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

PREINSPECTION OF NUCLEAR POWER PLANT SYSTEMS

1 GENERAL

The general plans of the systems affecting the safety of the nuclear power plants are accepted by the Institute of Radiation Protection (IRP) on the basis of the preinspection of the systems. This is the prerequisite of the preinspection of the structures and components belonging to these systems. Exceptionally, when separately agreed, the IRP may perform the preinspection of a separate structure or component, although the preinspection documentation of the whole system, e.g. the nuclear heat generating system, has not been accepted.

The preliminary safety report together with the preinspection explanations concerning one system forms the documentation supposed to be included to the final safety report. When applying for the preinspection of a system it is not necessary to deliver separately explanations concerning one system to the IRP if they have been presented in the scope meant by this guide in the preliminary safety report or in other documents.

2 SCOPE

This guide applies to the nuclear power plant systems that have been defined to be preinspected in the classification document accepted by the IRP.

3 DOCUMENTS

For preinspection the applicant shall provide the IRP as stated in YVL 1.2 with the documentation pertaining to the system in question. The document shall have a front flyleaf in conformance with the guide YVL 1.2. Subsystems of a separate system may, when needed, be taken for handling separately, if the document concerning the subsystem comprises sufficient explanations about the wholeness to which the subsystem belongs.

The document contains the following explanations whose grouping may differ from that presented below and whose scope depends on the safety class.

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3.1
Definition of the system

The definition of the system contains an explanation of the purpose of the system and a simplified functional scheme that reveals the limits of the system, the distribution to subsystems, and the connection with other systems. The main components shall be named.

3.2
Design bases of the system

Design bases are

- performance requirements of the system in operating and accident conditions and the initial values or the design parameters derived from these requirements (e.g. mechanical strains, temperature, pressure, radiation level, etc.)
- operating environment of the system and design requirements derived from these.
- operating range and structural material requirements for the components.
- criteria, standards, codes, etc.

3.3
Description of the system

In the description of the system there shall be concentrated upon the essential matters related to safety. The documentation shall be so wide that it contains the basic information needed in the analysis of the system. The scope of the documentation also depends on whether a whole new application or an established solution is in question. The description of the system contains

- functional schemes of the system that indicate limits of the system and connections with other systems and descriptions about separate operating conditions with their process parameters.
- an explanation of the functioning of the system in the separate operating conditions with their process parameters.
- an instrumentation explanation that shall include a description of control and protection systems associated with the system. The instrumentation may be presented, depending on the nature of the system, also in connection with the functional scheme, but shall be presented separately when needed.

- location drawings and location explanations that reveal the structure, assembly, and location (in separate rooms) of the system and how special requirements for the systems, structures, and components such as location requirements presupposed by the pressure vessels, radiation control, and air conditioning zone, leakage collecting, and maintainability have been taken into account.

- a list of the main components important to safety with their design data.

- explanations of how external accidents and disadvantages (missiles, floods, fires, etc.) have been taken into account.

3.4
Analyzing of the system

The analyzing of the system shall reveal that the system operates according to the design basis taking into account the safety aspects. The analyzing of the system contains a functional analysis and concerning the most important systems a failure analysis, a reliability analysis and possibly also a strength analysis and an explanation of the applicability of the material to the purpose in question.

The functional analysis shows that

- the system operates according to its purpose.

- the system and its parts have been designed with sufficient safety margins.

The failure analysis contains

- an explanation about the probabilities and effects of possible failures of different degrees to the safety of the system and the plant (an accident analysis).

- an identification of possible failures (system failures, operational faults, external disturbances).

The reliability analysis shows that the redundancy and fail safe requirements have been fulfilled. The explanations may contain e.g. a reference to the operational experiences.

The strength analysis or calculations are presented concerning the whole system. The stress states in separate parts of a structure caused by separate loads, and the conclusions made on the basis of these, are presented in the strength analysis. The strength analysis may contain e.g. a vibrational analysis. The strength explanations of some components, e.g. pressure vessels, are supplied separately.

3.5
Quality assurance of the system

In the quality assurance documents there are explained the measures whose purpose is to verify that the system, its structures and components are designed, constructed, installed, and tested in accordance with the predefined requirements. The detailed quality assurance explanations of a component are supplied in connection with the preinspection of the component if this is presupposed. In the quality assurance documents there are presented

- an organization explanation that reveals the parties responsible for the design, manufacturing, installation, and start-up operation of the system. The responsibility areas are defined, the realizing of the qualit assurance is explained, and possible experts used in separate phases are named.

- possibilities to perform inspections and tests after the installation and during the operation.

- timetable explanations in the scope presupposed by the design, manufacturing, installation, and start-up operation.