

**Hitachi-GE Nuclear Energy, Ltd.**  
**UK ABWR GENERIC DESIGN ASSESSMENT**  
**Resolution Plan for RO-ABWR-0020**

**(UK ABWR Internal Hazards Safety Case for the Main Steam Tunnel Room)**

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| <b>RO TITLE:</b>   | UK ABWR Internal Hazards Safety Case for the Main Steam Tunnel Room  |  |
| <b>REVISION :</b>  | <u>2</u>   |  |
| <b>Overall RO Closure Date (Planned):</b>                        | <u>04 November</u> 2016  |  |
| <b>REFERENCE DOCUMENTATION RELATED TO REGULATORY OBSERVATION</b> |  |  |
| <b>Regulatory Queries</b>  | RQ-ABWR-0248   |  |
| <b>Linked ROs</b>  | -  |  |
| <b>Other Documentation</b>                                       | “Preliminary Internal Hazard Assessment in Main Steam Tunnel Room”, GA91-9201-0003-00085, SE-GD-0071 Rev.0 |  |

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| <b>Scope of work :</b>   |
| <p><b>Back ground</b><br/> Hitachi-GE submitted an engineering document regarding assessment of Internal Hazards within Main Steam Tunnel Room (MSTR) [Ref-1] and presented the contents to the Office for Nuclear Regulation (ONR) in May 2014. ONR provided feedback and expectations to Hitachi-GE in August 2014. The ONR expectations were reiterated and presented within RO-ABWR-0020 which was issued in September 2014.</p> <p>This Resolution Plan presents the planned response with regards to the UK ABWR Internal Hazards Safety Case for the MSTR as described in RO-ABWR-0020.</p> <p><b>Scope of work</b><br/> This Resolution Plan presents the actions and milestones required to address the Regulatory Observation (RO) (RO-ABWR-0020) regarding the UK ABWR Internal Hazards Safety Case for the MSTR.</p> |

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| <b>Description of work:</b>  |
| <p><b>RO-ABWR-0020.A1</b><br/> <b>Review the Main Steam Tunnel Room plant layout and provide a robust ALARP justification of the internal hazards safety case in this area.</b></p> <p>Hitachi-GE have <u>divided</u> action RO-ABWR-0020.A1 into the following three actions, which are <u>listed within</u> the “Regulatory Observation Actions” <u>section</u>.</p> <p><b>ACTION 1-a. Review the MSTR plant layout and give consideration to different options from the existing design:</b><br/> Hitachi-GE will <u>review the existing design of MSTR</u>, which <u>will include</u>:</p> <ul style="list-style-type: none"> <li>• <u>Identification of potential</u> sources of <u>Internal Hazards within the MSTR</u></li> <li>• Review of MSTR layout</li> <li>• Identification of potential MSTR design options</li> </ul> |

This ACTION 1-a has been closed as options of MS Tunnel Room segregation that are different from exist design are identified and advantages / disadvantages are considered in Appendix A of the revision 1 of the topic report on MS tunnel Room [Ref-2].

**ACTION 1-b. Provide detail arguments to underpin the claims made:**

Hitachi-GE will develop further the MSTR Internal Hazard Claims, Arguments and Evidence. This includes:

- Identification of the bounding Internal Hazard events which may occur within Design Basis (DB) in the MSTR.
- Identify and develop the Internal Hazard claims placed upon the MSTR given the identified bounding Internal Hazard events.
- Provide detailed arguments to support the claims identified within the MSTR.
- Justification of the arguments with comprehensive evidence.

All normal operating states will be considered, including maintenance.

It is noted that the development of the MSTR combinations (correlated/consequential/independent) of Internal Hazards Claims, Arguments and Evidence is achieved utilising the same process identified above. The Topic Report on Internal Hazards in Main Steam Tunnel Room Rev.2 will present the process for selecting the bounding combinations of events and the subsequent Claims and Arguments.

Table i identifies the documentation which support the bounding event identification, Claims and Arguments.

**Table i : Identification of ACTION 1-b relevant documents (1/3)**

| <u>No</u> | <u>Internal Hazard</u>  | <u>Identification of Claims and Arguments</u>                             | <u>Supporting documentation</u>   | <u>Submission Date</u> |
|-----------|---|---|---|------------------------|
| <u>1</u>  | <u>Internal fire and explosion</u>                            | <u>Topic Report on Internal Hazards in Main Steam Tunnel Room – Rev.2</u> | =   | <u>23-Sep-2016</u>     |
| <u>2</u>  |   | =   | <u>Room Data Sheets for Internal Hazard Assessment – Rev.2 to support identification of hazard sources of internal fire and explosion in the MSTR.</u>        | <u>15-July 2016</u>    |
| <u>3</u>  | <u>Internal flooding (immersion, spray and steam release)</u> | <u>Topic Report on Internal Hazards in Main Steam Tunnel Room – Rev.2</u> | =   | <u>23-Sep-2016</u>     |
| <u>4</u>  |   | =   | <u>Room Data Sheets for Internal Hazard Assessment – Rev.2 to support identification of hazard sources of internal flooding, spray and steam in the MSTR.</u> | <u>15-July 2016</u>    |
| <u>5</u>  | <u>Pipe whip and jet impingement</u>                          | <u>Topic Report on Internal Hazards in Main Steam Tunnel Room – Rev.2</u> | =   | <u>23-Sep-2016</u>     |
| <u>6</u>  |   | =   | <u>Room Data Sheets for Internal Hazard Assessment – Rev.2 to support identification of hazard sources of pipe whip and jet in the MSTR.</u>                  | <u>15-July 2016</u>    |

**Table i : Identification of ACTION 1-b relevant documents (2/3)**

| No | Internal Hazard                      | Identification of Claims and Arguments                                    | Supporting documentation  | Submission Date     |
|----|--------------------------------------|---|---|---------------------|
| 7  | <u>Pipe whip and jet impingement</u> | =   | <u>Appendix of “Topic Report on Internal Hazards in Main Steam Tunnel Room Rev.2”</u><br><i>to support:</i><br>➤ <u>only one line of MS or FDW will break in design base.</u><br>➤ <u>MS line will not hit FDW line and FDW line will not hit MS line</u>   | <u>23-Sep-2016</u>  |
| 8  |                                      | =   | <u>“Topic Report on Internal Hazards in Main Steam Tunnel Room Rev.2”</u><br><i>to support:</i><br>➤ <u>in case of multiple pipe breaks that the consequences are the same (or similar) for barrier integrity, radiation, combined IHs</u><br>➤ <u>pipe whip failure bounding case in Class 3 pipework for damage to barriers</u> | <u>23-Sep-2016</u>  |
| 9  | <u>Dropped and collapsed loads</u>   | <u>Topic Report on Internal Hazards in Main Steam Tunnel Room – Rev.2</u> | =   | <u>23-Sep-2016</u>  |
| 10 |                                      | =   | <u>Room Data Sheets for Internal Hazard Assessment – Rev.2</u><br><i>to support identification of hazard sources of dropped and collapsed loads in the MSTR.</i>  | <u>15-July 2016</u> |
| 11 | <u>Internal blast</u>                | <u>Topic Report on Internal Hazards in Main Steam Tunnel Room – Rev.2</u> | =   | <u>23-Sep-2016</u>  |
| 12 |                                      | =   | <u>Room Data Sheets for Internal Hazard Assessment – Rev.2</u><br><i>to support identification of hazard sources of internal blast in the MSTR.</i>   | <u>15-July 2016</u> |
| 13 | <u>Internal missile</u>              | <u>Topic Report on Internal Hazards in Main Steam Tunnel Room – Rev.2</u> | =   | <u>23-Sep-2016</u>  |
| 14 |                                      | =   | <u>Room Data Sheets for Internal Hazard Assessment – Rev.2</u><br><i>to support identification of hazard sources of internal missile in the MSTR.</i>   | <u>15-July 2016</u> |
| 15 | <u>EMI/RFI</u>                       | <u>Topic Report on Internal Hazards in Main Steam Tunnel Room – Rev.2</u> | =   | <u>23-Sep-2016</u>  |

**Table i : Identification of ACTION 1-b relevant documents (3/3)**

| No | Internal Hazard           | Identification of Claims and Arguments                             | Supporting documentation  | Submission Date |
|----|---------------------------|--|---|-----------------|
| 16 | EMI/RFI                   | -  | Room Data Sheets for Internal Hazard Assessment - Rev.2 to support identification of hazard sources of EMI/RFI in the MSTR.                   | 15-July 2016    |
| 17 | Internal Combined Hazards | Topic Report on Internal Hazards in Main Steam Tunnel Room - Rev.2 | -   | 23-Sep-2016     |
| 18 |                           | -  | Room Data Sheets for Internal Hazard Assessment - Rev.2 to support identification of hazard sources of internal combined hazards in the MSTR. | 15-July 2016    |

**ACTION 1-c. Provide detail evidence to underpin the arguments made:**

As discussed in the resolution plan for Action 1-b Hitachi-GE will develop further the MSTR Internal Hazard Claims, Arguments and Evidence. The assessment of the identified bounding Internal Hazard events will provide Evidence to support the Claims and Arguments identified in Action 1-b. The assessment of the consequences to the divisional barriers will be presented in the barrier substantiation report. This provides evidence that the internal hazard loadings listed in Table i do not prevent the divisional barrier delivering their required FSFs. Table ii presents most of the claims are anticipated to be on the Divisional barriers, however where there are other claims the appropriate document will be referenced.

**Table ii : Identification of ACTION 1-c relevant documents**

| No | Internal Hazard               | Evidence Documentation  | Submission Date |
|----|-------------------------------|---|-----------------|
| 1  | Internal fire and explosion   | Barrier Substantiation Report Rev.2                               | 23-Sep-2016     |
| 2  | Internal flooding             | Barrier Substantiation Report Rev.2                               | 23-Sep-2016     |
| 3  | Pipe whip and jet impingement | Barrier Substantiation Report Rev.2                               | 23-Sep-2016     |
| 4  | Dropped and collapsed loads   | Barrier Substantiation Report Rev.2                               | 23-Sep-2016     |
| 5  | Internal blast                | Barrier Substantiation Report Rev.2                               | 23-Sep-2016     |
| 6  | Internal missile              | Barrier Substantiation Report Rev.2                               | 23-Sep-2016     |
| 7  | EMI/RFI                       | EMI/RFI Qualification report (referenced by EMI/RFI Topic Report) | 05-Sep-2016     |
| 8  | Internal Combined Hazards     | Barrier Substantiation Report Rev.2                               | 23-Sep-2016     |

Note that the barrier substantiation assessment will be performed for Internal Hazard sources that are present within the MSTR. If it is demonstrated that the Internal Hazard source is not present or not significant, no barrier substantiation assessment will be required.

**ACTION 1-d. Provide an internal hazards ALARP justification for the MSTR:**

The Topic Report on Internal Hazards in Main Steam Tunnel Room (SE-GD-0232 Rev.1) will be updated following the completion of the supporting MSTR Internal Hazard assessment. Once this is complete an ALARP justification will be considered in the Topic Report to determine if there are further measures which can be implemented which are reasonably practical and not grossly disproportionate. Relevant optioneering and design changes carried out will be used in the ALARP assessment.

**Summary of impact on GDA submissions:**

| <u>Related RO Actions</u> | <u>GDA Submission Document Title</u>                                    | <u>Document ID (Document No.)</u>                        | <u>Submission Date to the Regulators</u> |
|---------------------------|---|--|--|
| Submitted Document        |   |  |  |
| ROA1-a<br>(closed)        | Topic Report on Internal Hazards in Main Steam Tunnel Room              | GA91-9201-0001-00098 Rev.1<br>(SE-GD-0232 Rev.1)         | 14-May-2015                              |
| Planned Document          |   |  |  |
| ROA1-b                    | Topic Report on Internal Hazards in Main Steam Tunnel Room              | GA91-9201-0001-00098 Rev.2<br>(SE-GD-0232 Rev.2)         | 23-Sep-2016                              |
|                           | <u>Room Data Sheets for Internal Hazard Assessment</u>                  | <u>GA91-9201-0003-00427 Rev.2</u><br>(BKE-GD-0020 Rev.2) | 15-July 2016                             |
| ROA1-c                    | <u>Barrier Substantiation Report and other documents where relevant</u> | <u>GA91-9201-0003-00426 Rev.2</u><br>(BKE-GD-0019 Rev.2) | 23-Sep-2016                              |
| ROA1-d                    | <u>Topic Report on Internal Hazards in Main Steam Tunnel Room</u>       | <u>GA91-9201-0001-00098 Rev.1</u><br>(SE-GD-0232 Rev.1)  | 23-Sep-2016                              |

**Programme Milestones/ Schedule:**

See attached Gantt Chart (Table 1)

**Reference:**

(GA91-9201-0003-00085, SE-GD-0071 Rev.0, May 2014)

[Ref-2] “Topic Report on Internal Hazards in Main Steam Tunnel Room”

(GA91-9201-0001-00098, SE-GD-0232 Rev.1, May 2015)

Table 1 RO-ABWR-0020 Gantt Chart

| UK ABWR Internal Hazards Safety Case for the Main Steam Tunnel Room<br>Resolution Plan for RO-ABWR-0020 |   |           |           | 2014      |         |          |          | 2015    |          |       |       |     |      |      |    |    |   |   |    |    |    |   |    |    |    |   |   |    |    |   |   |    |    |    |   |    |    |    |   |    |    |    |   |   |    |    |    |   |    |    |    |  |  |
|---|---|-----------|-----------|-----------|---------|----------|----------|---------|----------|-------|-------|-----|------|------|----|----|---|---|----|----|----|---|----|----|----|---|---|----|----|---|---|----|----|----|---|----|----|----|---|----|----|----|---|---|----|----|----|---|----|----|----|--|--|
|   |   |           |           | September | October | November | December | January | February | March | April | May | June | July |    |    |   |   |    |    |    |   |    |    |    |   |   |    |    |   |   |    |    |    |   |    |    |    |   |    |    |    |   |   |    |    |    |   |    |    |    |  |  |
| Level   | Action Title  | Start     | Finish    | 1         | 8       | 15       | 22       | 29      | 6        | 13    | 20    | 27  | 3    | 10   | 17 | 24 | 1 | 8 | 15 | 22 | 29 | 5 | 12 | 19 | 26 | 2 | 9 | 16 | 23 | 2 | 9 | 16 | 23 | 30 | 6 | 13 | 20 | 27 | 4 | 11 | 18 | 25 | 1 | 8 | 15 | 22 | 29 | 6 | 13 | 20 | 27 |  |  |
| 1   | Regulator's Issues of RO  |           |           |           |         |          |          |         |          |       |       |     |      |      |    |    |   |   |    |    |    |   |    |    |    |   |   |    |    |   |   |    |    |    |   |    |    |    |   |    |    |    |   |   |    |    |    |   |    |    |    |  |  |
| 1.1   | ONR issue of RO   | 29-Sep-14 | 29-Sep-14 |           |         |          |          |         |          |       |       |     |      |      |    |    |   |   |    |    |    |   |    |    |    |   |   |    |    |   |   |    |    |    |   |    |    |    |   |    |    |    |   |   |    |    |    |   |    |    |    |  |  |
| 1.2   | Hitachi-GE acknowledge RO   | 20-Oct-14 | 20-Oct-14 |           |         |          |          |         |          |       |       |     |      |      |    |    |   |   |    |    |    |   |    |    |    |   |   |    |    |   |   |    |    |    |   |    |    |    |   |    |    |    |   |   |    |    |    |   |    |    |    |  |  |
| 1.3   | Hitachi-GE issue Resolution Plan                                      | 31-Oct-14 | 31-Oct-14 |           |         |          |          |         |          |       |       |     |      |      |    |    |   |   |    |    |    |   |    |    |    |   |   |    |    |   |   |    |    |    |   |    |    |    |   |    |    |    |   |   |    |    |    |   |    |    |    |  |  |
| 1.4   | Regulator's confirm credibility of Resolution Plan                    | 3-Nov-14  | 5-Dec-14  |           |         |          |          |         |          |       |       |     |      |      |    |    |   |   |    |    |    |   |    |    |    |   |   |    |    |   |   |    |    |    |   |    |    |    |   |    |    |    |   |   |    |    |    |   |    |    |    |  |  |
| 1.5   | Regulator's publish RO and Resolution Plan                            | 8-Dec-14  | 12-Dec-14 |           |         |          |          |         |          |       |       |     |      |      |    |    |   |   |    |    |    |   |    |    |    |   |   |    |    |   |   |    |    |    |   |    |    |    |   |    |    |    |   |   |    |    |    |   |    |    |    |  |  |
| 2   | Preparation of Submission Documentation                               |           |           |           |         |          |          |         |          |       |       |     |      |      |    |    |   |   |    |    |    |   |    |    |    |   |   |    |    |   |   |    |    |    |   |    |    |    |   |    |    |    |   |   |    |    |    |   |    |    |    |  |  |
| 2.1   | Action 1-a. Review MSTR plant layout and consider design options      | 27-Oct-14 | 26-Dec-14 |           |         |          |          |         |          |       |       |     |      |      |    |    |   |   |    |    |    |   |    |    |    |   |   |    |    |   |   |    |    |    |   |    |    |    |   |    |    |    |   |   |    |    |    |   |    |    |    |  |  |
| 2.2   | Action 1-b. Provide detail arguments to claims                        | 24-Nov-14 | 6-Feb-15  |           |         |          |          |         |          |       |       |     |      |      |    |    |   |   |    |    |    |   |    |    |    |   |   |    |    |   |   |    |    |    |   |    |    |    |   |    |    |    |   |   |    |    |    |   |    |    |    |  |  |
| 2.3   | Action 1-c. Provide detail evidences to claims and arguments          | 17-Aug-15 | 4-Mar-16  |           |         |          |          |         |          |       |       |     |      |      |    |    |   |   |    |    |    |   |    |    |    |   |   |    |    |   |   |    |    |    |   |    |    |    |   |    |    |    |   |   |    |    |    |   |    |    |    |  |  |
| 2.4   | Action 1-d. Provide internal hazards ALARP justification for the MSTR | 3-Nov-14  | 20-Feb-15 |           |         |          |          |         |          |       |       |     |      |      |    |    |   |   |    |    |    |   |    |    |    |   |   |    |    |   |   |    |    |    |   |    |    |    |   |    |    |    |   |   |    |    |    |   |    |    |    |  |  |
| 2.5   | Documentation of topic report   | 29-Dec-14 | 8-Apr-16  |           |         |          |          |         |          |       |       |     |      |      |    |    |   |   |    |    |    |   |    |    |    |   |   |    |    |   |   |    |    |    |   |    |    |    |   |    |    |    |   |   |    |    |    |   |    |    |    |  |  |
| 3   | Regulator's Closure of RO   |           |           |           |         |          |          |         |          |       |       |     |      |      |    |    |   |   |    |    |    |   |    |    |    |   |   |    |    |   |   |    |    |    |   |    |    |    |   |    |    |    |   |   |    |    |    |   |    |    |    |  |  |
| 3.1   | Regulator's assessment  | 9-Mar-15  | 6-May-16  |           |         |          |          |         |          |       |       |     |      |      |    |    |   |   |    |    |    |   |    |    |    |   |   |    |    |   |   |    |    |    |   |    |    |    |   |    |    |    |   |   |    |    |    |   |    |    |    |  |  |
| 3.2   | Regulator's publication of RO closure letter                          | 9-May-16  | 3-Jun-16  |           |         |          |          |         |          |       |       |     |      |      |    |    |   |   |    |    |    |   |    |    |    |   |   |    |    |   |   |    |    |    |   |    |    |    |   |    |    |    |   |   |    |    |    |   |    |    |    |  |  |

| UK ABWR Internal Hazards Safety Case for the Main Steam Tunnel Room<br>Resolution Plan for RO-ABWR-0020 |   |           |           | 2015   |           |         |          | 2016     |         |          |       |       |     |      |      |        |           |         |    |    |    |   |    |    |    |   |    |    |    |   |   |    |    |    |   |    |    |    |   |    |    |    |   |   |    |    |    |   |    |    |    |   |    |    |    |   |   |    |    |    |   |    |    |    |   |    |    |    |    |
|---|---|-----------|-----------|--------|-----------|---------|----------|----------|---------|----------|-------|-------|-----|------|------|--------|-----------|---------|----|----|----|---|----|----|----|---|----|----|----|---|---|----|----|----|---|----|----|----|---|----|----|----|---|---|----|----|----|---|----|----|----|---|----|----|----|---|---|----|----|----|---|----|----|----|---|----|----|----|----|
|   |   |           |           | August | September | October | November | December | January | February | March | April | May | June | July | August | September | October |    |    |    |   |    |    |    |   |    |    |    |   |   |    |    |    |   |    |    |    |   |    |    |    |   |   |    |    |    |   |    |    |    |   |    |    |    |   |   |    |    |    |   |    |    |    |   |    |    |    |    |
| Level   | Action Title  | Start     | Finish    | 3      | 10        | 17      | 24       | 31       | 7       | 14       | 21    | 28    | 5   | 12   | 19   | 26     | 2         | 9       | 16 | 23 | 30 | 7 | 14 | 21 | 28 | 4 | 11 | 18 | 25 | 1 | 8 | 15 | 22 | 29 | 7 | 14 | 21 | 28 | 4 | 11 | 18 | 25 | 2 | 9 | 16 | 23 | 30 | 6 | 13 | 20 | 27 | 4 | 11 | 18 | 25 | 1 | 8 | 15 | 22 | 29 | 5 | 12 | 19 | 26 | 3 | 10 | 17 | 24 | 31 |
| 1   | Regulator's Issues of RO  |           |           |        |           |         |          |          |         |          |       |       |     |      |      |        |           |         |    |    |    |   |    |    |    |   |    |    |    |   |   |    |    |    |   |    |    |    |   |    |    |    |   |   |    |    |    |   |    |    |    |   |    |    |    |   |   |    |    |    |   |    |    |    |   |    |    |    |    |
| 1.1   | ONR issue of RO   | 29-Sep-14 | 29-Sep-14 |        |           |         |          |          |         |          |       |       |     |      |      |        |           |         |    |    |    |   |    |    |    |   |    |    |    |   |   |    |    |    |   |    |    |    |   |    |    |    |   |   |    |    |    |   |    |    |    |   |    |    |    |   |   |    |    |    |   |    |    |    |   |    |    |    |    |
| 1.2   | Hitachi-GE acknowledge RO   | 20-Oct-14 | 20-Oct-14 |        |           |         |          |          |         |          |       |       |     |      |      |        |           |         |    |    |    |   |    |    |    |   |    |    |    |   |   |    |    |    |   |    |    |    |   |    |    |    |   |   |    |    |    |   |    |    |    |   |    |    |    |   |   |    |    |    |   |    |    |    |   |    |    |    |    |
| 1.3   | Hitachi-GE issue Resolution Plan                                      | 31-Oct-14 | 31-Oct-14 |        |           |         |          |          |         |          |       |       |     |      |      |        |           |         |    |    |    |   |    |    |    |   |    |    |    |   |   |    |    |    |   |    |    |    |   |    |    |    |   |   |    |    |    |   |    |    |    |   |    |    |    |   |   |    |    |    |   |    |    |    |   |    |    |    |    |
| 1.4   | Regulator's confirm credibility of Resolution Plan                    | 3-Nov-14  | 5-Dec-14  |        |           |         |          |          |         |          |       |       |     |      |      |        |           |         |    |    |    |   |    |    |    |   |    |    |    |   |   |    |    |    |   |    |    |    |   |    |    |    |   |   |    |    |    |   |    |    |    |   |    |    |    |   |   |    |    |    |   |    |    |    |   |    |    |    |    |
| 1.5   | Regulator's publish RO and Resolution Plan                            | 8-Dec-14  | 12-Dec-14 |        |           |         |          |          |         |          |       |       |     |      |      |        |           |         |    |    |    |   |    |    |    |   |    |    |    |   |   |    |    |    |   |    |    |    |   |    |    |    |   |   |    |    |    |   |    |    |    |   |    |    |    |   |   |    |    |    |   |    |    |    |   |    |    |    |    |
| 2   | Preparation of Submission Documentation                               |           |           |        |           |         |          |          |         |          |       |       |     |      |      |        |           |         |    |    |    |   |    |    |    |   |    |    |    |   |   |    |    |    |   |    |    |    |   |    |    |    |   |   |    |    |    |   |    |    |    |   |    |    |    |   |   |    |    |    |   |    |    |    |   |    |    |    |    |
| 2.1   | Action 1-a. Review MSTR plant layout and consider design options      | 27-Oct-14 | 26-Dec-14 |        |           |         |          |          |         |          |       |       |     |      |      |        |           |         |    |    |    |   |    |    |    |   |    |    |    |   |   |    |    |    |   |    |    |    |   |    |    |    |   |   |    |    |    |   |    |    |    |   |    |    |    |   |   |    |    |    |   |    |    |    |   |    |    |    |    |
| 2.2   | Action 1-b. Provide detail arguments to claims                        | 24-Nov-14 | 6-Feb-15  |        |           |         |          |          |         |          |       |       |     |      |      |        |           |         |    |    |    |   |    |    |    |   |    |    |    |   |   |    |    |    |   |    |    |    |   |    |    |    |   |   |    |    |    |   |    |    |    |   |    |    |    |   |   |    |    |    |   |    |    |    |   |    |    |    |    |
| 2.2.1   | Action 1-b. For Revision 2 of Resolution Plan                         | 23-May-16 | 2-Sep-16  |        |           |         |          |          |         |          |       |       |     |      |      |        |           |         |    |    |    |   |    |    |    |   |    |    |    |   |   |    |    |    |   |    |    |    |   |    |    |    |   |   |    |    |    |   |    |    |    |   |    |    |    |   |   |    |    |    |   |    |    |    |   |    |    |    |    |
| 2.3   | Action 1-c. Provide detail evidences to claims and arguments          | 17-Aug-15 | 4-Mar-16  |        |           |         |          |          |         |          |       |       |     |      |      |        |           |         |    |    |    |   |    |    |    |   |    |    |    |   |   |    |    |    |   |    |    |    |   |    |    |    |   |   |    |    |    |   |    |    |    |   |    |    |    |   |   |    |    |    |   |    |    |    |   |    |    |    |    |
| 2.3.1   | Action 1-c. For Revision 2 of Resolution Plan                         | 4-Jul-16  | 2-Sep-16  |        |           |         |          |          |         |          |       |       |     |      |      |        |           |         |    |    |    |   |    |    |    |   |    |    |    |   |   |    |    |    |   |    |    |    |   |    |    |    |   |   |    |    |    |   |    |    |    |   |    |    |    |   |   |    |    |    |   |    |    |    |   |    |    |    |    |
| 2.4   | Action 1-d. Provide internal hazards ALARP justification for the MSTR | 3-Nov-14  | 20-Feb-15 |        |           |         |          |          |         |          |       |       |     |      |      |        |           |         |    |    |    |   |    |    |    |   |    |    |    |   |   |    |    |    |   |    |    |    |   |    |    |    |   |   |    |    |    |   |    |    |    |   |    |    |    |   |   |    |    |    |   |    |    |    |   |    |    |    |    |
| 2.4.1   | Action 1-d. For Revision 2 of Resolution Plan                         | 5-Sep-16  | 23-Sep-16 |        |           |         |          |          |         |          |       |       |     |      |      |        |           |         |    |    |    |   |    |    |    |   |    |    |    |   |   |    |    |    |   |    |    |    |   |    |    |    |   |   |    |    |    |   |    |    |    |   |    |    |    |   |   |    |    |    |   |    |    |    |   |    |    |    |    |
| 2.5   | Documentation of topic report   | 29-Dec-14 | 8-Apr-16  |        |           |         |          |          |         |          |       |       |     |      |      |        |           |         |    |    |    |   |    |    |    |   |    |    |    |   |   |    |    |    |   |    |    |    |   |    |    |    |   |   |    |    |    |   |    |    |    |   |    |    |    |   |   |    |    |    |   |    |    |    |   |    |    |    |    |
| 2.5.1   | Documentation of topic report   | 1-Aug-16  | 23-Sep-16 |        |           |         |          |          |         |          |       |       |     |      |      |        |           |         |    |    |    |   |    |    |    |   |    |    |    |   |   |    |    |    |   |    |    |    |   |    |    |    |   |   |    |    |    |   |    |    |    |   |    |    |    |   |   |    |    |    |   |    |    |    |   |    |    |    |    |
| 3   | Regulator's Closure of RO   |           |           |        |           |         |          |          |         |          |       |       |     |      |      |        |           |         |    |    |    |   |    |    |    |   |    |    |    |   |   |    |    |    |   |    |    |    |   |    |    |    |   |   |    |    |    |   |    |    |    |   |    |    |    |   |   |    |    |    |   |    |    |    |   |    |    |    |    |
| 3.1   | Regulator's assessment  | 9-Mar-15  | 6-May-16  |        |           |         |          |          |         |          |       |       |     |      |      |        |           |         |    |    |    |   |    |    |    |   |    |    |    |   |   |    |    |    |   |    |    |    |   |    |    |    |   |   |    |    |    |   |    |    |    |   |    |    |    |   |   |    |    |    |   |    |    |    |   |    |    |    |    |
| 3.2   | Regulator's publication of RO closure letter                          | 9-May-16  | 3-Jun-16  |        |           |         |          |          |         |          |       |       |     |      |      |        |           |         |    |    |    |   |    |    |    |   |    |    |    |   |   |    |    |    |   |    |    |    |   |    |    |    |   |   |    |    |    |   |    |    |    |   |    |    |    |   |   |    |    |    |   |    |    |    |   |    |    |    |    |