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Pre-Construction Safety Report

Chapter 32

Emergency Preparedness

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32.1 List of Abbreviations and Acronyms

ALARP	As Low As Reasonably Practicable
CCA	Civil Contingencies Act, 2004
DEC	Design Extension Condition
DiD	Defence in Depth
ECC	Emergency Control Centre
EOP	Emergency Operating Procedure
GDA	Generic Design Assessment
HIRE	Hazard Identification and Risk Evaluation
IAEA	International Atomic Energy Agency
LC	Licence Condition
MCR	Main Control Room
NPP	Nuclear Power Plant
ONR	Office for Nuclear Regulation (UK)
OSC	Operation Support Centre
PCSR	Pre-Construction Safety Report
REPPIR	Radiation (Emergency Preparedness and Public Information) Regulations 2001
RGP	Relevant Good Practice
SAMG	Severe Accident Management Guideline
SAPs	Safety Assessment Principles for Nuclear Facilities
SQEP	Suitably Qualified and Experienced Person
TSC	Technical Support Centre
UK HPR1000	UK version of the Hua-long Pressurised Reactor

32.2 Introduction

The purpose of this chapter is to present the design information of emergency preparedness for the UK version of the Hua-long Pressurised Reactor (UK HPR1000) Nuclear Power Plant (NPP).

The emergency arrangements are established to prepare for the reasonably foreseeable

accidents and mitigate the consequences in case of an occurrence by taking all reasonably practicable measures. Emergency preparedness is a key link of defence in depth (DiD) (the fifth and final level) applied in the design of UK HPR1000 which is based on Safety Assessment Principles for Nuclear Facilities (SAPs), Reference [1] with respect to UK context (see Chapter 4).

In addition, the emergency arrangements will evolve as the NPP moves through its lifecycle. Once pre-loaded, a radiological release is conceivably possible. So, emergency arrangements apply to the lifecycle after the fuel is pre-loaded. It will be reviewed periodically as required by International Atomic Energy Agency (IAEA) specific safety guide, *Periodic Safety Review for Nuclear Power Plants*, SSG-25, Reference [2]. Transport of radioactive substances is out of scope of Generic Design Assessment (GDA)，Reference [3]. Therefore, the emergency arrangements relating to this will be developed during the nuclear site licencing phase. The detailed emergency arrangements for UK HPR1000 at a specific site will be developed in nuclear site licencing phase.

32.2.1 Chapter Route Map

The ***Fundamental Objective*** of the UK HPR1000 is that: *The Generic UK HPR1000 could be constructed, operated, and decommissioned in the UK on a site bounded by the generic site envelope in a way that is safe, secure and that protects people and the environment.*

To underpin this objective**,** five high level claims and a number of level 2 claims are developed and presented in Chapter 1. This chapter supports the ***Claim 3.2.3*** derived from the high level ***Claim 3***.

Claim 3*: The design and intended construction and operation of the UK HPR1000 will protect the workers and the public by providing multiple levels of defence to fulfil the fundamental safety functions, reducing the nuclear safety risks to a level that is as low as reasonably practicable (ALARP).*

Claim 3.2.3*: Analysis of Design Extension Conditions and Severe Accident Analysis has been carried out to identify further risk reducing measures and inform emergency arrangements.*

This sub-chapter provides an overview of the claims and arguments based on the IAEA SSG-25 Safety Factor 13, Reference [2]. Descriptions for each argument to support the overall claim are contained in each section covering the individual argument. The IAEA preamble to Safety Factor 13: Emergency Planning states:

The design and operation of a nuclear power plant should prevent or otherwise minimise releases of radioactive substances that could affect the health of workers or the public or harm the environment. Emergency Planning for the possibility of such releases is a prudent and necessary action, not only for the operating organisation but

also for local and national authorities.

The IAEA objective for the review of emergency planning is to determine:

Whether the operating organisation has adequate plans, staff, facilities and equipment for dealing with emergencies;

Whether the operating organisation's arrangements have been adequately coordinated with local and national systems and are regularly exercised.

The IAEA objective and other information presented in the *IAEA General Safety Requirements No. GSR Part 7*, Reference [4], have been reviewed and set out in a Claim, Argument and Evidence structure. In deriving the Pre-Construction Safety Report (PCSR) claim, it is important to note that the detailed review of the NPP design, at the GDA stage, has not been finalised and is, therefore, subject to further change. It follows, therefore, that this chapter, relies on the plant design and layout in Chapter 2, and aspects of other chapters.

It is particularly important for emergency planning with respect to internal arrangements of the future operator and external organisations, including the emergency services, local government and health services arrangements.

To support the Claim 3.2.3 and Claim 3, the resulting Sub-claim for chapter is presented, as follows:

Sub-claim*: Emergency arrangements will be in place, prior to commissioning, that will be in accordance with up-to-date standards in the event of a release of radioactive substances.*

The PCSR claim has been reviewed in order to formulate a list of arguments for use in the PCSR for UK HPR1000 GDA submission to Office for Nuclear Regulation (ONR). Additionally, the tasks and methodology in IAEA SSG-25, Reference [2], have been reviewed, in order to ensure that the list of arguments is complete insofar that the final design has not been completed. Where tasks and methodology are addressed by other PCSR chapters, a cross reference is made. The IAEA tasks and methods of SSG-25 Safety Factor 13, Reference [2], are utilised here and modified to take account of PCSR.

Essentially, this chapter aims to demonstrate that adequate emergency arrangements are in place prior to pre-loaded, addresses how they are implemented and determines whether these correspond to good practices, so as to verify that they do not present an unacceptable contribution to risk.

There are five arguments based on IAEA Safety Factor 13: Emergency Planning in Reference [2] that supports Chapter 32. They are listed as follows:

1) ***Argument 1.1****: Emergency arrangements adequately consider current safety analyses and accident mitigation studies.*

The detailed descriptions are presented in the Sub-chapter 32.5 and 32.6. Safety analyses and accident mitigation studies will be considered in the design of emergency facilities and the preparation of accident management procedures.

2) ***Argument 1.2****: Emergency arrangements include adequate on-site and off-site equipment and facilities, including the provision of technical and operational support centres and their communication systems.*

   The detailed descriptions are presented in the Sub-chapter 32.4 (in general and structure in figure F-32.4-2) and the Sub-chapter 32.5.

3) ***Argument 1.3****: Emergency arrangements include effective interaction with relevant off-site organisations.*

   The detailed descriptions are presented in the Sub-chapter 32.3 (*Civil Contingencies Act, 2004* (CCA) requirement) and the Sub-chapter 32.4 (the figure F-32.4-1).

4) ***Argument 1.4****: Emergency arrangements are tested and reviewed regularly and comprehensively, and lessons learned, are adopted in order to be effective when operations commence and maintained during the life of the plant.*

   The detailed descriptions are presented in the Sub-chapter 32.3 (refers to training) and the Sub-chapter 32.4 (refers to training). And it becomes important during operating.

5) ***Argument 1.5****: Emergency arrangements are in accordance with current standards, methods and good practices.*

   The detailed description is presented in the Sub-chapter 32.3.

32.2.2 Chapter Structure

The structure of PCSR Chapter 32 is as follows:

a) Sub-chapter 32.1 Lists the Abbreviations and Acronyms:

This section lists the abbreviations, acronyms that are used in the PCSR Chapter 32.

b) Sub-chapter 32.2 Introduction:

This section gives the brief introduction of Chapter 32.

c) Sub-chapter 32.3 Applicable Codes and Standards:

This section describes the applicable codes and standards of Chapter 32.

d) Sub-chapter 32.4 Emergency Management:

This section describes the emergency management and the framework of emergency organisations and responsibilities.

e) Sub-chapter 32.5 On-site Emergency Response Facilities:

This section describes the basic functions of main on-site emergency response facilities.

f) Sub-chapter 32.6 On-site Accident Management:

This section identifies the current accident management procedures.

g) Sub-chapter 32.7 ALARP Assessment:

This section presents the Relevant Good Practices of Chapter 32.

h) Sub-chapter 32.8 Concluding Remarks:

This section summarises the concluding remarks.

i) Sub-chapter 32.9 References:

This section lists the supporting references of Chapter 32.

32.2.3 Interfaces with other Chapters

The interfaces with other Chapters are listed in the following table.

T-32.2-1 Interfaces between Chapter 32and Other Chapters

PCSR Chapter	Interface
Chapter 1 Introduction	Chapter 1 provides the Fundamental Objective, Level 1 Claims and Level 2 Claims, Chapter 32 provides chapter claims and arguments to support relevant high level claims that are addressed in Chapter 1.
Chapter 2 General Plant Description	Chapter 2 provides a brief introduction to the emergency facilities of the plant.
Chapter 4 General Safety and Design Principles	Chapter 4 provides the concept of Defence in Depth and the selection of appropriate standards. Emergency preparedness is located at level 5 of defence in depth.
Chapter 9 Electric Power	Chapter 9 provides the design information of communication systems which is related to

PCSR Chapter	Interface
	emergency response.
Chapter 13 Design Extension Conditions and Severe Accident Analysis	Chapter 13 provides the basic strategy of Severe Accident Management Guidelines for Emergency Arrangements.
Chapter 20 MSQA & Safety Case Management	The organisational arrangements and quality assurance arrangements set out in PCSR Chapter 20 are implemented in the design process and in the production of this chapter.
Chapter 22 Radiological Protection	Emergency preparedness including emergency operations, on-site accident management and emergency facilities is described in Chapter 32. Chapter 22 presents information of post-accident accessibility which is connected with emergency operations.
Chapter 30 Commissioning	Chapter 30 provides the information of commissioning which considers the requirements of emergency arrangements.
Chapter 31 Operational Management	Chapter 31 presents the arrangement of the Emergency Operation Procedure (EOP) and the Severe Accident Management Guideline (SAMG) which shall be carried out by operator in a radiation emergency.
Chapter 33 ALARP Evaluation	The ALARP approach presented in Chapter 33 has been applied in Chapter 32.

32.3 Applicable Codes and Standards

For selection of applicable codes and standards, the statutory instruments in the UK are chosen, such as Radiation (Emergency Preparedness and Public Information) Regulations 2001 (REPPIR), Reference [5]. The relevant requirements and guidance are chosen to provide the detailed information, such as *Licence Condition* (LC) 11, Reference [6], *Japanese Earthquake and Tsunami: Implications for the UK Nuclear Industry*， Reference [7] and the associated underpinning guidance. International good practices or Relevant Good Practices (RGPs) recognised by UK regulators have also been selected along with the up-to-date version of codes and standards are selected. The IAEA safety standards are chosen to support the emergency arrangements of UK

HPR1000. The detailed principles of the selection of appropriate standards for this Chapter is presented in PCSR Chapter 4. The applicable codes and standards are listed in T-32.3-1.

The CCA, Reference [8], is the primary legislative document among the emergency planning procedures in the UK. The Act, constituted by three parts, defines the meaning of “emergency” as well as obligations of certain organisations, grants the government emergency power, and provides supplementary legislation in support of the first two parts. To support CCA, there are some accompanying regulations of CCA and supplementary document, Reference [9], [10] and [11]. The definition for emergency is relatively broad in the UK. A major incident may be declared by any emergency response organisation in Reference [12]. A leak of radioactive substances outside a NPP requiring the off-site plan to be initiated would be a major incident.

The licencee of each NPP site is required to establish an emergency plan to manage emergencies arising from activities on site. These plans are to be submitted to, and approved by, the ONR in accordance with LC 11, Reference [6]. Approved arrangements must not be altered or amended unless ONR has approved such alternation or amendment. If emergency arrangements need assistance and cooperation with other persons, local authority or organisations, the licencee has responsibilities to consult with them on such arrangements.

Emergency arrangements exercises are required to be performed on a regular basis. All persons who have duties in connection with emergency arrangements are properly instructed in the performance and the precautions. There are some detailed requirements in SAPs, Reference [1], fundamental principle FP.7 and accident management and emergency preparedness principle AM.1. These “adequate arrangements” are expected to be detailed in the operator’s site-specific emergency plans and associated documentation.

The REPPIR and its supporting guidance, Reference [5] and [13], aim to establish a legal framework for emergency arrangements, for the protection of the public from reasonably foreseeable radiation emergencies, and ensure that relevant public are supplied with the prior information specified in RPEEIR before and during a radiation emergency.

The quantities of radioactive materials or fissile materials associated with specific NPP based on UK HPR1000 design will be evaluated and compared with the threshold limits provided in REPPIR in nuclear site licencing phase. In GDA stage, the regulations associated with operators are assumed to apply. REPPIR regulations require that the on-site emergency plan is the responsibility of the operator and the off-site emergency plan (for premises) is the responsibility of the local authority. These provisions have imposed requirements on the licencee and the local authority to ensure that the on-site emergency arrangements are in place, drills and exercises are conducted on a regular basis, and countermeasures are developed for an emergency.

These responsibilities mainly include：

1) Undertaking the Hazard Identification and Risk Evaluation (HIRE);
2) Submitting a Report of Assessment to ONR;
3) Developing and testing emergency plans;
4) Supplying the necessary information to local authority to support preparation of an off-site emergency plan;
5) Reviewing and revising (if it is necessary) the plan;
6) Consulting and co-operating with relevant organisations and any other employers;
7) The operator’s duties once any employee receiving an emergency exposure;
8) Supplying information to the relevant members of public before and during a radiation emergency； and
9) Training operations managers, emergency response personnel and other personnel who may be called upon to assist emergency response.

It is noted that REPPIR Regulation 7 in Reference [5] states that emergency intervention employees should be given appropriate training and equipment. Nuclear Suitably Qualified and Experienced Person (SQEP) is a British nuclear industry requirement. In addition, ONR LC10 (Training) requires the operator to provide suitable training for all employees who have a responsibility for safety, Reference [6]. This will be undertaken for the operator of the UK HPR1000 prior to commissioning. The REPPIR and its supporting guidance may be updated in the future that may cause a revision to the emergency arrangements.

The UK government has issued nuclear emergency planning guidance in Reference [14] to help local emergency planners, HM government departments, devolved administrations of Scotland and Wales and other agencies that carry out nuclear emergency planning. The nuclear emergency planning and response guidance is the primary source of guidance for local emergency planners to enable them to prepare effective plans. This document covers the guiding principles and phases of emergency management. ONR has also issued lessons of the Fukushima accident on emergency preparedness, which in particular provides advice on the on-site emergency control, Reference [7].

An important point in the CCA, Reference [8], which is not contained in REPPIR, is the requirement for the operator to provide a representative to attend, and be part of, the local resilience forum for the geographic area where the NPP is situated. This is contained in The Civil Contingencies Act 2004 *(Contingencies Planning) (Amendment) Regulations 2012*,Reference [10], which reiterates the REPPIR

Regulation 11, that the operator must co-operate with off-site emergency organisations, that is the local resilience forum. Each site holds its own Emergency Planning Consultative Committee (with some local resilience forum attendees) to meet the requirements of REPPIR.

The IAEA has established a number of requirements and safety guidelines on the subject of emergency management, including *GSR Part 7 Preparedness and Response for a Nuclear or Radiological Emergency,* Reference [4], GS-G-2.1 *Arrangements for Preparedness for a Nuclear or Radiological Emergency,* Reference [15], which establishes the requirements and guidance on infrastructure and function of emergency preparedness, and *Criteria for Use in Preparedness and Response for a Nuclear or Radiological Emergency*, Reference [16].

T-32.3-1 List of Applicable Codes and Standards

No.	Standard No.	Title	Date Issued
1	——	Civil Contingencies Act 2004	2004
2	——	The Civil Contingencies Act 2004 (Contingency Planning) Regulations 2005	2005
3	——	The Civil Contingencies Act 2004 (Contingency Planning) (Amendment) Regulations 2012	2012
4	No.2975	The Radiation (Emergency Preparedness and Public Information) Regulations 2001	2001
5	——	Licence Condition Handbook	2017
6	ONR-FR-REP-11-002	Japanese Earthquake and Tsunami: Implications for the UK Nuclear Industry	2011
7	ISBN 978 0 7176 2240 5	A guide to the Radiation (Emergency Preparedness and Public Information) Regulations	2001
8	——	The Fit with Other Legislation, Revision to Emergency Preparedness Chapter 19	2011
9	ISBN 185 893 9208	Dealing with Disaster	1997
10	——	Nuclear Emergency Planning and Response Guidance	2015
11	——	Civil Contingencies Act Enhancement Programme 2012, Annex 7B: Lead Responsibility for Warning and Informing the Public	2012
12	No. SSG-25	Periodic Safety Review for Nuclear Power Plants, Specific Safety Guide	2013
13	No. GSR Part 7	Preparedness and Response for a Nuclear or Radiological Emergency, General Safety	2015

No.	Standard No.	Title	Date Issued
		Requirements	
14	Safety Guide No.GS-G-2.1	Arrangements for Preparedness for a Nuclear or Radiological Emergency	2007
15	General Safety Guide No. GSG-2	Criteria for Use in Preparedness and Response for a Nuclear or Radiological Emergency	2011

32.4 Emergency Management

The UK HPR1000 operator will establish a uniform on-site emergency response organisation and define its obligations according to the requirements of relevant regulations (such as fire-fighting and medical services). The relationship between the on-site and off-site emergency organisations is shown in F-32.4-1. The detailed description of each party's responsibilities will be included in the specific on-site emergency plan. The main requirements and duties within the plan include, but are not limited to, the following:

a) Specify the tasks and interfaces of emergency response organisations;

b) Determine the nuclear emergency action level, and co-ordinate the nuclear emergency response within the plant;

c) Undertake control measures to mitigate the accident consequences;

d) Monitor radiation on site, and, if necessary, off site as well;

e) Report as soon as possible the accident conditions to national and local authority nuclear emergency organisations, competent authorities, and national nuclear safety regulatory departments and designated departments, and maintain close contact during the accident;

f) ensure provision of information to the public who might be affected by a radiation emergency; and

g) Cooperate and assist the local authority nuclear emergency organisations in the nuclear emergency response, during planning and providing liaison personnel at the Strategic Coordination Centre, Reference [12], which also applies to exercises.

A typical structure of the NPP nuclear emergency organisation is shown in F-32.4-2. It consists of the On-site Emergency Control Centre (ECC) Controller and Deputy On-site ECC Controller of the NPP and several emergency response groups including operation control group, technical support group, maintenance service group, radiological protection group and administration and logistics group. Each group is

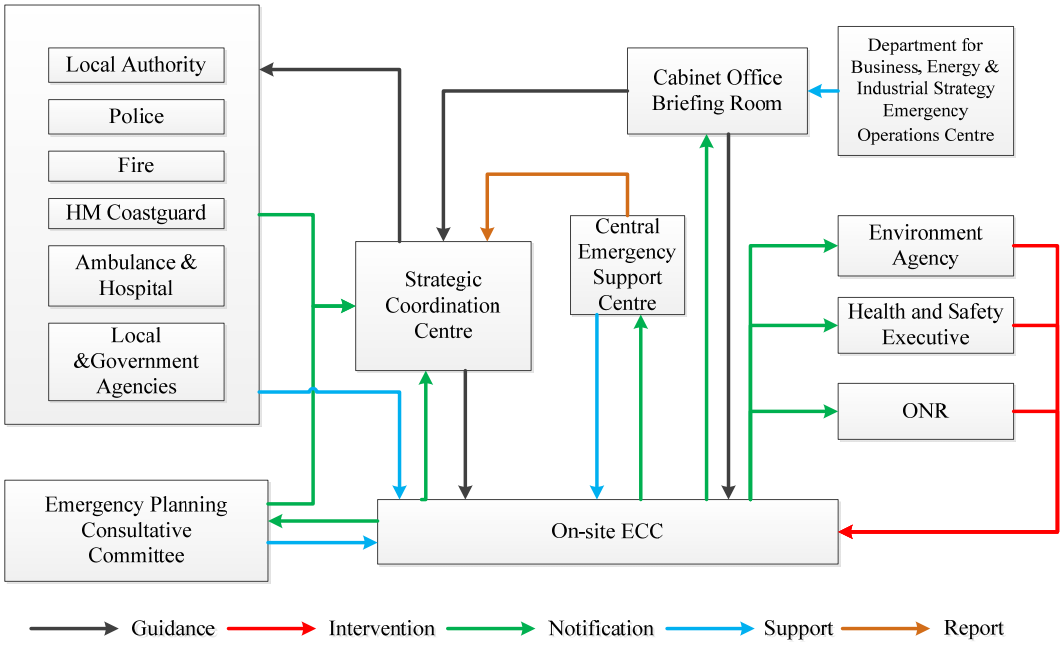
staffed with different duty-holders, such as the administration and logistics group consisting of industrial safety personnel, fire fighters, occupational medical technician and duty occupational medical and health physicists.

The On-site ECC is staffed with the On-site ECC Controller and Deputy On-site ECC Controller and several members. The range of work of emergency response groups cover communication, emergency operation, safety analysis, environmental monitoring, accident consequence evaluation, managing operations in a radiation emergency, mitigatory actions, security, logistics support, fire-fighting and medical aid.

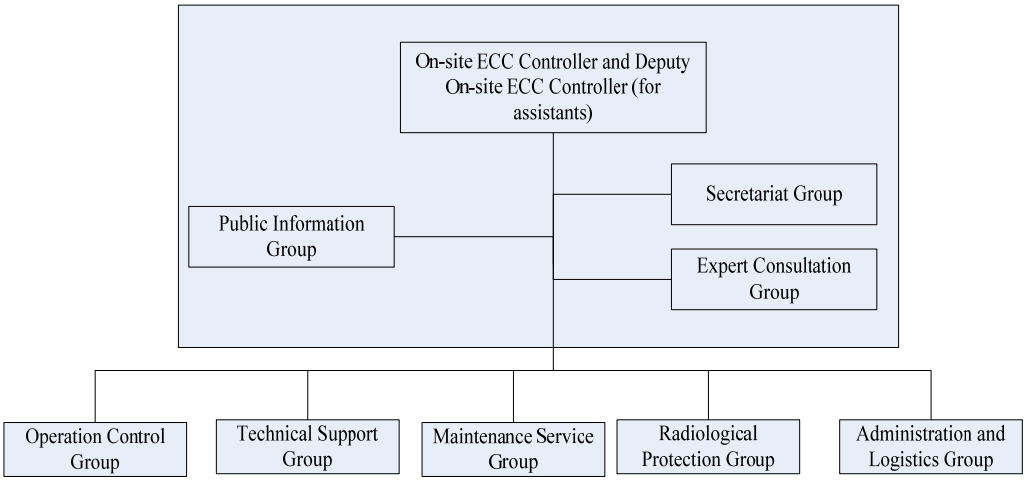
The staffing and qualification of emergency response organisation will be described in detail in the on-site emergency plan. In the UK, all emergency managers, responders and control centre support personnel must be SQEP, Reference [6].

Emergency response personnel are trained to become competent in use of emergency equipment and emergency procedures, and in particular communications equipment. Training, drills and exercises for emergency arrangements are conducted to demonstrate the overall response capability and capacity of emergency organisations. These include arrangements for continuing refresher training on an appropriate schedule and arrangements for ensuring that personnel assigned to positions with responsibilities in an emergency response undergo the specified training. The personnel responsible for critical response functions participate in drills and exercises on a regular basis so as to ensure their ability to take their actions effectively, as the requirement of Reference [4]. These will be described in detail in the on-site emergency plan. Records of training and exercises are maintained by the Human Resources Department. The emergency plan, amongst other things, forms part of the operational documentation and it is subject to the same quality assurance programme and must comply with site conditions regarding record keeping.

The detailed roles and arrangements will be further developed in the site specific PCSR.



F-32.4-1 Example of the Relationship between NPP Emergency Organisation and Off-site Emergency Organisations



F-32.4-2 Example of the NPP Emergency Organisation Structure

Note: The schematic diagram F-32.4-1 and F-32.4-2 will be changed as emergency planning arrangements for specific area change. The precise off-site emergency response arrangements will be formulated prior to commissioning, Reference [5].

32.5 On-site Emergency Response Facilities

This sub-chapter describes the basic functions of the main on-site emergency response facilities. In support of the on-site emergency management response arrangements, the UK HPR1000 on-site emergency plan will consider providing available

emergency response facilities to coordinate and manage site actions. The main on-site emergency response facilities are described below as well as the preliminary general design requirements for them. It is noted that the further design requirements for these facilities are still under development and will not be finalised during GDA. In terms of the plant layout, the locations of emergency facilities will be determined at the site specific stage.

32.5.1 Main Control Room

Main control room (MCR) is the workplace for the staff of the operation control group, where they perform relevant functions in an emergency. The functions of MCR are as follows:

a) Provide control measures for the operator to maintain or restore the safety status of the NPP； and

b) Serve as the major facility for emergency response command before start-up of the On-site ECC centre.

The MCR design ensures the effective delivery of its functions under internal and external hazards and meets the personnel habitability requirements throughout the duration of the postulated accidents.

32.5.2 Remote Shutdown Station

The remote shutdown station design is such as to ensure that the reactor can be placed and maintained in a shutdown state, residual heat can be removed, and essential plant variables can be monitored if there is a loss of ability to perform these essential safety functions in the MCR. The remote shutdown station has the same (duplicated) communications to the On-site ECC as the MCR.

32.5.3 On-site Emergency Control Centre

On-site ECC is a strategic centre and the workplace for the ECC controller and his/her staff to control and coordinate the emergency response to the extent that the on-site emergency response is efficiently managed and co-ordinated with the off-site emergency response. The On-site ECC is equipped with communication facilities with various functions, which all have interfaces to facilitate communication with on-site departments and facilities, other authorities as well as national and off-site emergency organisations.

The On-site ECC is located separately from both the MCR and the Remote shutdown station to safeguard its function, ensure it will not interfere with other on-going response actions and can be secured. On-site ECC design satisfies the requirements for personnel habitability throughout the duration of the postulated accidents. UK HPR1000 On-site ECC has been improved with Fukushima lessons drawn to ensure that the main structure has sufficient seismic capacity, Reference [7]. This

improvement is in line with relevant good practice.

32.5.4 Technical Support Centre

During the emergency response period, the Technical Support Centre (TSC) is the workplace for the staff of the technical support group where they initiate and implement emergency response actions. The staff carries out the power plant status diagnosis, prediction and evaluation, radiological consequence evaluation and gives advice to the On-site ECC on operational maintenance and protection actions. The technical support specialists work in this centre during the emergency response period. The TSC is located above the MCR, and both are mutually accessible. TSC is capable of communicating with external technical support agencies.

32.5.5 Operation Support Centre

During the emergency response period, the Operation Support Centre (OSC) serves as the workplace for the staff of the maintenance service group and administration and logistics group for emergency response. The OSC is co-located with the on-site ECC but is an independent room.

The maintenance service group assembles in the OSC to carry out their duties during the on-site and off-site emergency states.

The administration and logistics group organises and controls emergency response actions, including on-site radiation monitoring, emergency radiation control, security support, fire protection coordination, rescue, first aid, decontamination of injured personnel and medical emergency treatment.

32.5.6 Public Information Centre

Public Information Centre is the workplace for the staff of the public information group to communicate with On-site ECC by telephone, fax, video and network. The Public Information Centre is able to hold press conferences and receive the public and news media. It can also collect and issue emergency related public information and gather feedback, and release the emergency information about the nuclear power plant.

It is noted that the Public Information Centre only releases information about an incident after agreeing it with the On-site ECC controller and off-site control centre controller. This is usually coordinated by the police and local authority that have statutory responsibility for warning and informing the public, Reference [17].

32.5.7 Communication Systems

The UK HPR1000 communication systems (see Chapter 9) are designed to provide reliable and efficient communications. Effective means of communication are provided throughout the nuclear power plant to facilitate safe operation in all modes of normal operation and to be available for use after all postulated initiating events

and in accident conditions. Suitable and diverse means are provided to ensure that reliable and consistent information can be passed correctly and without delay to the interaction with organisations outside the plant, including the public. Testing and maintenance of the system equipment will be done periodically according to the manufacturer's specification. The communication systems also include regular update checks on contact numbers and for NPP personnel, linked to personnel records.

32.6 On-site Accident Management

32.6.1 Emergency Operation Procedures

Emergency operating procedures denote an important part of nuclear power plant DiD concept (including Design Extension Conditions (DEC) A). It supports and guides personal activities in preventing and managing incidental and accidental conditions (see Chapter 31, Operational Management).

EOPs are based on the state oriented approach. The fundamental objective of an emergency operation is to ensure the six basic safety functions (sub-criticality, primary pressure and temperature, primary water inventory, steam generator integrity, water inventory in steam generator and containment integrity). All the initial states of the plants are covered in emergency operating procedures. Different human-system interfaces are also considered in emergency operating procedures so as to minimise potential human or technical failures. The radiological protection issues under post-accident conditions are presented in PCSR Chapter 22.

EOPs need to take account of developments in adjacent sites during construction and commissioning, particularly where the new site is co-located with an existing nuclear licenced site, whether fully operational or decommissioning. An incident, nuclear or otherwise, may have important implications for both sites. It is good practice to recognise this possibility at an early stage of development.

32.6.2 Severe Accident Management Guidelines

Severe accident scenarios considered in safety analysis are analysed based on realistic assumptions, and dedicated severe accident mitigation measures are designed to mitigate the risk mentioned in Chapter 13. Operational guidance for severe accidents is detailed in Chapter 31.

Although the on-site emergency plan is based on reasonably foreseeable events, it is necessary to include non-reasonably foreseeable events through the concept of extendibility in REPPIR, Reference [5]. The arrangements will provide the framework for extending the response but they will not be as detailed as those for the reasonably foreseeable event.

32.7 ALARP Assessment

The following table summarises RGPs identified in Chapter 32, along with source

legislation and guidance to meet the ALARP requirement.

T-32.7-1 Summary of Relevant Good Practice

Item	Relevant Good Practice	Source	Gap Analysis
1	Suitable training for emergency response employees and those called on during their normal duty to make an emergency decision. Although not defined precisely, it is the RGP to provide a high standard of training at all levels of response, including refresher training.	REPPIR, Regulation 7.	No gap. The relevant description is presented in 32.3, 5th paragraph.
2	To keep plans up to date with experience of other accidents and changing practices.	REPPIR, Regulation 10.	No gap. The relevant description is presented in 32.3, 6th paragraph.
3	The provision of a liaison person to the local resilience forum during planning and review and to the Off-site Emergency Control Centre, which should be a technical person with sufficient seniority to advice.	CCA, Regulation 4 as 4(2) and 4(9) and amended. REPPIR, Regulation 9.	No gap. The relevant description is presented in 32.3, 7th paragraph.
4	The maintenance of training records for Suitably Qualified and Experienced Person (SQEP).	British nuclear industry requirement, see also Nuclear Emergency Planning Liaison Group for guidance notes.	No gap. The relevant description is presented in 32.4.
5	Adopting lessons learned from disasters, e.g. Fukushima.	Japanese Earthquake and Tsunami: Implications for	No gap. The relevant description is presented in

Item	Relevant Good Practice	Source	Gap Analysis
		the UK Nuclear Industry	32.5.3.
6	Emergency operations facilities should be remote from the reactor facility and depending on function may need to be off-site. Standby facilities should not be co-located with main facilities as there is a risk that both could be put out of action – common mode failure.	IAEA No. GSR Part 7 Requirement 24.	No gap. The relevant description is presented in 32.5.
7	Public Information Centre. Should be off-site and have facilities for media/press conference and interface with public. This should be done in co-operation with the local authorities who have a statutory duty on this issue.	Generally accepted in emergency planning in UK. For dissemination of information: REPPIR, Regulation 16 and CCA.	No gap. The relevant description is presented in 32.5.6.
8	When producing press statements this should be agreed with the local authority. This is an operational issue and strictly not GDA but it is worth mentioning as a new site is developed.	REPPIR, Regulation 16.	No gap. The relevant description is presented in 32.5.6.
9	Updating of emergency contacts for NPP staff should be done with Personnel Department as they should have latest contact details, especially via payroll and salaries section. Maintaining up-to-date emergency contact details is irksome but essential for efficient response.	Generally recognised as a good emergency planning and general management process.	No gap. The relevant description is presented in 32.5.8.
10	It is important to review the emergency operating procedures more frequently during the construction phase and commissioning where the new site will	REPPIR, Regulation 10.	No gap. The relevant description is

Item	Relevant Good Practice	Source	Gap Analysis
	be co-located with an existing nuclear facility, whether operational or decommissioning. Although a site specific issue it needs recognising during the GDA.		presented in 32.6.1.

32.8 Concluding Remarks

In summary, the UK HPR1000 emergency arrangements will meet the requirements of the relevant UK legislation, regulations, guidelines and standards, and of applicable standards of international organisations such as IAEA.

The UK HPR1000 emergency facilities design has also considered the lessons from the Fukushima accident. The Emergency Preparedness Plan will include information necessary to comply with REPPIR regulations, Reference [5], in site specific PCSR.

32.9 References

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[6] ONR, Licence Condition Handbook, February 2017.

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[13] HSE, A guide to the Radiation (Emergency Preparedness and Public Information) Regulations, 2001, ISBN 978 0 7176 2240 5, 2002.

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[17] Cabinet Office Civil Contingencies Secretariat, Civil Contingencies Act Enhancement Programme 2012, Annex 7B: Lead Responsibility for Warning and Informing the Public, 2012.