain alloys ...		Grammatical modification was introduced as a consequence of change to semicolon.
WNTI -S11-7 (TRANSSC)	3.6 (i)	(i) Radiolysis: a change in the material caused by the breaking of chemical bonds by irradiation. For example, when water is present in a package cavity, hydrogen <del>is</del> <b>may be</b> generated by radiolysis, which causes an internal pressure buildup in the package. Polymers might change in composition, due to the decomposition of crosslinks by irradiation.	Clarification.	x			
WNTI -S11-8 (TRANSSC)	3.9 (a) (b)	a) Components <del>important to</del> <b>relied on for</b> safety and necessary to fulfil one or more of the four safety functions of the package. (...). (b) Other components whose failure might prevent the components <del>important to</del> <b>relied on for</b> safety from fulfilling their intended functions.	Clarification. Consistency with the wording used in other parts of the draft, and also with para. 838(n)(ii) of the latest draft of SSR-6 (Rev. 2).	x			
WNTI -S11-9 (TRANSSC)	3.10	3.10. The materials of safety relevant components in a transport package should be listed to complete the scope setting process for ageing management described in para. 3.9. Materials used for components of <b>a</b> packaging might include the following [9]:	Editorial.	x			
JPN-S11-03 (TRANSSC)	4.3	The following blue text should be inserted at the beginning of section 4.3.  4.3. <b><u>A systematic approach is guided by adapting the Plan-Do-Check-Action (PDCA) cycle in line with section 3.1. Those are typically recommended for Nuclear Power Plants (SSG-48 [5]) and for transport and dual purpose casks [9].</u></b> The consideration of ageing .....	The section with the title of "APPROACHES TO AGEING MANAGEMENT FOR TRANSPORT PACKAGES" should have a guide for the principle way to approach. See also JPN-S11-13.			x	Section 4 of the guidance is aimed at all types of packages. This proposal seems to be specific to very complex packages, specifically dual purpose casks. It is considered not appropriate to make a reference to PDCA here, since it may produce some confusion. No comment from

							Member states was raised on this topic and drafting new text is not foreseen in step 11 of SPESS process.  <i>TO note: see also JPN-S11-11</i>
Comment Nr.	Para /Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
Iran-S11-3 (TRANSSC)	4.4/8	The evaluation of ageing should be based on the package design and its <u>environmental</u> and operational conditions <u>during service life</u> .	Add red words for Better and clear wording			x	Environmental conditions are already taken into account in the previous sentence (in para 4.3.). "During service life" is already used in the commented sentence. <i>TO note: the sentence commented is in para 4.3</i>
China-S11-1 (RASSC)	4.5 Table 1 (pg.13)	In the "Package design (package design safety report)" section of the table, for "Packagings intended to be used for a single transport," it stated that "Relevant ageing mechanisms in accordance with para. 613A of the Transport Regulations should be considered." This part needs to be clarified to avoid potential conflict with the description in Para. 2.5.	Para 2.5 mentioned that "The effect of the ageing mechanisms does not normally need to be considered because the duration of a single transport is relatively short (i.e. one year or less)." This differed from the description in the table.		Relevant ageing effects should be considered in the design (see paras 2.2 and 2.5)		It was considered that the table 1 is generally stating the requirements of SSR-6 for any type of packages, while in para 2.5 additional guidance for packagings intended to be used for single shipment is added. The designer of the package (regardless of the intended use) should consider the case of loading the packaging after prolonged storage since manufacturing, that is described in para 2.2 Comment was accepted and modified to add reference to paras 2.2 and 2.5 in the Table 1 for single used packagings.

Comment Nr.	Para /Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
JPN-S11-04 (TRANSSC)	4.11 (ii)	<p>(ii) Any deformation, rust, corrosion, or other defects in the packaging should be detected by the maintenance programme (see Section 6) and during <del>pre-shipment inspections</del> <u>inspections prior to use</u> <sup>10bis</sup>. If such ageing effects are detected, the packaging should be repaired or replaced.</p> <p><sup>10bis</sup> <u>"Inspections prior to use" include both pre-loading inspections for packaging before loading of radioactive contents and pre-shipment inspections for package (i.e. radioactive contents loaded) before commencement of shipment.</u></p>	<p>The term "pre-shipment inspections" (same meaning to "inspections before shipment (IBS)" implies the inspections on the loaded package ready for shipment in activities for transport of goods including radioactive material.</p> <p>The integrity of packaging should be checked before loading radioactive contents (i.e., the contents should be loaded to an intact packaging), and the compliance of package loaded with radioactive contents to the Transport Regulations should be checked before commencement of shipment. The footnote proposed clarifies this.</p>			x	<p>It is considered that the "pre-loading inspection" is covered in section 6 paras 6.20 and 6.24-6.26.</p> <p>The integrity of the package should be checked in accordance with maintenance programme (section 6), where for packages for repeated use is recommended to have periodic inspections, replacements of components and pre-shipment inspection. The content of periodic inspection covers the intent of the proposed comment.</p> <p><i>TO note: the para commented is 4.11 (b)</i></p>
WNTI -S11-10 (TRANSSC)	4.11 (g)	<p>(g) Corrosion of the external surfaces of packaging made of carbon steel or low alloy steel should be considered. Sea salt particles and road chemicals during transport or the storage environment might cause the initiation of pitting, crevice corrosion, and/or stress corrosion cracking on stainless steel surfaces. In case of storage indoors, storage conditions might be <u>specified and</u> monitored to exclude all ageing mechanisms that involve electrolytes. For example, humidity and temperature during storage might be <u>specified and</u> monitored to exclude any condensation on the package surfaces (dew point).</p>	<p>It is not possible to exclude ageing mechanisms or phenomena that are the cause of ageing mechanisms by monitoring per se.</p>	x			<p><i>TO note: the para commented is 4.12 (g)</i></p>

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WNTI -S11-11 (TRANSSC)	4.12 (h)	(h) (...). When replacement of the trunnions is not possible due to the design (e.g. when the trunnions are an integrated part of the packaging), other measures should be implemented to take into account their fatigue.	A comma after the text between brackets would make the reading easier.	x			
JPN-S11-05 (TRANSSC)	4.12 (i)	(i) <del>Degradation by bacteria and/or</del> humidity of the wood used as a shock absorbing material should be considered. ...	"Wood corrosion bacteria might degrade the wood used as a shock absorber." in 3.8 (b) (iv) of Step 8 was deleted during Step 10 and the contents should be consistent with it.			x	The comment is not clear as it refers to non-related paras. In any case, it is considered not acceptable to eliminate the degradation by bacteria, as this is one of the options for ageing of the wood used as a shock absorbing material.
JPN-S11-06	5.7	5.7. A non-compliant package cannot be transported to another location <del>if it is not in compliance with the Transport Regulations,</del> except under special arrangement in accordance with para. 310 of the Transport Regulations. <del>Depending on the degree of non-compliance, it might not be advisable to move the package at all until it has been repaired.</del>	Simplification to avoid duplication.  The second sentence is not necessary because it is obvious that non-compliant packages cannot to be transported regardless of the degree of non-compliance.		If a package is not in a compliance with the Transport Regulations, it cannot be transported to another location, except <b>when the shipment has been approved</b> under special arrangement in accordance with para. 310 of the Transport Regulations,		see S11-TRANSSC-28
WNTI -S11-12 (TRANSSC)	5.7	<del>A non-compliant package cannot be transported to another location if it</del> <b>if a package</b> is not in compliance with the Transport Regulations, except under special arrangement in accordance with para. 310 of the Transport Regulations, <del>it cannot be transported to another location.</del> <del>Depending on the degree of non-compliance, it might not be advisable to move the package at all until it has been repaired.</del>	Simplification. The second sentence is not in line with the first sentence. Any specific conditions should be provided if the second sentence is necessary.		If a package is not in a compliance with the Transport Regulations, it cannot be transported to another location, except <b>when the shipment has been approved</b> under special arrangement in accordance with para. 310 of the Transport Regulations,		see S11-TRANSSC-11

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JPN-S11-07 (TRANSSC)	5.15	... Documentation on the maintenance undertaken should be retained for the <del>service life of the packaging</del> <u>period of time specified by the management system</u> . For multiple packagings of the same design, records should indicate the serial number of each individual packaging.	It is not consistent with para. 6.15 (that maintenance documents should be retained for the period of time specified by the management system, taking into account the type of packaging and its usage) and it should be modified for consistency.	x			
WNTI -S11-13 (TRANSSC)	5.15	5.15. (...). <del>Documentation on the maintenance undertaken should be retained for the service life of the packaging</del> . For multiple packagings of the same design, records should indicate the serial number of each individual packaging.	The retention time of maintenance document is stated in 6.15 "Maintenance documents should be retained for the period of time specified by the management system, taking into account the type of packaging and its usage." and it seems appropriate. The duplication should be avoided.		.. Documentation on the maintenance undertaken should be retained for the period of time specified by the management system. For multiple..		see S11-TRANSSC-12
JPN-S11-08 (TRANSSC)	5.22 (e)	The condition of the wooden parts (e.g. drying, shrinkage, <del>crushing</del> <u>deformation</u> , cracks or other damage on the casing of shock absorbers);	Consistent to the other parts.	x			
WNTI -S11-14 (TRANSSC)	5.24	5.24. Components <del>important to</del> <u>relied on for</u> criticality safety (e.g. neutron absorbers) should be inspected for deformation or displacement, if ...	Clarification. Consistency with the wording used in other parts of the draft, and also with para. 838(n)(ii) of the latest draft of SSR-6 (Rev. 2).	x			
WNTI -S11-15 (TRANSSC)	5.26	5.26. For some package designs – normally those intended for repeated use and requiring competent authority approval – the cask body should be subject to periodic pressure tests. The test media may be gas or liquid, <u>and liquid should be the preferred media for occupational safety purpose</u> . The pressure should be slowly increased and maintained at a fixed value for a specific time in accordance with the design requirements.	Clarification.			x	It seems to establish a recommendation that goes beyond the objectives and scope of the guide, as it is an occupational safety recommendation (not related to radiation protection or nuclear safety). These issues should be defined in other guides in the field of occupational safety. In addition, the designer should specify



							what medium can be used based on the components he has used in the package.
Comment Nr.	Para /Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
JPN-S11-09 (TRANSSC)	6.26 (h)	Shielding performance measurement to detect ageing effects on shielding components by observing trends in the dose rate inspections for each shipment, or by taking periodic direct measurements of <u>the dose rates around the package loading</u> the <u>calibrated</u> radioactive contents.	Clarification Some explanations should be added for better understanding.		(h) Shielding performance measurement to detect ageing effects on shielding components by observing trends in the dose rate inspections for each shipment, or by taking periodic direct measurements of the <u>dose rate around the package and comparing with the expected dose rate considering the loaded radioactive contents.</u>		WNTI -S11-16 (TRANSSC)
WNTI -S11-16 (TRANSSC)	6.26 (h)	(h) Shielding performance measurement to detect ageing effects on shielding components by observing trends in the dose rate inspections for each shipment, or by taking periodic direct measurements of the <del>radioactive contents</del> <u>dose rate around the package and comparing with the expected dose rate considering the actual radioactive contents.</u>	Clarification.		(h) Shielding performance measurement to detect ageing effects on shielding components by observing trends in the dose rate inspections for each shipment, or by taking periodic direct measurements of the <u>dose rate around the package and comparing with the expected dose rate considering the loaded radioactive contents.</u>		Modification was introduced to avoid using "actual", instead word "loaded" was used to be clear.  see JPN-S11-09 (TRANSSC)
WNTI -S11-17 (TRANSSC)	6.33	6.33. The receiving inspection results should be retained throughout the service life of the packaging and retained by the organization responsible for the storage, the packaging owner and the owner of the radioactive contents, in accordance with regulatory requirements and the management systems. (...).	Clarification: at the end of the sentence "management systems" should be plural. All management systems, of the organization responsible for the storage, of the packaging owner and of the owner of the radioactive contents, should be considered. This is similar to the wording that is used in other parts of the documents, e.g. paras 6.37 and 6.41.	x			
WNTI -S11-18 (TRANSSC)	6.38 (c)	(c) Inter-lid or inter-seal pressure monitoring, which <del>is</del> <u>may be</u> conducted continuously or intermittently, and may substitute the leaktightness inspection ...	Editorial. Consistency of style with other bullet points such as (d) and (f).	x			

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JPN-S11-10 (TRANSSC)	8.7	Results of manufacturing inspections, pre-shipment inspections and inspections during maintenance should be kept, in accordance with the relevant management systems, by the package designer, the owner or user of the packaging, the packaging manufacturer, and the organization in charge of maintenance or storage, as applicable, <del>throughout the service life of the packaging</del> , to demonstrate that the safety functions are maintained.	In the first part, it is mentioned that the results of them should be kept in accordance with the relevant management systems and the latter part is not necessary. The first part is in line with 6.15.	x			
WNTI -S11-19 (TRANSSC)	8.7	8.7 Results of manufacturing inspections, pre-shipment inspections and inspections during maintenance should be kept, in accordance with the relevant management systems, by the package designer, the owner or user of the packaging, the packaging manufacturer, and the organization in charge of maintenance or storage, as applicable, <del>throughout the service life of the packaging</del> , to demonstrate that the safety functions are maintained.	In the first part, it is mentioned that the results of them should be kept in accordance with the relevant management systems and the latter part is not necessary. The first part is in line with 6.15.	x			
WNTI -S11-20 (TRANSSC)	Appendix I I.3 (a)	(a) Changes in mechanical strength, such as allowable stress, <del>and</del> fracture toughness, caused by irradiation, and thermal loading;	Change in the punctuation for clarification.	x			
WNTI -S11-21 (TRANSSC)	Appendix I I.4 (a)	(a) For structural components, changes in materials caused by high irradiation might lead to embrittlement of the components, which could result in a collapse of the elements <del>sharing</del> <del>having</del> safety functions, for example as follows:	Clarification.	x			

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Iran-S11-4 (TRANSSC)	Appendix I I.6 (c)	... taking into account <u>environmental</u> and operational conditions <u>during service life</u>	Add red words for compatibility with 2.1/3 and 4.4/8			x	It is considered that stress corrosion cracking will only be initiated under stress conditions or operation conditions. It is linked to stress faced during use cycles not to the service life (a package can be designed for 10 years but shear stress on surface is higher it is prone of stress corrosion cracking). Stress corrosion cracking is inflicted by manufacturing process defects, stress levels and temperatures.
Iran-S11-5 (TRANSSC)	Appendix II	Expand Appendix II (Example Aging Management Program) to include case studies for extreme environments	Appendix II addresses standard environmental conditions (e.g., temperature, humidity) but does not analyze the effects of extreme climatic changes (e.g., floods, hurricanes, or extreme heat) on package ageing. Example: Long-term storage in regions with high humidity or sub-zero temperatures may degrade specific materials (e.g., polymers, foams).			x	No comment from Member states was raised on the topic. Proposed text was not provided, and drafting new text is not foreseen in step 11 of SPESS process.
JPN-S11-11 (TRANSSC)	Appendix II II.2	Following blue texts should be inserted in the section II.2.  II.2 There are generally four types of activity, <u>i.e. Plan-Do-Check-Action, as described in 4.3 in the main text</u> that should be considered in an ageing management programme as follows: (a) <u>(Plan)</u> Prevention activities, ; (b) <u>(Do)</u> Condition monitoring .... (c) <u>(Check)</u> Performance ... (d) <u>(Action)</u> Mitigation activities,...	For the reader, APPENDIX II should have a clear and necessary description according to section 4.3 of the text. See JPN-S11-03			x	No comment from Member states was raised on the topic of PDCA cycle and drafting new text is not foreseen in step 11 of SPESS process.  It is considered also that these terms might be used by some maintenance

							procedures but not all.  It is also considered that the present text of the draft is consistent with guide SSG-48: Ageing Management and Development of a Programme for Long Term Operation of Nuclear Power Plants. (See para. 5.39 of SSG-48).  <i>TO note: see also JPN-S11-03</i>
Comment Nr.	Para /Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
WNTI -S11-22 (TRANSSC)	Annex	ANNEX - EXAMPLE SCOPE SETTING TABLE FOR AGEING MECHANISMS	Editorial. Ned for a separator between “ANNEX” and the title of the annex.	x			
WNTI -S11-23 (TRANSSC)	Referen ces	[1] INTERNATIONAL ATOMIC ENERGY AGENCY, Regulations for the Safe Transport of Radioactive Material, 2025 Edition, IAEA Safety Standards Series No. SSR-6 (Rev. 2), IAEA, Vienna (in preparation). <a href="https://doi.org/10.61092/iaea.ur52-my9o-">https://doi.org/10.61092/iaea.ur52-my9o-</a>	The text of reference [1] relates to SSR-6 (Rev. 2) (in preparation) whereas the link leads to SSR-6 (Rev .1).	x			
WNTI-S11-1 (TRANSSC)	Footnot e 1 to 8, 10 and 11		The sentences begin either as “In the context of this Safety Guide, the phrase ‘NNN’ or as “In the context of this Safety Guide, the term ‘NNN”. Homogeneity should be sought throughout the footnotes, and a single wording be used, either “phrase” or “term”, whichever is deemed as the most appropriate by the Technical Officer and the editors.	x			