Status Report – REACTOR

Overview

Full name	
Acronym	
Reactor type	
Purpose	(experimental, demonstration/prototype, commercial)
Coolant	
Moderator	
Neutron Spectrum	
Thermal capacity	
Electrical capacity	
Design status	(Conceptual, under design, construction, in operation, on hold)
Designers	
Last update	

1. Description of the Nuclear Systems (4 – 6 pages)

Depending on the design type, this section is meant to articulate information related to all nuclear systems. This can include but not limited to the following:

- Main characteristics of the primary circuit
- Reactor core and fuel design.
- Fuel handling systems
- Primary circuit component description (e.g. vessels, internals, steam generators etc)
- Auxiliary systems (e.g. heat removal systems, cooling systems etc)
- Operating modes
- Standard Fuel cycle (once through, closed, etc)
- Alternative Fuel options
- Spent nuclear fuel and disposal plans if any
- Examples of energy systems with NPPs of this kind, if any

2. Description of Safety concept (3 – 5 pages)

Depending on the design type, this can include but not limited to the following:

- Safety concept and design philosophy and licensing approach
- Provision for simplicity and robustness of the design
- Active and passive systems as well as inherent safety features; indication of whether the system is the main or backup system
- Defence in-depth description

- Safety goals (core damage frequency, large early release frequency and operator grace period)
- Safety systems to cope with Design basis accidents
- Safety systems to cope with Severe accidents (beyond design basis accidents)
- Provisions for safety under seismic conditions
- Probabilistic risk assessment
- Emergency planning measures

3. Proliferation resistance (1 – 2 pages)

- Technical features to facilitate implementation of safeguards

- Intrinsic features and extrinsic measures that ensure enhanced protection against nuclear material theft and misuse

4. Safety and Security (physical protection) (1- 2 pages)

- Features against human-induced malevolent external impacts and insider actions.

5. Description of turbine-generator systems (1 – 3 pages)

Depending on the design type, this can include but not limited to the following:

- Turbine generator description
- Feed water systems
- Auxiliary systems (as may be needed from design to design)

6. Electrical and I&C systems (1 – 2 pages)

Depending on the design type, this can include but not limited to the following:

- Power supply systems
- Safety related electrical systems
- Control room layout etc
- Reactor protection and other safety systems

7. Spent Fuel and Waste management (1 – 2 pages)

- Provisions for low consumption of non-renewable resources, including the degree of fuel utilization
- Provisions for minimum generation of wastes at the source
- Provisions for acceptable or reduced dose limits
- Provisions for low spent nuclear fuel (SNF) and waste management costs (such as particular fuel forms, minimized specific production of waste etc)

8. Plant layout (1 – 3 pages)

Wherever available and depending on the design type, this can include but not limited to the following:

- Buildings and structures (reactor, turbine and other buildings)

- Containment

9. Plant Performance (2 – 5 pages)

To include the following sub-items:

- Plant Operation
- Reliability
- Availability Targets
- Provision for reduced capital and construction costs e.g. simplification of design (standardisation, factory fabrication, transportability, etc)
- Construction schedule
- Provision for low fuel reload costs (such as low enrichment, particular fuel or fuel cycle type)

10. Development status of technologies relevant to the NPP (1 page)

- List of technologies to be included (hyper link to PDF file)
- Other potential applications

11. Deployment status and planned schedule (1 – 2 pages)

To include the following:

- Information on research and technology development status
- Companies/Institutions involved in RD&D and design
- Estimate of an overall time frame within which the design could be implemented
- Information on main RD&D and licensing stages and their duration

12. References

Appendix: **Summarized Technical Data (LWR)**

General plant data		
Reactor thermal output		MWth
Power plant output, gross		MWe
Power plant output, net		MWe
Power plant efficiency, net		%
Mode of operation		(baseload, load follow)
Plant design life		Years
Plant availability target		%
Seismic design, SSE		g
Primary Coolant material		
Secondary Coolant material		
Moderator material		
Thermodynamic Cycle		Rankine, Brayton?
Type of Cycle		Direct/Indirect
Non-electric application		Desalination? District heat? Industrial cogeneration? H2 production?
Safety goals		
Core damage frequency		/RY
Large early release frequency		/RY
Occupational radiation exposure		Person-Sv/RY
Operator Action Time		hours
Nuclear steam supply system		
Steam flow rate at nominal conditions		kg/s
Steam pressure/temperature		MPa(a)/℃
Feedwater flow rate at nominal conditions		kg/s
Feedwater temperature		℃
Reactor coolant system		
Primary coolant flow rate		kg/s
Reactor operating pressure		MPa(a)
Core coolant inlet temperature		℃
Core coolant outlet temperature		℃
Mean temperature rise across core		℃
Reactor core		
Active core height		m
Equivalent core diameter		m
Average linear heat rate		kW/m
Average fuel power density		kW/kgU
Average core power density		MW/m^3
Fuel material		

Cladding tube material		
Outer diameter of fuel rods		mm
Rod array of a fuel assembly		
Number of fuel assemblies		
Enrichment of reload fuel at equilibrium core		Wt%
Fuel cycle length		months
Average discharge burnup of fuel		MWd/kg
Burnable absorber (strategy/material)		
Control rod absorber material		
Soluble neutron absorber		
Reactor pressure vessel		
Inner diameter of cylindrical shell		mm
Wall thickness of cylindrical shell		mm
Total height, inside		mm
Base material		
Design pressure/temperature		MPa(a)/℃
Transport weight		t
Steam generator (if applicable)		
Type		
Number		
Total tube outside surface area		m^2
Number of heat exchanger tubes		
Tube outside diameter		mm
Tube material		
Transport weight		t
Reactor coolant pump (if applicable)		
Type		
Number		
Head at rated conditions		m
Flow at rated conditions		m^3/s
Pump speed		rpm
Pressurizer (if applicable)		
Total volume		m^3
Steam volume: full power/zero power		m^3
Heating power of heater rods		kW
Primary containment		
Type		
Overall form (spherical/cylindrical)		
Dimensions (diameter/height)		m
Design pressure/temperature		kPa(a)/℃
Design leakage rate		Vol%/day
Is secondary containment provided?		
Residual heat removal systems		
Active/passive systems		
Safety injection systems		
Active/passive systems		
Turbine		
Type of turbines		

Number of turbine sections per unit (e.g. HP/MP/LP)		
Turbine speed		rpm
HP turbine inlet pressure/temperature		MPa(a)/℃
Generator		
Type		
Rated power		MVA
Active power		MW
Voltage		kV
Frequency		Hz
Total generator mass including exciter		t
Condenser		
Type		
Condenser pressure		kPa(a)
Feedwater pumps		
Type		
Number		
Head at rated conditions		m
Flow at rated conditions		m^3/s
Pump speed		rpm