

SUMMARY OF SUBMISSIONS AND RESPONSES
DRAFT SAFETY GUIDE FOR PREDISPOSAL MANAGEMENT OF RADIOACTIVE WASTE

SUBMITTER	COMMENT	RESPONSE
<p>01 John Harries</p>	<p>The draft Safety Guide for the Predisposal Management of Radioactive Waste provides very useful guidance on the management of radioactive waste.</p> <p>Attached are a few comments on the draft.</p> <p>The most important comment relates to the scope of the Safety Guide (Section 1.4). Wording of the second dot point should be modified to include low level radioactive waste that with temporary storage will decay to below the exemption limits listed in the National Directory for Radiation Protection (ARPANSA 2004. Once the radioactivity levels are demonstrated to be below the exemption levels, the waste can be disposed of as non-radioactive waste (Para 4.3.7)</p> <p>Para 1.4.1 52 • Low level radioactive wastes that with temporary storage will decay to 53 levels suitable for disposal as very low level radioactive waste.</p> <p>ADD the words “to exemption levels or” after the word “decay” to read “Low level radioactive wastes that with temporary storage will decay to exemption levels or to levels suitable for disposal as very low level radioactive waste</p> <p>In many situations (e.g. lines 527, 585, 1383, 1502 in the Safety Guide) short lived radioactive waste can be stored long enough for the level of radioactivity to decay below the exemption levels given in the National Directory for Radiation Protection (ARPANSA 2004)</p> <p>Para 1.4.5, Para 2.5.8, Annex E line 1316, Annex E line 1458 76 ... The limits for such waste 77 discharge and tip disposal are proposed to be included in the National 78 Directory for Radiation Protection.</p> <p>Will the updated National Directory be published before this safety guide?</p> <p>Para 3.2</p>	<p>Agreed and completed.</p> <p>The Amendment to the National Directory on User Disposal will not be completed before this Safety Guide, however the publication of the Safety Guide can be held back if required.</p>

	<p>429 body an application including a Radiation Management Plan and, if required, 430 a Radioactive Waste Management Plan that details the proposed design and...</p> <p>Suggest adding cross references to aid the reader: Radiation Management Plan (Section 2.2) and Radioactive Waste Management Plan (Section 2.3).</p> <p>Annex B 989 radium sources are placed in a leak tight stainless steel capsule that is welded shut or 990 a in a stainless steel capsule with a screw top and metal gasket seal. The sealed</p> <p>Delete the “a” at the beginning of line 990</p> <p>Annex F 1646 ... If drums are used, 1647 they should be completely filled to minimise voidage, and the waste compressed to 1648 reduce total volume should be considered.</p> <p>“be considered” refers to compressing the waste, not also to minimising voidage. Suggest: “If drums are used, they should be completely filled to minimise voidage and consideration be given to compressing the waste to reduce total volume.”</p> <p>Contributors Change title to Dr Kaye Hart</p>	<p>Agreed and completed.</p> <p>Agreed and completed.</p> <p>Agreed and completed.</p> <p>Agreed and completed.</p>								
<p>02 Stuart Woollett ARPANSA</p>	<table border="1"> <thead> <tr> <th data-bbox="405 1086 551 1177">Line(s) reference</th> <th data-bbox="551 1086 1395 1177">Comment, query, suggested alteration</th> </tr> </thead> <tbody> <tr> <td data-bbox="405 1177 551 1283">General</td> <td data-bbox="551 1177 1395 1283">Without an overarching requirements document where will there be a pointer to this document that indicates how it is to be referenced and applied?</td> </tr> <tr> <td data-bbox="405 1283 551 1386">General</td> <td data-bbox="551 1283 1395 1386">Where is there information on the predisposal management of decommissioning waste; that is if it is considered necessary as an ARPANSA document?</td> </tr> <tr> <td data-bbox="405 1386 551 1455">13</td> <td data-bbox="551 1386 1395 1455">First use of waste classification which continues throughout the document. Is this consistent with ARPANSA/RHC’s latest</td> </tr> </tbody> </table>	Line(s) reference	Comment, query, suggested alteration	General	Without an overarching requirements document where will there be a pointer to this document that indicates how it is to be referenced and applied?	General	Where is there information on the predisposal management of decommissioning waste; that is if it is considered necessary as an ARPANSA document?	13	First use of waste classification which continues throughout the document. Is this consistent with ARPANSA/RHC’s latest	<p>*Dovetailing is important – see also General Comment by Alan Ritchie #13 (NSW Dept Env & Climate Change). Need to address during final editing. Regulators will include it in material to inform waste generators of good practice</p> <p>The need for guidance on decommissioning will be considered separately. The international guidance may suffice.</p> <p>Presume use of RHC classification system (in</p>
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	classification scheme?	preparation), based on IAEA DS390 scheme.
17-19	How does this guidance document fit into the requirements laid out in legislation and in ARPANSA/RHC documents that allow for their requirements to be taken up in legislation?	A Safety Guide is an advisory document, not intended to be adopted in legislation. Regulation of disposal of radioactive material is already in place in all jurisdictions.
53	Where is VLLW defined? This opens up terminology that I don't think currently has use in Australian legislation, requirements or guidance (see also comment for line 13).	Changed to "waste with very low levels of radioactivity".
213	What constitutes a "larger" facility? Shouldn't decommissioning be considered for all facilities but to a degree dependent on the size, and therefore complexity, of the facility?	Agreed and altered.
218-223	I don't see the benefit of including this section.	Agreed and completed.
238-239	Suggest amend to read "... measures required for normal operation and to minimise ..."	Agreed and completed.
241	Suggest amend to read "... should <u>be included in</u> a safety ..." to be consistent with section 2.5.1	Agreed and completed.
243-247	Suggest including these two sentences in section 2.5.3 and rephrasing the section to avoid repetition and become more concise.	Agreed and completed.
285	Delete "whether more accurate modelling". A good safety assessment will have dealt with uncertainties appropriately.	Agreed and completed.
289	Change "may" to "will". Even for a single iteration it is still iterative.	Agreed and completed.
297	Change "repeated" to "further developed". It's the process that should be repeated.	Agreed and completed.
305	Insert relevant "a, b, c ..." into reference "(IAEA 2003)".	Agreed and completed.
323-324	An assessment could still demonstrate an increased risk yet be within regulatory limits. This would just need regulatory approval.	Agreed and completed.
326	Change to "Records <u>of</u> all ..."	Agreed and completed.
329-332	What is the value of this paragraph?	Noted, no change.
351	Delete the first use of "facilities".	Agreed and completed.
358	Change to "... identified in <u>a</u> proposal ..."	Agreed and completed.
419	Delete "time".	Agreed and completed.
593	Remove "Glossary" and insert "a, b, c ..." into reference. Also add reference to Reference List.	Agreed and completed.
626	Delete "be".	Agreed and completed.
630	Note that the first annex referred to in the text is "G". This should not be the case.	Agreed and completed.

649	Is “area” referring to the industry, activity, practice? This is not clear.	Dot point deleted
676	For consistency in referencing just put “IAEA 2006c” then place the reference in the Reference List.	Modified.
783	Suggest amend to read “...emissions, <u>and releases into sewer, ...</u> ”	Agreed and completed.
796	Delete “for”.	Agreed and completed.
808	Delete “uses”.	Agreed and completed.
812	Where is says “radium per gram”. Is this per gram of paint?	Agreed and completed.
815-816	The statement “to the order of tens of kBq in some luminous applications” contradicts the statement in lines 811-812 that luminous paint contains up to 5 MBq radium.	No Change – 5 MBq/g is a concentration whereas “tens of kBq” is an amount.
825	Change to “... for <u>containing</u> radium containing waste ...”	Agreed and completed.
830	Delete “a”.	Agreed and completed.
873-875	Is this consistent with the RHC edict? Should it even be mentioned as it suggests the removal of source containment rather than the principle often used in this guidance document of utilising further containment as the best option.	No change made
876-877	How is this achieved in <i>Treatment</i> ? Should it perhaps be placed under <i>Conditioning</i> as containment is an option?	Agreed and completed.
881-886	This sentence should be made clearer. Even with the deletion of the 2 nd “and” on line 885 it’s a lengthy and confusing statement.	Agreed and completed.
922-923	If 4 GBq \equiv 100 mg, then 200 MBq \equiv 5.0 mg (not 5.6) and 260 MBq \equiv 6.5 mg (not 7).	Agreed and completed.
940	Same as for line 825: change to “... for <u>containing</u> radium containing waste ...”	Agreed and completed.
954	Change to “... dosimeters, relevant to the radiation and <u>appropriate for the contamination ...</u> ”	Agreed and completed.
972-973	Not relevant to a guidance document.	Agreed and completed.
1048	Change the first instance of “radioactivity” to “radioactive”.	Agreed and completed.
1096	Change “to” to “for”.	Agreed and completed.
1108	Change “were” to “where”.	Agreed and completed.
1135-1138	Is this sentence of value? A safety assessment will need to be performed for the facility incorporating all waste types present or expected.	Agreed and completed.
1145	Change “of” to “or waste”.	Agreed and completed.
1152	Same as for line 649: Is “area” referring to the industry, activity, practice? Its current use is ambiguous.	Amended “area” to “purpose”.
1190	Add a full stop.	Agreed and completed.
1197-	Change to read “... the IAEA <i>Code of Conduct on the Safety and</i>	

1198	<i>Security of Radioactive Sources</i> (IAEA 2004) place ...” Note the italics.	Modified
1224-1225	What national and international management strategies are being referred to?	No change made
1242	What is “grouping” referring to? For the purposes of putting sources through the same treatment/conditioning process this is okay, but if it means conditioning several sources together this may not be appropriate.	Agreed – added “if appropriate”.
1256	Change to read “... dispersible. The ...”	Agreed and completed.
1289	Change to read “institutional control period”.	Agreed
1333-1334	Remove the sentence beginning “The amount of waste ...” All generation of waste should be minimised.	Agreed and completed.
1341	For consistency in referencing amend to read: “(NCRP Report No 143, 2003).”	Agreed and completed.
1361	Replace “Half-life” with “Radioactive decay”.	Agreed and completed.
1397	Delete “a”.	Agreed and completed.
1448	Start a new paragraph between sentences.	Agreed and completed.
1469	Replace “packaging” with “conditioning”.	Agreed and completed.
1487	Change “technique” to “techniques”.	Agreed and completed.
1554	Remove the word “acceptance”.	Agreed and completed.
1562	Delete dot point (d). This is included in (e).	Agreed and completed.
1568-1571	This is a different tack to that suggested so far, for example line 1094 “Guidance on this issue is provided in Section 4.4.”	Agreed and completed.
1578	Same as for line 1554: remove the word “acceptance”.	Agreed and completed.
1584-1585	No disposal method for medical waste is mentioned.	Agreed and completed. Sentence on delay and decay added
1592	Change the comma to a semi-colon.	Agreed and completed.
1598	Delete “the”.	Agreed and completed.
1620-1621	What is “the Authority”?	Inserted “relevant regulatory authority”
1627	Change “or” to “of”.	Agreed and completed.
1632	Change “that” to “there”.	Agreed and completed.
1635	Insert relevant “a, b, c ...” into reference “(IAEA 2003)”.	Agreed and completed.
1677	Delete “should be”.	Agreed and completed.
1679-1683	Is this practice accepted by regulators around Australia?	Agreed and completed.
1716-1717	Rephrase “release in the release of water”.	Agreed and completed.

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<p>04 Pat Davoren Manager Radioactive Waste Management Section Resources Division Dept of Resources, Energy and Tourism</p>	<p>Please find attached the Department of Resources, Energy and Tourism’s comments on the draft <i>Safety Guide for the Predisposal Management of Radioactive Waste</i>.</p> <p>Substantive comments on the text of the draft are at <u>Attachment A</u>. Editorial comments are at <u>Attachment B</u></p> <p style="text-align: right;"><u>Attachment A</u></p> <p><i>Safety Guide for the Predisposal Management of Radioactive Waste (2008)</i> – Public consultation draft Substantive comments</p> <table border="1"> <thead> <tr> <th>Section</th> <th>Comment</th> </tr> </thead> <tbody> <tr> <td>1.3.4 - Lines 43-44</td> <td>We suggest amending paragraph 1.3.4 by replacing “...does not include regulatory requirements” with “...should be read in conjunction with applicable regulatory requirements” or “...does not substitute for requirements imposed by the regulator”. The purpose of the guidance, as stated in paragraph 1.3.1, is to assist in achieving compliance with regulatory requirements. Paragraph 1.3.4 as presently written is ambiguous as to the relationship between the guide, its stated purpose and regulatory requirements</td> </tr> <tr> <td>2.2 - General</td> <td>Is the terminology “Radiation Management Plan” used instead of ARPANSA’s normal terminology of “Radiation Safety Plan” for any particular reason?</td> </tr> <tr> <td>2.3 - General</td> <td>We would normally interpret “radioactive waste management plan” to mean a plan for managing radioactive waste generated by the use of radioactive materials. The pre-disposal management of radioactive waste forms part of the radioactive waste management plan for a facility or practice,</td> </tr> </tbody> </table>	Section	Comment	1.3.4 - Lines 43-44	We suggest amending paragraph 1.3.4 by replacing “...does not include regulatory requirements” with “...should be read in conjunction with applicable regulatory requirements” or “...does not substitute for requirements imposed by the regulator”. The purpose of the guidance, as stated in paragraph 1.3.1, is to assist in achieving compliance with regulatory requirements. Paragraph 1.3.4 as presently written is ambiguous as to the relationship between the guide, its stated purpose and regulatory requirements	2.2 - General	Is the terminology “Radiation Management Plan” used instead of ARPANSA’s normal terminology of “Radiation Safety Plan” for any particular reason?	2.3 - General	We would normally interpret “radioactive waste management plan” to mean a plan for managing radioactive waste generated by the use of radioactive materials. The pre-disposal management of radioactive waste forms part of the radioactive waste management plan for a facility or practice,	<p>Agreed and completed.</p> <p>This is the term agreed by all jurisdictions, and is already used in several other RPS publications</p> <p>Two new sentences have been added upfront of 2.3.1 to help clarify the intent.</p>		
Section	Comment											
1.3.4 - Lines 43-44	We suggest amending paragraph 1.3.4 by replacing “...does not include regulatory requirements” with “...should be read in conjunction with applicable regulatory requirements” or “...does not substitute for requirements imposed by the regulator”. The purpose of the guidance, as stated in paragraph 1.3.1, is to assist in achieving compliance with regulatory requirements. Paragraph 1.3.4 as presently written is ambiguous as to the relationship between the guide, its stated purpose and regulatory requirements											
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		rather than the other way around. If the purpose of this section is to provide guidance on a radioactive waste management plan only for waste generated by pre-disposal activities (e.g. treatment and conditioning) this should be stated for clarification.	
	2.3.2 - Lines 165-168	The need for a radioactive waste management plan is surely determined by whether any practices are undertaken that generate radioactive waste. A facility designed solely for the storage of radioactive waste, without any potential for generating radioactive waste, would presumably not need a waste management plan, irrespective of the amount of waste stored. (We note, however, that a storage facility has the potential to generate waste through, for example, failure of a waste package and subsequent decontamination and repackaging processes.)	The relevance of this comment is determined by the previous point, which in my opinion doesn't deal solely with waste generated by pre-disposal activities.
	2.5.5(i) - Lines 283-287	The first sentence is unclear; presumably it should read "...to determine whether more accurate modelling, changes to the facility design or changes to operating procedures are required , or whether the proposal should be abandoned."	Dealt with in altering the sentence due to another comment.
	2.5.7 – Lines 304-305 References section	The 'IAEA Safety Guide on Predisposal of Radioactive Waste' does not exist as cited. The IAEA document <i>number</i> listed in the references section (WS-R-2) is the higher level safety requirements document. The title cited suggests the reference should be to WS-G-2.5. The references list several documents as 'IAEA 2003' with no differentiation.	Agreed and completed.
	2.6.3 – Lines 342-345	Does a recommendation that a management system be implemented only for the pre-disposal management of radioactive waste adequately reflect the interdependencies between the practice generating the waste and subsequent waste management? If the practice generating waste is not well managed, complications may arise further down the chain due to (a) no knowledge of the waste characteristics as generated, leading to extra characterisation work with possibilities of higher doses; and (b) an increase in waste volume due to not applying waste minimisation principles earlier in the process. We suggest that the recommendation be to have a management system for the entire facility or practice if one does not already exist.	This would be desirable, however in my opinion, it is not the place of a guidance document for the predisposal management of radioactive waste to be recommending a quality assurance management system for other activities.
	2.6.7 – Line 370	Should process approvals be restricted to only conditioning	Agreed and dealt with.

		processes, or should it apply more generally to pre-treatment and treatment?	
	3.2 – Line 433-434	The requirement for the applicant to justify the proposed practices and show net benefit for waste management activities is inconsistent with ICRP Publication 77, which assumes the waste management practices are justified as a necessary part of the process creating the waste, for which net benefit would already have been shown. This of course does not mean that principles of dose optimisation, such as ALARA, should not apply to the waste management operations. Notwithstanding the above comment, we believe the requirement to show net benefit should apply to stand alone waste management facilities, unless that stand alone facility was anticipated in the justification of the facility or practice generating the waste. We would note however, consistent with ICRP Publication 77, the requirement to show net benefit should be for a specific proposal only, and should not require a comparative benefit analysis with other options.	Deleted “show that there is a net benefit”
	3.2.4	We agree in principle with this statement, but suggest adding a qualifying statement of “subject to any requirements of the regulator.” This qualifier is to take into account a situation where a contractor is authorised directly by the regulator to undertake an activity, rather than indirectly by the authorisation held by the Responsible Person.	Not agreed (Section is about the role of the Responsible Person in RWM)
	4.1.1 – Lines 473-475	The description of the most appropriate treatment and conditioning options is narrow. While having a waste form and package that meets disposal requirements is important, options that minimise waste volume and doses are presumably more appropriate than those that don’t (subject to the ALARA principle).	Agreed and completed.
	4.3.4 – Lines 561-566	Reference is made in the list to ‘sources’ whereas all previous references in the section are to ‘waste’. Given that “radioactive source” is generally understood to mean radioactive material in a certain physical form and packaged in a certain manner for a specific industrial, medical or scientific purpose, we suggest the references in the list be to ‘material’ or ‘waste’ rather than source.	Agreed and completed.
	4.5.2	The ‘siting’ of a storage facility cannot be considered in isolation from the design of the facility. It therefore does not	Added design factor in opening sentence of 4.5.2

	make any sense to talk about “siting of a radioactive waste storage facility” or “the level of siting requirements” depending on the potential radiological hazard of the waste. A well engineered and constructed storage facility in an area of strong seismic activity (unless actually located on or near an active fault) can be safer than a poorly designed and built store in an area of weak seismic activity.	Agreed and completed.
4.5.4	This paragraph repeats information from paragraph 4.5.2.	
4.5.22 – Lines 780-782	The level of environmental monitoring should be determined by the potential for significant release, as stated in the previous sentence. The size of the facility or where it is located should be irrelevant, other than to the extent that the size or location determines significant potential pathways of release.	Agreed and altered.
4.5 – General	The section on waste storage does not refer to security. We suggest a discussion of security be added, both as it relates to inadvertent radiation exposure and to deliberate attempts at theft and sabotage. We acknowledge that source security is discussed in Annex D, but believe the guide would benefit from a general discussion of security.	Paragraph added on security and reference to Code of Practice on Security of Radioactive Sources.
Annex C – Line 1088	Does a Type A container normally require certification? The Transport Code does not have this as a requirement.	Agreed – certified to be deleted
Annex D – Line 1282	The suggestion for using the original lead pot for management of high activity disused sealed sources is inconsistent with the guidance for radium at line 1003 in Annex B. We acknowledge that the use of lead may be required for radiation safety, however we believe the considerations in Annex B are valid for high activity sources.	Agreed and altered.
References	IAEA Glossary (cited at lines 592-593) is not included in the references. ISO9001 (cited at line 347) is not included in the references.	Agreed. The full citation for ISO 9001 has been added
<u>Attachment B</u>		
<i>Safety Guide for the Predisposal Management of Radioactive Waste (2008)</i> – Public consultation draft Editorial comments		
<i>Section</i>	<i>Comment</i>	
		Agreed and completed.

Throughout	Where bullet points/lists are used, capitalisation of the first word of each item is inconsistent.	Agreed and completed.
Throughout	“Responsible Person” is capitalised inconsistently.	Agreed and completed.
Throughout	“National Directory for Radiation Protection” is not italicised, which is inconsistent with citation of other documents.	Agreed, although the references have been reordered therefore it became 2000b.
Line 22	Replace ‘(IAEA 2000)’ with ‘(IAEA 2000a)’.	Agreed and completed.
Line 46	Superfluous ‘the’ in “... management of the radioactive wastes, including...”.	Agreed and completed.
Line 68	Insert ‘Safety’ between ‘this’ and ‘Guide’. “Safety Guide” has been used elsewhere in the document.	Agreed and completed.
Line 73	The <i>Code of Practice for the Near-Surface Disposal of Radioactive Waste In Australia</i> is abbreviated later in the guide; this abbreviation should be included after ‘Australia’ as (“Near-Surface Disposal Code”).	An amendment has been made to the Scope
Lines 77	We suggest that “new edition of the” (or similar) be inserted before “National Directory...”.	Agreed and completed.
Line 136	“Responsible Person” is not capitalised in this instance.	Agreed and completed.
Line 141	Suggest that “Recommendations for Limiting Exposure to Ionizing Radiation...” should be italicised for consistency with other citations in the guide.	Agreed to use HAZOP (singular) throughout.
Line 201	‘HAZOP’ is used in the singular whereas all other references are to ‘HAZOPs’.	Altered due to a previous comment.
Line 239	Insert ‘to’ between ‘and’ and ‘minimise’.	Amendment made to Scope
Line 315	See comment for line 77.	Agreed and completed.
		Agreed and completed.
Line 324	Replace ‘these’ with ‘the proposed’.	Agreed and completed.
Line 326	Insert ‘of’ between ‘Records’ and ‘all’.	Altered due to a previous comment.
Line 351	Delete first occurrence of ‘facilities’.	Agreed and completed.
Line 358	Insert ‘the’ between ‘in’ and ‘proposal’.	Agreed and completed.
Line 568	Insert ‘Disposal’ between ‘Near-Surface’ and ‘Code’.	Agreed and completed.
Line 581	Delete ‘and’ in “...emitters, and require...”.	Agreed and completed.
Line 590	Delete ‘the’ in “...regulator on the whether...”.	Agreed and completed.
Line 610	Delete ‘the’.	Agreed and completed.
Line 626	Delete ‘be’.	Agreed and completed.
Line 665	Delete ‘)’ after ‘sources’.	Agreed and completed.
Line 676	Replace ‘[Storage of Radioactive Waste, IAEA Safety Guide WS-G-6.1, 2006]’ with ‘(IAEA 2006c)’ and include	Agreed and completed.

	appropriate reference in the References section.	Agreed and completed.
Line 796	Delete 'for' in "...be appropriate for to place...".	Agreed and completed.
Line 808	Delete 'uses'.	Agreed and completed.
Line 819	Insert ',' between 'radionuclides' and 'four'.	Agreed and completed.
Line 827	Replace 'Ra-Be' with 'Ra/Be' for consistency with Annex B.	Agreed and completed.
Line 830	Delete 'a'.	
Line 885	Replace 'and' with ',' in "...accident scenarios and assuming that..."	Agreed and completed.
Line 887	We suggest replacing 'say' with 'for example,'.	Agreed and completed.
Line 920, 924	Replace '. [IAEA 1996]' with '(IAEA 1996).' for consistency with other citations.	Agreed and completed.
Line 982	Replace 'minimize' with 'minimise' for consistency with other occurrences.	Agreed and completed.
Line 1024	Delete ','.	Agreed and completed.
Line 1058	Delete ',' in "...manufacturer, or reuse."	Agreed and completed.
Line 1108	Replace 'were' with 'where'.	Agreed and completed.
Line 1110	Replace 'acceptable in' with 'accepted at'.	Agreed and completed.
Line 1115	Replace 'deeper' with 'deep'.	Agreed and completed.
Line 1133	Insert '(“the Security Code”)' after '(ARPANSA 2007)'.	Agreed and completed.
Line 1145	Delete 'of'.	Agreed and completed.
Line 1164	Insert ',' between 'stage' and 'removing'.	Agreed and completed.
Line 1190	Missing period at end of sentence.	
Line 1196	Replace " <i>Code of Practice for the Security of Radioactive Sources</i> (ARPANSA 2007) (“the Security Code”)" with "Security Code".	
Line 1197	We suggest that "Code of Conduct on the Safety and Security of Radioactive Sources" should be italicised for consistency with other citations. Replace '(2004)' with "(IAEA 2004)".	Agreed and completed. Altered due to a previous comment.
Line 1256	Replace ',' with ';' after 'dispersible' in "...radionuclide less dispersible, the ceramic...".	
Line 1340	Replace 'minimize' with 'minimise' for consistency with other occurrences.	Agreed and completed. Agreed and completed.
Line 1341	Delete "Report No 143" for consistency with other citations.	
Lines 1376-1377	Replace 'and or' with "and/or".	Agreed and completed.
Line 1397	Delete 'a'.	Agreed and completed.
Line 1438	Insert 'to' between 'means' and 'allow'.	Agreed and completed.

Lines 1457	We suggest that “new edition of the” (or similar) be inserted before “National Directory...”.	Amendment made to Scope
Line 1487	Replace ‘technique’ with ‘techniques’.	Agreed and completed.
Line 1512	Insert ‘, as described in Annex G,’ between ‘and’ and ‘a’ for reference.	Agreed and completed.
Line 1537	Replace ‘The 20’ with ‘Twenty’.	Agreed and completed.
Line 1543	Replace ‘amount’ with ‘amounts’.	Agreed and completed.
Line 1545	Insert ‘,’ between ‘indicated’ and ‘future’.	Agreed and completed.
Line 1546	Delete ‘,’.	Agreed and completed.
Line 1568	Insert ‘the’ between ‘of’ and ‘disposal’.	Agreed and completed.
Line 1574	Delete ‘,’.	Agreed and completed.
Line 1606	Delete ‘for’.	Agreed and completed.
Line 1617	Two references to ‘Directory’ – this abbreviation has not been previously defined. In all other cases the full title has been used.	Defined “National Directory” and used this abbreviation.
Line 1621	We suggest that ‘Authority’ – although defined in the National Directory – should be defined here, or replaced with ‘regulatory authority’.	Agreed & modified.
Line 1627	Replace ‘or’ with ‘of’.	Agreed and completed.
Line 1634	Replace “safety standard on remediation of areas contaminated by past activities and accidents (IAEA 2003)” with “Safety Standard on <i>Remediation of Areas Contaminated by Past Activities and Accidents</i> (IAEA 2003c)” for consistency with other IAEA citations.	Agreed and completed.
Line 1642	Delete ‘be’.	Altered due to a previous comment.
Line 1647	Replace “voidage, and the waste compressed to” with “voidage and waste compression to”.	Agreed and completed.
Line 1677	Delete “should be”.	Agreed and completed.
Line 1693	‘Code’ with “Near-Surface Disposal Code”.	Agreed and completed.
Lines 1716-1717	Replace “will not release in the release of water” with “will not result in the release of liquid”.	Agreed and completed.
Line 1717	Replace ‘part’ with ‘parts’.	Agreed and completed.
Line 1728	Replace “fill in” with “fit in a”.	Agreed and completed.
Line 1734	Replace ‘of’ with ‘off’.	Altered due to a previous comment.
Line 1738	Insert ‘be’ between ‘could’ and ‘the’.	To be amended prior to publishing
Lines 1845-1847	Reference is inconsistent in style with that used in paragraph 2.2.3.	
References	References are cited inconsistently, for example some IAEA	

	<p>documents have IAEA listed as the publisher whereas others do not.</p> <p>Multiple publications in the same year with the same author (mainly IAEA documents) should be differentiated by using, for example, 2003a, 2003b etc. to ensure citations in the text can be linked to the correct publication.</p>	To be amended prior to publishing																								
<p>05 Jocelyn Towson Radiation Safety Officer and Principal Scientist Dept of PET and Nuclear Medicine Royal Prince Alfred Hospital</p>	<p>I've seen the ANZSNM submission which I totally agree with.</p> <p>I didn't manage to look at the draft until today, then was prompted to submit some comments of my own because I was struck by the number of times "appropriate" appeared (42). Sometimes it was useful because the text explained why, but more often it wasn't. [bee in my bonnet]. I think you go to a Safety Guide to find out what you should do, and not to be told to do something appropriate.</p> <p>Along the way I picked up on a few other points. One of the most interesting is the potential impact of the ND2 schedules 4 and 8, including the vexed issue in Sydney of iodine tanks. I hope what I have suggested is consistent with the ANZSNM submission.</p> <p>Annex G does not include the option of landfill in a municipal tip and I don't suppose it can until ND2 is out. I don't know what information is available prior to ND2 release. I suspect disposal of Very Low Level Radioactive Waste in municipal tips is a political dead duck anyway, unless perhaps the package limits are specified for short lived radionuclides only, say half life < 30 days. I didn't mention that in my submission in case it put the cat amongst the pigeons.</p> <table border="1" data-bbox="405 1125 1397 1471"> <thead> <tr> <th>Page</th> <th>Lines</th> <th>Comment</th> </tr> </thead> <tbody> <tr> <td>8</td> <td>42</td> <td>Delete 'to ensure its ongoing safety and security'</td> </tr> <tr> <td>9</td> <td>65</td> <td>Delete 'at appropriate stages'</td> </tr> <tr> <td>9</td> <td>77</td> <td>Change to '...discharge and tip disposal will be included in Schedule 8 of the National ...'</td> </tr> <tr> <td>13</td> <td>238-9</td> <td>Change to '...should demonstrate that measures required for normal operation and minimizing ...'</td> </tr> <tr> <td>16</td> <td>395</td> <td>Change to '...A backup system...'</td> </tr> <tr> <td>18</td> <td>423</td> <td>Change to '...maintained for a specified period of time.'</td> </tr> <tr> <td>22</td> <td>558</td> <td>Change to '...to facilitate management and meet the</td> </tr> </tbody> </table>	Page	Lines	Comment	8	42	Delete 'to ensure its ongoing safety and security'	9	65	Delete 'at appropriate stages'	9	77	Change to '...discharge and tip disposal will be included in Schedule 8 of the National ...'	13	238-9	Change to '...should demonstrate that measures required for normal operation and minimizing ...'	16	395	Change to '...A backup system...'	18	423	Change to '...maintained for a specified period of time.'	22	558	Change to '...to facilitate management and meet the	<p>Generally agreed. In some cases below "appropriate" has been retained to show that compliance with regulatory requirements, which should indicate what is appropriate, is necessary.</p> <p>Annex G not the place; should be covered in Schedule 8 of NDRP? (3rd para Annex E) Need for consistency with Schedule 8 terminology (eg. no mention of VLLW in Schedule 8, thus remove VLLW from SG)</p> <p>Altered due to a previous comment. Agreed and completed.</p> <p>Amendment made to Scope Altered due to a previous comment but have retained "appropriate". "Appropriate" retained. "Appropriate" retained.</p>
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8	42	Delete 'to ensure its ongoing safety and security'																								
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		categories in waste ...'	Agreed and completed.
22	583	Query: should 'controlled' be expanded, not being in a Glossary?	Deleted - NDRP does not mention controlled facility.
22	585-6	Change to clarify: '...is below the exemption limit for regulatory control listed in Schedule 4 of the National ...'	Schedule 4 is not the only relevant provision
22	589	Change to '... or does not have suitable radioactivity measurement facilities, ...'	Agreed and completed.
23	602-3	Delete 'Treatment may result in an appropriate waste form.' Does not add anything to meaning.	Agreed and completed.
25	709	Change to 'for example, bunds, floor drains to a holding tank...'	Agreed and completed.
26	733	Change to '...tanks should have equipment for ...'	Agreed and completed.
26	752	Change to 'assessed, and if necessary monitored. Stores with...'	Agreed and completed.
26	756	Query: When would it be appropriate to remove radon from the extracted air? Why not vent to atmosphere? This is the sort of information that a Safety Guide could provide.	Option retained.
27	773-4	Change to 'Radiation warning signs should be displayed at each entrance to the store and possibly on the internal walls and external surrounds of the facility.' It is not possible to give generic guidance where signs would be appropriate – should be assessed on case by case basis.	Agreed and completed.
27	795-6	Change to 'In some cases, it may be necessary to place packaged waste in an overpack which meets the specific waste acceptance criteria for the particular disposal facility.'	Agreed and completed.
29	872	Change to '...should be undertaken in facilities with monitoring for contamination...'	Agreed and completed.
29	886	Change to '...low level waste with access controls, mitigation procedures and barriers.'	No change.
31	945-6	Change to '...determine whether to open any container or to overpack.'	Agreed and completed.
32	948-9	Query: what is appropriate QC? Change to '...new capsule with quality control for/on ???'	No change.
32	957	Change to '...environment. Personal protection equipment is important ...'	Agreed and completed.
35	1092	Change to '... should not be irretrievably conditioned until waste acceptance criteria ...'	Agreed and completed.
35	1096	Change to 'suitable for the expected period of storage...'	Agreed and completed.

	37	1167	Change to ‘... The manufacturer should have the capability...’	Agreed and completed.
	37	1170	Change to ‘and recertify sources if desired.’	No change.
	37	1174	Change to ‘...to facilitate management...’	Agreed and completed.
	37	1187	Change to ‘... In general, it is preferable to dispose of medium-lived sources...’	Agreed and completed.
	38	1240	Change to ‘checked for contamination and managed accordingly, either by storage or cleaning if contaminated, or by disposal or reuse if not.’	Agreed and completed.
	39	1250	Change to ‘...to allow for handling, ...’	Agreed and completed.
	41	1303	Change to ‘...in many different forms. This Annex considers unsealed source forms. A good understanding ...’	Agreed and completed.
	41	1311	Query: have all States aligned their regulatory exemption limits with Schedule 4 of NDRP?	In progress
	41	1316	Change to ‘...will be covered in Schedule 8 ...’	Agreed and completed.
	42	1345	Change to ‘segregate items on the basis of radiological, ...’	Agreed and completed.
	42	1379	Change to ‘compliance with the Transport Code ...’ [give reference to RPS2]	Agreed
	42	1382	Change to ‘...storing the waste in a storage facility approved by the regulatory authority...’	Agreed and completed.
	43	1407-1411	Change to ‘In the hospital environment, linen including bedding, towels and personal clothing which may be contaminated with radioactive materials should remain segregated from other linen and waste until it has been monitored. If found to be contaminated, the article should be stored for decay until the amount of radioactivity is below the exemption limit [ND Schedule 4] for the particular radionuclide. At that time the article can be laundered with other linen or disposed of as non-radioactive waste including return to the owner.’	Agreed and completed.
	43	1413-15 Para 1 of subsection	Change this paragraph and incorporate Para 8: ‘Liquid radioactive waste can be generated in laboratory or medical applications of radioactive materials. Limited quantities of aqueous liquids with low concentrations of radioactive material may be suitable for discharge to the sewer, under the requirements and limits for discharge of radioactive waste by the user proposed for inclusion in the National Directory for Radiation Protection. Liquid waste potentially containing radioactivity which would cause the	Agreed and completed.

		discharge exemption limit to be exceeded should be collected and stored for decay or other treatment determined by the chemical, physical and biological hazards of the liquid including the radionuclide half life.'	Agreed and completed.
43	Para 2 1416-21	Change to 'Where aqueous liquid radioactive waste is regularly produced in a laboratory at a level where the effluent from laboratory sinks may conceivably cause the discharge to the sewer to exceed the proposed exemption level, sinks should be connected to a holding or delay tank system and these sinks should be restricted to uses involving radioactive materials. Where the volume of liquid radioactive waste is small, a labelled screw top container in the working area may be adequate.'	
43	Para 3 1422-24	'Toilets used by inpatients being treated with radioiodine should be clearly marked and only used by those patients. If the effluent from these toilets may cause the exemption limit for discharge of iodine-131 from the premises to the sewer to be exceeded, the toilets should be connected to a holding tank system. The radioactivity and volume of the tank contents should be monitored continuously. Sufficient time should be allowed for decay of stored iodine-131 to below the exemption level for discharge to the sewerage system before a tank is emptied.'	
43	Para 4 1425-1428	Delete this paragraph. It sounds like a highly specialised application, not relevant to most laboratories or any medical practices. Segregation of liquid waste according to concentration is mentioned in Para 6 lines 1445-8 which should be sufficient.	
44	Para 5 1429-42	As is, with minor changes: 1429-30 'Holding tanks for short-lived radionuclide wastes are usually constructed in sets of two or more, so that one may be filling while the contents of a full one may be discharged after sampling or elapse of a sufficient period for radioactive decay.' 1437 '(d) have facilities to monitor the amount of radioactivity or to allow easy withdrawal of representative samples' 1438 '(e) have a means to allow inspection of build-up...' 1441-2 '(f) have sanitary controls and methane monitoring if	

	<p>Comments and suggested amendments</p> <p>ANSTO's comments and suggested amendments to the text of the Draft Safety Guide are:</p> <p>1.4.1.1 “Low level Radioactive wastes that with temporary storage will decay to levels suitable for disposal as very low level radioactive exempt waste.”</p> <p><u>Comment:</u> In Australia, waste is decayed to exempt or clearance levels and thereafter is not classed as a radioactive waste. This draft Safety Guide has introduced the concept of low level waste decaying to very low level waste, however, there has been no consideration given to a very low level radioactive waste disposal site within the context of the CRWMF. This terminology is used in numerous subsequent passages but only those highlighting different aspects will be raised in further comments.</p> <p>1.4.5 “Some very low level exempt waste or waste streams from the management and processing of radioactive materials may be suitable for discharge to the environment or disposal at a municipal tip. The limits for such waste discharge and tip disposal are proposed to be included in the National Directory for Radiation Protection”.</p> <p><u>Comment:</u> Regarding line 74, the use of “very low level waste” and “discharge to the environment or disposal at a municipal tip” may create confusion for some readers.</p> <p><u>Comment:</u> Regarding line 77, there are already several listing of limits for disposal as non-radioactive waste (state, ARPANSA and IAEA (RS-G-1.7)). Will the proposed National Directory listing be in line with these existing guides?</p> <p>2.1.3 <u>Comment:</u> In line 121, it is unclear who should “discuss” the effects beyond the boundaries with the regulator in the neighbouring jurisdiction, the operator or the regulator of that operator.</p> <p><u>Comment:</u> Good regulatory practice dictates that all involved regulators should attempt to minimise regulatory burden by harmonising requirements and approach</p>	<p>Partially accepted & changed.</p> <p>Not agreed.</p> <p>Clarified.</p>
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	<p>wherever practicable.</p> <p>2.2 <u>Comment:</u> For completeness, environmental protection should be included in this section.</p> <p>2.3.1 & 2.3.2 <u>Comment:</u> The guidance is confusing. What are the criteria used to decide if a Plan should be prepared? What is the reason for differentiating between solid and liquid waste in this section?</p> <p>2.3.3 (b) “Pre-work assessments and use of training mock-ups or non-active runs to minimise exposures during operational and maintenance activities, if warranted by the hazards”.</p> <p><u>Comment:</u> This section should include physical/chemical/biological characterisation of waste.</p> <p>2.3.6 <u>Comment:</u> Why specify HAZOP? Other systematic analyses could be appropriate.</p> <p>2.3.7 <u>Comment:</u> Biological hazards should also be considered.</p> <p>2.3.8 <u>Comment:</u> Planning for decommissioning is applicable to all facilities not just “larger” ones. On that note, there is no definition of “larger”.</p> <p>2.5 <u>Comment:</u> This paragraph contains duplicated guidance and would benefit from editing e.g. put all recommendations for contents of SCA in one list.</p> <p>2.5.5 <u>Comment:</u> include a description of chemical, biological and physical hazards posed by waste.</p> <p>2.5.10 “Records of all incidents and accidents (and also of incidents and accidents that were averted) should be periodically reviewed to determine if the safety assessment needs to be updated”.</p> <p>2.6.2 “The management system should focus on important safety, security environmental and business issues. The level of detail and control in the management system should be commensurate with the risk of adverse outcomes”.</p> <p><u>Comment:</u> Section 3.2 refers to the “Responsible Person”. Normal usage would be</p>	<p>Appropriate words have been added to 2.3.1</p> <p>Clarification has been added to 2.3.1 and 2.3.2.</p> <p>Agreed and added to 2.3.3</p> <p>Modified as suggested.</p> <p>Agreed and modified.</p> <p>Agreed.</p> <p>No change (now 2.4).</p> <p>Agreed and completed (now 2.4.5).</p> <p>Agreed and completed.</p> <p>Agreed and completed.</p>
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	<p>to refer to the operator. Is there a reason for a change in this regard?</p> <p>2.6.4 Comment: What is the safety justification for recommending compliance with ISO 9001? It would be more appropriate to recommend a good management system.</p> <p>Section 3: Comment: Although the title is Responsibilities – text covers much more than that</p> <p>3.1.2 & 3.1.3 These requirements should be justified on the basis of risk.</p> <p>4.2.4 “Waste contaminated with radionuclides of very short half-life (less than about 60 days) could be collected and stored until the radioactivity decays enough to meet exemption levels in the National Directory for Radiation Protection (ARPANSA 2004).”</p> <p>Comment: Why the limit of 60 days? Not only does it exclude Iridium-192, which is normally stored for decay, but there is no reason in principle to prevent storage for decay of materials of considerably longer half life (up to ~5 years) in properly administered and secured facilities.</p> <p>4.3.6 “Radioactive waste could also be segregated on the basis of the level of radioactivity and the radiotoxicity of the contained radionuclides. An indication of the radiotoxicity of the radionuclide(s) is the exemption level given in the National Directory for Radiation Protection (ARPANSA 2004). It may be worthwhile to segregate waste containing mainly alpha emitting radionuclides from waste with no or very low levels of alpha emitting radionuclides, because alpha emitters usually have higher radiotoxicity than non-alpha emitters, and require better containment and may need to be treated differently for disposal.”</p> <p>Comment: Or delete the last sentence, as several types of segregation may be viable strategies. For example, separation of low energy beta gamma emitters from high energy beta gamma emitters.</p> <p>4.4.2 “In the deciding on treatment and conditioning processes, consideration should be given to the suitability of the resultant waste packages for transport and storage, including retrieval, and to their suitability for emplacement in a disposal facility on the basis of the anticipated disposal waste acceptance requirements.”</p>	<p>No change..</p> <p>Agreed and completed.</p> <p>Noted.</p> <p>Agreed and completed (3.1.2).</p> <p>Agreed and changed.</p> <p>Agreed and changed.</p> <p>Agreed and changed.</p>
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	<p>4.4.3 “In many cases, decisions about predisposal management of radioactive waste have to be made before waste acceptance requirements for disposal are known. If the final disposal route is not known or has not been chosen, planning for earlier steps should consider a realistic range of options. Processing or conditioning steps selected for particular waste types should not impose significant constraints on following steps in managing the waste or foreclose viable options. Irreversible conditioning processes should, subject to the following paragraph, be avoided until all steps are fully defined.”</p> <p>4.4.4 “In some cases however, safety and/or security benefits can may be sufficiently persuasive to justify undertaking irreversible treatment or conditioning processes. For example, solidification of liquid waste is nearly always be justified by the increased safety associated with storing solids rather than liquids. If there is sufficient safety or security justification for undertaking irreversible conditioning, the responsible person should prepare an assessment to demonstrate the benefits of the proposed action. The generic waste acceptance criteria in Annex G and waste acceptance criteria of similar overseas disposal facilities may provide sufficient information to allow a case to be made for treatment treatment and conditioning.”</p> <p>4.4.5 “The assessment of the benefits of undertaking irreversible processing should be included in the application to the regulator seeking approval for undertaking the proposed waste treatment. However, even if the regulator approves the application to undertake the proposed waste processing, it is the Responsible Person who takes remains responsibility responsible for ensuring that the processed waste will be acceptable for a waste disposal when the waste disposal facility comes into operation.”</p> <p><u>Comment:</u> The first sentence assumes that all conditioning of waste requires regulatory approval. Is that stated elsewhere in the document?</p> <p>4.4.6 “A waste package should have a durable label bearing an identification number, weight, and contact dose rate. Other properties of the waste package should be easily retrievable from records. A proper record of each waste package should be kept in a records management system. Records should be securely stored, easily accessible and retrievable over an extended period.”</p> <p><u>Comment:</u> The contact dose rate should include a date, or at least the year of measurement.</p>	<p>Agreed and changed.</p> <p>Agreed and changed.</p> <p>Agreed and changed.</p> <p>Clarified.</p> <p>Agreed and changed.</p>
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	<p>4.4.7 “Information recorded for each waste package should include, where practical and available:</p> <ul style="list-style-type: none"> (a) the identification number of the package; (b) radionuclide and activity content; (c) a description of the area in which the source-material was utilised; <p><u>Comment:</u> Is this really useful information at the package level ?</p> <ul style="list-style-type: none"> (d) details of the package contents – type of source containment (if applicable), conditioning matrix and matrix containment; (e) mass; (f) the external size and/or volume of the package; (g) the maximum dose rate at contact and at 1 metre, and the date of measurements; and (h) the presence and activity of fissile materials, if any.” <p>Comment: Regarding line 646, all data relating to historical waste may not be available, and smaller organisations may not have the capabilities to measure radioactive content (as opposed to dose measurement).</p> <p>Comment: Paragraph needs clarification as to whether it only applies to final waste package suitable for off-site disposal after relevant treatment and conditioning.</p> <p>4.5.1 “Radioactive waste storage is required at all stages of waste management to provide isolation from humans-safety, security and environmental protection.”</p> <p>4.5.2 Delete the first sentence.</p> <p>Comment: This is not a true statement.</p> <p>4.5.3 Delete paragraph.</p> <p>Comment: This paragraph does not provide any guidance.</p> <p>4.5.4 Comment: This paragraph repeats 4.5.2.</p> <p>4.5.11 Comment: See 4.4.7</p>	<p>Agreed and modified.</p> <p>Noted.</p> <p>Not agreed.</p> <p>Clarified.</p> <p>Not agreed.</p> <p>Deleted.</p> <p>Accepted and changed.</p>
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	<p>4.5.14 “Design of the storage facility should permit regular radiation monitoring and inspection of the waste packages to obtain an early indication of any physical deterioration, signs of leakage or build-up of gases in the containers. Radiation monitoring and visual inspection should also be performed whenever the waste is handled or moved (placed into storage, retrieved or transported off the site). Where appropriate, there should be enough space in the store for stacking, sorting and visual inspection of packages.”</p> <p>Comment: There may be cases where high integrity packaging or over-packing may result in close proximity stacking which could limit the easy visual inspection.</p> <p>4.5.15 Duplicates ideas in 4.5.8.</p> <p>4.5.16 “The storage facility should be adequately ventilated to exhaust any gas generated in normal operation or under anticipated accident conditions. The potential for gas generation by radiolysis or chemical reaction should be assessed, and if necessary appropriate monitoring undertaken....Where appropriate, the removal of radon from extracted air should be addressed in the Radioactive Waste Management Plan.”</p> <p>Comment: Regarding line 752, the monitoring of radon should only be undertaken if a risk assessment and/or testing indicates that it is required. Small amounts of stored material and/or facility design may obviate the need for routine monitoring.</p> <p>Comment: Regarding line 756, how is radon removed from extracted air?</p> <p>4.5.18 Comment: The usual conservative approach would dictate that the dose target for a member of the public would be much lower than 1mSv/year.</p> <p>4.5.22 Comment: The need for environmental monitoring should be dictated by the hazard posed by the waste, not the size of the store.</p> <p>4.6.2 If a disposal facility is not established and the waste acceptance criteria are not known, an assessment should be undertaken to determine the type of disposal appropriate to the particular waste stream and an estimate made of the range of likely waste acceptance criteria for that type of disposal. Generic waste acceptance criteria are discussed in Annex G. In some cases, it may be appropriate for to place packaged waste in an overpack tailored to the specific waste acceptance criteria for</p>	<p>Accepted and changed.</p> <p>No change.</p> <p>Agreed and changed.</p> <p>Changed & clarified.</p> <p>Noted.</p> <p>Agreed and changed.</p>
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	<p>the particular disposal facility.</p> <p>Comment: This paragraph may be deleted as this section is about criteria.</p> <p><u>Annex A</u></p> <p>Line 830: “Many domestic smoke alarms contain a less than 40 kBq americiumamericium-241”.</p> <p>Comment: In lines 830 and 836, Americium-241 is misspelt (“amercium”).</p> <p>Line 879: “The small amount of radioactivity in each luminous item or smoke alarm means that the radioactivity can be considered to be dispersed in the package if a number of items are encapsulated into a cement mortar or other matrix, the radioactivity can be considered to be dispersed in the package. Accidents, incidents or intrusions that result in a broken, drilled or shattered package would result in the radioactivity being mixed with matrix material. and The consequent dose to an unintentional intruder or bystander is likely to be much less than the public dose limit for a realistic range of intrusion and accident scenarios. and assuming Nevertheless, that the waste is should be managed as low level waste, with appropriate access controls, mitigation procedures and barriers.”</p> <p>Line 887: “Items containing low levels of long-lived alpha emitters may be encapsulated in small or medium size say (20 or to 60 litre) drums using a cement mortar. Such encapsulation provides security and enables many items to be consolidated into one package. Encapsulation in such a small or medium size drum protects against reduces the likelihood of contamination if the radium paint deteriorates, and limits release of radium. A 60 litre drum is small enough for most future disposal options for low level waste, but might be too big for borehole disposal (see Annex G).”</p> <p><u>Annex B</u></p> <p>Line 915: “For applications in medicine and industry, radium was usually encapsulated 915 in platinum, platinum-iridium and other alloys, and sometimes in gold”.</p> <p>Line 968: “Special consideration should be given to the transport of Ra/Be sources which may require additional shielding for neutrons.”</p>	<p>Not agreed.</p> <p>Corrected.</p> <p>Corrected.</p> <p>Accepted and changed.</p> <p>Agreed and changed.</p> <p>Agreed and changed.</p>
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	<p>Comment: This is already covered off in the Transport Regulations (RPS 2). Suggest vague words “special consideration” be replaced with a reference to the relevant section of RPS 2.</p> <p>Line 1003: “Where practicable, lead should not be used in a package destined for disposal because lead is a toxic material and its presence might limit disposal options. Lead can be used for shielding so long as the capsule containing the radium is removed from the lead shield before disposal. The use of lead in a small limited number of packages may be acceptable if this avoids double handling of waste and provides operator protection. The use of lead shielding may be unavoidable in some cases (in general)”.</p> <p>Comment: Lead metal has been used in the environment for centuries. It is the dispersible compounds of lead that are problematic, not so much the solid metal. This aspect also requires good clarification in the repository and store disposal site criteria, when that is established.</p> <p>Line 1007: If lead is used, its presence must be recorded in the package description and the environmental impact considered.</p> <p><u>Annex C</u></p> <p>Line 1070: “For some short-lived sources, a period of 10 half-lives will allow the source to decay to insignificance, but a longer period may be required for more intense sources.”</p> <p>Comment: The assumed relationship between half-life and initial activity is invalid. Some short-lived sources may be relatively “intense” (e.g. some Ir-192 or Se-75 sources); conversely, some long-lived sources may not be very intense and will have well and truly decayed to insignificance after 10 half-lives (e.g. Am-241 sources).</p> <p><u>Annex D</u></p> <p>Line 1255: “Whilst low low activity caesium-137 sources are now usually prepared in ceramic form, making the radionuclide less dispersible, the ceramic form is not suitable for high activity caesium-137 sources.”</p>	<p>Reference added.</p> <p>Agreed and changed.</p> <p>Sentence added.</p> <p>Agreed and changed.</p> <p>Changed.</p>
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	<p>Line 1281: “Sources can be encapsulated into welded or sealed steel capsules, stainless steel drums or their original lead pot to facilitate future management.”</p> <p>Comment: This line states that sources should be encapsulated in “their original lead pot”. This appears inconsistent the injunction at line 1003 ff against using lead in a package destined for disposal because of its toxicity.</p> <p><u>Annex E</u></p> <p>Line 1316: “Waste that exceeds the regulatory exemption limits should be assessed to determine if it can be disposed of to the sewer or to a municipal tip. The requirements and limits for discharge of very low level waste to the sewer or disposal of small amounts of low level waste to municipal tips are proposed to be covered in Schedule 8 of the National Directory for Radiation Protection.”</p> <p>Comment: Coverage of disposal limits is not consistent with the title of Schedule 8 of the National Directory for Radiation Protection (Aug 2004 version 1.0).</p> <p>Line 1468: “In general, treatment of radioactive waste requires approval from the regulator before any treatment or packaging is undertaken.”</p> <p>Comment: given its importance, this should appear somewhere before Annex E.</p> <p><u>Annex F</u></p> <p>Line 1624 ff: “Large quantities of radioactive waste can be generated from the remediation of sites where radioactive radioactivity materials were used, where accidents involving radioactivity occurred or where industrial processing of naturally occurring radioactive materials radioactivity occurred. Most material collected during such remediation is likely to have low levels or of radioactivity. For site remediation, it is worthwhile characterising the material in situ before excavation to determine which material is contaminated with radioactivity above the exemption concentration limits given in the National Directory for Radiation Protection (ARPANSA 2004). There may be little advantage in excavating such material on the basis of its radioactivity unless that is a clearly identified exposure pathway that may cause harm to humans or the environment.”</p> <p>Line 1676 ff: “If there are large volumes of waste, consideration should be given to establishing such a facility should be close to the source of the waste, to minimise</p>	<p>Agreed and clarified.</p> <p>There has been a change to the proposed Schedule 8 in the NDRP. It is now to be the User Disposal requirements.</p> <p>A new paragraph 3.2.5 has been added to the section Responsibilities of Responsible Person.</p> <p>Corrections made.</p> <p>Corrected.</p>
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	<p>transport costs.”</p> <p><u>Annex G</u></p> <p>Line 1714 ff: “Once a waste repository is established, there will be clear specifications for each of these waste acceptance criteria. For example, the repository licence could define no free liquids as being less than 1 per cent by volume, and provide that a given pressure will not release result in the release of water. It might also define a threshold of 100 parts per million for defining when the presence of a hazardous material would not be accepted.”</p> <p>Line 1719 ff: “Until a repository is established, the above list of criteria could be used as a basis for a proposal to undertake irreversible treatment of radioactive waste that is likely to be destined to for a near-surface repository. Irreversible treatment of radioactive waste should only be undertaken where there are clear safety or security benefits.”</p> <p>Comment: The second sentence above should cross-reference the relevant part of the body of the Guide.</p> <p>Line 1728: “is small enough to fit fit in borehole”</p> <p>Line 1734 ff: “There is a trade of off between total depth and borehole diameter. It is possible likely that the safety case for disposal of higher radioactivity sources in a borehole facility might would put greater emphasis on increased depth rather than increased diameter.”</p> <p>Line 1738 ff: “Standard drill rigs used for petroleum exploration can drill deep, and could be the drilling technology used if a borehole disposal facility is required to be deep. Boreholes produced by petroleum exploration drill rigs are likely to have an internal diameter of 150 mm or more (based on an 8.5 inch drill). To allow for overpacking, this suggests that to ensure it is suitable for any borehole facility, a stainless steel package for radium needles and tubes or higher activity sources should be 100 mm or less in diameter. Keeping packages 100 mm or less in diameter therefore gives confidence that the waste will be able to be disposed of in any borehole disposal facility. Of course, if a borehole facility is established with a larger diameter borehole, then the waste acceptance criteria would be designed to accept larger diameter packages.”</p>	<p>Agreed and changed.</p> <p>Agreed and changed.</p> <p>A reference to Sections 2.1.2 and 4.4 has been added.</p> <p>Corrected.</p> <p>Agreed and changed.</p> <p>Agreed and changed.</p>
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	<p>Line 1321 ff: “Radioactive waste held for decay should be kept in secure stores and each container should be clearly labelled with a description of the radioactive contents, the activity when stored, the anticipated date when it may be released from the store and the name of the person responsible for placing it in the store. An accurate inventory of all containers and their contents in the store at any time should be maintained.”</p> <p>Comment: Marking each container as advised would be very onerous. Individual fibreboard waste drums have a Waste Operations Service Request (WOSR) form attached with all relevant detail before pickup by Waste Operations. We do not put names of responsible persons on packages for storage. Drums going into storage are bar-coded and numbered and all relevant information, including responsible operators names are entered into the Radioactive waste tracking database. We do not put an anticipated date of release on the drums but do evaluate the data held for potential free release of drums after appropriate checking and inspection.</p> <p>Line 1698 ff: “The following is a list of generic waste acceptance criteria for waste that should be accepted at any Australian near-surface repository. The waste:</p> <ul style="list-style-type: none"> (a) is a solid; (b) has stable chemical and physical properties; (c) contains no free liquid; (d) is compatible with concrete and natural barriers; (e) does not contain compressed gases; (f) contains no hazardous material, such as PCBs, infectious waste, putrescible materials; (g) contains no organic liquids or chelating agents; (h) is structurally stable and have long term compressive strength; (i) will not generate gases; (j) does not contain flammable material (excluding paper, plastics or cloth which may be included within normal radioactive waste); (k) contains less than 10 percent voidage; and (l) can be placed into a package that meets the <i>Code of Practice for the Safe Transport of Radioactive Material</i> (ARPANSA 2008). <p>Once a waste repository is established there will be clear specifications for each of these waste acceptance criteria. The repository licence could define “no free liquids” as being less than 1 percent by volume, and that a given pressure will not release result in the release of water. It might define a threshold of 100 parts per</p>	<p>Paragraph in Annex E has been modified accordingly.</p> <p>Agreed and changed.</p> <p>Accepted and changes made.</p>
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	<p>million for defining when the presence of a “hazardous material” would not be accepted. It could also define, “will not generate gases” to exclude that from normal decomposition of paper, plastics or similar material often included within radioactive waste”. “No organic liquids” could exclude minor amounts included in solid material, such as wipes.</p> <p>Comment: Minor amounts of organic liquid (for example within wipes), should be allowed provided they meet the other criteria. Many paper and plastic items generate minor amounts of gas on aging and deteriorating.</p> <p>Comment: Regarding line 1710, “does not contain flammable material” requires a qualification, as significant quantities of paper and many plastics that can burn are often included within radioactive waste. This material cannot be excluded, so flammability has to be defined for this purpose.</p> <p>Line 1738: “Standard drill rigs used for petroleum exploration can drill deep and could be theis drilling technology could be used if a borehole disposal facility is required to be deep.”</p> <p>Annex H Comment: Query whether this belongs in this document.</p>	<p>Agreed.</p> <p>Para has been changed.</p> <p>Noted, no change.</p>				
<p>06 Peter Collins (Immediate Past President), on behalf of</p> <p>Mr Geoff Roff President ANZSNM</p>	<p>The ANZSNM notes that no members of the working group contributing to the development of the Safety Guide are directly involved in the use of radioactivity in hospitals. The ANZSNM would be happy to assist ARPANSA in revising the draft (in particular Annex E) in response to submitted comments.</p> <p>Collated comments from Australian and New Zealand Society of Nuclear Medicine on ARPANSA Draft Safety Guide on Predisposal Management of Radioactive Waste (2008) - March 2008.</p> <table border="1" data-bbox="405 1222 1397 1291"> <thead> <tr> <th data-bbox="405 1222 591 1291">Page/ Clause / Line</th> <th data-bbox="591 1222 1397 1291">Comment</th> </tr> </thead> <tbody> <tr> <td data-bbox="405 1291 591 1453"></td> <td data-bbox="591 1291 1397 1453"></td> </tr> </tbody> </table>	Page/ Clause / Line	Comment			<p>Temporary storage to allow for decay to exemption levels or to levels suitable for disposal as very low level radioactive waste is within the scope of this guidance document.</p>
Page/ Clause / Line	Comment					

		<p>until the radioactivity decays enough to meet exemption levels in the National Directory for Radiation Protection (ARPANSA 2004).</p> <p>Given that this is what typically happens for Nuclear Medicine facilities, this option should be specifically mentioned in this section.</p> <p>Paragraph 1318-1325 is meant to refer to waste of higher activity than the Limits listed in Schedule 8 (limits for disposal). This is not immediately clear.</p>	<p>It is specifically mentioned in the following paragraph.</p>
	<p>Page 43 - Annexe E / 1407 - 1411</p>	<p>On segregation of bed Linen. Generally in the hospital environment, it is feasible to segregate contaminated bed linen until it reaches background levels and therefore does not have to be laundered separately. Similarly, any "linen and similar material for disposal" would usually be stored until it is able to be disposed of as non-active waste, not as radioactive waste.</p>	<p>This paragraph has been reworded appropriately.</p>
	<p>Page 43 - Annexe E/ Liquid Waste (1412)</p>	<p>This document has not defined liquid waste properly. In some sections it refers to free liquid which we gather means uncontained. The majority of (non-patient) waste in Nuclear Medicine is in liquid form but is in vials or syringes, stored in shielded containers – ie. contained. The Annex does not reflect Nuclear Medicine practice – a big part of “Medical” practice.</p>	<p>The opening paragraph has been modified and is clearer.</p>
	<p>Page 43 - Annexe E/ lines 1413- 1415</p>	<p>Line 1414 could be changed to say “free liquid” or “uncontained liquid”. It surely doesn’t mean that NM waste be collected in holding tanks!</p> <p>However, with regard to patients, does this mean that all department toilets used by patients (not just those having I131 treatment (see comment below)) should have holding tanks?</p> <p>The paragraph must be deleted as it really is meaningless for Medical practice.</p>	<p>This confusing sentence has been removed including its reference to holding tanks.</p> <p>The use of holding tanks has been clarified in the following paragraph.</p>
	<p>Page 43 - Annexe E / 1422-1424</p>	<p>This ARPANSA Safety guide should not be recommending installation of I-131 delay tank systems.</p> <p>The requirement for installation of delay tank systems for facilities undertaking I-131 therapy procedures has been a recent issue, particularly in Sydney. Despite the fact that estimated</p>	<p>This (3rd) paragraph has been changed to words provided by the RSO and Principal Scientist, Dept of PET & Nuclear Medicine at RPA Hospital.</p> <p>It is now reasonable and consistent with sound radiation protection principles that apply internationally for all facilities that deal with</p>

	<p>doses to Water facility workers have been shown to be low or negligible even in the worst case scenarios, Sydney Water has insisted that delay tanks are installed where ever inpatient I-131 therapy procedures are carried out, irrespective of facility workload.</p> <p>Significant issues have been overlooked, particularly:</p> <p>The costs, which would run into hundreds of thousands of dollars per hospital, would be a inappropriate use of public funds and non-ALARA.</p> <p>The fact that serious radiation safety issues can be created within the hospital environment. Malfunction of a delay tank system or blocking of complex pipe designs, can and has led to staff exposure and significant contamination of the facility. This is a particular risk in the case where tank systems are retro-fitted to existing premises with plumbing systems becoming complex and potentially traversing occupied areas.</p> <p>ICRP Guidance on Delay Tank Systems.</p> <p>Chapter 9 of ICRP Publication 94 (2004) Release of Patients After Therapy with Unsealed Radionuclides deals in detail with Disposal of Radioactive Waste from Therapy with Unsealed Sources.</p> <p>Firstly, this Publication reiterates a concept outlined in the general framework for radiation protection and disposal of radioactive waste from ICRP Publication 77 (1997):</p> <p>“It should be remembered that the primary aim of radiological protection is to provide an appropriate standard of protection for man without unduly limiting the beneficial practices giving rise to radiation exposure. The ICRP’s policies are based on limiting the risk of stochastic effects by all reasonable means, but not eliminating the risk entirely”.</p> <p>Specifically in relation to delay tank systems for I-131 therapy</p>	<p>radioactive materials.</p>
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	<p>facilities, it states:</p> <p>“In the UK, a multi-decade strategy (UK Department of the Environment, 2002) found that reduced discharge as a result of holding tanks at hospitals was not practical for most hospitals because of cost, the potential for exposing hospital staff, and because a significant proportion of discharges occur after patient release”</p> <p>Further, “With appropriate regulations, even without storage of urine, sewer disposal of excreta from patients diagnosed or treated with unsealed radionuclides has been shown to be well within both occupational and public radiation dose limits”.</p> <p>Also, in relation to potential doses to Water Facility workers, ICRP Publication 94 states: “ Radionuclides released into modern sewage systems are likely to result in doses to sewer workers and the public that are well below public dose limits”.</p> <p>These concepts have been recently reinforced in ICRP Publication 103 (The 2007 Recommendations of the International Commission on Radiological Protection). As ICRP Publication 60 (1990) has done in past years, ICRP Publication 103 will prescribe radiation safety practice in the next decade.</p> <p>ICRP Publication 103 states “ Publication 94 (ICRP, 2004b) comments on the use of holding tanks for the storage of urine, implying that their use is unnecessary”.</p> <p>Additionally, proceedings from a 1999 European Commission on Management of Radioactive Waste Arising from Medical Establishments in the European Union state :</p> <p>"At present delay/decay of this radionuclide is not practiced in the UK, as the low levels of radiation exposure are not regarded as warranting discharge abatement. However, where new facilities are being developed for treatment of large numbers of patients, which might lead to substantial increases in discharges of iodine 131, one of the options might be to provide the capacity to fit</p>	
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	<p>delay tanks, or other means of reducing discharges, if that were considered to be desirable in the future".</p> <p>In addition, 1422 implies that not only high dose inpatient therapy patients but also low dose outpatients (less than 600 MBq) need to use toilets with holding tanks. This is totally unwarranted.</p> <p>Page 43 - Annexe E / 1430 and 1437 (also 4.5.13)</p> <p>In the case of I-131 delay tanks, sampling of tanks contents is unnecessary and unwarranted.</p> <p>Page 45 - Annexe E / 1511</p> <p>Liquid waste isn't "treated" in Nuclear Medicine. From a Nuclear Medicine perspective, this line should be removed.</p>	<p>Corrected to apply to inpatients.</p> <p>Sentence has been altered to allow for this option.</p> <p>Agreed and changed.</p>
<p>07 Peter Collins Radiation Safety Officer Royal Adelaide Hospital and Institute of Medical and Veterinary Science</p>	<p>Thank you for giving me the opportunity to comment on the draft document. I am responsible (as RSO) for managing the disposal of radioactive waste generated within a large public hospital and also in an Institution that uses radionuclides in laboratory practice, so my comments are related to medical waste. They are of a general nature and apply primarily to Annex E.</p> <p><i>Nuclear Medicine</i></p> <p>I have contributed to, and fully endorse, the comments submitted by the Australian and New Zealand Society of Nuclear Medicine. As stated in their submission, the current draft, in particular Annex E, does not reflect current practice in relation to waste disposal in Nuclear Medicine - where most radioactive waste is either disposed of via the sewer (eg. patient urine) or is allowed to decay below regulatory limits and is then disposed of via normal waste channels. I believe that the current system is safe in relation to the handling of radioactive waste and some of the suggested changes (the use of holding tanks) are not warranted from a radiation safety perspective and would also add considerable cost to an existing department. The full definition of ALARA should apply with "economic and social considerations being taken into account".</p> <p><i>Medical Laboratories</i></p> <p>Although medical laboratories use longer lived radionuclides cf. Nuclear Medicine, the activities used are orders of magnitude lower. Consequently, most of the comments expressed in the ANZSNM submission apply also to laboratory waste –</p>	<p>Noted.</p>

	<p>ie. most waste can be either disposed of via the sewer (without holding tanks (delete line 1414)) or, for the shorter lived radionuclides, can be held in storage until the activity drops below regulatory limits – when it can then be disposed of as non-radioactive waste. As with the ANZSNM submission, liquid waste is not “treated” in laboratory practice (line: 1511. should be removed).</p>	<p>Line 1414 has been deleted and the whole paragraph modified appropriately.</p> <p>Line 1511 has been changed accordingly.</p>														
<p>08 Richard Smart Principal Physicist & RSO - St George Hospital (Dept of Nuc Med) (member of RHSAC)</p>	<p>For the record, I fully endorse the comments from the ANZSNM.</p>	<p>Noted.</p>														
<p>09 Ian Lancaster Director Water Management Natural Resource Management Division Natural Resources, environment and The Arts On behalf of NT State Government</p>	<table border="1"> <thead> <tr> <th colspan="2" data-bbox="405 611 1395 647" style="text-align: center;">Submission - Part A</th> </tr> <tr> <th data-bbox="405 647 591 684">Lines</th> <th data-bbox="591 647 1395 684">Comment</th> </tr> </thead> <tbody> <tr> <td data-bbox="405 684 591 1090">574 to 582</td> <td data-bbox="591 684 1395 1090"> <p>Paragraph 4.3.6 appears to be a key paragraph in this guide. Segregation is a means to control some risks such as chemical reactivity and toxicity. Separate shielding design is required for different types of radiation and radiotoxicity, which, by definition, includes chemical and physical properties. This paragraph needs considerable expansion and may need to be highlighted in some way. Repeating some important points is acceptable.</p> <p>Expansion of this paragraph is consistent with the scope of the guide. For example, there should be a warning on the storage of pyrophoric materials and alloys, explosive, chemically reactive or otherwise hazardous. This paragraph should refer to line 1368.</p> </td> </tr> <tr> <td data-bbox="405 1090 591 1193">575</td> <td data-bbox="591 1090 1395 1193"> <p>The exemption level appears to be adequate to characterise radiotoxicity. Categorisation into groups of radiotoxicity may be better.</p> </td> </tr> <tr> <td data-bbox="405 1193 591 1262">578</td> <td data-bbox="591 1193 1395 1262"> <p>Generalised or "safe" language should be avoided and clear guidance provided.</p> </td> </tr> <tr> <td data-bbox="405 1262 591 1366">581</td> <td data-bbox="591 1262 1395 1366"> <p>The words "better containment" should be avoided and “containment” used. The waste is either contained or is not contained.</p> </td> </tr> <tr> <td data-bbox="405 1366 591 1463">640</td> <td data-bbox="591 1366 1395 1463"> <p>The word “should” needs to change to “must”. For example, conditioning of waste is part of pretreatment and this requires labeling of waste. Appropriate labels form part of the acceptance</p> </td> </tr> </tbody> </table>	Submission - Part A		Lines	Comment	574 to 582	<p>Paragraph 4.3.6 appears to be a key paragraph in this guide. Segregation is a means to control some risks such as chemical reactivity and toxicity. Separate shielding design is required for different types of radiation and radiotoxicity, which, by definition, includes chemical and physical properties. This paragraph needs considerable expansion and may need to be highlighted in some way. Repeating some important points is acceptable.</p> <p>Expansion of this paragraph is consistent with the scope of the guide. For example, there should be a warning on the storage of pyrophoric materials and alloys, explosive, chemically reactive or otherwise hazardous. This paragraph should refer to line 1368.</p>	575	<p>The exemption level appears to be adequate to characterise radiotoxicity. Categorisation into groups of radiotoxicity may be better.</p>	578	<p>Generalised or "safe" language should be avoided and clear guidance provided.</p>	581	<p>The words "better containment" should be avoided and “containment” used. The waste is either contained or is not contained.</p>	640	<p>The word “should” needs to change to “must”. For example, conditioning of waste is part of pretreatment and this requires labeling of waste. Appropriate labels form part of the acceptance</p>	<p>Para’s 4.3.3 & 4.3.6 have been expanded as suggested (and additional para 4.3.7 added).</p> <p>Noted.</p> <p>Agreed and changed.</p> <p>Noted.</p>
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criteria for longer-term storage.

Submission – Part B

PURPOSE

To provide comments on the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) draft *Safety Guide for the Predisposal Management of Radioactive Waste* (the Safety Guide).

BACKGROUND

The Safety Guide has been prepared to help regulators, persons responsible for facilities that generate and manage (low and intermediate level) radioactive waste and other specialists comply with regulatory requirements.

It provides guidance on actions, conditions and procedures for managing radioactive waste. The information is advisory in nature, and does not include regulatory requirements. The document acknowledges that alternative measures and methods are acceptable if they provide a level of safety and effective control equal to or better than what it subscribes.

The recommendations of several International Atomic Energy Agency (IAEA) documents, such as the *Predisposal Management of Radioactive Waste, including Decommissioning* (2000), were considered during the drafting process. The Safety Guide outlines a best practice approach to achieve international safety requirements and closely resembles the IAEA's *Predisposal Management of Low and Intermediate Level Radioactive Waste Safety Guide* (2003).

The predisposal management of waste includes all activities in the management of waste, from its generation up to storage or disposal at a designated facility. This includes pre-treatment, treatment, conditioning, storage and activities in preparation for transport such as characterising the waste or waste package. These activities can take place at the facility where the waste is generated or at a secondary location.

In May 2006, the Northern Territory Government (NTG) provided comments to ARPANSA on the draft *Regulatory Guidance for Radioactive Waste Management Facilities: Near Surface Disposal Facilities and Storage Facilities*, which is one of the more prescriptive documents pertaining to the management of radioactive waste. At this time, the NTG stressed the following:

	<p>1. Access The provision (and maintenance) of reasonable networks to facilitate “access for the transport of materials and equipment during construction and operation and for the transport of waste packages onto the site” needs to be clearly defined in terms of cost recovery for the jurisdiction where the waste facility is built.</p> <p>2. Security The potential for terrorist or sabotage activity is plausible and should be considered in greater detail, especially given the level of public interest in the nomination phase of the facility.</p> <p>Further expansion of the requirement to adequately secure the store against malicious damage, as well as the development of contingency planning by the proposed operator must be included, pursuant to outcomes of the draft <i>Code of Practice on the Security of Radioactive Sources</i>.</p> <p>3. Community Consultation In order to manage what is an acceptable level of risk and effectively communicate contingency planning in the event of a crisis, a high degree of public/government consultation and education must form part of the intrinsic operation of the facility.</p> <p>CURRENT SITUATION</p> <p>The disposal of radioactive waste in Australia is a contentious issue because of the perceptions of risk associated with transport of waste to any repository, its storage, and the potential impacts on people and the environment.</p> <p>The Northern Territory (NT) currently has one radioactive waste storage facility at the Royal Darwin Hospital. In addition, several locations in the Territory are being investigated as potential sites for the Commonwealth Radioactive Waste Management Facility.</p> <p>The Safety Guide is a technical document. The processes and codes it suggests are not analysed here due to lack of expertise in the area. However, questions and issues of a non-technical nature arising from the draft Safety Guide include:</p>	<p>Submission & comments noted.</p>
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<p>NT Capability to Meet International Safety Standards for the Predisposal Management of Radioactive Waste</p> <p>Given that the Safety Guide is based on IAEA best practice, it is reasonable to expect that the content will be generally well received. However, the following questions arise:</p> <ul style="list-style-type: none"> • Does the radioactive waste storage facility at the Royal Darwin Hospital meet international safety standards? Does the facility or its operational procedures need to be upgraded? • Are the measures outlined in the Safety Guide feasible? Does the NT have the resources to implement the recommendations? For example, does the NT have the local capacity and institutional expertise to foster and maintain a culture of safety as recommended by the draft Safety Guide (paragraph 2.1.4)? <p>If the Commonwealth Radioactive Waste Management Facility is built in the Northern Territory, it is expected that the waste will arrive appropriately packaged for disposal or storage. Minimum handling by a small number of staff would be required. In this case, the recommendations of the draft Safety Guide will have limited applicability to the operation of the facility.</p> <p>Nonetheless, issues of safety are relevant and may be affected by the facility’s remote location and subsequent small population base. The requirement for the highest level of safety and risk management in the facility means that it is of paramount importance that capacity building and institutional development occur to foster and maintain a culture of safety as recommended by the draft Safety Guide (paragraph 2.1.4)</p> <p>The remote location of the facility must also be taken into consideration in its safety management plan. The draft Safety Guide states that a safety assessment report “could include a description of the components of the facility, the site and surrounds relevant to the management of the waste to be processed or stored in the facility” (paragraph 2.5.5). This is necessary as prescribed safety mechanisms may not adequately address the unique challenges posed by a facility located in a remote part of the NT.</p> <p>Security In recognising that this is a safety guide, the document should address security issues for site operators.</p>	<p>These are questions for NT Health</p> <p>The need for the Safety Assessment to address the unique features of a remote location facility have been emphasised in the paragraph (now 2.4.5).</p> <p>Security is mentioned in the Management System para’s 2.5.1, 2.5.2, also 3.1.2, 4.3.3, 4.4.4, 4.5.1, 4.5.4 and</p>
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	<p>Transparency and Accountability The Safety Guide also recommends the establishment of an audit program to “verify that the requirements of the management system are being met, procedures are being followed and the correct records being kept” (paragraph 2.6.10). However, it does not address transparency and accountability mechanisms, including who the audits will be reported to and how to keep the community informed of audit results.</p> <p>Community Consultation The draft Safety Guide does not address community consultation, an issue previously raised by the NTG. In recognising that the Safety Guide is focused on waste management and not on the management of a waste facility, it is nonetheless important to stress that public acceptance of proposed new repositories is low. Community sensitivities to radioactive waste means Australia has found it difficult to resolve its waste issues despite the small amount of material involved. Given this, ARPANSA publications should seek to address community expectations.</p> <p>CONCLUSION</p> <p>The main issues raised by the Department of the Chief Minister in relation to the draft Safety Guide are:</p> <ul style="list-style-type: none"> • NT local capability and resource to meet international safety standards for the predisposal management of radioactive waste, and how this capability will be developed within the NT; • potential risk for terrorist and sabotage activity, and protection from malicious damage; • transparency and accountability of safety performance; and • the document’s need to address community expectations. 	<p>throughout the Annexes.</p> <p>Para 2.6.10 (now 2.5.10) has been amended along the lines suggested.</p> <p>The Safety Guide does not address comprehensively the issues related to the siting of a waste facility. It deals with the technical aspects of the management of radioactive waste.</p> <p>Issue for NT Health in first instance.</p>
<p>10 Russell Booth Secretary Victorian Society of Nuclear Medicine Technologists Inc</p>	<p>Thank you for the opportunity to comment on the ‘Predisposal Management of Radioactive Waste 2008’ draft safety guide. The majority of this document is outside our area of expertise, however the management of laboratory and medical waste does impact on nuclear medicine technologists. Rather than detailed notes on each paragraph we have made some general comments for consideration.</p> <ul style="list-style-type: none"> • As a general principle we would recommend that technologists not be required to increase their radiation exposure performing monitoring and segregation manoeuvres that have no significant benefit. As the guide states, an 	<p>Noted, specific issues already addressed in response to ANZSNM submissions.</p>

	<p>understanding of the generation process for waste allows technologists to plan for effective disposal. Unnecessary monitoring and labelling should be discouraged.</p> <ul style="list-style-type: none">• Occasionally waste generated by nuclear medicine facilities contains both radioactive and biologically hazardous/infectious materials. Our group would appreciate more definitive guidelines on what is best practice in these circumstances. How do we dispose of blood products that are both infectious and radioactive. Keeping the waste until the radioactivity decays to safe levels has a significant downside. It means we produce putrescent materials which pose problems for our colleagues charged with disposing of infectious materials.• Similarly we produce waste that is both radioactive and highly flammable. Definitive guidelines on how to dispose of ¹⁴C contained in flammable materials would be useful to our group.• Any guidelines pertaining to patients treated with radioiodine directly impacts on our group. Keeping radioactive urine in bottles increases radiation exposure to technologists and any recommendations on this matter should have a clear, obvious benefit. The risks to the community as a result of disposing of urine directly into the sewage system should be convincing. Only then can we reasonably ask technologists to increase their radiation exposure by storing the urine.• The issue of holding tanks needs similar evaluation. While they provide a contained process to manage the storage and disposal of radioactive urine, they do have negatives.<ul style="list-style-type: none">o They are extremely expensive to install. Most hospitals currently providing these treatments would not be prepared to incur this expense for the relatively small number of patients that would utilize the facility. As a consequence, patients access to treatment would be limited to a very small number of sites. We would be concerned about the impact on patients requiring radioiodine treatment.o The radiation exposure to staff already occupationally exposed is increased if the facility has holding tanks. Additional manipulation of radioactive urine is to be avoided unless there is significant benefit.o Holding tanks have the potential to leak or malfunction and could be inadvertently accessed by unauthorised staff.	
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	<p>We would like to be assured that some analysis of the costs, benefits and risks of holding tanks compared to direct sewage disposal of these materials with appropriate dilution has been performed.</p> <p>A specific comment regarding Annex E; line 1422. This sentence could be interpreted in two ways. If it means that patients undergoing radioiodine treatment should use one specific toilet, then we would agree. If it means a single room with a toilet can only be used by radioiodine therapy patients and must remain unoccupied between these patients, then we would consider this unnecessary. Single rooms within hospitals are a valuable resource and if monitored and decontaminated correctly are safe to use for other patients.</p> <p>We are conscious of the need for strict guidelines in these matters however, as an underlying principle, the guide should reflect ALARA principles. We would need to be assured that our members were not subjected to additional radiation exposure for questionable benefits.</p> <p>Thank you for the opportunity to comment on this guide.</p>	<p>Agreed and modified accordingly.</p>
<p>11 Dr Barbara Shields, MARPS Senior Health Physicist Department of Health and Human Services Tasmania</p>	<p>General:</p> <p>The document contains a lot of useful information about dealing with various types of radioactive wastes but may need some modification once a classification scheme is further developed, particularly if the scheme addresses operational aspects.</p> <p>The document does not seem to take into account situations where waste processing (4.4) will be managed at different locations but this could be commonplace e.g. for centralised storage in a location different from that in which the waste was generated (Esk, in Queensland is one example) and central conditioning facilities. Thus, the three stages mentioned in 4.4.1 could be interspersed with “storage” and “transport” within and between stages.</p> <p>Security is dealt with somewhat erratically throughout the document. It is mentioned here and there but only addressed, minimally, in Annex D.</p> <p>There is no glossary in the document. Thus, some terms such as “low and intermediate level” have assumed meaning. A reference to the source of the term should be provided, at least. Other terms such as “source” and “type” and “amount” (of waste) are used with multiple meanings in the text. Cross-referencing to</p>	<p>Noted</p> <p>Para 4.4.1 has been modified to allow for this possibility.</p> <p>Para 4.5.23 has been added including ref to Security Code</p> <p>RHC is separately developing a classification system for radioactive waste.</p>

	<p>explanations in the Annexes may help.</p> <p>The terms “risk” and “hazard” seem to be used somewhat loosely in the document.</p> <p>More specific points:</p> <table border="1" data-bbox="405 304 1379 1129"> <thead> <tr> <th>Page/Section</th> <th>Comments</th> </tr> </thead> <tbody> <tr> <td>Page 8, S1.3.1</td> <td>“Compliance with regulatory requirements” is seen here as the primary goal. To my mind, this equates with an early development stage in an organisation’s safety culture. Thus, I would prefer this to be 1.3.3 and put the current 1.3.2 and 1.3.3 ahead of it.</td> </tr> <tr> <td>Page 9, S1.4.4</td> <td>This may be the ultimate aim but other, intermediate goals, such as making the waste safe for storage and addressing security issues also need consideration.</td> </tr> <tr> <td>Page 9, S1.6.1</td> <td>Again, the emphasis is on complying with regulatory requirements.</td> </tr> <tr> <td>Page 11, S2.3.2</td> <td>Why should a storage facility not have a waste management plan? It may be very straightforward but it could still have one.</td> </tr> <tr> <td>Page 22, S4.3.6</td> <td>Security issues could be considered here.</td> </tr> <tr> <td>Page 24, S4.4.7 (c)</td> <td>What is meant by “area”? Is it a physical location or e.g. “industry”, “research”?</td> </tr> <tr> <td>Page 25, S4.5.3(c)</td> <td>Does the word “sources” here mean “locations”?</td> </tr> <tr> <td>Pages 34, 35, Annex C</td> <td>This does not seem to advocate keeping radioisotopes, e.g. Co-60 and Am-241, separate. Line 1078: “quantity” is vague – is it “volume” or “activity content” or something else? Also confusion about “gauge” and “housing”.</td> </tr> </tbody> </table>	Page/Section	Comments	Page 8, S1.3.1	“Compliance with regulatory requirements” is seen here as the primary goal. To my mind, this equates with an early development stage in an organisation’s safety culture. Thus, I would prefer this to be 1.3.3 and put the current 1.3.2 and 1.3.3 ahead of it.	Page 9, S1.4.4	This may be the ultimate aim but other, intermediate goals, such as making the waste safe for storage and addressing security issues also need consideration.	Page 9, S1.6.1	Again, the emphasis is on complying with regulatory requirements.	Page 11, S2.3.2	Why should a storage facility not have a waste management plan? It may be very straightforward but it could still have one.	Page 22, S4.3.6	Security issues could be considered here.	Page 24, S4.4.7 (c)	What is meant by “area”? Is it a physical location or e.g. “industry”, “research”?	Page 25, S4.5.3(c)	Does the word “sources” here mean “locations”?	Pages 34, 35, Annex C	This does not seem to advocate keeping radioisotopes, e.g. Co-60 and Am-241, separate. Line 1078: “quantity” is vague – is it “volume” or “activity content” or something else? Also confusion about “gauge” and “housing”.	<p>Noted for review prior to publishing</p> <p>1.3.1 and 1.3.2 have been swapped, and “The purpose” changed to “A purpose”.</p> <p>Para’s 1.4.3 and 1.4.4 have been changed accordingly.</p> <p>Noted.</p> <p>Agreed and changed.</p> <p>Comment on security added to 4.3.3.</p> <p>Changed (ditto line 1311, Annex D).</p> <p>Changed to locations.</p> <p>Addressed by additional line, end of 1st section.</p> <p>Agreed and addressed.</p>
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<p>12 Dr Joseph Wong President, ANZAPNM</p>	<p>This letter is in response to the Draft Safety Guide for the Predisposal Management of Radioactive Waste. The ANZAPNM has concerns regarding several specific requirements stated below within Annex E, Management of Laboratory and Medical Waste.</p> <p><i>“1422 Toilets used by patients being treated with radioiodine should be clearly marked and 1423 only used by those patients. The effluent from these toilets should be connected to a</i></p>	<p>Noted, specific issues already addressed in response to other ANZSNM submissions.</p>																		

1424 holding tank system and be monitored before discharge to the sewerage system.”

These statements do not differentiate handling of effluent from patients with high dose I-131 for cancer treatment and low dose I-131 (below 600 MBq) for treatment of thyrotoxicosis. The treatment of thyrotoxicosis in Australia does not exceed 600 MBq as effective treatment does not require doses higher than this and this treatment is routinely provided as an outpatient procedure.

In accordance with the document produced by ARPANSA, Discharge of Patients Undergoing Treatment with Radioactive Substances, Radiation Protection Series No.4, in Annex 2, titled Maximum Activities of Radionuclides in Unsealed Forms which may be Administered to Outpatients, the maximum activity listed for I-131 is 600 MBq. Therefore, I-131 for treatment of thyrotoxicosis should not be relevant and should be specifically excluded from the requirement for a holding tank system to be in place. Indeed, a large proportion of I-131 treatment of thyrotoxicosis is undertaken in suburban nuclear medicine facilities. Given the sporadic use of the toilet facilities by patients post-treatment while in the nuclear medicine facility, and with the majority of excretion occurring after patient release from the facility, installation of holding tanks at the nuclear medicine facility is unwarranted and unrealistic.

Even for high dose therapy I-131 doses, any requirement for holding tanks is not supported by ICRP 94 (2004) and appears contrary to the principles of ALARA, where economic and social factors need to be taken into account.

To mandate installation of holding tanks for I-131 therapy will result in:

1. high unwarranted installation costs;
2. reduction in the number of facilities performing I-131 therapy with the consequent detriment to the patients requiring this treatment. Patients will encounter delays in treatment or will need to travel long distances for treatment at facilities that have holding tanks;
3. concentration of I-131 within effluent at the limited number of facilities with holding tanks. This poses significant radiation exposure hazards when pump malfunction or pipe blockage occurs; and
4. concentration of I-131 therapy work in limited facilities with increased radiation exposure to nuclear medicine and ancillary staff at these facilities, as

	<p>well as members of the public in businesses in and around these facilities.</p> <p>The realistic and practical balance of benefits and risks is stated by the ICRP in the following: <i>“the primary aim of radiological protection is to provide an appropriate standard of protection for man without unduly limiting the beneficial practices giving rise to radiation exposure. The ICRP’s policies are based on limiting the risk of stochastic effects by all reasonable means, but not eliminating the risk entirely”</i>.</p> <p>In relation to delay tank systems for I-131 therapy facilities, ICRP states the following:</p> <p><i>“In the UK, a multidecade strategy (UK Department of the Environment, 2002) found that reduced discharge as a result of holding tanks at hospitals was not practical for most hospitals because of cost, the potential for exposing hospital staff, and because a significant proportion of discharges occur after patient release”</i></p> <p><i>“With appropriate regulations, even without storage of urine, sewer disposal of excreta from patients diagnosed or treated with unsealed radionuclides has been shown to be well within both occupational and public radiation dose limits”</i>.</p> <p><i>“Radionuclides released into modern sewage systems are likely to result in doses to sewer workers and the public that are well below public dose limits”</i>.</p> <p>In reference to the paragraph below:</p> <p><i>“1318 For waste containing short-lived radionuclides, it may be feasible to store the 1319 material to allow the radioactivity to decay to activities such that they meet proposed 1320 requirements and limits in Schedule 8 of the National Directory for Radiation 1321 Protection. Radioactive waste held for decay should be kept in secure stores and each 1322 container should be clearly labelled with a description of the radioactive contents, the 1323 activity when stored, the anticipated date when it may be released from the store and 1324 the name of the person responsible for placing it in the store. An accurate inventory 1325 of all containers and their contents in the store at any time should be maintained.”</i></p> <p>the feasibility of storing short-lived radionuclides to allow decay is important in nuclear medicine. However, the requirement for labelling of containers with short-lived radionuclides is excessive. It should suffice to have the date of storage labelled. Other information such as the stored activity for short-lived radionuclides in medical use would only serve to increase the radiation exposure of staff</p>	<p>The para on labelling has been modified accordingly.</p>
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	<p>measuring and labelling the activity without any perceived benefits as decay to disposal time is relatively short.</p> <p>I also wish to reiterate the ANZAPNM's concerns raised in the previous letter to Dr John Loy, the Chief Executive Officer of ARPANSA, dated 22 November 2007, on a related issue which is Sydney Water's proposal for decay tanks to be required for nuclear medicine facilities based on a report commissioned from ARPANSA.</p> <p>Our concerns remain that:</p> <ol style="list-style-type: none"> 1. the ARPANSA Report was not reviewed by the Medical Radiation Branch of ARPANSA prior to its provision to Sydney Water; 2. there are many errors in this report, including errors in relation to the use of I-131, the radiopharmaceutical that this document specifically attempts to address; and 3. Sydney Water is pursuing a course of action to require all nuclear medicine facilities to install holding tanks without having undertaken monitoring to establish whether, in fact, a problem truly exists, as identified by HURSOG in its letter to Sydney Water. <p>The Draft Safety Guide in its current wording would compound the erroneous decision by Sydney Water to have decay tanks in nuclear medicine facilities, as well as having wider implications in the other States. We request ARPANSA review the Draft Safety Guide to reflect the scientific consensus of the ICRP while acknowledging the principles of ALARA in dealing with the issue of discharge of I-131 and publish the findings of such a review to all interested parties.</p>	
<p>13 ALAN RITCHIE A/Manager Hazardous Materials and Radiation Environment Protection and Regulation Group, Dept of Environment &</p>	<p>I refer to your invitation of 22 January 2008 to comment on the Draft Safety Guide for the Predisposal Management of Radioactive Waste (2008). The Department of Environment and Climate Change (DECC) in consultation with the NSW Radiation Advisory Council has reviewed this document and provides a number of general and specific comments as an attachment to this letter. I apologise for the delay in responding.</p> <p>The DECC supports the development of this non mandatory safety guide as a set of best management practices for industry use. The DECC's main comments are concerned with the scope of the document and how it is to dovetail with other documents currently being developed at the national level. The DECC also considers that further editorial work is required to remove unnecessary repetition</p>	<p>Comments noted.</p>

<p>Climate Change NSW</p>	<p>and ensure the tone is consistent with that of a safety guide.</p> <p style="text-align: center;"><u>Comment on the Safety Guide for the Predisposal Management of Radioactive Waste</u></p> <p>General comment</p> <p>The Safety Guide for the Predisposal Management of Radioactive Waste (the Safety Guide) is designed to be advisory and is not intended to contain mandatory requirements. The DECC supports the development of the guideline as a set of best management practices for industry to refer to when considering long term storage and the predisposal management of radioactive waste.</p> <p>The information in this document can also be used by regulatory authorities as the basis for setting of licence/registration conditions. However it is the regulators' responsibility to determine the nature and extent of regulation after careful consideration of the cost effectiveness of options. Recommendations regarding what the regulator should do in certain circumstances are not appropriate in a non-mandatory document such as this and should be removed.</p> <p>The document needs editorial work to remove duplication within the document and ensure plain English is used throughout. There also needs to be further consideration of the way in which the safety guide will dovetail with other material currently under development at the national level, in particular the disposal limits proposed in the amendments to the <i>National Directory of Radiation Protection Edition 1</i> and the <i>Classification of radioactive waste in Australia</i>.</p> <p>The scope of the Safety Guide should also be limited to issues concerning pre-disposal management. For instance, discussion of possible specifications for the future waste repository and the possible disposal of radioactive material in deep boreholes are contentious issues and warrant extensive appraisal. The inclusion of such material in the Safety guide suggests its prior endorsement as a 'best management' practice'. This is certainly premature.</p> <p>Specific Comments</p> <p><u>Introduction</u></p> <p>Clause 1.4.1 line 52 Suggest that "short half-life" would be a more appropriate term</p>	<p>Noted</p> <p>It is intended to be an advisory document, rather than mandatory. RHC , which includes all jurisdictions has agreed to the Guide.</p> <p>Dovetailing needs to be adequately addressed during the editorial stage.</p> <p>It is not inappropriate to include a brief generic reference to suitable disposal options for different types of waste.</p> <p>"low level" has been removed.</p>
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	<p>than “low level”</p> <p>Clause 1.4.4 This clause states that “Requirements for disposal in a near-surface facility can be found in the Code of Practice for the Near-Surface Disposal of Radioactive Waste in Australia (NHMRC 1992)”. Until a Code is put on the National Directory for Radiation Protection there is no obligation for jurisdictions to pick up its requirements. It is suggested that the word ‘requirements’ is replaced with the word ‘recommendations’.</p> <p>1.4.5 This clause states that the “limits for such waste discharge and tip disposal are proposed to be included in the National Directory for Radiation Protection”. It is suggested that a non-mandatory Safety Guide should not pre-empt what will be included in the NDRP.</p> <p><u>Protection of Human Health and the Environment</u></p> <p>2.5.6 To improve readability the following changes are suggested:</p> <ul style="list-style-type: none"> • Move point (j) to before point (h), • Combine the first phrase in point (i), with the changes shown, to the end of point (h), (letters added are in italics and letters removed are shown ‘struck out’) ‘If the <i>results of the</i> safety assessment does not meet the safety criteria’. • Move the following from point (i) and place it as a concluding paragraph with the following changes, “Then these results of the assessment should be used to determine whether more accurate modelling, changes to facility design, changes to operating procedures <i>etc. can be implemented to meet the safety criteria</i> or whether the proposal should be abandoned. Sensitivity and uncertainty analyses may identify the parameters that most affect the results of the safety analysis. Preparation of a safety assessment may be an iterative process, performed until a facility design and operational system can be demonstrated to meet all safety requirements”. <p>2.6.4 In this clause it states that the “management system should meet the international quality management standard ISO 9001 (2000) and the IAEA safety requirements for management systems for nuclear facilities and activities (IAEA 2006a)”. As these are very onerous requirements it is suggested that ‘should’ be</p>	<p>No change.</p> <p>Noted, no change.</p> <p>Agreed and done.</p> <p>No change.</p> <p>Agreed and phrase added.</p> <p>Modified accordingly.</p>
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	<p>replaced with 'could'.</p> <p>2.6.5 This clause outlines the information a management system should address. It is suggested that training is specifically stated too.</p> <p><u>Elements of Predisposal Management of Radioactive Waste</u></p> <p>4.3.4 The sentence regarding the rounding of half-lives to meet the Near-Surface Disposal Code (NRMRC 1992) is unnecessarily confusing. Suggest the reference to rounding is omitted or alternatively placed in a footnote with additional clarification.</p> <p>4.4.8 This clause lists 'neutron detectors' as examples of devices containing higher levels of long-lived alpha emitters. Was 'neutron sources' instead of 'neutron detectors' meant?</p> <p>4.5.22 This clause should include the need for a pre-operational background survey of the local environment. There could be other sources in the area or unusually high natural background levels. If these are not detected before the disposal site starts operating there will be confusion in later environmental surveys.</p> <p><u>Annex E</u></p> <p>Line 1335 refers to 'specific radioactivity concentration'. It is becoming more and more common for people to use the term 'Specific Activity' when they mean activity concentration. (Specific Activity is the activity concentration of the pure radionuclide, calculated from its half-life.) In line 1335 'specific radioactivity concentration' should be replaced with 'activity concentration'.</p> <p>Lines 1373-1375. It is suggested that this paragraph would be better placed as the second paragraph of 'Pre-treatment'.</p> <p>Lines 1463-1465. This sentence refers to the treatment of liquid waste but it is unclear what is meant. For liquid waste streams evaporation concentrates the radionuclide unless it has a very low boiling point. It is the liquid or gas that is removed while the radionuclide is generally retained in the solids.</p> <p><u>Annex F</u></p> <p>Lines 1601-1611 refer to the application of the Mining and Milling Code of</p>	<p>Agreed and completed.</p> <p>No change.</p> <p>Changed "neutron detectors" to "neutron sources".</p> <p>Agreed and incorporated in an additional paragraph.</p> <p>"Specific radioactivity concentration" has been replaced by "activity concentration".</p> <p>Agreed and done.</p> <p>Agreed and modified.</p> <p>Agreed and done.</p>
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	<p>Practice. To avoid confusion the ‘but it’ in line 1609 should be replaced with “but the Mining Code”.</p> <p>Lines 1653-1654. Increasing the density of the waste does not on its own reduce the volume of the waste. Mention could be made that separating out some of the non-radioactive components of the waste will reduce the volume. But it should also be noted that this would increase the activity concentration of the material which may or may not be an advantage. Also the separation procedure might be difficult or expensive and might be an additional source of exposure to the workers carrying out the separation. Is there a real life example of where this strategy would be used?</p> <p><u>Annex G</u></p> <p>The lines 1715-1718 are very vague. Their interpretation is further clouded by the use of ‘parts per million’ units rather than Bq/g and the phrase ‘will not release in the release of water’. It is suggested that these lines are revised.</p> <p>In the context of this Safety Code providing best management practices on predisposal, the addition of the material on the Deep Borehole Facility incorrectly suggests that the disposal of solid radioactive waste in holes drilled by standard drill rigs is agreed ‘best practice’ for deep burial disposal. Discussion should be limited to the likely waste acceptance criteria for deep burial.</p>	<p>Agreed and modified.</p> <p>Revised accordingly.</p> <p>Noted.</p>
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