

Nuclear Reactor Regulation
Rantamäki Karin

February 6, 2020

Reactor Safety Committee Meeting 1/2020

Date January 29, 2019, 9:00-17:20

Place STUK, Laippatie 4, Meeting room Röntgen 4386

Participant	Timo Vanttola	Chair
	Sylvie Cadet-Mercier	Member
	Lennart Carlsson	Member
	Richard Donderer	Member
	Ralph Schulz	Member
	Zdeněk Típek	Member
	Kirsi Alm-Lytz	Permanent expert member
	Karin Rantamäki	Secretary
	Petteri Tiippana	STUK
	Tomi Routamo	STUK
	Tapani Virolainen	STUK
	Janne Nevalainen	STUK
	Kim Wahlström	STUK
	Nina Lahtinen	STUK (item 5)

1 Opening and adoption of agenda

Timo Vanttola opened the meeting at 9:05 and welcomed everyone. A short round-table introduction was performed.

The agenda was approved and can be found in Appendix 1

2 Approval of the minutes of the previous RSC meeting (1/2019)

The minutes of the previous meeting were approved. It was recommended that tasks should be underlined for better resolution.

3 Brief update of current topics in the Finnish nuclear field

Kirsi Alm-Lytz gave a brief update on the current topics in the nuclear field. STUK is currently finalising the update of the YVL-guides. Mostly the updates are clarifications and reduction of unnecessary regulatory burden. A major change is that the use of commercial grade components has been allowed in safety classified systems. For the operating plants and plants under construction an implementation decision is still needed. STUK's strategy also includes consideration about how the structure of regulations should look in the future. Currently the YVL-guides are binding giving licensees right to propose alternative solutions. Discussions are ongoing whether the YVL-guides should only be regarded as guidelines. Thus, STUK's regulations would be the first binding level.

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In Loviisa, the Fukushima-modernisations are coming to an end. The current operating licence of the units in Loviisa are valid until 2027 and 2030. STUK is expecting the periodic safety review results this year. In Olkiluoto, the work on the operating units relate mostly to modernisation projects. Olkiluoto 3 is expected to become an operating unit. The current schedule for fuelling is next summer. Commercial operation is expected in 2021. Fennovoima has applied for the construction licence. So far, STUK has only received the first batch of the PSAR.

She also mentioned the waste sector. The spent fuel repository is in the construction phase, the research reactor Fir 1 is in the decommissioning licence phase and the Terrafame mining company has applied for a licence to extract uranium.

The presentation slides can be found in Appendix 2.

4 Follow-up on licencing and qualification for equipment approvals

Tapani Virolainen gave a follow-up talk on the topic of the previous meeting. In STUK's opinion, the RSC gave very good recommendations in the last meeting. The stronger participation in KELPO was slightly confusing, though, as STUK already participates in it.

He discussed the status of KELPO project of which the second phase was completed at the end of 2019. He described a few pilot projects (mechanical, electrical and I&C) that are ongoing. The mechanical pilot will show how well the proposed new equipment approval process works.

The licensees started to work on a common digital platform that would collect the data they have related to component qualification, approvals and manufacturing. STUK's opinion is that the work on developing the process would be more important than the tools. Although the licensees have started to take more responsibility there is still a lot to do in this area. One more sub-group was created with the aim to develop common processes and practices for equipment procurement, qualification etc.

The corresponding project at STUK is LARAVA. The focus has so far been on describing and understanding the present state of the technical disciplines. STUK has also collected recent observations or issues identified in the oversight of components. However, making conclusions turned out to be very challenging due to the availability of the data in different systems. A third effort is to develop risk informed tools and methods for grading of all regulatory activities. The next step in the LARAVA project is to finalise summaries of the current state description and to benchmark the results. A position paper is planned using workshops involving the staff as input. The paper will be more an internal paper discussing the objectives for regulatory framework and oversight effort of STUK. The graded approach is not used to relax requirements generally but rather to focus the oversight work. Risk-informed Graded approach might be a good topic for the RSC. It seems that it is used somewhat differently in various countries.

At the end of his presentation Tapani Virolainen presented some numbers related to last meeting's question on work amount used for oversight work. STUK uses about 10 man-years per operating plant and about double that for OL3. TSO work is not included in the number. Nor the administrative work or the development of the

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regulations. In Finland, the TSOs only do independent analysis. They do not perform safety assessments. The responses from the other members of the committee are collected to a separate note (Appendix 3b) as the data is not publicly available. There is also a report by OECD/NEA WGRNR in which data like this has been collected in the past.

The presentation slides can be found in Appendix 3.

5 Design maturity in the construction licence phase

Tomi Routamo presented the main topic of the meeting: design maturity in the construction licence phase. The background for the topic lies in the possible overall update of the nuclear safety legislation and the regulatory oversight. As part of this effort the review and evaluation process of the construction licence application is being reviewed. Therefore, STUK wanted to collect viewpoints from and hear about the practices in the countries represented in the RSC.

The current licensing practices in Finland contains four stages. The licencing process starts with a decision in principle. Already in this phase STUK is doing a preliminary safety assessment. The next phase is the construction licence phase where detailed design is needed for the evaluation. After that comes the operation license phase. He also briefly discussed regulatory requirements and expectations related to the construction license as well as the operating license. The fourth stage is the decommissioning licence.

One of the lessons learnt from the OL3 project was that the design was not final when the construction phase started. In some areas the level of detail was much more advanced than in others, and the detailed design did not always meet the high-level expectations or there were open issues in the interfaces between different design areas. This led to redesigning the systems during the construction phase and it took a very long time to finalise the design to such a level that it could be approved by STUK. Also, it was noted that the Finnish safety requirements for a NPP differ somewhat from those used in other countries, so there is no general design that would be directly applicable to meet the Finnish requirements.

The site evaluation and the site-specific hazards need to be dealt with at some point. In the Finnish process, the possible sites are considered already in the Environmental Impact Assessment phase prior to the decision in principle. This phase requires a certain envelope for the siting and the design that can be used to show that it is possible to build a plant on the given site. The decision in principle needs more details and fixes the site options. The site-specific issues are addressed at the same time as the detailed design. The question has been raised whether there should be an intermediate stage including a site evaluation, as from the design point of view the construction licence application is a rather late phase to fix the site-specific boundaries and limits.

During the discussion it was noted that during the construction changes within the detailed design are to be expected. In Finland, reference plants are considered but they are not required. During the previous decision-in-principle phases the reference was a mixture of various operating units. Now, discussions are ongoing about design differences between the refence plant and the one under review. In the discussion

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within this meeting the FH case was used as an example. However, the purpose of the discussion in this meeting was to provide ideas to a more general development of regulations.

Quality issues were discussed. The committee notes that a quality management plan is needed in an early phase. However, a new player needs a lot of work to meet the expectations set in the regulations. Often contracts are signed before the detailed design. The problem is in the bidding phase where safety requirements are needed as an input to the process. It is primarily an issue of the license applicant but ends up on the regulators table. The key question is the understanding of the requirements. In Finland, the current licencing process does not provide fixed involvement points for the regulator between the decision in principle and construction licence phase. This may cause problems especially if there are new licensees, new sites and new vendors.

The Finnish regulatory guides were updated considering the lessons learned from the construction of OL3. However, now the question is whether they are too detailed resulting in very limited freedom for the licensee and expecting final design at a very detailed level in early phases. The essential question is what needs to be ready at the construction licence phase and what can be left for later.

The presentation slides can be found in Appendix 4.

Richard Donderer presented the German practices to the subject. The need for construction and operating licenses is stated in the Atomic law. It is up to the applicant to ask for separate steps in the process. It has been the practice to apply for several partial construction licences and one operating licences. The purpose of separate construction licences is to help the applicant to organise the process appropriately. The partial licencing is used to enable changes during the construction phase. All the partial licences also look back and review whether the requirements are fulfilled. The final construction licence reviews all the previous partial licences. If a change is needed it is made as a supplement to the appropriate partial licence. He also showed an example of the various licencing steps. The partial licencing procedure is used in Germany also for smaller projects.

Nuclear construction may start in the first partial-construction-licence phase. Before that civil work on non-nuclear construction may be done. There exists a guide that states what is required at the very beginning of the process, what needs to be presented to the authority and to the general public.

The responsibility of the safety is on the licensee. When things are to be decided later a general understanding of the safety needs to be available. The known related "open" issues must be solved by the partial license application. New issues cause a need to re-evaluate the construction licence. The manufacturing of large components may start before the licencing phase but must be approved by the regulator in beforehand. The licences may include clauses which may e.g. contain points for documentation or reporting as well as surveillance tasks.

The presentation slides can be found in Appendix 5.

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Zdeněk Típek presented the Czech practice. Czech has only one construction licence. The regulator issues the construction licence after a review that confirms that the design fulfils the regulatory requirements. National requirements are written in the Atomic act and implementing decrees. Regulatory guides exist where guidance on how to fulfil the requirements is given. The objective is to prove that the NPP is safe.

He also discussed the documents to be delivered with the application. He discussed the level of detail of the design. It should contain all the three levels: the plant, system and component levels. The detailed deterministic and preliminary probabilistic safety analyses are part of the PSAR and needed before the construction licence is issued. The licensee needs to review all the documents it provides to the authority. For later phases the licensee can leave data that do not significantly change the PSAR. All safety related documentation should be delivered within the application.

Nuclear safety and radiation project issues are covered by a licence granted by SUJB. Other regulatory bodies have their own licenses or permits. After the construction licence has been granted the oversight continues as normal oversight of an operating plant. At the time of construction of Temelin the regulatory system was different and SUJB got all the QA documents before the work started. Now the system has changed in order to strengthen the licensee's responsibility. The authority no longer approves all the documentation but still reviews them. The conformance with the accepted design basis should be demonstrated by the licensee to the regulator. He also gave a detailed and realistic example using the Temelin NPP case.

The source of requirements on NPP design are the national legislations, the IAEA requirements and guides, the WENRA reference levels and the various groups of standards. The sources should be analysed by the licensee, the vendor and the manufactures, and it should be presented in the PSAR. A complete, logically arranged set of requirements should be prepared covering all important aspects of nuclear safety. One set of standards per discipline or branch should be used.

The presentation slides can be found in Appendix 6.

Sylvie Cadet-Mercier started her presentation with describing the French practices. So far there is only one licensee in France. France doesn't have a decision in principle. There is a new procedure for a proposal of a new licensee. In this new procedure an optional phase of safety options of the installation exists on which ASN gives its position. The final step is the decree giving the authorisation for creation of a new licensee. If something needs to be changed in the decree, the whole process needs to be started over. Since the process includes a public enquiry this is not wanted. Therefore, all the key elements of new licensee project need to be in the decree. The decree is granted by the government. Once the decree is given the applicant becomes a licensee and all the regulations are applied. In the operating phase, there is a unique decision with an application for the end of installation start-up on which there will be an ASN resolution.

For the authorisation for creation the following information is needed:

- the preliminary safety case
- the impact assessment
- the risk control study

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- the decommissioning plan.

She discussed in detail the objectives of the PSAR and its content. In France, the licensee is involved in the design of the plant. She also used the EPR as an example when discussing the level of detail and the evaluation.

Considering the question on what open issues may be solved at later phases she stated that there are two clearly different steps which have different requirements. This is especially clear in organisational aspects. Prescriptions can be adopted for issues to be solved at a given time. The manufacturing is also approved in two phases: materials procurement and the manufacturing itself. The procedure is applied for all pressure equipment although graded approach is applied. The requirements in the order were revised in 2018 in order to strengthen the link between the manufacturer and the licensee. At this stage the responsibility is by the manufacturer. She also listed other regulatory approvals needed before the start of construction and component manufacturing. There are around 12 to 16 of these.

There are no partial licences, but specific hold points can be defined. They are not used very often because lifting them needs very detailed information from the operator. Instead for e.g. the EPR, quarterly information is required for the authority to be able to control the construction. She discussed the continuation of the oversight after the construction license both from the licensees and the regulators viewpoint.

The presentation slides can be found in Appendix 7.

Lennart Carlsson presented the Swedish process. In 2011 Sweden was discussing new build in Ringhals. In Sweden, the government is only involved in the decision on the application for permit. After that the applications are handled by the radiation safety authority, SSM. He described the permit examination process as well as the steps after the permit in more detail. SSM is developing the regulation but has not been very active in the licensing questions. The approval process was applied to the spallation plant although it is not really a nuclear facility

The purpose of the construction licence is to do a stepwise review of a more developed PSAR than in the permit phase. The reference plant provides a steadier base on which to stand. The review should check that the regulations for safety, radiation protection and physical protection can be applied to the design and layout. The licensee should know and understand that they are responsible for the safety of the plant. If open issues exist during the construction phase there should at least be various options to do this according to the regulations. The oversight should continue during the construction and after the construction phase.

The presentation slides can be found in Appendix 8.

Ralph Schulz presented the Swiss process. The new-build projects in Switzerland were cancelled in 2011. Consequently, ENSI doesn't have recent experience with the licensing process for a new NPP. The construction licence as well as the operating licence are granted by the Federal Department of Environment, Transport, Energy & Communications based on ENSI's Safety Evaluation Report. Some contradicting requirements have been recognised in the Swiss Nuclear Energy Ordinance: on one

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hand the application should stay on concept level, on the other hand the assessments require data to small details.

He continued by describing the 4-steps process for the licencing. The process is the same for both the whole NPP as well as for component-level approval. He gave examples on the documentation needed for the plant documentation: the overall plant documentation (G-documents), the system engineering documents (S-documents) and civil engineering (B-documents). He also discussed the required documentation in quality management and the PSA.

The tables used for the examples would be interesting also in the other areas (not shown here). He was asked to provide such tables after the meeting.

The presentation slides can be found in Appendix 9.

STUK's summary: Tomi Routamo presented STUK's general observations on the topic. The presentations and the discussion around them were valuable for STUK. The partial licencing used in Germany was new as a concept. On the expectations of the readiness no strict criteria were presented. Such criteria may be difficult to define clearly on beforehand. However, no major open issues should be left for the construction phase, or at least it should be identified what cannot be changed in a later phase. It was clear that only the conceptual level is not adequate. The regulator should leave freedom to the licensee to bear the responsibility and make justified proposals. A reference plant could be a clear starting point. However, a different regulatory frame may make it difficult to use the reference plant directly. The differences between the reference plant and the design of the application should be clearly stated. A structured way of reviewing how the top-level requirements are implemented in the system design seems very useful. Very valuable was also to identify at an early phase the standards to be used.

The summary slide can be found at the end of Appendix 4

Additional remarks of the discussion

In the last years, the organisational structure and management has become more and more important. This would be a topic to be addressed if new project would start in Germany. The regulator should be in the position to check this in an early phase. Things prone to problems relate to quality issues.

Configuration management is needed during the construction phase. This becomes especially important if all details cannot be obtained in the beginning of the project. If the configuration management does not exist, you might get lost somewhere during the work. Some designs are trying to go into a direction that enable modifications in a later stage e.g. not having to move walls in order to fit larger or more components in a certain room. If reference plants are used, the differences in the requirements and the modifications needed should be identified very early. Each actor has its mission and role, and this should be respected. The regulator should not act as a designer or a TSO.

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There are clear expectations for the safety analyses in an early state of the licensing. A lot of information, although preliminary, is needed to enable a meaningful safety analysis.

Partial construction license or early hold points seem interesting. The licensee's ultimate responsibility should be emphasised in Finland. There is a huge set of standard families. The designer should select and clearly state at an early phase which standards and requirement should be applied to the design and to which level.

6 Any other business

No other business.

7 Next meeting

The next meeting will be on Thursday October 8, 2020 at STUK.

8 Closing of the meeting

The chair closed the meeting at 17:20.

Distribution: RSC members, NSAC members
PT, KiA, JHe, ToR, TV, JN, KW, NL, PSa

Appendices

1. RSC meeting 1/2020 agenda
2. RSC Meeting January 2020 KiA, presentation slides by Kirsi Alm-Lytz
3. Status of KELPO and LARAVA projects, presentation slides by Tapani Virolainen
 - 3b. Amount of oversight work done in various RSC countries, note by Karin Rantamäki
 - 3c. Manhours ENSI, presentation by Ralph Schulz
4. 20200129 - RSC - Design maturity in the CL, presentation slides by STUK
5. RSC January 2020 Donderer, presentation slides by Richard Donderer
6. STUK RSC 2020 I SUJB, presentation slides by Zdeněk Típek
7. RSC_design maturity_janv_27_2020-SCM, presentation slides by Sylvie Cadet-Mercier
8. STUK meeting 2020 01 29 -LC, presentation slides by Lennart Carlsson
9. Construction Licence ENSI, presentation slides by Ralph Schulz