

BfS

SAFETY CODES AND GUIDES - TRANSLATIONS

Edition 10/82

Contents

Compilation of Information Required for Review Purposes
under Licensing and Supervisory Procedures for Nuclear
Power Plants

of 7 September 1982

Zusammenstellung der in atomrechtlichen Genehmigungs-
und Aufsichtsverfahren für Kernkraftwerke zur Prüfung
erforderlichen Informationen

vom 7. September 1982

**Bundesamt für Strahlenschutz
Salzgitter**

The German original of this translation was published in *Bundesanzeiger* 1983, No. 6a.

In case of discrepancies the German text shall prevail.

**Compilation of Information Required for Review
Purposes under Licensing and Supervisory
Procedures for Nuclear Power Plants
of 7 September 1982**

Contents

1. Foreword
2. Definitions
- 3.A Compilation of Information on the Site
- 3.B Compilation of Information on the Steel Containment Vessel of PWRs
- 3.C Compilation of Information on the Containment Vessel with Pressure Suppression System of BWRs
- 3.D Compilation of Information on the Reactor Core and Control Assemblies including their Drives
- 3.E Compilation of Information on the Reactor Coolant Pressure Boundary
- 3.F Compilation of Information on the Reactor Pressure Vessel Internals
- 3.G Compilation of Information on the Emergency Core Cooling and Residual Heat Removal Systems including the Heat Removal Chain
- 3.H Compilation of Information on the Reactor Coolant System Auxiliary Systems
- 3.I Compilation of Information on the Equipment for Handling and Storage of Fuel Assemblies
- 3.K Compilation of Information on the Systems for Handling and Storage of Other Radioactive Materials, and the Reactor Auxiliary Systems
- 3.L Compilation of Information on the Ventilation Systems
- 3.M Compilation of Information on the Water/Steam Plant
- 3.N Compilation of Information on the Steam Turbine Plant
- 3.O Compilation of Information on the Cooling Water Systems and Plant Auxiliary and Supporting System
- 3.P Compilation of Information on the Electrical Power Supply of the Safety System
- 3.Q Compilation of Information on the Alarm Systems, Staff Paging Systems and Telecommunication Facilities (Communication Systems)
- 3.R Compilation of Information on the Instrumentation and Control, Control Room, Emergency Control Station and Local Control Stations
- 3.S Compilation of Information on the Reactor Protection System
- 3.T Compilation of Information on Radiological Protection and Activity Monitoring

The precise scopes of application are specified at the beginning of each compilation. All compilations of information are structured according to the same category scheme. This scheme is given at the beginning of each compilation.

1. Foreword

In order to facilitate and standardize the performance of review required under licensing and supervisory procedures for nuclear power plants, those items of information have been compiled which as a rule are required by the competent authorities or by the authorized experts consulted by those authorities under § 20 of the Atomic Energy Act with regard to the review of the licensing prerequisites according to § 7, para. 2 of the Atomic Energy Act, or in the context of official supervision according to § 19 of the Atomic Energy Act, for the construction or operation of nuclear power plants. This information is needed by the authorized experts as a basis for the preparation of expert analysis reports under the licensing procedure or - if applicable - for the approval, and for the material tests and examinations, in-process and acceptance inspections and functional tests, within the scope of accompanying inspections. As far as the information has not yet been presented in the safety analysis report, and unless the licensing and supervisory authorities decide otherwise, the information is submitted to the experts consulted. The expert analysis reports of the authorized experts and further documents not specified in the compilations of information (e. g. on personnel qualification and reliability, or on plant physical protection) are the decision making basis of the licensing and supervisory authorities.

The various information is allocated to sections within the individual compilations of information; different phases of manufacture, construction and commissioning of the plant or individual systems were selected as categories and at the same time as section headings, and are basically arranged according to the time sequence of the reviews conducted in the licensing and supervisory procedures. The order in which the information is contained in the individual sections does not constitute a stipulation of the chronological order or the importance of the submission.

The information is divided into the two classes "A" and "B" according to its importance and its submission date under the licensing and supervisory procedure:

"A" information is such information which shall be presented in time prior to a licensing step (see below) for the review of the licensing prerequisites. Prior to the administrative procedure of the competent authority, "A" information is as a rule approved by the authorized experts consulted. The classification of an information as "A" information does not necessarily mean that this information is included in the license documents.

"B" information is such information which shall be presented by the applicant/licensee in the course of construction e.g. for complying with licensing requirements or for the purpose of accompanying inspections by the authorized experts consulted. It shall be submitted as a rule in time prior to the date corresponding to the manufacture, construction, or commissioning phase mentioned in the respective section heading, so that an expertise and/or licensing and supervisory authority decision for the corresponding phase is possible.

Single or all "B" information, including the results of accompanying inspections may be required as "A" information for a subsequent licensing step. In the following compilations "A" information is written in normal size Type, and "B" information is written in small type.

The "A"/"B" classification is based on four licensing steps as reference, with the following extent.

- 1st partial construction permit (1st TEG):
site, concept, containment vessel, construction of the buildings and structures

- 2nd partial construction permit (2nd TEG):
erection, installation and commissioning of all mechanical and electrical equipment
- 1st partial operating license (1st TBG):
delivery and handling of the fuel assemblies, second hot trial operation
- 2nd partial operating license (2nd TBG):
nuclear commissioning, operation

The information specified in the above-mentioned sections of the individual compilations is assigned in terms of chronological order to these licensing steps as follows:

Licensing step	Information specified in section
1st TEG	1. Concept 2. Construction of the respective buildings and structures
2nd TEG	3. Manufacture of the respective product forms 4. Manufacture of the respective components 5. Pressure test at the manufacturers works 6. Installation of the respective components 7. Pressure and leakage rate test at the site 8. Commissioning of the respective systems
1st TBG	9. Delivery of the fuel assemblies 10. Initial core loading
2nd TBG	11. Nuclear commissioning of the plant

Information specified under the section heading 12. "Refuelling" shall be provided in the course of operation and is not classified as "A" or "B".

The individual items of information may be compiled under general issues, e.g. in the safety analysis report or in a description of the quality assurance system or in specifications.

The "A"/"B" classification stated respectively shall apply only to the division in the above specified licensing steps. If another division is preferred, the "A"/"B" classification must be altered on a case to case basis. The competent authority decides which information shall be submitted; this can be done on the basis of

- the systems and components for which the application has been submitted
- the phase for which the application has been submitted (e.g. concept, construction, commissioning)
- the kind of tests and examinations to be performed by the authority or the authorized experts consulted
- the information or test and examination results already presented, in particular if information on comparable matters has already been presented.

The submission of individual items of information may - on a case-to-case basis - be waived. If more information than mentioned here is required, type and scope must be specified in such way that this information can be prepared by the applicant accordingly.

Attention is drawn to the obligation of the applicant to appropriately mark documents which contain proprietary information and to present these separately (§ 3, subpara. 2, first sentence of the Nuclear Licensing Procedures Ordinance). Official instructions and applicable regulations shall also be observed when presenting information of a classified nature. These compilations of information only

specify type and scope of the information and do not contain requirements for design, manufacture, and examination.

These compilations of information are based on the experience of the manufactures, operating organizations, authorities, and authorized experts involved in the licensing procedure.

2. Definitions

Arrangement

Means that the location of certain components shall be stated with regard to their relation to each other or to other components or systems, e. g. the arrangement of valves upstream or downstream of important system components, inside or outside the containment vessel, and the like.

Description

Is a detailed representation of facts beyond the mere statement of data. A description may generally take the form of a drawing or a combination of drawing and text.

Specified Normal Operation

- (1) Operating processes for which the plant, assuming the proper functioning of all systems (fault-free conditions), is intended and suited (normal operation)
- (2) Operating processes which occur in the event of component or system malfunction (fault conditions), provided that safety related reasons do not oppose continued operation (abnormal operation)
- (3) Maintenance procedures (inspection, servicing, repair)

Explanation

Supplements the mere representation of facts contained in a description for which such explanation is submitted; states e.g. the reasons or consequences of facts or the safety considerations behind the facts.

Limit

Limits are values specified for parameters of state of components, systems or media contained therein, the adherence to which rules out failure of important safety-related equipment with a reasonable safety margin.

Commissioning

Means the initial functioning of components or systems at their final place of installation.

Inspection

Measures for the determination and evaluation of the actual condition.

Maintenance

Entirety of measures for the preservation and restoration of the design condition and the determination and evaluation of the actual condition. Maintenance is divided into inspection, servicing and repair.

Repair

Measures for the restoration of the design condition.

Component

The term "component" refers to pipes (including bends and branch connections), pumps, equipment such as coolers, pre-heaters, evaporators, filters, and to vessels tanks, and valves.

Verification

Means to submit controllable information or factual presentations which prove the accuracy of certain statements. Verification may be furnished, among others, in the form of calculations, drawings, test and examination reports, certificates or a combination thereof.

Layout Drawings

Layout drawings are graphical representations of the system design and the local arrangement of systems and components (e.g. flow diagrams, installation plans, piping plans). The degree of detail of layout drawings change in accordance with the progress of construction.

Location

Means that the spatial position of the respective system or component shall be stated.

Spatial Separation

Means that information is required as to whether, and if so how, any spatial distance between the components in question, or shielding against impacts of the components on each other or against the simultaneous impact of one and the same event on the spatially separated components, is provided.

Redundancy

Existence of more technical equipment suitable for fulfillment of the scheduled functions than is necessary.

Incident

An incident is a sequence of events which interferes with the operation of the plant or with the activity concerned in such a way that the operation or activity must be discontinued for reasons of safety, and which was considered in the plant design or for which protective measures are provided with regard to the activity concerned.

Malfunction

A Malfunction is a failure of a subunit, component, or system.

System

A system is an assembly of components which forms a technological unit capable of performing independent functions within the plant.

Approval

Approval means the safety-related review of the design, the stress calculations, the materials used, the manufacturing processes, the test and examination plan, the circuit design, the in-service inspection feasibility, the accessibility for servicing and repair, and the equipment used for process monitoring, on the basis of plans, written procedures, drawings and calculations according to the requirements contained in the license and in regulations.

Servicing

Measures for the preservation of the design condition.

In-service Inspections

In-service inspections are inspections which shall be carried out as a rule at specified intervals on the basis of legal provisions or other requirements.

Summary

Added to the term description or explanation, indicates that only the most important information is expected at the point in question in order to obtain an adequate overview.

3.A Compilation of Information on the Site

Scope of Application

This compilation of information shall apply to the site.

Category Scheme

1. Site
 - 1.1 Geographical location
 - 1.2 Population
 - 1.3 Land use within a radius of 10 km
 - 1.4 Traffic conditions
 - 1.5 Meteorological conditions
 - 1.6 Geological conditions
 - 1.7 Hydrological conditions
 - 1.8 Seismic conditions
 - 1.9 Radiological background
 - 1.10 Radiation exposure of the population in the environment of the site
 - 1.11 Other effects of the nuclear power plant to be expected during specified normal operation
 - 1.12 Support and emergency facilities
2. Construction of the buildings and structures
3. Manufacture of the product forms
4. Manufacture of the components
5. Pressure test at the manufacturer's works
6. Installation of the components
7. Pressure and leakage rate test at the site
8. Commissioning of the systems
9. Delivery of the fuel assemblies
10. Initial core loading
11. Nuclear commissioning of the plant
12. Refuelling
 1. Site
 - 1.1 Geographical location
 - 1.1.1 Statement of geographical longitude and latitude, elevation above sea level, Federal State, municipality, district, plot
 - 1.1.2 Description of neighboring natural and man-made features (e.g. rivers, lakes, hills) and of the site of the plant (e.g. boundaries, backfills, if any)
 - 1.1.3 Topographical survey map with distance rings, scale = 1 : 200 000
 - 1.1.4 Topographical map, scale = 1 : 50 000 (covering a radius of 10 km) and scale = 1 : 25 000 (covering a radius of 5 km)
 - 1.1.5 Map showing the boundaries of the area on which the power plant is to be built, scale = 1 : 1 000
 - 1.1.6 Information on local peculiarities, e. g. building restrictions
 - 1.2 Population
 - 1.2.1 Statement of population number and density in 30° sectors¹⁾) corresponding to the 12-sector wind rose), within the radii of 0-1, 1-2, 2-3, 3-5, 5-10, and 20-50 km
 - 1.2.2 List of places within a radius of 10 km, with statement of the distances of these places from the site and their respective numbers of inhabitants
 - 1.2.3 List of cities with more than 100 000 inhabitants up to 50 km from the site with statement of the distances and numbers of inhabitants
 - 1.2.4 Information on major population groupings within a radius of 5 km (e.g. sports grounds, camping sites, schools, homes, hospitals and penal institutions)
 - 1.2.5 Statement of development trends (regional planning), as far as official records are available
 - 1.3 Land use within a radius of 10 km
 - 1.3.1 Agriculture, and forestry fishery and hunting
 - 1.3.1.1 Information on agriculture areas, pasture and fallow land, and land used for horticulture and forestry (land- use plan)
 - 1.3.1.2 Information on the production of food and feedstuffs

¹⁾ North bisects the first sector. The other sectors are numbered clockwise.

1.3.1.3	Statement of the different species of animals kept on the farms; information on stockbreeding	1.4.3.4	Statement of ports, piers, anchorages, estuaries, locks, transshipment facilities, and other facilities
1.3.1.4	Information on hunting	1.4.3.5	Information on collisions and other dangerous events over the past years
1.3.2	Use of the main water source and other waters	1.4.4	Air traffic
1.3.2.1	Information on collection of drinking water (groundwater, riverbank filtrate, surface and cistern water) and irrigation	1.4.4.1	Statement of the civil and military airports within a radius of 50 km around the site
1.3.2.2	Information in the scope of production of food and feedstuffs (e. g. fishery)	1.4.4.2	Statement of the air routes (air traffic maps) for civil and military air traffic
1.3.2.3	Information on bathing	1.4.4.3	Statement of the flight frequencies, separate statements of civil and military traffic as far as official records are available
1.3.3	Trade and industry	1.4.4.4	Statement of low-level flight areas within a radius of 50 km around the site; working maps for low-level flights
1.3.3.1	Statement of industrial facilities possibly affected (e.g. industrial facilities producing or processing food, pharmaceutical and photochemical works, mineral springs), including information on type and size of industrial facilities, number of employees, location relative to the site	1.4.4.5	For airports within a radius of 20 km around the nuclear power plant: specific airport and air traffic information (e.g. orientation of the runways, arrival and departure procedures, type of aircraft)
1.3.3.2	Statement of potentially hazardous industrial facilities or plants (storage or handling of explosive, toxic, narcotic, corrosive, and/or flammable materials), including information on type and size of industrial facilities, number of employees, location relative to the site	1.4.5	Description of other transportation facilities (e. g. pipelines and related stations) and their location relative to the site
1.3.3.3	Statement of the other major industrial and research facilities, including information on type and size of facilities (branch), number of employees, location relative to the site	1.4.6	Statement of development trends, as far as official records are available
1.3.4	Other use	1.5	Meteorological conditions ²⁾ at the site and in its closer environment
1.3.4.1	Statement of recreation areas, nature preserves and national parks as well as protected areas pursuant to the Federal Forestry Act	1.5.1	Evidence of the reliability of the extrapolation of meteorological data from another area to the site, if such data were used
1.3.4.2	Statement of exercise grounds and other military facilities, e. g. ammunition depots, and their location relative to the site, as far as official records are available	1.5.2	Statement of the frequency distribution of meteorological phenomena as a function of wind speed and direction (data given the 12-sector wind rose)
1.3.5	Statement of development trends, as far as official records are available	1.5.3	Statement of the duration and frequency of fog formation
1.4	Traffic conditions	1.5.4	Statement of the mean frequency and duration of inversion conditions and of the mean level above ground of inversion layers
1.4.1	Roads within a radius of 10 km	1.5.5	Description of the dependence of the wind conditions on the topography, and if applicable on the elevation
1.4.1.1	Description of the road network and location relative to the site, statement of the road classes	1.5.6	Statement of the average and extreme air temperatures
1.4.1.2	Statement of the traffic densities	1.5.7	Statement of the air humidity and its seasonal distribution
1.4.1.3	Information on volume and frequency of transportation and on the aggregation state of hazardous (explosive, toxic, narcotic, corrosive, flammable) materials, as far as official records are available	1.5.8	Statement of the – mean precipitation per annum – maximum precipitation per month – maximum precipitation per day
1.4.1.4	Information on planned modification or expansion of the existing road network as far as official records are available	1.5.9	Information on meteorological peculiarities (e. g. severe storms, waterspouts)
1.4.1.5	Description of the link of the nuclear power plant to the road network	1.5.10	Description of the influence of cooling towers and their operation
1.4.2	Railroads within a radius of 10 km	1.5.10.1	Statement of the dispersion conditions of radioactive materials, including washout of aerosols and iodine
1.4.2.1	Description of the railroad network and location relative to the site	1.5.10.2	Statement of air humidity, insolation, fog and ice formation
1.4.2.2	Statement of traffic density, separate statements of passenger and freight trains	1.5.11	Statement of the dispersion factors (long-term and short-term) for releases through the stack and from buildings
1.4.2.3	Information on volume and frequency of transportation and on the aggregation state of hazardous (explosive, toxic, narcotic, corrosive, flammable) materials, as far as official records are available	1.6	Geological conditions
1.4.2.4	Description of the size and location of the nearest switchyard, and of loading and transshipment stations, including information on crossings (including of roads), switches and branches, far as important to safety	1.6.1	Expertise on soil mechanics foundation
1.4.3	Waterways within a radius of 10 km	1.6.2	Description of the soil conditions and the geological structure at the site and in its environment
1.4.3.1	Statement of the distance of the site from the Bank and the shipping channel, and statement of the effective capacity of the waterway, referred to the allowable ship size	1.7	Hydrological conditions
1.4.3.2	Statement of traffic density, separate statements of passenger and freight ships	1.7.1	Groundwater
1.4.3.3	Information on the volume and frequency of transportation and on the aggregation state of hazardous (explosive, toxic, narcotic, corrosive, flammable) materials, as far as official records are available	1.7.1.1	Statement of the depth and thickness of groundwater layers at the site and in its environment (groundwater maps)
		1.7.1.2	Statement of the flow directions and velocities
		1.7.1.3	Description of the effects of lowering the groundwater level during construction of the nuclear power plant
		1.7.2	Surface waters

²⁾ As far as direct site data are not available, data from neighboring or comparable stations of the German Meteorological Service may be used

1.7.2.1	Statement of average and extreme water levels of the main water source, giving the seasonal distribution	1.11	Other effects of the facility to be expected during specified normal operation
1.7.2.2	Statement of the average and extreme water temperatures of the main water source, giving the seasonal distribution	1.11.1	Description of the effects of drawing cooling water from, and returning it to, the main water source, with identification of the intended rates of drawing water from and discharging waste water to the main water source, alteration of the flow conditions and warming-up of the main water source, alteration of the oxygen content and fog formation
1.7.2.3	Description of the influence of tides if any on the water runoff of the main water source	1.11.2	Description of other effects of cooling tower operation: noise; deposition of salts, bacteria, etc.
1.7.2.4	Statement of the level data for weirs in the main water source	1.11.3	Statement of other ecological aspects (e. g. pollution of the main water source, discharged chemicals)
1.7.2.5	Statement of the maximum high water (if applicable high-water marks for 100- and 1000-year periods)	1.12	Support and emergency facilities
1.7.2.6	Information on the possibility of the site being flooded as a result of storm tide, high water or extremely heavy precipitation	1.12.1	Description of the traffic situation with regard to emergency planning
1.7.2.7	Statement of canals, dams, reservoirs, and weirs at the site and in its closer environment, including description of their possible effects (e.g. sufficient cooling water supply during incidents and flood waves)	1.12.2	Statement of the distance and accessibility of the site for
1.8	Seismic conditions		
1.8.1	Statement of all historical recorded earthquakes which have had an effect or which may be assumed to have had an effect on the site; in addition the following measured or estimated data: date of the event, magnitude or greatest intensity, damage caused, and, if available, a plan of the epicenter or of the area of greatest intensity		<ul style="list-style-type: none"> – the <i>Kerntechnische Hilfsdienst GmbH</i> (nuclear emergency response force) – the nearest fire brigade (largest fire-fighting vehicle) – other support and emergency response forces (Police, Red Cross, Armed Forces, Federal Border Police)
1.8.2	Statement of the site specific seismic parameters, e.g.: <ul style="list-style-type: none"> – the probabilities of occurrence – the duration of earthquakes, if any – the soil response spectra for the safe shutdown earthquake and the design basis earthquake 	2.	Construction of the buildings and structures (beginning of excavation and foundation work)
1.8.3	Description of the physical behavior of the geological strata and materials below the planned foundation of the plant	2.1	Results of the soil mechanics investigations
1.8.4	Description of the relationships between epicenters or areas of greatest intensity of historically recorded earthquakes, and of tectonic structures as far as relevant to seismic design	2.2	Description of the chemical and biological condition of the groundwater and the main water source (waste water impact)
1.9	Radiological background	3.	Manufacture of the product forms (no information)
1.9.1	Description of the existing situation at the site and in its environment including statement of the licensed and actual releases of radioactive materials into air and water (kind and quantity of the materials released, location of the radiation sources in relation to the site) from other nuclear facilities, as far as official records are available, and, as far as this can be determined due to the handling of other radioactive materials	4.	Manufacture of the components (no information)
1.9.2	Summary description of the results of radiological measurements, radiological expert opinions and official investigations concerning the radiation exposure limits of the ecosystem, and of emission registers and similar records. Explanation of the conclusions for the site.	5.	Pressure test at the manufacturer's works (no information)
1.9.3	Statement of the development trends, as far as official records are available	6.	Installation of the components (no information)
1.10	Radiation exposure of the population in the environment of the	7.	Pressure and leakage rate test at the site (no information)
1.10.1	Statement of the radiation exposure caused by the release of radioactive materials from the nuclear power plant during operation identifying kind and quantity of the release during operation, release rates applied for release via the stack and roof vents and with the waste water; nuclide composition to be expected	8.	Commissioning of the systems (no information)
1.10.2	Evaluation of the radiation exposure in the environment of the site caused by the licensed, applied for or measured release from other nuclear facilities and from the handling of radioactive materials (see No. 1.9)	9.	Delivery of the fuel assemblies (no information)
1.10.3	Statement of the radiation exposure of the population in the environment of the site resulting from No. 1.10.1 and No. 1.10.2, via the relevant exposure pathways: whole body, thyroid (infants)	10.	Initial core loading (no information)
		11.	Nuclear commissioning of the plant
		11.1	Meteorological conditions at the site and in its closer environment, with results of measurements performed at the site, or data from neighboring meteorological stations extrapolated to the site
		11.1.1	Statement of the frequency distribution of meteorological phenomena as a function of the wind speed and direction (data given the 12-sector wind rose)
		11.1.2	Statement of the duration and frequency of fog formation
		11.1.3	Statement of the main frequency and duration of inversion conditions
		11.1.4	Description of the dependence of the wind conditions on the topography
		11.1.5	Statement of the average and extreme air temperatures
		11.1.6	Temperature profiles and meteorological phenomena
		11.1.7	Statement of the air humidity and its seasonal distribution
		11.1.8	Statement of the <ul style="list-style-type: none"> – mean precipitation per annum – maximum precipitation per month – maximum precipitation per day
		11.1.9	Statement of the duration, frequency, and intensity of extremely heavy precipitation
		11.2	Background measurement including statement of location, number, and results of radioactivity measurements performed at the site and in its closer environment with respect to: <ul style="list-style-type: none"> – soil

- groundwater
- surface water
- background radiation
- vegetation
- foodstuffs (milk)
- fish and shellfish
- aerosol content of the air (long-lived β -emitters)

12. Refuelling (no information)

3.B Compilation of Information on the Steel Containment Vessel of PWR

Scope of Application

This compilation of information shall apply to:

- the steel containment vessel (JMA) of PWRs
- the equipment air locks (JME)
- the personnel air locks (JMF)
- the emergency air locks (JMG)
- the construction openings (JMH)
- the pipe penetrations (JMK), including ventilation duct penetrations
- cable penetrations (JML)

and, as far as they influence the containment vessel design, to:

- missile shielding structures, pipe whip restraints, anchor points
- internal structures (e. g. reinforced concrete bottom dish, load-carrying structures, partition walls) with regard to loads caused by operation, deadweights and incidents including external events
- the biological shield

(Identifiers according to the Power Station Classification)

Category Scheme

- | | |
|-----|--|
| 1. | Concept |
| 2. | Construction of the respective buildings and structures |
| 3. | Manufacture of the respective product forms |
| 4. | Manufacture of the respective components |
| 5. | Pressure test at the manufacturer's works |
| 6. | Installation of the respective components |
| 7. | Pressure and leakage rate test at the site |
| 8. | Commissioning of the respective systems |
| 9. | Delivery of the fuel assemblies |
| 10. | Initial core loading |
| 11. | Nuclear commissioning of the plant |
| 12. | Refuelling |
| 1. | Concept |
| 1.1 | Compilation of the codes and assessment criteria which govern the concept |
| 1.2 | Summary description of the functions of the containment ¹⁾ during specified normal operation and incidents, as well as of the internals and auxiliary systems ²⁾ necessary to fulfill the functions, including schematics and general layout plans |
| 1.3 | Summary description of the containment vessel design, including air locks and construction openings, with e. g. <ul style="list-style-type: none"> - general layout plans showing the design and division into compartments - description of the containment vessel bedding in the concrete - statement of the main dimensions - description of the spatial arrangement of |

¹⁾ The containment is the system comprising the containment vessel and the enclosing building as well as the auxiliary systems for retention and filtering of any leakage from the containment vessel

²⁾ For the air recirculation systems and the leakage monitoring and extraction system (PWR), Compilation L. Ventilation Systems applies

- | | |
|------|--|
| | penetrations, air locks, and construction openings |
| | - information on emergency and escape routes ³⁾ |
| 1.4 | Summary description of the design of pipe, cable and ventilation duct penetrations, with e. g. <ul style="list-style-type: none"> - statement of the design principle - statement of the number and information on redundancy - description of the spatial arrangement in the containment vessel - statement of the main dimensions |
| 1.5 | General layout plans showing the spatial arrangement of the main components and systems, e.g. <ul style="list-style-type: none"> - the reactor coolant system components⁴⁾ - the main steam and feedwater pipes including isolation valves⁵⁾ - emergency core cooling and emergency feedwater pipes including isolation valves⁶⁾ - the ventilation ducts, including isolation flaps⁷⁾ - the cable runs⁸⁾ |
| 1.6 | Summary description of the incidents taken into consideration, including external events, and the structural measures taken to mitigate their consequences |
| 1.7 | Summary description of the measures taken to control the consequences of jet impingement forces and loads caused by missiles (e. g. pipe whip restraints, retaining devices, anchors, missile shielding structures) following incidents according to No. 1.6 |
| 1.8 | Statement of the preliminary operating data as well as the design data resulting from No. 1.6, e. g. <ul style="list-style-type: none"> - design and operating pressures, test pressure - design and operating temperatures - leaktightness, leakage rate - isolating flaps closing times |
| 1.9 | Summary description of the functions and spatial arrangement of the shieldings ⁹⁾ in the containment vessel |
| 1.10 | Summary description of the equipment provided and measures taken for explosion protection (e. g. limitation of H ₂ concentration) and of active and passive fire protection in the containment vessel |
| 1.11 | Summary description of the signaling and monitoring concept ¹⁰⁾¹¹⁾ of the air locks and isolation valves |
| 1.12 | Summary description of the power supply ¹²⁾ of the air locks and isolating valves |
| 1.13 | Statement of the material properties and/or the materials, including product forms and type of processing for the main components |
| 1.14 | Summary description of the manufacturing processes |
| 1.15 | Summary description of the quality assurance |

³⁾ See "Compilation of Documents Required for Civil Construction Supervision Purposes of Nuclear Facilities" (GMB1. 1981, p. 518)

⁴⁾ See Compilation E. Reactor Coolant Pressure Boundary, No. 1.8

⁵⁾ See Compilation M. Water/Steam Plant, No. 1.4

⁶⁾ See Compilation G. Emergency Core Cooling and Residual Heat Removal Systems including the Heat Removal Chain, No. 1.6

⁷⁾ See Compilation L. Ventilation Systems, No. 1.4

⁸⁾ See Compilation P. Electrical Power Supply of the Safety system, No. 1.4

⁹⁾ See Compilation T. Radiological Protection and Activity Monitoring, Nos. 1.5.1 and 1.5.2

¹⁰⁾ See Compilation R. Instrumentation and Control, Control Room, Emergency Control Station and Local Control Stations, Nos. 1.2 and 1.3

¹¹⁾ See Compilation S. Reactor Protection System, No. 1.7

¹²⁾ See Compilation P. Electrical Power Supply of the Safety System, No. 1.2

	during planning, manufacture, installation, commissioning, operation	air locks, construction openings, penetrations, and isolating valves inside the building, with regard to maintenance procedures ¹⁷⁾ and in-service inspections
1.16	Summary description of maintenance, including in-service inspections	
1.17	Information on the possible impact of the pressure test on the environment	
2.	Construction of the respective buildings and structures	3. Manufacture of the respective product forms
2.1	Thermodynamic calculations	3.1 Design and calculation
2.1.1	Statement of the thermodynamic and geometrical input data ¹³⁾ required for the description of short-term and long-term transients (e. g. for calculation of pressure and temperature buildup transients, pressure differences)	3.1.1 Compilation of the considered codes and assessment criteria
2.1.2	Statement of the calculation models used for the thermodynamic calculations	3.1.2.1 Statement of design basis service conditions taken into account for normal operation, erection, pressure testing, and incidents taken into consideration according to No. 1.6
2.1.3	Statement of the results of the thermodynamic calculations	3.1.2.2 Statement of the loads resulting from No. 3.1.2.1
2.2	General layout plans ³⁾ of the internal structures and the foundations ³⁾ of the containment vessel	3.1.3 Compilation of the design data (including the permissible stresses for specified normal operation, pressure testing and the incidents taken into consideration according to No. 1.6)
2.3	Compartment classification for the containment vessel, including statement of the areas taken as a basis ¹⁴⁾ for the local dose rates in an appropriate grid	3.1.4 General layout plans necessary for review of the design and dimensioning of <ul style="list-style-type: none"> – the containment vessel – the air locks – the construction openings – the penetrations
2.4	General layout plans showing the spatial arrangement of components, unless presented under No. 1.5, including statement of pipe supports, pipe whip restraints, anchors, weights, as far as they govern the design of the containment vessel	3.1.5 Item lists
2.5	Information on construction materials, including bedding materials between steel containment vessel and concrete	3.1.6 Statement of the calculation codes for verification of the strength and stability, with reference to their validation
2.6	Statement and explanation of loads ¹⁵⁾ , or load assumptions and frequencies of occurrence, originating from the containment vessel and governing the design of the structure, during specified normal operation, e.g. caused by <ul style="list-style-type: none"> – loads resulting from deadweight, operational loads, live loads and pressure test – loads resulting from temperature gradients and transients, and from constrained thermal expansion 	3.1.7 Statement of possible corrosion mechanisms, corrosion effects, and corrosion protection measures
2.7	Statement and explanation of loads ¹⁵⁾ or load assumptions for single compartments, compartment groups, and structures, originating from incidents (according to No. 1.6) and governing the design of the structure, e. g. caused by <ul style="list-style-type: none"> – reaction and jet impingement forces – flooding; missile impacts – fires; explosions – pressures difference between compartment groups – temperature gradients and transients; obstructed thermal expansion – pressure buildup transients – acceleration forces and induced vibrations (e.g. resulting from blast waves, aircraft crash) – failure of pressure-retaining components outside the containment vessel – subatmospheric or positive pressure 	3.1.8 Verification of sufficient dimensioning
2.8	Information on anchors for the setting-up of mobile shielding ¹⁶⁾ and lifting equipment during maintenance procedures	3.2 Materials and product forms
2.9	Representation of the arrangement and accessibility of the containment vessel, including	3.2.1 Statement of materials for product forms (requirements, composition, mechanical technological data, as-delivered condition, verification of quality properties)

¹³⁾ If certain information cannot be supplied at this time, individual safety allowances and factors shall be stated

¹⁴⁾ See Compilation T. Radiological Protection and Activity Monitoring, No. 2.5

¹⁵⁾ The load transmission to the structure is dealt with in the "Compilation of Documents Required for Civil Construction Supervision Purposes of Nuclear Facilities" (GBM1. 1981, p. 518)

¹⁶⁾ See Compilation T, Radiological Protection and Activity Monitoring, No. 2.2

¹⁷⁾ See Compilation T. Radiological Protection and Activity Monitoring, No. 2.1

¹⁸⁾ Field fabrication and erection of the containment vessel are dealt with under Sec. 6

4.7.3	respective application and, if applicable, of the weldability, unless presented under No. 3.2.2	6.9.2	containment vessel and foundation
4.7.4	Verification of the suitability of the welding materials for the respective application	6.9.3	Information on effectiveness and durability of the thermal insulation
4.7.5	Information on qualification of materials manufacturers, unless presented under No. 3.2.3	6.10	Information on adequate fire protection
4.8	Information on qualification of welding materials manufacturers	6.10.1	Corrosion protection
4.8.1	Processing of product forms and welding materials	6.10.2	Description of the surface preparation of the containment vessel for the corrosion protection coating
4.8.2	Information on qualification of component manufacturers	6.10.3	Information on the material used for corrosion protection
4.8.3	Verification of adequate and valid procedure tests	6.10.4	Description of the coating application procedure
4.8.4	Information on welding supervision and qualification certificates for welders being employed	6.10.5	Verification of ensured durable and effective corrosion protection
4.8.5	Description of the quality assurance measures, including documentation, during component manufacture	6.11	Information on the influence of the corrosion protection coating on in-service inspections
5	Manufacturing documents required for quality assurance purposes	6.11.1	Welding materials
5.1	Pressure test at the manufacturer's works	6.11.2	Verification of suitability of the welding materials, unless presented under No. 4.7.3
5.2	Documentation of the quality assurance measures according to Nos. 4.8.4 and 4.8.5 and of their results for components subjected to pressure testing at the manufacturer's works	6.12	Information on qualification of welding materials manufacturers, unless presented under No. 4.7.5
5.3	Pressure test and strain gage location plan, including statement of type, number and location of the strain gages and, if applicable, of other measuring points	6.12.1	Field fabrication and erection
5.4	Examination plan for nondestructive examinations following the pressure test at the manufacturer's works	6.12.2	Verification of the type tests and routine inspections performed on the cable penetrations ²¹⁾ at the manufacturer's works
5.4	Information on component cleaning	6.12.3	Information on qualification of manufacturers involved in field fabrication and erection
6	Installation of the respective components (field fabrication and erection of the containment vessel)	6.12.4	Information on welding supervision and qualification certificates for the welders being employed
6.1	Documentation of the quality assurance measures and their results, unless presented under No. 5.1, as well as	6.12.5	Verification of adequate and valid procedure tests
	– reports on the results of the pressure test at the manufacturer's works	6.12.6	Description of the quality assurance measures, including documentation, during field fabrication and erection of the containment, vessel in particular for those areas of which the accessibility is restricted by the internal and external structures
	– reports on the results of the stress-strain measurements and comparison with the calculated data	6.13	Manufacturing documents required for quality assurance purposes
	– reports on the results of the nondestructive examination following the pressure test at the manufacturer's works	6.14	Information on the scheduled in-service inspection of penetration leaktightness as well as on the possibility of performing nondestructive examination on penetration welds
6.2	Statement of the components which must be installed prior to the containment vessel pressure test	7	Description of the control and monitoring of the containment vessel components, unless presented under Nos. 4.4 and 4.5, including functional and protective logic diagrams
6.3	Verification calculation of strength and stability, (even during erection) and if applicable, of the dynamic and fatigue behavior	7.1	Pressure and leakage rate tests at the site
6.4	Verification of deformation by calculation	7.1.1	Prerequisites for pressure and leakage rate testing
6.5	Detailed calculations of discontinuities (e.g. quenchers)	7.1.2	Documentation of the quality assurance measures according to Nos. 6.12.5 and 6.12.6, and their results
6.6	Measuring location plan for strain and displacement measurements in the area bedded in concrete, if applicable	7.1.3	Documentation of the actual condition of the containment vessel, including
6.7	Installation drawings		– air locks
6.8	Information on the spatial arrangement and anchoring of large components and pipes, in particular		– construction openings
	– the components of the reactor coolant pressure boundary ¹⁹⁾		– penetrations
	– air locks and construction openings		– isolating valves
	– the ventilation systems ²⁰⁾ in the containment vessel	7.1.4	Analysis of the mechanical behavior and specification of the permissible pressure test temperature, taking the NTD temperature into account
	– the cable, pipe, and ventilation duct penetrations	7.1.5	Plan of the safety measures taken during the pressure test, including statement of:
6.9	Insulation		– maximum blowdown rates
6.9.1	Information on the soft material bedding between		– safety areas
		7.2	Description of the administrative controls for performance the of pressure test
		7.2.1	Pressure test
		7.2.2	Pressure test plan, including pressure-time diagram and statement of the individual test steps
		7.3	Statement of the decision-making criteria for discontinuation of the pressure test
			Measuring point plan for strain and displacement measurements, including statement of type,

¹⁹⁾ See Compilation E. Reactor Coolant Pressure Boundary, Nos. 6.3 and 6.4

²⁰⁾ See Compilation L. Ventilation Systems, No. 6.5

²¹⁾ See Compilation P. Electrical Power Supply of the Safety System, No. 6.1

- 7.4 number and location of strain gages and if applicable, other measuring points
- 7.4 Leakage rate test plan, including statement of the test pressures media number and location of measuring points
- 7.5 Test plan for functional testing of the sir locks and isolating valves, if applicable
- 7.6 Statement of the scope and procedures for nondestructive tests (test specification) during and following the pressure test, including
 - statement of the selection criteria for the areas to be tested
 - plan showing the areas to tested
- 7.7 Information on the provided documentation of the test and examinations and their results
- 8. Commissioning of the respective systems (no information)
- 9. Delivery of the fuel assemblies
- 9.1 Test report on the results of the tests performed according to Nos. 7.2.1, 7.3 to 7.6, and comparison with the calculated results according to Nos. 4.2, 6.3 to 6.5
- 9.2 General test plan (list of tests) for recurrent leakage rate and functional tests on sir locks, including statement of
 - type of tests
 - responsibility for test
 - test intervals
 - plant condition considered (e.g. reactor power operation, reactor shutdown)
- 9.3 Documentation of the actual condition of the containment vessel, unless presented under No. 7.1.2
- 10. Initial core loading
- 10.1 Review of the thermodynamic calculations according to No. 2.1, as well as of the calculations according to Nos. 6.3 to 6.5, and 7.1.3, with regard to the actual condition according to No. 9.3
- 10.2 Instructions for in-service inspections
- 10.3 Information on the documentation of in-service inspection results
- 10.4 Submission of the relevant parts of the operating manual, including safety specifications
- 11. Nuclear commissioning of the plant
- 11.1 Report on the results of the first in-service inspections
- After completion of nuclear commissioning:
- 11.2 Complete documentation of the containment vessel, including
 - air locks
 - construction openings
 - penetrations
- 12. Refuelling (no information)

3.C Compilation of Information on the Containment with Pressure Suppression System of BWRs

Scope of Application

This compilation of information shall apply to the containment vessel with pressure suppression system of BWRs and, in particular to the following equipment and components of the plant (to the extent applicable)

- the drywell and the wetwell (steel shell and concrete confinement¹⁾ including liner, outer shell, missile shielding concrete¹⁾, thermal insulation, pipe whip restraints¹⁾, anchor points¹⁾, air locks, refuelling hatch cover, construction openings and manholes)
- the vent pipe system with vent pipe assembly and walkway

¹⁾ As far as these influence the design of the containment vessel with pressure suppression system

- the pressure relief system (relief pipes including guard pipes, pressure relief valves with valve supports, bottom mounts, relief geometries (quencher))
- the drywell and wetwell spray systems
- the penetration for pipes and cables
- the swing and lift check valves between drywell and wetwell
- the ventilation duct penetrations and equipment for Separation of drywell and control assembly drive compartment for ventilation purposes

The "Compilation of Documents Required for Civil Construction Supervision Purposes of Nuclear Facilities" (GMB1. 1981, p. 518) applies to the concrete containment vessel

Category Scheme

- | | |
|-----|---|
| 1. | Concept |
| 2. | Construction of the respective buildings and structures |
| 3. | Manufacture of the respective product forms |
| 4. | Manufacture of the respective components |
| 5. | Pressure test at the manufacturer's works |
| 6. | Installation of the respective components |
| 7. | Pressure and leakage rate test at the site |
| 8. | Commissioning of the respective systems |
| 9. | Delivery of the fuel assemblies |
| 10. | Initial core loading |
| 11. | Nuclear commissioning of the plant |
| 12. | Refuelling |
-
- | | |
|-----|---|
| 1. | Concept |
| 1.1 | Compilation of the codes and assessment criteria, which govern the concept |
| 1.2 | Summary description of the functions of the containment ²⁾ during specified normal operation, and incidents, as well as of the internals and auxiliary systems ³⁾ necessary to fulfill the functions, including schematics and general layout plans |
| 1.3 | Summary description of the containment vessel design, including refuelling hatch cover, air locks, and construction openings e.g. <ul style="list-style-type: none"> - statement of the design principle (steel or concrete containment vessel) - general layout plans showing the design and spatial subdivision - statement o the main dimensions - description of the spatial arrangement of penetrations, air locks, and construction openings - information on emergency and escape routes⁴⁾ |
| 1.4 | Summary description of the drywell, with statement of e.g. the <ul style="list-style-type: none"> - main dimensions of the drywell - systems and components in the drywell and their location relative to each other (spatial separation) - transportation possibilities (erection wells, openings, air locks, and connecting stairways) |
| 1.5 | Summary description of the wetwell, with statement of e. g. the <ul style="list-style-type: none"> - main dimensions of the wetwell, and the volume of water, water level, free air volume - equipment and components in the wetwell |
| 1.6 | Summary description of the vent pipe system, |

²⁾ The containment is the system comprising the containment vessel and the enclosing building as well as the auxiliary systems for retention and filtering of any leakage from the containment vessel

³⁾ For the air recirculation systems and the leakage monitoring and extraction system, Compilation L. Ventilation Systems applies

⁴⁾ See "Compilation of Documents Required for Civil Construction Supervision Purposes of Nuclear Facilities" (Gmb1. 1981, p. 518)

	with statement of e.g. the		limitation of H ₂ concentration) and of active and passive fire protection in the containment vessel
	– number, main dimensions, spatial arrangement, and submergence of the vent pipes	1.15	Summary description of the signaling and monitoring concept ^{6,7)} of the air locks and isolating valves
	– fixtures (e. g. anchoring of the vent pipe assembly, through-wall guard pipe assemblies, vent ducts)	1.16	Summary description of the power supply ⁸⁾ of the air locks and isolating valves
	– layout of the vent systems	1.17	Statement of the material properties and/or the materials, including product forms and type of processing of the main components
1.7	Summary description of the pressure relief system, with statement of the	1.18	Summary description of the manufacturing processes
	– spatial arrangement of the relief pipes and relief valves	1.19	Summary description of the quality assurance during planning, manufacture, installation, commissioning, operation
	– fixtures for the relief pipes and relief valves (e. g. anchors, retaining devices, valve supports)	1.20	Summary description of maintenance including in-service inspections
	– design of e. g. the	1.21	Summary description of the precautionary protective measures for maintenance procedures, including in-service inspections, with regard to minimization of radiation exposure ⁹⁾
	– relief pipes	1.22	Information on the possible impact of the pressure test on the environment
	– relief valves		
	– relief geometries, quenchers (e. g. aperture ratio, volume of air enclosed in the relief line)		
1.8	Summary description of the design of the pipe, cable and ventilation duct penetrations through the containment vessel and between drywell and wetwell, and of the swing check valves between drywell and wetwell, and e.g.	2.	Construction of the respective buildings and structures
	– Statement of the design principle	2.1	Thermodynamic calculations
	– Statement of the number and information on redundancy	2.1.1	Statement of the thermodynamic and geometrical input data ¹⁰⁾ required for the description of short-term and long-term transients (e.g. for calculation of pressure and temperature buildup transients, pressure differences)
	– description of the spatial arrangement in the containment vessel		– free volumes of the individual areas of the pressure suppression system (masses, surface structures and characteristic material data for containment vessel internals)
	– Statement of the main dimensions		– combination of several individual compartments to model compartments, with explanation
1.9	Description and explanation of the functions and mode of operation of the pressure suppression and pressure relief systems, with schematics for		– pipe routing for the calculations of discharge rates; statement of discharge rates
	– specified normal operation		– vent geometry of the pressure suppression system (vent cross sections, flow resistances)
	– incidents including external events		– initial pressure, temperature and humidity data
1.10	Design and operating conditions for the pressure suppression system		– safety allowances and safety factors
1.10.1	Summary description of the incidents taken into consideration mitigate external events and the structural measures taken to mitigate their consequences		– flow rate and scheduled opening characteristics of the pressure relief valves
1.10.2	Summary description of the load assumptions and load functions for the pressure suppression system, e.g. by citing reference plants		– flow limiter design, with statement of data important for the thermodynamic calculations, such as flow cross sections
	– during normal operation	2.1.2	Statement of the calculation models used for the thermodynamic calculations
	– during abnormal operation (e.g. pressure transients, maintenance of pressure and temperature loss of condenser depressurization of the reactor coolant loops, turbine trip)	2.1.3	Submission of documents to explain the load assumptions (e. g. reports on pressure relief and pressure suppression tests)
	– in the events of incidents during which the pressure suppression system has to perform safety-related functions (e. g. suppression of the pressure build-up in the containment vessel during loss-of-coolant, retention of the radioactive materials released into the containment vessel during loss-of-coolant)	2.1.4	Statement of the results of the thermodynamic calculations
	– during the other incidents mentioned under No. 1.10.1	2.2	General layout plans of the internal structures and the foundations ¹⁾ of the containment vessel and, if applicable, of the concrete containment vessel ⁴⁾ , as well as of the liner and its anchors
1.10.3	Statement and explanation of the load assumptions and design data resulting from Nos. 1.10.1 and 1.10.2	2.3	Compartment classification of the containment vessel, including statement of the areas taken as a basis for the local dose rate in an appropriate
1.11	Summary description of the measures for control of incidents, as far as they cause direct loads on the pressure suppression system (e. g. planning of wall penetrations to avoid pressure differences in the event of loss-of-coolant)		
1.12	Summary description of the measures provided to control the consequences of jet impingement forces and loads caused by missiles (e. g. pipe whip restraints, cages around valves, retaining devices)		
1.13	Summary description of the functions and spatial arrangement of shieldings ⁵⁾ in the containment vessel		
1.14	Summary description of the equipment and measures taken for explosion protection (e. g.		

⁵⁾ See Compilation T. Radiological Protection and Activity Monitoring, Nos. 1.5.1 and 1.5.2

⁶⁾ See Compilation R. Instrumentation and Control, Control Room, Emergency Control Station and Local Control Stations, Nos. 1.2 and 1.3

⁷⁾ See Compilation S. Reactor Protection System, No. 1.7

⁸⁾ See Compilation P. Electrical Power Supply of the Safety System, No. 1.2

⁹⁾ See Compilation T. Radiological Protection and Activity Monitoring, Nos. 1.5.4, 1.5.5 and 1.9

¹⁰⁾ If certain information cannot be supplied at this time, individual safety allowances and factors shall be stated

2.4	grid ¹¹⁾ General layout plans showing the spatial arrangement of components, unless presented under No. 1.3, including statement of pipe whip restraints, anchors, weights, as far as they govern the design of the containment vessel with pressure suppression system	3.1.2.2	specified normal operation, erection and incidents taken into consideration according to Nos. 1.10.1 and 1.10.2 Statement of the loads resulting from Nos. 2.6, 2.7 and 2.8
2.5	Information on the provided construction materials	3.1.3	Compilation of the design data including the permissible stresses for specified normal operation, the pressure test as well as the incidents considered according to Nos. 1.10.1 and 1.10.2
2.6	Statement and explanation of loads ¹²⁾ or load assumptions and load frequencies originating from the pressure suppression system and governing the design of the structures during specified normal operation, e.g. caused by – loads resulting from pressure relief and acting on the foundations and load bearing structures, taking into consideration the structures and internals of the pressure suppression system (e.g. relief pipes, bracing assembly, guard pipes, retaining devices) – loads resulting from deadweight, operational loads and live loads – loads resulting from temperature gradients and obstructed thermal expansion – loads resulting from mobile shielding	3.1.4	General layout drawings necessary for review of the design and dimensioning of, in particular – the steel containment vessel (if applicable) with pressure suppression system (drywell and wetwell) – the swing check valves between drywell and wetwell – the vent pipes and the pressure relief system, including vent pipe assembly, anchors and supports, the walkway, and the pressure relief valves – the spray systems in drywell and wetwell – the refuelling hatch cover, air locks, and manholes – the cable and pipe penetrations including statement of the requirements for leaktightness – the steel liner
2.7	Statement on explanation of loads ¹²⁾ or load assumptions originating from in-plant incidents (according to No. 1.10.1) and governing the design of the structure, e.g. caused by – loads resulting from pressure relief – quasi-static loads resulting from pressure, temperature, as well as pressure differences, e.g. during the pressure buildup phase – dynamic loads during the pressure buildup phase (vent clearing pool, swell and water fall-back loads) – dynamic loads during the condensation phase for condensation with air entrained or with practically no air entrained – loads resulting from temperature gradients and constrained thermal expansion – loads resulting from jet impingement and reaction forces, and from missiles – loads resulting from drywell flooding – loads resulting from failure of pressure-retaining components outside the containment vessel	3.1.5	Item lists
2.8	Statement and explanation of loads ¹²⁾ or load assumptions originating from external events (according to No. 1.10.1) and governing the design of the structures, taking into consideration the consequential events to be anticipated (e.g. pressure relief and pressure buildup)	3.1.6	Statement of the calculation codes for verification of strength and stability with reference to their validation
2.9	Information on anchors for the setting-up of mobile shieldings ¹³⁾ and lifting equipment during maintenance procedures	3.1.7	Statement of the possible corrosion mechanics, corrosion effects and corrosion protection measures
2.10	Representation of the arrangement and accessibility of the containment vessel with pressure suppression system, including air locks, construction openings, penetrations, isolating valves inside the building with regard to maintenance procedures ¹⁴⁾	3.1.8	Verification of sufficient dimensioning
3.	Manufacture of the respective product forms	3.2	Materials and product forms
3.1	Design and calculation	3.2.1	Statement of the product form materials (requirements, composition, mechanical technological data, as-delivered condition, verification of the quality properties)
3.1.1	Compilation of the considered codes and assessment criteria	3.2.2	Verification of the suitability of materials for the respective application and verification of the workability (welding suitability, suitability for cold and hot working)
3.1.2.1	Statement of design basis service conditions for	3.2.3	Information on qualification of the manufacturers of materials and product forms
		3.2.4	Description of the quality assurance measures, including documentation, during product form manufacture
		3.2.5	Manufacturing documents required for quality assurance purposes
		4.	Manufacture of the respective components ¹⁵⁾
		4.1	Documentation of the quality assurance measures according to Nos. 3.2.4 and 3.2.5 and their results
		4.2	Verification of the component strength, as e.g. quenchers, pipes, penetrations, verification of deformation, if applicable
		4.3	List of all penetrations (including spare penetrations) and statement of the requirements (e.g. statement of function, type of loading, design)
		4.4	Description of the control systems, the safety devices, the interlocks, and the power supply of air locks, including indications in the control room
		4.5	Description of initiation and signaling as well as actuation and power supply of the isolating valves, including statement of the closing times
		4.6	Design drawings of the components, unless presented under No. 3.1.4
		4.7	Materials, welding materials
		4.7.1	Statement of the component materials, unless presented under No. 3.2.1 (requirements, composition, mechanical technological data,

¹¹⁾ See Compilation T. Radiological Protection and Activity Monitoring, No. 2.5

¹²⁾ The load transmission to the structure is dealt with in "Compilation of Documents Required for Civil Construction Supervision Purposes of Nuclear Facilities" (GMB1. 1981, p. 518)

¹³⁾ See Compilation T. Radiological Protection and Activity Monitoring, No. 2.2

¹⁴⁾ See Compilation T. Radiological Protection and Activity Monitoring, No. 2.1

¹⁵⁾ Field Fabrication and erection of the containment vessel with pressure suppression system is dealt with in Sec. 6

	as-receive condition, verification of the quality properties), and of the welding materials		– the pressure relief valves
4.7.2	Verification of suitability of materials for the respective application, if applicable weld suitability, unless presented under No. 3.2.2		– the vent cross sections and the swing check valves between drywell and wetwell
4.7.3	Verification of the suitability of welding materials for the respective application		– the spray systems in drywell and wetwell
4.7.4	Information on qualification of materials manufacturers, unless presented under No. 3.2.3		– the refuelling hatch cover, the air locks, and manholes
4.7.5	Information on qualification of welding materials manufacturers		– the ventilation systems ¹⁷⁾ in the containment vessel
4.8	Processing of product forms and welding materials	6.9	Insulation, if applicable
4.8.1	Information on qualification of component manufacturers	6.9.1	Information on effectiveness and durability the thermal insulation
4.8.2	Verification of adequate and valid procedure tests	6.9.2	Information on adequate fire protection ¹⁸⁾
4.8.3	Information on welding supervision and qualification certificates for welders being employed	6.10	Corrosion protection
4.8.4	Description of the quality assurance measures including documentation, during component manufacture	6.10.1	Description of the surface preparation of the containment vessel for the corrosion protection coating
4.8.5	Manufacturing documents required for quality assurance purposes	6.10.2	Information on the material used for corrosion protection
5.	Pressure test at the manufacturer's works	6.10.3	Description of the coating application procedure
5.1	Documentation of the quality assurance measures according to Nos. 4.8.4 and 4.8.5 and of their results for components subjected to pressure testing at the manufacturer's works	6.10.4	Verification of ensured durable and effective corrosion protection
5.2	Pressure test and strain gage location plan if applicable, including statement of type, number and location of strain gages and, if applicable, other measuring points	6.10.5	Information on the influence of the corrosion protection coating on in-service inspections
5.3	Examination plan for nondestructive examinations following the pressure test at the manufacturer's works	6.11	Welding materials
5.4	Information on component cleaning	6.11.1	Verification of suitability of the welding materials, unless presented under No. 4.7.3
6.	Installation of the respective components (field fabrication and erection of the containment vessel with pressure suppression system)	6.11.2	Information on qualification of the welding materials manufacturers, unless presented under No. 4.7.5
6.1	Documentation of the quality assurance measures and their results, unless presented under No. 5.1, as well as	6.12	field fabrication and erection
	– reports on the pressure test results at the manufacturer's work	6.12.1	Verification of the type tests and routine inspections performed on the cable penetrations at the manufacturer's works
	– reports on the stress-strain measurement results and comparison with the calculated values	6.12.2	Information on the successful examination of the manufacturers involved in field fabrication and erection
	– reports on the nondestructive examination results following the pressure test at the manufacturer's works	6.12.3	Information on the welding supervision and qualification certificates for the welders being employed
6.2	Statement of the components which must be installed prior to the containment vessel pressure test	6.12.4	Verification of adequate and valid procedure tests
6.3	Verification by calculation of strength and stability of the containment vessel (even during erection), and, if applicable, of the dynamic and fatigue behavior	6.12.5	Description of the quality assurance measures including documentation during field fabrication of the containment vessel with pressure suppression system, in particular for those areas of which the accessibility is restricted by the internal and external structure
6.4	Verification of deformation by calculation	6.12.6	Manufacturing documents required for quality assurance purposes
6.5	Detailed calculation of discontinuities (e.g. quenchers)	6.13	Information on the scheduled in-service inspections of the penetration leaktightness as well as on the possibility of performing nondestructive examinations of penetration welds
6.6	Installation plans for pipes of the pressure suppression and pressure relief systems	6.14	Information on the failure probability of the pressure suppressions system components
6.7	Isometric drawing of the pipes, including	6.15	Information on maintenance procedures for individual components with the aid of installation plans (overall allocation of compartments) or models, including statement of the radiation exposure ¹⁹⁾ , as far as important with regard to radiation exposure
	– installation list, item lists	6.16	Description of the power supply of the pressure suppression system components, unless presented under Nos. 4.4 and 4.5
	– pipe hangers	6.17	Description of the control and monitoring of the pressure suppression system components, unless presented under Nos. 4.4 and 4.5 including functional and protective logic diagrams
	– devices for mitigating the consequences of incidents (e.g. pipe whip restraints, guard pipes)	7.	Pressure and leakage rate test at the site 7.1
6.8	Information on spatial arrangement and anchoring of large-size components and pipes, in particular		Prerequisites for the pressure and leakage rate testing
	– the components of the reactor coolant pressure boundary ¹⁶⁾		

¹⁶⁾ See Compilation E. Reactor Coolant Pressure Boundary, Nos. 6.3 and 6.4

¹⁷⁾ See Compilation L. Ventilation Systems, No. 6.5

¹⁸⁾ See Compilation P. Electrical Power Supply of the Safety System, No. 6.1

¹⁹⁾ See Compilation T. Radiological Protection and Activity Monitoring, Nos. 6.16 up to 6.19

	<ul style="list-style-type: none"> • the fuel swelling rate • the fuel rod elongation 		
1.3.2	Summary description of the burnable absorbers including statement of the materials	1.6	used and of their verification by measurements Summary description of the reactor core stability <ul style="list-style-type: none"> – nuclear thermohydraulic stability – multi-channel stability – xenon oscillations
1.3.3	Summary description of the structural parts (e. g. spacer grids, fuel channels, control rod guide tubes, hold-down springs) including statement of the materials, dimensions, and type of joints (e.g. bolted or welded)	1.7	Summary description of the incident sequences and of the anticipated effects of incidents on the reactor core, in particular considering the malfunctions and incidents referred to in the Appendix to Compilation D
1.3.4	Summary description of former experiences in reference plants	1.8	Summary description of the core instrumentation ³⁾ e. g. for the determination of <ul style="list-style-type: none"> – the reactor power – the neutron flux – the local neutron flux density or the power distribution – the temperature – the pressure – the coolant flow rate – the DNB margin in PWRs – the steam flow rate in BWRs – the boric acid concentration in PWRs including statement of the <ul style="list-style-type: none"> – measurement principles – power supply⁴⁾ – measuring ranges – number, design and arrangement of the instrument channels
1.4	Summary description of the planned nuclear core design	1.9	Summary description of the function of process computers in control and monitoring of the reactor core
1.4.1	Statement of the design bases	1.10	Scram system
1.4.2	Statement of the planned enrichment distribution in the initial core	1.10.1	Summary description of the function of the reactor scram system
1.4.3	Summary description of the loading and unloading procedure ²⁾ as well as of the fuel assembly positioning, the burnup cycle, the plutonium buildup and statement of planned burnup data	1.10.2	Summary description of the reactor scram procedure (initiation of the scram, rapid control assembly insertion (BWR) or control assembly, drop (PWR); statement of the scheduled rapid fast insertion or drop times, reaching of subcriticality of the reactor, subsequent measures)
1.4.4	Statement of planned values for the reactivity coefficients and equivalents for <ul style="list-style-type: none"> – the fuel temperature – the moderator temperature – the moderator pressure – the steam voids – the boron concentration (PWR) – the power – the xenon poisoning 	1.10.3	Statement of the boundary conditions for the scram system design (e. g. location, redundancy with regard to initiation; statement of the coolant cooldown rate, assurance of subcriticality in the shutdown condition)
1.4.5	Statement of maximum reactivity rates and equivalents during specified normal operation and operational malfunctions and incidents	1.10.4	Summary description of the scram system <ul style="list-style-type: none"> – information on design and operating data – summary description of the individual components (e. g. scram hydraulic system in BWRs) including arrangement plans – information on materials, dimensions and design principles of the individual components – summary description of the electrical equipment (single line diagrams, spatial arrangement of electrical components) – summary description of the initiation as well as of the signaling and monitoring concept for availability and operability
1.4.6	Summary description of the reactivity control and shutdown concept	1.10.5	Summary description of the functional connection between the scram system and the coolant borating systems (e.g. chemical control system, extra borating system in PWRs) ⁵⁾
1.4.6.1	Information on the excess reactivity compensation	1.10.6	Summary description of the measures taken to make a sufficient shutdown reactivity available (e. g. insertion depth limitation for the control assemblies in PWRs)
1.4.6.2	Information on the compensation of fast and slow reactivity changes during specified normal operation	1.11	Control assembly drives
1.4.6.3	Information on the assurance of subcriticality in the shutdown condition	1.11.1	Summary description of the actuation, drive mechanism, sequence of operations for control assembly insertion and withdrawal, the signaling and monitoring concept for availability and
1.4.6.4	Summary description of the shutdown procedure in the event of incidents, if applicable, including information on the reactivity balance		
1.4.7	Summary description of the power density distribution and of the measures taken for the local power density limitation considering <ul style="list-style-type: none"> – xenon transients – load changes – operational and incident-induced control assembly movements – burnup distributions – local core subcooling, if applicable 		
1.4.8	Summary description of the calculation codes used and of their verification by measurements		
1.5	Summary description of the thermohydraulic core design		
1.5.1	Statement of the design bases		
1.5.2	Statement of the main parameters such as <ul style="list-style-type: none"> – power density distribution – coolant flow rate – pressure differences – operating pressure – coolant inlet temperature 		
1.5.3	Description of the flow path including statement of <ul style="list-style-type: none"> – coolant distribution including void distribution – bypass flow – pressure differences – hot channel factors 		
1.5.4	Summary description of the margin to departure from nucleate boiling (DNB) and statement of the correlations used and numeric values of the DNB ratio		
1.5.5	Summary description of the calculation codes		

²⁾ See Compilation I. Equipment for Handling and Storage of Fuel Assemblies, No. 1.9

³⁾ See Compilation S. Reactor Protection System, No. 1.11

⁴⁾ See Compilation P. Electrical Power Supply of the Safety System, No. 1. 2

⁵⁾ See Compilation H. Reactor Coolant System Auxiliary Systems, No. 1.9

	operability, the control assembly position measurement and indication, positioning velocity, positioning limits, redundancy		
1.11.2	Summary description of the supply system necessary for the control assembly operation (supply of power and fluids)	4.2.3	Requirements concerning material behavior ⁸⁾ such as
1.11.3	Summary description of former experiences (including prototype tests) made with the provided control assembly drives		– corrosion behavior (including the corrosion rate) of the fuel rod cladding tubes under operating conditions up to the scheduled maximum burnup
1.12	Summary description of the quality assurance during planning, manufacture, installation, commissioning, operation		– statement of anticipated changes in the materials and welded joints as a result of irradiation
1.13	Summary description of the maintenance, including in-service inspections		– H ₂ uptake of the fuel rod cladding tubes up to the scheduled maximum burnup and the resulting changes in the cladding tube properties under operating conditions
1.14	Summary description of the precautionary protective measures for maintenance procedures including in-service inspections with regard to minimization of the radiation exposure ⁶⁾	4.2.4.1	Description of the fuel rod cladding tube stress analysis
2.	Construction of the respective buildings and structures	4.2.4.2	Stress analysis of the fuel rod cladding tubes considering
2.1	Demonstration of the spatial separation of redundancies of the auxiliary systems for scram system power supply in BWRs, as far as safety related and of significance to the construction of the building structures (only BWR)		– coolant pressure, rod internal pressure
3.	Manufacture of the respective product forms		– initial ovality of the cladding tubes
3.1	Information on the chemical composition and the characteristic properties of the materials and the fuel including main impurities	4.2.5	– thermal influences (radial and azimuthal temperature gradient)
3.2.1	Statement of the supposed service conditions ⁷⁾ and allocation of the service conditions to service levels		– vibrations
3.2.2	Statement of the loads on components resulting from No. 3.2.1	4.2.5	– compressive forces on the spacer grids
3.3	Drawings required for manufacture of the product forms	4.2.6	– differing thermal expansions (e.g. between fuel rods and control rod guide thimbles)
3.4	Materials and product forms		– pellet clad interaction
3.4.1	Statement of the product form materials ⁸⁾ (requirements, composition including major constituents possibly being activated, mechanical technological data, as-delivered condition, verification of the quality properties)	4.2.5	Description of the short-term behavior of the fuel rods (safety margin to elastic buckling and plastic deformation)
3.4.2	Verification of suitability of materials and statement of further scheduled materials tests (for materials not already proven "A" information)	4.2.6	Description of the long-term behavior of the fuel rods (safety margin to critical strain limits and to fatigue failure under operating conditions considering the material anisotropy and the resulting changes in material properties)
3.5	Description of the quality assurance measures, including documentation during product form manufacture ⁸⁾	4.2.7	Description of the fuel rod behavior in load following operation considering the scheduled refuelling operations ⁸⁾
3.6	Manufacturing documents required for quality assurance purposes	4.2.8	Information on the design and calculation of the core components ⁸⁾
4.	Manufacture of the respective components	4.2.9	Statement of the mechanical loads on the core instrumentation
4.1	Documentation of the quality assurance measures according to Nos. 3.5 and 3.6 including their results	4.2.10	Statement of the loads on absorber assemblies, the neutron sources, and the flow restrictor assemblies
4.2	Description of the reactor core design and the core instrumentation for specified normal operation (for control assemblies see No. 4.5)	4.3	Analysis of the effects of loss-of-coolant on fuel assembly and channel with regard to the shutdown capability ⁸⁾
4.2.1	Statement of the limits, e.g. allowable temperatures, stresses, strains	4.3.1	Statement of the design values ⁸⁾ , e.g. stresses, deformations
4.2.2	Requirements resulting from operating conditions ⁸⁾ such as	4.3.2	Definition of the design basis initial plant condition ⁸⁾
	– coolant pressure	4.3.3	Comparison of the calculated loads and the design values according to No. 4.3.1
	– initial rod internal pressure	4.4	Description of the calculation codes used under Nos. 4.2 and 4.3, including input data and results ⁸⁾
	– fission gas production and release rates	4.5	Design and calculation of the control assemblies
	– axial burnup and power distribution	4.5.1	Statement of the anticipated loads during specified normal operation and representative incidents ⁸⁾⁹⁾ for control assembly design (e.g. temperatures, temperature changes, pressure differences, flow forces, acceleration forces, vibrations, neutron flux)
	– axial and radial temperature distribution in the fuel rod subject to maximum load	4.5.2	Statement of the main calculation principles used in design and proof of their applicability ⁸⁾
	– hot channel factors	4.5.3	General layout plans of the subassemblies
		4.5.4	Description of the anticipated geometric deformations of the control assemblies and their guides as a result of neutron flux density distribution, temperature distribution and operation or incident related changes (dimensional stability, deformation analysis) including statement of the effects ⁸⁾
		4.5.5	Information on the anticipated frictional wear and the effects of vibrations

⁶⁾ See Compilation T. Radiological Protection and Activity Monitoring, Nos. 1.5.4, 1.5.5, and 1.9

⁷⁾ Service conditions include design conditions, specified normal operation and incidents

⁸⁾ For fuel and control assemblies, data governing the design are "A" information but manufacturing documents are "B" information

⁹⁾ See Appendix to Compilation D.

4.5.6	Information on the anticipated neutron activation of the control assemblies	5.6	manufacturer's works Tolerance considerations (e.g. for the control assemblies, control rod guide thimbles, control rod guide assemblies and connection to the control assembly drives)
4.6	Design and calculation of the control assembly drives	6.	Installation of the respective components (applies only to control assembly drives)
4.6.1	Statement of the anticipated loads during specified normal operation and representative incidents for the control assembly drive design	6.1	Documentation of the quality assurance measures including functional tests and their results, unless presented under No. 5.1
4.6.2	Statement of the calculation principles and proof of their applicability	6.2	Certificates for electrical equipment and component work tests (see No. 4.10.3)
4.6.3	Control assembly drive design drawings ¹⁰⁾ , unless presented under No. 3.3	6.3.1	Description of the quality assurance measures, including documentation
4.7	Materials, welding materials	6.3.2	Manufacturing documents required for quality assurance purposes
4.7.1	Statement of the component materials, unless presented under No. 3.4.1 (requirements, composition, mechanical technological data, as-delivered condition, verification of the quality properties), including statement of the welding materials	6.4.1	Information on reliability (qualitative if applicable) of the equipment provided for the control assembly drives
4.7.2	Verification of suitability of welding materials	6.4.2	Information on the equipment provided for the control assembly drives to verify that it has been proven in service
4.7.3	Information on qualification of the welding materials manufacturers	6.5	Description of the signaling and monitoring devices
4.8	Processing of the product forms	6.6	Information on the electrical component arrangement and on the ambient conditions during specified normal operation and incidents
4.8.1	Information on qualification of the component manufacturers	6.7	Description of the electrical components of the control assembly drives, unless presented under No. 4.10, including measuring point data sheets for the instrumentation, equipment documents, signal and circuit diagrams
4.8.2	Verification of adequate and valid procedure tests	7.	Pressure test of the respective systems (applies only to the scram system in BWRs) ¹³⁾
4.8.3	Information on welding supervision and qualification certificates for welders being employed	7.1	Documentation of the quality assurance measures according to Nos. 6.3.1 and 6.3.2 and their results
4.9.1	Description of the quality assurance measures including documentation, during the component manufacture ⁸⁾	7.2	Pressure test and, if applicable, strain gage location plan, including statement of type, number, and location of the strain gages and other measuring points, if applicable
4.9.2	Manufacturing documents required for quality assurance purposes ⁸⁾	7.3	Examination schedule for the nondestructive examinations following the pressure test, if applicable
4.10	Description of the electrical components of the control assembly drives	7.4	Information on system cleaning
4.10.1	Description of the electrical control systems as well as of the signaling and monitoring systems including statement of their tasks and function and of the System data ¹¹⁾¹²⁾	8.	Commissioning of the respective systems (applies only to the control assembly drives)
4.10.2	Description of the instrumentation including statement of its tasks and functions and of the System data	8.1	Documentation of the installation including measurement records
4.10.3	Statement of the scheduled work tests and examinations	8.2	Information on the planned arrangement of control assembly groups and on the control assembly movements (e. g. movement diagrams, information on the chronological sequence of control and shutdown operations)
4.10.4	Description of the power supply	8.3	Commissioning program Program for commissioning and commissioning tests up to nuclear commissioning of the plant including information on the insertion limit settings (PWR) Program for measuring the scram system characteristics, e.g. determination of the rapid insertion control assembly time (BWR) or drop time (PWR) for various temperature and flow conditions
4.11	Description of the documentation system for the electrical components of the control assembly drives	8.4	General inspection plan (list of inspections) for in-service inspections, including statement of - type of inspections - inspection intervals - responsibility for inspections - plant condition considered (e.g. reactor power operation, reactor shutdown)
5.	Pressure test at the manufacturer's works For components subjected to pressure testing at the manufacturer's works	8.5	Description of the process computer software according to No. 1.9
5.1	Documentation of the quality assurance measures according to Nos. 4.9.1 and 4.9.2 and their results for components subjected to pressure testing at the manufacturer's work		
5.2	Pressure test and, if applicable, strain gage location plan, including statement of type, number, and location of the strain gages and, if applicable, other measuring points For components assembled at the manufacturer's works		
5.3	Statement of the calculation codes, input data, and calculation results for specified normal operation and incidents (e.g. stress analysis for the component design)		
5.4	Verification of compliance with the loads and material stresses as given under Nos. 4.2.3 and 4.5.1 or 4.6.1 resulting from specified normal operation and representative incidents		
5.5	Test and examination program for control assembly drives of BWRs assembled at the		

¹⁰⁾ Drawings required for approval by the authorized expert

¹¹⁾ See Compilation R. Instrumentation and Control, Control Room, Emergency Control Station, and Local Control Stations, Nos. 6.9.1 and 6.10.1

¹²⁾ See Compilation S. Reaktor Protection System, Nos. 6.2 and 6.3 (if applicable)

¹³⁾ Corresponding information on the pressure retaining parts (PWR) and control rod drive housings (BWR) shall be presented according to Compilation E. Reactor Coolant Pressure Boundary

9.	Delivery of the fuel assemblies	10.5	Program for setting the response limits of the reactor protection system
9.1	Documentation of the fuel assemblies	10.6	Program lists for the process computers provided according to No. 1. 9
10.	Initial core loading	10.7	Description of core loading (initial core)
10.1	Description of the final core layout including statement of the	10.7.1	Flow chart
	– number of fuel assemblies and fuel rods	10.7.2	Verification by calculation of sufficient subcriticality during core loading, and description of the calculation codes
	– enrichments and their distribution inside the core	10.7.3	Description of the measures for monitoring of subcriticality
	– number of the control assemblies and their distribution	10.8	Programs for trial operation with loaded reactor and for scheduled functional tests (e.g. vibration behavior, calibration of the devices for monitoring the neutron poison concentration in PWRs, rate of change in concentration of the neutron poison in PWRs, the setting of limits)
	– distribution of the burnable absorbers	10.9	Submission of the relevant parts of the operating manual, including safety specifications
	– distribution of neutron sources, flow restrictor assemblies, instrumentation lances		
	– control assembly movements		
10.2	Description of the nuclear core design	11.	Nuclear commissioning of the plant
10.2.1	Description of the measures taken for local power density detection and limitation considering	11.1	Incident analysis, taken into particular consideration the malfunctions and incidents listed in Appendix to D., including description of the calculation codes used and proof of their applicability (e. g. by comparison of measured and calculated transient profiles, reference to tests on models and analysis of extent of damage)
	– xenon transients		
	– load changes	11.2	Program for nuclear commissioning
	– operation or incident-induced control assembly movements	11.2.1	Description of the scheduled sequence of operation for first criticality
	– burnup distribution	11.2.2	Program for checking the neutron flux instrumentation (source range and intermediate range)
	– local core subcooling	11.2.3	Program for measuring and recording e.g.
10.2.2	Statement of the reactivity values		– the shutdown reactivity
10.2.2.1	Statement of the anticipated critical boron concentration of the initial core for of operating and burnup conditions in PWRs		– the control assembly worth
10.2.2.2	Statement of the control assembly worth and of the borating systems (PWR) considering the following parameters:		– the boron concentration in PWRs
	– burnup condition of the core and of the control assemblies		– the reactivity coefficients
	– positions and load-dependent insertion limits of control assemblies		– the critical boron concentration for hot standby and cold standby in PWRs
	– effects of incidents		– the reactivity rates
10.2.2.3	Statement of the reactivity coefficients of	11.3	Program for measurements during the nuclear commissioning
	– fuel temperature	11.3.1	Program for the core instrumentation in the power range
	– moderator temperature	11.3.2	Program for measuring and recording e.g.
	– moderator pressure		– the thermal reactor power
	– voids		– the coolant temperature (part-load diagram)
	– boron concentration		– the coolant flow rate
	– power		– the power density
	for typical operating and burnup conditions		– the coolant temperature coefficients
10.2.3	Statement of further physical design data	11.3.3	Program for measuring transients (e.g. load changes, load rejection, turbine trip, failure of the reactor coolant pumps, core subcooling, maloperation of control assemblies) in order to prove the behavior as calculated under operating and incident conditions
10.2.3.1	Statement of the anticipated fuel assembly burnup (per zone and as an average over the entire core at the time of the respective refuelling) and of the maximum local fuel rod burnup	11.4	Information on the envisaged documentation of the in-service inspection results. After completion of nuclear commissioning:
10.2.3.2	Statement of the characteristic power density distribution and of the maximum power densities for constant load and load changes	11.5	Reports or other documents on the commissioning according to Nos. 8.3, 10.4, 10.8, 11.2, and 11.3
10.2.3.3	Statement of the design basis frequency distribution of the power density in the core with regard to the extent of damage in the case of loss of coolant	11.6	Comparison of the data determined experimentally according to No. 11.5 and the anticipated data
10.2.4	Description of the calculation codes used, and proof of their applicability	11.7	Verification of compliance with the specified limits (e.g. maximum allowable temperatures) during specified normal operation and incidents considering the results according to No. 11.6
10.3	Description of the thermohydraulic core design	11.8	Complete documentation of the systems
10.3.1	Statement of the final thermohydraulic design data	11.9	Instructions for in-service inspections
10.3.2	Statement of the final limits, e.g. maximum allowable temperatures	12.	Refuelling The following information shall be presented in the course the operation and is not classified "A" or "B" information
10.3.3.1	Analysis of the considered parameters such as e.g.	12.1	Description of the core layout with loading schedule according to Nos. 10.1 and 10.7
	– reactor power	12.2	Description of changes in the nuclear core design
	– coolant inlet temperature		
	– power distribution		
	– coolant flow rate		
	– hot channel factors		
	– pressure differences		
	– bypass flow		
10.3.4	Comparison of the calculated results and the limits, e. g. DNB safety margin		
10.3.5	Description of the calculation codes used, and proof of their applicability		
10.4	Program for checking the design data according to No. 10.3.1		

- 12.2.1 Statement of the burnup distribution at the end of the cycle and at the beginning of the new cycle
- 12.2.2 Statement of the reactivity data according to No. 10.2.2
- 12.2.3 Statement of further physical design data according to No. 10.2.3
- 12.2.4 Description of calculation codes which differ from those used for previous cycles, and proof of their applicability
- 12.2.5 Description of the power density profile of the design limiting fuel rod
- 12.3 Description of the changes in the thermohydraulic core design according to Nos. 10.3.2 to 10.3.4 and description of calculation codes or DNB correlations which differ from those used for previous cycles with proof of their applicability
- 12.4 Statement of the changes compared with No. 4.2.6
- 12.5 Information on design according to Nos. 4.2 to 4.5, 4.7 and 4.8 and quality assurance according to Nos. 3.5, 3.6, 4.9.1 and 4.9.2 when using core components which differ from those used in previous cycles in terms of design or manufacturing process
- 12.6 Description of the malfunctions and incidents according to Appendix to D., the course of which is influenced by the changes in the reactor core; if applicable incident analysis for significant changes of an adverse nature
- 12.7 Instructions for in-service inspections on core components as far as different from No. 11.9
- 12.8 Information on coolant activity and, to the extent possible at this stage, fuel rod damage in the previous cycle, including an analysis of the causes
- 12.9 Information on the operating mode in the previous cycle (e.g. load following operation, control assembly movements)
- 12.10 Information on malfunctions in the previous cycle (e.g. malfunctions of the core instrumentation, maloperation of control assemblies)
- 12.11 Information on the control assembly burnup and the scheduled replacement of control assemblies
- 12.12 Description of the changes in the core instrumentation and the neutron sources
- 12.13 Explanation of the scheduled measurements during reactor restart. The results of these measurements shall be submitted before continuous operation is started
- 12.14 Information on the measures and controls important for refuelling, as far as they affect the control and shutdown systems (e.g. minimum boron concentration during refuelling of PWRs)

Appendix to D.

Malfunctions and incidents (examples)

- 1. Reactivity anomalies
- 1.1 Uncontrolled withdrawal of control assemblies with the core sub critical or during zero load operation (startup incident)
- 1.2 Uncontrolled withdrawal of control assemblies during power operation
- 1.3 Ejection or failure of a control assembly
- 1.4 Uncontrolled deboration in PWRs
- 1.5 Uncontrolled coolant temperature transients
- 1.6 Uncontrolled coolant pressure transients
- 1.7 Inadvertent loading and operation of a fuel assembly in an improper position
- 2. Power distribution anomalies
- 2.1 Maloperation of control assemblies
- 2.2 Rod drop incident in PWRs
- 3. Malfunction of control and monitoring equipment
- 3.1 Failure of the power distribution control in PWRs
- 3.2 Failure of the process computer for core monitoring in BWRs
- 3.3 Malfunction of power control
- 4. Malfunction of the heat removal without loss of

- coolant
- 4.1 Load rejection
- 4.2 Turbine trip
- 4.3 Loss of the main heat sink
- 4.4 Inadvertent closing of main steam valves
- 4.5 Failure of main feedwater pumps
- 4.6 Increase in power demand in relation to reactor power
- 4.7 Loss of the auxiliary power (emergency power mode)
- 4.8 Failure of reactor coolant pumps
- 5. Incidents in the steam, condensate and feedwater cycle in PWRs
- 5.1 Main steam pipe break
- 5.2 Feedwater pipe break
- 6. Loss-of-coolant
- 6.1 Steam generator tube failure
- 6.2 Small and medium reactor coolant pipe breaks
- 6.3 Large reactor coolant pipe breaks
- 6.4 Breaks in pressure retaining boundary pipes outside the containment vessel

3.E Compilation of Information on the Reactor Coolant Pressure Boundary

Scope of Application

PWR:

Reactor pressure vessel (not reactor core and reactor pressure vessel internals), parts carrying reactor coolant, secondary side shell of the steam generators, pressurizer including valves, reactor coolant pumps, control assembly drive pressure housings¹⁾, connecting and pipes including the first isolating valve.

This compilation shall apply analogously to Small-diameter piping e.g. instrument and control lines, if safety-related consequences of a failure cannot be ruled out

BWR:

Reactor pressure vessel (not reactor core and reactor pressure vessel internals) and pipes and components subjected to the Same pressure side, including control assembly drive housings 1) as well as the isolating valves located outside the containment vessel; pressure relief line up to the pressure relief valve.

This compilation shall apply analogously to small-diameter piping e.g. instrument and control lines, if safety-related consequences of a failure cannot be ruled out.

Category Scheme

- 1. Concept
- 2. Construction of the respective buildings and structures
- 3. Manufacture of the respective product forms
- 4. Manufacture of the respective components
- 5. Pressure test at the manufacturer's works
- 6. Installation of the respective components
- 7. Pressure test of the respective systems
- 8. Commissioning of the respective systems
- 9. Delivery of the fuel assemblies
- 10. Initial core loading
- 11. Nuclear commissioning of the plant
- 12. Refuelling

- 1. Concept
- 1.1 Compilation of the codes and assessment criteria which govern the concept
- 1.2 Summary description of the system and its components, their functions, including the supply systems required for their operation
- 1.3 Statement of the design and preliminary operating data (e.g. pressure, temperature, flows, thermal power, neutron flux, transients) and the operating media

¹⁾ These components are treated as pipes with regard to the Submission date

1.4	Summary description of the incidents considered including external events and the design measures taken to mitigate their consequences	3.2.6	and estimation of the corrosion effects Reactor pressure vessel: information on sub critical crack propagation in the basic and the weld material and on possible discontinuity sizes, including explanation
1.5	Summary description of the thermohydraulic processes and their models, with reference to their verification	3.2.7	Reactor pressure vessel: brittle fracture operating diagram
1.6	Statement of the main dimensions	3.3	Materials and product forms
1.7	Information on redundancy	3.3.1	Statement of the product form materials (requirements, composition including major constituents possibly being activated, mechanical technological data, as-delivered condition, verification of the quality properties)
1.8	Summary description of the spatial arrangement including spatial separation considering the supply systems	3.3.2	Statement of the material approval test results and statement of further material tests
1.9	Statement of material properties and/or the product form materials	3.3.3	Information on qualification of the manufacturers for materials and product forms
1.10	Summary description of the manufacturing processes	3.3.4.1	Description of the quality assurance measures, including documentation
1.11	Summary description of the quality assurance during planning, manufacture, installation, commissioning, operation	3.3.4.2	Manufacturing documents required for quality assurance purposes
1.12	Summary description of maintenance, including in-service inspections	3.3.5	Reactor pressure vessel: estimation of the expected embrittlement caused by irradiation of the basic material in the core belt line region and the welded joints: if applicable, information on the irradiation program (type, number of the specimens)
1.13	Summary description of the precautionary protective measures taken for maintenance procedures, including in-service inspections with regard to minimization of the radiation exposure ²⁾		
1.14	Summary description of the actuation and the signaling and monitoring concept ³⁾⁴⁾ for specified normal operation and incidents		
2.	Construction of the respective buildings and structures	4.	Manufacture of the respective components
2.1	Representation of the arrangement and accessibility of the main components inside the building with regard to maintenance operations ⁵⁾ , as far as important for the construction of the respective structures	4.1	Documentation of the quality assurance measures according to Nos. 3.3.4.1 and 3.3.4.2 and their results
2.2	Verification of spatial separation of components, as far as important for the construction of the respective structures	4.2	Information on the respective components
2.3	Statement and explanation of the loads ⁶⁾ or load assumptions originating from the components and used as design basis for the respective structures	4.2.1	System design documents for the provided components, such as
	– during specified normal operation		– thermal design
	– during hydrostatic pressure tests		– hydraulic design
	– as far as they result from the considered incidents and their consequences		– pump behavior including envelope of pump head-flow curves (BWR) or pump head flow curve (PWR)
			– valve characteristics
			– safety valve design
			– leaktightness requirements
			– circuit diagram showing control and monitoring with valves identifiers according to an agreed identification system, e.g. power station classification (pressurizer)
			– information on measuring points
			– demonstration of the effectiveness of the measures for avoidance of undue thermal shocks (pressurizer)
			– specification of functional verification for specified normal operation and incidents including incident consequences
3.	Manufacture of the respective product forms	4.2.2	Statement of type and number of measuring points on the components, including statement of measuring location and use of the measured variables
3.1	Design basis loads	4.2.3	Statement of the requirements for the component auxiliary and supply systems requirements
3.1.1	Statement of the design basis service conditions ⁷⁾ and allocation of service conditions to service levels	4.2.4	Information on the anticipated irradiation of the core belt line region of the reactor pressure vessel over its lifetime, and on the resulting temperature loading (gamma heat)
3.1.2	Statement of the loads during pressure tests as well as the loads on components resulting from No. 3.1.1	4.3	Verification of the statements on the loads presented under Nos. 3.1.1 and 3.1.2 and estimation of the pipe forces
3.2	Design and dimensioning	4.4	Design and calculation
3.2.1	Compilation of the considered codes and assessment criteria	4.4.1	Compilation of the considered codes and assessment criteria, unless presented under No. 3.2.1
3.2.2	Statement of the main calculation bases for dimensioning and proof of their applicability	4.4.2	Verification of sufficient dimensioning of the components (other than pipes see Nos. 4.4.3.1 and 4.4.3.2) for specified normal operation and incidents including external events
3.2.3	Drawings required for dimensioning	4.4.3.1	Statement of the design basis service load conditions for specified normal operation and incidents including external events for the design and manufacture of pipes, unless presented under No. 3.1.1
3.2.4	Verification of adequate dimensioning		
3.2.5	Statement of the possible corrosion mechanisms		

²⁾ See Compilation T. Radiological Protection and Activity Monitoring, Nos. 1.5.4, 1.5.5 and 1.9

³⁾ See Compilation S. Reactor Protection System, No. 1.7

⁴⁾ See Compilation R. Instrumentation and Control, Control Room, Emergency Control Station, and Local Control Stations, Nos. 1.2 and 1.3

⁵⁾ See Compilation T. Radiological Protection and Activity Monitoring, Nos. 2.1 and 2.5

⁶⁾ Load transmission to the structure is dealt with in the "Compilation of Documents Required for Civil Construction Supervision Purposes of Nuclear Facilities" (GMB1. 1981, p. 518)

⁷⁾ Service conditions include design conditions, specified normal operation, and incidents

4.4.3.2	Statement of the pipe design data resulting from No. 4.4.3.1	6.6	radiation exposure Description of the power supply, including emergency power supply ¹⁰⁾
4.4.4	Design drawings ⁸⁾ of the components, unless presented under No. 3.2.3	6.7	Description of the system control, and monitoring ¹¹⁾
4.5	Materials, welding materials	6.8	Description of the auxiliary and supply systems of pumps and valves
4.5.1	Statement of the component materials, unless presented under No. 3.3.1 (requirements, composition, mechanical technological data, as-delivered condition, verification of the quality properties), including statement of the welding materials	6.9	Information on qualification of the manufacturers involved in component installation
4.5.2	Verification of welding material qualification	6.10	Verification of adequate of and valid procedure tests
4.5.3	Information on qualification of the welding material manufacturers	6.11	Information on welding supervision and qualification certificates for welders being employed
4.5.4	Reactor pressure vessel: check of the weld metal embrittlement estimated according to No. 3.3.5, and of the heat affected zone, against the analysis results	6.12.1	Description of the quality assurance measures, including documentation for component installation
4.6	Processing of product forms and welding materials	6.12.2	Manufacturing documents required for quality assurance purposes
4.6.1	Information on qualification of component manufacturers	6.13	Statement of the arrangement of process monitoring systems (e. g. loose parts monitoring system)
4.6.2	Verification of adequate and valid procedure tests	7.	Pressure test of the respective systems
4.6.3	Information on welding supervision and qualification certificates for welders being employed	7.1	Documentation of the quality assurance measures according to Nos. 6.12.1 and 6.12.2 and their results
4.6.4	Description of quality assurance measures including documentation during component manufacture	7.2	Pressure test and, if applicable, strain gage location schedule, including statement of type, number, and location of strain gages and, if applicable, other measuring points
4.6.5	Manufacture documents required for quality assurance purposes	7.3	Examination plan for nondestructive examinations following the pressure test
4.7	Statement of the scheduled functional tests	7.4	Information on system cleaning
4.8	Verification of design suitability for nondestructive examinations, with a view to in-service inspections	8.	Commissioning of the respective systems
5.	Pressure test at the manufacturer's works	8.1	Analysis of System and component mechanical behavior for typical operating conditions and incidents, including external events taking into consideration anchor points, hangers, and whip restraints, and statement of calculation codes, input data, and calculation results
5.1	Pressure test and, if applicable, strain gage location plan, including statement of type, number, and location of strain gages and, if applicable, other measuring points	8.2	Verification of complete material approval
5.2	Documentation of the quality assurance measures according to Nos. 4.6.4 and 4.6.5 and their results for components subjected to pressure test at the manufacturer's works	8.3	Reports or other documents on the system pressure testing
5.3	Verification of suitability of the safety valves (e.g. subunit test, individual acceptance inspection)	8.4	Reports or other documents on the stress-strain measurements, and comparison with the calculated data according to No. 8.1
6.	Installation of the respective components	8.5	Reports or other documents on the nondestructive examination following the System pressure test
6.1	Documentation of the quality assurance measures and their results, unless presented under No. 5.2, in particular <ul style="list-style-type: none"> – report on the results of pressure tests at the manufacturer's works – report on test results of stress-strain measurements and comparison with the calculated data – report on test results of the nondestructive examination following the pressure test at the manufacturer's works 	8.6	Location plan of the specimens to be irradiated inside the reactor pressure vessel, if applicable
6.2	System engineering design of the reactor coolant pressure boundary, including component dynamic behavior, unless presented under No. 4.2.1, including measuring point data sheets (pressurizer)	8.7	Commissioning program Program for commissioning and commissioning tests up to the nuclear commissioning of the plant Program for measuring the component characteristics e.g. pumps <ul style="list-style-type: none"> – specified operating points – speed – temperature – run-up time – drive power consumption e.g. valves <ul style="list-style-type: none"> – measurement of opening and closing times – testing of position checkback signaling – measurement of volumetric flow in connection with the valve characteristic Program for checking the interlocks on the basis of the protective logic and functional diagrams Program for the performance of displacement and vibration measurements
6.3	Installation plans and pipe routing plans	8.8	General inspection plan (list of inspections) for in-
6.4	Isometric drawings of pipes, including <ul style="list-style-type: none"> – installation list (item list) – pipe hangers – devices for mitigating the consequences of incidents 		
6.5	Information on maintenance procedures for individual components, with the aid of installation plans (overall allocation of compartments) or models, including statement of the radiation exposure ⁹⁾ as far as important with regard to		

⁸⁾ Drawings required for approval by the authorized expert
⁹⁾ See Compilation T. Radiological Protection and Activity Monitoring, Nos. 6.16 to 6.19

¹⁰⁾ See Compilation P. Electrical Power Supply of the Safety System, No. 6.7.1

¹¹⁾ See Compilation R. Instrumentation and Control, Control Room, Emergency Control Station, and Local Control Stations, No. 6.10.1

- service inspections, including statement of
 - type of inspections
 - inspection intervals
 - responsibility for inspections
 - plant condition considered (e.g. reactor power operation, reactor shutdown)
- 9. Delivery of the fuel assemblies (no information)
- 10. Initial core loading
- 10.1 Reports or other documents on the commissioning according to No.8.7
- 10.2 Instructions for recurrent functional tests
- 10.3 Final analysis of the system mechanical behavior on the basis of the final design and the commissioning tests according to No. 8.7
- 10.4 Submission of the relevant parts of the operating manual including safety specifications
- 11. Nuclear commissioning of the plant
- 11.1 Program for commissioning tests within the nuclear commissioning of the plant
- 11.2 Reports or other documents on commissioning according to No. 8.7, unless presented under No. 10.1, including comparison of the results with calculated data
- 11.3 Results of the baseline measurements
- 11.4 Information on the provided documentation of in-service inspection results After completion of nuclear commissioning:
- 11.5 Reports or other documents on the nuclear commissioning according to No. 11.1
- 11.6 Complete documentation of the system
- 11.7 Instructions for in-service inspections
- 12. Refuelling (no information)

3.F Compilation of Information on the Reactor Pressure Vessel Internals

Scope of Application

This compilation of information shall apply to the reactor pressure vessel internals (JAC), as e.g. parts which serve to fulfill the following functions:

- fixing of the reactor core and shielding of the reactor pressure vessel
- fixing and guiding of the control assemblies
- fixing of the instrumentation
- fixing of the irradiation test specimens
- guiding of the coolant
- separation of water and steam (BWR)
- core cooling by core flooding (BWR)

(Identifiers according to the power station classification)

Category Scheme

- 1. Concept
 - 2. Construction of the respective buildings and structures
 - 3. Manufacture of the respective product forms
 - 4. Manufacture of the respective components
 - 5. Pressure test at the manufacturer's works
 - 6. Installation of the respective components
 - 7. Pressure test of the respective systems
 - 8. Commissioning of the respective systems
 - 9. Delivery of the fuel assemblies
 - 10. Initial core loading
 - 11. Nuclear commissioning of the plant
 - 12. Refuelling
-
- 1. Concept
 - 1.1 Compilation of the codes and assessment criteria which govern the concept
 - 1.2 Summary description of the internals and of their functions in the reactor pressure vessel
 - 1.3 Statement of the design and preliminary operating data (e.g. pressure, temperature, neutron flux, coolant flow)

- 1.4 Summary description of the incidents considered, including external events and the design measures taken to mitigate their consequences
- 1.5 Statement of the main dimensions and the weights of the reactor pressure vessel internals
- 1.6 Statement of the material properties, or of the materials of the reactor pressure vessel internals
- 1.7 Summary description of the design of the reactor pressure vessel internals
- 1.8 Summary description of the maintenance including in-service inspections
- 1.9 Summary description of the precautionary protective measures taken for maintenance procedures, including in-service inspections with regard to minimization of the radiation exposure¹⁾
- 1.10 Information on installation, removal and set down facilities
- 1.11 Summary description of the quality assurance during planning, manufacture, installation, commissioning, operation
- 2. Construction of the respective buildings and structures (no information)
- 3. Manufacture of the respective product forms
- 3.1.1 Statement of the design basis service conditions²⁾ and allocation of the service conditions to service levels
- 3.1.2 Statement of the component loads resulting from No. 3.1.1
- 3.2 Drawings required for the manufacture of the product forms of the internals, including main dimensions
- 3.3 Materials and product forms
- 3.3.1 Statement of the product form materials (requirements, composition, including statement of the Co content, mechanical technological data, as-delivered condition, verification of the quality properties)
- 3.3.2 Verification of the suitability of the materials and statement of further materials tests provided
- 3.3.3 Information on qualification of the manufacturers for materials and product forms
- 3.3.4 Description of the quality assurance measures including documentation
- 3.3.5 Manufacture documents required for quality assurances purpose
- 3.3.6 Estimation of the expected embrittlement caused by irradiation of the base material and welded joints
- 3.3.7 Statement of the possible corrosion mechanics and estimation of the corrosion rates
- 4. Manufacture of the respective components
- 4.1 Documentation of the quality assurance measures according to Nos. 3.3.4 and 3.3.5 and their results
- 4.2 Statement of the design basis incidents including their consequences
- 4.3 Statement of the loads, unless presented under Nos. 3.1.1 and 3.1.2, e.g.
 - pressure loads
 - temperature loads
 - flow forces
 - vibrations
- 4.4 Design and calculation
- 4.4.1 Statement of the calculation bases for verification of the loads, and proof of their applicability
- 4.4.2 Compilation of the considered codes and the assessment criteria
- 4.4.3 Design drawings³⁾ of the internals, unless presented under No. 3.2 as well as calculation of the loads mentioned under No. 4.3
- 4.5 Materials, welding materials

¹⁾ See Compilation T. Radiological Protection and Activity Monitoring, Nos. 1.5.4, 1.5.5, 1.9

²⁾ Service conditions include design conditions, specified normal operation, and incidents

³⁾ Drawings required for approval by the authorized expert

- 4.5.1 Statement of the component materials, unless presented under No. 3.3.1 (requirements, composition, mechanical technological data, as-delivered condition, verification of the quality properties), including statement of the welding materials
- 4.5.2 Verification of the suitability of the materials, unless presented under No. 3.3.2, including welding materials
- 4.5.3 Information on qualification of the manufacturers of the materials, unless presented under No. 3.3.3, including the welding materials
- 4.6 Processing of product forms and welding materials
- 4.6.1 Information on qualification of component manufacturers
- 4.6.2 Verification of adequate and valid procedure tests
- 4.6.3 Information on welding supervision and qualification certificates for welders being employed
- 4.6.4 Description of the quality assurance measures including documentation during internals manufacture
- 4.6.5 Manufacture documents required for quality assurance purpose
5. Pressure test at the manufacturer's works (no information)
6. Installation of the respective components
- 6.1 Documentation of the quality assurance measures according to Nos. 4.6.4 and 4.6.5 and their results
- 6.2 Verification of the statements on the loads presented under Nos. 3.1.1, 3.1.2 and 4.3
- 6.3 Analysis for typical operating conditions and incidents including external events and statement of the calculation codes and input data
- 6.4 Statement of displacements of the internals during incidents with regard to scram reliability
- 6.5 Tolerance calculations, in particular concerning the free control assembly path, for hot and cold operation, and for incidents (e.g. deformation)
7. Pressure test of the respective systems (no information)
8. Commissioning of the respective systems⁴⁾
- 8.1 Commissioning program
Program for commissioning tests up to the nuclear commissioning of the plant, e.g.
– measurement of vibration behavior
– verification of compliance with the tolerances for the cold and hot conditions
– functional tests
- 8.2 General inspection plan (list of inspections) for in-service inspections, including statement of
– type of inspections
– inspection intervals
– responsibility for inspections
9. Delivery of the fuel assemblies (no information)
10. Initial core loading
- 10.1 Reports or other documents on the commissioning according to No.8.1
- 10.2 Submission of the relevant parts of the operating manual including safety specifications
11. Nuclear commissioning of the plant
- 11.1 Program for commissioning tests within the nuclear commissioning of the plant
- 11.2 Reports or other documents on commissioning according to No. 8.1, unless presented under No. 10.1, including comparison of the results with calculated data
- 11.3 Information on provided documentation of in-service inspection results After completion of

- nuclear commissioning:
- 11.4 Reports or other documents on the nuclear commissioning according to No. 11.1
- 11.5 Complete documentation of the reactor pressure vessel internals
- 11.6 Instructions for in-service inspections
12. Refuelling (no information)

3.G Compilation of Information on the Emergency Core Cooling and Residual Heat Removal Systems including the Heat Removal Chain

Scope of Application

This compilation of information shall apply to systems which mainly serve to fulfill the following functions:

- residual heat removal from the reactor core during normal reactor shutdown
- emergency core cooling during loss-of-coolant
- residual heat removal from the reactor core following loss-of-coolant
- residual heat removal from the reactor core following an incident not involving any loss-of-coolant (loss of condenser)
- fuel pool cooling

These systems are as follows:

- fuel pool cooling system (FAK)
 - emergency fuel pool cooling system (FAN)
 - emergency shutdown system (JDK)
 - residual heat removal system (JNA)
 - emergency residual heat removal system (JNB)
 - high pressure safety injection system (JND)
 - accumulator injection system (JNG)
 - borated water storage system (JNK)
 - component cooling system for safety-related components to be cooled (KAA)
 - emergency component cooling system (KAD)
 - feedwater pipe system (LAB) up to the first isolating valve
 - emergency feedwater pipe system including storage, PWR (LAR)
 - emergency feedwater pump system, PWR (LAS)
 - back-up emergency feedwater system, PWR (LAT)
 - main steam pipe system, PWR (LBA) up to the first isolating valve
 - emergency condensation, PWR (LBT)
 - steam generator blowdown system, PWR (LCQ) up to the first isolating valve
 - service water system for secured plant (PE)
 - emergency service water pipe system
 - emergency service water pump system
 - secured closed cooling water system (PJ)
 - operational cooling circuit II, BWR
- (Identifiers according to the power station classification)

For the scope and degree or detail of the information see "General Specification Basic Safety" (Appendix to Sec. 4.2 of the RSK-Guidelines for Pressurized Water Reactors, 2nd Edition as of 24 January 1979).

Category Scheme

1. Concept
2. Construction the respective buildings and structures
3. Manufacture of the respective product forms
4. Manufacture of the respective components
5. Pressure test at the manufacturer's works
6. Installation of the respective components
7. Pressure test of the respective systems
8. Commissioning of the respective systems
9. Delivery of the fuel assemblies
10. Initial core loading
11. Nuclear commissioning of the plant
12. Refuelling

⁴⁾ Reactor coolant pressure boundary

1.	Concept		assumptions ⁵⁾ originating from the components and governing the design of the respective structure
1.1	Compilation of the codes and assessment criteria which govern the concept		– during specified normal operation
1.2	Summary description of the systems and their components, and of their functions including the supply systems required for their operation, during specified normal operation and incidents with schematics		– during water pressure tests
1.3	Summary description of the system design for specified normal operation and incidents including external events, and	2.4	Statement of the differences to be expected in the settlement and displacement of different buildings, and of their consideration in the design of the safety-related systems and buildings concerned
	– statement of the design basis incidents requiring operation of the systems		
	– description of the incidents including the consequences	3.	Manufacture of the respective product forms ⁶⁾
	– statement and explanation of the design basis break sizes and locations in the reactor coolant pressure boundary	3.1	Design basis loads
	– statement of the basic conditions for the operation of the systems	3.1.1	Statement of the design basis service conditions ⁷⁾ and allocation service conditions to service levels
	– description of the thermohydraulic processes and their models with reference to their verification	3.1.2	Statement of the loads during pressure tests as well as the loads on components resulting from No. 3.1.1
	– statement of the transients taken into consideration	3.2	Design and dimensioning
	– statement of the design requirements	3.2.1	Compilation of the considered codes and assessment criteria
	– description of the subsystem interaction	3.2.2	Statement of the main calculation bases for dimensioning, and proof of their applicability
1.4	Statement of the design and preliminary data (e.g. nominal flow rate, nominal total head, and power consumption of pumps; cooling capacity of heat exchangers, pressures, temperatures, type and stored quantity of process media)	3.2.3	Drawings required for dimensioning
1.5	Information on redundancy	3.2.4	Verification of adequate dimensioning
1.6	Summary description of the spatial arrangement of the main components and of the main cable and pipe runs, including spatial Separation	3.2.5	Statement of the possible corrosion mechanics and estimation of the corrosion rates
1.7	Statement of the material properties or the materials and product forms of the main components	3.2.6	Component classification according to "General Specification Basic Safety" ⁸⁾
1.8	Summary description of the quality assurance during planning, manufacture, installation, commissioning, operation	3.3	Materials and product forms
1.9	Summary description of the barriers in the residual heat removal chain for retention of activity	3.3.1	Statement of the product form materials (e. g. requirements, composition, mechanical technological data, as-delivered condition, verification of the quality properties)
1.10	Summary description of the functional tests	3.3.2	Verification of the suitability of the materials and statement of further material tests provided
1.11	Summary description of maintenance including in-service inspections	3.3.3	Information on qualification of the manufacturers for material and product forms, if applicable
1.12	Summary description of the precautionary protective measures taken for maintenance procedures including in-service inspections with regard to minimization of the radiation exposure ¹⁾	3.3.4	Description of the quality assurance measures including documentation during product form manufacture
1.13	Summary description of the signaling and monitoring concept ²⁾³⁾ for specified normal operation and incidents, including initiation criteria and Limits	3.3.5	Manufacture documents required for quality assurance purposes
2.	Construction of the respective buildings and structures	4.	Manufacture of the respective components
2.1	Representation of the main component arrangement and accessibility inside the building regarding maintenance procedures ⁴⁾ , as far as important for the construction of the respective structures	4.1	Documentation of the quality assurance measures according to Nos. 3.3.4 and 3.3.5 and their results
2.2	Verification of spatial separation of redundancies, as far as important for the construction of the respective structures	4.2	System design documents for the main components, as e. g.
2.3	Statement on explanation of the loads or load		– thermal design
			– hydraulic design
			– pump characteristic
			– valve opening and closing times
			– specification of function proofs for specified normal operation and incidents including their consequences
		4.3	Statement of the requirements for component service and supply systems
		4.4	Verification of the load statements given under Nos. 3.1.1 and 3.1.2, except forces on pipes
		4.5	Design and calculation
		4.5.1	Compilation of the considered codes and assessment criteria, unless presented under No. 3.2.1

¹⁾ See Compilation T. Radiological Protection and Activity Monitoring, Nos. 1.5.4, 1.5.5 and 1.9

²⁾ See Compilation S. Reactor Protection System, No. 1.7

³⁾ See Compilation R. Instrumentation and Control, Control Room, Emergency Control Station, and Local Control Stations, Nos. 1.2 and 1.3

⁴⁾ See Compilation T. Radiological Protection and Activity Monitoring, Nos. 2.1 and 2.5

⁵⁾ The load transmission to be structure is dealt with in "Compilation of Documents Required for Civil Construction Supervision Purposes of Nuclear Facilities (GMB1. 1981, p. 518)

⁶⁾ As far as they are subject to accompanying inspections by the authorized expert

⁷⁾ Service conditions include design conditions, specified normal operation, and incidents

⁸⁾ RSK Guidelines for Pressurized Water Reactors, 2nd Edition as of 24 January 1979, Appendices to Sec. 4.2

- 4.5.2 Verification of adequate dimensioning of the components (other than pipes, see Nos. 4.5.3.1 and 4.5.3.2) for specified normal operation and incidents including external events
- 4.5.3.1 Statement of the design basis service conditions for specified normal operation and incidents including external events considered for design and manufacture of pipes, unless presented under No. 3.1.1
- 4.5.3.2 Statement of the pipe design data resulting from No. 4.5.3.1
- 4.5.4 Design drawings⁹⁾ of the components, unless presented under No. 3.2.3
- 4.6 Materials, welding materials
- 4.6.1 Statement of the component materials, unless presented under No. 3.3.1 (requirements, composition, mechanical technological data, as-delivered condition, verification of the quality properties), including statement of the welding materials
- 4.6.2 Verification of the suitability of the materials, unless presented under No. 3.3.2 including welding materials
- 4.6.3 Information on qualification of the main manufacturers, for materials, unless presented under No. 3.3.3, including for welding materials, if applicable
- 4.7 Processing of product forms and welding materials
- 4.7.1 Information of qualification of component manufacturers, if applicable
- 4.7.2 Verification of adequate and valid procedure tests
- 4.7.3 Information on welding supervision and qualification certificates for welders being employed
- 4.7.4 Description of quality assurance measures including documentation
- 4.7.5 Manufacture documents required for quality assurance purposes
- 4.8 Statement of the scheduled functional tests
- 4.9 Verification of design suitable for nondestructive examinations considering in-service inspections, if applicable
5. Pressure test at the manufacturer's works
- 5.1 Pressure test and, if applicable, strain gage location plan, including statement of type, number, and location of strain gages and other measuring points, if applicable
- 5.2 Documentation of the quality assurance measures according to Nos. 4.7.4 and 4.7.5 and their results for components subjected to pressure tests at the manufacturer's works
6. Installation of the respective components
- 6.1 Documentation of the quality assurance measures and their results, unless presented under No. 5.2, in particular
- report on the results of pressure tests at the manufacturer's works
 - report on the results of stress-strain measurements and comparison with the calculated data
 - report on the results of the nondestructive examination following the pressure test at the manufacturer's work
- 6.2 System design including component dynamic behavior, unless presented under No. 4.4
- 6.3 Installation plans, pipe routing plans, isometric drawings of pipes, including
- installation list (item list)
 - pipe hangers
- dependent on the nominal diameter of the pipes
- 6.4 Description of the power supply¹⁰⁾ including emergency power supply
- 6.5 Description of the system control and monitoring¹¹⁾, including
- protective logic and functional diagrams¹²⁾
 - statement and explanation of the measured variables which are used for System activation
 - compilation of the alarms, including information on their representation and the countermeasures to be taken
- 6.6 Information on maintenance procedures for individual components with the aid of installation plans (overall allocation of compartments) or models, including statement of the radiation exposure, as far as important with regard to radiation exposure
- 6.7 Verification of the effectiveness of the emergency core cooling and residual heat removal systems, including
- statement of the postulated basic conditions and parameters sustained
 - analysis of the cladding tube damage during loss-of-coolant
 - documentation of the computer codes employed and their empirical validation
- 6.8 Information on system internal incidents and their consequences, as applicable
- 6.9 Verification of the reliability of systems necessary for control of incidents by means of a system-related weak-point analysis, taking into consideration
- the short-term phase
 - the long-term phase
 - the maintenance concept for relevant service conditions
- 6.10 Information on qualification of the manufacturers involved in component installation, if applicable
- 6.11 Verification of adequate and valid procedure tests
- 6.12 Information on welding supervision and qualification certificates for welders being employed
- 6.13 Description of the quality assurance measures, including documentation
- 6.14 Manufacture documents required for quality assurance purposes
7. Pressure test of the respective systems
- 7.1 Documentation of the quality assurance measures according to Nos. 6.13 and 6.14 and their results
- 7.2 Pressure test and strain gage location plan, including statement of type, number and location of strain gages and other measuring points, if applicable
- 7.3 Examination plan for nondestructive examinations following the pressure test
- 7.4 Information on system cleaning
8. Commissioning of the respective systems
- 8.1 Analysis of the system mechanical behavior for typical operational states and incidents including external events taking into consideration anchor points, hangers, and statement of the calculation codes, input data, and calculation results
- 8.2 Reports or other documents on system pressure tests and, if applicable, stress-strain measurements, including comparison with the calculated data according to No. 8.1
- 8.3 Reports or other documents on the nondestructive examinations following the system pressure test
- 8.4 Commissioning program
- Program for commissioning and commissioning tests up to the nuclear commissioning of the plant
- Program for measuring the characteristic

¹¹⁾ See Compilation R. Instrumentation and Control, Control Room, Emergency Station, and Local Control Stations, No. 6.10.1

¹²⁾ Submission of informative functional diagrams required for System approval

⁹⁾ Drawings required for approval by the authorized expert

¹⁰⁾ See Compilation P. Electrical Power Supply of the Safety System, No. 6.7.1

component data for e.g. pumps

- specified operating points
- speed
- temperature
- run-up time
- drive power consumption

for e.g. valves

- measurement of opening and closing times
- testing of position checkback signaling
- measurement of volumetric flow in connection with the valve characteristic

Program for the empirical determination of heat exchanger cooling capacities
Program for checking the interlocks on the basis of protective logic and functional diagrams
Program for the performance of displacement and vibration measurements

- 8.5 General inspection plan (list of inspections) for in-service inspections including statement of
- type of inspections
 - inspection intervals
 - responsibility of inspections
 - plant condition considered (e.g. reactor power operation, reactor shutdown)

9. Delivery of the fuel assemblies (no information)

10. Initial core loading

- 10.1 Reports or other documents on the commissioning according to No. 8.4

- 10.2 Instructions for recurrent functional tests

- 10.3 Final analysis of the system mechanical behavior on the basis of the final design and the commissioning tests according to No. 8.4

- 10.4 Submission of the relevant parts of the operating manual including safety specifications

11. Nuclear commissioning of the plant

- 11.1 Program for nuclear commissioning tests of the plant

- 11.2 Reports or other documents on commissioning according to No. 8.4, unless presented under No. 10.1, including comparison of the results with calculated data

- 11.3 Results of baseline measurements

- 11.4 Information on the provided documentation of in-service inspection results

After completion of nuclear commissioning:

- 11.5 Reports or other documents on the nuclear commissioning according to No. 11.1

- 11.6 Complete documentation of the systems

- 11.7 Instructions for in-service inspections

12. Refuelling (no information)

3.H Compilation of Information on the Reactor Coolant System Auxiliary Systems

Scope of Application

This compilation of information shall apply to systems which essentially serve to fulfill the following functions:

PWR:

- volume control during startup, shutdown and/or during power changes
- makeup of small reactor coolant losses
- reactor coolant purification
- boric acid and demineralized water control for power control and shutdown
- reactor coolant pump seal water supply
- collection of reactor coolant during pressure relief, unless covered by Compilation E. Reactor Coolant Pressure Boundary

BWR:

- reactor coolant purification
- volume control during startup and shutdown
- recirculation pump and control assembly drive seal

- water supply
- boric acid control

These systems are as follows for PWRs:

- extra borating System/emergency borating system (JDH)
- pressurizer relief system (JEG), unless part of the reactor coolant pressure boundary
- sealing fluid supply, sealing water supply system (JEW)
- functional testing system (JNP)
- volume control system (KBA)
- boric acid control system (KBC) and demineralized water control system (KBN)
- coolant purification system (KBE)

(Identifiers according to the power station classification)

For the scope and degree of detail of the information, See "General Specification Basic Safety" (Appendix to Sec. 4.2 of the RSK Guidelines for Pressurized Water Reactors, 2nd Edition as of January 24, 1979).

Category Scheme

1. Concept
 2. Construction of the respective buildings and structures
 3. Manufacture of the respective product forms
 4. Manufacture of the respective components
 5. Pressure test at the manufacturer's works
 6. Installation of the respective components
 7. Pressure test of the respective systems
 8. Commissioning of the respective systems
 9. Delivery of the fuel assemblies
 10. Initial core loading
 11. Nuclear commissioning of the plant
 12. Refuelling
1. Concept
 - 1.1 Compilation of the codes and assessment criteria which govern the concept
 - 1.2 Summary description of the systems, and of their functions, during normal operation and incidents, including schematics
 - 1.3 Information on redundancy
 - 1.4 Summary description of the spatial arrangement of the main components¹⁾, the cable and pipe runs, and, if applicable, the protection against external events
 - 1.5 Statement of the design and preliminary operating data, and of the operating media
 - 1.6 Statement of the main dimensions of the main components
 - 1.7 Summary description of the incidents considered including external events and the design measures taken to mitigate their consequences
 - 1.8 Classification of the individual systems and components according to their importance to safety, and identification of the information from Secs. 3 to 11 required for these systems and components
 - 1.9 Summary description of the functional interconnections between the coolant borating systems and the scram system²⁾
 - 1.10 Summary description of the measures for monitoring and retention of radioactive materials³⁾
 - 1.11 Estimation of the anticipated activity concentration⁴⁾, including statement of the essential nuclides and the maximum anticipated activity inventory in the main components during

¹⁾ See. 2. Definitions

²⁾ See Compilation D. Reactor Core and Control Assemblies including their Drives, No. 1.10.5

³⁾ See Compilation T. Radiological Protection and Activity Monitoring, Nos. 1.3.6 and 1.4.1

⁴⁾ See Compilation T. Radiological Protection and Activity Monitoring, No. 1.3.2

1.12	specified normal operation and incidents, if applicable, citing reference plants Statement of the material properties and/or the materials of the main components	3.2	Design and dimensioning
1.13	Summary description of the quality assurance during planning, manufacture, installation, commissioning, operation taking into consideration the importance of the systems to safety	3.2.1	Compilation of the considered codes and assessment criteria
1.14	Summary description of maintenance including in-service inspections	3.2.2	Statement of the essential calculation bases for dimensioning and explanation of their applicability
1.15	Summary description of the precautionary protective measures taken for maintenance procedures including in-service inspections with regard to minimization of the radiation exposure ⁵⁾	3.2.3	Drawings required for dimensioning
1.16	Summary description of the actuation and monitoring concept ⁶⁾⁷⁾ for the systems, during specified normal operation and incidents	3.2.4	Verification of adequate dimensioning
1.17	Summary description of the supply systems required for the systems operation (media and power supply)	3.3	Materials and product forms
2.	Construction of the respective buildings and structures	3.3.1	Statement of the product form materials (requirements, composition, mechanical technological data, as-delivered condition, verification of the quality properties)
2.1	Representation of the main component arrangement and accessibility inside the building regarding maintenance procedures ⁸⁾ , as far as important for the construction of the respective structure	3.3.2	Verification of the suitability of the materials and statement of further materials tests provided
2.2	Verification of the spatial separation of redundancies, where required for safety reasons and important for the construction of the respective structures	3.3.3	Information on qualification of the manufacturers for materials and product forms, if applicable
2.3	Statement and explanation of the loads ⁹⁾ during specified normal operation originating from the components and used as design basis for the structures	3.3.4	Description of the quality assurance measures including documentation
2.4	Statement and explanation of the loads ⁹⁾ originating from the components and used as design basis for the structures concerned, as far as they result from the incident consequences according to No. 1.7, e. g. caused by – reaction and jet impingement forces – flooding, humidity – fires – acceleration forces and induced vibrations – pressure – temperature	3.3.5	Manufacture documents required for quality assurance purposes
2.5	Statement and explanation of the civil engineering design of shielding according to the requirements under Nos. 1.11 and 1.15	4.	Manufacture of the respective components ¹⁰⁾
3.	Manufacture of the respective product forms ¹⁰⁾	4.1	Documentation of the quality assurance measures according to Nos. 3.3.4 and 3.3.5 and their results
3.1	Loads considered	4.2	Design documents
3.1.1	Statement of the design basis service conditions ¹¹⁾ and allocation of the service conditions to service levels	4.2.1	System design documents for the main components, taking into consideration the conditions imposed by the system itself as e.g. – thermal design – hydraulic design – pump behavior – valve opening and closing times – leaktightness requirements – pipe and valve design pressures
3.1.2	Statement of the loads during pressure tests as well as the loads on components resulting from No. 3.1.1	4.2.2	Statement of type and number of measuring points on the components, including statement of measuring locations and use of the measured variables
		4.3	Design and calculation
		4.3.1	Compilation of the considered codes and the assessment criteria, unless presented under No. 3.2.1
		4.3.2	Verification of the adequate dimensioning of the components (other than pipes, see Nos. 4.3.3.1 and 4.3.3.2) for specified normal operation and incidents including external events, unless presented under No. 3.2.4
		4.3.3.1	Statement of the load events during specified normal operation and incidents including external events considered for design and manufacture of pipes, unless presented under No. 3.1.1
		4.3.3.2	Statement of the pipe design data resulting from No. 4.3.3.1
		4.3.4	Statement of the possible corrosion mechanisms and estimation of the corrosion effects, as far as important for material selection
		4.3.5	Design drawings and item lists, unless presented under No. 3.2.3
		4.4	Materials, welding materials
		4.4.1	Statement of the component materials, unless presented under No. 3.3.1 (requirements, composition, mechanical technological data, as-delivered condition, verification of the quality properties), including statement of the welding materials
		4.4.2	Verification of the suitability of the materials, unless presented under No. 3.3.2, including the welding materials
		4.4.3	Information on qualification of the manufacturers for materials, unless presented under No. 3.3.3, including for welding materials, if applicable
		4.5	Processing of product forms and welding materials
		4.5.1	Information on qualification of component manufacturers, if applicable
		4.5.2	Verification of adequate and valid procedure tests
		4.5.3	Information on welding supervision and qualification certificates for welders being

⁵⁾ See Compilation T. Radiological Protection and Activity Monitoring, Nos. 1.5.4, 1.5.5 and 1.9

⁶⁾ See Compilation S. Reactor Protection System, No. 1.7

⁷⁾ See Compilation R. Instrumentation and Control, Control Room, Emergency Control Station and Local Control Stations, Nos. 1.2 and 1.3

⁸⁾ See Compilation T. Radiological Protection and Activity Monitoring, Nos. 2.1 and 2.5

⁹⁾ The load transmission to the structure is dealt with in "Compilation of Documents Required for Civil Construction Supervision Purposes of Nuclear Facilities (GMB1. 1981, p. 518)

¹⁰⁾ Of the information mentioned under Secs. 3 to 11 only that identified under No. 1.8 shall be submitted for the individual systems mentioned in the scope of application

¹¹⁾ Service conditions include design conditions, specified normal Operation and incidents

	employed	7.	Pressure test of the respective systems ¹⁰⁾
4.5.4	Description of quality assurance measures including documentation	7.1	Documentation of the quality assurance measures according to Nos. 6.11 and 6.12 and their results
4.5.5	Manufacture documents required for quality assurance purposes	7.2	Pressure test and, if applicable, strain gage location plan, including statement of types, number and location of strain gages and, if applicable, other measuring points
5.	Pressure test at the manufacturer's works ¹⁰⁾	7.3	Examination plan for nondestructive examinations following the pressure test, if applicable
5.1	Pressure test and strain gage location plan, if applicable, including statement of type, number, and location of strain gages and, if applicable, other measuring points	7.4	Information on system cleaning
5.2	Documentation of the quality assurance measures according to Nos. 4.5.4 and 4.5.5 and their results for components subjected to pressure tests at the manufacturer's works	8.	Commissioning of the respective systems ¹⁰⁾
6.	Installation of the respective components ¹⁰⁾	8.1	Analysis of the system mechanical behavior for typical operating states and incidents including external events considering anchor points, hangers, and restraints
6.1	Documentation of the quality assurance measures and their results, unless presented under No. 5.2, in particular <ul style="list-style-type: none"> – report on test results of pressure tests at the manufacturer's works – report on the results of the stress-strain measurements, and comparison with the calculated data, if applicable – report on the results of the nondestructive examination following the pressure test at the manufacturer's works, if applicable 	8.2	Reports or other documents on systems pressure tests
6.2	Installation plans, pipe laying plans, isometric or comparable representation of piping, including statement of <ul style="list-style-type: none"> – pipe hangers – whip restraints 	8.3	Reports of other documents on the nondestructive examinations following the system pressure test
6.3	Information on maintenance procedures for individual components with the aid of installation plans (overall allocation of compartments) or models, including statement of the radiation exposure, as far as important with regard to radiation exposure	8.4	Proof of performance of acceptance tests according to conventional engineering codes and regulations (e.g. regulations relating to accident prevention and explosion prevention)
6.4	Description of the systems, including their supply systems and explanation of the final system design data, including description of overpressure and over temperature protection	8.5	Commissioning program <ul style="list-style-type: none"> Program for commissioning and commissioning tests up to the nuclear commissioning of the plant Program for measuring the characteristic component data for e.g. pumps <ul style="list-style-type: none"> – characteristics – speed – temperature – run-up time – drive power consumption for e.g. valves <ul style="list-style-type: none"> - measurement of opening and closing times - testing of position feedback for e.g. filters <ul style="list-style-type: none"> – pressures and temperatures – filter efficiencies and service lives – filter exchange (resin transfer and backwash) for e.g. heat exchangers, vessels and tanks <ul style="list-style-type: none"> – pressures and temperatures – flow rates – capacity (heat exchange capacity)
6.5	Description of the system internal incidents and the incidents and malfunctions originating from other system, and their control, e.g. with regard to containment of activity and safe operation		Program for checking the interlocks on the basis of the protective logic and functional diagrams as well as measuring devices and limit settings
6.6	Description of the systems power supply ¹²⁾ , including emergency power supply		Program for the performance of displacement and vibration tests
6.7	Description of the system ¹³⁾ control and monitoring, including <ul style="list-style-type: none"> – protective logic and functional diagrams¹⁴⁾ – statement of the variables which are used for system initiation and control, and explanation, if applicable, – compilation of the alarms, including information on the presentation and the countermeasures to be taken 	8.6	General inspection plan (list of inspections) for in-service inspections, including statement of <ul style="list-style-type: none"> – type of inspections – inspection intervals – responsibility of inspections – plant condition considered (e.g. reactor power operation, reactor shutdown)
6.8	Information on qualification of the manufacturers involved in component installation, if applicable	9.	Delivery of the fuel assemblies (no information)
6.9	Verification of adequate and valid procedure tests	10.	Initial core loading ¹⁰⁾
6.10	Information on welding supervision and qualification certificates for welders being employed	10.1	Reports or other documents on the commissioning according to No. 8.5
6.11	Description of quality assurance measures including documentation during component installation	10.2	Instructions for recurrent functional tests, if applicable
6.12	Manufacture documents required for quality assurance purposes	10.3	Final analysis of the system mechanical behavior on the basis of the final design and the commissioning tests according to No. 8.5
		10.4	Submission of the relevant parts of the operating manual including safety specifications
		11.	Nuclear commissioning of the plant ¹⁰⁾
		11.1	Program for commissioning tests within the nuclear commissioning of the plant
		11.2	Reports or other documents on commissioning according to No. 8.5, unless presented under No. 10.1, including comparison of the results with

¹²⁾ See Compilation P. Electrical Power Supply of the Safety System, No. 6.7.1

¹³⁾ See Compilation R. Instrumentation and Control, Control Room, Emergency Station and Local Control Stations, No. 6.10.1

¹⁴⁾ Submission of informative functional plans required for System approval

- 11.3 calculated data
Information on the provided documentation of in-service inspection results
- 11.4 After completion of nuclear commissioning: Reports or other documents on the nuclear commissioning according to No. 11.1
- 11.5 Complete documentation of the systems
- 11.6 Instructions for in-service inspections
- 12. Refuelling (no information)

3.1 Compilation of Information on the Equipment for Handling and Storage of Fuel Assemblies

Scope of Application

This compilation of information shall apply to equipment for handling and storage of fuel assemblies inside the plant as well as to the associated auxiliary systems; these are as follows:

- new fuel store and internals
- fuel pool, with (if existent) transportation cask pool, reactor well and setdown pool, and connected systems, with following scope: concrete structure of the pools, pool gates between the pools, seal diaphragm and vessel-to-drywell seal, storage racks and other pool internals, and the leakage monitoring system
- refuelling machine, lifting and other equipment (e. g. transfer carriage, auxiliary bridge and fuel assembly repair equipments), where these are used for operations in connection with fuel assembly handling and refuelling (beginning with opening and ending with closing of the reactor pressure vessel)

These systems are as follows according to the power plant station classification

- new fuel store (FAA)
- irradiated fuel store (FAB) (lining including support structure, leakage monitoring equipment, and internals)
- additional fuel store (FAD)
- reactor well equipment (FAE) (lining including support structure, leakage monitoring equipment, and internals)
- setdown area equipment (FAF) (lining including support structure, leakage monitoring equipment, and internals)
- fuel and other internals testing equipment (FBA)
- fuel and other core internals repair equipment (FBB)
- fuel and other core internals cleaning equipment (FBC)
- charge and discharge equipment (FCA)
- refuelling equipment at the reactor (FCB)
- reshuffling equipment (FCC)
- refuelling equipment in fuel and other reactor core internals store (FCD)
- fuel transfer equipment (FCF)
- transport equipment (FCJ)
- lifting equipment as far as used for fuel handling (Identifiers according to the power station classification)

The fuel store and pool concrete structures are covered for completeness insofar as they are considered part of the above mentioned facilities with regard to function. In the event of duplication with other compilations, single submission of the respective information is, with cross reference as necessary is sufficient.

Category Scheme

1. Concept
2. Construction of the respective buildings and structures
3. Manufacture of the respective product forms
4. Manufacture of the respective components
5. Pressure test at the manufacturer's works
6. Installation of the respective components
7. Pressure test of the respective systems
8. Commissioning of the respective systems

9. Delivery of the fuel assemblies
10. Initial core loading
11. Nuclear commissioning of the plant
12. Refuelling

1. Concept
- 1.1 Compilation of the codes and assessment criteria which govern the concept
- 1.2 Summary description of the fuel storage and handling facilities and equipment
 - 1.2.1 Summary description of the new fuel store, including
 - location
 - statement of the capacity
 - explanation of the safety against criticality
 - 1.2.2 Summary description of the fuel pool, cask pool, reactor well and setdown pool, including
 - the location of the pools
 - removal capacity and redundancy of the pool cooling and purification systems
 - the pool lining and internals, as well as the gates between the pools and the seals to the reactor pressure vessel
 - statement and explanation of the capacity of the fuel pool, and explanation of the safety against criticality
 - information on the arrangement of the cooling and purification system connections
 - monitoring for and localization of leaks, and the provided pool repair concept
 - shielding
 - the pool flooding and drainage procedure
 - 1.2.3 Summary description of the refuelling machine: functions, design principles, arrangement, structure grab mechanism, mode of operating interlocks
 - 1.2.4 Summary description of the other fuel handling equipment
 - 1.2.5 Summary description of the power supply of the refuelling machine and the other lifting equipment
 - 1.2.6 Summary description of the equipment for handling and setdown of the reactor pressure vessel closure head and the internals (e. g. setdown equipment, lifting beam)
 - 1.2.7 Summary description of the equipment for handling and setdown of fuel shipping casks
- 1.3 Summary description of the fuel assembly transport routes inside the plant
- 1.4 Summary description of the design basis incidents including external events and of the measures taken to ensure cooling and shielding, and against drop heavy load
- 1.5 Summary description of the quality assurance during planning, manufacture, installation, commissioning, operation
- 1.6 Summary description of maintenance including in-service inspections
- 1.7 Summary description of the precautionary protective measures taken for maintenance procedures including in-service inspections with regard to minimization of the radiation exposure¹⁾
- 1.8 Summary description of the signaling and monitoring concept for the components and systems mentioned under No. 1.2, and statement of the safety-related announcements in the control room
- 1.9 Summary description of the refuelling procedures and estimation of the radiation exposure to be expected, including the annual collective dose (if applicable, citation of reference plants)
- 1.10 Summary description of the equipment and procedures provided for inspection of the fuel assemblies for damage as well as for the fuel assembly damage repair procedure, as necessary description of the repair equipment

¹⁾ See Compilation T. Radiological Protection and Activity Monitoring, Nos. 1.5.4, 1.5.5, 1.9

2.	Construction of the respective buildings and structures ²⁾	qualification certificates for welders being employed
2.1	Statement of the design basis loads ³⁾ , loading combinations and loading frequencies for the fuel store and the pools, including the loads on the foundations (dead weight, operational loads and live loads), during specified normal operation and incidents, including external events as far as they are used as design basis for the respective structures	4.1.4.4 Description of quality assurance measures including documentation 4.1.4.5 Manufacture documents required for quality assurance purposes
2.2	Design drawings of the gate frames, including the seal assemblies and seals between fuel assembly pool and the reactor pressure vessel, as far as important for the design of the structures	4.2 Equipment for fuel handling 4.2.1.1 Statement of the design basis service conditions and loading combinations, during normal operational and incidents including external events which determine the design
2.3	Description of the measures for leak detection in the pools, as far as important for the construction of the structures	4.2.1.2 Statement of the loads on the components resulting from No. 4.2.1.1
2.4	Verification of sufficient strength of the gate frames between the pools	4.2.2 Design and calculation 4.2.2.1 Statement of the considered codes and assessment criteria
2.5	Verification of sufficient shielding ⁴⁾ by the pool walls, pool bottom and pool water, as necessary citation of reference plants	4.2.2.2 Statement of the essential calculation bases for dimensioning and explanation of their applicability 4.2.2.3 Design drawings ⁵⁾ of the components 4.2.2.4 Verification of - the design of the hoists (cinematic chain) and the load-carrying members, for sufficient strength - the stability of the lifting equipment and its runways, including for external events
3.	Manufacture of the respective product forms (no information)	4.2.2.5 Information on the sufficiently precise and reproducible grab positioning of the refuelling machine
4.	Manufacture of the respective components	4.2.3 Materials, welding materials
4.1	Store and pool internals, pool lining including connecting systems	4.2.3.1 Statement of the materials and product forms (requirements, composition, mechanical technological data, as-delivered condition, verification of the quality properties), including statement of the welding materials
4.1.1.1	Statement of the design basis service conditions, loading combinations and loading frequencies, during specified normal operation and incidents, including external events which determine the design	4.2.3.2 Verification of the suitability of the material for the respective application and, as necessary the welding suitability
4.1.1.2	Statement of the loads on the components resulting from No. 4.1.1.1	4.2.3.3 Information on qualification of the manufacturers of materials and product forms, if applicable
4.1.2	Design and calculation	4.2.4 Processing of product forms
4.1.2.1	Compilation of the considered codes and assessment criteria	4.2.4.1 Information on qualification of component manufacturers, if applicable
4.1.2.2	Statement of the essential calculation bases for dimensioning and explanation of their applicability	4.2.4.2 Verification of adequate and valid procedure tests
4.1.2.3	Drawings required for dimensioning	4.2.4.3 Information on welding supervision and qualification certificates for welders being employed
4.1.2.4	Verification of adequate design for the incidents mentioned in No. 4.1.1.1	4.2.4.4 Description of the quality assurance measures including documentation
4.1.2.5	Verification of safety against criticality when storing the fuel assemblies in the storage racks	4.2.4.5 Manufacture documents required for quality assurance purposes
4.1.2.6	Statement of the possible corrosion mechanism and estimation of the corrosion effects, as far as important for materials selection	5. Pressure test at the manufacturer's works (no information)
4.1.3	Materials, welding materials	6. Installation of the respective components
4.1.3.1	Statement of the materials and product forms (requirements, composition, mechanical technological data, as-delivered condition, verification of the quality properties), including statement of the welding materials	6.1 Store and pool internals, pool lining and connecting systems
4.1.3.2	Information on poison materials for neutron absorption in the fuel pool	6.1.1 Documentation of the quality assurance measures according to Nos. 4.1.4.4 and 4.1.4.5 and their results
4.1.3.3	Verification of the suitability of the materials for the respective application and, if applicable, of the weldability	6.1.2 Installation plans
4.1.3.4	Information on qualification of the manufacturers for materials and product forms, if applicable	6.1.3 Information on qualification of the manufacturers involved in component installation, if applicable
4.1.4	Processing of the product forms	6.1.4 Verification of adequate and valid procedure tests
4.1.4.1	Information on qualification of component manufacturers, if applicable	6.1.5 Information on welding supervision and qualification certificates for welders being employed
4.1.4.2	Verification adequate and valid procedure tests	6.1.6.1 Description of quality assurance measures including documentation
4.1.4.3	Information on welding supervision and	6.1.6.2 Manufacture documents required for quality assurance purposes
		6.1.7 Information on system cleaning
		6.1.8 Information on scheduled pool leakage tests
		6.1.9 Description of the leakage monitoring system

²⁾ The structures to accommodate the fuel store and pools as well as the concrete structures of the pools

³⁾ The load transmission to the structure is dealt with in "Compilation of Documents Required for Civil Construction Supervision Purposes of Nuclear Facilities" (GMB1. 1981, p. 518)

⁴⁾ See Compilation T. Radiological Protection and Activity Monitoring, Nos. 2.2 and 2.3

⁵⁾ Drawings required for approval by the authorized expert

- 6.1.10 Information on the media supply of the pools (flooding) and verification of the control of leaks in the pools
- 6.1.11 Description of pool operation control as well as monitoring⁶⁾
- 6.2 Equipment for the handling of fuel assemblies
- 6.2.1 Documentation of the quality assurance measures according to Nos. 4.2.4.4 and 4.2.4.5 and their results
- 6.2.2 Installation plans
- 6.2.3 Information on qualification of the manufacturers involved in component installation, if applicable
- 6.2.4 Verification of adequate and valid procedure tests
- 6.2.5 Information on welding supervision and qualification certificates for welders being employed
- 6.2.6.1 Description of the quality assurance measures including documentation
- 6.2.6.2 Manufacture documents required for quality assurance purposes
- 6.2.7 Description of the control and monitoring⁶⁾ including interlocks
- 6.2.8 Information on equipment power supply
- 6.2.9 Verification of the functional tests performed at the manufacturer's works
7. Pressure test of the respective systems (no information)
8. Commissioning of the respective systems
- 8.1 Documentation of the quality assurance measures according to Nos. 6.1.6.1, 6.1.6.2, 6.2.6.1 and 6.2.6.2 and their results
- 8.2 Commissioning program
Program for commissioning and commissioning tests up to the nuclear commissioning of the plant, e.g. for
- leakage control equipment
 - pool operation monitoring equipment
 - fuel handling equipment (e.g. positioning controls and interlocks of the refuelling machine)
- 8.3 Information on activity and local dose rate⁷⁾ monitoring
- 8.4 General inspection plan (list of inspections) for in-service inspections, including statement of
- type of inspections
 - inspection intervals
 - responsibility for inspections
 - plant condition considered (e.g. reactor power operation, reactor shutdown)
9. Delivery of the fuel assemblies
- 9.1 Reports or other documents on the commissioning according to No. 8.2, as far as required for the storage of new fuel assemblies
10. Initial core loading
- 10.1 Reports or other documents on the commissioning according to No. 8.2, unless presented under No. 9.1
- 10.2 Instructions for recurrent functional tests, if applicable
- 10.3 Submission of the relevant parts of the operating manual including safety specifications
11. Nuclear commissioning of the plant
- 11.1 Program for commissioning tests during the nuclear commissioning of the plant
- 11.2 Reports or other documents on commissioning according to No. 8.2, unless presented under No. 9.1 and 10.1
- 11.3 Information on the provided documentation of in-

service inspection results After completion of the nuclear commissioning:

- 11.4 Reports or other documents on the nuclear commissioning according to No. 11.1
- 11.5 Complete documentation of the systems
- 11.6 Instructions for in-service inspections
12. Refuelling (no information)

3.K Compilation of Information on the Systems for the Handling and Storage of Other Radioactive Materials¹⁾ and the Reactor Auxiliary Systems

Scope of Application

This compilation of information shall apply to:

- fuel pool coolant purification system (FAL)
 - control assembly drives cooling system (KAC), if applicable
 - nuclear component cooling system, PWR (KAB)
 - coolant storage system (KBB)
 - coolant treatment system (KBF)
 - chemical control system (KBD)
 - coolant degassing system (KBG)
 - solid waste processing system (KPA)
 - drum handling equipment (KPB)
 - radioactive concentrates processing system (KPC)
 - filter changing equipment (KPD)
 - solid waste storage system (KPE)
 - liquid waste processing system (KPF)
 - liquid waste storage system (KPK)
 - gaseous waste processing system²⁾ (KPL)
 - nuclear gas supply (KR)
 - nuclear component drain and vent systems (KT)
 - nuclear sampling systems (KU)
 - equipment decontamination system, stationary (SRK)
 - mobile decontamination equipment (SRL)
 - gland leakoff systems in the turbine building, BWR
 - nuclear chilled water systems (KJ)
- (identifiers according to the power station classification)

Nuclear fuels as well as calibration specimens are not covered by this compilation of information.

The term "handling" as used in this compilation refers to the handling of other radioactive materials either manually or with the aid of technical equipment.

The term "storage" as used in this compilation refers to the temporary keeping of other radioactive materials at locations designated for this purpose.

Category Scheme

1. Concept
 2. Construction the respective buildings and structures
 3. Manufacture of the respective product forms
 4. Manufacture of the respective components
 5. Pressure test at the manufacturer's works
 6. Installation of the respective components
 7. Pressure test of the respective systems
 8. Commissioning of the respective systems
 9. Delivery of the fuel assemblies
 10. Initial core loading
 11. Nuclear commissioning of the plant
 12. Refuelling
1. Concept

¹⁾ "Other radioactive materials" are radioactive materials as defined in Sec. 2, Para. 1, No. 2 of the Atomic Energy Act

²⁾ After issue of KTA Safety Standard 3202 it shall be clarified whether parts of these systems to be designed according to the basic safety concept shall be included in the scope of application of Compilation H. Reactor Coolant System Auxiliary Systems

⁶⁾ See Compilation R. Instrumentation and Control, Control Room, Emergency Control Station and Local Control Stations No. 6.10.1

⁷⁾ See Compilation T. Radiological Protection and Activity Monitoring, No. 6.20

1.1	Compilation of the codes and assessment criteria which govern the concept	2.3	components inside the building
1.2	Summary description of the systems and equipment and their functions during specified normal operation and incidents, including schematics	2.4	Statement of the radiation protection areas (compartment classification) ⁶⁾
1.3	General layout plans (plan views and sections) of the nuclear power plant, showing the spatial arrangement of the main components, pipe ducts, valve compartments and service floors for the systems and the equipment, as well as showing the transport routes for other radioactive materials	2.5	Statement of the shielding measures, including the shielding calculations ⁷⁾ , if applicable, citing reference plants
1.4	Summary description of the system and equipment design, also with regard to the anticipated quantities of radioactive materials produced (e. g. throughput, capacity), explanation of the design and operating data, if applicable, citing reference plants	2.6	Information on the space conditions and on the maximum allowable additional floor loads for these locations, with regard to additional shielding set up during maintenance work ⁸⁾
1.5	Process flow diagrams of the systems, including statement of the main components	2.7	Information on installation location and accessibility of major components or components emitting high levels of radiation, and if applicable, on the use of erection aids with regard to personnel radiation exposure
1.6	Summary description of the incidents, including external events and, if applicable, of the design measures taken to mitigate their consequences	2.8	Description of the in-plant transport routes and transport equipment for other radioactive materials as well as for radioactive subunits and components
1.7	Estimation of the anticipated activity concentrations with nuclide composition and of the maximum anticipated activity inventory in the main components, as well as activity flow diagrams ³⁾ for specified normal operation and for incidents and statement of the design, structural, and administrative radiological protection measures, if applicable, citing reference plants	2.9	Statement of the seal elevations and floor sumps
1.8	Classification of the individual systems and components according to their importance to safety and identification of those information from Secs. 4 to 11 required for these systems and components	2.10	Information on the suitability of the floor and wall linings in particular for floor sumps, as well as on their good decontaminability in the areas in which other radioactive materials are handled and stored, as far as important for the construction of the structures ⁹⁾
1.9	Summary description of the quality assurance during planning, manufacture, installation, commissioning, operation considering the importance of the systems to safety	3.	Statement and explanation of the loads ¹⁰⁾ originating from the components and used as design basis for the structures
1.10	Summary description of the equipment for monitoring the activity concentration and the local dose rate ⁴⁾	4.	– during specified normal operation
1.11	Summary description of the design and structural measures to prevent release and uncontrolled dispersion of radioactive materials in the compartments and the environment during specified normal operation and incidents (e.g. via floor sumps, compartment drains, directional air flow, and filters), including radiological protection measures, if applicable, citing reference plants	4.1	– during hydrostatic pressure tests
1.12	Summary description of the measures for preventing uncontrolled release of radioactive materials with the waste water or via the vent stack	4.1.1	– as far as they result from the design basis incidents and their consequences
1.13	Summary description of the measures for System and equipment protection against external events including explanation (e. g. environmental impact)	4.1.2	Manufacture of the respective product forms (no information)
1.14	Summary description of the measures for minimization of radiation exposure ⁵⁾ of the personnel during specified normal operation	4.1.3	Manufacture of the respective components ¹¹⁾
2.	Construction of the respective buildings and structures	4.1.4	Design documents
2.1	Statement of the measures for protection against external events (See No. 1.13), as far as important for the construction of the structures	4.1.5	System flow diagrams, including statement of component identifiers, room numbers, nominal pressures
2.2	General layout plans according to No. 1.3, showing large wall penetrations as well as verification of the accessibility of major	4.2	Statement of the service conditions, if applicable
		4.2.1	Statement of the maximum anticipated loads and stresses (mechanical, chemical, thermal) during specified normal operation and typical design basis incidents, if applicable, citing reference plants
		4.2.2	Statement of type and number of measuring points at the components, as far as necessary for the respective component, including statement of the measuring location and the use of the measured values
		4.2.3	Statement of the leaktightness requirements
		4.3	Design and calculation
			Compilation of the considered codes and assessment criteria
			Verification of adequate design of the components for specified normal operation and incidents including external events (if applicable) giving the calculation codes and Input data
			Design drawings and item lists
			Materials; welding materials

³⁾ See Compilation T. Radiological Protection and Activity Monitoring, No. 1.3.2

⁴⁾ See Compilation T. Radiological Protection and Activity Monitoring, No. 1.4

⁵⁾ See Compilation T. Radiological Protection and Activity Monitoring, No. 1.5.5

⁶⁾ See Compilation T. Radiological Protection and Activity Monitoring, No. 2.5

⁷⁾ See Compilation T. Radiological Protection and Activity Monitoring, No. 2.2

⁸⁾ See Compilation T. Radiological Protection and Activity Monitoring, No. 2.12

⁹⁾ See Compilation T. Radiological Protection and Activity Monitoring, No. 2.10

¹⁰⁾ The load transmission to the structure is dealt with in "Compilation of Documents Required for Civil Construction Supervision Purposes of Nuclear Facilities" (GMB1. 1981, p. 518)

¹¹⁾ Of the information mentioned under Secs. 4 to 11 only that identified under No. 1.8 shall be submitted for the individual systems mentioned in the scope of application

4.3.1	Statement of the materials (requirements, composition, mechanical technological data, as-delivered condition, verification of the quality properties), including statement of the welding materials	6.12	statement of the arrangement, as well as of the analog and binary signal transmitters Information on the component design, with regard to minimization of scope and frequency of inspection and servicing and on type and frequency of manual operation procedures, as far as necessary for the evaluation of personnel radiation exposure, including Information on scheduled in-service inspections
4.3.2	Verification of the suitability of the materials for the respective application and, as necessary, the welding suitability	6.13	Information on maintenance procedures for individual components with the aid of installation plans (overall allocation of the compartments) or models, including statement of the radiation exposure, as far as important with regard to radiation exposure
4.3.3	Statement of the changes to be expected in the materials used, as a result of radiation effects and creep, if applicable	7.	Pressure test of the respective systems ¹¹⁾
4.3.4	Information on qualification of the manufacturers for materials product forms including for welding materials, if applicable	7.1	Documentation of the quality assurance measures according to Nos. 6.10.1 and 6.10.2 and their results
4.4	Processing of product forms	7.2	Test plan for pressure and leak testing of systems and subsystems, if applicable
4.4.1	Information on qualification of component manufacturers, if applicable	7.3	Examination plan for the nondestructive examinations after the pressure test, if applicable
4.4.2	Verification of adequate and valid procedure tests	7.4	Information on system cleaning
4.4.3	Information on welding supervision and qualification certificates for welders being employed	8.	Commissioning of the respective systems ¹¹⁾
4.4.4	Description of quality assurance measures including documentation	8.1	Reports or other documents on pressure and leak tests according to No. 7.2, as well as on the nondestructive examinations according to No. 7.3
4.4.5	Manufacture documents required for quality assurance purposes	8.2	Program for commissioning and commissioning tests up to the nuclear commissioning of the plant
5.	Pressure test at the manufacturer's works ¹¹⁾	8.3	General inspection plan (list of inspections) for in-service inspections, including statement of <ul style="list-style-type: none"> – type of inspections – inspection intervals – responsibility for inspections – plant condition considered (e.g. reactor power operation, reactor shutdown)
5.1	Pressure test and, if applicable, strain gage location plan, including Statement of type, number, and location of strain gages and, if applicable, other measuring points	9.	Delivery of the fuel assemblies (no information)
5.2	Documentation of the quality assurance measures according to Nos. 4.4.4 and 4.4.5 and their results for components subjected to pressure tests at the manufacturer's works	10.	Initial core loading ¹¹⁾
6.	Installation of the respective components ¹¹⁾	10.1	Reports or other documents on the commissioning according to No. 8.2
6.1	Documentation of the quality assurance measures and their results, unless presented under No. 5.2, in particular <ul style="list-style-type: none"> – report on test results of pressure tests at the manufacturer's works, if applicable – report on test results of stress-strain measurements, and comparison with the calculated data, if applicable – report on test results of the nondestructive examination following the pressure test at the manufacturer's works, if applicable 	10.2	Verification of the statements made under No. 6.12, including explanation
6.2	System and process description, including information on power and media supply	10.3	Submission of the relevant parts of the operating manual including safety specifications
6.3	Information on activity and local dose rate monitoring ¹²⁾	11.	Nuclear commissioning of the plant ¹¹⁾
6.4	Description of System control and monitoring (e. g. instrumentation, protective logic and functional diagrams ¹³⁾ , including limits	11.1	Program for commissioning tests within the nuclear commissioning of the plant
6.5	Installation plans, pipe laying plans, isometric representation of piping, dependent of the nominal diameter of the pipes	11.2	Reports or other documents on commissioning according to No. 8.2, unless presented under No. 10.1
6.6	Nuclear sampling system: description of the measures for representative sampling from the media to be analyzed	11.3	Information on the provided documentation of in-service inspection results After completion of nuclear commissioning:
6.7	Information on qualification of the manufacturers being involved in component installation, if applicable	11.4	Reports or other documents on the nuclear commissioning according to No. 11.1
6.8	Verification of adequate and valid procedure tests	11.5	Complete documentation of the systems
6.9	Information on welding supervision and qualification certificates for welders being employed	11.6	Instructions for in-service inspections
6.10.1	Description of the quality assurance measures including documentation	12.	Refuelling (no information)
6.10.2	Manufacture documents required for quality assurance purposes	3.L	Compilation of Information on the Ventilation Systems
6.11	Compilation of measuring points, including		Scope of Application

This compilation of information shall apply to systems which essentially serve to fulfill the following functions:

- supply of outside air to compartments which have to be ventilated
- maintenance of permissible compartment air conditions
- removal of the heat transferred to the compartment air

¹²⁾ See Compilation T. Radiological Protection and Activity Monitoring, No. 6.20

¹³⁾ Submission of informative functional diagrams is required for System approval

- maintenance of compartment subatmospheric pressures, compartment subatmospheric pressure graduations and air flow directions according to radiological protection requirements
- removal of contaminated compartment air and reduction of activity concentration in the compartment air
- filtration, controlled and possibly proportioned discharge of contaminated exhaust air
- removal of combustible and hazardous gases and vapors with the compartment air
- hydrogen monitoring and limitation following incidents

These systems are as follows:

- ventilation systems in controlled access area (KL)
- ventilation systems, conventional area for the switchgear building (UBA) for the emergency power generating building and the chilled water system (UBP) for the emergency feedwater building (ULB) for the service cooling water intake works (UPD) for the service cooling water pump structures (UQB) for the main steam and feedwater valve compartment (UJE)

This compilation shall apply analogously to the leakage monitoring and extraction system, PWR (JMM), and to the hydrogen monitoring and limiting system (JMU) (Identifiers according to the power station classification)

For the containment isolation flaps the Compilations B. Steel Containment Vessel of PWRs and C. Containment Vessel with Pressure Suppression System of BWRs also apply

Category Scheme

1. Concept
 2. Construction of the respective buildings and structures
 3. Manufacture of the respective product forms
 4. Manufacture of the respective components
 5. Pressure test at the manufacturer's works
 6. Installation of the respective components
 7. Pressure test of the respective systems
 8. Commissioning of the respective systems
 9. Delivery of the fuel assemblies
 10. Initial core loading
 11. Nuclear commissioning of the plant
 12. Refuelling
-
1. Concept
 - 1.1 Compilation of the codes and assessment criteria which determined the concept
 - 1.2 Summary description of the ventilation systems, and of their functions, during specified normal operation and incidents including external events, with schematics
 - 1.3 Information on redundancy
 - 1.4 Summary description of the spatial arrangement and the locations of the ventilation equipment, and the location of the supply air inlets and exhaust air outlets
 - 1.5 Statement of buildings and building areas supplied by the ventilation systems
 - 1.6 Classification of the individual ventilation systems and components according to their importance to safety and identification of the information from Secs. 2 to 11 required for the these systems and components
 - 1.7 Statement of the conditions which are important to safety during specified normal operation and incidents and of the design data such as:
 - compartment subatmospheric pressures, pressure graduations, directional air flow
 - minimum air change constants for building areas

- volumetric flows for the systems or building areas
- compartment accessibility, also taking radiological aspects into consideration, if applicable
- compartment air conditions (e.g. temperature, humidity, activity concentration)
- separation efficiencies of filter systems, if applicable
- pressure design, if applicable
- leaktightness of systems, compartment areas and buildings, if applicable
- design against induced vibrations, if applicable

- 1.8 Summary description of quality assurance during planning, manufacture, installation, commissioning, operation taking into consideration the importance of the systems to safety
 - 1.9 Summary description of the fire protection measures taken in connection with the ventilation systems (e. g. establishment of fire zones)
 - 1.10 Summary description of the supply systems (power and media supply) required for the operation of the ventilation systems
 - 1.11 Summary description of maintenance procedures including filter inspection possibilities (also following incidents if applicable), and filter changing procedures as well as the scheduled in-service inspections
 - 1.12 Summary description of the precautionary protective measures taken for maintenance procedures, including in-service inspections with regard to minimization of the radiation exposure¹⁾
 - 1.13 Summary description of the signaling and monitoring concept²⁾³⁾
-
2. Construction of the respective buildings and structures⁴⁾
 - 2.1 Representation of the arrangement and accessibility of the main components inside the building with regard to maintenance procedures⁵⁾, as far as important for the construction of the respective buildings and structures
 - 2.2 Duct routing plans (according to elevation), including Information on wall and floor penetrations, as far as important for the construction of the buildings and structures
-
3. Manufacture of the respective product forms (no Information)
-
4. Manufacture of the respective components⁴⁾
 - 4.1 Statement of the component design data, as applicable
 - pressures, pressure surges
 - temperatures
 - volumetric flows
 - pressure losses
 - leaktightness
 - flap closing and opening times
 - response pressures for opening and closing procedures
 - differential pressures during opening and closing
 - humidity

¹⁾ See Compilation T. Radiological Protection and Activity Monitoring, Nos. 1.5.4, 1.5.5 and 1.9

²⁾ See Compilation S. Reactor Protection System, No. 1.7

³⁾ See Compilation R. Instrumentation and Control, Control Room, Emergency Control Station and Local Control Stations, Nos. 1.2 and 1.3

⁴⁾ Of the information mentioned under Secs. 2. to 11 only that identified under No. 1.5 shall be submitted for the individual systems mentioned in the scope of application

⁵⁾ See Compilation T. Radiological Protection and Activity Monitoring Nos. 2.1 and 2.5

- cooling or heating capacity
- induced vibrations
- 4.2 Design and calculation
- 4.2.1 Statement of the design loads for incidents (e.g. temperature and pressure changes, acceleration forces, vibrations)
- 4.2.2 Statement of the essential calculation basis for dimensioning
- 4.2.3 Verification of adequate dimensioning with regard to static loads (and, if applicable, dynamic loads, e.g. for earthquakes) as well as temperature loads
- 4.2.4 Design drawings and parts list, and if applicable, general layout drawings e.g. for ventilation ducts, filters, dampers, fans
- 4.3 Statement of the materials for the components, including verification of suitability (e.g. information on corrosion protection, radiation resistance, if applicable, decontaminability, combustibility)
- 4.4 Manufacture of the components
- 4.4.1 Verification of adequate and valid procedure tests
- 4.4.2.1 Description of the quality assurance measures, including documentation
- 4.4.2.2 Manufacture documents required for quality assurance purposes
- 4.4.3 Information on welding supervision and qualification certificates for welders being employed
- 5. Pressure test at the manufacturer's works (no information)
- 6. Installation of the respective components⁴⁾
- 6.1 Documentation of the quality assurance measures according to Nos. 4.4.2.1 and 4.4.2.2 including their results
- 6.2 Description of the ventilation systems, including their supply systems, and explanation of the final design data (e. g. volumetric flows, cooling loads), including incident loads
- 6.3 Description and explanation of the operability of the ventilation systems required for mitigation of the consequences of incidents including external events
- 6.4 Information on reliability and effectiveness of the ventilation systems, and on containment isolation reliability (e. g. by citing reference plants)
- 6.5 Installations plans
- 6.5.1 Installation plans for the ventilation components and filters
- 6.5.2 Duct routing plans, including statement of the location of flaps and measuring devices
- 6.6 Description of the system power supply, including emergency power supply
- 6.7 Description of the control and monitoring of the ventilation systems⁶⁾, including
 - protective logic and functional diagrams⁷⁾
 - statement of the variables which are used for system actuation and control, with explanation, if applicable
 - compilation of hazard alarms, including information on their representation and the countermeasures to be taken
- 6.8 Information on the scheduled acceptance and functional tests
- 6.9 Information on maintenance procedures for individual components with the aid of installation plans (overall allocation of the compartments) or models, including statement of the radiation exposure, as far as important with regard to radiation exposure
- 7. Pressure test of the respective systems (no information)
- 8. Commissioning of the respective systems
- 8.1 Documentation of the acceptance and functional tests performed
- 8.2 Commissioning program
 - Program for commissioning and commissioning tests up to the nuclear commissioning of the plant, e.g. testing of
 - leaktightness, function, and closing and opening times of flaps
 - volumetric flows
 - subatmospheric pressure graduation and the existence of a directional air flow
 - leaktight fit of filter cells
 - subatmospheric pressure and temperature control
 - measuring devices and limit settings
 - switch-on, switch-off and changeover operations during specified normal operation and incident operation (e.g. emergency power operation)
 - compartment air conditions
- 8.3 General inspection plan (list of inspections) for in-service inspections, including statement of
 - type of inspections
 - inspection intervals
 - responsibility for inspections
 - plant condition considered (e.g. reactor power operation, reactor shutdown)
- 9. Delivery of the fuel assemblies (no information)
- 10. Initial core loading⁴⁾
- 10.1 Reports or other documents on commissioning according to No. 8.2
- 10.2 Instructions for recurrent functional tests
- 10.3 Submission of the relevant parts of the operating manual including safety specifications
- 10.4 Verification of the effectiveness of the ventilation systems, and of containment isolation reliability
- 11. Nuclear commissioning of the plant⁴⁾
- 11.1 Reports or other documents on commissioning according to No. 8.2, unless presented under No. 10.1, including comparison of the results with the information presented under Nos. 4.1 and 6.2
- 11.2 Information on the provided documentation of in-service inspection results

After completion of nuclear commissioning:
- 11.3 Complete documentation of the ventilation systems, including the test results for the compartment air conditions
- 11.4 Instructions for in-service inspections
- 12. Refuelling (no information)

3.M Compilation of Information on the Water/Steam Plant

Scope of Application

This compilation of information shall apply to:

PWR:

- feedwater tank (LAA)
- feedwater pipe system (LAB) (from the feedwater tank to first isolating valve)
- high pressure feed heating system (LAD)
- startup and shutdown pipe system (LAH)
- startup and shutdown pump system (LAJ)
- main steam pipe system (LBA) (from the first isolating valve outside the containment vessel up to but not including turbine trip valves)
- moisture separator reheater (LBJ)
- high pressure extraction system (LBQ) (not extraction)

⁶⁾ See Compilation R. Instrumentation and Control, Control Room, Emergency Station and Local Control Stations, No. 6.10.1

⁷⁾ Submission of informative functional diagrams is required for system approval

- swing check valves or extraction pipes inside the condenser¹⁾)
- feedwater pump system (LAC)
- low pressure extraction system (LBS) (not extraction swing check valves or extraction pipes inside the condenser¹⁾)
- main condensate pipe system (LCA)
- main condensate pump system (LCB)
- low pressure feed heating system (LCC)
- condensate de-superheating spray system (LCE)
- high pressure heater drains system (LCH)
- low pressure heater drains system (LCJ)
- clean drains system (LCM)
- auxiliary steam condensate collecting and recirculation system (LCN)
- steam generator blowdown system (LCQ) (from the first isolating valve)
- reheater drains system (LCS) (not reheater drains tank¹⁾)
- sealing and cooling drains system (LCW) (Identifiers according to the power station classification)

BWR:

- main steam and feedwater system outside the containment vessel
- bypass system
- reheat system
- feed heating system
- condensate system
- auxiliary and gland steam system

For the scope and degree of detail of the information, see "General Specification Basic Safety" (Appendix to Sec. 4.2 of the RSK Guidelines for Pressurized Water Reactors, 2nd Edition as of January 24, 1979).

Category Scheme

1. Concept
 2. Construction of the respective buildings and structures
 3. Manufacture of the respective product forms
 4. Manufacture of the respective components
 5. Pressure test at the manufacturer's works
 6. Installation of the respective components
 7. Pressure test of the respective systems
 8. Commissioning of the respective systems
 9. Delivery of the fuel assemblies
 10. Initial core loading
 11. Nuclear commissioning of the plant
 12. Refuelling
-
1. Concept
 - 1.1 Compilation of the codes and assessment criteria which govern the concept
 - 1.2 Summary description of the systems, their functions, well as the interaction of the individual systems during specified normal operation, including schematics
 - 1.3 Information on redundancy
 - 1.4 Summary description of the spatial arrangement of the main mechanical components
 - 1.5 Summary description of the design basis incidents, including external events and the design measures taken to mitigate their consequences
 - 1.6 Statement of the design and important preliminary operating data, operating media and of other data (e.g. main dimensions, vessel volumes, valve opening and closing times, pressures)
 - 1.7 Summary description of the measures for monitoring and retention of radioactive materials²⁾ (for BWRs)
 - 1.8 Classification of the individual systems and components according to their importance to

- 1.9 safety and identification of those information from Secs. 3 to 11 required for these systems and components
- 1.10 Summary description of the signaling and monitoring concept³⁾⁴⁾ for the main systems
- 1.11 Summary description of the quality assurance during planning, manufacture, installation, commissioning, operation considering the importance of the systems to safety
- 2. Summary description of the precautionary protective measures taken for maintenance, procedures, including in-service inspections with regard to minimization of the radiation exposure⁵⁾ (BWR)
- 2. Construction of the respective buildings and structures
- 2.1 Representation of the main component arrangement and accessibility inside the building regarding maintenance procedures⁶⁾, as far as important for the construction of the respective structures (BWR)
- 2.2 Statement and explanation of the loads⁷⁾ originating from the components and used as design basis of the structures, as far as they result from the incident consequences according to No. 1.5
- 3. Manufacture of the respective product forms⁸⁾
- 3.1 Loads considered
- 3.1.1 Statement of the design basis service conditions⁹⁾ and allocation of the service conditions for service levels
- 3.1.2 Statement of the loads on the components resulting from No. 3.1.1., and of the loads during pressure tests
- 3.2 Design and dimensioning
- 3.2.1 Compilation of the considered codes and assessment criteria
- 3.2.2 Statement of the main calculation bases for dimensioning and proof of their applicability
- 3.2.3 Drawings required for dimensioning
- 3.2.4 Verification of adequate dimensioning including against corrosion
- 3.3 Materials and product forms
- 3.3.1 Statement of the product form materials (requirements, composition, mechanical technological data, as-delivered condition, verification of the quality properties)
- 3.3.2 Verification of the suitability of the materials and statement of further material tests provided
- 3.3.3 Information on qualification of the manufacturers for materials and product forms, if applicable
- 3.3.4 Description of the quality assurance measures, including documentation
- 3.3.5 Manufacture documents required for quality assurance purposes
- 4. Manufacture of the respective components⁸⁾
- 4.1 Documentation of the quality assurance

³⁾ See Compilation S. Reactor Protection System, No. 1.7

⁴⁾ See Compilation R. Instrumentation and Control, Control Room, Emergency Control Station and Local Control Stations, Nos. 1.2 and 1.3

⁵⁾ See Compilation T. Radiological Protection and Activity Monitoring, Nos. 1.5.4, 1.5.5 and 1.9

⁶⁾ See Compilation T. Radiological Protection and Activity Monitoring, Nos. 2.1 and 2.5

⁷⁾ The load transmission to the structure is dealt with in "Compilation of Documents Required for Civil Construction Supervision Purposes of Nuclear Facilities (GMB1. 1981, p. 518)

⁸⁾ Of the information mentioned under Secs. 3 to 11 only that identified under No. 1.8 shall be submitted for the individual systems mentioned in the scope of application

⁹⁾ Service conditions include design conditions, specified normal operation, and incidents

¹⁾ See Compilation N. Steam Turbine Plant

²⁾ See Compilation T. Radiological Protection and Activity Monitoring, Nos. 1.3.6 and 1.4.1 c

	measures according to Nos. 3.3.4 and 3.3.5 and their results		manufacturer's works
4.2	Design documents		– report on the results of the stress-strain measurements, and comparison with the calculated data, if applicable
4.2.1	System flow diagrams and system descriptions		– report on the results of nondestructive examination following the pressure test at the manufacturer's works, if applicable
4.2.2	System design documents for the components, such as	6.2	Installation plans, pipe laying plans, isometric or comparable representation of pipes, including statement of
	- design data for pressure and temperature		– pipe hangers
	- capacity design		– pipe restraints
	- hydraulic design		dependent on the nominal diameter of the the pipes
4.2.3	Information on the measuring points important for component functioning	6.3	Verification of sufficient safety allowances for the equivalent loads used under No. 4.4.2
4.2.4	Description of the auxiliary and supply systems of the components	6.4	Description of the systems power supply ¹¹⁾ including emergency power supply
4.2.5	Information on initial and in-service inspection performability	6.5	Description of the control and monitoring of the systems ¹²⁾ including
4.3	Statement of the loads taken into account in the design of the components, including the design basis loads during specified normal operation and incidents, unless presented under Nos. 3.1.1 and 3.1.2		– protective logic and functional diagrams ¹³⁾
4.4	Design and calculation		– representation of the measured variables which are used for system actuation and control, and explanation, if applicable
4.4.1	Compilation of the considered codes and the assessment criteria, unless presented under No. 3.2.1	6.6	Information on the overpressure and overtemperature protection of the systems, including the type of protective measures
4.4.2	Verification of the adequate dimensioning of the components (other than pipes, see No. 4.4.3) during specified normal operation and incidents	6.7	Information on qualification of the manufacturers involved in component installation, if applicable
4.4.3	Statement of the load events during specified normal operation and incidents, considered for design and manufacture of pipes, as well as the resulting pipe design data	6.8	Verification of adequate and valid procedure tests
4.4.4	Design drawings and items lists, unless presented under No. 3.2.3	6.9	Information on welding supervision and qualification certificates for welders being employed
4.4.5	Statement of essential calculation bases for dimensioning and explanation of their applicability	6.10	Description of quality assurance measures, including documentation during component installation
4.4.6	Verification of adequate pipe dimensioning for static loads and corrosion, unless presented under No. 3.2.4	6.11	Manufacture documents required for quality assurance purposes
4.5	Materials, welding materials	7.	Pressure test of the respective systems ⁸⁾
4.8.1	Statement of the, component materials, unless presented under No. 3.3.1 (requirements, composition, mechanical technological data, as-delivered condition, verification of the quality properties), including statement of the welding materials	7.1	Documentation of the quality assurance measures according to Nos. 6.10 and 6.11, and their results
4.8.2	Verification of the suitability of the materials, unless presented under No. 3.3.2, including welding materials	7.2	Pressure test and, if applicable, strain gage location plan, including statement of types, number and location of strain gages and other measuring points, if applicable
4.8.3	Information on qualification of the manufacturers for materials, unless presented under No. 3.3.3, including for welding materials, if applicable	7.3	Examination plan for nondestructive examinations following the pressure test, if applicable
4.9	Processing of product forms and welding materials	8.	Commissioning of the respective systems ⁸⁾
4.9.1	Information on qualification of component manufacturers, if applicable	8.1	Analysis of the system mechanical behavior for characteristic operating states and incidents, including external events, considering anchors, hangers
4.9.2	Verification of sufficient and valid procedure tests	8.2	Reports or other documents on system pressure test
4.9.3	Information on welding supervision and qualification certificates for welders being employed	8.3	Reports or other documents on the nondestructive examinations following the system pressure test, if applicable
4.9.4	Description of quality assurance measures including documentation	8.4	Proof of performance of acceptance tests according to conventional regulations (e.g. regulations relating to accident prevention, explosion prevention)
4.9.5	Manufacture documents required for quality assurance purposes	8.5	Commissioning program
5.	Pressure test at the manufacturer's works ⁸⁾		Program for commissioning and commissioning tests up to the nuclear commissioning of the plant Program for measuring the characteristic component data
5.1	If applicable, pressure test and strain gage location plan, including statement of type, number, and location of strain gages and, if applicable, other measuring points		
5.2	Documentation of the quality assurance measures according to Nos. 4.6.4 and 4.6.5 and their results for components subjected to pressure tests at the manufacturer's works		
6.	Installation of the respective components ⁸⁾		
6.1	Documentation of the quality assurance measures and their results, unless presented under No. 5.12, in particular		
	– report on the results of the pressure test at the		

¹¹⁾ See Compilation P. Electrical Power Supply of the Safety System, No. 6.7.1

¹²⁾ See Compilation R. Instrumentation and Control, Control Room, Emergency Station and Local Control Stations, No. 6.10.1

¹³⁾ Submission of informative functional diagrams required for System approval

- 8.6 General inspection plan (list of inspections) for in-service inspections, including statement of
- type of inspections
 - inspection intervals
 - responsibility for inspections
 - plant condition considered (e.g. reactor power operation, reactor shutdown)
9. Delivery of the fuel assemblies (no information)
10. Initial core loading⁸⁾
- 10.1 Reports or other documents on the commissioning according to No. 8.5
- 10.2 Instructions for recurrent functional tests
- 10.3 Final analysis of the system mechanical behavior on the basis of the final performance and the commissioning tests according to no. 8.5
- 10.4 Submission of the relevant parts of the operating manual including safety specifications
11. Nuclear commissioning of the plant⁸⁾
- 11.1 Program for commissioning tests during the nuclear commissioning of the plant
- 11.2 Reports or other documents on commissioning according to No. 8.5, unless presented under No. 10.1, including comparison of the results with calculated data
- 11.3 Information on the provided documentation for in-service inspection results
- After completion of nuclear commissioning:
- 11.4 Reports or other documents on the nuclear commissioning according to No. 11.1
- 11.5 Complete documentation of the Systems
- 11.6 Instructions for in-service inspections
12. Refuelling (no information)

3.N Compilation of Information on the Steam Turbine Plant

Scope of Application

This compilation of information shall apply to

- high pressure turbine (MAA)
- low pressure turbine (MAC)
- bearings (MAD)
- condenser without turbine bypass (MAG)
- air removal system (MAJ)
- drain system (MAL)
- leak-off steam system (MAM)
- turbine bypass (MAN)
- oil supply system (MAV)
- seal steam system (MAW)
- control fluid system (MAX)
- hot reheat pipe system (LBB)
- cold reheat pipe system (LBC)
- high pressure extraction system (LBQ) (only extraction swing check valves)
- low pressure extraction system (LBS) (only extraction swing check valves and extraction lines inside the condenser)
- reheater drains system (LCS) (only reheater drains tank)
- moisture separator drains system (LCT) (only moisture separator drains tank)

(Identifiers according to the power station classification)

Category

1. Concept
2. Construction the respective buildings and structures
3. Manufacture of the respective product forms
4. Manufacture of the respective components
5. Pressure test at the manufacturer's works
6. Installation of the respective components

7. Pressure test of the respective systems
 8. Commissioning of the respective systems
 9. Delivery of the fuel assemblies
 10. Initial core loading
 11. Nuclear commissioning of the plant
 12. Refuelling
1. Concept
 - 1.1 Compilation of the codes and assessment criteria which govern the concept
 - 1.2 Summary description of the functions, the design, the location and the functioning during specified normal operation
 - 1.3 Summary description of the design basis incidents and the measures taken for mitigation of their consequences
 - 1.4 Summary description of the measures for monitoring and retention of radioactive materials¹⁾²⁾
 - 1.5 Statement of the design and preliminary operating data
 - 1.6 Statement of the material properties and/or the main component materials
 - 1.7 Summary description of the quality assurance
 - 1.8 Summary description of the fire protection measures taken for the steam turbine plant
 - 1.9 Summary description of the indication and monitoring concept³⁾
 - 1.10 Summary description of the radiological protection measures taken (shielding, accessibility) (BWR)
2. Construction of the respective buildings and structures
 - 2.1 Statement and explanation of the loads⁴⁾ or load assumptions originating from the components and used as design basis for the structures
 - 2.2 Verification of control of fires and explosions
3. Manufacture of the respective product forms (no information)
 4. Manufacture of the respective components (no information)
 5. Pressure test at the manufacturer's plant (no information)
 6. Installation of the respective components
 - 6.1 System descriptions and flow diagrams of the auxiliary and supply system, including statement of type and location of the adjacent systems
 - 6.2 Information on the maintenance procedures on the turbine (BWR) with the aid of installation plans (overall allocation of compartments) or models, including statement of the radiation exposure⁵⁾
 7. Pressure test of the respective systems (no information)
 8. Commissioning of the respective systems
 - 8.1 Information on type and extent of commissioning tests within the frame of the entire plant
 9. Delivery of the fuel assemblies (no information)

¹⁾ See Compilation M. Water/Steam Plant, No. 1.7

²⁾ See Compilation T. Radiological Protection and Activity Monitoring, Nos. 1.3.6 and 1.4.1.c

³⁾ See Compilation R. Instrumentation and Control, Control Room, Emergency Control Station and Local Control Stations, Nos. 1.2 and 1.3

⁴⁾ The load transmission to the structure is dealt with in "Compilation of Documents Required for Civil Construction Supervision Purposes of Nuclear Facilities (GMB1. 1981, p. 518)

⁵⁾ See Compilation T. Radiological Protection and Activity Monitoring, Nos. 6.16 to 6.19

10.	Initial core loading (no information)	1.1	Summary description of the systems, their locations and functions during specified normal operation including schematics
11.	Nuclear commissioning of the plant	1.2	Description of the precautionary protective measures taken for maintenance procedures with regard to radiation exposure (for BWRs)
11.1	Submission of the relevant parts of the operating manual including safety specifications After completion of nuclear commissioning:	1.3	List of the loads or load groups which are supplied by the systems, if applicable
11.2	Reports or other documents on the commissioning within the frame of the entire plant	1.4	Statement of the design and operating data and the operating media
12.	Refuelling (no information)	1.5	Statement of the materials for cooling water systems
		1.6	Summary description of quality assurance, as far as required by legal regulations
		1.7	Summary description of the site specific conditions for cooling water supply, in particular the influence <ul style="list-style-type: none"> - of the water levels (water flow rates) - of the water quality in the intake and outfall structures - the increase in temperature of the cooling water - the impact of biological organisms (e. g. mussel grown) - of other contaminants on the cooling water supply
		1.8	Summary description of the measures for preventing fouling of the cooling water systems
		1.9	Summary description of the measures for monitoring and retention of radioactive materials ¹⁾
		2.	Construction of the respective buildings and structures
		2.1	Plans showing pipe and cable runs, and canals for cooling water on the plant site, as far as important for the design of the structures, including plan views and sections
		3.	Manufacture of the respective product forms (no information)
		4.	Manufacture of the respective components (no information)
		5.	Pressure test at the manufacturer's plant (no information)
		6.	Installation of the respective components
		6.1	System description and flow diagrams, including information on location and type of such adjacent systems as may have impacts on safety-related systems; if applicable, information on measures for retention of radioactive materials, unless presented under No. 1. 9
		6.2	Description of overpressure protection
		6.3	Documentation of the acceptance and pressure tests performed, and statement of the material acceptance and test specifications used as a basis
		7.	Pressure test of the respective systems (no information)
		8.	Commissioning of the respective systems
		8.1	Program for in-service inspections performance, as far as required by legal regulations
		9.	Delivery of the fuel assemblies (no information)
		10.	Initial core loading
		10.1	Submission of the relevant parts of the operating manual, if applicable
		11.	Nuclear commissioning of the plant (no information)
		12.	Refuelling (no information)

3.0 Compilation of Information of the Cooling Water Systems and Plant Auxiliary and Supporting Systems

Scope of Application

- This compilation of information shall apply to
- raw water supply system (GA)
- demineralizing system (GC)
- blowdown demineralizing system, PWR (GD)
- demineralized water supply system (GHC)
- seal water supply system (GHW)
- drinking water supply system (GK) (nuclear area)
- process drains collection and disposal (Building drains) (GM)
- process drains treatment system (GN)
- domestic liquid waste collection and disposal (GQ)
- storm water collection and disposal (GU)
- coolant purification regenerating system (KBH) (only chemical control)
- nuclear sealing and flushing fluid supply (KW)
- auxiliary steam system (LBG)
- condensate demineralizing systems (LD)
- main cooling water system for the conventional plant (PA)
- service water system for conventional plant, PWR (PC)
- conventional closed cooling water system, PWR (PG)
- closed cooling water system for transformers (PM)
- cooling tower makeup water supply and treatment system (Pp)
- auxiliary cooling water system (PQ)
- cooling tower blowdown system (PS)
- operational cooling circuit I, BWR
- central chemical supply (QC)
- general soot blower and plant air supply (QE)
- general control air supply (QF)
- auxiliary steam supply system (QH)
- central gas supply system (QJ)
- chilled water systems (QK)
- air humidifying system (QM)
- sampling system (QU)
- heating systems (SB)
- permanent plant air systems (SC)

(Identifiers according to the power station classification)
Circulating water intake and outfall structures and cooling towers are considered only with regard to assurance of circulating water supply.

Category Scheme

1. Concept
2. Construction of the respective buildings and structures
3. Manufacture of the respective product forms
4. Manufacture of the respective components
5. Pressure test at the manufacturer's works
6. Installation of the respective components
7. Pressure test of the respective systems
8. Commissioning of the respective systems
9. Delivery of the fuel assemblies
10. Initial core loading
11. Nuclear commissioning of the plant
12. Refuelling

1. Concept

¹⁾ See Compilation T. Radiological Protection and Activity Monitoring, Nos. 1.3.6 and 1.4.1 c

3.P Compilation of Information on the Electrical Power Supply of the Safety System

Scope of Application

This compilation of information shall apply to:

- the entire electrical power supply with power grid connections, including the transformers, unit generator (including auxiliary systems¹⁾, generator leads including generator circuit breaker, and unit auxiliary power system with its transformers, where these are required for the electrical power supply of the safety system;
- the emergency power supply with its parts and components, in particular generating sets and converters with their auxiliary systems, switchgear and distribution systems, cables and leads, places of installation and laying routes, control, monitoring, and signaling equipment;
- lightning protection and grounding systems
- emergency and safety lighting

Category Scheme

1. Concept
2. Construction of the respective buildings and structures
3. Manufacture of the respective product forms
4. Manufacture of the respective components
5. Pressure test at the manufacturer's works
6. Installation of the respective components
7. Pressure test of the respective systems
8. Commissioning of the respective systems
9. Delivery of the fuel assemblies
10. Initial core loading
11. Nuclear commissioning of the plant
12. Refuelling
1. Concept
- 1.1 Compilation of the codes and assessment criteria which govern the concept
- 1.2 Summary description of the entire electrical power supply system and explanation of the selected design, including statement of the design basis incidents
- 1.3 Single line diagram of the entire electrical power supply System with power grid connection, transformers, buses, circuit breakers, and statement of the main design data (e. g. rated power, rated voltage, short-circuit voltage, rated breaking capacity)
- 1.4 Layout plan and arrangement drawings of the buildings which contain components of the electrical power supply of the safety system, including information on the planned arrangement of the main components, the main cable runs, and the adjacent main pipe runs
- 1.5 Information on the integration of the nuclear power plant into the power grid e. g. protective decoupling, location of the nearest substations, capacity of the power grid connections for the safety system supply
- 1.6 Explanation of the redundancy relationships between the emergency power system and the engineered safety related systems, including any differences in these relationships
- 1.7 Tentative power, balances for emergency power loads, according to the incident analyzed
- 1.8 Summary description of the quality assurance during planning, manufacture, installation, commissioning, operation
- 1.9 Summary description of the auxiliary systems related to the emergency power systems (e.g. cooling and ventilation systems, fuel and lubrication oil supply, startup system, electrical

power supply, excitation and instrumentation and control equipment)

- 1.10 Description of the protection of the safety system electrical power supply against failure initiating events inside the power plant, and against external events
- 1.11 Statement of the initiation criteria for the emergency power supply, resulting from the incident analysis, and their interfacing with the reactor protection system
- 1.12 Summary description of the planned mode of operation of the power supply system during startup and shutdown, power operation, and on loss of offsite power, turbine trip or load rejection or reactor trip or in more than one of these events
- 1.13 Summary description and explanation of the lightning protection and grounding systems, including statement of the selected design
- 1.14 Summary description of the emergency and safety lighting
- 1.15 Summary description of the explosion protection measures taken for the generator
2. Construction of the respective buildings and structures
- 2.1 Tentative power balances for the emergency power systems, and short circuit calculation for the medium voltage switchgear for determination of the space requirements
- 2.2 Installation plans (as a rule scale 1 : 100) of all emergency power systems, including statement of the main cable runs and the distribution, e. g.
 - diesel sets with auxiliary systems and switchgear
 - direct-current / three-phase current converters with associated switchgear
 - batteries with direct-current switchgear
 - associated ventilation systems
 - storage facilities for fuel and lubricating oil
- 2.3 Lists and plans for the arrangement of the containment vessel cable penetrations, as far as important for the construction of the structures
- 2.4 Description of the lightning protection and grounding systems, with general layout plan and explanation of adequate design
- 2.5 Description of the passive provisions for fire protection in emergency power Systems (e. g. establishment of fire zones)
- 2.6 Estimation and explanation of the loads originating from the components and governing the design of the buildings and structures during specified normal operation and design basis incidents
3. Manufacture of the respective product forms (no information)
4. Manufacture of the respective components (no information)
5. Pressure test at the manufacturer's works (no information)
6. Installation of the respective components
- 6.1 Results of the assembly and acceptance tests performed at the manufacturer's works for the emergency power system and the auxiliary power system equipment, as far as these are important for the power supply of the safety system
- 6.2 Short-circuit calculations for the emergency power systems
- 6.3 Verification of sufficient voltage stability for the loads (compliance with permissible voltage limits during load fluctuations and switching operations in the three-phase and direct current systems)
- 6.4 Verification of the selectivity of the protection equipment in the emergency power system for normal operation and emergency power operation, including information on the protection

¹⁾ The information stated in Compilation 0. Cooling Water Systems and Plant Auxiliary and Supporting Systems, shall also be submitted for the unit generator auxiliary systems

	equipment of the sets and components of the emergency power systems (e. g. short circuit, overcurrent, temperature, ground fault)		switchgear-related protective logic and signal gating plans
6.5	Trip diagram for unit protection	6.22	Summary description of the low-voltage switchgear, as far as it may impact the electrical power supply of the safety system
6.6	Verification of decoupling of the power system connections for protection purposes	6.23	Summary description of the generator, generator leads, generator circuit breaker, and transformers
6.7.1	Power balance for the emergency generating systems, including statement of scheduled reserve as well as the technical data of the Major drives (torque and current characteristics of Motor and prime mover)	6.24	Description of the design of the safety power supply, with regard to the protection against failure initiating events inside the power plant and in the power supply system
6.7.2	Verification of acceptance of the connection of non-safety-related emergency power loads	6.25.1	Description of the emergency and safety lighting
6.8.1	Description of the main components of the emergency power systems, including the associated auxiliary systems and the signaling concept	6.25.2	Verification of adequate design of the emergency and safety lighting, for specified normal operation, and incidents, including circuit diagrams, installation plans, and power balance
6.8.2	Verification of adequate design of the components under No. 6.8.1, for specified normal operation and incidents, statement of the time-based capacity of the supply systems	6.26	Statement of the technical measures taken for fire protection in emergency power systems (e.g. cable routing, partitioning)
6.9.1	Description of the cable and lead types, and of their laying (cable tray routing, clearances, fill derating factors, minimum cross sections, grounding)	7.	Pressure test of the respective systems (no information)
6.9.2	Verification of the adequate design of the parts under No. 6.9.1, for specified normal operation	8.	Commissioning of the respective systems
6.10.1	Description of the containment vessel cable penetrations	8.1	Commissioning program
6.10.2	Verification of adequate design of the cable penetrations under No. 6.10.1, for specified normal operation		Program for commissioning and commissioning tests up to the nuclear commissioning of the plant
6.11	Data sheets for all measuring points of the emergency power systems (including information on analog transmitters)	8.2	General inspection plan (list of inspections) for in-service inspections, including statement of
6.12	Compilation of all signals from the emergency power systems (alarm and status signals, also at local control stations)		– type of inspections
6.13	Protective logic functional diagrams for the emergency power systems ^{2),3)}		– inspection intervals
6.14	Description of the programs for connection loading, and shutdown of the emergency power generating sets, including the calculations for the programs; description of the automatic changeover equipment		– responsibility for inspections
6.15	Description of the auxiliary systems for the emergency power systems, including the associated system flow diagrams showing valves and measuring points		– plant condition considered (e.g. reactor power operation or reactor shutdown)
6.16	Circuit diagrams (including item lists) for the various emergency switchgear feeder types (including feeder power range, feeder rated current range, protection equipment)	9.	Delivery of the fuel assemblies (no information)
6.17	Feeder data sheets for all safety-related loads, including information on type of power supply, design and ambient conditions, cable types	10.	Initial core lading
6.18	Information on testability of all safety-related equipment of the emergency power systems which have to be tested during operation (testing concept)	10.1	Reports or other documents on commissioning according to No. 8.1
6.19	Verification of adequate function of the emergency power systems during external events	10.2	Instructions for recurrent functional tests
6.20	Verification of reliability of the electrical power supply of the safety system	10.3	Submission of the relevant parts of the operating manual including safety specifications
6.21.1	Description of the unit auxiliary power switchgear, as far as required for the electrical power supply of the safety system including its auxiliary systems	11.	Nuclear commissioning of the plant
6.21.2	Verification of adequate design of the unit auxiliary power switchgear under No. 6.21.1., for normal operation and incidents, including	11.1	Program for commissioning tests during the nuclear commissioning of the plant
		11.2	Reports or other documents on commissioning according to No. 8.1, unless presented under No. 10.1
		11.3	Statement of the operating restrictions in the event of component failure or lack of redundancy of the power supply of the safety system and the auxiliary systems (statement of the allowable times between failures and times to repair)
		11.4	List of the limit settings for alarm annunciation and initiation of the protection and monitoring systems; program for the simulations of anticipated abnormal operating states of the emergency power system, and the tests and measurements to be performed under this conditions
		11.5	Statement of the scheduled servicing procedures for the emergency power systems After completion of nuclear commissioning
		11.6	Reports or other documents on the nuclear commissioning according to No. 11.1
		11.7	Complete documentation of the systems
		11.8	Instructions for in-service inspections
		12.	Refuelling (no information)

²⁾ See Compilation B. Steel Containment Vessel of PWRs, No. 4.3, and C. Containment Vessel with Pressure Suppression System of BWRs, No. 4.3

³⁾ When applying for the 2nd partial construction permit, a summary description of the emergency power systems shall be submitted as "A" Information

3.Q Compilation of Information on the Alarm Systems, Staff Paging Systems and Telecommunication Facilities (Communication Systems)

Scope of Application

This compilation of information shall apply to:

- alarms systems
- staff paging systems
- telecommunication facilities

These systems serve for communication inside the power plant and of communication with the outside.

Category Scheme

1. Concept
 2. Construction of the respective buildings and structures
 3. Manufacture of the respective product forms
 4. Manufacture of the respective components
 5. Pressure test at the manufacturer's works
 6. Installation of the respective components
 7. Pressure test of the respective systems
 8. Commissioning of the respective systems
 9. Delivery of the fuel assemblies
 10. Initial core loading
 11. Nuclear commissioning of the plant
 12. Refuelling
1. Concept
 - 1.1 Compilation of the codes and assessment criteria which govern the concept
 - 1.2 Summary description of
 - the communication system concept
 - the communication system spatial arrangement, cable routing, and power supply
 - the communication system equipment design for ambient conditions during specified normal operation and incidents (e.g. temperature, humidity, induced vibrations)
 2. construction of the respective buildings and structures
 - 2.1 Drawings showing cable and lead routing, as far as important for the construction of the respective buildings and structures
 - 2.2 Description of the spatial arrangement of the control desks, the central stations, and the antennas of the communication systems, as far as important for the construction of the buildings and structures
 - 2.3 Drawings showing the arrangement of the cable penetrations through the containment vessel, as far as important for the construction of the respective buildings and structures
 - 2.4 Description of typical spatial arrangements of loudspeakers and visual alarm signaling to serve as examples
 - 2.5 Statement of the safety-related local control stations of the nuclear power plant containing communication systems
 3. Manufacture of the respective product forms (no information)
 4. Manufacture of the respective components (no information)
 5. Pressure test at the manufacturer's works (no information)
 6. Installation of the respective components
 - 6.1 Description of the communication systems, including general layout plans
 - 6.2 Design documents for the communication systems including their power supply
 - 6.3 Documentation of the quality of the communication system equipment (e.g. proof in operation and suitability or reliability qualification)
 - 6.4 Plans showing the arrangement of the communication system components (e.g. central stations, junction boxes, power supply, high-frequency cables)
 - 6.5 Description of the function of and data sheets for the alarm and staff paging system equipment, as

- well as of the safety-related telecommunication facilities to the outside
 - 6.6 Alarm system circuit diagrams
 - 6.7 Statement of all alarms which can be given in the nuclear power plant
 - 6.8 Information on communication system maintenance and testing facilities
 - 6.9 Description of the communication between the control rooms, the local control stations, and the emergency control stations, and of communications to the outside
 - 7. Pressure test of the respective systems (no information)
 - 8. Commissioning of the respective systems
 - 8.1 Commissioning program
Program for commissioning and commissioning tests up to the nuclear commissioning of the plant
 - 8.2 General inspection plan (list of inspections) for in-service inspections, including statement of
 - type of inspections
 - inspection intervals
 - responsibility for inspections
 - 9. Delivery of the fuel assemblies (no information)
 - 10. Initial core loading
 - 10.1 Reports or other documents on the commissioning according to No. 8.1
 - 10.2 Instructions for recurrent function tests
 - 10.3 Submission of the relevant parts of the operating manual including safety specifications
 - 11. Nuclear commissioning of the plant
 - 11.1 Program for commissioning tests during the nuclear commissioning of the plant
 - 11.2 Reports or other documents on commissioning according to No. 8.1 unless presented under 10.1
 - 11.3 After completion of nuclear commissioning: Reports or other documents on the nuclear commissioning according to No. 11.1
 - 11.4 Complete documentation of the communication systems
 - 11.5 Instructions for in-service inspections
 - 12. Refuelling (no information)
- 3.R Compilation of Information on the Instrumentation and Control, Control Room, Emergency Control Station and Local Control Stations**

Scope of Application

This compilation of information shall apply to:

- the instrumentation and control, excluding the reactor protection system
- the control room
- the emergency control station
- the local control stations

The terms control room, emergency control station and local control stations shall be deemed to include any necessary side rooms.

Category Scheme

1. Concept
2. Construction of the respective buildings and structures
3. Manufacture of the respective product forms
4. Manufacture of the respective components
5. Pressure test at the manufacturer's works
6. Installation of the respective components
7. Pressure test of the respective systems
8. Commissioning of the respective systems
9. Delivery of the fuel assemblies
10. Initial core loading

11.	Nuclear commissioning of the plant	5.	Pressure test at the manufacturer's works (no information)
12.	Refuelling	6.	Installation of the respective components ¹⁾
1.	Concept	6.1	Documentation of the quality assurance measures according to No. 4.1 and their results
1.1	Compilation of the codes and assessment criteria which govern the concept	6.2	Verification of adequate design of the control room, emergency control station, and local control station internals to withstand in-plant and external events
1.2	Summary description of the instrumentation and control (e. g. measuring devices, control equipment indications, recording, storage and documentation of measured values)	6.3	Information on the planned physical work environment of the control room, emergency control station and the local control stations, unless presented under No. 2.5
1.3	Summary description of the assignment of the monitoring and control functions to the control room, the emergency control Station, and the local control stations	6.4	Description and explanation of the ergonomic design principles and of the equipment allocation of the rooms for the control room, the emergency control station, and the local control stations
1.4	Summary description of the control room, the emergency control station, and the local control stations, with general layout plans of the control room and the emergency control station	6.5	Plans and sectional drawings of the control room and equipment contained therein, showing the precise dimensions, angles (e. g. viewing angle, work surface inclination) and distances
1.5	Summary description of the spatial arrangement of the main instrumentation and control systems and equipment (e. g. electronic equipment cabinets, transducer rooms), as well as the main instrumentation and control cable runs	6.6	Description of the planned desk and wall panel arrangement of the control room, emergency control station and local control stations, including statement of the files to the individual systems, and stating their function
1.6	Summary description of the control room, the emergency control station, and the local control stations, against external and in-plant events	6.7	Summary description of the work places and work areas of the control room, emergency control station and local control stations, including statement of typical functions and work procedures, and information on equipment and information systems to assist in fault diagnosis
1.7	Description of the concept for the ergonomic design of the control room and the emergency control station, as well as of the safety-related local control stations	6.8	Description of the main closed-loop control equipment, if applicable, including information on the planned verification of stability in interaction with the controlled systems
1.8	Classification of the instrumentation and control systems, the control room, the emergency control station as well as the local control stations, according to their importance to safety and identification of information required according to nos. 2.1 to 2.3 and secs. 6 to 11	6.9.1	Description of the computer systems, including information on the power supply
1.9	Summary description of the quality assurance during planning, manufacture, installation, commissioning, operation	6.9.2	Statement of the system data, including computer system power supply
2.	Construction of the respective buildings and structures	6.10.1	Description of the instrumentation and open-loop control systems, including information on the power supply
2.1	Verification of adequate design of the control room, emergency control station, and local control station structures to withstand in-plant and external events ¹⁾²⁾	6.10.2	Statement of the system data of the instrumentation and open-loop control systems, including their power supply, and functional diagrams for manually activated functional group controls required for actuation of engineered safety features
2.2	Plans showing fluid-carrying components and pipes (e. g. water, waste water), in the area of the control room and the emergency control station insofar as they may endanger the control room and the emergency control station ¹⁾	6.11	Description of the incident instrumentation, and statement of the system data, including power supply
2.3	Building drawings, showing dimensions of the electronic equipment rooms, control room, emergency control station, and local control stations, as well as Statement of the planned equipment allocation of the rooms	7.	Pressure test of the respective systems (no information)
2.4	Statement of scope and spatial arrangement of the Instrumentation and control systems and equipment (e. g. spatial Separation), as far as required for estimation of space requirements	8.	Commissioning of the respective systems ¹⁾
2.5	Information on the planned physical work environment in the control room, and at the emergency control station and the local control stations, as far as important for the construction of the buildings and structures	8.1	Commissioning program Program for commissioning and commissioning tests of the instrumentation and control up to the commissioning of the plant Program for commissioning tests of the control rooms, emergency control station, and local control stations concerning – lighting – ventilation ³⁾ – fire protection
3.	Manufacture of the respective product forms (no information)	8.2	General inspection plan (list of inspections) for in-service inspections, including statement of – type of inspections – inspection intervals – responsibility for inspections
4.	Manufacture of the respective components	9.	Delivery of the fuel assemblies (no information)
4.1	Description of the quality assurance measures including documentation	10.	Initial core loading ¹⁾
		10.1	Reports or other documents on commissioning

¹⁾ Of the information mentioned under Nos. 2.1 to 2.3 and Secs. 6 to 11 only that identified under No. 1.8 shall be submitted for the individual systems mentioned in the scope of application

²⁾ See Compilation of Documents Required for Civil Construction Supervision Purposes of Nuclear Facilities (GHB1. 1981, p. 518)

³⁾ See Compilation L. Ventilation Systems, No. 8.2

	according to No. 8.1		
10.2	Instructions for recurrent functional tests	2.	Construction of the respective buildings and structures
10.3	Submission on the relevant parts of the operating manual including safety specifications	2.1	Drawings showing the cable and lead runs, as far as important for the construction of the buildings and structures
11.	Nuclear commissioning of the plant ¹⁾	2.2	Building drawings including statement of the main electrical components, location of the reactor protection system on the engineered safety features
11.1	Program for commissioning tests during the nuclear commissioning of the plant	2.3	Drawings showing the arrangement of cable penetrations through the containment vessel and the reactor building, as far as important for the construction of the respective building or structure
11.2	Reports or other documents on commissioning according to No. 8.1, unless presented under No. 10.1	3.	Manufacture of the respective product forms (no information)
11.3	Description of the desk and wall panel arrangement in the control room, the emergency control station, and the local control stations, including statement of the allocation of the modules to the individual systems, and stating their function After completion of nuclear commissioning:	4.	Manufacture of the respective components
11.4	Reports or other documents on nuclear commissioning according to No. 11.1	4.1	Description of the quality assurance including documentation
11.5	Complete documentation of the systems	5.	Pressure test at the manufacturer's works (no information)
11.6	Instructions for in-service inspections	6.	Installation of the respective components
12.	Refuelling (no information)	6.1	Documentation of the quality assurance measures according to No. 4.1 and their results

3.S Compilation of Information on the Reactor Protection System

Scope of Application

This compilation of information shall apply to the reactor protection System.

Category Scheme

1.	Concept	6.2	Mechanical engineered components
2.	Construction of the respective buildings and structures	6.2.1	List of measuring points and statement of the arrangement of the analog and binary signal transmitters, including the related process system flow diagrams and descriptions
3.	Manufacture of the respective product forms	6.2.2	Description of the analog data acquisition for the reactor protection system and the control equipment with regard to separation of the reactor protection system from other systems
4.	Manufacture of the respective components	6.2.3	Measuring point data sheets for the reactor protection system
5.	Pressure test at the manufacturer's works	6.2.4	Statement of the final control elements actuated by the reactor protection system, including design data (operating and incident conditions)
6.	Installation of the respective components	6.2.5	Description of the reactor protection System analog and binary signal transmitter testing during specified normal operation of the plant
7.	Pressure test of the respective systems	6.2.6	Single line diagrams of the reactor protection system
8.	Commissioning of the respective systems	6.3	Electrical components
9.	Delivery of the fuel assemblies	6.3.1	Verification of equipment quality (e.g. stability, precision, reproducibility, reliability, Signal-to-noise ratio, qualification testing)
10.	Initial core loading	6.3.2	Description and explanation of the reactor protection system
11.	Nuclear commissioning of the plant	6.3.3	Description of the analog data processing for the reactor protection system and the control equipment with regard to Separation of the reactor protection system from other systems
12.	Refuelling	6.3.4	Installation plans for the reactor protection system, information on cabinet equipment allocation and statement of the ambient conditions during specified normal operation and incidents
1.	Concept	6.3.5	Internal circuit diagrams and data sheets for the equipment used in the reactor protection system
1.1	Compilation of the codes and assessment criteria which govern the concept	6.3.6	Description of the reactor protection system power supply equipment
1.2	Summary description of the reactor protection system, its functions, as well as scope and type of tests and examinations	6.3.7.1	Description of the signaling concept and the alarm annunciation system
1.3	Summary description of the spatial arrangement of the reactor protection system	6.3.7.2	Compilation of the alarms, including type and location of the acquisition equipment, and location of the indication equipment
1.4	Information on redundancy	6.3.8	Signal and circuit diagrams of the reactor protection system (analog data acquisition, logics, control)
1.5	Summary description of the design basis incidents including incident sequences (preliminary incident analysis)	6.3.9	Process system flow diagrams, including statement of the measuring points and the related instrumentation and control equipment of the safety-related systems
1.6	Compilation of the safety related variables used as initiation criteria for the reactor protection system, and of their allowable ranges	6.3.10	Incident analysis
1.7	Summary description of the relationships between incidents, initiation criteria, and protective actions, including schematics		
1.8	Statement of the failure initiating events and the provided countermeasures for assurance of operability of the reactor protection system		
1.9	Summary description of the signaling concept for indicating operational readiness and operability of the reactor protection system and the safety features		
1.10	Summary description of the quality assurance during planning manufacture, installation, commissioning, operation		
1.11	Summary description of the equipment and systems provided for implementation of the reactor protection concept		

7. Pressure test of the respective systems (no information)
8. Commissioning of the respective systems
 - 8.1 Commissioning program
Program for commissioning and commissioning test up to the nuclear commissioning of the plant
 - 8.2 General inspection plan (list of inspections) for in-service inspections, including statement of
 - type of inspections
 - inspection intervals
 - responsibility of inspections
 - plant condition considered (e.g. reactor power operation, reactor shutdown)
9. Delivery of the fuel assemblies (no information)
10. Initial core loading
 - 10.1 Reports or other documents on the commissioning according to No. 8.1
 - 10.2 Instructions for recurrent functional tests
 - 10.3 Statement of the limit settings required for nuclear commissioning
 - 10.4 Submission of the relevant parts of the operating manual including safety specifications
11. Nuclear commissioning of the plant
 - 11.1 Program for commissioning tests during the nuclear commissioning of the plant
 - 11.2 Reports or other documents on commissioning according to No. 8.1, unless presented under No. 10.1
 - 11.3 Statement of all limit settings required, unless presented under No. 10. 3 After completion of nuclear commissioning:
 - 11.4 Reports or other documents on the nuclear commissioning according to No. 11.1
 - 11.5 Complete documentation of the reactor protection system
 - 11.6 Instructions for in-service inspections
12. Refuelling
The following information shall be presented in the course of operation and is not as "A" or "B" information:
 - 12.1 Statement and explanation of changed reactor protection limits resulting from changes in the nuclear core design¹⁾

3.T Compilation of Information on Radiological Protection and Activity Monitoring

Scope of Application

This compilation of information shall apply to the following aspects of radiological protection and activity monitoring:

This compilation of information shall apply to the following aspects of radiological protection and activity monitoring:

- activity inventory and activity flows in the plant,
- monitoring of the activity concentration of radioactive materials in compartment air,
- monitoring of the activity concentration of radioactive materials in steam, liquids, and gases
- shielding and local dose rates,
- measures taken for the purposes of occupational radiological protection
- monitoring of activity releases in the exhaust air and effluents, including information on calculation of radiation exposure to the environment,
- environmental monitoring,

Category Scheme

1. Concept
2. Construction of the respective buildings and

¹⁾ See Compilation D. Reactor Core and Control Assemblies including their Drives, No. 12.2

3. structures
 4. Manufacture of the respective product forms
 5. Manufacture of the respective components
 6. Pressure test at the manufacturer's works
 7. Installation of the respective components
 8. Pressure test of the respective systems
 9. Commissioning of the respective systems
 10. Delivery of the fuel assemblies
 11. Initial core loading
 12. Nuclear commissioning of the plant
 13. Refuelling
1. Concept
 - 1.1 Compilation of the codes and assessment criteria which govern the concept
 - 1.2 Radiation from the reactor core¹⁾
 - 1.2.1 Summary description and explanation of the methods used for determination of the reactor core source strength
 - 1.2.2 Statement of the radiation flows in the individual shielding layers
 - 1.2.3 Statement of the dose rates (neutrons, gamma) in the radial and axial direction
 - 1.3 Radioactive materials in systems¹⁾
 - 1.3.1 Information and explanation on generation rate or quantity (anticipated and design values) of radioactive materials (e.g. fission products, activation products)
 - 1.3.2 Statement and explanation of the routing of radioactive materials in the Systems, with the aid of an activity flow diagram for the main nuclides; statement of
 - activity concentrations in major components²⁾
 - Separation factors (e. g. during change from water to steam)
 - retention factors (if applicable, empirical values) and estimation of hold-up times
 - Classification of the compartments into groups, according to the occurrence of radioactive materials in the compartment air, including explanation (in general a rough division covering compartments known from experience to be particularly endangered)
 - 1.3.3 Summary description of the measures taken to keep activity in the reactor coolant system low and to monitor this activity³⁾
 - 1.3.4 Summary description of the reactor coolant system and the coolant purification system, as well as of the measures taken to reduce deposition of radioactive sludges, including layout drawings and statement of performance data for the coolant purification system⁴⁾
 - 1.3.5 Summary description of the protective measures taken to prevent escape of radioactive materials from systems carrying radioactive materials, e. g. by means of material barriers or design measures
 - 1.3.6 Summary description of the ventilation systems, including information on e. g. pressure graduations, air change constants, changeover possibilities to filter systems⁵⁾

¹⁾ The information required may also include suitable experimental results obtained from reference plants, if comparable, instead of theoretical evaluations

²⁾ See Compilation K. Systems for the Handling and Storage of Other Radioactive Materials, and Reactor Auxiliary Systems, No. 1.7

³⁾ See "Guideline for the Protection against Radiation of Personnel during the Execution of Maintenance Work in Nuclear Power Stations with Light-Water Reactor; the Precautionary Protective Measures to be taken during the Planning of the Plant," as of July 10, 1978 (GMB1. 1978, p. 418) (Guideline Radiation Protection), No. 5.4.1

⁴⁾ See Guideline Radiation Protection, No. 5.4.2

⁵⁾ See Compilation L. Ventilation Systems, Nos. 1.2 and 1.4

- 1.4 Stationary monitoring systems⁶⁾
- 1.4.1 Summary description of the stationary systems for monitoring the
- a) local dose rate in the various plant compartments
 - b) activity concentration of radioactive materials in the compartment air
 - c) activity concentration of radioactive materials in liquids⁷⁾
- 1.4.2 Summary description of the stationary systems for monitoring the activity concentration of radioactive materials in gas or steam
- 1.5 Shielding and local dose rate⁸⁾
- 1.5.1 Summary description of the permanent equipment provided pursuant to Sec. 54 of the Radiological Protection Ordinance
- 1.5.2 Summary description of the shielding provided by e. g. water, concrete, steel, lead
- 1.5.3 Summary description of the methods for predetermining and verifying the local dose rates in accessible areas
- 1.5.4 Summary description of the arrangement of the main components and systems carrying activity, with regard to radiological protection during maintenance work⁹⁾
- 1.5.5 Summary description of measures taken for occupational radiological protection (e. g. principle of separation of valves carrying activity from their operating devices; facilities for purging, flushing, emptying and decontamination of subsystems, accessibility, ease of operation)
- 1.5.6 Description of the division of the nuclear power plant into zones with defined local dose rate ranges and of the appropriate allocation of the compartments, including explanation (if applicable, citation of reference plants)
- 1.6 Summary description and explanation of the functions of compartment air monitoring, if these functions go beyond those of personnel protection
- 1.7 Personnel monitoring
- 1.7.1 Summary description and explanation of the personnel monitoring measures
- 1.7.2 Summary description of the boundaries of exclusion areas and other restricted access areas¹⁰⁾, as well as of the protection monitoring measures provided at the restricted access area entrances and exits
- 1.8 Storage and handling of radioactive materials
- 1.8.1 Summary description of the transport of nuclear fuels¹¹⁾ and other radioactive materials, including information on location and type of the decontamination measures taken for the shipping casks
- 1.8.2 Summary description of the in-plant transport routes and transport equipment for other radioactive materials, as well as for radioactive components, and subunits, including information on planned storage locations
- 1.8.3 Summary description of the decontamination equipment provided
- 1.9 Occupationally radiological protection
- 1.9.1 Summary description of the hygiene tract with layout drawing and statement of the number of personnel for which the tract is designed¹²⁾
- 1.9.2 Summary description of the location and equipment of the special room for first aid measures located inside the restricted access area¹³⁾
- 1.9.3 Summary description of the communication systems in the various plant rooms, with layout drawings^{14),15)}
- 1.9.4 Layout plan of locations to be protected (outside the plant buildings), at which large components of the reactor coolant system with a high degree of radiation or contamination, which are to be finally removed, can if necessary be placed in intermediate storage and be dismantled, with all the protective measures required¹⁶⁾
- 1.9.5 Summary description of the measures provided for the case in which operation cannot be continued with the installed large components of the reactor coolant system (in particular reactor pressure vessel, steam generator, pressurizer, pumps) due to irreparable damage¹⁷⁾
- 1.9.6 Summary description of further measures for occupational radiological protection, including information on
- surface coatings provided inside equipment compartments
 - hot workshop
 - mobile shielding taken into account
 - arrangement of routes for frequent transport of radioactive materials (drum and filter transport), in relation to personnel routes
- 1.10 Activity release
- 1.10.1 Waste water
- 1.10.1.1 Summary description of the amount and the release and/or recirculation of radioactive and possibly radioactive water, including statement of the corresponding activity concentrations¹⁸⁾
- 1.10.1.2 Summary description of the systems for collection and treatment of liquid radioactive waste, including layout drawings and information on capacity data for collecting tanks and performance data for the individual treatment stages (e.g. throughput, decontamination factor)^{18),19)}
- 1.10.1.3 Summary description of the type of release (e.g. in batches), and of the activity concentration measurement of radioactive water
- 1.10.1.4 Statement and explanation of the limits applied for the release of radioactive materials with the waste water
- 1.10.1.5 Summary description of the measuring and sampling equipment
- 1.10.2 Exhaust air
- 1.10.2.1 Summary description and explanation of the amount, retention, filtering, and release of radioactive materials with the exhaust air²⁰⁾
- 1.10.2.2 Summary description of the monitoring of radioactive materials released with the exhaust air
- 1.10.2.3 Statement and explanation of the values applied for the activity release with the exhaust air
- 1.10.3 Other radioactive waste
- 1.10.3.1 Summary description of the solid radioactive waste generated, including statement of frequency, type, amount and activity
- 1.10.3.2 Summary description of the process systems

⁶⁾ See Compilation K. Systems for the Handling and Storage of Other Radioactive Materials, and the Reactor Auxiliary Systems, No. 1.10

⁷⁾ See Guideline Radiation Protection, No. 5.3.7

⁸⁾ If applicable, see also Compilation K. Systems for Handling and Storage of Other Radioactive Materials, and the Reactor Auxiliary Systems, No. 1.3

⁹⁾ See footnote¹⁾

¹⁰⁾ See Guideline Radiation Protection, No. 5.6.1

¹¹⁾ See Compilation 1. Equipment for Handling and Storage of Fuel Assemblies, No. 1.9

¹²⁾ See Guideline Radiation Protection, No. 5.3.1

¹³⁾ See Guideline Radiation Protection, No. 5.3.2

¹⁴⁾ See Compilation Q. Alarm Systems, Staff Paging Systems, and Telecommunication Facilities (Communication Systems), No. 1.2

¹⁵⁾ See Guideline Radiation Protection, No. 5.3.6

¹⁶⁾ See Guideline Radiation Protection, No. 5.7.1

¹⁷⁾ Text fehlt

¹⁸⁾ If applicable, see Compilation K. Systems for Handling and Storage of Other Radioactive Materials, and Reactor Auxiliary Systems, No. 1.2, 1.4 and 1.7

¹⁹⁾ See Guideline Radiation Protection, No. 5.3.4

²⁰⁾ See Compilation L. Ventilation Systems, No. 1.2

	provided for processing of the radioactive materials contained in liquid waste in order to obtain a product suitable for transport or storage, including statement of capacities ²¹⁾		shield
1.11	Radiation exposure to the environment	2.4.2	Statement of the temperature distribution in the biological shield; statement of the maximum permissible increase in temperature; description of the measures taken for cooling of the biological shield
1.11.1	Calculation of the radiation exposure via the waste water pathway, including statement of the input data ²²⁾	2.4.3	Statement of the composition of the concrete with regard to its shielding effectiveness and activation
1.11.2	Calculation of the radiation exposure via the exhaust air pathway including statement the input data ²³⁾	2.4.4	Verification by calculation of the shielding effectiveness of the biological shield; if applicable, statement of the results of measurements performed at reference plants
1.12	Environmental monitoring	2.4.5	Verification by calculation of the anticipated activation of the biological shield, if applicable, citation of reference plants
1.12.1	Description and explanation of the function of environmental monitoring	2.5	Preliminary compartment classification, including statement of the areas used as a basis for local dose rates in an appropriate grid
1.12.2	Summary description of the type of measuring procedures, and of the equipment of the for environmental monitoring stations	2.6	Description of the hygiene tract with layout drawing and statement of the number of personnel for which the tract is designed ²⁶⁾
1.12.3	Summary description of the measures taken for determination of meteorological data (e.g. wind directions, wind velocities, temperature)	2.7	Description of the location and equipment of the special room for first aid measures located inside the restricted access area ²⁷⁾
1.13	Summary description of the signaling concept for readiness for operation and operability of the equipment for radiation and activity monitoring, including power and media supply	2.8	Description of the hot workshop, including information on the size of setdown areas provided, and of permanent and mobile shielding, as well as of the envisaged work procedures, as far as important for the construction of the buildings and structures
1.14	Information on the design basis incidents with regard to compliance with the requirements of Sec. 28, Para. 3 of the Radiological Protection Ordinance, including statement of the main data and results for the calculation of radiation exposure	2.9	Information on the entrances and exits of the permanent exclusion areas and other controlled access areas, including emergency exits, as far as important for the construction of the buildings and structures
1.15	Summary description of the administrative radiation protection management	2.10	Information on the suitability of the floor and wall linings, in particular of floor sumps and on their good decontaminability, as far as important to the construction of the buildings and structures ²⁸⁾
1.16	Statement of the coding systems which is used for clear identification of the systems, components and subunits ²⁴⁾	2.11	Statement of locations inside the restricted access area to be protected, at which dismantled radioactive parts (e. g. pump internals) can be stored temporarily with all the protective measures required until they are reinstalled ²⁹⁾ , as far as important for the construction of the buildings and structures
2.	Construction of the respective buildings and structures	2.12	Layout drawings of the floors and working platforms inside restricted access areas (exclusion areas shall be included as parts of restricted access areas), including statement of the maximum permissible additional planar and linear loads for mobile shielding ³⁰⁾
2.1	Building drawings (scale = 1 : 100), showing the major components (including pipes or pipe runs), as far as important for occupational radiological protection and for the construction of the buildings and structures	2.13	Information on work spaces provided for maintenance work on components with a high degree of radiation
2.2	Statement of the shielding including the shielding calculations for selected examples (if applicable, citation of reference plants) ²⁵⁾	2.14	Description of the precautionary protective measures taken for the rapid removal of certain large components of the reactor coolant system (lifting equipment, attachment aids, provision of the necessary transport space, proposed method of removal) ³¹⁾
2.3	Construction drawings according to the construction progress for walls and floors with shielding function	3.	Manufacture of the respective product forms (no information)
2.4	Design and shielding effectiveness of the biological shield	4.	Manufacture of the respective components (no information)
2.4.1	General layout drawings of the biological shield, including the penetrations through the biological	5.	Pressure test at the manufacturer's works (no

²¹⁾ See Guideline Radiation Protection, No. 5.3.5

²²⁾ As a rule the radiation exposure will be determined according to the "General Principle of Calculation for the Radiation Exposure Resulting from Radioactive Effluents in Exhaust Air and in Surface Waters" (Guideline under Sec. 45 of the Radiological Protection Ordinance), GMB1. 1979, p. 371. Where special conditions apply this calculation principle may be waived. The deviations shall be explained. The Information on hydrological conditions, including the radiological background needed for the calculation shall be presented under Nos. 1.7 and 1.9 of Compilation A. Site

²³⁾ See footnote 22, 1st paragraph

The information on meteorological conditions at the site and in its immediate vicinity, as well as information on the radiological background needed for the calculation, shall be submitted under Nos. 1.5 and 1.9 of Compilation A. Site

²⁴⁾ See Guideline Radiation Protection, No. 5.2.1

²⁵⁾ See Compilation K. Systems for Handling and Storage of Other Radioactive Materials, and Reactor Auxiliary Systems, No. 2.4 as well as I. Equipment for Handling and Storage of Fuel Assemblies, No. 2.5

²⁶⁾ See Guideline Radiation Protection, No. 5.3.1

²⁷⁾ See Guideline Radiation Protection, No. 5.3.2

²⁸⁾ If applicable, see Compilation K. Systems for Handling and Storage of Other Radioactive Materials, and Reactor Auxiliary Systems, No. 2.9

²⁹⁾ See Guideline Radiation Protection, No. 5.5.1

³⁰⁾ See Guideline Radiation Protection, No. 5.6.2

³¹⁾ See Guideline Radiation Protection, No. 5.7.2

	information)		radioactive water, including Statement of the corresponding activity concentration
6.	Installation of the respective components	6.12.7	Description of the processes and systems provided for the transfer of radioactive materials occurring with the waste water in a condition suitable for transport or storage, including Statement of capacity data ³⁹⁾
6.1	Description of the internal administrative control system by means of which the identification of the systems, components and subunits in accordance with the code systems used is ensured ³²⁾	6.12.8	Description of the amount, collection, delay, filtering and release of radioactive materials with the exhaust air
6.2	Update of the activity flow diagram submitted under No. 1.3.2	6.13	Description of the communication systems in the various equipment compartments with layout drawings ⁴⁰⁾⁴¹⁾
6.3	Updating of the compartment group classification according to No. 1.3.3	6.14	Layout plan of the boundaries of the exclusion areas and other restricted access areas, with statement of the locations at which <ul style="list-style-type: none"> a) in-service inspection and servicing work b) repair work, if applicable, is to be performed, considering <ul style="list-style-type: none"> - the local dose rates - duration and frequency of the work, and - the number of persons so be commissioned with performance of the work for which detailed planning of protective measures is required before its performance in order to keep the collective dose so low that the requirements under No. 4.1 of the Guideline Radiation Protection are met⁴²⁾,
6.4	Description of the measures taken to keep the activity in the reactor coolant system low and for monitoring this activity ³³⁾	6.15	Layout drawings of floors and working platforms inside restricted access areas (exclusion areas shall be included as part of restricted access areas), showing the spaces provided for mobile shielding, and information on the maximum permissible additional planar loads and linear loads at these points ⁴³⁾ , unless presented under No. 2.12
6.5	Description of the reactor coolant system, and of the coolant purification system, as well as of the measures taken to reduce deposition of radioactive sludges, including layout drawings and statement of performance data for the coolant purification system ³⁴⁾	6.16	List of components for which <ul style="list-style-type: none"> a) in-service inspection and servicing work is to be performed b) repair work is to be performed at points for which detailed planning of the protective measures is required before its performance in order to keep the collective dose so low that the requirements under No. 4.1 of the Guideline Radiation Protection are met, taking into consideration <ul style="list-style-type: none"> - the local dose rate - duration and frequency of the work - the number of persons to be commissioned with performance of the work⁴⁴⁾
6.6	Description of the air supply and exhaust system (ventilation systems) for exclusion and other restricted areas, including layout drawings ³⁵⁾³⁶⁾	6.17	List of the type, extent and frequency of the in-service inspection and servicing work on the components mentioned under No. 6.16a ⁴⁵⁾
6.7	Updating of the information on compartment classification in No. 2.5	6.18	Estimation ⁴⁶⁾ of the annual collective doses to be expected from the in-service inspection and servicing work listed under No. 6.17 and in Annex Ia of the Guideline Radiation Protection, using the form according to Annex Ib of the Guideline Radiation Protection ⁴⁷⁾
6.8	Description of the hot workshop equipment, including information on the dimensions of the setdown areas provided, and of permanent and mobile shielding, as well as on the envisaged work procedures, unless presented under No. 2.8	6.19	Estimation of the collective doses to be expected from the repair work listed in Annex 2a of the Guideline Radiation Protection, using the form
6.9	Description of the entrances and exits of the permanent exclusion areas and other restricted access areas, including statement of the monitoring equipment at the restricted access area entrances and exits, unless presented under Nos. 1.7.2 and 2.9		
6.10	Information on the suitability of the floor and wall linings provided, as well as on their good decontaminability, unless presented under No. 2.10		
6.11	Information on installation location and accessibility of major components or components with high degree of radiation and, if applicable, on the use of erection aids with regard to personnel radiation exposure		
6.12	Handling and storage of radioactive materials		
6.12.1	Description of the in-plant transport of nuclear fuels and other radioactive materials, including information on location and type of the decontamination measures taken for the shipping casks		
6.12.2	Description of the in-plant transport routes and transport equipment for other radioactive materials, as well as for radioactive subunits and components, including information on the storage locations provided		
6.12.3	Layout plan of locations inside the restricted access areas to be protected, at which dismantled radioactive parts can be stored temporarily with all the protective measures required until they are reinstalled ³⁷⁾		
6.12.4	Description of the equipment for decontamination		
6.12.5	Description of the systems for collection and treatment of radioactive liquid waste, with layout drawings and information on capacity data for collecting tanks and performance data for the individual treatment stages (e. g. throughput, decontamination factor) ³⁸⁾		
6.12.6	Description of the amount and the release and/or recirculation of radioactive and possibly		

³²⁾ See Guideline Radiation Protection, No. 5.2.2

³³⁾ See Guideline Radiation Protection, No. 5.4.1

³⁴⁾ See Guideline Radiation Protection, No. 5.4.2

³⁵⁾ See Compilation L. Ventilation Systems, No. 6.2

³⁶⁾ See Guideline Radiation Protection, No. 5.3.3

³⁷⁾ See Guideline Radiation Protection, No. 5.5.1

³⁸⁾ See Guideline Radiation Protection, No. 5.3.4

³⁹⁾ See Guideline Radiation Protection, No. 5.3.5

⁴⁰⁾ See Compilation Q. Alarm Systems, Staff Paging Systems, and Telecommunication Facilities (Communication Systems), Nos. 6.1 and 6.9

⁴¹⁾ See Guideline Radiation Protection, No. 5.3.6

⁴²⁾ See Guideline Radiation Protection, No. 5.6.1

⁴³⁾ See Guideline Radiation Protection, No. 5.6.2

⁴⁴⁾ See Guideline Radiation Protection, No. 5.8.1

⁴⁵⁾ See Guideline Radiation Protection, No. 5.8.2

⁴⁶⁾ These estimations shall be updated according to progress in the planning of the plant

⁴⁷⁾ See Guideline Radiation Protection, No. 5.8.3

	according to Annex 2b of the Guideline Radiation Protection ⁴⁸⁾		measuring equipment, as far as required for radiological protection monitoring for fuel assembly storage
6.20	Description of the stationary systems for monitoring the <ul style="list-style-type: none"> - local dose rate in the various plant compartments⁴⁹⁾ - activity concentration of radioactive materials in liquids⁵⁰⁾ - activity concentration of radioactive materials in the compartment air⁵¹⁾ - activity concentration of radioactive materials in gas or steam - radioactive materials released with the waste water - radioactive materials released with the exhaust air including layout drawings and tables, stating e.g. <ul style="list-style-type: none"> - the radioactive materials to be monitored - the sampling and measuring procedures - the sampling and/or measuring points - the indication location (in control room or local) - the design and operating conditions, in particular the requirements for measuring and sampling equipment which must remain operable during and following incidents and accidents 	10.	Initial core loading
		10.1	Description of the measurement program for determination of the activity concentrations and local dose rates inside the plant, including statement of e. g. <ul style="list-style-type: none"> - measuring points - measuring procedures - measured data indication - planned documentation of the measured results
		10.2	Description of the measurement program for determination of the meteorological data, including statement of e. g. <ul style="list-style-type: none"> - measuring points - measuring procedures - measured data indication and recording - planned documentation of the measured results
		10.3	Description of the measurement program for determination of the activity concentrations and local dose rates in the environment ⁵²⁾ , including statement of e. g. <ul style="list-style-type: none"> - measuring points - measuring procedures - measured data indication - planned documentation of the measured results
6.21	Description of the equipment required for the systems mentioned under No. 6.20	10.4	Documentation of the results of the measurements for determination of the activity concentration and local dose rates in the environment prior to the nuclear commissioning of the plant (baseline measurement) ⁵³⁾
6.21.1	Description of the instrumentation, including characteristic data sheets	10.5	Documentation of the installation of the equipment and components of the radiological protection instrumentation (see No. 6.23)
6.21.2	Documentation on the measuring and sampling equipment (e. g. single-line diagrams, data sheets, mechanical and electrical properties)	10.6	Documentation of the results of the acceptance inspections and functional tests according to No. 6.25
6.21.3	Statement of the measuring ranges and permissible measurement errors	10.7	Description of the planned documentation of the results of <ul style="list-style-type: none"> - local dose rate measurements - scheduled contamination monitoring - system monitoring - compartment air monitoring - monitoring of the liquid radioactive materials released, as well as of the radioactive materials released with the exhaust air
6.21.4	Verification of suitability	10.8	Description of the planned documentation of the results of the personnel monitoring (internal and external irradiation)
6.21.5	Connection diagrams for the electrical power supply as well as for the measured data and signal transmission	10.9	Description of the laboratory analysis procedures with regard to the radioactive materials to be balanced
6.22	Description of the signaling and monitoring concept for the Systems mentioned under No. 6.20	10.10	Description of the radiation protection clothing as well as of the mobile radiation protection equipment for in-plant radiological protection, including verification of the results of the acceptance inspections and functional tests performed on the mobile radiation protection measuring equipment, unless presented under No. 9.1
6.23	Information on the installation location provided for the radiation and activity monitoring system equipment and components	10.11	Description of the design basis incidents, including verification of compliance with the requirements of § 28, subpara. 3 of the Radiological Protection Ordinance, unless presented under No. 1.14 or if the parameters for the calculation presented under No. 1.14 have changed substantially
6.24	Requirements for the testing and acceptance of the stationary radiation and activity monitoring systems	10.12	Submission of the parts of the operating manual concerning the radiation and activity monitoring systems, including safety specifications
6.25	Program for the acceptance and initial functional testing of the stationary radiation and activity monitoring systems	10.13	List of the radiological protection officers
6.26	Description of the scheduled maintenance measures for the radiation and activity monitoring systems, including information on <ul style="list-style-type: none"> - servicing and repair work, especially with regard to accessibility - tests and examinations (e.g. test and examination plans, calibrations, in-service inspections) 		
7.	Pressure test of the respective systems (no information)		
8.	Commissioning of the respective systems (no information)		
9.	Delivery of the fuel assemblies		
9.1	Description of the radiation protection clothing as well as of the mobile radiation protection equipment for the in-plant radiological protection, including verification of the results of the acceptance inspections and functional tests performed on mobile radiation protection		

⁴⁸⁾ See Guideline Radiation Protection, No. 5.8.4

⁴⁹⁾ See Guideline Radiation Protection, No. 5.3.7a

⁵⁰⁾ See Guideline Radiation Protection, No. 5.3.7c

⁵¹⁾ See Guideline Radiation Protection, No. 5.3.7b

⁵²⁾ This description shall be presented in time prior to the nuclear commissioning

⁵³⁾ See Compilation A. Site, No. 11.2

	appointed in writing by the personnel responsible for radiation protection, for the management and supervision of the activity for which the license is applied for, in accordance with § 29, subpara. 2 of the Radiological Protection Ordinance, with statement of the in-plant sphere of competence of each radiological protection officer, from which it can also be seen who is authorized to manage or supervise activities which are necessary as precautionary measures for the protection of personnel against radiation during the maintenance work performed after commissioning of the plant ⁵⁴⁾	11.1	Documentation of the results of the acceptance inspections and functional tests according to No. 6.25, unless presented under No. 10.6
		11.2	Documentation of the results of the measurements for determining the meteorological data in the plant environment (see No. 10.2)
		11.3	Updating and completion of the statements under No. 6.18
		11.4	List of the equipment available for mobile shielding, including statement of the storage location ⁵⁶⁾
10.14	Presentation of the radiological protection directive in accordance with § 24 of the Radiological Protection Ordinance for plant and transient personnel employed at the plant, which, among other things, shall show ⁵⁵⁾	11.5	List of the remotely operated tools, remote observation equipment and special tools available for maintenance work to be specified, including statement of the storage location ⁵⁷⁾
	– organization of the radiological protection including statement of the in-plant spheres of competence and responsibilities which fall under the management and supervision of radiological protection officers	11.6	List of the models available for the planning of maintenance work, including statement of the storage location ⁵⁸⁾
	– directives to be followed by plant personnel and transient personnel, in order to be able to plan radiological protection appropriately before commencement of work involving exposure to radiation and to ensure this protection during performance of the work	11.7	List of the components and elements of systems for which, in addition to design drawings, photographs or video recordings (e.g. of installation) are available for the planning of maintenance work, including statement of the storage location ⁵⁹⁾
	– directives for the recording and evaluation of data and procedures essential to radiological protection (instruction, health physics checks and medical supervision of personnel; issue, registration, keeping and checking of radiation passports, airborne and surface contamination at work places, decontamination of personnel, workplaces and traffic areas; release of radioactive materials with air and water; environmental monitoring; amounts of solid and liquid radioactive waste; functional testing and servicing of radiation measuring equipment and other equipment and devices important for radiological protection; examination of sealed radioactive materials; extraction, generation, acquisition, delivery and other whereabouts of radioactive materials; operations important for radiological protection, such as commencement, type, scope, and duration of work involving radiation exposure, and the level of the whole body doses accumulated by the persons participating in this work)	11.8	Layout drawings for the entering of local dose rates for points in exclusion areas and other restricted access areas where the radiation protection of the personnel commissioned with the performance of work requires detailed planning ⁶⁰⁾
	– directives for reporting to the in-plant supervision and for notifying the competent supervisory authority (events relevant to safety, exceeding of Limits for local dose rates, whole body doses or activities of incorporated radioactive materials; exceptional radiation exposures; leakage of sealed radioactive materials; extraction, generation, acquisition, delivery, and other whereabouts of radioactive materials; stocks of radioactive materials; loss of radioactive materials)	11.9	Layout drawings for the entering of surface contamination in exclusion areas and other restricted access areas ⁶¹⁾
10.15	Statement of the radioactive exposure calculated on the basis of the Limits applied for the release of radioactive materials with the waste water, including statement of input parameters, as far as different from those obtained under No. 1.11.1	11.10	After completion of nuclear commissioning: Statement of the results of the shielding inspection and comparison with the assumptions
10.16	Statement of the radiation exposure calculated on the basis of the Limits applied for the release of radioactive materials with the exhaust air, including statement of the input data, as far as different from those obtained under No. 1.1.2	12.	Refuelling (no information)
11.	Nuclear commissioning of the plant		

⁵⁴⁾ See Guideline Radiation Protection, No. 5.1

⁵⁵⁾ See Guideline Radiation Protection, No. 5.9.1

⁵⁶⁾ See Guideline Radiation Protection, No. 5.9.3

⁵⁷⁾ See Guideline Radiation Protection, No. 5.9.3

⁵⁸⁾ See Guideline Radiation Protection, No. 5.9.4

⁵⁹⁾ See Guideline Radiation Protection, No. 5.9.5

⁶⁰⁾ See Guideline Radiation Protection, No. 5.9.6

⁶¹⁾ See Guideline Radiation Protection, No. 5.9.7