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Bilateral Consultation

May 26th, 2008, Helsinki

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Ordered by the
Federal Ministry for Agriculture, Forestry,
Environment and Watermanagement,
Project management Department V/6
"Nuclear Coordination"
GZ BMLFUW-UW.1.1.2/0013-V/6/2008

lebensministerium.at

ÖSTERREICHISCHES ÖKOLOGIE INSTITUT

REPORT
REP-0190

Vienna, 2008

Project management

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For further information about the publications of the Umweltbundesamt please go to:
http://www.umweltbundesamt.at/

Imprint

Owner and Editor: Umweltbundesamt GmbH
Spittelauer Lände 5, 1090 Vienna/Austria

This publication is only available on http://www.umweltbundesamt.at/.

ISBN 3-85457-988-8

CONTENT

1 INTRODUCTION

The company Teollisuuden Voima Oy (TVO) plans to construct a new nuclear power plant (NPP) at Olkiluoto Island in the municipality of Eurajoki. Olkiluoto is the location of two operating NPP units and a new one under construction: Olkiluoto 3 (EPR). Electric capacity of the fourth NPP unit shall be 1,000 to 1,800 MWe.

According to the Finnish law the construction of a new nuclear power plant is subject to a Decision-in-Principle issued by the Government and ratified by the Parliament. For this Decision-in-Principle an Environmental Impact Assessment (EIA) is necessary.

With reference to the ESPOO Convention the Austrian Federal Ministry of Agriculture and Forestry, Environment and Water Management has expressed its interest to take part in the transboundary EIA. The Austrian Institute of Ecology was assigned by the Austrian Ministry of Agriculture and Forestry, Environment and Water Management to elaborate an Expert Statement on the EIA Program for Olkiluoto 4 (OL 4) In the second stage of the EIA process the Austrian Institute of Ecology in cooperation with Dr. Helmut Hirsch was engaged by the Austrian Federal Environmental Agency to assess the Environmental Impact Assessment Report of TVO.

The findings of this evaluation are presented in an Expert Statement (WENISCH et al. 2008), which is published at the website of the Umweltbundesamt[1].

This Expert Statement includes a list of questions resulting from the evaluation of the EIA Report. Bilateral consultations were held in Helsinki on May 26th, 2008. During this consultation the questions of the Austrian side were discussed with the relevant Finnish authorities and the applicant TVO.

For the Austrian side the Federal Ministry of Agriculture, Forestry, Environment and Water Management, the Federal Environment Agency, a representative of the provinces and the Austrian Institute of Ecology took part in the consultation.

For the Finnish side representatives of the Ministry of Environment (ME), the Ministry of Employment and the Economy (MEE), the Radiation and Nuclear Safety Authority STUK as well as TVO attended the meeting.

The consultation included three presentations by MEE, STUK and TVO. The Finnish delegation has submitted these presentations in electronic form to the Austrian delegation. They are summarized in chapter 3.

The discussion followed the structure proposed in the Austrian Expert Statement. This report follows the same thematic structure and presents in chapters 4-7 the results of the discussions as follows:

- Summary of treatment of the respective issue in the EIA Report
- Comments of the Austrian Expert Statement
- Questions posed in the Austrian Expert Statement
- Answers of the Finnish side and the results of the discussion
- Evaluation of the results by the Austrian consultants.

The Finnish side has written a protocol, which has been brought into agreement with this report.

Assessment and recommendations are summarized in chapter 2.

[1] http://www.umweltbundesamt.at

2 ASSESSMENT AND RECOMMENDATIONS

By the presentations of Finnish delegation members, the replies of the Finnish side to the Austrian questions and the discussion during the consultation several open questions could be clarified.

An important issue concerned the EIA procedure, the Decision-in-Principle and the following licensing process:

The procedure for a new NPP in Finland includes the following steps:

- EIA procedure
- Decision-in-Principle
- Choosing of the plant supplier and the plant site
- Construction license; building, environmental and other permits
- Construction of the plant
- Operating license
- Start of operation

In the EIA the new NPP is regarded as a black box with standard impacts which has to fulfil the regulatory requirement. This requirement is satisfied if the possibility of a Cs-137 release of more than 100 TBq caused by a severe accident is extremely small (< 5E-7/a). In order to assess the fulfilment of this requirement the applicant has to provide STUK with sufficient information according to the YVL-Guides[2], a feasibility study is not explicitly required.

Four or five reactor designs are under closer consideration. In this stage of the procedure STUK has to assess whether there are safety issues foreseen, which would prevent the plant meeting the Finnish requirements. STUK could probably recommend the exclusion of a certain design if it suspects that the requirements probably will not be fulfilled.

In the process of issuing a construction license STUK will review the plant design applied for in the construction license and can point out possible improvements.

Feasibility studies will be included in the preliminary safety evaluation prepared by STUK for the Decision-in-Principle procedure and will be made public afterwards.

Nonetheless it is recommended to make more safety relevant information on the different reactors considered available to the interested people and NGOs in order to allow a public debate before decision making in Parliament.

For the reduction of the residual risk associated to the OL 4 project, the following measures are recommended:

1. For the different reactor types the core damage frequency (and, as far as results are available, the large release frequency) of the different types should be reported and discussed in the further course of the procedures, as a relevant input for decisions. In spite of the fact that concrete, specific modifications can be implemented at the reactor constructed at Olkiluoto reducing CDF (core damage frequency) and LRF (large release frequency), the generic values of those frequencies are relevant, since they provide the starting point for improvements, and since the potential of improvements is limited by the basic features of a reactor type.

[2] YVL-Guides = Finnish Regulatory Guides on Nuclear Safety

2. The exemplary source term considered in the EIA Report (corresponding to a mitigated accident with limited releases, according to Finnish regulations) clearly is non-conservative regarding the ratio of Cs-137 and I-131. In the further course of the procedures, it should be made more realistic by selecting a more appropriate, higher value for the amount of I-131 released.
3. In the further course of the procedures, a consequence calculation for a source term corresponding to a severe, unmitigated accident should be performed. The source term should be selected in accordance with the results of analyses performed for such accidents for comparable reactor types, since according to present knowledge such an accident cannot be excluded for any of the reactor types listed.
4. Method and input data for the dose assessment based on the exemplary source term should, in the further course of the procedures, be documented in more detail than they are documented in the EIA Report, particularly regarding the dispersion model and the weather data. It should be ascertained that the dose assessment is based on a well documented, suitable program yielding meaningful results for distances up to 1,000 km, and going beyond mere extrapolation for large distances. For example, FLEXPART could be such a program.

3 PRESENTATIONS OF THE FINNISH SIDE

Presentations were given by the Ministry of Employment and the Economy, STUK and TVO. In this chapter the presentations including addenda and discussions are summarized.

3.1 Presentation Ministry of Employment and the Economy

The Ministry of Employment and the Economy (MEE)[3] presented the Finnish Energy Policy and Practice with data about primary energy sources and electricity supply. In 2006 24.4% of electricity was produced with nuclear power.

In autumn 2008 the new climate- and energy strategy will be decided upon by the Finnish parliament. So far, there has been no specific nuclear power program in Finland, nuclear power was included in energy and climate programs.

The procedure for a new NPP in Finland includes the following steps:

- EIA procedure;
- Decision-in-Principle (taking into account the “overall good of society”; the Decision-in-Principle is taken by the government and confirmed by parliament);
- choosing of the plant supplier and the plant site;
- construction license; environmental and other permits;
- construction of the plant;
- operating license;
- start of operation.

Decision-in-Principle, construction license and operating license have to be in accordance with the Nuclear Energy Act.

The Ministry of Employment and the Economy also presented the decision-making processes for spent fuel and radioactive waste. In Finland, import and export of nuclear waste and therefore reprocessing are banned since 1994.

Spent fuel is handled by Posiva, which is owned to 60% by TVO and to 40% by Fortum. A Decision-in-Principle for a final repository was issued in 2001. After a long lasting process Olkiluoto was selected as the site for this repository. The construction license is expected to be issued in 2012, start-up will be 2020.

The permitted capacity only includes waste from current reactors. For spent fuel of OL 3 a Decision-in-Principle was issued in 2002. For OL 4 and LO 3 another extension of the repository is required. On April 25th, 2008 Posiva applied for a Decision-in-Principle for OL 4. An application for LO 3 will follow after the EIA procedure. For the planned new NPP of Fennovoima the spent fuel program is open.

Money for waste management is collected in a State fund. Management of waste of five units will cost about 5 billion Euro, spent fuel 3 billion Euros.

[3] Before Dec 2007: Ministry of Trade and Industry MTI

Concerning OL 3, The Ministry of Employment and the Economy stated that it is not a government project but a project of TVO. The EIA was conducted in 1998, the Decision-in-Principle was issued 2002 together with the Decision-in-Principle for spent fuel, the construction license was issued in 2005, and the application for the operating license will be submitted in 2009, commissioning is scheduled for 2011.

For the sixth Finnish reactor three companies started with the EIA procedures (TVO: OL 4; Fortum: LO 3; Fennovoima). The Decision-in-Principle by the government can be made in 2010 at the earliest. The industry has free hands for site and supplier choices.

Concerning the decision for a specific reactor type, the Ministry of Employment and the Economy explained that an “overall description of facility” has to be provided before the application for the Decision-in-Principle, but before the Decision-in-Principle is actually taken. This corresponds to a listing of types as included in the EIA Report. The upper limit for thermal power has to be specified. The government might accept different options even after the Decision-in-Principle. The application for the construction license has to be specific about the chosen reactor.

3.2 Presentation STUK

The Radiation and Nuclear Safety Authority STUK presented its responsibilities and competences in the siting and licensing process. Statements from STUK are requested in several steps of the process: in the Land Use Plan, in the EIA, and in the feasibility study phase of the licensing in accordance to the Nuclear Energy Act Section 55. This Act gives STUK the mandate to discuss key safety issues before the formal license application.

The feasibility studies for the new NPPs are already ongoing or will start soon. STUK started discussions with TVO about OL 4 in June 2007. TVO has to provide STUK with sufficient information according to the YVL-Guides, a feasibility study is not explicitly required. Four or five reactor designs are under closer consideration, of these two designs with about 1,000 MWe (two units to be built), and two designs with about 1,600 MWe (one unit to be built).

Topics under discussion are different for each step of the licensing process. For the Decision-in-Principle the following topics will be reviewed by STUK:

- basic design requirements: postulated internal and external hazards and security threats;
- technical standards for design and manufacturing of structures and components and for quality management;
- main safety systems and plant layout;
- principles for physical separation of redundant parts of safety systems;
- level of diversity and redundancy;
- means to ensure containment integrity after core meltdown.

For further steps of the licensing process (construction permit and reviews during construction) the reviewed topics will go more in depth. For the construction permit the plant type must be selected, and a probabilistic risk analysis (PRA) must be conducted. During construction detailed design reviews and safety analyses will be performed.

The limit for a severe accident is regulated as release which causes neither acute harmful health effects nor any long-term restrictions on the use of extensive areas of land and water. This requirement is satisfied if the possibility of a Cs-137 release of more than 100 TBq is extremely small. According to Guide YVL 2.8 the expectation value of the probability of core damage is less than 1E-5/y. The expectation value of the probability of a release exceeding the release limit of a severe accident must be smaller than 5E-7/a.

In the EIA the new NPP is regarded as a black box with standard impacts which has to fulfil the regulatory requirements. These standard impacts include only radiological impacts, not f. e. impacts of cooling water etc.

STUK´s input for the Decision-in-Principle is that no safety issues are foreseen which would prevent the plant meeting Finnish requirements.

STUK is not taking part in the selection process of the reactor type. As long as legal limits are kept, no type can be excluded. The plant design applied for in the construction license will then be reviewed, possible improvements pointed out etc. According to Ministry of Employment and the Economy, STUK is in a very strong position, it could probably recommend the exclusion of a certain design if it suspects that the requirements probably will not be fulfilled.

3.3 Presentation TVO

The EIA procedure and the contents of the EIA were presented.

The EIA has to take into account the combined impact of all four units at the Olkiluoto site.

TVO sees the thermal impact as the most significant. Even this impact, however, is small-scale. Noise levels will remain below the guideline values.

The EIA process ends in summer 2008 with a statement from the MEE.

4 PROCEDURE

4.1 Treatment of issue in the EIA Report

According to the Finnish law the construction of a new nuclear power plant is subject to a Decision-in-Principle issued by the Government and ratified by the Parliament. The EIA process has to be completed before the Decision-in-Principle concerning a new nuclear power plant can be issued.

In the EIA Report TVO examines the construction of a NPP unit with an approximate net electrical output of 1,000 to 1,800 MW and thermal power of 2,800 to 4,600 MW at Olkiluoto. A service life of 60 years is envisaged. The reactor type could be a BWR or a PWR. Only a "non binding" (TVO 2008, 37) list of nine reactor types is presented. All these reactors are generally considered to belong to Generation III. There is no review of these reactors and no information about technical and safety features in the EIA Report.

4.2 Comments on the issue in the Austrian Expert Statement

The EIA Report presents only general information about the project. The NPP is presented as a black box, which has to meet the Finnish regulations and requirements. Without any description of the NPP's features it is not possible to assess the feasibility of realization of this target. More information about the reactor is important because the nuclear inventory is different for a reactor with an output of 1,000 or 1,800 MW. The inventory is of importance for the assessment of potential transboundary impacts also on Austria. It is not possible to properly assess transboundary impacts with precise information on power output and reactor type missing.

Furthermore, the EIA Report does not follow the recommendation of MEE's scoping statement: "In the Ministry's view, the EIA Report should include a review of current nuclear power plants on the market which are suitable for the project under review. Similarly, the safety planning criteria for the prospective plant must be presented with respect to the limitation of emissions of radioactive substances and environmental impacts, alongside an assessment of the feasibility of meeting the safety requirements in force." (MTI 2007)

The missing information per se seems to be available. TVO has submitted the application for the Decision-in-Principle to the Council of the State before the EIA was completed. Feasibility studies on five nuclear power plants were issued to the Radiation and Nuclear Safety Authority (STUK). According to a press release by TVO of April 25th 2008, these studies describe the essential technical and safety properties of these alternatives.

In contrast to the Finnish procedure a similar consultation process in the UK provides feasibility studies of Generation III reactors at a public website[4]. The British authorities have made comprehensive documents about the reactor types in discussion available to the public.

[4] http://www.hse.gov.uk/newreactors/reactordesigns.htm, seen 05-08-2008

The project under discussion seems not to be elaborated well enough to fulfil the requirements of the EC EIA Directive (EC 97/11) and the ESPOO Convention (ESPOO CONVENTION 1997), because the EIA Report does not present a certain project and alternatives.

4.3 Questions formulated in the Austrian Expert Statement

1. When will TVO reach a decision regarding the reactor type?
2. Has the European Commission acknowledged that the implementation of an EIA procedure previous to the decision about the reactor type is in accordance with the EC EIA Directive?
3. Are the feasibility studies for five reactor types submitted by TVO to the Radiation and Nuclear Safety Authority available for the interested public?
4. What is the formal framework, in which foreign states participating in the cross border EIA on OL 4 will have access to these documents?
5. Why is the information about the reactor types in discussion not made public, especially as in a similar UK procedure the availability of comprehensive information is obviously possible?

4.4 Answers and results of discussion

According to Finnish legislation there will be no decision regarding the reactor type before the Decision-in-Principle. The Decision-in-Principle will not be issued before 2010, and it will leave considerable room for application.

The Finnish EIA procedure (the EIA is conducted first, before the project moves into a detailed phase) is well known to the EC and accepted by the Commission. According to the EC-Directive the EIA might fit in better at later stage, but EC-Directive and Finnish system are compatible.

It is up to the government to decide about the need for a nuclear facility project with respect to the country's energy supply according to Nuclear Energy Act Section 14. For the Decision-in-Principle, a study of options will be commissioned by MEE. It will be made public together with the Decision-in-Principle. The applicants can also perform such a study if they wish – MEE would like the applicants to perform a study, but cannot force them.

In principle, all documents are public in Finland. Limits exist if security or information on private business are concerned. Feasibility studies contain professional secrets and business-related information. They will therefore not be made public, at least not until STUK has made its statement for the Decision-in-Principle.

It was confirmed that five reactor types are under closer consideration. The application for the Decision-in-Principle contains brief descriptions. So far, it is only available in Finnish, soon it will be translated into English. The types under consideration are: EPR, MHI APWR, Korean APR-1400, Thoshiba/WH BWR and GE ESBWR.

The basic requirements for the reactor designs are containment integrity in case of severe accidents, resistance to aircraft crash etc. All in all, the Finnish requirements are described as stricter than requirements in other countries.

The construction license is the most important step of the procedure. The feasibility study is needed for vendors to gain orientation regarding the Finnish system.

The feasibility study will not be published as such. But STUK performs a preliminary safety analysis after having received the feasibility study. This analysis will be made public. It contains important elements of the feasibility study and is to be expected in early 2009. There is no deadline, only the general rule of “good administration” with no unnecessary delays.

Concerning the UK procedure in which the availability of comprehensive information is obviously possible, TVO stated that for OL 4 the Finnish law applies, therefore it cannot be commented on the UK procedure. STUK cannot generally refuse to publish background material. This has to be decided on case-by-case basis.

Details, as published at the UK website, are not required for a Decision-in-Principle. Furthermore, the UK website contains more details than the feasibility study, but the feasibility study also contains proprietary information.

Concerning the legal situation for the release of information STUK would have to check if it would be possible to hold consultations with limited participation, which could be a solution for confidentiality.

4.5 Evaluation

Feasibility studies will be included in the preliminary safety evaluation prepared by STUK for the Decision-in-Principle procedure and will be made public afterwards.

Nonetheless it is recommended to make more safety relevant information on the different reactors considered available to the interested people and NGOs in order to allow a public debate before decision making in Parliament.

5 REACTOR TYPES

5.1 Treatment of issue in the EIA Report

The EIA Report does not provide sufficient information about the reactors considered for OL 4. Based on the information given in the EIA, an evaluation of safety, the maximal source term and its probability of occurrence is not possible.

5.2 Comments on the issue in the Austrian Expert Statement

Almost all commercial nuclear power reactors under operation today belong to Generation II. All the reactors listed in the EIA are generally considered to belong to Generation III. There is very little operational experience with these reactor types. Only one of those types (ABWR) has been in operation so far.

The majority of the reactor types listed relies on ex-vessel cooling (i.e. installation of a core catcher) for control and mitigation of severe accidents. However, fundamental problems remain regarding the reliable functioning of a core catcher. The concept of in-vessel cooling is basically more promising, but difficult to implement in large reactors.

Information on the reactor types mentioned in the EIA Report was researched by the authors of the Expert Statement and was taken mostly from publications of plant designers and other nuclear industry sources, and from IAEA.

5.3 Questions formulated in the Austrian Expert Statement

1. The reactor types listed in the EIA Report as being in “non binding” consideration for OL 4, are in different stages of development; most of them are still at the design stage, only one of them (ABWR) has operational experience. Especially the accuracy and reliability with which the hazards can be assessed will also vary considerably and should therefore be described in detail. How will the Finnish authorities address this circumstance during the EIA process and follow-up decisions?
2. The "core catcher" (ex-vessel cooling) as foreseen in most of the reactor types is still under development; basic problems regarding its functioning have been reported. Is it assumed that all those problems will be resolved in the short term and will be reflected within the EIA process?
3. Core damage frequencies (CDF) and early release frequencies (ERF) vary considerably (by two orders of magnitude) for the reactor types listed. How will this be evaluated within the EIA process or at a later stage of the licensing?
4. Is a lower CDF/lower ERF seen as a substantial advantage of a reactor type?
5. Which criteria has TVO defined for the selection of the reactor? Can they be described and reported to the public before a governmental decision is taken?

5.4 Answers and results of discussion

According to the Finnish side, the procedure will be going increasingly deeper into detail with every step. Differences which can clearly be foreseen between reactor types, however, should be addressed in the EIA-Report.

The Austrian side remarked that the variation among the five designs – regarding how close they are to the core damage frequency (CDF) and early release frequency (ERF) limits, f.e. very markedly differences between EPR and ESBWR – should be noted in the EIA. The Finnish side agreed that there are differences between the types regarding CDF. But the list of reactor types is seen as sufficiently, no more information is required because the types do not significantly affect the environmental impact (black box concept). After the Decision-in-Principle, there will be more details made public. No decision is to be taken during the EIA. For the individual plant which will be built, there will be improvements, and hence the CDF will be markedly different from the generic result for the type. It will be modified according to Finnish regulations.

The generic PSA results are important nevertheless, since they provide the starting point for any improvements which will be implemented at the site. If generic PSA results differ by a factor of ten and more this is very important according to the Austrian side. For the construction license, a full PSA will be required according to STUK. ME agrees that the basic characteristics of the projected reactor type and the additional measures implemented later have to be kept apart.

The discussion about the "core catcher" (ex-vessel cooling) is not regarded as a question for the EIA process. Finnish reg. YVL 2.2 concerns the requirements for safety analyses of the plant, and for proofs of safety, including long-term core cooling. An experimental result will be required for the core catcher. For the EPR, a large amount of information is already available, but there are still open questions. Ex-vessel cooling is not necessarily more complicated than in-vessel cooling. The provisions for ex-vessel cooling have no connection at all with normal operation. And the materials for the core catcher can be selected freely.

The criteria for the selection of the reactor are not yet developed.

Concerning the role of EUR (European Utilities Requirements) it was stated that Finnish requirements are very strict. For OL 3, for example, Finnish requirements were applied which are not mentioned in EUR. A summary to which extent Finnish requirements are stricter than EUR does not exist, but the suppliers know them well.

Concerning the (non-binding) request of MEE to TVO for a market survey of possible designs, MEE answered that “they didn't do it”. ME states that different levels of criticism of the EIA are possible, the legal situation is not 100% clear. In case of fundamental criticism a new EIA would be required before the Decision-in-Principle. Another possibility is that some issues are marked as needed to be addressed in the next stages of the process.

5.5 Evaluation

For the reduction of the residual risk associated to the OL 4 project, the following measures are recommended:

For the different reactor types, the core damage frequency (and, as far as results are available, the large release frequency) of the different types should be reported and discussed in the further course of the procedures, as a relevant input for decisions. In spite of the fact that concrete, specific modifications can be implemented at the reactor constructed at Olkiluoto, reducing CDF (core damage frequency) and LRF (large release frequency), the generic values of those frequencies are relevant, since they provide the starting point for improvements, and since the potential of improvements is limited by the basic features of a reactor type.

6 SAFETY AND ACCIDENTS

6.1 Treatment of issue in the EIA Report

PSA results for the reactor types can be found in the open literature. Core damage frequencies span two orders of magnitude.

In the EIA Report a dose assessment of the accidental release with the exemplary source term is presented for a region of 100 km. For a distance up to 1,000 km the dose is evaluated by extrapolation.

6.2 Comments on the issue in the Austrian Expert Statement

The source term, as assumed in the EIA Report for exemplary dose calculations, appears questionable regarding the relation between Cs-137 and I-131, and it does not take all nuclides into account, which are required for checking European Utilities Requirements (EUR) release criteria (Criteria for Limited Impact). Even so, not all EUR criteria are kept by the source term in the EIA Report.

A detailed technical assessment of the reactors would be required to answer the question whether it can be expected that the reactor types listed in the EIA Report conform to Finnish regulations.

STUK officials criticized in a comment that the EIA for OL 4 does not sufficiently cover the consequences of an accident and how people near the plant would be protected. Also a review of the consequences of less serious accidents and how they would be handled is described as missing. This requirement of STUK is a very important objection with its demand for a comprehensive assessment of accidents and emergency measures.

The dose assessment used in the EIA Report is not state of the art. For modelling the long-range transport, diffusion and deposition of radionuclides more sophisticated tools are required. There is no long-range transport of an accidental release presented in the EIA. For this kind of assessment a simple dispersion model cannot be used.

For an assessment of the potential impact of a severe accident at the OL 4 the information of the EIA Report is not sufficient (no worst case, only one source term which cannot be proven to be the maximum release).

6.3 Questions formulated in the Austrian Expert Statement

1. The exemplary source term in the EIA Report contains, in relation to the releases of Cs-137, a rather small amount of I-131. How can this be justified?
2. The exemplary source term in the EIA Report does not contain important nuclides like Sr-90, Ru-103 and others. How can it be justified that the calculations of consequences nevertheless yield meaningful results?

3. The exemplary source term does not fulfil all EUR Criteria for Limited Impact. To which extent are those criteria binding; which role do the EUR generally play in the licensing procedure?
4. What is the maximum release due to a worst case accident in the new NPP?
5. Method and input data for the dose assessment are not explained in the EIA Report. Please, provide a description of the dispersion model and the weather data used for the assessment.

6.4 Answers and results of discussion

The ratio of Cs-137 and I-131 in the source term is described as the same as the ratio for core inventory. The Austrian side argued that because Iodine is more volatile then Caesium, volatility has to be taken into account. The Finnish side answered that the source term should correspond to the limit (100 TBq Cs-137) without going very deeply into physics, and that assumptions are disputable.

Sr-90 and Ru-103 are not considered because their relevance compared to other nuclides is not seen as so high.

EUR Criteria are not legally binding in Finland. Not all EUR Criteria for Limited Impact are fulfilled by the exemplary source term. Finnish requirements have to be fulfilled in every case, they are more strictly than EUR.

The investigations regarding large releases for OL 4 will be performed in the framework of the construction licensing procedure for the reactor type chosen. No analyses/considerations for accidents with releases higher than 100 TBq Cs-137 (i.e. accidents with frequency below 5 x 10E-7/a) have been performed. However, accidents with large releases will be checked later. In particular, it will be investigated whether such accidents have an overall frequency below, but close to the limit. The limit 5 x 10E-7/a is cumulative for the sum of all accident sequences.

The PSA for OL 3 showed a large margin: The probability of sequences with releases beyond 100 TBq Cs-137 lies well below 5 x E-7/a.

The PSA will include internal/external hazards according to STUK´s own risk model.

The dispersion model is Gaussian for short-term, TRADOS for long-term. The latter is referred to in the EIA Report, however, the reference is missing in the Report. It will be provided by TVO. The weather data have been collected locally.

According to MEE the manner in which possible interactions between the plants existing and proposed will be addressed cannot be stated by now.

6.5 Evaluation

The exemplary source term considered in the EIA Report (corresponding to a mitigated accident with limited releases, according to Finnish regulations) clearly is non-conservative regarding the ratio of Cs-137 and I-131. In the further course of the procedures, it should be made more realistic by selecting a more appropriate, higher value for the amount of I-131 released.

In the further course of the procedures, a consequence calculation for a source term corresponding to a severe, unmitigated accident should be performed. The source term should be selected in accordance with the results of analyses performed for such accidents for comparable reactor types, since according to present knowledge such an accident cannot be excluded for any of the reactor types listed.

Method and input data for the dose assessment based on the exemplary source term should, in the further course of the procedures, be documented in more detail than they are documented in the EIA Report, particularly regarding the dispersion model and the weather data. It should be ascertained that the dose assessment is based on a well documented, suitable program yielding meaningful results for distances up to 1,000 km, and going beyond mere extrapolation for large distances. For example, FLEXPART could be such a program.

7 SPENT FUEL MANAGEMENT

7.1 Treatment of issue in the EIA Report

Construction of a final repository is intended at Olkiluoto. Meanwhile, the spent fuel is stored in the interim storage at the site. For long-term interim storage the pool is not an optimal technology. Critical aspects are the integrity of the fuel rods and their handling after several decades in the pool. A further extension of the interim fuel storage is envisaged in order to prepare place for the fuel from OL 3 and OL 4.

The EIA Report states, that the long-term safety of the final repository has been proven by using a model for calculations.

7.2 Comments on the issue in the Austrian Expert Statement

Since it is planned to store the spent fuel in the interim storage over several decades, the disadvantage of the storage pool compared to a dry one should be considered. Furthermore, an assessment of the risk of accidents caused by external impacts to the pool storage should be given.

According to the state of science and technology final waste disposal for spent fuel can be realized in deep geological formations. But there are large uncertainties in the results of the safety analysis, i.e. resulting from the assessment of the influence of ice-ages with fault movements, land uplift, earthquakes and the creation of new weakness zones.

In particular, the long-term capability of the technical and geological barriers cannot be guaranteed because of the long storage period required. Experience and experiments cannot be carried out for such long periods.

7.3 Questions formulated in the Austrian Expert Statement

1. The interim storage of spent fuel in a pool over long periods seems not to be an optimal solution. An enlargement of the interim storage is envisaged. Considering the disadvantages of wet storage, would dry storage not be a safer option?

2. At present an underground laboratory is investigating the suitability of the bedrock at Olkiluoto as a location for the final spent fuel repository. What alternatives are considered, if the investigation reveals that the bedrock is not adequate to guarantee the safe long term storage of high level nuclear waste?

7.4 Answers and results of discussion

Dry interim storage has been assessed by TVO, a report has been published in 1999. TVO does not agree with the Austrian position that dry storage is better than wet storage. Wet storage requires active cooling (designed for single failure – 2 x 100%); but there are long intervention times if it fails. Both concepts (wet and dry) are allowable according to Finnish requirements.

There is a separate Decision-in-Principle decision necessary for spent fuel. Therefore, it is not mentioned in EIA OL 4.

During the site selection process, sites in bedrock were selected outside fracture zones. In the late 1990ies, four sites were chosen for preliminary and detailed site investigation. From those, the applicant suggested Olkiluoto. In 2000, construction of a deep geological repository started there, combined with more detailed investigations. STUK will receive the safety case in 2009; an international review group will be involved. The construction license is foreseen for 2012.

Investigations concern the best construction of the facility, the suitability of the site is regarded as clear. The repository concept relies on multiple barriers. The bedrock really is only a “cocoon for the repository”; a wide range of bedrock can meet the criteria since its properties are not all that crucial. Results at Olkiluoto so far are confirmative and it is expected that the bedrock will fulfil the criteria.

7.5 Evaluation

For spent fuel of OL 4 a separate Decision-in-Principle decision is necessary.

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9 GLOSSARY

ABWR ..... Advanced Boiling Water Reactor

APWR ..... Advanced Pressurized Water Reactor

BWR..... Boiling Water Reactor

CDF..... Core Damage Frequency

Cs-137 ..... Caesium isotope 137

EC ..... European Commission

EIA ..... Environmental Impact Assessment

EPR..... European Power Reactor

ERF..... Early Release Frequency

ESBWR..... Economic Simplified Boiling Water Reactor

EUR ..... European Utilities Requirements

I-131..... Iodine isotope 131

IAEA..... International Atomic Energy Agency

LO 3 ..... Loviisa Unit 3, EIA procedure ongoing

LRF ..... Large Release Frequency

ME..... Ministry of Environment

MEE ..... Ministry of Employment and the Economy, Finland

MWe..... Megawatt electric

NGO..... Non Governmental Organization

NPP..... Nuclear Power Plant

OL 3 ..... Olkiluoto Unit 3, under construction

OL 4 ..... Olkiluoto Unit 4, topic of this EIA procedure

PRA..... Probabilistic Risk Analysis

PSA..... Probabilistic Safety Assessment

Ru-103 ..... Ruthenium isotope 103

Sr-90 ..... Strontium isotope 90

STUK ..... Radiation and Nuclear Safety Authority, Finland

TBq ..... Tera-Becquerel

TVO ..... Teollisuuden Voima Oy

YVL ..... Regulatory Guides on Nuclear Safety

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Within the framework of the cross-border Environmental Impact Assessment (SEA) concerning the construction of a new nuclear power plant at Olkiluoto (Finland) a report was elaborated on behalf of the Umweltbundesamt. The report presents the results of a Bilateral Consultation held on May 26th 2008 in Helsinki.

It contains a description of the procedures and requirements foreseen before a Finnish Decision in Principle will be granted. Additional presentations and information provided by the Finnish Ministries and the Project Sponsor TVO were assessed.

The Consultation Report concludes with recommendations related to aspects of relevance for Austria such as: the incompleteness of specific plant parameters, missing information about accident scenarios and possible releases under severe accident conditions.

Documents for download:
http://www.umweltbundesamt.at/olkiluoto

ISBN 3-85457-988-8