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REGULATORY OBSERVATION Resolution Plan

RO Unique No.:	RO-UKHPR1000-0044
RO Title:	Identification and Use of Operational Experience (OPEX) in the UK HPR1000 Generic Design and Safety Case
Technical Area(s)	Project
Revision:	0
Overall RO Closure Date (Planned):	2021-04-30
Linked RQ(s)	RQ-UKHPR1000-0294, RQ-UKHPR1000-0713, RQ-UKHPR1000-0716, RQ-UKHPR1000-0717
Linked RO(s)	RO-UKHPR1000-0004, RO-UKHPR1000-0010, RO-UKHPR1000-0035
Related Technical Area(s)	Reactor Chemistry, Radiological Protection, Human Factors, MSQA, Radwaste, Decommissioning & Spent Fuel
Other Related Documentation	

Scope of Work

Background

The Office for Nuclear Regulation (ONR) and Environment Agency (EA) considers that adequate identification and use of Operational Experience (OPEX) should be presented in the UK Version of the Hua-long Pressurised Reactor (UK HPR1000) generic design and safety case. It is expected that the Requesting Parties (RP) provide evidence on how the approach to OPEX is established, how OPEX is identified and used, and how relevant processes and procedures are applied to demonstrate risks are reduced to So Far As Is Reasonably Practicable (SFAIRP)/impacts minimised through the use of Best Available Techniques (BAT).

OPEX is a valuable source for learning about and improving the safety, environment impact and security of nuclear facilities and activities. The identification and use of OPEX is an important element and has been considered to support justification for the UK HPR1000 generic design parameters and ALARP/BAT demonstration. Generally, world-wide OPEX has been identified and used during the design development for all technical topics in order to support the design process and to provide confidence that relevant good practice (RGP) and applicable learning from other reactor designs have been taken into account for UK HPR1000.

The RP has a complete process for OPEX source collection, identification, applicability justification and verification which is described in the China General Nuclear Power Corporation (CGN) procedure The Experience Feedback Specifications of UK HPR1000 GDA Project Rev. B, Reference [1]. Specifically, different

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topic areas gather OPEX from a wide range of sources and use them to notably identify the gaps between UK HPR1000 and UK context requirements, or demonstrate the UK HPR1000 design is appropriate.

There exists a database in CGN that all the engineers utilise to identify and use relevant OPEX. CGN's OPEX database contains various Chinese domestic and international OPEX information are recorded, such as incidents/events/data on similar Nuclear Power Plants (NPPs), significant changes in the design basis threat, relevant new research findings, factors that may have impact on the safety, environment and security of the design, potential problems related to equipment and human performance, safety-related concerns, opportunities for improvement and good practices that are relevant to safety, environment and security.

In accordance with the UK HPR1000 ALARP Methodology, Reference [2], it is required to consider relevant OPEX during the design evolution review and systematic review of design against RGP and OPEX. It is also stated that adequate OPEX should be taken into account during the optioneering process, either to generate potential options or to support decision-making. Relevant OPEX is widely used and presented in the ALARP demonstration for UK HPR1000 such as ALARP Demonstration Reports for topics and various optioneering reports. Relevant OPEX is also taken into account for the application and demonstration of BAT, Reference [3].

However, the Regulators have identified shortfalls in UK HPR1000 safety case documentation across several topic areas, including chemistry, radiological protection, human factors and decommissioning. The identified gaps include insufficient evidence of a systematic approach, narrow selection of OPEX, missing OPEX, insufficient justification on the applicability and the links between topic area's OPEX. Regulatory Observation (RO) RO-UKHPR1000-0044 presents the Regulator's expectations for gaining greater clarity on the identification and use of OPEX within the Generic Design Assessment (GDA) of the UK HPR1000. It is noted that the scope of this RO is not seeking a response which provides an "event-by-event" analysis of international OPEX.


The present resolution plan intends to explain how the RP will address the Regulators' concerns and expectations set out in RO-UKHPR1000-0044. It describes the current plan to address RO-UKHPR1000-0044 and contains the intended activities and submissions to provide a suitable demonstration for this observation.

Major submissions include:

- Update of the procedure The Experience Feedback Specifications of UK HPR1000 GDA Project to instruct topic teams on the use of OPEX in the UK HPR1000 GDA project;
- Issue of a document Methodology for Use of OPEX in UK HPR1000 to set out the approach for the identification and use of OPEX for different technical topics; and
- A programme of sample safety case submissions in some topic areas where gaps have been identified.

Abbreviations and Acronyms

ALARA	As Low As reasonably Achievable
ALARP	As Low As Reasonably Practicable
BAT	Best Available Techniques

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CGN	China General Nuclear Power Corporation
EA	Environment Agency
GDA	Generic Design Assessment
NPP	Nuclear Power Plant
ONR	Office for Nuclear Regulation (UK)
OPEX	Operational Experience
RGP	Relevant Good Practice
RO	Regulatory Observation
RP	Requesting Party
SFAIRP	So Far As Is Reasonably Practicable
UK HPR1000	UK Version of the Hua-long Pressurised Reactor

Deliverable Description

RO-UKHPR1000-0044.A1 –Arrangements for identifying, capturing and justifying the applicability of relevant OPEX

The Regulatory Observation (RO) Action 1 states that:

In response to this Regulatory Observation Action, RP should provide information on the documented arrangements which:

- *Define and explain the approach and associated process(es) which control how different sources of OPEX (i.e. internal, external and international) are: identified, captured and analysed. The approach to identifying and using external, international OPEX, should be especially robust.*
- *Explain the method(s) or approach(s) RP personnel follow to justify the applicability, or otherwise, of OPEX, and the arrangements which control how this justification and the OPEX (data) itself, are presented and used in the generic safety case.*
- *Explain how dependencies or interfaces between technical topics, and/or safety case submissions etc., which rely on similar or the same sources of OPEX are identified, together with a description of how they are managed, to ensure consistency.*
- *Identify and justify any specific constraints which may impact on the availability of any particular sources of OPEX and how they have been addressed; and*
- *Explain how learning from relevant non-nuclear sectors is considered and captured.*

Resolution Plan Action 1

Action 1.1 Arrangement for Management of OPEX

In response to this Regulatory Observation Action 1 (ROA1), the RP plans to carry out a review on the existing

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CGN procedure *The Experience Feedback Specifications of UK HPR1000 GDA Project*, Reference [1]. The procedure will be updated and submitted by 30th Aug, 2020. The updated procedure will include the following contents:

- Present a systematic management, i.e. the processes and control measures for OPEX sources gathered for UK HPR1000 GDA Project, including the following aspects:
 - i. Explain how Chinese domestic and international sources of OPEX are collected, identified, and analysed. All OPEX sources to which CGN has access will be listed in an appendix;
 - ii. Describe key roles and responsibilities in the OPEX management process, including Project Experience Feedback Committee, project directors, chief engineers, topic leads, etc.; and
 - iii. Describe how OPEX sources are recorded and referenced after analysis.
- Describe the arrangements for controlling and managing sources of OPEX, notably when there are interfaces between technical topics and/or safety case submissions. It is required in the procedure that the OPEX data is collected and reported through the Experience Feedback Management System. The OPEX report and application analysis is reviewed and approved by relevant topic areas.
- Describe the OPEX database and OPEX tracking system. The OPEX database comprises shared documents that are published with an internal document number (some are classified documents). Applicable OPEX items are uploaded onto the OPEX tracking system for further tracking. Relevant topic areas analyse the OPEX with project analysis criteria provided in the procedure and decide whether to draw up a forward action plan after reviewing the OPEX items on the system. More information on the tracking system will be presented in the procedure.

Action 1. 2 OPEX approach

The RP intends to produce and submit a new document, *Methodology for Use of OPEX in UK HPR1000 Rev. A* by 1st September, 2020. The document will include the following main contents:

- Define the importance of OPEX for the various technical topics. In general, OPEX is used in different topic areas either to provide evidence that the design is reasonable and valid or to provide the input to the optioneering process or design modification. The topic areas where OPEX is of greater importance (OPEX-dependent) may be identified based on the criteria below:
 - i. There is insufficient RGPs, codes & standards or approved code of practices applicable, thereby greater emphasis is placed on the use of OPEX to form or justify the design; or
 - ii. The design is strongly based on UK context such as legal requirements, environmental policies, site-related conditions, etc.

At present, the proposed list of OPEX-dependent topics includes Chemistry, Human Factors, Radiological Protection (Normal Operation Source Term), Radioactive Waste, Decommissioning & Spent Fuel

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Management and Environment. Where necessary, the list will be amended during the implementation of the methodology.

- Describe how the RP personnel justify the applicability of the OPEX and use the appropriate OPEX in the generic safety case. The analysis process and results will be documented according to the requirements specified in the procedure. Topic areas should consider the following questions in order to assess the applicability of OPEX:
 - i. What is the type of the OPEX? (operational data/information, event reports, investigations, corrective actions, design modifications, or research and development)
 - ii. Does the OPEX relate to UK HPR1000 design? (e.g. some BWR-specific OPEX is excluded)
 - iii. Is the OPEX already considered in the design?
 - iv. Is the source of OPEX reliable?
 - v. Is the OPEX of sufficient breadth and depth?
 - vi. What is the intended use of the OPEX, i.e. input, justification or optioneering?
- Explain the approach to use of OPEX in the UK HPR1000 generic design. Notably for OPEX-dependent topics, OPEX could be used either as a design input, design justification or potential option in the optioneering process. Therefore, the RP plans to specify the approach for use of OPEX in this document, including the use of OPEX in the ALARP/BAT process and the use of OPEX in the UK HPR1000 generic design development process.
- Explain how OPEX arising from non-nuclear sectors is considered. OPEX from non-nuclear sectors can be relevant for some topic areas (e.g. human factors). For example, a particular piece of learning about the performance of an operator may come from aerospace industry, but have implications for similar designs used in the UK HPR1000. Industry bodies and discipline based associations are the best way of sourcing non-nuclear OPEX. Such OPEX sources are incorporated in the OPEX source. Current non-nuclear sources will be presented in the procedure.
- Describe solutions on constraints and unavailability of OPEX sources. Unavailability of OPEX sources might result from some external constraints, such as commercial restraint factors or intellectual property/copyright protection, etc. The methodology will provide guidance on how these constraints are identified and addressed.
- Explain the interfaces between safety case submissions. A demonstration of the robust application of the arrangements for OPEX will be presented in the safety case submissions, from project level to topic level. The documentation hierarchy, structure and interfaces are part of the OPEX justification and will be explained in this document.

Figure 1 shows a flowchart of the RP's strategy to identify, apply and present OPEX for all topic areas.

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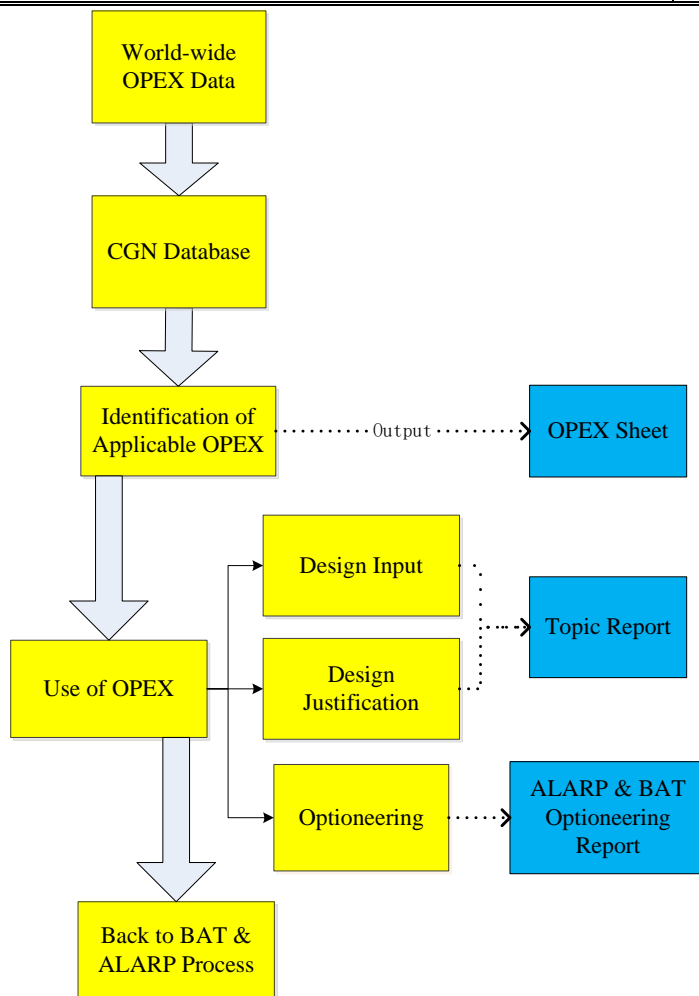


Figure 1 The RP’s Flowchart for Use of OPEX

RO-UKHPR1000-0044.A2 –Demonstration of suitable and sufficient integration of relevant OPEX into the

UK HPR1000 generic safety case

RO Action 2 states that:

The information provided to respond to this ROA should seek to provide an adequate demonstration of the robust application of the arrangements described under ROA1. Specifically, it should seek to provide ONR with confidence that safety case submissions dealing with normal operational radiological source term(s) appropriately capture and integrate OPEX (data). Based on the response to ROA1 above, in response to this ROA, the RP should provide information to:

- *Identify the technical topics/areas etc. with the greatest reliance on the use of OPEX.*
- *Define and explain any gaps identified in the application of the RP’s extant arrangements for controlling the use of OPEX in the generic safety case – including the steps being taken to address them. Impacted*

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technical topics, areas, submissions etc. should be clearly identified, listed, and a plan for when any identified gaps will be addressed, provided to The Regulators.

- *Based on the above, provide a sample of technical submissions to The Regulators, to demonstrate the practical application of the arrangements which control the use of OPEX in the generic safety case:*
- *Identify the various submissions (i.e. topic reports, support studies, ALARP and BAT demonstrations etc.) that will be provided, together with a programme for delivery to ONR. The sample should include all impacted submissions in the normal operational radiological source term(s) topic.*
 - *Provide a short explanation to justify which aspect(s) of the arrangements each submission will demonstrate.*

Resolution Plan Action 2

The RP plans to identify and address gaps in the application of the RP's extant arrangements for controlling the use and the presentation of the justification of OPEX in the generic safety case. OPEX-dependent topics and gaps in the application of OPEX will be identified according to Procedure and Methodology. A sample of the submissions including normal operation source term will be described in programme for submission sample. The programme for submission sample will be developed with the engagement of the regulators so that the sample submitted will be representative of the gaps identified and of the GDA submissions as a whole. The production and delivery of documents in the sample of submissions will be completed by the end of 2020.

The RP's plan to address RO-UKHPR1000-0044 is listed in Table 1.

Table 1 Plan for RO-UKHPR1000-0044

No.	Plan	Submission date
1	Update of <i>Experience Feedback Specifications of UK HPR1000 GDA Project</i>	1 st September, 2020
2	Issue of <i>Methodology for Use of OPEX in UK HPR1000</i>	1 st September, 2020
3	Application of the arrangements and gap analysis: <ul style="list-style-type: none"> - Identify OPEX-dependent topics; - Identify and apply OPEX by following the <i>Procedure and Methodology</i> - Identify gaps and sample of submissions - Choose the sample of the submissions (normal operation source term document included) - Issue of <i>programme for submission sample</i> 	31 st October , 2020
4	Delivery of the issued & updated documents in the sample of submissions	31 st December , 2020

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Impact on the GDA Submissions

This section should list all GDA submissions that are impacted by this resolution plan which could include:

- Experience Feedback Specifications of UK HPR1000 GDA Project, GH-40M-001 Revision C to be submitted to the Regulator by 1st September, 2020.
- Methodology for Use of OPEX in UK HPR1000 (GHX00100059DOZJ03GN) Revision A to be submitted to the Regulator by 1st September, 2020.
- The ALARP Demonstration Report of relevant topic areas to be updated and issued to the Regulator as the update plan of each topic area.

Timetable and Milestone Programme Leading to the Deliverables

See attached Gantt Chart in APPENDIX A.

Reference

- [1] CGN, The Experience Feedback Specifications of UK HPR1000 GDA Project, GH-40M-001, Revision B, December 2018
- [2] CGN, ALARP Methodology, GHX00100051DOZJ03GN, Revision D, April 2020
- [3] CGN, BAT Methodology, GHX00100055DOHB03GN, Revision C, July 2018

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PREVIOUS REVISIONS RECORD

Rev.	Author	Scope/Reason of Revision	Date	Page

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APPENDIX A RO-UKHPR1000-0044 Gantt Chart

Task and Schedule		2020							2021				
		31May	30Jun	31Jul	31Aug	30Sep	31Oct	30Nov	31Dec	31Jan	28Feb	31Mar	30Apr
RO Action 1													
1	Development of <i>The Experience Feedback Specifications of UK HPR1000 GDA Project</i>												
2	Submission of <i>The Experience Feedback Specifications of UK HPR1000 GDA Project</i>				▲								
3	Development of <i>Methodology for Use of OPEX in UK HPR1000</i>												
4	Submission of <i>Methodology for Use of OPEX in UK HPR1000</i>				▲								
5	Target ROA1 Close Date												
RO Action 2													
1	Application of the arrangements and gap analysis												
2	Submission of <i>programme for submission sample</i>						▲						
3	Delivery of sample of submissions												
4	Target ROA2 Close Date												▲
Assessment													▲

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Task and Schedule		2020								2021			
		31May	30Jun	31Jul	31Aug	30Sep	31Oct	30Nov	31Dec	31Jan	28Feb	31Mar	30Apr
1	Regulatory Assessment												
2	Target RO Close Date												