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1 PREFACE

Teollisuuden Voima Oy (TVO) submitted on 25 April 2008 an application for a decision-in-principle to the Council of State concerning the construction of a new nuclear power plant unit in Olkiluoto. The Ministry of Employment and the Economy has asked the Radiation and Nuclear Safety Authority (STUK) to draw up the preliminary safety assessment referred to in Section 12 of the Nuclear Energy Act.

The subject of the application for a decision-in-principle is a new nuclear power plant unit (Olkiluoto 4) as well as the on-site nuclear facilities required for storage of fresh nuclear fuel, interim storage of spent nuclear fuel and handling, storage and final disposal of low and intermediate level operational wastes.

The following clarifications pertaining to the planned site, referred to in Section 24 of the Nuclear Energy Decree, accompanied the application for a decision-in-principle:

Appendix 9. An outline of the ownership and occupation of the site planned for the nuclear facility
Appendix 10. A description of settlement and other activities and land use planning arrangements at the planned nuclear facility site and in its immediate vicinity
Appendix 11. An evaluation of the suitability of the planned location for its purpose and the restrictions caused by the nuclear facility on land use in the immediate vicinity
Appendix 12. An assessment report drawn up according to the Act on the environmental impact assessment procedure as well as a description on the design criteria that will be observed by the licence-applicant to avoid environmental damage and to restrict the burden on the environment

TVO also submitted on 23 April 2008 to STUK for the review of the application for a decision-in-principle the clarification "Technical requirements regarding the site of OL4". TVO supplemented this document on the basis of STUK's request for further clarification and submitted it on 30 October 2008 as report "Requirements regarding the site of OL4".

The planned site of the new nuclear power plant unit is on the island of Olkiluoto in the municipality of Eurajoki. Distance to the town of Rauma is about 13 km and to the town of Pori about 33 km. In Olkiluoto, there are two operating nuclear power plant units Olkiluoto 1 and 2, and Olkiluoto 3 unit is currently under construction. In addition, there are several buildings and facilities in the area related to the production of nuclear power, such as an interim storage for spent nuclear fuel (KPA storage), interim stores for operating waste, a final disposal repository for operating waste (VLJ...
repository), Posiva's ONKALO construction site (a research tunnel for the final disposal facility of spent nuclear fuel), accommodation villages, a visitors' centre as well as a gas turbine plant owned jointly by Fingrid Oyj and Teollisuuden Voima Oyj.

TVO concludes in the application for a decision principle and in a separate memorandum pertaining to the plant site that the existing and well functioning infrastructure in Olkiluoto is significant also in terms of the new nuclear power plant unit.

This Appendix to the Preliminary Safety Assessment provides an assessment of the suitability of the planned plant site and the surrounding areas for the intended purpose. The assessment encompasses the effects of the prevailing site conditions on nuclear safety, emergency response arrangements, physical protection as well as nuclear waste management. The suitability of the plant site is assessed against the requirements for nuclear safety set forth in norms and regulations. The experience gained from the control of the existing units and the unit under construction as well as the aspects brought up in the environmental impact assessment (EIA) procedure are also taken into account.

2 NORMS AND REGULATIONS REGARDING PLANT SITE AND SAFETY FEATURES OF THE SITE

Norms and regulations set forth requirements for the site and surrounding areas of nuclear power plants and other nuclear facilities as well as requirements for the investigation of the characteristic features and conditions of the site and their consideration in plant design.

Requirements regarding the site of nuclear power plants are presented in the Nuclear Energy Act (990/1987), Government Decree on the safety of nuclear power plants (733/2008), Government Decree on physical protection of nuclear power plants (734/2008), Government Decree on emergency preparedness at nuclear power plants (735/2008) and Government Decree on the safety of the disposal of nuclear waste (736/2008) as well as in YVL Guides issued by STUK. Finnish norms and regulations take account of international treaties and regulations.

In addition to the requirements set forth in norms and regulations, the licensee defines its own requirements for the plant site and the surrounding areas in order to ensure the safe and economical construction, operation and, ultimately, decommissioning of the plant unit.

2.1 Nuclear Energy Act

The following Sections of the Nuclear Energy Act refer to the plant site:

Section 14, subsection 2. Consideration of the decision-in-principle by the Government
Should the Government find that the prerequisites laid down in subsection 1 have been met, it shall, in reaching its decision-in-principle, consider the issue from the
perspective of the overall good of society, and take into account the benefits and drawbacks arising from the nuclear facility, paying particular attention to:

1. the need for the nuclear facility project with respect to the country’s energy supply;

2. the suitability of the intended site of the nuclear facility and its effects on the environment; and

3. arrangements for the nuclear fuel and waste management.

Section 19. Construction of other nuclear facilities
A licence to construct a nuclear facility other than that referred to in section 18 can be granted:

...  
2) if the location of the nuclear facility is appropriate with respect to the safety of the planned operations and environmental protection has been taken into account appropriately when planning operations;

...  
4) if a site has been reserved for constructing a nuclear facility in a town plan or building plan in accordance with the Land Use and Building Act (132/1999), and the applicant has possession of the site required for the operation of the facility;

Pursuant to Section 18 of the Nuclear Energy Act, the requirements set forth in Section 19 also apply to a nuclear facility having considerable general significance. Although Section 19 discusses the prerequisites for the granting of a construction licence, the appropriateness of the site in terms of safety needs to be assessed as part of the review of the application for a decision-in-principle. An assessment of the adequacy of prerequisites for the implementation of planning arrangements is also necessary in the review of the application for a decision-in-principle. The actual land use planning process can be implemented after the decision-in-principle procedure before the eventual submittal of an application for a construction licence.

Section 58. Construction and planning of land use
What is provided elsewhere in law shall apply to the planning of land use of an area intended for the site of a nuclear facility. Before a town plan or building plan is drawn up for the area intended for the site of a nuclear facility, and prior to the approval of such a plan where a site is reserved for the construction of a nuclear facility, a statement must be obtained from the Radiation and Nuclear Safety Authority (STUK). What is provided elsewhere in law shall apply to the construction of a nuclear facility. Regardless of the aforesaid, however, the Radiation and Nuclear Safety Authority has the right within the scope of the control duties referred to in Section 55, subsection 1, after hearing other authorities, if necessary, to issue more detailed regulations regarding construction in order to fulfil special requirements set forth in the general principles referred to in Sections 6 and 7 or in international treaties binding on Finland, concerning the prevention of the proliferation of nuclear weapons.

2.2 Government Decrees

Government Decree on the safety of nuclear power plants (733/2008) sets forth the following general requirements regarding the plant site:
Section 11. Nuclear power plant site
The effects of local conditions on safety as well as on emergency response
arrangements and physical protection shall be taken into account in the selection of
the nuclear power plant site. The adverse effects and hazards caused by the plant to
the environment shall be very small on the selected site and it must be possible to
implement the removal of heat from the plant into the environment reliably.

In addition, Government Decrees on the safety of nuclear power plants, emergency
response arrangements, physical protection and final disposal of nuclear waste set
forth several other requirements referred to in this assessment, the fulfilment of which
is influenced by the special features of the site and the surrounding areas.

Requirements regarding emergency response arrangements are also presented in the
Rescue Act (468/2003) and in the Decree of the Ministry of the Interior on plans to be
prepared for radiation emergencies and on communication of radiation emergencies
(520/2007).

2.3 YVL Guides issued by STUK

Requirements for nuclear power plant sites or references to site conditions are
presented in e.g. the following YVL Guides issued by STUK:

- YVL Guide 1.0 Safety criteria for design of nuclear power plants
- YVL Guide 1.10 Requirements for siting a nuclear power plant
- YVL Guide 2.6 Seismic events and nuclear power plants
- YVL Guide 2.8 Probabilistic safety analysis (PSA) in safety management of
  nuclear power plants
- YVL Guide 7.1 Limitation of public exposure in the environment of and limitation
  of radioactive releases from a nuclear power plant
- YVL Guide 7.2 Assessment of radiation doses to the population in the
  environment of a nuclear power plant
- YVL Guide 7.3 Calculation of the dispersion of radioactive releases from a
  nuclear power plant
- YVL Guide 7.4 Nuclear power plant emergency preparedness
- YVL Guide 7.5 Meteorological measurements of a nuclear power plant
- YVL Guide 7.8 Disposal of low and intermediate level waste from the operation
  of nuclear power plants.

Guide VAL 1.1 "Radiation protection measures in a radiation emergency", issued by
STUK and included in the Ministry of the Interior's Code of Regulations, also sets
forth requirements pertaining to the plant site.

2.4 International norms and regulations

Finland is a party to the Convention on Nuclear Safety (SopS 74/1996). The parties to
this Convention "recognise that this Convention entails a commitment to the
application of fundamental safety principles for nuclear installations rather than of
detailed safety standards and that there are internationally formulated safety guidelines
which are updated from time to time and so can provide guidance on contemporary
means of achieving a high level of safety". Finland is also a party to the Joint

In practice, participation in the conventions translates into committing to the general safety requirements issued by the International Atomic energy Agency (IAEA). IAEA's publication NSR-3 "Site Evaluation for Nuclear Installations Safety Requirements" (2003) sets forth general requirements for nuclear power plant sites. IAEA has also issued guidelines for the various fields of technology, which present detailed recommendations regarding the plant site. The requirements set forth in IAEA's guidelines have been taken into account in the Finnish national norms and regulations to the extent required by Finnish conditions.

The Western European Nuclear Regulators’ Association (WENRA) has published recommendations to be applied as requirements regarding nuclear safety. The requirements set forth in Finnish norms and regulations cover WENRA’s recommendations also in terms of the plant site.

3 PREREQUISITES FOR IMPLEMENTATION OF PHYSICAL PROTECTION AND EMERGENCY RESPONSE ARRANGEMENTS

3.1 Releases of radioactive materials in severe reactor accidents

Large amounts of radioactive materials are produced at a nuclear power plant. As the radiation resulting from the decay of these materials has adverse effects on people and organic nature, releases of radioactive materials into the environment must be reliably prevented by means of successive engineered barriers. In addition, nuclear power plants are equipped with safety systems and built according to strict safety requirements.

However, there must also be arrangements in place at the nuclear power plant for the possibility of radioactive releases from the plant into the environment in connection with severe accidents, although the probability of such an event is extremely low. The term "emergency response arrangements" refers to preparedness for accidents or events that can impair safety at the nuclear facility or on the facility site. Emergency response arrangements particularly pertain to situations, which involve releases or a risk of releases of radioactive materials into the environment.

The operation of the reactor at the nuclear power plant is based on the fission reactions of uranium nuclei, induced by neutrons. Energy is released and radioactive fission products are produced in fission reactions. In normal operating conditions, the radioactive materials are for the most part bound to the ceramic fuel pellets. A small portion of gaseous and volatile radioactive materials is released into the gas-tight cladding tube, which surrounds the fuel pellets, however. The most significant risk of a reactor accident is related to the fact that the disintegration of the radioactive fission products generates heat in the uranium fuel even after the reactor has been shut down. If the cooling of the fuel is lost in the accident, the fuel (the reactor core) may overheat and be damaged so that the fission products accumulated in it are released. The term "severe reactor accident" refers to an accident in which a considerable part of the reactor fuel is damaged. When the fuel is damaged, the wall of the reactor cooling
circuit and the reactor containment act as barriers against the dispersion of radioactive materials. Only if the integrity of all the barriers is lost, radioactive materials may gain access into the environment. However, even in severe accidents the most probable scenario is that practically all the radioactive materials will remain inside the containment.

The importance of the radioactive materials contained in the reactor to the emergency response arrangements is dependent on the amount of these materials as well as on their chemical and physical properties. These properties define the release of radioactive materials from the fuel, their dispersion inside the containment, in the atmosphere, in waterways and in the soil as well as their behaviour in organic nature. The half life of radioactive materials determines the rate at which their amount decreases due to radioactive disintegration.

Radioactive noble gases (xenon and krypton) are most easily released from the fuel. If the integrity of all barriers is lost, some radioactive noble gases will be released into the atmosphere. The noble gas emission will migrate in the air currents, causing external radiation dose within the region covered by the release cloud. The long-term radiation doses caused by noble gases are relatively low, as noble gases do not cause a fall-out and are not accumulated in the body.

Radioactive iodine also evaporates at a low temperature and is easily released from the fuel. A significant part of the iodine released from the fuel, however, is bound along the release route into containment structures and in water pools. Still, the possibility of a major release of iodine cannot be ruled out in all accident conditions. At the initial stages of an accident resulting in a release, radioactive iodine can be the most important source of radiation doses because iodine accumulates in the human thyroid gland through inhalation and food intake. From the radiation protection point of view, the most important iodine isotope is iodine-131. Because its half-life is relatively short, only 8 days, iodine is significant only for a period of few days or weeks.

Cesium is also evaporated at a relatively low temperature and it is easily released from the nuclear fuel. From the radiation protection point of view, the most important cesium isotope is cesium-137. Its half-life is relatively long, 30 years, and the cesium release is significant for the long-term effects of the accident. The severity of a nuclear accident is often depicted by giving the released amounts of iodine and cesium.

Even in the worst possible accident only a small part of the other solid radioactive materials would be released. The radiation dose caused by them would be clearly lower than the dose caused by iodine and cesium releases.

The propagation of the accident and the magnitude, time and duration of radioactive releases are affected by a number of factors, such as the operation of the safety systems and the actions of the operators. Due to the large number of possible event sequences, the starting time or the duration of a release cannot be exactly determined in advance.

Neither events that could involve alerting the preparedness and rescue service organisations nor accidents involving severe reactor core damage, would most
probably not develop into radiation accidents requiring civil defence actions in the areas near the plant. In most of the analysed accident scenarios, radioactive materials will practically be completely retained within the containment. The prevailing weather conditions at the time of the accident would also influence the behaviour of a potential release outside the power plant. The dispersion of the release would depend on the wind speed. If the wind speed is high, the release cloud travels fast, but the wind also disperses and dilutes the cloud effectively.

The plant-type-specific analyses and dose calculations of different transients and accidents are presented with the eventual construction license application. During the handling of the application for decision-in-principle, it is estimated whether the plant alternatives incorporate such basic solutions for safety technology that the safety requirements can be fulfilled during the detailed design phase. The evaluation of the technical solutions of plant alternatives is presented in the Appendix 1 of the Preliminary Safety Assessment.

As an example indicative of the effects of a severe accident, the Environmental Impact Assessment report for the Olkiluoto 4 plant unit describes an accident, which would result in a cesium-137 release equal to the 100 TBq limit value defined for severe accidents in Article 10 of the Government Decree on the safety of nuclear power plants (733/2008).

The analysis assumed that the reactor core melts and a release containing all the radioactive noble gases accumulated in the reactor, 100 TBq of cesium isotope 137, 1500 TBq of iodine isotope 131 (ca. 0.1% of the total amount) as well as corresponding shares of other cesium and iodine isotopes takes place from the containment at the height of the exhaust stack of the plant. The release was assumed to start 24 hours after the onset of the accident and continue for one hour. The weather conditions used in the calculation were chosen so that more unfavourable conditions are present only seldom (time fraction less than 5% of the year). No protection measures have been taken into account in the analysis.

The Table below presents the dose indicated by the calculation results for the first 24 hours after the onset of the accident as well as the dose accumulated over fifty years after the first 24 hours, at different distances from the power plant.

<table>
<thead>
<tr>
<th>Distance from power plant (km)</th>
<th>Radiation dose during the first 24 hours (mSv)</th>
<th>Dose accumulated over 50 years after the first 24 hours (mSv)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>200</td>
<td>300</td>
</tr>
<tr>
<td>3</td>
<td>70</td>
<td>200</td>
</tr>
<tr>
<td>10</td>
<td>20</td>
<td>70</td>
</tr>
<tr>
<td>100</td>
<td>2</td>
<td>4</td>
</tr>
</tbody>
</table>

The probability of accidents leading to a release larger than the one described above is very low in a light water reactor designed according to current safety regulations. Yet, even such accidents are taken into account in the planning of preparedness and emergency response measures.
Detectable adverse effects of radiation on health will occur, if the short-term dose exceeds 500 mSv. Even without any protection measures in the near environment of the nuclear power plant, the aforementioned release would not cause a single acute radiation disease in the population in the near environment of the plant. Protection measures can further decrease radiation exposure considerably. Protection measures are discussed later in Section 3.5.4.

STUK had in 2006 a study conducted at VTT focusing on the 100 TBq limit value of cesium-137 defined in the Government Decree. It can be concluded on the basis of the study, that a release of this size near ground level could during the growing season result in restrictions on grazing and on the use of agricultural products over a significant area of up to tens or even a hundred square kilometres. Outside the growing and grazing season the release would have no immediate effect on agricultural products, but could even then make it necessary to clean the soil near the plant or execute some other protection measures related to living during the first few years.

The licensee shall, in connection with the eventual application for a construction licence, present more detailed analyses on releases and the radiation doses that they cause, as stipulated in the regulations. For the processing of the construction licence application, STUK will have independent analyses made on the release source terms and doses.

3.2 Requirements for emergency response arrangements

The most important requirements pertaining to emergency response arrangements at nuclear power plants are presented in the Government Decree on emergency preparedness at nuclear power plants (735/2008) and in YVL Guide 7.4 issued by STUK. The regulations also contain requirements for cooperation with the rescue services regarding emergency response arrangements for and action in a severe nuclear power plant accident. The licensee is not actually required to present plans and clarifications concerning preparedness for emergencies until in the construction licence application, which shall be accompanied by the preliminary emergency plan referred to in Section 36, subsection 5, Item 5 of the Nuclear Energy Decree. The final emergency plan shall be presented in connection with the application for the operating licence and the licensee shall demonstrate the fulfilment of the other requirements presented in the norms and regulations for emergency response arrangements (emergency organisation, facilities, equipment, training, etc.). STUK inspects the emergency plan as part of the review process of the application for a construction or operating licence.

Pursuant to the Government Decree on emergency preparedness at nuclear power plants, the planning of the emergency response arrangements shall be based on analyses performed to study the propagation over time of severe reactor accidents possibly leading to releases of radioactive materials. Variations in the state of the plant, the development of events over time, the radiation situation at the plants, the releases, the release routes and the weather conditions must be taken into account. Emergencies, i.e. potential accidents and events, which threaten to impair plant safety considerably, are classified according to their severity and manageability.
The review of the application for a decision-in-principle encompasses an evaluation of how the requirements of norms and regulations pertaining to emergency response arrangements and rescue actions in the areas near the plant can be met on the planned plant site and in the surrounding areas, and how these arrangements have been implemented with respect to the existing plant units.

3.3 Requirements for protective zone and emergency planning zone

The Government Decree on emergency preparedness at nuclear power plants (735/2008) contains definitions of the site area, the protective zone and the emergency planning zone (Section 2).

More detailed requirements for the power plant site and for emergency response arrangements in areas near the plant are presented in YVL Guide 1.10 "Requirements for siting a nuclear power plant", issued by STUK. The general principle is that nuclear power plants shall be located in a sparsely populated area away from significant population centres. This means that the emergency response measures encompass a smaller population group, which makes them easier to implement. No activities, which might cause an external hazard to the plant, are allowed in the vicinity of nuclear power plants.

The significant population centres nearest to the Olkiluoto nuclear power plant include the municipal centre of Eurajoki and the town of Rauma: the municipal centre of Eurajoki is at a distance of about 16 km and the town centre of Rauma at a distance of about 13 km from the power plant site. The town of Rauma and the municipal centre of Eurajoki are clearly outside the protective zone of the Olkiluoto power plant and are not considered to be part of the plant's immediate surroundings. The aforementioned requirements stipulated in YVL Guide 1.10 are fulfilled on the site, which has been presented in the application for a decision-in-principle.

There are no industrial facilities, warehouses, transport routes, etc. in the vicinity of Olkiluoto, which could cause hazards to the plant. There is a port in the Olkiluoto power plant area, used for the needs of the power plant. The number of vessel calling at the port has been 1 – 2 per year. Upon completion of Olkiluoto 3, the number of vessel calls is estimated to remain unchanged. The Tankokari industrial port, which is called by 90-100 vessels every year, is located in the northern part of the Island of Olkiluoto, some 2.5 km from the planned new plant unit.

The closest port with high traffic numbers is the deep harbour of Rauma, at a distance of ca. 13 km. The railroad closest to the power plant also runs to the Port of Rauma. The nearest major industrial facilities include Rauma Pulp Mill, Rauma Paper Mill of UPM and STX Europe Shipyard (previously Aker Yards) (at distances of 12-14 km from the power plant). Raikka Oy produces charge rounds, detonators and pyrotechnical products at their explosives factory located in Eurajoki abt. 11 km from the power plant.

Highway 8 runs at a distance of ca. 14 km from the power plant. The closest airport is in Pori, at a distance of some 32 km, and the nearest air routes are at a distance of ca. 10 km from the power plant.

N.B. This is an unofficial translation.
Original:
Accidents possibly occurring at the industrial plants or transport routes referred to above will not cause any danger to the nuclear power plant in Olkiluoto.

The existing power plant area in Olkiluoto is defined in the valid street plan as a block of industrial and warehouse buildings. There are no permanent or holiday homes in the area. An accommodation village designed for the accommodation of workers is located in the power plant area, but most of the workers, ca. 75%, live in the new accommodation village, which is about 3 km away from the power plant. No traffic routes run through the area. The new plant unit primarily relies on the existing infrastructure, but the construction of a new power plant unit would require some rearrangements in the power plant area with respect to e.g. fencing, transport connections as well as intake and discharge of cooling water. The existing power plant area in Olkiluoto meets the requirement of YVL Guide 1.10. The power plant area can be expanded in the manner presented in the application.

The regional plan valid in Eurajoki is the Satakunta regional plan ratified by the Ministry of the Environment in 1999. The regional plan shows a buffer zone, which surrounds the Olkiluoto power plant at a distance of ca. 5-7 km. There are clearly less than 200 permanent residents within the buffer zone. The number of permanent residences on the Island of Olkiluoto is 3 and the number of holiday homes is ca. 30. The number of permanent residences within the entire buffer zone is 33 and the number of holiday homes ca. 550. About 40% of the holiday homes are located on the mainland in the villages of Ilavairen and Orjasaari, and the rest are on the nearby islands. The vicinity of Olkiluoto can be considered a sparsely populated area as referred to in YVL Guide 1.10.

Satakunta Rescue Service Region has a valid rescue plan covering the emergency planning zone in case of a potential radiation accident at the nuclear power plant of Teollisuuden Voima Oyj (rescue plan for the plant surroundings). The plan has been evaluated at regular intervals, with statements obtained from STUK and other authorities. The rescue plan defines the emergency planning zone referred to in Guide VAL 1.1 issued by STUK and published in the Code of Regulations of the Ministry of the Interior. The emergency planning zone follows municipal borders and covers the municipalities of Eurajoki, Rauma and Luvia. There are ca. 46 000 inhabitants within the emergency planning zone. The number of inhabitants within a 100 km radius of the power plant is ca. 500 000. The construction of a new plant unit in Olkiluoto would not result in any need to change the emergency planning zone.

3.4 Land use planning situation

In the street plan of Olkiluoto, the planned construction site of the new nuclear power plant unit is reserved for nuclear power plants. No amendments are needed in the valid land use plans of the area due to the construction of the new nuclear power plant unit.

Olkiluoto area is governed by Satakunta regional plan 5, which was approved in the Regional Council of Satakunta in 1996 and ratified by the Ministry of the Environment in 1999. The power plant area in Olkiluoto is indicated in the regional plan as an area for public utilities and services, and the plan also shows the protective zone, which surrounds the nuclear power plant area at a distance of ca. 5-7 km.
Regional plan 5 will be replaced by a provincial plan prepared by the Regional Council of Satakunta. As far as Olkiluoto is concerned, the national objectives for land use as well as the requirements derived from nuclear waste management are taken into account in the provincial plan. The draft version of the provincial plan indicates the area of Olkiluoto as an area reserved for energy supply. The draft also shows the near environment of the plant area reserved for energy supply as well as the protective zone, which extends to ca. 5-7 km from the power plant.

STUK has issued a statement on the draft version of the Satakunta provincial plan on 6 June 2008.

There is no valid master plan for the Olkiluoto area in the municipality of Eurajoki, but the area is covered by a master-plan-type building plan approved by the Municipal Council of Eurajoki. The master shore plan ratified in 1999, which covers the sea shores in Eurajoki, as well as the component shore plan for the northern shores of Rauma, are valid for the Olkiluoto area. The component shore plan was amended in 2005 to include an accommodation village in the north-east part of Olkiluoto, at a distance of ca. 3 km from the power plant, as well as other services, which support energy production. Since the submittal of the application for a decision-in-principle, the master plans of the area have been amended as follows: the Municipal Council of Eurajoki approved on 19 May 2008 the component master plan for Olkiluoto, and the Town Council of Rauma approved on 29 September 2008 an amendment to the component shore plan of the northern shores of Rauma. The amendments have not yet acquired final validity. The most important objective of the amendments has been to maintain opportunities for land use in the energy production area of Olkiluoto and to reserve areas for the final disposal of spent fuel. STUK has issued a statement on the draft of the master plan amendments and on the proposal.

The valid street plan covering Olkiluoto pertains to the existing power plant units and the plant units under construction or at planning stage. The plans have been ratified in 1974 and 1997. Also, the plans approved in 2005 for the block areas of accommodation buildings supporting energy production as well as the ratified shore plans for areas east of the island of Olkiluoto are valid for the area. The street plan amendment under preparation for Olkiluoto retains the current permitted building volume for the construction of nuclear power plants, while the plan is supplemented with regulations and permitted building volume for the deep geological repository of spent nuclear fuel. The Radiation and Nuclear Safety Authority has issued a statement on the participation and assessment plan for the town plan of the Olkiluoto final disposal site on 9 January 2009 and on the draft version of the town plan on 11 February 2009.

The new nuclear power plant unit will have to be connected to the Finnish national power transmission grid. Fingrid Oyj is responsible for the required strengthening of the national grid and for the adequacy of transient capacity. A new 400 kV transmission line to Rauma, along a new route, will be built to connect the new unit to the national grid. The transmission connections from Rauma to the rest of the national grid will also be reinforced. The new power lines are taken into account in local planning, first as advisory markings. Final decisions about the routing of the power lines will be made at the detailed design stage.

N.B. This is an unofficial translation.
Original:
In the opinion of STUK, the currently valid land use plans allow the licensing procedure for and the construction of a new nuclear power plant unit in Olkiluoto.

3.5 Cooperation between nuclear power plant and authorities

3.5.1 Emergency and rescue plans

Section 9 of the Rescue Act lays down the obligations to plan and prepare for major accidents in the nuclear power plant and in its vicinity. The Nuclear Energy Decree (161/1988) and the Government Decree on emergency preparedness at nuclear power plants (735/2008) set forth requirements for the emergency plan of the nuclear power plant. Detailed requirements for the rescue plan for the environment of the nuclear power plant are based on the Decree of the Ministry of the Interior on the plans of rescue services for radiation hazards and on the communication of a radiation hazard (520/2007). The licensee's preliminary emergency and rescue plans are to be enclosed to the construction licence application. The final, revised plans are enclosed to the operating licence application.

The rescue plans for the vicinity of the nuclear power plant shall be based on the radiation protection design bases defined by STUK. In an accident situation, the rescue and the civil defence actions are based on the estimated magnitude and composition of the release, on the prevailing weather conditions and spreading conditions as well as on the results of the radiation measurements carried out in the area.

At the initial stage of the accident, the following emergency response arrangements may be necessary in the direction in which the release is spreading within the emergency planning zone of the nuclear power plant, which extends to a distance of abt. 20 km from the plant

- rapid alerting of population
- isolation of the accident area and restriction of the traffic, and
- protection against direct exposure to external radiation from the release cloud and from the fall-out as well as against radiation exposure caused by inhalation of radioactive air. The primary method of protection is to seek shelter indoors and to take iodine tablets before the arrival of the release cloud. Their protective effect is particularly important to children and young people.

In an extreme situation, a rapid evacuation of the population in the protective zone might be necessary before the start of a release in a severe accident.

The protective zone extends to a distance of ca. 5 km from the power plant. An emergency plan approved by STUK on 22 December 2008 has been prepared for the Olkiluoto power plant (TVO's emergency plan) to ensure preparedness for emergencies at the existing plant units. This plan contains a general description of actions in an emergency, instructions for action and the composition of the emergency organisation. Appropriate facilities, equipment and materials are available at the plant for emergencies. According to the EIA report (Section 10.5) pertaining to Olkiluoto 4, the emergency response arrangements would be extended according to the current principles to cover also the new plant unit.
The rescue services of the area have arrangements in place for emergencies and the rescue plan for the vicinity of the power plant has been updated on 25 July 2007. The licensee has participated in the preparation and updating of the plan in compliance with Section 9, sub-section 2 of the Rescue Act. TVO has, in cooperation with the rescue service of the area, distributed, in beforehand, emergency instructions to the population within the emergency planning zone. In 2005, TVO also distributed iodine tables for people within the protective zone, for use in case of a severe accident.

3.5.2 Warning and alarm arrangements, sharing of situational picture and leadership relationships

By virtue of the Government Decree on emergency preparedness at nuclear power plants (735/2008) the power company is responsible for alerting the emergency organisation and for warning the other personnel at the power plant using the GSM alarm system of the emergency organisation, the public alarm siren and loudspeaker announcements. On the power plant site, the decision on the alerting of the emergency organisation and on issuing the alarm sound is made by TVO's on-site emergency manager.

TVO's current emergency plans take into account the alerting and evacuation of the personnel on the Olkiluoto 3 construction site as well as the cooperation with the contractors. The rescue plan of the Olkiluoto 3 construction site, for its part, contains instructions for action in case an accident occurs at the operating plant units. Similar arrangements can be implemented at the construction phase of the possible new plant unit.

The licensee must immediately inform STUK and the pertinent Emergency Response Centre about the activation of the preparedness plan and the category of the preparedness situation. STUK and the Emergency Response Centre will further alert other authorities and cooperation partners involved. The licensee must communicate the situational picture, recommendations, all major decisions and their rationales during the emergency situation to STUK and to the Head of Rescue Operation. The licensee must provide recommendations regarding protection measures to the Head of Rescue Operation until STUK assumes the responsibility for the issuance of such recommendations. TVO's emergency plan provides instructions regarding these duties.

The population in the environment of the power plant are warned by sounding the public alarm using fixed and/or portable alarm sirens. The Head of Rescue Operation gives the order for the sounding of the public alarm. When the public alarm is sounded, an emergency population warning issued by the authorities is at the same time broadcast on the radio stations audible in the region. The alerting of the population and the issuance of instructions for civil defence measures are described in Section 5 of the rescue plan for the vicinity of the power plant. The responsibility for the warning of the population rests with Satakunta Rescue Service Region and the rescue command group of the district of Rauma, assisted by the Rauma Police Station of Satakunta Police and the Archipelago Sea Coast Guard District. The licensee must in an emergency participate in the alerting of population under immediate danger, e.g. in the new accommodation village, which lies outside the plant site.

N.B. This is unofficial translation.
Original:
About 60% of the ca. 550 holiday homes within the protective zone of the power plant are located on islands. The archipelago conditions may impede the alerting of the holiday residents and the possible evacuation of the protective zone. Moreover, the coastline is rather broken in the emergency planning zone, particularly on the north side of the power plant, which makes it difficult to alert population in the sparsely populated areas. In the archipelago, and on the broken coastline, the boats of the Coast Guard can be used to alert population. The development of alarm and rescue arrangements is one aspect of authority cooperation and in the future, alarm arrangements can also be developed utilising the possibilities offered by modern communication technology.

Pursuant to the Government Decree on emergency preparedness at nuclear power plants (735/2008) the on-site Emergency Manager indicated in the emergency plan of the nuclear power plant initiates action in a preparedness situation and is in charge of the action on the power plant site until the Head of Rescue Operations assumes the leadership of the rescue operation. The management of matters pertaining to nuclear safety and radiation protection on the plant site is the responsibility of the licensee. TVO's emergency plan and the rescue plan for the vicinity of the power plant contain a description of and instructions for the command relationships and the division of duties.

3.5.3 Radiation measurements and meteorological measurements

Pursuant to the Government Decree on emergency preparedness at nuclear power plants (735/2008), the licensee must, as part of the analysis of the situation, assess the technical state of the plan and the release or the risk of the release of radioactive materials as well as the radiation conditions inside the plant buildings and on the plant site and in the emergency planning zone. In an emergency, the licensee must also be prepared to carry out radiation measurements on the plant site and in the protective zone, as well as meteorological measurements on the basis of which the spreading of radioactive releases in the emergency planning zone can be estimated. Radiation measurements are implemented on the plant site and in the protective zone by means of fixed radiation-monitoring stations and power plant measurement teams with portable equipment. There is a weather mast on the plant site for meteorological measurements. TVO's emergency plan contains instructions for the analysis of the situation and for measurement activities. Data communications for the purposes of the measurement teams used in emergencies can in the future be developed utilising the possibilities offered by modern communication technology.

The Rescue Manager at the Rauma Local Operations Centre gives the orders regarding the establishment of radiation measurement patrols for the emergency planning zone. Section 4 in the rescue plan for the vicinity of the power plant describes regional radiation monitoring and the division of duties in radiation monitoring between TVO, STUK, the Satakunta Rescue Service Region as well as the Defence Forces and the Coast Guard District. Appendix 2 to the plan contains practical operating instructions for the monitoring patrols of the Rescue Services.
3.5.4 Protection measures and plans for them

Guide VAL 1.1 issued by STUK and included in the Code of Regulations of the Ministry of the Interior presents the fundamentals of radiation emergencies, the levels of action for the initiation of key protection measures as well as the fundamentals of the radiation protection of employees involved in rescue operations. The on-site Emergency Manager at the power plant issues recommendations for the protection of the population to the Head of rescue operation until STUK assumes the responsibility for the issuance of such recommendations. The Rescue Service Authorities are responsible for the practical implementation of the protection measures.

Pursuant to the Guide, immediate evacuation within the protective zone of the nuclear power plant (at a distance of under 5 km from the plant) must be implemented in case there exists a risk of a significant release of radioactive materials into the environment. This action is based on the state of a general emergency declared by the preparedness organisation of the nuclear power plant. In the emergency planning zone (at a distance of 5-20 km from the plant) beyond the protective zone, actions to be considered include seeking shelter indoors, taking iodine tablets and evacuation.

Section 5 of the rescue plan for the vicinity of the power plant describes the alerting of the population and the issuance of instructions for protection, and Section 6 describes civil defence measures and their implementation. Civil defence measures include the isolation of the danger area, seeking shelter indoors, the use, storage and distribution of iodine tablets as well as the evacuation of the population. The rescue plan presents the arrangements for transport, accommodation, food supply and health care in the case of evacuation. Rescue operations of holiday residents in the archipelago as well as rescue operations in the sparsely populated areas on the coast, on the construction site (during plant construction phase) and in the accommodation village pose special challenges.

The threats on which rescue arrangements in the environment of Olkiluoto are based are determined according to the plant units already in operation. The starting point is that a major release of radioactive materials can be forecast four hours before it happens. The design of the Olkiluoto 3 nuclear power plant unit and the possible new plant unit considers from the very start the possibility of a severe reactor accident resulting in the melting of the reactor core, and systems are implemented, which will effectively limit the consequences of such an accident. A new plant would therefore not require any changes in the rescue plan for the environment of the power plant.

3.5.5 Training, exercises and other forms of cooperation

Preparedness training and exercises are organised every year at Olkiluoto nuclear power plant. The effectiveness of the rescue plan for the vicinity of the plant as well as the preparedness plans of the power plant and other authorities are tested under supervision of the State Provincial Office at intervals of no more than three years in a joint emergency exercise of the preparedness organisations of the authorities and the power plant in compliance with the Decree of the Ministry of the Interior (520/2007). The latest joint exercise was organised on 3 December 2008.

N.B. This is unofficial translation.
Original:
The State Provincial Office of Western Finland appointed on 25th April 2006 a joint task force for the external safety of Olkiluoto. The task force consists of representatives of TVO, the Radiation and Nuclear Safety Authority, the Finnish Meteorological Institute, the Department of Rescue Services and Police of the State Provincial Office of Western Finland, the Rauma Division of Satakunta Rescue Service Region, Satakunta Emergency Response Centre and the Emergency Services College. The group is responsible for the preparation of the emergency exercises conducted at regular intervals under supervision of the State Provincial Office, for monitoring how the various organisations satisfy the development needs revealed by the exercises and for planning and organising joint training events.

3.5.6 Prerequisites for implementation of emergency response arrangements for Olkiluoto 4 nuclear power plant unit

In its application for a decision-in-principle, TVO presents that the existing preparedness plans for Olkiluoto can be expanded to cover the new nuclear power plant unit as well as other nuclear facilities pertaining to its activities and mentioned in the application for a decision-in principle. The preliminary preparedness plan of the new nuclear power plant unit will be submitted to STUK for the handling of the construction licence application and the final plan in connection with the operating licence application.

It is the conception of STUK that TVO meets the prerequisites to implement, as prescribed in norms and regulations, the preparedness measures which belong to the responsibility of the licensee of such new nuclear power plant unit and such other nuclear facilities pertaining to its activities, as are meant in the application for decision-in-principle.

The alarm and rescue arrangements for the vicinity of the plant are, as required by Rescue Act, presented in the rescue plan prepared and ratified by the Satakunta Rescue Service Region. The State Provincial Office oversees the adequacy of the rescue plan and the training provided. It is the conception of STUK that the alarm and rescue arrangements of the near-by population, required as a result of the new nuclear power plant unit and the extensions of the nuclear waste facilities, can be implemented as prescribed in norms and regulations. TVO must maintain effective emergency response arrangements for the power plant area and the associated accommodation village. In summer time, the alerting of holiday residents is a challenging task for the local rescue services. Additional fixed alarm sirens as well as regional emergency civil defence warnings based on GSM technology or broadcast on TV would improve the effectiveness of alerting the population.

3.6 Physical protection

3.6.1 Regulations pertaining to physical protection

The Government Decree on the physical protection of nuclear power plants (734/2008) sets forth the following requirements for the consideration of physical protection in the general design of the nuclear power plant:

N.B. This is unofficial translation.
Original:
Section 4. General design of nuclear power plants

"Structures, systems and components critical to the safety of the nuclear power plant as well as the disposal sites of nuclear substances and nuclear waste must be designed so as to allow effective implementation of physical protection, taking into account the requirements for nuclear and radiation safety.

Physical protection shall be based on the use of several nested security zones so as to ensure special protection for systems and components critical to safety as well as to nuclear substances and nuclear waste, and so as to enable access control as well as control of goods traffic.

The interfaces between the security zones must constitute effective engineered barriers against unlawful actions."

In addition, YVL Guide 1.10 issued by STUK and titled "Requirements for siting a nuclear power plant" sets forth the following detailed requirements for the plant site, which affect the successful implementation of physical protection:

"A nuclear power plant site [the power plant site referred to in Government Decree 375/2008] extends to about a kilometre's distance from the facility. ... The licensee responsible for the operation of the nuclear power plant shall have authority of decision over all activities in the area and shall be able to remove unauthorised individuals from the site, if necessary, or prevent such individuals from entering it. The plant site may contain other non-facility related activities provided that they do not pose a threat to plant safety. A traffic lane may traverse the site if the volume of traffic is small and if traffic can be directed elsewhere, if necessary. Visits onsite are allowed provided that the licensee has the possibility to control the movement of visitors." [YVL Guide 1.10, Section 2]

The term "physical protection" refers to the measures needed to protect the use of nuclear energy against unlawful actions in the nuclear facility, its precincts, other places or vehicles where nuclear energy is used. Section 71 of the Nuclear Energy Act sets forth the following requirements regarding physical protection:

- The physical protection of the use of nuclear energy shall be based on the threats posed to the use of nuclear energy and on analyses of protection needs.
- The nuclear power plant shall employ security personnel with training in the planning and implementation of security arrangements (security organisation). Security personnel must be available for the protection of the transports and storage of nuclear substances and nuclear waste.
- The duties of and the training requirements for the security organisation and the security personnel shall be defined. They shall have control equipment, communication equipment, protective equipment and forcible means equipment suited for the execution of their duties.
- The forcible means equipment shall be selected in proportion to the threats and protection needs to ensure they are suited to the intended purpose.
- The people working at the nuclear power plant or present on the site for other purposes must be appropriately informed about the measures included in regular security control at the nuclear facility.
Pursuant to the Government Decree on the physical protection of nuclear power plants (734/2008), physical protection entails e.g. the inspection of vehicles, persons, items and substances as well as means of goods transport to ensure that no dangerous objects are brought into the nuclear facility. Movement must be restricted and controlled at a nuclear facility in such a manner that physical protection and security aspects can be effectively taken into account. The licensee shall particularly ensure that no nuclear substances, nuclear waste, radioactive materials or confidential data can be removed from the nuclear facility without appropriate authorisation.

3.6.2 Current status of physical protection in Olkiluoto

There are two operating nuclear power plant units, a storage for spent fuel as well as other facilities related to the operation of the nuclear power plant at present in Olkiluoto. TVO has implemented in Olkiluoto the physical protection arrangements referred to in the Nuclear Energy Act in cooperation with the authorities.

Due to the changes taking place in the general operating environment and in local conditions, the requirements for the physical protection of nuclear power plants and the threat scenarios on which they are based may also change. The physical protection arrangements are being continuously assessed and developed. A thorough assessment is carried out at intervals of ca. ten years in connection with the renewal of operating licences and regular safety assessments.

3.6.3 Prerequisites for implementation of physical protection at Olkiluoto 4 plant unit

According to TVO's application for a decision-in-principle, the current security plan of Olkiluoto can be extended to cover the new nuclear power plant unit and other nuclear facilities pertaining to its activities and meant in the application for decision-in-principle. The preliminary security plan for them will be submitted to STUK for the handling of the construction licence application and the final plan in connection with the eventual operating licence application.

It is the conception of STUK that TVO meets the prerequisites to implement, as prescribed in norms and regulations, the physical protection arrangements which are the responsibility of the licensee of such new nuclear power plant unit and such other nuclear facilities pertaining to its activities as are meant in the application for a decision-in-principle.

4 SAFETY FACTORS ASSOCIATED WITH SITE

The Government Decree on the safety of nuclear power plants (733/2008) sets forth the following requirements regarding safety factors associated with the site:

Section 17. Protection against external events
"The design of the nuclear power plant must take account of external events, which could threaten safety functions. Systems, structures and components shall be designed,
located and protected so as to minimise the effects of external events on the safety of the plant. External events to be taken into account include at least exceptional weather conditions, seismic phenomena and other factors resulting from the environment or human activities. Unlawful actions designed to damage the plant as well as the impact of a large passenger airliner shall also be taken into account in design.”

The following YVL Guides issued by STUK set forth more explicit requirements:

- YVL Guide 1.10 Requirements for siting a nuclear power plant
- YVL Guide 1.0 Safety criteria for design of nuclear power plants
- YVL Guide 2.6 Seismic events and nuclear power plants
- YVL Guide 2.8 Probabilistic safety analysis (PSA) in safety management of nuclear power plants

4.1 Geology and seismology

Numerous geological studies have been carried out in the area of Olkiluoto for the construction of the nuclear power plant units, the final disposal repository for operating waste and the final disposal facility for spent nuclear fuel.

The bedrock in the area is ca. 1800–1900 million years old. The bedrock is dominated by migmatite consisting of mica gneiss and granite. The soil in Olkiluoto is mainly moraine, with thin layers of clay and peat in lowland areas. The soil at the sea bottom consists of moraine, clay and sand. The foundations of safety-critical buildings are built on bedrock. The area offers good conditions for the foundations of buildings. The licensee will have detailed ground investigations conducted for the design of the buildings after an eventual decision-in-principle, and will submit the results to STUK for the handling of the construction licence application.

On the north side of the Island of Olkiluoto, there are indications of a plane of weakness in the bedrock, which, according to the EIA report, could be of significance to the construction of the tunnel required in the eventual remote cooling water discharge alternative. TVO has not assessed the remote discharge alternative in the application for a decision-in-principle.

The seismic properties of the area have been established in Posiva Oy's project regarding the final disposal of spent nuclear fuel as well as in connection with the seismic risk analysis of the existing plant units and the design process of the Olkiluoto 3 plant unit. Olkiluoto is located in the zone of low seismic activity in South Finland.

There is an intention to deal with the spent fuel from the plant unit Olkiluoto 4 in the same way as the spent fuel from the existing plant units. It will be emplaced in a final disposal repository in the bedrock after an interim storage period of ca. 50 years. The designs for the Olkiluoto 4 plant unit include fuel storage pools in which spent fuel is stored for some years before it is transferred into a separate spent fuel storage facility. A new interim storage for spent fuel can be built for the needs of the Olkiluoto 4 plant unit or the existing interim storage (KPA storage) in the plant area can be expanded to accommodate also the fuel from Olkiluoto 4. The design bases for the interim storage
of fuel at the Olkiluoto 4 plant unit include the design earthquake defined for the site as well as the impact of a large passenger airliner.

Posiva Oy has submitted a separate application for a decision-in-principle on the final disposal of spent nuclear fuel generated at the Olkiluoto 4 plant unit. STUK assesses the suitability of the site for final disposal in the preliminary safety assessment associated with Posiva's application.

Part of the low and intermediate level operating waste from the Olkiluoto 4 plant unit could be emplaced in the final disposal repository (VLJ repository) built in the bedrock near the plant site and commissioned in 1992. This final disposal repository will need to be expanded later, probably in the 2020s.

Adequate geological studies for the review of the application for a decision-in-principle have been carried out in areas planned to be used for the construction of the new nuclear power plant unit, the extension of the interim storage for spent fuel and the extension of the final disposal repository for operating waste. It is the conception of STUK that the planned site displays no adverse geological or seismological features that would prevent the construction of the new nuclear plant unit and other nuclear facilities meant in the application for a decision-in-principle.

4.2 Seawater level

Exceptional variations in seawater level are taken into account in the design of the new nuclear power plant unit. The design values are influenced by variations in seawater level both above and below the mean water level as well as long-term changes in the mean water level. Variations in seawater level have been monitored at the Olkiluoto power plant and at the nearby measurement stations of the Finnish Institute of Marine Research for several decades.

The maximum seawater level measured in the near environment of Olkiluoto is +1.23 m above the mean water level (Rauma 2007). In the year 2009, this corresponds to level +1.03 m on the N60 coordinate system anchored to the bedrock. The origin of system N60 is close to the mean water level in 1960. The minimum level is -0.77 m below the mean water level (Rauma 1934) which, in year 2009, corresponds the level -0.97 m on the N60 coordinate system. Different coordinate systems show different extreme values and variation ranges due to land uplift. When evaluating the risk of flood, the values tied to the mean water level are representative. Because the height levels of buildings are given in system N60, it is necessary to tell what are the present-day N60 values of old extreme water levels.

Variations in seawater level are quite small in the areas near Olkiluoto in comparison with Finnish conditions in general. The ground height of the existing Olkiluoto plant site is +3.20 m and the flood limit of the buildings is +3.5 m on the N60 coordinate system.

Long-term changes in the mean water level are affected by land uplift, long-term changes in the wind conditions in the North Atlantic as well as the rising of the ocean levels as a result of the thermal expansion of water and the melting of glaciers due to the warming of the climate.

N.B. This is an unofficial translation.
Original:
The change in the ocean level by the year 2100 as a result of the climate change has been assessed e.g. in the reports of UN's Intergovernmental Panel on Climate Change (IPCC). According to the most probable scenario, the increase in the level will be ca. 0.30 m and according to the worst scenario ca. 0.59 m by 2100. As land uplift in the Olkiluoto area is abt. 0.71 m in 100 years, the net increase in the sea level with respect to the bedrock would be small even according to the worst scenario, and in the most probable scenario the relative decrease in the sea level with respect to the bedrock would continue.

The Finnish Institute of Marine Research has studied as part of the national research programme on nuclear safety, SAFIR2010, also other estimates of the changes in ocean levels presented in international publications. Some study reports suggest higher values than the reports of IPCC. However, the expert panel of IPCC has not considered such extreme estimates to be very credible. According to the most pessimistic estimate, ocean levels could rise by ca. +2.0 m by the year 2100. With land uplift taken into consideration, the mean water level will by the end of this century fall in Olkiluoto by ca. 0.20 m according to the estimate of the Finnish Institute of Marine Research. The uncertainty limits of this estimate are -0.50 m and +1.20 m. Studies on the extreme seawater levels on the Finnish coast continue in the research programme, taking into considerations the effects of climate change.

The estimates of seawater level variations and the required safety margins can be taken into account in the design of the new plant unit. The extreme level values used as design bases will be determined on the basis of the best available knowledge prior to the submittal of the construction licence application.

4.3 Factors affecting seawater intake

As at the existing plants and at the plant under construction, seawater is needed at the plant unit Olkiluoto 4 for the cooling of the turbine condenser. No obstacles are foreseen to the implementation of such seawater intake and outlet arrangements as presented in the application for a decision-in-principle. TVO will have the detailed geological studies required for the construction of the seawater tunnels carried out for the eventual construction licence application. The effects of cooling water, discharged from the plant unit at an elevated temperature to the sea, have been analysed in the Environmental Impact Assessment Report.

The seawater intake channels of the existing plant units in Olkiluoto have suffered from sudden formation of frazil ice, which has decreased the seawater intake capacity. Structural modifications have been implemented at the plant units to eliminate this problem. Instructions and procedures for action have also been modified. The risk of frazil ice is taken into account in the design of the new plant unit. Ice conditions in Olkiluoto area correspond to normal conditions on the coast of South Finland.

Algae and mussels have also posed problems to seawater intake at the existing Olkiluoto plant units. At the new plant unit, there will exist preparations for the case of a long-term loss of seawater cooling.
4.4 Weather phenomena

Measurement data on weather phenomena have been gathered in Olkiluoto for more than 30 years. In addition, the Finnish Institute of Meteorology, among others, has produced estimates of the extreme magnitudes of weather phenomena that can be expected in Olkiluoto. The possible effects of the climate change on the conditions in Olkiluoto are studied in the national research programme on nuclear safety. The extreme magnitudes of weather phenomena estimated to be possible on the plant site are taken into account in the design of the new nuclear power plant.

Weather phenomena assessed in the design process of the nuclear power plant include e.g. strong winds, including tornados, high and low outdoor temperatures, lightning strikes, rain, snow, frost and ice formation.

4.5 Fresh raw water supply

The processes at a nuclear power plant require a lot of purified fresh water. For example, large amounts of purified process water are needed in some plant types for the management of disturbances in seawater cooling and for some accident conditions. There are plants in Olkiluoto for the pumping, storage, purification and demineralisation of fresh raw water. The raw water is supplied via a pipeline from a distance of about 8 km from River Eurajoki. The application for a decision-in-principle does not include a separate analysis of the supply of fresh raw water. TVO has announced that it has a long-term plan pertaining to this and that a clarification of the adequacy and reliability of raw water supply in different operating conditions will be enclosed to the application for a construction licence for the Olkiluoto 4 plant unit.

4.6 Hazards caused by normal human activities on plant site

Hazards related to normal human activities, which might pose a risk to the nuclear power plant, include e.g. major oil spills at sea, releases of toxic and flammable gases as well as explosion accidents. There are no industrial plants, storage facilities or traffic routes near Olkiluoto that could risk the safety of the nuclear power plant as a result of accidents (cf. Section 3.1). The possibility of an oil spill or other chemical spills affecting the supply of seawater is taken into account in the engineering design of the plant.

5 SUMMARY

The clarifications regarding habitation, land use, land use planning and environmental conditions on the planned site of the new plant unit in Olkiluoto and in the vicinity of the plant as well as the effects of these factors on the safety of the planned plant unit and on the implementation of physical protection, preparedness and emergency measures, are adequate for the handling of the application for a decision-in-principle.

In the opinion of STUK, the conditions on the site do not display any unfavourable features that would constitute an obstacle to the construction of the new plant unit or

N.B. This is an unofficial translation.

Original:
other nuclear facilities, which pertain to its activities and are mentioned in the application for a decision-in-principle, in conformity with safety requirements or to the implementation of physical protection and emergency response arrangements.

N.B. This is unofficial translation.
Original: