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REGULATORY OBSERVATION Resolution Plan	
RO Unique No.:	RO-UKHPR1000-0023
RO Title:	Demonstration of Diverse Protection for Frequent Faults
Technical Area(s)	Fault Studies
Revision:	0
Overall RO Closure Date (Planned):	2021-03-31
Linked RQ(s)	RQ-UKHPR1000-0471
Linked RO(s)	RO-UKHPR1000-0001; RO-UKHPR1000-0017; RO-UKHPR1000-0021
Related Technical Area(s)	Control & Instrumentation, Electrical Engineering, Mechanical Engineering, Cross-cutting
Other Related Documentation	

Scope of Work

Background

As mentioned in Safety Assessment Principles (SAPs) [1] FP.6, all reasonably practicable steps must be taken to prevent and mitigate nuclear or radiation accidents. The objective of diversity design is to augment the reliability of safety measure to avoid the Common Cause Failures (CCFs).

SAPs [1] EDR.3 states that CCFs should be addressed explicitly where a structure, system or component employs redundant or diverse components, measurements or actions to provide high reliability. Considering that the fault sequence frequency of 1E-07 pa is the cut-off when applying design basis techniques, the safety systems claimed for frequent fault (with frequency exceeding 10E-3 pa) require a combined failure per demand (fpd) for less than 10E-4. This means that the safety systems need to be diversified.

The sub-claim 3.4.3.SC12.3 mentioned in PCSR Chapter 12 presents that *Depending on the frequency of the initiating fault, an appropriate level of diversity, redundancy, and reliability of the individual SSCs is provided to achieve safety measures for a robust fault-tolerant plant, and identified in a comprehensive fault schedule*.

Especially, safety measures with high reliability are required to protect against frequent faults whose frequencies exceed 10E-03 pa to achieve a safe state. To ensure that risks result from the frequent faults have been reduced to As Low As Reasonably Practicable (ALARP), the following works

should be developed:

a) Identify all the frequent faults;
b) Identify Systems, Structures, Components (SSCs) of each of the safety measures including primary protection line and diverse protection line against frequent faults;
c) Demonstrate the independence between primary protection line and diverse protection line;
d) Carry out optioneering for the safety measures not satisfying requirement on diversification to ensure that the risk has been reduced to ALARP.

In addition, the reference plant (FCG3) of UK version of the Hua-long Pressurised Reactor (UK HPR1000) has considered the design of diversity but the requirements are not exactly the same as UK Context. Office for Nuclear Regulation (UK) (ONR) has raised RO-UKHPR1000-0001 and RO-UKHPR1000-0017 to highlight the diversity requirement implemented in Instrumentation and Control (I&C) architecture: RO-UKHPR1000-0001 is about the diverse requirements between the I&C systems and RO-UKHPR1000-0017 is about the independence between the shared components at different defence in depth levels. The responses to these two ROs will demonstrate the diversity on signals and I&C platforms, which will support the diverse analysis in RO-UKHPR1000-0023. RO-UKHPR1000-0021 on EMIT is also relevant to this RO as EMIT could affect the availability of safety systems in some operating modes and functional requirements for protection lines could impact schedule of EMIT activity. Consistency with RO-UKHPR1000-0023 needs to be reflected in the work addressing RO-UKHPR1000-0021.

Based on UK HPR1000 Fault Schedule, the safety measures in primary protection line and diverse protection line are identified. To demonstrate diversity between primary protection line and diverse protection line, Requesting Party (RP) has submitted a number of documents:

- An *early version fault schedule* which identifies candidate diverse lines of protection [2] for DBC-2 and DBC-3 faults;
- A report to identify most onerous fault sequences for demonstrating diverse protection [3];
- A report which summarises the transient analysis that has been conducted for these bounding cases to validate the candidate diverse lines within the Fault Schedule [4].

Although part of shortfall in diversification has been identified, the logic chain linked to whole diversity design and activity arrangements are not shown in a clear way.

This resolution plan is provided as a response to ONR's expectation on demonstration of diverse protection for frequent faults.

Abbreviations and Acronyms

ALARP	As Low As Reasonably Practicable
CCF	Common Cause Failure
DBC	Design Basis Condition
GDA	Generic Design Assessment
GNS	General Nuclear System Limited
HVAC	Heating, Ventilation and Air Conditioning
I&C	Instrumentation and Control
MSIV	Main Steam Isolation Valve
ONR	Office for Nuclear Regulation (UK)
PIE	Postulated Initiating Event
PSA	Probabilistic Safety Assessment
PTR	Fuel Pool Cooling and Treatment System [FPCTS]
RCV	Chemical and Volume Control System [CVCS]
RO	Regulatory Observation
RP	Requesting Party
SAPs	Safety Assessment Principles
SBLOCA	Small Break (Loss of Coolant Accident)
SBO DG	Station Black Out Diesel Generator
SGTR	Steam Generator Tube Rupture
SSCs	Structures, Systems and Components
UK HPR1000	UK Version of the Hua-long Pressurised Reactor

Scope of work

This Resolution Plan describes the current plan to address RO-UKHPR1000-0023. It contains the planned activities and expected submission reports for demonstration of diverse protection.

Deliverable Description

RO-UKHPR1000-0023.A1 – Confirm the list of frequent design basis faults

The Regulatory Observation (RO) Action 1 states that:

In response to this Regulatory Observation Action, GNS should:

- *Confirm the list of design basis initiating events for which diverse protection is required, consistent with its design basis rules.*

Resolution Plan Action 1

The safety systems, which are claimed to be used in design basis conditions with occurrence frequency exceeding 10E-3 pa, should be diverse to achieve a combined failure per demand (fpd)

less than 10E-4, so that the frequency of fault sequence can be reduced to a level below 10E-7 pa. Therefore, for frequent faults, there will be diverse and independent means to provide the required safety function. The design of the diverse protection line will demonstrate that the plant is able to achieve a safe state. Failure of primary protection line due to failure of I&C platform, mechanical parts and sensor have been considered, as mentioned in *Fault Schedule Production Methodology* [5].

The functions providing a diverse backup for a Category 1 function in a frequent fault should be assigned to Category 2. Category 3 function should be assigned to provide a diverse backup for Category 2 function in a frequent fault. These requirements are presented in the document *Methodology of Safety Categorisation and Classification* [7] which has been submitted to ONR in June 2018.

The design conditions including frequent faults are bounding cases grouped from the Postulated Initiating Events (PIEs) with potential radioactive materials release, which are identified through Master Logic Diagram (MLD) and Failure Mode and Effect Analysis (FMEA) methods. The detailed methodology has been presented to ONR in document *Methodology of PIE Identification* [6].

The list of frequent faults is provided in the document *The Design Condition List and Acceptance Criteria* (Revision H) [11] which includes the new identified faults due to spurious I&C actuation or loss of essential support systems.

RO-UKHPR1000-0023.A2 - Identify which two safety systems are provided for each required safety function for the events identified in A1 and provide evidence that demonstrates the adequacy of each safety system.

The RO Action 2 states that:

In response to this Regulatory Observation Action, GNS should:

- *Confirm the main and diverse safety systems, and any required support systems, that are claimed against each fault identified in A1.*
- *Provide sufficient information to demonstrate that these systems can be considered independent from each other and the initiating events.*
- *Confirm the safety classification and required reliability (probability of failure on demand) of each of these safety systems.*
- *Provide evidence (or reference to existing submissions) that demonstrates the ability of each of these systems to deliver the required safety functions.*
- *Provide evidence (or reference to existing submissions) that demonstrates that the systems will acheive the required reliability.*

Resolution Plan Action 2

In response to RO Action 2, it is important to identify and confirm the diversity requirement of safety systems including frontline systems and support systems, and to evaluate and justify their

level of diversity.

A general example for protection line configuration is shown in the Figure 1. To respond to Action 2 and 3, the following steps will be taken:

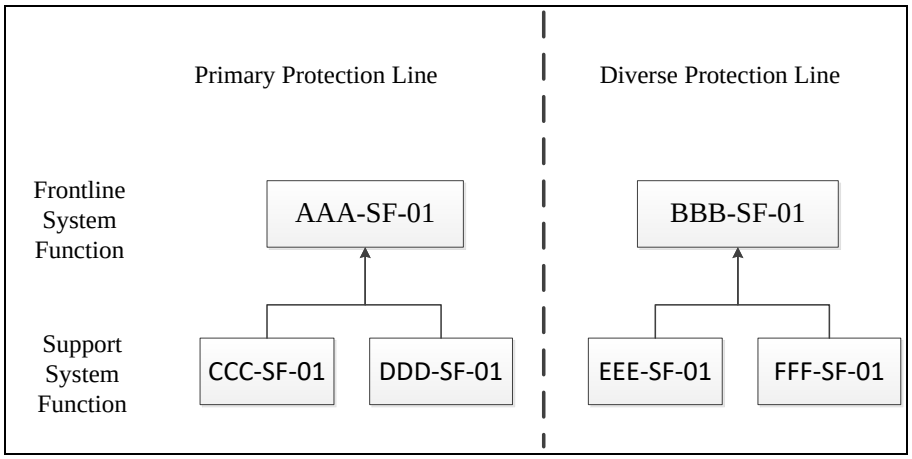

Figure 1 Example for RO Action 2

1. Identify the diversity requirement of frontline systems.

   As shown in the Figure 1, BBB-SF-01 should be diversified with AAA-SF-01. The corresponding equipment, signals as well as I&C platform of AAA-SF-01 and BBB-SF-01 will be summarised and compared to make sure if any vulnerability or common part could directly lead to loss of both primary protection line and diverse protection line.

   Functional requirement analysis of frontline systems is based on *UK HPR1000 Fault Schedule*, to make clear corresponding equipment, signals as well as I&C platform of each frontline system function in both primary protection line and diverse protection line.

   UK HPR1000 Fault Schedule Revision B [10] has been submitted, but new Design Basis Conditions (DBCs) are not included. Definitive new DBCs will be provided in Fault Schedule to be updated during Step4. If there are new frequent faults, the functional analysis and diversity justification process will be carried out to identify the potential shortfalls on diversification, then these shortfalls will be treated by optioneering and related documents will be updated as appropriate.

2. Clarify which support system need to be diversified.

   As shown in the Figure 1, CCC-SF-01 and DDD-SF-01 supporting AAA-SF-01 are necessary to be diversified with EEE-SF-01 and FFF-SF-01 that support BBB-SF-01 to avoid loss of both primary line and diverse line caused by the loss of common support system.

Based on the result of step 1, RP will continue to carry out functional requirement analysis of support systems. The corresponding equipment of support systems, including I&C, Heating, Ventilation and Air Conditioning (HVAC) System, cooling chain, Electric, which service safety functions called upon in frequent fault, will be summarised and compared to find out the potential risk of loss of both primary protection line and diverse protection line due to failures of support system.

After the completion of above analysis in step 1 and step 2, the diversity requirement of frontline systems against frequent faults and relevant support systems will be confirmed and presented in the document *Functional Analysis Report for Diverse Protection Line Design*, which is scheduled to be submitted to ONR before March 15th 2020.

3. Justify that these systems can be considered independent from each other (Section 3.1) and the initiating events (Section 3.2).

3.1 The physical co-location or functional support of diverse systems or the diversity shortfall in nuclear facilities themselves would defeat the objective of providing independency between the safety systems in different protection lines. The provision of segregation of redundant and/or diverse safety measures by distance or by barriers to prevent dependent failures has been considered in the configuration of diverse protection line, which will be provided in the justification report.

Except segregation measure, the alternative and independent equipment (i.e. diversity) is also considered to eliminate undue reliance on any single system. The adequacy of diversity between primary protection line and diverse protection line is demonstrated by both qualitative analysis and quantitative analysis.

a) Qualitative analysis from different aspects, for example different manufacturers, different components, different types of equipment that use different physical methods, etc., to provide sufficient information to justify diversity of these safety systems. Some elements mentioned above including manufacturers and detailed equipment information may be not clear and out of GDA scope. This kind of elements will be implemented as a requirement in the nuclear site licensing phase according to the project safety case management.

A justification report will be produced in each technical area (including Frontline System, Cooling Chain, I&C, HVAC, Electrical system).

The justification reports concerning Frontline System, Cooling Chain, HVAC system

are scheduled to be submitted to ONR before March 31st 2020.

The CCF analysis of the electrical power system is already in progress. The justification process has been completed, which is covered by the documents *Common Cause Failure and Diversity Analysis on Electrical Design* (Revision D). The Revision D of this report is based on the understanding of the reference design. Optioneering and preliminary ALARP assessment have been also performed in the report which has been submitted to ONR. And the report is scheduled to be updated before April 30th, 2020. The results of PIE identification study and optioneering of other systems (process system, HVAC system, I&C system, etc.) will be used as input for the Rev. E of this report.

For the shortfall in classification of SBO DG mentioned in RQ-UKHPR1000-0471, EDG and SBO DG have been recognised as the primary and the diverse protection line of power supply system. To fulfil the requirements of the diverse line system, the voltage level of the SBO DG and associated switchboards have been changed from 10kV to 690V and the classification of them has been changed from class 3 to class 2. This design change has been presented in Design Reference 2.1.

The diversity justification process of I&C system will be presented in the document *Independence Analysis of I&C Systems* (Revision B), which is also mentioned in RO-UKHPR1000-0017. The Revision B of this report will be submitted to ONR before June 30th, 2020, which will include the diverse analysis and justification of shared sensors, component interface module, etc., in I&C architecture. Besides, the Revision C of *Independence Analysis of I&C Systems* (by November 2020) will include the segregation justification of I&C architecture against internal hazards. Revision B and Revision C will be tracked by both RO-UKHPR1000-0017 and this RO, so that the consistence and completeness for the independent and diverse justification are guaranteed.

In the justification reports, the diversity justification methodology and the justification result for the safety system which meets the diversity requirement will be presented. Meanwhile, based on the process of functional requirement analysis and justification, the fault sequence, safety function, corresponding category or class, as well as shortfalls in diversification will also be identified, and will be presented in the justification reports shown in Table 1.

The list of documents related to justification process is shown below:

Table 1 List of Documents Related to Justification Process

Related Document	Main Content
Justification for Diverse Protection Line Design on Frontline System and Cooling Chain system	The reports mainly include diversity justification methodology and the justification process and results including the shortfalls.
Justification for Diverse Protection Line Design on HVAC System	
Common Cause Failure and Diversity Analysis on Electrical Design (Revision E)	
Independence Analysis of I&C Systems (Revision B and C of this report will include the justification for diverse protection line on I&C system.)	

b) Quantitative analysis including Probabilistic Safety Assessment (PSA) and deterministic safety analysis

PSA is to demonstrate the reliability of these functions against frequent faults. The classification of safety feature including frontline systems and support systems is given in the document *Functional Analysis Report on Diverse Protection Line Design*.

The relationship between deterministically assigned feature class and the expected reliability and the evidence that demonstrates that the systems will achieve the required reliability will be presented in the *Reliability report of safety functions against frequent faults*. This report is scheduled to be submitted to ONR before April 15th 2020.

For the reliability justification of I&C systems, a typical example of modelling and reliability calculation will be provided, as well as the justification of methodology. Relevant justifications will be integrated in the *Reliability report of safety functions against frequent faults*.

Deterministic safety analysis is to demonstrate the ability of each of these systems to deliver the required safety functions so as that the plant is able to achieve a safe state. The proof of ability of each of frontline systems against frequent faults is summarised in the document *Transient Analysis Report for Diverse Protection Line Demonstration* [4]. The diversity design of the support systems ensures that the ability to deliver safety functions of these frontline systems is not affected due to loss of support systems in primary protection line. The ability of diverse protection lines to limit radiological release will be presented and explained in the updated *Bounding Case*

Selection for Diverse Protection Line Demonstration by April 30th 2020.

3.2 The independency between diverse protection line and initiating events has been embodied in the process of Postulated Initiating Event (PIE) identification. A systematic approach is established to identify PIEs which result in radioactive materials release and a significant dose of radiation. The consequence of each PIE has been confirmed in the process of setting up a diverse protection line, to make sure that an initiating event would not cause the failure of both protection lines at the same time.

RO-UKHPR1000-0023.A3 – Provide additional information for any areas where additional work is needed to demonstrate diverse protection for frequent faults.

The RO Action 3 states that:

In response to this Regulatory Observation Action, GNS should provide sufficient information to explain the nuclear safety significance of any shortfalls against the safety case claims for diverse protection:

- *Identify each relevant fault sequence and the safety functions for which the GNS has not been able to demonstrate diverse protection.*
- *Explain the current level of diversity within the delivery of the safety functions with reference to system diagrams as appropriate.*
- *Explain the nature and safety significance of any shortfalls against the expectations described above.*

Resolution Plan Action 3

As mentioned in step 3 in Action 2, the justification reports will be produced, which would identify the fault sequence, safety function, corresponding category or class, as well as shortfalls in diversification. The important information will be noted in the conclusion section.

In addition, the current level of diversity within the delivery of safety functions will be explained by system diagrams if necessary.

The justification reports mentioned in RO Action 2 will address the expectations of Action 3.

RO-UKHPR1000-0023.A4 – Provide evidence that a range of options has been considered to address the issues described in response to A3 and that risks have been reduced ALARP.

The RO Action 4 states that:

In response to this Regulatory Observation Action, GNS should:

- *Consider whether there are any modifications to the design or operation of the plant that are*

reasonably practicable to implement.

- *Demonstrate the adequacy of any proposed modifications to deliver the required safety functions.*
- *Provide a clear justification that the risks associated with the chosen design are reduced ALARP, consistent with GNS deterministic design rules, probabilistic risk targets and relevant good practice.*

Resolution Plan Action 4

Based on current list of frequent faults, for situations where diversity requirement is not satisfied and potential enhancement is necessary, optioneering process will be carried on including impact analysis on relevant aspects (e.g. operation of the plant). All potential weakness on diversification in system design will be identified. Based on the significance and potential impact of all the shortfalls, RP will discuss with ONR to screen in the items with high safety significance and to determine the optioneering report to be published and submitted to ONR during GDA stage. Optioneering for the items with minor impact and detailed design for all items will be addressed in nuclear site licensing phase according to the project safety case management.

In response to RO Action 4, the optioneering reports for shortfalls identified will be produced and the optioneering will be strictly controlled through project management process as follows:

a) Performing technical analysis, including the cause of the technical issues, potential scope affected and extent of the technical issues, and compliance analysis with the regulatory requirements and the RGP;

b) Identifying technical requirements and establish evaluation criteria;

c) Finding as many alternative solutions as possible;

d) Conducting optioneering evaluation to choose a suitable option. The evaluation methods include qualitative and quantitative methods; the sensitive evaluation also should be performed for the uncertainty factors;

e) Reviewing the optioneering results.

For submission documents, optioneering reports related to RQ-UKHPR1000-0471 will be submitted to ONR. Moreover, significant shortfalls identified through the steps above where diversity requirement are not satisfied will be presented in additional optioneering reports during GDA stage.

Radioactive release will be taken into account in the optioneering process. The optioneering reports mentioned above are scheduled to be submitted to ONR before April 30th 2020, shown below:

Table 2 Optioneering reports submitted to ONR

No.	Optioneering reports	Submitted date	Note

1	Optioneering report on Boron dilution isolation valve on RCV [CVCS] malfunction mitigation	April 30th 2020	Shortfall from RQ0471
2	Optioneering report on Containment isolation	April 30th 2020	Shortfall from RQ0471
3	Optioneering report on MSIV closure on SGTR (one tube) mitigation	April 30th 2020	Shortfall from RQ0471
4	Optioneering Report on PTR [FPCTS] Related to Isolation of the Cooling trains	April 30th 2020	Shortfall from RQ0471
5	Optioneering report on reactor trip signal in SBLOCA	April 30th 2020	Shortfall from RQ0471
6	Optioneering reports on the significant shortfalls	August 30th 2020	Significant shortfalls newly identified

Table 3 presents the link between ONR expectations and RP response.

Table 3 The link between ONR expectations and RP response

No.	ONR expectation	RP response/Report
1	List of frequent design basis faults	The Design Condition List and Acceptance Criteria (Revision H)
2	Demonstration of the adequacy of each safety system	➢ UK HPR1000 Fault Schedule ➢ Functional Analysis Report for Diverse Protection Line Design ➢ Justification for Diverse Protection Line Design on Frontline System and Cooling Chain system ➢ Justification for Diverse Protection Line Design on HVAC System ➢ Common Cause Failure and Diversity Analysis on Electrical Design (Revision E) ➢ Independence Analysis of I&C Systems (Revision B and C) ➢ Reliability report of safety functions against frequent faults ➢ Bounding Case Selection for Diverse Protection Line Demonstration ➢ Transient Analysis Report for Diverse Protection Line Demonstration
3	Additional information for demonstration of diverse protection for frequent faults	

4	Evidence that a range of options has been considered to address the issues and that risks have been reduced ALARP	➢ Optioneering report on Boron dilution isolation valve on RCV [CVCS] malfunction mitigation ➢ Optioneering report on Containment isolation ➢ Optioneering report on MSIV closure on SGTR (one tube) mitigation ➢ Optioneering Report on PTR [FPCTS] Related to Isolation of the Cooling trains ➢ Optioneering report on reactor trip signal in SBLOCA ➢ Optioneering reports on the significant shortfalls

Impact on the GDA Submissions

The information will be incorporated into PCSR Chapter 7, 8, 9, 10, 11, 12, 33. Related PCSR chapters and their supporting submissions including System Design Manual are also involved in this resolution plan.

GDA Submission Document	**Related ROAs**	**Planned schedule for submission**
The Design Condition List and Acceptance Criteria (Revision H）	ROA1	Submitted
UK HPR1000 Fault Schedule (Revision B)	ROA2	Submitted
Functional Analysis Report for Diverse Protection Line Design (Revision A)	ROA2	March 15th 2020
Justification for Diverse Protection Line Design on Frontline System and Cooling Chain system (Revision A)	ROA2, ROA3	March 31st 2020
Justification for Diverse Protection Line Design on HVAC System (Revision A)	ROA2, ROA3	March 31st 2020
Common Cause Failure and Diversity Analysis on Electrical Design (Revision E)	ROA2, ROA3	April 30th 2020
Independence Analysis of I&C Systems (Revision B)	ROA2, ROA3	June 30th 2020
Independence Analysis of I&C Systems (Revision C)	ROA2, ROA3	November 30th 2020
Reliability report of safety functions against frequent faults (Revision A)	ROA2	April 15th 2020
Bounding Case Selection for Diverse Protection Line Demonstration (Revision C)	ROA2	April 30th 2020

Optioneering report on Boron dilution isolation valve on RCV [CVCS] malfunction mitigation	ROA4	April 30th 2020
Optioneering report on Containment isolation	ROA4	April 30th 2020
Optioneering report on MSIV closure on SGTR (one tube) mitigation	ROA4	April 30th 2020
Optioneering Report on PTR [FPCTS] Related to Isolation of the Cooling trains	ROA4	April 30th 2020
Optioneering report on reactor trip signal in SBLOCA	ROA4	April 30th 2020
Optioneering reports on the significant shortfalls	ROA4	August 30th 2020

Timetable and Milestone Programme Leading to the Deliverables

See attached Gantt Chart in APPENDIX A.

Reference

[1] ONR, Safety Assessment Principles for Nuclear Facilities, Rev. 0, November 2014.
[2] Early Version of Fault schedule. GHX82036001DRAF03GN, Revision B dated December 2018.
[3] Bounding Case Selection for Diverse Protection Line Demonstration. GHX00600277DRAF02GN, Revision B, dated April 2019.
[4] Transient Analysis Report for Diverse Protection Line Demonstration. GHX00600141DRAF02GN Revision A, dated August 2019.
[5] Fault Schedule Production Methodology. GHX00600172DRAF02GN. Revision D, dated June 2019.
[6] Methodology of PIE Identification (GHX00100008DOZJ03GN). Revision H, dated January 2019.
[7] Methodology of Safety Categorisation and Classification (GHX00100062DOZJ03GN). Revision B, dated June 2018.
[8] Common Cause Failure and Diversity Analysis on Electrical Design (GHX05000004DEDQ45GN). Revision D, dated June 2019.
[9] Independence analysis of I&C systems (GHX06002020DIYK03GN). Revision A, dated January 2019.
[10] UK HPR1000 Fault Schedule. GHX00600276DRAF02GN, Revision B dated December 2019.
[11] The Design Condition List and Acceptance Criteria, GHX00100029DOZJ04GN Revision H dated December 2019.

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APPENDIX A RO-UKHPR1000-0023 Gantt Chart

Tasks	Steps	2019		2020												2021			
		Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr
RO Action 1																			
The Design Condition List and Acceptance Criteria (Revision H)	Development																		
	Submission																		
Regulator assessment																			
Target RO Action 1 Closure Date																			
RO Action 2 & 3																			
UK HPR1000 Fault Schedule (Revision B)	Development																		
	Submission																		
Functional Analysis Report for Diverse Protection Line Design (Revision A)	Development																		
	Submission																		
Justification for Diverse Protection Line Design on Frontline System and Cooling Chain System (Revision A)	Development																		
	Submission																		
Justification for Diverse Protection Line Design on HVAC System (Revision A)	Development																		
	Submission																		
Common Cause Failure and Diversity Analysis on Electrical Design (Revision E)	Development																		
	Submission																		
Independence Analysis of I&C Systems (Revision B)	Development																		
	Submission																		
Independence Analysis of I&C Systems (Revision C)	Development																		
	Submission																		
Reliability Report of Safety Functions against Frequent Faults (Revision A)	Development																		
	Submission																		
Bounding Case Selection for Diverse Protection Line Demonstration (Revision C)	Development																		
	Submission																		
Regulator assessment																			
Target RO Action 2 & 3 Closure Date																			
RO Action 4																			
Optioneering report on Boron dilution isolation valve on RCV [CVCS] malfunction mitigation	Development																		
	Submission																		
Optioneering report on Containment isolation	Development																		
	Submission																		
Optioneering report on MSIV closure on SGTR (one tube) mitigation	Development																		
	Submission																		
Optioneering Report on PTR [FPCTS] Related to Isolation of the Cooling trains	Development																		
	Submission																		
Optioneering report on reactor trip signal in SBLOCA	Development																		
	Submission																		
Optioneering reports on the significant shortfalls	Development																		
	Submission																		
Regulator assessment																			
Target RO closure Date																			