

Guide YVL A.2, Site for a nuclear facility

1 Scope of application

Guide YVL A.2 sets forth the basic requirements imposed on the licence applicant or licensee concerning the site of a nuclear facility and relating to the safety of the population and the environment.

The requirements apply to the siting of a new nuclear power plant as well as the planned site of a new reactor unit at an existing site that may contain plant units or other nuclear facilities that are in operation or under construction.

Where applicable, the Guide shall also be applied to other nuclear facilities of major general significance (Nuclear Energy Act (990/1987), Section 11).

The requirements concerning the siting of a nuclear waste final disposal facility are presented in the Radiation and Nuclear Safety Authority Regulation on the Safety of Disposal of Nuclear Waste (STUK Y/4/2018) and in Guide YVL D.5 "Disposal of nuclear waste".

2 Justifications of the requirements

The principles for siting a nuclear power plant in Finland were fixed in the 1970s in the construction licences of the Loviisa nuclear power plant and the Olkiluoto nuclear power plant. Taking into account the development of nuclear energy legislation and the impact of the international development work of safety principles, the Radiation and Nuclear Safety Authority recorded the requirements as Guide YVL 1.10, Safety criteria for siting a nuclear power plant (2001). It was applied to the preliminary safety assessments of nuclear power plant projects OL3, OL4, FH1 and LO3 in 2008–2009. Before that, statements for the environmental impact assessment stage of the projects had been submitted to the Ministry of Employment and the Economy. Both the procedure pursuant to the Act on Environmental Impact Assessment Procedure and the zoning of areas pursuant to the Land Use and Building Act concerned the planned Hanhikivi power plant site and its surroundings.

The general principle of Guide YVL A.2 for siting a nuclear power plant is that the plant shall be located in a relatively sparsely populated area. The normal operation of the nuclear power plant, anticipated operational occurrences, postulated accidents and design extension conditions do not limit land use outside the plant area, but in the surroundings of the nuclear power plant, precautions in the form of land use plans and public protection plans shall be taken with a view to the possibility of a severe accident.

When the site for a possible new nuclear power plant is zoned, the possibility for quick evacuation of the public in a threatening accident situation should be assessed. The most important thing, also at existing sites, is to ensure that the alarm functions and passage-ways needed for evacuation enable quick exit from the precautionary action zone, including exit from the power plant area, and service and rescue

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operations to the zone. In relation to this, the siting of a nuclear power plant shall take into consideration the requirement of two road connections (para. 402, item 5): *At least two road connections to the power plant shall be available, or it shall be possible to make them available, to ensure rescue operations and plant safety also under exceptional traffic conditions and other conditions.*

The plant area is still surrounded by a precautionary action zone pursuant to Regulation STUK Y/2/2018 concerning nuclear power plant emergency response arrangements, extending to a distance of at least 5 kilometres from the plant. The dimensioning of this precautionary action zone around nuclear power plants that is used as the basis for zoning and rescue planning is based on the discretion of the Radiation and Nuclear Safety Authority, and the dimensioning practices of other countries are not exactly the same. Around most nuclear power plants in the world, there are significantly more people living in the precautionary action zone or at an equal distance from the plant than in Finland.

According to Guide YVL A.2, there are restrictions on land use in force in the precautionary action zone. Facilities inhabited or visited by a considerable number of people are not allowed within the zone. Furthermore, the zone may not contain significant productive activities. The number of permanent inhabitants, recreational housing and recreational activities shall be limited inside the precautionary action zone, so that a rescue plan that allows for effective evacuation of the population may be drawn up and implemented for the area. In Guide YVL 1.10, the population limit concerning Loviisa and Eurajoki was that the number of permanent inhabitants should not be in excess of 200. This requirement is clearly met at the existing sites. In the precautionary action zone allocated in the regional land use plan to the Hanhikivi plant project in Pyhäjoki that has been given a decision-in-principle, the number of permanent inhabitants is approximately 600.

Concerning radiation hazard, it is not possible to specify a geographical safety distance measured from the nuclear power plant after which the amount of radiation caused by releases from a severe accident would significantly decrease. Neither would an additional distance of a few kilometres provide any essential extra time for carrying out the evacuation. The course of a possible accident would be such that with a high degree of certainty, the evacuation could be carried out in the near-field before the start of radioactive releases, and therefore, the exposure caused by any large release close to ground level could be avoided in the early stages of the accident.

Legislative requirements and references have been updated in Guide YVL A.2 so that it comprehensively describes most regulations relating to the selection of the site location, even those that are not nuclear energy regulations.

The prerequisites of the siting of a nuclear power plant relating to land use shall also be researched in a design process under the Land Use and Building Act. Because of the nationally significant impact of a nuclear power plant, the siting requires that the regional land use plan enables the siting of a nuclear power plant. When considering the prerequisites of siting, the current land use at the planned site and in the nearby areas and the land use allocated in plans with legal effect are taken into account.

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If necessary, the design of land use shall thus begin with preparing a regional land use plan, after which it may advance to the preparation of more detailed general and local plans. The siting of a nuclear power plant causes a need to guide and restrict the land use not only in the power plant area but also in the precautionary action zone. For this reason, the land use suitable for the vicinity of a nuclear power plant shall be resolved in the general and local plan processes.

The zoning situation of the location of a planned nuclear power plant shall be reviewed as a whole, and the plans with legal effect valid in the area shall be taken into account from the point of view of the implementation prerequisites of the nuclear power plant. The siting of a nuclear power plant may also require plan amendments in the precautionary action zone. When deciding about a land use plan and a construction permit, the authorities consider the special requirements pertaining to construction work on the nuclear power plant site and in its surroundings, also during the operation of the plant.

3 International provisions concerning the scope of the Guide

The requirement level corresponding to the requirements of Guide YVL A.2 is found in IAEA safety standard NS-R-3 (Rev. 1), Site Evaluation for Nuclear Installations, Vienna (2016).

The IAEA has more requirements/recommendations, which have not yet been taken into account in this Guide:

- Prospective Radiological Environmental Impact Assessment for Facilities and Activities, GSG-10 (September 2018).
- Site Evaluations for Nuclear Installations, Draft DS484 (6 April 2017).

The Radiation and Nuclear Safety Authority has commissioned a survey from VTT, which has been published as report *STUK-YTO-TR182 Ydinvoimalaitoksen sijaintipaikka ja sen ympäristön turvallisuus* (Nuclear power plant site and the safety of the surrounding areas) (November 2001). It also includes an overview of the situation in certain other countries. Up-to-date population register data has later been received on the surroundings of nuclear power plants in France and the UK.

4 Impacts of the Tepco Fukushima Dai-ichi accident

In the previous revision round in 2013, the above-mentioned requirement of two road connections (para. 402, item 5) was added to the Guide, partly as a result of the Fukushima accident. In places, the Guide also refers to more detailed requirements in other YVL Guides including requirements caused by the Fukushima accident.

In this revision round, the Fukushima accident did not result in new requirements in this Guide.

5 Needs for changes taken into account in the update

The needs for changes due to changes made to international and national laws/regulations and the change proposals made in connection with the preparation of the YVL Guide implementation decisions (SYLVI) together with others recorded in

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STUK's change proposal database have been considered when updating the requirements. In addition, the possibilities to reduce the so-called administrative burden have been considered..

For example, the changes made to radiation and nuclear laws were taken into account in the update.

Small specifications were made to the Guide: for example, the requirement of two road connections (para. 402, item 5) was specified. Text corrections and updates of references were also made. Reference 28 was added.

In the requirements of the Guide, no possibilities for administrative burden reduction were observed.