

PBMR Safety and Design Familiarization

Session 1 - Plant layout and systems, and fuel design / fueling operations

Day 1

PBMR Program Overview (1 hour)
Project Elements and Schedule
PBMR Distinguishing Characteristics
Koeberg Site Plant Layout

PBMR Design Principles (2 hours)
Physics and gas hydraulics
Brayton Cycle
Fuel Design
Use of Proven Technologies

Reactor Unit and Main Support Systems (3 hours)
Core Structures
Core Conditioning System
Core Barrel Conditioning System
Reactivity Control and Shutdown System
Neutron Source System
Fuel Handling, Storage and Safeguards

Day 2

Power Conversion Unit (2 hours)
System Overview
Main Power System Description
Turbine-Generator Set
Main Power System Heat Exchangers
Helium Inventory Control System
Gas Cycle Valves
Gas Cycle Piping System
Main Power System Pressure Boundary

Auxiliary Systems Overview (2 hours)
Active Cooling System
Reactor Cavity Cooling System
Equipment Protection Cooling Circuit
Main Heat Sink System
Fire Protection System
HVAC System
Primary Loop Initial Cleanup System
Compressed Air System
Pressure Relief System
Decontamination System
Waste Handling System

Specialized Doorways
Special Tools and Equipment Handling Systems

Civil Structures and Equipment Arrangements (1 hour)
Reactor Confinement Building
Conventional Island
Auxiliary Buildings

Day 3

Automation System (2 hours)
System Overview
Human-System Interface
Control Room
Reactor Protection System
Post-Event Instrumentation
Equipment Protection System
Operational Control System
Burnup Measurement System
Activity Measurement System

Electrical System (1/2 hour)
Main Electrical Power System
Auxiliary Electrical Power System

PBMR Safety and Design Familiarization

Session 2 - Safety design and analysis, and plant operations and events

Day 1

Plant Operations Overview	(1 hour)
Plant Operating Environment	
Plant and Major Component Maintenance Concept	
Power Plant Constraints and Operating Plant Envelope	
Operating Conditions and Modes	(1/2 hour)
Plant Startup and Equilibrium Core	
Main Power System Control Functions	
Turbine-Generator Control Functions	
Fuel	(2 hours)
Fuel Design Specification	
Coated Particle	
Fuel Sphere	
Operational Monitoring	
Manufacturing and Quality Control	
Safety Design Approach	(1 hour)
Enhanced Safety Expectations for New Plants	
PBMR Safety Design Concept	
Top Level Regulatory Criteria (TLRC)	(1 hour)
Event Frequency Criteria	
Event Consequence Criteria	
Safety Goals / QHOs	

Day 2

Integrated Deterministic and Probabilistic Safety Analysis Approach (3 hours)	
Integration of Approaches	
Deterministic Safety Analysis Approach	
PRA Development and Integrated Use in Design	
Event Identification and Categorization	(1 hour)
General Overview	
Normal Events	
Anticipated Operational Occurrences (AOOs)	
Design Basis Events (DBEs)	
Beyond Design Basis Events (BDBEs)	
Event Analysis	(1 hour)
Selected Analyses of AOOs	
Selected Analyses of DBEs	

Selected Analyses of BDBEs	
Risk Analysis	(1 hour)
Selected Analyses	
Comparison of Risks to TLRC	