Draft Safety Guide DS482 "Design of Reactor Containment Systems for Nuclear Power Plants"
(Version dated 20 April 2016)
Status: STEP 7 – First review of the draft safety standard by the SSC(s)

Note: Underlined are those to be added in the text. ~~Crossed out~~ are those to be deleted in the text.

	COMMENTS BY REVIEWER Reviewer: **Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB)** (with comments of GRS, M. Sonnenkalb) Pages 18 Country/Organization: **Germany** Date: May 20, 2016				RESOLUTION			
Relevance	Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
GENERAL REMARKS / LACK OF CLARITY								
2	1	whole document	It seems that the information provided within the document primarily focuses on PWR reactors. Specific requirements with regard to BWR and especially the suppression pool are rare or missing. Are there no requirements?					With this new revision the goal is to provide guidance and recommendations which are not reactor technology dependent to the extent possible, taking into account that design recommendations for safety systems or DECs are not reactor technology or design dependent. This safety guide is also reviewed by MS designing or operating BWR.
2	2	§1.2 and whole document	§1.2 intends to define the use of the terminology **"containment"** for a strong structure surrounding the reactor and **"associated systems"** or **"systems"** for systems necessary for the normal operation, or to minimize radioactive releases, to remove ener-					**"containment structure and associated systems" seem to be the more appropriate.** **"Structures, Systems and components" is used on purposes and cannot be systematically replaced**

Relevance: 1 – Essentials 2 – Clarification 3 – Wording/Editorial

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			gy or to preserve the structural integrity of the containment. Nevertheless, in the whole document the wording used for "the containment (structure) and (associated) systems" varies. E.g. the title of the document uses: "containment structure and systems", chapter 3 headline is named "… of structures and components", chapter 4 headline uses "containment structure and associated systems". Other variants in the full text are: "containment structures and systems", "containment structure and its associated systems", "containment and its associated systems", "containment and systems", "containment and of the safety features necessary", "containment systems". **It should be clarified, what is the most appropriate terminology, probably: "containment structure and associated systems". The document should be harmonized accordingly.**					
1	3	§1.2, §2.1, §2.3, §2.5-2.8, §2.11, §2.13, chapter 3.5	First in §1.2 and later especially in chapter 3.5 the terminology "… structural integrity of the containment in **accident conditions …**" is used. It is not clear if "accident conditions"					" Accident conditions" is here used as in SSR 2/1 Rev. 1

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		and whole document	includes design basis accident and those summed up by design extension conditions? **It should be clarified and defined in the first chapter.**					
2	4	§1.5 and chapter 1	"Recommendations given in this Safety Guide are targeted primarily to **new nuclear power plants**. For plants designed with earlier standards, **comprehensive safety assessments are to be carried ou**t considering these recommendations …" What does the terminology "new NPPs" mean? Is the document only related to the plants which are currently under construction and which often have new features like core catchers, passive systems etc. like EPR, AP1000, ABWR, WWER next generation? Is it intended (as written) that after the IAEA document is published the States have to carry out "**comprehensive safety assessments … for plants designed with earlier standards**"? The intention of the document to					A foot note is needed to indicate which "date" should be associated to New NPPs. Definition should be made by NUSSC Appendix 1 was sent a side document and should be discussed at next NUSSC meeting.

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			update it for "new NPPs" and to include requirements for "design extension conditions" to be included in the plants design is not clearly mentioned. "Design extension conditions" is not mentioned in the whole chapter 1.					
1	5	Chapter 2	In all paragraphs of **chapter 2** (in difference to the other parts of the document) **no should or shall statements are used** in the sentences as typically done in IAEA guides. Instead of sentences read like: …are designed to perform … **This has to be changed.**					Such practice has already been used in SSR 2/1
2	6	§2.3, 2.7, 2.9, 3.8, 3.16, 3.26, 3.31, 3.32, 3.33, 3.52, 3.53, 3.56 etc.	The wording **"accident with core melting"** is used several times. All "accidents with core melting" should be covered by "design extension conditions". **The text should be rechecked.**					DEC conditions result from a limited number of scenarios and sequences beyond DBAs. It means that all possibilities for accident with core melting are not considered for design.
1	7	§2.10	As a supplementary measure to those implemented to mitigate the consequences of the postulated conditions, the use of non-permanent equipment is considered, and adequate connection points and interfaces with the plant are installed with the objective to avoid **unacceptable** large release	This para should be rechecked, since the use of non-permanent equipment is required in SSR2/1, §6.28a only for restoring the capability to remove heat from the containment. Furthermore, following questions arise:				1-Removing energy from containment contributes to prevent large release. 2-Unacceptable is applicable to off site contamination and will be moved 3-Large release and unacceptable off site contamination

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			and off-site contamination in case of **accidents exceeding** those **considered in the design** (see Requirement 58).	1. Why is it required in NS-G-1.10 with the objective to avoid unacceptable **large release and off-site contamination** 2. Why **unacceptable** large? 3. Why in case of accidents e**xceeding** those considered in the design? What is meant here? Accidents beyond DEC? 4. Why is the requirement from SSR2/1 not mentioned?					should not occur in the event of postulated events or sequences Lessons learnt from past nuclear events have shown that despite provisions implemented in the design the loss of a fundamental safety function can occur.
1	8	§2.10 and §2.11		Reference is made to Requ. 58 from SSR2/1. The §6.27, 6.28, 6.29 and 6.30 from SSR2/1 are missing in these two § respectively in the list of requirements under the headline CONFINEMENT OF RADIOACTIVE MATERIAL. Also §2.9 - §2.11 from old NS-G.1.10 have been deleted - why?					A reference to an overarching requirement is also a reference to all its subsequent requirements Req. 58 is indicated as a relevant reference for the section CONFINEMENT OF RADIOACTIVE MATERIAL.(see 2.7) Section 2 has been refined and is more dedicated to present the safety approach for design. Former more detailed recommendations have been removed but are not omitted in the other sections.
2	9	§3.16	For external flooding this would mean that **either all the structures hosting the above mentioned systems** are located at an elevation	It is not clear what the intention of the text would be. How is an elevation <u>higher than the beyond design basis flood</u> de-					E. g.By providing additional margins to margins directly derived from the methods used to defined the design basis flood

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			higher than the beyond design basis flood, or adequate engineered safety features (such as water tight doors etc.) should be in place to protect these structures and ensure that mitigating actions can be maintained:	fined?					elevation
2	10	Chapter 3.5.1 Design basis accidents	It is not clear why the former §3.11 – 3.17 and §3.20 from NS-G-1.10 have not been transferred into the new guide.						3.11 – See 4.12. Moreover the detailed recommendations of [7} are applicable to this guide 3.20- Not correct see 4.27 3.17- SSR 2/1 do not define “safety margin”, “operating margin” etc
2	11	§3.42, §3.43, §3.46		Specification of the energy management and location of control of radionuclides would improve readability and understanding.					This revision is for at least 10 years and therefore recommendations cannot be made on the basis of a description of specific systems
2	12	§3.49	Complementary safety features should have an adequate reliability to contribute to the practical elimination of early and large releases.	Is this requirement related to the use of mobile equipment as newly defined in §2.10. Unclear what the intention will be. Why there should be such equipment?					Safety features for DEC
2	13	§3.76	Probabilistic safety analysis should be used taking into accounts its limitations in support of demonstrating the practical elimination of conditions that could lead to early or large releases. In particular PSA may be used	Why is the use of PSA recommended if its limitations are known? Are there no other means available to demonstrate practical elimination of different events or situations?					Verification of a low probability of sequences is necessary but not sufficient

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			for analyzing the containment isolation provisions, for preventing containment by-pass and the total failure of the energy management systems.					
2	14	§3.77	As a complement to a number of investigations related to fabrication, testing, inspection, evaluation of the operating experience, PSA should be used together with deterministic calculations in demonstrating a **very low probability** of early or large releases for postulated design extension conditions with core melting.	"Very low" probability is undefined. How should the requirement be checked?				IAEA does not give metrics to MS. That is the reasonability of MS to declare what is acceptable or not.
2	15	Chapter 4, §4.1 and 4.2		Are these two paragraphs the only GENERAL requirement for DESIGN OF CONTAINMENT STRUCTURE AND ASSOCIATED SYSTEMS? §4.1 - 4.4 of NS-G-1.10 are not further used, why? Further §4.33/4.34 Performance of secondary system and 4.27-4.29 Safety classifications of NS-G-1.10 are no longer used, why?				4.1 and 4.2 Not correct See the whole section 3 and in particular recommendations 3.3, 3.4, 3.26. 3.27 etc. 4.3 Interesting 4.4 Why attention should be paid to shutdown modes and not to severe accident conditions? 4.29- Your review should be made taking into account the latest IAEA requirements and Safety guides
2	16	Chapter 4.1.4		No requirement any longer exist for sharing a common containment (old §4.38), why?				Your review should be made taking into account the latest IAEA requirements and Safety

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								guides
2	17	§4.11	Means allowing interconnections between units should be installed to facilitate the management of accidents **not considered in the design** of the NPP.	Does this mean situations which are beyond DEC, as such are included now in the "design of the NPPs"?				No, because provisions to mitigate the consequences are not implemented in the design
2	18	Chapter 4.4 and §4.50	4.4 STRUCTURAL DESIGN OF SYSTEMS 4.50 For **containment systems**, a set of representative loads and load combinations,	What is meant by the headline and by the first §? The containment itself or systems associated to the containment?				See 4.81 of former NS-G 1.10
2	19	Chapter 4.5	4.5 ENERGY MANAGEMENT	Chapter 4.5 does not provide any longer information with regard to Air cooler systems, jet condenser systems, ice condenser systems and vacuum pressure systems used for ENERGY MANAGEMENT. Is this caused by the application of the Guide to "new NPPs"?				Such design are no longer retained by designer for new NPPs
1	20	Chapter 4.6.1 and §4.83	4.6.1 Containment source term 4.83 For design basis accidents, this should be done by means of a conservative analysis …	Information is missing how the containment source term should be calculated for DEC conditions.				Refer to paragraph 3.5.2, item 3.27
2	21	§4.98	4.6.3. Secondary containment 4.98 The confinement volume should be kept at negative gauge pressure **in normal operation**, to enable the leak tightness of the secondary containment to be monitored.	What about DBA and DEC conditions? No requirement?				For accident conditions see 4.96

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2	22	§4.104	…. Where a design of this type is used, provisions should be made **to minimize the uncontrolled release of radionuclides to the environment resulting from such leakage**, to test the leak rate periodically, and to detect and isolate accidental leaks by qualified means.	Is this requirement still conform with the stronger requirement mentioned in §2.4 of this new guide?				This recommendation is important because systems operating in a recirculation mode outside the Primary containment still exit. This recommendation is useful to support recommendation 2.4
2	23	§4.116	Where containment venting systems are installed, the discharge should be filtered **to control the release of radionuclides to the environment** [15]. Typical filter systems include sand, multi-venturi scrubber systems, HEPA or charcoal filters, or a combination of these. HEPA, sand or charcoal filters may not be necessary if the air is scrubbed in a water pool.	No limits are mentioned. A link to the requirement §3.37 respectively the strong release requirements should be made.				Venting containment is not recommended in the event of DBA. For DECs, the limit for radiological releases is given in section 2
1	24	§4.119	4.7 MANAGEMENT OF COMBUSTIBLE GASES 4.7.1. Generation of combustible gases The amount of combustible gases generated should be calculated for normal operation, LOCA and design extension conditions. The uncertainties in the various possible mechanisms for generation should be taken into account by the use of adequate margins. If the amount of hydrogen	For the determination of hydrogen counter measures in DBA and DEC conditions not only the total amount of combustible gases generated is of importance, even of greater importance is the calculation of the hydrogen release rates and the containment conditions during the release period (steam inertisation).				Loads and associated acceptance criteria are given in Table 3 4.122 gives recommendations for the identification of the different threats and stressed generation, transport and mixing of combustible gases inside the containment. Specific recommendations depend on the findings of the assessment, on the free volume

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			expected to be generated by metal–water reactions is estimated on the basis of the assumption of total oxidation, uncertainty evaluation may be not necessary.	The whole para should be discussed again and specific requirements for hydrogen mitigation and determination of expected loads need to be defined.				of the Primary containment on the mixing of the atmosphere, on the strategy to cool the corium debris, whether the atmosphere was or can be inerted, etc.
1	25	Chapter 4.7.2	4.7.2. Threats due to combustible gases	Threats due to combustible gases are discussed only with regard to the containment. What about secondary buildings surrounding the containment. Fukushima highlighted what might happen if hydrogen stored in the containment is leaking into surrounding buildings.				A safety guide cannot provide recommendations where there is no requirement
2	26	§4.129	4.7.3.2.Homogenization 4.129. The containment design either should incorporate active means (such as sprays and mixing fans qualified for operation in a combustible gas mixture) or should facilitate the action of mechanisms (such as large volume dispersion or natural circulation) to enhance the uniform mixing of the containment atmosphere within and between compartments. T**his is to ensure that local hydrogen concentrations do not reach detonation limits following an accident.**	Is the prevention of detonable gas mixture in the containment locally or globally enough? Other combustion processes exist, like flame acceleration or DDT which might challenge the containment integrity as well (see 4.122)? The requirement should be check for appropriateness.				See answer to comment 23
1	27	Chapter	4.10. INSTRUMENTATION AND	Are there no special require-				See all recommendations listed

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		4.10	CONTROL SYSTEMS	ments with regard to instrumentation used in case of DEC to detect the plant status, to determine the proper measures implement and to bring back the plant into a safe and stable state?				in para. 4.10.6
1	28	Chapter 4.10	4.10.2.4. Water levels in the drain storage tanks and sumps	Are there no specific requirements for water level measurement in BWRs, especially in the wetwell?				Do not confuse sumps and tanks to collect drains with the wet well of BWR
1	29	Chapter 4.10 §4.202	4.10.6. Post-accident monitoring 4.202 For the management of accidents, appropriate instrumentation displays and records should be available **in the MCR** to allow personnel to make a diagnosis and to decide … Dedicated instrumentation should be implemented to allow personnel **in the MCR** to initiate long term actions necessary to maintain the containment integrity in the event of an accident with core melting.	Post-accident means under DEC conditions? Why instrumentation to be used in DBA and DEC is required to be available only in the MCR. Typically a second location should be provided as well, which is well equipped.				During accident management there is no longer difference between DBA and DECs Necessary information for the operator should be available or displayed. All that instrumentation for DBAs and DECs is listed in para. 4.10.6. Recommendations for the design of instrumentation may be and is different. According to SSR2/1 the Supplementary control room or ECR is not required to be designed to operate the reactor in accident conditions.
2	30	§4.202	Process parameters to implement	Is it already clear that new NPPs				Agree

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			actions specified in the **emergency procedures or severe accident management guidelines** (process parameters to control the pressure and to maintain the conditions inside the containment below the specified limits);	will have both EOP and SAMG? Typically all measures implemented for DEC in new plants would require procedures to implement them correctly in case of a severe accident, not GUIDELINES (as in old plants) which might be followed or even not if decided by the crisis team. This part needs to be updated.				But some MS would rather keep terminology EOPS for AOOs and DBAs and the terminology SAMG for severe accidents
1	31	Chapter 4.10 §4.203	4.10.7. Sampling A monitoring or sampling system should be provided **inside the containment** to enable assessment of the risks of explosion from combustible gases. The monitoring can be achieved by direct gas concentration measurement or sampling. **Alternative possibility is to measure the recombining activity of the recombiners by temperature measurement.**	Why only inside the containment, and not in secondary buildings? Fukushima showed that especially in case of inerted containments, where hydrogen is stored within for a long time and not recombined, a challenge to the surrounding building exist. Here SAMG (if not design features) are needed to prevent combustions. For such proper instrumentation is needed as well in the secondary containment. Is it appropriate to mention in a Guide a special measurement system, which might even not yet exist - **measure the recombining activity.**				Temperature measurement will be deleted if not implemented. At NUSSC workshop meetings hold for the revision of SSR 2/1, this point was raised by German representative but not retained by consensus at the end of the discussion.

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				Radiation measurement outside the containment in the secondary building is as well requested..				Will be added in para. 4.10.2.5
1	32	§4.204	Provisions should be made in the design for sampling of the containment atmosphere a**nd the sump water at suitable locations.**	Why only the sump water (in PWR). What about sampling from SFP located inside the containment, IRWST, or the wetwell of BWR?				SFP inside or outside the containment is not in the scope of this safety guide. Wet well will be added
3	33	Chapter 5.1.2, 5.2.2	5.1.2. Integrated leak tests (of the c**ontainment envelope**) 5.2.2. Integrated leak tests (of the c**ontainment envelope)**	What means "**containment envelope**"?				The term "envelope" can be deleted
			NEW TEXT PROPOSALS					
2	34	§1.2	"The confinement of radioactive material in a nuclear power plant, including the control of discharges and the minimization of radioactive releases into the environment, is a fundamental safety function to be ensured in any operational condition ~~and **accident condition**~~., for anticipated operational occurrences, in design basis accidents and for design extension conditions termed "accident conditions". In accordance with the concept of defence in depth, this fundamental safety function is achieved by means of several barriers and levels of defence.	The old NS-G-1.10 was much more precise. "The confinement of radioactive material in a nuclear plant, including the control of discharges and the minimization of releases, is a fundamental safety function to be ensured in normal operational modes, for anticipated operational occurrences, in design basis accidents and, to the extent practi- cable, in selected beyond design basis accidents (see Ref. [1], para. 4.6). In accordance with the concept of		The confinement of radioactive material in a nuclear power plant, including the control of discharges and the minimization of radioactive releases into the environment, is a fundamental safety function to be ensured in any operational conditions and **accident conditions**.,. In accordance with the concept of defence in depth, this fundamental safety function is achieved by means of		

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				defence in depth, this fundamental safety function is achieved by means of several barriers and levels of defence [6].In most designs, the third and fourth levels of defence are achieved mainly by means of a strong structure enveloping the nuclear reactor." **"Accident conditions" should be defined and DiD should be mentioned including the extension for DEC.** (see comments 3 and 4) If possible "accident conditions" could include DBA, BDBA and DEC. The full text should be checked for necessary modifications.		<u>several barriers and levels of defence.</u>		
2	35	§1.2	Moreover, taking into account energy and combustible gases released in case of accident, systems designed to preserve the integrity of the containment or to avoid a bypass of the <u>containment</u> ~~confinement~~ are necessary.	Wording.	X			
2	36	§1.6	This Safety Guide addresses the functional aspects of major systems associated <u>to the containment</u> for the management of energy, radionuclides and combustible gases.	Wording.	X			
2	37	§1.6	Consideration is given to the definition of the **design basis** for the containment and <u>associated</u> systems, in particular to aspects affecting the structural design,	The sentence is not clear. It should be mentioned that the design basis of the containment	X			See SSR 2/1

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			the reliability and the independence of systems that do not belong to the same level of defence.	for new NPPs now includes DBA and DEC.					
2	38	§1.8	Design limits and ~~engineering~~ acceptance criteria, together with the system parameters that should be used to verify them, are specific to the design and to the individual Member State, and are therefore outside the scope of this Safety Guide.	The former NS-G and Requ. 14 of SSR2/1 use the word "acceptance criteria". Reasons for modification done are unknown.				X	Opposite comments
1	39	§2.3	The containment structure and its associated systems is primarily designed to ensure that any radioactive release from the nuclear power plant to the environment is as low as reasonably achievable, to comply with the authorized limits on discharges in operational states and the dose limits accepted by the regulatory requirements in accident conditions to ensure a good level of protection of the people and the environment (see Requirement 55).	The sentence does not reflect the Requirement 55 of SSR2/1 completely. The new requirement for new NPPs is missing "… to ensure that any radioactive release from the nuclear power plant to the environment is as low as reasonably achievable"	X				
2	40	§2.3	- Radiological releases in accident conditions are to be dealt with as follows: ~~minimized, and long term off-site contamination avoided:~~ ... *After last bullet:* Moreover the containment and its associated systems are designed so that releases are below the prescribed limits and as low as reasonably achievable (see Requirement 55).	This is not conform with the latest requirements in SSG2/1. Compare to Requirement 5, 19, 20 of SSR2/1. Reason for separation of this requirement from #55 is not clear, it should be included in §2.3.	X				
2	41	§2.4	~~Moreover the containment and its associated systems are designed so that releases are below the prescribed limits and as low as reasonably achievable (see Requirement 55).~~	See our comment for §2.3	X				

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1	42	§2.9	Regardless of the multiplicity of design provisions taken to prevent accident from escalating to significant core damage, **a set of the most likely representative core melting conditions is postulated**.	SSR2/1 Requirement 20 is much more precise. There the wording "most likely representative core melting conditions" is not used. In addition, the terminology DEC should be used here. There is a discrepancy in the requirement formulated further down in §3.28 and §3.32. It seems that §3.28 is most appropriate. Harmonization is needed.				X	Most likely representatives includes likelihood and phenomena to be considered
2	43	§2.12	The containment <u>structure and the associated systems</u> is designed to protect SSCs housed inside the containment against the effects of natural and human induced external hazards identified by the site hazard evaluation, …	See comment #2.		The containment <u>structure</u> is designed to protect SSCs housed inside the containment against the effects of natural and human induced external hazards identified by the site hazard evaluation, …			
2	44	§2.13	In operational states and in **accident conditions**, the containment contributes to the protection of plant personnel and the public from undue exposure due to direct radiation from radioactive material <u>contained within the containment</u>. The composition and thickness of the concrete, steel and other materials is such that the dose limits and dose constraints for operators and the public remain below acceptable limits and as low as reasonably	Sentence is incomplete. Meant is radioactive material contained within the containment. "Accident conditions" is not defined or unclear. Does it include DEC? (see comment 3)	X				Accident conditions: see SSR2/1

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Relevance	Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows		Rejected	Reason for modification/rejection
			achievable in, and following **accident conditions** (see Requirement 5).						
2	45	§3.1	The design basis of the containment structure and systems important to safety should be defined ~~conducted~~ taking into account the recommendations of GS-G-3.1 [15] and GS-G-3.5 [16] to meet the requirements ~~1 to 3~~ 4-7, 16, 19, 20 of SS-R 2/1 Rev.1 and GSR Part 2 requirements [14].	The design basis is probably meant. The requirements 1 to 3 of SS-R 2/1 Rev.1 mentioned here are not the most relevant ones with regard to the design (basis) of the containment. Requ. 4-7, 16, 19, 20 are more appropriate.				X	We refer to the need to implement a Quality management system
2	46	§3.2	The design basis of the containment structure and systems important to safety should be defined ~~conducted~~ taking into account design recommendations for safety and security in an integrated manner in such way that safety and security measures do not compromise each other. Recommendations for security are detailed in [18].	The design basis is probably meant.				X	Some MS are confused when Design basis is used for conditions beyond DBA conditions
2	47	§3.4	Design basis conditions and design basis loads should be derived from combinations of bounding conditions determined for the relevant plant states or hazards.	The design basis is probably meant.				X	See above
1	48	§3.6	Typical postulated initiating events that should be relevant for the design of the containment and its associated systems are: • Large, medium and small breaks in the Reactor Coolant System; • Large, medium and small breaks in the main steam/feedwater system; • Equipment failure in systems carrying radioactive liquid or gas within the containment; • Fuel handling accidents in the containment.	Typical PIEs for BWR are missing in the current list, the list in the old NS-G-1.10 under §3.4 was more comprehensive.				X	Confusion between internal hazards and PIEs in the former revision. Internal hazards are not PIEs The last 2

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			• Inadvertent opening of a pressurizer safety valve or relief valve in a PWR, or of a SRV in a BWR • Condensation oscillations and 'chugging' of liquid-gas mixtures during blowdown in a BWR						bullets will be added
2	49	§3.11-3.15		The requirements mentioned in the paragraphs are of general nature and should be placed under the headline 3.1 GENERAL.				X	3.14 will be moved under paragraph 3.5 "Accident conditions" Others are relevant for external hazards and should be kept here
2	50	§3.16	~~SSCs ultimately necessary to prevent an early radioactive release or a large radioactive release refer in particular to some of the SSCs necessary to mitigate the consequences of accidents with core melting.~~ A detailed list of the~~se~~ SSCs necessary to prevent an early or large radioactive release is design dependent, however, in general and for the scope of this Safety Guide it should include at least: • Containment structure; • Systems necessary to contain the molten core; • Systems necessary to remove heat from the molten core; • Systems necessary to remove heat from the containment and transfer heat to the ultimate heat sink in design extension conditions;	The first half of the requirement is of general nature and should be placed under the headline 3.1 GENERAL.				X	It also serves as an introduction to the list

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			• Systems to prevent hydrogen detonations; • Containment venting system (if it exits); • Containment isolation.					
2	51	§3.17 - 3.20	Margins provided by the design basis of the	The design basis is probably meant in all § in the respective sentence.				See comment 46
2	52	§3.27	Calculation performed to specify the design bases of the containment structure and systems for DEC may be less conservative than those used for design basis accidents provided that margins be still sufficient to cover uncertainties. Performing sensitivity analyses could also be useful to identify the key parameters.	Calculations for DEC are probably meant.		X … to assess conditions imposed by DECs		
1	53	§3.28	DECs relevant for the design of the containment structure and the systems should be identified on the basis of engineering judgement as well as deterministic and probabilistic assessment.	There is a discrepancy in the requirement formulated in §3.28 compared to §2.9 and §3.32 (below). It seems that §3.28 is most appropriate. Harmonization is needed. In addition, §3.31 should be linked with §3.28.			X	Conditions with core melting (see 2.9 and 3.32) form a sub group of DECs and are postulated. 3.28 is for all DECs and performing probabilistic analyses is relevant for DECs without significant fuel degradation.

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2	54	§3.31	Following conditions should be considered as generic candidates for design extension conditions relevant for the design of the containment structures and systems: …XXX	BWR specific examples are missing, e.g. loss of wetwell heat sink.	X			
1	55	§3.32	A set of the most likely representative conditions in case of an accident with core melting should be considered to provide inputs to the design of the containment and of the safety features necessary to mitigate the consequences of an accident with core melting.	There is a discrepancy in the requirement formulated in §3.28 compared to §2.9 and §3.32 (below). It seems that §3.28 is most appropriate. Harmonization is needed.			X	See comment 53
2	56	§3.35 - 3.37		Requirements with regard to venting the containment do not belong only to DEC conditions; such are of GENERAL nature. They should be added to chapter 3.1 GENERAL.			X	They do
2	57	§3.36	Venting the containment should not be needed in case of controlled DBAs. <u>Needs for additional systems or safety features are reactor technology and design dependent.</u>	§3.36 and §3.48 belong together.		X		As been modified to match other comments
2	58	§3.39	A set of primary design limits for the containment and for the systems should be established ensuring the achievement of the overall safety functions of the containment. These primary design limits are usually expressed in terms of: • Overall containment leak rate at design pressure; • Direct <u>bypass</u> leakage (for a double wand containment); …	Wording from old NS-G was better to understand.				Containment by pass and direct leaks (unfiltred leaks) are different

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2	59	§3.40	Furthermore, design limits should be specified for each containment system as well as for each structure and component within each system. Limits should be applied to operating parameters (e.g. maximum coolant temperature and minimum flow rate for air coolers), performance indicators (e.g. maximum closing time for isolation valves and penetration air leakage) and availability measures (e.g. maximum outage times and minimum numbers of certain items of equipment that must be available).~~for each relevant plant state category, limits and engineering criteria should also be specified for each system as well as for each structure and component.~~	The form §3.24 of the old NS-G-1.10 was better to understand.	X	All Text of former 3.24 will be kept but the least sentence for availability of the systems. Allowed time for unavailability is part of the Limits and Conditions for normal operation		
2	60	§3.41	The following factors should be considered to achieve the adequate reliability of the systems necessary to store energy, radioactive material and combustible gases released inside the containment.	Incomplete sentence / wording		X to ~~store~~ control		
2	61	§3.48	~~Needs for additional systems or safety features are reactor technology and design dependent.~~	§3.48 should be linked to §3.36. They belong together.			X	To 3.36 ? unclear
2	62	§3.55	~~Different systems should be implemented for the energy management (for pressure control and for containment heat removal from the containment) in the different plant states.~~	Similar requirement is provided by §2.7 (which is more precise). Furthermore it´s not clear whether DBA and DEC are included in the term “different plant states”.			X	This recommendation is the application of SSR 2/1 Rev1. Req. 7, bullet f)
1	63	§3.57	Conditions arising that could lead to an early radioactive release or a large radioactive release are required to be practically eliminated by design (see Requirement 5.31)					

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			3.57. Regarding the scope of this Safety Guide, ~~such possibilities~~ conditions that could lead to an early or large radioactive release should include: • Conditions involving high energetic phenomena the consequences of which could not be mitigated with implementation of reasonable technical means, • ~~Core melt accident~~ DEC combined with a containment bypass. • Typical examples of conditions to be practically eliminated: • Severe accident conditions that could damage the containment in an early phase as a result of a direct containment heating, steam explosion or hydrogen detonation; • Severe accident conditions that could damage the containment in a late phase as a result of a basemat melt-through; • ~~Severe accident conditions with an open containment, notably in shutdown modes;~~ • ~~Severe accident conditions~~ with unintentional containment bypass.	Without the before mentioned sentence, §3.57 cannot be understood. Wording: ~~Core melt~~ → DEC It´s unclear how the last two examples in the list can be practically eliminated. Are there additional measures in place in new NPPs with this regard?			X X	International consensus on that list Demonstration of Practical elimination request for the implementation of several measures which are not all specific.
2	64	§3.62	~~More detailed guidance is given in the Safety Guide~~	Not clear to which topic this sen-					

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			~~SSG-30 [4].~~	tence belongs.				
2	65	§3.78	~~The use of probabilistic analyses should not be considered as a substitute to a design approach based on deterministic requirements, but as a part of the process to identify potential safety enhancements and to judge their effectiveness.~~	Should be combined with §3.75.	X			
2	66	4.7.1	4.7.1. Generation of combustible gases Hydrogen and oxygen are generated during normal operation of a plant as a result of the radiolysis of water in the core. In accident conditions ~~(after a LOCA, or to a larger extent during an accident with core melting)~~, combustible gases might be released into the containment atmosphere.	It´s not clear why specifically a LOCA is mentioned.		(e.g. during a LOCA, or to a larger extent during an accident with core melting)		Examples help
2	67	Chapter 4.7.3	4.7.3 Measures for the prevention of hydrogen ~~detonation~~ <u>combustions challenging the containment integrity</u>	A better terminology would be: Measures for the prevention of hydrogen combustions challenging the containment integrity. This is in accordance with §4.127	X			

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