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UK ABWR Generic Design Assessment

Generic PCSR Sub-chapter 20.8 : Post Accident Accessibility

Hitachi-GE Nuclear Energy, Ltd.

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20.8.1 Post Accident Access Requirements

(1) Statutory Requirements

When there is a risk of dose exposure for members of public during a radiological emergency, a mitigation procedure for the radiological emergency is required.
Emergency recovery actions are developed by the risk assessed, and an estimation of the potential dose uptake is a part of this assessment. If needed, emergency dose levels may be authorised. Intervention workers may be exposed to doses in excess of the dose limits in the Ionising Radiations Regulations 1999 (IRR99) [Ref-1]. The emergency dose levels quoted below are those that are normally regarded as acceptable within UK regulations [Ref-2]:

•**Effective Dose:** 100 mSv

• **Equivalent Dose to Skin:** 1,000 mSv

• **Equivalent Dose to Eye Lens:** 300 mSv

Specific provision may be made explicitly for life saving. In this case it should be recognised that regulation 14(7) may take precedence over regulations 14(2), 14(3) and 14(4) of REPPIR. However, it is desirable that for planning purposes the target should normally apply the following levels:

• **Whole Body Dose:** 500 mGy

• **Dose to Skin:** 5,000 mGy
*(Doses quoted above in milligray are for deterministic effects).

In a dose assessment of this chapter, confirmation will be needed to be determine that the above requirements are satisfied.

(2) Post Accident Access Facilities

The post accident access facility which is necessary to access differs from an accident category. In Sub-chapter 14.2 “Safety Principles and Development Practice”, the safety systems for emergencies are described. Safety System Logic and Control (SSLC), the main safety system and the hardwired backup safety system are described in Sub-chapter 14.5 “C&I Systems”. The severe accident management systems are described in Sub-chapter 16.5 “Severe Accident Management Systems”.
In a design basis accident, the key facilities/systems for responding to the accident are the main control room, the technical support centre, the post accident sample system (PASS), stack monitor sample system, hot laboratory, residual heat removal system (RHR), reactor building closed water system (RCW), reactor building closed cooling sea water system (RSW), and fuel pool cooling purification system as shown in Table 20.8-1.

Table 20.8-1 : Post Accident Access Facilities

Category	Objective	Facility	Action
Design Basis Accident	Operation	Main Control Room	Operation for DBA
		Technical Support Centre	Operation support for DBA
	Monitoring	Post Accident Sample System (PASS)	Sampling of primary coolant
		Stack Monitor Sampling	Sampling of iodine adsorbent filter
		Hot Laboratory	Radioactivity analysis
	Cooling and Residual Heat Removal	Residual Heat Removal System (RHR)	Patrol and maintenance
		Reactor Building Closed Water System (RCW)	Patrol and maintenance
		Reactor Building Closed Cooling Sea Water System (RSW)	Patrol and maintenance
		Fuel Pool Cooling Purification System (FPC)	Patrol and maintenance
Severe Accident	Accident Management Operation	Main Control Room	Operation for SA
		Technical Support Centre	Operation sufor SA
		Remote Shutdown Panel	Operation for SA
		Emergency Response Facility	Operation for SA
	Monitoring	Post Accident Sample System (PASS)	Sampling of primary coolant sample
		Stack Monitor Sampling	Sampling of iodine adsorbent filter
		Hot Laboratory	Radioactivity analysis
	Cooling and Residual Heat Removal	Residual Heat Removal System (RHR)	Emergency Repair
		Reactor Building Closed Water System (RCW)	Emergency Repair
		Reactor Building Closed Cooling Sea Water System (RSW)	Emergency Repair
		Fuel Pool Cooling Purification System (FPC)	Emergency Repair
	Gas Supply	Nitrogen Gas Supply System	Manual valve operation
	Venting	Filtered Containment Venting System (FCVS)	Manual valve operation
	Alternative Power Supply	Storage Battery	Connection and operation
		Gas Turbine Generator	Startup and maintenance
		Air Cooling Type Diesel Generator	Startup and maintenance
		Power Supply Truck	Installation and connection
		Fuel Tank	Connection and operation
		Emergency Switch Board	Startup and maintenance
	Aletrnative Cooling and Residual Heat Removal	Condensate Storage Pool (CSP)	Manual valve operation
		Filterd Water Storage Tank	Manual valve operation
		Fire Fighter Truck	Connection and operation

In a severe accident, the accessibility to facilities may be restricted by the accident situation. In this case, accident management is performed using the various facilities which include the alternative AC power supply systems and the alternative cooling systems installed in Backup Building.
The available facilities in severe accident, are the main control room, the technical support centre, the remote shutdown panel, the emergency response facility, the post accident sample system (PASS), stack monitor sample system, hot laboratory, residual heat removal system (RHR), reactor building closed water system (RCW), reactor building closed cooling sea water system (RSW), and fuel pool cooling purification system, nitrogen gas supply system, the filtered containment venting system, alternative power supply system, and alternative cooling and residual heat removal systems as shown in Table 20.8-1.

20.8.2 Post Accident Radiation Zone Maps

The locations of these facilities will be described in Chapter 9 “General Description of the Unit (Facility)”. The post accident radiation zone maps for design basis accidents will be developed to design the post accident access facilities based on layout and radiation source term distribution. The access routes are determined to minimise the dose rates as a result of the radiation zoning activity.
In a severe accident, accident management depends on the accident situation and radiation protection could be achieved by shielding highly radioactive-equipment. Radiation zone map are not prepared for a severe accident since the accident situation is highly variable.

20.8.3 References

[Ref-1] The Ionising Radiations Regulations 1999. Statutory Instrument 1999 No. 3232. ISBN 0-11-085614-7. HM Stationery Office.

[Ref-2] Provisional HSE Internal Guidance on Dose Levels for Emergencies. HSE. 2008. http://www.hse.gov.uk/radiation/ionising/doses/dose-pr.htm