

Hitachi-GE Nuclear Energy, Ltd.
UK ABWR GENERIC DESIGN ASSESSMENT
Resolution Plan for RO-ABWR-0007
Spurious C&I failures as design basis initiating events

| | | |
|--|---|--|
| RO TITLE: | Spurious C&I failures as design basis initiating events | |
| REVISION : | 0 | |
| Overall RO Closure Date (Planned): | 30.Dec.2015 | |
| REFERENCE DOCUMENTATION RELATED TO REGULATORY OBSERVATION | | |
| Regulatory Queries | - | |
| Linked ROs | - | |
| Other Documentation | 'Topic Report for Fault Assessment' (Document No. UE-GD-0071) | |

| |
|--|
| Scope of work : |
| <p>Modern nuclear power plant (NPP) control and instrumentation (C&I) systems such as those proposed for the UK Advanced Boiling Water Reactor (ABWR) are complex and have a large number of outputs controlling a wide range of both safety and non-safety functions.</p> <p>Hitachi-GE will understand a common cause failure (CCF) and a spurious failure of C&I, and will develop the procedure to undertake wide ranging analyses of spurious failures in its proposed C&I systems for the UK ABWR to ensure that such failures are either bounded by existing design basis analyses or, if not, to evaluate the new failure event as a design basis analysis or to propose design changes to keep the faults within the design basis acceptance criteria. Hitachi-GE will provide the topic report which includes these procedure and result of the C&I CCF and will describe the overview in the revised PCSR at an appropriate time.</p> <p>This Resolution Plan describes Hitachi-GE's current plan to address the RO however as the work develops we may choose alternative means to address the RO.</p> |

| |
|---|
| Description of work: |
| <p>RO-ABWR-0007.A1: Identification of the major output functions in the UK ABWR control and protection systems</p> <p>Hitachi-GE will identify the major output functions for the Class1 SSLC (including the NMS system), the Class2 hardwired protection system (including the ARI system), Class2 plant control system, and the Class3 auxiliary control system.</p> <p>Hitachi-GE has already explained the outline to this approach at the April 16th, 2014 workshop.</p> <p>We will conduct Action1 for the important systems which are Class1 SSLC, Class2 hardwired protection system, and plant control system by October 2014. And we will conduct Action1 for Class3 auxiliary control system which</p> |

controls some plant normal operations by December 2014.

RO-ABWR-0007.A2: Demonstration of protection against a failure in the Class 1 SSLC

Hitachi-GE will analyse the spurious actuation of each function of the Class 1 SSLC identified in A1 in turn. In each case, the other functions of the SSLC will be assumed to be unavailable. Hitachi-GE will ensure that the specific faults:

- A spurious reactor trip initiated in the SSLC, with the SSLC assumed not to be available following the spurious initiation.
- A spurious containment isolation initiated in the SSLC, with the SSLC assumed not to be available following the spurious initiation.
- A spurious actuation of a safety system initiated by the Emergency Core Cooling System / Engineered Safety Features (ECCS/ESF) (e.g. LPFL, ADS, HPCF, RCIC), with the SSLC assumed not to be available following the spurious initiation.
- Any frequent design basis initiating event and the correct performance of the Reactor Protection System, but where the ECCS/ESF fails to function or initiates an inappropriate response.

RO-ABWR-0007.A3: Demonstration of protection against a failure in the Class 2 hardwired protection System

Hitachi-GE will analyse the spurious actuation of each function of the Class 2 Hard-wired protection system identified in A1 in turn. In each case, the other functions of the hard-wired protection system will be assumed to be unavailable.

RO-ABWR-0007.A4: Demonstration of protection against a spurious control system failure

Hitachi-GE will analyse the spurious actuation of each function of the Class 2 plant control system and Class 3 auxiliary control system identified in A1 in turn. In each case, the other functions of the affected system will be assumed to be unavailable.

For each of the actions A2 to A4, the analyses will be based on existing transient analyses where such analyses are available and bounding, or will be based on new transient analyses if required. Hitachi-GE will perform these analyses in accordance with SAP FA.6, considering all appropriate conditions such as the worst case operational condition (equipment structures, etc.), simultaneous occurrence of an initial fault and other faults, and a single failure criteria and so on.

In each case, Hitachi-GE will verify that those designs remain justifiable and demonstrate that the UK ABWR can be brought to a sustainable safe state.

Hitachi-GE has already explained the outline of the fore mentioned approach at the April 16th, 2014 workshop.

Furthermore the draft result of FMEA and potential map etc are shown at May 12th, 2014 workshop.

Hitachi-GE shall complete the results from Action 2 through Action 4 by the end of June 2015.

Hitachi-GE will incorporate any changes required in the Fault Schedule as a result of this RO response into the revision of the 'Topic Report for Fault Assessment' (Document No. UE-GD-0071).

In addition, if the considerations should result in adding new bounding faults, Hitachi-GE shall incorporate them into the revision of the 'Topic Report for DSA.'

Summary of impact on GDA submissions:

| GDA Submission Documents | Related GDA RO Action(s) | Submission Date to ONR |
|--|--------------------------|----------------------------|
| 'Topic Report for Fault Assessment' (UE-GD-0071) | RO A1-A4 | 30 th June 2015 |

Programme Milestones/ Schedule:

See attached Gant Chart (Table 1).

Reference:

-

