GE Hitachi Nuclear Energy

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BWRX-300 UK Generic Design Assessment (GDA) BWRX-300 Chapter 24 – Conventional Safety and Fire Safety Summary Report

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EXECUTIVE SUMMARY

The purpose of this PSR Chapter is to summarise the BWRX-300 Conventional Health and Safety (CHS) and Conventional Fire Safety (CFS) assessments performed for the UK's Generic Design Assessment (GDA) process, including the extent to which these assessments comply with UK regulatory expectations.

CHS and CFS assessments were performed for the BWRX-300 Power Block buildings.

This chapter presents a level of detail commensurate with a 2 Step GDA. It is split into two main sections, which separately summarise the CHS and CFS assessment work performed.

The CHS and CFS assessments were similar in their approach, the general purpose of each assessment was to:

- Identify the appropriate UK CHS/CFS regulatory expectations.
- Define methods that could be used to identify the gaps between UK regulatory expectations and what information was currently available in the existing design.
- Define methods for assessing the identified gaps and determining how these may be addressed, which may include the need to perform further work.
- To apply the defined methods for identifying and assessing potential gaps to UK regulatory expectations, within Power Block building assessment workshops.
- To capture the results of the CHS/CFS workshops performed, the potential gaps to UK regulatory expectations that were identified, and any actions that were placed to address them.

The scope of the CHS assessment work included:

- Conventional H&S considerations, appropriate for Steps 1 and 2 of the UK's GDA process.
- The methodology for identifying and addressing gaps.
- Assessments of Power Block buildings, applying the defined methodologies.
- Consideration of Dangerous Substances and Explosive Atmosphere Regulations (DSEAR).
- How interfacing discipline areas will be considered, e.g., civil engineering, mechanical lifting operations and human factors engineering.

The scope of the CHS assessment work excluded:

- Nuclear safety, environmental safety, life fire safety, security, safeguards, and radiation protection; with the exception of interfacing chapter considerations.
- Quantitative risk considerations.

The scope of the CFS assessment work included:

- CFS considerations, appropriate for Steps 1 and 2 of the UK's GDA process.
- The methodology for identifying and addressing departures.
- Assessments of Power Block buildings, applying the defined methodologies.
- How interfacing discipline areas will be considered, e.g., civil, electrical, and structural engineering, and Instrumentation and Control.

The scope of the CFS assessment work excluded:

- Nuclear safety (including nuclear fire safety), conventional H&S, environmental safety, security, safeguards, and radiation protection; with the exception of interfacing chapter considerations.
- DSEAR, which was considered within the scope of the CHS assessments.
- Fire safety for construction activities.
- Quantitative risk considerations.

The CHS assessment work considered the Reactor Building (RB), Turbine Building (TB) and Radwaste Building (RWB), whereas the CFS assessments considered all Power Block Buildings.

The CFS assessments resulted in ten gaps to UK regulatory expectations being identified and proved the effectiveness of the defined assessment approach. There were no CHS gaps identified that could not be addressed by normal business activities during plant construction, commissioning, or operations. None of the CHS gaps identified were considered to require any plant design or significant operational changes.

The key chapters that interface with the CHS and CFS work are described.

Claims and arguments relevant to GDA step 2 objectives and scope are summarised in Appendix A, along with an ALARP position. Appendix B provides a Forward Action Plan, which includes future work commitments where gaps to GDA expectations were identified.

ACRONYMS AND ABBREVIATIONS

Acronym	Explanation
ACoP	Approved Code of Practice
ALARP	As Low As Reasonably Practicable
BL3	Baseline 3
BS	British Standard
BWR	Boiling Water Reactor
CAE	Claim, Argument, Evidence
CDM	Construction Design Management
CFS	Conventional Fire Safety
CHS	Conventional Health and Safety
COMAH	Control of Major Accident Hazard
CST	Condensate Storage Tank
DSEAR	Dangerous Substances and Explosive Atmosphere Regulation
ECI	Export Controlled Information
EMIT	Examination Maintenance Inspection and Testing
FAP	Forward Action Plan
H&S	Health and Safety
HSWA	Health and Safety at Work Act
HSE	Health and Safety Executive
GDA	Generic Design Assessment
GEH	GE-Hitachi Nuclear Energy
I&C	Instrumentation and Control
IAEA	International Atomic Energy Agency
IRR	Ionising Radiation Regulations
MSQA	Management System and Quality Assurance
NDT	Non-Destructive Testing
NISR	Nuclear Industries Security Regulations
ONR	Office for Nuclear Regulation
OPEX	Operational Experience
PSA	Probabilistic Safety Assessment
PSR	Preliminary Safety Report
PUWER	Provision and Use of Work Equipment Regulation
QA	Quality Assurance
RB	Reactor Building
RGP	Relevant Good Practice
RP	Requesting Party

Acronym	Explanation
RR(FS)O	Regulatory Reform (Fire Safety) Order 2005
RWB	Radwaste Building
RWST	Refuelling Water Storage Tank
SAP	Safety Assessment Principle
SCDS	Safety Case development Strategy
SMR	Small Modular Reactor
SNI	Sensitive Nuclear Information
SSC	Structures, Systems and Components
TB	Turbine Building
UK	United Kingdom

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None.

REVISION SUMMARY

Revision #	Section Modified	Revision Summary
A	All	Initial Revision
B	All	Update for end of GDA Step 2 consolidation

24 CONVENTIONAL SAFETY AND FIRE SAFETY SUMMARY REPORT

Introduction

In addition to nuclear safety, the United Kingdoms (UKs) nuclear industry regulator “The Office for Nuclear Regulation” (ONR) also has responsibility for regulating Nuclear Site Health and Safety, including Conventional Health and Safety (CHS) and Conventional Fire Safety (CFS) matters. Their overall aims are to ensure that risks to workers and the public can be reduced As Low As Reasonably Practicable (ALARP), and to ensure that proposed reactor designs are capable of meeting UK regulatory expectations for protecting the Health and Safety (H&S) of personnel.

The purpose of this Preliminary Safety Report (PSR) Chapter is to summarise the BWRX-300 CHS and CFS assessments performed for the UK’s Generic Design Assessment (GDA) process, including the extent to which these assessments comply with UK regulatory expectations.

CHS and CFS assessments were performed for the BWRX-300 Power Block buildings.

This chapter presents a level of detail commensurate with a 2 Step GDA and is presented in two main sections as follows:

- A CHS assessment work summary in Section 24.2.
- A CFS assessment work summary in Section 24.3.

For the BWRX-300 UK GDA project, the assessment of CHS and CFS risks focused on the following activities:

- Identifying the UK regulatory expectations, in terms of codes, standards, Relevant Good Practice (RGP), regulations and legislation that must be complied with, and demonstrating that these were understood.
- Developing strategies to identify any gaps between UK regulatory expectations and what information is currently available in the existing design.
- Defining a method for assessing any identified gaps.
- Applying the defined methods for identifying and assessing potential gaps to UK regulatory expectations to reactor plant (i.e., Power Block) buildings.
- Capturing the results of the building assessments, including summarising any gaps to UK regulatory expectations, and making recommendations to address the gaps.

In ONR-GDA-GD-006, “New Nuclear Power Plants: Generic Design Assessment Guidance to Requesting Parties,” (Reference 24-1) and ONR-GDA-GD-007, “New Nuclear Power Plants: GDA Technical Guidance,” (Reference 24-2), ONR state that key areas for assessment will be selected in the context of the design and recognised areas of known risks that are most likely to cause harm, including design aspects considered innovative or unusual to the ONR. ONR-GDA-GD-007 (Reference 24-2) has been used in order to define the scope of the CHS and CFS work required for a 2-Step GDA.

The key chapters that interface with the CHS and CFS work are described below.

Claims and arguments relevant to GDA step 2 objectives and scope are summarised in Appendix A, along with an ALARP position. Appendix B (Table B-1) provides a Forward Action Plan (FAP), which includes future work commitments where gaps to UK GDA expectations were identified.

Interfaces with Other Chapters

This document interfaces with the following Chapters:

- Chapter 3: Safety objectives and design rules for Structures, Systems and Components (SSC) - provides the general principles for the application of laws, regulations, codes, and standards.
- Chapter 7: Instrumentation and Control - Ensuring an ergonomic design, e.g., to align with the Provision and Use of Work Equipment Regulations (PUWER).
- Chapter 8: Electrical Power - CHS and CFS risks associated with electrical power systems are considered within the GDA assessments performed.
- Chapter 9B: Civil Structures - CDM 2015 for the design/management and risk assessment of construction activities, including excavations and ground works.
- Chapter 11: Management of Radioactive Waste - A workshop reviewing CHS aspects of the RWB was performed, e.g., considering IRR 2019.
- Chapter 13: Conduct of operations - Operational activities were considered as part of the scope of the CHS assessments.
- Chapter 14: Plant construction and commissioning - CHS and CFS risks associated with plant construction and commissioning activities are considered within the GDA assessments performed, e.g., CDM 2015 and risks associated with buildability and operations.
- Chapter 15.7: Internal Hazards - CHS and CFS risks associated with internal hazards (e.g., fire and hazardous substances) are considered within the GDA assessments performed.
- Chapter 17: Management for safety - Management Safety and Quality Assurance (MSQA) arrangements are implemented in the design process and in the production of the CHS and CFS assessment work. These management arrangements include the organisation for the project, training, and competence information, plus the processes and procedures of design risk management for CHS during the GDA stage.
- Chapter 18: Human Factors engineering - CFS risks associated with building evacuations have human factors considerations associated with them. The approaches to managing CHS risks likewise consider human factors, e.g., the ergonomic management of control of plant to reduce human error.
- Chapter 19: Emergency Preparedness and Response - The approaches to both emergency evacuation and response depend upon CHS and CFS factors, e.g., fire evacuation arrangements and CHS legislation.
- Chapter 21: Decommissioning and end of life aspects - Decommissioning activities were considered as part of the scope of the CHS assessments.
- Chapter 25: Security - Security considerations interface in particular with the CFS work, e.g., considering the number and location of evacuation points. Site access/egress control and CHS risk assessments.
- Chapter 27: ALARP Evaluation - The CHS and CFS GDA work performed (and summarised here) supports the development of a future ALARP argument.

24.1 Claims, Forward Action Plan and Interfaces

24.1.1 Claims

The ONR "Safety Assessment Principle for Nuclear Facilities," (SAPs) 2014, (Reference 24-3) identify ONR's expectation that a safety case should clearly set out the trail from safety claims, through arguments to evidence.

A GDA Claims, Argument, Evidence (CAE) structure has been defined within the Safety Case Development Strategy (SCDS), NEDC-34140P, "BWRX-300 GDA Safety Case Development Strategy," (Reference 24-4) and is a logical breakdown of the overall claim that:

> *"The BWRX-300 is capable of being constructed, operated and decommissioned in accordance with the standards of environmental, safety, security and safeguard protection required in the UK."*

This overall claim is broken down into Level 1 claims relating to environment, safety, security, and safeguards, which are then broken down again into Level 2 area related sub-claims and then finally into Level 3 (chapter level) sub-claims.

The Level 3 sub-claims and derived arguments, that this chapter identifies future means of compliance against, are identified within Appendix A. It is considered that the evidence identified to support the derived arguments, and thereby the Level 3 chapter sub-claims, will support a future demonstration that CHS and CFS risks may be reduced ALARP.

24.1.2 Forward Action Plan

A project Forward Action Plan (FAP) item process is in place to manage any gaps to either GDA or other UK regulatory expectations, see NEDC-34274P, "BWRX-300 UK GDA Forward Action Plan," (Reference 24-5).

Where such gaps were identified for the CHS and/or CFS disciplines, then these are included within Appendix B.

24.1.3 Interfaces

The BWRX-300 GDA safety submission being delivered integrates environmental protection, safety, security, and safeguards as defined in NEDC-34140P (Reference 24-4).

The nuclear and conventional safety aspects of the BWRX-300 GDA safety submission are included within a PSR, which is broken down into a number of chapters that align with the internationally accepted guidance in International Atomic Energy Agency (IAEA) SSG-61, "Format and Content of the Safety Analysis Report for Nuclear Power Plants," (Reference 24-6). The key PSR chapters that interface with the CHS and CFS work are described above.

24.2 Conventional Health and Safety

The CHS summary information presented within this section was taken from the BWRX-300 Conventional Safety Strategy report, NEDC-34145P, "BWRX-300 UK GDA Step 1 Conventional Safety Strategy," (Reference 24-7):

The purpose of the CHS report was to:

- Identify UK regulatory expectations for the required conventional H&S assessments.
- Define a method that could be used to identify the gaps between UK regulatory expectations and what information was currently available in the existing design.
- Define a method for assessing the identified gaps and determining how these were to be addressed, which may include the need to perform further work.
- Provide a description of the UK's conventional safety regulatory requirements, to enhance the Requesting Party's (RPs) knowledge of the UK-specific regulatory expectations and explain how compliance against these expectations may be managed throughout the project lifecycle.
- To apply the defined method for identifying and assessing potential gaps to UK H&S regulatory expectations, within Power Block building assessment workshops.
- To capture the results of the workshops performed, which identified potential gaps, their significance and the actions placed to address them.

The scope of the CHS report included:

- Conventional H&S considerations, appropriate for Steps 1 and 2 of the UK's GDA process.
- The methodology for identifying and addressing gaps.
- Consideration of DSEAR.
- How interfacing discipline areas will be considered, e.g., civil engineering, mechanical lifting operations and human factors engineering.

The scope of the CHS report excluded:

- Nuclear safety, environmental safety, life fire safety, security, safeguards, and radiation protection; with the exception of interfacing Chapter considerations.
- Quantitative risk considerations.

24.2.1 Applicable Acts, Regulations, Approved Code of Practice, and Guidance Documents

A detailed listing of UK H&S codes, standards, guidance, regulations, and legislation is presented in Appendix A of NEDC-34145P (Reference 24-7).

Key UK H&S legislation includes:

- The Health and Safety at Work Act 1974 (HSWA).
- Energy Act 2013.
- CDM Regulations 2015.
- Workplace (Health, Safety and Welfare) Regulations 1992.
- Lifting Operations and Lifting Equipment Regulations 1998.
- Dangerous Substances and Explosive Atmosphere Regulations 2002.

- Working at Height Regulations 2005.
- Confined Spaces Regulations 1997.
- PUWER 1998.
- British Standard (BS) 5975:2019 Temporary Works.
- The Manual Handling Operations Regulations 1992 amended 2002 and Manual Handling – Manual Handling Operation Regulations 1992.
- The Planning (Hazardous Substances) (Amendment) Regulations 2015.

Under the HSWA 1974 and the Energy Act 2013, there is a fundamental responsibility on duty holders to reduce risk ALARP.

The HSWA is supported by a number of Approved Codes of Practice (ACoPs), which provide guidance and RGP for certain disciplines. Each ACoP is approved by the UK's Health and Safety Executive (HSE) and provides practical advice on how to comply with the law. If the ACoP advice is followed, then that is sufficient to comply with the law in respect of those specific matters on which each ACoP gives advice. Key CHS hazards, which have associated ACoPs are as follows:

- Working at height.
- Collapse of excavations.
- Collapse of structures.
- Exposure to building dusts.
- Exposure to asbestos.
- Electricity.
- Lifting operations.
- Working in confined spaces.

24.2.2 Requirements and Strategy

Compliance with UK H&S legislation is a legal requirement, e.g., HSAWA and the Construction (Design Management) (CDM) regulations. In order to have confidence that the BWRX-300 concept design would be able to comply with all UK H&S legal requirements a 5-step strategy was developed, as follows:

1. Step One: Identification of UK H&S legislation and expectations.
2. Step Two: Identify what conventional H&S regulations/standards are included within the Hitachi BWRX-300 design and to what extent these address UK H&S expectations.
3. Step Three: Identify any significant differences between the step one and step two information, (i.e., are there any gaps to UK expectations).
4. Step Four: Identify how to close any gaps between the step one and step two information to achieve compliance with UK H&S legislation.
5. Step Five: Track the implementation from the output of the gap analysis in step four and test for validation.

24.2.3 Summary of the Generic Design Assessment Activities Performed

The 5-step strategy was implemented as follows:

1. Step One (UK H&S Legislation and Expectations).

- Relevant UK H&S legislation was identified (this is detailed in Appendix A of NEDC-34145P (Reference 24-7).

2. Steps Two and Three (Gap Identification)

- It was considered impractical to try and identify all UK H&S regulatory expectations, as this would have been an extensive and unmanageable list. It was therefore considered reasonable to use a H&S hazard checklist proforma against which the BWRX-300 design could be compared. A series of workshops were then held, as follows:
  - Workshops to make all stakeholders aware of the UK H&S regulatory expectations. This took the form of presentations to the relevant CHS stakeholders (who participated in the subsequent workshops) describing UK H&S regulatory expectations, legislation, and guidance.
  - Workshop to discuss and agree a suitable and manageable suite of construction, operation and/or maintenance activities including decommissioning that could be assessed in the subsequent workshops with respect to UK H&S regulatory expectations. A H&S hazard checklist proforma was proposed and agreed at this workshop.
  - Turbine Hall Assessment workshop – The proposed proforma was employed identifying the key H&S legislation and expectations applicable covering the life cycle of the BWRX-300 plant. The contents of this proforma were agreed at the start of the workshop and then systematically worked through to identify any differences between the UK H&S expectations and what has been included within the existing BWRX-300 design (See Appendix C of Reference 24-7).
  - Radwaste Building Assessment workshop - The proforma was employed identifying the key H&S legislation and expectations applicable covering the life cycle of the BWRX-300 plant. The contents of this proforma were agreed at the start of the workshop and then systematically worked through to identify any differences between the UK H&S expectations and what has been included within the existing BWRX-300 design (See Appendix D of Reference 24-7).
  - Reactor Building Assessment workshop - The proforma was employed identifying the key H&S legislation and expectations applicable covering the life cycle of the BWRX-300 plant. The contents of this proforma were agreed at the start of the workshop and then systematically worked through to identify any differences between the UK H&S expectations and what has been included within the existing BWRX-300 design (See Appendix E of Reference 24-7).

The outputs from the above workshops were also shared with other disciplines, who were unable to attend the workshops, to capture further feedback to the workshop results.

3. Step Four (Gap Assessment)

   Once gaps to UK H&S regulatory expectations had been identified (in Steps 2 and 3 above) an additional review was held to agree how the identified gaps should be closed/actioned (see Appendix F of Reference 24-7).

   The workshop gaps identified were categorised as follows:

   - No apparent issue.
   - Further investigation required.
   - Deviation we cannot comply with.

The focus during the gap assessment was, to assess how gaps should be addressed in accordance with UK regulatory expectations. There were zero gaps rated as (iii). The gaps rated as (ii) were reviewed to propose future actions to comply with UK expectations. All discussions and decisions were recorded.

4. Step Five (Proposed GDA Actions and Track Implementation)

   Having completed the process detailed above (methods, analysis, and actions) numerous normal business related actions were identified that require further investigation. These have been captured as a single over-arching forward action within the BWRX-300 FAP item list (see Appendix B), so that they can be managed appropriately.

24.2.4 Gap Management

The CHS workshops performed did not identify any UK regulatory expectations that could not be complied with as part of a UK deployed plant. However, the workshops did identify numerous UK regulations that would require future site-specific work in order to demonstrate compliance against them. These gaps to UK regulatory expectations had actions raised against them which will be managed via the projects FAP item process, NEDC-34274P (Reference 24-5).

24.2.5 As Low As Reasonably Practicable Assessment

The four fundamental aspects of the approach to demonstrate that risks have been reduced ALARP are:

- RGP has demonstrably been followed.
- Operational Experience (OPEX) has been taken into account within the design process.
- All reasonably practicable options to reduce risk have been incorporated within the design.
- Quantitative dose/risk calculations comply with numerical dose/risk targets and a balanced design has been achieved, (i.e., no fault sequences contribute a disproportionately large part of the overall risk).

In terms of CHS, UK H&S regulatory expectations, RGP were defined in NEDC-34145P (Reference 24-7), which then demonstrated that there were no gaps against this RGP that could not be dealt with via future normal business actions. These future actions will require site-specific assessment work, which will consider reasonably practicable options to reduce CHS risks, while also taking into account their potential impact on other risk areas, e.g., nuclear, and environmental safety.

In terms of OPEX, GEH have decades of Boiling Water Reactor (BWR) design and operating experience, and it is considered that the BWRX-300 design has benefited greatly from this.

Probabilistic Safety Assessment (PSA) work is beyond the scope of the GDA CHS assessment work, and thus its potential impact on dose/risk targets cannot be quantified. However, it is considered that the RGP, OPEX and reasonable practicability aspects of the future CHS work will support a future site-specific ALARP argument.

24.2.6 Conclusions

The CHS strategy report, NEDC-34145P (Reference 24-7) performed the following activities:

- Identified the UK's regulatory expectations for the required UK conventional H&S assessments.
- Described the UK's CHS requirements and how compliance with them may be managed through the lifetime of the plant.
- Defined a method for identifying the gaps between UK H&S regulatory expectations and the currently available BWRX-300 design information.
- Defined a method for assessing identified gaps and determined how these should be addressed.
- Applied the gap identification and assessment methods to the Power Block buildings across numerous workshops.
- Presented all the associated workshop results, and all proposed actions associated with potential UK H&S Regulatory expectation gaps identified, which are to be carried into the next stages of the BWRX-300 design.

Having completed the process detailed above (methods, analysis, and actions) numerous normal business related actions were identified that require further investigation (see Section 5 of NEDC-34145P Reference 24-7). These future actions were then captured within the overall BWRX-300 FAP items list, under a single over-arching forward action.

There were no conventional H&S gaps identified that were of such a significance that they could not be addressed by normal business actions during plant construction, commissioning, or operations.

24.3 Conventional Fire Safety

The CFS summary information presented within this section was taken from NEDC-34146P, “BWRX-300 UK GDA Step 1 Conventional Fire Safety Strategy,” (Reference 24-8).

The purpose of the CFS report was to:

- Identify UK regulatory expectations for the required CFS assessments.
- Define a method that could be used to identify the departures between UK regulatory expectations and what information was currently available.
- Define a method for assessing the identified departures and determining how these may be addressed, which may include the need to perform further work.
- Apply the methods for identifying and assessing departures with respect to UK regulatory expectations for the RB.

The scope of the CFS report included:

- CFS considerations, appropriate for Steps 1 and 2 of the UK’s GDA process.
- The methodology for identifying and addressing departures.
- Assessments of Power Block buildings, applying the defined methodologies.
- How interfacing discipline areas will be considered, e.g., civil, electrical, and structural engineering, and Instrumentation and Control (I&C).

The scope of the CFS report excluded:

- Nuclear safety (including nuclear fire safety), conventional H&S, environmental safety, security, safeguards, and radiation protection; with the exception of interfacing Chapter considerations.
- DSEAR, which was considered within the scope of the CHS assessments.
- Fire safety for construction activities.
- Quantitative risk considerations.

24.3.1 Applicable Acts, Regulations, Approved Code of Practice and Guidance Documents

In line with UK legislation, fire risk management needs to be considered consistently across all areas to ensure that risk to workers and the public is reduced ALARP, as promulgated in the Health and Safety at Work Act (HSWA).

The UK HSWA requires consideration of both the direct effects of fire on peoples CFS and the effects of ionizing radiation on people resulting from fire events (nuclear fire safety). Nuclear Fire Safety is out of the scope of this report, although there is a significant interface with the internal hazards assessment of internal fires.

The Regulatory Reform (Fire Safety) Order 2005 (RR(FS)O) is the major piece of UK fire legislation and covers general fire precautions and other fire safety duties. The RR(FS)O requires fire precautions to be put in place where necessary and to the extent that it is reasonable and practicable and covers the design and occupation of buildings.

The Building Regulations 2010 exercise powers given in the Building Act 1984 and generally apply to the design and construction of buildings in England and Wales, rather than their occupation. Part B of Schedule 1 to the Building Regulations 2023 presents functional requirements for Fire Safety within buildings, covering:

- B1 - Means of warning and escape.
- B2 - Internal fire spread (linings).
- B3 - Internal fire spread (structure).
- B4 - External fire spread.
- B5 - Access and facilities for the fire service.

Scotland and Northern Ireland both have separate regulations covering the requirements for buildings, in the Building (Scotland) Regulations 2004 and The Building Regulations (Northern Ireland) 2012.

However, an exemption is included in the three sets of regulations above for buildings erected on a site in respect of which a license under the Nuclear Installations Act 1965 is in force. Despite this, in line with Regulatory expectations, the BWRX-300 will aim to comply with the fire specific functional requirements of Building Regulations via the application of suitable RGP.

The CDM Regulations 2015 place legal duties on those involved in construction work, commonly referred to as duty holders, which include clients, principal designers, designers, principal contractors, contractors, and workers. These regulations are much broader in scope than fire related issues. However, CDM requires that, where conclusions and recommendations of the fire strategy specify particular materials, products, or forms of construction, these will be assessed in accordance with CDM Regulations.

Nuclear materials are not assessed as dangerous substances under the Control of Major Accident Hazards (COMAH) Regulations 2015, however nuclear sites may be subject to COMAH where quantities of dangerous substances identified in the regulations are kept or used above the threshold levels. Therefore, the possibility exists that COMAH regulations may impact the storage of flammable materials within the BWRX-300 plant design, though it is considered unlikely that stored volumes of flammable materials in the GDA design will exceed thresholds in COMAH.

Note: The DSEAR 2002 were not included within the scope of the CFS workshops. DSEAR was considered within the scope of the CHS workshops, i.e., to demonstrate that there were no plant design aspects that would prevent complying with these regulations in future.

The Building Regulations 2023, Building (Scotland) Regulations 2004 and Building Regulations (Northern Ireland) 2012 all have associated guidance documents. All are accepted methods of meeting the relevant country specific Building Regulations, though are generally suited more to simple buildings.

BS 9999: 2017, “The code of practice for fire safety design, management and construction of buildings” is also an accepted way of meeting the functional requirements of the UK wide Building Regulations as well as the building construction related requirements of the RR(FS)O. As a code of practice, it contains elements of good fire safety management and design practice, covering life safety and the enhancement of property protection and business continuity.

It was decided that if the BWRX-300 plant buildings could be demonstrated to comply with the expectations RGP of BS 9999 then compliance against UK fire safety expectations would effectively have been achieved.

24.3.2 Requirements and Strategy

Compliance with UK H&S legislation is a legal requirement, e.g., HSWA and the CDM regulations. In order to have confidence that the BWRX-300 concept design would be able to comply with UK CFS regulatory expectations a fire safety assessment strategy was developed in NEDC-34146P (Reference 24-8).

It was considered that the BWRX-300 Power Block building designs were sufficiently developed to consider building details for compliance against the recommendations of BS 9999:2017. The fire safety assessment strategy was applied to the Power Block buildings, as follows:

1. Identify and record any assumptions made that form the basis of the compliance assessment.
2. Undertake a tabulated compliance assessment of the BS 9999 "Code of Practice for Fire Safety Design, Management and Construction of Buildings," (Reference 24-9). This tabulated assessment detailed the relevant clauses of the standard, whether compliance was considered to be achievable, and if not, describe the departure.
3. All identified departures were then subjected to a graded sentencing approach (described below).
4. Following initial sentencing, workshops were held to consider options for the justification, rectification, or mitigation of each departure with a focus on those departures sentenced as more significant.
5. Once options had been established for the departures, they were prioritised based on their potential impacts on the plant design, considering the nature of the relevant recommendations made in BS 9999.
6. Justifications were developed to close departures where feasible, which would take cognisance of risk mitigation measures implemented, above the recommendations within BS 9999 (Reference 24-9) due to safety case or asset protection requirements.
7. Where departures could not be closed out during the GDA process, they were recorded as needing resolution during a future UK site specific assessment.

24.3.3 Summary of the Generic Design Assessment Activities Performed

The 7-step strategy was implemented as follows:

1. Step One (Identify and record any assumptions made)

    - Relevant UK fire safety legislation was identified (this is detailed in Section 3 NEDC-34146P (Reference 24-8), and summarised in Section 24.3.1 above), which includes a number of assumptions, e.g., the BS9999 guidance is based on the assumption that under normal circumstances (i.e., except in the case of arson) a fire is unlikely to start in two different places in a building.
    - Detailed descriptions of the Power Block building floor layouts, including fire safety mitigation features, are presented in Section 6 of NEDC-34146P (Reference 24-8), which aligns with the GDA project's defined design reference, NEDC-34154P, "BWRX-300 UK GDA Design Reference Report," (Reference 24-10).
    - Building occupancy, fire detection, management and fire growth rate assumptions were detailed as part of the building Minimum Fire Safety Package, which is defined in Section 7 of NEDC-34146P (Reference 24-8).

2. Step Two (Undertake tabulated building compliance assessments against BS 9999)
   - Detailed Power Block building compliance assessments were undertaken against the guidance given in BS 9999 (Reference 24-9), the results of which are presented in the Appendices of NEDC-34146P (Reference 24-8).
   - The outcome of the assessments was that the buildings were considered to be largely compliant with BS 9999; however, ten departures were identified where the reference design NEDC-34154P (Reference 24-10) did not meet the guidance and recommendations provided in BS 9999.
   - The ten departures identified were as follows:
     - Departure 1: Lack of a fire-fighting shaft in the RB.
     - Departure 2: Lack of Basement Smoke Venting. The RB is not provided with a Heat and Smoke Control System to provide a route for smoke to escape to the open air from the basement levels.
     - Departure 3: Lack of RB Compartment Floors in the Basement Levels. Basement floors are not compartment floors, including the ground floor over a basement due to risers not being fire rated and Hatches are open, which means that floors are connected.
     - Departures 4 and 5: Lack of subdivision in the hallways in the Control Building, leading to a BS 9999 non-compliance.
     - Departure 6: Lack of subdivision in the hallway connecting the Turbine Building and the Service Building, leading to a BS 9999 non-compliance.
     - Departure 7: BS 9999 non-compliant single maximum travel distance from the RWST and CST Room in the Turbine Building.
     - Departures 8 and 9: BS 9999 non-compliant single and two-ways maximum travel distances from the Condenser Area and Shield Area in the Turbine Building.
     - Departure 10: Lack of a protected corridor in a final exit in the Control Building from stair B in the Reactor Building, leading to a BS 9999 non-compliance.
3. Step Three (Departures were then subjected to a graded sentencing approach)
   - The graded departure sentencing approach included the following stages:
     - Departure identification and grouping: capturing similar departures across a building.
     - Departure sentencing: identifying the risk significance of departures to ensure that departures were assessed proportionate to their risk.
     - Departure optioneering: which considered preliminary optioneering as a means of identifying potential future ways of addressing departures.
     - Departure prioritisation: to consider the post-preliminary optioneering level of residual risk associated with departure closure. For example, a more challenging departure could be more difficult to address and retain a level of safety risk, which in turn would then require further justification.

   The graded approach covered Steps 2 to 5 of the 7-step CFS strategy. However, as only 10 departures were identified (and departures 4 to 10 were relatively minor) minimal sentencing was performed/required.

4. Step Four (Workshops held to consider departure options, i.e., optioneering)
    - Several workshops were held with fire protection, mechanical, civil, and electrical disciplines to understand UK regulatory expectations for CFS (training session first) and then to identify departure options (optioneering workshops after training).
    - Extensive workshop notes were recorded, which were used to inform the optioneering portion of the departure reports, which are presented in the Appendices of NEDC-34146P (Reference 24-8).
5. Step Five (Departures options were prioritised, based on their potential plant impacts)
    - Preliminary optioneering solutions to the identified departures were considered within the workshops described above. It was not considered necessary to perform any prioritisation.
6. Step Six (Justifications produced for closed departures)
    - There were no closed departures per se, however it is noted that where preliminary optioneering was performed this is anticipated to inform future departure resolution.
7. Step Seven (FAP - Post-GDA departure resolution process)
    - A project decision was made not to make any design changes to the BWRX-300 Standard Plant design until such time as a UK build programme was in place. Therefore, the identified departures were included within the project's FAP item list, to be addressed in a future site-specific licensing phase (post-GDA); also see Appendix B. The preliminary optioneering work performed in Step 5 may be used to inform future decision making.

24.3.4 Gap Management

The CFS workshops performed identified ten departures against UK regulatory expectations, that could require UK-specific solutions as part of future site-specific licensing. These gaps to UK regulatory expectations have FAP action items raised against them which will be managed via the project's formal FAP process, NEDC-34274P (Reference 24-5).

24.3.5 As Low As Reasonably Practicable Assessment

The four fundamental aspects of the approach to demonstrate that risks have been reduced ALARP are:

- RGP has demonstrably been followed.
- OPEX has been taken into account within the design process.
- All reasonably practicable options to reduce risk have been incorporated within the design.
- Quantitative dose/risk calculations comply with numerical dose/risk targets and a balanced design has been achieved, i.e., no fault sequences contribute a disproportionately large part of the overall risk.

In terms of CFS, UK fire safety regulatory expectations (RGP) was defined in NEDC-34146P (Reference 24-8). Subsequent workshops then identified ten potential departures (gaps) to UK fire safety regulatory expectations. Notwithstanding the departures identified, it is considered that the Power Block CFS risk is low, and that the fire safety measures already incorporated within the Power Block building designs often go beyond what is required by UK RGP (i.e., BS 9999, (Reference 24-9)).

Project FAP items have been implemented to manage the departures, and future site-specific assessment work will consider all reasonably practicable options to resolve these departures and reduce risks ALARP. Multi-disciplinary optioneering work, supported by UK OPEX, will support the development of future departure resolutions.

GEH have decades of BWR design and operating experience, and it is considered that the BWRX-300 design has benefited greatly from this. Any future fire safety departure resolution will need to consider risks holistically, trading-off different technical discipline requirements, considering existing design requirements and considering all departures collectively to develop an optimised solution. It is considered that the preliminary optioneering work, performed as part of the workshops, will support future optioneering studies.

PSA work is beyond the scope of the GDA CFS assessment work, and thus its potential impact on dose/risk targets cannot be quantified. However, it is considered that the RGP, OPEX and reasonable practicability aspects of the future CFS work will support a future site-specific ALARP argument.

24.3.6 Conclusions

The report NEDC-34146P (Reference 24-8) performed the following activities:

- Identified UK regulatory expectations for the required CFS assessments.
- Defined a method that could be used to identify the departures between UK regulatory expectations and what information was currently available.
- Defined a method for assessing the identified departures and determining how these may be addressed, which may include the need to perform further work.
- Applied the methods for identifying and assessing departures with respect to UK regulatory expectations to the Power Block buildings.

Ten CFS departures were identified within a suite of workshops, that compared the Power Block buildings designs to the UK's fire safety regulatory expectations (BS 9999, (Reference 24-9)).

Preliminary optioneering studies were performed within the CFS workshops, in order to identify potential solutions to the identified departures. Any future fire safety departure resolution will need to consider risks holistically, trading-off different technical discipline requirements, considering existing design requirements and considering all departures collectively to develop an optimised solution. It is considered that the preliminary optioneering work, performed as part of the workshops, would support such future optioneering studies.

Notwithstanding the departures identified, it is considered that the Power Block CFS risk is low, and that the fire safety measures already incorporated often go beyond what is required by UK RGP (i.e., BS 9999, (Reference 24-9)).

Project FAP items have been implemented to manage the departures identified, and future site-specific assessment work will consider all reasonably practicable options to resolve these departures.

At the conclusion of the GDA conventional fire safety assessment process, it is recognised that a total of 10 departures from UK RGP have been identified. Although preliminary optioneering has been undertaken to document potential forward paths for these departures, the BWRX-300 design is continuing to mature. It is understood there is more work to do with the conventional fire safety departures before a final outcome can be agreed that aligns with the need to show risks due to fire are acceptable and ALARP. Therefore, more detailed optioneering for all departures will be undertaken post-2 Step GDA in order to be able to support a future site-specific licensing phase of the project. During the more detailed optioneering workshops, all relevant stakeholders will be engaged with a further developed BWRX-300 design and the potential interplay between departures will be considered to ensure any cumulative effects of multiple departures are addressed.

This future detailed work presents the possibility that additional options to address departures may be identified and it is also possible that some of the current options the team has already identified in NEDC-34146P (Reference 24-8) may be removed from being considered a realistic option due to new information uncovered in the future. To assist the future team in resolving these departures, a reference has been added within the Forward Action Plan items to direct the future detailed optioneering team to review the Conventional Fire Safety Strategy report to understand the original discussion of pros, cons, and mitigations captured in preliminary optioneering workshops. It is the intent that the conclusion of more detailed optioneering workshops would result with a final decision on how each departure is addressed during site-specific licensing phase.

24.4 References

24-1. ONR-GDA-GD-006, “New Nuclear Power Plants: Generic Design Assessment Guidance to Requesting Parties,” Revision 0, ONR, October 2019.

24-2. ONR-GDA-GD-007, “New Nuclear Power Plants: GDA Technical Guidance,” Revision 0, ONR, May 2019.

24-3. “Safety Assessment Principles for Nuclear Facilities,” 2014 Edition. Revision 1, ONR, January 2020.

24-4. NEDC-34140P, “BWRX-300 GDA Safety Case Development Strategy,” Revision 0, GE-Hitachi Nuclear Energy, Americas, LLC.

24-5. NEDC-34274P, “BWRX-300 UK GDA Forward Action Plan,” Revision 2, GE-Hitachi Nuclear Energy, Americas, LLC.

24-6. SSG-61, 2021, “Format and Content of the Safety Analysis Report for Nuclear Power Plants,” IAEA, 2021.

24-7. NEDC-34145P, “BWRX-300 UK GDA Step 1 Conventional Safety Strategy,” Revision 1, GE-Hitachi Nuclear Energy, Americas, LLC.

24-8. NEDC-34146P, “BWRX-300 UK GDA Step 1 Conventional Fire Safety Strategy,” Revision 4, GE-Hitachi Nuclear Energy, Americas, LLC.

24-9. BS9999: 2017, “Fire safety in the design, management and use of buildings. Code of Practice, January 2017.

24-10. NEDC-34154P, “BWRX-300 UK GDA Design Reference Report,” Revision 3, GE-Hitachi Nuclear Energy, Americas, LLC.

24-11. DBR-0066822, “BWRX-300 System Functional Requirements (A11),” Revision 4, GE-Hitachi Nuclear Energy, Americas, LLC.

24-12. NEDO-34193, “BWRX-300 UK GDA Chapter 21: Decommissioning and End of Life Aspects,” Revision B, GE-Hitachi Nuclear Energy, Americas, LLC.

APPENDIX A CLAIMS, ARGUMENTS AND EVIDENCE AND ALARP

Claims, Argument, Evidence

The ONR SAPs 2014 (Reference 24-3) identify ONR's expectation that a safety case should clearly set out the trail from safety claims, through arguments to evidence. The CAE approach can be explained as follows:

1. Claims (assertions) are statements that indicate why a facility is safe.
2. Arguments (reasoning) explain the approaches to satisfying the claims.
3. Evidence (facts) supports and forms the basis (justification) of the arguments.

The GDA CAE structure is defined within NEDC-34140P (Reference 24-4) and is a logical breakdown of an overall claim that:

> *"The BWRX-300 is capable of being constructed, operated and decommissioned in accordance with the standards of environmental, safety, security and safeguard protection required in the UK."*

This overall claim is broken down into Level 1 claims relating to environment, safety, security, and safeguards, which are then broken down again into Level 2 area related sub-claims and then finally into Level 3 (Chapter level) sub-claims.

The Level 3 sub-claims that this Chapter demonstrates compliance against are identified within NEDC-34140P (Reference 24-4) and are as follows:

2.1.2: The design of the system/structure has been substantiated to achieve the safety functions in all relevant operating modes.

2.1.3: The system/structure design has been undertaken in accordance with relevant design codes and standards (RGP) and design safety principles and taking account of Operating Experience to support reducing risks ALARP.

2.1.4: System/structure performance will be validated by suitable testing throughout manufacturing, construction, and commissioning.

2.1.5: Ageing and degradation mechanisms will be identified and assessed in the design. Suitable examination, inspection, maintenance, and testing will be specified to maintain systems/structures fit-for-purpose through-life.

2.1.6: The BWRX-300 will be designed so that it can be decommissioned safely, using current available technologies, and with minimal impact on the environment and people.

In order to facilitate compliance demonstration against the above Level 3 sub-claims, this PSR Chapter has derived a suite of arguments that comprehensively explain how their applicable Level 3 sub-claims are met (see Table A-1 below).

It is not the intention to generate a comprehensive suite of evidence to support the derived arguments, as this is beyond the scope of GDA Step 2. However, where evidence sources are available, and are within the scope of the GDA work performed, examples are provided.

Risk Reduction As Low As Reasonably Practicable

It is important to note that nuclear safety risks cannot be demonstrated to have been reduced ALARP within the scope of a 2-Step GDA. It is considered that the most that can be realistically achieved is to provide a reasoned justification that the BWRX-300 Small Modular Reactor (SMR) design aspects will effectively contribute to the development of a future ALARP statement. In this respect, this Chapter contributes to the overall future ALARP case by demonstrating that:

- The chapter-specific arguments derived may be supported by existing and future planned evidence sources covering the following topics:
  - RGP has demonstrably been followed.
  - OPEX has been taken into account within the design process.
  - All reasonably practicable options to reduce risk have been incorporated within the design.
- It supports its applicable level 3 sub-claims, defined within NEDC-34140P (Reference 24-4)

It is considered that the CHS/CFS UK regulatory expectations, that constitute UK RGP, are well understood and that plant designers are able to apply their knowledge and experience of these expectations appropriately. Initial reviews of these CHS/CFS regulatory expectations have been performed during GDA Step 1 and where potential gaps to such expectations have been identified then forward actions have been raised to manage these in future. The BWRX-300 design is based upon decades of BWR operating experience, which is expected to support CHS/CFS risk reduction.

Probabilistic safety aspects of the ALARP argument are out of the scope of this PSR Chapter.

Table A-1: Claims, Arguments, Evidence Route Map

L3 No.	Level 3 Chapter Claim:	Chapter 24 Arguments:	Sub-sections and/or reports that evidence the arguments:
2.1: The functions of systems and structures have been derived and substantiated taking into account RGP and OPEX, and processes are in place to maintain these through-life. (Engineering Analysis)			
2.1.2	The design of the system/structure has been substantiated to achieve the safety functions in all relevant operating modes.	Appropriate UK CHS/CFS design requirements (regulatory expectations) are defined	24.2.1: Summarises the UK CHS regulatory expectations, which are defined in more detail within NEDC-34145P (Reference 24-7). 24.3.1: Summarises the UK CFS regulatory expectations, which are defined in more detail within NEDC-34146P (Reference 24-8).
		The plant has been assessed with respect to the design requirements / regulatory expectations	24.2.3 Summarises the CHS assessment work performed in GDA Step 1. 24.3.3 Summarises the CHS assessment work performed in GDA Step 1.
		Any shortfalls in design requirement compliance will be identified and assessed to identify any reasonably practicable means to reduce risk	24.2.4: Identified that there were no CHS gaps identified that could not be addressed by forward actions during plant construction, commissioning, or operations. 24.3.4: Identified that there were ten departures to UK CFS regulatory expectations. Appendix B includes the FAP items raised to address the CHS/CFS assessment shortfalls identified.
2.1.3	The system/structure design has been undertaken in accordance with relevant design codes and standards (RGP) and design safety principles, and taking account of Operating Experience to support reducing risks ALARP	UK CHS/CFS regulatory expectations (e.g., applicable acts, regulations, and guidance) have been identified	24.2.1: Summarises the UK CHS regulatory expectations, which are defined in more detail in NEDC-34145P (Reference 24-7). 24.3.1: Summarises the UK CFS regulatory expectations, which are defined in more detail within NEDC-34146P (Reference 24-8).
		Designers are suitably qualified and experienced to be able to apply UK CHS/CFS UK regulatory expectations	24.2.3 Summarises the CHS assessment work performed in GDA Step 1, which included CHS training workshops. 24.3.3 Summarises the CHS assessment work performed in GDA Step 1, which included CFS training workshops.
		Appropriate management arrangements are in place to manage CHS/CFS requirements	The CHS/CFS strategy documents and the FAP process support the management of CHS/CFS requirements. It is expected that these documents/process will be further developed post-GDA to support any site-specific licensing work.

L3 No.	Level 3 Chapter Claim:	Chapter 24 Arguments:	Sub-sections and/or reports that evidence the arguments:
		SSC designs take into account UK CHS/CFS regulatory expectations	24.2.3 Summarises the CHS assessment work performed in GDA Step 1. 24.3.3 Summarises the CHS assessment work performed in GDA Step 1.
2.1.4	System/structure performance will be validated by suitable testing throughout manufacturing, construction, and commissioning.	SSC pre-commissioning tests (e.g., Non-Destructive Testing (NDT)) validate the relevant performance requirements	This is outside of the scope of a 2-Step GDA. However, it is expected that there will be pre-commissioning CHS/CFS related tests defined within UK regulatory regulations and guidance, e.g., ACoPs.
		SSC commissioning tests (e.g., system level pressure and leak tests) validate the relevant performance requirements	This is outside of the scope of a 2-Step GDA. However, it is expected that there will be commissioning CHS/CFS related tests defined within UK regulatory regulations and guidance, e.g., ACoPs.
		SSC are manufactured, constructed, and commissioned in accordance with QA arrangements appropriate to their safety classification	DBR-0066822, “BWRX-300 System Functional Requirements (A11),” (Reference 24-11) describes how safety categorisation and SSC classification are linked to quality group (QA arrangement) definition.
2.1.5	Ageing and degradation mechanisms will be identified and assessed in the design. Suitable examination, inspection, maintenance, and testing will be specified to maintain systems/structures fit-for-purpose through-life	SSC ageing and degradation mechanisms will be identified during SSC design. These will be assessed to determine how they could potentially lead to SSC failure	This is out of the scope of a 2-Step GDA, where the design maturing is at a concept stage. However, there is an intention to identify SSC ageing and degradation mechanisms, taking into account operational experience and UK CHS/CFS regulatory expectations.
		Appropriate Examination, Maintenance, Inspection and Testing (EMIT) arrangements will be specified taking into account SSC ageing and degradation mechanisms	This is out of the scope of a 2-Step GDA, where the design maturing is at a concept stage.
		The SSCs that cannot be replaced have been shown to have adequate life	PSR chapters 3 and 13 describe BWRX-300's ageing management arrangements for systems. Specifically, PSR Chapter 3 sub-sections 3.1.13, 3.9.1, 3.9.2 and 3.9.3 apply, along with Chapter 13 sub-section 13.3.8.

L3 No.	Level 3 Chapter Claim:	Chapter 24 Arguments:	Sub-sections and/or reports that evidence the arguments:
		Ageing and degradation OPEX will be considered as part of the design stage component/materials selection process in order to mitigate SSC failure risk	PSR chapters 3 and 13 describe BWRX-300's ageing management arrangements for systems. Specifically, PSR Chapter 3 sub-sections 3.1.13, 3.9.1, 3.9.2 and 3.9.3 apply, along with Chapter 13 sub-section 13.3.8.
2.1.6	The BWRX will be designed so that it can be decommissioned safely, using current available technologies, and with minimal impact on the environment and people	SSC decommissioning is considered at the design stage to ensure that safe decommissioning may take place	OPEX demonstrates that decommissioning of reactor facilities is facilitated if the following are considered during the design phase: [1] Materials are selected to minimise the quantities of radioactive waste and assisting decontamination. [2] Plant layout is designed to facilitate access for decommissioning or dismantling activities. [3] Future potential requirements for storage of radioactive waste. See NEDO-34193, "BWRX-300 UK GDA Ch. 21 Decommissioning and End of Life Aspects," (Reference 24-12).
		SSC are designed in order to minimise impacts on people and the environment during decommissioning	This is outside of the scope of a 2-Step GDA. However, it is expected that there will be decommissioning CHS/CFS related design guidance defined within UK regulatory regulations and guidance, e.g., ACoPs.

APPENDIX B FORWARD ACTION PLAN ITEMS

The FAP items below are also included within the project's FAP report, NEDC-34274P (Reference 24-5).

Table B-1: Engineered Safety Features Forward Action Plan Items

FAP No.	Finding	Forward Action Plan Item	Delivery Phase
PSR24-86	The RB does not contain 2x fire-fighting shafts, which is potentially not in accordance with BS 9999 (Departure 1).	Perform detailed optioneering with all relevant stakeholders to determine how Reactor Building firefighting shaft will be resolved in order to support a future UK site-specific licensing phase for BWRX-300. For background perspective, full documentation of preliminary optioneering and analyses performed during 2-Step GDA for Conventional Fire Safety can be found in NEDC-34146P, BWRX-300 UK GDA Conventional Fire Safety Strategy. Preliminary options already documented does not prevent the future more detailed optioneering team from identifying new or better options based on information available in the future in order to make a final decision to resolve departure 1.	Before Site License Application, Environmental Permit Applications, and/or BL3 Design Phase.
PSR24-87	The RB does not have a defined means of smoke venting in the event of a fire, which is potentially not in accordance with BS 9999 (Departure 2).	Perform detailed optioneering with all relevant stakeholders to determine how Reactor Building basement smoke venting will be resolved in order to support a future UK site-specific licensing phase for BWRX-300. For background perspective, full documentation of preliminary optioneering and analyses performed during 2-Step GDA for Conventional Fire Safety can be found in NEDC-34146P, BWRX-300 UK GDA Conventional Fire Safety Strategy. Preliminary options already documented does not prevent the future more detailed optioneering team from identifying new or better options based on information available in the future in order to make a final decision to resolve departure 2.	Before Site License Application, Environmental Permit Applications, and/or BL3 Design Phase.

FAP No.	Finding	Forward Action Plan Item	Delivery Phase
PSR24-88	The RB contains basement flooring that does not resist smoke/fire progression, which is potentially not in accordance with BS 9999 (Departure 3).	Perform detailed optioneering with all relevant stakeholders to determine how Reactor Building basement compartmentation will be resolved in order to support a future UK site-specific licensing phase for BWRX-300. For background perspective, full documentation of preliminary optioneering and analyses performed during 2-Step GDA for Conventional Fire Safety can be found in NEDC-34146P, BWRX-300 UK GDA Conventional Fire Safety Strategy. Preliminary options already documented does not prevent the future more detailed optioneering team from identifying new or better options based on information available in the future in order to make a final decision to resolve departure 3.	Before Site License Application, Environmental Permit Applications, and/or BL3 Design Phase.
PSR24-89	Numerous proposed 'Forward Actions' were raised in the conventional safety strategy document, which were considered to be 'normal business' activities. However, this single forward action plan item was raised as an aid for future consideration.	Perform a review of the CHS strategy report 'Forward Actions' in order to inform CHS activities to be performed during any future site-specific assessment work.	Before Site License Application, Environmental Permit Applications, and/or BL3 Design Phase.
PSR24-387	Lack of subdivision in the hallways of the following locations, which is potentially not in accordance with BS 9999. • Lack of subdivision in the hallways of the Control Building (Departures 4&5). • Lack of subdivision of the hallway connecting the Turbine Building and the Service Building (Departure 6).	Perform detailed optioneering with all relevant stakeholders determine how subdivision in the hallways will be resolved in order to support a future UK site-specific licensing phase for BWRX-300. For background perspective, full documentation of preliminary optioneering and analyses performed during 2-Step GDA for Conventional Fire Safety can be found in NEDC-34146P, BWRX-300 UK GDA Conventional Fire Safety Strategy. Preliminary options already documented does not prevent the future more detailed optioneering team from identifying new or better options based on information available in the future in order to make a final decision to resolve departures 4, 5, and 6.	Before Site License Application, Environmental Permit Applications, and/or BL3 Design Phase.

FAP No.	Finding	Forward Action Plan Item	Delivery Phase
PSR24-388	Non-compliant maximum travel distances in the Turbine Building, which is potentially not in accordance with BS 9999. • Non-compliant single maximum travel distance from the Refueling Water Storage Tank (RWST) and Condensate Storage Tank (CST) Room (Departure 7). • Non-compliant single and two-ways maximum travel distances from the Condenser Area and the Shield Area (Departures 8&9).	Perform detailed optioneering with all relevant stakeholders determine how maximum travel distances in the Turbine Building will be resolved in order to support a future UK site-specific licensing phase for BWRX-300. For background perspective, full documentation of preliminary optioneering and analyses performed during 2-Step GDA for Conventional Fire Safety can be found in NEDC-34146P, BWRX-300 UK GDA Conventional Fire Safety Strategy. Preliminary options already documented does not prevent the future more detailed optioneering team from identifying new or better options based on information available in the future in order to make a final decision to resolve departures 7, 8, and 9.	Before Site License Application, Environmental Permit Applications, and/or BL3 Design Phase.
PSR24-389	Lack of a protected corridor in a final exit in the Control Building from Stair B in the Reactor Building, which is potentially not in accordance with BS 9999 (Departure 10).	Perform detailed optioneering with all relevant stakeholders determine how lack of protected corridor will be resolved in order to support a future UK site-specific licensing phase for BWRX-300. For background perspective, full documentation of preliminary optioneering and analyses performed during 2-Step GDA for Conventional Fire Safety can be found in NEDC-34146P, BWRX-300 UK GDA Conventional Fire Safety Strategy. Preliminary options already documented does not prevent the future more detailed optioneering team from identifying new or better options based on information available in the future in order to make a final decision to resolve departure 10.	Before Site License Application, Environmental Permit Applications, and/or BL3 Design Phase.