

## **Guide YVL A.5, Construction and commissioning of a nuclear facility**

### **1 Scope of application**

Guide YVL A.5 covers the construction of nuclear facilities and the requirements set for its different phases in order to establish and ensure nuclear and radiation safety. The guide sets forth commissioning requirements for the nuclear facility and its systems.

The guide applies as it is to the construction of new nuclear facilities and to plant modifications to operating nuclear facilities, where applicable. The requirements in Chapter 4 of the Guide shall also apply to modifications, where applicable. The guide's requirements apply as they are to holders of construction and operating licences and to the appropriate extent to construction licence applicants planning to construct a nuclear facility as well as safety-significant suppliers contributing to construction or plant modification projects of nuclear facilities.

### **2 Justifications of the requirements**

The requirements of Guide YVL A.5 are based on the following requirements of the Nuclear Energy Act (990/1987) and Decree (161/1988) as well as the Radiation and Nuclear Safety Authority Regulation on the Safety of a Nuclear Power Plant (STUK Y/1/2018) and the safety of disposal of nuclear waste (STUK Y/4/2018) set forth in the introduction of the guide:

- Nuclear Energy Act
  - Section 7 f: *Safety shall take priority during the construction and operation of a nuclear facility; the holder of a construction licence shall be responsible for the nuclear facility's construction in accordance with safety requirements.*
  - Section 55(4): *The Radiation and Nuclear Safety Authority may, upon request by anyone planning to use nuclear energy, check the plan drawn up by them and issue preliminary instructions on what should be taken into account with respect to safety, physical protection and emergency planning.*
  - Section 55(5): *After Parliament has decided that a decision-in-principle pertaining to the construction of a nuclear facility having significant importance remains in force, the Radiation and Nuclear Safety Authority can on request by the holder of the decision-in-principle inspect the nuclear facility and its systems, inspect and approve plans for components and structures and also inspect and witness the manufacturing of individual components and structures. No work related to structures affecting nuclear safety may, however, be commenced at the plant site before the construction licence has been granted. The structures and components inspected and approved by the Radiation and Nuclear Safety Authority may only be used for the construction of a nuclear facility if they are in conformance with the construction licence.*
- Nuclear Energy Decree
  - Section 108: *The various phases in the construction of a nuclear facility cannot be commenced until the Radiation and Nuclear Safety Authority*

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*(STUK) has, on the basis of the documents mentioned in Section 35 and other detailed plans and documents, ascertained for each phase that all safety-related factors and safety regulations have been given sufficient consideration.*

- *Section 109: After the construction licence has been granted, the Radiation and Nuclear Safety Authority (STUK) controls the implementation of the facility project in detail. The purpose of the control is to ensure that the conditions of the construction licence and the approved plans referred to in Section 35 are complied with and that the nuclear facility is also in other respects constructed in accordance with regulations issued on the basis of the Nuclear Energy Act.*
- *Section 110: The various phases in the commissioning of a nuclear facility cannot be commenced until the Radiation and Nuclear Safety Authority (STUK) has determined, on the basis of the documents mentioned in Section 36, and other detailed plans and documents required by STUK, for each stage, that sufficient attention has been paid to factors influencing safety, and regulations concerning safety. Similar requirements also apply to the restarting of a nuclear facility after a particularly substantial plant modification.*
- *Section 112: If the licensee intends to carry out modifications to the nuclear facility systems, structures, nuclear fuel or the way the facility is operated that influence safety and involve changes in the plans or documents approved by the Radiation and Nuclear Safety Authority (STUK), the licensee shall obtain approval from STUK for such modifications before they are carried out. In addition, the licensee shall ensure that the documents submitted to the Radiation and Nuclear Safety Authority (STUK) as provided in Sections 35, 36 and 36 a are revised accordingly.*
- *Section 118 b: The use of nuclear energy shall be planned and implemented so that the obligations concerning the nuclear safeguards, as provided and defined in the Nuclear Energy Act and provisions issued thereunder, and in the Euratom Treaty and provisions issued thereunder, are met. The nuclear facility or any other place where nuclear energy is used shall not contain premises, materials or functions, relevant to the nuclear safeguards, which are not included in the design information. The licensee or any other user of nuclear energy shall have an accounting and reporting system for nuclear material and other nuclear use items which ensures the correctness, scope and consistency of information in order to implement the supervision necessary for the non-proliferation of nuclear weapons.*
- **Radiation and Nuclear Safety Authority Regulation on the Safety of a Nuclear Power Plant (STUK Y/1/2018)**
  - *Section 3(1): The safety of a nuclear facility shall be assessed when applying for a construction license and operating license, in connection with plant modifications, and at Periodic Safety Reviews during the operation of the plant. It shall be demonstrated in connection with the safety assessment that the nuclear facility has been designed and implemented in a manner that meets the safety requirements. The safety assessment shall cover the operational states and accidents of the plant. The safety of a nuclear facility shall also be assessed after accidents and, whenever necessary, on the basis of the safety research results.*

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- Section 18: *The holder of the nuclear facility's construction license shall ensure during construction that the nuclear facility is constructed and implemented in conformity with the safety requirements and using approved plans and procedures.*
- Section 19(1): *In connection with the commissioning of a nuclear facility or its modifications, the licensee shall ensure that the systems, structures and components and the nuclear facility as a whole operate as designed. The procedures of the commissioning of the nuclear facility or its modifications shall be planned, and instructions shall be provided.*
- Section 19(2): *At the commissioning stage, the licensee shall ensure that appropriate procedures are in place for the future operation of the nuclear facility.*
- Section 25(1): *When designing, constructing, operating and decommissioning a nuclear facility, a good safety culture shall be maintained. Safety shall take priority in all operations. The decisions and activities of the management of each organisation participating in the abovementioned activities shall reflect its commitment to operational practices and solutions that promote safety. Personnel shall be encouraged to perform responsible work, and to identify, report, and eliminate factors endangering safety. Personnel shall be given the opportunity to contribute to the continuous improvement of safety.*
- Radiation and Nuclear Safety Authority Regulation on the Safety of Disposal of Nuclear Waste (STUK Y/4/2018)
  - Section 22(1): *The holder of the nuclear facility's construction license shall ensure during construction that the facility is constructed and implemented in conformity with the safety requirements and using approved plans and procedures.*  
*Section 22(2): At the construction stage, the licensee shall ensure that an expedient organisation is in place for the construction of the nuclear facility, alongside a sufficient number of qualified personnel and appropriate procedures.*
  - Section 23(1): *In connection with the commissioning of the nuclear facility or its modifications, the licensee shall ensure that the systems, structures and components and the facility as a whole operate as designed and that the disposal system can be implemented. The procedures of the commissioning of the nuclear facility or its modifications shall be planned, and instructions shall be provided.*
  - Section 23(2): *At the commissioning stage, the licensee shall ensure that appropriate procedures are in place for the future operation of the nuclear facility.*

### **Justifications of the requirements by topic**

The following presents justifications for each topic of the guide corresponding to the title structure of the guide.

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## 2.1 Chapter 3 Procedures during nuclear facility construction

### 2.1.1 Section 3.1 Project management

The requirements set forth in the section specify in many respects the general requirements of project management set forth in Guide YVL A.3, Leadership and management for safety and, as such, do not involve new requirements, but detail the application of existing requirements in light of construction. For example, **requirements 302 and 303** require that processes and procedures regarding construction shall be defined, described and carried out and that dealing with safety matters takes place in an appropriate manner in the licensee's organisation. **Requirement 304** requires regular review of processes and procedures. Similar requirements regarding the definition of construction processes and procedures and their regular review are also set forth in the guide concerning construction of IAEA SSG-38 "Construction for Nuclear Installations".

**Requirement 305** requires the determination of the nuclear facility's construction phases. Based on **requirement 306**, the construction project shall cover, in addition to the technical construction phases, also the preparation of the licensee's organisation for operating the nuclear facility. With regard to nuclear safety, it is essential for the future operating organization to familiarise itself with the facility already at the construction phase and, thus, to be able to explore, for example, technology applied at the facility in a manner that will not be possible at a later stage. In view of organisational functionality, it is vital that there is no "discontinuity" in the licensee's operations when nuclear commissioning begins because that time is very critical to safety.

**Requirement 307** reminds of the observance of matters regarding the arrangement of nuclear safeguards in construction in accordance with Guide YVL D.1 "Regulatory control of nuclear safeguards".

**Requirement 308** requires the coupling of licensing (construction and operating licence phases) and other regulatory approvals and the related procedures with the construction project phases and processes. The Finnish practice requires the participation and approvals of an authority ensuring radiation and nuclear safety in many different project phases and, in order to enable this, it is necessary to integrate licencing in the required manner.

Based on **requirement 309**, the licensee shall also ensure that suppliers contributing to the projects have adequate competence and procedures.

#### **Subsection 3.1.1 Risk management during construction and plant modifications of nuclear facilities**

The risk management procedures presented in Section 3.1.1 require the identification, analysis, control and prevention of risks relating to nuclear and radiation safety caused by the construction operations and targeting it. The licensee is required to prepare an appropriate risk management plan and to maintain a risk register. In these areas, the guide is consistent with standards SFS-EN ISO 31000:2011 "Risk management – Principles and guidelines" and SFS-EN ISO 21500:2012 "Guidance on project management".

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The Radiation and Nuclear Safety Authority Regulation on the Safety of a Nuclear Power Plant (STUK Y/1/2018) serves also as the provision base of the section, and Section 25 of the regulation requires that *the operation of the organisation shall be evaluated and continuously developed and the risks associated with the organisation's operation are to be evaluated regularly.*

### **Subsection 3.1.2 Project organisation and resources**

The requirements regarding the project organisation and resources mostly specify the general requirements regarding construction and plant modification projects of Guides YVL A.3 and A.4 "Organisation and personnel of a nuclear facility". The aim is to ensure with the help of the requirements the adequacy of the resources available to the project, i.e. they also apply to work and deliveries that the licensee does not perform itself. **Requirements 325 and 326** regarding supplier control.

**Requirement 322** requires persons in the management of the organisation of the licensee and that of essential suppliers and those in positions essential for safety to have competence and experience in the nuclear field and of demanding projects. The requirement aims to ensure that persons in charge of the project understand the safety significance of the operations in addition to their project management and leadership skills. However, because the purpose of the requirement is not to prevent the transfer of good industrial skills to the nuclear field, the interpretation of the requirement may take into consideration the overall competence of the organisation (for example, the cumulative knowledge of the nuclear field of the persons in charge, even if a single person does not meet the requirement).

**Requirements 327–328** require the licensee to prepare for commissioning and operation already during construction, cp. requirement 306.

### **Subsection 3.1.3 Responsible manager for construction**

The subsection specifies the requirements of Section 7 k of the Nuclear Energy Act and Guide YVL A.4 with regard to the responsible manager for construction and his or her substitute and the requirements set for their appointing. Based on the Nuclear Energy Act, approval for the responsible manager for construction shall be sought in connection with the submittal of the construction licence. **Requirement 329** specifies that the approval shall be available before the construction licence can be granted.

In terms of the responsible manager and his or her deputy it is essential that they have an actual possibility to impact decision-making of the project. Therefore, **requirement 330** requires that the responsible manager shall be part of the licensee's project management and that also his or her deputy shall have sufficient authority to carry out duties required in the position. That is to say, the deputy does not necessarily have to be part of the project management, but the authority can be assigned to him or her in the licensee's management system.

**Requirement 331** requires that the responsible manager ensures that the safety requirements originating from different sources are observed and complied with in the project. Naturally, he or she can be responsible for the matter only after his or her appointment, but he or she shall know, among other things, the preparation method of the design documentation submitted in connection with the construction licence,

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the procedures applied in the preparation and the design process itself, so that he or she can ensure in the later project phases that the set safety requirements are met. In order for the responsible manager and his or her deputy to fulfil this responsibility, **requirement 332** requires the arrangement of the organisation's operations and flow of information in a way to keep them informed about the necessary information.

### 2.1.2 Section 3.2 Safety culture in construction operations

Good safety culture shall be maintained during construction and plant modification projects. More detailed requirements regarding safety culture are set forth in Guide YVL A.3.

### 2.1.3 Section 3.3 Licensing plan

Requirement 338 requires that the licensee shall draw up a licensing plan for the construction of a new nuclear facility or an extensive plant modification of an operating facility describing how the fulfilment of nuclear and radiation safety requirements is ensured and demonstrated in the different phases of the construction or plant modification project. More detailed requirements for the contents of the licensing plan are presented in requirements 339 and 340. The principles for updating the licensing plan are provided in requirement 341. The licensing plan helps all parties already at the beginning of the project to perceive the main principles and submittal schedule of the documents to be submitted to STUK.

The licensing plan is one of the documents to be submitted to STUK in connection with the construction licence application that have been specified in Guide YVL A.1 "Regulatory oversight of safety in the use of nuclear energy". Good practical experience from plant modifications in Loviisa and Olkiluoto already implemented and planned in terms of licensing favour licensing planning in plant modifications. The licensing plan is submitted to STUK for information.

### 2.1.4 Section 3.4 Management of suppliers and the supply chain

The requirements presented in the section have been transferred to Guide YVL A.3, which regards also construction.

### 2.1.5 Section 3.5 Starting component and structure manufacturing and preparing the site before the granting of a construction licence

The presented requirements are justified in the Government Proposal to Amend the Nuclear Energy Act (HE 145/2011 vp), which states: *...The purpose of the new proposed Subsection 5 is to clarify the grounds for executing monitoring measures at the phase, when Parliament has decided that a decision-in-principle pertaining to the construction a nuclear facility having significant importance remains in force, but the plant has not yet been granted a construction licence as per Section 18 of the Nuclear Energy Act. In practice, this period lasts several years and involves, besides assessment and specification of plans preparing for the implementation of the nuclear facility project, also measures pertaining to the start of key component manufacture. For example, the supplier of a nuclear power plant's reactor pressure vessel shall, in practice, be selected and manufacture started already before the construction licence in order to ensure the timely availability of a pressure vessel manufactured according*

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*to the requirements... Requirements regarding the construction taking place at the nuclear facility site are itemised in the construction licence processing. A restriction of this kind has been included in the last sentence of the new Subsection 5, according to which work on structures impacting nuclear safety shall not be started at the site before the construction licence is granted. In practice, this means that preparatory earthmoving and excavation work may be carried out at the site before the construction licence is granted without the Nuclear Energy Act preventing it, but starting the laying of a nuclear facility's base slab requires a construction licence as per the Nuclear Energy Act. Under Section 55(4), plans regarding civil construction at the site may be submitted to the Radiation and Nuclear Safety Authority for review in advance...*

The requirements set forth in the section specify the requirements of Section 55(5) of the Nuclear Energy Act. The requirements emphasise the recognition of the requirements of the YVL guides well before the granting of the construction licence in order to avoid a situation where components have been designed, manufactured and preparatory earthmoving and excavation work has been carried out without the observance of the applicable requirements, the fulfilment of which are assessed in the safety assessment of the construction licence.

Section 55 of the Nuclear Energy Act gives the holder of the decision-in-principle the possibility to request STUK to inspect the nuclear facility and its systems review and approve components and structures as well as witness the manufacturing of individual components and structures. Thus, the licensee can, when desired, have regulatory documents inspected and approved by STUK before the construction licence is granted in frontloaded manner. In the justifications of the act, the practice is meant to be applied for components and structures having a long manufacturing time, which mostly include the main components involved in the primary circuit of the facility. Therefore, it should be observed that the facility and system level approval procedure and the resulting assessment of the overall safety of the facility will be performed by STUK during the processing of the construction licence, only after which the component and structure level processing can begin on a more extensive scale.

**Requirement 357** requires, pertaining to the design and manufacturing of safety-classified components or structures, the presentation of the documents that have been used in determining the design bases of the components and structures. Such documents may include preliminary safety and design analyses. The requirement is applied to ensure the correctness of the design bases of the components and structures and to identify the related preliminary design margins.

When planning preparatory work to be carried out at the facility site, it is important to recognise the possible risks caused by such work, for example, to operating nuclear facilities. These may include risks resulting from dredging, earthmoving, excavating, lifting, heavy transport and transport of dangerous goods. In order to recognise and prepare for risks, the requirement for preparing and implementing risk assessments is set forth in Subsection 3.1.1. This requirement is also included IAEA's Guide SSG-38.

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### 2.1.6 Section 3.6 Non-conformance management in construction

The requirements regarding non-conformance management specify the general requirements in view of construction given in Guide YVL A.3. The requirements require in a construction or plant modification project the specification of procedures for the non-conformance management of product non-conformances and organisational non-conformances, incl. processing and approval of non-conformances and monitoring of corrective and preventive actions. Based on **requirement 367**, the licensee shall ensure that the organisations involved in the project who supply safety-significant products comply with the procedures for the management of non-conformances specified in the project so that the licensee can assess the significance and acceptability of non-conformances.

**Requirement 369** requires the determination of the root causes of safety-significant or recurring non-conformances. **Requirement 370** requires grouping of non-conformances to allow the recognition of reoccurrence. Based on **requirement 371**, reports on non-conformances shall be submitted to STUK for approval. In general, the requirement refers to non-conformances from STUK-approved actions/documents. STUK assesses non-conformances, their corrective measures and overall impact on nuclear safety. Non-conformances may also lead, for example, to changes in documentation involving the nuclear facility or organisation and the subsequent processing by STUK.

### 2.1.7 Section 3.7 Lessons learned from construction

The guide requires the application of the procedures of Guide YVL A.10 "Operating experience feedback of a nuclear facility" to construction. Based on **requirement 372**, experiences and best practices gained from elsewhere shall be utilised in construction. **Requirement 375** requires that when non-nuclear commissioning starts the licensee shall have in place the operational experience feedback organisation defined in Guide YVL A.10. This is justified in order to prepare for the nuclear commissioning and operation and for the thorough utilisation of experiences gained at the beginning of commissioning. Based on **requirement 374**, the licensee shall have adequate resources, competence and methods to analyse safety-significant non-conformances and events during the whole construction process.

**Requirement 376** requires that the licensee shall assess the construction and plant modification project already during its implementation project, after the completion of its various phases (determined by the licensee). This way, experiences gained in the project can be utilised already during the project and, naturally, in other projects. Items to be processed in reviews are listed in **requirement 377**.

### 2.1.8 Section 3.8 Reporting and communication

Reporting and communication shall be comprehensive, open and timely. The objective is to ensure that all those involved in the project have available real-time and adequate data about the project: timetables, progress, organisations and their interfaces as well as safety-significant non-conformances and events and also about the related corrective and preventive action. Based on this, the parties can, for example, prepare their own operating plans and develop their operations.



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Phase and final reports shall be prepared on the construction and plant modification project. In these areas, reference is made to **requirement 376**.

Reporting to the Radiation and Nuclear Safety Authority is presented in Subsection 3.8.2. With regard to the general reporting requirements, references are made to Guide YVL A.9 "Regular reporting on the operation of a nuclear facility" and YVL A.10 "Operating experience feedback of a nuclear facility". The requirements set forth in Subsection 3.8.2 specify in more detail regular reporting; regular reports of the construction project of a new facility are the monthly and annual reports. The content requirements for the monthly report are set forth in Appendix A. The objectives of the report are the same as presented on a more general level in **requirement 380** – to provide the Radiation and Nuclear Safety Authority an up-to-date view of the project status, based on which STUK can plan its own operations and assess the needs concerning project-related oversight.

The key content of the annual report on construction is an overall safety assessment prepared by the licensee, which is required by **requirement 390**.

## 2.2 Chapter 4 Special requirements for the commissioning of a nuclear facility

### 2.2.1 Section 4.1 General requirements

The objective of commissioning is to ensure that the constructed facility meets the design requirements and that the instructions for using the facility are functional and the organisation is able to operate the facility in a safe manner. **Requirements 401–406** present on a general level the tasks that shall be performed as part of commissioning. **Requirement 407** requires the participation of the licensee's personnel in the commissioning testing to familiarise themselves, which supports the requirements on the competence of personnel (e.g. 402). **Requirement 404** is based on requirement 6.5 of IAEA's requirement document SSR-2/2 "Safety of Nuclear Power Plants: Commissioning and Operation" and Section 2.12 of IAEA's guide SSG-28 "Commissioning for Nuclear Power Plants".

Commissioning includes very different activities (such as documenting test results, commissioning inspections, preservation of systems, management of test schedules). A prerequisite for successful commissioning is that the activities are instructed. **Requirement 408** requires that instructions shall be in place for procedures applied during commissioning. A similar recommendation is presented in Section 5.10 of IAEA's guide SSG-28.

### 2.2.2 Section 4.2 Commissioning plan

The requirements require a commissioning plan. Commissioning is an extensive entity that may involve several organisations. Many commissioning-related tasks start already at the very beginning of the project (e.g. the preparation of commissioning testing and other commissioning documentation), so a preliminary commissioning plan shall be prepared well in advance. The commissioning plan may also comprise several sections, one of which is called a commissioning testing plan.

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### 2.2.3 Section 4.3 Requirements concerning testing and testing programmes

**Requirements 411–412** are based on Requirement 6.3 of IAEA SSR-2/2. At appropriate points, the results gained in commissioning testing and prerequisites for continued testing shall be assessed. To enable this, commissioning testing shall be divided into appropriate phases in view of the entity.

**Requirements 414–422** cover testing programmes and procedures. The requirements are based on Sections 4.13, 4.15 and documentation requirements of Chapter 5 of IAEA's guide SSG-28. In Guide YVL A.5, a testing programme and testing procedure have been specified separately. The contents of a testing programme have been specified in **requirement 416**, and those of a testing procedure in **requirement 418**. The division into testing programmes and procedures has been made, because the detailed performance instructions do not require approval from STUK, those can be submitted to information.

**Requirements 420–421** regard the submittal of testing programmes to STUK. Testing programmes of systems of safety classes 1 and 2, testing programmes of systems used for severe accident management and testing programmes of plant tests (e.g. low-power tests and power tests) shall be submitted to STUK for approval. **Requirement 423** allows for the test to take place only after receipt of the approval and specifies what is meant by the commencement of the test.

### 2.2.4 Section 4.4 System performance tests

**Requirement 425** means that the commissioning inspections of components and structures shall be acceptably performed. Requirements regarding the commissioning inspections are mostly set forth in the E series Guides. In addition, the commissioning inspections of the fire protection systems are covered in Guide YVL B.8 "Fire protection at a nuclear facility" and those of the radiation monitoring systems in Guide YVL C.1 "Structural radiation safety at a nuclear facility". **Requirements 426–428** set objectives for the system performance tests.

### 2.2.5 Section 4.5 Loading of nuclear fuel and testing after loading

According to **requirement 429**, the loading plan shall present a safety assessment on starting the operation of the facility based on the commissioning testing results and the results of commissioning testing completed prior to loading in the scope deemed necessary to justify the conclusions of the safety assessment.

**Requirement 432** is based on Section 4.49 of IAEA's guide SSG-28. **Requirement 438** is based on Sections 4.55–4.56 of IAEA's guide SSG-28. **Requirement 440** sets forth a similar condition to the start of power tests as for the criticality/low-power tests in **requirements 436–437**. **Requirement 441** is based on Sections 4.57–4.59 of IAEA's guide SSG-28.

### 2.2.6 Section 4.6 Reporting on commissioning

The reporting requirements are based on Sections 4.67, 4.68, 5.33 and 5.34 of IAEA's guide SSG-28. **Requirement 449** requires that an assessment shall be performed before starting operation.

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### **2.3 Appendix A Special requirements for the monthly report on nuclear facility construction**

The justifications of Appendix A are covered under “reporting and communication”.

### **3 International provisions concerning the scope of the Guide**

There are two actual safety requirements of IAEA that apply to the scope of the guide: one presenting the general design requirements IAEA Specific Safety Requirements SSR-2/1 “Safety of Nuclear Power Plants: Design” and one presenting general commissioning requirements SSR-2/2 “Safety of Nuclear Power Plants: Commissioning and Operation”. With regard to the construction of nuclear facilities, IAEA has also published guide SSG-38 “Construction for Nuclear Installations”. In terms of commissioning, there is also IAEA’s guide SSG-28 “Commissioning for Nuclear Power Plants”.

In SSR-2/1, the construction of a nuclear power plant is seen as one phase in the plant’s life cycle and, thus, it is mentioned in several general requirements that regard, among other things, the concept of defence in depth (2.13), the licensee’s responsibility on the fulfilment of the safety requirements (req. 1), the utilisation of construction experience and best practices (4.6 and req. 11). The objectives of the requirements are similar to the requirements presented in Guide YVL A.5.

Chapter 4 of Guide YVL A.5 sets forth detailed commissioning requirements. In general, it can be stated that the requirements of Guide A.5 are consistent with SSR-2/2. The requirements of Sections 6.1–6.7, 6.9 and 6.11 of SSR-2/2 are, for the most part, included in the requirements of Chapter 4. Requirements 6.10, 6.12, 6.13 and 6.15 have been observed elsewhere in the YVL guides in a more general format, not limiting to commissioning only (e.g. Guide YVL A.3). Requirement 6.8 of SSR-2/2 is not included in a corresponding format in the YVL guides, but the tasks mentioned in the item and schedule for their completion have been covered in the YVL guides regarding the subject area in question.

Compared with the YVL guides, guide SSG-28 is very specific. Guide YVL A.5 is much more generic. However, the YVL guide and IAEA’s guides do not differ from each other on a principle level in view of the required safety level.

Because Guide YVL A.5 specifies the requirements set forth in Guide YVL A.3, GSR Part 2 “Leadership and Management for Safety” can also be considered a requirement document regarding the field of the guide. The document does not present direct requirements for construction, but the field of application of the guide states that its requirements can be applied to all phases of the life cycle of the facility. Because the requirements of GSR Part 2 are very “generic”, they are not itemised in the explanatory memorandum. However, in general, it can be stated that no contradictions were observed in the guides and their objectives are consistent.

WENRA Safety Reference Levels for Existing Reactors (2014) and WENRA Safety Objectives for New Nuclear Power Plants (2013) do not set forth direct requirements for the construction of a nuclear facility. The reference levels regarding plant modifications target other YVL guides and the requirements regarding new facilities regard the design of a facility.

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#### **4 Impacts of the Tepco Fukushima Dai-ichi accident**

A key lesson to learn from the Fukushima accident is to prepare in the design of the facility for incidents caused by more rare external factors. In practice, this impacts the technical and quality control requirements set forth for the facility's systems, structures and components (for example operation in "toughened" environmental conditions, seismic design requirements, reliability of operation). Guide YVL A.5 emphasises, among other things, the licensee's responsibility, which extends to the whole supply chain.

The requirements of Guide YVL A.5 are, in terms their objectives, consistent with the lessons learnt from the Fukushima accident, even though the accident itself has not impacted the requirements of the 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 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.

The most significant changes have been made to the requirements regarding suppliers and supply chain management as well as safety culture, many of which have been transferred in essential parts to Guide YVL A.3 due to their generic nature. Requirements regarding the observance of the safety significance (previous 310 and 311) have also been transferred to Guide YVL A.3 due to their generic nature. Some requirements regarding resource management have been removed, because they have in practice already been mentioned in an identical manner in other guides (YVL A.3 and A.4).

Requirements regarding commissioning have been specified and the most recent STUK experience has been observed. The changes reduce the administrative burden and make it more clear to the actors when certain things need to be done. The administrative burden has been reduced by alleviating the STUK processing of the testing programmes.