5th Review meeting of CNS

4. April 2011 – 14. April 2011

Country Group 6

Answers to questions posted to Finland

Convention on Nuclear Safety
Questions Posted To Finland in 2011

Q.No	Country	Article	Ref. in National Report
1	Canada	General	17

Question/ Comment: System of Licensing, Paragraph 4: Regarding the Decision-in-Principle by the Government, please clarify if the Government can make a positive decision if STUK's statement on safety recommends a negative decision.

Answer: The licensing process for a new nuclear power plant includes the following phases:
- decision-in-principle
- construction license
- operating license.

The Decision-in-principle is done and licenses for the construction and operation are granted by the Finnish Government. The related administrative preparation work is carried out by the Ministry of Employment and the Economy but the Ministry is not a decision-making body. In addition to safety, many other essential issues are considered, and therefore the licensing decisions are made in Finland at the governmental level.

The Nuclear Energy Act includes conditions for Decision-in-principle and for granting licenses. In the Decision-in-Principle -phase STUK's safety assessment is required in Section 12 of the Act. According to Section 14 of the Act, a condition for making a Decision-in-Principle is that no factors indicate a lack of sufficient prerequisites for constructing a facility according to Section 6 of the Act. In Section 6 it is provided that the use of nuclear energy must be safe; it shall not cause any injury to people, or damage to the environment or property. General safety requirements are given in the Section 7 of the Act.

As regards Construction and Operating Licenses, Section 23 of the Act provides that a statement has to be requested from STUK. Conditions for granting a License are provided in Sections 18, 19 and 20 of the Act. They include e.g. that provisions of Section 6 are fulfilled. In Section 20 of the Act it is further stated that the operation of the nuclear facility shall not be started until STUK has ascertained that the nuclear facility meets the prescribed safety requirements.

Any Decision-in-principle can not be made and any license can not be granted if the conditions are not fulfilled. So STUK has a clearly defined role in the licensing process based on the Nuclear Energy Act.

In addition to the nuclear power plant units, the similar licensing process is applied to nuclear waste disposal facilities and other significant nuclear facilities. Furthermore, e.g. the possession, fabrication, production, transfer, handling, use, storage, transport and import of nuclear materials and nuclear wastes as well as the export of nuclear wastes are subject to licenses.

The detailed requirements concerning licensing processes are given in the Nuclear Energy Decree Chapter 5 and in STUK's Guide YVL 1.1. Both are available in English at STUK's website.

Q.No	Country	Article	Ref. in National Report
2	Canada	General	19

Question/ Comment: Oversight during Construction, Paragraph 3: The report states that "inspections are determined when STUK reviews component or structure specific implementation plans." Please provide some examples of the triggers for these inspections. When in the process do the implementation plan reviews occur?

Answer: These implementation plans are delivered to STUK as a part of component specific construction plan which shall be approved by STUK or an independent 3rd party Inspection Organization before start of manufacturing or construction. These plans include component/structure specific

Quality Plans which contain inspection duties of various parties as Hold (H) and Witness (W) points. When reviewing and approving the implementation plan, STUK defines its H and W points in the same quality plan which is then submitted to the licensee.The licensee has to inform STUK also if there are other reasons to ask regulator to visit the manufacturing/construction site. This means that STUK can attend to any oversight/inspection event that is seen appropriate.

Q.No	Country	Article	Ref. in National Report
3	Canada	General	55

Question/ Comment: Section “Application of defence in depth concept at the Finnish NPPs”: regarding the fuel leak at Loviisa Unit 2, where was the exhaust vented (e.g. was it inside or outside of containment)? Please describeany plans to require detection methods for failed fuel prior to this exhaust for new or existing plants?

Answer: The question is related to the following paragraph:
A fuel leak was observed at the Loviisa unit 2 on 28 November 2008. The leak was detected as the activity of exhaust gases increased. All fuel bundles were tested during 2009 annual outage and leaking fuel bundles were removed from the reactor. Leaking fuel rod was detected also at the Loviisa unit 1 on November 2009. The previous fuel leak in Loviisa before these two cases occurred in 1999.

Loviisa unit 2 is a PWR. Here the exhaust gases mean the normal process gases that originate from the pressurizer relief tank, reactor coolant drain tank and degasification of the primary coolant. After combustion of hydrogen the gases are purified and delayed before they are discharged to the atmosphere through the ventilation stack of the power plant. There was no abnormal gas leak from the process systems. The first indication of the fuel cladding failure was the rise of the radiation level at the first radiation monitor of the exhaust gas processing system (located just after combustion of hydrogen and before purification).

This kind of monitoring of exhaust gases gives very early and sensitive indication of a fuel cladding failure. At Olkiluoto unit 3 (PWR) under construction there will additionally be continuous radiation monitoring of the primary coolant in the primary coolant sampling system. In addition to continuous radiation monitoring, primary coolant samples are taken normally daily and analyzed in the laboratory of the power plant.

Q.No	Country	Article	Ref. in National Report
4	Canada	General	38

Question/ Comment: What are the differences in expectations and requirements for PRAs between the application for Construction License stage and the Application for Operating License stage? Please provide examples where PRA and their reviews by the licensee and/or the regulator have resulted in substantial changes to the design of the plant? If there were changes, were these changes identified by the licensee and implemented by initiatives by the licensee/designer or where they mandated by STUK?

Answer: PRA for Construction License Application (Design Phase PRA) is based on preliminary design information and generic reliability data for components. PRA for Operation License Application (Construction Phase PRA) is based on essentially final design information and vendor specific component reliability data, where available, and system modeling is also more detailed.

Items for potential improvements were mainly identified by the licensee, in some cases by the regulator (STUK). Modifications were implemented by the licensee/vendor. Examples include component cooling systems, provisions against external events (blockage due to snow, extreme wind, tornadoes, high seawater) where definite deterministic requirements are not included in regulations.

Q.No	Country	Article	Ref. in National Report
5	Germany	General	all

Question/ Comment: Germany congratulates Finland for a well structured, informative and comprehensive Report.

Answer	Thank you for the kind comment.

Q.No	Country	Article	Ref. in National Report
6	Korea, Republic of	General	Annex p.72~73

Question/ Comment	You described that Loviisa plant adopted the strategy of in-vessel retention (IVR) of corium during severe accident. It is generally known that the plant with capacity of over 1000MWe has high uncertainty in successful operation of the strategy. - Please explain in detail on the basis of the adoption of the strategy at Loviisa plant. - Please provide us, if any, the design modifications and procedural improvements adopted at the plant for the IVR.
Answer	The main factor enabling adoption of the Loviisa in-vessel melt retention strategy is the low power of the reactors, 500 MWe. As a result, the estimated maximum heat flux from the melt is less than 50% of the critical heat flux. The other factors favoring in-vessel melt retention are large coolant volumes in the primary and in the secondary side, no penetrations in the lower head of the RPV, reflective RPV insulation and melting of ice in the ice condensers, which ensures a passively flooded cavity in most severe accident scenarios. Application of the strategy required several plant modifications. The most important were: -mechanism to lower the RPV thermal/neutron shield from the control room. This was required to ensure coolant contact with the RPV -modification of the reactor pit ventilation channels to provide adequate routes for coolant into the reactor pit -modification of the outlet ducts from the pit to ensure large enough passage for steam -installation of screens to prevent debris entering into the reactor pit.

Q.No	Country	Article	Ref. in National Report
7	Poland	General	n/a

Question/ Comment	To what extent do you require detailed technical design documentation at the moment of application for the construction licence (i.e. civil engineering and mechanical erection drawings)? How do you cope with design changes proposed by licensee during the construction?
Answer	The principle is that plant and system design shall be conducted in the construction license phase. This is followed by component/equipment design phase the outcome of which is compiled to construction plans that include e.g. detail drawings. The construction plans shall be approved before start of manufacturing/construction. The design modifications during construction must be first inspected and approved by licensee. After that licensee shall send the documentation to STUK or independent 3rt party Inspection Organization for approval or for information, depending on the importance of the modification.

Q.No	Country	Article	Ref. in National Report
8	United Arab Emirates	General	77

Question/ Comment	Annex 2 Under periodic safety reviews of the Loviisa NPP, a statement is provided on page 77 that “Based on the assessment, STUK considered that the Loviisa Nuclear Power Plant meets the set safety requirements for operational nuclear power plants but there are some reservations related to the redundancy and separation of components needed for performing safety functions”. Please describe the reservations, as well as STUK plans to correct.
Answer	These reservations are originating from the design basis laid down during the 1970’s. One example is the accident risk resulting from fires. The fire compartmentalization is not such that the plant safety functions could be maintained in all possible fire conditions. The licensee has carried out substantial modernizations at the Loviisa NPP since its commissioning to improve safety. Risk factors have been systematically identified and eliminated using operating experience, research and development and probabilistic risk analysis. Examples of such plant modifications include the development of fire detection and fire extinguishing systems, as well as operative fire protection in parallel with structural fire protection. The most recent risk reducing modifications include also improvements to the plant residual heat removal and emergency cooling systems and ensuring the

cooling of reactor coolant pump seals. The licensee has also many ongoing projects for enhancing safety and reducing the accident risk. They include e.g., improvements aiming at prevention reactor coolant pump seal leaks with regard to fire and flood conditions, precautions against oil accidents in the Gulf of Finland, and improvements aiming at reducing the risk arising from heavy load lifting with the structural reliability of the polar crane and developing the procedures relating to lifting.

Q.No	Country	Article	Ref. in National Report
9	United Arab Emirates	General	79

Question/ Comment: Annex 2
Under protection against fires at the Olkiluoto NPP, a statement is made that halon extinguishing systems have been replaced with other extinguishing systems, and that fire risks have been assessed in a probabilistic risk assessment that concentrates on fire issues. Based on this the fire protection of cables, that are critical to safety, have been improved at the entire plant.

It is not clear what has been done to improve the fire protection of cables. This information would be helpful to other operators.

Answer: Fire detectors have been renewed and fire extinguishing systems in cable tunnels and rooms have been improved, thus reducing the risk due to cable fires. The cables have not been replaced.

Q.No	Country	Article	Ref. in National Report
10	United Arab Emirates	General	83

Question/ Comment: Annex 2
Under a common cause failure in main steam line outer isolation valve actuator at Olkiluoto unit 1 (page 83), a situation is described in which a common cause mechanical failure occurred in a valve actuator and in its replacement valve actuator. This information was not communicated by the maintenance personnel, and both units were started prior to the information regarding the failure mechanism being transmitted to the plant's safety personnel or the authorities.

It would be helpful if procedural steps for communication of defects were addressed, and steps taken to preclude recurrence

Answer: This identified problem has been discussed so that safety relevant failures should be more promptly communicated inside licenseeÂ´s organization. In addition guidance in Permit-to-Work system has been clarified to include spare part related aspects. For more detailed information, please see IRS report no. 8029.

Q.No	Country	Article	Ref. in National Report
11	China	Article 6	6

Question/ Comment: STUK is presently(2010) reviewing the application to extend the operation of the pressure vessel at the Loviisa unit 2 until the end of 2030, but why the Finnish Government has granted in July 2007 to Fortum new operating licenses for unit 2 until the end of 2030?

Answer: From start of operation of Loviisa Units 1 and 2 the reactor pressure vessels have been licensed separately in addition to plant licensing. This arises from the specific pressure vessel legislation and from additional need of radiation embrittlement control of the reactor vessels. This is why the licensing of plants and vessels have had different time periods.

The ageing management programme and the related know-how have been actively and systematically developed at the Loviisa NPP since the beginning of 1990's. A number of improvements have been made at both NPP units to reduce the risk of brittle fracture in the reactor pressure vessel. According to the licensee's justification received in periodic safety review (PSR carried out in connection with the licence renewal), the risk of brittle fracture can be sufficiently controlled until the end of the 50-year lifetime (meaning 2030 at Loviisa unit 2). STUK stated in the safety assessment related to the PSR that STUK was not aware of any obstacles of a principal nature for the continued operation of the reactor pressure vessels after the end of current approved time periods (Lo2 2012 and Lo1 2010). STUK stated also that the continued operation of the

pressure vessels needs renewal of the safety analyses and the licensee's assessment of the need for further recovery heat treatments on pressure vessels. STUK has continuous oversight process which includes also ageing management issues. In addition, there will be two periodic safety reviews during the current operating licence period (by the end of the year 2015 and 2023). STUK has now issued a decision that the pressure vessel at the Loviisa unit 2 can be operated until the end of 2030. The application concerning the pressure vessel at the Loviisa unit 1 is expected to be submitted to STUK by the end of 2011.

Q.No	Country	Article	Ref. in National Report
12	China	Article 6	6

Question/ Comment: What is the economical lifetime of the NPP? Why the economical factor is considered in the safety review of extended lifetime for the NPP?

Answer: The Loviisa power plant was reaching its original design age in 2007-2010 at the same time with the latest overall safety review and operating licence renewal. The licensee estimated during the operating licence renewal that the technical and economical lifetime of the plant is at least 50 years according to their knowledge of the plant ageing. Economical factor was included in the licensee's decision to continue the plant operation but was not an issue in the actual safety review.

Q.No	Country	Article	Ref. in National Report
13	Japan	Article 6	p11 left

Question/ Comment: It is reported the Finnish Government granted in July 2007 to Fortum new Operating Licences. Two periodic safety reviews (by the end of the year 2015 and 2023) are to be carried out by the licensee as a licence condition.
Although the period of latest overall safety review of the Loviisa unit1 is different from of unit2, the time of two PSRs are same for each unit.
Were there any discussions about it?

Answer: Typically periodic safety reviews are carried out at the same time for the both units because the plant designs are similar and the same operating organisation is responsible for the both units. Until 2007 the operating licence periods have always been the same for the both units. In the latest operating licence renewal, the new operating licences were granted for unit 1 until the end of 2027 and for unit 2 until the end of 2030 corresponding to the current goal for the plant's lifetime of 50 years. Because the granted operating licence period of the unit 2 is 23 years, there is need for two PSRs during the period. The PSRs should be performed to the both units at the same time, so the deadlines for submitting the PSR to STUK are the end of the year 2015 and end of 2023.

Q.No	Country	Article	Ref. in National Report
14	Japan	Article 6	p11 right

Question/ Comment: It is reported that the application to extend the operation of the pressure vessel at the Loviisa unit 2 until the end of 2030, i.e., to the end of the plant unit's operating license, is presently at STUK's review.
But The Finnish Government already granted Operating Licences in July 2007. What's the purpose of the STUK's review?

Answer: From start of operation of Loviisa Units 1 and 2 the reactor pressure vessels have been licensed separately in addition to plant licensing. This arises from additional need of radiation embrittlement control of the reactor vessels. This is why the licensing of plants and vessels has had different time periods.

So the purpose of the operating license of the reactor vessels is to carry out a specific safety analysis against radiation embrittlement phenomena under various plant transient situations. In the last safety review it was decided to connect the reactor vessel safety reviews to the Periodical Safety Reviews that will take place until the end of 2015 and 2023.

Please see also the reply to question made by China on article 6.

Q.No	Country	Article	Ref. in National Report
15	Japan	Article 6	p12 right

Question/ Comment: It is reported that as the result of the PSR, the physical protection of the Olkiluoto nuclear power plant was not yet considered to be completely in compliance with the requirements of Government Decree.
Until when the situation allowed?
Did STUK require any improvement to licensee with a deadline?

Answer: STUK stated in the safety assessment of the latest Olkiluoto NPP PSR that the arrangements for physical protection of the Olkiluoto NPP have been planned and implemented in a manner that makes it possible to prevent unlawful actions against the plant, but was not yet considered to be completely in compliance with the requirements of Government Decree. The Decree came into force in December 2008. In the PSR decision (October 2009), STUK gave the licensee requirements with deadlines to correct the situation. STUK gave also some additional requirements based on the continuous improvement principle. One example of such requirements was the need for updating the physical protection plan to be more comprehensive and detailed. The updated plan was requested to be submitted to STUK by 30 November 2009. All the deadlines for the improvement requirements were set between 30 November 2009 and 31 January 2010. STUK has reviewed the updated physical protection plan which is now more comprehensive and other documents related to the continuous improvement of physical protection. Some actions are still uncompleted but overall the physical protection of the Olkiluoto plant can be considered to comply with the Government Decree.

Q.No	Country	Article	Ref. in National Report
16	Japan	Article 6	p13 right

Question/ Comment: It is reported that the technical requirements for Olkiluoto 3 unit were specified by using the European Utility Requirements (EUR) document as a reference.
What the position of the EUR in the Finish Regulatory framework?

Answer: It has no formal position in the Finnish Regulatory Framework. The main references for the Finnish rulemaking are the IAEA Safety Requirements and Guides and also WENRA Reference Levels and other statements. The decision to use EUR as a reference was made by the license applicant.

Q.No	Country	Article	Ref. in National Report
17	United Arab Emirates	Article 6	16

Question/ Comment: STUK is to be commended for establishing a simplified and user friendly regulatory structure.

Answer: Thank you for your encouraging comment. These are our objectives when revising our regulatory guide system. The coming years will show how we succeeded.

Q.No	Country	Article	Ref. in National Report
18	China	Article 7.1	7

Question/ Comment: Can the present regulations and guides in force cover all aspects related to nuclear safety of Olkiluoto unit 3 project (EPR)? If can't, please explain how to deal with these uncovered aspects, STUK provides separate technical position or the licensee proposes an alternative procedure or solution to be reviewed?

Answer: The YVL Guides issued by STUK set the detailed safety requirements e.g. to NPPs in Finland. The guides are set in force by the DG of STUK. In case of missing requirement in the YVL Guides, STUK can always prepare a separate decision, signed by the DG, setting the necessary safety requirements. This mandate is given to STUK by the Nuclear Energy Act. Later on, when revising the guidelines, these decisions will then be included in the guidelines. As an example of this alternative procedure was the issue of considering the aircraft impacts: at the time of issuing the construction license to OL3 unit, STUK's guidelines did not include specific requirements on how to deal with this issue. STUK prepared a separate decision setting the safety requirements on how to take into account this threat.

Q.No	Country	Article	Ref. in National Report
19	China	Article 7.1	7

Question/ About the re-structured YVL Guides, what is major adjustment and revision of those? Please state

Comment the major reference documents to the re-structured YVL Guides. What is the major adjustment on laws and guides For EPR project? Some new requirements in new or revised YVL Guide may not applied to a nuclear power unit in operation or under construction, how do STUK require a nuclear power unit in operation or under construction comply with these new or revised YVL Guide.

Answer STUK has issued YVL guides since 1973, always when needed and on issues requiring documented safety requirements. During the years the contents of single guides have been systematically updated but the overall structure has remained the same. In 2005 we decided to â€œclean the tableâ€ and start establishing the guide system from the first scratch. The structure was revised leading also to lower number of guides (now 71, after revision around 40). Also the internal structure of single guides was standardized. All requirements (or logical compilations of requirements) are given a number in the same style as in the IAEA guidelines. In this revision, also some safety areas earlier presented in several guides are now addressed in more detail and systematically in their own specific guides. These are Operation, Ageing, Containment Systems, External and Internal Threats, Uranium Production.

The EPR project as such did not cause need to revise YVL guides. The YVL guides are written such a way that they can be applied to all types of NPPs.

After issuing a new guide STUK asks the licensees of operating units or units under construction to evaluate how their units fulfill the new requirements and, if compliance can not be shown, they are asked to make a justifiable proposal how to reach the same safety level as require by the revised requirements. STUK prepares a plant specific decision, how the licensee has to follow the new requirements and, eventually, which are the back fitting actions considered necessary.

Q.No	Country	Article	Ref. in National Report
20	China	Article 7.1	7

Question/ Comment Please summarize the requirements about the processing and evaluation of operating events on regulation?

Answer Regulatory requirements for Operational Events and for Operational Experience Feedback

General requirements for operational experience feedback and reporting are given in the Finnish legislation i.e. in Government Decree (733/2008) on nuclear safety, physical protection and emergency preparedness. Currently the requirements for event reporting and operating experience feedback are presented in YVL 1.5 and 1.11. STUK is updating the guidelines and will establish a new guide STUK’s YVL guide A.10, which will follow IAEA Guide: A System for the Feedback of Experience from Events in Nuclear Installations Safety Guide NS-G-2.11. The guide includes both external and internal operational experience.

In Finland, the regulations provide adequate guidance for implementing systematic OEF, and the organizations have established necessary structures for it. Each licensee has established its own OEF process, being thus in compliance with the regulatory requirements. STUK reviews the function and results of each OEF process through its supervision processes of nuclear safety and as part of its periodical inspection programmes for operating NPP’s as well as for a unit under construction.

Investigation of events base on the graded approach. Investigation of events have different demands in different categories. Event in the highest cathegory shall analyse by analytical techniques. STUK does not require a specific type of method, but requires that the method:
Provide useful frameworks for demonstrating and documenting the cause- consequence relationship
- To organize the information on events once the evidence has been collected;
- To help in describing the causation of events and developing hypotheses for future examination by experts;
- To help with the assessment of proposed corrective actions.
Reporting bases on the list of different kind of events. Types of event report, timing, format and

content are:

The early notification report by telephone

The preliminary report
- Electronically or facsimile
- Short description
- The level of safety of the plant
- The need to correct factual errors
- Estimation of the safety significance of events
- INES -rating

A main report
- Basic information;
- Narrative description;
- Safety assessment (consequences and implications);
- Causes and corrective actions (taken and/or planned);
- Lessons learned;
- Graphic information for a better understanding of the event (if necessary);

Follow up report

Corrective actions should be tracked and prioritized.

STUK evaluates the safety significance of operational events and the needs for improvements and changes concerning the safety of plant. Licensee's activities, methods and organizational arrangements related to operating experience feedback are inspected within the periodic inspection programmes annually. In addition, area is followed with some specific indicators. If needed, STUK assigns its own investigation to study events and licensee's performance in more detail.

Q.No	Country	Article	Ref. in National Report
21	Korea, Republic of	Article 7.1	p.14

Question/ Comment (page14) It is stated that all requirements having principal nature were, based on the rules of constitutionality, transferred from the Decrees to the Act.
1) What is the main content of the amendment made or to be made to reflect the EU Directives or the results of international peer review?
2) As an EU member, what is the status of EU Directives in the legal hierarchy (constitution, law, decree) in your country?

Answer The only EU Directive causing changes to Finnish Nuclear Act is the Directive 2009/71/Euratom. These are, we have to clarify the Act to say, that 1) licensees responsibility for safety may not be delegated, 2) licensees have to take care of the training of their own staff and, 3) a self assessment study on safety has to be carried out every thee years (including reporting to EU).

In general, the Directives of EU are obligatory directives to amend the national legislation in such a way that it will be in compliance with the Directive requirements.

Q.No	Country	Article	Ref. in National Report
22	Korea, Republic of	Article 7.1	p.15 & p. 25

Question/ Comment Is it correct if we understand that the description on the nuclear liability issue in the part of Article 7(Legislative and regulatory framework) in page 15 and the last paragraph in the part of Article 9(Responsibility of the license holder) in page 25 mean that you have already amended the Finnish Nuclear Liability Act, and further it will enter into force on the same date as that of the new Paris/Brussels Conventions?

Answer Yes, that is correct. The Finnish nuclear liability act has been amended to reflect the changes of Paris/Brussels Convention. However, because the revised conventions have not been ratified yet,

also the Finnish amendments are not in force.

Since preparing the Finnish report, the situation has been changing such a way, that the Finnish Government has decided to amend the nuclear liability act on purely national basis and not anymore to wait for the ratifying of Brussel/Paris conventions changes. At the moment, the bill is being prepared to enact on licensees' unlimited responsibility and a subsequent major increase in the sum, which the licensees have to make available through insurance, for compensation of damages in case of nuclear accident.

Q.No	Country	Article	Ref. in National Report
23	Russian Federation	Article 7.1	pp. 17-20

Question/ Comment: According to the definition of the Convention Article 2 the "regulatory body" means any body given the legal authority to grant licenses and to regulate the siting, design, construction, commissioning, operation or decommissioning of nuclear installations. In Finland all the regulatory provisions at the level of obligatory requirements are set by the Government decrees, and STUK is authorized to control all the above activities and to publish the corresponding "guides". Thus, the position and tasks of STUK do not comply with the tasks of the regulatory body set by provisions of Articles 2 and 7 of this Convention though it is shown on Figure 5 of the Report exactly as a regulatory body. In essence, STUK is a regulator of nuclear and radiation safety with very wide authorities.
Please give your comments to the above statements.

Answer: According to article 2 the regulatory body can be consisted of several bodies, depending on the national legal infrastructure. It is not a convention requirement, that all the licensing and regulation activities would be taken care by same organization. E.g., in Finland the NPP construction and operation licenses are granted by the Government, but only if STUK's safety assessments are supporting this. Higher level safety requirements (at the level of acts and decrees) are often prepared by STUK and issued by the Government. At the level of safety guidance STUK prepares the YVL guides and also sets them into force. We don't recognize any discrepancy between the Finnish legal and regulatory infrastructure and the definitions and aims of the convention.

Q.No	Country	Article	Ref. in National Report
24	Russian Federation	Article 7.1	pp. 14-20

Question/ Comment: According to the information contained in the report, the mission of STUK is "to protect people, society, environment, and future generations from harmful effects of radiation". Then, how are we to deal with the prime responsibility of the license holder to ensure the safe use of atomic energy, which is also imposed on the licensee by the same law?

Answer: We think, that STUK's mission is not contradictory to or in anyway replace or diminish the responsibility of the licensee of safety. This licensee responsibility is stipulated in the Nuclear Energy Act and can not be overridden by any mission statements by STUK. STUK also sets the detailed safety requirements on the safe use of nuclear energy and is responsible for the regulatory control of them.

Q.No	Country	Article	Ref. in National Report
25	Slovenia	Article 7.1	p.15 and/or p.25

Question/ Comment: The revised law will also have some other improvements, like extending the claiming period up to 30 years for victims of nuclear accidents.
Is extended 30 years prescription period only for personal injury claims or for all other claims as well?

Answer: According to the act amendment the 30 years claiming period covers only personal injury. Please see also the answer to the question on same topic made by Korea, Republic of.

Q.No	Country	Article	Ref. in National Report
26	United Kingdom	Article 7.1	Page 15

Question/ See also Annex 1 Page 69

Comment In this section it is mentioned that YVL regulatory guides are in the process of revision and YVL 2.5 The Commissioning of a nuclear power plant (Annex 1, page 69) has not been revised since 2003. Given the current status of construction of Olkiluoto 3, what priority is given to YVL 2.5 in the plan for the revision of the regulatory guides?

Answer Current version of the Guide YVL 2.5 gives adequate requirements concerning the commissioning of Olkiluoto unit 3 and there is not any urgent need for updating the Guide because of this. All STUK's regulatory guides (YVL Guides) are under revision and the target for publishing new guides is the end of year 2011. Requirements concerning commissioning will be included in the new Guide YVL A.5, Construction of a NPP, mainly based on the existing requirements in the Guide YVL 2.5. The last update of the Guide YVL 2.5 took into account also the recommendations presented in the IAEA safety guide on commissioning (NS-G-2.9).

Q.No	Country	Article	Ref. in National Report
27	Japan	Article 7.2.1	P15 right

Question/ Comment Are there any examples of alternative procedure by licensee for the requirement of YVL Guide and that are approved by STUK?

Answer It happens very seldom that the licensees propose to STUK alternative solutions at system design level or changes in procedures to be followed e.g. in plant operations. With regard to administrative requirements presented in YVL's (like timing of inspections, content and timing of documentation submittal, review and approval), occasionally licensee presents an alternative method to proceed and to meet the same level of safety. At the level of plant equipment (e.g. maintenance, spare parts etc.) it is common that e.g. technical standards referenced in YVL guides will be replaced with newer standards.

Q.No	Country	Article	Ref. in National Report
28	Japan	Article 7.2.1	p16 right

Question/ Comment "To update the contents of the regulatory guides, especially with the lessons learnt from the Olkiluoto unit 3 project";
What were the major lessons learnt that were incorporated into the regulatory guides?

Answer Some examples are the following:
- More emphasis will be put in new YVLs on licensee's and vendor's resources, competencies, management system, project management, requirement management
- More emphasis will be put in new YVLs on design completeness and design documentation in the Construction License phase, and design management from there on as well as on clarity of safety and design requirements and use of codes and standard
-a plan covering all licensing steps with their schedules has to be provided
-STUK will delegate major part of its inspections to outside organizations; a system to control these companies will be established
-more STUK audits at the stakeholder organizations during CL application evaluation
- STUK will reject and return poor applications after preliminary check.

Q.No	Country	Article	Ref. in National Report
29	Czech Republic	Article 7.2.2	Page 18

Question/ Comment Please provide further details of the justification of a new build as a high-level assessment of whether the benefits of new build outweigh the detriments (the justification of a practice).
Which part of the new build licensing could be identified as justification and who could be regarded as the supreme justification authority?
What is the relationship between Decision in Principle and SEA (Strategic Environmental Assessment)?

Answer According to the Finnish Nuclear legislation it is the Government to decide, whether or not the requirement of the act (NEA §6: The use of nuclear energy, taking into account its various effects, shall be in line with the overall good of society) is followed. This phase of decision making has to some extent political nature but also includes a preliminary assessment by STUK of capabilities to fulfill the safety requirements.
The Environmental Impact Assessment has to be carried out before applying for the Decision in

Principle. The results of the assessment have to be enclosed to the application for DiP.

Q.No	Country	Article	Ref. in National Report
30	Japan	Article 7.2.3	p19 left

Question/ Comment: "STUK conducts ad-hoc inspections if seen necessary."
What kind of inspections does it perform?
In what case does STUK judge the necessity of additional inspections?

Answer: This means that STUK may add additional inspections into Inspection Programme if seen necessary or during the year STUK may decide on additional inspection ad hoc. These decisions do not have any strict criteria. Latest ad hoc inspections STUK has done on Olkiluoto 3 construction site. These inspections were triggered by inspectors' findings related to safety culture and information security on site. Conduct of inspections is similar to any other Inspection Programme inspections.

Q.No	Country	Article	Ref. in National Report
31	Japan	Article 7.2.3	p20 left

Question/ Comment: On the licensee's application, STUK may approve separate inspection organizations to carry out specified regulatory control duties.
In what cases are separate inspection organizations approved to carry out such duties?

Answer: This refers to the independent 3rd party Inspection Organizations (IO) that can carry out inspections on behalf of STUK. IOs can be used based on licencees application e.g. for Safety Class 2 components although SC 2 belongs normally to STUK's inspection area. The IO proposed shall have STUK's approval before starting the inspection activity.

Q.No	Country	Article	Ref. in National Report
32	Poland	Article 7.2.3	p. 19

Question/ Comment: Does the Construction Inspection Programme covers also inspections on manufacturing of components in foreign countries? If yes – how does STUK assures itself authority to perform inspections abroad? What is working language of such inspections?

Answer: The construction inspections are carried out at manufacturer's premises that often locate in foreign countries. STUK nevertheless holds the authority because the component of question belongs to Finnish NPP project and is, thus, linked solely to Finnish radiation safety activity. It should be also mentioned that STUK controls the Finnish licensee who has the main responsibility on nuclear safety. The licensee's and STUK's construction inspections are always carried out during the same inspection visits. The principle is that the licensee makes its inspection first. STUK's inspection is followed when the licensee has approved the documentation and the component. The working language is English and interpretation is used as necessary.

Q.No	Country	Article	Ref. in National Report
33	Russian Federation	Article 7.2.3	pp.14-20

Question/ Comment: There is nothing stated in the Report with respect to the terms of licensing, though this issue is addressed in the Parts iii and iv of the Convention Article 7. Could you please clarify the situation?

Answer: The plant license typically includes 1) plant identification data, 2) max. power level, 3) duration of the license, 4) time point for any Periodic Safety Reviews, 5) amounts and types of nuclear materials to be used, 6) and max. amount of radioactive waste generated. The safety requirements follow directly from the nuclear legislation and STUK's YVL guides, and therefore, are not anymore mentioned in the license.

Q.No	Country	Article	Ref. in National Report
34	Slovenia	Article 7.2.4	p.20

Question/ Comment: The enforcement system includes provisions for executive assistance if needed and for sanctions in case the law is violated. How many times the law was violated in Finland NPP in the last 3 years?
How STUK react in such violations?

Answer: There are no cases known by STUK.

Q.No	Country	Article	Ref. in National Report
35	China	Article 8.1	8

Question/ Comment: Please summarize the major contents of education and training programs for new regulatory staff members at STUK.

Answer: STUK has developed introductory training program for new regulatory staff members. This training is personalized depending on previous experience and it covers legal and regulatory issues, inspection and review practices, STUK's management system and also issues related to employment and civil servants.
In addition all new inspectors participate national version of Basic Professional Training Course on Nuclear Safety, which have been developed on the basis of IAEA's BPTC. The duration of the Finnish course is 19 days and it covers all technical and legal issues.

Q.No	Country	Article	Ref. in National Report
36	Japan	Article 8.1	p24 right

Question/ Comment: What is the procedure for the approval of the fund to support safety research and waste research? Are representative of licensees participate in the process and is the cost for the fund included in the electricity fee?

Answer: The funding of these programmes has basis on legislation. Section 53 a in nuclear energy act is â€˜ Fee collected from nuclear facility operator. Principles of research funding are presented there. These programmes have steering groups which are chaired by regulator and which have members from all stakeholders, including licensees.

In 2011 National Nuclear Power Plant Safety Research SAFIR2014 and Finnish Research Programme on Nuclear Waste Management KYT2014 are in progress. Both research programmes have an own research plan for the period 2011-2014. The aim of both programmes is, besides producing scientific and technical results, to ensure the maintenance and development of Finnish expertise. These new programmes are continuations of earlier government-led nuclear safety research programmes.

Q.No	Country	Article	Ref. in National Report
37	Japan	Article 8.1	p22 right

Question/ Comment: At the end of 2009, the number of staff in the department of Nuclear Reactor Regulations (STUK) was 106.
Does the number include STUK's resident inspectors?
How many resident inspectors are posted per plant?

According to "Oversight during construction", "STUK has four resident inspectors overseeing the construction, installations, and commissioning work at the Olkiuoto site."
Are about four resident inspectors currently posted at each power plant such as Loviisa?

Answer: The number of staff (106) includes inspectors, resident inspectors, oversight support, and department services. STUK has currently two resident inspectors overseeing the existing units in Olkiluoto (units 1 and 2), two resident inspectors at the existing units in Loviisa (units 1 and 2), and four resident inspectors overseeing the construction, installation, and commissioning work in Olkiluoto (unit 3).

Q.No	Country	Article	Ref. in National Report
38	Romania	Article 8.1	page 24

Question/ Comment: Could you please provide more information on the research projects in the area of the assessment of safety culture conducted as part of the research programme SAFIR2010?

Answer: One area of research has been safety culture and organizational learning. It is Finnish TSO (VTT) whose researchers have studied this area. More information can be found from VTT/SAFIR 2010 website (www.vtt.fi/safir2010/).

Q.No	Country	Article	Ref. in National Report
39	Russian Federation	Article 8.1	pp. 20-24

Question/ In Finland the cost of the regulatory oversight performed by STUK is charged in full to the

Comment licensees. Along with that, starting from 2000, these fees are paid by the licensees to STUK directly. Considering that the financial independence of the regulatory body is a significant element of its general independence from all the other organizations acting in the area of atomic energy use, in our opinion, the Convention's requirements are not fully met here. Please give your comments, is it planned to change the existing situation?

Answer Since the beginning of the operation of nuclear power plants in Finland the costs of the regulatory control have been charged to the licensees. Until the end of 1999, the licensees paid STUK's invoices to the Government (State Treasury), and STUK received the needed financial resources through the state budget. The strategy of reimbursing regulatory control costs was changed in 2000 to so called net budgeting model. This approach is a common practice in Finland, based on the legislation. This means that the licensees pay the regulatory control fees directly to STUK. The change concerning reimbursing of STUK's regulatory control costs was carefully analysed and discussed.

The reimbursement principles are provided in the Finnish legislation, and the licensees have to pay STUK's invoices based on the law. This practice has not endangered the independence of STUK as a regulatory body, and this practice is not considered to be against to the obligations of the Convention. It is not planned to change the existing situation.

Q.No	Country	Article	Ref. in National Report
40	Russian Federation	Article 8.1	pp. 20-24

Question/ Comment The Report mentions the periodic inspection program as a basis for STUK regulatory activities. Could you please clarify what is this program: a working document or a standard guide, or, probably, both exist?

Answer Inspection Programs for operating plants as well as for plant(s) under construction are part of STUK's Quality Manual. Manual has guides that define the scope and conduct of inspection programmes in general level as well as descriptions of the content of each inspection. This is overall description so every inspection is then planned individually in inspection plan to incorporate up-to-date issues and current activities.

Q.No	Country	Article	Ref. in National Report
41	Slovenia	Article 8.1	p.24

Question/ Comment How many STUK staff are full-time and part-time working in the area of training?

Answer At STUK level we have 1 full-time training manager, all departments have their own persons who are responsible on training issues. On nuclear reactor regulation and nuclear materials and waste management STUK has 2 part-time staff member. In addition STUK has one staff member working with training for external organizations.

Q.No	Country	Article	Ref. in National Report
42	Switzerland	Article 8.1	23

Question/ Comment According to figure 9 the full time equivalents (FTE) for Olkiluoto unit 3 at STUK were about 35 person years at the end of 2009.

How are the forecasts of FTEs at STUK for Olkiluoto unit 4 and Loviisa unit 3? How do you translate these forcasts of FTE into increase of number of personnel at STUK?

Answer Since there are no firmly scheduled plans from the utilities, STUK has not yet done FTE or staffing forecasts for Olkiluoto 4 or Fennovoima 1 (There is no positive Decision in Principle for Loviisa 3). Resources needed in the new projects depend on several external factors (like timing of the two projects, choice of plant vendor, and resources needed for the oversight of Olkiluoto 3 operating license and commissioning).

STUK is currently renewing regulatory guides that will have an impact on the resources needed by the regulator in different phases of new build projects. In the new projects, STUK will put more emphasis on the early phases of the project to ensure completeness of the design, competence and

resources of the license applicant and plant vendor and its' major contractors. In addition, STUK will use inspection organizations more in the future projects for review and assessment and inspection activities.

With that STUK does not believe that a significant number of new recruitment is needed due to Olkiluoto 4 and Fennovoima 1.

Q.No	Country	Article	Ref. in National Report
43	United Arab Emirates	Article 8.1	22

Question/ Comment: Article 8 identifies that STUK's operations have been assessed by a peer review. Full scope IRRT mission (IAEA's International Regulatory Review Team) was carried out in 2000 and a follow-up mission in 2003. What were the findings of these assessments?

Answer: During the International Regulatory Review Team (IRRT) mission in the year 2000 several good practices were identified and also many recommendations and suggestions were presented to further improve the regulations and regulatory control activities in Finland. These recommendations and suggestions related e.g. to the enforcement policy, regulatory control of the research and development work related to the final disposal of nuclear waste, STUK's inspection program and its resources, and development of the regulatory guides. Special consideration were given on how detailed the inspection program is and on how prescriptive the YVL guides are. Based on the report STUK established and implemented an action plan.

During the follow up mission in the year 2003 it was concluded that STUK had taken initiatives to address all the recommendation and suggestions from the IRRT mission. Nearly all the recommendations and suggestions had been adequately addressed. Some new recommendations were given. They related to the construction of the proposed underground research laboratory and regulatory control of transport of radioactive materials. Based on the follow up mission report STUK established an action plan which were implemented in following years.

As mentioned in the Finnish 5th national report, an Integrated Regulatory Review Services (IRRS) mission will be carried out in Finland in October 2012.

Q.No	Country	Article	Ref. in National Report
44	United Arab Emirates	Article 8.1	24

Question/ Comment: Article 8 identifies that on average 5% of the annual working hours for STUK employees have been used to enhance the competence, training. This is commendable.

Answer: The amount that a regulatory should use for competence enhancement depends of course on the situation. STUK is a established regulatory body and we have found this average good for staff members who already have regulatory experience. In the case of new comers the percentage of working time spend on competence building should be higher.

Q.No	Country	Article	Ref. in National Report
45	United Kingdom	Article 8.1	Page 24

Question/ Comment: The report states that "STUK has adopted a competence management system". How does STUK determine its competence needs in both the short and medium term?

Answer: For long and medium term the determination of competence need starts from the strategy. The long term objectives are derived from strategy and competence need are depending on those. STUK also uses regularly human resource planning (incl. forecasts for retirements) as a basis for long term analysis.
The other perspective is starting from organization, tasks and job descriptions. Short term competence need is be analyzed by using STUK's competence analyses tool as a TNA (training need assessment).

Q.No	Country	Article	Ref. in National Report
46	Russian Federation	Article 8.2	Article 7, pp. 14-20

Question/ Comment: The Ministry of Employment and Economy is the authority, which, in accordance with the Nuclear Energy Act, identifies the energy policy, and thus, is an entity promoting the use of

atomic energy. Therefore the performance by the Ministry of the licensing functions contradicts Part 2 of Article 8 of the Convention prescribing effective separation of such functions. What is the position of the Finnish party with regard to this issue?

Answer The licensing process for a new nuclear power plant includes the following phases: decision-in-principle, construction license and operating license phases.

The Decision-in-principle is done and licenses for the construction and operation are granted by the Finnish Government. However, the Government is not considered as regulatory body. The related administrative preparation work is carried out by the Ministry of Employment and the Economy, but the Ministry is not a decision-making body. In addition to safety, many other essential issues are considered, and therefore the licensing decisions are made in Finland at the governmental level.

The Nuclear Energy Act includes conditions for Decision-in-principle and for granting licenses. These conditions relate also to safety. According to the Nuclear Energy Act, STUK's statement is needed for Decision-in-principle and for granting construction and operating licenses. In the statement is it considered whether safety related conditions are fulfilled. So STUK has a clearly defined role in the licensing process based on the Nuclear Energy Act. STUK also carries out regulatory control for ensuring that the license conditions and safety regulations are fulfilled during the construction and operation of a nuclear power plant. Accordingly, STUK is the regulatory body referred to in the Convention.

Q.No	Country	Article	Ref. in National Report
47	Russian Federation	Article 8.2	pp. 20-24

Question/ Comment It is stated in the Report that the regulatory guides contain detailed STUK safety requirements as well as administrative procedures in the area of atomic energy use. The guides are the obligatory rules for the license holders and other organizations concerned. However, it is also allowed having other, alternative procedures or decisions to be submitted to STUK provided they are proved to be acceptable and ensure the safety level set by the Nuclear Energy Act. STUK continuously updates the guides, along with that the new or updated guides are directly applicable only for the new installations, and with respect to the already existing installations STUK makes individual decisions. Thus, there are numerous updates and new guides and the old installations gradually go out of their area of action and are regulated by the individual decisions of STUK. In our view, this results in gradual development of preconditions for complete destruction of the main principle of ultimate responsibility for safety of the operating organization set by Convention Article 9. What is going on with compliance to the obligatory requirements of the Government decrees along with that, also remains unclear.
Please give your comments to the above statements.

Answer It is the Finnish policy continuously to develop the regulations to take into account the latest safety knowledge. In case of older units the new requirements are taken into account to the extent it is feasible. This decision making is done case by case by STUK after hearing the licensees. Always when making bigger changes at an older plant it is necessary to evaluate to effects of the change on other plant systems and, in general, on the balance of the plant. PSA methods are in use in this context. We also carry out Periodic Safety Reviews every 10 years to reveal, as one tool, that the design base of the plant has remained sound and no cumulative deteriorating modifications have been done.

Q.No	Country	Article	Ref. in National Report
48	Russian Federation	Article 8.2	pp. 20-24

Question/ Comment In the description of the licensing process in the Report it is mentioned that in accordance with the Government decree, prior to commencement of different phases of a nuclear installation construction performed with the scope of the corresponding construction license it is necessary to receive a STUK safety statement confirming that all the safety factors and regulatory provisions have been given sufficient consideration. The Report does not contain any information describing what these phases are, who establishes them and in which documents.

Please provide us with the missing information.

Answer In Finland, mandatory safety regulations are provided in the Nuclear Energy Act and decrees issued by the Government. Safety related Decrees are prepared by STUK based on the Nuclear Energy Act.

In addition to safety decrees, STUK prepares and issues safety guides (YVL Guides). When a new safety guide is issued, STUK makes a separate decision on how this guide will be applied to operating nuclear power plants and plants under construction. These decisions are mandatory. For new nuclear power plants the guides are applied as such.

The YVL Guides provide detailed information on which approvals are needed from STUK and how STUK conducts the regulatory control activities. Guide YVL 1.1 includes general overview on STUK's regulatory control work during the construction and operating phases of a nuclear power plant. The Guide YVL 1.1. is available in English at STUK's website.

During the construction phase of a nuclear power plant STUK controls that the facility is constructed according to the safety requirements and approved documents. Subjects to the approval of STUK are e.g. safety related structures, systems and components of the plant.

Q.No	Country	Article	Ref. in National Report
49	Russian Federation	Article 8.2	pp. 20-24

Question/ Comment It is stated in the Report that in some cases STUK performs under its leadership some joint inspections (obviously, jointly with the operating organization). Such a practice puts the operating organization in the position of being subordinate to STUK, which violates the principle of ultimate responsibility of the operating organization for safety.
Please give your comments with respect to this issue.

Answer In the report it is stated that STUK may assign own investigation teams to evaluate events deemed to have special importance. The related inspections are usually conducted by STUK's leadership. The investigation teams may also include external experts from TSOs, universities or other competent organizations but the operating organizations are not included in the teams. The operating organizations have to conduct their own evaluations of the events and report their findings to STUK as described in the report. In this way they take care of their own responsibility.

Q.No	Country	Article	Ref. in National Report
50	Russian Federation	Article 8.2	pp. 20-24

Question/ Comment As follows from the Report, although STUK does not grant the licenses by itself, it possesses wide authorities in the area of safety regulation by means of the guides and direct decisions. An impression is produced that no decision of any safety significance can be made by the operating organization without approval of STUK. In what form these approvals are issued, remains unclear from the presented descriptions, but, obviously, this is effected not through the licensing terms, because licensing is separated from practical nuclear oversight activities of STUK. The approvals of STUK are required for appointment to a number of positions in the operating organization, whose activities are safety related. STUK is involved in examination of the shift personnel instead of independent oversight of such activities, which is included into responsibilities of the operating organization. Multiple approvals of STUK are required in the process of NPP commissioning and operation. The programs of non-destructive in-service testing for the pressurized components are submitted for STUK approval prior to each specific inspection. STUK approvals are also needed for numerous testing programs. STUK is authorized by law to require NPP upgrading.
Doesn't it seem that all the above leads to the transfer of the safety responsibility (despite the presence in the Finnish laws of a provision giving this responsibility to the operating organization) to STUK as the main actor, and thus, - to the destruction of the principle of operating organization prime responsibility for safety set by the Convention Article 9?

Answer The licensing process for a new nuclear power plant includes the following phases: decision-in-principle, construction license and operating license phases.

The Nuclear Energy Act includes safety conditions for Decision-in-principle and for granting licenses. According to the Nuclear Energy Act, STUK's statement is needed for Decision-in-principle and for granting construction and operating licenses. In the statement is it considered whether the conditions are fulfilled.

In the Nuclear Energy Act it is stipulated in the Section 9, Licensee obligations, that it shall be the licensee's obligation to assure safe use of nuclear energy. Further, in the Section 7f it is stated that the holder of a construction license is responsible to see that the nuclear facility is constructed according to the safety requirements and the holder of an operating license is responsible to see that the nuclear facility is operated according to the safety requirements.

Also in Guide YVL 1.1 it is stated that the licensee bears prime responsibility for the safety of a nuclear facility. It is essential that the measures of the licensees shall be sufficient to ensure safety and that STUK independently verifies the achieving of the required safety level by regulatory control.

In the regulatory control activities the undivided safety responsibility of the licensees is taken into account. The regulatory body shall retain its objectivity when evaluating safety provisions. This presupposes that the representatives of STUK do not provide ready made models concerning operations or technical solutions to the licensees.

The licensees always have to make their own decisions first. STUK follows very carefully that the licensees bear their responsibilities in all safety related activities and that this responsibility is not shifted to STUK.

Q.No	Country	Article	Ref. in National Report
51	United States of America	Article 8.2	8.2, p 24

Question/ Comment: (1) What are the primary elements of STUK's competence management system?
(2) How does STUK identify current or future knowledge gaps and ensure the availability of experts in a given area?

Answer: (1) Competence and expertise are STUK's values. Managers have responsibilities on CM in their units. CM is integrated in our management system and we have policy statements on competence building and all individuals are courage to improve their competence continually. The routines of competence management are: a) annual competence analysis (self assessment by individuals and assessment by managers and then the gap analysis) . b) Gap analysis is used as an input for annual training programmes.
(2) For long and medium term the determination of competence need starts from the strategy. The long term objectives are derived from strategy and competence need are depending on those. STUK also uses regularly human resource planning (incl. forecasts for retirements) as a basis for long term analysis. The other perspective is starting from organization, tasks and job descriptions. Short term competence need is be analyzed by using STUK's competence analyses tool as a TNA (training need assessment).

Q.No	Country	Article	Ref. in National Report
52	Japan	Article 9	p25 right

Question/ Comment: It is reported that the licensee with a waste management obligation shall submit the waste management scheme and the calculations of waste management costs, which are based on the scheme, to the Ministry for approval for the first time early enough before beginning the operations producing nuclear waste, and at the latest in connection with the operating licence application.
Are the procedures of the approval for current facilities or units already done?

Answer: Yes. The licensees must every three years supplement the approved waste management schemes and the associated calculations and, for the estimation of the assessed liabilities, submit the following documents to the Ministry:
- the revised and supplemented waste management scheme,

- information on the costs and prices of waste management measures,
- information on the amounts of nuclear waste included in the waste management obligation and on the necessary waste management measures, and
- the resultant calculation of the total costs of nuclear waste management.

Before approving the waste management scheme the Ministry must obtain a statement from STUK on factors relating to the safety of the measures presented in the waste management scheme.

Q.No	Country	Article	Ref. in National Report
53	United Kingdom	Article 9	Page 26

Question/ Comment: See also page 63
The report states (page 26) that “Due to changes in Fortum’s organisation, the responsible director at the Loviisa NPP changed in 2008 and then again in 2009. In addition, a restructuring of the unit responsible for safety at the Loviisa NPP has taken place, and new employees have been recruited for the unit”. On page 63 it states that in 2009 there were significant organisational changes, particularly in the area of technical support.

What criteria did STUK use to establish whether these organisational changes were acceptable and to determine that safety is not compromised?

Answer: STUK approves responsible directors so that they fulfill competence criteria. Organisational changes are inspected based on licensee´s own evaluation that is required in major safety related changes. Criteria for approval is not explicitely stated, however STUK has required additional information in some of these cases if STUKÂ´s own inspection has raised concerns in these changes.

Q.No	Country	Article	Ref. in National Report
54	Canada	Article 10	27

Question/ Comment: How did STUK conclude that the OL3 site (installers, designers and licensee) has implemented and is working with a satisfactory safety culture? What elements of the site safety culture, if any, require improvements?

Answer: OL3 site has been subject to safety culture inspections in co-operation with VTT experts. Based on these inspection findings and lisensee´s and vendors own initiatives there has been actions to enhance safety culture. STUK has approved and followed these actions. As an example one aspect of safety culture has been the possibilities to raise concerns inside the OL3 project. Another issue is how to communicate the safety requirements and safety importance of individual work phases so that everyone understands the importance of their own actions.

Q.No	Country	Article	Ref. in National Report
55	Canada	Article 10	31

Question/ Comment: What elements of the design or regulatory/licensing processes which, if improved, could have avoided the project delays/concerns associated with OL3 Digital I and C? Please clarify how these processes were modified or improved by STUK (or by the licensee/vendor) to avoid future problems in a new build reactor for either Digital I and C or First of a Kind features?

Answer: It is essential, that there is own design process to overall I&C architecture. This process must be part of I&C lifecycle. The main goal of this process is to coordinate tasks and boundaries of individual I&C systems and give basic automation side requirements to individual I&C systems. E.G. overall functionality, diversity, defence in depth, fault propagation preventing, cyber security, quality, followed standards and main requirements of equipment qualification issues must be coordinated in this level.

It is also essential to plan equipment and system qualification in early phase in the project. Software based systems are very hard to qualify for safety critical usage, if there are no evidence of the quality from the design phase of the system. So there must be some principal selection criterions in the main qualification plant for equipments and systems in the early phase of project.

Q.No	Country	Article	Ref. in National Report

56	Japan	Article 10	p26 left
Question/ Comment	What are the most important factors/conditions during the process of the approval for the responsible director of construction and operation?		
Answer	Basic education, nuclear work experience and required university degree are quite straightforward to inspect. In addition STUK has a discussion session where individual need to present their own views and opinions of the different areas of responsibilities of responsible directors mandate. These include radiation and nuclear safety, nuclear materials, security issues, emergency preparedness.		
Q.No	Country	Article	Ref. in National Report
57	Japan	Article 10	p27 right
Question/ Comment	"STUK conducts an inspection at least every third year based on the periodic inspection program." Does STUK conduct sometimes an unannounced inspection? How often and on what occasions does STUK carry out periodic inspection?		
Answer	Inspection program includes about 22 inspections per year per licensee. The whole content of inspection programme should be inspected in 3 years timeframe. STUK's Quality Manual describes the scope and conduct of periodic inspection programmes. Manual enables STUK to perform also unannounced inspections. During the recent years, STUK has not conducted any unannounced inspection within the Inspection Program. Instead, STUK has resident inspectors (RI) at both sites who have access to anywhere at the site. RIs follow licensee's activities on a daily basis without any pre announcement to the licensee. In addition, there have been some ad hoc inspections outside the scope of planned inspection programmes. These are announced to the licensee a day or two prior to inspection.		
Q.No	Country	Article	Ref. in National Report
58	Korea, Republic of	Article 10	p.27
Question/ Comment	It is stated that a top level inspection of the periodic inspection programme, "Management and Safety Culture", includes an assessment of safety culture issues, management and leadership. - what are the critical issues and findings, and how the improvements or corrective actions are reflected in your work? - What components or indicators are used in the assessment of safety culture?		
Answer	STUK does not evaluate the licensee´s safety culture as such. STUK inspections are evaluating licensee´s own assessments, actions and stated policies regarding safety culture. STUK´s inspectors may judge licensee´s assessments and actions based on own information. As an example, operating events as well as operating decisions of the licensee are significant inputs to initiate discussions on licensee's safety culture.		
Q.No	Country	Article	Ref. in National Report
59	Korea, Republic of	Article 10	p.27
Question/ Comment	Report says that STUK has inspected the management systems of both licensees for completion of the updated guide and topics on safety culture are also included in the STUK's periodic inspection programme - Are there experts (how many) specialized in organizational culture, human performance, or interview skill and so on in STUK? - What are the main results on safety culture assessments for Olkiluoto unit 3 construction site which was recently conducted? - Is there any possibility that the safety culture is affected by the pressure from the management on construction schedule?		
Answer	STUK has 4 HOF experts and few others who have related experience. See also the answer to question by Canada on article 10. Management is one key factor in promoting strong Safety culture. This can be seen in the OL3		

site. Safety culture is larger issue that goes beyond schedules.

Q.No	Country	Article	Ref. in National Report
60	Romania	Article 10	art. 10, page 27; art. 13, page 35

Question/ Comment: On page 27 of the report there are several mentions of safety culture relevant topics included in the regulatory inspection programme. Are there any specific guidelines and / or training provided to STUK inspectors in order to assist them in recognising issues relevant to safety culture in the licensees' organisations?

What references / guidelines are used for developing the procedure for collecting observations concerning management system and organisational issues (mentioned on page 35 of the report)?

Answer: STUK has regulatory guide on Management Systems that includes requirements for safety culture. This guide is in line with GS-R-3. Inspectors who are responsible of related inspections in the inspection programme are experts in safety culture issues.

STUK has started internal project to develop more coherent and structured way to collect and analyze management and organizational findings as a day to day activities of all inspectors.

Q.No	Country	Article	Ref. in National Report
61	United States of America	Article 10	10.2 p 25-27

Question/ Comment: In the 5th CNS report, Finland clearly demonstrated governmental commitment to, and the legal framework for, a strong safety culture in the construction and operation of nuclear facilities. Is there a similar effort to promote a good safety culture within STUK and the Ministry of Employment and the Economy?

Answer: Finnish public offices are legally required to follow good governance principles. As a nuclear regulator STUK has promoted safety culture inside the whole industry not only as a regulator but also thorough co-operation and research. In 2010, STUK's Nuclear Reactor Regulation department participated in a survey on how safety culture is addressed within the organization. In addition, a seminar was organized in 2010 in which expectations for good safety culture as well as assessment of safety culture in safety critical organizations could be made more practicable.

Q.No	Country	Article	Ref. in National Report
62	United States of America	Article 10	10.2 p 26

Question/ Comment: The July 2008 follow up to the May 2007 OSART review at Loviisa found that some recommended development actions had not been started.
(1) Are steps now being taken to address all of these recommendations?
(2) What were the findings of the WANO peer review that was performed in March 2010?

Answer: It was recognized that follow-up mission was in Loviisa rather soon after actual OSART mission and due to this there were not yet adequate actions in place for all identified recommendations during follow-up mission. There were a few issues that the plant did find that further actions were needed after follow-up mission and remedial actions are either taken or still in progress for some areas.

WANO keeps their reports confidential. Loviisa have discussed the results with STUK in overall terms and as a broad conclusion one can say that the overall picture of WANO was that it addressed very similar issues that OSART mission highlighted.

Q.No	Country	Article	Ref. in National Report
63	Germany	Article 11.2	page 29, left column

Question/ Comment: In the article 11 is stated that "STUK is under the impression that the workload of certain key persons has increased because TVO deploys its personnel for the needs of both the operational units of Olkiluoto 1 and 2 and the construction site of Olkiluoto unit 3.
Question: Is there sufficient personnel trained and already available for unit 3?

Answer: Personnel recruitment for OL3 has been successful although project delays have made the planning effort more difficult. STUK has discussed with the licensee the resources needed for operating organization of OL3. Based on these discussions and plans presented so far to STUK,

OL3 personnel has been and can be recruited in a timely manner.

Q.No	Country	Article	Ref. in National Report
64	Japan	Article 11.2	p29 left

Question/ Comment: TVO operates a data system designed for competence management.
Could you show an advantage of the system compared with before?

Answer: This system is very efficient at nuclear power plant where are many competence requirements for different positions. These competences need to be regulary updated and managed so it is more than helpful to organize these kind of record in efficient manner.

Q.No	Country	Article	Ref. in National Report
65	Slovenia	Article 11.2	p.28

Question/ Comment: Could you please provide some additional information about examination (e.g. who performs examination, is there also an oral examination, …)

Answer: STUK licensing process for power plant operators includes written exams, simulator test and oral exam. Licensee has undivided responsibility to establish and organize these examinations and to evaluate the results. STUK does participate in the oral exam and evaluates the licensee´s assessments. Typically unit operating manager is the licensee´s responsible examiner in the oral exam.

Q.No	Country	Article	Ref. in National Report
66	Slovenia	Article 11.2	p.29

Question/ Comment: Could you please explain what kind of measures that have been taken by Loviisa NPP that enable and support the systematic recruitment of young people?

Answer: Resource planning is one tool for power plant to have replacement recruits in place in timely manner. Licensee's management has emphasized plant modernization programmes as well as periodic safety review as an opportunity for young people to get involved and trained on nuclear safety and operations.

On national scale the Finnish nuclear research program provides one source of competent people. Nuclear industry´s own efforts to provide interesting and challenging job opportunities must be emphasized.

Q.No	Country	Article	Ref. in National Report
67	China	Article 12	12

Question/ Comment: Does STUK's regulatory oversight cover safety culture, and how to regulate?

Answer: Please see the answer to question made by Romania on article 10.

Q.No	Country	Article	Ref. in National Report
68	Germany	Article 12	page 30, right column

Question/ Comment: It is stated that "Human redundancy is provided by independent safety engineer" at the Loviisa plant in case of severe accidents (symptom based procedures).

What means "independent" is this case? Is there a safety engineer on site 24 hours a day?

Answer: Safety engineer on duty is available in the control room in less than an hour. During office hours safety engineer is always available at site. This on call system works 24/7 and is not confined to severe accidents but also for any abnormal plant situations.

Independent means that safety engineer evaluates in incident and accident situations the plant safety functions independently according to his own separate procedure.

Q.No	Country	Article	Ref. in National Report
69	India	Article 12	Page-31(para 2)

Question/ Comment: With reference to a separate control room for severe accident. Please elaborate the following
(i) Where is this severe accident control room located
(ii) Who is in command in this control room – operation shift personnel or technical support

personnel
(iii) What controls and information is provided in this control room
(iv) In case of severe accident in one unit, when this control room is to be used, from where the non accident unit would be operated

Answer Control room for severe accidents is located inside the plant area but it is separated from the normal control rooms. This control room will be manned by the shift team leaving the normal control room if the severe accident situatution is developing. Controls include the information and controls of severe accident management systems and measurements and communication tools. Severe accident control room does have separate controls for each unit. Severe accident control room will be manned only when severe accident is evident (e.g. core heat-up). So non-affected unit will be operated from itÂ´s own control room.

Q.No	Country	Article	Ref. in National Report
70	India	Article 12	Page 31

Question/ Comment Olkiluoto nuclear power plant:
i. What was the shift duration before introducing 12 hours shift pattern? What human factors were considered before finalizing 12 hours shift pattern?
ii. Would you elaborate on process of ‘resting in the control room night shift’?

Answer 8 hour shifts. There was an experimental period when operators were avaluated by certain tests and interviews. Controlled control room rest during night shifts are max. 30 min period of rest and operator is near the control room if there is some problems with operations.

Q.No	Country	Article	Ref. in National Report
71	Japan	Article 12	p33

Question/ Comment When evaluating abnormal events and lessens learnt, Are STUK and licensees work together or independently?
And could you explain the framework/procedure?

Answer Independently. Each licensee is required to have their own operating experience feedback process including their own as well as foreing operating experience. Reports are the sent to STUK for evaluation and STUK may decide based on its own review if further actions are needed. STUK oversees licensee’s processes within periodic inspection programme.

Q.No	Country	Article	Ref. in National Report
72	Korea, Republic of	Article 12	p.30

Question/ Comment According to the descriptions of page 30, the special attention of human reliability have been paid to the avoidance, detection and correction of any human error during design, construction, operation and maintenance in accordance with Section 6 of the Government Decree on the Safety of Nuclear Power Plants (733/2008). Please explain briefly the regulatory positions for ensuring the appropriateness of the results of human reliability analysis in the qualitative aspects (i.e. human error analysis) as well as quantitative aspects (i.e. determination of human error probability). And please explain on the related regulatory guidelines and technical standards.

Answer Quantitative aspects are regulated within PRA framework and it has itÂ´s own regulatory guide YVL 2.8. Human factors are one overall design requirement and licensee shall provide design process that addresses this question. More detailed human factors considerations are presented when STUK evaluates human factors programs in connection with control room design.

Q.No	Country	Article	Ref. in National Report
73	Korea, Republic of	Article 12	p.30

Question/ Comment The last paragraph in page 30 stated that, due to the inherent characteristics of the Loviisa plant, the operators will have more time for consideration in a transient situation than usually at other nuclear power plants.
What are the inherent characteristics of the Loviisa plant to have more time for operation in a transient situation?

Answer This reference is mainly due to the VVER 440 design with low thermal power and large water volume in steam generators.

Q.No	Country	Article	Ref. in National Report
74	Korea, Republic of	Article 12	p.31

Question/Comment: According to the descriptions of the second paragraph in page 31, the shutdown of the reactor as well as the safety-related control actions can be performed by means of emergency control room table. Please explain in detail the function and the design characteristics of human-system interfaces of the emergency control room table.

Answer: This is very traditional push button controls and analogic measurements of selected safety systems that provide shutdown function and emergency core cooling. Controls include eg. scram button, emergency feedwater systems and steam relief system.

Q.No	Country	Article	Ref. in National Report
75	Korea, Republic of	Article 12	p.31

Question/Comment: According to the descriptions of the third paragraph in page 31, the I&C systems (including Human-System Interfaces in MCR) are currently being renewed at the Loviisa plant and human performance is taken into account during the modification. Please explain briefly the regulatory issues of human performance and human-system interfaces design during the safety review of the plant modification.

Answer: Large control room modification will have many effects for control room operations during accidents even if the basic plant design is not changing very much. These control room and system modifications are also subject to STUK inspection. STUK evaluates the overall design intention and licenseeÂ´s plans to address human factors during the modification (eg. automation system design, training, lay-out, operator licensing)

Q.No	Country	Article	Ref. in National Report
76	Korea, Republic of	Article 12	p.31

Question/Comment: According to the descriptions of the fourth paragraph in page 31, a 30-minute rule has been the design basis for the protection system at the Olkiluoto units 1 and 2. Important protection measures are taken automatically so that no actions of operating personnel are needed during the first thirty minutes. This is the rule and concept of "Accident Analysis" in the perspectives on the design of defence-in-depth. However, in real situation, the operator actions are permitted within 30 minute to mitigate DBEs. Please explain briefly what the acceptance criteria for ensuring the appropriateness of time response in safety-related operator actions are. And please explain the related regulatory guidelines and technical standards.

Answer: Basic approach is that actions which are in the emergency operating procedures can be credited if justified by the licensee with accident analysis. This requires that information is available for operators to respond according to procedures and there is enough time to respond. Also operator errors shall be evaluated. STUK Guide YVL 2.2 is about accident analysis.

Q.No	Country	Article	Ref. in National Report
77	Korea, Republic of	Article 12	p.31

Question/Comment: Concerning the training of operators and managers as stated in page 31, please explain briefly the main contents of Control Room Resource Management and TVO’s Human Performance 2012 Programme.

Answer: CRRM is establishing expectations and good control room behaviors that are common to all operating crews which enhances co-operation and communication in control room operations. Human Performance 2012 is company wide project where some best practices to enhance human performance are incorporated in normal routines. Each department should identify the best solutions for their own activities by themselves so that there is good acceptance for new processes.

Q.No	Country	Article	Ref. in National Report
78	Korea, Republic of	Article 12	p.33

Question/Comment: Concerning the Finnish regulation and practices as stated in page 33, please explain briefly what are the regulatory guidelines and technical standards which can be applied for ensuring the appropriateness of human performance and the design of human factors engineering during the safety review and inspection process.

Answer	STUK has basic requirements of appropriate human factors, however licensee shall provide the more detailed procedures and standards which they use in this process and STUK then evaluates the used standards and design based on these design requirements. NUREG 0711 or IEC 60964 are used.

Q.No	Country	Article	Ref. in National Report
79	Pakistan	Article 12	Page 31

Question/ Comment	Is the 30 minute rule adopted for all accidents or for certain specific accidents? Is it only a design consideration or adopted in full scope training simulator (FSTS) trainings?
Answer	It is a design rule which guides the plant design basis accidents. However the exact time is not a regulatory requirement. Plant design should not require immediate operator actions and it should allow operators enough time to identify and monitor automatic response of engineered safety functions which take place more rapidly. This plant real time behaviour is the basis for emergency operating procedures and training. Operators are required to identify, monitor and contol the plant with detailed emergency operating procedures right from the start of any disturbance.

Q.No	Country	Article	Ref. in National Report
80	Pakistan	Article 12	Page 31

Question/ Comment	Resting needs to be elaborated. How is it ensured?
Answer	Operators are now allowed to have a thirty minute rest during the shift. Resting is voluntary.The place for rest is very close to the main control room. The person going to rest has to notify the crew before going.

Q.No	Country	Article	Ref. in National Report
81	Slovenia	Article 12	p.33

Question/ Comment	Could you please, explain why 85% of all Loviisa NPP events contained human root causes and why only 30% of all Olkiluoto NPP contained human root causes?
Answer	The reason has not been studied in more detail. It has to be noted that there are no uniform criteria established for classifiying these events into different categories. This particular indicator is a very rough indicator. Therefore, these figures are very much subject to variation and interpretation. They should not be treated as concluding evidence. Usually in most events there always is human component involved and â€œtechnicalâ€ causes could be traced deeper into poor design or maintenance even though in this indicator they are not taken into account.

Q.No	Country	Article	Ref. in National Report
82	United Arab Emirates	Article 12	31

Question/ Comment	Article 12 reports that control room personnel have participated in studies which evaluate fatigue in their working arrangements and shift patterns. TVO has had a twelve hour shift pattern since 2005, and in 2009, TVO conducted a trial of resting in the control room night shift. Based on the experiences, TVO made this a permanent procedure in main Control Rooms. The actions taken to date are impressive. Are there outstanding concerns with fatigue management?
Answer	Overall results from trial period were positive. Fatigue during shift work can be more difficult to persons that are older or nearing the retirement age.

Q.No	Country	Article	Ref. in National Report
83	China	Article 13	13

Question/ Comment	STUK’s Guide YVL 1.4 sets general requirements for the management system and was updated in 2008 adhered to IAEA Safety Standard GS-R-3 on management systems, but the management systems of Loviisa NPP and Olkiluoto NPP are still not meet the integrated management systems requirements of YVL 1.4 partly . Please describe the analysis result for this infection to the safety of NPP, and the measures would be adopted by STUK. What criterion will be used in the inspection of management systems by STUK during this period?
Answer	There are no unresolved safety concerns. Licensee’s have established plans how to be in

compliance with the YVL 1.4. One area of further actions for licensees is to change to managements systems to be more process oriented. This process takes time and it is followed by STUK. Criteria that are used are presented in the YVL 1.4.

Q.No	Country	Article	Ref. in National Report
84	Germany	Article 13	page 34, right column

Question/ Comment: It is stated that “According to STUK’s review, the management system of Olkiluoto unit 3 complies with the Guide YVL 1.4 with the only deviation of missing procedures for the regular, independent assessment of the management system.”

Were these missing procedures related to the regular internal or external assessment of the management system?

Answer: Independent assessment (internal).

Q.No	Country	Article	Ref. in National Report
85	Japan	Article 13	p34,35

Question/ Comment: It is reported that “For the construction phase of Olkiluoto 3, STUK conducted the review of document and QM system of plant vendor, and STUK has participated as an observer in the licensee's and Vendor’s audit.”
Is this a standard procedure during construction phase of any NPP?
How does STUK conduct regulatory effective participation as an observer in the licensee's and Vendor’s audit?

Answer: This is STUK’s a standard procedure. The licensee is responsible for safety and therefore STUK has mainly participated audits as an observer. In these audits STUK can set questions anytime when needed. In addition, STUK has made some own audits on vendor and its subcontractors during the OL3 project (for example on Design management, PRA, Radiation protection instrumentation and control and manufacturing of main coolant lines).

Q.No	Country	Article	Ref. in National Report
86	Korea, Republic of	Article 13	p.34

Question/ Comment: It is stated that the review of the QM systems of plant vendor and major suppliers is carried out by STUK. Does it mean that STUK reviews the QM systems of them that were already selected by the licensee? How will the result of the reviews affect the contract?

Answer: STUK reviews the MS of all possible vendors selected by the license applicant already in the DiP phase of the Finnish licensing system. When applying the construction license the applicant must submit the quality manuals of the vendor, of the suppliers of fuel and the most imÂportant components and equipment as well as of the design organizations to STUK for information. STUK may also require at its discretion that the quality manuals of other organisations participating in the facility project be submitted for information.
After review STUK may set requirements how the vendors MS shall be improved. THe contract is between the licensee and vendor, STUK is not informed about the affects of regulatory review.

Q.No	Country	Article	Ref. in National Report
87	Korea, Republic of	Article 13	p.33

Question/ Comment: It is stated that the quality management requirements related to specific technical areas are presented in the corresponding technical guides. Please explain what kind of areas in which STUK presents technical guides exist and what the main content of those guides are.

Answer: Many YVL-guides includes detailed guidance on quality assurance. Such guides are for example (not all listed here): YVL 6.7 quality management of nuclear fuel, YVL 6.3 Regulatory control of nuclear fuel and control rods, YVL 5.5 Instrumentation systems and component at nuclear facilities, YVL 5.2 Electrical power systems and components at nuclear facilities, YVL 4.1 Concrete structures for nuclear facilities, YVL 1.14 Mechanical equipment and structures in nuclear facilities, YVL 3.8 Nuclear power plant pressure equipment. In these technical YVL-guides STUK present for example detailed requirements for quality management system for nuclear fuel manufacturing (YVL 6.7) or detailed requirements quality management of design and implementation of an I&C system (YVL 5.5).

Q.No	Country	Article	Ref. in National Report
88	Russian Federation	Article 13	pp. 33-35

Question/ Comment: The Convention on Nuclear Safety was adopted when the prevailing approach of the nuclear community to quality assurance was the one based on the development of quality assurance programs for all safety relevant activities. Currently, in accordance with the IAEA recommendations, the transfer to the comprehensive (integral) quality management takes place in many countries, when the corresponding system of guidance documents comprehensively considers all the types of activities influencing not only safety but also health, environment, security, quality and economy. There is a reference to the corresponding IAEA standard GS-G-3 in the Report. However, there is no description of this transfer process for STUK or for operating organizations in Finland. It is mentioned in the Report that the guide YVL 1.4 was updated in accordance with the aforementioned IAEA standard, and the guide YVL 1.9 still contains the requirements to the quality assurance programs. It remains unclear how they correlate with each other.
Please give your comments with respect to this issue.

Answer: STUK updated YVL 1.4 Management systems for nuclear facilities in 2008. The updated guide is in line with GS-R-3. After issuing a new or an revised YVL-guide STUK makes, after having heard those concerned, a separate decision on how the new guide applies to an operating NPP. In this hearing process NPP analyses how the requirements are met and also presents a plan how the gaps will be fulfilled. This process was carried out when YVL 1.4 was issued. In related hearing process licensees did not report difficulties on terminology nor on understanding requirements on YVL 1.4 and YVL 1.9.
Just now STUK is updating all YVL-guides at the same time. All requirements on licensees management system will be included in one document.

Q.No	Country	Article	Ref. in National Report
89	Slovenia	Article 13	p.33

Question/ Comment: What are the main difficulties for licensees in adapting management system to the updated Guide YVL 1.4 which adheres to IAEA Safety Standard GS-R-3 on management systems?

Answer: See the answer to question by China on article 13.

Q.No	Country	Article	Ref. in National Report
90	Switzerland	Article 13	33

Question/ Comment: The report says: “According to Section 29 of the Government Decree on the Safety of Nuclear Power Plants (733/2008), the organisations participating in the design, construction, operation, and decommissioning of a nuclear power plant are required to employ a management system”.

Does STUK require that the mentioned management system be certified by an independent and accredited authority?

Answer: Certified managements system is a good starting point when providing evidence to fulfill STUK requirement, however justification for adequate management system cannot be based on this alone. So directly this requirement for certified management system is not included in our regulatory guides, however usually most factories and organizations do have certified management systems.

Q.No	Country	Article	Ref. in National Report
91	Switzerland	Article 13	33

Question/ Comment: The report says: “STUK’s Guide YVL 1.4 sets general requirements for the management system and was updated in 2008. The updated Guide YVL 1.4 adheres to IAEA Safety Standard GS-R-3 on management systems”.

Is there a STUK’s guideline planned or being prepared that specifically addresses the design and construction phases taking into account the IAEA Guides GS-G-3.1 and 3.5?

Answer: STUK is updating all YVL-guides till the end of this year. One of the new Guides will be ˜Construction of a NPP’ and requirements for design phase will be presented in an other guide

˜Design of the safety systems of a nuclear facility'.

Q.No	Country	Article	Ref. in National Report
92	Switzerland	Article 13	35

Question/ Comment: The report says: "STUK is developing a procedure for collecting observations concerning management system and organisational issues".

Which are the criteria to evaluate the performance of the management system of an organisation? How are these criteria integrated into the global safety assessment of a new build project?

Answer: Generic criteria for management systems are presented in YVL 1.4. A project to develop more specific criteria for inspection within the periodic inspection programme has been started early 2011. This work is still ongoing and the goal is to have procedure and process in place by the end of 2011.

Q.No	Country	Article	Ref. in National Report
93	United Kingdom	Article 13	Page 34

Question/ Comment: The report suggests that TVO's quality management system at Olkiluoto did not include appropriate control of outsourced processes and activities.

Could Finland comment as to whether this issue is affecting the outsourcing activities at Olkiluoto 3?

Answer: In principle, there are similarities with the management of subcontractors in the operating units as well as with OL3. However, due to the fact that OL3 is a turn key project, there are differences in the scope and framework on the use and management of subcontractors by the licensee.

Q.No	Country	Article	Ref. in National Report
94	China	Article 14.1	14

Question/ Comment: Please explain what differences are there between operating licence renewal for extended lifetime of a NPP and operating licence of a new NPP in Finland?

Answer: When operating licence is applied for a new NPP, the licence applicant shall submit documents defined in Nuclear Energy Decree to the Ministry of Employment and the Economy and to STUK. The Ministry asks STUK's statement on safety. In applying for a renewal of the operating licence, the procedure to be followed is in general the same as in applying for an operating licence for a new NPP. The renewal of the operating licence however always involves also a periodic safety review (PSR) of the facility. PSR practice in Finland follows the IAEA's guidance (NS-G-2.10). PSR is also considered an appropriate tool to assess the long term operation. In Finland, the PSR process (methodology and scope) is always the same regardless whether it is related to the extended lifetime or not, but some topics (e.g. ageing) could be paid a greater attention.

Q.No	Country	Article	Ref. in National Report
95	China	Article 14.1	14

Question/ Comment: Please introduce the requirements of the independent verification and independent verification organizations for the new NPP design and the modification design of the operating NPP in Finland.

Answer: The following requirements on the topic has been given in YVL-guides:

The licence applicant/holder shall prepare a comprehensive safety assessment of the plans concerning the prospective nuclear power plant and its safety-classified systems prior to submitting the plans to STUK for review. When planning modifications to the safety-classified systems of a nuclear power plant for which an operating licence has already been granted, the licence holder shall prepare a safety assessment of the design concept pertaining to the modifications prior to commencing any detailed systems design. Adequate instructions shall be issued for the completion of the safety assessments that shall be duly documented.

In the absence of sufficient expertise for the preparation of the safety assessment within the licence applicant's/holder's organisation, the services of experts independent of the designers shall

be retained for the completion of the assessment. In such a case, the licence applicant/holder shall define the qualifications required of the independent assessors and ensure that they are duly met.

Q.No	Country	Article	Ref. in National Report
96	Germany	Article 14.1	page 38

Question/ Comment: STUK applies probabilistic safety goals to new plant units. For operating units, instead of the numerical safety goals, the SAHARA (safety as high as reasonably achievable) principle and the principle of continuous improvement are applied. What are the reasons for different approach?

Answer: It is a generally accepted principle that new NPP units must be designed and built safer than the currently operating units. Existing NPPs have not been designed to meet numerical safety goals. Although many safety improvements have been implemented at the operating plant units, it is questionable if the operating units can meet the new probabilistic safety goals with reasonable efforts and costs. Numerical safety goals for existing NPPs are interpreted as objectives, not as strict criteria.

Q.No	Country	Article	Ref. in National Report
97	Japan	Article 14.1	p35 right

Question/ Comment: It is reported that in plant modification process, conceptual design plans etc. must be submitted to STUK for approval.
In article 8 (in page 21 right), it is reported that STUK does not grant any construction or operating licenses for nuclear facilities. On other hand, STUK approves for plant modification. And for example, it is also reported that expansion of the capacity of spent fuel repository planned (page 36 right).
Is there any distinction between “construction” and “plant modification”?

Answer: In Finnish nomenclature a license by the Government is needed for constructing new nuclear facilities or making such kind of bigger changes to the existing facilities, which affect the licensing terms. Typically, e.g. the power level and amount of nuclear material (or waste generated) handled are limited by the license terms. Replacing system components, building new safety systems, changing the procedures how systems are used etc. are plant modifications, which require STUK’s approval.

Q.No	Country	Article	Ref. in National Report
98	Japan	Article 14.1	p37 right

Question/ Comment: It is reported that STUK required updating of the loss of coolant analyses assuming a level of system availability specified in the Guide YVL 2.2. TVO submitted the required updates in 2010. On the other hand, In article 6(in page 12 left), it is reported that STUK made a decision concerning the PSR in October 2009.
Aren’t there any changes to STUK’s decision of PSR in response to TVO’s update?

Answer: TVO submitted in 2010 the required updates to loss-of-coolant analyses assuming the system availability according to the Guide YVL 2.2. All fuel safety criteria were fulfilled in the new analyses, therefore no modifications were needed to STUK PSR decision.

Q.No	Country	Article	Ref. in National Report
99	Japan	Article 14.1	p37 right

Question/ Comment: Related to the PSA, your report says □gThe objective of the study was¥¥¥□h.
Is the PSA positioned only as study?
Does STUK require any action to licensee in response to the result of PSA?

Answer: PSA/PRA is a mandatory part of licensing and the PRA report is a mandatory licensing document. Regarding new units, design modifications have to be done, if the results of PSA do not fulfil the probabilistic safety goals (CDF less than 1E-5/year, LRF less than 5E-7/year). Regarding currently operating units, planh modifications have to be considered according to the SAHARA principle, if PRA or PRA update reveals new significant risks.

Q.No	Country	Article	Ref. in National Report
100	Korea, Republic of	Article 14.1	38

Question/ Comment: Please explain why the quantitative safety goal for the operating plants is not established and how the SAHARA principle has been applied. And please provide us your regulatory experiences specifically applied to the plants under SAHARA.

Answer: For the operating NPP units, PRA is regarded as a tool for identifying needs for safety improvements and for helping decisions on plant and procedure modifications according to the SAHARA principle. A large number of safety improvements have been implemented since the commissioning of the operating units based on deterministic and probabilistic considerations. Some examples are structural and operative fire protection improvements, an additional auxiliary feedwater system and control of primary secondary leaks in Loviisa, provisions against seawater intake blockage due to algae or frazil ice, provisions against diesel generator combustion air intakes by snow, protection against flooding.

Q.No	Country	Article	Ref. in National Report
101	Korea, Republic of	Article 14.1	38

Question/ Comment: It is reported that STUK and licensees are well using risk information for improving regulatory practices and plant operating performance, respectively. It is also understood that risk and performance monitoring are very important for the risk-informed regulation.
Do the performance monitoring program and risk monitoring system (e.g. MR) have been implemented in operating plants? If yes, please explain your activities related to them.

Answer: Risk analysis is mandatory in several applications, such as applications for exemption from Technical Specifications and for plant modifications. The risk significance of operating events is assessed on semiannual basis. On-line risk monitors are not in use in Finland. The use of Living PSA models by expert users has been considered preferable to on-line risk monitors.

Q.No	Country	Article	Ref. in National Report
102	Lithuania	Article 14.1	35

Question/ Comment: Guide YVL 2.8 includes the following probabilistic safety goals: 1) Core damage frequency less than 1∙10–5/year; 2) Large radioactive release (> 100 TBq Cs-137) frequency less than 5∙10–7/year. Please provide the justification for setting this particular release limit for large radioactive release.

Answer: This release limit 100 TBq of Cs-137 is assigned for preventing long-term consequences of an accident. STUK has asked the Technical Research Centre of Finland to perform a study on consequence assessment in the environment due to prolonged exposure after this defined release in certain NPP site specific conditions. The consequence estimates consisted of areas of contamination, radiation doses and assessment of prospects to return normal activities in the environment. The results showed that the defined cesium release is a relevant limit preventing long-term restrictions on the use of extensive areas of land and water. The significance of other nuclide groups than cesium was shown to be much smaller.

Q.No	Country	Article	Ref. in National Report
103	United Arab Emirates	Article 14.1	35

Question/ Comment: The discussion of article 14 indicates that the main principle in the plant modification process is that conceptual design plans and system-specific pre-inspection documents of Safety Class 1, 2 and 3 systems must be submitted to STUK for approval, and STUK reviews and approves the modification prior to its implementation at the plant.

Is there a graded approach as to what constitutes a modification requiring pre-approval, or does STUK indeed pre-approve all changes to safety Class 1, 2, and 3 systems?

Answer: STUK pre-approves all changes to safety class 1, 2 and 3 systems. Currently there is also safety class 4, where system pre-inspection documents shall be submitted to STUK for information. There are some additional requirements for safety class 2 systems. For example the quality plan and requirements specification of a safety class 2 I&C system shall be independently assessed. Graded approach can be seen even more comprehensively on a component level, where STUK's oversight of safety class 2 components is much more comprehensive than safety class 3 components.

Q.No	Country	Article	Ref. in National Report
104	United Arab Emirates	Article 14.1	42

Question/ Comment: The discussion of Article 14 (page 42) indicates that according to expert's view, the risk informed inspection programme that has been introduced and approved by STUK at Loviisa unit 1 is the most extensive risk-informed in-service inspection program so far implemented in Europe. What is the basis for this statement, that is, what is the expert's view?

Answer: Risk informed in-service inspection (RI-ISI) programmes are so far not very common in Europe. The scope of the Finnish RI-ISI programmes covers all safety classes (SC1-SC4) systems and also the non-nuclear safety systems. The scope is thus extended from the typical requirements in applicable standards and practices in other countries.

Q.No	Country	Article	Ref. in National Report
105	United Kingdom	Article 14.1	Page 41

Question/ Comment: The report states that TVO have used PRA for, amongst other things, the planning of plant commissioning tests.

How was this done?

Since some of the assumptions in a PRA cannot be fully validated until the commissioning tests are done, especially on a First Of A Kind (FOAK) plant, how does STUK ensure that TVA's use of PRA in the planning of commissioning tests is a valid one?

Answer: PRA shall be used to assess the adequacy and coverage of the phase and system commissioning programs of OL3 NPP. Also the potential risks related to commissioning tests during nuclear test phase, shall be assessed with the help of PRA. In case the risk related to a specific test is relatively high, potential measures to reduce the risk should be discussed. Risk reduction measures could include for example following considerations:
- development of specific test procedures and additional precautions, e.g.
- the test may be replaced by another test
- the test may be shifted to the non-nuclear commissioning phase B
- adequate information may be received from other tests
- reducing the test related risk by decreasing the probability of potential disturbances or by strengthening the plant response by e.g. additional testing of redundant/diverse system functions.

Q.No	Country	Article	Ref. in National Report
106	United Kingdom	Article 14.1	Page 43 and 46

Question/ Comment: The report refers to radiation embrittlement issues regarding the RPV. Considerable work has been done to justify continuing operation. Is there scope in STUKs procedures to require a PSR at more frequent interval than 10 years?

Is the increase in the maximum individual dose in Loviisa in 2008 a consequence of increased NDT requirements? If so how is the balance between the dose burden on NDT operators and continuing operation judged?

What is the reason for the noted ambient temperature rise in containment, which has resulted in accelerated degradation of cables?

Answer: The operation licence was granted in 2008 so that for Loviisa 1 and 2 the licensees will expire in 2027 and 2030, respectively. PSRs are requested to realize in 2015 and 2023. Consequently, there is PSR in 7-8 years periods.

The regular NDT inspections of the reactor pressure vessel have been implemented for practical reasons in 8 year intervals from the beginning of plant operation. These inspections are mechanized without remarkable human dose increase, and therefore, also the 2008 individual dose increase was not due to NDT requirements. The inspection period of 10 years arises from ASME XI requirements but some components (such as RPV) have still been inspected slightly more frequently. This arises from practical outage planning reasons.

The containment temperature has been noticeably higher than expected from the beginning of plant operation. This is the reason for cable ageing and their replacements.

Q.No	Country	Article	Ref. in National Report
107	China	Article 14.2	14

Question/ Comment: Which severe accidents are analysed in deterministic safety analyses of Loviisa NPP and Olkiluoto NPP?

Answer: Olkiluoto 1 and 2 FSAR includes the following six severe accident sequences:
1. Guillotine break in a feedwater line in combination with a total lossa of AC-power and an initial leakage of 5 cm2 in the diaphragm floor
2. Guillotine break in a feedwater line in combination with a total lossa of AC-power and an initial leakage of 5 cm2 in the diaphragm floor and with spraying of the drywell using the external independent containment water filling system with the capacity of 25 kg/s
3. Station blackout with total loss of AC power with an initial leakage of 5 cm2 in the diaphragm floor
4. Station blackout with total loss of AC power with an initial leakage of 50 cm2 in the diaphragm floor
5. Station blackout with total loss of AC power with an initial leakage of 50 cm2 in the diaphragm floor and with spraying of the drywell using the external independent containment water filling system with the capacity of 25 kg/s
6. Station blackout with total loss of AC power with an initial leakage of 5 cm2 in the diaphragm floor. Large hydrogen generation in ex-vessel fuel-coolant interaction. Total hydrogen generation corresponds to 100% oxidation of core zirconium

The Loviisa FSAR primarily considers actions and physical phenomena associated with the Loviisa severe accident management strategy (these analyses are not necessarily coupled to specific initiating events). In addition, the following severe accident sequences are analysed:
1. Medium sized LOCA (through pressurized safety valve). Safety injection systems unavailable and containment spray system unavailable.
2. Medium sized LOCA (through pressurized safety valve). Safety injection systems unavailable. Containment spray can be activated at 4800 s
3. Medium sized LOCA (through pressurized safety valve). Safety injection systems are available in the beginning of the sequence, but switch to the recirculation cooling fails
4. Small break (4,5 cm2) LOCA in a cold leg. Safety injection systems unavailable.
5. Large break (0,38 m2) LOCA in a cold leg. Safety injection systems unavailable.

Q.No	Country	Article	Ref. in National Report
108	Japan	Article 14.2	p41 right

Question/ Comment: Is the “NDT systems” means the system as described in the last paragraph in page41 right? What’s shortend to NDT?

Answer: NDT refers to Non Destructive Testing

Q.No	Country	Article	Ref. in National Report
109	Japan	Article 14.2	p44 left

Question/ Comment: It is reported that “In its review, STUK made a general point that the state-of-the-art permitted a quantitative life-time evaluation only in case of ageing by fatigue.”
On the other hand, it is reported the Government granted the applied operating licences on condition that two PSRs are undertaken during the license period.
Does it mean that Government applied operated licenses in spite of STUK’s general affirmation, in view of the other factors?
If so, who, other than STUK, assessed the other factors?

Answer: The PSRs requested in 2015 and 2023 were included in STUK’s original statement to the Ministry and further to the Government, so there is no additional requirement proposed by another party.

Q.No	Country	Article	Ref. in National Report

110	Slovenia	Article 14.2	p.43
Question/ Comment	Do you consider equipment qualification (EQ) in the scope of ageing management or periodic safety review (PSR)?		
Answer	Finnish approach in the PSR follows the IAEA's guidance (NS-G-2.10), where equipment qualification is one of the safety factors to be reviewed in the PSR. In the last PSRs at the Finnish existing NPPs the equipment qualification has been discussed quite extensively. STUK concluded that the qualification procedures for new equipment both at the Loviisa and Olkiluoto NPPs are sufficient but there are some improvement needs regarding the systematic approach for maintaining the documentation demonstrating the qualification. Qualification maintenance is closely related to the plant's ageing management. Both licensees submitted STUK action plans for improving the qualification maintenance.		
Q.No	Country	Article	Ref. in National Report
111	Bulgaria	Article 15	p.48
Question/ Comment	On Page 48 it is described that "An outside contracted laboratory collects and analyses about 300 samples (air, fallout, sediment, indicator organisms, milk, etc.) per year from the environment of each NPP. Very small quantities of radioactive substances of local origin were detected in 2007–2009 on some samples from the environment of each nuclear power plant. Concentrations of the radioactive substances were very low, and effects on the public are insignificant. Could Finland provide some more information if those "Very small quantities of radioactive substances of local origin" come from NPP operation?		
Answer	Radioactive substances originating from the Finnish NPPs were measured in some environmental samples. Radioactive substances were usually measured in samples of aquatic plants, sea water, sinking matter, bottom fauna and deposition. Concentrations of the radioactive substances (H-3, Mn-54, Co-58, Co-60, Ag-110 m, Te-123 m and Sb-124) were very low. For example: aquatic plants (Co-60, Ag-110m, Sb-124: 1-5 Bq/kg), sea water (H-3: 2-5 Bq/l), deposition (Co-60, Ag-110m: 0,005 - 0,1 Bq/m2). All the detected concentrations were low. Radioactive cesium originating from the Chernobyl accident release as well as strontium, and plutonium fallout isotopes from atmospheric nuclear weapons tests are still measurable in environmental samples. Natural radioactive substances (i.a. beryllium-7, potassiÂum-40 as well as uranium and thorium with their decay products) are also detected. Their concentraÂtions usually exceed those of nuclides originating from the power plant or fallout.		
Q.No	Country	Article	Ref. in National Report
112	China	Article 15	15
Question/ Comment	Please provide the release limits stipulated by the national decrees or guides, the release limits authorized by the STUK and the managerial target values set by the plant operators. Please provide the proportion of the managerial target values occupied by actual radioactive effluents.		
Answer	According to STUK's guide YVL 7.1, the release limits of a nuclear power plant shall be derived so that the dose constraint of a member of the public is not exceeded. The release limits shall be separately determined for the most important radionuclides or groups of radionuclides. The dose constraint is 0.1 mSv (effective dose from external radiation during a year and committed effective dose from the intake of radioactive substances in the same time period (government decree 733/2008). The release limits of Loviisa NPP (two PWRs) are the following: To the atmosphere from the stack from the roof Noble gases (Kr-87 equivalent) 2.2 x 1016 Bq/a 4.4 x 1014 Bq/a Iodine (I-131 equivalent) 2.2 x 1011 Bq/a 1.4 x 1010 Bq/a To the sea Tritium 1.5 x 1014 Bq/a Other nuclides 8.9 x 1011 Bq/a.		

The weighted sum of the releases of the groups â€œnoble gasesâ€□ and â€œother nuclidesâ€□ with the corresponding release limits shall be â‰¤ 1. The same applies to the weighted sum of the releases of the groups â€œiodineâ€□ and â€œother nuclidesâ€□.

The release limits of Olkiluoto NPP (two BWRs) are the following:

To the atmosphere
Noble gases (Kr-87 equivalent) 1.77 x 1016 Bq/a
Iodine (I-131 equivalent) 1.14 x 1011 Bq/a

To the sea
Tritium 1.83 x 1013 Bq/a
Other nuclides 2.96 x 1011 Bq/a.

No conditions on the weighted sums of the releases of the groups.

There have not been any numerical managerial target values for the releases (only general optimization principle to be followed) but in spite of that the releases have been very low compared to the release limits (only tritium releases to the sea are not very far from the limits, but those limits have been set quite close to optimized releases. In 2009 STUK recommended such target values to be set by the licensees and recently one of the licensees (TVO) proposed such values. STUK will review the proposal.

Q.No	Country	Article	Ref. in National Report
113	China	Article 15	15

Question/ Comment: Please provide the measurement values of tritium and C-14 in table 3 and table 4.

Answer: Table 3. Radioactive effluents from the Loviisa NPP (H-3 and C-14). The proportion of the release limit is given in parenthesis.

Year	Airborne effluents H-3 [Bq]	Airborne effluents C-14 [Bq]	Liquid effluents H-3 [Bq]
2007	1,68E+11	2,42E+11	1,63E+13 (10,9 %)
2008	2,71E+11	3,29E+11	1,71E+13 (11,4 %)
2009	4,38E+11	3,35E+11	2,07E+13 (13,8 %)

Table 4. Radioactive effluents from the Olkiluoto NPP (H-3 and C-14). The proportion of the release limit is given in parenthesis

Year	Airborne effluents H-3 [Bq]	Airborne effluents C-14 [Bq]	Liquid effluents H-3 [Bq]
2007	3,76E+11	1,08E+12	2,41E+12 (13,2 %)
2008	4,28E+11	8,76E+11	2,39E+12 (13,1 %)
2009	3,20E+11	7,79E+11	1,85E+12 (10,1 %)

Q.No	Country	Article	Ref. in National Report
114	China	Article 15	15

Question/ Comment: Dose the STUK independently perform radioactivity measurements of emissions and monitoring of radiation in the environment by using its own equipment and instruments?
If the measurement results obtained by the STUK and the plants are significantly different, how are they coincided with each other?

Answer: STUK doesn’t measure radioactive emissions of nuclear installations (only strontium analyses have been ordered from the Research and Environmental Surveillance department of STUK) but otherwise supervises the monitoring of emissions performed by the licensees of the installations.

Large part of the environmental radiation monitoring around the Loviisa and Olkiluoto NPPs is performed by the Research and Environmental Surveillance department of STUK (mainly sampling and analyses) as ordered by the licensees.

There has not yet been any discrepancy between the measurement results. If some discrepancy was found out, the reasons for it would have to be examined and corrective actions planned and implemented if needed.

Q.No	Country	Article	Ref. in National Report
115	Germany	Article 15	page 45

Question/ Comment: Are dose limits defined for the occupational exposure of trainees, students and pregnant women?

Answer: Radiation Act (1512/1991) stipulates in 4§ that a person between 16 and 18 years as a trainee or student must not receive effective dose in excess of 6 mSv per year. It's 5 § states that a pregnant woman may not receive a dose in excess of 1 mSv.

Q.No	Country	Article	Ref. in National Report
116	Germany	Article 15	page 47

Question/ Comment: What is the definition of the "critical group"?

Answer: The definition of the critical group is that of ICRP and is given in STUK's guide YVL 7.2. It means the population group which, on the basis of its place of residence and habits, is estimated to receive the highest radiation doses. Dose limits are compared with the dose average of this group. In practice when calculating doses to the population around Loviisa and Olkiluoto NPPs, the doses are calculated to a hypothetical adult whose habits result in an overestimate of the dose. There are so few infants or children living close to NPPs that they don't form a critical group.

Q.No	Country	Article	Ref. in National Report
117	Japan	Article 15	p45 right

Question/ Comment: It is reported that "Loviisa and Olukiluoto are trying continuous improvement in collective dose reduction".
What is the STUK's interference to these approach of the licensees? Are these approach purely self disciplined operator's program
Does STUK stimulate the approach with some kind of incentive?

Answer: ALARA requirement is given by the Radiation Act. STUK YVL Guides deal with different aspects of ALARA (for NPP design YVL 7.18, for NPP operation and worker collective dose YVL 7.9). As reported in the text there are several NPP specific tools and procedures to implement an up today ALARA for the Loviisa and Olkiluoto NPPs. STUK has reviewed these ALARA programmes in depth and follows the practical implementation at both sites in regular inspections, especially during maintenance periods.

Q.No	Country	Article	Ref. in National Report
118	Korea, Republic of	Article 15	p.11

Question/ Comment: It is understood that generally the period of refuelling and maintenance outage for an operating plant is about 30 days. However, in your report, it is stated that outage in Finnish plants lasted less than 20 days. (Olkiluoto-1 lasted just 8 days in 2009). Please provide us the reasons for such a short outage period. What are the main works done during the outage period except the refuelling?

Answer: The Olkiluoto units have safety systems with 4 x 50 per cent capacity and consistent physical and electrical separation. These inherent features allow preventive maintenance of safety systems during power operation. The design of the reactor pressure vessel and its upper internals as well as the permanent watertight connection between the reactor vessel flange and the containment help to minimize the preparations needed before unloading.

The annual outages for the Olkiluoto power plant units are divided into two groups: the refuelling outages and the maintenance outages. The refuelling outage is shorter in duration (approx. 7-9 days). The length of the maintenance outage depends on the amount of work (2â€“4 weeks).

Annual outages are scheduled so that in the same year, one plant unit has a mainteÂnance outage and the other a refuelling outage.

In 2008, the annual maintenance outage of Olkiluoto 1 lasted 18 days and the annual refuelling outages of Olkiluoto 2 lasted 8 days (in Finnish National Report, there was a mistake with the period time of refuelling outage). In 2009, the annual refuelling outage of Olkiluoto 1 lasted 8 days and the annual maintenance outage of Olkiluoto 2 lasted 16 days.

The refuelling outage mainly consists of refuelling, corrective
maintenance, periodical inspections and tests required by the Technical Specifications and maintenance according to the preventive maintenance programme for annually overhauled components.

The maintenance outage can be either normal or extensive and includes in addition to the refuelling work all major plant modifications or upgradings. The service outage duration varies between 14 days (normal, including the opening of turbine) to 20 to 30 days (extensive, including major modifications) for Olkiluoto BWRs. The maintenance outage mainly consists of refuelling outage work tasks, major overhauls, service, inspections, modifications and improvements.

Q.No	Country	Article	Ref. in National Report
119	Korea, Republic of	Article 15	p.45

Question/ Comment: It is stated that 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 mSv.
Is there a legal action if the individual dose exceeds the limit? Is the value of the limit changed at the multi-plants in one site? How is the measurement point of dose limit set?

Answer: A legal action is possible according to the Finnish legislation but there has not yet been a test case. As regards to enforcement see p. 20 in National Report.

The limit value 0.1 mSv is for the site (one or more reactors) and that is given in the Government Decree 733/2008. In Radiation Decree there is also the limit value of 1 mSv from the use of radiation to a person not engaged in radiation work.

It is not possible in practice to measure such dose to a member of the public. The dose to the member of the most exposed population group is estimated by a calculation model.

Q.No	Country	Article	Ref. in National Report
120	Korea, Republic of	Article 15	p.47

Question/ Comment: In 2005-2009, the maximum dose was 54.6 mSv and was also received by a person working both at the Loviisa and Olkiluoto nuclear power plant. For the exceeded dose limit, what actions had been taken?

Answer: In Finnish Radiation Decree (1512/1991), the following is prescribed about occupational exposure: The effective dose caused to a worker by radiation work shall not exceed an average of 20 millisieverts (mSv) per year reckoned over a period of five years, nor 50 mSv in any one year. The maximum dose 54.6 mSv was the highest total dose over a period of five years (the limit is 100 mSv). The effective dose limit was not exceeded.

Q.No	Country	Article	Ref. in National Report
121	Ukraine	Article 15	Page 47

Question/ Comment: What method is used for monitoring Tritium and Carbon-14 in effluents and discharges from NPP (continuous monitoring, quasi-continuous monitoring, sampling or measurements using laboratory equipment?)

Answer: At the Loviisa NPP there is monthly sampling and at the Olkiluoto NPP there is continuous sampling of gaseous H-3 and C-14 discharges. Samples are analyzed in the laboratory.

Q.No	Country	Article	Ref. in National Report
122	Bulgaria	Article 16.1	p.50-51

Question/ Comment: Pages 50 and 51 describe the off-site emergency arrangements.
Could Finland provide some more information on the computer codes used by STUK to assess and monitor accident development and in respect of decision making?

Answer: STUK emergency response centre has two main operative teams for situation assessment: one for reactor situation assessment and the other for environmental situation assessment. Reactor assessment team has direct access (data transfer from) to the accident or incident reactor process computer. In it's own assessment no quickly running codes for reactor and fuel behavior are not in primary use. Reference material for accident analysis, both for the plant and potential releases are available.
The consequence assessment is based in early phase to the predicted release potential (time, radioactive content) and a real time weather prediction. The basic codes in use for dispersion and dose assessment are typical (names Aino, Valma) or national (SILAM) based on a long term trajectory calculation. See also Question and Answer 127. European RODOS is also used in training and exercises. Main idea is anyhow to carry effective environmental radiation measurements, to obtain not only predictions but real data describing the need for emergency actions to protect the population in the threat area.

Q.No	Country	Article	Ref. in National Report
123	China	Article 16.1	16

Question/ Comment: Would there be especial emergency preparedness arrangements targeted for the EPR （Olkiluoto 3 reactor）? For example, Severe accident scenario and source term is the tech basis of Emergency Planning Zone, will EPR have different consideration in EPR?

Answer: Final emergency plans for Olkiluoto 3 reactor operating team will be assessed before the plant operating license, together with unit specific FSAR and accident analysis reports. So, the plant emergency teams in the arrangements will consider results of EPR specific accident scenarios and related potential source term.
External emergency actions (off site arrangements) will consequently be based on the realistic situation assessment and thus a response in accident situation would be in line with the threat from a accident reactor. Any major difference in advance planning is not expected, the regional authority will have a common procedure for the Olkiluoto site (2 BWRs, 1 PWR) surrounding areas.

Q.No	Country	Article	Ref. in National Report
124	Germany	Article 16.1	Page 51/53

Question/ Comment: Can you please provide more details on the emergency planning and response arrangement in the Emergency Planning Zone versus the provisions taken in the Precautionary Action Zone mentioned on Page 53?

Answer: Finland has applied the internationally recommended approach that a PAZ within EPZ sets more requirements both for the NPP operator and Regional Emergency Authorities. NPP operator has to distribute in advance iodine pills to the PAZ households, run a real time operating radiation monitoring network at distances of about 1 and about 5 km from the plant, alert workers accommodation sites as well as any technical support area to the operating and under construction reactors.
Emergency Authorities must provide more effective means for EPZ actions, e.g. controlling access, alerting and potential evacuation.
Otherwise the radiation protection related criteria for protection of the population within PAZ and EPZ are not different. The key urgent actions are sheltering indoors and taking iodine pills (especially effective for population under 40 years) if the situation assessment results in such a emergency authority decision.

Q.No	Country	Article	Ref. in National Report
125	Switzerland	Article 16.1	50

Question/ Comment: Switzerland would like to ask additional questions to chapter "Off-site arrangements".

What are the source term characteristics (NGs, Iodines, arerosols released to the environment,

duration of release, time of release after onset of accident) of the scenarios used for emergency planning?

What is the probability of an accident source term leading to health consequences to the public larger than those associated with the scenarios used for emergency planning?

Answer Severe accident (core damage) scenarios including quite early and large releases of radioactive materials are used for emergency planning. The results are plant specific. A general requirement is that no acute health effects must not occur and the long term restrictions in land use are not allowed (Cs -137, release less than 100 TBq)

The probability of larger source terms is very small. Probabilities of accident source terms are analyzed in probabilistic risk analyses (PRA) of the level 2 but the results should be taken only as an indication of very small probability.

According to STUK's Guide YVL 2.8 the following design objectives concern a nuclear power plant:
- The mean value of the frequency of core damage is less than 1 x 10 5/a.
- The mean value of the frequency of a release exceeding the limit value defined in section 12 of the Government Resolution 395/1991 must be smaller than 5 x 10 7/a.
The Government Resolution 395/1991 has been replaced with Government Decree 733/2008 (see section 10). The regulations can be found at www.stuk.fi.

Q.No	Country	Article	Ref. in National Report
126	Switzerland	Article 16.1	50

Question/ Comment Switzerland would like to ask an additional question to chapter "Off-site arrangements".

How are new plant designs with improved safety features impacting the selection of accident scenarios for emergency planning?

Answer See also the answer to question made by China on article 16.2.

In a new NPP site, where a single new reactor unit may operate in 2020s, a decision how to implement Regional Emergency Preparedness (Off sites Emergency Plans) to protect the population may differ from the present plant environments, if a safety evaluation provides a firm basis for such a judgment.

Q.No	Country	Article	Ref. in National Report
127	Turkey	Article 16.1	page 49

Question/ Comment Which atmospheric dispersion codes are used for assessing the consequences of an accident? How were the codes verified?

Answer For safety analyses the licensees of the NPPs have TUULET code (with a simple Gaussian plume model) for analyzing radiation doses from accidents. For real-time analyses during an accident they have ROSA and LENA codes (with simple Gaussian plume models). STUK utilizes many codes for real-time analysis (HIRLAM, SILAM, AINO, RODOS) in cooperation with the Finnish Meteorological Institute. Verification is often based on comparison calculations with other codes. Experimental verification or comparison with real accidents or other dispersion events is also possible. In case of HIRLAM, see hirlam.org.

Q.No	Country	Article	Ref. in National Report
128	China	Article 17.1	17

Question/ Comment Please provide the answers to several thermal pollution issues as following:
1) The regulations, standards and provisions used to control the thermal discharge from coastal NPP
2) The methods, such as model prediction, remote sensing and thermography, used to assess and mitigate the impact of thermal discharge
3) The utilization practices of waste heat produced by NPP

Answer Intake and discharge of cooling water of a NPP from and to the sea need the permits according to Environmental Protection Act and Decree and Water Act.

All the impacts of the intake and discharge of the sea water and their mitigation are analyzed in connection with Environmental Impact Assessment (EIA) procedure (according to EIA Act and Decree) before licensing the NPP. Several alternative locations for the intake and discharge channels (even tunnels) are studied. The EIA report is also one of the documents needed for the application of a new NPP to the government of Finland (at first for decision in principle; positive decision needs ratification by the parliament, after which the application for the construction license can be submitted to the government). The flow and temperature field in the sea are assessed by a sophisticated calculation model. During operation of the NPP temperature of the sea is monitored at some points for which the maximum allowed temperatures are given in one of the permits. Other impacts to the sea, too, are monitored during operation of the NPP.

The waste heat of the cooling water of Finnish NPPs has not been utilized much. Warm water has been used for small scale fish farming and such at the NPP sites.

Q.No	Country	Article	Ref. in National Report
129	France	Article 17.1	§17 - page 52

Question/ Comment "The report states that “Deterministic analysis are made to assess the impact of various natural phenomena and other external events. The probabilistic risk assessment required for the safety review of construction and operating licence applications provides information on risk caused by external events”.
Could Finland give details about the criteria used to define the list of natural phenomena and external events to be taken into account in the safety demonstration? Is this list proposed by the licensee, regulatory body or another administrative body?
Could Finland provide details about the method (deterministic or probabilistic) used to analyse the natural phenomena or the external events and lessons learnt?"

Answer The list of events considered in external events PRA is drawn up by the licensee as part of the PRA and reviewed by the regulator STUK. Only some minor additions have been required by STUK. The list is based on international guides, local experiences and expert judgment. The starting point is typically a list of about 50 types of events. Events are screened out from further analysis if they are considered impossible at the site, for example, due to geographical reasons or if their frequency is estimated to be less than 1E-8/a.

A lesson learned is that seismic events and extreme meteorological and oceanographic conditions (snow storms, high seawater level, frazil ice, high seawater temperature) were not considered sufficiently in the design of the operating units and plant modifications have been implemented. The design basis of new units regarding these types of events has been based on more extensive analyses.

Q.No	Country	Article	Ref. in National Report
130	France	Article 17.1	§17 - p. 53

Question/ Comment "The report states that ""a new nuclear power company, Fennovoima, was founded in 2007"".
In order to deliver an operating authorisation, could Finland indicate how the financial and technical capabilities of the applicant are assessed? "

Answer According to the Nuclear Energy Decree, when applying for Decision in Principle the applicant has to provide (24§) 1) a description of the applicant's financial resources and the economic viability of the nuclear facility project; and 2) an overall financing plan for the nuclear facility project.
When applying for the construction license, the applicant has to provide (32§) 1) a description of the economic viability of the nuclear facility project and its other financial prerequisites; and 2) the cost estimate and financing plan of the nuclear facility project; and 3) the applicant's financial statements for the last five years.
When applying for the operating license, the applicant has to provide (34§) 1) a description of the

applicant's financial status, the plan for the administration of the finances of the nuclear facility and the production plan of the nuclear facility; and 2) the applicant's financial statements for all the years following the years mentioned in paragraph 13 of section 32 [of the law] or, if the nuclear facility has previously been granted an operating licence, the financial statements for the year when the previous operating licence was applied for and any subsequent years.
The technical capabilities of the applicant are also assessed during the licensing process:
When applying for Decision in Principle the applicant has to provide (24§) a description of the expertise available to the applicant.
When applying for the construction license, the applicant has to provide (32§) a description of the expertise available to the applicant and the organization implementing the construction project.
When applying for the operating license, the applicant has to provide (34§) a description of the expertise available to the applicant and the operating organization of the nuclear facility.
The detailed requirements on the needed technical expertise are given in the YVL guides and assessed by STUK during the licensing process. In case of Fennovoima the financial and technical capabilities have been assessed and found appropriate during the DiP phase.

Q.No	Country	Article	Ref. in National Report
131	India	Article 17.1	1st para, line 13, Page 52

Question/ Comment: It is stated that 'Deterministic analyses are made to assess the impact of various natural phenomena and other external events. The probabilistic risk assessment required for the safety review of Construction and Operating Licence applications provides information on risks caused by external events'. Are quantitative acceptance criteria specified for risk associated with external events?

Answer: Limits are set on the total core damage frequency (less than 1E-5/a) and frequency of large release (less than 5E-7/a for release exceeding 100 TBq of Cs 137). The contribution by external events is included in these limits.

Q.No	Country	Article	Ref. in National Report
132	Japan	Article 17.1	p52

Question/ Comment: It is reported that "Site characterisation is performed based on geological, seismic, hydrological and meteorological factors as well as on transport routes and risks, industrial activities, agriculture, nature and population."
How do you consider the accompanying incidents by seismic such as slope failure around a site and tsunami?

Answer: In Finland NPPs are founded on hard crystalline bedrock and the sites have flat topography. Consequently slope failure is not relevant at the Finnish sites. Earthquakes or displacements capable of causing large Tsunami waves have not been observed in the Baltic Sea region. The sea is also shallow and there a no large variations of depth physically necessary for the formation of high Tsunami waves near the coast line. The possible Tsunami waves are covered by the sea level variations due to other phenomena.

Q.No	Country	Article	Ref. in National Report
133	Korea, Republic of	Article 17.1	p.52

Question/ Comment: It is stated in the second paragraph of page 52 (Article 17) that Site characterization is performed based on geological, seismic, hydrological and meteorological factors as well as on transport routes and risks, industrial activities, etc. Please explain the following, in relation to the capable faults:
1) What is the definition of the capable faults?
2) How do you determine whether a fault is capable or not?
3) How far shall reactors (or plant sites) be apart from the capable faults?
4) What is the closest plant to the capable faults in Finland?
5) What kinds of effects shall be evaluated regarding the effect caused by the capable faults (e.g., intensity of vibratory ground motion, affected area by surface faulting, etc.)?

Answer: 1-4) In Finland, the observed earthquakes cannot be associated with known faults (diffuse seismicity). Therefore the concept of capable faults is not used in the Finnish seismic

requirements. The design earthquake is determined by probabilistic seismic hazard analysis using diffuse source regions. The existing sites are situated in a region with low seismic activity with estimated peak ground acceleration less than 0.1 g (frequency of occurrence 1E-5/a). The new plant planned by Fennovoima would be in a region with somewhat higher seismic activity.

5) Only the vibratory motion, defined by horizontal and vertical Peak Ground Acceleration (PGA) and the ground response spectrum, is mentioned explicitly in the Finnish seismic requirements (Guide YVL 2.6).

Q.No	Country	Article	Ref. in National Report
134	Ukraine	Article 17.1	page 20

Question/ Comment: In the report it is said: “Actions can include shutting down the plant operation immediately or decrease of reactor power and for unlimited time”.
Have such actions been ever taken? What actions/enforcement measures have been recently taken? What is their number?

Answer: The enforcement tools and sanctions available to STUK through Nuclear Energy Act are very strong, but so far needs to use them have been very rare. The most recent enforcement from STUK to lower the power of a nuclear power plant to ensure safety goes back to 2008. In this case STUK required licensee to lower the power after an over voltage event at Olkiluoto. For more information see press release (http://www.stuk.fi/stuk/tiedotteet/2008/en_GB/news_498/)

In case of safety concerns, the Finnish licensees have usually made their own decisions e.g. concerning shutting down the plant for repairs after discussions with STUK and no formal actions by STUK have been needed. In practice, it is normal regulatory work to use lower level enforcement tools like inspector’s oral notice, inspector’s written notice, STUK’s written notice (e.g. decision requiring to clarify/evaluate something) and STUK’s written order (decision to take actions).

Q.No	Country	Article	Ref. in National Report
135	China	Article 17.2	17

Question/ Comment: EIA was a tool to increase the opportunity for citizens and authorities to receive information, become involved in the planning and express their opinions on the project. How to ensure the effectiveness of public participation□H

Answer: Finnish experience was that when EIA and all later authority actions concerning land use planning and the whole Nuclear Energy Act related Decision in Principle (requiring consent of the municipality concerned) process were implemented for potential new NPP sites, an effective public participation was really realized. When similar processes were concerning a NPP site where already existed operating NPP reactors, similar intensive interest and involvement of the general public was not reached.

Q.No	Country	Article	Ref. in National Report
136	India	Article 17.2	Para 4 and 7, Page 53

Question/ Comment: Are the EIA and the size of the precautionary action zone dependent on the reactor type besides its power?

Answer: No, they are not dependent. When EIA is started, no real information of the reactor project and safety are existing. See also answers to questions by China and Switzerland on article 16.1.

Q.No	Country	Article	Ref. in National Report
137	Japan	Article 17.2	p52

Question/ Comment: Concerning the recreational houses on the seaside within 5 km, is there any special arrangement (ex. communication) during nuclear emergency exercise?

Answer: Finland has for the present not such specific tools for household alerting and communication (sirens, radio, TV and web are used). A future demand is that also GSM messaging to the phones situated in threat areas should be developed. This is a common authority planned action for several emergency situations in the society.
In addition to the permanent resources of Emergency Authorities, certain type of trained

volunteering rescue teams are available with boats, measuring and communication equipment.

Q.No	Country	Article	Ref. in National Report
138	Japan	Article 17.2	p53 right

Question/ Comment: What is the consideration in the criterion of 4hours time for an early evacuation after evacuation decision?

Answer: A judgment to include such a practical criteria for preplanning was made after TMI accident in late 1980s. Further severe accident mitigation actions and source term evaluations since that have not changed this value, being also a practical goal taking into consideration the potential emergency response resources and local demography conditions.

Q.No	Country	Article	Ref. in National Report
139	France	Article 18.1	§18 - p. 54

Question/ Comment: "The report states that « the design of the nuclear facility and the technology used is assessed by STUK when reviewing the applications for a decision in principle, construction licence and operating licence ».
Could Finland indicate whether the results of assessment of a technology (indeed EPR) could be used to deliver an authorisation for another project (generic authorisation)? "

Answer: There is no generic authorization for a design in Finland. However, if we postulate that Olkiluoto 4 or Fennovoima 1 will be an EPR, the results of the review performed for Olkiluoto 3 (EPR) would be used, in practice. However, each unit requires a separate safety review and a license and differences in design, operating practices and safety requirements, if any, need to be addressed in the safety review.

Q.No	Country	Article	Ref. in National Report
140	France	Article 18.1	§18 - p. 55

Question/ Comment: "The report states that “the possibility of human error shall be taken into account in the design of the NPP and in the planning of its operation and maintenance, so that human errors and deviations from normal plant operations due to human error do not endanger plant safety.”
Could Finland give details about the criteria to define the list of natural phenomena and external events to be taken into account in the safety demonstration?
Is this list proposed by the licensee, regulatory body or another administrative body?
Could Finland provide details about the method (deterministic or probabilistic) used to analyse the natural phenomena or the external events and lessons learnt?"

Answer: See the answer to question made by France on article 17.1. The list of events considered in external events PRA is drawn up by the licensee as part of the PRA and reviewed by the regulator STUK. Only some minor additions have been required by STUK. The list is based on international guides, local experiences and expert judgment. The starting point is typically a list of about 50 types of events. Events are screened out from further analysis if they are considered impossible at the site, for example, due to geographical reasons or if their frequency is estimated to be less than 1E-8/a.

A lesson learned is that seismic events and extreme meteorological and oceanographic conditions (snow storms, high seawater level, frazil ice, high seawater temperature) were not considered sufficiently in the design of the operating units and plant modifications have been implemented. The design basis of new units regarding these types of events has been based on more extensive analyses.

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Q.No	Country	Article	Ref. in National Report
141	Germany	Article 18.1	page 55

Question/ Comment Concerning the mentioned reassessment of the Olkiluoto plant units in 2007 – 2009 in the periodic safety review process and the planned activities to improve safety.
Please provide some more information about technical and organisational improvements of the plants.

Answer In the last PSR of Olkiluoto NPP, STUK concluded that the Olkiluoto NPP meets the set safety requirements for operational nuclear power plants. Design bases of Olkiluoto units 1 and 2 were set in the 1970's. Substantial modernisations have already been carried out since their commissioning to improve safety (examples are given in Annex 2 of the Finnish convention report).

The safety of the plant will be further improved based on continuous improvement principle. As a result of the last PSR, systematic assessment and development of the diversity principle was required, including investigation of possibilities for diversifying the residual heat removal. STUK has just started reviewing the licensee's assessment and development plan. In addition to residual heat removal system, there are plans to improve diversity of systems important in a loss of off-site power event and to diversify the reactor level measurement system. Another requirement considered plant modifications to improve safety in situations involving spurious opening of the turbine bypass valves. Licensee has also plans to build an emergency control room in accordance with the updated regulatory requirements. The implementation schedule was discussed and agreed in the PSR. There was also quite extensive discussion of the equipment qualification. The licensee was requested to improve the qualification maintenance (the documentation demonstrating the qualification and the follow-up of the equipment qualification) to be more systematic. Licensee has also plans to develop its emergency operating procedures and technical specifications.

Probabilistic risk assessment (PRA) modeling was also discussed during the last PSR. It was concluded that the PRA's outage analysis shall be updated and possible changes to reduce the risk shall be assessed. Licensee will also continue to develop the fire risk analysis. PRA shall also be supplemented with a risk assessment for oil leaking into the sea and the adequacy of the preparedness for oil releases.

Licensee is preparing for the change of generation of workers e.g. by continuously developing the competence of personnel. STUK has stated that as a result of the challenges posed by the change of generation, the licensee shall assess the competence assurance activities as a whole and develop the activities to be more systematic.

STUK also stated in the last PSR that the physical protection of the Olkiluoto NPP was not yet completely in compliance with the requirements of Givernment Decree 734/2008, which came

into force in December 2008. Further requirements concerning this issue based also on the principle of continuous improvement were included in the decision related to PSR. One example of such requirements was the need for updating the physical protection plan to be more comprehensive and detailed.

Q.No	Country	Article	Ref. in National Report
142	Switzerland	Article 18.1	56

Question/ Comment: The report says: “Fortum and TVO have also reviewed all of the analyses of transient and accident situations at the Loviisa and Olkiluoto nuclear power plants in connection with the operating licence renewal and periodic safety review”.

Have there been improvements in safety for the existing power plants due to recent lessons learned from the new nuclear power plant Olkiluoto unit 3?

Answer: Not directly due to the safety analyses. Analyses for the periodic safety review were done according to the Guide YLV 2.2, having the same requirements for existing and new plants. In a more general level, continuous safety assessment and enhancement approach is presented in the Finnish nuclear legislation. Therefore, operating experiences from existing plants and knowledge from new plants must be taken in account. It is however difficult to name any improvement in existing plants, that has been implemented mainly due to Olkiluoto 3 lessons.

Q.No	Country	Article	Ref. in National Report
143	Switzerland	Article 18.1	56

Question/ Comment: The report says: “Compared with the existing reactors, the possibilities to mitigate the consequences of the severe accidents are taken into account already in the early design phase. This is achieved by implementing features to ensure containment integrity. Design provisions include e.g. core catcher for corium spreading and cooling, (…)”.

There are mentioned some improvements regarding the defence in depth concept for Olkiluoto unit 3 for severe accident conditions. What are the major improvements in the defence in depth concept for Olkiluoto unit 3 regarding design basis conditions?

Answer: New event category called design extension conditions has been introduced in OL3 design. This new category handles multiple failures including among others common cause failures in safety systems. This category is between design bases accidents and severe accidents giving a new level into the defense in depth concept.

Q.No	Country	Article	Ref. in National Report
144	United Kingdom	Article 18.1	Page 56 and 82

Question/ Comment: The report refers to a potential undervoltage event identified at the Swedish NPP, Oskarshamn. At Olkiluoto, the effects on pump motors in safety systems was analysed.

Were any tests carried out to confirm the results of the analysis?

In page 82 it is stated, in reference to a grid disconnection event in May 2008, that “The most important lesson learnt from the event was that the design of NPP’s electric systems must take into account the transients coming from internal and external grid”.

Noting the findings from this event, what provisions has Finland taken to ensure that future NPPs are designed to take into account transients coming from both the internal and external grid? Additionally, has this finding been shared with the IAEA for consideration in developing its Safety Guides?

Answer: The answer is valid for old and new NPPs.

Undervoltage tolerance of electrical equipment has been checked by calculations and analyzes. The calculations are verified by type tests of equipments. The settings of protective devices (e.g. thermal protection relays) must also be considered in the calculations, because motors and

rectifiers consume nearly normal power in undervoltage situation that leads to higher currents.

The most dimensioning under/over voltage/frequency combinations (there can be several different cases) and their length must be calculated and defined to each nuclear plant. These voltage deviations can come from internal (e.g. main generator) or external (e.g. grid connection) sources. Diversification and correct dimensioning of electrical equipments are mandatory in future NPPs.

More information and recommendations can be find from OECD/NEA DIDELSYS final report NEA/CSNI/R(2009)10.

Q.No	Country	Article	Ref. in National Report
145	China	Article 18.2	18

Question/ Comment: Please state the development status of the revised Guide YVL 5.5 which gives the requirements specific to I&C systems. For ensuring the function and reliability of digital I & C systems and implement verification & validation of digital I & C systems, which specific requirements does revised Guide YVL 5.5 provide.
If the revised Guide YVL 5.5 has not issued, please explain the review basis for renewed digital I&C systems (including the qualification standards for hardware and software of digital I&C systems).
Please state the verification & validation situation of digital I&C systems which have been renewed.

Answer: Revised YVL 5.5 has nearly the same requirement level than the old one. The main difference are in plant level (see answer to question No. 55).

Standards and guidelines intended for nuclear engineering applications as well as quality management measures that comply with them must be used in the design and implementation of Safety Class 2 equipment. In the design of Safety Class 3 equipment applicable standards are used as well as quality management measures that are in compliance with them. The standards used in design and implementation shall be specified and their applicability justified at the beginning of design phase.

Q.No	Country	Article	Ref. in National Report
146	Germany	Article 18.2	page 55

Question/ Comment: It is mentioned that TVO aims to prevent fuel leaks by preventing loose parts from entering the reactor more effectively. Can you give information about the measures taken for preventing loose parts from entering the reactor?

Answer: Mainly this is related to enhancement of administrative procedures during reloading in order to prevent loose parts enter into the reactor core.

Q.No	Country	Article	Ref. in National Report
147	Germany	Article 18.2	page 56

Question/ Comment: At Loviisa plant, the I&C systems are currently being renewed and the project is intended to be completed in 2014. It is mentioned that the first protection system renewal will be the phase two of Loviisa automation renewal project 2010.
Which procedures and quantitative reliability analysis are taken into account for the development of detailed safety requirements and procedures to ensure adequate reliability of such systems?

Answer: The power company has made a quantitative reliability analyze in plant level to the new I&C architecture. The goal was to demonstrate, that the new I&C architecture fulfill the core damage frequency requirements.

Detailed functionality and safety requirements are mostly coming from the old design. There are also some detailed requirements that are coming from the new I&C platform itself and from small modifications to the old functionality.

The reliability of the new protection system is based on verification/validation process (during

planning, manufacturing, installation and testing), type approved I&C platform and its application development process/tools, analyzes of new protection system, accurate testing including testing of protection system with on-line process simulator and third part inspections. The needed analyzes of the protection system are a failure mode and effects analysis, a common cause failure analysis, an operating experience analysis, and a quantitative reliability analysis.

The overall reliability requirements of plant I&C systems are fulfilled with defence in depth concept that consist of several different I&C systems. Independence/interface analyzes between different systems are needed in the plant level to proof that systems are correctly isolated from each other.

Q.No	Country	Article	Ref. in National Report
148	Germany	Article 18.2	page 56-57

Question/ Comment: Concerning the incorporation of proven technologies it is mentioned that at the Olkiluoto nuclear power plant units 1 and 2 changes in the control room are made gradually and that digital instrumentation and control technology has already been implemented in the modernised systems.

Is it planned to use digital instrumentation and control technology for the protection system in the next years?

Answer: The modernization point of the protection system is not decided yet. It depends from many factors. There is no acute need to chance the system, if the reliability and functionality are at required level and you can maintain the system. It is very hard to get any advance of exchange of functioning protection system, with no sign of the end of its lifetime, to new software based protection system, if you still can get reserve parts to you old system. In OL1/2 case the power company has ordered, together with some Swedish power companies, restarting of fabrication of reserve parts to the old protection system. There must also be an ageing management program to monitor the residual lifetime of the system.

Q.No	Country	Article	Ref. in National Report
149	India	Article 18.2	para 8, Page 55

Question/ Comment: Are all the periodic (once in four years) tests on containment carried out at full test pressure for the containment?

Answer: The tests are carried out at containment pressure that equals the maximum pressure in the limiting design basis accident.

Q.No	Country	Article	Ref. in National Report
150	India	Article 18.2	Page 56

Question/ Comment: ‘Incorporation of proven technologies’ (para 2):
What is stratergy of STUK for review of modern digital I&C systems, that may get introduced in the operating NPPs and in the new designs, to ensure adequate reliability and safety?

Answer: The main principles can be found from the answer to question by Germany on article 18.2. More accurate requirements can be find from YLV 5.5 guide.

Q.No	Country	Article	Ref. in National Report
151	United States of America	Article 18.2	18.2, p 56

Question/ Comment: What were the most significant findings from the STUK review of the Preliminary Suitability documents pertaining to the qualification of the digital I&C platforms being used at the Loviisa plant?

Answer: The currently installed part (phase 1) of the new software based systems consists only of a safety class 3 (safety related) reactor limitation/control rod positioning system and a non safety primary circuit auxiliary control system (mainly water treatment systems). So STUK has not reviewed the suitability documents of actual safety systems yet.

The most significant equipment qualification finding from the phase 1 were, that one must also seriously take into account, not only the main I&C platform, but also the bulk I&C equipment like separate isolation amplifiers or relays. It is very hard to qualify a safety class 2 off the shelf relay

during the installation phase.

The commissioning and first operational experience also confirmed again the theory that it is impossibly to prevent and find software design errors by well managed design processes, comprehensive testing and good previous operation experience. The triggering events that activate abnormal software behavior can be so complex, that all errors can't be detected during SW inspections or tests. Errors detected during first operation period were caused by occasionally timing (synchronization) problems and timer register overruns. The period between two this kind of faults can be months and errors can't be detected by analyzing the application code or (probably not) by running the code in simulation tools. So there really is need for defence in depth concept with independent defence lines and diversification, when software based I&C systems are used in safety critical environment.

Q.No	Country	Article	Ref. in National Report
152	Korea, Republic of	Article 19.1	p.64 & p.65

Question/ Comment (Operational experience feedback)
The section of operational experience feedback describes the collection, analysis and feedback of operational experience.
Please explain how the regulatory body can confirm that the lessons-learned or corrective actions are being properly implemented on nuclear power plants.

Answer Lessons learned and corrective actions originating from operating experience need to be reported to STUK according to the YVL 1.5. For most significant events, STUK requires licensee to report on the implementation of corrective actions. Other instances where fulfillment of corrective actions is verified are inspections, document updates or regulatory approval process for modifications. Some can be verified by resident inspectors at site. In addition, licensees have to submit an annual report of OPEX activities to STUK in which they report also the fulfillment of corrective actions.

Q.No	Country	Article	Ref. in National Report
153	United Arab Emirates	Article 19.1	60-64

Question/ Comment The discussion of procedures in Article 19 beginning on page 60 is extensive, but there is no mention of a training program, other than a statement that to the extent necessary, procedures have been verified during operator training at plant simulators. The discussion of Article 19 on page 64 specifies that at the Olkinuoto NPP, seven events in 2007, eight events in 2008 and five events in 2009 were classified on the INES scale, and ten of these events were rated at level 1, Anomaly. Several of these events appear to have resulted from not complying with procedures. Including a discussion of training on procedures would be helpful in addressing Article 19.

Answer There are a few events that have resulted from improper usage of existing procedures. Nuclear power plant operations is highly regulated and controlled activity and this is a clear reminder that there is no room for over-confidence.

Q.No	Country	Article	Ref. in National Report
154	China	Article 19.2	19

Question/ Comment Please explain which design improvements, design verifications and commissioning items had they completed when the increases of rated power level of Loviisa NPP and Olkiluoto NPP were implemented in the 1990's?

Answer See annex 2 of the Finnish CNS report for overview.

Q.No	Country	Article	Ref. in National Report
155	Japan	Article 19.3	p60,62

Question/ Comment It is reported that "The procedure for operation, maintenance, inspection and testing have been established by licensee and submitted to STUK.
STUK verifies that the procedures are followed by means of inspection and oversight by resident inspector."
Could you explain how the inspections by resident inspectors are conducted? Namely how often?, how long?, with prior notices?

Answer Resident inspectors are constantly overseeing licensee´s activities rather than performing inspections on the mentioned activities continously. Resident inspectors have broad access to lisensee´s activities so they can follow very closely any activities taking place at the plant. There is a limited number of tests for which the licensee is required to notify STUK.

Q.No	Country	Article	Ref. in National Report
156	Japan	Article 19.3	p60 right

Question/ Comment "STUK verifies by means of inspections and continuous oversight performed by resident inspectors that approved procedures are followed in the operation of the facility."

What are the roll differences between STUK's inspections and resident inspectors' oversights above?

Answer There isn´t any actual difference. Resident inspectors have better access to licensee´s data systems and meetings. The main aspect is that resident inspectors are located at site and they provide constant oversight.

Q.No	Country	Article	Ref. in National Report
157	Germany	Article 19.5	page 62

Question/ Comment The Maintenance department plans and implements the annual maintenance outages together with the Operation Department and Technical Support Department. Special attention has been paid to the reliable work of the subcontractors and to the technical competence of the external work force. The technical expertise of testing laboratories and contractors is controlled both by the power company and STUK.

Which procedures are used for the control of technical expertise and competence of testing laboratories and contractors / subcontractors?

Answer Best example might be the NDT testing where both the methods and experts are required to fulfill certain regulatory requirements. Use of a testing organization requires STUK’s approval. Requirements are given in YVL 1.3. Manufacturing of the highest safety classified components are also subject to STUK approval.

Q.No	Country	Article	Ref. in National Report
158	Russian Federation	Article 19.7	pp. 64-65

Question/ Comment The Report presents sufficiently detailed information on the process of foreign NPP operating experience feedback. Do the Operator and Regulator apply any criteria/indicators for assessing the effectiveness of this activity?

Answer External operating feedback process has some indicators that describe the process, however to measure the effectiveness of this process is quite hard. Some indications can be used like how many modifications are started based on external opex.

Q.No	Country	Article	Ref. in National Report
159	Switzerland	Article 19.8	66

Question/ Comment The report says: “The repository for the low and intermediate level waste at the Olkiluoto NPP site consists of two silos at the depth of 60 to 95 meters in tonalite bedrock, one for solid low level waste and the other for bituminised intermediate level waste”.

What is so far the experience concerning the chemical stability of the bituminised waste in that repository (concerning chemical alteration processes, gas production rate, swelling, etc.)? How does the monitoring of the repository take into account those processes?

Answer The waste consists of ion exchange resins bituminised into steel barrels, which are placed in concrete boxes. The gas production rate is not remarkable, but swelling of the bituminized granular resins due to moisture is. This is taken into account by leaving space in the barrels when filling them with mixture of bitumen and resins.

The boxes are piled into the silo, the walls of which are made of reinforced concrete. Monitoring of the barrels is therefore not been done. Before the disposal concept was accepted, there was a

comprehensive test program. The results showed that the concept is feasible.

Q.No	Country	Article	Ref. in National Report
160	Switzerland	Article 19.8	66

Question/ Comment: The report says: “The dismantling starts immediately and lasts until 2035. Olkiluoto units 1 and 2 are planned to be shut down after 60 years operation in 2038 and 2040. The dismantling starts after 30 years delay”.

What is the justification for the delay of 30 years?

Answer: The justification is the radiation protection of the workers. Olkiluoto units 1 and 2 are BWRs. The decontamination of the large and complicated reactor circuits of the BWRs is more difficult than the decontamination of the PWR primary circuit and the delay of 30 years allows the decay of the most important radionuclide, cobalt-60.