Convention on Nuclear Safety
Questions Posted To Finland in 2014

| Vastaaja | Q.No | Country | Article | Ref. in National Report |
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| | 1 | Australia | General | E |
| **KiA** | Question/ Comment | Finland should be commended for making the temporary amendments in 2012 to the Nuclear Liability Act in 2012, implementing the provision on unlimited liability and requirement of insurance coverage for a minimum amount of EUR 700 million by the operator, despite delays in the international ratification process.<br><br>Commend for continuing to place priority on the updating of their regulatory guides on nuclear safety and including updated security arrangements in this activity and for addressing recommendations from the Fukushima accident that deals with the design of NPPs and spent fuel storages, consideration of severe external hazards and on-site EP arrangements in these reviews.<br><br>Commend for continuing to review and put emphasis on the management of their Periodic Inspection Programme and also their Construction Inspection Programme, taking into account recommendations and suggestions of IRRS mission and enhancing the focus of inspection on the most safety-significant areas and updating the internal guidance around such inspection programmes.<br><br>Commend for recognised strengths and good practices through IRRS missions:<br>- Effective safety assessment of new NPPs<br>- STUKs organisation and conduction of emergency exercises; and<br>- Contribution of STUK to the global improvement of radiation and nuclear safety.<br><br>Commend for already having preliminary plans in place for another follow up IRRS mission in 2015.<br><br>Commend for ensuring that the financial liability is covered for the future management and disposal of nuclear wastes and for the decommissioning of nuclear facilities is covered by requiring companies to make payments to the State Nuclear Waste Management Fund and every third year present estimates for future costs of these operations.<br><br>Commend for ensuring funding for long-term nuclear safety and nuclear waste management research in Finland by annually collecting funds from the licence holders to include in a special fund.<br><br>Commend for strengthening regulatory oversight particularly in the area of safety culture evaluation methods and management commitment for safety culture and the responsibility for the management to define and communicate the requirement for a good safety culture.<br><br>Commend for developing a National Action Plan to address measures initiated at a national level and at the NPPs as a restul of the Fukushima accident, for having this plan peer reviewed by ENSREG in April 2013 and for publishing | | |

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| | | on the STUK website.<br><br>Commend for undertaking the LOVIISA13 exercise with such a wide range of stakeholders and for hosting a joint international exercise with Nordic and Baltic countries and the IAEA. | | |
| | Answer | Thank you for the kind comment. | | |
| | Q.No<br>2 | Country<br>Brazil | Article<br>General | Ref. in National Report<br>Annex 3 . Pag. 103 |
| **MV** | Question/ Comment | What was the root cause of the reported failure of new pilot valves of the blowdown system after only one year of installation? Who was the vendor of these valves? | | |
| | Answer | The root cause was inadequate qualification of the design modification. The material of the valve bushing was changed to martensitic stainless steel which required a coating between the bushing and the piston. Hard chrome coating was selected for the valves of question instead of plasma nitriding that has been used earlier at a reference plant. The chrome coating oxidized during plant operation and the clearance between the bushing and the piston decreased. This resulted in jamming of the valve. The vendor was CCI AG. | | |
| | Q.No<br>3 | Country<br>Brazil | Article<br>General | Ref. in National Report<br>Annex 5 - pag 119 |
| **LiS** | Question/ Comment | How is STUK considering the IRRS recommendation related to the government should establish a “new regulator as a body separated in law from other arms of the government”? | | |
| | Answer | The IRRS recommendation states: *The government should embed, in law, STUK as an independent regulatory body separated from other entities having responsibilities or interests that could unduly influence its decision making*. STUK and the Ministry of Employment and the Economy are currently considering some amendments and clarifications in the Nuclear Energy Act to underline STUK’s position as an independent regulatory body. | | |
| | Q.No<br>4 | Country<br>Canada | Article<br>General | Ref. in National Report<br>Page 114, Annex 5 |
| **JN** | Question/ Comment | An Environmental Impact Assessment was carried out and STUK had prepared a preliminary safety assessment on the construction of a third reactor at Loviisa, yet Fortum’s application for a Decision-in-Principle was rejected by the Government. Can you elaborate on the reason for the rejection of the application by the Ministry of Employment an Economy? What were the safety factors or considerations that contributed to this decision? | | |
| | Answer | There were not nuclear or radiation safety factors which would have been reason for the rejection of Fortum’s application for DiP. Ministry of Employment and the Economy based the decision according to the Nuclear Energy Act 5 §, where: *“The use of nuclear energy, taking into account its various effects, shall be in line with the overall good of society.”* Judgement of “overall good of society” was made in other areas of energy and economical politics, not based on safety factors or considerations. | | |
| | Q.No<br>5 | Country<br>Canada | Article<br>General | Ref. in National Report<br>Page 117, Annex 6 |

**KiA** Question/ Comment: Finland is commended for its clear and comprehensive description of the measures implemented to meet the obligations of the IAEA Action Plan on Nuclear Safety.

Answer: Thank you for the kind comment.

| Q.No | Country | Article | Ref. in National Report |
|---|---|---|---|
| 6 | Canada | General | Page 117, Annex 6 |

**RSr** Question/ Comment: Of the Fukushima-related actions (39) identified by Finland in the Second Extraordinary Meeting National Report and throughout this Report, what are the activities completed to date? Have there been additional improvements or actions identified since the national report was writtenk? What types of measures have been taken to consult and inform the public on the National Action Plan or progress on its short, medium or long term goals?

Answer: The following list updates the activities presented in the Finland National Report for CNS Second Extraordinary Meeting

Loviisa NPP

Updating the seismic fragility analyses of the spent fuel pools

The utilities have sent to STUK fragility analyses for the spent fuel pools and fire water supply systems in seismic events. The spent fuel pools have been estimated to withstand a 0.1g PGA.

Improving preparedness for high seawater level

The utility is investigating the variation (low probability / high level events) of sea water level at the site with the Finnish Meteorological Institute. The utility will decide of improvements for high sea water level after completion of the study in 2014.

Implementation of an alternative ultimate heat sink

The utility has sent to STUK the conceptual design plan of a new system that ensures decay heat removal in case of loss of seawater. The system consists of two cooling towers dimensioned for decay heat per unit: one for the reactor, one for spent fuel. Power for the system can be supplied by an independent air cooled DG. High sea level and high wind speeds are taken into account in design.

Securing the availability of the auxiliary emergency feed water system

DC batteries needed for operation of the DGs for the auxiliary emergency feed water pumps have been replaced. An assessment of the fuel availability has been made: operation of the system is ensured for 48 h.

Use of biodiesel for EDGs

Availability of bio-free diesel may be limited in emergency situations. According to the evaluation by the utility, biodiesel may also be used for EDGs.

Enhancing the battery power sources

Half of the DC batteries have been changed in 2013 maintenance to new batteries with 2h depletion time. The rest will be changed in 2014. The racks have been changed to more earthquake resistant type.

Acquiring mobile power supply and mobile pumps

The need for mobile power supply and mobile pumps will be decided when the utility decides of the plant improvements for high seawater level. Existing diverse systems (for example the auxiliary emergency feed water system) can already be utilized in case of non-operation of the normal safety systems.

Connecting the additional diesel power engine to the plant switchgears by a dedicated cable

In addition to the EDGs (4/unit), the plant has a separate air-cooled diesel generator that can be used in SBOs. A new connection from the DG to the plant switchgear has been installed in 2013.

Modifications of water injection into the spent fuel pools

The utility has sent to STUK a conceptual design of the diverse cooling of spent fuel pools in the containment. The new system will take coolant from the containment sump. Two new pumps/unit will be installed for coolant injection.

Capability of dealing with multi-unit severe accidents

The utility has evaluated the availability of personnel in case of a severe accident at both units. The utility considers the resources adequate. A simultaneous accident at both units will be trained in future emergency exercises.

<u>Olkiluoto NPP</u>

Updating the seismic fragility analyses of the spent fuel pools

The utilities have sent to STUK fragility analyses for the spent fuel pools and fire water supply systems in seismic events. Improvements in the seismic resistance of the Olkiluoto 1&2 the fire fighting system will be implemented in 2013-2014.

Conceptual design of independent way of pumping water into the RPV

The utility has submitted to STUK assessments for diverse methods to inject coolant into the reactor in case of loss of all AC. The system would inject coolant using the fire fighting system after reactor cooling system depressurization. Decay heat would be removed from the cooling circuit into depression pool and from the containment via containment filtered venting system. Power supply will be ensured by an independent diesel generator. System design for the plant modification is under way.

In a case of a total SBO, the time available prior fuel damage may not be long enough to take the system into use. The utility is investigating possibilities for additional fast acting methods to ensure fuel cooling. Possibilities are a system with a turbine driven pump or independent diesel driven pump.

Conceptual design of implementing an additional way of component cooling of the auxiliary feed water system (independent of sea water cooling)

The utility has sent to STUK the system design for approval. The modification increases the operation time of the auxiliary feed water pump to several days in case of loss of component cooling water. The

modification is planned in 2014-2015.

Conceptual design of using water injection and boiling as an alternative means for fuel pool cooling

The system design is under way. The diverse system will be based on new injection lines from the fire fighting system.

Implementation of mobile power supply and pumps

The utility has decided to obtain new diesel aggregates and two new mobile fire fighting pumps. The pumps will be delivered in 2014. They can be used for containment water filling in severe accidents, coolant injection into spent fuel pools and coolant injection into the spent fuel storage.

Capability of dealing with multi-unit severe accidents

Emergency planning has been updated for severe accidents in multiple units

| | Q.No | Country | Article | Ref. in National Report |
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| | 7 | Canada | General | Page 13, Page 80 |

**JN** Question/ Comment: The Working Group established in 2012 by the Ministry of Employment and Economy to investigate the two options for spent fuel disposal from the new operating plant at Fennovoima recommended that negotiations continue, and it did not appear to favour a specific option. Can you elaborate on the action/deliverables that may be expected of this Working Group in future and the timeline for completion? Can you clarify whether STUK is a member of the Working Group?

Answer: The Working Group worked nearly all year 2012 and delivered a report in Finnish. The main conclusion is that all the expertise in Finland in final disposal of spent fuel must be used in the future solution of the spent fuel of the Fennovoima.

It is not very important if there will be one or two final repositories. However, this can be decided only after Posiva has started its operation with ONKALO and the research has been done. This will take many years. The need for the final disposal for Fennovoima is in the 2070s which means that there is a lot of time to plan the solution. Fennovoima and the owners of Posiva (Fortum and TVO) has started their negotiations but these are not public. Fennovoima has to publish also an overall plan of its waste handling when delivering its possible construction license application in 2015.

STUK has not been a member of the Working group, but STUK has given it's statement on this matter and it was attached in the report.

| | Q.No | Country | Article | Ref. in National Report |
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| | 8 | Canada | General | Page 14 |

**MV** Question/ Comment: From sharing operating experience with Belgium (IRS report), Finland has identified reactor pressure brittle fracture as an aging management issue for operating NPPs, especially Loviisa. Can you elaborate on the clarifications that were requested by STUK of the licensees in their March 2012 letter? Can you describe the plant modifications that have been carried out by Loviisa to reduce

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| | | this risk and the scope of work that remains to be done? How is Fortum 'managing' the brittle fracture risk? | | |
| | Answer | The question refers to page 14 of the national report. There we have described the actions to ensure safety against RPV brittle fracture. The licensee Fortum has implemented comprehensive analysis and investigation in management of brittle fracture from the beginning of Loviisa NPP operation. This arises from the needs to control radiation embrittlement and the risk of brittle fracture in transient situations. This is explained elsewhere in the national report.<br><br>The question mentions also "March 2012 letter", which is assumed to mean the letter mentioned on p. 76 of the national report. This deals with request of clarification to the Finnish licensees to evaluate the integrity of the reactor vessels against hydrogen flaking as specified in the Belgium IRS report. The licensees were asked to assess and clarify for Finnish NPPs whether the risk of hydrogen flakes is taken into account and sufficiently eliminated during forging of the reactor shells. It was also asked to clarify the effectiveness of in-service inspections to detect such phenomena.<br><br>The licensee (Fortum) clarified the situation based on manufacturing data available and a supplementation received from the manufacturer of Loviisa 1&2 RPV's. The manufacturing data indicated that the forgings have been subjected to "antiflake treatment" during manufacturing. The NDT-inspection data (UT normal probe) from that time showed that the acceptance limit for individual defect has been 20 $mm^2$ (diameter of 5 mm) which should be small enough to detect possible hydrogen flakes especially when located in groups as typical. Complete manufacturing, hydrogen data and inspection documentation were, however, not available from the time of manufacturing. As a further measure the licensee has decided to enlarge the scope of the RPV inservice inspections to base metals (belt line forgings). These inspections from full thickness will be carried out in coming outages linked to the inservice inspection programme of the RPV.<br><br>STUK considered that the clarifications are sufficient but required the licensee to assess the integrity of the RPV areas close to support structures and nozzles and send information on this issues until end of May, 2014<br><br>For Olkiluoto 1-2 plants it was shown by the licensee (TVO) that the reactor shells have been manufactured from rolled plates (with longitudinal welds) where the rolling reduction is much larger than in ring forging. This substantially decreases the magnitude of segregation and risk to hydrogen flaking. In addition, the NDT-inspections after material manufacturing have been carried out so that possible hydrogen flakes would have been detected with sufficient detection accuracy. The forgings for Olkiluoto 3 reactor were manufactured in 2003-2004 and the risk of hydrogen flaking was sufficiently taken into account in material manufacturing and NDE-inspections. | | |
| | Q.No<br>9 | Country<br>Germany | Article<br>General | Ref. in National Report<br>entire report |
| **KiA** | Question/ Comment | Finland presented an excellent CNS-Report, the report is well-written and comprehensible including detailed annexes describing features and | | |

improvements of NPPs.

Answer Thank you for the kind comment.

| | Q.No | Country | Article | Ref. in National Report |
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| | 10 | Hungary | General | Page 113, Annex ~~3~~ 4 |

**TV** Question/ Comment: Could you please describe the role and capabilities of the mentioned gas turbine and of the station black out diesel generators?

Answer: In EPR design, station blackout situations are originally managed by using two diverse SBO-diesel generators which are also protected against different internal and external events (like EDG's also are). The design capacity of the diesel units is such that the reactor can be shut down safely. During severe accident situations SBO diesels are also used to feed electricity to the systems needed to manage containment pressure (containment heat removal system) after 12 hours.

At Olkiluoto site, there is also a gas turbine plant which consist of two gas turbines and corresponding supporting systems and electrical connections and is one more diverse way to product electricity at the site. There are fixed connections from gas turbine plant to all units at the site, in case of Olkiluoto 3 directly to the EDG busbars. Capacity of the gas turbines is about 50 MW each which is much more than combined loads of all EDG backed-up consumers. The gas turbine plant is not protected against additional external conditions and is not safety classified.

| | Q.No | Country | Article | Ref. in National Report |
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| | 11 | Sweden | General | A2, 84 |

**KW** Question/ Comment: Annex 2: Regarding the modernisation of the Loviisa I&C equipment. Are these modernisation changes evaluated against the new YVL-guides or have other requirements been used as the basis for this review?

Answer: The modernisation project started 2005. So it is going according the old YVL-guides which are still valid for existing nuclear facilities. The implementation process of new YVL guides at the existing NPPs has now started and licensees have to send their position of the fulfilment of new requirements and possible improvement plans to STUK by the ened of year 2014. After this hearing process, STUK will make separate decisions how the new guides are applied also at the Loviisa nuclear power plant.

| | Q.No | Country | Article | Ref. in National Report |
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| | 12 | Ukraine | General | Annex 2, page 92 |

**JKu** Question/ Comment: It is stated that "increasing number of incidents occurred at the Loviisa NPP during 2012. Three of them were classified at INES Level 1 and seven of them at INES Level 0. Several of them occurred during the plant outage."
Could you provide information on the causes of the increased number of incidents and actions taken to eliminate their root causes and to prevent their occurrence in future?

Answer: Licensee established an investigation group which reported to the top management and issued recommendations. These recommendations are elaborated further by the plant management into detailed actions. Recommendations are divided in 6 different topical areas, which are:

1. Configuration management of plant design data and drawings, updating

and coherent use of design data
2. Management system need to be updated and according to plant practices. Process oriented approach should be used.
3. Roles and responsibilities should be clarified in different work processes
4. Modification process should be comprehensive and complete. “Design Authority” approach is established.
5. Operating experience feedback process should be improved.
6. Human Performance Tools should be established and used in normal work processes.

| | Q.No | Country | Article | Ref. in National Report |
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| | 13 | Ukraine | General | Annex 2, page 89 |

**KW**

Question/ Comment: It is stated that construction of a new diesel powered off-site generator plant was carried out in 2011-2012 for Loviisa NPP. The power of the plant is 10 MW and it can be used as a peak power plant for electrical grid or as a power supply for the nuclear plants. It is not safety classified, but it can feed power as a last resort to the safety and non-safety classified systems of the nuclear plants.
Could you clarify whether the construction of a new diesel generator plant is a part of the post-Fukushima measures? How is robustness of the diesel generator and cables to extreme events ensured? What systems are to be powered by the diesel generator?

Answer: The power plant was not part of Fukushima measures. The project started before Fukushima accident. The diesel was mainly designed as a peak power unit for the grid but the power company wanted also use it as an additional power source for Loviisa power plants. In principle, all system of Loviisa power plants can be powered by the diesel plant. It can feed plant area, nuclear units via 110kV grid connections or directly the diesel busbars of nuclear units.

| | Q.No | Country | Article | Ref. in National Report |
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| | 14 | United States of America | General | Annex 5 |

**JN**

Question/ Comment: Decisions-in-Principle were granted by the Finnish Government in 2010 for two new reactors, and Olkiluoto Unit 3 is nearing completion of construction.

(1) Has the political climate or public perception of nuclear power in Finland changed significantly as a result of the Fukushima accident?
(2) Has it had an impact on these 2 new nuclear projects?

Answer:
(1) There has been and will be in the future critisism for new nuclear reactors, but Fukushima has not changed significantly public perception in Finland.
(2) Not significally, there could be seen few factors on public perception: One factor could be the Finnish three phase licencing process, where the political acceptance is measured during the first DiP phase. According to the Nuclear Energy Act 5 and 11 §:*“The use of nuclear energy, taking into account its various effects, shall be in line with the overall good of society.”* Other factor could be the Finnish requirement of continuous enhancement of operating NPP safety, which is written in Nuclear Energy Act 7a §:” *The safety of nuclear energy use shall be maintained at as high a level as practically possible. For the further development of safety, measures shall be implemented that can be*

*considered justified considering operating experience and safety research and advances in science and technology."* After Tshernobyl accident severe accident management requirements were introduced to the Finnish legislation. Specific SAM systems were designed and installed to the operating NPPs. One factor could also be STUK's experts continuous communication to the public during the Fukushima accident. In addition, the regulatory requirements have been updated taking into account the lessons learnt from Fukushima accident and the updated requirements are taken into account in the new nuclear projects.

| | Q.No | Country | Article | Ref. in National Report |
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| | 15 | Bulgaria | Article 6 | p.13 |
| **KW** | Question/ Comment | The report informs that STUK has permitted the extended operation of Loviza NPP Units 1 and 2 till 2027 and 2030 respectively. However, the report indicates that there are problems that still need to be addressed in order to ensure the continued safe operation of the units (i.e. complete replacement of the reactor control and protection system). These activities are expected to be completed by 2017.<br>In this regard, could Finland indicate what restrictions and conditions have been defined to the plant till upgrades completion in 2017? | | |
| | Answer | Complete replacement of the reactor control and protection system gives no reason for any restrictions. The plants are currently having fully functioning protection and I&C systems. The replacement project is a preventive action against possible future aging and lack of spare parts of I&C systems. | | |
| | Q.No | Country | Article | Ref. in National Report |
| | 16 | China | Article 6 | section 6 |
| **MV** | Question/ Comment | In 2007, the Finnish government approved the lifetime extension for two units of Loviisa NPP, and during 2010 till 2012, the government approved the lifetime extension of RPV of the two units, could you please explain the logistic relationship between the two approvals? When the lifetime extension of the two units were approved in 2007, the result of whether the RPV can be lifetime extended was not defied, what are the foundations for the operation permits for the two units of their lifetime extended respectively to 2027 and 2030? | | |
| | Answer | Loviisa 1 and 2 RPVs have separate operation permits in addition to the operating license of the NPP itself. This arose originally from the need to control radiation embrittlement rate of the reactors that was found to be unexpectly fast during first years of operation.<br><br>Plant safety is assessed in the operating licenses and periodical safety reviews (PSR) processes as well as during the operation. In addition, reactor (RPV) safety is assessed against sufficient margins to brittle fracture by requiring separate operation permits for the reactors. The permits have been very useful to control the safety of the RPVs and to get confidence against brittle fracture risk. Last RPV operation permits (Loviisa 2 in 2010 and Loviisa 1 in 2012) could be given until the end of the 50 year lifetime of the whole plants (until 2027 for Loviisa 1 and 2030 for Loviisa 2) because the comprehensive analysis of the licensee showed that the brittle fracture risk can be managed until the end of licensed plant operation. In the next PSRs (2015 and 2023) the safety of | | |

the reactors is, however, assessed again as a part of the plant periodical safety reviews. This will include re-assessment of deterministic and probabilistic analysis results.

As a clarification to the 2nd question we refer to the reactor operating permit which controls operational safety of the reactors themselves and must be in force all the time during plant operation. The operating permit of both reactors has been valid in 2007 because the approval for LO1 is given in 2002- 2012 and that for LO2 in 1994 - 2010.

| | Q.No | Country | Article | Ref. in National Report |
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| | 17 | Czech Republic | Article 6 | Page 12 |
| **JHe** | Question/ Comment | The construction licence application for disposal facility for spent nuclear fuel was submitted to the Ministry of Employment and the Economy at the end of 2012. (The disposal facility is envisaged to be op¬erational in about 2022). What is the actual status of the decision-making process? Have all public hearings already been completed? STUK provided Posiva with the first opinion on the material submitted in April with many requests for additional information. What are the substantial issues to be solved? Is there any time-limit given by Finnish law for making a decision? | | |
| | Answer | In Finland Ministry of Employment and the Economy (MEE) is the contact authority in nuclear facility licensing and is taking care also for the public hearings. A more comprehensive public hearing process is part of environmental impact assessment and decision-in-principle process. The decision-in-principle was given by the Government in 2000 and ratified by the Parliament in 2001. The construction license process involves public announcement of the license application and possibility to provide opinions and statements to MEE to be noticed in the decision making process. The deadline for opinions and statement was 30th September 2013.<br><br>STUK is in the middle of review and assessment process. The first opinion was related to accepting safety and design documents for detailed safety review. STUK requested Posiva to update for example licensing plan, safety classification and parts of safety analysis documents before STUK would start detailed review and assessment of that part. Finnish legislation does not specify any time limit for license application review, but MEE has requested STUK to submit safety appraisal by 30th June 2014. | | |
| | Q.No | Country | Article | Ref. in National Report |
| | 18 | Czech Republic | Article 6 | Pages 16 and 110 |
| **RSr** | Question/ Comment | Can you specify some characteristics of fuel assemblies which will be used in Olkiluoto NPP unit 3 reactor such as number of fuel pins in fuel assembly, enrichment of fuel pins, geometry of fuel pellets etc.?<br>Can you specify types of burnable absorbers which will be used in fuel assemblies?<br>Do you presume that the MOX fuel will be used there?<br>If yes, how highly enriched (fissionable material - 235U, 239Pu) MOX fuel do you intend to use? | | |
| | Answer | The Olkiluoto 3 fuel assembly consists of a square 17x17 array composed of 265 fuel rods. The remaining 24 positions are equipped with guide thimbles. | | |

The active height of the assembly is 4200 mm. Fuel rod cladding is M5. Fuel pellet dimensions are 8.19 mm (diameter), 9.8 mm (length). Two types of fuel pellets are used: UO2 and UO2/Gd2O3. Use of MOX fuel is not planned. The first core will consist of rods having enrichments of 1.9 – 3.3 %.

| | Q.No | Country | Article | Ref. in National Report |
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| | 19 | Hungary | Article 6 | Page 13, Chapter 2 |

**LPn**

Question/ Comment: 1) Have you considered building a new research reactor?

2) Will the decommissioning of the research reactor have any effect on your nuclear power plant related educational and R&D capabilities?

Answer: 1) No, we have not considered building a new research reactor in Finland. State-owned VTT, the operator of FiR 1, is preparing the shutdown and decommisioning of FiR 1 because of economical reasons. Building a new research reactor seems not to be possible because of economical reasons, too.
2) Yes, the decommissioning of FiR 1 has an effect on nuclear power related educational and R&D capabilities in Finland. There have been courses for technical and energy technology students in reactor and neutron physics that have utilized the reactor. Foreign capabilities may be utilized for that purpose in the future. R&D activities at the reactor during recent years have mainly been related to medical physics, R&D of BNCT (Boron Neutron Capture Therapy) treatments. That work will not be possible in Finland in the future.

| | Q.No | Country | Article | Ref. in National Report |
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| | 20 | India | Article 6 | Page 14 |

**RSr**

Question/ Comment: In order to enhance safety measures Post-Fukushima , Loviisa NPP is planning for Installation of independent cooling towers for decay heat removal from the reactor core and from the spent fuel pools. Can STUK provide the information why this is not considered in Olkiluoto NPP?

Answer: There are two reasons:
1) One of the main scenarios for loss of seawater as ultimate heat sink at the Loviisa site is the possibility of oil spill accident near the plant. The Finnish Gulf, where the Loviisa NPP is located, has a heavy traffic of oil tankers. No such traffic exists close to the Olkiluoto NPP.
2) If seawater as the ultimate heat sink is lost, residual heat can be removed at the Olkiluoto 1 and 2 units to the atmosphere. This is done by blowing the steam produced in the core to the condensation pool, by letting the condensation pool to boil, and by venting the steam from the containment to atmosphere via the containment filtered venting system.

| | Q.No | Country | Article | Ref. in National Report |
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| | 21 | India | Article 6 | Page 15 |

**KW**

Question/ Comment: Can STUK share the information on design basis of mobile DG? What are the loads considered for DG capacity?

Answer: The licensee of Olkiluoto 1 and 2 plant units has decided to replace severe accident management diesel aggregates and to obtain new aggregates for backing up meteorological measurements, communication equipment, emergency center, spare part storages etc. small consumers. There is no other special design basis than the load carrying capacity and fuel and oil storages for 72 hour.

| | Q.No | Country | Article | Ref. in National Report |
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| | 22 | Japan | Article 6 | p14 |

**RSr**

Question/ Comment: Finnish report says □h Installation of independent cooling towers for decay heat removal from the reactor core and from the spent fuel pools.□h
Installation of cooling towers are legal requirement ?
How much will the fuels damage risk be improved in PRA?
Cooling towers will be also installed in Olkiluoto nuclear power plants?

Answer: The Finnish Nuclear Energy act (990/1987) states: *The safety of nuclear energy use shall be maintained at as high a level as practically possible. For the further development of safety, measures shall be implemented that can be considered justified considering operating experience and safety research and advances in science and technology.* Based on that, STUK sent to the utilities after the Fukushima accident a request to consider i.a. diverse means for decay heat removal.

The effect of the cooling towers in Loviisa CDF has been estimated $3x10^{-6}$/a.

Cooling towers are not planned for Olkiluoto units. There are two reasons:
1) One of the main scenarios for loss of seawater as ultimate heat sink at the Loviisa site is the possibility of oil spill accident near the plant. The Finnish Gulf, where the Loviisa NPP is located, has a heavy traffic of oil tankers. No such traffic exists close to the Olkiluoto NPP.
2) If seawater as the ultimate heat sink is lost, residual heat can be removed at the Olkiluoto 1 and 2 units to the atmosphere. This is done by blowing the steam produced in the core to the condensation pool, by letting the condensation pool to boil, and by venting the steam from the containment to atmosphere via the containment filtered venting system.

| | Q.No | Country | Article | Ref. in National Report |
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| | 23 | Japan | Article 6 | p14 |

**MV**

Question/ Comment: Finnish report says □gSGs of Loviisa nuclear power plants are practically impossible to be replaced by new ones.□h
On the other hand, STUK approved the life time extension to 50 years for Loviisa 1&2.
How will the aging management of the SGs of Loviisa 1&2 be performed?

Answer: The Steam Generators (6 units) belong to the highest inspection and monitoring scope (class A) among the SSC's of Loviisa 1&2 plant units. This means that they are subjected to regular in-service inspection programme that follows the principle of ASME Code, Section XI. Consequently, all the SG's become fully inspected during 10 year inspection period applying qualified NDT-methods and personnel. The inspections are implemented as partial inspections at every outage which results in 100% inspection scope during every 10 years of operation.

Also the SG tubes are correspondingly inspected by a qualified eddy current (ET) method. Tubes showing indication are plugged according to normal practice. The licensee follows the plugging frequency which has remained relatively low compared to some other VVER 440 plants. This is due to well controlled water chemistry at Loviisa 1&2 as well as to regular secondary side blow down to remove concentrated impurities.

Major repair and modification works to ensure long term operation of SGs have been replacements of feed water headers and primary collector heads

Experiences from other VVER-plants are also followed to be aware about potential failure phenomena and their trends.

STUK controls the activity of the licensee by periodic inspection program on annual basis. In addition STUK has resident inspectors continuously at the plant.

| | Q.No | Country | Article | Ref. in National Report |
|---|---|---|---|---|
| | 24 | Japan | Article 6 | p16 |

**RSr** Question/ Comment: Finnish report says □gThe technical requirements for Olkiluoto unit 3 were specified by using the European Utility. Requirements (EUR) document as a reference. TVO□fs specifications complemented the EUR mainly in those points where Finnish requirements are more stringent.□h
Please show us some specific examples that are more stringently required in Finland?

Answer: There are major differences between EUR and Finnish requirements concerning redundancy, diversity and severe accidents.

Redundancy:

EUR 2.8, 3.1.1.A. Where Single Failure Criterion (SFC) is applicable on equipment which provides a Safety Function, redundant equipment shall be provided in accordance with the N+1 concept. This Safety Function shall be ensured assuming the most limiting single failure were to occur in addition to the failure constituting the accident.

Finnish Government Decree 717/2013, Section 14. The most important systems necessary for transferring to, and remaining in, a controlled state must be capable of fulfilling their function even if any individual system component is inoperable and even if any other component of the same system or of a supporting or auxiliary system necessary for its operation is simultaneously out of use due to required repair or maintenance (N+2 concept)

Diversity

EUR 2.8. 3.1.2 A. The design of systems providing Safety Functions shall take account of Diversity of components, as defined in Chapter 2.1 Section 2.1.6.2.2.1, where needed to achieve the reliability required to meet the probabilistic objectives. Diversity shall be considered in combination with other design measures such as Redundancy, Independence, and separation.

EUR 2.8. 3.1.2 B Diversity should not be implemented on a deterministic basis but rather considered as one way to meet the probabilistic objectives.

STUK YVL Guide B.1 449. In addition to the decay heat removal system(s) meeting requirement 448, the nuclear power plant shall have a diverse system capable of removing the decay heat from the reactor and containment

following an initiating event of any anticipated operational occurrence or Class 1 postulated accident …

Severe accidents

EUR 2.9 4.1.1.1.2 The CHRS shall be as independent as possible of all other systems whose failure may have contributed to Core Damage.

Finnish Government Decree 717/2013, Section 14. The plant shall be provided with systems, structures and components for controlling and monitoring severe accidents. These shall be independent of the systems designed for operational conditions and postulated accidents. Systems necessary for ensuring the integrity of the containment building in a severe accident shall be capable of performing their safety functions, even in the case of a single failure.

| | Q.No | Country | Article | Ref. in National Report |
|---|---|---|---|---|
| | 25 | Sweden | Article 6 | -,14 |
| **MV** | Question/ Comment | It is stated that steam generators are practically impossible to replace. Would this be a specific issue for the steam generators in Loviisa units, or is this a general concerned for all VVER? | | |
| | Answer | The situation is similar at all VVER 440 plants due to design and layout issues that do not allow replacing to be done with reasonable economical investments. | | |

| | Q.No | Country | Article | Ref. in National Report |
|---|---|---|---|---|
| | 26 | United Kingdom | Article 6 | Section 2, Page 14 |
| **JKu** | Question/ Comment | The section summarises a number of reviews taken place (e.g. WANO peer review). Please provide any key findings, recommendations or suggestions arising following this and similar reviews. | | |
| | Answer | WANO mission results have not been published to the regulator. Loviisa OSART result summary can be obtained from: http://www-ns.iaea.org/downloads/actionplan/OSART-139-Loviisa(summary).pdf There has not been a recent OSART mission in Olkiluoto NPP. OL3 pre-OSART is planned and also regular OSART has been considered for TVO. | | |
| | Q.No | Country | Article | Ref. in National Report |
| | 27 | United Kingdom | Article 6 | Section 2, Page 15. |
| **JKu** | Question/ Comment | Please provide details of key findings and recommendations arising from any safety reviews undertaken by the operator/ licensee or international reviews of safety in Olkiluoto units 1 &2. | | |
| | Answer | Fukushima related safety review at the Olkiluoto NPP | | |

Updating the seismic fragility analyses of the spent fuel pools

The utilities have sent to STUK fragility analyses for the spent fuel pools and fire water supply systems in seismic events. Improvements in the seismic resistance of the Olkiluoto 1&2 the fire fighting system will be implemented in 2013-2014.

Conceptual design of independent way of pumping water into the RPV

The utility has submitted to STUK assessments for diverse methods to

inject coolant into the reactor in case of loss of all AC. The system would inject coolant using the fire fighting system after reactor cooling system depressurization. Decay heat would be removed from the cooling circuit into depression pool and from the containment via containment filtered venting system. Power supply will be ensured by an independent diesel generator. System design for the plant modification is under way.

In a case of a total SBO, the time available prior fuel damage may not be long enough to take the system into use. The utility is investigating possibilities for additional fast acting methods to ensure fuel cooling. Possibilities are a system with a turbine driven pump or independent diesel driven pump.

Conceptual design of implementing an additional way of component cooling of the auxiliary feed water system (independent of sea water cooling)

The utility has sent to STUK the system design for approval. The modification increases the operation time of the auxiliary feed water pump to several days in case of loss of component cooling water. The modification is planned in 2014-2015.

Conceptual design of using water injection and boiling as an alternative means for fuel pool cooling

The system design is under way. The diverse system will be based on new injection lines from the fire fighting system.

Implementation of mobile power supply and pumps

The utility has decided to obtain new diesel aggregates and two new mobile fire fighting pumps. The pumps will be delivered in 2014. They can be used for containment water filling in severe accidents, coolant injection into spent fuel pools and coolant injection into the spent fuel storage.

Capability of dealing with multi-unit severe accidents

Emergency planning has been updated for severe accidents in multiple units

| | Q.No | Country | Article | Ref. in National Report |
|---|---|---|---|---|
| | 28 | United States of America | Article 6 | Art. 6, P.15 and Annex 2 |

**RSr** Question/ Comment

Olkiluoto is making plans to put in place additional mobile pumps and generators as a result of Fukushima (pg. 15). STUK has required Loviisa to investigate the need for mobile equipment (pg. 95) since most severe accident equipment already in place at Loviisa appears to be permanently installed and could potentially become unavailable in the event of an extreme natural or man-made disaster.

(1) Can you provide an update on the Loviisa investigation?
(2) Describe what criteria will STUK use to make a decision about requiring Loviisa to put mobile equipment in place?

Answer

The new STUK YVL Guide B.1 requires (req. 450) … “It shall be possible to accomplish decay heat removal and reactivity control in rare external events (DEC C) without relying on power supply from transportable sources for at least eight hours without any material replenishments or recharging of the DC batteries. In addition, a sufficient inventory of water and fuel and capability to

recharge the DC batteries shall exist on site to enable decay heat removal for a period of 72 hours."

Because of this new requirement, the utility has postponed acquisition of mobile equipment. The need for mobile power supply and mobile pumps will be decided when the utility decides of the plant improvements for high seawater level.

| | Q.No | Country | Article | Ref. in National Report |
|---|---|---|---|---|
| | 29 | United States of America | Article 6 | Art. 6, p. 15 |

**KiA** Question/ Comment: Olkiluoto 1 and 2 licenses expire in 2018. License renewal was not sought during the PSR in 2007-2009, but Olkiluoto appears to be making significant upgrades to plant equipment.

(1) Pleaser clarify if there are definitive plans for Olkiluoto to seek license renewal?
(2) If yes, when will the renewal PSR take place?

Answer: The licensee of Olkiluoto units 1 and 2 has plans to apply for the new operating licence by the end of 2017. This licence renewal includes also a periodic safety review. In Finland, the operating licence is granted for a fixed term but the length of the licence is not determined in the legislation (licensee presents the justifications). Operating licence renewal includes always a periodic safety review. If the operating licence period is longer than ten years, the licensee has to carry out periodic safety review at least every ten years and send the results for STUK's approval. Improvement of safety is a continuous process at the Finnish NPPs and significant upgrades have been made during the whole operating lifetime based on e.g. updated regulatory requirements in the regulations.

| | Q.No | Country | Article | Ref. in National Report |
|---|---|---|---|---|
| | 30 | Australia | Article 7.1 | 21 |

**LiS** Question/ Comment: It was unclear under article 7 whether any action will be taken to address IRRS mission recommendation in relation to the System of Licensing. Are changes being considered?

Recommendation of IRRS mission in October 2012 – that the Finnish Government should seek to modify the Nuclear Energy Act so that the law clearly and unambiguously stipulates STUKs legal authorities in the authorization process for safety. In particular, the changes should ensure that STUK has the legal authority to specify any licence conditions necessary for safety.

Answer: STUK is working on that matter and an amendment to the Nuclear Energy Act, which would give STUK the legal authority to specify any licence conditions necessary for nuclear safety, is under consideration.

| | Q.No | Country | Article | Ref. in National Report |
|---|---|---|---|---|
| | 31 | Canada | Article 7.1 | Page 22 |

**JKu** Question/ Comment: The IRRS suggestion to further enhance the effectiveness of STUK's inspection program particularly that of conducting more unannounced inspections is noted by Canada. Do these measures apply to operating plants and plants under construction? What has been the average number of

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|---|---|---|---|---|
| | | unannounced inspections carried out at both NPPs and is this number expected to increase in future? Will these be carried out by the existing resident inspectors or are there plans to augment the number of inspectors? | | |
| | Answer | This suggestion was identified in the IRRS self-assessment and STUK has since carried out about 1 unannounced inspection / licensee / year. These inspections are used both in operating units and unit under construction. There are no plans to further increase this type of inspections. STUK has resident inspectors, so this type of inspections are seen as an additional to resident inspectors day-to-day activities. Resident inspectors are carrying out many activities that could be considered as an “unannounced inspections” but sometimes it is better to use other experts as well. | | |
| | Q.No<br>32 | Country<br>Canada | Article<br>Article 7.1 | Ref. in National Report<br>Page 17 |
| **LR** | Question/ Comment | It appears that revisions to the YVL guides following the 2008 legislative amendment to the Act (revised schedule is Fall 2013) have not yet been completed. Will the latest changes to legislation affecting nuclear energy (Nuclear Energy Act, Radiation Act, Decrees) cause a re-evaluation of the 70 or so regulatory guides, and with new constructions, will this impact on their production given the likelihood of competing resources for this type of service within STUK? | | |
| | Answer | In 2008, the Finnish nuclear energy legislation was updated to correspond to current level of safety requirements and the new Finnish constitution which came into force in 2000. The revision of the legislation was necessary as a basis for the overall revision of YVL Guides. In 2013 the Government Decree on the Safety of Nuclear Power Plants and the Government Decree on Emergency Response Arrangements at Nuclear Power Plants were again revised, mainly due to tightening of safety requirements after the TEPCO Fukushima accident and new WENRA Safety Objectives (2010). Also the Nuclear Energy Act and Decree were revised to include in the legislation requirements related to the use of inspection organizations.<br><br>The new YVL guides (40/44) were issued December 1, 2013 and the changes in legislation in 2008 and 2013 are fully considered in the new YVL Guides. Re-evaluation of the new YVL Guides is not necessary for this reason. | | |
| | Q.No<br>33 | Country<br>Canada | Article<br>Article 7.1 | Ref. in National Report<br>Page 25, Annex 6 |
| **KaK** | Question/ Comment | Together with making information available on STUK’s web site and social media sites, as well as conducting meetings, seminars and training courses, are there other types of initiatives employed by STUK to educate the public on nuclear energy such as outreach, science fairs, videos, educational tools, etc.)? | | |
| | Answer | Related to safe use of nuclear energy and STUK’s requirements our experts have given presentations in meetings conducted by different associations as well as given lectures in universities. STUK has also organized courses to media on nuclear and radiation safety, STUK’s role on ensuring the safety and current topics. STUK has also encouraged educational institutes to visit STUK. Related to radiation safety STUK has participated different fairs. | | |
| | Q.No | Country | Article | Ref. in National Report |

| | | | | |
|---|---|---|---|---|
| | 34 | Germany | Article 7.1 | page 19, 20 |

**LR**

Question/ Comment: The new revised schedule of the overall revision of YVL Guides is that all the new guides will be published during the autumn of 2013
The new revised YVL Guides have been newly structured.
Please explain the reasoning and benefit for the different user-groups, quote some examples.

Answer: The structure of the new YVL Guides is presented on page 19 of the Finnish national report on nuclear safety. In the new structure 44 YVL Guides replace 71 Guides of the old structure. The new structure includes 5 groups of Guides instead of 7 groups in the old structure. The new overall structure is considered more logical than the old structure. No foreign model was used in planning the structure.

In the new structure, all Guides related to structures and components including their inspection and testing are in the same group (E). This was not the case in the old structure. The Guides related to plant and system level are in Group B.

All Guides related to nuclear materials and waste are in the same group (D), as well all guides related to radiation protection (C). In the old structure Guides related to radiation protection and waste were in the same group.
In the new structure several guides in groups C and D are combined from the old structure which partly explains the smaller number of YVL Guides altogether.

it was decided to establish two new groups dealing with on one hand safety management of a nuclear facility (Group A) and on the other hand with plant and system design (group B).There are many quite new guides in these new groups A and B (for example YVL A.5, YVL A.8, YVL A.12, YVL B.5, YVL B.6, YVL B.7).
The new structure is more user-friendly than the old one. Several new Guides are introduced in the new structure.

| | Q.No | Country | Article | Ref. in National Report |
|---|---|---|---|---|
| | 35 | United Kingdom | Article 7.1 | Page 20 |

**RSr**

Question/ Comment: A summary of changes and enhancement made to YVL guides is provided in this section. Please provide information on key actions taken by licensees and operators to enhance their procedures and guidance to implement lessons learnt from the Fukushima accident.

Answer: A comprehensive updated list of post-Fukushima investigations and plant modifications is given in Answer 6. Enhancements in procedures have been made concerning severe accidents involving multiple units and instructions for operation of new equipment.

| | Q.No | Country | Article | Ref. in National Report |
|---|---|---|---|---|
| | 36 | Brazil | Article 7.2.1 | Pag 24 |

**LiS**

Question/ Comment: One of the possible enforcement actions is listed as “2) threatening with interruption or limiting the operation”. How can STUK limit the license since the license is given by the Minister of Employment and Economic affairs?

Answer: STUK doesn’t have the power to limit the license. If STUK limits or interrupts

the operation, the license stays unchanged. When the reason which led to the limitation or interruption of the operation does no longer exist, the operation can continue according to the license.

| | Q.No | Country | Article | Ref. in National Report |
|---|---|---|---|---|
| | 37 | United Kingdom | Article 7.2.2 | Page 21 |

**LR** Question/ Comment: Please explain what action has been taken to address the IRRS recommendation on process of "decision-in-principle" for licensing

Answer: No recommendation was presented in the IRRS concerning the Decision-in-Principle procedure. In preliminary discussions concerning future changes of the nuclear energy legislation no principal changes of this procedure have been considered.

In the IRRS a recommendation was given that the Finnish Government should seek to modify the Nuclear Energy Act so that the Act clearly and unambiguously stipulates STUK's legal authorities in the authorization process for safety. In particular, the changes should ensure that STUK has the legal authority to specify any license conditions necessary for safety. The necessary changes are under consideration in the Government.

| | Q.No | Country | Article | Ref. in National Report |
|---|---|---|---|---|
| | 38 | France | Article 7.2.3 | § Oversight during construction p23 |

**TV** Question/ Comment: In the report it is mentioned "Licensee is responsible for inviting STUK to perform the inspection at a right time". Does it means that there are no unannouced inspections?

Answer: STUK's inspections on manufacturing and construction of buildings, concrete and steel structures, and components are specified in the regulatory guides (YVL Guides) and are determined in details when STUK reviews component or structure specific construction plans. Inspections are defined in advance either as hold or witness points.

In addition, STUK oversees licensee's performance under Construction Inspection Programme. About 10 % of inspections (1 to 2 inspections per annum) are performed as unannounced inspections. STUK's inspectors (resident inspectors and inspectors from the main office) also daily oversee the construction, installations and commissioning work at the Olkiluoto site without any notice in advance to the project parties.

| | Q.No | Country | Article | Ref. in National Report |
|---|---|---|---|---|
| | 39 | Hungary | Article 7.2.3 | Page 23, Chapter 2 |

**TV** Question/ Comment: 1) In what work schedule do the resident inspectors work (e.g. 3 shift work schedule for 24 hour presence or else)?

2) Besides the resident inspectors are there any resources dedicated to the daily overview of the construction at the STUK headquarters?

Answer: 1) Usually there are STUK resident inspectors at the site from 6:00 to 17:00 in

weekdays. If there are any additional needs for inspections or STUK's oversight, the presence of resident inspectors is settled case by case.

2) STUK's inspectors from the headquarters are on the site every day – average is 2 to 3 inspectors per day besides the resident inspectors. The number of the visiting inspectors depends on ongoing activities at the site. In the headquarters, STUK's project group (inc. project manager and subproject managers of different technical disciplines) follows site activities and informs STUK's organization when needed.

| | Q.No | Country | Article | Ref. in National Report |
|---|---|---|---|---|
| | 40 | Hungary | Article 7.2.3 | Page 23, Chapter 2 |

**TV** Question/ Comment In what document(s) (e.g. construction license) is it predetermined where and how many hold or witness points are required, or is it determined during the construction process?

Answer Finnish licensing process is explained in the legislation and in details in the YVL guidance. In accordance with Section 108 of the Nuclear Energy Decree, the different phases of construction of a nuclear facility may be begun only after STUK has, on the basis of the construction license documents and other detailed plans and documents it requires, verified in respect of each phase that the safety-related factors and safety regulations have been given sufficient consideration. Review of the detailed design of structures and equipment can begun after STUK has found that the plant and system-level design data of the system concerned are sufficient and acceptable. This assessment may take place as part of the review of the Preliminary Safety Analysis Report or separate system-specific descriptions, which are subsequently added to the Final Safety Analysis Report.

Based on the YVL guidance, STUK's pre-approval of the detailed design is usually needed prior to starting manufacturing of structures and components. The YVL guidance also gives general principles when inspections performed by STUK are needed to ensure product's compliance with the requirements. Inspections are determined in details when STUK reviews component or structure specific plans.

Before loading fuel into the reactor, an operating license is needed. Based on the Sections 20 of Nuclear Energy Act operation of the nuclear facility shall not be started on the basis of a license granted until STUK has ascertained that the nuclear facility meets the safety requirements. Important parts of the safety demonstration are tests performed during commissioning of the plant. Detailed requirements for STUK's approvals during commissioning phase are set inYVL guidance; STUK pre-approves commissioning programmes of safety related SSC's and accepts progression between commissioning steps.

As a part of the construction license application the licensee shall submit a licensing plan for the construction of a new nuclear facility describing how the fulfillment of nuclear and radiation safety requirements is ensured and demonstrated in the different phases of the construction or plant modification project. The licensing plan shall include at least:

- the project main phases with their planned schedule (i.e. design and manufacturing schedule for the main components; duration of the design, construction, installation and commissioning phases; configuration freeze points in relation to the phases of regulatory review; submission of the operating licence application; and starting the operation of the plant)
- the titles and descriptions of the main contents of the document types specified in the YVL Guides which are to be submitted to STUK during the construction, principles for the document submission schedule and the time available for STUK's review
- a plan for the licensing of safety-related matters at system level in the construction licence phase
- a plan for addressing safety-related matters at component level in different documents, as specified in the YVL guides, and their scheduling in relation to component design, manufacturing and plant construction.

| | Q.No | Country | Article | Ref. in National Report |
|---|---|---|---|---|
| | 41 | France | Article 7.2.4 | § Enforcement p23-24 |
| **LiS** | Question/ Comment | Would it be possible to have an indication of the number of administrative sanctions issued by STUK during these last three years? | | |
| | Answer | During the last three years STUK has not issued any administrative sanctions under the Nuclear Energy Act. Under the Radiation Act STUK has used the threat of fine (section 59) three times during the last three years. | | |
| | Q.No | Country | Article | Ref. in National Report |
| | 42 | India | Article 7.2.4 | Page 23 |
| **LiS** | Question/ Comment | It is understood that license is issued by the ministry and enforcement actions are taken by STUK. What arrangements exist for the licensee to appeal against the enforcement measures taken by STUK? | | |
| | Answer | STUK's decisions on enforcement actions can be appealed against as laid down in the Administrative Judicial Procedure Act (586/1996). According to the Act, STUK's decisions can be appealed to the administrative court of Helsinki. | | |
| | Q.No | Country | Article | Ref. in National Report |
| | 43 | Australia | Article 8.1 | 26 |
| **KaK** | Question/ Comment | On page 26 of the report it is noted that STUK receives about 33% of its financial resources through government budget. However, the costs of regulatory oversight are charged in full to the licensees. The model of financing the regulatory work is called net-budgeting model. The report states that this model of budgeting makes it possible to increase, for example personnel resources based on needs in a more flexible way. STUK advises that as needed they are able to order independent analyses, review and assessment from technical support organisations to complement its own review and assessment work.<br><br>As this type of costing is currently a challenge faced by ARPANSA/Australia it would be interesting to better understand how the net-budgeting model works | | |

and how it calculates the costs of regulatory oversight and assessment of applications.

Answer Net budgeting means that all costs related to regulatatory oversight are charged from the licensee and that STUK does not get funding for those from the state budget. The costs include hourly wages and overheads (such as administration, ITC, renting expenses etc), travel expenses, expenses of technical support and other expenses which are directly related to oversight (such as expenses of protective clothes).

When preparing the budget for forthcoming year STUK estimates the charge per hour and during the year uses this estimation in its invoicing, expenses of technical support and other direct expenses are charged as such. In the end of the year when all real wage costs and overheads are known and accounted STUK calculates the real cost per hour and additional invoice or refund is sent to the licensee if needed (of course trend of wage cost is carefully followed during the year in the licensee is informed in the case of differences between estimated and real hourly wage).

| | Q.No | Country | Article | Ref. in National Report |
|---|---|---|---|---|
| | 44 | Belgium | Article 8.1 | Section 8 |

**KaK** Question/ Comment -

Technical input apparently comes from the universities in Finland, strengthening the regulator. But how does the regulator strengthen the courses at the university for a further safe operation of nuclear power, especially considering the retirement of a large group in the nuclear sector?

Answer STUK has good relationships with universities, especially with those involved in capasity building in the nuclear field in Finland, Aalto university in Espoo, Lappeenranta technical university and Helsinki university. The cooperation stretches from national training course in nuclear safety to cooperation in national commitees in the area of capacity building and research strategy which were set up by the Ministry of Employment and the Economy.
In addition STUK experts have given lectures and courses on nuclear safety at these universities

| | Q.No | Country | Article | Ref. in National Report |
|---|---|---|---|---|
| | 45 | Brazil | Article 8.1 | Pag.25 |

**SSu** Question/ Comment Who are the members of the Advisory Committee of Nuclear Safety? And what are their qualifications?

Answer Chairman of ACNS Seppo Vuori, Doctor of Technology, Helsinki University of Technology. Vuori is a part-time expert for VTT Technical Research Centre of Finland where he was working full-timely nearly 40 years as a Research Scientist and Manager before his retirement 5 years ago. His key qualifications are: Long-term experience in risk analyses for the safety of nuclear reactors both in research tasks and in management; Probabilistic assessment of off-site consequences of reactor accidents; Computerized tools for nuclear emergency preparedness. Probabilistic assessment of reactor safety (PSA).

Vice-chair of ACNS Miliza Malmelin, MSc in Agriculture and Forestry, Major subject Environmental Science and Policy. Malmelin is a Senior Specialist at the Ministry of the Environment, Environmental Protection Department. She

has worked for ten years at the Ministry specializing in environmental protection issues related to the use of nuclear energy and radiation, as well as environmental issues related to handling of nuclear and other radioactive waste.

Member Riitta Kyrki-Rajamäki, Doctor of Technology, Helsinki University of Technology. Kyrki-Rajamäki has performed her official duties as a Professor of Nuclear Energy Technology at Lappeenranta University of Technology (LUT) since 2002. After her graduation Kyrki-Rajamäki worked nearly 20 years at VTT Technical Research Centre of Finland. Her expertise is wide: Nuclear engineering, reactor physics, reactor dynamics, criticality safety, thermal hydraulics – computational and experimental research, PRA, power plant technology, and safety systems.

Member Antero Tamminen, Licentiate in Technology (nuclear physics), Helsinki University of Technology. Tamminen retired some years ago from a position a Technical Manager of Loviisa Nuclear Power Plant where he was working 30 years. Before his career at Loviisa NPP he was a Radiation protection officer of FIR-1 research reactor in Espoo, Finland. After his graduation he was a Research Scientist (nuclear physics) at Helsinki Technical University Tamminen has been a Member of some OSART and WANO Peer Review missions and Team Leader of some WANO Peer Reviews 1990-2005.

Member Ilona Lindholm, MScTech, Helsinki University of Technology, Department of Technical Physics (mathematics, technical physics, control and systems theory). Lindholm is a Key Account Manager, Principal Scientist in Nuclear Safety at VTT Technical Research Centre of Finland where she has been working at different positions over 30 years. Lindholm has experience in severe reactor accident research and applications to various domestic and foreign plants both in cost-shared projects (Finnish National Research Programmes on Nuclear Safety and EU projects) and Commercial Projects. She has also worked as an independent expert in customer projects on the area of nuclear safety and severe reactor accidents.

Member Timo Okkonen, Doctor of Technology, Nuclear Safety, KTH, Sweden. At the moment Okkonen is a Country manager at Inspecta working there 10 years as a total. Before that he has been in management positions at TUKES (plant and installations surveillance), STUK (plant projects), VTT (Senior research engi-neer) and Westinghouse (former ABB) Atom (safety and analysis for nuclear automation). Okkonen has strong expertise in nuclear regulations, nuclear engineering, nuclear plant design, process system safety, automation safety, risk assessment, and nuclear licensing.

Member Rauno Rintamaa, Doctor of Science and Technology, graduated in Helsinki University of Technology, Department of Mechanical Engineering. Rintamaa has worked since 1980 at VTT, the Technical Research Centre of Finland (VTT), since 2014 his position is Senior Advisor in Smart Industry and Energy Systems Business Area, and since 2006 to 2013 he has worked as a Vice President, and is responsible for contract research and customer relationships in Energy Sector. Before current position he worked as Research

Professor and Manager in Material and Structural Integrity related issues with the focus on nuclear energy. Rintamaa has hold several positions in trust in international organizations (NULIFE, ETSON, IASMiRT) currently he is a Vice President of NUGENIA Association.

Permanent expert of STUK at ACNS Petteri Tiippana, Director General of STUK, is graduated from Lappeenranta University of Technology (LUT). His key expertise areas are: Nuclear and radiation safety, Nuclear engineering, Nuclear Power plants.

General secretary of ACNS Hannu Koponen, Deputy Director General of STUK, is graduated from , Helsinki University of Technology (TKK).

Technical Secretary of ACNS Seija Suksi, Principal Advisor of Nuclear Reactor Regulation of STUK. Suksi is graduated at Helsinki University, MSc (Radiochemistry, Physics, Mathematics). She has been working at STUK since 1989 in several positions: Event Investigation Manager, Head of Human and Organizational Factors, Head of Operational Safety, Senior Inspector in Operational Safety, Inspector in Chemistry and Nuclear Waste Management. Before STUK Suksi was working 10 years period as a training assistant and a Research Scientist (Nuclear Waste Management) at the University of Helsinki. Suksi is also a Technical Secretary of a subcommittee of ACNS, Reactor Safety Committee (RSC) which is composed of 5 foreign and 6 ACNS members.

| | Q.No | Country | Article | Ref. in National Report |
|---|---|---|---|---|
| | 46 | Canada | Article 8.1 | Page 26, Figure 8 |
| **KaK** | Question/ Comment | There has been a steady climb in the number of staff in the Nuclear Reactor Regulation Department over the last decade – credited mostly to construction at OL3, but also to enhance security. Is this trend expected to continue as a result of the Decision-in-Principles granted for Fennovoima and Olkiluoto (OL4), and the Posiva's geologic repository? | | |
| | Answer | The increasing of regulatory staff has been remarkable during OL3 construction. The Posiva's geologic repository has also increased the need for recruiting experts on that competence area. If both new projects will start at the same time STUK needs to increase its staff number but not nescessarily to such degree than in the past. | | |
| | Q.No | Country | Article | Ref. in National Report |
| | 47 | France | Article 8.1 | §Finance and resources of STUK, p 26 |
| **KaK** | Question/ Comment | Does VTT work for operators? If it is the case how is ensured the indenpendance of the personnel from VTT ho is working for STUK (Chinese wall?)? | | |
| | Answer | VTT work for the operators as well. STUK and VTT have a framework contract and rules on the co-operation to ensure independent advice and to avoid conflict of interest. In addition to VTT, STUK uses other organizations in Finland and abroad. The advice and assistance from external organizations does not have a formal status and it does not relieve STUK of its assigned responsibilities. The independence as well as possibilities to conflicting interests are addressed in the course of contracting. | | |

| | Q.No | Country | Article | Ref. in National Report |
|---|---|---|---|---|
| | 48 | Germany | Article 8.1 | page 28 |
| **KaK** | Question/ Comment | The amount of money collected from the licensees in year 2012 was about 5.6 million € for nuclear safety research. The research projects have also additional funding from other sources. The total volume of the programme in 2012 was 10 million €.<br>Which other organisations provide the additional funding for nuclear safety research projects? | | |
| | Answer | In addition to the funding from State Waste Management Fund VYR the major funding partners were VTT with 2.675 M€, NKS with 0.230 M€, Aalto University with 0.228 M€, Fortum with 0.178 M€, TVO with 0.076 M€, and other partners with 1.006 M€. | | |
| | Q.No | Country | Article | Ref. in National Report |
| | 49 | Korea, Republic of | Article 8.1 | 25 |
| **JN** | Question/ Comment | According to the National Report, although having a decisive role in the licensing process, actually STUK does not perform the authorization/licensing for nuclear facilities. It belongs to the authority of the Ministry of Employment and the Economy.<br>- The Ministry of Employment and the Economy is also heavily involved in the promotion of nuclear energy (e.g. the formulation of the national energy policy). How can the Ministry ensure the neutrality of the issuance of licenses for nuclear facilities, especially regarding the safety aspects of the licenses?<br>- According to the IAEA Safety Guide (SSG-12 on Licensing Process for Nuclear Installations, page 6), ¡°the objective of granting authorizations in the licensing process is for the regulatory body to establish regulatory control over all activities and facilities where safety is concerned¡±. In the situation that the Ministry of Employment and the Economy retains the jurisdiction over the licensing process, how can STUK establish the comprehensive and thorough regulatory control over the nuclear facilities from the beginning of the project? | | |
| | Answer | According to the Nuclear Energy Act STUK has overriding role in terms of nuclear safety. STUK has to give it’s statements on safety in all authorization/licensing phases as well STUK shall carry out it’s independent safety assessments in all phases of authorization/licensing. Advisory Committee for Nuclear Safety shall give it’s independent statement on STUK’s safety assessments in all licensing phases. According to the IRRS mission 2012 finding, the Finnish Nuclear Energy legislation will be revised to promote STUK’s role giving binding licensing conditions in terms of radiation and nuclear safety.<br><br>Also in the IRSS 2012, the peers commented the role of MEE. MEE is preparing the major licenses and presenting them in the Council of State (= Government). So MEE is not making any decisions regarding safety. And when the Government is now preparing the legislation changes these suggestions by IRRS are taken into account.<br><br>According the to Finnish Nuclear legislation and statutory requirements, STUK has regulatory control from Decision-in-Principle phase to plant decommissioning. There is a particular piece of legislation, which allows | | |

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| | | STUK to start establishing the comprehensive and thorough regulatory control over the nuclear facilities from the beginning of the project. This is laid down in the Nuclear Energy Act chapter 55 : “The Radiation and Nuclear Safety Authority (STUK) may, upon request by anyone planning to use nuclear energy, check the plan drawn up by them and issue preliminary instructions on what should be taken into account with respect to safety, physical protection and emergency planning” . This piece of legislation has been used in new NPP projects as Olkiluoto unit 3, Olkiluoto 4, Loviisa 3 and Hanhikivi. STUK is also participating into Environmental Impact Assessment process with a statement to the contact authority, MEE. | | |
| | Q.No<br>50 | Country<br>Korea, Republic of | Article<br>Article 8.1 | Ref. in National Report<br>26 |
| **KaK** | Question/ Comment | What is the level of STUK¡¯s dependence (e.g. strong/weak dependence) on external technical support organizations like the VTT Technical Research Centre, LUT, or Aalto University? If these external TSOs also have cooperation with nuclear licensees and other nuclear promotion organizations, is there any mechanism described in STUK¡¯s contracts with external TSOs or other formal procedures to verify the exclusion of any possible conflict-of-interest? | | |
| | Answer | STUK’s main support organization in Finland is VTT Technical Research Centre of Finland. STUK and VTT have a framework contract and rules on the co-operation to ensure independent advice and to avoid conflict of interest. In addition to VTT, STUK uses other organizations in Finland and abroad. The advice and assistance from external organizations does not have a formal status and it does not relieve STUK of its assigned responsibilities. The independence as well as possibilities to conflicting interests are addressed in the course of contracting | | |
| | Q.No<br>51 | Country<br>United Kingdom | Article<br>Article 8.1 | Ref. in National Report<br>Page 27, Figure 9 |
| **KaK** | Question/ Comment | Please provide a summary of the roles of Oversight Personnel within the overall structure of STUK. | | |
| | Answer | In addition to safety assessment related to authorization STUK personnel carries out review and assessment of documents submitted by the licensee as well as inspections at NPP’s, at construction site and at manufacturer’s premises. Of the personel mentioned in figures 8 and 9, 16 were working in the area of reactor safety, 6 in radiation protection, 8 in probabilistic safety analysis, 9 in mechanical engineering, 14 in fabrication techniques, 3 in civil engineering, 14 in operational safety and 7 in project management. | | |
| | Q.No<br>52 | Country<br>Australia | Article<br>Article 10 | Ref. in National Report<br>32 |
| **AnS** | Question/ Comment | STUK implemented a special inspection tool in 2012 for gathering information about issues relating to Human and Organisational Factors (particularly around – personnel planning, communication, handling of non-conformances and process management). IRRS mission suggested that STUK should consider the development and implementation of a more systematic method for collection and assessment of indications of the licensee’s safety culture. What work has STUK been doing to address this suggestion for both operating NPPs and | | |

NPPs under construction?

Answer STUK developed originally the inspection tool (KOTKA) also to gather information about safety culture. Personnel planning, communication, handling of non-conformances and process management are according to safety culture theories (compare e.g. Reiman&Oedewald) important artefacts that tell us also something about the safety culture. If the organization has a good safety culture these factors should be managed and implemented in a proper way. But as this inspection tool (KOTKA) is used only during periodical inspections at the existing NPPs, STUK has started a project to develop a tool also for a more systematic "daily" collection of safety culture indications from all sources such as document reviews, meetings etc. In this new tool STUK includes the factors used in the KOTKA-tool but includes also a new more specific factor concerning leadership of safety culture. This development project will be finished during 2014.

| | Q.No | Country | Article | Ref. in National Report |
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| | 53 | Brazil | Article 10 | Pag. 30 |

**AnS** Question/ Comment What are the requirements and criteria use for STUK to approve the director responsible for a nuclear power plant? Were there cases of refusal of the indicated name by STUK?

Answer The approval criteria for a responsible manager of a nuclear facility are defined in Section 125 of the Nuclear Energy Decree and in the regulatory guide YVL A.4. These approval criteria mean, among other things, that the individual concerned
- is known to be honest and dependable and his or her personal characteristics make him or her suitable for the position;
- has good management and communication skills;
- is familiar with the principles of emergency preparedness and security arrangements, nuclear safeguards, and the fundamental legislation related to supervisory and managerial duties and is capable of applying the legislation to the practical duties and various problem situations arising at the nuclear facility;
- has the expertise in the field of nuclear energy required for the position and, in particular, expertise in the safe use of nuclear energy;
- is sufficiently familiar with nuclear legislation and the regulations issued there under;
- has sufficient managerial experience;
- sets an example of good safety culture through his or her own conduct.

STUK has not refused anyone but several times demanded additional training and competence development that has been followed up during inspections.

| | Q.No | Country | Article | Ref. in National Report |
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| | 54 | Germany | Article 10 | page 32 |

**AnS** Question/ Comment STUK has developed a special inspection tool for gathering information about issues related to Human and Organisational Factors (HOF) within periodic inspection programme for operating NPPs.
Please comment on the special tool and on experiences made so far.

Answer The tool is very much inspired by the tool and methodology (Komfort) used initially by the regulator in Baden-Würtenberg, Germany. We have now a 2

years experience of the the “KOTKA” tool used in periodical inspections and it has worked well. It is easy for the inspectors to use as there is included a “help-guide”. It is mandatory to include two topics of four during every inspection in the STUK’s yearly inspection program. One of the topics is the same for all inspections as a “theme of the year”. The first theme 2012 was personnel resource planning, the theme 2013 was handling of deviations and the theme for 2014 is process management.

| | Q.No | Country | Article | Ref. in National Report |
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| | 55 | India | Article 10 | page 32 |

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| **AnS** | Question/ Comment | It is mentioned that as a part of regulatory oversight , special top level inspections were conducted of licensees. These includes assessment of safety culture issues, management and leadership. Can Finland provide additional information on the methodology adopted for these inspections and findings, if any? |
| | Answer | This top level inspection concentrates on the top level managers of the NPP/licensee. The inspection includes typically individual interviews with the managers. The topics have been e.g. definition of safety culture, process management, development of management system, the top managers responsibility for handling of deviations. STUK conducts approx. 8-10 interviews and presents the results during the inspection meeting where the top management is present for discussions. Examples of inspection findings are e.g. developing top manager activities in follow up of corrective actions, developing safety culture definition and communication, and top manager training. |

| | Q.No | Country | Article | Ref. in National Report |
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| | 56 | Korea, Republic of | Article 10 | 31-32 |

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| **AnS** | Question/ Comment | According to the National Report, STUK and the nuclear licensees (Fortum, TVO) have utilized different methods and criteria to assess and maintain the nuclear safety culture at nuclear facilities. Is there any significant difference between these approaches by STUK and the nuclear licensees? If such difference exists, is there any plan to develop a harmonized approach to safety culture (which may be similar to the ¡°common safety culture language¡± applied in USA by both NRC and nuclear licensees)? |
| | Answer | There are some differences between the approaches used by the facilities and STUK but the theories behind are quite similar. STUK is also of the opinion, that it is good to have several methods and approaches for dealing with safety culture. This increases the reliability of the picture that the different methods give about the safety culture. Consequently there are not any plans to harmonize the approaches more for the moment. |

| | Q.No | Country | Article | Ref. in National Report |
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| | 57 | Slovenia | Article 10 | 42 |

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| **RSr** | Question/ Comment | Could you please describe more in detail how are severe accidents treated inside SAR?<br><br>Are there some additional regulatory requirements related with severe accident analyses after Fukushima accident? |
| | Answer | The Loviisa FSAR has a separate chapter of severe accidents. The chapter focuses on main steps of the Loviisa severe accident management: primary |

system depressurization, core melt retention within the RPV, hydrogen control and containment external cooling. Demonstration of the acceptability of the SAM actions is given by analyses of limiting cases and by reference to plant specific experiments (melt retention, hydrogen mixing).

The Olkiluoto units 1 and 2 FSAR presents analysis results of six typical severe accident scenarios (SBO, total loss of feedwater etc.). It also refers to analyses of specific issues (ex-vessel steam explosions, debris coolability in lower drywell) important for the Olkiluoto units 1 and 2 SAM.

No Fukushima related changes were made, when the YVL Guide concerning deterministic analyses was updated in 2013. The new Guide is more specific in determining the focus of the severe accident analyses: Guide YVL B.3 (requirement 309) "Severe accident analyses shall cover all actions required for the plant severe accident strategy and the phenomena associated with the strategy"

| | Q.No | Country | Article | Ref. in National Report |
|---|---|---|---|---|
| | 58 | Slovenia | Article 10 | 43 |

**RSr** Question/ Comment: How are safety analyses for shut down states treated inside USAR (special chapter, which format, which analyses)?

Is the PSA level 3 required by regulatory guide YVL 2.8?

Answer: The Loviisa FSAR has three chapters for analyses of low power states: transients initiated at hot stand-by, transients initiated at cold shut-down, transients initiated at refueling. The scope of the analyses consists of reactivity accidents, loss of residual heat removal, loss of coolant inventory and load drops.

The Olkiluoto 1 and 2 FSAR includes the shut down analyses as part of the different accident classes, i.e. a shut down cases considered within anticipated operational occurrences, within postulated accidents, etc.

PSA level 3 has not been required.

| | Q.No | Country | Article | Ref. in National Report |
|---|---|---|---|---|
| | 59 | Japan | Article 11.2 | p28, p34 |

**AnS** Question/ Comment: In Finland, three types of nuclear power plants will be operated in future. Those are VVER(Loviisa), BWR (Olkiluoto1,2) and EPR□@(Olkiluoto3). Does Finland have particular plans for effective use of human resources and□@for□@ensuring competence.

Answer: The responsibility for having resources and competences needed at the plants is lying on the licensee. STUK has specific inspections concerning personnel and competences in the yearly inspection program where STUK inspects the procedures for personnel planning and competence development. STUK has also a licensing process for operators and persons in specific safety critical positions such as responsible manager, persons in charge of safeguards, emergency arrangements, and physical protection. Only a person specifically approved by STUK may serve in these positions. STUK follows up also the NPP's under planning and construction to ensure the operator has proper

prepations in place for ensuring the personnel needed during the different stages of the NPP life cycle.

In addition to different types on nuclear power plants, plans for new NPP construction and the retirement of large age groups are challenges for human resources in Finland. During 2010-2012 a committee set up by the Ministry of Employment and the Economy (MEE) worked on a report aiming at givin recommendations and steps to be taken until the 2020's for ensuring competence and resources needed for the nuclear sector. In addition, MEE set up in January 2013 a working group to prepare a research and development strategy for nuclear sector in Finland.

| | Q.No | Country | Article | Ref. in National Report |
|---|---|---|---|---|
| | 60 | India | Article 12 | Page 36 |

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| **RSr** | Question/ Comment | It is understood that common control room for Lovissa unit 1&2 for severe accident conditions. What are the facilities, infrastructure , Qualification criteria (seismic, flood, radiation etc.) considered for this control room? Is this common control room capable to handle severe accident affecting both the units simultaneously? |
| | Answer | The SAM control room is located at the plant yard at level +3.00 m and is common to both Loviisa plant units. Severe accident radiation conditions have been taken into account in the design. The design basis of the shielding of the walls and the roof and ventilation is high external outdoor exposure rate caused by potential radioactive release plume, deposition, and skyshine radiation around the SAM building. The operator has all necessary information available so the SAM safety functions can be successfully executed and monitored. Severe accident measurements are safety classified and qualified for severe accident conditions.<br><br>The conditions in the SAM control room make also extended stays possible. SAM diesels feed the SAM control room electricity.<br><br>The SAM control room has been designed for a severe accident in one reactor, but there are no technical reasons, why severe accidents couldn't be managed from SAM control room for both units simultaneously. |

| | Q.No | Country | Article | Ref. in National Report |
|---|---|---|---|---|
| | 61 | Korea, Republic of | Article 12 | page 38 |

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| **JKu** | Question/ Comment | According to the description of page 38, human factors have to be taken into account in the design and analysed in the failure analyses of plant safety systems and in probabilistic risk assessments. Please explain how many staffs with human factors expertise are working in the utility and the regulatory body, and what kinds of duties they perform in their organization. |
| | Answer | There is no definitive answer to this question. Human factors are present in many activities and there is no definitive answer when a specialist is needed. Mainly human factor specialist is used in connection with major modernization projects eg. control room modifications. Also designing and implementing training may need similar expertise. Design and modifications of plant systems and operating procedures need also to include human factors. |

| | Q.No | Country | Article | Ref. in National Report |
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| | 62 | Brazil | Article 13 | Pag. 40 |
| **KaK** | Question/ Comment | What branch of STUK is in charge of the STUK Management System? Who conducts internal audit activities? | | |
| | Answer | The Director General has taken the responsibility for the Management System and its continual improvement. The Director General appoints the Quality Manager, reporting to Deputy Director General, to coordinate and develop the methods in the Management System. In addition STUK has a Quality Group in which all departments have appointed their representatives.<br><br>The Quality Group coordinates the implementation and development of STUK's Management System, drafts of annual plan for quality management, follows the development of management systems both in domestic and in international fellow organizations and takes the necessary initiatives to improve Management System of STUK.<br><br>The annual plan for internal audits and other independent assessments is included in the annual plan for quality management. All departments nominate experts for audit / assessment groups and audit are done by these internal groups | | |
| | Q.No | Country | Article | Ref. in National Report |
| | 63 | Slovenia | Article 13 | 39 |
| **KaK** | Question/ Comment | Does the updated Guide YVL 1.4 include the requirements of WENRA reference levels on management systems or also all other requirements defined in the IAEA GS-R-3 standard on management systems?<br><br>Does the updated Guide YVL 1.4 follow the structure of the IAEA GS-R-3 standard?<br><br>Do you attend to introduce into the new guide the requirements of the IAEA GSR Part 2 standard on leadership and management for safety? | | |
| | Answer | STUK has just finalized new YVL guides and Guide YVL 1.4 was superseded by YVL A.3 The management System for Nuclear Facility. In YVL Guides STUK refers to existing IAEA Requirements and WENRA reference levels. After GSR Part 2 is published STUK assesses the need for update and makes the decision on the update schedule | | |
| | Q.No | Country | Article | Ref. in National Report |
| | 64 | United Kingdom | Article 13 | Management systems of the reg. body |
| **KaK** | Question/ Comment | Please provide a brief description of the existing structure of the quality assurance function within STUK and the skill-set of staff working in this section. | | |
| | Answer | Responsibilities and accountabilities for STUK's Management System including QA are described in internal guide. STUK does not have separate QA fuction, all departments have to organize their operations so that also QA is taken into account.<br><br>The Director General is responsible for determining STUK's quality policy and for establishing the conditions needed to implement the quality policy. | | |

STUK's Quality Manager is responsible for maintenance and development activities supported by the quality group, in accordance with the instructions of the Director General.

Each Director is responsible for the application of the quality policy in his/her area of responsibility as well as for the implementation and development of the internal man-agement system for the area.

The unit manager ensures that the unit follows the management system in force, that the quality targets set are achieved and that any non-conformities and matters requiring corrective action are communicated appropriately.

Every STUK employee is responsible for the quality of his/her own work. This also in-cludes cooperation and active dissemination of information whenever the task or situation requires it.

STUK does not have formal qualifications for the staff working on QA. Majority of the staff working on QA have many years experience in quality management and management systems. STUK provides some internal training in the area but most experts have also participated external training such as LeadAuditor or Quality Manager cources.

| | Q.No | Country | Article | Ref. in National Report |
|---|---|---|---|---|
| | 65 | Australia | Article 14.1 | 45-46 |
| **MV** | Question/ Comment | The national report says that STUK has strengthened the use of risk informed regulation and safety management and the application of probabilistic risk assessment. At the Loviisa NPP the number of inspections was increased but the focus shifted from high safety classes to lower safety classes. It is noted that this will reduce radiation doses to inspection personnel and this is positive, has the increased number of inspections required more personnel and resources? | | |
| | Answer | The personnel and resources have not substantially increased. Although the inspections are shifted to lower safety class piping systems the number of them does not still increase remarkably. This is based on the RI-ISI approach (risk informed in-service inspections) using risk classification methodology. By this means a risk classification matrix is achieved and used as a basis to direct in-service inspections to piping and welds showing higher failure risks (instead of all lower safety class SSCs). | | |

| | Q.No | Country | Article | Ref. in National Report |
|---|---|---|---|---|
| | 66 | Brazil | Article 14.1 | Fig. 10 and Fig. 14 |
| **JSa** | Question/ Comment | Clarify if the initial value of the vertical axe of the figures should be 0.0E-00 or 1.0E-06. | | |
| | Answer | The vertical scale in Figures 10 and 12 displaying the core damage frequency is linear with increments 1E-5 and 1E-6, respectively, and the initial value is 0.0. In the Figure 14 presenting doses the initial value is also 0.0. | | |
| | Q.No | Country | Article | Ref. in National Report |
| | 67 | Brazil | Article 14.1 | Pag.44,50 and Annex2, Pag.93 |

**MV** Question/ Comment: Does the Loviisa reactor pressure vessel have material samples for destructive tests of brittle fracture? How was the heat treatment effectiveness evaluated? How is the brittle fracture values estimated for the extrapolation for end of life conditions?

Answer: Yes, they are of great importance to follow radiation embrittlement of the RPVs and to assess safety margins against brittle fracture. Material surveillance samples are prepared both from base and weld metal for RPV belt line.

The effectiveness of the RPV annealing was evaluated by surveillance samples that were irradiated in the reactor to representative dose. After that they were annealed correspondingly to the heat treatment of Loviisa 1 RPV (year 1996). After this the re-irradiation was continued for various times (1, 2, 3 and 4 years) prior to fracture mechanics testing.

Fracture and crack arrest toughness is determined based on Master-curve method using all surveillance tests results as a function of dose and P-content of the materials. In this analysis the reference temperature To is determined as a function toughness and dose and used in determination of $K_{Ic}$. Upper bound curve of the test results is used and the effects of the dose of fast neutrons and P-content of the materials are taken into account.

| | Q.No | Country | Article | Ref. in National Report |
|---|---|---|---|---|
| | 68 | China | Article 14.1 | section14.1 |

**JSa** Question/ Comment: Could you please briefly introduce the overall policy and the future plan of STUK in PRA application?

Answer: PRA shall be used throughout the life cycle of a nuclear facility. PRA shall include Level 1 (core damage frequency) and Level 2 (large release frequency) for full power operation and low power and shutdown states and transients between them. All relevant classes of initiating events shall be covered (internal events, internal fires and floods, seismic events and other external hazards). However, intentional damaging of the plant need not be included.

The licencee shall submit the design phase PRA in connection with the construction licence application, an updated PRA shall be submitted with the operating licence application and PRA shall be updated regularly during operation. PRA shall be used to support several activites defined in Guide YVL YVL A.7, including Risk Informed In-service Inspections, Risk-Informed In-service Testing, review of safety classification, review of Technical Specifications (testing intervals and allowed outage times), plans for plant modifications, applications for exemptions from technical specifications, operating procedures and training of operating personnel. The regulatory reqirements on the use of PRA are set forth in the Guide YVL A.7 available on www.stuk.fi.

| | Q.No | Country | Article | Ref. in National Report |
|---|---|---|---|---|
| | 69 | Czech Republic | Article 14.1 | Page 42 |

**RSr** Question/ Comment: Deterministic safety analyses
The analyses presented in the Safety Analysis Reports for Olkiluoto 1,2 cover anticipated operational transients, category 1 and 2 accidents, and severe

accidents. The analy¬ses cover all operating states and include accident analyses for the storages of spent fuel and reactor waste. Fortum has supplemented the deterministic safety analyses in 2008 by analyses of design ex¬tension conditions.
To ensure the cooling of reactor debris, the plant units are also provided with a water filling system, by the means of which the water level inside the containment can be raised all the way to the same level with the upper edge of the reactor core.

Could you describe the STUK requirements for scope and documentation of analyses for anticipated operational transients in Level 2 of Defence in depth (if realised) and for design extension conditions and generally for severe accidents in the SAR?

Answer The requirements are given in the new YVL Guide B.3, Deterministic Safety analyses for Nuclear Power Plants. The main requirements for the scope are:

301. Analyses pertaining to the plant's behaviour as well as radioactive releases and radiation doses shall cover the nuclear power plant's normal operational conditions, anticipated operational occurrences, postulated accidents, design extension conditions and severe accidents. Examples of the events to be analysed are given in [4 and 5].

302. The scope of the analysed events shall provide a comprehensive assessment of the nuclear power plant's behaviour during incidents and accidents, as well as releases and doses during incidents and accidents.

303. Operator actions shall be assessed to identify essential operator actions for accident management and the effects of potential operator errors.

304. The inadvertent actuation of any single system accomplishing a safety function shall be addressed as an initiating event.

305. Pressure control analyses for the reactor coolant circuit shall consider cases during which the reactor pressure tends to increase or decrease in consequence of an initiating event and situations where the coolant circuit pressure must be increased or decreased.

308. Severe accident analyses shall cover all actions required for the plant severe accident strategy and the phenomena associated with the strategy.

Requirements for documentation include:

404. A description of the models and analysis methods used shall be given. The models shall be described in such detail that facilitates conduction of verifying analyses. The information to be presented shall include the plant model or part of it (eg the division into nodes applied in the model), justification of the model parameters selected as well as the plant data used for the analyses or a reference to the source of available plant data.

405. The physical models and computer programs used for the analyses shall be validated by comparing the calculation results obtained by them to separate effects tests or integral tests or nuclear power plant incidents. Comparison with

already validated models may also be utilised.

406. The plant and fuel type specific experimental correlations used in the calculation methods shall be justified by presenting the measurement data from which the correlations have been derived. If the correlation is commonly known and the measurement data are publicly available, a bibliographic reference is sufficient.

| | Q.No | Country | Article | Ref. in National Report |
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| | 70 | Germany | Article 14.1 | p. 43 |
| **JSa** | Question/ Comment | Another important objective was to enhance the plant personnel's understanding of the plant and its behaviour in different situations. Therefore, STUK also required that the PRAs are performed mainly by the utility personnel and external consultants are used only for special topics.<br>This is considered as a good Practice. Notably, the Finnish PRA-Guide requires a full-scope (including internal events, fires, floods, seismic events, harsh weather and other external events) PRA Level1 and 2 for power operation and low-power and shut-down states. | | |
| | Answer | The comment is appreciated. | | |
| | Q.No | Country | Article | Ref. in National Report |
| | 71 | Korea, Republic of | Article 14.1 | 43 |
| **JSa** | Question/ Comment | It is mentioned in page 43 that "PRA shall be updated continuously to reflect plant and procedure modifications and changes in reliability data (Living PRA)." What is the update cycle of living PSA? | | |
| | Answer | PRA shall be updated in connction with modifications of the plant systems or operating procedures. In addition, the updated PRA shall be submitted annually. The cycle for major updates of each part of the PRA depends on the findings of of the regulatory review, the significance of the part and developments in the area in question. Typically the cycle for more detailed updates is three to five years. | | |
| | Q.No | Country | Article | Ref. in National Report |
| | 72 | Korea, Republic of | Article 14.1 | 44 |
| **JSa** | Question/ Comment | It is mentioned in page 44, the SAHARA (safety as high as reasonably achievable) principle is applied for operating units instead of the numerical safety goals. Please explain the SAHARA principle in detail. | | |
| | Answer | When the numerical targets (CDF < 1E-5/year, LRF < 5E-7/year) were set on new units, no fixed numerical target was set on the operating units. Instead the objective was to improve the units step by step to get as high safety level as reasonably achievable taking into consideration the basic technical features of the units and the results of safety reasearch. | | |
| | Q.No | Country | Article | Ref. in National Report |
| | 73 | Korea, Republic of | Article 14.1 | 45-46 |
| **JSa** | Question/ Comment | Are the recent fire PRAs in Fig.10-13 based on NUREG/CR-6850 methodology ? | | |
| | Answer | The fire PRA methodology has been developed by the licencees since the 1980's based on several international guides. The report NUREG/CR-6850 is an important reference but it is not rigorously followed. As an example, fire simulations have been conducted to support Loviisa fire PRA. | | |

| | Q.No | Country | Article | Ref. in National Report |
|---|---|---|---|---|
| | 74 | Slovenia | Article 14.1 | 51 |
| **KW** | Question/ Comment | Could you please give us some more information about the massive projects? | | |
| | Answer | At Loviisa plants old safety critical cables were replaced and the cooling was improved inside the containment. The replacement project of I&C is going on as a preventive action against possible future aging and lack of spare parts of I&C systems. | | |
| | Q.No | Country | Article | Ref. in National Report |
| | 75 | Sweden | Article 14.1 | 2, 41 |
| **RSr** | Question/ Comment | At what stage in the licensing is the organisational capabilities assessed and what does STUK use as the basis for this? I.e. ensuring that the eventual Operator has adequate skills to conduct proper safety assessments independently and retain and develop competence within the organisation, as there will initially be a relatively larger gap in comprehending the design as compared to the plant designer. | | |
| | Answer | According to Guide YVL A.1, the applicant for a decision-in-principle shall draw up a preliminary personnel plan for the design, construction, commissioning and operation stages of a nuclear facility. The preliminary personnel plan shall describe the competences and personnel resources by competence area, as well as how the licence applicant intends to acquire these resources. These plans shall contain general plans for the organisations and expertise needed for implementing the facility options. Organisational capabilities are assessed also in construction licence (updated personnel plan) and operating licence phase. More detailed organisational requirements are given in Guides YVL A.4 and YVL A.5. | | |
| | Q.No | Country | Article | Ref. in National Report |
| | 76 | Ukraine | Article 14.1 | Annex IV, page 112 |
| **JSa/PVa** | Question/ Comment | What are the PGA values that were taken as conservative estimates in the design of Olkiluoto NPP Unit 3 which is under construction now? | | |
| | Answer | The design basis value of peak ground acceleration (PGA) for Olkiluoto 3 is 0.1 g. The PGA value calculated for the Olkiluoto site using probabilistic seismic hazard analysis is 0.085 g corresponding to 100 000 year return period (median confidence level) but 0.1 g is used according to the IAEA recommendation for the minimum PGA value. PRA studies cover PGA values up to 0.23 g. | | |
| | Q.No | Country | Article | Ref. in National Report |
| | 77 | Ukraine | Article 14.1 | page 46 |
| **JSa** | Question/ Comment | It is shown in Figure 13 that relative contribution of initiating events at low power for Olkiluoto units 1 and 2 to CDF is 4%. What factors have allowed such relatively low value to be reached? | | |
| | Answer | The contribution 4 % refers only to the refuelling states with an open containment. The value is low because the duration of these states is short (typically only a few days) and the maintenance procedures have been optimized with PRA. The shutdown and restart period are included in the power operation risk. With these states the total contribution of a shutdown with power reduction and start-up periods is about 20 % of the total CDF. | | |

| | Q.No | Country | Article | Ref. in National Report |
|---|---|---|---|---|
| | 78 | Hungary | Article 14.2 | Page 49, Chapter 2 |

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| **MV** | Question/ Comment | Is risk-informed inspection coupled with risk-informed maintenance? If no, are there any plans to do so? |
| | Answer | Direct coupling does not exist yet. However, e.g. at NPP Loviisa the implementation of the risk-informed in-service inspection methodology created a comprehensive documentation on failure-, consequence- and risk classification of NPP pipings. This is based on PRA analysis. This data could be utilized also in risk informed maintenance. Thank you for a good idea.<br>As a matter of fact our new Regulative Guide YVL A.7 sets a requirement (331) that PRA shall be applied in planning of programmes for in-service inspections, testing and preventive maintenance as well as in development of aging management. The descriptions for the methodology and their updated revisions shall be sent to STUK for approval and their application for information (unofficial translation). |

| | Q.No | Country | Article | Ref. in National Report |
|---|---|---|---|---|
| | 79 | Japan | Article 14.2 | p44 |

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| **JSa** | Question/ Comment | Finnish report says □gFor a new plant unit, a preliminary PRA covering Levels 1 and 2 shall be submitted to STUK for the review of the construction license application (design phase PRA)□h and □gPRA□fs computer models shall be made available to STUK. STUK uses PRA routinely to support its decision making, for example, in review of plant modifications and applications for exemption from Operational Limits and Conditions and in analysis of operating events.□h<br>How has STUK verified the PRA□fs computer models that licensees have submitted to STUK? |
| | Answer | STUK has carried out reviews of the PRAs and the updates submitted to STUK, using external consultants when necessary. The review has also covered the computer models (event trees, fault trees etc.). |

| | Q.No | Country | Article | Ref. in National Report |
|---|---|---|---|---|
| | 80 | Japan | Article 14.2 | p46 |

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| **KiA** | Question/ Comment | Finnish report says □gPlant modifications have been carried out continuously at the Olkiluoto plant, including backfitting with severe accident management systems and power uprate and modernization in the 1990□fs (see Annex 2).□h □gBackfitting□h is legally stipulated in Finland? |
| | Answer | It is said in the Finnish Nuclear Energy Act (Section 7a): ” The safety of nuclear energy use shall be maintained at as high a level as practically possible. For the further development of safety, measures shall be implemented that can be considered justified considering operating experience and safety research and advances in science and technology.” STUK regularly updates the nuclear safety regulations based i.a. on operating experience, safety research and advances in science and technology. New or updated regulatory guides (YVL Guides) are applied as such for new nuclear facilities. For operating facilities or facilities under construction STUK makes a separate decision on how a new or revised YVL Guide is applied. This decision defines the possible backfitting requirements based on the Nuclear Energy Act Section 7a. Overall picture of the plant safety and the required backfitting measures are discussed with the |

licensee at least every ten years during the periodic safety reviews.

| | Q.No | Country | Article | Ref. in National Report |
|---|---|---|---|---|
| | 81 | Australia | Article 15 | 56 |

**ATy** Question/ Comment: Can STUK advise if they will act on the suggestion of the IRRS mission and withdraw from the practice of conducting environmental monitoring programmes in the vicinity of the nuclear facilities based on commercial contracts with the licensees?

Answer: There is a proposal to change the Finnish Nuclear Energy Act based on this suggestion of the IRRS mission. Changes will come into force to the Finnish Nuclear Energy Act after the Ministry of Employment and the Economy has finalised the process and the Finnish parliament has approved the updated Act.

| | Q.No | Country | Article | Ref. in National Report |
|---|---|---|---|---|
| | 82 | Bulgaria | Article 15 | p. 53, Fig. 16 |

**ATy** Question/ Comment: Since 1994 (for Loviza NPP) and 1998 (for Olkiluoto NPP), the calculated exposure of the critical group of the population have been reduced to less than 0.5E-6 Sv/a.
Bulgaria would appreciate if Finland could share its approach in achieving this results, namely:
- Are H-3 and C-14 emissions monitored and are they included in the evaluation of public exposure?
- What models are used for exposure evaluation?

Answer: STUK is using its own calculation model (VALTO) for calculating the doses of the representative persons in the vicinity of the Finnish nuclear power plants. In addition both nuclear power plant companies have their own calculation models at Loviisa NPP and Olkiluoto NPP. STUK is using the results of the VALTO calculations in the Finnish Nuclear safety annual reports.

Dispersion calculation for atmospheric releases is based on the dilution factors calculated from the dispersion condition data measured continuously at the meteorological tower of the power plant site. All the Finnish dispersion calculations are based on the ordinary Gaussian dispersion model.

H-3 and C-14 emissions are monitored in the Finnish nuclear power plants.

There are two ways to calculate the doses for representative persons in the VALTO program, so called old and new way. Calculations of the old way do not take into account enough of the H-3 and C-14 emissions. In the new way H-3 and C-14 nuclides are calculated with the simplified methods recommended by the International Atomic Energy Agency (IAEA). However the dose results of the representative person have been reported in the Finnish annual safety reports in the old way. There has been the need to compare different results with each other over the years, which have been calculated in the same way. The reported doses are underestimated because of C-14. The dose results of the VALTO model and models of the NPPs are close to each other if the emissions of H-3 and C-14 are not taken into account. Mostly the discharge of C-14 both at the Loviisa and Olkiluoto sites causes the dose to the representative person in the vicinity of the nuclear installations.

| | Q.No | Country | Article | Ref. in National Report |
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| | 83 | Canada | Article 15 | Page 55 |

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| **ATy** | Question/ Comment | What role does the Ministry of Social Affairs and Health play in radiological and environmental monitoring in Finland? Are the results of the monitoring made available to the public? Has STUK adopted a strategy to implement the changes to the Nuclear Energy Act of an independent monitoring program as recommended by the IRRS? |
| | Answer | According to the Radiation Act, the overall authority in the field of the use of radiation and other radiation practices is the Ministry of Social affairs and Health. One of the main roles of the Ministry of Social Affairs and Health is to fund the activities of the radiological and environmental monitoring in Finland and direct actions in STUK in the area of the radiation act. However STUK is independently making all the radiological and environmental monitoring in Finland.<br><br>The results of radiation monitoring in Finland are published in the internet pages of STUK. Time to time we publish the Annual Report of Surveillance of Environmental Radiation in Finland (latest 2010).<br><br>According to the Finnish Nuclear Energy Act, the overall authority in the field of nuclear energy is the Ministry of Employment and the Economy. Results of monitoring of radioactive substances around Finnish nuclear power plants are published in the internet pages of STUK and in the annual reports of Regulatory oversight of nuclear safety in Finland.<br><br>STUK has adopted the strategy of an independent monitoring program as recommended by the IRRS, but work is still in progress. There is a bill that is based on the suggestion of the IRRS mission. Changes will come into force to the Finnish Nuclear Energy Act after the Ministry of Employment and the Economy will get the progress in the end and the Finnish parliament will approve that. |

| | Q.No | Country | Article | Ref. in National Report |
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| | 84 | China | Article 15 | section 15 |

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| **ATy** | Question/ Comment | Please provide us the release limits stipulated by the national decrees or guidelines, the release limits authorized by STUK and the target values set by the nuclear plant operating utility, and explain how the release limit is determined? |
| | Answer | According to Finnish Nuclear Act, in Section 7 c, it says that limits on releases of radioactive materials from a nuclear facility, in order that they do not exceed the maximum values for radiation exposure provided by Government decree, shall be confirmed by the Radiation and Nuclear Safety Authority (STUK).<br><br>For nuclear power plants the dose constraint for discharges is given in Government Decree on the Safety of Nuclear Power Plants (717/2013), Section 8. The limit for the annual dose of an individual in the population, arising from the normal operation of a nuclear power plant, is 0.1 millisievert (mSv). This limit or constraint is 1/10 of the dose limit for a member of the public (1 mSv) enacted in Radiation Decree (1512/1991), Section 6. More detailed requirements are given in guide YVL C.3, Limitation and Monitoring of Radioactive Releases from a Nuclear Facility. |

The release limits of the Finnish NPPs are set and specified in the safety technical specifications of the plants that have been approved by STUK. The licensee shall derive limits for the release of radioactive materials from the nuclear power plant (the nuclear power plant units located on the same plant site and other nuclear facilities) in such a way that the limit for the dose (0,1 mSv) to an individual as defined in section 8 of Government Decree 717/2013 is not exceeded.

The licensee shall separately define release limits for the most important radionuclide groups or radionuclides in terms of radiation exposure. When the limits are derived, all significant radionuclides and release pathways shall be considered, up-to-date models and parameters based on theoretical and practical knowledge shall be employed and sufficient safety margins applied.

The release limits are as follows:

| Airborne discharges | Loviisa NPP | Olkiluoto NPP |
|---|---|---|
| Noble gases | 1,40E+16 Bq | 9,42E+15 Bq |
| Iodine | 2,20E+11 Bq | 1,03E+11 Bq |
| Liquid effluents | | |
| H-3 | 1,50E+14 Bq | 1,83E+13 Bq |
| All gamma nuclides | 8,90E+11 Bq | 2,96E+11 Bq |

In addition the licensee shall determine target levels for the releases of radioactive materials and the radiation doses received by the representative person in the most highly exposed population group. Such target levels shall reflect good operation of the plant and practices of the plant personnel and the efforts for continual improvement, the aim of which is to attain levels below said target levels. The target levels can be specified for groups of elements and the most important radionuclides, for example in the plant's radiation protection guidelines.

For example the target levels in Olkiluoto NPP:

| Airborne discharges | Olkiluoto NPP |
|---|---|
| Noble gases | 3,00E+11 Bq |
| Iodine | 8,00E+7 Bq |
| Liquid effluents | |
| H-3 | 2,50E+12 Bq |
| All gamma nuclides | 6,20E+8 Bq |

| | Q.No | Country | Article | Ref. in National Report |
|---|---|---|---|---|
| | 85 | India | Article 15 | page 53 |

**ATy** Question/ Comment: It is noted that in past 3 years, there is a continuous downward trend in the collective annual occupational dose for Olkiluoto NPP as reported in figure 15 . Can Finland provide details on the measures taken to achieve this trend for Olkiluoto NPP?

Answer: The radiation levels at the turbine plants have decreased in average 15 – 20 % per year due to the new steam dryers in the reactors in Olkiluoto NPP. The new dryers installed during 2005 - 2007 remove moisture from the steam

effectively, and they clearly reduce the transportation of radioactive substances to the turbines. After the installations of the new dryers, there has been continuous downward trend in the collective annual occupational doses.

| | Q.No | Country | Article | Ref. in National Report |
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| | 86 | Ukraine | Article 15 | page 54 |

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| **ATy** | Question/ Comment | Table 3 shows data on radioactive effluents from the Loviisa NPP. Could you clarify the reasons for abrupt decrease of iodine effluents (I-131 eqv.) in 2011/2012 compared with 2010? |
| | Answer | In general, leaking fuel assemblies in a reactor affect iodine releases from a NPP. There was one fuel rod leak at the Loviisa 1 plant unit during the refueling cycle of 2009-2010 and one at the Loviisa 2 plant unit that began in the final part of 2012. The leakages have increased the iodine effluents to the air in those years. There were no fuel rod leakages in 2011 and that is why the iodine effluents were such low during the year. |

| | Q.No | Country | Article | Ref. in National Report |
|---|---|---|---|---|
| | 87 | Canada | Article 16.1 | Page 58, Annex 6 |

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| **JSo** | Question/ Comment | When is the National Forum on NPP Emergency Preparedness expected to be held? Will a national exercise also be planned to bring together all players (Ministry of Interior, Ministry of Interior, STUK, Ministry of Social Services and Health, licensees, regional services/fire & police departments) to test the 2012 Nuclear Emergency Guide issued by the Ministry of Interior on Roles and Responsibilities? What are the roles and responsibilities of these Ministries in emergency situations? |
| | Answer | So far a preliminary meeting has been arranged. The next step is that STUK will officially ask the Ministry of Interior to invite the National Forum.<br><br>Every third year the NPP's emergency exercise is a national large scale exercise (so called co-operative exercise) in which a large number of operator organisations are invited. The exercise is headed by the regional rescue service. For example 2013 the Loviisa NPP's large scale exercise had about 60 participating organisations including ministries, agencies, municipalities etc. The Nuclear Emergency Guide of 2012 was in use during the exercise. The next national large scale exercise will take place 2014 at Olkiluoto NPP.<br><br>Principle is that during the emergencies every operator (ministry, agency etc.) takes care of the same area of responsibility as it has normally. Ministry of Interior has e.g. the responsibility of police, rescue services, border control and emergency response centre administration. Ministry of social Affairs and Health has the responsibility of health services including e.g. the guidance concerning the iodine prophylaxis. |

| | Q.No | Country | Article | Ref. in National Report |
|---|---|---|---|---|
| | 88 | China | Article 16.1 | section16 |

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| **TRe** | Question/ Comment | Are there any special emergency preparedness arrangements targeted for the EPR unit£¨Olkiluoto 3 reactor£©? For example, how are the emergency source term and emergency preparedness zone considered for the EPR unit? |
| | Answer | Each NPP has own set of special features that have to be considered in emergency planning. Most of these features are technical operations that only affect NPP's own accident handling procedures. Thus most of these are |

invisible to other organizations that are part of the whole emergency operation. EPR is not treated specially compared to other NPP units. Final Olkiluoto 3 emergency plan is not finished yet but there seems to be no issues that would need special arrangements.

It is licensee's responsibility to provide analyzed accident data including source term to Radiation safety authority (STUK). In practice most of this material is prepared by plant vendor and reviewed by the licensee. This material is assessed at STUK. STUK uses inhouse resources to review material and may order independent studies at licensee's expence.

Emergency preparedness is governed by Gornment degree 716/2013 and YVL guide C.5. Emergency zones are defined there and are the same for all NPP's. Plant designs have to fulfill demands emerging from zone sizes and allowed accident consequence's set in Governmen degree 717/2013 and several YVL guides. These Degrees and guides set constraints on plant design not the other way around.

| | Q.No | Country | Article | Ref. in National Report |
|---|---|---|---|---|
| | 89 | Japan | Article 16.1 | p57, p58, p59 |

**JSo**

Question/ Comment: Finnish report says gIn the new Decree, there is a requirement to take into account the possibility of several reactor units f simultaneous @accident in the emergency planning. h On the other hand, Finnish report says gAs a result of the studies made after the TEPCO Fukushima Dai-ichi accident, no major changes have been identified in off-site emergency preparedness so far h Are there any specific reasons why several NPPs simultaneous accidents are not mostly taken into account in off-site emergency preparedness?

Answer: The new requirement of taking into account the possibility of several reactor units simultaneous accident will cause changes in emergency preparedness and response arrangements on-site. Arrangements off-site (i.e. evacuation, sheltering inside, iodine prophylaxis) are practically the same even there were several units in accident. The director of rescue operations has in all cases wide powers inclusive the right to get the executive assistance which is needed.

| | Q.No | Country | Article | Ref. in National Report |
|---|---|---|---|---|
| | 90 | Slovenia | Article 16.1 | 57 |

**TRe**

Question/ Comment: Please, briefly describe »emergency standby state« and how many persons of the emergency response organization are incorporated? Also how many people emergency response organisation required for emergency have available and how many people are activated in case of an emergency ?

Answer: "Emergency standy", term will be changed to "alert" in near future translations. It is situation which involves alerting the nuclear power plant emergency organisation to the extent necessary to ensure the safety level of the plant. The emergency standby / alert and its justification shall be promptly communicated to STUK and, if considered necessary, to the local rescue authority. At the plant it involves accident managent team of less than ten people.

Licensee applies for acceptance for their emergency plan. Plan has to fulfill Government degree 716/1013 and YVL guide C.5. It is licensee's

responsibility to make emergency plans for their own organization. STUK decides if the plan is acceptable. Assessing the plan includes working procedures of the emergency organization and the organization itself. Each position has multiple peoples for handling long lasting situations. If organization is e.g. too thin licensee is required to train more people to emergency organization. Having accepted emergency plan and trained organization is a requirement for example for loading fuel to the reactor. Full emergency organization is alerted at site emergency and general emergency. The planned strength of licesee's one shift depends on plant but is about 50 people for site or general emergency. Depending on situation assessment they may call extra people to work.

| | Q.No | Country | Article | Ref. in National Report |
|---|---|---|---|---|
| | 91 | Ukraine | Article 16.1 | page 59 |

**HAa** Question/ Comment: The IRRS mission of 2012 recommended STUK to consider, in cooperation with relevant Government authorities, improvement of national arrangements to comply with the Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency. What measures are underway (or planned) to implement this IAEA recommendation?

Answer: IAEA's Response and Assistance Network (RANET) is the operational tool used to implement the Convention on Assistance in Case of a Nuclear Accident or Radiological Emergency ('Assistance Convention'). Finland has registered its national assistance capabilities into RANET already in 2007, soon after establishment of the concept, and is presently considering registering more capabilities into it. As RANET now, according to the IAEA Action Plan on Nuclear Safety in September 2011, is to be expanded to cover on-site topics, too, Finland is considering that possibility, as well. Thus by being a member of RANET Finland has fulfilled its obligations as a State Party to the Assistance Convention.

The IRRS suggestion is two-folded: 1) how to improve national arrangements to immediately be able to respond to requests of assistance especially in case of need for deployment of expert teams to requested state, and 2) how to efficiently make use of resources available in other countries in Finland.

In the first case, in Finland Ministry of the Interior (MI) is the organization approving and financing assistance provided to other countries by sending teams and material. Radiation and Nuclear Safety Authority (STUK) as a National Competent Authority receives requests of international assistance. In order to achieve a rapid response to requests of assistance on 24/7 basis concerning especially financial aspects, there is need to update relevant procedures by MI and STUK. STUK has discussed this issue with MI. The procedures should be finalized by the end of 2014.

In the latter case, when finalizing e.g. Finland's monitoring strategy, possibilities for receiving assistance from other countries will be taken into account. Situations when requests of assistance may be considered, concern later phases of very severe nuclear or radiological emergencies.

| | Q.No | Country | Article | Ref. in National Report |
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| | 92 | Korea, Republic of | Article 17.1 | 61 |

**LPn/JSa**

Question/ Comment: Were the data and evaluation results from the site survey and characterization for the Olkiluoto Spent Fuel Repository reviewed and considered for the re-evaluation of the site safety during the recent Periodic Safety Review for the Olkiluoto units? Were there any changes in the site-related input parameters of the Olkiluoto units?

Answer: The company (Posiva) responsible for the development of the Olkiluoto Spent Fuel Repository is a subsidiary of the licensee of the Olkiluoto Nuclear Power Plant (TVO). The site survey and characterization for the repository has been going on for more than thirty years and the site related information has been shared by the companies. The information from the site characterization for the repository has been used by TVO in the periodic safety review of the operating NPP units, where relevant. At STUK, the review of site-related information relevant to both facilities, e.g. seismology and geology, has been conducted in cooperation by the respective review teams. Regarding the periodic safety review of the operating units, the comparison with the information of the site re-evaluation for the Okiluoto unit 3 and Olkiluoto unit 4 projects has been more relevant.

| | Q.No | Country | Article | Ref. in National Report |
|---|---|---|---|---|
| | 93 | Germany | Article 17.3 | page 62 |

**RSr**

Question/ Comment: Olkiluoto NPP: In addition, studies are carried out on systems to ensure residual heat removal in the case of total loss of AC power and/or loss of the ultimate heat sink due to external or internal events.
What measures (coolant injection with mobiles pumps and heat removal via venting system?) are considered in such studies?

Answer: Olkiluoto NPP, conceptual design of independent way of pumping water into the RPV:

> The utility has submitted to STUK assessments for diverse methods to inject coolant into the reactor in case of loss of all AC. The system would inject coolant using the fire fighting system after reactor cooling system depressurization. Decay heat would be removed from the cooling circuit into depression pool and from the containment via containment filtered venting system. Power supply will be ensured by an independent diesel generator. System design for the plant modification is under way.
>
> In a case of a total SBO, the time available prior fuel damage may not be long enough to take the system into use. The utility is investigating possibilities for additional fast acting methods to ensure fuel cooling. Possibilities are a system with a turbine driven pump or independent diesel driven pump.

| | Q.No | Country | Article | Ref. in National Report |
|---|---|---|---|---|
| | 94 | Brazil | Article 18.1 | Pag 64 |

**KW**

Question/ Comment: Why the new upgraded I&C needs a “new building” of Loviisa? What type of instruments will be housed in the “new building”? Will the information of these instruments be also available in the control room?

Answer: The renewal project was planned so, that new I&C cabinets are installed and partly tested during normal operation. Old field cables coming from the plant are turned and connected to the new cabinets during outages. So the idea is to

keep the outages as short as possible. But there is not enough space for the new cabinets in old cabinet rooms, because old cabinets can not be dismantled before new are installed. So the power company decided to build new buildings for new I&C cabinets. The old cabinet rooms are going to be quite empty after the modernisation.

| | Q.No | Country | Article | Ref. in National Report |
|---|---|---|---|---|
| | 95 | Brazil | Article 18.1 | Pag. 65 |

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| **RSr** | Question/ Comment | The proposed cooling towers will still depend of electrical power to be functional. How will the system be protected against external events or common mode failures? |
| | Answer | Loviisa NPP, implementation of an alternative ultimate heat sink<br>The utility has sent to STUK the conceptual design plan of a new system that ensures decay heat removal in case of loss of seawater. The system consists of two cooling towers dimensioned for decay heat per unit: one for the reactor, one for spent fuel. Power for the system can be supplied by an independent air cooled DG. High sea level and high wind speeds are taken into account in design. |

| | Q.No | Country | Article | Ref. in National Report |
|---|---|---|---|---|
| | 96 | Germany | Article 18.1 | page 63 and 64 |

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| **RSr** | Question/ Comment | Due to the TEPCO Fukushima Dai-ichi accident, the Finnish requirements are being supplemented by requiring that the plant shall be pro¬vided with systems and procedures by which decay heat removal from the reactor and from the spent fuel pools can be ensured for 72 hours independent of the electricity or water supply from off-site sources in events caused by rare external events or disturbances in the plant internal electricity distribution.<br>The plant shall also be provided with systems, structures and components for controlling and monitoring severe accidents. These shall be independent of the systems designed for operational conditions and postulated accidents.<br><br>Such requirements for coping with severe accidents are consequently stringent and commendable and are considered as a good practice. |
| | Answer | Thank you for the kind comment. |

| | Q.No | Country | Article | Ref. in National Report |
|---|---|---|---|---|
| | 97 | Germany | Article 18.1 | Annex 3, page 106 |

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| **RSr** | Question/ Comment | TVO has studied possibilities to supplement the currently used low level measurement system with another system based on a different measuring principle.<br>The implementation of a diverse redundant measurement of the RPV-Level is highly recommendable to cope with a common cause failure of the existing differential measurements.<br><br>Which new measuring principle has been planned to resolve this generic issue? |
| | Answer | The studies have focused on float level switches that are planned to be installed in the suction pipes of the reactor shut-down cooling system. Similar switches are used in Sweden in Oskarshamn 1 and Ringhals 1 NPPs. Operation of the switches has been tested in a test loop in 2013. The final design has not yet been decided. |

| | Q.No | Country | Article | Ref. in National Report |
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| | 98 | Slovenia | Article 18.1 | 68 |

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| **TjW** | Question/ Comment | Could you please describe the regulatory requirements related with cyber security threats for NPPs? |
| | Answer | STUK has prepared Guide YVL A.12 “Information Security Management in a Nuclear Facility”. This guide was published along with other YVL guides in December 2013. Currently this guide is available in Finnish, an English version will be published during the Spring 2014. YVL A.12 lays requirements on information security management (people and processes) and to cyber security (technical information security). Furthermore, our new DBT (Design Basis Threat) was put into force in 2013. Cyber security was integrated to our new DBT. |

| | Q.No | Country | Article | Ref. in National Report |
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| | 99 | United Kingdom | Article 18.1 | Page 16 |

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| **TV/MTu** | Question/ Comment | The section summarises the progress made to-date with the construction of unit 3. Please explain whether the pre-active and active commissioning is covered as part of the licence issued for construction. |
| | Answer | Commissioning Plan describing the commissioning phase (both non-nuclear and nuclear testing) and the organization of commissioning activities in general was covered by the construction license. The detailed testing programs were not covered. They are submitted separately to STUK for approval before the tests are carried out. After the tests within a testing program are completed, the result report is submitted for STUK’s approval. |

| | Q.No | Country | Article | Ref. in National Report |
|---|---|---|---|---|
| | 100 | Czech Republic | Article 18.3 | Page 68 |

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| **TjW** | Question/ Comment | Could you please provide some details about how the important issue of cyber security is being, or will be addressed? |
| | Answer | STUK has prepared Guide YVL A.12 “Information Security Management in a Nuclear Facility”. This guide was published along with other YVL guides in December 2013. Currently this guide is available in Finnish, an English version will be published during the Spring 2014.This guide uses risk informed approach. Some fundamental principles are: cyber security shall be considered in the design of I&C, protection and control systems shall be isolated from the Internet, the I&C design features contribute essentially to cyber security (DiD, physical separaration, functional isolation, hardwired systems), Defence-in-Depth protective strategies and effective security controls need to be implemented (including technical controls and operational controls), there is a special emphasis on the use of mobile devices<br>maintenance and configuration management practices and awareness of employees. PDCA model and proactive security are in special focus.<br>The new YVL guide is applied as such to the new nuclear facilities. A separate implementation decision will be made during 2014-2015 for the existing facilities and facilities aunder construction. Furthermore, our new DBT (Design Basis Threat) was put into force in 2013. Cyber security was integrated to our new DBT. |

| | Q.No | Country | Article | Ref. in National Report |
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| | 101 | Canada | Article 19.1 | Page 75, Figure 19 |

**JKu**

Question/ Comment: Since 2008 there have been an increasing number of INES Level 1 events at Loviisa. Can STUK elaborate as to whether the trend is expected to continue and whether any actions are being taken to curb or reduce the frequency?

Answer: Licensee established an investigation group which reported to the top management and issued recommendations. These recommendations are elaborated further by the plant management into detailed actions. Recommendations are divided in 6 different topical areas, which are:

1. Configuration management of plant design data and drawings, updating and coherent use of design data
2. Management system need to be updated and according to plant practices. Process oriented approach should be used.
3. Roles and responsibilities should be clarified in different work processes
4. Modification process should be comprehensive and complete. "Design Authority" approach is established.
5. Operating experience feedback process should be improved.
6. Human Performance Tools should be established and used in normal work processes.

STUK is following the implementation of corrective actions.

| | Q.No | Country | Article | Ref. in National Report |
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| | 102 | Ukraine | Article 19.1 | page 76 |

**MV**

Question/ Comment: Concerning operating experience feedback, the "Reactor Pressure Vessel Flaw Indications at Doel 3, Belgium" (IRS report number 8244) caused actions at the Finnish plants in 2012. STUK asked clarifications by a mandatory request, with deadline end of May 2013 for TVO and end of August 2013 for Fortum. Could you provide information on review of this issue for Finnish NPPs, especially Loviisa NPP?

Answer: The licensee (Fortum) clarified the situation based on manufacturing data available and a supplementation received from the manufacturer of Loviisa 1&2 RPV's. The manufacturing data indicated that the forgings have been subjected to "antiflake treatment" during manufacturing. The NDT-inspection data (UT normal probe) from that time showed that the acceptance limit for individual defect has been 20 $mm^2$ (diameter of 5 mm) which should be small enough to detect possible hydrogen flakes especially when located in groups as typical. Complete manufacturing, hydrogen data and inspection documentation were, however, not available from the time of manufacturing. As a further measure the licensee has decided to enlarge the scope of the RPV inservice inspections to base metals (belt line forgings). These inspections from full thickness will be carried out in coming outages linked to the inservice inspection programme of the RPV.

STUK considered that the clarifications are sufficient but required the licensee to assess the integrity of the RPV areas close to support structures and nozzles and send information on this issues until end of May, 2014

For Olkiluoto 1&2 plant units it was shown by the licensee (TVO) that the reactor shells have been manufactured from rolled plates (with longitudinal welds) where the rolling reduction is much larger than in ring forging. This

substantially decreases the magnitude of segregation and risk to hydrogen flaking. In addition, the NDT-inspections after material manufacturing have been carried out so that possible hydrogen flakes would have been detected with sufficient detection accuracy. The forgings for Olkiluoto 3 reactor were manufactured in 2003-2004 and the risk of hydrogen flaking was sufficiently taken into account in material manufacturing and NDE-inspections.

| | Q.No | Country | Article | Ref. in National Report |
|---|---|---|---|---|
| | 103 | Ukraine | Article 19.1 | pages 78-79 |

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| **JHe** | Question/ Comment | The report gives general information on current plans for decommissioning for the existing NPPs. Immediate dismantling is planned for the Loviisa NPP and delayed dismantling for the Olkiluoto NPP. It is indicated that final planning and building of disposal facilities for the Olkiluoto NPP will start already during the safe storage period, but there is no such information for the Loviisa NPP. Could you clarify whether there are similar plans for the Loviisa NPP? |
| | Answer | Loviisa NPP has also planned to license and construct disposal facilities to be ready for operation when NPP dismantling starts. The environmental impact assessment and licensing for disposal facility enlargement is planned to start in early 2020's and construction is scheduled to take place in the latter half of 2020's. |

| | Q.No | Country | Article | Ref. in National Report |
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| | 104 | Ukraine | Article 19.1 | page 79 |

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| **JHe** | Question/ Comment | It is stated that «The final planning and building of disposal facilities will start already during the safe storage period and altogether the decommissioning project will last about 15 years». Could you clarify who will be responsible for disposal safety after NPP decommissioning? Are there requirements on the duration of site monitoring measures? |
| | Answer | The NPP licensee, under nuclear waste management obligation (Nuclear Energy Act Section 9), is responsible to take care of all waste management and disposal actions. The waste management obligation can be expired when STUK has confirmed that decommissioning and disposal has been done according to safety requirements. When the licensee's waste management obligation has ceased the responsibility is transferred to the State. The licensee is required to pay lump sum to the State for the future monitoring and control of the nuclear waste. Finnish legislation or safety requirements do not specify duration of site monitoring after closure. The basic principle of nuclear waste disposal is that it has to be passively safe and no active measures are needed after closure of the facility. The details and planned duration of site monitoring can be decided nearer to actual closure and it might also include expectations from other stakeholders than safety authority. |

| | Q.No | Country | Article | Ref. in National Report |
|---|---|---|---|---|
| | 105 | Brazil | Article 19.2 | Pag. 71 |

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| **JKu** | Question/ Comment | This is the first time the Report mentions about "resident inspectors". What is the policy of STUK related to use of resident inspectors? How many resident inspectors are there for each plant? To which branch of STUK the resident inspectors report? What is the policy related to rotation of resident inspectors between sites and headquarters? |
| | Answer | There are 3 resident inspectors in Loviisa NPP and 4 resident inspectors in |

Olkiluoto NPP. STUK is recruiting 2 more resident inspectors to Olkiluoto NPP in near future due to replacement and retirement.
Residents report directly to Operational Safety Section but their report is delivered also to the whole Nuclear Reactor Regulation Department staff for them to identify any relevant data and information.
There is no declared policy for rotation. STUK values experience that is attained when working in the same NPP site. Residents do not typically participate in regulatory decision making directly so their ability to provide relevant information is not jeopardized.

| | Q.No | Country | Article | Ref. in National Report |
|---|---|---|---|---|
| | 106 | Czech Republic | Article 19.4 | Page 73 |

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| **JKu** | Question/ Comment | According the WENRA Reference Level LM 2.4 the symptom-based operating procedures for Design basis Events are recommended. The formulations of the situation with status of EOPs on Finnish NPPs is not so clearly described. Could you explain, if or when symptom-based EOPs for DBEs were or will be developed and implemented? |
| | Answer | Finnish EOP's are a combination of symtom based (for identification of situation and DEC + SAM situations) and event based (main actions that are more effective with event base approach eg. identified DBC2 to DBC4 situations). There is always a symptom based back up for situations where event based strategy is not working and procedures may require transition to symptom based actions when safety function cannot be maintained or it is jeopardized. These EOP's may need extensions like SAM situations during outage. The mentioned WENRA Reference Level is fulfilled. |

| | Q.No | Country | Article | Ref. in National Report |
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| | 107 | Germany | Article 19.4 | page 74 |

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| **JKu** | Question/ Comment | Loviisa NPP: As a lesson learnt from the TEPCO Fukushima Dai-ichi accident, the licensee will improve EOPs and SAM procedures to support heat removal from spent fuel pools by pool boiling and supplying additional water to the pools. New EOPs for shutdown states, which cover the immediate recovery of SAM systems, have been developed in 2012 and are going through implementation.<br>Please provide further clarification on the new EOPs for shutdown states. |
| | Answer | There are existing EOPs for events during shutdown and there is clear SAM guidance already in place. However the existing shutdown procedures will be updated to the new EOP flow chart format and at the same time improve their scope (e.g. to include fuel pools and additional recovery actions). These EOP's are event based so they could be also improved. SAM procedures will also be updated to include more diverse set of initial status of systems that means to include additional recovery actions that are needed during shutdown. |

| | Q.No | Country | Article | Ref. in National Report |
|---|---|---|---|---|
| | 108 | Brazil | Article 19.8 | Pag. 79 |

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| **KiA** | Question/ Comment | It is stated that the construction of spent fuel interim storage facility and its recent extension with 3 new pools have been "handled as plant modifications". Since these are major facilities, should not they been handled as new facilities, requiring a new Decision in Principle and or a new Nuclear and Environmental Licensing process? |
| | Answer | The operating licences of both Loviisa and Olkiluoto operating plants include |

the related storage facilities for low and intermediate radioactive waste and spent fuel. The current operating licence of Olkiluoto units 1 and 2 is valid until the end of 2018. The licence includes an option to extend the existing spent fuel storage capacity to 1800 tons of Uranium with the condition that STUK approves the modification. STUK has approved the conceptual design of the extension of the spent fuel storage, more detailed system descriptions and other required documentation and is currently overseeing the construction works.

| | Q.No | Country | Article | Ref. in National Report |
|---|---|---|---|---|
| | 109 | Slovenia | Article 19.8 | 79 |

**RSr** Question/ Comment: Are there any additional measures for storage of spent fuel required by STUK after Fukushima accident (related with FA racks arrangement, capacity of spent fuel pool)?

Answer: The new YVL Guide B.1, safety Design of a NPP, requires that:

**450.** In events involving a combination of failures (DEC B) and in rare external events (DEC C), it shall be possible to accomplish decay heat removal from the reactor to outside the containment and control of reactivity in such a way that the limits set forth for fuel integrity, radiological consequences and overpressure protection in design category DEC are not exceeded.

It shall be possible to accomplish decay heat removal and reactivity control in rare external events (DEC C) without relying on power supply from transportable sources for at least eight hours without any material replenishments or recharging of the DC batteries. In addition, a sufficient inventory of water and fuel and capability to recharge the DC batteries shall exist on site to enable decay heat removal for a period of 72 hours

**451.** In view of a loss of the on-site power distribution system, provisions shall be made for decay heat removal to outside the containment and control of reactivity by ensuring that

1. the systems required for this purpose operate without any external power supply or run on an independent power supply; and that

2. a sufficient inventory of water and fuel and capability to recharge the DC batteries exist on site to maintain these arrangements for a period of 72 hours.

**452.** The nuclear power plant shall have arrangements in place to ensure sufficient cooling of the fuel in fuel storages in rare external events in accordance with requirement 450. These arrangements shall enable the monitoring of the water level in fuel storage pools containing spent fuel for at least eight hours without recharging the DC batteries. Additionally, it shall be possible to keep the fuel fully submerged even in case of loss of the on-site power distribution system as provided in requirement 451. A sufficient inventory of water and fuel and capability to recharge the DC batteries shall exist on site to maintain these arrangements for a period of 72 hours.