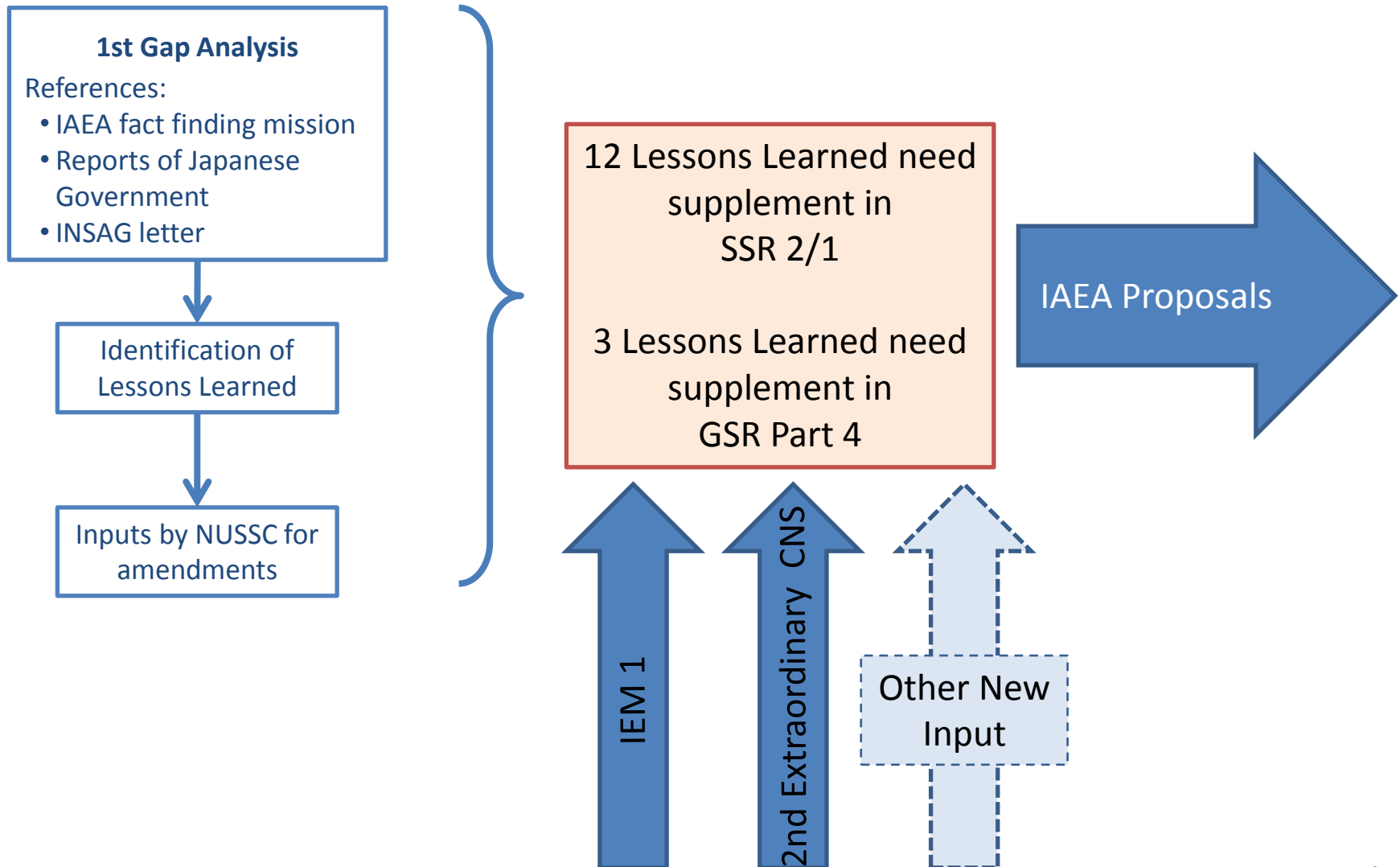


Result of the IAEA Gap Analysis for SSR 2/1 and GSR Part 4





1) Prevention of unacceptable radiological consequences for the public and environment			2) Avoid long term off site contamination (Severe accident mitigation)				3) Prevention of severe accident/ Strengthen the plant design basis				
a	b	c	d	e	f	g	h	i	j	k	l
Partially Addressed			Partially Addressed			SSR 2/2			Partially Addressed	Partially Addressed	
Addressed By 2.11 and 4.3	Req. 33	Req. 67: 6.42	Addressed by Req. 7 and 20	Req. 17: 5.21	Req. 68: 6.45 a		General part 2.13	Req. 17: 5.20	Addressed by Req. 20	Addressed by Req. 80: 6.67; 6.68	Req. 32: 5.55
General part 2.13 (4)	Req. 68: 6.45 c	Req. 67	General part 2.13 (4)	Req. 20: 5.29			Req. 17	Req. 17: 5.17	General part 2.13 (4)	New Proposal	
See also GSR Part 4	Req. 58: 6.28 a	Req. 67: 6.42 a	Addressed by Req.59: 6.31					See Also GSR Part 4	Req. 53: 6.19 a		
	LL 30.2 to be discussed in Req. 58: 6.29		Addressed by Req. 58 and 6.29						Req. 68: 6.45 b		

1. Prevention of unacceptable radiological consequences for the public and environment (BDBE)

- a. Practically elimination of any event or sequence leading to an early or large release
- b. Recover the fundamental safety functions
- c. Improve the effectiveness of the emergency response

2. Avoid long term off site contamination - (Severe accident mitigation)

- d. Implementation of specific design provisions designed to meet this target in case of a severe accident
- e. Include Safety margins in the design of specific building, structure and component to avoid cliff edge effect or to withstand extreme events
- f. Plant response to a total loss of AC power supplies
- g. Developing SAMGs for operators

3. Prevention of severe accident/Strengthen the plant design basis

- h. Application of the DiD
- i. Protection against internal/external hazards
- j. Implementation of DEC design provisions
- k. Design of the spent fuel pools
- l. Improvement of the layout to facilitate the operation in accidental conditions



DS462 – Proposal for Definition

Current text	IAEA Proposals	Conclusion of NUSCC WG
DEFINITIONS pg. 59 [beyond design basis accident] This term is superseded by design extension conditions.	Delete the two last lines in the DEFINITIONS on pg. 59 Note; The proposed change allows to keep the current definition of “beyond design basis accident” in the Glossary as it is.	Remove the definition on pg.59 BDBA on SSR 2/1 Add the schema of DBA,DEC,BDB on SSR 2/1 whit the following modifications: • Remove the line BDBA • Add information also about safety assessment relative to the plant states



Definitions for DBA, DEC and BDB

NS-R-1, 2000

Operational states		Accident conditions		
NO	AOO	(a)	DBAs	Beyond design basis accidents — — — — —>
		(b)	Severe Accidents	
		Included in the design basis —————>		
		Beyond design basis — — — — —>		

SSR-2/1, 2012

Operational states		Accident conditions		Cond. practically eliminated
NO	AOO	DBAs	Beyond design basis accidents	—————>
		Design Extension Conditions		
		No core melt	Severe Accidents (core melt)	
		Included in the design basis —————>		
		Beyond design basis —————>		





Safety Assessment				
Practical elimination of event/sequence leading to an early or large release	Evaluate Safety Margins to avoid Cliff edge effect	Multi unit aspect	Use of PSA complementary to DSA	Strengthen the scope of the periodic safety review
New statement with the this objective should be added under Req. 4				
Clear reference to practical elimination in 4.47 should be implemented				
	Req. 13: 4.48			
		Req. 2: 4.0		
		Req. 10: 4.31		
		Req. 14: 4.48a		
		Req. 14: 4.48b		
			Addressed	
				Addressed

DS462 – Proposal for LL 21.1

LL	Current text	IAEA Proposals	Conclusion of NUSC WG
21.1	§ 2.12 to 2.14 and § 4.9 to 4.13 2.13. (4) The purpose of the fourth level of defence is to mitigate the consequences of accidents that result from failure of the third level of defence in depth. The most important objective for this level is to ensure the confinement function, thus ensuring that radioactive releases are kept as low as reasonably achievable.	2.13 (4) The purpose of the fourth level of defence is to mitigate the consequences of accidents that result from failure of the third level of defence in depth. This level is aimed at preventing the progression of core damage and mitigating consequences of severe accidents. In case of a severe accident, the most important objective for this level is to ensure the confinement function, thus ensuring that significant radioactive releases would be practically eliminated.	(4) The purpose of the fourth level of defence is to mitigate the consequences of accidents that result from failure of the third level of defence in depth. This level is aimed at preventing the progression of fuel damage and mitigating consequences of severe accidents. In consistency with 5.31 the concept of “significant radioactive releases” should be linked with “Only limited protective measures in area and time may be needed for the public in case of radioactive release”.

Comments made by USA, ENISS



DS462 – Proposal for LL 25.1

LL	Current text	IAEA Proposals	Conclusion of NUSSC WG
25.1	Requirement 33: Sharing of safety systems between multiple units of a nuclear power Plant Safety systems shall not be shared between multiple units unless this contributes to enhanced safety.	Requirement 33: Sharing of safety systems between multiple units of a nuclear power plant Safety systems shall not be shared between multiple units unless, in accident conditions , if this contributes to enhanced safety.	Requirement 33: Sharing of safety systems between multiple units of a nuclear power plant Safety systems shall not be shared between multiple units unless, in accident conditions , if this contributes to enhanced safety for the all units .

Comments made by UAE, France, Japan, ENISS, Germany



DS462 – Proposal for LL 35.1

LL	Current text	IAEA Proposals	Conclusion of NUSSC WG
35.1, 46.16 and 46.17	Requirement 68: Emergency power supply The emergency power supply at the nuclear power plant shall be capable of supplying the necessary power in anticipated operational occurrences and accident conditions, in the event of the loss of off-site power.	6.45.c The design shall include features for connection of alternative mobile power sources to cope with prolonged total loss of AC power or DC sources.	6.45.c The design shall include features for connection of alternative/mobile power sources to cope with prolonged total loss of AC power or DC sources.

Link to the new structure of emergency power supply section



Comments made by UAE, ENISS



DS462 – Proposal for LL 21.2

LL	Current text	IAEA Proposals	Conclusion of NUSSC WG
21.2		6.28a. The design shall include features to facilitate the use of alternative/mobile equipment for removing heat from the containment to ensure that its confinement function can still be fulfilled in case of loss of all containment cooling systems.	Group all the proposal on the employ of the mobile equipment to cope situations beyond design basis in one section. Suggestion under Requirement 6 or 7 In addition to the 6.28a on the containment, consider also additional paragraph for recover the cooling of the core and the SFP.

Comments made by France, USA, Finland



DS462 – Inputs for the discussion on LL 30.2

LL	Current text	IAEA Proposals	Conclusion of NUSSC WG
30.2	6.29. Design features to control fission products, hydrogen, oxygen and other substances that might be released into the containment shall be provided as necessary: (a) To reduce the amounts of fission products that could be released to the environment in accident conditions; (b) To control the concentrations of hydrogen, oxygen and other substances in the containment atmosphere in accident conditions so as to prevent deflagration or detonation loads that could challenge the integrity of the containment.	Need to strengthen the paragraphs below Requirement 58 on venting systems, hydrogen mitigation and filters The current formulation of 6.29 is considered to be adequate. However, further discussion on filtered containment venting is needed before a final decision is made.	Input to write proposal on venting system: • It shall not be the primary countermeasure to remove decay heat from the containment, • it shall not be necessary in the short time. Consider the deflagration outside of the containment for the integrity of the structure.

Comments made by France, USA, Japan



DS462 – Proposal for LL 46.3

LL	Current text	IAEA Proposals	Conclusion of NUSC WG
46.3	6.42. Information about important plant parameters and radiological conditions at the nuclear power plant and in its immediate surroundings shall be provided in the on-site emergency control centre. The on-site emergency control centre shall provide means of communication with the control room, the supplementary control room and other important locations at the plant, and with on-site and off-site emergency response organizations. Appropriate measures shall be taken to protect the occupants of the emergency control centre for a protracted time against hazards resulting from accident conditions. The emergency control centre shall include the necessary systems and services to permit extended periods of occupation and operation by emergency response personnel.	6.42. Information about important plant parameters and radiological conditions at the nuclear power plant and in its immediate surroundings shall be provided in the on-site emergency control technical support centre. The on-site emergency control technical support centre shall provide means of communication with the control room, the supplementary control room and other important locations at the plant, and with on-site and offsite emergency response organizations. Appropriate measures shall be taken to protect the occupants of the emergency control centre for a protracted time against hazards resulting from accident conditions. The emergency control centre shall include the necessary systems and services to permit extended periods of occupation and operation by emergency response personnel.	Introduce a new requirement for the “Emergency control Centre”. Need to create link with GSR Part 7 and SSR 2/2 on this topic and verify the consistency with these two documents.

Comments made by USA



DS462 – Proposal for LL 46.3

LL	Current text	IAEA Proposals	Conclusion of NUSCC WG
46.3	Requirement 67: Emergency control centre An on-site emergency control centre, separate from both the plant control room and the supplementary control room, shall be provided from which an emergency response can be directed at the nuclear power plant.	Requirement 67: Emergency control centre Technical support centre The design of the plant shall include an on-site emergency control on-site technical support centre, separate from both the plant control room and the supplementary control room, from which <u>technical support can be provided to the control room operators during emergency conditions.</u> an emergency response can be directed at the nuclear power plant.	Requirement 67: Technical support centre The design of the plant shall include an on-site technical support centre, separate from both the plant control room and the supplementary control room, from which technical support can be provided to the operation staff during emergency conditions.

Comments made by France, USA, ENISS



DS462 – Proposal for LL 46.3

LL	Current text	IAEA Proposals	Conclusion of NUSSC WG
46.3	Requirement 67: Emergency control centre An on-site emergency control centre, separate from both the plant control room and the supplementary control room, shall be provided from which an emergency response can be directed at the nuclear power plant.	6.42a. The technical support centre shall be designed to be operable and habitable for a protracted time in all conditions considered in the design basis of the plant with the appropriate margins to cope with situations even more severe than those considered in the design basis. The technical support centre shall include the necessary systems and services to permit extended periods of occupation and operation by emergency response personnel.	6.42a. The technical support centre shall be designed to be operable and habitable for a protracted time in all conditions considered in the design of the plant with significant margins. The technical support centre shall include the necessary systems and services to permit extended periods of occupation and operation.

Comments made by USA, ENISS

DS462 – Proposal for LL 19.1

LL	Current text	IAEA Proposals	Conclusion of NUSSC WG
19.1	5.21. The seismic design of the plant shall provide for a sufficient safety margin to protect against seismic events and to avoid cliff edge effects (see footnote 5).	5.21 The design shall include provisions to avoid cliff edge effects to occur in a short time in case of: • an extreme external event of an intensity or a duration exceeding those considered in the design basis of the plant; • a combination of external events.	5.21 The design shall include sufficient provisions or margins to avoid a cliff edge effect for external hazards of a severity or duration moderately exceeding the ones considered in the design basis. 5.21a In case of a rare yet credible severe external hazard, the plant design shall be such that only off-site protective measures limited in time and areas might be necessary to protect the public and the environment. <i>Check GSR Part 4 for definition of cliff edge effect</i> <i>Ensure 5.32 covers combination of hazards</i>

Comments made by UAE, France, USA, ENISS, Germany



DS462 – Proposal for LL 22.1

LL	Current text	IAEA Proposals	Conclusion of NUSSC WG
22.1	5.29. The analysis undertaken shall include identification of the features that are designed for use in, or that are capable⁹ of preventing or mitigating, events considered in the design extension conditions. These features: (a) Shall be independent, to the extent practicable, of those used in more frequent accidents; (b) Shall be capable of performing in the environmental conditions pertaining to these design extension conditions, including design extension conditions in severe accidents, where appropriate; (c) Shall have a reliability commensurate with the function that they are required to fulfil.	5.29 The analysis undertaken shall include identification of the features that are designed for use in, or that are capable⁹ of preventing or mitigating, events considered in the design extension conditions. These features: ... (d) Shall include sufficient design margins to remain operational in conditions more severe than those considered in their design basis to avoid cliff edge effects to occur in a short time.	5.29 d) Shall include sufficient design margins. Reformulate consistent with 5.21a

Comments made by USA, ENISS



DS462 – Proposal for LL 35.1

LL	Current text	IAEA Proposals	Conclusion of NUSSC WG
35.1, 46.16 and 46.17	Requirement 68: Emergency power supply The emergency power supply at the nuclear power plant shall be capable of supplying the necessary power in anticipated operational occurrences and accident conditions, in the event of the loss of off-site power.	6.45.a The design shall be such that the loss of off-site power combined with the loss of emergency power supply will not result in significant core or spent fuel degradation at least for the time necessary to restore or provide off-site power. The estimation of this time shall be done taking into consideration adverse effects of external hazards.	The lesson refers to the safety assessment therefore could be appropriate include something in GSR Part 4 about it. Proposal: add example of emergency power supply in 4.47, bullet c). This lesson should be also considered in dedicated Safety Guide 6.43a Formulate a new statement on the specification of DC capacity (USA Proposal)

Link to the new structure of emergency power supply section



Comments made by UAE, France, USA



DS462 – Proposal for LL 21.1

LL	Current text	IAEA Proposals	Conclusion of NUSSC WG
21.1	§ 2.12 to 2.14 and § 4.9 to 4.13 2.13. Application of the concept of defence in depth in the design of a nuclear power plant provides several levels of defence (inherent features, equipment and procedures) aimed at preventing harmful effects of radiation on people and the environment, and ensuring adequate protection from harmful effects and mitigation of the consequences in the event that prevention fails. The independent effectiveness of each of the different levels of defence is an essential element of defence in depth at the plant and this is achieved by incorporating measures to avoid the failure of one level of defence causing the failure of other levels. There are five levels of defence:	2.13 ... The independent effectiveness of each of the different levels of defence is an essential element of defence in depth at the plant and this is achieved by incorporating measures to avoid the failure of one level of defence causing the failure of other levels. The independence of levels three and four is of particular relevance because of the severity of potential consequences of simultaneous failures of these two levels. There are five levels of defences: ...	2.14a The independent effectiveness of each of the different levels of defence is an essential element of defence in depth at the plant and this is achieved by incorporating measures to avoid the failure of one level of defence causing the failure of other levels. The independence of levels three and four is of particular relevance because of the severity of potential consequences <i>should</i> simultaneous failures of these two levels <i>occur</i>.

DS462 – Proposal for LL 25.2

LL	Current text	IAEA Proposals	Conclusion of NUSSC WG
25.2	Requirement 17: Internal and external hazards All foreseeable internal hazards and external hazards, including the potential for human induced events directly or indirectly to affect the safety of the nuclear power plant, shall be identified and their effects shall be evaluated. Hazards shall be considered for determination of the postulated initiating events and generated loadings for use in the design of relevant items important to safety for the plant.	Requirement 17: Internal and external hazards All foreseeable internal hazards... ... Hazards shall be considered for determination of the postulated initiating events and generated loadings for use in the design of relevant items important to safety for the plant. <u>Layout of items important to safety shall be such to minimize the potential consequences on safety of internal and external hazards.</u> 5.18 (to be deleted) Items important to safety shall be designed and located to minimize, consistent with other safety requirements, the likelihood of external events and their possible harmful consequences.	Requirement 17: Internal and external hazards All foreseeable internal hazards and external hazards, including the potential for human induced events directly or indirectly to affect the safety of the nuclear power plant, shall be identified and their effects shall be evaluated. Hazards shall be considered when establishing plant layout, determining the postulated initiating events and generating loadings for use in the design of relevant items important to safety for the plant. 5.15 a (after Requirement 17) Items important to safety shall be designed and located, considering other safety implications, to limit their exposure to hazards and possible harmful consequences of their failures.

Comments made by USA, Japan (5.18 also), Finland, ENISS



DS462 – Proposal for LL 19.1

LL	Current text	IAEA Proposals	Conclusion of NUSSC WG
19.1	5.20. The design shall be such as to ensure that items important to safety are capable of withstanding the effects of external events considered in the design, and if not, other features such as passive barriers shall be provided to protect the plant and to ensure that the required safety function will be performed.	5.20 The design shall be such as to ensure that those items important to safety that are necessary to fulfil the fundamental safety functions are capable of withstanding the effects of external events considered in the design, and if not, other features such as passive barriers shall be provided to protect the plant those items and to ensure that the required safety function will be performed.	5.20 The design shall be such as to ensure that those items that are necessary to fulfil the fundamental safety functions are capable of withstanding the effects of external hazards considered in the design basis, and if not, other features such as passive barriers shall be provided to protect those items and to ensure that the required safety function will be performed. Verify the consistency in the glossary of the term “fundamental/main safety functions”

Comments made by UAE, USA, ENISS, Germany



DS462 – Proposal for LL 19.1

LL	Current text	IAEA Proposals	Conclusion of NUSSC WG
19.1	External hazards 5.17. The design shall include due consideration of those natural and human induced external events (i.e. events of origin external to the plant) that have been identified in the site evaluation process. Natural external events shall be addressed, including meteorological, hydrological, geological and seismic events. Human induced external events arising from nearby industries and transport routes shall be addressed. In the short term, the safety of the plant shall not be permitted to be dependent on the availability of off-site services such as electricity supply and fire fighting services. The design shall take due account of site specific conditions to determine the maximum delay time by which off-site services need to be available.	5.17 The design shall include due consideration of those natural and human induced external events (i.e. events of origin external to the plant) that have been identified in the site evaluation process. Natural external events shall be addressed, including meteorological, hydrological, geological volcanological and seismic events. Human induced external events arising from nearby industries and transport routes shall be addressed. Causality and likelihood shall be considered in postulating potential concurrent events. In the short term, the safety of the plant shall not be permitted to be dependent on the availability of off-site services such as electricity supply and fire fighting services. The design shall take due account of site specific conditions to determine the maximum delay time by which off-site services need to be available.	5.17 The design shall include due consideration of those natural and human induced external hazards that have been identified in the site evaluation process. Natural external hazard shall be addressed. Human induced external hazards arising from nearby industries and transport routes shall be addressed. Causality and likelihood shall be considered in postulating potential concurrent hazards. In the short term, the safety of the plant shall not be permitted to be dependent on the availability of off-site services such as electricity supply and fire fighting services. The design shall take due account of site specific conditions to determine the maximum delay time by which off-site services need to be available. Reference to NS-R-3 is already in SSR 2/1 in the section of external hazards

DS462 – Proposal for LL 29.1

LL	Current text	IAEA Proposals	Conclusion of NUSSC WG
29.1	Requirement 53: Heat transfer to an ultimate heat sink Systems shall be provided to transfer residual heat from items important to safety at the nuclear power plant to an ultimate heat sink. This function shall be carried out with very high levels of reliability for all plant states.	6.19a (after Requirement 53) If the availability of the ultimate heat sink cannot be demonstrated for all potential conditions generated by external hazards, a second diverse ultimate heat sink that it is not impaired by the same hazards shall be provided.	6.19a (after Requirement 53) If the availability of the ultimate heat sink cannot be demonstrated for all potential conditions generated by external hazards, an alternative ultimate heat sink that it is not impaired by the same hazards shall be provided.

Comments made by UAE, France, USA, ENISS



DS462 – Proposal for LL 35.1

LL	Current text	IAEA Proposals	Conclusion of NUSSC WG
35.1, 46.16 and 46.17	Requirement 68: Emergency power supply The emergency power supply at the nuclear power plant shall be capable of supplying the necessary power in anticipated operational occurrences and accident conditions, in the event of the loss of off-site power.	6.45.b The design of the emergency power supply shall be such that the safety features for design extension conditions could be powered by any of the available power sources and, in addition, by a dedicated, independent and physically separated power system.	6.44a Additional statement: The design of the emergency power supply shall be such that relevant safety features for design extension conditions can be supplied by dedicated back-up power system independent and physically separated from the one used in case of loss of off-site power to avoid significant core or spent fuel degradation or to mitigate the consequences of a severe accident should it occurred. 6.44 b (was 6.45.b) The design of the emergency power supply shall be such that the safety features for design extension conditions could be powered by any of the available power sources.

Link to the new structure of emergency power supply section



Comments made by USA, ENISS



Emergency power supply

Current text	Conclusion of NUSCC WG
Requirement 68: Emergency power supply The emergency power supply at the nuclear power plant shall be capable of supplying the necessary power in anticipated operational occurrences and accident conditions, in the event of the loss of off-site power.	Requirement 68: Emergency power supply The emergency power supply at the nuclear power plant shall be capable of supplying the necessary power in anticipated operational occurrences and accident conditions, including the event of prolonged loss of off-site power.
6.43. In the design basis for the emergency power supply at the nuclear power plant, due account shall be taken of the postulated initiating events and the associated safety functions to be performed, to determine the requirements for capability, availability, duration of the required power supply, capacity and continuity.	
6.44. The combined means to provide emergency power (such as water, steam or gas turbines, diesel engines or batteries) shall have a reliability and type that are consistent with all the requirements of the safety systems to be supplied with power, and their functional capability shall be testable.	

Emergency power supply

Current text	Conclusion of NUSSC WG
	6.44 a (was 6.45b) The design of the emergency power supply shall be such that relevant safety features for design extension conditions can be supplied by dedicated back-up power system independent and physically separated from the one used in case of loss of off-site power. to avoid significant core or spent fuel degradation or to mitigate the consequences of a severe accident should it occur The dedicated back-up power system connection time shall be consistent with battery autonomy.
	6.44 b (was 6.45b) The design of the emergency power supply shall be such that the safety features for design extension conditions could be powered by any of the available power sources.
6.45. The design basis for any diesel engine or other prime mover that provides an emergency power supply to items important to safety shall include: 	
	6.45.a (was 6.45 c) The design shall include features for connection of alternative/mobile power sources to cope with prolonged total loss of AC power or DC sources.



DS462 – Proposal for LL 19.1

LL	Current text	IAEA Proposals	Conclusion of NUSSC WG
19.1	5.20. The design shall be such as to ensure that items important to safety are capable of withstanding the effects of external events considered in the design, and if not, other features such as passive barriers shall be provided to protect the plant and to ensure that the required safety function will be performed.	5.20 The design shall be such as to ensure that those items important to safety that are necessary to fulfil the fundamental safety functions are capable of withstanding the effects of external events considered in the design, and if not, other features such as passive barriers shall be provided to protect the plant those items and to ensure that the required safety function will be performed.	5.20 The design shall be such as to ensure that those items that are necessary to fulfil the fundamental safety functions are capable of withstanding the effects of external hazards considered in the design basis, and if not, other features such as passive barriers shall be provided to protect those items and to ensure that the required safety function will be performed. Verify the consistency in the glossary of the term “fundamental/main safety functions”

Comments made by UAE, USA, ENISS, Germany



Proposal for LL 42.1 – Spent Fuel Pool

LL	Current text	IAEA Proposals	Conclusion of NUSSC WG
42.1	6.68. For reactors using a water pool system for fuel storage, the design of the plant shall include the following: a) Means for controlling the temperature, water chemistry and activity of any water in which irradiated fuel is handled or stored; b) Means for monitoring and controlling the water level in the fuel storage pool and means for detecting leakage; c) Means for preventing the uncovering of fuel assemblies in the pool in the event of a pipe break (i.e. anti-siphon measures).	6.68. For reactors using a water pool system for fuel storage, the design of the plant shall include the following: a) Means for controlling the temperature, water chemistry and activity of any water in which irradiated fuel is handled or stored; b) Means for monitoring and controlling the water level in the fuel storage pool and means for detecting leakage; c) Means for preventing the uncovering of fuel assemblies in the pool in the event of a pipe break (i.e. anti-siphon measures). d) Means to facilitate the use of alternative/mobile equipment to ensure the long term cooling of the fuel in case of events not considered in the design.	6.68. For reactors using a water pool system for fuel storage, the design of the plant shall include the following: a) Means for controlling the temperature, water chemistry and activity of any water in which irradiated fuel is handled or stored in operational states; b) Means for monitoring the temperature and controlling the water level in the fuel storage pool and means for detecting leakage in operational states and accident conditions for an extended period; c) Means for preventing the uncovering of fuel assemblies in the pool in the event of a pipe break (i.e. anti-siphon measures). d) Means to facilitate the use of alternative/mobile equipment to ensure the long term cooling of the fuel in case of events not considered in the design. This bullet (d) should be considered in the part concerning the mobile equipment



DS462 – Proposal for LL 25.2

LL	Current text	IAEA Proposals	Conclusion of NUSSC WG
25.2	5.55 The design shall support operating personnel in the fulfilment of their responsibilities and in the performance of their tasks, and shall limit the effects of operating errors on safety. The design process shall pay attention to plant layout and equipment layout, and to procedures, including procedures for maintenance and inspection, to facilitate interaction between the operating personnel and the plant.	5.55 The design shall support The design process shall pay attention to plant layout and equipment layout, and to procedures, including procedures for maintenance and inspection, to facilitate interaction between the operating personnel and the plant in all plant states.	5.55 The design shall support The design process shall pay attention to plant layout and equipment layout, and to procedures , including procedures for maintenance and inspection, and to facilitate interaction between the operating personnel and the plant in operational states and accident conditions.



DS462 – Proposal for LL 5.1

LL	Current text	IAEA Proposals	Conclusion of NUSSC WG
5.1	4.48 It has to be determined in the safety assessment whether there are adequate safety margins in the design and operation of the facility, or in the conduct of the activity in normal operation and in anticipated operational occurrences or accident conditions, such that there is a wide margin to failure of any structures, systems and components for any of the anticipated operational occurrences or any possible accident conditions. Safety margins are typically specified in codes and standards as well as by the regulatory body. It has to be determined in the safety assessment whether acceptance criteria for each aspect of the safety analysis are such that an adequate safety margin is ensured.	4.48 ... Safety margins are typically specified in codes and standards as well as by the regulatory body. It has to be determined in the safety assessment whether acceptance criteria for each aspect of the safety analysis are such that an adequate safety margin is ensured. The safety assessment has to prove that the safety margins are appropriated to avoid cliff-edge effects in case of extreme external events.	4.48 ...The safety assessment has to prove that the safety margins are appropriated to avoid cliff-edge effects in case of extreme external events. 4.56 a The safety assessment shall include investigations to identify potential cliff-edge effects in the facility response to postulated initiating events. For each cliff-edge effects identified, the safety assessment shall confirm that adequate margins or grace period is available.

DS462 – Proposal for LL 50.1

LL	Current text	IAEA Proposals	Conclusion of NUSSC WG
50.1	Requirement 2: Scope of the safety assessment A safety assessment shall be carried out for all applications of technology that give rise to radiation risks; that is, for all types of facilities and activities.	4.0 (after Requirement 2) The safety assessment has to consider the site as a whole to establish that hazards from interactions between different facilities or activities have been taken into account.	Create a section grouped all the statement on multiple-facility aspects. The position has to be decided, yet. Refer to multi-facility aspect also in the figure in page 13. This reference should be included in the left part of the schema.

Comments made by USA, Finland, ENISS, Germany



DS462 – Proposal for LL 50.1

LL	Current text	IAEA Proposals	Conclusion of NUSSC WG
50.1	4.31. The external events that could arise for a facility or activity have to be addressed in the safety assessment, and it has to be determined whether an adequate level of protection against their consequences is provided. This could include natural external events, such as extreme weather conditions, and human induced events, such as aircraft crashes, depending on the possible radiation risks associated with the facility or activity. Where applicable, the magnitude of the external events that the facility is required to be able to withstand (sometimes referred to as design basis external events) has to be established for each type of external event on the basis of historical data for the site for natural external events and a survey of the site and the surrounding area for human induced events. Where there is more than one facility or activity at the same location, account has to be taken in the safety assessment of the effect of a single external event, such as an earthquake or a flood, on all of the facilities and activities, and of the potential hazards presented by each facility or activity to the others.	4.31 The external events that could arise ... Where there is more than one facility or activity at the same location, account has to be taken in the safety assessment of the effect of single external events, such as an earthquake or a flood, on all of the facilities and activities, and of the potential hazards presented by each facility or activity to the others.	4.31 The external events that could arise ... Where there is more than one facility or activity at the same location, account has to be taken in the safety assessment of the effect of external hazards on all of the facilities and activities, and of the potential hazards presented by each facility or activity to the others. Consider to move the last part of 4.31 in the new part dedicated to multiple facility aspects

Comments made by Japan, Germany



DS462 – Proposal for LL 50.2

LL	Current text	IAEA Proposals	Conclusion of NUSSC WG
50.2	Requirement 14: Scope of the safety analysis The performance of a facility or activity in all operational states and, as necessary, in the post-operational phase shall be assessed in the safety analysis.	4.48.a (after Requirement 14) For sites with multiple facilities the safety analysis has to consider the possibility of simultaneous events in different facilities.	In the new section for the multi-facility aspects: § For sites with multiple facilities the safety assessment has to consider the possibility of credible concurrent events affecting all facilities or consequence impact of failures of one facility on the others . Verify if the word “credible” is the more appropriate. Consider other options (plausible).

Comments made by USA, Japan, Finland, ENISS, Germany

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LL	Current text	IAEA Proposals	Conclusion of NUSSC WG
50.2	Requirement 14: Scope of the safety analysis The performance of a facility or activity in all operational states and, as necessary, in the post-operational phase shall be assessed in the safety analysis.	4.48b (after requirement 14) A systematic process shall be used to review multiple unit sites for the potential for common cause failures and for ensuring that shared resources to be used in accident conditions can fulfil their safety functions.	The 4.48b could be split in two statement. They will be included in the section for multi-facility aspects. § A systematic process shall be used to review multiple facility sites for the potential for common cause failures. § If facilities share resources in accident conditions the safety assessment shall demonstrate that the required safety functions for each facility can be fulfilled.

Comments made by France, USA, ENISS



1. Prevention of unacceptable radiological consequences for the public and environment (BDBE)
 - a) Practically elimination of any event or sequence leading to an early or large release (Addressed by SSR 2/1: 2.11; 4.3)
 - i. The safety assessment shall provide a robust demonstration of accomplishment of the objective (See GSR Part 4)
 - ii. Specific design provision might be necessary to fulfil the objective (SSR 2/1: 2.13 (4)) (Specific Design provision should implemented in SG)
 - b) Recover the fundamental safety functions (SSR 2/1: Req.33)
 - i. Control of reactivity (Not an issue on FH accident)
 - ii. Heating Removal (SSR 2/1: 6.45c)
 - iii. Containment integrity (SSR 2/1: 6.28 a; 6.29 Containment venting need further discussion LL 30.2)
 - c) Improve the effectiveness of the emergency response
 - i. Adequate design bases of monitoring and communication means required in case of emergency conditions (SSR 2/1: 6.42)
 - ii. The MCR, SCR, TSC and emergency centre should be available. (SSR 2/1: Req. 67-6.42a)



2. Avoid long term off site contamination - (Severe accident mitigation) (Addressed by SSR 2/1: 5.31)
- d) Implementation of specific design provisions designed to meet this target in case of a severe accident
 - i. Dedicated systems and equipment designed to mitigate consequences of a severe accident (SSR 2/1: 2.13 (4), also addressed by SSR 2/1: Req. 7; Req. 20)
 - ii. Monitoring of the key parameters in accident conditions (Addressed by SSR 2/1: 6.31)
 - iii. Control of Containment conditions (Addressed by SSR 2/1: Req. 58 - 6.29)
 - e) Include Safety margins in the design of specific building, structure and component to avoid cliff edge effect or to withstand extreme events (SSR 2/1: 5.21- 5.29)
 - f) Plant response to a total loss of AC power supplies
 - i. Consistency of the plant autonomy with a reasonable time delay before crediting the offsite capabilities (SSR 2/1: 6.45a)
 - g) Developing SAMGs for operators (SSR 2/2)
 - i. Improvement of procedures and rules
 - ii. Improvement training of the operators



3. Prevention of severe accident/Strengthen the plant design basis

h) Application of the DiD

- i. Importance of Independence between level (SSR 2/1: 2.13)
- ii. Common cause failure (SSR 2/1: Req. 17)

i) Protection against internal/external hazards (SSR 2/1: 5.20)

- i. Combination of events (SSR 2/1: 5.17)
- ii. Multi-units aspect (See GSR Part 4)

j) Implementation of DEC design provisions

- i. prevent a core melt accident in case of multiple failures or common cause failures in the safety systems (SSR 2/1: 2.13 (4), also addressed by SSR 2/1: Req. 20)
- ii. Increase the reliability of the cooling chain and the ultimate heat sink (SSR 2/1: 6.19a)
- iii. Improve reliability and protection of on-site power source (SSR 2/1: 6.45b)

k) Design of the spent fuel pools (Partially addressed in SSR 2/1: 6.67 - 6.68)

- i. Monitoring and control of the key parameters in accident conditions
- ii. Prevent spent fuel uncover in operational and accident conditions

l) Improvement of the layout to facilitate the operation in accidental conditions (SSR 2/1: 5.55)

