UK EPR	UK EPR GDA PROJECT			
	Title: Resolution Plan for GI-UKEPR-CE04			
	RP unique number:	Revision No.:	Effective Date:	Page No.:
	GI-UKEPR-CE04-RP	0	29/06/2011	1 of 8

Approved for EDF by: A. PETIT	Approved for AREVA by: C. WOOLDRIDGE
Name/Initials  *Date* *28/06/2011*	*Name/Initials*  *Date* *28/06/2011*

Resolution Plan Revision History

Rev.	Description of update	Date issued
0	First Issue	29/06/2011

1.0 GDA ISSUE

GDA Issue Title	Main Assessment Area	Related Assessment Area
Containment Analysis	Civil Engineering	Not Applicable

GDA Issue	The analysis of the UK EPR containment structure has not been demonstrated to capture the behaviour in a sufficiently accurate manner.

2.0 OVERVIEW OF SCOPE OF WORK

RO-UKEPR-76 was raised based on the combined rationale that the analysis methodology and associated design basis were insufficient in providing a coherent description of the inner containment overall analytical process and that a satisfactory demonstration of structural performance and reliability was needed.

The first three (3) actions of RO-UKEPR-76 have been provided to ONR for assessment, but too late in GDA Step 4 for assessment. Additionally, there are two (2) actions which have yet to be issued to ONR for assessment.

This GDA Issue requests AREVA/EDF to provide support for the ongoing assessment of the RO-UKEPR-76 associated documentation.

3.0 GDA ISSUE ACTIONS AND RESOLUTION PLAN DELIVERABLES

3.1 Action GI-UKEPR-CE04.01

Action I/D	Action Description
GI-UKEPR-CE04.01	Support assessment within the following areas and provide adequate responses to any questions arising from the assessment by ONR of documents submitted during GDA Step 4 but not reviewed in detail at that time. During the Step 4 assessment, the following areas were highlighted as requiring further justification: • Inner Containment seismic calculations in relation with ETC-C requirements. • Damping ratio of the pre-stressed concrete containment structure. • Comparison Between Equivalent Static Seismic Analysis of the Pre-stressed Inner Containment and Seismic Spectrum Analysis with Global NI Model • Simplifications over the representation of the foundation The combined rationale for the analysis methodology and associated design basis is insufficient in providing a coherent description of the overall analytical process, and fails to adequately address specific analytical aspects necessary to demonstrate a level of structural performance and reliability commensurate with that expected for inner containment. Based on a high level review of the documents and assurances provided to date I have sufficient confidence in the approach to conclude that it should be possible to provide a suitable demonstration of both the beyond design basis performance. With agreement from the Regulator this action may be completed by alternative means.

3.1.1 Deliverables already submitted to ONR/EA in response to GI-UKEPR-CE04.01

	Date of submission
12680-RP01-39 Revision D, Analysis of Inner Containment (submitted by AREVA/EDF Letter ND(NII) EPR00830N)	10/03/2011
This document responds to RO-UKEPR-76, Actions 1 and 2 by demonstrating that the local stress conditions in the gusset singular zone (i.e. inner containment/basemat junction) have been considered and explain how the boundary between the models has been represented	
ENGSGC110030 Revision A, Analysis of EPR Inner Containment - GDA/Step4 – Inner Containment Seismic Calculations in Relation with ETC-C Requirements (submitted by AREVA/EDF Letter ND(NII) EPR00830N)	10/03/2011
This document responds to RO-UKEPR-76, Action 3 by justifying the appropriateness of the chosen critical damping value and its application, along with providing clarification of how the global nuclear island model seismic analysis is used for the design of the inner containment wall.	
12680-RP01-46 Revision B, Damping Ratio of the Pre-stressed Concrete Containment Structure (submitted by AREVA/EDF Letter ND(NII) EPR00830N)	10/03/2011
This document responds to RO-UKEPR-76, Action 3 by evaluating the influence of the damping ratio of the prestressed concrete containment	
12680-RP01-49 Revision C, Comparison Between Equivalent Static Seismic Analysis of the Pre-stressed Inner Containment and Seismic Spectrum Analysis with Global NI Model (submitted by AREVA/EDF Letter ND(NII) EPR00830N)	10/03/2011
This document responds to RO-UKEPR-76, Action 3 by providing a comparison between equivalent static seismic analysis of the prestressed inner containment and seismic spectrum analysis with global nuclear island model	
ENGSDS100269 Rev. A, UK EPR - Methodology for Seismic Analysis of NI buildings (submitted by AREVA/EDF Letter ND(NII) EPR00783N)	11/02/2011
This document describes the methodologies to be used and to clarify what will be done for the seismic analysis of safety related C1 classified structures of the Nuclear Island at the Nuclear Site Licence phase	

3.1.2 Planned submissions in response to GI-UKEPR-CE04.01

3.1.2.1 Description of Scope of Work

AREVA/EDF will support the ONR assessment of the engineering documentation and justification associated with RO-UKEPR-76.

Additionally, Actions 4 and 5 of RO-UKEPR-76 have yet to be issued to ONR. As part of the resolution of this GDA Issue Action, AREVA/EDF will finalise these actions per the response approach delineated in AREVA/EDF Letter ND(NII) EPR00612N and support ONR's assessment of these items as requested.

3.1.2.2 Description of Methodology to be employed

AREVA/EDF will complete the response to existing RO-UKEPR-76 Actions 4 and 5 in accordance with the methodology delineated in AREVA/EDF Letter ND(NII) EPR00612N:

RO-UKEPR-76.A4 – Item (A)

(a) AREVA/EDF will provide justification of the stress limits stated in ETC-C.

(b) AREVA/EDF will justify the use of the 0.5 factor for prestressed containment wall subject to thermal actions and explain its applicability to the design.

RO-UKEPR-76.A4 – Item (B)

(a) AREVA/EDF will provide clarity as to which load factors are used in the inner containment design.

RO-UKEPR-76.A4 – Item (C)

(a) AREVA/EDF will describe and summarise the MAEVA mock-up test results performed relating to EPR containment design to justify the acceptability of the structure and factor used.

(b) AREVA/EDF will demonstrate that the structural performance is not affected by cracking (non sensitive) – linked to RO-UKEPR-37.

RO-UKEPR-76.A5 – Item (A)

(a) AREVA/EDF will provide a synthesis report related to justifying the design basis of the inner containment.

Task 1 of GI-UKEPR-CE04.01 – Completion of RO-UKEPR-76 Action 4

An engineering report will be prepared addressing the scope of questions posed by ONR in RO-UKEPR-76 Action 4. This report will utilise the response methodology delineated above as found in AREVA/EDF Letter ND(NII) EPR00612N.

Task 2 of GI-UKEPR-CE04.01 – Completion of RO-UKEPR-76 Action 5

An engineering report will be prepared addressing the supplementary information committed by AREVA/EDF for responding to RO-UKEPR-76. This report will utilise the response methodology delineated above as found in AREVA/EDF Letter ND(NII) EPR00612N.

The engineering reports generated will be reviewed by ONR upon AREVA/EDF approval. Also, review of the previously submitted responses to RO-UKEPR-76 Actions 1 to 3 is required of ONR. This review cycle is anticipated to require at least one (1) face-to-face meeting to facilitate resolution of any residual questions and/or offer clarifications to the RO-UKEPR-76 responses. Accordingly, progress meetings have been accounted for in the work programme to facilitate this resolution.

No updates to the PCSR are expected since the documentation provided with RO-UKEPR-76 was determined to be not relevant to the PCSR (Sub-chapter 3.3).

AREVA/EDF will support ONR as requested to ensure a complete understanding of the RO-UKEPR-76 deliverables is achieved and effectively closes this GDA Issue.

3.1.2.3 Deliverable description	Submission date to ONR/EA
Completion of RO-UKEPR-76 Action 4 Response	15/07/2011
This document will provide justifications for using linear elastic methods when designing reactor containments and will correlate this with testing results from mockup facilities	
Completion of RO-UKEPR-76 Action 5 Response	15/07/2011
This document will provide justification of the design basis of the inner containment	

4.0 SUMMARY OF IMPACT ON GDA SUBMISSION DOCUMENTATION

4.1 GDA submission documents impacted by GDA Issue and scheduled to be created (C) or updated (U) within GDA

GDA Submission Documents	C/U	Related GDA Issue Action(s)	Submission Date to ONR/EA
SSER sub-chapters Not Applicable		N/A	N/A
GDA reference design documents (SDM in UKEPR-I-002) Not Applicable		N/A	N/A
Other GDA submission supporting documents Completion of RO-UKEPR-76 Action 4 Response	**C**	GI-UKEPR-CE04.01	15/07/2011
Completion of RO-UKEPR-76 Action 5 Response	**C**	GI-UKEPR-CE04.01	15/07/2011

5.0 JUSTIFICATION OF ADEQUACY

AREVA/EDF will support the ONR assessment of the engineering documentation and justification associated with RO-UKEPR-76.

As delineated in the write-up of GDA Issue GI-UKEPR-CE04, ONR has stated that based on their high level review of the documentation, they are confident that upon a more detailed assessment this GDA Issue can be adequately satisfied. Their statement is considered encouraging and acceptable due to the late delivery of the first three (3) action responses and the need to issue the remaining two (2) action responses. These technical deliverables were developed in GDA Step 4 in response to ONR Letter EPR70246R as documented in AREVA/EDF Letter ND(NII) EPR00612N and remain applicable to satisfying the intent of this GDA Issue.

The engineering documentation which makes up the totality of the response to RO-UKEPR-76 and this GDA Issue support the below listed relevant ONR SAPs.

Engineering principles: containment and ventilation: containment design	**Minimisation of releases**	**ECV.2**
Nuclear containment and associated systems should be designed to minimise radioactive releases to the environment in normal operation, fault and accident conditions.		

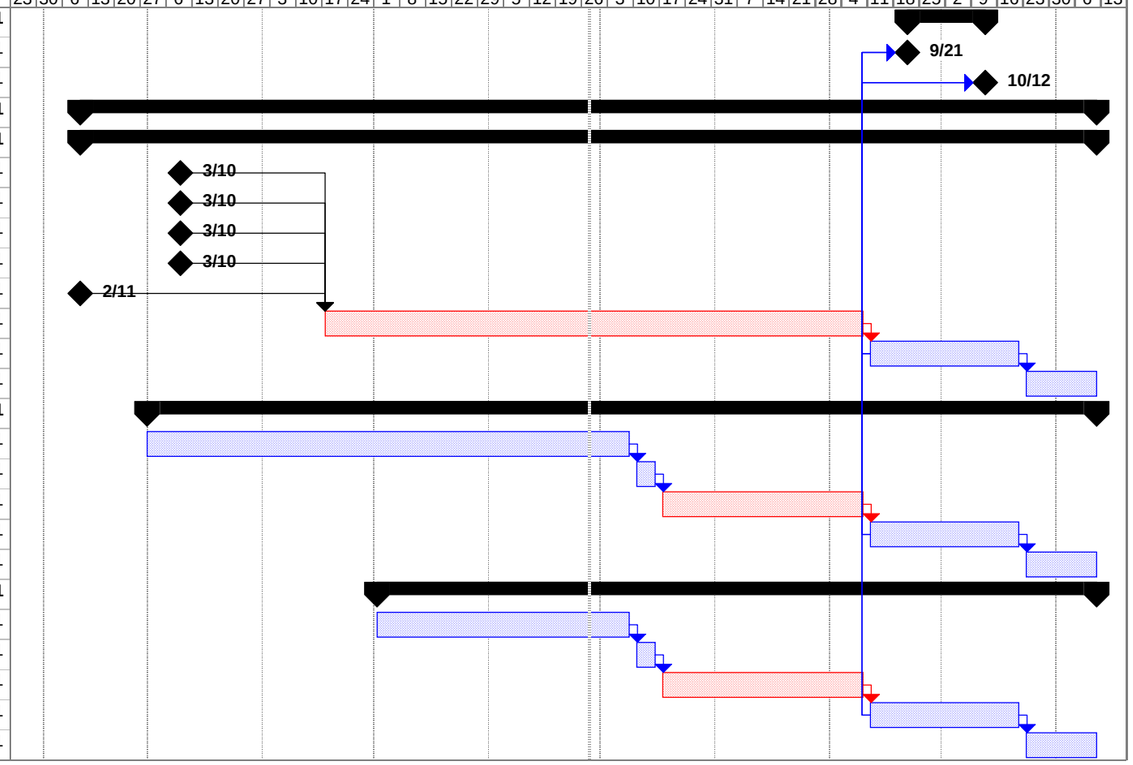
Engineering principles: civil engineering: structural analysis and model testing	**Structural analysis and model testing**	**ECE.12**
Structural analysis or model testing should be carried out to support the design and should demonstrate that the structure can fulfil its safety functional requirements over the lifetime of the facility.		

Engineering principles: civil engineering: structural analysis and model testing	**Validation of methods**	**ECE.15**
Where analyses have been carried out on civil structures to derive static and dynamic structural loadings for the design, the methods used should be adequately validated.		

6.0 TIMETABLE AND MILESTONE PROGRAMME LEADING TO THE DELIVERABLES

Consult the following pages for the associated timetable and milestone programme.

ID		Task Name	Duration	Start	Finish
1		**Civil Topic Meetings**	**15 days**	**Wed Sep 21, '11**	**Wed Oct 12, '11**
2		Civil Topic Progress/Working Meeting	0 days	Wed Sep 21, '11	Wed Sep 21, '11
3		Civil Topic Progress/Working Meeting	0 days	Wed Oct 12, '11	Wed Oct 12, '11
4		**Action 1 of GI-UKEPR-CE04**	**196 days**	**Fri Feb 11, '11**	**Fri Nov 11, '11**
5		**EDF and AREVA Support ONR Assessment**	**196 days**	**Fri Feb 11, '11**	**Fri Nov 11, '11**
6		COB Report 12680-RP01-39 (Actual Submittal to ONR)	0 days	Thu Mar 10, '11	Thu Mar 10, '11
7		EDF Report ENGSGC110030 (Actual Submittal to ONR)	0 days	Thu Mar 10, '11	Thu Mar 10, '11
8		COB Report 12680-RP01-46 (Actual Submittal to ONR)	0 days	Thu Mar 10, '11	Thu Mar 10, '11
9		COB Report 12680-RP01-49 (Actual Submittal to ONR)	0 days	Thu Mar 10, '11	Thu Mar 10, '11
10		EDF Report ENGSDS100269 (Actual Submittal to ONR)	0 days	Fri Feb 11, '11	Fri Feb 11, '11
11		ONR Assessment	105 days	Mon Apr 18, '11	Fri Sep 9, '11
12		Resolution of ONR Assessment Comments (if applicable)	30 days	Mon Sep 12, '11	Fri Oct 21, '11
13		Issuance of Updated Documentation (if applicable)	15 days	Mon Oct 24, '11	Fri Nov 11, '11
14		**Task 1 of GI-UKEPR-CE04.01**	**184 days**	**Tue Mar 1, '11**	**Fri Nov 11, '11**
15		Report Preparation - Completion of RO-UKEPR-76 Action 4 Response	94 days	Tue Mar 1, '11	Fri Jul 8, '11
16		Issuance to ONR	5 days	Mon Jul 11, '11	Fri Jul 15, '11
17		ONR Assessment	40 days	Mon Jul 18, '11	Fri Sep 9, '11
18		Resolution of ONR Assessment Comments (if applicable)	30 days	Mon Sep 12, '11	Fri Oct 21, '11
19		Issuance of Updated Documentation (if applicable)	15 days	Mon Oct 24, '11	Fri Nov 11, '11
20		**Task 2 of GI-UKEPR-CE04.01**	**140 days**	**Mon May 2, '11**	**Fri Nov 11, '11**
21		Report Preparation - Completion of RO-UKEPR-76 Action 5 Response	50 days	Mon May 2, '11	Fri Jul 8, '11
22		Issuance to ONR	5 days	Mon Jul 11, '11	Fri Jul 15, '11
23		ONR Assessment	40 days	Mon Jul 18, '11	Fri Sep 9, '11
24		Resolution of ONR Assessment Comments (if applicable)	30 days	Mon Sep 12, '11	Fri Oct 21, '11
25		Issuance of Updated Documentation (if applicable)	15 days	Mon Oct 24, '11	Fri Nov 11, '11



Project: GI-UKEPR-RC02 Schedule
Date: Tue Jun 28, '11

Task | Progress | Summary | External Tasks | Deadline
Split | Milestone | Project Summary | External Milestone