



STUK's views on operating experiences from construction and commissioning phases of Olkiluoto 3

Olkiluoto 3: Safety Control

Teollisuuden Voima Oyj has built the Olkiluoto 3 nuclear power plant in Olkiluoto, Eurajoki. Olkiluoto 3 is based on the European Pressurised Water Reactor (EPR), a concept developed in French-German collaboration.

OL3 regulatory control at STUK

- 480 person-years
- Over 100 experts
- Several thousand inspections in approx. 30 countries
- Over 10,000 on-site inspections
- Over 24,000 applications



- 2000 TVO's application for a decision in principle
 - 2001 STUK provides the Government with a statement of the preliminary safety assessment.
 - 2002 The Parliament approves the Government's decision in principle on the building of OL3.
 - 2004 TVO submits an application for a construction licence. STUK initiates a safety assessment.
 - 2005 STUK's statement on the application for the construction licence. The Government grants the construction licence.
 - 2006 STUK supervises construction work at Olkiluoto and the manufacturing of various components in different countries, e.g. the manufacturing of a reactor pressure vessel in Japan.
 - 2011 After the Fukushima accident, particular attention is paid to the impact of extreme natural phenomena. After stress tests, STUK states that the planning of OL3 has already factored in such phenomena.
 - 2014 STUK supervises: the results of the containment building's pressure and leakage tests are as expected.
 - 2015 STUK supervises the testing of automation in Germany.
 - 2016 TVO submits an application for an operating licence.
 - 2019 STUK's statement on the operating licence. The Government granted the operating licence to OL3.
 - 2021 STUK granted the fuel loading permit in March and permit for making the reactor critical in December. Nuclear commissioning starts.
 - 2023 OL3's regular electricity production starts
- STUK's regulatory control at Olkiluoto continues throughout the plant's entire life cycle, all the way from decommissioning to final disposal.
- 20XX Decommissioning commences.

OL3 Project

- The construction and licensing project of OL3 has been a unique learning process to all parties
- Construction of OL3 was challenging project, because
 - it was the first EPR being ever constructed when the project was started;
 - its construction started after a long break after the previous NPP project in Europe which has resulted gradual loss of experienced engineering and production facilities
 - original schedule for a plant that is first of its kind and larger than any NPP built earlier was too ambitious - inadequate completion of design and engineering work prior to start of construction
- Due to the previous factors, there was needs to some re-manufacturing and repairs.
- These and other deviations have been detected and corrected with a high sensitivity because of multiple quality control by manufacturers, vendor, licensee, 3rd party and STUK.

An example from OL3: Concreting the reactor building base slab 2005

Photo: TVO



- Multiple organizations participated in specifying and testing the concrete mixture, as well as in the preparation and conducting the concreting of the reactor base slab during 2005. The regulator followed the process carefully.
- However, the concrete composition was changed during the pouring (to prevent repeated pump clogs and to prevent drying of the concrete during the work, the casting joints).
- Information about the change in the concrete mixture was conveyed to the licensee and to the regulator months later (when the results from the quality of the final concrete arrived)
- Vivid discussion and argumentation on whether the quality requirements were adequately followed, and if all parties understand the principles of nuclear safety.

Investigation report: Management of safety requirements in subcontracting during the Olkiluoto 3 nuclear power plant construction phase:

- Lack of shared understanding concerning behavioural / work practice expectations in the nuclear industry: adherence to rules and procedures, prompt reporting of deviations and safety concerns, continuous learning...
- Licensee's overall responsibility and the priority of safety in decision making needs special attention in the project environment.
- Competence and training needs should be identified early on.

Several corrective actions

Operating experiences during construction and commissioning of OL3

(1/2)

Licensee and plant supplier have a systematic way of sharing the design and operating experiences of EPR-units.

STUK has had co-operation with other regulators and operating experiences of other EPR-units have also been shared in this forum

- Co-operation with other regulators is also a good possibility to benchmark requirements, findings and coverage of the review and inspection work

Operating experiences during construction and commissioning of OL3

(2/2)

Several plant modifications were needed for all EPR-units based on the operating experiences, example from the commissioning tests:

- OL3 surge line vibration:
 - Before fuel loading, during the OL3 hot functional tests, was detected high vibration level of surge line. Surge line is the pipeline between the pressurizer and primary circuit loop.
 - Required several additional analyses, tests and plant modification for all EPR-units
 - STUK shared the information with other authorities about the findings, requirements, progress and followed the investigation of other EPR-units.
 - All safety important information is necessary to share with other operators to ensure safety of nuclear power plants.

During the project, practices (incl. procedures) were developed based on the operation experiences and findings from the investigations.

