RESPONSES TO REMARKS SUBMITTED BY THE FINNISH PARTY

No.	Entity	Page/Section - CONTENT OF A REMARK	METHOD OF IMPLEMENTATION
	FINLAND	**FINLAND**	**FINLAND**
1.	FINLAND MINISTRY OF ENVIRONMENT	The Ministry of Employment and Economy as its general observation indicates that the energy generation and consumption in Poland are quite well balanced. However, the situation shall change dramatically in coming years, when existing coal power plants are decommissioned due to the protection of the environment. This in turn shall lead to the reduction of the CO_2 emission, improve the reliability of energy supplies and the energy independence in the long perspective. The Ministry points out that Polish Nuclear Power Programme seems to have a significantly beneficial consequences for operations of domestic and international markets.	Poland is grateful for the opinion expressed by the Ministry of Environment of Finland. Indeed, the investment shall be beneficial, particularly for operations of the domestic electric energy market. It shall also be beneficial for the reduction of the CO_2 emission.
2.	FINLAND MINISTRY OF ENVIRONMENT	According to the Ministry of Social Affairs and Health it is important, before starting the authorisation process of the first nuclear power plant, to include in the national legal provisions the high level of nuclear safety requirements specified in the SEA report and being registered at the moment in the Polish legal frameworks.	We fully agree with the position of the Ministry. Safety requirements set out in draft regulations of the Council of Ministers, already adopted by the Polish government and currently considered by the European Commission are consistent with the highest and most recent safety requirements posed in the European Union and the world. Detail information concerning that matter is presented below in response to the comment submitted by the Finnish nuclear regulatory authority STUK (F4).
3.	FINLAND MINISTRY OF ENVIRONMENT	The Ministry of Social Affairs and Health states that conclusions presented in the report concerning the favourable impact of the low-dose radiation of slow accumulation on human health (the so called hormesis theory) seem to be controversial. In the SEA report there are no references to the meta-analysis of consequences of exposure to radon inside buildings published in 2005 (Darby et al. Concentration of radon in houses and the risk of lung cancer: common analysis of individual data from 13 clinic and control studied carried out in Europe. BMJ 2005; 330(7485):223), which supports the LNT model (linear non-threshold model). The LNT model was used as a basis for	The main principle of the radiological protection – ALARA (as low as reasonably achievable) was adopted as the basic standard of the radiological protection in Poland and considering reactors projects for the first Polish nuclear power plant we consider also doses caused by the operation and possible failures of nuclear power plants, aiming to ensure that they are minimal. Currently, the ALARA principle is applied in comparisons of technologies and protective measures. While the approach of the LNT model and concepts of collective dose arising from it have changed in recent years. The report “Recommendations of ICRP – 103” of 2007 (replacing previous reports from the 90s) the ICRP recommended to refrain from any calculations of the number of deaths in the low dose range applying the “collective dose”. This was approvingly accepted by the community of experts of the radiological protection[1]. In addition, the Directive of the European Union adopted on 29th of September 2011[2] does not even mention the collective dose nor the LNT concept. It shall also

1 Evolution of the System of Radiological Protection. Discussion of New ICRP Recommendations. Fourth Asian Conference, Tokyo, 13-14 December, 2007. OECD 2009, NEA No. 3636.
2 COUNCIL DIRECTIVE laying down basic safety standards for protection against the dangers arising from exposure to ionising radiation, Brussels, 29.9.2011, COM(2011) 593 adopted by the European Commission on 29 September 2011, http://ec.europa.eu/energy/nuclear/radiation_protection/doc/com_2011_0593.pdf.

		formulation of the main principle of the radiological protection ALARA (as low as reasonably achievable). The meta-analysis has an important impact on the statement of central authorities assessing the risk (for example: International Commission on Radiological Protection – MKOR). These statements affected both the regulation concerning basic safety standards published by the International Atomic Energy Agency (IAEA) as well as the proposal of the European Commission concerning the Directive concerning Basic Safety Standards (the proposal was published on 29th of September 2011 under the Euroatom treaty). Results of the meta-analysis have been interpreted as supporting the conventional LNT model, which was criticised in the SEA report.	be clearly stated that the SEA report does not comment the accuracy nor the LNT hypothesis. This is a subject of scholar discussions and the issue will remain unresolved for many years. However, in practice nuclear experts in every country, and certainly also in Poland, consequently apply the ALARA principle and it shall constitute the basis of the radiological protection also in Polish nuclear power plants. Statements included in the SEA report concerning the possible hormesis phenomenon applies to the realistic assessment of impacts of the low doses of radiation, confirmed by several hundreds of researches dedicated to low doses on large human populations. These researches have been dedicated to the increased natural radiation background (for example in areas of USA with a high radiation background[3] [4] [5] [6], the Yiang-jiang region in China[7], Kerela in India[8], Ramsar in Iran[9],Guarapari in Brasil) as well as additional doses for people professionally exposed (employees of the Shippingport[10] dockyard, British radiologists[11], employees of the nuclear industry[12] [13]), patients undergoing diagnostic radiation or treated with radiation[14] [15], etc. There were also case-control studies carried out, for example concerning the impact of radon on lung cancer, which covered over 200 cases of disease and 397 control cases, giving results indicating the significantly decreased mortality due to the lung cancer among people living in houses with increased concentration of radon up to about 75 – 100 Bq/m^3 while the reference level was below 25 Bq/m^3 [16].

3 FRIGERIO, N.A., STOWE, R.S., "Carcinogenic and genetic hazards from background radiation", in: Proc. of a Symp. on Biological Effects of Low-Level Radiation Pertinent to Protection of Man and His Environment , (Chicago 3-7 Nov. 1975), IAEA, Vienna (1976).

4 HICKEY, R.J. et al. Low level ionizing radiation and human mortality: multi-regional epidemiological studies, Health Physics, Vol. 40, (May 1981) 625-641.

5 Sandquist G.M. et al., Assessing Latent Health Effects from U.S. Background Radiation, Proc. of ANS Meeting, Nov. 1997.

6 JAGGER J. Natural Background Radiation and Cancer Death in Rocky Mountain States and Gulf Coast States, Health Physics, October 1998, Vol. 75, No 4, 428-430.

7 Sun Q, et al.:: Excess Relative Risk of Solid Cancer Mortality after Prolonged Exposure to Naturally Occurring High-Background Radiation in Yangjiang, China, Radiation Res. (Tokyo) 41, (2000) Suppl 433-52.

8 Nair MK, et al., Population study in the high natural background radiation area of Kerala, India. Radiat Res. 152, 145-148S, 199.

9 S. M. J. Mortazavi1 and P. A. Karam High Levels of Natural Radiation in Ramsar, Iran: Should Regulatory Authorities Protect the Inhabitants? http://www.angelfire.com/mo/radioadaptive/ramsar.html.

10 MATANOSKI, G.M., "Health effects of low-level radiation in shipyard workers- final report", DOE DE-AC02-79 EV 10095, US Dept. of Energy, (1991).

11 Berrington A, Darby SC, Weiss HA, Doll R. 100 years of observation on British radiologists: mortality from cancer and other causes 1897- 1997. Br J Radiol 2001;74:507, 19

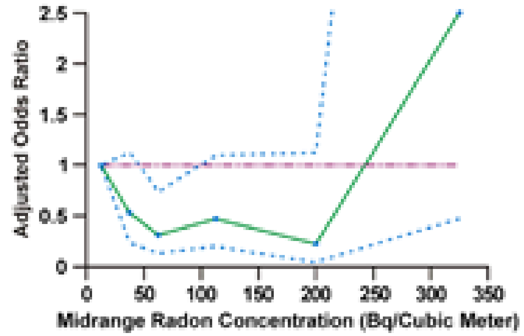
12 CARDIS E. et al., "Combined analysis of cancer mortality among nuclear industry workers in Canada, UK and the USA", IARC Techn. Report No. 25, Lyon, (1995).

13 Fornalski, K. W. and Dobrzyński, L., Ionizing radiation and health of nuclear industry workers, Int. J. of Low Radiation, vol. 6, no 1, 2009, pp. 57-78 oraz Lagarde F.: Tiny excess relative risks hard to pin down, 5 August 2005, BMJ, http://www.bmj.com/cgi/eletters/bmj.38499.599861.E0v1#114265.

14 HALL, P., et al., Thyroid cancer after diagnostic administration of Iodine 131, Radiation Research,. 145 (1996) 86-92.

15 Howe G.R., 'Lung cancer mortality between 1950 and 1987 after exposure to fractionated moderate dose rate ionizing radiation in the Canadian fluoroscopy cohort study and a comparison with lung cancer mortality in the atomic bomb survivors study', Radiation Research, 142, p295—304, 1995.

16 Thompson RE, Nelson DF, Popkin JH, Popkin Z. Case-control study of lung cancer risk from residential radon exposure in Worcester county, Massachusetts. Source http://www.ncbi.nlm.nih.gov/pubmed/18301096.

			 Fig. F10. The relative probability of death from lung cancer depending on the exposure on radon radiation, researches carried out by Thompson in Worcester County. These results are numerous and cannot be overlooked when discussing impacts of low radiation doses. Trying to minimise any radiation doses caused by the nuclear power industry, at the same time we consider appropriate to inform people about results of existing studies concerning impacts of low radiation doses indicating that it does not cause any detectable adverse health effects.
4.	FINLAND MINISTRY OF ENVIRONMENT	The Nuclear Safety and Radiation Authority (fin. STUK) states that concepts concerning reactors described in the SEA report include management systems in case of severe failures shall limit the most important consequences related to the leakage from damaged core of the reactor to the extent that, for example, Finland would not be affected by significant impacts of the failure on the environment. According to the STUK it is important that the national provisions ensure the high level of requirements concerning the nuclear safety. In addition to regulations provided by legal provisions, also the safety requirements concerning nuclear power plants shall be included in domestic regulatory requirements. The independent authority controlling the nuclear safety and the thorough knowledge shall significantly contribute to the safety of nuclear power plants. The SEA report does not include that issue. Furthermore, the report lacks information about the complete nuclear plan of the fuel cycle and the management of the low and medium active waste.	**The STUK correctly states that** *„management systems in case of severe failures shall limit the most important consequences related to the leakage from damaged core of the reactor to the extent that, for example, Finland would not be affected by significant impacts of the failure on the environment*”. It is very important statement that should be taken into account also by other participants of the debate. The STUK noted that when developing the Prognosis, the role of domestic provisions that should be formulated so as to “*ensure the high level of requirements concerning the nuclear safety*”has not been included. This is a justified comment and is repeated also in other remarks, that is why we shall answer it in more details. Provisions of the Polish Nuclear Law (Nuclear Law Act and implementing regulation to the Act – the relevant regulations of the Council of Ministers) set very high standards of the nuclear safety and the radiological protection, based on the current and recently adopted global safety requirements. In particular provisions of the Atomic Law Act[17] amended in June 2011 include the following provisions: ▪ Article 36c, paragraph 2: “Should any emergency arise that may lead to the degradation of the reactor core, the design of the nuclear facility shall have in place specific solutions that will be most likely to prevent:

17 http://www.dziennikustaw.gov.pl/DU/2012/264/1.

		The STUK notes that the report contains four main proposals concerning locations of nuclear power plants in Poland. It indicates also possible, external, natural threats (such as weather phenomena, water bursting its banks, seismic phenomena). The assessment of locations has been executed 20 years ago, but contains necessary additions. Some effects of the radiation impact on the human health presented in the SEA report are controversial.	1) a chain of incidents leading to premature release of radioactive substances, i.e. incidents that require intervention measures to be employed outside the nuclear facility, if no time is left to implement them; 2) a chain of incidents leading to considerable releases of radioactive substances, i.e. incidents that require general public protection measures to be employed which would be unlimited in time and space.” ▪ Article 36f, paragraph. 2: “The restricted-use area surrounding the nuclear facility shall cover an area, outside the boundaries of which: 1) The annual effective dose from all routes of exposure shall not exceed 0.3 milisivert (mSv) under normal operating conditions of the nuclear facility and during predictable operating emergencies; 2) The annual effective dose from all routes of exposure shall not exceed 10 milisiverts (mSv) in emergencies during which the reactor core remains safe.” Furthermore, provisions of the draft regulation of the Council of Ministers concerning the design requirements[18] for nuclear facilities (already approved by the Polish government and currently being considered by the European Commission) are based on requirements included in: – The IAEA Nuclear Safety Standards and in particular in the most recent SSR-2/1 (DS414) document issued in January 2012, replacing the NS-R-1 document; – Requirements of European energy industry for nuclear power plants equipped with III generation light water reactors (European Utility Requirements for LWR Nuclear Power Plants, Rev. C, 2001) – the “EUR” document; – American federal authorisation provisions for nuclear facilities (10CFR50); – Guidelines and recommendation of the tern European Nuclear Regulators Association (WENRA): 1) WENRA Reactor Safety Reference Levels. Western European Nuclear Regulators’ Association Reactor Harmonization Working Group, January 2008 and 2) Safety Objectives for New Power Reactors. Study by WENRA Reactor Harmonization Working Group, December 2009; – Relevant provisions and regulatory requirements applicable in selected EU Member States and particularly also in Finland (Government Decree 733/2008, and the STUK guidelines: YVL 1.0 , YVL 3.3 and others). The draft regulation of the Council of Ministers includes basic requirements concerning III generation nuclear power plants relating in particular to:

18 REGULATION OF THE COUNCIL OF MINISTERS of ……2011 concerning nuclear safety requirements and the radiological protection that shall be included in a project of a nuclear facility [ROZPORZĄDZENIE RADY MINISTRÓW z dnia ….. 2011 r. w sprawie wymagań bezpieczeństwa jądrowego i ochrony radiologicznej, jakie ma uwzględniać projekt obiektu jądrowego]. http://212.160.99.106/bip/lista/3/projekt/12196/katalog/40420,40419#12196.

			– Criteria to reduce the radiological impact in operational states and in case of design failures or extended design conditions; – Probabilistic safety criteria; – The practical exclusion of hypothetical failures that could lead to the premature damage of the safety containment of the reactor and to large releases of radioactive substances; – Some design solutions of a reactor and its cooling system and the reactor safety containment. In particular in relation to design solutions of the reactor safety containment the following requirements were introduced: ▪ §67 paragraph 2: the safety containment shall be consisted of a primary and secondary containment (covering at least all culverts and transitions from the primary containment); ▪ §32: the requirement to prevent or minimise consequences of containment bypass(paragraph 1), prevent severe failures, which could result in the early damage of the primary safety containment (paragraphs 2 and 3) and limit effects of severe failures related to the degradation of the reactor core (paragraph 4); ▪ §33 point 2: the requirement to ensure resistance of the safety containment (as well as the waste fuel tank) to impacts of large civil aircrafts; ▪ §76 paragraph 2: the requirement to use passive systems in order to reduce the concentration of flammable gases within the safety containment[19]. Formulating some of design requirements, also basic conclusions arising from the failure of the Japanese Fukushima Dai-ichi nuclear power plant were included, as well as flood risk of the American Fort Calhoun nuclear power plant (2011) and the French Blayais nuclear power plant (1999), including also these arising from European "stress tests" and associated with ensuring – the resistance to loads caused by seismic shocks and the flood risk; – the reliable power supply system and external cooling systems of a nuclear power plant. In particular, the requirement to use alternate emergency power supply systems was introduced as well as alternate ultimate heat sink. The requirement to ensure the autonomy for a nuclear power plant in terms of power supplies was increased (more than twice compared to requirements included in the "EUR" document) Similarly high nuclear safety and radiological protection standards for nuclear facilities (and particularly nuclear power plants) are also included in many others regulations of the Council of

19 Which is particularly important in the context of the failure in the Fukushima Dai-ichi nuclear power plant.

			Ministers and draft regulations, particularly in the draft regulation concerning safety analysis and the content of the preliminary safety report[20]. The STUK draws attention to the meaning of the *„independent authority controlling the nuclear safety and the thorough knowledge*" of its experts. In Poland the nuclear regulatory authority are the President of the National Atomic Energy Agency (NAEA), the Chief Nuclear Regulatory Inspector (the Vice-president of the NAEA) as well as nuclear regulatory inspectors being employees of the NAEA. The President of the NAEA is subordinated to the Minister of Environment – and therefore in Poland the regulatory operations related to the surveillance and control of the nuclear safety as well as the radiological protection are separated and independent from activities associated with the promotion and the development of nuclear power industry and the corporate governance over energy companies with the majority shareholding of the State Treasury, which at the governmental level is being implemented respectively by the Ministry of Economy and the Ministry of Treasury. Organisationally, the Polish Nuclear Regulatory Authority is located within the structure of the National Atomic Energy Agency (NAEA), which in 2011 was reorganized in order to adjust it to requirements related to the supervision activities over the nuclear energy. The current organisational chart (effective from 06.11.2011) is presented below (Fig. F11) [21]. In next few years, it is planned to convert the NAEA into Office of the Nuclear Safety and Radiation Protection. In 2011, the employment in the NAEA was 92 people, including 25 nuclear supervision inspectors. In connection with requirements of efficient supervision over the nuclear energy, the Polish Government attaches the great importance to ensure the sufficiently strong and skilled nuclear surveillance. Currently, the NAEA employs several people with long experience in the field of safety and supervision of the nuclear energy gained mainly during the implementation of the Nuclear Power Plant in Żarnowiec in the 80s of the 20th century. These people are involved in development of appropriate provisions concerning the nuclear safety and radiation protection as well as surveillance guidelines (technical and organisational guidelines of the President of the NAEA).

[20] REGULATION OF THE COUNCIL OF MINISTERS of … 2012 on the scope and procedures for safety analysis performed before submitting the application for the nuclear power plant construction permission and the scope of the preliminary safety report for a nuclear facility [ROZPORZĄDZENIE RADY MINISTRÓW z dnia … 2012 r. w sprawie zakresu i sposobu przeprowadzania analiz bezpieczeństwa przeprowadzanych przed wystąpieniem z wnioskiem o wydanie zezwolenia na budowę obiektu jądrowego, oraz zakresu wstępnego raportu bezpieczeństwa dla obiektu jądrowego].
http://212.160.99.106/docs//3/12192/40424/40425/dokument32052.pdf?lastUpdateDay=08.06.12&lastUpdateHour=12%3A22&userLogged=false&date=pi%C4%85tek%2C+8+czerwiec+2012

[21] National Atomic Energy Agency: Activities of the President of the National Atomic Energy Agency and the assessment of the nuclear safety and the radiological protection in Poland in 2011. http://www.paa.gov.pl/dokumenty/atomistyka2011.pdf.

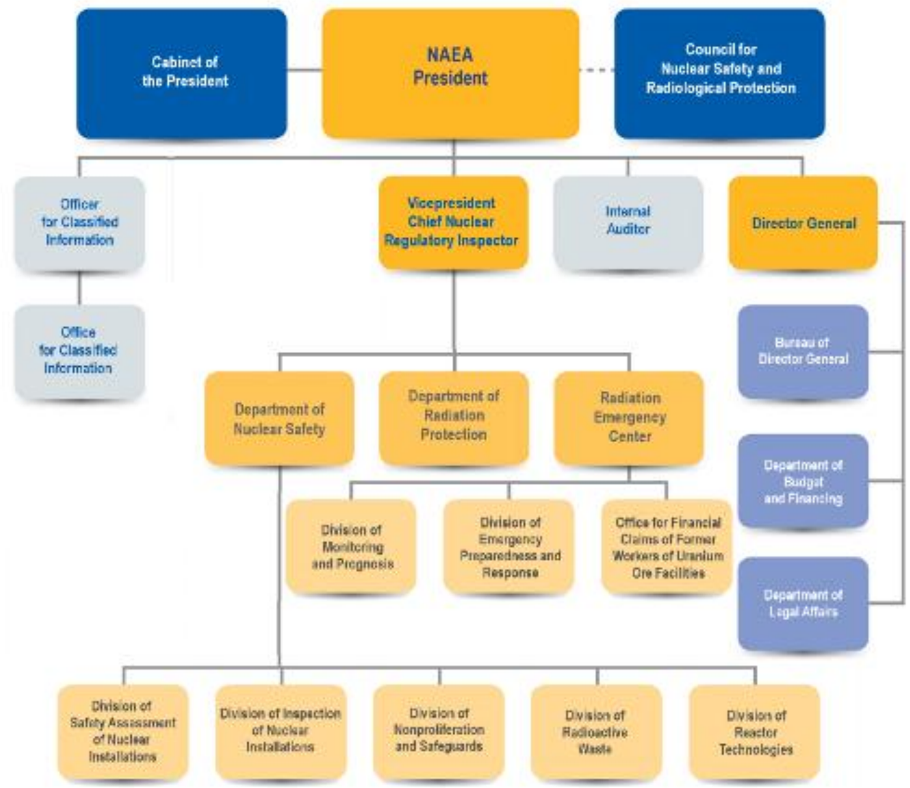


Fig. F11. The current organisational chart of the National Atomic Energy Agency.

Between 2012 – 2014 it is planned to employ and train for specific positions further 39 people, including:

- 17 nuclear surveillance inspectors,
- 13 specialist for the analysis of the safety documentation,
- 9 solicitors or experts in the field of the administrative law.

The appropriate basic and repetitive trainings, both domestic and international, shall be performed for nuclear surveillance experts. The time required to obtain first results is at least three years. A nuclear surveillance inspector, who shall participate in the surveillance over the nuclear premises, obtains full independence in work after about five years.

			The NAEA President benefits from expert advice of the Council for the Nuclear Safety and Radiation Protection. The nuclear surveillance is also supported by experts from technical support organizations – TSO, such as: National Centre for Nuclear Research in Świerk, Institute of Nuclear Chemistry and Technology in Warsaw, Central Laboratory for Radiological Protection in Warsaw, Institute of Geophysics of the Polish Academy of Sciences in Warsaw. Furthermore, on 23.09.2010, NAEA concluded an agreement with the American nuclear surveillance authority U.S. NRC concerning the exchange of technical information and cooperation regarding the nuclear safety, which provides assistance of the NRC in trainings of employees of the nuclear regulatory authority in Poland. The NAEA also cooperates intensively with the IAEA – particularly representatives of the NAEA participate in works of specific committees for safety standards (NUSSC, RASSC, TRANSSC, WASSC), WENRA and NEA OECD. In the period from January until March 2012, 3 experts delegated by the NAEA actively participated in the peer review of “stress tests” of European nuclear power plants. All these measures contribute significantly to raising the level of knowledge, competences and experiences of the Polish nuclear regulatory authority. According to the STUK the study lacks information about the complete nuclear plan of the fuel cycle and the management of the low and medium active waste. In the Polish Nuclear Power Industry Programme it has been assumed that by 2050 burnt-out fuel shall have been stored in storages by the reactors within the area of a power station. The problem of burnt-out fuel storage yard construction necessity shall occur in approx. 30-40 years since activation of the first nuclear power station that is circa 2050 at the earliest. By 2050 Poland does not plan different means of such waste management. That solution essential in terms of rationality has been subject to EPO assessment and described both in PNPIP and Prognosis to PNPIP. Accordingly, in the Prognosis the problem of burnt-out fuel has been featured and possibilities of its solution have been shown (in the chapter describing “fuel cycle”) at the level of detail in which the Programme assessed refers to those issues. Nevertheless, the option of burnt-out fuel processing is not excluded. Broader information on this issue are included in “Prognosis…” (SEA) in point 8.3.1. These days, the Ministry of Economy is preparing *the radioactive waste and burnt-out nuclear fuel management plan* – appendix 1 – action 5 of Polish Nuclear Power Industry Programme. In accordance with the Schedule *National radioactive waste and spent nuclear fuel management plan* has to be finished by the end of 2013. **NRWaSNFMP** similar to Polish Nuclear Power Industry Programme shall be subject to strategic environmental impact assessment, which shall evaluate environmental results of its implementation and at the same time, environmental results of transportation and storage of radioactive waste, including removal of radioactive contaminations

			and liquidation of a nuclear facility. A tender for contractor selection of EPO Prognosis shall take place at the turn of 2012 and 2013. **In this programme issues related to fuel cycle shall be described in detail.** Poland is at the stage of preparing Polish Nuclear Power Industry Programme. The strategic implementation document which comprises legal, organisational and formal means necessary for nuclear power industry implementation in Poland. At this stage it is even not certain which technology shall be used, in which location, with which cooling system, of which powers, etc. (except that it shall be 3rd or 3rd+ generation reactor). Extending this information, taking into account the Programme's function and character, is not rational. Important information is that costs of radioactive waste disposal and power stations liquidation shall be defrayed from payments which Polish nuclear power station shall make during its operation period, adding those costs to payments for electricity. The fund collected shall remain under the supervision of an independent body related to environmental protection. Such a solution has been included in the bill on payment amount on defrayal of final burnt-out nuclear fuel and radioactive waste management costs and nuclear power station liquidation costs made by an organisation unit which has received permit for nuclear power station exploitation. **POLISH PARTY WANTS TO STRESS AT THE SAME TIME THAT IT DOES NOT IMPLEMENT NUCLEAR POWER INDUSTRY PROGRAMME WITHOUT KNOWLEDGE AND IDEAS FOR SOLVING THE ISSUE OF HIGHLY RADIOACTIVE WASTE.** Nuclear waste and spent fuel management Has been also discussed In point F7. In the last paragraph the STUK notes that "*Some effects of the radiation impact on the human health presented in the SEA report are controversial*". That matter has already been discussed in section F9.
5.	FINLAND MINISTRY OF ENVIRONMENT	Based on received comments and own opinions, the Ministry of Environment concludes that the priority should be to provide within domestic provisions the high level of nuclear safety requirements. In addition to legal provisions, also safety requirements related to nuclear power plants shall be included within domestic regulatory requirements. An independent authority controlling the nuclear safety and the thorough knowledge shall significantly contribute to the safety of nuclear power plants.	The comment is the same as in the section F4. The response to this comment has been provided in section F4.
6.	FINLAND	Concepts concerning reactors described in the SEA report include	III generation reactors retain inside the safety containment both gases and liquids. The volume of

	MINISTRY OF ENVIRONMENT	management systems in case of severe failures that will limit the most severe consequences associated with the leakage from the damaged reactor core to the extent that, for example, Finland would not be affected by significant impacts of the failure on the environment. If design conclusions are developed, the Ministry notes that the environmental impact assessment (EIA) shall include detail assessments of possible consequences of severe failures. Finland expresses great interest in possible impacts of severe failures on the Baltic Sea, therefore this issue should be described and subjected to the clear assessment in the next SEA report. Results of specific assessments shall be taken into account during the decision process concerning location of nuclear power plants.	emissions that might occur under emergency conditions was specified in the SEA Report in safety analysis for considered reactors, that is the EPR[22], AP1000 and ESBWR. These are gaseous and not liquid releases, therefore they cannot threaten the biosphere of the Baltic Sea. Other reactors that could be submitted in the tender for the supply of the first Polish nuclear power plants shall meet similar safety requirements. Amounts radioactive substances that could get out the safety containment are so small, that do not pose a threat to the Baltic Sea. The reference to the failure in Fukushima is inappropriate, because reactors in Fukushima were of II generation, designed over 40 years ago and were not resistant to severe failures, and that is why their safety containments were damaged. Containments in III generation containments would remain intact, and that is the fundamental feature distinguishing III generation reactors from previous ones. In addition, the disaster that occurred in Japan cannot happen in Poland. The stress tests actions carried out in Member States of the European Union has confirmed that III generation reactors do not pose any threats to the environment even in case of the greatest natural hazards that could occur in Europe. Besides the safety containment only in the building with radioactive waste there are radioactive substances. The highest level of radioactivity is present in reservoirs and rapture of such container is analysed in the safety report for each power plant. However, possible leakages do not escape to soil and water. And therefore, in case of damage of the reservoir with liquid radioactive waste[23] in the ESBWR reactor, the leakage of radioactive liquids shall not get out the radioactive waste management building. The possibility of leakage was estimated as insignificantly small. The building is equipped with an active feedback system preventing the opening of drain valves in case of the leakage of the radioactive fluid. It shall remain within the system of tight concrete walls and steel coverings preventing the leakage to the environment. Then the liquid waste shall be pumped from the tight reservoir into the drain bowl for further reprocessing. The probability of such leakage was estimated based on previous experiences of operations of nuclear power plants in USA. According to NUREG/CR-5750 they have 32 years of experience from 1969 to 1997 equivalent to 1 392 reactor-years of experience with pressurized water reactors (PWR) and 710 reactor-years of experience with boiling water reactors (BWR). Taking into account that during all these 2102 years of operation there was no events of leakage from a reservoir with liquid waste, it can be assessed that zero failures during 2100 years corresponds to 50% probability that during 3030 there will be one such case. Similar analyses have been performed for the EPR reactor and for the AP1000 reactor. Generally, after a severe failure main hazards are related to releases to the atmosphere, while leakage to soil and water are insignificantly small both in case a severe failure including melting the core and leaks from systems containing the liquid radioactive waste.

[22] UK-EPR Fundamental Safety Overview Volume 2: Design And Safety Chapter S: Risk Reduction Categories, Sub-Chapter: S.2 Section : S.2.3. Radiological Consequences Of Severe Accidents Page: 1 / 10.

[23] ESBWR Design Control Document/Tier 2 26A6642BP Rev. 09.

7.	FINLAND MINISTRY OF ENVIRONMENT	According to the information included in the SEA report, the assessment of impact of the radioactive waste and the spent nuclear fuel has not been included in the scope of the study. The National Plan for Radioactive Waste and Spent Fuel Management will be developed later, and then will be subjected to the strategic environmental assessment. The Ministry considers the separation of these two matters (that is the use of nuclear power and the radioactive waste disposal) as well as the issuing separate opinions concerning impacts of these two plans as artificial. One of the most important issues concerning the safe use of nuclear power is to ensure the safe system for management of the radioactive waste and spent nuclear fuel.	In the Polish Nuclear Power Industry Programme it has been assumed that by 2050 spent fuel shall have been stored in storages by the reactors within the area of a power station. The problem of burnt-out fuel storage yard construction necessity shall occur in approx. 30-40 years since activation of the first nuclear power station that is circa 2050 at the earliest. By 2050 Poland does not plan different means of such waste management. That solution essential in terms of rationality has been subject to EPO assessment and described both in PNPIP and Prognosis to PNPIP. Accordingly, in the Prognosis the problem of burnt-out fuel has been featured and possibilities of its solution have been shown (in the chapter describing “fuel cycle”) at the level of detail in which the Programme assessed refers to those issues. Nevertheless, the option of burnt-out fuel processing is not excluded. Broader information on this issue are included in “Prognosis…” (SEA) in point 8.3.1. These days, the Ministry of Economy is preparing *the radioactive waste and burnt-out nuclear fuel management plan* – appendix 1 – action 5 of Polish Nuclear Power Industry Programme. In accordance with the Schedule *National radioactive waste and burnt-out nuclear fuel management plan* has to be finished by the end of 2013. **NRWaBNFHP** similar to Polish Nuclear Power Industry Programme shall be subject to strategic environmental impact assessment, which shall evaluate environmental results of its implementation and at the same time, environmental results of transportation and storage of radioactive waste, including removal of radioactive contaminations and liquidation of a nuclear facility. A tender for contractor selection of EPO Prognosis shall take place at the turn of 2012 and 2013. **In this programme issues related to fuel cycle shall be described in detail.** Poland is at the stage of preparing Polish Nuclear Power Industry Programme. The strategic implementation document which comprises legal, organisational and formal means necessary for nuclear power industry implementation in Poland. At this stage it is even not certain which technology shall be used, in which location, with which cooling system, of which powers, etc. (except that it shall be 3rd or 3rd+ generation reactor). Extending this information, taking into account the Programme’s function and character, is not rational. Important information is that costs of radioactive waste disposal and power stations liquidation shall be defrayed from payments which Polish nuclear power station shall make during its operation period, adding those costs to payments for electricity. The fund collected shall remain under the supervision of an independent body related to environmental protection. Such a solution has been included in the bill on payment amount on defrayal of final burnt-out nuclear fuel and radioactive waste management costs and nuclear power station liquidation costs made by an organisation unit which has received permit for nuclear power station exploitation.

			POLISH PARTY WANTS TO STRESS AT THE SAME TIME THAT IT DOES NOT IMPLEMENT NUCLEAR POWER INDUSTRY PROGRAMME WITHOUT KNOWLEDGE AND IDEAS FOR SOLVING THE ISSUE OF HIGHLY RADIOACTIVE WASTE. Those issues have already been considered for the needs of the first nuclear programme in Poland (NPS Żarnowiec). At that time, a series of examinations were conducted related to burnt-out fuel deep storage yard location selection. Those works were continued also after closure of the first nuclear programme between 1997 and 1999 within Strategic Government Programme prepared by Polish Atomic Agency *"Radioactive waste and burnt-out nuclear fuel management in Poland."* One of the Programme's tasks was location selection and preparation of radioactive waste storage yard conception in deep geological formations. As a result of works conducted within Government Programme on radioactive waste storage location selection in deep geological formations, 44 rock structures have been identified within the area of Poland in which there is a potential possibility of radioactive waste deep storage location. Structures comprise magma and metamorphic rocks, loamy formations, salt deposits. Crystalline rocks in the ground of the East-European platform in NE Poland, complexes of loamy rocks on Pre-Sudeten Monocline and on elevation of Łeba and selected salt domes of Cechsztyński (Thick Zechstein) salt-bearing formation of Polish Lowland are considered as prospective regions. Within works conducted a negative assessment of radioactive waste storage possibilities in pits and surface geological formations as well as undeveloped deep geological formations has been made. Areas of underground waters reservoirs, lying valuable minerals, areas seismically active, located within the site of mining works conduction or at last, attractive in terms of nature and landscape have also been assessed unfavourably. Accordingly, Poland offers both research and knowledge which demonstrate the possibility of economy improvement through burnt-out fuel and radioactive waste within the country area. Poland shall use information on research already conducted. Nevertheless, they shall not be the basis for deduction as they were conducted and finished over ten years ago. Therefore, **NRWaBNFHP** has been prepared. Adoption of the plan shall allow for geological research initiation using the latest knowledge and research techniques as well as experience of other countries in this respect. **BOTH POLISH NUCLEAR POWER INDUSTRY PROGRAMME AS WELL AS** Prognosis…" (**SEA Report) TO THE PROGRAMME SHALL BE COMPLEMENTED WITH INFORMATION SHOWN ABOVE.** .

8.	FINLAND MINISTRY OF ENVIRONMENT	The Ministry of Environment would like to point out that both the Polish Nuclear Power Programme and the SEA report contain information that the average dose of the natural background radiation in Finland is 7 mSv. This is not true. The dose of the natural radiation background in Finland is about 1 mSv per year.	Of course the Finnish authorities know the best how high are radiation doses in Finland. Values specified in the Programme and the SEA were taken from IAEA publications. However, we are convinced that the controversy may be caused by discrepancies concerning the type of radiation included in the calculation of the dose. The value specified in the SEA corresponds to the total dose received by an average resident of Finland. The value of 1 mSv specified in the comment above cannot be understood as the total dose, because on the STUK web site we can read that the average annual radiation dose for Finns caused by an indoor radon, X-ray examinations, etc. is 4 mSv[24]. We do not know, whether this amount covers all other contributions to the dose. We ask Finnish party to provide us average annual doses for Finland, which will be published in the next edition of the Report. .
9.	FINLAND MINISTRY OF ENVIRONMENT	When the programme is adopted, Finland, pursuant to Article 11 of the Protocol concerning the strategic assessment of the impact on the environment, would like to obtain the information about the availability of the programme together with statements summarising methods of including environmental features and submitted comments in the programme as well as arguments in favour of the adoption of the programme in the light of considered alternatives.	The comment was accepted. We do inform that Finland will be informed about the availability of the programme with statements summarising methods of including in the Programme environmental features and submitted arguments in favour of the adoption of the programme in the light of considered alternatives.

[24] Source: STUK: http://www.stuk.fi/sateilyvaara/en_GB/esim_annos/ some examples of radiation doses, Page updated 05/03/2012.

Short summary of objections and replies

No.	BRIEF – SUMMARY OF COMMENTS	SUMMARY OF REPLIES
F1	The beneficial effect on the CO_2 reduction, domestic and European electric energy market.	Agreed.
F2	The safety level shall be included in legal provisions.	Agreed, that is the case.
F3	The hormesis is controversial, no reference to the study of Darby.	We apply the ALARA principle, the LNT principle is not mentioned in recent documents. Researches carried out in areas with high background radiation as well as case studies indicate that low radiation doses do not give any detectable impacts on health.
F4	Regulations cover the severe failures management. The surveillance shall be independent.	Yes, they do. Regulations have been specified. The surveillance is independent. The employment, organisational chart and provisions have been specified.
F5	Provisions concerning the nuclear safety are required.	See F2.
F6	Consequences of severe failures shall be included – impact on the pollution of the Baltic Sea.	III generation reactors are resistant and hermetic. The probability and consequences of a leakage from the reservoir have been described in the Prognosis
F7	Lack of discussion concerning the waste issue.	Provisions require the discussion concerning the waste issue, it shall be done in special study dedicated to it.
F8	The average dose in Finland is 1 mSv/year.	Probably a misunderstanding in translation, because according to STUK the average dose is 4 mSv and also other sources of the dose should be included.
F9	Finland wants to receive information about the development of the nuclear power programme.	Agreed.