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FURTHER CLARIFICATIONS REQUIRED BY THE MINISTRY OF EMPLOYMENTAND THE ENERGY IN THE SATEMENT ON THE EIA REPORT OF A NEW NUCLEAR POWER PLANT

RESPONSES TO THE QUESTIONS OF SOME FOREIGN COUNTRIES CONCERNING ENVIRONMENTAL IMPACT ASSESSMENT AND SUMMARY OF NATIONAL FURTHER CLARIFICATIONS

CONTENTS

1 INTRODUCTION

Section 14.13 of the statement of the Ministry of Employment and the Economy requires a response to certain questions and comments concerning the environmental impact assessment returned by Estonia, Sweden and Germany. This report contains responses to the questions made by these parties of Espoo Convention.

Further this report contains a summary of further clarifications to environmental impact assessment submitted to the Ministry of Employment and the Economy. The issues concerned are national in nature and thus the summary is aimed to serve international stakeholders with information of the process and to give a general overview of the content of further clarifications. The original report of further clarifications is available in Finnish and Swedish.

2 RESPONSES TO THE QUESTIONS OF SOME PARTIES OF ESPOO CONVENTION CONCERNING ENVIRONMENTAL IMPACT ASSESSMENT

2.1 Estonia

2.1.1 Potential incidence of blue-green algae blooms on the north coast of Estonia due to cooling water in the Ruotsinpyhtää plant site alternative

The warming effect of cooling water may increase the incidence of local blue-green algae blooms within its impact area. The impact area of cooling water in the Ruotsinpyhtää plant site alternative would be about 20 square kilometers at most. However, currents could in principle transport blue-green algae blooms beyond the impact area.

The distance from the cooling water discharge area to the coast of Estonia is about 85 km. The principal current direction in the sea at Ruotsinpyhtää is towards the west along the coast (current direction in the Gulf of Finland runs along the coast from Estonia to Finland). Therefore a plant in Ruotsinpyhtää would not contribute to the incidence of blue-green algae blooms on the coast of Estonia.

2.1.2 Maritime transport environmental impact assessment

The construction of the shipping channel and quay is described in section 3.5.3 'Excavation and water construction' of the EIA report, and the impact of construction is described in section 8.2.2 'Construction of the shipping channel and quay'.

The volume of maritime transports that would occur during construction of the nuclear power plant is minimal compared to shipping along other shipping channels in the vicinity. During the operation of the power plant, maritime transports would only be used occasionally. Maritime transports might cause some noise along the new shipping channels to be built from existing shipping channels to the nuclear power plant. Fishing with fixed traps could not be practiced along the new shipping channels. The new shipping channels would be mainly about 5 m in depth, so the impact of turbulence from ships' propellers on the bottom sediment would be negligible.

The impact of maritime transports during construction would be minor, and in any case the impact would be local and would only last for the duration of the construction. None of the impacts would reach beyond the territorial waters of Finland.

2.1.3 Informing neighboring countries in case of an accident

The international notification procedure in case of an accident is described in section 8.18.2 'Impact of a serious nuclear power plant accident' on p. 346 of the EIA report.

In case of an accident, the nuclear facility licensee is obliged to notify the Finnish Radiation and Nuclear Safety Authority (STUK) and to propose a classification for the event. As per international treaties, STUK will then notify the International Atomic Energy Agency (IAEA). All events classified INES 2 or higher must be notified to the IAEA, which will then convey the information to other governments. The EU has its own notification and information exchange system for events at nuclear power plants and radiation hazards.

Finland has ratified two IAEA Conventions signed in 1986 (*SopS 98/1986* and *SopS 82-83/1990*) that include an obligation to publish radiation monitoring information. These Conventions have been binding upon Finland since 1987 (*Decree implementing the Convention on Early Notification of a Nuclear Accident 98/1986*) and 1990 (*Decree implementing the Convention on Assistance in the Case of Nuclear Accident or Radiological Emergency and approving certain provisions therein, and on the entry into force of the Act on the application of the Convention 83/1990* and *Act on approving certain provisions of the Convention on Assistance in the Case of Nuclear Accident or Radiological Emergency and on application of the Convention 1120/1990*), respectively.

Articles 35 and 36 of the Treaty establishing the European Atomic Energy Community (Euratom Treaty) oblige Member States of the EU to monitor radiation levels in the environment continuously and to report on measurements to the European Commission regularly. This applies even under normal circumstances and is not limited to nuclear accidents or other exceptional radiological situations as is the case with the IAEA Conventions.

In May 2005, the European Council adopted the proposals of the European Commission (August 16, 2004) concerning the accession of Euratom to the Convention on Early Notification of a Nuclear Accident (Early Notification Convention) and the Convention on Assistance in the Case of Nuclear Accident or Radiological Emergency (Assistance Convention). Finland is also a party to these IAEA Conventions. The Early Notification Convention contains provisions on notification to be made to governments of countries affected by the impacts of an accident. The Assistance Convention contains provisions on procedures to be followed in case of an accident, including the requesting and providing of assistance and compensation for costs incurred through providing assistance.

In June 2001, the Council of the Baltic Sea States agreed in Hamburg on an Agreement on the Exchange of Radiation Monitoring Data (*Sop 53/2002*). The purpose of this Agreement is to create a legal and administrative basis for more efficient exchange of

radiation monitoring data between members of the Council of the Baltic Sea States, both under normal circumstances and in cases of nuclear or radiation accidents or other exceptional events. The Agreement has been binding upon Finland since May 2002 (*Act on implementation of legislative provisions in the Agreement on the Exchange of Radiation Monitoring Data 386/2002*).

In addition to the aforementioned multilateral obligations, Finland has also entered into more detailed bilateral agreements on exchange of data based on the IAEA Conventions. These include the agreements concluded with Sweden (*SopS 28/1987*), Norway (*SopS 46/1987*), Denmark (*SopS 27/1987*), Germany (*SopS 35/1993*), Russia (*SopS 38/1996*) and Ukraine (*SopS 66/1997*). The agreements contain more detailed provisions on what information is to be included in the notifications and how the exchange of information is to be implemented.

2.1.4 Compensation of costs incurred through evacuation and other measures in case of an accident (nuclear liability arrangements)

The liability of the operator of a nuclear facility is described in section 8.15.1.3 of the EIA report. 'Nuclear liability' refers to the liability of the operator of a nuclear facility regarding damage caused to outside parties. Under the Nuclear Liability Act (484/1972), the licensee of a nuclear facility is liable to compensate for damage caused by a nuclear event at the nuclear facility, regardless of whether the licensee is actually responsible for the occurrence of that damage. The liability includes personal and property damage, financial damage and the costs incurred through environmental restoration and damage prevention measures. The operator of a nuclear facility must have liability insurance to cover nuclear liability.

Under the Act amending the Nuclear Liability Act enacted in 2005 (493/2005), parties claiming compensation must file their claims with the operator of the nuclear facility within three years of the date on which they received notification of the damage and of who is responsible for it, or should have reasonably received that information.

The amendment of 2005 has not yet entered into force, because the 2004 amendment of the Paris Convention on which it is based has not yet been implemented in the legislation of all countries party to the Convention.

2.2 Sweden

2.2.1 Salmon migration

There is a considerable natural breeding population of salmon in Tornionjoki and Simojoki rivers flowing into the Bothnian Bay on the Finnish side. Salmon smolts usually spend two to four years growing in the river, after which they go on a feeding migration extending to the main basin of the Baltic Sea. The migrating smolts enter the sea between late May and early July, the migration typically peaking when the temperature of the river water reaches 10 °C (*Jutila et al. 2005).* According to Ikonen (*2006*), the migrating smolts in the sea, or post-smolts, migrate southwards along both

the Finnish and Swedish coasts in the Bothnian Bay, as the sea water warms up more quickly in shallows than in the open sea. South of the Kvarken area, post-smolts mainly migrate along the Swedish coast (*Ikonen 2006*). Fish have a highly developed sense of temperature and seek out areas with desired temperature levels. Fish can sense water temperature differences as slight as 0.03 °C (*Bull 1936, Ikonen 2006*).

Salmon spawning migration back to their breeding rivers usually takes place near the surface, at depths of 2 m to 3 m, and the migration speed is generally 20 km to 30 km per day (*Karlsson et al. 1999, Westerberg et al. 1999*). The northward migration usually takes place along the Finnish coast, which being shallower warms up faster than the Swedish coast (*Westerberg et al. 1999*). Migration may occur along the Swedish coast in cases where the water there is warmer than along the Finnish coast. During prevailing northerly winds and during weak winds, the salmon migration route shifts outward from the Finnish coast (*Westerberg et al. 1999*).

Returns of tagged salmon indicate that in the northern part of the Bothnian Bay salmon mainly pass to the west of Hailuoto island, probably following sea currents, directly to Karsikkoniemi in Simo (*Siira 2007*). From there, the majority of the migrating population continues north to the mouth of Kemijoki river and to the Tornionjoki and Kalix rivers. Some turn back south towards the mouths of the Iijoki and Oulujoki rivers.

There is very little research data on the impact of cooling water on salmon migration. Existing findings suggest that the warming of sea water due to cooling water has no significant impact on fish migrations (*Langford 1990*). The impact area of the cooling water from the proposed power plant sites is a considerable way away from the mouths of salmon breeding rivers, and it is entirely possible for the salmon to avoid the areas of warmer water in their migration. There are therefore no grounds to assume that the cooling waters from power plants would have an adverse impact on salmon returning to their breeding rivers.

2.2.2 Detailed investigation of the ecological and chemical state of the Bothnian Bay and Tornionjoki river

The chemical and ecological state of the sea area off Simo and Tornionjoki river is monitored on an annual basis as required. The results of this monitoring are public and are available from the Finnish environmental authorities, such as the regional environment centers. This information has been used as necessary as source material for the EIA in the Fennovoima project.

2.3 Germany

2.3.1 Impacts of a serious accident

The Finnish Radiation and Nuclear Safety Authority (STUK) enforces compliance with the provisions of Finnish nuclear safety legislation and regulations. Fennovoima and the power plant suppliers have prepared feasibility studies on the power plant alternatives, describing the power plants conceptually and ensuring that they can be built so as to

comply with Finnish requirements. STUK will perform an independent study of the acceptability of the power plant concepts on the basis of these feasibility studies. A power plant design that could not withstand a serious reactor accident or the crash of a large commercial passenger aircraft would be eliminated at this stage.

Plant safety design, structural design and basic dimensioning will be described in the Preliminary Safety Analysis Report (PSAR) and related safety analyses to be prepared by the power plant supplier and inspected by Fennovoima with a view to their acceptability. STUK will also review these documents and ensure through an independent study that the design of the selected power plant unit actually does fulfill all safety requirements.

STUK will monitor construction of the power plant throughout the construction stage by inspecting detailed working plans and actual completed constructions. For example, the casting of concrete for the wall designed to withstand an aircraft crash may not even be begun on site before STUK has approved all plans, methods and quality control involved in the work. In this way, STUK will ensure that the plant is built as planned and fulfills all safety requirements.

Before the power plant is commissioned, Fennovoima and the power plant supplier will draw up the Final Safety Analysis Report (FSAR) and other licensing documents. These will include descriptions of the power plant as built and of the continuous monitoring of the condition of the equipment, structures and systems of the power plant. STUK will perform an independent study of these documents to ensure that the completed power plant fulfills all safety requirements. Not until this is done will the power plant be issued an operating license. In Finland, the initial operating license issued to any nuclear power plant is limited to five to ten years. Operating licenses may be renewed. STUK will monitor the running and maintenance of the power plant through a variety of inspections during normal operations.

All power plant licensing documents must be maintained, i.e. Fennovoima will be updating them constantly. Operating license renewal is contingent on a Periodic Safety Review and a comprehensive inspection of all licensing documents similar in procedure and extent to the processing of the initial operating license of the power plant. In renewing the operating license, Fennovoima and STUK will pay particular attention to the condition and maintenance of the power plant. Operating experiences worldwide and any advances in safety technology will also be taken into account. For the operating license to be renewed, the power plant must comply with the safety requirements valid upon expiry of the license, even if those requirements are stricter than those valid when the power plant was originally designed. The renewed operating license is also granted for a fixed term, typically 10 or 20 years. For a 20-year license, a Periodic Safety Review is conducted 10 years into the license period. The operating license can be revoked at any time if its requirements are not fulfilled. If user experiences or safety studies so indicate, Fennovoima will undertake safety improvements at the power plant even in the middle of operating license periods. Such improvements will be supervised by STUK. Continuous improvement of safety is one of the highest safety priorities in Finland.

2.3.2 Storage of spent nuclear fuel

Interim storage of spent nuclear fuel is subject to the same safety regulations as nuclear power plants as a whole. If Fennovoima builds a separate building for interim storage of spent nuclear fuel, it must be designed to withstand the same external hazards as the power plant itself, including the crash of a large commercial passenger aircraft.

Fennovoima has not yet selected the storage facility for the dry interim storage. If the dry interim storage facility selected is not a separately built crash-proof building, steel tanks capable of withstanding an aircraft crash will be used for outdoor storage.

3 FURTHER CLARIFICATIONS – TOPICS OF NATIONAL INTEREST

3.1 Programme to achieve supplementary information on water quality and present state of the aquatic ecosystem

In this section a monitoring programme to achieve additional information on water quality and present state of the aquatic ecosystem is presented. The programme consists of various field surveys and will be carried out during spring/summer 2009. It includes monitoring of both physico-chemical water quality as well as ecological quality factors (plankton, bottom fauna and macrophytes).

3.2 Impact of local conditions and water flows on cooling water flow modelling

In this section the impacts of local conditions and water flows on the cooling water flow modelling results are explained

3.3 Impact of the supplementary information of the aquatic ecosystem (3.1) on the conclusions

In this section it is assessed whether the supplementary information achieved based on the programme presented in section 3.1 does have an impact on the conclusions of the environmental impact assessment or flow modelling results.

This will be further assessed in autumn 2009 when the results of the monitoring programme are available. However, no major influence on conclusions is expected.

3.4 Long-distance discharge of cooling water

In this section the impacts of long-distance discharge of cooling water on water temperature, ice conditions and ecology are assessed by modelling. The technical and other feasibility of the long-distance discharge are also assessed. In the long distance discharge of cooling water the discharge site is located on the bottom of the seabed few kilometres off the coastline.

When a long-distance cooling water discharge is used, the warming sea areas as well as the ice-free areas are smaller than when using a discharge site located by the coastline. Consequently, the area where ecological impacts are observed is expected to be

somewhat smaller. However, when taking into account the technical, economical and schedule aspects, this alternative is not justified.

3.5 Combined impacts of cooling water discharge and house-hold waste water

In this section the possibility of combined effects of cooling and house-hold waste water discharges are assessed in more detail. The assessment proves that no combined harmful impacts are expected as the amount of waste water realised is insignificant from the environmental point of view.

3.6 Methods applied in the bird survey and programme for a supplementary bird survey

In this section the methodology of the bird survey, which was carried out as a part of the EIA program phase, is explained in more detail. This section also contains a programme for a supplementary bird survey which will be carried out during spring/summer/autumn 2009 in Pyhäjoki and Simo. The survey includes monitoring of both nesting and migrating species.

3.7 Programme to achieve supplementary information on fish reproduction areas

In this section a monitoring programme to achieve supplementary information on fish spawning and nursery areas in the vicinity of the planned cooling water discharge areas is presented. The programme consists of various field studies and will be carried out during the spring/summer 2009. The species concerned include e.g. whitefish, Baltic herring, perch and burbot.

3.8 The state of Hanhikivi area as a significant area for biodiversity

In this section the state of Hanhikivi area (in Pyhäjoki) as a significant area for biodiversity on the provincial level is discussed. Measures to protect the valuable succession forests are also presented.

3.9 List of the endangered species and habitat types in Hanhikivi and Karsikko areas, mitigation measures and programme for supplementary field surveys

In this section the endangered species and habitat types in Hanhikivi (Pyhäjoki) and Karsikko (Simo) areas are listed. The section contains also a programme for supplementary field surveys to be carried out during summer 2009. The results of the field surveys as well as mitigation measures for nature protection will be reported in autumn 2009.

3.10 National land use objectives

In this section it is assessed how the national land use objectives are in line with the planned nuclear power plant project. The assessment shows that the project complies with the national land use objectives fairly well.

3.11 Uncertainty in the impact assessments due to climate change

In this section the possible uncertainty in impact assessment due to climate change is assessed. The main conclusion of this assessment is that climate change has been taken into consideration in the assessments and does not cause uncertainty as far as the assessment results are concerned.

3.12 Environmental impacts of combined heat and power production

In this section the technical and environmental feasibility of the combined heat and power production is assessed. Technically it is possible to produce district heating on all alternative sites, but the possible district heating loads vary significantly between the alternative sites. Combined heat and power production would decrease the thermal load to sea during winter time in Ruotsinpyhtää alternative, but during the ecologically important summer time the decrease would be negligible.

3.13 Risks and environmental impacts of transportation of spent nuclear fuel

In this section possible impacts and risks related to transportation of spent nuclear fuel are assessed. Three different transportation possibilities are assessed: sea, railroad and land transport. The risks of transportation are extremely small and do not differ between alternative sites. The environmental impacts of transportation are negligible.

3.14 Environmental impacts of the repository facility for operating wastes containing radioactive substances of low and intermediate levels

In this section, possible environmental impacts of construction and operation of the repository facility for operating wastes containing radioactive substances of low and intermediate levels are assessed. The environmental impacts during construction and operation phases are minor and confined to the power plant area. After the operation phase, the environmental impacts are negligible.

3.15 Additional analysis on nuclear accidents

In this section additional analysis is presented on the effects of the nuclear accident case example (severe accident) assessed in the EIA report. The analysis includes a case, where all the noble gases in the nuclear fuel are released. Also the effects of additional weather situations on the radiation doses are assessed.

3.16 Impacts of the supplementary information on the conclusions and comparison between alternative power plant locations

In this section it is assessed, whether the additional information achieved based on the supplementary assessments provided in 3.1–3.13 does have an impact on the conclusions of the significance of environmental impacts or on comparison between the alternative power plant locations.

The supplementary information achieved by now does not change the conclusions or the comparison in any significant way. The possible impact on conclusions will be further

assessed in autumn 2009 when the results of the surveys to be carried out during the summer are available. These assessments are expected to provide additional information on the topics in question but this information is so specific in nature that conclusions or the comparison of the alternatives given in the EIA report are not expected to change.

3.17 Corrections

In this section the corrections of misprints in the environmental impact assessment report are presented.

3.18 A flaw in the resident survey

In this section causes and effect of a flaw observed in the resident survey sampling are assessed. As a conclusion, the minor flaw did not affect the conclusions in any way.

3.19 Termination of EIA procedure in one of the alternative sites (Kristiinankaupunki)

In this section the reason for termination of the EIA procedure at Kristiinankaupunki is presented.

From the beginning of the project Fennovoima has considered co-operation with the local community essential for project implementation. During the EIA procedure it became apparent that co-operation with the municipality was not on the level which would guarantee sufficient prerequisites for project development in the long run and thus Fennovoima decided to terminate the EIA procedure in Kristiinankaupunki in June 2008.

3.20 Lamprey fishing at Pyhäjoki

In this section information on lamprey fishing is presented.

3.21 Other questions presented in statements

In this section answers to some of the questions presented in the statements are given.

3.22 Natura assessments

In this section the need of Natura assessments in Ruotsinpyhtää and Pyhäjoki is discussed. Fennovoima has decided to carry out assessments.