Form for Comments
Radiation Safety in the Use of Sources in Research and Education (DS470)

COMMENTS BY REVIEWER				RESOLUTION			
Country/ Org	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
Ecuador	General	It is considered that they have a language and structure appropriate to the specialized knowledge on ionizing radiation. Therefore, no observations are presented in the text of the document in question.		A			
France	General	1. The Scope of the document could be clearer: schools end education is well delimited but research is broad. Academic research conducted in universities or public research dedicated bodies is clearly in the scope. **But limits should be clear for medical research (pre clinical only ?) and perhaps also for research in industrial facilities, such as pharmaceutical or oil industry**. 2. Handling of exempted sources is possible without license and perhaps without proper training or radiation safety officer if total amount remain in exemption scope. Of course, serious accidents are unlikely, but detection of problems or contaminations could be seriously delayed (for example, a laboratory handling only 500 MBq of tritium or 2 kBq of Am, with recurrent contaminations of work space due to poor procedures and absence of detection means). **Perhaps include as good practice a minimal list of recommendations (adapted to source nuclide) joined by suppliers to documentation sent with any source they sell (as it is already done for devices and X-ray tubes)? Insist on the fact that documentation should be kept for long term and given with source if given to other user.** 3. Problematic of "waste" qualifier and clearance levels, which is highly sensitive and country dependant - **should be made more versatile.** 4. Considerations on gestion of past and historical is a recurrent problem in research and **should be addressed in the document.** 5. 3.5 and 3.6: maybe these paragraphs should be either 3.4 and 3.5 (3.4 becoming 3.6) or should be at the end of the sealed sources section. Present 3.4 as well as 3.7 to 3.10 are example of uses and perhaps better together. Iso standard, leak tests and special form apply to all types of sources.		A	1. New Annex on medical education is added as per RASSC decision. 2.References on exemption concepts is added in Section 4. 3. Not clear 4. Added in paragraph II-5 5. Accepted. 6. Not clear about the suggestion. Why only old schools?		

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		6. Annexe I: **a paragraph dedicated to sources often found in old schools could be useful** (radium, sources for cloud chambers, spinthariscope…).					
Hungary	General	After review by the competent institutions, Hungary doesn't want to make any comment.		A			
Israel	General	**General remark relevant for the whole document** concerning mainly students of age less than 18: The document deals with research facilities and educational institutes, both of which cover a large variety of possible kinds. We want to suggest to refine the issue of the radiation protection guides relevant to students, un particular those of age less then 18. The guide includes that information in its various sections: Section 2 (mainly paragraphs 2.20 and 2.24), section 4 (mainly par. 4.29), section 7 (mainly paras. 7.74-7.75), section 9 (par. 1) and in Annex I (mainly in paras. I-6 and I-7). Considering the high importance of emphasizing the radiation safety for those of age less than 18, and to assure consistency of that issue throughout the document, it could be much more effective for the users of this guide to find in the guide some kind of summarizing table which refers specifically to those under the age of 16, apprentices aged 16 to 18, students aged 16-18 and those of age above 18 (being casual/intermittent users of radiation sources or being defined at the occupational level).	completeness		A Modified para 2.22. Guide do not classify below 16 and above 18 ages. Guide specifies students and workers for the purpose of radiation protection. (see also Japan comments)		

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Japan	General	It would be helpful to provide definitions, including age ranges, for each of the following categories used in this Safety Guide: secondary school, undergraduate, graduate, and postgraduate.	For clarification Given that different countries have different education systems depending on their circumstances, it might be difficult to identify the classification of students which corresponds to "secondary school", "undergraduate", "graduate", and "postgraduate".	A			
Pakistan PNRA	General	Section 8 of Safety Guide describes requirements for decommissioning of radiation sources. Therefore, it is suggested that specific requirements relevant to commissioning activities of sources may also be included. The commissioning requirements may be added under any suitable section (existing or new) of the draft standard. Some of the commissioning requirements are as under: i. The commissioning process of the radiation sources should be clearly described encompassing measurement range, target, method, the device used and the results. This data should commensurate with reference data provided by the manufacturer ii. Base line values should be established against which performance will be	Some radiation facilities such as Particle Accelerators in R&D, Irradiators used in Agricultural Research, Nuclear Medicine/ Radiotherapy centers intended for research activities on animals etc. undergo a comprehensive set of commissioning requirements before their operation. Therefore, it is pertinent to include requirements relevant to commissioning activities just like the requirements already included regarding decommissioning of sources. References i. Medical Accelerator			R	The suggestion is beyond the scope of the safety guide. Practice specific safety guides are already available for instance, GSG-11, GSG-13, SSG-8, SSG-11, SSG-57, SSG-58, SSG-59 etc.

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		compared in the future as part of the ongoing quality control program iii. Verification should be carried out that equipment is operating within the specified tolerances. iv. Possible risk management items in the process of measuring beam data and various parameters needed for beam modeling should be documented during commissioning process. In beam data measuring, "2 person rule" should be implemented.	Safety; TG-35 (1993) ii. Comprehensive Quality Assurance; TG-40 (1994) iii. Code of Practice for Accelerators; TG-45 (1994) iv. Quality management and quality assurance standards, ISO 9000 (1994)				
Tanzania		**1. General:** As is for other IAEA Safety Guides, DS470 provides a guidance on how to meet the requirements of GSR Part 3 during the use of radiation sources in research and education. The document is structured as in other similar IAEA documents. The chapters have been written on basis of Information published in previous IAEA document on radiation protection and safety matters. Information in DS470 will serve also for outreach purposes. Therefore, the publication of document is timely and will promote fulfillment of GSR Part 3 requirements. **2. Specific:** (a) In the document, Radiation Protection Officer (RPO) and Laboratory Radiation Protection Officer (LRPO) are indicated. While the responsibilities of RPO are well familiar and adopted in many national legislation/regulations, those of LRPO may not be familiar clear. However, the importance of LRPO is acknowledged. The assumption is that LRPO will report to RPO or work under him/her. The DS470 appears to be silent on this. It is proposed to add a sentence that LRPO *should work under* RPO to avoid potential confusion. (b) Typical local rules are given for safe handling of unsealed sources exposure, sealed sources and of radiation generators. This is commendable for promoting a desirable the term as a component of radiation protection programme. Experience has shown that focal rules are		A A Modified para 4.27 A			

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		not well understood in practice. **3. Conclusion:** Comment 2(a) needs serious consideration. Otherwise the publication process of DS470 should proceed.					
UK	General Comments	Nothing significant to add – as it seems to cover everything. Although, when referring to "Management Systems" they only refer to Quality Management e.g. ISO 9001. From an environmental perspective, it would be useful to reference other international standards like: • ISO14001 Environmental Management Systems • OHSAS 45001 Health and Safety • ISO27001 information security Just for info, we have the UK CLEAPSS Guidance (which is the UK Schools guidance on rad safety) so not sure if they have been consulted? They may need to revise their guidance which was last done in 2019. http://science.cleapss.org.uk/Resource-Info/L093-Managing-Ionising-Radiations-and-Radioactive-Substances-in-Schools-and-Colleges.aspx		A			
Russia SEC-NRS	Title of DS 470	Radiation Safety ~~in the Use~~ of ***Radiation*** Sources ***Used*** in Research and Education	A small clarification of the Title of DS 470 according to the Section 3 of DS 470.				Title will be fixed at final editing by Standards Specialist.
Spain	Background	Consider to include next reference: IAEA-TECDOC-1528: *Organization of a Radioisotope Based Molecular Biology Laboratory (2006)*				R	As there are many such practices it may not be appropriate to add this ref.
Libya	P3 the scope	The scope of this Safety Guide covers the following aspects: (a) Radiation protection and safety aspects of the use of X ray.. (b) Exposure of students and workers … (c) Exposure of volunteers for the purposes of biomedical research ..	IAEA format.	A			This will be fixed in final editing.

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		(d) Requirements relating to the protection of students and research workers … (e) Information on the need for appropriate nuclear security measures …					
Mexico	1.5	Occupational radiation protection can be found in IAEA Safety Standards Series No. FSG-7, Occupational Radiation Protection [9]. Recommendations on the protection of the public and the environment are provided in ~~in~~ [IAEA Safety Standards Series No. GSG-8, Radiation Protection of the Public and the Environment [10]. Requirements and recommendations for radiation protection in emergency exposure situations are provided in Refs [11-14]	Editorial correction.	A			
Pakistan PAEC	1.7	It provides guidance on the control of occupational exposure and of public exposure *for planned & emergency situations* and on safety measures specific to this practice.	The addition in the text is proposed for completeness and clarity. As section 11 also provides guidance on emergency preparedness and response.	A			
Libya	1.9/2	Add: and radioactivity waste generation	Addition needed			R	Protection and safety are more generic and covers all those aspects.
Mexico	1.14	…The preparation of a safety assessment is covered in Section 5. Section 6 provides recommendations on the design of facilities, laboratories and equipment and sources	The title of the section 6 is "Design of facilities, laboratories equipment and sources"	A			This will be fixed in final editing.
Mexico	1.14	Section 8 provides recommendationson the discharge of radioactive material from laboratories, ~~and on~~ the management of		A			

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		radioactive waste, **and decommissioning.**					
Japan	1.15/line 1	In the use of radiation sources in secondary schools, different circumstances from those in other educational institutions are expected, such as the age of students who may be exposed to radiation and the level of exposure, therefore Annex-I provides guidance on the use of sources in secondary schools.	For clarification In the current draft, it is not clear why protection of students in secondary schools is particularly addressed in the Annex, and this should be clarified in the main part of this Safety Guide by developing an appropriate sentence.		A		
Libya	2.6/	Add: and transportation- should be considered	Addition needed	A			
UAE	2.7.-b/7	performance to define corrective actions, **records keeping** and setting new objectives;	Records keeping should be added since documentation is important, as appropriate, for future accountability.	A			
Pakistan PNRA	2.8	The process of optimization **of protection and safety** should take account of:	Proposed change will make the text used in the section consistent. In Paras 2.5~2.10 (except 2.9) phrase optimization of protection and safety is used.	A			
Indonesia	2.9/line no 1	2.9. The optimization of protection and safety should be considered at the designstage of equipment and laboratories, when some degree of flexibility is stillavailable, **in accordance with the gradedapproach concept**	The implementation of the graded approach concept at the design stage of equipment and laboratoriesis very important to optimize the cost.	A			
Indonesia	2.9/line no 4	... options. Decisions made at the designstage include the design of shielding, thedesign of ventilation/fume cupboards, the design of hot	Design of instrumentation is very important to assure the optimization of protection	A			

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		laboratories; **the designof instrumentation includes interlock system**, and the choice of surfaces for cleanup of contamination.....	and safety in thefacility				
Libya	2.14/1	Optimisation to optimization	Consistency	A			
India	Page 10-11, para 2.14, to 2.17	Suggestion: The objective and scope of dose constraint is elaborated in the document. Inclusion of typical values of dose constraints for different types of facilities, as examples, will be useful.	Typical dose constraint values for these type facilities would be useful for better understanding and practical application of the concept.			R	It is difficult to suggest typical values as they are fraction of dose limits determined by several considerations.
UAE	2.11./4	At some stage, for low doses, the effort might not be worthwhile. efforts in radiation protection should take the law of diminishing return.	ICRP recommendations “the effort on optimization may have reached a near optimal point (i.e., a diminishing return for further investment in the ALARA process).			R	Suggested addition will unnecessarily confuse.
Australia	2.13.	…(a) The rationale for proposed operating, maintenance and administrative procedures including purchase, storage and disposal of sources, together with other options that have been considered and the reason for their rejection; …	To enable adequate full capture of the whole process	A			
Libya	2.17/17	…shielding for lab, radioactive sources and waste storage rooms	Addition needed	A			
UAE	2.18/6	(b) An equivalent dose to the lens of the eye of 150 mSv…	Rereview this item to be compatible with IAEA Standards.			R	This is directly from GSR Part 3.
Australia	2.22	…licensees should make arrangements for pregnant or breast-feeding research workers or graduate students or school students to meet the requirements of para 3.114 …	To adequately address ALL possibilities. School students have been known to be pregnant etc whilst still	A			Such cases are very rare.

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			attending school.				
UAE	2.22, 11.4	"Registrants and licensees should ensure that secondary school students ~~and undergraduate students,~~ that is, students of age less than 16 years." "Emergencies that could affect workers, students (for instance, graduate and post-graduate students doing research using radiation sources), the public (e.g. school students and undergraduate students ~~of age less than 16 years~~, administrative staff of the facility) or the environment and could warrant emergency response actions should be identified in the hazard assessment for the research and education facility."	Undergraduate students start at minimum age of 18 years in majority of countries. Recommend to strike out 'undergraduate students'		A Additional clarity provided based on MS comments (see also Japan, Israel comments)		
UK	Para 3.3 Line 3	Sealed sources only present a risk of external radiation exposure if ~~unless~~ they have been breached or are leaking.	Grammatical suggestion.	A			
Belarus	Para 3.7	To remove para 3.7 from the part named SEALED SOURCES and to add a separate part, devoted for plated sources: PLATED SOURCES Plated radioactive sources where a thin layer of radioactivity is coated on a non-radioactive surface are also used in some applications in research and education. They present a greater potential contamination hazard than the same amount of material as a sealed source but less than the same amount of material in unsealed form. Plated sources are used in the detection section of gas chomatography units (e.g. ^{3}H, ^{90}Sr, ^{63}Ni, ^{226}Ra, ^{57}Co).	According to the current wording <in addition to sealed sources, plated radioactive sources… are also used…> plated radioactive sources are considered to be something other than sealed sources, and in that case there would be a question whether the requirements for sealed sources (para 3.5 and others) could be spread on the plated radioactive sources or not.	A (see also UK comment)			
China	para. 3.7	The radiation effects of radioactive gases or		A	Corrected in		

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		aerosols should be considered in the study of using iodine related nuclides.			unsealed sources		
France	3.8 line 1	Sample irradiators are used to irradiate different kinds of samples such as **metal, plastics,** cells, tissue samples, plants or small animals to study the effects of radiation exposure.	Sample irradiators are also used for studying aging and properties of materials under irradiation, not only for biology	A			
France	3.9 line 2	Sealed sources may be used in scientific or measurement equipment such as gas chromatographs, electron capture detectors **or scintillation counters.**	Chromatographs are a variety of use of electron capture detectors. Liquid scintillation is completely different, widely used in research and often not noticed as radioactive when discarded	A			
UK	Para 3.9 Lines 1 and 2	Sealed sources may be used in scientific or measurement equipment ~~such as gas chromatographs or electron capture detectors~~.	In the UK we do not classify electrodeposited sources such as those used in gas chromatographs and electron capture devices as sealed sources. Therefore including them as examples in a section titled 'Sealed sources' could be misleading. Alternative suggestion is to change the title of this section to 'Sealed sources and electrodeposited sources'.	A (see Belarus comment)			
Indonesia	3.10/line 5	.... Control **the radiation**of neutron sources requires attention to shielding to protect against exposure to both neutron and photon radiations.	It is important to insert the word "radiation" in the sentence to assure that the meaning of control here refers to controlling neutron radiation, not neutron			R	Neutrons are particles and current version is technically correct.

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			population				
Spain	Pg.13 SEALED SOURCES	I would suggest including a new paragraph with microPET and microSPECT calibration sources (Ge-68, Co-57, Na-22) of Preclinical Multimodal Imaging for small animals		A Added in para 3.6			
Spain	Pg.13 SEALED SOURCES 3.8	Consider including next paragraph: It will be necessary to request the agreement of source possession transfer of biomedical irradiators.				R	Not appropriate to include here. This is part of authorizing procedures.
Libya	3.10/3	Add: and neutron activation analysis	Addition needed	A			
UK	Para 3.11 Line 1	Unsealed sources are radioactive materials that are not permanently sealed within a protective container.	The definition of a sealed source is that it is 'permanently ' sealed; this seems to suggest that if something is just in a container, e.g. a radioactive liquid in a screw top vial, that it is a sealed source.	A			
France	3.12 end	As a result, contamination risks depend on the dispersal method, the activity, the nature of the radioactive source, **the age of the source** and the chemical and physical forms of the material involved.	Exposure may vary with age of source or experimental frequency (gas puffs on opening)	A			
France	3.13 line 10	The radioactive material may be present as a liquid, gas or **powder.**	Replace dust by powder, more general	A			Will be fixed in the final editing
Libya	3.17/1	Naturally Occurring Radioactive Materials (NORM).	IAEA format	A			
Mexico	3.17	Naturally occurring radioactive materials (NORM) are used in educational and research establishments. NORM includes	Editorial correction. It is not clear which term			R	NORM is defined in Safety Glossary 2018.

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		material in the natural state as well as material in which the activity concentrations of radionuclides of natural origin may have been changed by man-made processes including the residues from these rocesses. In many cases, research laboratories using NORM are part of the industrial activity [21] and may be carried out in a specific laboratory at an industrial site …	refers to [2]. The term NORM is defined in note 1 (Mexico comment 1.5)				
UK	Para 3.17 Line 5	The use of NORM varies from minerals containing NORM in demonstrations ~~showcases~~ in secondary schools, to research projects involving NORM in universities or research centres.	The word 'showcase' could be construed as meaning it is just a static display whereas I think the intention of this sentence is that NORM is used for active demonstrations.		A .. display or class demonstrations		
UAE	3.17./12	**Research may also be carried out at university laboratories, or at technical support organizations, specific guidance on the NORM is provided in Annex III [ANNEX III].**	ANNEX III presents more info related to NORM	A			
France	3.17 line 5		U and Th compounds such as acetate, nitrate… bought as chemical products by schools may be not perceived as alpha sources by all			R	Not clear
France	3.19 line 5	In addition to the intentional generation of X rays for a specific application, they may be generated as **a parasitic or** a secondary radiation when particles, such as electrons or protons, are accelerated or are produced in high energy laser applications.				R	Not clear.
Libya	3.22/8	Computed Tomography (CT)	IAEA format	A			

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UAE	3.23/3	The radiological hazards of secondary radiation of “Bremsstrahlung” resulting from the use of means of plastic protection with lead, as their effects are greater than the primary rays. Therefore, it is advised to use materials with high hydrogen content to avoid exposure to secondary X-rays "Bremsstrahlung ".	This information should be add because educational team and students should have information about effect of “Bremsstrahlung” and how Protect themselves against it.	A			
France	3.23 end	In addition, exposure to **chemicals (ozone),** magnetic and electric fields and high voltage associated with the accelerator operation should also be considered for protection of workers. **Management of activated parts and device decommissioning should also be considered.**		A			
Spain	Pg16/ or in the topic about Radiation Generator	It would also be necessary to include in the text or document the use in education and research of medical X-ray equipment, I cite some examples from my experience: -intraoral dental equipment on mannequins or patients in dental schools and associated centers; - X-ray or scopy equipment (mini arches) on mannequins or patients in Podiatry Schools and associated centers; -use of medical X-ray equipment in Veterinary Schools; -use in undergraduate, postgraduate, master or specialization courses, of surgical arches in dissection rooms with human specimens (for example in traumatology); - Research on large animal models (for	All these practices can influence the radiological protection of teaching / non-teaching staff, students, patients and researchers, depending on the specific case. If these types of practices are included in the document, the specific aspects of these practices should also be developed in the rest of the sections and / or include one or more specific annexes.			R	Safety Report 104 provides detailed guidance on RP in veterinary medicine. Additional new Annex III provides guidance on medical and paramedical education.

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		example pig) with surgical arches (for example in pulmonology and hemodynamics) in the operating rooms of the Animal Centers of research centers and universities.					
Germany	4.1	GSR Part 3 [1] establishes ~~recommendations~~ requirements on duties and responsibilities related to the use of radiation sources.	GSR Part 3 is establishing requirements that are complemented by the recommendations in the Safety Guide.	A			
Morroco	4.2.	The responsibilities of the regulatory body include the exemption or authorization of practices, the review and assessment of applications for authorization, inspection of facilities and activities, **development of regulations and user guides** and enforcement of the regulations and law relating to radiation safety.	it is proposed to add “development of regulations and user guides” as a main core function of the regulatory body.	A			
India	Page 18, para 4.5	Suggestion: **Graded approach** Additional para (after para 4.5) may be included in the document addressing the concept of exemption and clearance.	Exemption and clearance form part of the radiation protection framework and licensing programme. It would be useful to include these for completeness and to provide guidance on application of graded approach in licensing process.	A			
Morroco	4.5.	Registrants and licensees, and employers are required to use the graded approach in the measures they take for protection and safety. For example, university departments with accelerators, **research irradiators** or with laboratories using unsealed sources	It is proposed to consider “Research irradiator for research” as a high-risk installation.	A			

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		producing waste would have a more detailed safety assessment and a more elaborate set of local rules compared to a department with a few check sources or a secondary school that may have very limited (in numbers and activity) radioactive sources					
Indonesia	4.9	4.9. Other parties with specified responsibilities in relation to protection and safety include: (a) Radiation protection officers **and radiation protection experts (when needed),**	The presence of a radiation protection expert needs to be considered for advanced facilities that requires it	A	Suggested addition is already within item (b)		
Indonesia	4.9 and 4.28	--This paragraph needs furtherexplanation about the qualification,competency, and appointment system of“qualified expert” in research andeducation activities that use radiation sources.	In some countries, it is difficult to establish the system of recognition of the qualified expert. For instance, it is not clearly understood how to assign them;does it need authorisation from the regulatory body? It will be good to add some examples of the qualified Experts who can be consulted on radiation protection and radiation safety of radiation sources used in research and education.		A (examples added) Safety Glossary 2018 provides clear definition of Qualified Expert.		
Pakistan PAEC	4.16(b)	The programme is periodically reviewed to assess its effectiveness and its continued fitness for purpose **by considering & incorporating operating experience**	Operating experience feedback and lessons learned will enhance the effectiveness of radiation	A			

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		feedback & lessons learned;	protection programme.				
India	Page 21, Para 4.19	The key points should be summarized on a leaflet and given to workers and students who might be exposed to radiation sources and may be prominently displayed at important locations.	Additional mode for communication.	A			
Pakistan PAEC	4.19(e)	Arrangements for protection of workers: These include, local rules, designation of controlled or supervised areas; arrangements for individual monitoring & **decontamination** of workers, **occupational exposure & contamination control limits**, monitoring workplaces and environment, and a health surveillance programme as appropriate;	Decontamination arrangements, occupational exposure and contamination control limits are essential elements and should be explicitly mentioned in RPP.		A		Relevant paragraphs 3.49-3.158 of GSG-7 Ref.[9] has been referred here.
Morroco	4.19.	The radiation protection program should include as essential elements: (…) - Radiological monitoring of workplaces; Classification of exposed workers.	It is proposed to add those elements to the RPP.		A		Relevant paragraphs 3.49-3.158 of GSG-7 Ref.[9] has been referred here
Australia	4.23	…(k) Reviewing information or analysis reports of abnormal events, incidents or accidents including against previous/historical events and making recommendations for improvements in radiation protection programme as well as to avoid their reoccurrence. …	To enable tracking and comparisons and analysis of the adequacy of any actions taken as a result of an incident/accident ie was the previous action taken adequate to prevent recurrence.	A			
Australia	4.24	…(a) Review the design criteria and design features relating to the exposure and potential exposure of workers, students and general public in all operational situations and accident conditions including the related	To ensure that all potentially exposed people are captured not just the workers.	A			

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		monitoring aspects; …					
Indonesia	4.24/line no 9	b. Make recommendations and setting conditions on the proposed work with the new radiation source(s). **c. Request a justification from regulatory body if it is related to safety related issues.**	Justification is required from the regulatory body if it is related to safety issues, specifically when a new type of radiation source is used			R	All of these activities are performed within a legal and regulatory framework and paragraph 4.2 applies.
Pakistan PAEC	4.26	The licensee should designate a radiation protection officer in accordance with the requirements established by the regulatory body. The designation should be in writing and integrated into a job description that assigns the radiation protection officer the organizational responsibilities and authority to effectively implement the ~~safety program~~ **radiation protection program**.	Safety program may be replaced by RPP for the sake of consistency with rest of the document.	A			
Tanzania	4.27	The laboratory radiation protection officer (LRPO) (or equivalent) is responsible for ensuring that the requirements of the radiation protection programme are implemented on a day- to-day basis restricted to the specific laboratory assigned. The LRPO should work under the radiation protection officer	By adding the last sentence on *"assigning the LRPO to work under RPO"* will streamline the operations of the two staff by avoiding confusion.		A Para modified: Each laboratory radiation protection officer should work under the overall guidance of the designated RPO.		
UAE	Figure 1, 4.28, 6.17, 6.24, 7.68	"The initial assessment should be reviewed by a **qualified expert** or by the supplier, to confirm that it is in compliance with regulatory requirements and to determine whether additional authorization or approval is required." "The regulatory body may recommend certain tests for the extension of use of a source after it reaches its	Need to state the eligibility, qualifications of 'Qualified Experts,' as it is not defined in the document.	A Ref. now added in para 4.10			Definition is provided in IAEA Safety Glossary, 2018 ed. and GSR Part 3.

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Country/ Org	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
		recommended working life, such as an increased frequency of leak tests or assessment by a **qualified expert** with access to appropriate facilities." "Counselling should be given under the advice of an appropriately experienced and **qualified expert.**" **Need to define what 'Qualified Experts' mean.**					
China	4.35	It is suggested to add a clause: (f) provide necessary radiation protection equipment.		A			
Russia SEC-NRS	4.38	Operating organizations should ensure that they obtain radioactive sources from only authorized suppliers and that disused ***sealed*** sources are returned to the original supplier or transferred to another authorized body (see Section 8)	A small clarification of the text. The term «disused sealed sources» is used in the Section 8 of DS 470.	A			
France	4.39 line 6	For sealed source(s) or mobile radiation generator(s), the users should log their name, the date and time, the location the source or the generator was moved to **and the return to storage.**		A			
China	4.40	It is suggested to add the relevant requirements for the disposal records of waste radioactive sources and key components (such as X-ray tube, etc.) of the x-ray device.				R	Already addressed in section 8.
Israel	Page 27, para 4.41	If source loss, damage or theft is confirmed, the operating organization is required to notify the regulatory body (se para. 3.55 of GSR Part 3 [1]) and security agency in the country, in accordance with the emergency plan and established emergency procedures.	To act promptly to guard against unintentional use.		A		
UK	Para 4.42	Since some of the radioactive material used	Grammatical suggestion.	A			

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	Line 5	for research and education purposes can cause serious injuries, it may therefore be assumed that there could be a significant impact if these materials were to be used for malicious purposes.					
Morroco	4.45	In the case of facilities presenting issues in terms of safety and security, it is preferable to conduct joint inspections to optimize the resources of the regulatory body and to ensure the interface between safety and security.	addition proposal			R	This is usually determined by the respective authorities.
UAE	4.52	"As an integral part of the operating organization's management system, the radiation protection programme and its implementation should be assessed on a **regular** basis." (**what is the frequency**)?	Need to specify frequency of assessing radiation protection programme effectiveness. 'Regular' period is vague.		A Cross reference provided. Para 3.157- 3.158 of Ref.[9]		
Indonesia	5.3	--This paragraph needs to clarify, maybe by giving the examples, the scope and level of details of each type of safetyassessment (generic safety assessmentand specific safety assessment), as well as the circumstances when both of these types be performed	It will be easier to implement the Requirements and recommendation in this publication when the information is comprehensively provided.			R	Subsequent sections provide necessary information. Details of safety assessment cases are beyond the scope of the guide.
Libya	5.6/2	Safety assessment should also consider any accident could happened	Addition needed			R	Para 5.10 explains in detail.
Israel	Page 32, para 5.10	Suggestion: Safety assessment Referring to this section, an annexure addressing typical examples of safety assessment of various facilities and activities may be included in the document.	Examples of safety assessment addressing radiological impact on the public and the environment will be useful as guidance on application of graded approach in regulation and			R	Section provides relevant information. Details of safety assessment cases are beyond the scope of the guide.

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			licensing process.				
Libya	5.10	Add: Describe the emergency plan for any accident.	Addition needed			R	This should be in accordance with GSR Part 7 requirements and related guidance.
China	5.10	It is suggested to add the content of carrying out radiation monitoring in the workplace in advance if necessary.			A Additional point (d) added.		
China	5.12	It is suggested that significant change should include the renovation of radiation workplaces.				R	Modification to facilities already covered.
Morroco	5.13	Operating organizations should consider a review frequency based on the hazards involved and the dynamic nature of the work. Remark: Some examples of frequency could be given.	Some examples of frequency could be given to assure a better understanding and application of the safety review			R	It is difficult to recommend some values as it is based on the hazards involved and nature of work.
Indonesia	5.15.	--The report of the safety assessment should form an integral part of the documentation of the radiation protection programme.	The content of the report needs to be explained further. Propose to add significant change in the conditions of use of a radiation source and how to handle the change.			R	Already explained the previous sections.
India	Page 34, para 6.1	The siting and layout should take into account the types of radiation sources, activity, the frequency and the purpose of its use.	Source activity is an important parameter to decide siting and layout	A			
Morroco	6.1.	The siting and layout should take into	There are devices used for	A			

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		account the types of radiation sources, the frequency, the purpose of its use **and the level of exposure to ionizing radiation around the equipment.**	training / research purposes with a self-protection system				
Libya	6.1/1	.. a location for using or storing radiation sources and radioactive waste storing	Addition needed	A			
Libya	Par 6	DESIGN OF FACILTIY AND LABORATORIES: add emergency ways in the building that contain radioactive sources.	Addition needed			R	Emergency preparedness and response is covered in Section 11.
Pakistan PAEC	6.6	The materials having low activation cross-section should be preferred in shielding, rooms construction, sealed sources encapsulation and accelerator housing etc.	New text. Around sealed sources or accelerators, residual radiation field is produced due to activation of surrounding material. Where possible, this can be minimized by choosing such materials having low activation cross-section.	A			
UAE	6.6 b, 6.12	"Provisions should be made for **adequate illumination and ventilation.**" "Laboratories where unsealed sources are used should be provided with **adequate ventilation.**" **Specific requirements in terms of lighting (in lux or footcandles) and general dilution or room ventilation (in terms of feet per minute, meter per second or air changes per hour) were not specified.**	The term 'adequate illumination and ventilation' is vague. Specific numerical requirements in lighting (in terms of lux or footcandles) and general room ventilation (in terms of meter per second, feet per minute or air changes per hour) shall be specified.			R	No values suggested. GSG-7 provides more guidance on workplaces.
UAE	6.6 c, 6.10 c	"An exclusive enclosure with low background radiation should be available for storing individual dosimeters when not in	The term 'low background radiation' is vague. The threshold shall be quantified			R	No values suggested by the reviewer. It is difficult to prescribe

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		use." "The level of background radiation in the counting room **should be low." How low should the background radiation be? This shall be expressed in terms of dose rate.**	in terms of dose rates (e.g., microsieverts per hour).				a dose rate value here.
Morroco	6.6 (d)	(d) Space should be provided for working with the sources and for storing records relating to inventory of radioactive sources, disposal of sources, individual dose, calibration of radiation monitors, servicing and maintenance of equipment, incidents and emergencies, **technical radiation protection controls** and other reports.	it is important also to indicate the controls carried out in terms of radiation protection either by the RPO or a technical service provider.		A		
UAE	6.8	"Care should be taken to avoid excessive overestimates of required shielding by multiplication of conservative assumptions. Care should be taken to avoid excessive overestimates of required shielding by multiplication of conservative assumptions. For example, workload, use and occupancy factors are often overestimated, and the persons to be protected are considered as remaining permanently in the most exposed place of the adjacent room. Therefore, a balanced decision needs to be achieved and accumulation of overly conservative measures should be avoided." It is ideal for the exposure rate to be brought down as low as reasonably achievable (ALARA) or as low as reasonably practicable (ALARP), which means the lower dose rate achieved, the better. Moreover, shielding requirements depend on the exposure rate that needs to be achieved, the linear/mass energy	Suggest to delete these sentences, as shielding requirements depend on exposure rate that needs to be achieved, the linear/mass energy absorption/attenuation coefficient, the density of the shielding material to be used, or whether you will use the half value layer or tenth value layer values.			R	This is to avoid excessive conservatism in approaches.

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		absorption/attenuation coefficient, the density of the shielding material to be used, or whether you will use the half value layer or tenth value layer values.					
Morroco	6.9	Shielding requirements in respect of facilities where self-shielded irradiators are used would depend upon factors such as the radiation levels on the exterior of such equipment, the nature of occupancy around and the period of operation of the equipment. In places where very low activity radioactive sources and low rating radiation generating equipment are handled, structural shielding might not be required **if the dosimetry study around the installation gives rise to dose rates below the public limits**	it is proposed to add this clarification in order to specify the cases which do not require structural protections	A			
Morroco	6.10 Specific design requirements	it is proposed to add to this part: - **Decontamination equipment as well as contamination monitor must be installed at the laboratories.** **A decontamination SAS must be put in place at the exit of the area where unsealed radioactive sources are handled.**	To consider the necessary measures to detect and intervene in cases of contamination		A		
Indonesia	6.11a (between 6.11 and 6.12)	6**.11a. Laboratories that use unsealed sources should be provided withspecific equipment such as decontamination tools, segregated bin for contaminated objects, stickymats to prevent contaminants off shoes from entering inside, etc**.	To ensure radiation protection and safety of users working withunsealed sources in the laboratory.		A		
UK	Para 6.13, 6.14 and 6.15	(6.14, line 9) A warning notice incorporating the radiation trefoil symbol (trefoil) [26] and information on area designation should be displayed on the door.	Consistency of terminology between ‘trefoil symbol’ and ‘radiation symbol (trefoil)’. Using different terms may cause confusion and an	A			

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		(6.15, line 4) A warning notice incorporating the radiation trefoil symbol (trefoil) [26] should be displayed on the door to the room.	expectation that they are different which is not the case. I've suggested changing to the first term used but it doesn't really matter so long as it is consistent.				
Libya	6.15	add: Specific design for toilet and bath-rooms	Addition needed			R	These are parts of hygiene measures. However, decontamination facility is added.
Morroco	6.20 (b)	Each radioactive source should be permanently and clearly marked with the following details: (…) (b) The word 'RADIOACTIVE' in visible letters, **in local language**	in order to ensure understanding by members of the public, the local language should be used			R	Para 6.19 already specifies to meet equivalent national standards. It may be noted that sources are not always manufactured for a particular State.
UK	Para 6.20 Line (a)	The ~~international ionizing~~ ~~radiation~~ trefoil symbol ~~(trefoil)~~ [26];	Same as comment above, need consistency. This is the third different term used for the warning symbol.	A			
France	6.20 end		Due to available space on source capsule, complete information is not always practicable.		A		
UK	Para 6.22 Line 2	In accordance with RSG-1.9 [25], sealed sources of Category 1, 2 or 3, may require enhanced safety and security precautions as specified by the concerned competent authority.	Competent authority is the term usually used to refer to the regulator rather than 'concerned'.	A			

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France	6.23 end	It is an indication of the period of time over which the source should **be usable as primarily intended and** retain its integrity.	At the beginning, it was an indication that manufacturer was no aware of aging problems after X years and considered that the source could perform its initial mission (decreased sources could be not suitable for their initial use).			R	out of context
France	6.24 line 1	Sealed sources should be p**eriodically replaced. When no other regulatory guidance exists, replacement** at end of recommended working life **should be considered.**	Systematic replacement at end of RWL implies 2 years use for many small sources, frequent in research but posing few radioprotection hazards (never done). On the other hand, sources with no known RWL should nevertheless be replaced.			R	Source replacement is not necessary as long as it is useful for the intended purpose within the recommended working life.
France	6.25	Certificates for special form radioactive material should be retained and used as a reference for the radiation protection officer. **Special form certificate expiration date should also checked by RPO and considered for replacement policy, to avoid difficulties with transport of disused sources.**		A	See modified para 6.25		
Morroco	6.26	(…) **An operational area must be limited to ensure compliance with the dose limits prescribed by the regulatory body**				R	Local rules will ensure dose constraint/limits compliance.
UAE	7.3	"All other laboratories, rooms and areas that are not designated as controlled areas or supervised areas should be considered to be in the public domain and the levels of	Need to specify what 'low enough' means in terms of a numerical threshold. Does this mean less than 1 mSv		A ..should be within the range of local natural background		

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		radiation in these areas **should be low enough** to ensure compliance with the dose limits for exposure of the public." **What does 'low enough' mean in this context? Does this mean less than 1 mSv per year?**	per year which is applicable to the general public?		radiation levels.		
China	7.8	"For the use of small levels of radioactivity that do not present an exposure hazard to Bystanders", it is suggested to give guidance on dosage.		A			
India	Page 41-42, para 7.18	**(q)** workers should use foot operated dustbin and food operated wash basin.	Additional measures for the purpose of protection of workers		A Included in the bullet (g)		
India	Page 41, para 7.18	(d) Workers should wear personal protective equipment such as laboratory coats, gloves that are appropriate for the radiological, biological and chemical hazards associated with the materials being used, safety ~~glasses~~ goggles and close-toed shoes;	Better terminology	A			
Israel	7.13	Paragraph 7.13 mentions (only) radioactive powders, liquids and gases that are not sealed in a container, as unsealed sources. Even though paragraph 7.19 later on (in connection with to Annex III) refers to handling of NORM, we suggest to consider mentioning rocks/geological samples (or other unsealed solid sources) also in paragraph 7.13.	completeness	A			
Belarus	7.22	To remove para 7.22 from the part named SEALED SORUCES and to add a separate part, devoted for plated sources: PLATED SOURCES When using plated sources (alpha or beta	For consistency with the previous comment (para 3.7)	A			

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		sources), special care needs to be exercised to minimize the risk of abrading these plated sources causing a release of the radioactive material and contamination of workers and workplace. Plated sources shall not be tested for leakage by wiping the layer directly. An indication of leakage can be obtained by checking the storage container for radioactivity or by checking the exhaust ports of gas chromatography units, Tests of the solutions used to clean the source may give some indication of the integrity of the plating.					
China	7.24	It is suggested to add a clause: if the work plan changes, the corresponding radiation safety and protection measures should be adjusted appropriately.		A			
Israel	7.24 c	We suggest to consider to improve the present phrasing/wording : *"Workers should remain at a sufficient distance from the source, **since** the radiation level decreases inversely as the square of the distance"*…Both parts of the sentence separately are of course correct, however the connecting word ***since*** seems to be used and located not in the most logically correct way.	clarity	A			This will be fixed in the final editing. “since” is replaced with “noting that”
China	7.30	It is suggested to increase the consideration of cooling water activation.		A			
China	7.31	It is suggested to add a clause: the repaired equipment should be used after the confirmation of quality assurance.		A			
Israel	7.31 b	We suggest to replace "source" with "X-ray	clarity	A			

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		generator", since this and the adjacent paragraphs deal with x-ray generators.					
Morroco	7.18	Add: **The area should be equipped with contamination monitors**	To detect possible contamination	A			
Morroco	7.18.i)	Workers should remove personal protective equipment and wash hands before leaving the work area **by using SAS to avoid spreading contamination outside the work area**	Removing PPE should be in an appropriate area			R	Not clear. What is SAS?
Morroco	7.18	**Reference should be made to workers and students**	Research students working in those facilities	A			
Morroco	7.32.d)	At the end of each source use, to verify that the radioactive source has returned to its shielded position or the emission of radiation has ceased, in the case of radiation generators, **or the level of surface contamination in the case of unsealed sources** ;	Unsealed sources should be included in the paragraph	A			
Morroco	7.41	Add **The radiation protection officer should be in charge of the implementation of the monitoring programme**	The radiation protection officer is in charge of the radiation protection programme including the monitoring programme			R	Current text is in line with the GSR Part 3 Requirements
India	Page 48, para 7.48	Direct reading dosimeter or (e.g. electronic dosimeters) give an instantaneous reading of the dose received.	Electronic dosimeter is one type of direct reading dosimeter.	A			
India	Page 48, para 7.48	These can be a very useful tool for measuring exposures in higher radiation dose rate operations or specific tasks (e.g. source loading and unloading, servicing and maintenance).	During servicing and maintenance, significant exposures are likely.	A			

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Libya	7.60/1	Personal Protective Equipment (PPE)	IAEA format	A			
Spain	Pag 51/7.67	Reformulate the text considering biologic dosimetry not only in the case of over exposed workers.	Not only in the case of overexposed workers, it should be investigated with biological dosimetry, in case of not wearing a dosimeter or as a complement to physical dosimetry it would also be justified. As referenced in different documents such as the following below: https://humanhealth.iaea.org/HHW/RadiationOncology/RadiationBiology/Biological_Dosimetry/index.html "Cytogenetic dosimetry is recognized as a valuable dose assessment method which fills a gap in dosimetric technology, particularly when there are difficulties in interpreting the data, in cases where there is reason to believe that persons not wearing dosimeters have been exposed to radiation, in cases of claims for compensation for radiation injuries that are			R	The paragraph is not restricting the applicability of biological dosimetry.

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			not supported by unequivocal dosimetric evidence, or in cases of exposure over an individual's working lifetime." https://www.fda.gov/media/90385/download https://www.remm.nlm.gov/explainbiodosimetry.htm https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4697270/				
Libya	7.71,a,b and c	Add: workers and students	Addition needed			R	This is a direct quote from GSR Part 3
France	8.1 line 4	Research and education facilities that plan to discharge liquid effluent or airborne effluents or solid wastes to the environment are required to make an application for authorization for such discharges, **with consideration to specific activity and half life of nuclides. Discharges to environment should be kept as low as possible and interim storage for decay perform whenever practicable.**	8.1 line 4		A		
France	8.4 end	Such exemptions are granted on a case-by-case basis by the regulatory body or established in guidance provided by the regulatory body. **On locations with many facilities (campuses, hospitals…), attention must be paid to coordination : application for exemption or discharges to environment should take into account the**	8.4 end		A		

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		whole site.					
Indonesia	8.5	……Any **engineered control measures** put in place should be maintained at appropriate intervals.	It needs to add some examples of engineering control measures tomitigate the risk from discharge. The examplescan be given for most common practice in research and education that use radiation sources. The examples will guide the user to choose the proper measures and technologies to mitigate the risk from discharge.	A			
UK	Para 8.5 Line 9	Any engineered control measures put in place should be maintained and tested at appropriate intervals.	Need to be tested to ensure that they are working effectively.	A			
Germany	8.10	Research and education facilities may generate mainly two types of radioactive waste: (a) Sealed sources that have completed their operating life; (b) Materials and items contaminated with radionuclides from unsealed sources such as contaminated clothing, vials containing residual radioactivity, contaminated absorbent pads, contaminated glassware and liquids.	Clarification. There could be, in some research facilities, also waste from activation.	A			
Spain	Pg.56. 8.10	I would suggest to mention in this paragraph: - the animal and biological waste and - waste with Uranyl Acetate salt generated in electronic microscope techniques			A		These examples belong to (b).
Russia	8.10 (a)	***Disused*** Sealed sources ~~that have completed~~		A			

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SEC-NRS		~~their operating life~~					
France	8.10 (a)	Sealed sources that have completed their operating life **(sealed sources that are no longer in use - no more needed or too old - may be qualified as waste in accordance with local regulations)**;	Local regulation may interfere if "waste" qualification is given too early and return to foreign suppliers could be problematic. Better to treat disused sources as sealed sources as long as possible	A			
France	8.11 line 2	When sealed sources are no longer required, they should be returned to the original supplier **or manufacturer**.		A			
France	8.11 end	Disused sealed sources waiting for return to their supplier or for transfer to an authorized waste management facility should be stored in the research or education facility's radioactive waste storage room **when allowed by their size or weight. Sources kept in their original equipment should continue to be monitored, signaled etc. and their retrieval by manufacturer planned as soon as possible**. Disused sources should be **kept in sealed sources inventory, or** included in the inventory of radioactive waste **in line with local legislation. Storage of disused sources on user premises should be discouraged.**	Some sealed sources are in devices that cannot be moved easily to a waste storage room (e.g; lab irradiators…) Cf above		A		
Russia SEC-NRS	8.11	When sealed sources are no longer required, they ***become disused and*** should be returned to the original supplier. If this is not possible, disused sealed sources should be either transferred to a centralized waste management facility or disposed of by a			A		

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		route authorized by the regulatory body. Disused sealed sources waiting for return to their supplier or for transfer to an authorized waste management facility should be stored in the research or education facility's radioactive waste storage room. Disused ***sealed*** sources should be included in the inventory of radioactive waste.					
Indonesia	8.12	A waste storage room or building should be designed to accommodate the liquid **and/or** solid radioactive waste generated by the laboratories of the research and education facility.	Not all laboratories generate liquid waste andsolid waste. Some laboratory only generates liquid waste or solid waste.	A			
Morroco	8.15	Mixing of liquid wastes should not take place in stores **Remark: the meaning of stores is not clear**	In order to be understandable	A			
France	8.15 line 6-7	Solid waste should be segregated from liquid, powder and gaseous wastes, **and** should be divided into disused sealed sources and contaminated solid objects.	Insist on separation of disused sources from any other waste. They should not even be in the same local, or at least in a closed and physically separated part of the waste local.	A			
Indonesia	8.16	Each waste container should be managed to control the total activity in the container and ensure packaging as required by waste disposal services and to ensure that the radiation and contaminationlevels on the exterior of the containerare kept as low as possible. **The total activity of liquid waste can be estimated by taking the count rate of the**	Needs some explanation on how to calculate the total activity. Reference to other available publications on this topic can also be made.			R	The suggested text may not be appropriate and such basic information should be available in other technical literature.

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		sample in the container, subtract the background reading and take into account the efficiency for the measured isotopes as necessary. Meanwhile the total activity of solid waste can be estimated by considering the amount of radioactivity that has been used and the amount of each form of waste (whether it remains solid waste or has been transformed into liquid waste) generated from the experiments in that period, corrected for the decay of the radioactive material.					
France	8.17 line 3	Solid waste containing short half-life radionuclides should be stored in a shielded part of the waste storage facility until the radioactivity has decayed to below the clearance levels specified in Schedule I of GSR Part 3 [1]**, if agreed by country regulations**. **In this case,** when clearance levels have been met, the waste can be treated as non-radioactive waste.	Countries may have no clearance levels or specific levels specified in their legislation		A …or equivalent national standards.		
Germany	8.18	Solid waste containing long half-life nuclides should be transferred as authorized by national regulations to a facility that is authorized for management of this type of waste. The containers should be promptly disposed of transferred to such a facility to minimize radiation exposure, limit accumulation of radioactive materials and reduce the risks associated with incidents. If waste containers are suitable for re-use, they may be returned by the waste management	Clarification to avoid confusion with actual disposal of waste. + Typo	A			

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		facilities to the research laboratories in compliance with the requirements of SSR-6 (Rev. 1) [24] for the safe transport of empty packagings					
Germany	8.20	Liquid effluent containing radionuclides with long half-lives that cannot be discharged under the terms and conditions of the authorization should be stored in specific shielded tanks or containers and transferred to a licensed/approved waste management facility for this type of waste or treated on-site and the resulting solid waste should be disposed of with regulatory approval.	Clarification	A			
Spain	Pg.58.8.21	Consider including a new paragraph: Additional risks Biological and Chemical	It is important to sign the additional risk of radioactive waste.	A			
Pakistan PAEC	8.22	If several research laboratories store radioactive waste in the same waste storage room or building, the radiation protection officer should establish rules describing the responsibilities of the research workers in each laboratory **and waste acceptance criteria.**	Keeping in view the storage conditions and compatibility requirements for hazardous material, the waste acceptance criteria is an essential requirement for safe storage of radioactive waste.	A			
France	8.23 end	X ray tubes may contain hazardous material and may require disposal as a hazardous waste. **Others regulations may also be considered, such as those for electrical/electronical waste.**			A		
France	8.24 (a)	Sealed sources should be transferred to an authorized organization. As a best practice the operating organization should return the sealed sources to the original supplier **or manufacturer,** or disposed of through a		A			

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		channel authorized by the regulatory body.					
France	8.24 (d)	Radiation generators should be made **definitely** inoperable **and activated or contaminated materials removed if any**: see para. 8.23.		A			
France	8.24 (e)		Note that it could be complex for big or century old research facilities : volume of data and evolution in procedures make these records difficult to handle overtime.				
France	8.24 (f)	A comprehensive radiation survey should be made, to confirm that no radioactive sources**,** **waste** or contamination have been left on the site. This should involve a combination of direct monitoring and analysis of wipes of surfaces and floors.		A			
France	8.24 (i)	Operating organizations should inform the relevant authorities when all sources of radiation have been removed from the site and forward a copy of the comprehensive report indicated in **(f) and, if practicable, report indicated in (e).**	Authority should be in capacity of verifying final radiation surveys. But copy of all receipt, transfer etc… of any source could be a little difficult for some (either very old or handling/producing very short lived sources with very frequent movements)	A			
Indonesia	9.1	In addition, secondary school students and undergraduate and post-graduate students in universities who just uses radiation sources **intermittently** as part of their academic learning and studying process should be	Needs further elaboration on the term when someone is said to have used a radiation source intermittently. How long can it be to fall into the			R	Para 2.22 already explained.

Form for Comments
Radiation Safety in the Use of Sources in Research and Education (DS470)

COMMENTS BY REVIEWER				RESOLUTION			
Country/ Org	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
		afforded the same level of protection and safety as any member of the public.	category intermittently, or in what condition?				
UK	Para 9.1 Line 7	In addition, secondary school students and undergraduate and post-graduate students in universities who just uses radiation sources intermittently as part of their academic learning and studying process should be afforded the same level of protection and safety as any member of the public.	Grammatical suggestion.	A			
Morroco	9.4	Following adequate shielding, control of access to controlled **and supervised** areas, where relevant, is the next most important step in controlling doses to members of the public and personnel other than those who are occupationally exposed. There should be a limited number of entry points to the controlled areas and these should be controlled by the laboratory staff, and there should be signage placed at the entry points stating clearly who is permitted to enter the controlled area.	To avoid unauthorizied access of the public to those areas	A			
Indonesia	11.10 and 11.25	A qualified expert or **radiation protection adviser** should beconsulted, where possible, when drawing up emergency plans and procedures. **In which a radiation protection adviser is an individual who, is duly recognized as having expertise and appropriate to provide advices in the field of radiation protection**	The term “radiation protection adviser” only appears once in chapter 11. If this term is meant to be the same with radiation protection officer, then it is better not to use it for consistency. Otherwise, the difference has to be stated clearly. And if it is part of qualified expert, it would be better to make the	A Deleted the word radiation protection adviser			

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			connection, for instance by stating that qualified expert on radiation protection should be consulted etc.				
Indonesia	11.24	..... (xiii) Preparation of report on the occurrence and the management of the emergency **(xiv) locating the evacuation area, if it is determined in the emergency plan**	Locating the evacuation area is needed in emergency situation.			R	Already covered in other bullet points ii) and iii).
Pakistan PAEC	11.27(g)	Corrective actions identified **and lesson learned** with the aim of preventing similar emergencies in the future and necessary for improving overall radiation safety, security and emergency arrangements;	Lesson learned should be included in the report as these are also essential to prevent emergencies in future.	A			This will be fixed in the final editing.
UAE	Appendix III-10	"In the case of facilities handling thorium chain nuclides, **adequate ventilation** should be provided to reduce inhalation exposures due to long-lived thorium isotopes and thoron progeny nuclides." **What does 'adequate ventilation' mean? Does it need specific specific requirements like radon fan/ventilators? Any specific requirements in terms of room air volumetric flow (in air changes per hour or cubic feet per minute)?**	Need to specify ventilation requirements in terms of equipment (e.g.. radon fan/ventilator) or room air volumetric flow rate specifications.	A (added pointer to section 9 of GSG-7)			
UAE	Appendix III-15	"**use suitable respiratory protective equipment** as appropriate to prevent inhalation of any likely airborne radioactive contamination."	Recommend to specify which specific respirators are advisable (e.g., P100 filter)			R	This depends on many parameters and facility conditions and a single type of respirator cannot be recommended.

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UAE	Appendix III-19	"Airborne dust monitoring may need to **be performed regularly** whenever there is a possibility of receiving significant doses from the inhalation of dust, i.e. in larger NORM research facilities such as pilot plants." **Frequency will depend on magnitude of airborne dust obtained. Recommend to mention 'periodic dust monitoring depending on historical/baseline dust levels obtained/risk level magnitude shall be performed.'**	How frequent is 'regular'? IAEA needs to set guidelines on airborne monitoring frequency depending on historical/baseline dust levels obtained or magnitude of risk level.			R	Previous sentence already specifies this aspects and need to be fixed as per safety assessment.
France	Annexe I I-1 line 6	Exempt sources are not subject to regulatory requirements and may ~~generally~~ **sometimes** be dealt with as though they were not radioactive.	Some countries have no liberation threshold. And considering exempt sources as "normal" radioactive sources as far as practicable is good practice.			R	As per GSR Part 3, Schedule I requirements.
France	I-1 end	Sealed sources are generally designed, manufactured and tested to ensure that they meet the requirements of the appropriate ISO standard 2919 [I-1] or an equivalent national standard. **As far as practicable, ISO classifications higher than requested by standard should be preferred and C11111 should be avoided even when admitted by ISO (for low activities check sources <1MBq), especially if sources are to be manipulated**	Some model, such as plastic foils or alpha deposit models, perfectly suitable for, could be to frail			R	Not clear (C111111 is widely used already)

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Country/ Org	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
		by students.					
France	Table I – 1		Where are these values coming from ? (to be specify somewhere)	A Ref.added			
France	I-2 line 2	Some unsealed sources may also be used in schools **(for example,** Radon-220 (thoron) generators for half-life experiments or mini-generators using caesium-137 for half-life experiments).	Intact smoke detectors contain sealed sources, not unsealed. Other radioactive consumer products or objects (glass, thoriated lenses, clocks…) are used in school for demonstration and should be treated as sealed sources		A Deleted first line		
France	I-5	[…] **Special attention should be given to information transmission among staff members, to avoid "discovery" of sources well known by former teachers. In addition to immediate radiation protection measures, training should include alert on costs on elimination when supplying new sources and costs of characterization in case of loss of information.**			A		
Japan	I-4/line 2	the~~,~~ safety	Editorial	A			
Japan	I-10/line 1	The ~~store~~ storage should be located away from areas frequented by students with necessary security arrangements.	For clarification While "store" gives an impression of a large room, a place for containing small radiation sources should be	A			

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			called “storage”.				
UK	Table I-1.	Strontium-90 200 kBq (changed from Strontium-90 80 kBq)	The limit of 80 kBq for strontium-90 means that it will not be possible to demonstrate the ionisation current with the equipment a secondary school could be reasonably expected to hold. Demonstration of ionisation currents is relevant to GCSE and A-level physics.			R	Table reference added now.
UK	Table I-1.	Americium-241 200 kBq (Changed from Americium-241 40 kBq)	The limit of 40 kBq means the demonstration of a spark detector becomes less effective. (This demonstration is commonly carried out at GCSE and A level physics).			R	Table reference added now.
France	Annexe II II-7 line 2	Enclosures should be designed to provide adequate shielding and should be interlocked to prevent accidental exposures. **Security systems such as detection of aperture, circuit breaker etc… should be present.** Other key safety features include […]		A			
France	II-12	Usually Tritium containing targets are used for neutron tubes; these targets, **generally** composed of the layer of porous titanium saturated by Tritium, […]	Other support material, such as copper, can also be found for target	A			
France	II-15	The neutron generators can have some radioactive contamination of outer surfaces. Appropriate personal protective equipment is recommended. Beta contamination checks		A			

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		are needed periodically (at least once a year, upon receiving and shipping out of neutron generators, and following recovery from an incident with neutron generator). **When not in use, manufactured neutron generators tubes with tritium targets should be treated in the same way as sealed sources.** **In research, tritium targets are also operated with user's accelerators to generate neutrons. Special attention should be given to operating condition, e.g. target cooling, access to accelerator room…, to avoid accidents and contaminations.**					
Israel	IV-2	We suggest to add after the sentence: " *For laboratories that contain X ray generators, turning off the primary electrical source immediately stops any radiation being produced*".., the following: …using, for example, appropriately located and distinctively marked emergency power cut off push buttons.	completeness	A			

Bolivia Comments (received as image)

Resolution: comments 1, 2, 3, 4, 7, 8, 9, 10, 15 – Accepted. These are minor editorial and will be fixed in the final editing.

Comment 5, 13 – Rejected (Research reactors is out of scope)

Comment 6 - Rejected (Para 2.18 already gives dose limits)

Comments 11, 12, 14 – Rejected. These editorials will be fixed in the final editing.