

# ESPOO PROCEDURE NPP LOVIISA-3

Evaluation of additional information  
received after the  
Bilateral Consultation

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# 1 INTRODUCTION

In the framework of the EIA Directive, the Espoo Convention respectively, Austria has participated in the transboundary EIA procedure concerning the construction of a third reactor at the Loviisa nuclear power plant (NPP) site.

In the EIA process the Austrian Institute of Ecology in cooperation with Dr. Helmut Hirsch was engaged by the Austrian Federal Environmental Agency to evaluate the Environmental Impact Assessment Report of Fortum Power and Heat Oy (Fortum). The findings of this evaluation are presented in an Expert Statement (WENISCH et al. 2008a). This Expert Statement includes a list of questions resulting from the evaluation of the EIA Report. Bilateral consultations were held in Helsinki on June 27<sup>th</sup>, 2008. During this consultation the questions of the Austrian side were discussed with the relevant Finnish authorities and the applicant Fortum. The result of the consultation is summarized in a report (WENISCH et al. 2008b), which was submitted to the Finnish contact authority.

In February 2009 Austria received additional information from the Finnish authorities and the consultants were assigned to evaluate to which extent this information addresses the recommendations Austria had formulated as result of the Bilateral Consultation of June 27<sup>th</sup>, 2008:

1. To establish an information exchange between the competent authorities of Finland and Austria, concerning the further procedures (in particular, the results of feasibility studies and safety assessments).
2. To provide a worst case accident scenario and the related source term in order to assess transboundary impacts.

Furthermore, the consultants checked any additional answers to questions put forward in the Expert Statement before the Consultation are provided.

The documents under evaluation are:

- Environmental Impact Assessment Report for the Loviisa 3 Nuclear Power Plant Unit; Statement by the Contact Authority, Ministry of Economy and the Employment, 15.8.2008 (MEE 2008)
- Supplementing the Loviisa Nuclear Power Plant with a Third Plant Unit: Supplementary Report to the Environmental Impact Assessment Report, Fortum Power and Heat Oy, 26.11.2008 (FORTUM 2008a)
- Supplementing the Loviisa Nuclear Power Plant with a Third Plant Unit, Answers to the Questions posed as part of the International Hearing related to the Environmental Impact Assessment, Fortum 16.12.2008 (FORTUM 2008b)

## 2 SUMMARY

In the framework of the EIA Directive, the Espoo Convention respectively, Austria has participated in the transboundary EIA concerning the construction of a third reactor at the Loviisa nuclear power plant (NPP) site.

In the EIA process the Austrian Institute of Ecology in cooperation with Dr. Helmut Hirsch was engaged by the Austrian Federal Environmental Agency to evaluate the Environmental Impact Assessment Report of Fortum Power and Heat Oy (Fortum) (WENISCH et al. 2008a). The experts also participated in the Bilateral Consultation and assessed its output. (WENISCH et al. 2008b) After the transboundary EIA procedure as such having been concluded the Finnish contact authority submitted additional documents. The evaluation of the documents in the context of the previous discussion is the main focus of this expert statement.

As a result of the Bilateral Consultation of June 27<sup>th</sup>, 2008 Austria had formulated two recommendations:

1. To establish an information exchange between the competent authorities of Finland and Austria, concerning the further procedures (in particular, the results of feasibility studies and safety assessments).
2. To provide a worst case accident scenario and the related source term in order to assess transboundary impacts.

These recommendations are linked to the Finnish EIA procedure, which allows to treat a reactor project as a “black-box”, with generic maximum emissions in normal operation as well in accident conditions. Therefore, specific safety issues of the concrete candidate reactors are no issue in the EIA Report. But the EIA has to be finalized before the government and the parliament will rule on the Decision in Principle (DiP). At present, three companies are planning the construction of a new reactor. The pertinent authorities announced that, the three applications for a DiP will be pooled (legally they remain as three separate decisions)

At the Bilateral Consultation of June 27<sup>th</sup>, 2008, it was clarified that many data missing in the EIA Report will become available during the preparation of the documents for the DiP. Concrete safety relevant information (feasibility studies) concerning the candidate reactors provided by the applicant plus a review by STUK are required for the DiP.

Reactor safety is of high relevance for the assessment of transboundary impacts. Therefore, Austria is interested to be informed about the further decision process. This concerns in particular the accident risk and the potential airborne emissions caused by a severe accident.

During the transboundary EIA procedure, Austria as well as other countries (e. g. Norway, Germany) requested safety relevant information, which was missing in the EIA Report. In addition the MEE itself requested that Fortum should provide additional information, in the context of the DiP application, in particular key technical data with a view to the environmental impacts of various power plant options.

Fortum claims in its supplement to the EIA Report to meet the requests for additional information by MEE, especially that the environmental impacts of the different reactors will not differ substantially in practice (FORTUM 2008a). In fact, none of the three supplementary documents contains new information regarding the candidate reactors.

In the Austrian Expert statement and in several other statements on the EIA Report it is asserted that the release of radionuclides assumed for the transboundary impact assessment was too small to represent a conservative emission scenario.

Nevertheless, the MEE supports the view of the EIA Report that the limited release scenario is justified because it is based on the Finnish regulation (MEE 2008a). The source term chosen in the EIA Report corresponds to the limit for severe accident emissions. Higher emissions have to be very unlikely (frequency of occurrence  $< 5E-7/\text{yr}$ ).

Above that, the comments of foreign states on the severe accident source term are not even mentioned in the supplement to the EIA Report (FORTUM 2008a). In its reply to Austria Fortum states, that “the fulfillment of the limited release requirement is demonstrated by means of various analyses” (FORTUM 2008b). However, Fortum presents no further explanations or references to support this conclusion.

**In the context of safety, severe accidents are the issue of foremost interest from the Austrian point of view since such accidents can potentially lead to adverse effects on Austrian territory. Generic literature about Generation III reactors indicates that early and large releases exceeding the Finnish release limit cannot be excluded at the present state of knowledge. Only results of a detailed safety assessment for the candidate reactor(s) would eventually allow to exclude a larger source term. Such results, however, are not yet available. Therefore, a source term for a worst case release scenario (e.g. an early containment failure or containment bypass) should have been analyzed within the EIA, but at least now in preparation for the DiP, in particular, because of its relevance for impacts at greater distances.**

**It was announced by the Finnish Ministry of Employment and the Economy (MEE) that the DiP including the STUK reviews of the feasibility studies of the reactor types (for all DiP applications) would be made available to the Austrian side as an important contribution to keeping the Austrian side well-informed. This information would be highly appreciated as a basis for further discussion and cooperation.**

### 3 ZUSAMMENFASSUNG

Im Rahmen der UVP-Richtlinie bzw. der Espoo Konvention hat sich Österreich an der grenzüberschreitenden Umweltverträglichkeitsprüfung (UVP) betreffend den Bau eines dritten Reaktors im Kernkraftwerk (KKW) Loviisa beteiligt.

Das Österreichische Ökologie-Institut und Dr. Helmut Hirsch wurden vom Umweltbundesamt beauftragt, den UVP-Bericht des Betreibers Fortum Power and Heat Oy (Fortum) zu begutachten (WENISCH et al. 2008a). Die ExpertInnen nahmen auch an der Bilateralen Konsultation teil und bewerteten deren Ergebnis (WENISCH et al. 2008b). Nach Abschluss des eigentlichen grenzüberschreitenden UVP-Verfahrens übermittelte die finnische Kontaktstelle ergänzende Dokumente. Die Bewertung dieser Unterlagen im Kontext der bisherigen Diskussion ist Schwerpunkt dieser Fachstellungnahme.

Als Ergebnis der Bilateralen Konsultation vom 27. Juni 2008 formulierte Österreich zwei Empfehlungen:

1. Fortführung des Informationsaustausches zwischen den zuständigen Behörden von Finnland und Österreich hinsichtlich des weiteren Verfahrens (insbesondere bezüglich der Ergebnisse der Machbarkeitsstudien und Sicherheitsanalysen).
2. Bereitstellen eines „worst case“ Unfallszenarios und Quellterm, insbesondere für die Analyse grenzüberschreitender Auswirkungen.

Diese Empfehlungen ergeben sich aus dem finnischen UVP-Verfahren, das es erlaubt den Reaktor als „Blackbox“ mit maximalen Emissionen während des Betriebs und bei Unfällen zu behandeln. Deshalb ist die Sicherheit der konkret vorgeschlagenen Reaktoren nicht Gegenstand des UVP-Berichts. Allerdings muss das UVP-Verfahren abgeschlossen werden, bevor Regierung und Parlament ihre Grundsatzentscheidung, die „Decision in Principle“ (DiP), fällen. Die finnischen Behörden kündigten an, dass im Weiteren alle drei aktuellen Anträge für eine DiP gemeinsam behandelt werden (rechtlich gesehen bleiben es aber drei eigenständige Entscheidungen).

Im Rahmen der Bilateralen Konsultation vom 27. Juni 2008 wurde mitgeteilt, dass viele Daten, die im UVP Bericht fehlen, während der Vorbereitung von Dokumenten zur DiP zur Verfügung gestellt werden. Sicherheitsrelevante Informationen (Machbarkeitsstudien) für die konkreten Reaktoren müssen vom Anbieter erstellt werden und mit der finnischen nuklearen Aufsichtsbehörde STUK diskutiert werden, die ihrerseits diese Unterlagen kommentieren wird.

Die Reaktorsicherheit ist von großer Bedeutung für die Bewertung grenzüberschreitender Auswirkungen. Deshalb ist es für Österreich von großem Interesse vom folgenden Entscheidungsprozess informiert zu sein, insbesondere hinsichtlich des Unfallrisikos und der Freisetzung von Radionukliden bei schweren Unfällen.

Im Rahmen des grenzüberschreitenden UVP-Verfahrens wurden von Österreich und anderen Ländern (z. B. Norwegen, Deutschland) sicherheitsrelevante Daten eingefordert, die im UVP-Bericht fehlen. Auch das zuständige Ministerium für Wirtschaft und Beschäftigung (MEE) selbst verlangte, dass Fortum für den Antrag zur DiP zusätzlich Informationen vorlegt, nämlich technische Daten zur Beurteilung der Umweltauswirkungen der verschiedenen Reaktoroptionen.

In der vorliegenden Ergänzung zum UVP Bericht, in der die von MEE verlangten zusätzlichen Informationen zusammengestellt sein sollten, erklärt Fortum aller-

dings, dass die Umweltauswirkungen der unterschiedlichen in Erwägung gezogenen Reaktortypen in der Praxis keine wesentlichen Unterschiede aufweisen würden und bringt daher keine detaillierten technischen Daten bei (FORTUM 2008a). Tatsächlich sind in keiner der drei nachgereichten Unterlagen neue Informationen zu den ausgewählten Reaktortypen enthalten.

In der österreichischen Stellungnahme und anderen Stellungnahmen zum UVP-Bericht wird kritisiert, dass die unterstellte Emission von Radionukliden für die Untersuchung der grenzüberschreitenden Auswirkungen schwerer Unfälle zu niedrig ist, um ein konservatives Emissionsszenario darzustellen.

Nichts desto trotz, unterstützt das zuständige Ministerium (MEE) die Darstellung des UVP-Berichts, da die gewählte begrenzte Emission der geltenden finnischen Vorschrift entspricht (MEE 2008). Der für den UVP-Bericht gewählte Quellterm für schwere Unfälle entspricht diesem Emissionsgrenzwert. Höhere Emissionen müssen extrem unwahrscheinlich sein (Eintrittswahrscheinlichkeit  $< 5E-7/a$ ).

Darüber hinaus, sind die internationalen Kommentare zu den Unfallemissionen in der Ergänzung zum UVP Bericht nicht erwähnt (FORTUM 2008a). In der Beantwortung der österreichischen Kritik erklärt Fortum, dass die Einhaltung der Vorschrift für die Emissionsbegrenzung durch verschiedene Analysen belegt sei (FORTUM 2008b). Fortum führt hierfür aber keine weiteren Erklärungen oder Quellen an.

**Im Kontext der Sicherheitsdiskussion ist das Thema „schwere Unfälle“ von höchstem Interesse für Österreich, da solche Unfälle auch zu negativen Auswirkungen auf österreichisches Staatsgebiet führen könnten. Die allgemeine Literatur zu Generation III Reaktoren gibt an, dass frühe und große Freisetzungen, die den finnischen Grenzwert überschreiten, auf Basis des heutigen Wissensstands nicht ausgeschlossen werden können. Erst eine detaillierte Sicherheitsanalyse der vorgesehenen Reaktoren würde es erlauben, einen größeren Quellterm auszuschließen. Bisher liegen einschlägige Belege noch nicht vor. Daher sollten im EIA Bericht oder zumindest zur Vorbereitung der DiP auch die Auswirkungen der Emissionen eines Unfalls mit einem "worst-case" Freisetzungsszenario (z. B. mit frühem Containmentversagen oder Containment Bypass) untersucht werden, insbesondere aufgrund der großen Bedeutung für die Auswirkungen in großer Entfernung.**

Das finnische Ministerium für Wirtschaft und Beschäftigung erklärte, dass es Österreich die Grundsatzentscheidungen (DiP) einschließlich der Berichte der Aufsichtsbehörde (STUK) zur Machbarkeitsstudie für die Reaktortypen zur Verfügung stellen wird. Das MEE möchte damit dazu beitragen Österreich gut zu informieren. Diese Informationen würden als Grundlage für weitere Diskussion und Zusammenarbeit begrüßt.

## **4 PROCEDURE (1<sup>st</sup> RECOMMENDATION)**

### **4.1 Conclusions from the Bilateral Consultation in June 2008**

At this consultation a better understanding of the EIA in the context of the licensing process could be achieved. It was clarified that many data missing in the EIA will become available during the preparation of the documents for the DiP. This requires preparation of concrete safety relevant information (feasibility studies) by the applicants concerning the candidate reactors and discussions of STUK with the applicant. The vendors have to confirm that they are willing to adapt their project to the Finnish safety requirements before DiP. Since reactor safety is of high relevance for transboundary impacts, Austria is interested to be informed in the further decision process. This concerns in particular the accident risk and the potential airborne emissions caused by a severe accident.

### **4.2 Treatment of the issue in the supplementary information**

According to the Summary of the contact authority (MEE 2008), other countries (e.g. Norway, Germany) also requested safety relevant information, which was missing in the EIA report. The MEE itself requested that for the DiP Fortum has to provide additional information, in particular, key technical data with a view to the environmental impacts of various power plant options.

Fortum states in the supplement to the EIA Report that the environmental impacts will not differ substantially in practice. However, this description concerns only normal operation of the NPP and the difference between PWR and BWR. (FORTUM 2008a).

In the three supplementary documents no new information regarding the candidate reactors is given.

### **4.3 Conclusion**

In January 2009 another Bilateral Consultation between Finland and Austria took place. There, the follow-up of the decision process was also an important issue. As a conclusion it was announced by the Finnish MEE that the DiP including the STUK reviews of the feasibility studies of the reactor types (for all DiP applications) would be made available to the Austrian side as an important contribution to keeping the Austrian side well-informed. This information would be highly appreciated as a basis for further discussion and cooperation.

## 5 SAFETY AND ACCIDENTS (2<sup>nd</sup> RECOMMENDATION)

### 5.1 Conclusions from the Bilateral Consultation in June 2008

A complete PSA will have to be provided only for the construction license. Core issues concerning the potential significant emissions from severe accidents are still open. Therefore, Austria recommended to provide a worst case accident scenario (exceeding the permitted maximal release as considered in the EIA Report) in order to assess transboundary impacts.

### 5.2 Treatment of the issue in the supplementary information

In several other statements it was also stated that the release of radionuclides assumed for the transboundary impact assessment was too small to represent a conservative emission scenario. The MEE supports the view that the limited release scenario is justified because it is based on the Finnish regulation (MEE 2008a).

The international comments on the severe accident source term are not even mentioned in the supplement to the EIA Report. (FORTUM 2008a.) Fortums reply to Austria Fortum states that **“the fulfillment of the limited release requirement is demonstrated by means of various analyses”** (FORTUM 2008b). However, Fortum presents no further explanations or references to back this conclusion.

### 5.3 Conclusion

In the context of safety, severe accidents are the issue of foremost interest from the Austrian point of view since such accidents can potentially lead to adverse effects on Austrian territory. According to the YVL Guide 2.8, the probability for core damage shall be less than  $1E-5/a$ . The probability for a core damage accident exceeding the release limit of 100 TBq Cs-137 shall be less than  $5E-7/a$ .

Generic literature about Generation III reactors indicates that early and large releases (from 2 to 20% of the Cesium inventory) cannot be excluded. In the Expert Statement for the Fennovoima NPP a Cs-137 source term of 25,000 TBq (5% of the Cs-inventory of the EPR core) was assumed for accident consequence calculations, i.e. 250 times the amount assumed for the INES 6 accident according to the Finnish regulation. (WENISCH 2008c).

**A conservative worst case release scenario should be included in the EIA, in addition to the limited release scenario. Only results of a detailed safety assessment for the candidate reactor(s) would permit to exclude a larger source term – in case it can be proven beyond doubt that such a larger source term cannot occur. Such results, however, are not yet available. Therefore, a source term for e.g. an early containment failure or containment bypass scenario should have been analyzed as part of the EIA or in preparation of DiP – in particular because of its relevance for impacts at greater distances.**



## 6 QUESTIONS FROM EXPERT STATEMENT

The questions formulated in the expert statement concerned the topics of procedure, reactor types, safety and accidents, spent fuel management as well as alternatives and zero option.

To some extent, the questions were answered at the Bilateral Consultation of June 27<sup>th</sup>, 2008. Furthermore, it became clear during the Consultations that more information relating to the questions was not available at that time and would only become available during the further course of the procedures, after the Environmental Impact Assessment has been concluded.

A evaluation of the supplementary information showed that it does not contain any further answers to the Austrian questions. The supplementary information summarizes the discussion which has taken place in the context of the Environmental Impact Procedure, briefly comments various issues and also presents some new information on topics which are not of central interest to the Austrian side (e.g. regarding combined production of heat and electricity, and cooling water).

## 7 REFERENCES

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- FORTUM – Fortum Power and Heat Oy (2008a): Supplementing the Loviisa Nuclear Power Plant with a Third Plant Unit: Supplementary Report to the Environmental Impact Assessment Report, Fortum Power and Heat Oy, 26.11.2008.
- FORTUM – Fortum Power and Heat Oy (2008b): Supplementing the Loviisa Nuclear Power Plant with a Third Plant Unit, Answers to the Questions posed as part of the International Hearing related to the Environmental Impact Assessment, Fortum 16.12.2008.

## APPENDIX: CONTENT OF THE SUPPLEMENTARY DOCUMENTS

This Appendix provides a summary overview of the content of the supplementary documents. Items which are of particular interest from the Austrian point of view are briefly elaborated.

### **Statement by the Contact Authority, Ministry of Economy and the Employment, 15.8.2008 (MEE 2008)**

Chapter 1 deals with general information and procedural questions.

Chapter 2 gives an account of the communication of the EIA report and the related hearings.

Chapter 3 provides a summary of the comments and opinions submitted.

Section 3.1 deals with Finnish institutions – Ministries involved, various regional authorities, the Radiation and Nuclear Safety Authority (STUK), the City of Loviisa and various municipalities, professional and environmental associations and others.

The Ministry of the Environment (ME) regards it as a significant deficiency of the EIA Report that it does not explore in detail the differences between the reactor types with a view to nuclear safety and environmental impact. Also, it criticizes the possible impacts of climate change on the safety of the plant, and the precautions taken to avoid them are not assessed in the EIA Report.

Other points of criticism of the ME concern cooling water issues, storage and final disposal of wastes, as well the assessment of the impact of participation on the procedure.

The issue of climate change (sea level rise) is also taken up by the Ministry of Agriculture and Forestry and the Regional Environment Centre of Uusimaa.

Greenpeace emphasizes that the impact of a severe nuclear accident – with higher releases than those considered in the EIA Report should be assessed

Several comments address the cogeneration of heat and electricity which should be explored as an important option.

In most comments, no fundamental objections are raised.

Section 3.2 reports the statements from the international hearing.

The Norwegian Ministry of the Environment points out that probability and environmental impact of a severe accident (an accident in which all protective barriers of the unit are destroyed) should have been assessed in the EIA Report.

The Ministry of the Interior of the German State of Mecklenburg-Vorpommern expresses the view that reactor safety and intermediate storage of spent fuel require additional clarification. (See below – “Answers to the Questions ...” for details.)

The Ministry of the Environment of Estonia notes that the EIA Report does not include a description of responsibilities and information of neighboring countries in case of a nuclear accident.

The Polish Ministry of the Environment has no comments, but hopes to be further informed about the project in the future.

Other government authorities (from Sweden and Lithuania) express no fundamental reservations regarding reactor safety and waste management, as far as reported here.

The Austrian recommendations are duly noted.

Section 3.3 provides a summary of other statements and opinions – from small groups and individuals. It appears that those statements are brief, and of a rather general nature.

Chapter 4 contains the statement of the contact authority, the Ministry of Employment and Economy (MEE).

It contains the following key assertions:

Section 4.1 – Project description and alternatives:

The EIA meets the requirements of the Finnish EIA decree regarding information on the project and project alternatives, land use, the project' technical data, suitability of the project vis-à-vis planning on provincial, regional and town level, the relationship between the project and the environmental protection regulations and the relationship between the project and national and EU plans and programs.

The information on the state of the environment as well as on population and employment, the economy and services, seismology and fauna is seen as adequate, although information concerning agricultural production should have been included in the EIA Report.

The alternatives selected for the reactor type have been assessed in the EIA Report; also, the report includes an assessment of whether the options offered by various suppliers have passed the EUR inspection procedure. MEE considers the description as adequate.

The cost structure of the project is presented in the EIA Report; however, corresponding information regarding the projects options is missing.

The description of energy conservation measures and measures for improved efficiency of energy consumption is considered as adequate by the MEE. This issue will also have to be dealt with in the application for a Decision in Principle, and the review of this application will take into account Finnish energy supply as a whole.

#### Section 4.2 – Assessment of impact and significance:

In the view of MEE, the impacts in the following areas have been adequately assessed: Cooling waters, water supply, power transmission link, traffic, the fuel supply chain and final disposal of nuclear waste, exceptional situations, employment and real estate.

Regarding intermediate storage of spent nuclear fuel, the description in the EIA Report can be considered as narrow.

The accident scenario used for the assessment is justified, in the view of MEE. Some inconsistencies in the data presented, however, have to be corrected.

The description of assessment methods and material is considered to be mostly adequate. This issue will have to receive further attention in the future planning of the project.

#### Section 4.3 – Comparison of alternatives and their feasibility:

The assessment of options and their feasibility is in accordance with the Finnish EIA Decree. However, the assessment of impacts of various alternatives is not comprehensive enough in all respects.

#### Section 4.4 – Prevention and monitoring of negative effects:

This includes aspects of nuclear safety. In the view of MEE, the issue is described to an adequate extent, considering the planning phase.

#### Section 4.5 – Organization of participation in the EIA procedure:

The participation arrangements fulfill the Finnish requirements; most questions which were raised have been addressed.

#### Section 4.6 – Assessment report and submitting the Decision in Principle:

For the processing of an application for the Decision in Principle, various clarifications on the points requiring supplementation will have to be submitted, as pointed out by MEE in other sections of the statement (see also below).

#### Section 4.7 – Summary and adequacy of the assessment report:

EIA legislation has been complied with, and the EIA report is comprehensive and appropriate. However, several topics will require additional clarification in the application for a Decision in Principle:

1. Co-generation of electricity and heat
2. Combined impact of cooling waters from various reactors
3. Key technical data regarding the environmental impacts of various reactor options
4. Revision of the Natura 2000 assessment
5. Environmental impacts of nuclear waste management

6. Issues to be taken into consideration in the further planning
7. Agriculture and fish farming
8. Cost structure of power production

MEE requires that a report on those issues be submitted by November 30, 2008.

Chapter 5, the concluding chapter, briefly states how this statement will be communicated to other authorities, and how all statements and opinions received by MEE will be made available.

#### **Report to the Environmental Impact Assessment Report, Fortum Power and Heat Oy, 26.11.2008 (FORTUM 2008a)**

This report was drawn up by Fortum, at the request of MEE in the statement of August 15, 2008 (see above).

The eight topics listed are duly dealt with. The cooling water issue is dealt with in some detail. Otherwise, the treatment is rather summary and sketchy.

Regarding co-generation, a basic implementation schema for PWR and BWR is presented, as well as a discussion of seasonal variations. Possible safety implications are not dealt with.

The section on key technical data of reactor types is limited to a brief explanation of the functioning of a nuclear power plant and a discussion of variations in radionuclide production between PWR and BWR. No detailed technical information on reactor types and no assessment of the relevance of design differences for safety (in particular, for probability and source term of severe accidents) is provided.

The section on nuclear waste gives a summary overview of the licensing required for a repository for operating waste, and the expansion which will be needed. Intermediate storage of spent fuel is also briefly discussed, without a detailed discussion of safety issues.

#### **Answers to the Questions posed as part of the International Hearing related to the Environmental Impact Assessment, Fortum 16.12.2008 (Fortum 2008b)**

This Report deals with the questions submitted by Norway, Germany (Mecklenburg-Vorpommern), Estonia, Austria, Sweden and Lithuania.

Questions from Germany and Lithuania which have not been presented in the statement of the contact authority (see above) are listed in the report.

### *Norway*

Q: Probability and consequences of a severe accident with destruction of all five barriers should be assessed.

A: The accident described in the EIA Report corresponds to the release limit set by Finnish legislation. For the release to occur, all barriers retaining active materials have to be at least partially broken, or leak.

Due to the design of the containment building, larger releases are extremely rare ( $<5E-7/yr$ ).

### *Germany*

Q1: Specifications should be submitted which demonstrate that even in case of the crash of a large civilian aircraft or of a terrorist attack, the probability of a failure of the containment is below  $5E-7/yr$ .

Q2: Regarding storage of spent fuel elements: Which external influences have been taken into account designing the buildings, and which storage containers, designed against which external influences, are to be used in case of dry storage?

A1: The plant will be designed as Finnish legislation requires. This includes a large passenger airplane crash. Fulfillment of this requirement is demonstrated by means of analyses. The central principles will become public in the safety assessment by STUK, which will be made in the construction phase. Furthermore, provision will be made against illegal actions in the design of the security system of the plant.

A2: Either wet or dry storage will be applied. No detailed concepts have been discussed at this stage. A decision on the storage method will be taken as part of the decision to acquire the power plant unit. Crash of a large passenger airplane, earthquakes and other potential external threats will be taken into consideration.

### *Estonia*

Q1: How will neighboring countries be informed of accidents, how is this planned to be carried out and who is responsible for what.

Q2: Who carries out the environmental impact monitoring? Are accredited laboratories used for that?

A1: STUK is responsible for informing neighboring countries, with 24 hours-readiness. Reporting and responsibilities are based on IAEA international conventions, ratified by Finland, and the corresponding EU Council decision. Also, Finland has bilateral agreements with neighboring countries.

A2: The licensee is responsible for implementing the monitoring program; it has to be approved by STUK. Samples are taken by the licensee, STUK and sub-contractors. They are analyzed by STUK, the laboratory operations of which have been accredited.

### *Austria*

Q: A worst case accident scenario and the related source term should be provided in order to assess transboundary impacts.

A: In accordance with Finnish regulations, the possibility that a release more serious than described in the EIA Report would occur is extremely small (<5E-7/yr). The fulfillment of the regulation requirements is demonstrated by means of various analyses.

For the release described in the EIA report to occur, all barriers have to be at least partially broken, or leaking. There is no generally applicable method to define the worst possible accident.

### *Sweden*

Q: Not listed explicitly in the report. They concern (1) technological progress, (2) effects of transports and (3) weather conditions for dose calculations.

A1: Technological progress is monitored by Fortum and the Finnish authorities. Well-tried and reliable methods are employed to reduce the releases of radioactive materials.

A2: Transports of fresh or spent fuel have not environmental effects in Sweden. The containers are specifically designed for this purpose.

A3: Weather conditions are based on data obtained at Loviisa NPP. EIA Report describes depositions at different distances. It does not specifically deal with the weather conditions which would lead to the releases reaching Sweden.

### *Lithuania*

Q1: Relationship of the proposed project to the Helsinki Commission Baltic Sea Action Plan (15 November 2007).

Q2: (Concerning normal operation) No limits for aerosol, tritium and radiocarbon emissions into the air are provided in the EIA Report. Also, estimated releases from new units are higher than from existing two units (particularly concerning tritium).

Q3: What are the activity limits for releases of waste waters from the laundry to the sea?

Q4: The existing environmental monitoring system should be explained in detail.

A1: Releases do not affect the activity level in the Baltic Sea, and hence are not relevant for the Baltic Sea Action Plan.

A2: The authorities did not set limits for releases of aerosols, tritium and radiocarbon into the air. (For releases into the sea, there are no limits for radiocarbon.)

The plant type and details of the design are not yet known. Therefore, only a rough estimate of the releases can be given. Upon selection of the plant type, tritium releases will be assessed more accurately.

A3: The limits imposed by the authorities in the operating license phase will apply to the waste waters released to the sea.

A4: See Estonia, A2. Some more details concerning the surveillance program are provided in response to the Lithuanian question, and a reference to the STUK website is given.