



Revision 1  
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U.S. ATOMIC ENERGY COMMISSION

# REGULATORY GUIDE

DIRECTORATE OF REGULATORY STANDARDS

## REGULATORY GUIDE 1.16

### REPORTING OF OPERATING INFORMATION

#### A. INTRODUCTION

Section 50.36, "Technical Specifications," of 10 CFR Part 50, "Licensing of Production and Utilization Facilities," requires that each applicant for a license authorizing operation of a nuclear power plant include in his application proposed technical specifications. These technical specifications as approved by the AEC are incorporated into the facility license and are conditions of the license. The technical specifications for nuclear power plants include a section on reporting requirements. In addition to the reporting requirements necessary for compliance with the technical specifications of the license, there are specific reporting requirements included in Part 50 as well as in Parts 20, 40, 70, and 73 of Title 10. For the convenience of licensees, these specific reporting requirements are included in the reporting program described in this guide. Each report discussed in this guide is either required by AEC regulations or is normally specified in licensees' technical specifications. In some cases this program may need to be supplemented or modified because of unique plant design features or other factors. The need for a supplemental or modified program will be determined on an individual-case basis. The Advisory Committee on Reactor Safeguards has been consulted concerning this guide and has concurred in the regulatory position.

#### B. DISCUSSION

The information provided in the reports discussed herein should be sufficient to permit an assessment by the Commission of all safety-related activities during and following the startup of the facility.

In addition to those reports that relate to the safety of operation of the plant, the information on nuclear materials safeguards that must be reported pursuant to

the Commission's regulations is also included. The AEC Regulatory staff has reviewed the types of information needed. Based on this review and a review of licensees' current reporting programs, the staff has developed guidelines for such reporting. This guide presents an acceptable reporting program for power reactor licensees. Tables I and II of this guide are compilations of time limits or frequency intervals for submitting routine and nonroutine reports. Acceptable reporting programs for radioactive effluents and environmental monitoring are presented in Regulatory Guides 1.21 (Safety Guide 21), "Measuring and Reporting of Effluents from Nuclear Power Plants," and 4.1 "Measuring and Reporting of Radioactivity in the Environs of Nuclear Power Plants," respectively.

Significant differences in Revision 1 of this guide from Regulatory Guide 1.16 (formerly Safety Guide 16) dated October 27, 1971 are:

1. Extensive quoting of the Commission's regulations has been deleted. References to the appropriate portions of the Commission's regulations are included in Tables I and II of this guide.
2. For ease of reference the reporting summary table included in the original guide has been divided into two tables (Routine Reports and Nonroutine Reports)
3. Reporting requirements have been updated to reflect changes in the Commission's regulations and the reports required by the technical specifications.
4. Appendix A of this guide, "Standard Format for Reporting Abnormal Occurrences," has been added to give guidance to licensees submitting abnormal occurrence reports.

\*Lines indicate substantive changes from previous issue.

#### USAEC REGULATORY GUIDES

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The guides are issued in the following ten broad divisions:

- |                                   |                        |
|-----------------------------------|------------------------|
| 1. Power Reactors                 | 6. Products            |
| 2. Research and Test Reactors     | 7. Transportation      |
| 3. Fuels and Materials Facilities | 8. Occupational Health |
| 4. Environmental and Siting       | 9. Antitrust Review    |
| 5. Materials and Plant Protection | 10. General            |

## C. REGULATORY POSITION

The following reporting program should be used to implement the reporting requirements of 10 CFR Parts 20, 40, 50, 70, 73 and reporting requirements imposed by the AEC as license conditions, including those reports required by the technical specifications.

### 1. Routine Reports

#### a. Operations Reports<sup>1</sup>

(1) **Startup Report.** A summary report of plant startup and power escalation testing should be submitted following receipt of an operating license, following an amendment to the license involving a planned increase in power level, following the installation of fuel that has a different design or has been manufactured by a different fuel supplier, or following modifications that may have significantly altered the nuclear, thermal, or hydraulic performance of the plant. The report should include a description of the measured values of the operating conditions or characteristics obtained during the test program and a comparison of these values with design predictions and specifications. Any corrective actions that were required to obtain satisfactory operation should also be described. Startup reports should be submitted within (1) 90 days following completion of the startup test program, (2) 90 days following resumption or commencement of commercial power operation, or (3) 9 months following initial criticality, whichever is earliest. If the Startup Report does not cover all three events, i.e., initial criticality, completion of startup test program, and resumption or commencement of commercial power operation, supplementary reports should be submitted at least every three months until all three events are completed.

(2) **First Year Operation Report.** A report should be submitted within 60 days after completion of the first year of operation. This year begins on completion of all three events listed in C.1.a.(1). This report may be incorporated into the semiannual operating report and should cover the following:

(a) an evaluation of plant performance to date in comparison with design predictions and specifications;

(b) a reassessment of the safety analysis submitted with the license application if measured operating characteristics indicate that there may be substantial variance from prior analyses;<sup>2</sup>

(c) an assessment of the performance of structures, systems, and components important to safety;

<sup>1</sup> Reports in this category should be submitted in writing to the Director of the appropriate AEC Regional Operations Regional Office.

<sup>2</sup> Previously submitted safety analysis reports may be incorporated by reference.

(d) a progress and status report on any items identified as requiring additional information during the operating license review or during the startup of the facility, including items discussed in the AEC's Safety Evaluation Report and Supplements, items on which additional information was required as a condition of the license, and items identified in the licensee's startup report; and

(e) a report of measured in-plant radiation levels which are greater than those estimated in the final safety analysis report by a factor of two or more.

(3) **Semiannual Operating Reports.**<sup>3</sup> Routine operating reports covering the operation of the previous 6 months should be submitted within 60 days after January 1 and July 1 of each year. The initial report should be submitted within 60 days after the end of the first six-month period during which initial criticality took place. Each report should include the following:

(a) **Operations Summary.** A summary of operating experience occurring during the reporting period that relates to the safe operation of the facility, including a summary of:

(i) changes in facility design,  
(ii) performance characteristics (e.g., equipment and fuel performance),

(iii) changes in operating procedures which were necessitated by (i) and (ii) above or which otherwise were required to improve the safety of operations,

(iv) results of surveillance tests and inspections required by the licensee's technical specifications,

(v) the results of any periodic containment leak rate tests performed during the reporting period,

(vi) a brief summary of those changes, tests, and experiments requiring authorization from the Commission pursuant to 10 CFR 50.59(a), and

(vii) any changes in the plant operating staff for those positions designated as key supervisory personnel positions in the technical specifications.

(b) **Power Generation.** A summary of power generated during the reporting period including:

(i) gross thermal power generated (in MWT),

(ii) gross electrical power generated (in MWH),

(iii) number of hours the reactor was critical,

(iv) number of hours the generator was on line, and

(v) histogram of thermal power vs. time.

<sup>3</sup> A single submittal may be made for a multiple facility station. The submittal should combine those sections that are common to all facilities at the station.

(c) **Shutdowns.** Descriptive material covering all outages occurring during the reporting period. For each outage, information should be provided on:

- (i) the cause of the outage,
- (ii) the method of shutting down the reactor; e.g., trip, automatic rundown, or manually controlled deliberate shutdown,
- (iii) duration of the outage (in hours),
- (iv) plant status during the outage; e.g., cold shutdown or hot standby, and
- (v) corrective action taken to prevent repetition, if appropriate.

(d) **Maintenance.** A discussion of corrective maintenance (excluding preventive maintenance) performed during the reporting period on safety-related systems and components<sup>4</sup> and on systems and components that reduce or prevent the release of radioactive materials to the environs. For any malfunction for which corrective maintenance was required, information should be provided on:

- (i) the system or component involved,
- (ii) the cause of the malfunction,
- (iii) the results and effect on safe operation, and
- (iv) corrective action taken to prevent repetition.

(e) **Changes, Tests and Experiments.** A brief description and the summary of the safety evaluation for those changes, tests, and experiments, carried out without prior Commission approval pursuant to the provisions of 10 CFR 50.59(b).

(f) **Primary Coolant Chemistry.** A tabulation on a monthly basis of the maximum, average, and minimum values for the following primary coolant system parameters:

- (i) Gross radioactivity in  $\mu\text{Ci/ml}$ ,
- (ii) Suspended solids in parts per million,
- (iii) Gross tritium in  $\mu\text{Ci/ml}$ ,
- (iv) Iodine-131 in  $\mu\text{Ci/ml}$ ,
- (v) Ratio of Iodine-131 to Iodine-133,
- (vi) Hydrogen in cc per kg,
- (vii) Lithium in parts per million,
- (viii) Boron-10 in parts per million,
- (ix) Oxygen-16 in parts per billion,
- (x) Chloride in parts per million, and
- (xi) pH at 25°C.

<sup>4</sup>Those plant features necessary to assure the integrity of the reactor coolant pressure boundary, the capability to shut down the reactor and maintain it in a safe shutdown condition, or the capability to prevent or mitigate the consequences of accidents which could result in offsite exposures comparable to the guideline exposures of 10 CFR Part 100.

## (g) Occupational Personnel Radiation Exposure

(i) A tabulation of the number of occupational personnel exposures for plant operations personnel (permanent and temporary) in the following exposure increments for the reporting period: less than 100 mrem, 100-250 mrem, 250-500 mrem, 500-750 mrem, 750-1000 mrem, 1-2 rem, 2-3 rem, 3-4 rem, 4-5 rem, 5-6 rem, and greater than 6 rem.

(ii) A tabulation of the number of personnel receiving more than 500 mrem exposure in the reporting period according to duty function [e.g., routine plant surveillance and inspection (regular duty), routine plant maintenance, special plant maintenance (describe maintenance), routine fueling operation, special refueling operation (describe operation), and other job-related exposures.]

(iii) A tabulation annually of the number of personnel receiving more than 3 rem and the major cause(s).

(h) **FSAR Changes.** Submission of revised FSAR pages on a replacement page basis appropriately prepared for direct insertion into the applicable FSAR section and describing all safety-related changes in facility design, method of operation, revised safety or transient analysis, or facility equipment additions. Also a listing of effective pages by date of revision or revision number should be submitted.

b. **Additional Routine Reporting Requirements.** Table 1 lists routine reports required by 10 CFR Parts 20, 40, 50, and 70, including those listed in Regulatory Position C.1.a.

## 2. Nonroutine Reports

### a. Reporting of Abnormal Events

(1) **Abnormal Occurrence Reports.** A notification must be made within 24 hours by telephone and telegraph to the Director of the appropriate AEC Regulatory Operations Regional Office, (cc to the Director of Licensing) followed by a written report within 10 days to the Director of the appropriate AEC Regulatory Operations Regional Office in the event of an abnormal occurrence.

Appendix A of this guide, "Standard Format for Reporting Abnormal Occurrences," should be used as guidance when submitting abnormal occurrence reports.

Abnormal occurrences are defined in the definitions section of the licensee's technical specifications and usually include, as a minimum, items (a) through (h) of this paragraph.

(a) A safety system setting<sup>5</sup> less conservative than the limiting setting<sup>5</sup> established in the technical specifications.

(b) Conditions which result in a limiting condition for operation<sup>5</sup> established in the technical specifications not being met.

(c) Abnormal degradation of one of the several boundaries designed to contain radioactive materials.

(d) An unplanned or uncontrolled release of radioactive material from the site boundary.

(e) Uncontrolled or unanticipated changes in reactivity equal to or greater than 1%  $\Delta k/k$ .

(f) Incidents or conditions which prevented or could have prevented the performance of the intended safety function of an engineered safety feature system or of the reactor protection system.

(g) Observed inadequacies in the implementation of administrative or procedural controls such that the inadequacy causes or threatens to cause the existence or development of an unsafe condition in connection with the operation of the plant.

(h) Conditions arising from natural or man-made events that affect or threaten to affect the safe operation of the plant.

(2) **Reporting of Unusual Events.** A written report should be forwarded within 30 days to the Director of the appropriate AEC Regulatory Operations Regional Office, in the event of:

(a) Discovery of any substantial errors in the transient or accident analyses, or in the methods used for such analyses, as described in the Safety Analysis Report or in the bases for the technical specifications.

(b) Discovery of any substantial variance from performance specifications contained in the technical specifications or in the Safety Analysis Report.

(c) Discovery of any condition involving a possible single failure which, for a system intended to be designed against assumed single failures, could result in a loss of the capability of the system to perform its safety function.

#### **b. Additional Nonroutine Reporting Requirements**

Table II lists nonroutine reports required by 10 CFR Parts 20, 40, 50, 70, and 73, including those listed in Regulatory Position C.2.a.

<sup>5</sup> As defined in 10 CFR 50.36(c).

**TABLE I**  
**REPORTING SUMMARY—ROUTINE REPORTS**

Requirement	Report	Timing of Submittal
TS <sup>1</sup>	Startup	Within (1) 90 days following completion of the startup test program, (2) 90 days following resumption or commencement of commercial power operation, or (3) 9 months following initial criticality, whichever is earliest. If all three events are not completed, supplementary reports every 3 months.
TS	First Year Operation	Within 60 days after completion of the first year of operation.
TS	Semiannual	Within 60 days after January 1 and July 1 of each year.
§20.407	Personnel Exposure and Monitoring	Within first quarter of each calendar year.
§20.408	Personnel Exposure on Termination of Employment or Work	Within 30 days after the exposure of the individual has been determined or 90 days after date of termination of employment or work assignment, whichever is earlier.
§40.64(a)	Transfer of Source Material	Promptly upon transfer.
§40.64(a)	Receipt of Source Material	Within 10 days after material is received.
§40.64(b)	Source Material Inventory	Within 30 days after June 30 of each year.
§50.59(b)	Changes, Tests, and Experiments	Annually or at shorter intervals as may be specified in the license.
§70.53	Special Nuclear Material Status	Within 30 days after June 30 and December 31 of each year.
§70.54	Transfer of Special Nuclear Material	Promptly upon transfer.
§70.54	Receipt of Special Nuclear Material	Within 10 days after material is received.
Appendix G to 10 CFR Part 50	Fracture Toughness	On an individual-case basis at least 3 years prior to the date when the predicted fracture toughness levels will no longer satisfy the requirements of section V.B. of Appendix G to 10 CFR Part 50.
Appendix H to 10 CFR Part 50	Reactor Vessel Material Surveillance	Completion of tests after each capsule withdrawal.
Appendix J to 10 CFR Part 50	Reactor Containment Building Integrated Leak Rate Test	Approximately 3 months following conduct of test.

<sup>1</sup> Technical Specifications

**TABLE II**  
**REPORTING SUMMARY—NONROUTINE REPORTS**

Requirement	Report	Notification	Initial Written Report Within			
			10 days	15 days	30 days	3 mo
TS <sup>1</sup>	Abnormal Occurrence	Within 24 hours	X			
TS	Unusual Events				X	
§20.405	Overexposures and Excessive Levels of Radiation and Concentration of Radioactive Material				X	
§20.402	Theft or Loss of Material	Immediately			X	
§20.403(a)	Severe Accident Involving Licensed Material	Immediately				
§20.403(b)	Accident Involving Licensed Material	Within 24 hours				
§40.64(c)	Theft or Unlawful Diversion of Source Material	Promptly		X		
§50.59(d)	Authorization of Changes, Tests, and Experiments	X <sup>2</sup>				
§70.52	Accidental Criticality or Loss of Special Nuclear Material	Promptly				
§73.42	Unaccounted for Shipments, Suspected Theft, or Unlawful Diversion of Special Nuclear Material	Immediately		X		
TS	Special					X <sup>3</sup>

<sup>1</sup> Technical Specifications.

<sup>2</sup> AEC authorization is required prior to performing a change, test, or experiment in this category.

<sup>3</sup> Special reports covering inspections, tests, and maintenance that are appropriate to assure safe operation of the facility. The frequency and content of these special reports are determined on an individual case basis and designated in the Technical Specifications. Such reports include inservice inspection, tendon surveillance program study, fuel inspection, and containment structural tests.

## APPENDIX A

### STANDARD FORMAT FOR REPORTING ABNORMAL OCCURRENCES

The standard format for submission of abnormal occurrence reports (AOR) identifies the principal information that should be contained in a completed AOR and gives a format for presenting it. In the course of reviewing past AOR's the AEC Regulatory staff has found a wide variance in the type and detail of information reported. To assure that AOR's submitted are consistent both in format and in the principal

information included, the format for abnormal occurrence reports presented below should be used and the information requested should be submitted when applicable. If investigation is not complete by the time the initial report is submitted, the licensee should so indicate and give estimated time when a supplemental report will be submitted.

### STANDARD FORMAT FOR ABNORMAL OCCURRENCE REPORTS

Report Number: (1)

Report Date: (2a)

Occurrence Date: (2b)

Facility: (3)

Identification of Occurrence: (4)

Conditions Prior to Occurrence: (5)

- ☐ Steady-State Power
- ☐ Hot Standby
- ☐ Cold Shutdown
- ☐ Refueling Shutdown
- ☐ Routine Startup Operation
- ☐ Routine Shutdown Operation
- ☐ Load Changes During Routine Power Operation
- ☐ Other (Specify)

Description of Occurrence: (6)

Designation of Apparent Cause of Occurrence: (7)

- ☐ Design
- ☐ Manufacture
- ☐ Installation/Construction
- ☐ Operator
- ☐ Procedure
- ☐ Unusual Service Condition Including Environmental
- ☐ Component Failure
- ☐ Other (specify)

Analysis of Occurrence: (8)

Corrective Action: (9)

Failure Data: (10)

### NOTES TO AOR STANDARD FORMAT

1. **Report Number:** Abnormal occurrence reports should be numbered sequentially on a calendar-year basis for each facility (or each unit of a multi-unit site) using the facility (unit) docket number as the principal identifier (e.g., Docket Number/Year-Sequential Number in calendar year). Supplementary reports should be numbered using alphabetical identifying letters following the principal report number (e.g., Docket Number/Year-Sequential Number in calendar year-alphabetical letter identifying supplementary report.)
2. **Report Date:** Date of (a) report submitted and (b) occurrence.
3. **Facility:** Name and location of facility.
4. **Identification of Occurrence:** The abnormal occurrence should be identified by a short title which identifies the type of abnormal occurrence and the system, component, or event involved. (Regulatory Position C.2.a.(1) should be used as a guide for listing the type of abnormal occurrence.)

5. **Conditions Prior to Occurrence:** The applicable caption should be used followed by a description of plant status prior to the abnormal occurrence. Major plant parameters should be included.

6. **Description of Occurrence:** A chronological sequence of events should be described in an objective manner. The following should be included:

- a. Method of detection and time of detection.
- b. Step-by-step sequence of events identifying all protection system actions and operator actions to bring the situation under control.

7. **Designation of Apparent Cause of Occurrence:** The single apparent cause should be identified and narrated. When other causes contributed to the abnormal occurrence, the narrative of the apparent cause should discuss fully the single cause assigned and the contributing causes assigned.

8. **Analysis of Occurrence:** The abnormal occurrence should be analyzed for safety implications. The analysis of effects and the attendant consequences should include the following information, as applicable:

- a. Maximum and minimum conditions during transients.
- b. Equipment malfunction.
- c. Operator error.
- d. Damage to systems, components, and

structures.

- e. Personnel injuries.
- f. Personnel exposures.
- g. Quantity and composition of radioactive materials released.
- h. The consequences or potential consequences from the standpoint of public health and safety.

9. **Corrective Action:**<sup>1</sup> The following information should be provided:

- a. Corrective action taken (or to be taken) to correct the abnormal occurrence.
- b. Corrective action taken (or to be taken) to prevent repetition of the occurrence and of similar occurrences.

10. **Failure Data:** Where equipment failure is cause of the occurrence or equipment failed as a result of the occurrence, the following information should be provided:

- a. Record of previous failures and malfunctions of the affected systems and components or of similar equipment.
- b. Equipment identification (e.g., component, manufacturer, name plate data).

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<sup>1</sup>The cause of the occurrence is described in Item 7, "Designation of Apparent Cause of Occurrence," and the action taken to bring the situation under control is discussed in Item 6, "Description of Occurrence." These items should not be repeated in this discussion.