Säteilyturvakeskus YVL-ohje YVL 1.13
Finnish Centre for Radiation and Nuclear Safety
YVL Guide
9 May 1985 1 (14)

Second, revised edition

Translation

REGULATORY INSPECTIONS RELATED TO SHUTDOWNS AT NUCLEAR POWER PLANTS

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Helsinki 1986
Government Printing Centre

ISBN 951-47-0075-9
ISSN 0783-232X

PL-P.O.BOX 268
SF-00101 HELSINKI
FINLAND

Ydinturvallisuusosasto
Department of Nuclear Safety
Kalevankatu 44

Puh.-Tel.
(90) 616 71

Telex
122691 STUK SF

STUK 41.01 1985

8085035600 — 12/6354/PTP

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1 GENERAL

The regulatory inspections related to repair, maintenance and refuelling shutdowns at nuclear power plants is a part of the nuclear power plant regulation undertaken by the Finnish Centre for Radiation and Nuclear Safety (STUK). The purpose of the inspections is to assure that the work to be performed during the shutdown is carefully planned, done in accordance with relevant plans and approved procedures, documented properly, and the plant is in an acceptable condition upon completion of this work. The regulatory activities of STUK include inspections of both administrative controls and individual work performances.

This guide deals with the general arrangements for supervision during shutdowns and the prerequisites for start-up. Requirements concerning individual repairs, modifications and maintenace operations, as well as the related inspections, are described in Guide YVL 1.8.

2 NOTIFICATION OF SHUTDOWNS

In accordance with Guide YVL 1.5, a notification of a shutdown is given in a monthly report or in a daily report as soon as the need for a shutdown has become apparent and a preliminary date has been set out. Changes to the plans are reported in subsequent reports.

STUK shall be notified of refuelling outages at least two months in advance, as provided in Guide YVL 6.11.

If the shutdown must be initiated unexpectedly after a transient, the representatives of STUK shall be immediately notified thereof by telephone and, during office hours, by telex.

In connection with the notification of a shutdown, the licensee is required to provide a list of the work to be

performed during the shutdown or to inform STUK when and how such a list will be presented.

3 DECISIONS OF THE FINNISH CENTRE FOR RADIATION AND NUCLEAR SAFETY RELATIVE TO SHUTDOWNS

On the basis of a review of documents and other control measures, STUK will issue the following decisions to the power company on written application:

- decision on the radiation protection plan, when necessary (section 4.1.2)
- decisions on the emergency plan, physical protection and fire protection, when necessary (section 4.1.3)
- decision on refuelling in refuelling outages (section 4.2)
- decisions on the reports concerning the behaviour of the reactor and fuel in the next operating cycle (section 4.3)
- decisions on individual repairs, modifications and maintenance operations, as provided in Guide YVL 1.8 (section 4.4)
- decision on the start-up (section 4.5).

4 DOCUMENTS TO BE SUBMITTED TO THE FINNISH CENTRE FOR RADIATION AND NUCLEAR SAFETY

4.1 Documents concerning administrative controls

The documents listed below concerning the administrative controls of refuelling outages and other extensive planned shutdowns must be submitted to STUK for review not later than one week before the commencement of the operations that will be carried out during the shutdown.

The corresponding documents on unexpected repair and maintenance shutdowns shall be drawn up as quickly as possible to the extent agreed upon separately.

If some of the documents concerning administrative controls have already been submitted to STUK separately, a reference to these documents is regarded as sufficient.

4.1.1 General description of shutdown

A general description of refuelling outages and other extensive planned shutdowns is submitted to STUK for information. It contains the following data:

- the main schedule of the shutdown, including the data on critical operations with respect to the schedule, the timetables for shutdown and start-up, and the topical, more detailed timetables
- a work list, indicating the work to be performed during the shutdown. The list shall include at least the following operations
  - inservice inspections as per Decree on Pressure Vessels and Guide YVL 3.8
  - performance tests of safety relief valves
  - tests and inspections of systems and components, as provided in the Technical Specifications
  - maintenance work
  - repair work
  - modification work
- description of the removal of residual heat from spent fuel, of the components available in the systems needed therein, and their power supply, including any temporary couplings in the various phases of the shutdown
- organization, authorities and responsibilities for the shutdown, including relevant instructions
- plan on the use of the power company's own and outside personnel.

A preliminary description of the main schedule and the most important operations to be performed during the shutdown, including the latest work list, shall be submitted to STUK two months in advance of the commencement of the planned shutdown.

4.1.2 Radiation protection

A radiation protection plan for refuelling outages and other extensive planned shutdowns shall be submitted to STUK for approval. The radiation protection plan provides information on

- special arrangements for radiological protection during the shutdown, such as monitoring of radiation doses received by any specific group of workers or resulting from any specific operation, measures taken to contain the spread of contamination, access control, setting up coffee and lunch rooms, etc.
- persons participating in radiation protection and the arrangement of work in the various phases of the shutdown
- handling of the wastes accumulated or produced during the shutdown
- description of the operations for which a collective dose exceeding 0.1 manSv is predicted.

The plan is supplemented with an estimate of the number of persons who will be working in the controlled area.

If the plan on the special arrangements for radiological protection during shutdowns has been approved permanently, and there is no reason to deviate from it, reference can be made to this plan. The rest of the above data can be submitted to STUK for information.

4.1.3 Emergency plans, physical protection and fire protection

For refuelling outages and other extensive shutdowns, the licensee shall prepare and submit to STUK for approval separate plans concerning emergency preparedness, physical protection and fire protection. If the plans do not deviate from the documents that have already been sent to STUK, they need not be submitted again but they can be referred to in the general description mentioned in section 4.1.1.

4.2 Application for refuelling

The application for refuelling shall be submitted to STUK for approval not later than two weeks before the planned commencement of refuelling. The application shall include

- the reloading plan
- a description of the core configuration and the location of the fuel in the plant before and after reloading as well as the fuel transfer plans including the sequence of operations
- a work and inspection plan for fuel and control rods
- a schedule specifying the sequence of the refuelling and related operations as well as other work to be performed in the reactor hall
- reference to the relevant instructions on the reloading and handling of fuel and to the plans on emergency preparedness and physical protection.

If so required in the decision on refuelling given by STUK, the reloading cannot be commenced until the protocol drawn up by STUK has been provided with a positive inspection result. The protocol is not drawn up until the above-mentioned document and the fuel bundles to be placed in the reactor have been approved and the power

company has ascertained that the plant is in the proper condition for reloading.

4.3 Behaviour of reactor and fuel

Separate reports on the behaviour of the reactor and fuel in the next operating cycle shall be submitted to STUK for approval. The reports shall be delivered not later than two weeks before the planned closing of the reactor pressure vessel head.

4.4 Repairs, modifications and maintenance

The documents concerning individual repairs, modifications and maintenance operations are submitted to STUK as per Guide YVL 1.8.

4.5 Application for start-up

A decision issued by STUK on the start-up of the plant unit is needed after refuelling outages, after other shutdowns specified by STUK and also when the Technical Specifications so require. For this purpose, an application for the start-up of the plant unit is submitted to STUK about one week before the planned start-up. The application includes a list of the important events and discoveries that have come up during the shutdown, any deviations revealed by inspections and affecting the start-up, as well as other issues that are important to the start-up of the unit. In addition, the application contains the following information:

- unfinished work, tests and other matters affecting the start-up,
- summary of the inspections performed in accordance with Guide YVL 3.8,
- summary of the results of tests and inspections included in the Technical Specifications.

When necessary, the application can be supplemented with additional data before the end of the shutdown.

5 REGULATORY INSPECTIONS DURING SHUTDOWNS

5.1 Refuelling outages and comparable extensive shutdowns

The Finnish Centre for Radiation and Nuclear Safety inspects the activities at the power plant during shutdowns by conducting audits, which involve especially

- the plant shutdown and start-up procedures,
- refuelling work and inspections of fuel
- tests and inspections of systems, structures and components, as well as repairs, modifications and maintenance work,
- arrangements concerning radiation protection, emergency preparedness, physical protection and fire protection.

The Finnish Centre for Radiation and Nuclear Safety conducts the audits either regularly or to the extent deemed necessary, as provided by the various YVL Guides and decisions by STUK.

The following requests for inspection shall be submitted to the Finnish Centre for Radiation and Nuclear Safety:

- A request for the inspectors needed daily for inspecting pressure vessels and mechanical components shall be made by telex to STUK. If inspections have to be conducted, or if a STUK inspector needs to be prepared (on call) for inspections outside normal office hours, the request shall include the necessary data for this (number of inspectors, times). The request shall be delivered to STUK at the latest on

Thursady for inspections to be conducted during the weekend or the coming week.

- The request for the commissioning inspections of electrical and instrumentation equipment for the coming weekend and week shall be delivered to STUK not later than Thursday.

The Finnish Centre for Radiation and Nuclear Safety shall be presented with the following notifications of the individual actions to be taken during the shutdown:

- The times of the inservice tests presented in the Technical Specifications and mentioned in a separate decision and the times of the test runs relating to the system modifications specified in Guide YVL 1.8. STUK shall be notified of the tests by telex on the previous working day (Monday - Friday) by noon, at the latest.
- The actions concerning fuel shall be reported in the way described in the pertinet YVL guides.

The Finnish Centre for Radiation and Nuclear Safety witnesses the assembly of the reactor internals and the closing of the reactor vessel head. The reactor vessel head can be closed after STUK has accepted the descriptions on the behaviour of the reactor and fuel in the next operating cycle and after the protocols compiled by STUK on the reactor vessel and nuclear materials have been provided with a positive inspection result.

The protocol on the reactor vessel cannot be drawn up until the power company has presented a representative of STUK with the preliminary results of fuel inspections. The discoveries made in connection with the inspections of the reactor vessel and its internals, as well as any other factors affecting the closing of the head, are taken into account in compiling the protocol.

The protocol on nuclear materials cannot be drawn up until STUK has inspected the nuclear material inventory of the plant. This also includes the inspection of the core configuration.

Prior to the issuance of the start-up permit, STUK ascertains that all the operations mentioned in the work list and the related inspections, as well as the tests and inspections referred to in the Technical Specifications, have been completed as required and that there are no other deficiencies that would impede the start-up of the plant. If so required in the decision on the start-up permit by STUK, the start-up cannot be commenced until the relevant protocol drawn up by STUK is provided with a positive inspection result.

5.2 Unplanned repair shutdowns

For unplanned shutdowns, the power company shall keep a list of work that is intended to be carried out during the next hot or cold shutdown. STUK is notified of an unplanned shutdown in accordance with section 2. The updated lists are delivered to STUK and to the STUK office on the power plant site without delay. STUK will announce the requirements concerning inspections and control as soon as it has received the information on the work to be done.

6 REPORTING TO THE FINNISH CENTRE FOR RADIATION AND NUCLEAR SAFETY

6.1 Shutdown report

The report, the contents of which depend on the extent of the shutdown, is submitted to STUK for information after a completed shutdown. On unplanned maintenance shutdowns the report is delivered to STUK within two weeks, and on refuelling outages and other comparable shutdowns within

three months after the termination of the shutdown. The report includes the following information:

- general description of the shutdown and the actual timetable
- technical and administrative implementation of the shutdown when compared with the plans
- the principal operations carried out by the various maintenance units and the discoveries made
- summary of tests and inspections.

6.2 Results of tests, inspections and maintenance

The following reports on the tests, inspections and maintenance performed on systems, structures and components shall be delivered to STUK:

Inspections of fuel and control rods

- A report on the inspections of fuel and control rods shall be submitted to STUK for information within two months after the completion of the inspection.

Inservice inspections as per Guide YVL 3.8

- A summary report on the results of the inservice inspections conducted according to Guide YVL 3.8 shall be submitted to STUK for approval within three months after the completion of the inspections.

Leak tests of the containment system

- A report on the periodic tests of the containment, the containmet sublevels, isolation valves and other penetrations shall be submitted to STUK for

approval within three months after the termination of the shutdown.

The reports on the test runs relating to repairs, modifications and maintenance shall be submitted to STUK in accordance with Guide YVL 1.8.

Reports on other tests, inspections and maintenance are delivered to STUK only if they have been specifically requested for.

6.3 Radiation protection

A summary report on the implementation of radiation protection during refuelling outages and other extensive shutdowns shall be submitted to STUK for information within two months after the termination of the shutdown. The report is compiled applying the instructions given for annual reports.

6.4 Nuclear material reports

The reports and notifications concerning the control of nuclear materials shall be delivered to STUK in accordance with Guide YVL 6.11.

6.5 Events and discoveries during the shutdown

Events and discoveries during the shutdown shall be reported to STUK in accordance with Guide YVL 1.5.

7 LITERATURE

7.1 Guides issued by the Finnish Centre for Radiation and Nuclear Safety

YVL 1.5 Reporting nuclear power plant operation to the Finnish Centre for Radiation and Nuclear Safety

YVL 1.8 Repairs, modifications and preventive maintenance in nuclear facilities

YVL 3.8 Nuclear power plant pressure vessels. Inservice inspections

YVL 6.3 Supervision of fuel design and manufacture

YVL 6.11 Reporting on nuclear materials

In the event of any differences in interpretation of this guide, the Finnish version shall take precedence over this translation.