Resolution table
DS 441 DPP Construction of Nuclear Installations

COMMENTS BY REVIEWER Country/Organization: See each comment number Date: 20.06.2010				RESOLUTION			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
1. India	Para 2, 2nd line	---- stakeholders for a safe and sound construction of nuclear power plants and other nuclear installations.	Reworded for clarity and also other nuclear facilities requiring similar approach have been included.	✓			
2. India	Para 6, 5th line Draft Outline	---- water cooled reactors and nuclear fuel cycle facilities.	It would be prudent to include nuclear fuel cycle facilities in such examples.	✓			
3. India	Draft Outline Para 3, last line (Other Civil Works)	(----------, Insulation, Painting)	Painting of nuclear installations has an important bearing on the finishing quality of construction.		✓		Included under the section "Coating".
4. India	Additional Para in the Draft Outline	VENTILATION AND AIR-CONDITIONING COMPONENT MANUFACTURING AND INSTALLATION	Ventilation and air-conditioning is a safety related system in many nuclear installations and hence guidelines on `Manufacturing and Installation' of		✓		Included in the scope of mechanical section

			Ventilation and Air-conditioning will be very helpful to the users of this guide				
5. Pakistan PNRA	Section 5. 4th para	The proposed safety guide must be consistent with the following IAEA publications also: 50-SG-Q7 (QA in manufacturing) 50-SG-Q11 (QA in construction)	These two guides are related to QA of manufacturing and construction and should be considered for inclusion in the list.			✓	GS-R-3, GS-G-3.1, and GS-G-3.5 supercedes 40-SG-Q1-14.
6. Pakistan PNRA	6. overview Draft outline	Comment: The proposed guide includes diverse type of contents. e.g. it include civil /architectural engineering and constructions; Mechanical, and Electrical, I & C components manufacturing and installations; Software installations, etc. Therefore, it is proposed to write separate guide on each topic or to change the title of the guide. .	All mentioned fields are specialized fields and should be treated as separate due to their sensitive applications. Therefore, safety guide containing different specialized areas may be difficult to compile in one guide.			✓	Although this SG will cover many areas of construction but it will not be an inspection manual or comprehensive codes and standards which are commonly seen as industry guide world wide. This SG just focuses on the general SAFETY aspects in each area and this is considered possible to be compiled in one document.
7. Pakistan PNRA	6. overview Draft outline	Comment: The section SAFETY CLASSIFICATION may be deleted from the contents as there would be a separate guide (DS 367) on this topic.				✓	DS367 does not go in detail about how to apply safety classification during construction phase. This SG will make recommendations with relation to detailed construction requirements specified by design, qualifications of construction personnel, construction methods, QA, records, procurement specification,

							tests, etc.
8. EC	General	The proposed guide does not support explicitly any requirements of NS-R-1 or NR-R-2 and thus its link to these two documents is not very clear. This most probably shall be taken into account in the future revision of the IAEA SS.	Consistency of the IAEA SS	✓			There exists no Safety Requirement referring to construction issues except SF-1 as described in the DPP. However, guidance document such as DS441 is urgently needed due to drastic increase in number of construction world wide.
9. EC	P1 & P2	Last sentence of chapter 2 is repetition of 3rd sentence of chapter 4.	Duplication.	✓			Delete the last sentence of 2. Background/Rationale
10. EC	Chapter 5, P2	The relation with Safety Guide GS-G-3.1 Application of the Management Systems for Facilities and Activities should be explained.	GS-G-3.1 Safety Guide is highly relevant as concerns Quality control and Assurance issues.			✓	This par. already describes the relation with GS-G-3.1, stating that it deals with Management Systems which intrinsically includes QC/QA. DS441 will go into more details with regards to technical issues as described.
11. EC	Draft outline - Section 3 (page 4)	The item “Quality control / Inspection test plan” is handled exclusively within the section 3 “Civil/Architectural", but not in the sections 4 to 7. There should be consistency and maybe link to relevant part of GS-R-3 and GS-G-3.1	Experience has showed that Quality Management, QA, QC and third party QC is a generic issue and is very important during NPP construction. .	✓			The new section titled “General Requirements for Construction of Nuclear Installations” which will include QC/QA and will make reference to GS-R-3 and GS-G-3.1.
12. EC	Draft outline - Section 3	It may be useful to start the document with some reference to the general requirements and recommendation for management of NPP construction. Reference to the relevant parts of GS-R-3 and	Experience feedback from past construction projects has clearly highlighted the importance of the management of the		✓		GS-R-3 and GS-G-3.1 will be referenced in Introduction and General Requirement sections.

		GS-G- 3.1 could be useful.	construction project to reduce the number of events during the construction phase and subsequent operation of the plant.				
13. EC	Draft outline – Section 3 (page 4)	The following work and items should be handled specifically in the document in addition to the one listed in "Civil and structural work": anchors, penetrations, building seals, sumps.	Experience feedback from past construction projects points out that these components have been frequently concer-ned by deficiencies.		✓		They will be included under the scope but will not be the Subtopic titles of TOC.
14. EC	Draft outline – Section 4 (pages 4 and 5)	Welding is included in section 4 “Mechanical component manufacturing and installation” whereas the section 7 is completely dedicated to welding. It is suggested to have a single, separated chapter on welding that would cover all type of welding activities. The mention of welding in chapter 4 should be removed.	Welding is a very important activity in construction projects; it deserves indeed to have a separate chapter. The mention in chapter 4 is worthless and confusing; all wleding activities should covered by chapter 7 (page5).	✓			Single dedicated chapter will be created.
15. EC	Draft outline – Sections 4 and 5 (page 4 and 5)	The items “Manufacturing” in both sections should cover as well the mastership of manufacturing technologies and the purchase of commercial grade components for safety-related systems.	Experience feedback coming from previous construction projects showed the significance of these topics.		✓		This recommendation will be discussed under new section entitled, “General Requirements for Construction of Nuclear Installations” with a reference to GS-G-3.5(5.35) which already covers the topic well.
16. EC	Draft outline – Sections 4 (page 4)	The item “installation” should cover the topics of labeling, and torque of screwed assemblies.	Experience feedback coming from previous construction projects showed the significance of these topics.		✓		This will be covered under the new section “General Requirements for Construction of Nuclear Installations”

17. EC	Draft outline – Section 5 (page 5)	The item “installation” should cover the labeling.	Experience feedback coming from previous construction projects showed the significance of this topic.		✓		This will be covered under the new section “General Requirements for Construction of Nuclear Installations”
18. EC	Draft outline – Section 5	The section 5 “Electrical and I&C components manufacturing and installation” seems not to cover all electrical and I&C items. For instance, there is no mention of instrumentation, electrical actuators and motors. All components should be handled in this chapter.	Each item should be addressed specifically. Different items will most probably lead to different rules and to different potential issues.		✓		All components are not listed completely at the moment, but for sure these mentioned components will be covered, but not as subtopics.
19. EC	Draft outline	From the proposed outline, it is not clear where would the following systems be handled: fire protection, emergency diesels, ventilation. These systems could also be covered in the document.	Experience feedback coming from previous construction projects showed the significance of these systems.		✓		Fire protection → Civil and Architectural Emergency Diesels → Mechanical and Electrical HVAC → Mechanical Section
20. EC	Draft outline – Section 4	The section 8 deals with commissioning whereas this topic is specifically addressed by another safety guide (NS-G-2.9). It is not clear what will be included in this section in DS 441?	To avoid duplication and possible inconsistencies.		✓		DS441 will recommend the preparation of hand-over to commissioning from construction, which should minimize overlap with NS-G-2.9
21. USA	general	Coverage of fabrication/manufacturing in one document could overly complicate the document and guidance. Guidance solely on fabrication of safety components would be a fertile area for a separate effort. Including those topics together in this document would either make it too complicated, or more likely give it less adequate discussion than it				✓	The construction, by its definition, inherently includes manufacturing/fabrication process and they are considered very integral part of construction. To omit this part to another new guide is perhaps possible, but not including this in DS441 at all

		deserves. It appears that the mechanical component sections were much more focused on fabrication than the others.					makes it much less valuable and useful. DS441 will not include, for instance, specific material properties and technical numerical values, but rather should provide what sort of elemental issues licensee or regulators should confirm to ensure safety (=quality) of the system, structures and components. Therefore, DS441's scope will be limited to general recommendations on manufacturing/fabrication activities that are more of a quality management issue that significantly impact safety of an installation, but more detailed in technicalities than GS-G-3.1 or GS-G-3.5.
22. USA	Draft Outline, Section 5	"5. ELECTRICAL AND I&C COMPONENTS MANUFACTURING AND INSTALLATION Scope Manufacturing Marking and Identification of Cables and Conductors Factory Acceptance Test Installation <u>Cable Pulling</u> Environmental Conditions Ambient Conditions Electrical and Fluid Supply Networks and Conditions"	During new plant construction, several miles of cable will need to be pulled throughout the plant, and proper attention needs to be focused on this activity.	✓			

23. Japan	General	The important aspect of construction of nuclear installations in term of safety is management. DS349; **GS-G-3.5** The Management System for Nuclear Installations (2009) has been developed in this regard and covers it. In construction other aspects than management for which treatment vary from country to country are difficult to settle as for international standards. Moreover, the proposed contents cover broad areas of techniques and seem too detailed as for an IAEA Safety Guide. We therefore recommend this document as for a TECDOC, understanding its usefulness.				✓	While it is true that each country tends to follow specific industry standards for construction, there are many aspects of the technical issues which are common but yet critical activities from the point of view of ensuring safety. Management System documents (GS-R-3, GS-G-3.1/3.5) covers quite comprehensively about the management system issues but DS441 intends to cover more issues in these mentioned technical areas. DS441 will not include, for instance, specific material properties and technical numerical values, but rather should provide what sort of elemental issues licensee or regulators should confirm to ensure safety (=quality) of the system, structures and components.
24. ENISS		A chapter on management systems is missing and should include "management of modification during construction".				✓	GS-G-3.5 (5.82,5.85(e), 5.147(c), 5.148, 5.150, 5.164, Appendix II.30(b), & V.18) covers this topic well.
25. ENISS		On §4 *MECHANICAL COMPONENT MANUFACTURING AND INSTALLATION*, at the end after *Pre-commisioning tests*, add			✓		Included under subtopic entitled “Final Installation Inspections” (new TOC)

		"Hydropressure tests"					
26. ENISS		On §5 *ELECTRICAL AND I&C COMPONENTS MANUFACTURING AND INSTALLATION* after *Electromagnetic compatibility*, add " Lightning protection"		✓			
27. ENISS		On §5 *ELECTRICAL AND I&C COMPONENTS MANUFACTURING AND INSTALLATION* after *Installation checks*, add "Instrumentation calibration"			✓		It will be added under "Pre-Commissioning Test/ System Function Test" (new TOC)
28. ENISS		A chapter on Documentation is missing, to include "End of erection status reports"				✓	Covered by GS-G-3.5 Appendix V (V.11, V.34, V.35)
29. ENISS		The title of the safety guide should be « Construction of Nuclear Power Plants » in order to incorporate all the experience from projects with good performance but also to give guidance regarding the problems in the procurement of Gen III reactors currently under construction. For instance the document handling regime should be addressed.				✓	The title should stay since "nuclear installation" includes NPPs by the IAEA definition. The construction experience regarding the procurement of GEN III reactors would be very useful to be added to the DS441. Please give us further guidance on where we can have this information. Document handling is already covered by GS-G-3.1/3.5.
30. France	3		The "users" of this guide should be clarified (operating organization, constructing organization/manufacture	✓			Users will be described in the Introduction.

			rs of components, regulators, TSO…)				
31. France	3	It appears necessary to distinguish the different objectives of the inspections carried out by different actors :depending on their activity : design, manufacturing, inspection, assembling, testing. <u>Contract requirements</u>. For instance, in France and Finland, inspections carried out are different because the terms of the orders are different. In Finland, the utility specifies requirements to the manufacturer and then directly deals with the manufacturer. Further, the utility substantiate the safety demonstration to the regulator together with the builder AREVA. AREVA is the builder and STUK the customer In France, EdF plays the role of both customer and builder. They control the management of deviations and are responsible for their substantiation towards the regulator. <u>Inspection during construction:</u> Mainly carried out by the utility in France which is not the case in all industrial fields. We suppose that other countries might have a different organization. So the guide should be adapted to the different	Different actors have not the same views and objectives. So goals to reach by different actors have to be defined in the guide.		✓		Each actor's duty, objectives, and its relationships with other actors are unique for each construction project. Therefore it would be difficult to specify and agree among all MS on which actors have what roles and responsibilities, nor make a matrix of all possible cases. However, DS441 can mention something about this which can be applicable to all MS.

		processes established for inspection.. <u>Role of the regulator</u>: In France, the regulator accompanied by its TSO (IRSN) carries out inspection to check that the construction allow to meet the safety requirement.					
32. France		<u>Different specialties</u>: The nature of an inspection has to be adapted to the specificities: the nature of the inspection is different depending on the professional field: civil work, software. This should be specified in the guide		✓			Each technical section would cover its own inspection issues.
33. France	Draft outline §2		Replace “Safety classification” by a wider scope such as “input from the safety analysis report”.				?????? Needs clarification
34. France	Draft outline §3		The main subchapters should be similar to §4 and §5 (manufacturing, installation, pre-commissioning tests)		✓		New TOC is made and they are included under different subtopics.
35. France	Draft outline §7		Why is welding not incorporated in §3 and § 4 ?		✓		There will be new separate section on welding
36. France			Add a specific chapter on contractor supervision as most of construction is performed by contractors			✓	GS-G-3.5 (5.79-5.83) “Control and Supervision of Contractors” cover these subjects well but it will be referenced in DS441 as

							appropriate.
37. France			Add a chapter on safety issue related to a construction site at an operating facilities site		✓		It will be discussed in the new section "General Requirement for Construction of Nuclear Installations"
38. France			Add a chapter on the "real-time" management of discrepancies discovered during construction activities and modification of installation during construction		✓		GS-G-3.5 (5.82,5.85(e), 5.147©, 5.148, 5.150, 5.164, Appendix II.30(b), V.18 cover this topic well, but will be referenced in DS441 as appropriate.
39. Hungary	General comment	We judge it a very good idea to develop a guide in this topic, since these questions are not covered by other guides, while the importance of them is getting more and more important. Thus, the elaboration of the material is quite urgent.		✓			
40. Hungary	p. 2, Ch. 5. 1st sentence	The new guide will elaborate the defence in depth concept of Fundamental Safety Principles which requires nuclear installations to be constructed in accordance with appropriate quality levels, technical attributes and engineering practices in order to prevent system failures ~~(the first level of defence)~~ and to ensure that all the safety features are consistent with the design assumptions and requirements.	The reason to require a high quality construction is not only the avoidance of system failures (initiating events) but also of ensuring the required performance of the safety systems designed to mitigate the consequences of any malfunction or initiating event.	✓			
41. Hungary	p. 2, Ch. 5. 1st para end	It is recognized that even if the design is fully compliant with NS-R-1 and the commissioning is	This (or some similar) addition could clarify and emphasize that this guide	✓			

		compliant with NS-R-2, the high level of safety can only be achieved if all the details of the construction are carried out according to the highest quality and care, since even the most careful and detailed commissioning cannot test every aspects.	is going to fill some gap present in the current standards.				
42. Hungary	p. 3. Ch. 6 Proposed scope	???	It should be clarified who is the intended target of the guide: the licensee, the organizations carrying out the construction work, the quality control organizations or the regulatory body. It is also an option that all of these are targeted, but then it should be a goal for the document developers to discriminate clearly among the responsibilities of the different organizations.		✓		DS441 can be used by any stakeholders of construction: licensee, vendors, constructors, QC or QA organizations, or the regulatory bodies. This will be described in the Introduction section. With regards to each role and responsibility of each organization, this is difficult since all projects are unique in their roles and responsibilities. DS441 most likely will only say from the perspective of nuclear safety.
43. Hungary	p. 4 Draft outline	The “Welding” section should logically follow the “Mechanical…” section or incorporate it within the latter.			✓		There will be a new section on welding.
44. Hungary	p. 4 -5 Draft outline	There are some imbalances between the different main topics ***which should be handled during the development of the document***. E. g.: the “coatings” is mentioned in the “Civil/architectural…” section,		✓			Inconsistencies will be corrected. A new TOC is under development to cover all these mentioned aspects.

		while the “coatings” and the “heat insulations” is not mentioned in the “Mechanical… “ section. Also, the “Marking and identification” is mentioned only in relation with the Electric systems, though it is also important in other chapters, as well.					
45. Finland	General	At the moment IAEA is preparing the safety guides on the requirements to the construction of the NPP and the regulatory oversight of the construction of a NPP. The regulatory oversight safety guide should reflect the content of the requirements safety guide. However the different working groups are preparing right now quite different safety guides. There should be coordination so that the guides as constant.		✓			The Safety Guide on the regulatory oversight of the construction is now going to be the Safety Report, not a Safety Guide. DS441 will include the general guidance for the regulatory activities pertinent to the technical construction activities which are the scope of DS441. There will be coordination for the consistency of these documents.
46. Finland	General	In the DPP it is presented that there are requirements and related safety guides to management system of nuclear installations and the next step need are the requirements for the detailed technical questions. However there is need for the requirements for the NPP construction project and related issues. This has been taken into account in the regulatory oversight safety guide.					It is not clear what is really meant by “need for the requirements for the NPP construction projects and related issues” in 2nd Par. If it is meant to be related to project management issues such as schedule/cost/project control, DS441 will not cover such aspects since it should be covered under Management System documents, GS-G-3.1/3.5.

		There is need for the detailed technical safety guide which can be either separate safety guide of appendix of the more general safety guide of the project.					Needs clarification.
47. Finland	Content	1. Management of the NPP construction project and leadership 2. Organization, 3. Management and resolution of the safety issues, 4. Security issues at the construction site 5. Procedures, 6. The resources (competence, training and resource management) 7. Management of the timetable 8. Supervisor of the design and design control 9. Requirements for the design process and the control of the process 10. Configuration management of the plant 11. Management of design modifications 12. Management of design requirement and, requirement management 13. Control and evaluation of the designing organization and its subcontractors 14. Audit programme, 15. Project planning, construction	A proposal for a new content of the safety guide. The design organization is also assumed to deliver the plant.			✓	The suggested topics of project management are already covered well in GS-R-3, GS-G-3.1, and GS-G-3.5. Some topics such as #13, #18, #19, #22, #26 are planned to be included in DS441, but to have other topics in separate safety guide is considered overlapping with above documents.

		site, installation, review of the commissioning handbooks 16. The exchange of information between plant designer and the licensee/license applicant 17. The approval of the design and its relation to the production/construction during the construction project 18. The Competence and experience of the construction and production personnel on the nuclear safety 19. Ensuring the competence of the persons responsible of the QA and QC at the resign organization and its subcontractors 20. Design, construction and commissioning 21. Risk management 22. Safety culture 23. Operating experience feed back (own and others) 24. Requirements for handling non-compliances during construction project 25. Requirement for the identification of the non-compliances, reporting and handling in the whole chain of design organization and subcontractors 26. Common classification of the systems, structures and				

		components 27. Root cause analysis 28. The task of the responsible manage of the construction 29. Reporting to the regulator during the construction project 30. Commissioning of the Nuclear power plant					
48. Finland	Outline of the technical safety guide	ELECTRICAL AND I&C COMPONENTS MANUFACTURING AND INSTALLATION Scope Manufacturing Marking and Identification of Cables and Conductors Factory Acceptance Test Installation Environmental Conditions Ambient Conditions Electrical and Fluid Supply Networks and Conditions Installation Sequence and Procedure Electrical Cabinets Cable Routing and Terminal Connections Isolation by Train, Channel and Safety Class Earthing Network Cable Trays Electromagnetic Compatibility Cleanliness Installation Checks Pre-Commissioning Tests	Electrical and Fluid Supply Networks and Conditions The meaning of the subchapter is not clear.		✓		The new TOC with more understandable topics will be made, but since some of them could include technical terms, it may not be clear to all readers. It is suggested to comment again when a real draft DS441 is developed.
49. Finland	new	Chapters for the fluid and pneumatic systems are needed.	The fluid and pneumatic systems are missing.		✓		It will be covered but not necessarily as subtopic titles.
50. Finland	new	Security at the construction site	The central concepts which are applied at the site should be presented.			✓	NS-G-3.5 (5.182, 5.183 and Appendix V.15(e)) covers this topic well.
51. Finland	Outline of the	6. IMPLEMENTATION, SYTEM INTEGRATION AND INSTALLATION	add Use of different types of		✓		It will be discussed under “Verification and Analysis”,

	technical safety guide	OF SOFTWARE FOR COMPUTER BASED SYSTEMS Scope Technical Considerations Development Process and Activities Software Implementation Verification and Analysis Computer System Integration Use of different types of simulators in the verification and validation process Validation of Computer Systems Installation and Tests	simulators in the verification and validation process				and "Validation of Computer Systems," but not as outline titles.
52. Finland	new	components environmental qualification	This is and issue that causes a lot of problems thus the qualifications quit often lack some tests or the only a certificate is offer in stead of the whole report which show the limitations of the qualification test or the component.	✓			Will be added to the new section on "General Requirement for Construction of Nuclear Installations"
53. CANADA CNSC		Wording similar to that in DS446 (for Commissioning) with respect to Safety Management, is needed e.g, from Section 4 of DS446 The topic of safety culture has developed significantly since the issue of the guide, and it is considered that a specific section would be useful to identify the key issues relating to safety culture to replace the sporadic references in the current guide.			✓		Safety Culture will be in the new section "General Requirements for Construction of Nuclear Installations." But the roles and responsibilities between various actors are different on each project, so limited statements can be made with regards to roles and responsibilities.
54. CANADA		There should be information on the control of documentation and			✓		Documentation will be referenced to GS-G-3.1/3.5

CNSC		records, and it is considered that this is an issue of particular significance during construction due to the additional demands on configuration control as the plant is commissioned, modified, operating limits and parameters are amended and operating procedures are validated.					mostly and some emphasis will be added.
55. CANADA CNSC		A recurrent issue within the current version of the guide is a need for a consistent approach to the responsibilities for the construction programme and the responsibility for safety through the construction and commissioning phases. This issue should be dealt with early in the document, perhaps by reference to a chart or matrix of activities and responsibilities, and should consider the effect of alternative contracting arrangements, including turnkey contracts, and those applicable to new nuclear states. The organization and management arrangements relate to the construction (and commissioning) programme, its interface with construction phase, the stages of commissioning, and implementation			✓		Although the DS441 can be quite clear about the ultimate responsibility for safety of the plant lies on a licensee, it is difficult and has no safety significance to make matrix of activities and responsibilities with all cases of contracts. The role and responsibility of licensee will be included in the introduction section.
56. CANADA CNSA		Suggest to add sections similar to that proposed for DS446, up front in the document, e.g. 2. ORGANIZATION AND MANAGEMENT Construction organization Safety culture		✓			Will be covered under the new section, "General Requirements for Construction of Nuclear Installations" with reference to GS-G-3.1/3.5, but will not be included as topic titles in the outline.

		Functions and responsibilities in construction activities Interfaces between participants in the construction process Qualification and training Maintenance during construction Turnover to commissioning Management Systems Emergency arrangements Feedback of experience from construction 3. CONSTRUCTION PROGRAMME General Main aspects of the construction programme Testing in the construction programme Review and approval					
57. CANADA CNSA	3	Separate 'Concreting/Manufacturing/Installation' into three different and separate topics.	Concreting, Manufacturing and Installation each has different technical concerns.		✓		New TOC will cover these topics separately.
58. CANADA CNSA	3	Add a new sub-topic on modular construction.	Modular construction is increasingly being adopted by vendors and it presents different technical concerns.	✓			New separate section will be created.
59. CANADA CNSA	4	Add topical areas under 'Installation'.	'Manufacturing' contains a long list of topical areas. A similar breakdown of topical areas should be provided for 'Installation'.		✓		Needs clarification on what it means by "Topical" Areas, but There will be new TOC structure as draft will be created and this comment will be reflected.
60.	4	Add a new sub-topic on "Marking			✓		Will be covered under new

CANADA CNSA		and Identification of bulk and divisible material".					section on General Requirements.
61. CANADA CNSA	New	Add a section on 'Warehouse and/or Storage'.	Many material, components and equipment require special handling and storage control. Technical guidance needs to be provided.		✓		This is already covered by GS-G-3.1/3.5 but reference will be made to these documents.
62. CANADA CNSA	Glossary	Definition of 'Graded Approach'	Ensure there is a definition of 'Graded Approach' mentioned in the 'Overview' section of the DPP or a reference to the document which contains this definition.			✓	The term is used for any IAEA docs without any additional explanation since it is widely accepted and defined in the IAEA glossary.
63. CANADA CNSA	Section 2 2nd para, last sentence	Consider adding 'examinations' between tests and inspections.	Some codes and standards view examinations as different to inspections, such as conducting non-destructive examinations, and the inspection of those examinations.			✓	Addition of the word "examination" here does not necessarily mean that it refers to non-destructive examination (NDE), and thus would not add much meaning (or may confuse readers for not knowing the difference). NDE could be covered in its section so the current statement should suffice the purpose.
64. CANADA CNSA	General comment	Consider better separating manufacturing from construction / installation.	SSC manufacturing is performed at the vendors' facilities' under more ideal conditions, and in the case of OEM equipment by their own employees; purchaser			✓	The inclusion of manufacturing makes DS441 more useful and valuable especially for MS without much manufacturing capabilities. The licensee or owner should be able to know

			oversight is then tailored to that reality. Whereas, site activities are usually performed by contractors (sometimes under to supervision of a vendor's representative) under less than ideal conditions. Site activities may also include on-site fabrication facilities such as pipe-spool fabrication, valve disassembly and re-assembly, safety relief valve setting, modular assembly, etc.				from this DS441 the critical construction activities that affect safety and quality during manufacturing phase. There are some cases of manufacturing/fabrication processes performed at construction site or on-site shop which make it more integrated with the construction at the site.
65. CANADA CNSA	Draft Outline 2	Consider adding QUALITY CLASSIFICATION to title.	The quality classification unusually an outcome of the safety classification, which then helps determine the quality code and/or standard.		✓		It will definitely be included and discussed in the section, but currently not written as this specific title in the outline.
66. CANADA CNSA	Draft Outline 3, Technical Issues	Consider adding Earthworks, Soils and Foundations.	All have unique characteristics such as placement and compacting.		✓		It will be covered under newly added topic title "Site excavation."
67. CANADA CNSA	Draft Outline 4, Manufacturing	Consider adding Special Coatings, Mechanical Joints, Brazing, Pressure Testing, Functional Tests (e.g. valve actuators), and other Factory Acceptance Tests.	All can be part of mechanical component manufacturing.		✓		May be not as titles in the outline but they will be covered under other topics.
68. CANADA	Draft Outline 4,	Consider adding Preservation, Packaging & Shipping.	Some SSCs require special preservation and		✓		It will be covered in "General Requirement" with reference

CNSA	Manufacturing		packaging, particularly for overseas shipments. Overseas shipments may also require special considerations, such as on-deck / below-deck storage, maintaining cover gas levels, etc.				to GS-G-3.1/3.5.
69. CANADA CNSA	Draft Outline 4, Installation	Consider adding Receiving, Storage, Handling, and Material Issue and Returns.	Controlling SSCs from receipt to installation has its own important characteristics, such as indoor or outdoor storage, environmental controls, hazardous materials, etc.		✓		It will be covered in "General Requirement" with reference to GS-G-3.1/3.5. (Mostly already covered in these documents)
70. CANADA CNSA	Draft Outline 4, Installation	Consider adding on-site concrete batch plant and testing laboratories.	Large project build on-site concrete batch plant and testing laboratories for better control of concrete production and delivery.		✓		It will be included under the new section "Concrete Batch Plant and Control Constituents"
71. CANADA CNSA	Draft Outline 4, Installation	Consider adding Foreign Material Exclusion, Welding/Brazing, Drilling and Grouting of Pipe Hangers, Pump Stands, etc., Destructive & Non-Destructive Testing, Insulation and Cladding, System Pressure Testing.	All can be part of mechanical construction and installation.		✓		Some will be under General Requirement; NDT will be under its own section; Others will be added.
72. CANADA CNSA	Draft Outline 4, Installation	Consider adding Hoisting, Slinging, Rigging and Handling Equipment.	Improper selection and use during construction can lead to damaged or incorrectly placed SSCs.		✓		Will be added but not as exact titles in the outline.

			It may be necessary to keep an SSC in a hoisted position for a length of time before placement.				
73. CANADA CNSA	Draft Outline 4, Installation	Consider adding Heavy Lift and High Lift Cranes.	The design, assembly, use and maintenance of such cranes are a critical safety factor for any major construction site.	✓			
74. CANADA CNSA	Draft Outline Installation	Consider adding adequate working space for construction personnel.	Scaffolds and platforms, stairs and ladders, barriers, screens, shields are necessary to install SSCs.	✓			
75. CANADA CNSA	Draft Outline Installation	Consider adding Housekeeping.	Housekeeping can be an all-inclusive term for environment, cleanliness, fire protection and prevention, zone designations for clothing, hygiene, eating, smoking, etc.		✓		Already covered in GS-G-3.5 but DS441 will make a reference to it.
76. CANADA CNSA	Draft Outline Installation	Consider adding maintenance and care of SSCs during construction.	Constructors / installers need to comply with supplier recommendations to maintain and preserve SSCs during the construction period that could last several years.	✓			
77. WNA/	Para 2 and Para 3	Clarification is necessary. Last sentence in Para 2				✓	Par. 2 is first referring to overall “technical activities”

CORDEL	always last sentence	"Background/ rationale" is contradicting with the last sentence of Para 3 "Objective". The former talks about the steps to be followed for carrying out the civil construction / installation works and the testing / inspection requirement; whereas the latter talks about identifying safety significant construction activities rather than procedural guidance on how to construct a nuclear installation.					during construction and this DS441 (objective) will focus only on "safety significant technical issues" out of above mentioned technical activities. More clear statement is not considered necessary as all other readers are clear of the above mentioned statements above. The last sentence in Para. 2 will be deleted since there is a similar sentence in Para. 4 "Justification"
78. WNA/ CORDEL	Para 4 last sentence	It is presumed that the 'vendor' mentioned in this text refers to 'construction vendor'. Similarly, the term 'regulatory body' may be replaced by 'construction authority'.				✓	Vendor referred in this case may not necessarily be limited to construction vendor (it could be any vendor) so it should remain as it is. The term "Regulatory Body" is clearly defined in the IAEA Glossary and this definition clearly applies to the intended use of the word in this case. This would also make it consistent with other IAEA documents on construction such as GS-R-3, GS-G-3.1/3.5.
79. WNA/ CORDEL		As the scope of this document is to provide general guideline / recommendation for construction of nuclear installations, it may be clarified whether addressing aspects				✓	Technical Specification will not be the scope of this guide and should be handled separately. Par. 5 already mentions about the validity of

		of technical specification shall be under the purview of this safety guide. The technical specifications are finalised based on design requirements and are provided to the respective vendors by the organisation irrespective of whether the activity is critical or not.					this DS441 with the fulfillment of NS-R-2, which inherently includes the Technical Specification requirement (Operational Limits and Conditions).
80. WNA/ CORDEL		It may be brought out clearly that all the requirements during construction, installation and commissioning flow from the design criteria and approved technical specifications.				✓	Design criterion is mentioned in Par. 3 and 6. Technical Specification should be treated differently as final "as-built" Technical Specification is finalized (or modified) before actual operation starts. Commissioning is out of the scope for DS441.
81. WNA/ CORDEL		It is suggested to remove the "Safety Classification" section since these terms will be defined in other standards and repeating them within this standard raises to possibility of differing terms, definitions, and concepts as standards change.				✓	DS367 does not go into detail on how to implement safety classification during construction phase. This SG will make recommendations on how to link safety classification with relation to detailed construction requirements specified by design, qualifications of construction personnel, construction methods, QA, records, procurement specification, tests, etc.
82. WNA/ CORDEL		This draft standard seems to go beyond simply construction and includes fabrication and manufacturing.			✓		It is not the intention of DS441 to specify all the technical data i.e. material property, chemical

		It is strongly recommended to proof whether the details of manufacturing especially towards mechanical, electrical and I&C components need to be part of this safety guide, since well established codes are available for this process. Items such as forging, melting, casting, and the like should only be in a construction standard if there are specific aspects very close on construction processes and if they could affect these.					composition, welding techniques, etc. DS441 will only provide general recommendation on what should licensee or regulatory body should watch out for from the safety perspective in these technical activities. For example, the following recommendation can be made in the area of forging: "(1)Establish the following requirements for forming procedure qualifications including specification of maximum permissible strain for each of the cold forming, cold forming and heat treatment after forming, hot forming, hot forming and heat treatment after forming: (a)Perform the procedure qualification test and production of relevant records, (b)Documentation of the forming procedure, (c)Training and qualification of workers to be involved in the forming, (d)Verification methods that which may include destructive testing and their records, (e)Assurance of the measuring & test equipment being

							available and maintained."
83. WNA/ CORDEL		Quality Assurance controls apply to each of the construction areas and thus is deserving of a chapter in its own right instead of being mentioned only under CIVIL/ARCHITECTURAL ENGINEERING AND CONSTRUCTION A chapter that deals with "Quality Assurance" should added and beside recommendations on the quality assurance program on construction and relevant interfacing areas further issue should be covered like: - a section on "Records and the Control of Records" during construction, installation and commissioning - final documentation of plant as constructed			✓		The general aspects of QA & QC are extensively covered in GS-R-3.1/3.5, but it will be also discussed wherever there is relevance in DS441 with a reference. There will be new TOC structured to reflect more consistency among each sections. "Records…" and final documentation will be covered in DS441 with a reference to GS-G-3.1/3.5.
84. WNA/ CORDEL		The following general points may be addressed: - Safety, health, environmental aspects to be considered during construction, installation and commissioning phases. - Manpower qualification/training - Color coding for piping as well as various radiation zones - Piping - Reactor components - Mock-up for critical components and structural elements			✓		GS-G-3.1/3.5 covers these topics well but will be mentioned and referenced as necessary in the draft of DS441 Safety Guide.

		- Life time ground water monitoring system at site through planned boreholes					
85. WNA/ CORDEL		An additional chapter that deals with "construction management" should be introduced.				✓	GS-G-3.1/3.5 covers this topic
86. WNA/ CORDEL		The following Topics 6 to 9 should be also considered in the content of new SG:			✓		All these will be covered in the draft of DS441 but will not necessarily be the titles of sections in outline.
87. WNA/ CORDEL	chapt. 3	3. CIVIL/ARCHITECTURAL ENGINEERING AND CONSTRUCTION • Modular Construction Techniques, Issues and Standards • Site Heavy Lift Techniques and Issues • Concrete Batch Plant Planning and Construction • Embedment Plate Installation and Interference Issues • Handling ground water during dewatering (near existing operating plants) • Control blasting during excavation • Critical embedded parts • Reinforcement splicing/welding/threaded couplers • Critical liners other than containment liner (such as spent fuel pool, calandria vault etc) • Epoxy painting on concrete and			✓		All these will be covered in the draft of DS441 but will not necessarily be the titles of sections in outline.

		steel structures in areas requiring decontamination • Containment leak test • Spent fuel pool leak test (concrete pool as well as the leakage collection system) • Leak tightness of basements • Cleanliness • Rock anchors (active and passive) – installation, stress and corrosion monitoring. • Long term monitoring of containment and other important structures.					
88. WNA/ CORDEL	chapt. 4	4. MECHANICAL COMPONENT MANUFACTURING AND INSTALLATION • System Flushing • Integrated System Testing • Containment Pressurization Testing • Pipe Hangers and Restraints • Installation of MOV's, Operators and other in-line components • Pipe Spools Installation Considerations • Load test for building cranes			✓		All these will be covered in the draft of DS441 but will not necessarily be the titles of sections in outline.
89. WNA/ CORDEL	chapt. 5	5. ELECTRICAL AND I&C COMPONENTS MANUFACTURING AND INSTALLATION ....Integrated System Testing • Lightning Protection • Fire barriers			✓		All these will be covered in the draft of DS441 but will not necessarily be the titles of sections in outline.

90. WNA/ CORDEL		7. WELDING • Welding Qualification Plan and Procedure			✓		All these will be covered in the draft of DS441 but will not necessarily be the titles of sections in outline.
91. WNA/ CORDEL	Chapter 8	Chapter 8, "Authorization and Commissioning" is not defined and may cover areas planned for inclusion within other IAEA specifications.		✓			It will be restricted to the interface or what is not covered in other IAEA Safety Standards.