European level recommendations				
No.	**Recommendation**	**Sect. in NAcP**	**Comment**	**Related action/activity**
2.1	<u>European guidance on assessment of natural hazards and margins</u> The peer review Board recommends that WENRA, involving the best available expertise from Europe, develop guidance on natural hazards assessments, including earthquake, flooding and extreme weather conditions, as well as corresponding guidance on the assessment of margins beyond the design basis and cliff-edge effects.	2	Generic recommendation for WENRA, Finland participates and follows the work.	2 (implementing the new requirements to Finnish Regulatory Guides)
2.2	<u>Periodic safety review</u> The peer review Board recommends that ENSREG underline the importance of periodic safety review. In particular, ENSREG should highlight the necessity to reevaluate natural hazards and relevant plant provisions as often as appropriate but at least every 10 years.	5.1	Generic recommendation, Finland has been leading the related working group in WENRA.	2 (implementing the new requirements to Finnish Regulatory Guides)
2.3	<u>Containment integrity</u> Urgent implementation of the recognised measures to protect containment integrity is a finding of the peer review that national regulators should consider.	4.1	This recommendation is discussed in more detail in 3.3.1, 3.3.2, and 3.3.3.	SAM measures with qualified systems ensuring containment integrity have been implemented in Finnish NPPs already in 1990's and early 2000's. 118 (further improving the containment decay heat removal in case of multi-unit accidents in Loviisa when the fixed systems have been lost)
2.4	<u>Prevention of accidents resulting from natural hazards and limiting their consequences</u> Necessary implementation of measures allowing prevention of accidents and limitation of their consequences in case of extreme natural hazards is a finding of the peer review that national regulators should consider.	2 and 3	Generic recommendation which is further discussed under topics 1 and 2. xCNS: Deterministic methods should form the basis for hazard assessment. Probabilistic methods, including probabilistic safety assessment (PSA), are useful to supplement the deterministic methods.	Many actions under topic 2

Topic 1 – Natural Hazards				
No.	**Recommendation**	**Sect. in NAcP**	**Comment**	**Related action/activity**
3.1.1	Hazard Frequency The use a return frequency of 10^{-4} per annum (0.1g minimum peak ground acceleration for earthquakes) for plant reviews/back-fitting with respect to external hazards safety cases.	2.1	Also related to xCNS recommendation: Re-evaluating the hazards posed by external events, such as earthquakes, floods and extreme weather conditions, for each nuclear power plant site through targeted reassessment of safety. 0.1 g is already required for new plants and structures in existing regulatory guides (pre-Fukushima). On existing sites 0.1 g is less frequent than 10^{-5} per year. Earthquakes contribute approximately 1% of the total CFD in Finland.	2 (implementing the new requirements to Finnish Regulatory Guides) 101 (Evaluation of fragility of the spent fuel pools at high temperature and at high pressure, LO) 102, 201 (Updating the seismic fragility analyses of the spent fuel pools and fire fighting systems, LO+OL) 103, 202 (improving preparedness for high sea-water level, LO+OL) 104, 203, 301 (Analysis of consequences of beyond design basis low and high temperature, LO+OL+OL3) 105, 204, 302 (Analysis of consequences of tornados and downbursts on plant structures and systems, LO+OL+OL3)
3.1.2	Secondary Effects of Earthquakes The possible secondary effects of seismic events, such as flood or fire arising as a result of the event, in future assessments.	2.3	Seismic qualification of fire fighting systems has not been required previously as in Finland the possibility of consequential fires due to an earthquake is considered very small. Other consequential effects are not considered possible at the Finnish sites due to geographical and geological reasons.	102, 201 (Updating the seismic fragility analyses of the spent fuel pools and fire fighting systems, LO+OL)
3.1.3	Protected Volume Approach The use a protected volume approach to demonstrate flood protection for identified rooms or spaces.	2.2	The approach is to prevent a) water entering the plant from outside, and b) spreading of water inside the buildings. This should be the goal, regardless of the term used. The first one of these is the main protection level at existing plants. Olkiluoto 1&2 have good physical separation of the divisions, and thus the second one is utilised, as well. At Loviisa NPP the second one has been improved with additional protection.	103, 202 (improving preparedness for high sea-water level, LO+OL)

Topic 1 – Natural Hazards				
No.	**Recommendation**	**Sect. in NAcP**	**Comment**	**Related action/activity**
3.1.4	Early Warning Notifications The implementation of advanced warning systems for deteriorating weather, as well as the provision of appropriate procedures to be followed by operators when warnings are made.	2.5	The operating procedures of the Finnish NPPs require the operating personnel to contact the Meteorological Institute under circumstances with increased possibility of hazardous meteorological or marine phenomena.	Existing practices are adequate.
3.1.5	Seismic Monitoring The installation of seismic monitoring systems with related procedures and training.	2.4	Seismic monitoring instrumentation will be installed in Olkiluoto unit 3 but the currently operating units do not have seismic monitoring systems. A new Regulatory Guide YVL B.7 on provision for external events in nuclear facilities includes more detailed requirements on seismic instrumentation in NPPs and other nuclear facilities. Decisions on the application of the requirements of the new guide to existing facilities, including the requirement on a seismic monitoring system, will be made by STUK after issuing the new guide.	2 (implementing the new requirements to Finnish Regulatory Guides)
3.1.6	Qualified Walkdowns The development of standards to address qualified plant walkdowns with regard to earthquake, flooding and extreme weather – to provide a more systematic search for non-conformities and correct them (e.g. appropriate storage of equipment, particularly for temporary and mobile plant and tools used to mitigate beyond design basis (BDB) external events).	2.6	Plant walkdowns are a mandatory part of verifying the seismic design before commissioning of NPPs or major plant modifications. In addition, plant walkdowns are an established practice in conducting and reviewing probabilistic safety assessment for external and internal hazards.	2 (implementing the new requirements to Finnish Regulatory Guides)
3.1.7	Flooding Margin Assessments The analysis of incrementally increased flood levels beyond the design basis and identification of potential improvements, as required by the initial ENSREG specification for the stress tests.	2.2	Analysis on the effects of different seawater levels has been made for the Loviisa site. At Olkiluoto, the probability of exceeding the design basis for flooding has been considered such low that further analyses are not needed.	103, 202 (improving preparedness for high seawater level, LO+OL)

Topic 1 – Natural Hazards				
No.	**Recommendation**	**Sect. in NAcP**	**Comment**	**Related action/activity**
3.1.8	External Hazard Margins In conjunction with recommendation 2.1 and 3.1.7, the formal assessment of margins for all external hazards including, seismic, flooding and severe weather, and identification of potential improvements.	2.1	Also related to xCNS recommendation: Further developments and further studies beyond the licensing basis	2 (implementing the new requirements to Finnish Regulatory Guides) 101 (Evaluation of fragility of the spent fuel pools at high temperature and at high pressure, LO) 102, 201 (Updating the seismic fragility analyses of the spent fuel pools and fire fighting systems, LO+OL) 103, 202 (improving preparedness for high sea-water level, LO+OL) 104, 203, 301 (Analysis of consequences of beyond design basis low and high temperature, LO+OL+OL3) 105, 204, 302 (Analysis of consequences of torna-dos and downbursts on plant structures and sys-tems, LO+OL+OL3)

Topic 2 – Design Issues				
No.	**Recommendation**	**Sect. in NAcP**	**Comment**	**Related action/activity**
3.2.1	Alternate Cooling and Heat Sink The provision of alternative means of cooling including alternate heat sinks.	3.1	Also related to xCNS recommendation: Protecting Pumping station and on-site water sources.	2 (implementing the new requirements to Finnish Regulatory Guides) 106 (Implementation of an alternative ultimate heat sink, LO) 107 (Securing the availability of the auxiliary emergency feed water system, LO) 205 (Conceptual design of independent way of pumping water into the RPV, OL) 206 (Conceptual design and implementation of modification to prevent overheating of the auxiliary feed water system (independent of sea water cooling), OL) 303 (Evaluating modifications required for independent decay heat removal system, OL3)
3.2.2	AC Power Supplies The enhancement of the on-site and off-site power supplies.	3.2	Also related to xCNS recommendation: Improving protection of on-site electrical distribution network.	108 (Acquiring a container to transfer diesel fuel at site, LO) 111 (Connecting the additional diesel power engine to the plant switchgears by a dedicated cable, LO) 114 (Enhancing the diesel fuel transfer capabilities on-site; acquiring a new diesel fuel storage tank at site, LO) 115, 207 (Evaluation of suitability of biodiesel for the diesel engines, LO+OL)
3.2.3	DC Power Supplies The enhancement of the DC power supply.	3.3		109 (Enhancing the battery power sources, LO) 110 (Acquiring mobile power supply and mobile pumps, LO) 208 (Acquiring mobile power supply (including recharge of DC batteries), OL)

Topic 2 – Design Issues				
No.	**Recommendation**	**Sect. in NAcP**	**Comment**	**Related action/activity**
3.2.4	Operational and Preparatory Actions Implementation of operational or preparatory actions with respect to the availability of operational consumables.	3.1 and 3.2		108 (Acquiring a container to transfer diesel fuel at site, LO) 112 (Evaluation of demineralised water reservoirs, LO) 113, 210 (Evaluation of demineralised water usage in case of accident concerning all units and spent fuel pools at the site, LO+OL) 114 (Enhancing the diesel fuel transfer capabilities on-site; acquiring a new diesel fuel storage tank at site, LO) 115, 207 (Evaluation of suitability of biodiesel for the diesel engines, LO+OL)
3.2.5	Instrumentation and Monitoring The enhancement of instrumentation and monitoring.	3.4		116, 211 (Ensuring the water injection into the spent fuel pools and monitoring the conditions of the pool, LO+OL)
3.2.6	Shutdown Improvements The enhancement of safety in shutdown states and mid-loop operation.	3.1	see 3.2.1	
3.2.7	Reactor Coolant Pump Seals The use of temperature-resistant (leak-proof) primary pump seals.	3.3	The licensee has carried out experiments on long-term high temperature behaviour of PCP seals, and is analysing the results.	109 (Enhancing the battery power sources, LO)
3.2.8	Ventilation The enhancement of ventilation capacity during SBO to ensure equipment operability.	3.1	Ensuring necessary supporting functions is a normal procedure in Finland when evaluating the adequacy of the approach.	No additional actions required.
3.2.9	Main and Emergency Control Rooms The enhancement of the main control room (MCR), the emergency control room (ECR) and emergency control centre (ECC) to ensure continued operability and adequate habitability conditions in the event of a station black-out (SBO) and in the event of the loss of DC (this also applies to Topic 3 recommendations).	4.5	Analysis of radiological conditions related to habitability of control rooms and emergency centres as well as accessibility for local manual actions during severe accident has been done and appropriate modifications have already earlier been implemented at the operating Finnish NPPs.	No additional actions required.

Topic 2 – Design Issues				
No.	**Recommendation**	**Sect. in NAcP**	**Comment**	**Related action/activity**
3.2.10	Spent Fuel Pool The improvement of the robustness of the spent fuel pool (SFP).	3.4	xCNS: Installing additional equipment and instrumentation in spent fuel pools to ensure cooling can be maintained or restored in all circumstances, or performing additional technical evaluations to determine if additional equipment and instrumentation are needed; Develop alternative provisions for SF pool cooling in all conditions by using fixed and mobile means for water feeding; Increase the reliability and the availability of the fire extinguishing system for its use in all conditions, also as a robust alternative cooling system for SF pool; Spent fuel accident scenario and cooling issues: Spent fuel pool integrity in case of prolonged loss of cooling; Improving water level control and extension of injection possibilities for spent fuel pools.	101 (Evaluation of fragility of the spent fuel pools at high temperature and at high pressure, LO) 102, 201 (Updating the seismic fragility analyses of the spent fuel pools and fire fighting systems, LO+OL) 116, 211 (Ensuring the water injection into the spent fuel pools and monitoring the conditions of the pool, LO+OL) 202 (Improvement against exceptionally high seawater level on the cooling systems of the spent fuel interim storage, OL) 213 (Reactor building top venting for steam escape; hydrogen possibly formed could be exhausted through this route as well, OL) 304 (Ensuring the water injection into the spent fuel pools with mobile pumps, OL3)
3.2.11	Separation and Independence The enhancement of the functional separation and independence of safety systems.	3.1	see 3.2.1	
3.2.12	Flow Path and Access Availability The verification of assured flow paths and access under SBO conditions. Ensure that the state in which isolation valves fail and remain, when motive and control power is lost, is carefully considered to maximise safety. Enhance and extend the availability of DC power and instrument air (e. g. by installing additional or larger accumulators on the valves). Ensure access to critical equipment in all circumstances, specifically when electrically operated turnstiles are interlocked.	3.2	Taken into account, see also 3.2.9	

Topic 2 – Design Issues				
No.	**Recommendation**	**Sect. in NAcP**	**Comment**	**Related action/activity**
3.2.13	Mobile Devices The provision of mobile pumps, power supplies and air compressors with prepared quick connections, procedures, and staff training with drills.	3.5	xCNS: Increase robustness by injection possibilities, by availability of secured mobile equipment, by improve accessibility of hook-up points.	110 (Acquiring mobile power supply and mobile pumps, LO) 116, 211 (Ensuring the water injection into the spent fuel pools and monitoring the conditions of the pool, LO+OL) 208 (Acquiring mobile power supply (including recharge of DC batteries), OL) 304 (Ensuring the water injection into the spent fuel pools with mobile pumps, OL3)
3.2.14	Bunkered/Hardened Systems The provision for a bunkered or "hardened" system to provide an additional level of protection with trained staff and procedures designed to cope with a wide variety of extreme events including those beyond the design basis (this also applies to Topic 3 recommendations).	3.1 and 3.5	The new regulatory guides will include requirements concerning Defence-in-Depth level 3b which is aiming at managing design extension conditions (DEC). DEC C category includes rare and extreme external hazards. There will be a requirement that decay heat removal from the reactor and the containment and sufficient cooling of the fuel in fuel storages shall be possible also in rare and extreme conditions (DEC C). The modifications related to residual heat removal systems (see 3.2.1) and mobile equipment (see 3.2.13) are reviewed taking into account this requirement on the protected autonomous systems.	2 (implementing the new requirements to Finnish Regulatory Guides) 106 (Implementation of an alternative ultimate heat sink, OL) 107 (Securing the availability of the auxiliary emergency feed water system, OL) 110 (Acquiring mobile power supply and mobile pumps, LO) 116, 211 (Ensuring the water injection into the spent fuel pools and monitoring the conditions of the pool, LO+OL) 205 (Conceptual design of independent way of pumping water into the RPV, LO) 206 (Conceptual design and implementation of modification to prevent overheating of the auxiliary feed water system (independent of sea water cooling), LO) 208 (Acquiring mobile power supply (including recharge of DC batteries), OL) 303 (Evaluating modifications required for independent decay heat removal system, OL3) 304 (Ensuring the water injection into the spent fuel pools with mobile pumps, OL3)

Topic 2 – Design Issues				
No.	**Recommendation**	**Sect. in NAcP**	**Comment**	**Related action/activity**
3.2.15	Multiple Accidents The enhancement of the capability for addressing accidents occurring simultaneously on all plants of the site and consideration of the site as a whole for a multi-units site in the safety assessment.	3.5 and 4.5	xCNS: Multi-unit site risk considerations planned to be evaluated. Effects of units on each other and effects of other nearby industry on NPP risk planned to be studied	117, 212, 305 (Capability of dealing with multi-unit severe accidents; updating the emergency plans and organisation, LO+OL+OL3)
3.2.16	Equipment Inspection and Training Programs The establishment of regular programs for inspections to ensure that a variety of additional equipment and mobile devices are properly installed and maintained, particularly for temporary and mobile equipment and tools used for mitigation of BDB external events. Development of relevant staff training programmes for deployment of such devices.	3.5	taken into account in acquiring mobile equipment, see 3.2.13	110 (Acquiring mobile power supply and mobile pumps, LO) 116, 211 (Ensuring the water injection into the spent fuel pools and monitoring the conditions of the pool, LO+OL) 208 (Acquiring mobile power supply (including recharge of DC batteries), OL) 304 (Ensuring the water injection into the spent fuel pools with mobile pumps, OL3)
3.2.17	Further Studies to Address Uncertainties The performance of further studies in areas were there are uncertainties. Uncertainties may exist in the following areas: · The integrity of the SFP and its liner in the event of boiling or external impact. · The functionality of control equipment (feedwater control valves and SG relief valves, main steam safety valves, isolation condenser flow path, containment isolation valves as well as depressurisation valves) during the SBO to ensure that cooling using natural circulation would not be interrupted in a SBO. · The performance of additional studies to assess operation in the event of widespread damage, for example, the need different equipment (e.g. bulldozers) to clear the route to the most critical locations or equipment. This includes the logistics of the external support and related arrangements (storage of equipment, use of national defence resources, etc.).	2.1, 3.4 and 4.5		2 (implementing the new requirements to Finnish Regulatory Guides) 101 (Evaluation of fragility of the spent fuel pools at high temperature and at high pressure, LO) 102, 201 (Updating the seismic fragility analyses of the spent fuel pools and fire fighting systems, LO+OL) 117, 212, 305 (Capability of dealing with multi-unit severe accidents; updating the emergency plans and organisation, LO+OL+OL3) 119, 214 (Plans for restoring the access routes to the site, LO+OL) 121, 218 (Plans for access control and radiation monitoring of the staff and decontamination measures in extreme natural hazards, LO+OL) 215 (Enhancement of the emergency plan on radiation measurement patrols, OL) 216 (Enhancement of adequacy of the maintenance personnel in case of emergency, OL)

Topic 3 – Severe Accident Management				
No.	**Recommendation**	**Sect. in NAcP**	**Comment**	**Related action/activity**
3.3.1	WENRA Reference Levels The incorporation of the WENRA reference levels related to severe accident management (SAM) into their national legal frameworks, and ensure their implementation in the installations as soon as possible.	4.1	xCNS: Analyze /develop and implement strategies to secure containment integrity including consideration of base mat melt through In Finland, Government Decree on the Safety of Nuclear Power Plants (733/2008) and the regulatory guides (YVL Guides) include requirements for severe accident management which are in compliance with the WENRA Reference Levels Issue F. In particular, Finnish regulations include requirements on dedicated, safety-classified and single-failure tolerant SAM systems and measurements. A comprehensive severe accident management (SAM) strategy has been developed and implemented both at Olkiluoto 1&2 and Loviisa 1&2 plant units.	No additional actions required.
3.3.2	SAM Hardware Provisions Adequate hardware provisions that will survive external hazards (e.g. by means of qualification against extreme external hazards, storage in a safe location) and the severe accident environment (e.g. engineering substantiation and/or qualification against high pressures, temperatures, radiation levels, etc), in place, to perform the selected strategies.	4.1	see 3.3.1 In Finland, the SAM systems are not required to be seismically qualified because earthquake risks are low. The philosophy is to seismically qualify the systems used for severe accident prevention (systems for design basis accidents). Availability of dedicated SAM systems and components in the severe accident environmental conditions has been verified as part of the qualification process, as required by Regulatory Guides.	No additional actions required.

Topic 3 – Severe Accident Management				
No.	**Recommendation**	**Sect. in NAcP**	**Comment**	**Related action/activity**
3.3.3	Review of SAM Provisions Following Severe External Events The systematic review of SAM provisions focusing on the availability and appropriate operation of plant equipment in the relevant circumstances, taking account of accident initiating events, in particular extreme external hazards and the potential harsh working environment.	4.1	xCNS: Containment venting for new NPPs STUK is still evaluating the design of Olkiluoto unit 3, but the overall SAM strategy and approach has been accepted. No such hazards or deficiencies that would require changes to this approach have been found, and STUK has not set any further requirements on the SAM approach of OL3.	118 (Improving the containment decay heat removal in case of multi-unit accidents, LO)
3.3.4	Enhancement of Severe Accident Management Guidelines (SAMG) In conjunction with the recommendation 4, the enhancement of SAMGs taking into account additional scenarios, including, a significantly damaged infrastructure, including the disruption of plant level, corporate-level and national-level communication, long-duration accidents (several days) and accidents affecting multiple units and nearby industrial facilities at the same time.	4.3	xCNS: Performing or planning an evaluation of the guidance that is to be used by the operator to manage emergency situations resulting from severe accidents caused by extreme natural phenomena at nuclear power plants, including for low power and shutdown states. These documents include emergency operating procedures to prevent core damage. Analysis of guidance during severe long term accidents. Performing or planning of extensive damage mitigation guidelines to address accidents that result in fires or explosions that affect a large portion of a nuclear power plant.	116, 211 (Ensuring the water injection into the spent fuel pools and monitoring the conditions of the pool, LO+OL)
3.3.5	SAMG Validation The validation of the enhanced SAMGs.	4.3	EOPs and SAM procedures are verified and validated.	No additional actions required.

Topic 3 – Severe Accident Management				
No.	**Recommendation**	**Sect. in NAcP**	**Comment**	**Related action/activity**
3.3.6	SAM Exercises Exercises aimed at checking the adequacy of SAM procedures and organisational measures, including extended aspects such as the need for corporate and nation level coordinated arrangements and long-duration events.	4.4	xCNS: Analysis of human resources, communication, personnel training and guidance during severe long term accidents (esp. multi-unit) and validation of effectiveness through exercises.	6 (Emergency exercises exceeding 24 hours or exercises containing aspects of recovery have not been organised systematically, and should be included in the exercise calendar) 120, 217 (Evaluation of suitability of emergency preparedness personnel to their duties, LO+OL) 215 (Enhancement of the emergency plan on radiation measurement patrols, OL) 216 (Enhancement of adequacy of the maintenance personnel in case of emergency, OL)
3.3.7	SAM Training Regular and realistic SAM training exercises aimed at training staff. Training exercises should include the use of equipment and the consideration of multi-unit accidents and long-duration events. The use of the existing NPP simulators is considered as being a useful tool but needs to be enhanced to cover all possible accident scenarios.	4.4	Control room operators are required to participate in the simulator training every year. There is basic emergency preparedness training and task-specific training. Training of the severe accident management is part of the regular operator training programme. The training simulator is used when practicing the accidents, but the simulators are not capable of extending the simulation into the severe accident domain at the moment. When there is need to practice severe accidents then table top training is used together with the training simulator at the Loviisa NPP. Severe accident simulation will be included in the ongoing I&C renewal project in Loviisa. At the Olkiluoto NPP, a PC-simulator has been developed to illustrate severe accident phenomena.	120, 217 (Evaluation of suitability of emergency preparedness personnel to their duties, LO+OL)
3.3.8	Extension of SAMGs to All Plant States The extension of existing SAMGs to all plant states (full and low-power, shutdown), including accidents initiated in SFPs.	4.3	The licensees will improve EOPs and SAM procedures to support heat removal from spent fuel pools by pool boiling and supplying additional water to the pools.	116, 211 (Ensuring the water injection into the spent fuel pools and monitoring the conditions of the pool, LO+OL)

Topic 3 – Severe Accident Management				
No.	**Recommendation**	**Sect. in NAcP**	**Comment**	**Related action/activity**
3.3.9	Improved Communications The improvement of communication systems, both internal and external, including transfer of severe accident related plant parameters and radiological data to all emergency and technical support centre and regulatory premises.	4.5	Strengthening of the power supplies of the authorities' network base stations is under investigation. There is also a satellite telephone connection dedicated to the emergency situations both in Loviisa and in Olkiluoto.	219 (Improvement of communication capabilities)
3.3.10	Presence of Hydrogen in Unexpected Places The preparation for the potential for migration of hydrogen, with adequate countermeasures, into spaces beyond where it is produced in the primary containment, as well as hydrogen production in SFPs.	4.1	Hydrogen leakages out of the containment during severe accidents has been analysed for all units, and the results show that design leakages do not cause a threat to the containment integrity. For spent fuel pools, the approach in Finland is to "practically eliminate" the possibility of fuel damage. xCNS: Spent fuel accident scenario and cooling issues: Hydrogen generation in case of loss of cooling Preventing challenges to containment by mitigating hydrogen risk in the fuel building.	213 (Reactor building top venting for steam escape; hydrogen possibly formed could be exhausted through this route as well, OL)
3.3.11	Large Volumes of Contaminated Water The conceptual preparations of solutions for post-accident contamination and the treatment of potentially large volumes of contaminated water.	4.5	The design of Finnish NPPs aims at maintaining the radioactive material inside the containment, and thus there should not be any need for treating large amounts contaminated water outside the containment. Long-term leaktightness of the containment is required in severe accident conditions, as well. (Finnish technology is being utilized at Fukushima Dai-ichi for treatment of contaminated water.)	No additional actions required.

Topic 3 – Severe Accident Management				
No.	**Recommendation**	**Sect. in NAcP**	**Comment**	**Related action/activity**
3.3.12	Radiation Protection The provision for radiation protection of operators and all other staff involved in the SAM and emergency arrangements.	4.5	Analysis of radiological conditions related to habitability of control rooms and emergency centres as well as accessibility for local manual actions during severe accident has been done and appropriate modifications have already earlier been implemented at the operating Finnish NPPs. As a lesson learnt from the Fukushima accident, STUK requested the licensees to provide plans for access control and radiation monitoring of the staff and decontamination measures for personnel, vehicles and materials in case of the normal provisions at the plant site are not available (e.g. in extreme natural hazards or fallout).	121, 218 (Plans for access control and radiation monitoring of the staff and decontamination measures in extreme natural hazards, LO+OL)
3.3.13	On Site Emergency Center The provision of an on-site emergency center protected against severe natural hazards and radioactive releases, allowing operators to stay onsite to manage a severe accident.	4.5	Analysis of radiological conditions related to habitability of control rooms and emergency centres as well as accessibility for local manual actions during severe accident has been done and appropriate modifications have already earlier been implemented at the operating Finnish NPPs.	No additional actions required.
3.3.14	Support to Local Operators Rescue teams and adequate equipment to be quickly brought on site in order to provide support to local operators in case of a severe situation.	4.5		119, 214 (Plans for restoring the access routes to the site, LO+OL)

Topic 3 – Severe Accident Management				
No.	**Recommendation**	**Sect. in NAcP**	**Comment**	**Related action/activity**
3.3.15	Level 2 Probabilistic Safety Assessments (PSAs) A comprehensive Level 2 PSA as a tool for the identification of plant vulnerabilities, quantification of potential releases, determination of candidate high-level actions and their effects and prioritizing the order of proposed safety improvements. Although PSA is an essential tool for screening and prioritising improvements and for assessing the completeness of SAM implementation, low numerical risk estimates should not be used as the basis for excluding scenarios from consideration of SAM especially if the consequences are very high.	4.2	At the Olkiluoto units 1 and 2, level 2 PSA analyses include all level 1 core damage sequences, i.e. the analysis includes power operation, plant start-ups, shutdowns as well as refuelling outages. The initiating events considered include internal initiating events such as component failures and human errors, internal hazards such as flooding and fires, and external hazards such as extreme weather phenomena, seismic phenomena and marine oil spills. Events related to spent fuel storage are planned to be included during the ongoing storage extension project. The current level 2 PSA for Loviisa unit 1 covers full, low and non-power states and it includes accident sequences initiated by internal events, internal floods and weather events (incl. oil spills). Accident sequences initiated by fire events during full power were integrated into the level 2 PSA in December 2012. Fire events during low and non-power states are currently under development and will be integrated into the level 2 PSA in the future. The level 2 fire analysis is based on the level 1 fire analysis and it considers the same initiating fire events. Seismic events are not covered in level 2, but the fraction of overall risk from seismic events is very small. Loviisa unit 2 specific level 2 PSA studies are planned to be carried out in future, but due to the extensive similarities between the reactor units, no major differences are expected. Currently, the level 2 PSA studies do not cover the spent fuel storage.	No additional actions required other than those aiming at complementing the studies (pre-Fukushima).

Topic 3 – Severe Accident Management				
No.	**Recommendation**	**Sect. in NAcP**	**Comment**	**Related action/activity**
3.3.15 cont'd			This issue will be discussed with the licensee after the new Regulatory Guides (YVL Guides) are published. At the Olkiluoto unit 3, level 1 PSA analysis has been extended with level 2 PSA. Risk integration has been performed over all plant damage states. It must be noted that STUK has not yet approved the PSA analyses for OL3, and thus the results have to be considered as preliminary and they need to be updated.	
3.3.16	Severe Accident Studies The performance of further studies to improve SAMGs.	4.3	xCNS: Filtration efficiency; R&D related to: • In vessel corium retention • Hydrogen risk studies (e.g. large scale test…)	Adequacy of severe accident management has been experimentally supported when designing the provisions (e.g. in-vessel retention and hydrogen mixing in the containment for Loviisa NPP). 118 (Improving the containment decay heat removal in case of multi-unit accidents, LO)

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