INSTITUTE OF RADIATION PROTECTION

GUIDE YVL 1.5

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

REPORTING NUCLEAR POWER PLANT OPERATION TO THE INSTITUTE OF RADIATION PROTECTION

1 GENERAL

In order to be able to supervise that nuclear power plants are operated safely, the Institute of Radiation Protection (IRP) presupposes to receive from the plant owners reports concerning the operation.

This guide presents a summary of the reports required. More exact instructions concerning each report are given other in this guide or in other YVL-guides referred to.

2 REPORTS REQUIRED

Daily reports

The daily report is compiled and mailed to the IRP daily. Reports to be compiled during week-ends and holidays are mailed not later than the following workday. More exact instructions are given in this guide.

Annual reports

The annual report concerning the operation of the preceding calendar year is delivered to the IRP before the first of April of the following year. More exact instructions are given in this guide.

Environmental radiation safety reports

The report comprising the results of the preceding calendar year is sent to the IRP before the first of April of the following year. In addition, the results of the first half of the year are reported before the first of October. The environmental radiation safety reports give radioactive releases, spreading data, dose calculations, and the results of radiation monitoring based on environmental measurements. More exact instructions are given in guide YVL 7.8.

Postadress
P.O. BOX 268
00101 HELSINKI 10
FINLAND

Telephone
659588

Telex
122691 STL - SF

A4 75-2658 b/4

Reports concerning personal radiation doses

As a main rule personal dose data are quarterly reported for the central dose data bank held by the Institute of Radiation Protection.

Deviating from this, outer radiation doses are reported immediately after the working relation of a person expires, or a casual worker ceases to work. More exact instructions are given in guide YVL 7.10.

Reports concerning nuclear materials

For the accounting and control of nuclear materials the following documents are sent to the IRP

- accounting reports
- operational programmes and reports
- notifications related to the accounting and control
- special reports.

More exact instructions are given in guide YVL 6.11.

Summary reports of inservice inspections

The summary report concerning each inspection interval is delivered to the IRP not later than three months after the inspections are completed. More exact instructions are given in guide YVL 3.8.

Special reports

Special reports are compiled on exceptional occurrences or observations having safety significance. The most significant occurrences are immediately reported to the IRP using telephone or telex. A preliminary written report is annexed to the daily report. The final report is delivered in 30 days' time if the occurrence could not be adequately clarified in the preliminary report. More exact instructions are given in this guide.

3 DAILY REPORTS

The daily report is compiled on a form like Appendix 1. Special situations are preferably referred to with one sentence and the number of the special report.

Operating disturbances which have no direct safety significance, but call forth a reduced power, are briefly described. All trips of the reactor are also mentioned in this connection. For each reactor trip a form like Appendix 2 is filled. Each calendar year trip forms are numbered with a running ordinal number.

Radioactive releases are marked on the remark column if their mean value of three months is greater than two times the operational release rate, or if occasionally the operational release rate has been exceeded tenfold (compare guide YVL 7.1). In addition, observed small faults or some other noteworthy events can be mentioned on the remark column.

The compilation of the daily reports is commenced when the reactor gets critical for the first time.

4 ANNUAL REPORTS

The annual report is a comprehensive summary of the operating experience obtained during the year. Regarding the details earlier reports delivered to the IRP may be referred to.

Following matters shall be included in the annual report:

1. Operating data of the plant

   - gross thermal energy produced
   - gross electrical energy generated
   - net electrical energy generated
   - number of hours the reactor was critical
   - number of hours the generator was connected to the grid
   - capacity factor (the ratio between the net electrical energy generated and the energy which could be generated during a year with the planned not power)
   - outage rate (the decrease of the capacity factor due to operation disturbances or forced power reductions)
   - availability (that share of the year, which the plant has generated or could have generated electricity)
   - production diagram of the thermal and electrical power.

2. A list of the plant shutdowns and of those power decreases due to component faults which lasted over 4 hours and which have been more than 20 % of the design power of the plant. Power decreases related with normal service or inservice inspections are not presented in this connection. The list shall mention the following things:

   - day of occurrence
   - plant power before and after the power decrease
   - cause of the shutdown or power decrease
   - corrective actions
   - time which the plant was shutdown or at reduced power
   - number of possible special report.

3. Tests of systems and components

   - summary of component faults and functional deficiencies revealed at the tests carried out according to technical specifications.

4. Inservice inspections

   - summary of the faults exceeding the reporting limit and revealed at the inservice inspections of the components performed according to a programme approved by the IRP.

5. Use of the reactor and the fuel

   - monthly mean valves and monthly measured extreme values for the parameters characterizing the power distribution for the most important thermal parameters, and for power change rates
   - reactivity data immediately before the loading of the fuel
   - observed fuel damages.

6. Heat transients directed to different parts of the primary circuit

   - the number of those heat transients which have been used as the design basis of the parts of the primary circuit
   - greater or faster temperature changes than the transients assumed in the design.

7. Water-chemical condition of the primary circuit

   - mean monthly values of the parameters to be measured, and extreme values measured monthly.

8. Storing of liquid wastes

   - volumes and characteristics of the wastes collected into the storage, and the most important radionuclides contained in them.

9. Storing and transport of solid wastes

   - volumes and characteristics of the wastes collected into the storage, and the most important radionuclides contained in them
   - volumes and characteristics of the wastes removed from the plant site, and the most important radionuclides contained in them; storage site and form.

10. Radiation dose data

   - data of the integrated radiation doses of the workers; presented separately for permanent and casual workers, and for both groups the dose distribution between normal operation, routine services, special services, inservice inspections, waste disposal, and fuel handling
   - numbers of those persons belonging to the scope of radiation dose control, the annual radiation doses of whom are 0...0,5 rem, 0,5...1,5 rem, 1,5...3,0 rem, 3,0...5,0 rem, and over 5,0 rem
   - corresponding distribution of the doses caused by inner radiation
   - collective radiation dose of all persons who have worked in the plant during the year.

11. Changes in the technical composition of the plant and exceptional repair works during the annual maintenance

12. Changes in the permanent personnel of the plant

13. Changes in the safety analysis report, emergency plans, technical specifications, quality assurance programme and accounting and control system of nuclear fuel.

5 SPECIAL REPORTS

Special reports are compiled on unexpected occurrences or observations being safety related.

A special report can in most cases be compiled on a form like Appendix 3, and it can be supplemented with

another page according to Appendix 4. In case the IRP considers that the preliminary report does not suffice as clarification of the occurrence, it will also require a final report. Unless the IRP does not separately require a more throughout clarification, similiar forms may also be used in the final report as in the preliminary report.

Special reports are numbered with an ordinal number each calendar year. Reports describing the same occurrence are furnished with the same number as the first report, but after the number an alphabetacally running letter symbol is added.

The following is a list of examples of situations which presuppose compilation of a special report.

1. The releases of radioactive substances exceed the limit calling for measures by authorities (see guide YVL 7.1)

2. Automatic protective function has not started, although some parameter to be controlled has exceeded the protective limit specified in the technical specifications.

3. An abrupt activity increase of the reactor coolant due to fuel rupture, an exceptional leakage or weakening of the primary circuit, or weakening of the reactor containment thus that it does not meet the toghtness or strength requirements, has been observed.

4. A component fault has occurred which has led to a temporary interruption of the coolant circulation important to safety, or to exceptional spreading of radioactive substances inside the plant.

5. During the loading or some other handling of the fuel an accident leading to fuel damage has occurred.

6. An unplanned criticality or an increase of short duration of the neutron flux with a shorter period than 10 seconds has been observed in the reactor or outside of it.

7. A rare natural phenomenon or some other outward hazard upon the plant has caused a situation, where restriction of the power or some other protective action has been considered necessary.

8. Accidental loss of nuclear material has been observed in the nuclear material inventory, or it is otherwise reasonable to believe that nuclear material has vanished. In this case the report shall include the information mentioned in guide YVL 6.11.

9. A component fault has been noticed in the tests preventing a protective action or the function of a safety system in a manner assumed in the accident analyses.

10. Deviations have been observed in the operation of the components of systems which make the assumptions in the accident analysis unjustified or the data presented in the safety analysis report are clearly misleading.

11. The reactor multiplication factor observed in the stationary condition has deviated more than one per cent from the value anticipated for this condition.

12. A factor endangering the safety has been observed, which has not been taken into account earlier, but which calls for structural changes.

13. A damage of a pressure vessel has occurred or a leakage other than that from a sealing has been observed in a pressure vessel.

14. A structural weakening important to safety has been observed. As such is also regarded the weakening of the structure in a component less important to safety, if the same phenomenon can for the same reason appear in another component and thus endanger the safety.

15. During the inservice inspections a fault exceeding the reporting limit has been observed.

16. The plant has been observed to have been operated in a manner, which is not in accordance with the technical specifications e.g.

    - calculated level of reactivity has shown the reactor shutdown margin to be less than required.
    - some system has been cooled faster than allowed
    - due to a systematic measuring error the boron concentration in the boron solution tank has been less than allowed
    - after maintenance a safety system has been observed to be in state, where it had not performed its task in intended manner
    - the limiting values of the automatic protective function have been observed to be erroneously set.

17. Due to the technical specifications it has been necessary to lower the plant power.

18. A component fault or a functional deficiency has been observed during tests made according to the technical specifications.

19. The radiation dose of a certain person has possibly exceeded the dose limit. The report shall then include the data mentioned in guide YVL 7.10.

Of the before-mentioned examples 12 first ones are such that they pressupose immediate telephone of telex notification to the IRP.

Appendix 1

Nuclear power plant XX

Daily report

DISTRIBUTION	COMPILED BY (name and date)

REPORTING PERIOD

(date) o'clock - (date) o'clock

OPERATIONAL STATES DURING THE DAY	NET ELECTRICAL ENERGY GENERATED
☐ REFUELING ☐ COLD SHUTDOWN ☐ HOT SHUTDOWN ☐ COOLING ☐ HEATING ☐ HOT STANDBY ☐ SERVICE POWER ☐ POWER OPERATION	_____ MWh GROSS ELECTRICAL ENERGY GENERATED _____ MWh MEAN THERMAL POWER _____ MW
SPECIAL OCCURRENCES	REPORT No.
OPERATING DISTURBANCES	TRIP REPORT No.

REMARKS

Nuclear power plant XX

Trip report No._____

DISTRIBUTION	COMPILED BY (name and date)

TRIP OCCURRED _____(date)_____o´clock_____

CAUSE FOR TRIP OPERATIONAL STATE BEFORE TRIP	OPERATING DATA BEFORE TRIP REACTOR POWER _____% OF NOM. POWER GENERATOR POWER _____MW POSITIONS OF CONTROL RODS_____

DESCRIPTION OF OCCURRENCE

CAUSE FOR OCCURRENCE SERIES LEADING TO TRIP

ACTIONS TAKEN AND RE-START

REMARKS

Appendix 3

Nuclear power plant XX
Special report No.

☐ preliminary
☐ final
☐ see also App.4

DISTRIBUTION	COMPILED BY (name and date)

SPECIAL OCCURRENCE (primary occurrence with one sentence)

OBSERVED (date) o'clock

SYSTEM

COMPONENT

☐ influence on radioactive releases
☐ caused extra radiation dose
☐ caused other personal damages

OPER. CONDITION WHEN OBSERVED	MODE OF OBSERVATION	INFLUENCE ON OPERATION
☐ REFUELING	☐ CONTROL ROOM ALARM	☐ TRIP
☐ COLD SHUT DOWN	☐ CONTROL ROOM INDICATION	☐ OTHER SHUTDOWN
☐ HOT SHUTDOWN	☐ INSPECTION ROUND	☐ HOT STANDBY
☐ COOLING	☐ TEST	☐ SERVICE POWER
☐ HEATING	☐ MAINTENANCE	☐ POWER LEVEL ____ %
☐ SERVICE POWER	☐ INSERVICE INSPECTION	☐ CONTAINMENT ISOLATION
☐ POWER OPERATION	☐ OTHER:	☐ SAFETY SYSTEM START-UP
		☐ NO INFLUENCE
THERMAL POWER ____ %		
GENERATOR POWER ____ MW		

DIRECT CAUSE	INITIAL CAUSE	MEASURES
☐ CORROSION, EROSION	☐ DESIGN FAULT	☐ EXCHANGE OF FAULTY PARTS
☐ ABNORMAL WEARING	☐ MATERIAL FAULT	☐ EXCHANGE OF DEFECTIVE COMPON.
☐ UNBALANCE, FATIGUE	☐ MANUFACTURING FAULT	☐ REPAIR
☐ WATER SHOCK, PRESSURE SCHOCK	☐ INSTALLATION FAULT	☐ CLEANING, LUBRICATION
☐ HEAT MOTION	☐ MAINTENANCE FAULT	☐ DECONTAMINATION
☐ OVERLOADING	☐ OPERATION FAULT	☐ NEW SETTING, CALIBRATION
☐ FIRE, EXPLOSION	☐ ERRONEOUS WATER CHEM.	☐ CHANGE IN PROCEDURES
☐ GROUND CONTACT, SHORT-CIRCUIT	☐ INADEQUATE PROCEDURES	☐ OTHER:
☐ VOLTAGE DROP	☐ OTHER:	
☐ OTHER		

Nuclear power plant XX

Appendix to special report No._____

PROGRESS OF OCCURRENCES AND CONSEQUENCES

PROBABLE CAUSE OF THE FAULT

ACTIONS PLANNED OR TAKEN