Convention on Nuclear Safety

Questions Posted To Sweden in 2017

No.	Country	Article	Ref. in National Report	Question
1	Hungary	General	p.135	"Efforts to reduce releases of radioactive substances to air and water have been effective and the activity amounts, as well as the corresponding calculated doses, have decreased or remained at the same order of magnitude.." How can they reduce the radioactive emissions into air and water? Answer: For the Oskarshamn NPP some examples of measures to reduce discharges are the reduction of off gas flow, which gives longer decay time in the delay system for off gases, separation of water with low activity from water with higher activity that implies higher efficiency in the filters, and actions to reduce water consumption. At Forsmark NPP the main objective for releases to air have been to reduce the aerosol releases. Forsmark performed a thorough survey in the facility of sources of aerosols. The survey resulted in a more extensive use of mobile filters in connection to works done on the facility, a more extensive redirection of filtered ventilation during leakage from primary systems, the development and use of a robot for reactor pool decontamination, and risk assessment with regard to aerosols in advance of outage work with a thorough follow up. Forsmark also stresses the importance of minimizing water use and reuse of water as much as possible, in order to reduce radioactivity in water releases.

				At Ringhals NPP, the refurbishment of waste evaporator, the delay of short-cut gas release routes from charging pumps (e.g. Ar-41) on PWR, membrane filtration in addition to ion exchange filtration of process-water as well as waste water, improved particulate filtration on PWR RC clean-up system, as well as water balance and improved water reuse, minimizing system leakages, is mentioned as activities contribution to reduced releases to air and water.
2	India	General	Page 16	It is stated "The owners of RAB have decided that operation of Ringhals unit 2 will end in 2019 and that operation of Ringhals unit 1 in 2020. As a consequence, all major investments for these units have been cancelled, but all necessary measures to maintain safety will be taken until they are taken out of operation. In parallel, planning for safe and efficient decommissioning is ongoing." In the light of the decision for phasing out of NPPs, does Sweden foresee any challenges in the continued availability of human, financial & technical resources (R&D support) till safe completion of phase out / decommissioning? Please provide details on these aspects. Answer: We can see a risk of long term lack in competence due to reduced interest in the nuclear related education and training in Sweden in the light of decommissioning of Oskarshamn units 1 and 2 and Ringhals units 1and 2. This lack of interest however already started when the new build project was put on hold 2015. Phasing out reactors was mainly caused by a difficult economic situation. Since then nuclear production taxes has been reduced, the remaining reactors will be put in a different position, financially. Challenging but not critical. Sweden has for many year been innovation driven in terms of new design features and big projects. A shift towards a slower plant evolution and enhanced maintenance performance, is quite naturally foreseen, and a change of the needed

				competence profile obviously. In the short term, the risk is fairly low that there will be a lack of human resources. The need for new design engineers and high-level technical support will decrease, however other challenges; ageing management, maintenance R&D, etc., will increase and should attract young engineers to the business. The community will be smaller, going to fewer reactors means that the vendor support will be more expensive and with lower quality. Components will be obsolete and must be replaced by new components manufactured in small series at old production lines. Preferably, the replacement should be done by modern, high quality industrial components. However, these components might be superior in quality but the room for formal acceptance, according to present quality assurance requirements, is not regulated. Therefore, the major challenge will be the replacement of obsolete components. To use current, modern quality standards; petroleum, marine, etc., or new nuclear quality assurance standards, with regulator acceptance, is probably unavoidable in the long term.
3	Japan	General	P29	According to the 29th page of the report, more than 60 measures which increase the level of safety have been completed at Swedish NPPs, were these actions done by licensees independently, or required by regulator? Answer: After Fukushima Dai-ichi NPP accident, a number of technical and administrative measures to increase the level of safety have been taken at Swedish nuclear power plants. These measures were mainly identified during the EU stress tests and in connection with investigative work linked to the licensees' international forum, WANO. Some of these measures were required by the authority and some were implemented on the utilities own initiative. The Swedish National Action Plan was submitted to ENSREG in 2012 and presents the regulatory requirements. Within the framework of the National Action Plan, SSM

				has also decided that the licensees shall report on implementation plans for the strengthened core cooling and safety measures that should be implemented by 2017, as well as for the permanent additional independent core cooling system to be introduced in 2020 at the latest.
4	Netherlands	General	general	Since the IRRS FU has been done: could you please give some information on the main results. Answer: The general conclusion from the 2016 IRRS follow-up team was that they were satisfied with the approach of Sweden to address the findings of the 2012 IRRS mission and to improve on the regulatory system for nuclear safety. Eleven (11) recommendations out of the 22, which were identified in 2012, were closed and a further nine (9) were closed "on progress and confidence". Two recommendations remained open. Twelve (12) suggestions out of the 17 identified during the 2012 IRRS-mission were closed and the remaining five (5) were closed on "progress and confidence". The two recommendations that remain open refer to 1) Provisions to maintain competence for nuclear safety and radiation protection on a national level, and 2) The systematic evaluation of operational experience from non-nuclear facilities and radiation protection events and activities, including dissemination of all significant experience. The work with these will continue. As a further result of the 2016 IRRS follow-up, additionally four (4) suggestions were received: SSM should • Complete a comprehensive resource and competence assessment, based on a strategic review that incorporates the Swedish nuclear industry's perspective.

				• Consider making key management system process documentation available to the applicants, licensees and other interested parties. • Consider reviewing its roles, responsibilities, and expectations of its departments to assure clarity and to consider methods to assure effective cross organizational boundary communication that enable effective implementation of its management system components. The Swedish government should consider expanding the scope of the national emergency response plan for management of nuclear accidents to take into consideration arrangements for responding to radiological emergencies, based on threat/hazard assessment. SSM also received two new "Good practices" referring to a) the development of criteria for assessing risks in connection with the use of radiation sources and b) SSM's approach to establish consistent and comprehensive regulations, taking into account international standards and good practices.
5	Netherlands	General	general	What are the main outcomes of the SSM's analysis of the IAEA Fukushima report? Answer: Sweden and SSM experts have contributed to preparation of IAEA Fukushima report mainly in part of analysis of Emergency Preparedness and the accident management. SSM has had access to information during the drafting of the report. Furthermore, the information collected and analyzed for various expert meetings has been assessed and discussed internally at SSM. The IAEA Fukushima report is to be understood as a description and collection of facts regarding the accident. Therefore, majority of the aspects taken up in the report were already accounted for in the process of the European stress test. However, to recognize the importance of the IAEA Fukushima report, a special seminar has been organized by IAEA and SSM to summarize conclusions of the report and to discuss the adoption of some aspects in the Swedish action plan.

6	Netherlands	General	general	The Vienna Declaration also aims at taking measures at existing power plants, if reasonable, to practically eliminate early and large area releases. This recommendation might go beyond the regular PSRs. In the past we might stop by saying "it is not reasonable/impossible to install a core catcher", but with the VD we are challenged to go a step further and pursue improvements in a more pro-active way. What are the pro-active actions from SSM and the power plants (e.g. by R&D) to further strengthen the nuclear safety in this respect? Answer: By installation of FILTRA or Multi Venturi Scrubber System (MVSS) systems at all Swedish units the basic question of large releases has been addressed as a result of TMI accident. In continuation, so call APRI (Accident Phenomena of Risk Importance) project has been established to research in areas with some uncertainties in respect of management of an accident and to strength prevention against core-melt accidents. APRI is a joint project, which serves as a platform for utilities and regulatory body SSM and as a knowledge base regarding phenomena and events of importance for severe accidents in nuclear power plants. The new knowledge that the project adds for SSM and force companies to improve the assessment of existing measures, technical and administrative, to deal with severe accidents. As one of the results of this project, SSM decided in 2014 to require installation of an independent core-cooling system at all units before 2020.
7	Netherlands	General	general	In the report ample information is given about the operating experience feedback proces (OEF). Could SSM give information about the other type of feedback, which is also important: regulatory experience feedback? How is the regulatory experience from other regulators (national or international and not related to events) used at SSM? Answer: SSM uses information gathered from other sources through an active participation in OECD/NEA CNRA, in various working groups of NEA and also

				in the Multinational Design Evaluation Programme (MDEP). Furthermore, regular contacts based on bilateral agreements with e.g. USNRC, STUK, ASN, CNSC, etc. are used for information collection. Some examples of use of experience feedback from other regulators are NDT and Inspection Qualification, water chemistry and ECP monitoring.
8	Netherlands	General	general	What is the position of Sweden on the special rapporteur challenges of the CNS 6? Answer: The challenges of the special rapporteur have a rather general character and are not easy to be addressed by individual contracting parties. However, Sweden uses various opportunities to discuss the identified challenges in the context of international relations and fora, including in CNS country group discussions, and specifically within bilateral activities with other regulatory bodies.
9	Netherlands	General	general	When permanent closure is announced there is a need to prevent people to leave and to make sure that new people are recruited. What is the general policy of SSM and what is the policy of the licensees? Is this policy successful? Answer: SSM does not have a special policy but there is a set of regulatory provisions, which require that the licensees have an organization and the necessary human resources to perform the nuclear activities in a safe way during each stage of the facility. These are followed-up during inspections, taking into account human and technical factors, as appropriate. There has not yet been an effect of the announced closures at SSM. What the authority has done is to investigate how the closure of the reactors will affect its future work. There will naturally be, in a few years, less operational oversight activities. On the other hand, the oversight of decommissioning and waste management will increase. Therefore, the strategy has been to make sure the right

				competencies is available in the organization and SSM will increase the number of staff in area of decommissioning. For the licensees the situation is different. One of the licensees is in the situation that one reactor will not be restarted after modernization and the other reactor will end its operations in mid-2017. After this, only one reactor at the site will be in the operation. The present number of staffs cannot be kept and staff reductions has already been announced. For the other licensee, which also decided *on* closure of two reactors, there is more time to adjust the organization and secure needed competencies and staffing. This latter licensee actually sees a risk for not having enough staff if the present rate of persons leaving the organization stays the same. Both licensees work actively and focused on different ways to keep the needed competence and staff. One way to achieve this is to retrain staff for decommissioning. Another is to give certain staff groups, important for the continued operation of reactors (e.g. control room operators) some special agreements, for example salary and/or guaranteed employment for some years. Measures have been taken to keep the staff informed about the situation and what is foreseen to happen, to communicate the vision of the organization in the near future, to inform what job opportunities there will be, and to motivate the staff as best as possible.
10	Portugal	General	31	What percentage of your NPP's already have autocatalytic hydrogen recombiners installed in the containment? Answer: For all three PWRs installation of passive recombiners was done after the Three Mile Island accident. For the boiling-water reactors, there is no need for such installations since an inert nitrogen-based atmosphere is established in the containment during operation.

11	Portugal	General	31	What percentage of your NPP's already have a containment venting-filtration system installed. Answer: In order to reduce large releases and avoid off-site contamination, containment venting-filtration systems (FILTRA or Multi Venturi Scrubber System) were installed at all units before the middle of the 80's of the last century.
12	Slovenia	General	Appendix 2, p. 217	Measures implemented during the reporting period 2013–15 Ringhals unit 2 - Incore and Flux measurement (2015) Q.: Please, provide more information on the replacement of the Incore and flux measurement system. What were the reasons for implementing this modification and how does the new system perform during operation? Are there plans to perform this modification also in Ringhals units 3 and 4? Answer: At Ringhals unit 2 and unit 3, the in-core and flux measurement systems have been changed; for Ringhals 4, this change (installation) is scheduled to take place during the annual outage in 2017. The old measurement systems were worn and out-dated. There were not any longer any spare parts in stock, nor any available on the market. This lack of suppliers´ support and spare parts is largely a result of that the manufacturer Eanco has stopped its production. If needed, spare parts must therefore be ordered and manufactured individually or be made in-house, at Ringhals NPP. The degradation of the Ringhals 2 measurement system negatively affected the availability of margins and the quality of monitoring the power distribution. The ultimate goal was to replace the outdated equipment with new one that had easier handling, less maintenance needs and a better reliability. The new equipment should, with regard to the availability of spare parts and expertise, have a long expected life-time and it will ensure its intended function during the remaining lifetime of the plant.

13	Switzerland	General	Vienna Declaration	Principle 1 1.1 How do you define 'a new nuclear power plant'? For example: do you consider a power plant to cease being a 'new nuclear power plant' once operation begins? Answer: Currently, Sweden has no "new" reactor in the meaning of principle 1 of the VD. However, in case of a new build the design shall follow requirements as stated in new regulations, which are under preparation.
14	Switzerland	General	Vienna Declaration	Prevention 1.2 How does your national requirements and regulations incorporate appropriate technical criteria and standards to address the objective of preventing accidents in the commissioning and operation of new nuclear power plants? For example: can you describe the basic design objectives and the measures you have in place to ensure the robustness and independence of defense in depth measures? Consider for instance inclusion of implementation of Regulatory requirements for: • Robustness of DiD and independency of the levels of DiD; • Design Extension Conditions (DEC); • practical elimination of high pressure core melt scenarios; • achieving a very low core melt frequency; • protecting digital safety equipment against Common Cause Failure (CCF). • External events analysis Answer: The requirements focusing on preventing accidents were and are managed in the following manner: • Robustness of DiD and independency of the levels of DiD – there will be strengthening of those aspects in the new regulations;

				• Design Extension Conditions (DEC)- since the 90's the regulatory body put continuously requirements on necessary safety upgrades of all the units as soon as a new and unresolved safety issues are identified; • Practical elimination of high pressure core melt scenarios;- installation pressure reliefs valves giving possibility to de-pressurization with both steam and water; • Achieving a very low core melt frequency- required update of PSA to verify low core-melt frequencies and off-site consequences; • Protecting digital safety equipment against Common Cause Failure (CCF).- requirement for design and verification and validation; • External events analysis – treated as design basis especially reviewed in connection to the stress test exercise.
15	Switzerland	General	Vienna Declaration	Mitigation 1.3 How do your national requirements and regulations incorporate appropriate technical criteria and standards to address the objective of mitigating against possible releases of radionuclides causing long-term offsite contamination and avoiding early radioactive releases or radioactive releases large enough to require long-term protective measures and actions. For example: can you describe the measures you have in place to protect against severe accidents and your accident management arrangements - how do you protect staff during accident management? Consider for instance inclusion of implementation of Regulatory requirements for: • Engineered systems to protect the containment; • engineered systems to cool the molten core; • severe accident management, protection of staff during the accident. • Provision and resilience of Emergency Mitigation Equipment (EME) Answer:

				The regulatory and technical measures addressing the objectives of mitigating against possible releases of radionuclides causing long-term offsite contamination and avoiding early radioactive releases were taken as follows:
				• Engineered systems to protect the containment;
				  o Means to control containment pressure, including active and passive relief capacity and
				  o FILTRA system and Multi Venturi Scrubber System (MVSS),
				  o Containment spray with mobile equipment.
				• Engineered systems to cool the molten core;
				  o Mobile equipment and means to cool the core and
				  o Requirement to install an independent system with full autonomy for reactor core cooling by year 2020.
				• Severe accident management guidelines, protection of staff during the accident
				  o SAMG procedures or similar are in place for mitigation of severe accidents. Main control room and command and control center are equipped with filtered air intakes and also with possibility to operate in self-circulating ventilation mode. New regulations will have requirement on maximum allowed effective dose for staff during a severe accident.
				• Provision and resilience of Emergency Mitigation Equipment (EME) New regulation requires the licensee to have independent core cooling installed by 2020. Until 2020, it is required to have compensating equipment, i.e. mobile “FLEX” equipment for accident management. This equipment is not required by regulation after 2020. The requirement target is core cooling and prevention of severe accidents, but the mobile equipment can be used also for mitigation purposes.

16	Switzerland	General	Vienna Declaration	Principle 2 2.1 How do your national requirements and regulations address the application of the principles and safety objectives of the Vienna Declaration to existing NPPs? Answer: By the planned update of the Act on Nuclear Activities, as well as by the implementation of the new Nuclear Safety Directive the principle of the Vienna Declaration will be covered.
17	Switzerland	General	Vienna Declaration	2.2 Do your national requirements and regulatory framework require the performance of periodic comprehensive and systematic safety assessments of existing NPPs – if so, against what criteria/benchmarks are these assessments completed and how do you ensure the findings of such assessments are implemented? Answer: Sweden has a long tradition since the 80's of last century in the so-called ASAR reviews (As Safe As operated Review) which have developed over the years and are now quite similar to those safety factors recommended in the IAEA Safety Standards. The safety reviews are now in the fourth round of the 10-year period. The assessment of safety factors and review reports are presented to the regulatory body for analysis. The conclusions are put into an action plan with measures to be taken prior to the next safety review. The criteria for assessment are fulfillment of regulatory requirements and measures in the action plan, but also safety challenges for the coming period until the next safety review.
18	Switzerland	General	Vienna Declaration	2.3 Do your national requirements and regulations require reasonably practicable/achievable safety improvements to be implemented in a timely manner – if so, against what risk/engineering objective or limit are these judged and can you give practical examples? Answer:

				According to Government decisions taken in the 1980s, the extensive and long-term contamination of soil shall be prevented. This resulted in installation of filter-venting equipment at all Swedish plants. During 90's further major safety upgrades were required for all units, e.g. Oskarshamn unit 1 to install an additional safety train including additional EDGs. Examples of applied regulations are SSMFS 2008:1, SSMFS:17, etc. as well as the new EU Nuclear Safety Directive.
19	Switzerland	General	Vienna Declaration	Principle 3 How do your national requirements and regulations take into account the relevant IAEA Safety Standards throughout the life-time of a Nuclear Power Plant. Answer: In SSM's management system, it is stated that IAEA Safety Standards shall be reflected in the national regulations. This rule applies in the ongoing process of preparation of a new set of regulations.
20	Switzerland	General	Vienna Declaration	General question What issues have you faced or expect to face in applying the Vienna Declaration principles and objectives to your existing fleet or new build of Nuclear Power Plants Answer: Based on stress test some small modifications were performed but there were not any big issues in respect of VD principles application. The reasons for this are explained in connection to other questions related to large releases and other aspects of VD principles.
21	United Arab Emirates	General	11	Progress and challenges on implementing the action plan for Fukushima accident lesson learned?

				Answer: The EU stress test and following action plan recognized some weaknesses or sensibility of the Swedish plants against some of phenomena learned from Fukushima accident. As example, full dependence of core cooling on electric power supply in case of SBO or emergency; have been known as the most urgent issues. The action plan resulted in a number of additional analyses to assure resistance against certain natural phenomena. However, the main challenge is implementation of additional and fully independent core-cooling system at all Swedish units, which shall be in operation beyond 2020. This requirement by the regulatory body requests also a temporary solution to be in place during the preparation and implementation of the final design.
22	United Arab Emirates	General	12	How was the controller of the decommissioning fund decided? Answer: In the process of preparation of a law on the financing of future costs for management of spent fuel and decommissioning, there were different variants under discussion. One to allocate the funds and remain in power companies and then the second where responsibility is at the state, which has overall control over handling and use of the means. Thus, the Swedish parliament decided in the early 1980s of a financing system for handling costs for the future management of spent fuel and radioactive waste and to decommission and dismantle nuclear reactors. According to the legal provisions for the financing the system, the person who has a license to operate a nuclear facility that gives or has given rise to waste products, shall pay a special fee to the state and then placed in a fund, the Nuclear Waste Fund. SSM and in some cases the Government decides about payment from the Nuclear Waste Fund. The “Nuclear Waste Fund” is also the name of a government authority whose assignment is to receive and manage the fees paid in by the nuclear power companies and other nuclear facilities in Sweden. The Nuclear Waste Fund is

				overseen by a Board of Governors appointed by the Government. Two of the six members are appointed at the suggestion of the fee-liable licensees. This authority has no staff of its own. Its administration is handled by another authority: the Legal, Financial and Administrative Services Agency.
23	Poland	Article 6	6.1.1, Page 36	Regarding loss of two phases of 400kV offsite supply, is there a necessity to change the logic of electrical system? Should the bus bars have phase unbalance protection? Generally what would be the conclusion coming from this particular incident? Answer: There are two main insights from the event. Firstly, the event itself and its characteristics have been analysed for various plant states (power operation, shutdown etc.). It has been concluded that the plants are generally well protected during power operation by installed protections on the conventional plant. During shutdown states however, there may be difficulties from such an event. Therefore corrective measures are taken to provide plant electric power supply from the off-site grid from different connection points (main and reserve connection) when possible and ensuring enhanced thermal inertia (e.g. RPV open) when possible, especially if critical electrical works are planned. Additionally it is deemed that reliance on conventional plant only for protection is undesirable and dedicated protections should be (or are) installed. The second insight is that disturbances such as degraded power supplies, which are unexpected or not analysed, can propagate to redundant trains through points of common coupling. Therefore, additional work is ongoing in order to scope how enhanced robustness against such disturbances could be achieved. It should be noted that further work is pursued within OECD/NEA WGELEC.
24	Slovakia	Article 6	p. 36	A reactor scram caused by seawater leakage into the reactor building is described. One of the task of the “stress test was to analyse the resistance of the NPP against

				external events with the periodicity of at least 10 000 years. Even the reactor was safety shut down it seems that the resistance is not sufficient. Please explain the situation (after the “stress tests”). Answer: The event described in the report, that the strainers in drain lines between two drain systems were clogged by sediment, was an unexpected and not anticipated circumstance and this was recognized as caused by lack of knowledge. However, the event resulted in reactor shut down and the safety systems functioned as planned. All the Swedish NPP have showed that they are resistant against external events with the periodicity of at least 100 000 years, according to the Swedish requirements. It has been demonstrated according to the National Action plan in December 2015, in Action T1. LA.4 Extreme weather condition and T1. LA.5 Extreme water level estimation.
25	Slovenia	Article 6	p. 37	6.1.3 Corrosion in the bottom part of containment liner Investigations, analyses and discussions are still ongoing in the early 2016 Q.: The report presents initial findings of corrosion in steel containment liner of Ringhals-2. Could you provide an update on investigations as well as the plans for restart of the plant? Are there plans for investigating conditions of steel containment liner also for other units of Ringhals? Answer: SSM performed an extensive review during 2016 and concluded that Ringhals AB had demonstrated adequate safety margins in order to put Ringhals 2 into operation with a damaged containment liner in the reactor containment. SSM then granted Ringhals permission to operate Ringhals 2 until 31 December 2019 when the unit to be permanently shut down.

				However, some uncertainties in the assessment remained and Ringhals AB was required to conduct further analyses and testing. Before operation, Ringhals AB had to: • Conduct an analysis of the toroidal plate's resilience against local corrosion damage in connection with events assigned to the event class "highly improbable events" and report to SSM on the outcomes, and • Perform renewed pressure testing for verification of welding leak tightness in the leakage monitoring system. After satisfactorily performing these additional tests, Ringhals 2 was connected to the grid 26 November 2016. Finally, Ringhals AB are required to conduct a renewed CAT (Containment Air Test) of the reactor containment during the annual outage in 2017 and report the findings to SSM. There are no plans for investigating conditions of steel containment liner for other units of Ringhals or any other reactor in Sweden. The reason for this is the unique design of the Ringhals 2 containment.
26	Slovenia	Article 6	p. 36	6.1.2 Reactor scram and containment isolation caused by seawater leakage into the reactor building. The event shows the importance of re-evaluating risks from often neglected peripheral systems, especially infrastructure systems, as the plant and organization shows their age. Measures implemented during the reporting period 2013–15 Ringhals unit 2 – In-core and Flux measurement (2015) Q.: The seawater leakage occurred into the reactor building of the Ringhals-1 unit that is a BWR. How did the high level of seawater affect the other units of Ringhals plant? Have the conditions of drainage systems of other units been inspected to see whether these systems have been clogged or degraded by aging? Please, provide more information on the replacement of the In-core and flux

				measurement system. What were the reasons for implementing this modification and how does the new system perform during operation? Are there plans to perform this modification also in Ringhals units 3 and 4? Answer: At the other plants problems caused by the high sea water level has not been identified. Ringhals AB has informed SSM that the maintenance group shall investigate further needs in other infrastructure systems not currently included in the maintenance program.
27	Spain	Article 6	page 16	It is stated that in the year 2015 was decided the phase-out of the reactors Ringhals units 1/2 and Oskarshamn units 1/2. The decision was taken in respect, among others, of SSM´s safety requirements regarding operation beyond 2020. Could you please provide information on the origin of these safety requirements (Long Term Operation regulations, specific safety regulations…)? Answer: The new requirements regarding installation of full independent core-cooling system was motivated by the accident at Forsmark NPP in 2006, but was raised again in connection to EU stress test. The dependency on supply of electric power in case of an emergency at the Swedish reactor units has been discussed already in 90´s. An extra and fully independent system was subject of discussions already at that time. The results of the stress tests and subsequent analyses and conclusions resulted in the regulatory decision to install such systems, which are required to be in place for the continued operation of units after 2020.
28	United Arab Emirates	Article 6	35	The Licensees finalized power uprating programmes of seven reactors and a minor uprating of one reactor. The uprate programmes added some 600 Mwe to nuclear power capacity in Sweden. Please summarize any significant safety issues identified during the review of the power uprates?

				Answer: There has been no major safety issues identified, but we can mention two interesting findings: • Although a licensee can show, by safety analysis, that all safety requirements will be fulfilled, a large power uprate can affect the safety level of the plant due to decreased robustness. When the margins are small, the plant gets more difficult to operate and the vulnerability to disturbances increases. The plant with the largest power uprate is going through a long and difficult test operation period with significantly more scrams than before. This difficult test period was not foreseen. • When the licensed power level is increased, the power profile over the core gets more flat. For BWR dry out analyses, new methods including statistical methods have had to replace the former way to decide safety limit minimum critical power ratio (SLMCPR). This has led to a need for more margins to the dry out criteria, which costs money for the licensee.
29	United Arab Emirates	Article 6	35	The licensees finalized power uprating programmes of seven reactors and a minor uprating of one reactor. The uprate programmes added some 600 MWe to nuclear power capacity in Sweden. What were the ranges of power uprates? Answer: The power levels are described in Table 3, p. 39, but some of the power uprates there were made in the eighties. The added capacity mentioned on p. 35 comes from power uprates between 2007 and 2015. One of them is very small (+15 MWe for R1) but the others are large: they range from plus 120 to 250 MWe. Please note that to this date the total added capacity is 815 MWe.
30	Belgium	Article 7	Pg 57, pg 60	How is the waste management plan (on site & off-site) of the applicant considered at the licensing stage? Answer:

				Historically, during beginning of development of Nuclear Industry in Sweden the original waste management plans as a part of a license were limited to the site. At a later stage, by the request to industry to take responsibility for handling of radioactive waste and spent fuel, SKB (Swedish Nuclear Fuel and Waste Management) was established. However, this happened after the initial licensing of all operators of the Swedish plants. Nevertheless, in the connection to power uprates or the continued operation of units, in the safety assessment, the impact of radioactive waste production and spent fuel generation must be accounted for. Especially the impact on the Central Spent Fuel Storage and the Final Repository for Short-lived Radioactive Waste must be assessed.
31	Japan	Article 7	P45	According to the National Report on 45 page, under the act on Nuclear Activities section 5 "all contractors whom the license- holder plan to use in nuclear operation need approval- upon application – from SSM", please explain how SSM verify regulatory requirements. If there a case of violation, please explain how SSM requires utilities for corrective action. Answer: SSM issues an authorization after receiving, assessing and approving an application. The fulfillment of any requirement are controlled within regular supervisory activities. Any violation of this provision results in sanctions or legal prosecution.
32	Japan	Article 7	P55	Regarding license process, While SSM has independency, municipal authority has power and authorization to approve or reject of granting license approval. If there is a case of municipal authority rejects license approval, please explain how SSM organize in a case of rejection by municipal authority. Answer: In case of rejection of the application in accordance with the Environmental Code on the grounds that concerned municipality says no, there are no specific courses

				of action that the SSM should take. The courses of action of the applicant depends on the reasons for why the municipality has said no. For example, it may be that the application needs to be supplemented or that any new study must be carried out.
33	United Arab Emirates	Article 7	41	Sweden is currently transposing two EU directives in the area of nuclear safety and radiation protection into Swedish legislation. SSM has presented to the Government its suggestions for national implementation of the revised nuclear safety directive and the new directive in the area of radiation protection. The Ministry of the Environment and Energy is preparing necessary legislative changes based on the proposals from SSM. What were the proposals from SSM to the ministry of environment and energy in the area of radiation protection? Answer: SSM proposes a new RP Act and Ordinance. Basic concepts will be defined and regulated in the Act and not in SSM regulations. The new European Directive uses "*exposure situations*" instead of the former "*practices*" and "*interventions*". However, in the proposal, the 1988 RP Act expression: "*activities involving ionising radiation*" is supplemented with "*other activities where ionising radiation occurs*" to cover planned and existing exposure situations. The new European Directive stresses the use of dose constraints and reference levels in optimisation. The proposed Act includes a series of dose limits and reference levels to be used, as appropriate, in planned, existing or emergency exposure situations. SSM proposes a reference level for radon exposure of 200 Bq per cubic meter for homes, public buildings and workplaces. A reference level of one (1) mSv/year effective dose is stated for exposure to gamma radiation from building materials. If effective doses are likely to exceed six (6) mSv, operations must be reported and requirements for activities involving ionizing radiation apply.

				Some other noteworthy changes are: • For not exempted activities, notification complements licensing (graded approach). • The Act will better clarify the responsibilities regarding waste management and decommissioning. • The Act introduces provision concerning non-medical imaging. Strict justification and the consent of the exposed persons are required. • The Ordinance tasks SSM to regulate, as necessary, exposure in connection with operation of airplanes.
34	Belgium	Article 7.1	7.1.2, pg 43, 7.3.5 pg 57	SSM has the rigth to issue general regulations and to impose license conditions. Th Government grants the license under the the Act on Nuclear Activities (7.3.4). Can the Governement not take into account or modify the license conditions proposed by SSM ? Answer: The Government, when reviewing the license application, is not bound by the conditions suggested by SSM. The Government can change them or decide not to include them in the licence. The Government can also include other licence conditions, not suggested by SSM, but this is less likely to occur. However, the Government has authorized SSM, during the period a licence remains valid, to add additional licence conditions as needed for ensuring nuclear safety.
35	Belgium	Article 7.1	7.1.3 pg 44	The License holder is required to give informations to the local safety board. Is this requirement explicitely written in the regulations ? Has the license holder

				other transparency obligations about his activities (addressing for example the general public) ? Answer: The task for the local safety board is to follow and inform locally on the development at the nuclear site from a safety perspective. The tasks of the local safety board are outlined in the Ordinance SFS 2007:1054. These tasks cannot be fulfilled without information from the license holder. SSM staff takes part in the meeting of the local safety board and gives its view on the information. In case of an emergency the license holder has specific obligations described separately in the report.
36	Belgium	Article 7.1	7.1.2.5 pg 45	A license may be revoked by the competent authority. Does it mean that only the Governement has the rigth to revoke a licence ? Is it a possibility to suspend the licence (by SSM?) ? Did this already occur in the past ? Answer: Yes, since the Government issues nearly all licences for operating nuclear facilities or for performing “nuclear activities”, it is for the Government to revoke or suspend such licences. However, a few licences regarding nuclear activities are issued by SSM (transports, landfills) and it is for SSM to revoke or suspend these. It should be noted that if a dangerous situation should occur, for example at a nuclear power plant, SSM is empowered to order the licensee to stop the operation or the on-going nuclear activities.
37	Montenegro	Article 7.1	Chapter B, 7.1.2.3, p 44	Subchapter 7.1.2.3 Public transparency explain that it is very important to give the public insight into and information on nuclear activities and so-called local safety boards have been established in municipalities hosting nuclear power plants. Also, the license-holder for a major nuclear plant is required to give the local safety board insight into the safety and radiation protection work at the plant and on request provide the board information on the facts available and allow the

				board to study relevant documents and have access to plants and sites. Is there any surveys about public hearing regarding the construction and operation of nuclear facilities and the potential hazards that can occur as a consequences of human factors or natural disasters? In connection with this, is there a possibility that the local population in a referendum decides about the construction and operation of nuclear facilities, or those types of decisions are at the state level? Answer: The task for the local safety board is to follow and inform locally on the development at the nuclear site from a safety perspective. The tasks of the local safety board are outlined in the Ordinance SFS 2007:1054. According to Swedish legislation, in a licensing process and decision on siting or extension/major modification of a nuclear facility an important instrument is the Environmental Impact Assessment (EIA). In the EIA process, the applicant must consult with the county administrative board at an early stage. If the county administrative board decides that the activity or measure is likely to have a significant environmental impact, an environmental impact assessment procedure shall be performed. In such procedure, the person who intends to undertake the activity or measure must consult with the other government agencies, the municipalities, the citizens and the organizations that are likely to be affected. The consultation shall relate to the location, scope, design and environmental impact of the activity or measure and the content and structure of the environmental impact statement. The municipalities can decide on a local referendum to use it as an advisory support from the local population. Further, the licensing process preparation and review of a licence application, as well as the issuing of a license and conditions, take place in open court hearings at the Land and Environmental Court. At that hearing, all interested parties may attend and comment, also too may the relevant authorities. The applicant must verbally describe all relevant aspects of its case. Questions can be submitted during the proceedings.

				It should be noted that at one stage in this process the municipal authority approves or reject the activity (municipal veto). In case of non-approval the courses of action of the applicant depends on the reasons for why the municipality decided in such way. For example, it may be that the application needs to be supplemented or that any new study must be carried out.
38	Slovakia	Article 7.1	p. 41 + Appendix I, p. 207-213	In this chapter and appendix I of national report set of legal instruments described. Please explain if all pieces of legislation went through European comments procedure according to Articles 30 – 33 Euratom Treaty and also according to EU Directive 1535/2015 (previous EU Directive 98/34 and 98/48). Answer: All SSM's regulations have been notified to the Commission in accordance with Art. 33 Euratom Treaty (some of these were issued by the former authorities SSI, SKI).
39	Slovakia	Article 7.2.1	Chapter 7.3, p. 55	In figure 3 is scheme of licensing procedure. It is mentioned that Municipal authority as part of entities is involved in the process. Please explain where is the position of public at large (environmental NGOs, individuals, legal persons etc.). Is it represented only by Municipal authority or whether the public at large has right to access the process individually? Answer: Environmental NGOs have the right to participate in the process at the Environmental Court and appeal against certain decisions. In addition, individuals affected by a decision, e.g. the local residents have this right. Furthermore, it can be emphasized that the applicant has to, in connection with the preparation of the Environmental Impact Statement, consult not only the authorities but also individuals and environmental organizations. These consultations provide an opportunity to raise issues that they might have.

40	Slovakia	Article 7.2.1	Chapter, 7.5, p. 64	In this chapter the public accession to documentation is described. However, some information in the documents could be confidential and hence will not be disclosed. In such cases, the authorities must state on what ground this information is confidential. Please explain who is responsible for exclusion of confidential information (regulatory body, applicant or other authority?) and how this procedure running in practice? Answer: It is primarily the authority who holds the document/information to assess whether it can be disclosed or not. This assessment is performed based on the provisions of the *Public Access and Secrecy Act*, SFS 2009:400. If the request is denied and the document/information is judged to be classified as confidential, this decision can be appealed to the Administrative Court of Appeal. In practice, anyone who wants access to information turns to the authority with a request to release the document/information. If the document/information is assessed not to be subject to confidentiality, it is immediately released. However, if the authority considers that confidentiality exists, the person who requested the disclosure is informed about the authority's decision and that a written decision, which can be appealed, can be requested. If such a decision is requested, a formal written decision is made and is sent to the applicant. If an appeal, in a timely manner, is submitted to the authority, the case is handed over to the Administrative Court of Appeal for review.
41	Finland	Article 7.2.3	8.3.1	Does the basic inspection programme include inspections that are carried out unannounced? In addition, if there has been unannounced inspections in last years, could you please give an example on what areas are these inspections focused?

				Answer: Some examples of unannounced inspections are: - Documents regulating operations at Oskarshamn NPP - Housekeeping with focus on radiation protection at Westinghouse Electric Sweden - Inspection during Forsmark 3 outage - Management of events when removing fuel bundles from fuel boxes at Forsmark NPP - Management of foreign waste at Studsvik Nuclear AB - Housekeeping at Ringhals 1-Ringhals 4 - Activities with a focus on radiation protection at Oskarshamn 1 and Oskarshamn 2 - Access and registration to the facility at Ringhals NPP
42	Slovakia	Article 7.2.3	p. 53	In 2013 SSM began a comprehensive and through review of Code of Statutes. Does it mean that the regulations will be more prescriptive setting more specific safety requirements or requirements for safety improvements? To which extent these new requirements will influence further operation of existing NPPs? Answer: The predecessors of SSM, i.e. SKI and SSI, mainly developed the present set of regulations. Based on needs motivated by: • experience and feedback, • the earlier request of the licensees for new-build, and • the IRRS recommendations to Sweden, the renewal process and development of a new structure of the rules has been started.

				The goal is to develop a more homogenized structure of rules, covering both nuclear safety and radiation protection, starting with common principles and philosophy and after that to cover the specific areas. The new regulations should not necessarily be more prescriptive but the aim is that they should take into account the expected future development. For example, in the area of nuclear safety, requirements regarding long-term operation of existing NPPs, but also requirements applicable in the case of new build.
43	Belgium	Article 8	§8.3.1, pag. 76	It is mentioned that 17 areas have been defined that are covered in the basic inspection programmes. Are these 17 areas fixed or do they change with time? Please also elaborate how the licensee's safety culture is monitored (by means of these 17 areas)? Answer: The 17 areas have been fixed for a number of years. The approach with 17 areas is under review and potential changes will be implemented during 2018. Area no. 2 *Organisation and management system* includes safety culture. The safety culture at nuclear facilities is regularly monitored and corrective actions are required, and implementation followed up, by SSM as considered necessary.
44	Hungary	Article 8	p.78	"SSM applies strengthen supervision when a licensee has announced suspension and decommissioning of a reactor units." How does the SSM apply strengthened supervision when a licensee is decomissioning a reactor unit? Answer: General areas that are in focus: • Competences and staffing, • Management of the transition from operating to decommissioning,

				• Organisational change and change management, and • Staff concerns regarding uncertainty. Depending on the situation at the NPP, the focus on the above areas differ.
45	Korea, Republic of	Article 8	82	With reference to article 8.5.2, page 82 of the Swedish national report, It is stated that external audit on the SSM management system is conducted annually, but the latest external review was in September 2012. With respect to the provided information in the article in question, Korea would like to inquire the following questions: 1) Considering the latest external review discussed in the report was carried out in 2012, does this mean a contracted external review was not conducted since 2012? In addition, what is the criteria in selecting organizations to conduct external reviews? 2) SWEDAC is an organization under the Ministry of Enterprise and Innovation associated with the promotion of nuclear energy. If SWEDAC takes part in external reviews, how can independency be ensured? Answer: Q1: The year 2012 remains, by mistake, from the previous NR. The right year should be 2015 as the available results of the last audit are from that year. As it is an annually performed activity, an audit was also performed in 2016, but the results were not available at the date of the NR preparation. Q2: SWEDAC is the national accreditation body for Sweden and is a government authority. The Director General alone is responsible for the authority's operations. SWEDAC has assignments regarding accreditation and quality control. The authority's activities are regulated by instructions and appropriation

				directions from the government as well as legislation, technical standards, normatives and agreements within Europe and globally. SWEDAC is actually accountable to two departments: the Ministry for Foreign Affairs and the Ministry of Enterprise, Innovation and Communications, and reports to the minister for EU Affairs and Trade. In such a structure, the SWEDAC function is independent. Compulsory accreditation by SWEDAC of an inspection body to be active in Nuclear Power area is always done in consultation with the regulator, which operates in the area, in this case the SSM. In the accreditation process, focus is on applicants QA system, qualification of staff and resources. Beside this, a full inspection qualification is required for method, equipment and data acquisition and evaluation system.
46	United States of America	Article 8	8.2.2	The Report states that SSM still strives to recruit persons with suitable competence. What current efforts has SSM pursued to recruit suitable staff? Answer: During the last years, SSM has been more extensively working with an EVP employee value proposition and employer branding. Regulatory body is also attending job fairs and acting proactively at various and appropriate occasions. As a part of an effective management process, an internal Competence supply model has been put in place and this is used as a basis for recruiting activities.
47	United States of America	Article 8	8.7	In April 2016, a follow-up IRRS mission was conducted at the Swedish Radiation Safety Authority (SSM). Were there any additional recommendations and good practices identified by the team, and if so, could SSM briefly share what those were? [As of the time of this question, the report was not available on the IAEA's web site.]

				Answer: As a result of follow-up mission the following additional 4 suggestions and 2 good practices are reported: RESPONSIBILITIES AND FUNCTIONS OF THE REGULATORY BODY SF1 Suggestion: SSM should complete a comprehensive resource and competence assessment, based on a strategic review that incorporates the Swedish nuclear industry's perspective. RESPONSIBILITIES AND FUNCTIONS OF THE REGULATORY BODY SF2 Suggestion: SSM should consider making key management system process documentation available to the applicants, licensees and other interested parties. MANAGEMENT SYSTEM OF THE REGULATORY BODY SF3 Suggestion: SSM should consider reviewing its roles, responsibilities, and expectations of its departments to assure clarity and to consider methods to assure effective cross-organizational boundary communication that enable effective implementation of its management system components. INSPECTION GPF1 Good Practice: SSM has developed a comprehensive and well-defined set of criteria for assessing the risks involved in different types of uses of radiation sources. REGULATIONS AND GUIDES GPF2 Good Practice: SSM's prompt and integrated approach to establish a consistent and comprehensive regulation taking into account international standards and good practices. EMERGENCY PREPAREDNESS AND RESPONSE

				SF4 Suggestion: The Government should consider expanding the scope of the national emergency response plan for management of nuclear accidents to take into consideration arrangements for responding to radiological emergencies, based on threat/hazard assessment.
48	Finland	Article 8.1	8.2.2	Long-term planning and resources: The renewal process of regulation is going on. After launching the new regulation, the volume and scope of oversight might be different than it is today. How is SSM prepared for that in terms of resources? Answer: The situation as today is slightly different in comparison with the original expected scope and use of the new regulations. The expectation was to have regulatory activities regarding operation of old units, licensing of a new unit, etc. Currently, as consequence of several decisions, the scope of necessary activities of the regulator will be changed towards decommissioning. It has had also influenced resources needed for different areas, decreased scope in the area of nuclear safety (considering the fact that a new-build project was put on hold), while focus moved to the mentioned decommissioning.
49	Finland	Article 8.1	8.2.3	Internal staff training: Does SSM have a plan to include training of new regulation to e.g. competence development programs? Answer: There are no plans to have specific training regarding the new regulations yet. The reason is that the majority of staff is involved in development of the new regulations through either direct responsibility or intern reviews and consultations, questions and comments from licensee, etc. By this, the staff has a basic knowledge of the scope and contents of the new regulations. However, some seminars are expected to be organized in connection to the approval of the final versions of the regulations.

50	France	Article 8.1	§ 8, 67	Sweden mentions that "SSM has improved its work with ensuring long-term human resources needs and the planning of recruitment and internal staff training." Could Sweden provide detail on its situation regarding the retirement of high experience staff? Answer: SSM has a model for structured competence transfer. The practical process of knowledge transfer is then, in each case, customized in an agreement. The knowledge transfer programme runs for approx. 1.5 year. The process of sharing the knowledge is divided into various roles as follows: • Adept – Confirms the objectives which will be achieved • Mentor – Transfers competence and helps the adept to achieve the objectives • Manager – Follows up and secures the competence transfer • HR – Supports the follow-up process To create prerequisites for a productive cooperation we have mutual training for Mentors and Adepts containing the following steps: • Responsibility allocation • Forms and structure • How do we best learn? My personal profile • Coaching and career development discussion • Practice and discussion
51	Netherlands	Article 8.1	Article 8.1	Many regulatory bodies in the world, face the challenge to transfer knowledge of retiring or senior staff to younger and/or new staff. If this is also the case in Sweden, do you have a dedicated program for knowledge transfer and do you provide trainings to senior staff to improve their skills in knowledge transfer? Answer: SSM has a model for structured competence transfer. The practical process of knowledge transfer is then, in each case, customized in an agreement. The

				knowledge transfer programme runs for approx. 1.5 year. The process of sharing the knowledge is divided into various roles as follows: • Adept – Confirms the objectives which will be achieved • Mentor – Transfers competence and helps the adept to achieve the objectives • Manager – Follows up and secures the competence transfer • HR – Supports the follow-up process To create prerequisites for a productive cooperation we have mutual training for Mentors and Adepts containing the following steps: • Responsibility allocation • Forms and structure • How do we best learn? My personal profile • Coaching and career development discussion • Practice and discussion
52	Russian Federation	Article 8.1	Section 8.2.4	It is mentioned in the end of section 8.2.4 "Financial Resources" in the National Report that there are additional resources from fees for reviewing special applications or licensing work that are paid directly to the Authority. Considering that financial independence of regulator is an important constituent of overall regulator independence from all other organisations promoting the use of nuclear energy, we believe that in this case there is no full compliance with the requirements of Article 8 of the Convention. Would you please comment on this opinion. Answer: The costs of regulatory activities of SSM are covered by fees decided by the Government according to the Act (1984:3) on Nuclear Activities. With other words, the licensee pays the necessary costs of the supervision. As the nuclear facilities are owned not only by state but also by the private companies, this is a way to avoid that the taxpayers are through the state budget fully

				covering the costs for supervision of such nuclear activities. Therefore, it is stated in the Act *"Anyone who has a license for nuclear activities shall pay a fee for regulatory oversight of the Law (1984: 3) on nuclear activities and regulations".* The fees are divided in "*Regulation (2008: 463) on certain fees to the Swedish Radiation Safety Authority*" into various categories such as supervision fee, contingency fee, fee for nuclear non-proliferation control, etc. In addition to this, there are also defined additional fees for reviewing special applications or licensing work (application for construction of a new unit, etc.) that are paid directly to the Authority. By the above Sweden fulfills Article 8, par 1 and it is assured that sufficient funding of state supervision on nuclear activities exists (…*provided with adequate authority, competence and financial and human resources*). Regarding fulfillment of the Article 8, par 2 *"… to ensure an effective separation between the functions of the regulatory body and those of any other body or organization concerned with the promotion or utilization of nuclear energy".* The effective separation is assured by the organizational matters and through that SSM is a central administrative authority reporting directly to the Minister of Environment. According to the Swedish constitution, the administrative authorities are effectively independent within the legislation and statutes given by the Government. In addition to this, all SSM's missions and tasks are defined in the Ordinance (SFS 2008:452) with instructions for the Swedish Radiation Safety Authority and in annual appropriation directions.
53	Poland	Article 8.2	8.2.1, Page 72-74	The report often mentions challenges with ensuring enough staff with sufficient competence both in case of regulatory body and the licensees. Regarding the regulatory body staff that is needed for strengthening regulatory supervision

				especially for new nuclear power plants, is it practicable for the regulatory body to recruit the needed staff from the non-nuclear facilities? Answer: SSM recruits people with different competencies, including people from non-nuclear activities and facilities. You then need an education and training plan on the technical issues, specific aspects and the laws and regulations applicable in the nuclear field. In some cases, it is in fact an asset for the development of supervision and other activities in the nuclear and radiation protection field to also have staff with different experiences and viewpoints. SSM works actively to retain its staff and to be an attractive employer. It is however still somewhat challenging to find people with some specific competencies (e.g. criticality calculations, epidemiology, dose calculations etc.) since gaining the skills and the deep know-how needed is a process that takes many years. Often such know-how and skills must be developed within the authority during several years. SSM presently tries to better use its experienced staff in the learning process and skills development of new staff through mentor programmes.
54	Slovakia	Article 8.2	p. 74	Does SSM developed a knowledge management system for its staff? If yes what are the main characteristic? Answer: Yes, SSM has developed a knowledge management system. Identification of core competencies and competence mapping of all employees is a continuous process. The mapping is documented and managed in a computer-based “skills module”. The aim of the mapping is to provide a clear picture of the current status of the SSM’s competencies, and with this information, be able to analyse what new or strengthened knowledge and or skills SSM needs in the short and

				long-term perspective. To remedy identified gaps in knowledge or skills the authority can either recruit new staff, which is sometimes possible/successful, or develop its own employees. A new model for professional development has been established. Professional development is to be goal-oriented. SSM has trained managers and employees to use professional development reviews as a strategic knowledge/skills tool. Reviews are performed yearly and during these individual technical education is discussed and goals are set to ensure that the employees receives the right training to ensure that the right level of competence is achieved. A structured model for the transfer of skills has been developed to secure the critical competencies. Finally, some knowledge must be documented. Apart from usual documentation of rationale and reasoning and results in connection with decisions, licensing, safety assessments, periodic safety reviews, power uprates etc., SSM sometimes documents the historical and technical development in certain areas in order to make sure that it can be retrieved in the future.
55	Germany	Article 9	p. 85	Could you please comment on the mechanism by which Sweden ensures that the licencees have appropriate resources (technical, human, financial) (sec. 9, p. 85) Answer: SSM is following the licences closely with focus on technical aspects and human resources as well as safety culture. This is done in a systematic manner by analysing events and other observations at the site. Regarding financial resources SSM has asked from time to time the CEOs when observations indicate that it could be due to not taking actions or lack of personnel in certain areas. It has in a few cases led to regulatory actions.

				On a yearly basis, the SSM management meets with the licensees' management and present the findings from SSM's supervision.
56	Russian Federation	Article 9	p. 85	It is stated in section 9.1 "Regulatory requirements" of the National Report that Swedish Radiation Safety Authority shall ensure that regulations and used procedures are cost effective and useful for individuals as well as companies. Could you please clarify this requirement? Wouldn't economic considerations override safety in such regulations and procedure, which will be a breach of safety culture principle? Answer: Thank you for the question. According to Swedish legislation, all regulations and derived procedures shall be cost effective and useful for individuals as well as companies. This is generally valid for all authorities. This does not mean that economic considerations should override safety aspects in the regulations and procedures. However, an incorrectness has occurred in rewriting this paragraph in section 9.1. The sentence should be formulated as follows: *Furthermore, according to the Swedish legislation, SSM shall ensure that regulations and used procedures are cost effective and useful for individuals as well as companies.* It is not specifically formulated in Act 1984: 3 on Nuclear Activities.
57	Russian Federation	Article 9	Section À	As follows from Figure 2 in section "A" of the National Report, Sweden NPPs largely feature cross-ownership (several owners own parts of different NPPs). In such cases, who is the licensee responsible for safety? It the responsibility shared by owners? Answer: We can agree that the cross-ownership of the Swedish NPPs is complex. However, the ultimate responsibility for safety is with the plant itself (and CEO), who is the holder of the licence. Therefore, the licence holders are Forsmark Kraftgrupp AB, OKG Aktiebolag, Ringhals AB. The shareholders have impact on decisions regarding economical aspect and business results. Finally, the

				owners can take decision on closure of operation as it happened in case of two units at Oskarshamn NPP and two units at Ringhals NPP in 2015.
58	Spain	Article 9	page 85-88	Please provide some information on the mechanisms by means of which the regulatory body ensures that the license holder complies with its obligations regarding safety. Answer: In principle, this question is about all activities carried out by SSM. Supervision is performed by inspections, safety reviews and in some areas supported by research. SSM follows operational events and any deviation observed in the licensees' organisations. A yearly report is written for each licensee and on a ten-year basis the periodic safety reviews summarises the situation at each plant.
59	Belgium	Article 10	§10.2.5, pag. 97	In this paragraph the safety culture programmes of the licensees are described. Please described the initiatives taken by SSM to ensure it has a strong safety culture too. Answer: SSM has taken an initiative based on the OECD/NEA Green booklet "The Safety Culture of an Effective Nuclear Regulatory Body". The five principles (Green booklet) have been introduced in the SSM management system. A survey of the internal safety culture has been carried out. The management will discuss what will be the next step to strengthen the focus on safety and to create continuous improvement by learning and self-assessment at all levels in the organisation.
60	Germany	Article 10	p. 101	It is mentioned that the regulatory body (SSM) strengthened supervision due to the fact that Oskarshamn 1 and 2 and Ringhals 1 and 2 are planned to end production earlier (sec 10.3.3, p. 101). What was the outcome and experience

				gained from this, in particular related to maintaining safety culture as well as staff/competence/knowledge retention? Answer: The outcome of the strengthened supervision so far is that the licensees have been able to uphold a strong focus on safety and there are no indications of a weakening safety culture. One important aspect of the activities at the licensees is the continuous effort to communicate to the organization that safety must still be the first priority; even if there will be early closures of some units at Oskarshamn and Ringhals site. Both licensees have had a strong emphasis on following up day-to-day activities and look for shifting trends. The need for having managers in the field has also been recognized as one way to keep up safety levels. When it comes to staff/competence/knowledge retention, both licensees work very actively and focused on different ways to keep the needed competence and staff. One way to achieve this is to retrain staff for competencies needed for the decommissioning stage. Another is to give certain staff groups, which are most important to retain for the continued operation of the reactors until closure or for the remaining reactors on site (i.e. control room operators) some special agreements (salary and/or guaranteed employment for some years). Efforts have been taken to keep the staff as informed about the situation and what to come, communicate the vision of the organization in the near future and what job opportunities there is, and to motivate the staff as best as possible.
61	Slovenia	Article 10	p. 89 and 98	The owners of Ringhals NPP and Oskarshamn NPP decided to shut down Ringhals unit 1 and 2 and Oskarshamn unit 1 and 2. As a result of those decisions, measures have been taken by SSM to strengthen supervision of the licensees in order to follow the situation more closely. 10.2.6 Safety culture during a period of preparation for decommissioning Q.: The owners of Ringhals and Oskarshamn NPP decided to shut down two

				units at each of these sites. As presented in 10.2.6 the owners (and the regulator) are well aware of possibility of safety culture degradation during these few remaining years in operation. What is the Swedish experience from shut down of Barsebäck NPP in the 1999 and 2005 and will this experience be used also for planned shutdowns of Ringhals and Oskarshamn NPP (from owners and regulatory position)? Answer: The experience from Barsebäck NPP is that there was no real degradation of the safety culture directly connected to the closures of Barsebäck 1 and Barsebäck 2. The licensee worked hard before the closures to uphold the safety. There was a time between the closure of the first reactor and the second reactor, which showed some signs of weakened safety management. Barsebäck worked hard to strengthen their safety management and culture after the weaknesses were revealed in 2003 and from a regulatory perspective. Barsebäck had a most satisfying safety level before the closure of the second reactor. The decisions to close both of the Barsebäck reactors were political and there was a different and more favourable financial situation at that time compared to the decisions for Ringhals and OKG, which were taken due to the situation at electricity market. This makes the situation today in some way different for the licensees than it was in case of Barsebäck, Ringhals, OKG and SSM have used some experience from the Barsebäck shut down and Ringhals and OKG share their experience from their planning and activities connected to the early closure of the four reactors.
62	Netherlands	Article 11	Article 11	How does the regulatory body assess the sufficiency of human and financial resources at the nuclear installations? Answer: SSM is following the licensee closely with focus on technical aspects and human resources as well as safety culture. This is done in a systematic manner by

				analysing events and other observations at the site. Regarding financial resources SSM has asked from time to time the CEOs when observations indicate that it could be due to not taking actions or lack of personnel in certain areas. It has in a few cases led to regulatory actions. On a yearly basis, the SSM management meets with the licensees' management and present the findings from SSM's supervision.
63	Pakistan	Article 11	11.3.1, Page 104	The report highlights that "A challenging factor in the continued use of consultants is that several with experience from the start of the nuclear programme have changed positions and/or are no longer available." What actions are being taken to deal with this challenge. Answer: Partly by building up the necessary competence within the organization, but also by knowledge management, e.g. through revision of SAR and by existing requirements on review and update in connection with modifications and modernization projects. By this, the licensee is in a position to build in-house competence, or to have a plan for how the necessary expertise should be made available. It can be done e.g. by support of the Swedish Centre for Nuclear Technology at KTH, the Royal Institute of Technology, in education of young graduated engineers.
64	Finland	Article 11.2	11.3	It is stated that thus decision to permanently show down four oldest units OKG has performed a staffing and competence analysis for the remaining business timeframe. It is also stated that in the next few years, about 30 employees are expected to retire each year from Ringhals. Is there similar staffing and competence analysis made in Ringhals to assure needed competencies during the entire expected operating lifecycle and decommissioning phase? Answer:

				Ringhals made a competence and staffing plan for 2016 and this plan will be reviewed at least once a year further on, this plan have an overview until 2021.
65	India	Article 11.2	Page 12	Furthermore, decisions have been taken by the owner of the Swedish NPPs to phase-out the oldest NPPs. This requires SSM to strengthening its regulatory activities in the area of decommissioning and assess availability of further necessary competence. The human resources situation at SSM has improved during the review period, but SSM still strives to find and recruit personal with suitable skills. What are the details of program for skilled human resources for decommissioning and for the regulatory control of decommissioning activities? Answer: SSM has performed a competence- and resource analysis during 2016 (covering the period 2016-2022) in order to identify critical competencies and to identify the number of resources needed in order to handle the upcoming decommissioning activities. The analysis indicates that SSM have to increase the number of staff dealing with decommissioning, waste management and radiation protection with approx. 3-4 persons up to 2019. We have not so far noticed any problem to recruit the right competence to SSM, as the area of decommissioning is growing fast in Sweden and SSM is right now an attractive employee.
66	Korea, Republic of	Article 12	112	With reference to article 12, page 112 of the Swedish national report, it is stated that Swedish licensees have recently adopted the FRAM (Fundamental Resonance Analysis Methodology) method to analyze human-related events. With respect to the FRAM method, Korea would like to inquire the following questions: 1) What is the background behind the adoption of the FRAM method?

				2) How is the FRAM method generally applied to the analysis of human-related events? For example, what is scope of analysis, process and method of the FRAM method and how are corrective actions identified? Answer: 1. The functional resonance accident model (FRAM) assumes that adverse outcomes are the result of unexpected combinations of normal variability of system functions. In other words, it is the tight couplings that lead to adverse outcomes and not sequences of cause(s) and effect(s). Since the investigation furthermore looks for functions rather than structures, it is less problematic if the description is intractable. Indeed, functions may come and go over time whereas system structures must be more permanent. Functions are associated with the social organisation of work and the demands of a specific situation. Structures are associated with the physical system and equipment, which does not change from situation to situation. (SKI Report 2008:50, Study on Developments in Accident Investigation Methods: A Survey of the "State-of-the-Art") Link to the report: http://www.stralsakerhetsmyndigheten.se/Global/Publikationer/Rapport/Sakerhet-vid-karnkraftverken/2008/SKI-Rapport-2008-50.pdf 2. To arrive at a description of functional variability and resonance, and to lead to recommendations for damping unwanted variability, a FRAM analysis consists of four steps: • Identify and describe essential system functions, and characterize each function using the six basic characteristics (aspects). In the first version, only use describe the aspects that are necessary or relevant. The description can always be modified later. • Check the completeness / consistency of the model. • Characterize the potential variability of the functions in the FRAM model, as well as the possible actual variability of the functions in one or more instances of the model.

				• Define the functional resonance based on dependencies / couplings among functions and the potential for functional variability. • Identify ways to monitor the development of resonance either to dampen variability that may lead to unwanted outcomes or to amplify variability that may lead to wanted outcomes. How to use the model has been clearly described in i.e. Woltjer, R. & Hollnagel, E. (2007). The Alaska Airlines Flight 261 accident: A Systemic Analysis of Functional Resonance. Proceedings of the 2007 (14th) International Symposium on Aviation Psychology (ISAP), 763-768, Dayton, OH. There is an SSM report which can give some more insight of the model and its use: SSM 2013:09, An Application of the Functional Resonance Analysis Method (FRAM) to Risk Assessment of Organisational Change. Link: http://www.stralsakerhetsmyndigheten.se/Global/Publikationer/Rapport/Sakerhet-vid-karnkraftverken/2013/SSM-Rapport-2013-09.pdf There is also a lot to be find about FRAM on the internet.
67	Korea, Republic of	Article 12	113	With reference to article 12.2.1, page 113 of the Swedish national report, it is stated that all licensees have formal procedures for the assessment and review of organizational changes. With respect to the provided information in the article in question, Korea would like to inquire the following questions: 1) Do the formal procedures for the assessment and review organizational changes cover the cumulative effect of small changes as stated by INSAG 18 “A review mechanism needs to be agreed on to ensure that cumulative small changes do not impair safety"? 2) How does the SSM assess or verify the cumulative effects of organizational changes? Answer:

				The procedures cover the following: - An evaluation of the strengths and weaknesses of the current organization - Clearly defined motives and goals - A description of how the reorganization is to be managed (including responsibilities and resources) - That experience form similar reorganizations has been absorbed - An analysis of the safety consequences of the reorganization - A description of how the reorganization is to be done - A description of the plans and methods to be employed in monitoring and reviewing the process - A safety review - An assurance that possible weaknesses, or improvements revealed during the safety review and monitoring process will be acted upon - Intentions regarding a possible revision of the plant safety report. The principles guiding the management and control of the revised organization. As you can see, the procedures are quite extensive. Sometimes full procedure is not used in full for smaller changes. There is an understanding of the risk of the impact of cumulative small changes, both at the licensees and at the regulator, but there might not be a perfect systematic verification of the cumulative effects. In the yearly safety reviews of the licensees SSM tries to get a full picture of the licensee, and part of that process is also to look back on earlier years.
68	Korea, Republic of	Article 13	117	With reference to article 13, page 117 of the Swedish national report, Korea would like to inquire the following question: In case a licensee procures an item significant to safety from a supplier with a different management system from that of the licensee, what are the measures taken by the licensee to ensure that the supplier is capable of providing items pivotal to safety?

				Answer: The assessment of suppliers to the Swedish nuclear industry is governed mainly by Swedish Radiation Safety Authority's (SSM's) regulations. Each licensee holder have instructions on how to assess suppliers and the supplier shall give guarantee to deliver under the same quality requirements as used in the QA procedures of the plant. Suppliers of safety related items need to have a documented quality system that meet the requirements according to: • IAEA GS-R-3, alternatively ISO9001 with additional requirements based on IAEA GS-R-3 • US 10CFR50 Appendix B • SSMFS (Swedish regulations) • Other equivalent nuclear standards
69	Korea, Republic of	Article 13	117	With reference to article 13.2.3, page 117 of the Swedish national report, it is stated that a shared audit procedure between the Swedish licensees is used for joint supplier audits. With respect to the provided information in the article in question, Korea would like to inquire the following question: If licensees' auditor qualification requirements varies, how can the qualified auditors be shared in joint supplier audits? Answer: In Sweden, all auditors go through same certification, under the same qualification requirements. The qualified auditors are used by several licensees but in separate cases. The single licensee uses the competence from the pool of auditors for purpose of a supplier in connection to a procurement. There are no shared or joint audits of suppliers; an audit is done in a specific case for the purpose of a specific order of delivery, such as a safety classified equipment.

70	Slovenia	Article 13	p. 117	SSM has reviewed the management systems of all the plants and concludes that they comply with the regulatory requirements. Each year, SSM checks the licensee's work to improve their systems. In addition, SSM meets with each licensee annually to review which internal audits have been carried out and their results. Q.: Does SSM also monitor the corrective actions arising from internal audits? Do the audits result also the bases for updating inspection plans? Answer: SSM is following the actions taken by the licensee. The MTO group performs inspections and reviews of safety important issues regarding organisational changes. Such changes must be reported in advance to SSM. The inspections plans are adjusted to focus on the most safety significant issues and issues raised in earlier plant audits are followed up.
71	Spain	Article 13	page 115, 116, 117	Have Sweden´s NPPs a corrective actions program? Just in case, how is the corrective actions program in Sweeden´s NPPs? Answer: Description of the application of Corrective Action Programmes at the Swedish NPPs is available in chapter 19 of the National Report and in the subchapters as below: 19.2.9 Operating experience feedback function at Ringhals 19.2.10 Operating experience feedback function at Forsmark 19.2.11 Operating experience feedback function at Oskarshamn
72	Spain	Article 13	page 115	Which are the nuclear quality standards used to defined the quality requirements? Answer:

				Quality requirements are governed mainly by Swedish Radiation Safety Authority's (SSM's) regulations, in particular SSMFS 2008:1. Other standards which are used for defining additional safety requirements are for example: • IAEA GS-R-3, GS-G-3.1, • ISO9001 • OHSAS 18001 • US 10CFR50 Appendix B
73	Belgium	Article 14	None	In some parts of your National Report the use of a "graded approach" is mentioned, for instance in view of emergency preparedness, incident findings and some uses by the Licensees. However, in the information provided concerning Article 14 on "Assessment and verification of safety", we did not find any reference towards a graded approach. Has the SSM any formalised method or practices to apply a graded approach in review and assessment of different projects and topics? If an approach is being used, is it supported by some decision criteria? Is it oriented towards an optimum use of manpower resources ? Answer: The answer is that there is a formal method, which could be related to graded approach. A group of experts from various sections meet every week and classify the request from the licensees for plant modifications. There are certain criteria used when classifying the requests. Based on these, the group proposes to the management the requests which should be further reviewed. Every Monday the section heads discuss these recommendations and decide on what should be selected for further review. In a similar manner, the additional review of operating experience reports are decided. However, the latter reporting is on a monthly basis, unless something is urgent.
74	Germany	Article 14	p. 131	In section 14.3.4 (p.131), it is mentioned that SSM has found some shortcomings related to the ageing management in some plants in recent years. Could you

				please provide more information on these shortcomings as well as on the way they have been or will be resolved? Answer: Inspections of licensees' programs for management of ageing were performed during this reporting period. The ageing management programmes are still in a development phase. Therefore, the inspection findings are related mainly to the early stages of programme implementation and the organizational and methodological matters identified refers to issues such as: • Deficits of program function to handle the overall assessment of age-related changes and damages, to collect them and to show how such issues are handled by the plant; • The selection of safety important systems, structures and components sensitive to ageing phenomena is not done in a coordinated way; • The evaluation of selection of components to be included in the aging management program as well as the subsequent assessment of the aging mechanisms are not properly documented; • The management of obsolescence, including responsibility for obsolete equipment, within the program for ageing management is not sufficient. SSM is following the licensees' work of improving their programme for ageing management with new devoted inspections in the area. Apart from SSM:s inspections two out of three NPP licensees in Sweden have conducted IAEA SALTO reviews and the third NPP licensee has agreed to perform a SALTO review later this year. There is also an ongoing project within SSM in revising the regulations. The requirements with regard to ageing management are clarified. The licensees are active in the referral work of these changes in regulatory requirements.

75	Spain	Article 14	page 119	It is indicated that: “All safety systems as well as other plant structures systems and components of importance for the defence-in-depth shall be described in the SAR: • Is there a common definition of the concept “important for safety” or importance for “defense-in-depth” • Is there a rule, method or guide to set the scope of those type of components in a standardized way Answer: The systems and equipment, additional to safety systems that have an essential importance to the plants defense in depth, such as those with potential impact on fulfillment of safety functions and protection around the plant are included in SAR, based on operating experience and probabilistic safety analyses. In the development of new regulations, SSM’s intention is to more closely follow the IAEA recommendations.
76	Spain	Article 14	page 127/page 120	This section says: Section 14.1.3. This section that shows two types of review are contemplated: the primary review, shall be carried out within those parts of the licensee’s organisation which are responsible for the specific issues. The second step, the independent review, shall be carried out by a safety review function (a safety committee), established for this purpose and with an independent position in relation to the organisation responsible for the specific issues. This section says: Section 14.2.7 Safety reviews This section describes three types of reviews: First, a primary review is carried out by the operations department, that is primarily responsible for reactor safety. If needed, resources from other departments are utilized. A second, independent, review is then performed by an independent department or function within the licensee organisation. This independent

				department (10–15 experienced engineers) or function shall not been involved in the preparation or execution of the issues under review. A third type of review is performed by the safety review committees and councils at different levels of the power plant organization Explain the relationship between revisions described in section 14.1.3 Verification of safety decisions and Safety review and section 14.2.7 Safety reviews Answer: Section 14.1.3 describes the requirements by SSM, which are a primary review and a second independent review by a safety committee. Section 14.2.7 describes implementation of the requirements by a licensee. The procedure of the licensee sets up a process with an additional review to the ones described in 14.1.3. The phrase "second independent review" is here used in a different sense than in 14.1.3. In this licensee procedure, the third review step is presenting the second independent review required by SSM.
77	Spain	Article 14	page 127-128	This section 14.2.7 Safety reviews describe three types of reviews: First, a primary review is carried out by the operations department, that is primarily responsible for reactor safety. If needed, resources from other departments are utilized. A second, independent, review is then performed by an independent department or function within the licensee organization. This independent department (10–15 experienced engineers) or function shall not been involved in the preparation or execution of the issues under review. A third type of review is performed by the safety review committees and councils at different levels of the power plant organization How is assured that the results of the review of second independent review y the third review are implemented? Answer:

				Section 14.1.3 describes the requirements by SSM, which are a primary review and a second independent review by a safety committee. Section 14.2.7 describes implementation of the requirements by a licensee. The procedure of the licensee sets up a process with an additional review to the ones described in 14.1.3. The phrase "second independent review" is here used in a different sense than in 14.1.3. In this licensee procedure, the third review step is presenting the second independent review required by SSM. Regarding SSM's control of requirements on safety review the following is the case. When the application is submitted to SSM, there is a requirement that the notes from the independent review (safety committee) shall be attached. SSM reviews the application, including these notes. If the SSM reviewers need additional material or information, it will be requested.
78	Spain	Article 14	page 120/127	Section sección 14.1.3 says the following: The primary review, shall be carried out within those parts of the licensee's organisation which are responsible for the specific issues. The second step, the independent review, shall be carried out by a safety review function (a safety committee), established for this purpose and with an independent position in relation to the organisation responsible for the specific issues. Section 14.2.7 Safety reviews says the following: First, a primary review is carried out by the operations department, that is primarily responsible for reactor safety. If needed, resources from other departments are utilized. A second, independent, review is then performed by an independent department or function within the licensee organisation. This independent department (10–15 experienced engineers) or function shall not been involved in the preparation or execution of the issues under review. A third type of review is performed by the safety review committees and councils at different levels of the power plant organization

				What type of monitoring or review makes the Regulatory Body over those three different types of safety reviews performed by the licensee holders? Answer: Section 14.1.3 describes the requirements by SSM, which are a primary review and a second independent review by a safety committee. Section 14.2.7 describes implementation of the requirements by a licensee. The procedure of the licensee sets up a process with an additional review to the ones described in 14.1.3. The phrase "second independent review" is here used in a different sense than in 14.1.3. In this licensee procedure, the third review step is presenting the second independent review required by SSM. Regarding SSM's control of requirements on safety review the following is the case. When the application is submitted to SSM, there is a requirement that the notes from the independent review (safety committee) shall be attached. SSM reviews the application, including these notes. If the SSM reviewers need additional material or information, it will be requested. In addition, SSM controls that required functions for safety reviews are implemented in the licensees' management systems (processes and procedures).
79	Spain	Article 14	page 124/125	This section say: The licensees are required to submit a PSR of each reactor unit at least every 10 years. The analyses, assessments and proposed measures as a result of the review shall be submitted to SSM. Typically a project is formed to conduct the review, involving 15-20 staff of the licensee Typically, how many resources from Regulatory Body involve the evaluation of each PSR and how many time spend?

				Answer: A typical PSR involves about 45 experts. The number of man-days in total for the review varies from 400 to 600. The latest PSR used 476 man-days and about 25 were used for project management.
80	Spain	Article 14	page 124/125	This section says: The licensees are required to submit a PSR of each reactor unit at least every 10 years. The analyses, assessments and proposed measures as a result of the review shall be submitted to SSM Could give examples of type of measures has been proposed by licensees, as result of PSR? Answer: Some recent examples are: • Updating of maintenance programme • Time limiting safety analyses of primary systems components • Some improvements coming from stress test results Many other identified measures are related to LTO and action plans are developed.
81	Finland	Article 14.1	14	It is stated that special attention is directed towards regulating PSR. Could you provide more information how PSR is included in the new regulatory requirements? How is the regulation or the PSR process changing compared to the current situation? Answer: In Sweden, the former nuclear safety authority SKI introduced the obligatory requirement on performing periodic safety reviews (PSR) in the early 1980s, after the TMI nuclear accident. The provisions regarding these reviews have developed over the years. According to 10a § in the Nuclear Activity Act the review shall

				verify that the plant complies with the current safety requirements as well as having the prerequisites for safe operation until the next PSR, taking into account advances in science and technology. In SSMFS 2008:1, provisions that are more specific require that the reviews should cover 17 pre-defined safety areas as well as an integrated assessment. General experience so far is that the licensees focus mostly on compliance and less on reassessments, taking into account advances in science and technology, to identify further reasonably practicable safety improvements. Changes are foreseen, both in the Act on Nuclear Activities SFS 1984:3 and in the SSM regulations, to address these shortcomings and to obtain a partly different focus in the licensees' PSR during the coming years.
82	France	Article 14.2	§ 14.3.4, 131	Concerning ageing management, can Sweden give more details on the ageing management program? What are the type and the scope of controls? What are the deficiencies that have been found? Are there modifications implemented deriving from the controls? Answer: Inspections of licensees' programs for management of ageing were performed during this reporting period. The main shortcoming found were that the programme for ageing management for several licensee´s did not integrate and coordinate existing programmes and activities that relate to managing the ageing of SSC's. Additionally, the scope setting process to identify SSC´s subject to ageing management were for some nuclear facilities inadequate, in that SSC´s whose failure may prevent SSC´s important to safety to fulfil their safety function were not included in the program for ageing management. The ageing management programmes are basically still in a development phase. Therefore the inspection findings are related mainly to the early stages of

				programme implementation and the organizational and methodological matters identified refers to issues such as: • Deficits of program function to handle the overall assessment of age-related changes and damages, to collect them and to show how such issues are handled by the plant; • The selection of safety important systems, structures and components sensitive to ageing phenomena is not done in a coordinated way; • The evaluation of selection of components to be included in the aging management program as well as the subsequent assessment of the aging mechanisms are not properly documented; • The management of obsolescence, including responsibility for obsolete equipment, within the program for ageing management is not sufficient. Follow-up reviews and inspections are done to control that the measures taken by the licensees have the intended effect. In addition to this, the IAEA SALTO Review Missions were performed at all plants, resulting in recommendations for measures to be taken regarding ageing management.
83	Slovenia	Article 14.2	p. 129	14.3.2 Periodic safety review of nuclear facilities Q.: Table 8 lists the schedules for PSR at 10 NPPs in Sweden. In 2015 the owners decided that four units will not continue their operation while some other units' operation will be extended to 60 years. The Table 8 also shows that the SSM review of the Ringhals units 1 and 2 is ongoing. Since some units have decommissioning in the future while other aim for long term operation, how this affects the scope of the PSR and the regulatory criteria to identify findings and possible improvements? Is review of decommissioning program also included in the PSR? Please, present Swedish experience.

				Answer: The scope of the PSR is not changed unless a very short operating time is expected. The decommissioning program is not reviewed in the scope of the PSR. However, the preparation for decommissioning is part of the PSR.
84	Belgium	Article 15	pp. 143-144	Sweden exposes radiation dose statistics for Swedish nuclear power plants with all the needed details. This completeness is much appreciated. Answer: Thank you!
85	Belgium	Article 15	p. 143	Sweden indicates that the radiation exposure is mainly due to contamination of surface layers by Co-60. What are the measures undertaken by the Licensees to reduce this contribution ? (Zn-64 injection ?) Answer: At Forsmark NPP, the strategy is to keep the water chemistry as clean as possible. Due to yearly analysis of nuclide contents in the primary systems´ oxide layers "Co-generators" are removed when applicable. System decontamination is one example of possible measures to be taken. At Ringhals NPP, zinc injection is not used. Measures to remove the material source of elemental cobalt have been taken in BWR. In PWR careful high-pH control in combination with effective shut-down clean-up (H_2O_2) has been used to reduce primary Co-58 but is of course also useful for Co-60. At Oskarshamn NPP, units 1 and 2 use depleted zinc injection.

86	Finland	Article 15	page 138	It is mentioned that “The decisions to phase out the two oldest units at Oskarshamn NPP will affect the organizational structure in radiation protection. Measures will be taken to ensure adequate competence and resources during the future process.” Could you give examples on how this ensurance of competence can be done? Answer: This answer describes the general actions that have been taken at OKG but it is also applicable for the radiation protection area as such: In the recent year, an iterative process has been conducted with the aim to analyze the future need of competence and staffing at OKG. The analysis has been based on the steadily growing knowledge of the challenges of parallel operation and decommissioning. The analysis includes all positions in the company and thus enables OKG to predict future competence needs both on a departmental level and for single positions. Records from the HR system further enhance the analysis in terms of age structure, also on both departmental and single position levels. It has also become vital to incorporate the supervisor perspective on the conditions for their respective area of responsibility and the capabilities and competencies of individuals in terms of identifying key positions or key individual competencies. In November 2016, OKG informed all employees of upcoming redundancies as a consequence of the decommissioning of unit 1 and 2. The transformation of OKG to a single site must be carried out without jeopardizing radiological safety. Because of the redundancy situation however, vacancies within the organization must primarily be filled through internal recruitment. In order to handle this complexity, OKG has established a process for steered internal movement. All position appointments are scrutinized from a totality perspective. Competence, personal ambition and the overall competence situation on both the emitting and receiving organization are included in the final decision. If the accurate competence cannot be found within the company, external recruitment is still an option.

				The transformation of OKG is in focus for the management. Competence and staffing are essential parts of this process and much attention has been brought to these matters. A consecutive dialogue is conducted with the local unions to ensure that all perspectives are taken into consideration. The ability to capture and sustain the competence level within the company is essential to successfully maintain all activity areas in the future. OKG will continue to be an important employer in the region for a considerable amount of time. Therefore, a fair process to deal with redundancies is an important contribution to maintaining an image of being a solid and trustworthy employer, both internally and externally.
87	Finland	Article 15	page 141	It is reported that "Efforts to avoid fuel failures are ongoing and include education and training as well as introducing new techniques to stop foreign debris from entering reactor systems." Could you please give some examples on the new techniques to stop foreign materials from entering the reactor? Answer: Cyclone filter removal of debris from FW and FPHD on BWR has been introduced. Fuel elements, the newer ones, are equipped with debris filters on fuel element intake side. A joint education, all NPPs, regarding FME ("Rent system" = "Clean system") is obligatory to all personnel conducting work at RCA/CCA. The education has to be refreshed every 3 years. Strong focus on FME, especially prior to and during outages. A cleanliness inspection is obligatory after work done in the primary systems, prior to closing the system.

				Everyday FME awareness has been supported by a more easy-to-use seals, hoods and securely anchored equipment.
88	Hungary	Article 15	p.135	"Radiation protection education and training has been regularly reviewed and strengthened." How has the radiation protection education and training been regularly reviewed and strengthened? Answer: All licensees have conducted a needs analysis a few years ago. This led to the development of a new practical training course for personnel working at RCA/CCA. Training facilities have been created using real protective materials e.g. step-overs, monitors, tools etc. to give hands-on training on industrial safety, RP and FME in specific training sessions. A refresher practical training course is being implemented during 2016/2017. This refresher training has a strong focus on operational experiences. The development of the E&T programme at NPPs is continuously on-going.
89	Hungary	Article 15	p.136	"Compliance with the dose constraint is demonstrated by calculating the dose to the most exposed individual (critical group). The dose models used should calculate the dose from one year's releases integrated over a 50 year period, and the calculated dose should consist of the sum of the effective dose from external exposure and the committed effective dose from internal exposure. The dose models are to be regularly updated and approved by SSM." In Hungary there are two critical groups, one for the air emission and the other for the water emission, and the value of one year's releases integrated over 50 years for adults and 70 years for children.

				If SSM updates the dose models, does they take into account the procedures of authorities in another countries? Answer: Yes, SSM participates in international working groups concerning dose models, cooperate with other regulatory bodies and have the ambition to follow the scientific and regulatory achievements and developments concerning dose models and radiological risk assessments.
90	Hungary	Article 15	p.136	"The discharge limit is achieved by restricting the radiation dose to the critical group. Sweden has no statutory nuclide-specific discharge limits. The effective dose limit for members of the public is 1 mSv per year. Hence, in order to protect the public, the dose constraint is 0.1 mSv per year and site for discharges of radioactive substances to water and air (authorized releases)." Why does Sweden not have statutory nuclide-specific discharge limits? Answer: SSM have chosen to regulate the discharge by the use of dose-limits and dose constraints, which the licensee has to show that they contain by using their annual releases to air and water and calculated the annual dose to the public. The licensing process in addition to the us e of target and reference values for the operation of the facility are other regulatory tools in order to regulate the releases of radionuclides to air and water during normal operation.
91	Netherlands	Article 15	Article 15	The collective (worker) doses of Swedish NPPs seem to be relatively high. Also there seems to be only a slow downward trend. What are the reasons and is SSM acting to request more from the licensees to reduce the annual worker dose? Answer:

				A factor is the age of the Swedish fleet, in older facilities more maintenance and component replacements, modernization, safety enhancements, as examples, are needed. There is, though, a downward trend. At Ringhals NPP, as an example, the collective dose year 2016 is the lowest since the 1970´s. There are a number of different kind of measures taken in order to optimize the doses to workers, both collectively and individually. Lowering the alarm levels in EPD-systems and better adjusting these to different work groups, source term reduction, operational measures such as water chemistry, can be mentioned as examples. SSM, through its regulatory supervision, such as inspections, activity tracking and audits, closely follow and provide impetus on the licensees´ work with dose reduction and ALARA.
92	Pakistan	Article 15	15.2.5, Page 139, Para 2	It is mentioned that a more effective system for monitoring releases of radionuclides via the main stack was installed at Oskarshamn unit 3 in 2015. Please elaborate how the newly installed system is more effective than the previous system. Answer: For Oskarshamn 3 the improvements in 2015 concerned nuclide-specific analysis of noble gases. In 2015 new more effective detectors were installed, which are able detect more than three times lower activity levels than before.
93	Pakistan	Article 15	15.2.6, Page 140, Para 3	Sweden may like to provide details of suggestions given by ALARA benchmark mission for improvement in ALARA programs at Forsmark and Ringhals NPPs. Answer: The Focus areas were: – Breakdown of overall ALARA-program to individual levels.

				– ALARA-planning. – Source term management. – Management of small individual doses. The purpose was to evaluate which suggestions from the benchmark report that are most efficient to implement taking into account both additional resources needed for the implementation and resulting effect of the improvement. Examples from the results: One particular tool has been to move the responsibility for reducing collective doses into the regular daily activities of departments and work teams. Departments are now to present ALARA-measures that come from within the workgroup. Department specific dose targets and planning is beside specific ALARA-group a strong tool-box for improved ALARA. Participation of Maintenance Sections representatives in ALARA-group meetings. Reinforcement of the dissemination of radiation protection culture elements. Examples: work-book on radiation protection distributed to all workers, use of the intranet and initiation of education for project sponsors and personel involved in plant modification in ALARA. Effort put into the establishment of the ALARA programs: additional distribution, additional “ALARA-anchoring” meeting, and more input from ALARA-group members taken into account. After finishing a planned upgrade of ISOE website, in February, the report will be accessible for logged in ISOE members.

94	Spain	Article 15	page 145	According to the report, the concepts of reference values and target values are used for nuclear power reactors as a measure of the application of BAT for reducing releases of radionuclides, values that are defined by the licenses Please, could you provided additional information on those reference and target values Answer: According to the Swedish Radiation Safety Authority's Regulations on Protection of Human Health and the Environment in connection with Discharges of Radioactive Substances from certain Nuclear Facilities, SSMFS 2008:23, each nuclear power reactor are required to determine the so-called reference values and target values. The reference values should represent a typical value for discharges from a specific reactor during normal operation, and are normally represented by a selection of a few easy-to-measure nuclides as representatives of each category, noble gases, particulates etc. Target values should represent the discharge of separate radioactive substances or groups of radioactive substances and to which levels the discharges could be reduced to in a specified period of time. The intention with target values is that it should be set low enough to be challenging to current performance.
95	Spain	Article 16	page 158	It is indicated that a number of exercises are conducted annually related with accident management, communications, environmental monitoring, etc.: • Do the Swedish plants also conduct firefighting drills using the “FLEX” equipment? • Is there any requirement associated to the time needed to deploy the (FLEX) equipment in those cases (big fires)?

				Answer: No, the Swedish plants are not conducting firefighting drills using the FLEX equipment. However, this does not rule out the possibility for the FLEX equipment to be used for firefighting in case of failure to extinguish fire with other equipment dedicated for the purpose. It should be noted that the FLEX equipment mainly consists of floodlights, portable power units, bilge pumps and mobile diesel generators to secure the power for reactor safety systems. The FLEX equipment is used several times a year at all three power plants during training and drills of various types. The number of occasions and type of training differs somewhat for the different power plants. However, emphasis lies foremost on training to prepare and testing of the equipment for core cooling functions. There are no regulatory requirements, but there are recommended time limits for the equipment to be operational, set by the licensees.
96	Finland	Article 16.1	page 156	It is reported that "At Forsmark NPP, a new emergency level for internal use, in accordance with requirement in SSMFS 2014:2, has been introduced for events that are not considered to have the capacity to pose a hazard to the environment or to public health." Is the introduction of the new emergency level required only for Forsmark? What is the situation on the other NPP sites? Answer: The new emergency level for internal use has been introduced at all nuclear power plants, not only at Forsmark. This is a requirement in SSMFS 2014:2.
97	Slovakia	Article 16.1	p. 148	"SSM's regulations SSMFS 2014:2 require the licensee to take prompt actions in the event of emergencies in order to: - classify the event according to set alarm criteria, - alert the facility's emergency response organisation, - assess the risk for and size of possible radioactive releases and time related

				aspects,..” Are there any binding time limits for fulfilment of these duties? Are there any time limits for informing the public? Answer: During disturbances at a power plant, the shift supervisor on duty follows the symptom based emergency operating procedures. In these procedures, the criteria for determination of different alarm levels (site area emergency and general emergency) are stated, i.e. the specific technical or radiological conditions, or combinations of the same, which characterize each alarm level. The shift supervisor suggests an alarm level, which thereafter must be approved and decided on by the plant management. However, if the plant management is unavailable, the shift supervisor has full authority for determining the alarm level. Subsequently, after an alarm level is determined, the plant alerts the relevant, pre-determined authorities via the national alarm center (SOS Alarm AB). In case of a general emergency, the licensee immediately contacts SOS Alarm, which will alert authorities as well as direct the power plant staff to the broadcasting management of the state radio responsible for sending IPA´s (Important Public Announcement). The residents of the inner emergency planning zone will thereafter promptly be alerted via outdoor sirens (alarm initiated by the power plant) and radio announcements on the automatically starting indoor radio receivers (RDS) placed in all households in the zone. This means that the nearest affected population will be alerted approximately simultaneous to the authorities. The IPA also reaches the general public in the affected county/counties via radio, text message on state television and outdoor sirens. The County Administrative Board is responsible for rescue operations and the continued information to the public.

				Existing time requirements are: • Within one hour of the accident, a first report should be given to the Swedish Radiation Safety Authority and the County Administrative Board. This report should include, among other information, the time point and a short description of the event, event classification (according to set alarm criteria) and an assessment of the possible (continued) development of events. • Every second hour, or when new information is available, an updated report should be given to the Swedish Radiation Safety Authority. • The management function of the emergency response organisation should be operative within two hours after alarm has been declared. No additional time limits exists. The alarm sequence will differ to some extent for site area emergency at power plants and for emergencies at nuclear facilities categorized in threat category II.
98	Slovakia	Article 16.1	p. 149	"The Act contains provisions on how community rescue services shall be organised and operated and also stipulates that a rescue commander with a specified competence, and far-reaching authority, is to be engaged for all rescue operations". Is the rescue commander a specific person or a function that can be exercised and staffed even during a long-term events? Answer: The rescue commander is a function within the community rescue service and is appointed by the County Governor. Specific requirements according to regulations are set on the appointed person, such as an appropriate experience and education. Individuals appointed as rescue commanders are continuously trained and exercised for various rescue operations. The number of individuals with

				competence to act as rescue commanders are sufficient for keeping a sustainable system that can cope with long-term events.
99	Slovakia	Article 16.1	Chapter 16.7, p. 162	"SSM proposes that reference levels be set in the amended Radiation Protection Act..." What value for reference levels according to 2013/59/Euratom has SSM proposed? Answer: For emergency exposure situations, a general reference level of 20 mSv yearly effective dose will be set. The Government has the possibility to set another reference level for specific events in the interval 20-100 mSv yearly effective dose. The only event identified so far that would require a different reference level is a beyond design base nuclear power plant accident. For this event, the present suggestion is to use a reference level of 100 mSv yearly effective dose. The new Swedish Radiation Act will in principle provide the possibility for the Government to change the reference level during an emergency. However, it is not foreseen that this would happened. Instead, optimization will be the key during an emergency with the goal to lower the residual doses as low as reasonable taking societal and economic consequences into account. No reference level will be set in advance for existing exposure situations that follow from emergency exposure situations. The Government will instead have the possibility to set and change the reference level based on the actual circumstances. It is foreseen that the reference level in such situations will be lowered stepwise. However, note that Government can only set reference levels in the given interval between 1-20 mSv yearly effective dose for those situations.

				A reference level for the transition from an emergency exposure situation to an existing exposure situation will not be set. However, already implemented protective actions together with planned protective actions must lead to an effective dose (annual) of 20 mSv or less for the transition to be possible.
100	France	Article 16.2	§ 16.2, 150	How harmonization has been achieved between the new regulation for on-site emergency plan and the national contingency plan? Answer: There is no specific harmonization of the on-site emergency plan and the national contingency plan. These two plans are of different purpose. The national contingency plan focuses on how the authorities should handle the consequences of a radioactive discharge, not the actual handling of the event at the nuclear power plant. The national contingency plan describes the national crisis management system, roles and responsibilities of different players and associated laws and regulations. However, the on-site response plan is coordinated with the corresponding response plan at the County Administrative Board.
101	Russian Federation	Article 16.2	para 16.3, p. 156	Para 16.3 ‘Measures taken by license holders’ of the National Report states that in respect to all nuclear plants in Sweden a new principle has been introduced so that in case of emergency situation, the staff that is not urgently needed for management of an event is ordered to leave the site and return home. Would you please clarify how personnel not needed for management of the event (under emergency conditions) is identified? What is to be done if in the course of emergency management a need arises for additional personnel because of an unexpected progression of the emergency? Do you take into account that some members of personnel present on the site may be under stress, or disabled because of the event, and hence cannot participate in the accident management? Answer:

				The personnel that are not part of the emergency response organisation of the nuclear plant are the first to be sent home. Thereafter, a decision is made on which of the personnel from the emergency response organisation that should be sent home (for stand-by service) and which are to stay for the first shift. This decision is taken by the site manager. If individuals belonging to the emergency response organisation are seen to be affected by the situation in a way that they are not fit to participate in the management of the accident, the site manager sends these individuals home. This fact will be accounted for during the first decision-making on how many of the emergency response organisation that should be sent home and also when deciding on the stand-by personnel to be called in for the second shift (or prior to that if needed).
102	Slovakia	Article 16.2	p. 151	"Moreover, residents in the inner emergency planning zone are provided with special radio receivers. These are used for alerting the residents in the event of an emergency at the NPP." Please provide more info, how this system works? Is it a paging system? Who provides for maintenance and replacement? How many are distributed? Answer: It is not a paging system, but an RDS (radio data system) receiver that will start automatically in case of emergencies. It is set for the Swedish public radio station P4 where an announcement will be read. The receiver will issue an alarm even if it is switched off. The warning system is regularly tested. The county administrative boards together with the Swedish Civil Contingencies Agency (MSB) are responsible for maintenance and replacement of the receivers. One RDS receiver is distributed to each household within the inner emergency planning zone.

103	Slovakia	Article 16.2	p. 152	"MSB has overall responsibility for the Swedish national digital radio communication system (‘Rakel’) that connects national emergency services and others in the fields of civil protection, public safety and security, emergency medical services and healthcare during emergency situations, the system is currently being implemented or is already used by municipalities, counties, national agencies and even commercial entities". Is this system qualified for natural disasters? Answer: Yes, the system is a robust and reliable communication system designed to cope with harsh weather conditions and power failures. Robustness is ensured by e.g. duplicated power supplies to switchboards and their connections and diesel power units starting automatically during power failures. Rakel is more robust than the public mobile network and detached from it, hence will remain unaffected in case of for instance, an overload of the public network.
104	Slovakia	Article 16.3	p. 157	"A new fibre connection has been installed and connected to the on-site operational support centre which enables the personnel in the emergency response organization to view process data from Ringhals unit 2, using the existing process information system." Is this system qualified for natural disasters? Answer: No, the system is not designed to resist natural disasters. No such requirements were posed by the Swedish Radiation Safety Authority.
105	Montenegro	Article 17.4	Chapter B, 17.4.1, page 174	In subchapter 17.4.1 International arrangements which provide information about consultation with other Contracting Parties likely to be affected by the installation, it is stated that Sweden is party to all of the relevant conventions

				expected for a country operating nuclear power plants including the Espoo convention and the Aarhus Convention. Sweden is also obliged to report construction of new facilities, dismantling of facilities and radioactive discharges under the Euratom Treaty. Could Sweden provide more information about consultation with neighboring countries in light of implementation of Espoo convention? Answer: The latest consultation with neighboring countries in frame of Espoo convention is as follows: In 2005, the Swedish Environmental Protection Agency invited the neighboring countries to participate in the Environmental Impact Assessment (EIA) transboundary procedure for the planned Swedish system for final disposal of spent nuclear fuel in accordance with article 4 and 5 in the Espoo convention and EU directive 2011/92/EU. Finland, Germany, Lithuania, Poland and Russia decided to take part in the procedure. In February 2008, the official procedure was started by the Swedish Environmental Protection Agency. According to the Environmental Code, a permit is required for environmentally hazardous activities. The Land and Environmental Court is the court of first instance for the hearing of applications concerning such activities. The Land and Environmental Court announced the application for final disposal of spent nuclear fuel being complete on January 29th 2016. After that, the Espoo consultation process for the repository system could continue and go to the next step. On 5 February 2016, the Swedish Environmental Protection Agency sent out a consultation letter to the countries participating in the Environmental Impact Assessment (EIA) transboundary procedure, asking for views on the planned

				Swedish system for final disposal of spent nuclear fuel. In total five organizations and eight authorities from neighboring countries answered to this request. A consultation meeting was held on the 21 March 2016. Information is given in Swedish, English and German.
106	Netherlands	Article 18	Article 18	In the report it is written that "in practice" the NPPs apply next to INSAG-10 also the WENRA reference levels/safety objectives with respect to defence in depth. Will these WENRA approaches be implemented in the regulations? Answer: Yes, the WENRA defense in depth approaches will be implemented in the SSM regulation. The work is part of the major regulation revision project going on since 2013. According to the work schedule, the regulation will come into force in 2018.
107	Netherlands	Article 18	18.1.4	The Vienna Declaration is to be seen as an additional impulse to improve safety worldwide. Of course PARs and filtered venting have been introduced early in Sweden. In vessel retention and core catcher are difficult to implement, but international research (at least in Europe) is going on in that area to find alternatives that aim at the same goal. What is the position of SSM? Answer: Over many years, there has been a concern that the Swedish approach has concentrated on severe accidents. The plants in general are dependent on electricity supply. Therefore, even before the Fukushima event there were proposals under discussion on how to strengthen the core cooling capacity. SSM decided on requirement that an independent core cooling system shall be installed, in order to significantly reduce the core damage frequency for all type of events. It has been assessed as to be the best way to improve the risk profile for Swedish plants.

108	France	Article 18.1	§ 18.1.2, 180	In the event of extreme hazards affecting the whole site and leading to a total loss of electrical power supplies and of heat sink, how long the operator has to deploy mobile equipment (Flex equipment)? Is mobile equipment sufficient for all the reactors and the spent fuel pools simultaneously? Answer: The 8/72 hours rule is applied in the special case of ELAP/LUHS events. It means that prepared on-site mobile equipment (controlled according to procedures) may be credited after 8 hours if it can be justified that it is available and functional under extreme conditions. Heavy external equipment may be credited 72 hours (as earliest) after initiating event and justification must be provided that the equipment is available, can be transported and connected under extreme external conditions. Ringhals will however not in a large extent rely on the FLEX strategy with mobile equipment. For Ringhals unit 3&4 an independent core cooling function (with full autonomy) will be installed in a new building for each of the units due 2020. The system will have the capability to handle a total loss of electrical power supplies (ELAP) and of heat sink (LUHS). The equipment can also be used to give make-up to the spent fuel pools. In this case, no mobile equipment will be needed the first 72 hours. For Ringhals unit 3&4 an interim solution with mobile diesel generators (DGs) will be available from 2017. The DGs can energize the battery-backed grid when the batteries are depleted which extends the coping time for the existing steam driven auxiliary feed-water system, which can handle ELAP and LUHS. The battery capacity is 8 hours, so the operator has 8 hours to arrange the mobile DGs. The operation of Ringhals unit 2 will end in 2019 and after that operation of Ringhals unit 1 in 2020.

				Ringhals unit 1 has erected new structures and installed a diversified plant section in the previous modernization and safety upgrade projects: - Diversified emergency power supply through air-cooled diesel generators - An additional core cooling water source No (further) plant modifications in terms of independent core cooling are planned. Ringhals unit 2 has strengthened the auxiliary feed-water system in a previous safety upgrade - Two new steam-driven pumps in a new building - An additional water source (new CST) No (further) plant modifications in terms of independent core cooling are planned. Forsmarks plant (FKA) strategy regarding use of mobile equipment is to mainly use them for slow events. Rapid events will be covered by the new independent core cooling system that will be in place 2020. Until the new system is operational, FKA has mobile generators that can supply power to one train on each reactor (they are physically in place but have to be started manually). This is sufficient to power supply the auxiliary feed-water system in one train and insert cooling water to the core. The mobile generators are placed beside the reactor buildings for quick connection. For the spent fuel pools, FKA is building pipes to insert water from firetrucks or mobile pumps. For the slow events, the assessment is that this is sufficient for cooling all three spent fuel pools on the site. For Oskarshamn plant (OKG) it can be stated that there are sufficient supplies as fuel and lubricating oils for seven days at the facility. Furthermore, there are adequate equipment installed in all three plants. Regarding the reactor core-cooling additional requirements to be met in 2020, the system will have capacity

				for independent function during 72 hours as minimum. Existing requirements including extreme external impact (10^{-5}) are met at OKG with installed qualified equipment. Until 2020 is the permanent gas turbine on site credited for power supply with prepared fixed connections to all three units.
109	India	Article 18.1	Page 178	It is stated "The general risk of flooding was re-assessed after the Fukushima Dai-ichi accident and measures to cope with extreme water levels have been taken or are under implementation." Could Sweden share information on the measures taken for coping extreme water levels. Answer: The designs will be changed to cope with cliff-edge effects down to event frequencies of 10^{-6} /yr. For this reason, among others, Independent Core Cooling will be installed to handle extreme water levels (for this region). Since the Fukushima accident and following the European stress tests, the nuclear power plants have re-assed the risk for flooding. Advanced hydrodynamic modeling of high sea water levels in combinations with wind-generated waves have been performed by meteorological experts. The results indicate that the plants can withstand the combined effect of extreme sea level and wave action with a frequency higher than 10^{-6} per year. Thus, the plants are well protected against flooding and further risk-reduction measures are not presently planned. The plants have developed a system together with the Swedish Meteorological and Hydrological Institute regarding early warnings of extreme weather. The stress tests pointed out that Ringhals needed to reassess the flooding scenario. During the stress test, Ringhals could not guarantee that the flooding with a return time of 1 million years would not submerge ground level where some key equipment is localized. New extreme-value statistics have been

				supported with 3d-flow-simulations where the effect of waves also has been taken into account. These new data verify that the flooding with a return period of a million years will not submerge the ground level. This new finding lead to that Ringhals only will perform local reinforcements of buildings/structures to prevent flooding. Forsmark plant lies beside a relatively protected sea so the likelihood that the plant is exposed to this problem is less than 10^{-6} (sea level over +3 m) based on the Swedish meteorology institute analyses. Forsmark plant has not implemented any measurers yet, because of the low probability of extreme water levels. The planned measure is to build an independent core cooling system that is designed for a +4.5 m sea level. This will be in place 2020. Regarding Oskarshamn NPP site, it is located like Forsmark plant besides a relatively protected sea and the whole site is designed for + 4.3 m sea level, before seawater enters the site. The likelihood that the site is exposed to level over 2.6 m is less than 10^{-6} based on the Swedish meteorology institute analyses.
110	Russian Federation	Article 18.1	Section 18.1	The requirements given in the National Report, Section 18.1 "Implementation of defence in depth", on the implementation of the defence in depth concept, differ from the provisions of the IAEA documents (SF-1 (para. 3.31, 3.32) and SSR-2/1 (para 2.12 – 2.14)). Could you please explain the differences? Does Sweden intend to bring its regulatory requirements in compliance with the IAEA requirements? Answer: Yes, the Swedish regulation will be changed so it complies with the IAEA requirements. The work is part of the major regulation revision project going on

				since 2013. According to the work schedule, the regulation will come into force in 2018.
111	Slovakia	Article 18.1	p. 177	SSR2/1 Rev.1 contains specific requirements for the design basis. For example the design basis for each item important to safety shall be systematically justified and documented. Is this information contained in a document (design basis) prepared originally by the vendor of the NPP and subsequently updated by the operator or this information is contained in different documents like SAR, QA documentation, etc? Answer: Design Basis requirements were a part of SAR from the beginning. SAR has since then been kept updated with new requirements, design changes, updated design documentation and other plant data.
112	France	Article 19.2	§ 19.2.8 and 19.2.9, 198 to 200	In others NPP's than Ringhals, could Sweden specify which actions are implemented to analyze and treat the "low" levels (near misses, deviations, lessons learned) and to use them for operational feedback? Answer: The procedures at Forsmark NPP are the same as for Ringhals NPP. In OKG, near misses, deviations and lessons learned are primarily managed and trended in corrective action program (CAP). However, there are several other routines in place that aims to address operation experience and experience from performed maintenance. Internal and external operational experiences are spread through regular meetings (operations meetings etc.) where dedicated OE staff are present. OE staff also monitor experience from other plants through participation in the NORDERF network. After each outage, experiences and lessons learned are gathered in a formal report where issues are addressed to appropriate

				functions within the company. For maintenance lessons learned (primary technical), experiences are written directly into our operation and maintenance management application (an IFS application).
113	France	Article 19.2	§ 19.2.8, 199	Does Sweden intend to develop safety performance indicators' set (SPI) as IAEA suggested since 2000 (based on specific guide "operational SPI IAEA-TECDOC-1141 2000)? Answer: SSM has no intention to come forward with a set of safety performance indicators. This aspect has been under discussion for many years, and the decision was taken not to introduce such a regulatory approach. A suggestion to use such indicators exists in the IAEA TECDOC but not in the IAEA safety standards. For assessment of the safety status of nuclear plants, findings from regulatory inspections and other means of collecting information on safety performance are instead used.
114	Finland	Article 19.6	19.3.4	It is mentioned that there is procedure for making on-site rapid investigations following significant events. What is the aim of these rapid investigations? Could you please give an example of what kind of events this method has been applied in last years? Answer: During the last two years, two events have led to on-site rapid investigations; one was related to a dropped fuel element and the other event concerned the unintended lifting of an in-core neutron flux detector out of the shielding water column. The purpose of on-site rapid investigations is to collect, as quickly as possible, all available information that concerns the event and for SSM to form its own understanding of the circumstances of the event.

115	Korea, Republic of	Article 19.6	198~205	In accordance with article 19 section (vii) of CNS, contracting parties are required to collect, analyze operating experience and reflect them in their respective operations. With reference to article 19.7, pages 198 to 205 of the Swedish national report, regulations, systems and procedures regarding the Swedish reflection on operating experience is well discussed. With respect to the Swedish reflection on operating experience, Korea would like to inquire the following question: Are there any recent examples of Sweden analyzing domestic or foreign operating experiences and reflecting them on Swedish NPPs? Answer: The operational experience is gained through various sources such as Westinghouse Owners Group, Norderf for the Scandinavian plants, bilateral exchange of information with Finland, etc. Some examples are the current case of the carbon content in pressurized components (Flamanville RPV), inspection of Doel RPV in connection with manufactory-introduced flaws, Finnish experience with a defect power supply, etc.