HOME

EUROPEAN UTILITY REQUIREMENTS
FOR LWR NUCLEAR POWER PLANTS

VOLUME 1

MAIN POLICIES AND OBJECTIVES

APPENDIX B - DEFINITIONS

Revision E

December, 2016

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APPENDIX B - DEFINITIONS

Revision E December, 2016

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A

Abnormal Occurrence Procedures (AOP)

A set of plant specific procedures describing in detail the management chains of operator actions and preventive measures to be taken by operators during postulated Anticipated Operational Occurrences* (AOO).

Accident Conditions

Deviations from Normal Operation* which are less frequent and more severe than Anticipated Operational Occurrences*, and which include Design Basis Accidents* and Design Extension Conditions*.

Accident Management Procedures

See Emergency Operating Procedures* and Severe Accident Management Guidelines* (based on WENRA approach).

Active Equipment

A piece of equipment whose functioning depends on external input other than the process fluid, such as actuation, mechanical movement, or supply of AC power.

Alternate Power Source

Power supply intended for supplying the necessary power in Design Extension Conditions*.

Anticipated Operational Occurrences (AOO)

An operational process deviating from Normal Operation* which is expected to occur at least once during the operating lifetime of a facility but which, in view of appropriate design provisions, does not cause any significant damage to Items Important to Safety* or lead to Accident Conditions*.

See Design Basis Conditions 2* (DBC2).

Anticipated Transients Without Scram (ATWS)

Accident sequences when the fast shutdown system (also called scram system) fails to function during an Anticipated Operational Occurrence*. ATWS sequences are categorised as Complex Sequences*.

Architect Engineer

Organisation in charge of the construction. Depending on the implementation model, replaced in this document either by Plant Designer* or by Plant Constructor* according to the context.

Auxiliary Normal Transformer (ANT)

Transformer from Extra High Voltage (EHV) or generator voltage to auxiliary medium voltage.

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Auxiliary Standby Transformer (AST)

Backup transformer from Extra High Voltage (EHV) or High Voltage (HV) to auxiliary voltage; an auxiliary transformer supplies the auxiliary circuits of the plant.

Availability Factor

Ratio of the time the Unit* or equipment is capable of operation to the total time in a given time period, usually a year.

The Availability Factor* is also used by the EPRI-URD. It is better adapted to new design specifications than the Unit Capability Factor* defined by UNIPEDE. The UNIPEDE definition, currently implemented by WANO, is more appropriate to the operation phase to represent Unit* performances.

If the plant is capable of rated power production when in operation, then the Availability Factor* is roughly equal to the "Unit Capability Factor*".

Depending on the definition Outage Duration*, three kinds of Availability Factor* can be defined:

- Theoretical Availability Factor*;
- Design Availability Factor*; or
- Realistic Availability Factor*.

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B

Balance of Plant (BOP)

The Balance Of Plant* includes all items not included in the Nuclear Island* or in the Power Generation Plant*.

Barrier

1. Physical Barrier* isolating the radioactive products from the environment and/or providing shielding against ionising radiation.
2. See also "Fire Barrier*".
3. See also "Principal Barrier*".

Best Estimate Analysis

Best estimate analysis can be used for the deterministic safety analysis, to avoid unduly conservatism. In Best estimate analysis, best estimate consideration could concern part or all of:

- The computer codes used for the analysis;
- The assumptions on systems availability and;
- The initial and boundary conditions.

The term “best estimate consideration” designates here:

- The inputs obtained by using the most realistic knowledge and data available to the analyst (i.e., not biased by conservatism or optimism);
- The most likely values derived from experience or experimental data, including uncertainties where available; and
- The most realistic hypothesis concerning, for the analyzed configuration, the plant parameters, for initial and boundary condition, and for systems availability.

An adequate “level of confidence” associated to the best estimate analysis result has to be defined with regards to the object of the analysis or the importance of the consequences.
To ensure this confidence, uncertainty analysis and/or sensitivity analysis should be performed:

- Uncertainty analysis means evaluation of the result range, when taking into account the uncertainty of the computer code parameters and of the input or boundary conditions;
- Sensitivity analysis means evaluation of the effect of variation in input or modeling parameters on code results, especially when the uncertainties of these parameters are not known, according to the state of knowledge and/or to the extent of availability of experience or experimental data.

A “best estimate analysis” is considered “realistic best estimate analysis” when all hypothesis of the analysis are considered on a best estimate basis (Best estimate computer codes with best estimate assumptions on systems availability and best estimate input data and boundary conditions).

Break Preclusion (BP)

Break Preclusion* is a concept, implemented during the design phase, to deterministically rule out the Double-Ended Guillotine Failure (DEGF) of any important pipe (e.g. LBLOCA in main coolant line) from the list of the design events considered for structures and components.

The way to implement this concept is based on:

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- Quality in design (material selection, manufacturing, low stresses, good inspectability);
- Integrity demonstration (limited crack growth of path-through flaw, safety margins to fracture);
- Surveillance and monitoring of design bases;
- In -Service Inspection; and
- Adequate leak detection (with margin).

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C

Clearance Levels

A set of values, established by the regulatory body in a country or state, expressed in terms of activity concentrations and/or total activities, at, or below, which sources of radiation can be released from nuclear regulatory control.

Cliff Edge Effect

In a nuclear power plant, an instance of severely abnormal plant behaviour caused by an abrupt transition from one plant status to another following a small deviation in a plant parameter, and thus a sudden large variation in plant conditions in response to a small variation in an input.

Codes and Standards

Groups of norms, criteria and recommendations, together with the approved document resulting from its correct formulation and application to a specific activity, issued by a Safety Authority* or a recognised entity with solid technical reputation.

Cold Shutdown Modes

This family of Operational Modes* is defined by control of subcriticality (Keff < 0,99) and by core coolant temperature ranging from about 90°C to a temperature suitable for personnel intervention during refuelling operation. This family includes maintenance and refuelling shutdown modes.

Common-Cause Failure (CCF)

The failure of a number of Structures, Systems and Components* (SSCs) as a result of a single specific event or cause, including human errors, internal and external impact. (This encompasses common mode failure of identical devices.)

Complex Sequences (COM)

Certain unlikely event sequences which go beyond those in Design Basis Conditions* in terms of failure of equipment or operator errors, and which have the potential to lead to significant releases but do not involve core melt.

Complex Sequences* are a subset of the Design Extension Conditions*.

Component Code

Component Code* is an identification marking for the structural, mechanical, electrical and automation component, which is used in an equipment location. Equipment location is identified with Equipment Location Code*.

The quality measures and purchasing actions are connected to the Component Code*.

Condensate Clean-up System

A system designed for purification of the condensate in the PGP. The system may also be called Condensate Polishing System*.

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Configuration Management

According to ISO 10007, Configuration Management* is a management discipline that applies technical and administrative direction to the development, production and support life cycle of a configuration item.

The general objectives of the Configuration Management* are: documentation of the plant design basis, continued maintenance and updating of the plant design basis and verification that plant modifications are consistent with the existing plant.

From US NUREG/CR-5147, Configuration Management* of NPPs can be considered as a programme which facilitates the design, construction, test, modification and operation of the plant to achieve:

- Verification of the plant design basis;
- Documentation of the baseline design basis of the plant;
- Continued maintenance and updating of the plant design basis with respect to plant modifications or changes in requirements or criteria; and
- Verification that the plant modifications and changes in requirements or criteria are consistent with the established criteria for the overall plant.

Constructor

The company that is responsible for the construction of the plant.

Containment Bypass Accident

These are the accidents which involve bypass of Primary Containment* and in some cases also the Secondary Containment*.

Containment Related Systems

Containment Related Systems* are all systems specifically designed to support containment functions and operation and part of the overall Containment System*.

Containment System

The Containment System* is the assembly of Structures, Systems and Components* (SSCs) mainly designed to prevent uncontrolled releases of radioactive products, from the Reactor Coolant System* to the environment.

It includes the Primary Containment* and the Secondary Containment*, and any other piece of equipment, which is part of the Primary or Secondary Containment* boundary, such as: piping between the containment isolation valves; containment isolation valves; other penetration and isolation devices (e.g. pipe and electrical penetrations, passages, locks and doors through Primary and Secondary Containment*).

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Containment System Bypass

See "Secondary Containment Bypass*".

Contractor

All the companies which have contracts with the Owner*, Prime Contractor*or Subcontractor*.

Controlled State

Plant state, following an Anticipated Operational Occurrence* or Accident Conditions*, in which the Fundamental Safety Functions* can be ensured and which can be maintained for a time sufficient to implement provisions to reach a Safe State*.

Conventional Island (CI)

See "Power Generation Plant*" (PGP).

Core Damage

For probabilistic assessment, Core Damage* is presumed to start when the prescribed criteria for the fuel in the reactor core (DBC4) or spent fuel pool are exceeded.

Corrective Action

Action taken to eliminate the cause of an existing Non-conformity* or Defect*, in order to prevent recurrence, as defined in ISO 8402.

Corrective Maintenance

Repair and replacement activities occurring after failure.

Criterion for Limited Impact (CLI)

Criterion for Limited Impact* is an acceptance criterion, given by a comparison of a linear combination of families of isotope releases, versus a maximum value. Each criterion is associated with a specific kind of limited consequence to the public.

Critical Maintenance Activities

Maintenance activities related to essential components or to the critical path of scheduled plant shutdowns.

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D

Decommissioning

The term 'Decommissioning*' refers to the administrative and technical actions taken to allow the removal of some or all of the regulatory requirements from a facility. A facility means a building and its associated land and equipment in which radioactive material is produced, processed, used, handled or stored on such a scale that consideration of safety is required.

Decommissioning* may not include Dismantling* (e.g. when existing structures of the decommissioned facility are put to another use). On the opposite, Dismantling* may be performed without Decommissioning* (e.g. when PGP is dismantled before beginning of Decommissioning* process).

Defect

Non fulfilment of an intended usage requirement, or reasonable expectation, as defined in ISO 8402.

Defence-in-Depth (DiD)

A hierarchical deployment of different levels of diverse equipment and procedures to prevent the escalation of Anticipated Operational Occurrences* and to maintain the effectiveness of physical Barriers* placed between a radiation source or radioactive material and workers, members of the public or the environment, in Operational States* and, for some Barriers*, in Accident Conditions*. DiD is implemented through design and operation to provide a graded protection.

Delayed Actions

Actions involving public temporary relocation, based on projected doses up to 30 days caused by groundshine and aerosol resuspension, which may be implemented after the practical end of the releases phase of an accident.

Design Availability Factor

Availability Factor* including a provision for special works (major repairs or replacements of large components) which are unplanned, but will inevitably be performed over the lifetime of the plant. It takes into account the Target Outage Duration*.

Design Basis Accidents (DBA)

An accident causing Accident Conditions* for which a facility is designed in accordance with established design criteria and conservative methodology, and for which releases of radioactive material are kept within acceptable limits (DBC 3/4).

Design Basis Conditions (DBC)

Conditions for which the plant is designed according to established design criteria and conservative methodology. These conditions are categorized in DBC 1, DBC 2, DBC 3 and DBC 4 primarily according to their estimated frequency of occurrence.

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Design Basis Conditions 1 (DBC1)

See Normal Operation* conditions.

Design Basis Conditions 2 (DBC2)

Conditions which may occur once or more in the life of the plant ($f>10^{-2}$).

See Anticipated Operational Occurrences* conditions.

Design Basis Conditions 3 (DBC3)

Accident Conditions*, caused by Design Basis Accidents*, which may occur very infrequently ($10^{-2}>f>10^{-4}$).

Design Basis Conditions 4 (DBC4)

Accident Conditions*, caused by Design Basis Accidents*, which are not expected to take place ($10^{-4} > f > 10^{-6}$).

Design Basis Earthquake (DBE)

A suite of vibratory ground motions which have been chosen on the basis of the likely seismicity and geology at and around probable nuclear power plant Sites* in Europe.

Design Basis External Hazard (DBEH)

Design Basis External Hazards* are those for which the plant is designed in accordance with established design criteria and conservative methodology and for which releases of radioactive material meet the objectives defined for accidents without core melt.

Design Extension Conditions (DEC)

Postulated Accident Conditions* that are not considered for Design Basis Accidents*, derived on the basis of engineering judgement, operational experience feedback and deterministic and probabilistic assessments, for the purpose of further improving the safety of the nuclear power plant. In this way, the plant's capabilities are enhanced to withstand accidents that are either more severe than Design Basis Accidents* or that involve additional failures by keeping radiological consequences at acceptable level.

Design Extension Conditions* are considered in the design process of the facility in accordance with best estimate methodology.

Design Extension Conditions* include Complex Sequences* and Severe Accidents*.

Design Lifetime

Design Lifetime* is the period during which a system, structure or component is expected to function within acceptance criteria**.**

Design Manual

A collection of procedures prepared for the design development and implementation plan for each technical discipline (e.g. civil construction, mechanical, electrical and I&C) and for all stages of the project.

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Design Organisation

See "Designer*".

Designer

A company that is responsible for all or part of the design. It is recognised that in practice more than one organisation may participate in the design process. These may include, for example, the Plant Owner* itself, an Architect Engineer*, NSSS supplier* or Subcontractor*, and are referred to as "Design Organisation*" or "Designer*".

Deviation

Objective fact which is different from that specified.

Discrepancy

See "Non-conformity*".

Dismantling

Dismantling* is a disassembly and removal of any struscture, system and component.

Diversity

The presence of two or more redundant systems or components to perform an identified function, where the different systems or components have different attributes so as to reduce the possibility of Common Cause Failure*, including common mode failure.

Division

A Division* is a set of Functional Trains*, performing diverse Safety Functions*, separated both mechanically and electrically from another Division*. The separation between Divisions* is provided geographically or by physical Barrier*. Division* generally refers to an area of the plant.

Drywell / Wetwell

For Primary Containments* of the pressure suppression type, usual in BWRs, the building areas connected with the pressure suppression water pool is called the Wetwell*; and the building area, which includes the Reactor Vessel*, is called the Drywell*. In a LOCA, the Drywell* constitutes a pressure chamber and the Wetwell* a pressure suppression or condensation chamber. Wetwell* and Drywell* constitute jointly the Primary Containment* building, which may be part or all of the reactor building.

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E

Early Release

Release for which off-site protective measures are necessary but are unlikely to be fully effective in due time.

Emergency Arrangements

The integrated set of infrastructural elements made in advance that are necessary to provide the capability for performing a specified function or task required in response to a nuclear or radiological emergency. These elements may include authorities and responsibilities, organization, coordination, personnel, plans, procedures, facilities, equipment or training.

Emergency Control Room (ECR)

The Emergency Control Room* (ECR) is a room, where the Remote Shutdown Panel* is situated. ECR is a separate area from the Main Control Room*.

Emergency Operating Procedures (EOP)

A set of plant specific procedures describing in detail the management chains of operator actions and preventive measures to be taken by operators during postulated Design Basis Accidents* and Complex Sequences situations. Usually EOPs include a combination of event-based and symptom-based procedures.

The Severe Accident* Management is normally presented in a separate set of instructions (see Severe Accident Management Guidelines*).

Emergency Power Supply

Power supply system for supplying the necessary power in Anticipated Operational Occurrences* and Design Basis Accidents* conditions, in the event of the loss of off-site power.

Emergency Preparedness Centre

A central command and control facility responsible for carrying out the principles of emergency preparedness and emergency management, or disaster management functions at a strategic level in an emergency situation. This is a separate on-site/near-site control place, where plant information for the emergency organisation is provided during Incidents*, Accidents* and other emergency situations. The Emergency Preparedness Centre* shall have premises, equipment, and devices for the management, situation assessment, alerting, communications, data transfer and recording, planning and repair.

Emergency Procedure Guidelines (EPG)

Set of generic guidelines which aid an operator in successfully responding to and mitigating the effects of an abnormal occurrence or accident.
They describe the operating actions to be implemented in the procedures for successfully responding to and mitigating the effects of all potential situations, with at least:

- Abnormal Occurrence Procedure* (AOP) guidelines for Anticipated Operational Occurrences* (AOO) situations;

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- Emergency Operating Procedures* (EOP) guidelines for Design Basis Accidents* (DBA) and Complex Sequences*;
- Severe Accident Management Guidelines* (SAMG) for Severe Accidents* situations.

Emergency Protection Actions

Actions involving public evacuation, based on projected doses up to 7 days, which may be implemented during the emergency phase of an accident, e.g. during the period in which significant releases may occur. This period is generally shorter than 7 days.

Emergency Response Facilities

Emergency Response Facilities* are separate facilities from the Main Control Room* and the Emergency Control Room*. They include the Technical Support Centre*, the operational support centre and the Emergency Preparedness Centre*.

Engineering/Testing Simulator

The Engineering/Testing Simulator* is a tool for realistic functional analyses as well as for verification and validation, and also testing of the NPP:

- Control and automation concept;
- I&C system; and
- Capability and performance in Normal Operation*, in Anticipated Operational Occurrences* and in Accident Conditions*.

Equipment Location Code

Equipment Location Code* is the marking method of physical location in system design, layout, figures and drawings for equipment, which shall fulfil the designed safety and operation functions.

In one Equipment Location Code* there are usually several components (e.g. mechanical part, regulating unit, actuator and supporting structures of a valve). Equipment Qualification* and purchasing requirements of a component are normally based on requirements of the most demanding Equipment Location Code*, where similar components are situated.

Equipment Qualification

Demonstration by means of analyses, type tests or operating experience that the equipment is able to function within its required accuracy and performance requirements in its defined and required operational and environmental conditions (based on IAEA Glossary - 2007 Edition).

Escape Routes

Escape routes include:

- Escape route is any part of the construction which provides a path for evacuation of the occupants (door, exit, way out, horizontal pathway, circulation zone, staircase, corridor, ramp, etc.);
- Protected escape route are areas protected from the effects of fire. They are basically protected corridors and protected staircases, but also the outside of the building.

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Essential Components

Essential Component* is that whose failure would impair safety, reliability or protection of the investment. Essential Equipment* includes all Safety Classified Structures, Systems and Components* (SSCs), as defined in Chapter 2.1, as well as all equipment important for plant availability.

Essential Equipment

See Essential Component*

Evacuation Action

Emergency protection action involving public evacuation. Triggering limit for the action is based on estimated effective radiation dose from integration time of 7 days.

Evolutionary Plant

An Evolutionary Plant* is a nuclear power plant that achieves improvements over existing designs through small to moderate modifications, with a strong emphasis on feedback of experience and on maintaining design proven to minimise technological risks.

External Hazard

External Hazards* are those Hazards* arising from outside the power plant Site*, and for which the plant Designer* or Owner* has a very limited or no control over its occurrence. External Hazards* can be categorised as natural External Hazards* and human induced External Hazards*.

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F

Fail-safe

The behaviour of a component or system, which following a failure leads directly to a safe condition, with respect to that failure.

Feed Water Heating Plant

The Feed Water Heating Plant* consists of a set of heaters, pumps, tanks and pipes supplying the feed water at a correct level of pressure, flow and temperature.

Fire Area

A building or part of a building that comprises one or more rooms or spaces, constructed to prevent the spreading of fire to or from the remainder of the building for a given period of time.

Fire Barrier

Walls, floor, ceiling or devices for closing passages such as doors, hatches, penetrations and ventilation systems, etc. used to limit the consequences of a fire. A Fire Barrier* is characterised by a fire resistance rating, which will take account of the use of any fire resistant insulation material.

Fire Zone

A subdivision of a Fire Area* in which fire separation between some items is provided by fire protection features (such as limitation of combustible materials, spatial separation, fixed fire extinguishing systems, fireproof coatings or other features) so that consequential damage to the other separated systems is not expected.

Forced Outages

Forced Outages* consist of loss (partial or total) of overall plant availability due to equipment damage or Operator* fault. They occur at random.

Forced Unavailability Factor

Forced Unavailability Factor* is defined as the ratio of the time the Unit* is unable to produce power due to equipment or system failure to the total time in a given time period, usually a year.

For the same reason as for the availability objective, the unavailability in time (i.e. Forced Unavailability Factor*) is preferred to "Unplanned Capability Loss Factor*" defined by UNIPEDE/WANO as the ratio of unplanned (i.e. less than 4 weeks' notice) unavailable energy over a period of time, to the maximum amount of energy which could be produced over the same period.

Fuel Assembly

A set of fuel elements and associated components which are loaded into and subsequently removed from a reactor core as a single unit.

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Fuel Damage

Damage to some fuel rods such that they cannot be used for further power operation.

Full Scope Training Simulator

The Full scope training simulator* is an identical copy of the Main Control Room* of nuclear power plant, in which the reactor's, turbine's and other systems' behaviors are modeled continuously by computer based calculations. The training simulator is requested by the authority and is necessary for validation of operator actions and training the operating staff of nuclear power plant for normal operation and accident situations. The Full-Scope Training Simulator* includes the Human-Machine Interface (HMI), the control system and simulation of the plant processes.

Functional Isolation

Provisions taken between two connected systems (or parts of a system), so that mal-operation of one of the systems does not propagate to the other system.

Functional Train

A Functional Train* is defined as a subset of a system. It is a set of components providing totally or partially one or several function(s) of a system.

A train is redundant to one or more similar Functional Train* (s), each with the same capability to provide the specified function(s).

Fundamental Safety Functions

1. control of reactivity;
2. removal of heat from the reactor and from the fuel store; and
3. confinement of radioactive material, shielding against radiation and control of planned radioactive releases, as well as limitation of accidental radioactive releases.

G

Generator Breaker

Equipment allowing the coupling of the generator to the grid through the Generator Transformer* and the switch-off of any fault current including short-circuit.

Generator Transformer (GT)

Transformer from generator voltage to Extra High Voltage (EHV).

Grace Period

The period of time during which a safety function is ensured in an event with no necessity for action by personnel.

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H

Hazard

All foreseeable Internal Hazards* and External Hazards*, including the potential for human induced events directly or indirectly to affect the safety of the nuclear power plant.

Hazard Requirements Level

Structures, Systems and Components* (SSCs) are subject to Hazard Requirements Level* 1, 2, S or N, according to their own functional and structural requirements in environmental conditions associated with the different design conditions and during and after different Hazard* levels, and according to the impact of their failure on other Structures, Systems and Components* (SSCs).

Heat Sink

The Heat Sink* consists of the natural means used to dissipate the waste heat produced by the power generation and the ancillaries.

High Energy Lines

High energy lines* are pipes carrying water or steam with normal operating conditions equal to, or greater than, 20 bar or 100°C.

High Level Waste

(a) the radioactive liquid containing most of the fission products and actinides originally present in spent fuel and forming the residue from the first solvent extraction cycle in reprocessing and some of the associated waste streams;

(b) solidified high level waste from (a) and spent fuel (if it is declared a waste); and

(c) any other waste with an activity level comparable to (a) or (b).

High Level Waste* is in practice considered long-lived (the term long lived radionuclides refers to half-lives usually greater than 30 years). One of the characteristics which distinguishes HLW from less active waste is its level of thermal power.

Hot Shutdown Modes

This family of Operational Mode* is defined by control of sub-criticality (Keff < 0,99) and by core coolant temperature ranging from the Hot Zero Power* corresponding temperature, to about 90°C. The Hot Zero Power* is not included.

Hot Standby* (BWR)

Hot critical reactor at nominal pressure and temperature with a reactor power of a maximum of 5-8% depending on design.

Hot Zero Power

In this Operational Mode*, the core is critical, the pressure and the temperature of the core coolant are nominal. No significant power is being generated.

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I

Incidents

See "Design Basis Conditions 2*".

Incidents Conditions

See "Design Basis Conditions 2*".

In-Containment Source Term

The release into the containment from the Reactor Coolant System* and, in the case of Severe Accident*, from the melted core, outside the reactor vessel.

Independence

Independent Structures, Systems and Components* (SSCs) possess both of the following characteristics:

- The ability to perform their required functions is unaffected by the operation or failure of other SSCs;
- The ability to perform their functions is unaffected by the occurrence of the effects resulting from the Postulated Initiating Event* for which they are required to function.

Inherent Safety Characteristics

Characteristics which rely on natural phenomena (like natural circulation, free fall, etc.), sizing or material choice. A process governed by inherent safety characteristics on its own goes in the direction to a condition resulting in less damage and less radiological consequence than it would be in the initial state of the process. Examples: free fall of control rods, negative reactivity coefficients in certain predefined conditions.

Inner Area

An area with additional protection measures inside a Protected Area*, where Category I nuclear material (as defined in Section 4 of IAEA Nuclear Security Series No. 13) is used and/or stored.

In-Service-Inspection Outage

In-Service-Inspection Outage* is the outage required by the regulatory authorities to be performed on a regular basis to inspect a large number of components (e.g. decennial outage).

Inspection

Actions which by means of examination, observation or measurement determine the conformance of material, components, equipment, systems, structures, with defined requirements.

Intermediate Level Waste

See "Low and Intermediate Level Waste*".

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Internal Hazard

Internal Hazards* are those Hazards* arising inside the power plant Site*, and its occurrence, to some degree of extent can be controlled in the design by the Designer* or plant Owner*.

In-Vessel Retention (IVR)

In-Vessel Retention* is a Severe Accident* management strategy for corium localisation and stabilisation within the Reactor Pressure Vessel* (RPV) preventing vessel failure. The decay heat is transferred through the RPV wall to water in the Reactor Cavity*.

Iodine Prophylaxis

Emergency protection action involving public ingestion of iodine pills. The triggering limit for the action is based on estimated equivalent thyroid dose for an integration time of 7 days.

Items Important to Safety

An item whose malfunction or failure could lead to undue radiation exposure of the site personnel or members of the public.

In this context, items are Structures, Systems and Components*.

Items Important to Safety* include Safety Systems*, Safety Related Items* and Safety Features for Design Extension Conditions*.

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L

Large Release

A release for which off-site protective measures limited in terms of times and areas of application are insufficient to protect people and the environment.

Leak Before Break (LBB)

Leak Before Break* (LBB) is a concept in which leakage of a postulated through-wall defect in pipework is detected by a qualified leak detection system in time to bring the plant to a state where there is no risk of complete break.

This concept also necessitates:

- The exclusion of degradation mechanisms which could challenge the integrity of piping; and
- The stability assessment of a through-wall defect under the worst loading conditions.

Levelised Cost

The Levelised Cost* is the average discounted cost per kWh, necessary to exactly balance the discounted costs and discounted revenue.

Licensing Authority

See "Safety Authority*".

Licensing Regulator

See "Safety Authority*".

Limited Access Area

A designated area containing a nuclear facility and nuclear material to which access is limited and controlled for physical protection purposes.

Load Breaker Switch

Equipment allowing the coupling of the generator to the grid through the Generator Transformer* and the switch-off of current lower than or equal to, the generator rated current.

Load Following

See "Scheduled Load Variations*".

Long Term Actions

Actions that reflect the emergency actions which involve permanent public resettlement, based on projected doses up to 50 years caused by groundshine and aerosol resuspension. The distinction

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between these actions and those which actually require permanent relocation of members of the public is that doses due to ingestion are not considered in this definition

Low and Intermediate Level Waste

Radioactive Waste* in which the concentration or quantity of radionuclide is above clearance levels established by the regulatory body, but with a radionuclides content and thermal power below those of High Level Waste*. Low and Intermediate Level Waste* is often separated into short-lived waste (with a half-life shorter than 30 years) and long-lived waste (with a half-life longer than 30 years). Short-lived waste may be disposed of in near surface disposal facilities. Government policy generally calls for the disposal of long-lived waste in geological repositories.

Low Level Waste

See "Low and Intermediate Level Waste*".

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M

Main Control Room (MCR)

The Main Control Room* is the secured and protected working place for the Operator*, from where systems and components of the plant are monitored and controlled. The MCR contains direct measurements and operator workstations with display and control devices and provides access to the Information management System* (IMS) as well as all available controls, alarms, measurements and displays of plant systems and components.

Main Transformer

See "Generator Transformer*".

Maximum Assembly Burn-up

The Maximum Assembly Burn-up is the maximum permissible fuel burn-up defined by the limit for radiation damage to engineered materials.

Maximum Continuous Rating

The power output assigned to the turbine by the Supplier*, at which the Unit* may be operated for an unlimited time, not exceeding the specified thermal conditions. This is the rating which will normally carry a guarantee of heat rate.

Moisture Separator and Reheater (System) (MSR)

The Moisture Separator and Reheater System* consists of separators and steam to steam reheaters in order to avoid excessive wet steam in the turbine during steam expansion.

Mission time

The Mission Time* is the time that a system or component is required to operate in order to successfully perform its function.

Mobile equipment

See Non-Permanent Equipment*.

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N

Net Capacity

Generated active power minus auxiliary demand.

Nominal Power

See "Maximum Continuous Rating*".

Non-conformity

Non fulfilment of a specified requirement, as defined in ISO 8402.

Non-permanent Equipment

Non-permanent Equipment* is either mobile equipment or fixed equipment that is not permanently connected.

Normal Operation

Operation within specified operational limits and conditions.

This includes start-up, power operation, reactor trip, shutdown, maintenance, testing and refuelling (including all situations induced by refuelling activities such as fuel handling and on-site fuel transfer).

Nuclear Island (NI)

The Nuclear Island* consists of:

- Reactor Building and Secondary Containment* Structure;
- Nuclear Auxiliaries Building;
- Fuel Building (this facility may be included in the Reactor Building);
- Radwaste Building;
- Control Building;
- Hot Shop/Outage Maintenance Building;
- On-site Safety Standby AC Power Supply Facility;
- Radiological Access Control;
- Emergency Shutdown Facility;
- Storage Tanks important to Safety; and
- The associated equipment.

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Nuclear Steam Supply System (NSSS)

The Nuclear Steam Supply System* consists of:

- The Reactor Coolant System*;
- The reactor core;
- The systems connected to the Reactor Coolant System*; and
- The Reactor Protection System*.

O

Online Condition Monitoring System

The Online Condition Monitoring System* permanently monitors selected parameters of equipment condition, such that a significant change is indicative of potential failure. It is a major component of predictive maintenance, allowing maintenance to be scheduled, or other actions to be taken to avoid the consequences of failure, before the failure occurs.

Operational Modes

Modes defined under Normal Operation* conditions that are divided into Power Operation*, Hot Shutdown* and Cold Shutdown* Modes.

Operational States

Includes Normal Operation* and Anticipated Operational Occurrences*.

Operator

Depending on the context:

- The company in charge of operating the plant; or
- The personnel in charge of controlling the plant from the Main Control Room* or any other control facility.

Outage Duration

Three kinds of Outage Duration* can be defined for a given Outage:

- Reference Outage Duration*;
- Target Outage Duration*; or
- Realistic Outage Duration*;

Owner

The company that owns the plant.

BACK

P

Passive Component

A Passive Component* is essentially a component whose function requires only its structural integrity or which is self-supporting (autonomous).

Passive Equipment

Passive Equipment* is essentially equipment whose function requires only its structural integrity or which is self-supporting (autonomous). However, there are several degrees of passivity. Degrees of passivity are discussed in "Safety related terms for advanced nuclear plants" IAEA-TECDOC 626, September 1991.

Passive System

A Passive System* does not depend on operability of any other system of the Unit* during performance of its Safety Function*. Such a system has its own dedicated power supply or conserved energy for its Safety Function* execution. There is a significant difference between types of Passive Systems* in their initiation, depending on whether an external signal is needed or not.

Physical Separation

1. Separation by geometry (distance, orientation, etc.); or
2. Separation by appropriate Barriers*; or
3. Separation by a combination the above.

Planned Outages

The different types of Planned Outages* considered in the plant lifetime are:

- refuelling and maintenance outage;
- turbine-generator overhaul, including a refuelling and maintenance outage;
- In-Service-Inspection Outage* including a refuelling and maintenance outage and, possibly, a turbine-generator overhaul; and
- Refuelling-only Outage* (including fuel reshuffling).

Plant Constructor

See "Constructor*".

Plant Designer

See "Designer*".

Plant Operator

See "Operator*".

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APPENDIX B - DEFINITIONS

Plant Owner

See "Owner*".

Plant States

Plant States* include Operational States* (Normal Operation* and Anticipated Operational Occurrences*) and Accident Conditions* (Design Basis Accidents* and Design Extension Conditions*).

Postulated Initiating Events (PIE)

An event identified during design as capable of leading to Anticipated Operational Occurrences* or Accident Conditions* and their consequential failure effects.

Power Generation Plant (PGP)

The Power Generation Plant* consists of all facilities to transform steam into electricity including:

- The turbine generator and the turbine building;
- The Generator Transformer*; and
- Their ancillary buildings and facilities.

Power Operation Modes

During these modes, the reactor is critical. The coolant temperature range corresponds to thermal power range from Hot Zero Power* to Full Power.

Power Station Unit

See "Unit*".

Practically Eliminated

The possibility of certain accident sequences occurring is considered to have been Practically Eliminated* if it is physically impossible for the accident sequence to occur or if the accident sequence can be considered with a high level of confidence to be extremely unlikely to occur.

Predictive Maintenance

Maintenance based on expected failure modes that might occur. (The frequency and extent of Preventive Maintenance* may be affected by the use of Predictive Maintenance* methods.

Predictive Maintenance* methods are based on the surveillance of carefully selected parameters and a special analysis of the results. The analysis may be used to justify either the postponement, or bringing forward, of the scheduled maintenance.

Preventive Action

Action taken to prevent the cause of an existing Non-conformity* or Defect*, in order to prevent a recurrence, as defined in ISO 8402.

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Preventive Maintenance

Inspections*, tests, servicing, repairs and replacements intended to reduce the frequency and impact of equipment failure. The frequency and extent of Preventive Maintenance* may be affected by the use of Predictive Maintenance* methods.

Preventive Maintenance* methods are based on the surveillance of carefully selected parameters and a special analysis of the results. The analysis may be used to justify either the postponement, or bringing forward, of the scheduled maintenance.

Primary Containment

The Primary Containment* is a leak-tight structure, housing the Reactor Coolant System*. The Primary Containment* is designed to withstand the mechanical and thermal loads arising in Design Basis Accidents* (DBA) and Design Extension Conditions* (DEC) using appropriate design rules. It is designed to confine the activity released during these accidents as a leaktight structure.

Primary Control of Grid Supply

The Primary Load Control* is the automatic action of the Unit* based on local measurement, within a time scale of a few seconds, to establish the balance between electricity production and load and to stabilise the frequency.

Primary Load Control

See Primary Control of Grid Supply*.

Note: In chapter 2.3, Primary Load control* is also sometimes called “Load frequency control”

Prime Contractor

A company which has direct contracts with the Plant Owner*.

Principal Area

An area that is contained within a Principal Barrier*.

Principal Barrier

A Principal Barrier* is a structural wall or floor of the building designed to protect against the propagation of the effects of a Hazard* from one Division* to the next.

Project Phases

The Project Phases* are the following: design, reviewing, licensing, procurement, manufacturing, factory testing, construction, installation, component testing, commissioning testing and initial operation.

Promoters

Used to designate the Electricity Supply Companies who promote the EUR document.

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Protected Area

Area inside a Limited Access Area* containing Category I or II nuclear material (as defined in Section 4 of IAEA Nuclear Security Series No. 13) and/or sabotage targets surrounded by a physical barrier with additional physical protection measures.

Protection System

A system which encompasses all electrical and mechanical devices and I&C equipment, from sensors to actuation device input terminals, that monitors the operation of a reactor and which, on sensing an abnormal condition, automatically initiates actions to prevent an unsafe or potentially unsafe condition.

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Q

Quality Assurance (QA)

All those planned and systematic actions necessary to provide adequate confidence that an item or service will satisfy given requirements for quality.

Quality Control (QC)

The operational techniques and activities, as a part of quality management, focused on fulfilling quality requirements for structures, systems and components.

Qualification Margins

The difference between the most demanding environmental and functional conditions at the designated equipment location and the defined and simulated type test conditions used during qualification.

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APPENDIX B - DEFINITIONS

R

Radioactive Waste

Any material that contains or is contaminated with radionuclides at concentrations or radioactivity levels greater than clearance levels as established by the regulatory body, and for which no use is foreseen (This definition is purely for regulatory purposes, noting that material with activity concentrations equal to, or less than, the clearance levels can still be radioactive from a physical viewpoint, but the associated radiological hazards are considered negligible.)

Rare and Severe External Hazard (RSEH)

Within the design of the plant, in order to guarantee that, at the end of the design, the final overall probabilistic evaluation will meet the objectives on core melt and radioactive releases, the designer has to take account of more challenging or less frequent External Hazards* called Rare and Severe External hazards*. Since they are attached to the probabilistic evaluation of the design, they are considered during the design process using a realistic approach and best estimate rules. Their definition must cover the large uncertainties which could exist for hazards, by ensuring that sufficient margin exists with regards to cliff edge effects.

Rated Power

See "Maximum Continuous Rating*".

Rated Power Factor

The ratio between rated active power and rated apparent power of a generator. The Rated Power Factor* specifies how much reactive power can be produced by the generator at the rated active power output.

Reactor Cavity

Reactor Cavity* is the volume directly beneath and around the Reactor Vessel*. This volume is generally intended to collect any water leakage from the Reactor Coolant System* in the case of an accident.

Reactor Coolant System (RCS)

The system in an LWR that circulates water through the reactor core. In a PWR, the heat is transferred to the Steam Generators* for conversion to steam and then to electricity. In a BWR, the heat converts the water directly to steam in the Reactor Vessel*. For BWR, the RCS is bounded by the main steam isolation valves.

Reactor Pressure Vessel (RPV)

The pressurised vessel containing the reactor core.

Reactor Vessel (RV)

See "Reactor Pressure Vessel*".

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Realistic Availability Factor

The Availability Factor* which takes into account extensions due to organisational problems or unplanned events. It takes account of the Realistic Outage Duration*.

Realistic Outage Duration

The Realistic Outage Duration* corresponds to the Target Outage Duration* plus extensions due to organisational problems or unplanned events. The Realistic Outage Duration* which reflects the Utilities* organisation and efficiency, is not considered in design requirements.

Redundancy

Provision of more than the minimum number of (identical or diverse) Structures, Systems and Components* (SSCs), so that the loss of any one does not result in the loss of the required function.

Reference Outage Duration

The Reference Outage Duration* is the shortest outage duration possible as consequence of the design of the plant. It is related directly to the design of the plant.

Refuelling-only Outage

An outage for which the critical path of the outage is dictated by refuelling-related operations and none of these operations takes longer than planned.

Reliability Centred Maintenance (RCM)

RCM analysis is a systematic evaluation approach for developing or optimising a maintenance programme. RCM uses a decision logic tree to identify the maintenance requirements of equipment according to the safety and operational consequences of each failure and the degradation mechanism responsible for the failures.

Remote Shutdown Panel

The Remote Shutdown Panel* is situated in the Emergency Control Room*. It is used by Operators* to reach the plant safe state in situations when the Main Control Room* (MCR) is not available.

Rules

Groups of laws, decrees, regulations and Codes and Standards* which are required to be met.

S

Safe Shutdown Earthquake (SSE)

The Safe Shutdown Earthquake* corresponds to a site-specific earthquake which can be withstood by the plant from any Design Basis Condition*. Following a Safe Shutdown Earthquake*, the plant remains in Safe State*.

Safe Shutdown State (SSS)

See "Safe State*"

Safe State

The plant state, following an Anticipated Operational Occurrence*, Design Basis Accident* or Complex Sequences*, in which the reactor is subcritical and the Fundamental Safety Functions* can be ensured and maintained stable for a long time.

Safety Authority

A national authority or a system of authorities appointed by a government, assisted by technical and other advisory bodies, which has the legal authority for conducting the licensing process.

Safety Category

The functions required for fulfilling the Fundamental Safety Functions* are categorized in Safety Category* I, II or III based on their safety significance. The safety significance of a function is determined by taking account of the following factors:

- The consequences of failure to perform the function;
- The frequency of occurrence of Postulated Initiating Events* for which the function will be called upon; and
- The significance of the contribution of function in achieving either a Controlled State* or a Safe State*.

See Chapter 2.1 section 5.

Safety Class

SSCs are classified in Safety Class* I, II or III according to the highest Safety Category* attributed to their Safety Functions*.

See Chapter 2.1 section 5.

Safety Feature for Design Extension Conditions

An item designed to perform a Safety Function* or which has a Safety Function* in Design Extension Conditions*.

Safety Functions

A specific purpose that must be accomplished for safety, to prevent or mitigate the radiological consequences of Normal Operation*, Anticipated Operational Occurrences* and Accident Conditions*.

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APPENDIX B - DEFINITIONS

Safety Measure

Any action that might be taken, condition that might be applied or procedure that might be followed to fulfil the basic requirements for safety.

Safety System (or Engineered Safety System**)**

A System Important to Safety*, provided for achieving and maintaining a Safe State* in case of Anticipated Operational Occurrences* and Design Basis Accidents*, to prevent or mitigate radiological consequences in these conditions and to prevent progression to Design Extension Conditions*.

Safety Systems* were previously known as Engineered Safety Features in EUR.

Safety Related Item

An Item Important to Safety* that is not part of a Safety System*.

In this context, items are Structures, Systems and Components*.

Scheduled Load Variations

Scheduled Load Variations* are load variations performed in accordance with the individual daily load programme sent by the network control centres to each nuclear power plant.

Scheduled Outages

Scheduled Outages* are loss (partial or total) of overall plant availability which are planned to occur at a specific time and to last for a specific duration (usually for refuelling, inspection and test/maintenance).

Secondary Containment

The Secondary Containment* is a fission product confinement envelope, which surrounds (entirely or only partially):

- The Primary Containment*;
- The Primary Containment* penetrations and isolation valves (entirely); and
- Parts of systems and components, connected to the reactor pressure boundary or the Primary Containment* volume, which, in case of an accident, may transport highly contaminated fluids outside Primary Containment*.

Secondary Containment Bypass

Secondary Containment Bypass* is defined as the sum of the leakage from the Primary Containment* boundary to be considered released outside the Secondary Containment*.

Secondary Control of Grid Supply

Automatic or manual control of plant power supply to the electrical network in defined time according to the power variations of the electrical network.

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Secondary Load Control

The Secondary Load Control* is a central control (manual or automatic) of selected regulating power plants within an area, in a time scale of a few minutes, to restore the frequency and the net power exchanges to their previous values.

Segregation

See "Physical Separation*".

Severe Accidents

Certain unlikely event sequences beyond Design Basis Accidents* involving significant core melt which have the potential to lead to significant releases.

Severe Accidents* are a subset of the Design Extension Conditions*.

Severe Accident Management Guidelines (SAMG)

Severe Accident Management Guidelines* (SAMG) describe the management chains of Operator* actions and other measures to mitigate the consequences of Severe Accidents*. The guidelines are followed to limit significant releases.

Severe Accident Management Guidelines* are part of the Emergency Procedure Guidelines* (EPG).

Severe Accident Safe State (SASS)

In case of Severe Accidents* the plant achieves a Safe State* if the following conditions are ensured:

- Core debris is safely contained;
- Core debris heat is being removed and transferred to the Heat Sink*, and the temperature is stable or decreasing;
- Debris configuration is such to ensure sub-criticality;
- The containment pressure is so low that, in case of a containment opening, the Criterion for Limited Impact* (CLI) would be met; and
- The rapid evolution of fission products to the containment has ceased.

Sheltering Action

Emergency protection action involving the public sheltering indoors. The trigger limit for the action is based on the estimated effective radiation dose for an integration time of 2 days.

Single Failure

A Single Failure* is a failure that results in the loss of capability of a component to contribute to the fulfilment of the dedicated Safety Function(s)* and any consequential failure(s) of components and systems that result from it.

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Single Failure Criterion (SFC)

The Single Failure Criterion* is a criterion (or requirement) applied to a system such that it must be capable of performing its task in the presence of any Single Failure*.

Site

A geographical area within a security perimeter fence, containing one or more Units* operated by the same Owner*.

Standard Design

A Standard Design* is a plant design which can be licensed in a majority of European countries using the same safety case. The standardisation policy is specified in Volume 1 Chapter 1.1.

Standard Plant

See "Standard Design*".

Steam Convertor

Steam to steam heat exchanger producing auxiliary steam from main steam or bleed steam and setting up a physical barrier between main steam or bleed steam and auxiliary steam.

Station Black Out (SBO)

The term Station Blackout* refers to the complete loss of alternating current electric power to the essential and nonessential switchgear buses in a nuclear power plant. Station Blackout* therefore involves the Loss Of Off-site Power* (LOOP) concurrent with turbine trip and failure of the on-site Emergency Power Supply*, but not the loss of available AC power to buses fed by station batteries through inverters or the loss of power from the Alternate Power Source*.

Steam Generator (SG)

Heat Exchanger converting the thermal power of the Reactor Coolant System* into steam.

Steam Transformer

See "Steam Convertor*".

Step Down Transformer

See "Auxiliary Normal Transformer*".

Step-up Transformer

See "Generator Transformer*".

Subcontractor

A company which has contracts with the Prime Contractor* (first level) or with one first level Contractor* (second level).

Supplier

Generally replaced by Contractor* or Subcontractor* depending on the context.

Structures, Systems and Components (SSCs)

A general term encompassing all of the elements (items) of a facility or activity which contribute to protection and safety, except human factors.

- Structures are the passive elements: buildings, vessels, shielding, etc.;
- A system comprises several components, assembled in such a way as to perform a specific (active) function; and
- A component is a discrete element of a system.

Examples of components are wires, transistors, integrated circuits, motors, relays, solenoids, pipes, fittings, pumps, tanks and valves.

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T

Target Outage Duration

The Target Outage Duration* corresponds to the Reference Outage Duration* plus extensions for special works which must be inevitably performed over the lifetime of the plant (modifications, component replacement etc...) and are directly linked to the design of systems or components.

Technical Specifications

The Technical Specifications* for plant operation establish requirements for items such as safety limits, limiting safety system settings, limiting control settings, limiting conditions for operation, surveillance requirements, design features, and administrative controls.

Technical Support Centre (TSC)

The Technical Support Centre* is a separate area near the Main Control Room* where the information needed by the technical support team is provided during emergency situations, including Severe Accidents*.

Theoretical Availability Factor

This is the maximum Availability Factor* technically achievable by the plant and which takes into account only Reference Outage Durations*.

Third Party

An entity, which is independent from the Vendor* and Owner*, that has been authorised by the national regulator to undertake specific inspections or audits.

Train

See "Functional Train*".

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U

Ultimate Heat Sink

A medium into which the transferred heat can always be accepted, even if all other means of removing the heat have been lost or are insufficient. This medium is normally a body of water or the atmosphere.

Unit

A Unit* consists of an NI, a PGP and a BOP, which form a coordinated system to utilise the energy of nuclear fuel for producing electricity. A Unit* may have services in common with other units.

Unit Capability Factor

The Unit Capability Factor*, defined by UNIPEDE in conjunction with INPO, is the ratio of the available energy over a given time period to the maximum amount of energy which could be produced at maximum capacity if operated continuously over the same period, expressed as a percentage. Available energy is the energy that could have been produced considering only limitations within the control of the plant management.

Unplanned Automatic Scrams

Unplanned Automatic Scrams* are defined by UNIPEDE/WANO as both unplanned and automatic scrams (reactor Protection System* logic actuations), with manual actions excluded. The Unplanned Automatic Scrams* per 7000 hours critical is the number of unplanned automatic scrams that occur per 7000 hours of critical operation.

Unplanned Capability Loss Factor

The ratio of unplanned (i.e. there was less than 4 weeks' notice) unavailable energy over a period of time to the maximum amount of energy which could be produced over the same period.

Unplanned Outages

Unplanned Outages* consist of either Forced Outages* or extension of Scheduled Outages*.

During Scheduled Outages*, risks encountered on equipment, failure in organisation or even work conflicts cause extensions to the Scheduled Outages*.

Unscheduled Load Variations

Unscheduled Load Variations* are load variations which were not expected from the daily load programme sent by the network control centres to each nuclear power plant.

Load variations resulting from the Primary Load Control* and Secondary Load Control* are not considered as "unscheduled".

Utility

The Electricity Supply Company that is generally described as the Operator* or the Owner* depending on the context, usually when the objective is to define the role of the participants.

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V

Vendor

Generally replaced either by Plant Designer* or by Plant Constructor*, depending on the context.

Vital Area

An area inside a Protected Area* containing equipment, systems or devices, or nuclear material, the sabotage of which could directly or indirectly lead to high radiological consequences.

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W

Wetwell

See "Drywell

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