

**UK ABWR**

Document ID	:	GA91-9101-0101-22000
Document Number	:	HE-GD-0044
Revision Number	:	A

## UK ABWR Generic Design Assessment

### Generic PCSR Chapter 22 : Emergency Preparedness



**DISCLAIMERS**

*Proprietary Information*

This document contains proprietary information of Hitachi-GE Nuclear Energy, Ltd. (Hitachi-GE), its suppliers and subcontractors. This document and the information it contains shall not, in whole or in part, be used for any purpose other than for the Generic Design Assessment (GDA) of Hitachi-GE's UK ABWR. This notice shall be included on any complete or partial reproduction of this document or the information it contains.

*Copyright*

No part of this document may be reproduced in any form, without the prior written permission of Hitachi-GE Nuclear Energy, Ltd.

Copyright (C) 2014 Hitachi-GE Nuclear Energy, Ltd. All Rights Reserved.

**Table of Contents**

**22.1 Introduction ..... 22.1-1**  
**22.2 General Requirements ..... 22.2-1**  
**22.3 Emergency Response ..... 22.3-1**  
**22.4 Emergency Facilities ..... 22.4-1**  
**22.5 Conclusion ..... 22.5-1**  
**22.6 References ..... 22.6-1**

## **22.1. Introduction**

The purpose of this chapter is to show the requirements for emergency response and facilities in a nuclear incident and to identify arrangements for emergency response and the facilities that are currently included in the design.

## 22.2. General Requirement

Accident Management and Emergency Preparedness are required by the UK and the safety standards of requirements are presented by the international atomic energy agency(IAEA) .

Also, safety requirements for emergency preparedness in IAEA are specified by GS-R-2[Ref-1] . Requirements for emergency facilities in GS-R-2 are as follows.

*“5.26. For facilities in threat category I or II emergency facilities shall be designated where the following will be performed in the different phases of the response: the co-ordination of on-site response actions; the co-ordination of local off-site response actions (radiological and conventional); the co-ordination of national response actions; co-ordination of public information; and co-ordination of off-site monitoring and assessment.*

*5.27. [For facilities in threat category I, an] on-site emergency control centre, separated from the [facility] control room, shall be provided to serve as [a] meeting place for the emergency staff who will operate from there in the event of an emergency. Information about important [facility] parameters and radiological conditions in the [facility] and its immediate surroundings should be available there. The room should provide means of communication with the control room, the supplementary control room and other important points in the [facility], and with the on-site and off-site emergency response organizations. Appropriate measures shall be taken to protect the occupants for a protracted time against hazards resulting from a severe accident.”*

Furthermore recommended emergency facilities are listed in GS-G-2.1 Appendix VIII[Ref-2].

Examples of recommended emergency facilities are a control room, an emergency operations facility, a operational support centre and a technical support centre. Within the UK the following Regulations place a requirement on the Licensee (on-Site) and the Local Authority (off-site) to develop and test emergency plans.

One is Licence Condition 11 under the Nuclear Installations Act 1965. Licence Condition 11 specifies the requirement for emergency arrangements.

The other is the Radiation (Emergency Preparedness and Public Information) Regulations (REPPPIR), 2001. REPPPIR establishes a framework for the protection of workers and the public through emergency preparedness for a radiation emergency.

An emergency plan for sites where the UK ABWR is deployed will be established in accordance with these regulations.

### 22.3. Emergency Response

The emergency preparedness program will be controlled by a specific role within the Licensee organization. The role will ensure that the arrangements take into account of appropriate potential hazards, seamlessness with the Local Authorities arrangements and local facilities.

And arrangements for the emergency response will take account of the requirements in GS-R-2(IAEA) and UK Regulations.

The arrangements for the emergency response are as follows :

#### (1) Establishing Emergency Management and Operations

Arrangements will be made for the implementation of a command and control system for the response to a nuclear emergency coordinating both on and off site responses.

#### (2) Identifying, Notifying and Activating

##### (a) Identifying and Activating

Emergency Plans will be defined based on the reference accident scenarios, derived from the fault studies of the UK ABWR and reported in the Report of Assessment(see para 22.3(4)). The generic UK ABWR analysis will be reviewed in the light of site specific hazards, geography and other factors to ensure that the basis for the emergency plans are representative and provide a robust basis for developing those plans.

When circumstances necessitate an emergency response, operators will promptly determine the emergency class and will initiate the appropriate on-site actions.

The declaration of an emergency will be made based by a duly authorized person with an established set of criteria regarding the state of the plant, together with full knowledge of onsite and offsite activities.

##### (b) Notifying

Immediate notification of the necessary external organizations would be made via secure communications and established protocols.

#### (3) Taking Mitigatory Action

The responders shall take all practicable and appropriate actions to minimize the consequences of a nuclear emergency.

Arrangements for these mitigatory actions will be made based on the reference design and technical support information. And arrangements for providing technical advice to the responders will form part of the formal testing and demonstration of the emergency plan.

#### (4) Taking Urgent Protective Action

Urgent protective action shall be taken to prevent to the extent practicable the occurrence of severe deterministic health effects and to avert doses. Off-site emergency zones for which arrangements shall be made for taking urgent protective action shall be determined by authorities. These off-site emergency zones are as follows:

- Off-Site Emergency Planning Area – the area for which the Local Authority is required to prepare and demonstrate detailed emergency plans for the multi-agency response to an event.

- Public Information Zone(PIZ) – the area over which the operator must give prior information about potential radiation emergencies and the actions to be taken.

Licensee will provides the below information for the specification of these off-site emergency zones.

- Hazard Identification and Risk Evaluation (HIRE)  
The HIRE will draw upon plant design information to identify what hazards may exist. For a nuclear power station, this information is contained within the safety case, primarily in the fault studies sections and will determine the potential for a radiation emergency. For the UK ABWR, the generic plant design information contained in this PCSR will form the basis of the information contained in the HIRE, supplemented by site specific design aspects.
- Report of Assessment(RoA)  
The RoA summarises the HIRE and provides the information listed in Schedule 5 of REPPiR. While the RoA considers a range of scenarios, one major purpose is to provide information on the size, shape and location of the area that may be affected by any reasonably foreseeable radiation emergencies.

(5) Providing Information and Issuing Instructions and Warnings to The Public

On site alarms and announcements will be initiated in the event of an emergency together with notifications to the Emergency Organization personnel. Design and implementation of the communication systems to support this will be reviewed by the appropriate arrangements within the Licensee organization as part of the overall site design

(6) Protecting Emergency Workers

The dose assessment of the external radiation received by persons during an emergency will carry out using approved dosimeters.  
Following this assessment and the internal dose assessment, medical surveillance will be established for individuals.

(7) Assessing The Initial Phase

Radiation monitoring and environmental sampling assessment shall be carried out in order to identify new hazards promptly and to refine the strategy for response.  
Routine monitoring will be conducted in the vicinity of sites where the UK ABWR is deployed. In the event of emergencies, additional monitoring will be performed as defined in the site emergency plans and the results of this monitoring will form a part of the decision making processes outlined in the emergency plans.

(8) Keeping The Public Informed

The public and media will be provided with the necessary information regarding the emergency and response activities in accordance with pre-established protocols. The responsibility and authority for communication with the media and public in an emergency rests with the Senior Commander of the local police force nominated in the Emergency Plan

(9) Conducting Recovery Operations

22. *Emergency Preparedness*  
22.3 *Emergency Response*  
Ver. 0

Arrangement will be established for the transition from emergency phase operations to routine long term recovery operations.

## 22.4. Emergency Facilities

All nuclear power stations are required to include facilities to facilitate the management of emergencies.

The UK ABWR Main Control Room provides the main control function for the plant and is designed to remain habitable following an in-vessel severe accident without a PCV failure. The main Control Room is shielded and provided with filtered air at a modest overpressure. Also, when operations are difficult in the main control room, operators can bring the reactor into a state of cold shutdown from hot shutdown after a scram operation, using the Remote Shutdown System (RSS) established in a RSS room.

In addition to the Main Control Room, the UK ABWR Design specifies an on-site Backup Building(B/B). The function of this facility is as follows:

- The Backup Building(B/B) provides an alternative safety management capacity for accident management. The building houses an alternative Alternating Current (AC) power source as well as Instrumentation & Control (I&C) facilities. The operator in a B/B shall be enabled to execute monitoring and controlling when the Main Control Room cannot be occupied.

A B/B room shall be designed that enables the operator to maintain the B/B and to conduct necessary operations during a SA.

Additional emergency facilities with the following functions are planned for the site.

- Coordination of the on-site and off-site response to an emergency warranting off-site protective actions. (e.g. an emergency control centre)
- Technical support for the control room operators in mitigating the consequences of the emergency. (e.g. a technical support centre)

The emergency plan will be fully implemented and tested before nuclear fuel arrives on site.

Detailed activities in each facilities are not yet fully developed.

The Main activities in expected in each facility are as follows:

In an emergency control centre the site emergency controller will manage the overall Licensee's activities to minimise off-site releases and restore the site to a safe condition. And warnings, on-site information and technical information for the urgent protective action will send to off-site organization included authorities from an emergency control centre.

The Facility Control Centre (FCC) will be not planed currently. FCC's purpose is to provide management control over activities to recover casualties, make an initial assessment of the impact of the incident and plan and initiate tactical measures to return the plant to a safe state.

Activities for these purpose will be curried out by staff in an emergency control centre or technical support centre.

Specialists in a technical support centre will provide the technical advices for taking mitigatory action and recovey operations to operators in the main control room.

## **22.5. Conclusion**

This chapter addresses the requirements for UK ABWR emergency facilities and arrangements to support the site emergency response in a nuclear incident.

It will be shown that the emergency facilities in UK ABWR are properly designed or planned to support the site's emergency response to a nuclear incident

## **22.6. References**

- [Ref-1] IAEA Safety Requirements, Preparedness and Response for a Nuclear or Radiological Emergency No GS-R-2,2002
- [Ref-2] IAEA Safety Guide, Arrangements for Preparedness for a Nuclear or Radiological Emergency Appendix VIII Emergency Facilities and Locations No GS-G-2.1,2007