

May 22, 2014

Radiation and Nuclear Safety Authority

Unofficial translation

Request for a statement by STUK, reg. no. 5/J42211/2014, May 8, 2014

APPLICATION BY FENNOVOIMA OY FOR SUPPLEMENTING THE DECISION-IN-PRINCIPLE BY THE GOVERNMENT DATED MAY 6, 2010; PRELIMINARY SAFETY ASSESSMENT OF THE RADIATION AND NUCLEAR SAFETY AUTHORITY

With reference to the request for a statement by the Radiation and Nuclear Safety Authority reg.no. 5/J42211/2014, May 8, 2014, the Advisory Commission on Nuclear Safety presents the following statement on the application by Fennovoima Oy for supplementing the Decision-in-Principle concerning Fennovoima Oy's nuclear power plant project that the Government issued on May 6, 2010:

The Ministry of Employment and the Economy has requested the Radiation and Nuclear Safety Authority to especially focus on the changes that have taken place in the project. Key changes in Fennovoima's nuclear power plant project include the new plant alternative and the changes in Fennovoima's ownership.

With regard to its preliminary safety assessment, the Radiation and Nuclear Safety Authority (STUK) has requested the Advisory Commission to pay specific attention on whether:

- the regulations, requirements and objectives used as the basis of STUK's draft safety assessment are adequate and up-to-date in terms of issuing a Decision-in-Principle;
- the safety issues, security arrangements, emergency arrangements and nuclear safeguards have been assessed to an adequate degree and drawing on the necessary expertise; and
- the results of the assessment are acceptable.

When preparing the statement, the Advisory Commission has familiarised itself with the draft versions of STUK's preliminary safety assessment on Fennovoima Oy's nuclear power plant project dated May 8, 2014 and their appendices as well as STUK's draft cover letters dated May 8, 2014 and May 21, 2014. In the course of the assessment process and the preparation of the statement, the Advisory Commission has also heard the experts of STUK and Fennovoima.

Fennovoima Oy's application for supplementing the Decision-in-Principle concerns the construction of a nuclear power plant comprising one plant unit supplied with the AES-2006 pressurized water reactor with a maximum thermal output of 3,220 MWth and an electrical output of 1,200 MWe as well as the other nuclear facilities necessary for its operation as detailed in the 2010 Decision-in-Principle. In 2011, Fennovoima selected the Hanhikivi headland in Pyhäjoki as the intended site for the plant.

The regulations, requirements and objectives used as the basis of STUK's draft preliminary safety assessment

STUK's preliminary safety assessment report addresses the adequacy and resources of the applicant, Fennovoima, and the proposed plant concept, the AES-2006, in respect to the requirements of Government Decrees 717/2013 and 716/2013, and the YVL Guides. STUK's safety assessment differs from the previous assessment compiled in 2009 in the sense that these requirements have recently been updated. The new, comprehensive requirements reflect the most modern international standards. Moreover, the requirements take in to consideration the latest international experiences on the impacts of external disturbances on the safety of nuclear power plants.

The Advisory Commission states that the requirements, regulations and objectives used by STUK for its preliminary safety assessment of the Decision-in-Principle documentation are correct and up-to-date.

Safety issues, security arrangements, emergency arrangements and nuclear safeguards

STUK has assessed the safety of the AES-2006 plant alternative based on Government Decree 717/2013. STUK concludes in its safety evaluation report that the plant design involves several technical details and larger technical issues that require redesign, additional analysis, and experimental verification. The Advisory Commission concurs with STUK's conclusions.

Section 14 of the Decree states the following: *"In ensuring safety functions, inherent safety features attainable by design shall be primarily utilised. In particular, the combined effect of a nuclear reactor's physical feedback characteristics shall be such that it mitigates the increase in reactor power"*

If inherent safety features cannot be utilised in ensuring a safety function, priority shall be given to systems and components which do not require a power supply or which, in consequence of a loss of power supply, will settle in a state preferable from the safety point of view."

The AES-2006 plant is a pressurized water reactor-type light water reactor, and the Advisory Commission considers that the physical characteristics of the plant design

can be arranged in a way that mitigates the increase in reactor power. The AES-2006 plant alternative also uses traditional passive safety systems for the implementation of primary safety functions. The Advisory Commission finds it positive that the plant design alternative also embodies new types of passive safety systems even though their acceptability still requires experimental demonstration.

The Advisory Commission also emphasizes the importance of having a programme in place for monitoring the radiation embrittlement of the new type of steel used in the pressure vessel and carrying out studies on radiation embrittlement already in the plant design phase.

As a prerequisite for the oversight of the preparation of the plant modifications documentation according to STUK's requirements concerning essential safety functions and for verifying their acceptability, Fennovoima shall have sufficient internal resources to manage the modifications and ensure their conformity, or Fennovoima shall be able to independently verify the compliance with the requirements in some other manner.

STUK has comprehensively and with expertise assessed the safety issues, security arrangements, emergency arrangements and nuclear safeguards of with regard to purposes of supplementing the Decision-in-Principle.

Acceptability of the assessment results

The Advisory Commission on Nuclear Safety concurs with the three statements that STUK presents in the conclusions of its preliminary safety assessment:

- 1. The AES-2006 plant alternative can meet the Finnish nuclear and radiation safety requirements following the implementation of design changes, additional analyses and qualification. In STUK's opinion, the necessary further engineering and modifications can be carried out in such a manner that the requirements set forth in Government Decree (717/2013) can be met at the construction licence phase.*
- 2. Of the alternatives presented in the Decision-in-Principle, Fennovoima has selected Hanhikivi, Pyhäjoki as the intended site. It is the considered opinion of STUK that there are no features at the Hanhikivi site that would prevent the construction of the AES-2006 nuclear power plant presented in the application for supplementing the Decision-in-Principle or the related other nuclear facilities or that would prevent the implementation of the security arrangements and emergency arrangements in compliance with the safety requirements.*
- 3. Fennovoima has not grown its organization and developed its management system in accordance with the material submitted with the application for the 2010 Decision-in-Principle (M 4/2010 vp, May 6, 2010). At the time of this assessment, Fennovoima is reinforcing the competence of its organization and developing its management system. It is the considered opinion of STUK that*

the company has devised a plan to reinforce its organization and develop its management system to satisfy the requirements by the construction licence phase.

The Advisory Commission wants to point out the fact that Fennovoima's sufficient in-house expertise and independence shall be verified in all phases of the project taking Rosatom's different roles as the plant supplier, owner and investor into consideration. Fennovoima's independent in-house expertise is already required before submitting the application for a construction licence especially because the plant concept still requires plant modifications and supplementation presented by the Radiation and Nuclear Safety Authority in its safety assessment. The licensee is responsible for verifying the conformance of the design alterations to the regulatory requirements as well as the steering of the entire design process.

The Advisory Commission on Nuclear Safety concludes that, in order to ensure the safety and quality of the project, the decision making related to the application for supplementing the Decision-in-Principle should carefully consider the schedule for the submission of the licensing documentation to the Radiation and Nuclear Safety Authority in regard to the construction licence application as well as the schedule for processing the construction licence application by the authorities.

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