Enclosure 2 (Non-SRI)

Docket No. 05200046

Reply to NOV Report No.05200046/2016-202

September 2017

Reply to a Notice of Violation (NOV): NRC Inspection Report No.05200046/2016-202

NRC Identification No. 05200046/2016-202-01

1. Issue identified as violation

During a U.S Nuclear Regulatory Commission (NRC) inspection of the Korea Hydro and Nuclear Power Co., Ltd. (KHNP) Advanced Power Reactor 1400 (APR1400) aircraft impact assessment (AIA) conduced in San Diego, CA, on July 17-20, 2017, NRC staff identified one violation of NRC requirements with three examples. In accordance with the NRC Enforcement Policy, the violation is listed below:

Title 10 of the Code of Federal Regulations (10 CFR), Section 50.150, "Aircraft impact assessment," Paragraph (a)(1) requires that each applicant listed in 10 CFR 50.150(a)(3) shall perform a design-specific assessment of the effects on the facility of the impact of a large, commercial aircraft. Using realistic analyses, the applicant shall identify and incorporate into the design those design features and functional capabilities to show that, with reduced use of operator actions:

i. the reactor core remains cooled, or the containment remains intact; and

ii. spent fuel cooling or spent fuel pool integrity is maintained.

KHNP chose to meet 10 CFR 50.150 by showing that the reactor core remains cooled and spent fuel pool integrity is maintained.

a. Contrary to the above, as of July 17, 2017, KHNP failed to identify and incorporate into the APR1400 design control document (DCD) those design features and functional capabilities credited in the AIA to show the reactor core remains cooled and spent fuel pool integrity is maintained.

Specifically, the AIA relied upon the following design features and functional capabilities to show how the reactor core remains cooled. However, the DCD failed to identify or incorporate the following design features and functional capabilities:

- ultimate heat sink;
- cabling for the safety-related instrumentation and control in the A and B equipment rooms;
- design and configuration of viewing areas in the A and B diesel generator control rooms;
- design of the wall and the size of rebar used in the exterior walls of the main steam valve rooms;
- design and configuration of the polar crane support brackets and girders; and,
- design and configuration of auxiliary building interior and exterior walls.

In addition, the AIA relied upon the design and configuration of the auxiliary building exterior walls to show how spent fuel pool integrity is maintained. However, the DCD does not identify or describe the design and configuration of the auxiliary building exterior walls, which contribute to the protection of the spent fuel pool.

This is the first example of Violation 05200046/2016-202-01.

b. In addition, KHNP failed to perform a design specific assessment in certain portions of the AIA. Specially, the AIA credits component cooling water to provide room cooling for systems relied upon to support core cooling (such as the motor driven auxiliary feed water pumps and safety injection pumps). However, the essential chilled water system is the system designed to provide room cooling. The essential chilled water system was not identified nor considered as a key design feature in the assessment; and, as a result, it was not analyzed in the assessment nor identified or described in the DCD. In addition, the AIA incorrectly credits the remote shutdown room for controlling core cooling equipment for a number of aircraft impact scenarios.

This is the second example of Violation 05200046/2016-202-01.

c. Furthermore, KHNP did not use realistic analyses in certain portions of the AIA. Specifically, KHNP used a non-realistic value of concrete strength gain to analyze aircraft impacts. Specifically KHNP utilized 91-day test strength values for concrete and NEI 07-13 aging factors, but the NEI 07-13 aging factors are intended for use with 28-day test strengths. The resulted in non-realistic values for the aging strength gain of the concrete.

This is the third example of Violation 05200046/2016-202-01.

2. Reason for the violation

A post-inspection investigation was performed to identify the reason for the violation and to identify the underlying causes that contributed to the issues identified in the inspection report related to a) omission of key design feature and functional capabilities in DCD, b) failure to perform a design specific assessment for essential chilled water system (ECWS), c) failure to use realistic analyses. The investigation included an AIA inspection follow-up meeting with participating design suppliers for the detailed reviews of deficiencies between APR 1400 DCD and Aircraft impact assessment report (APR1400-E-P-NR14002-P-SGI, Hereafter AIA report). The following summarizes the findings from our investigations and discussions:

a. Omission of key design features and functional capabilities in DCD

APR1400 DCD Section 19.5.4 addressed most of the key design features identified in the AIA process. However, a few key design features that NRC expected to be included in the DCD were omitted. KHNP regarded at that time that those features are too detailed to be addressed in the regulatory document. The cause of this omission has been attributed to lack of industry experience by

KHNP on level of detail required to meet NRC expectations for applying results from AIA into the DCD.

b. Failure to perform a design specific assessment for essential chilled water system

As to assessment of ECWS, when technical analyses suppliers performed the heat removal assessment for the APR1400 AIA, the ECWS was not initially recognized as the primary system for component cooling. The assessment included detailed evaluations for the component cooling water system (CCWS), but failed to include the dependence of component cooling on the ECWS. KHNP subsequently performed further AIA evaluations with help from a consulting company to more fully address the complex nature and interactions between plant design systems and aircraft impact. This omission, however, was not identified or discussed in any of the project review meetings prior to the NRC July 17-20 inspection. The reason for this omission is attributed to communication issues between KHNP and its consultants whereby the details of the heat removal assessment relative to the system design for component cooling functions were not clearly communicated.

c. Failure to use realistic analyses involving concrete strength

The structural assessment relied on test data from actual concrete placements used in previous nuclear plants constructed by KHNP rather than the guidance provided in NEI 07-13. The guidance in NEI 07-13 provides a means for determining the nominal (or median) strength to be reached at 28 days for a given concrete design strength. The concrete strength used in the assessment was based on the median value of the tested samples at 28 days even though the design strength is specified at 91 days. KHNP believed that this test data provided a more realistic value than the generic NEI guidance. However, the AIA did not clearly specify that the value considered was to be the median value at 28 days as a key design feature. The cause of this violation is attributed to a failure of clearly documenting the bases for assumptions used in the structural assessment.

3. Corrective steps that have been taken and the results achieved; Corrective steps that will be taken to avoid further violations

After the identification of the reason for the violation, the post-inspection investigation identified several actions that, once completed, will bring the APR 1400 design into full compliance with 10 CFR 50.150. As part of the KHNP corrective action process, action was taken immediately to ensure all specific DCD and technical issues were addressed. Additionally, KHNP has identified necessary design changes, and it has taken steps to update the AIA as appropriate to resolve each specific issue associated with the NOV. The resolution of the issues is provided as DCD markups in Attachment and will be incorporated into Revision 2 of the DCD. Furthermore, in support of this response to the NOV, KHNP plans to perform an extent of condition review to determine if the AIA contains any additional issues similar to those identified during the inspection.

Additional corrective actions include improved interactions and contracting practices with APR1400 technical support suppliers to ensure work scope requirements and expectations are clear and to assure contractor internal processes for performing work, e.g. heat removal and structural assessments for aircraft impact, analysis reviews, etc., conform to prescribed requirements and that work products adequately document the results pursuant to the scope of work. In addition, the corrective actions included improving the process used to ensure that the results of the specific heat removal and structural assessments for the APR1400 AIA were incorporated back into the design control documents.

KHNP has issued one condition report (CR No 11E47-CR-17-N-244 “Corrective action of DCD to AIA inspection”). The condition report was initiated to correct issues identified during the AIA inspection. As a result, the AIA report will be revised and APR1400 DCD will be updated as shown in the DCD markups in Attachment.

a. Corrective actions for the first example of Violation.

   KHNP has performed corrective actions for the items that can be corrected through immediate action and closed as of 29 September, 2017. In addition to opening a condition report as identified above; KHNP took the corrective actions as identified below to address first example of violation. Through the corrective action process, KHNP has reviewed and prepared markups for the APR1400 design control document of the following items. the AIA report will also be revised in order to perform the corrective actions of inspection results.

   Immediate actions taken:

   DCD markups have been prepared for the following items, as presented in the Attachment;

   1) The ultimate heat sink (UHS) is added to Section 19.5.4.4 in DCD as a key design feature.
   2) The cabling routing for the safety-related instrumentation and control in the A and B equipment rooms is added to Section 19.5.4.4 in DCD as a key design feature.
   3) The window size of viewing areas in the A and B diesel generator control rooms is added to Section 19.5.4.2 in DCD as a key design feature.
   4) The wall and the size of rebar used in the exterior walls of the main steam

valve rooms are revised and added to Section 3.8A (Table 3.8A-29, Figure 3.8A-40, 3.8A-41) and 19.5.4.2 as a key design feature.

5) The polar crane support brackets and girders are added to Section 19.5.4.1 as a key design feature.
6) The auxiliary building interior and exterior walls are added to Section 19.5.4.2 as key design features.

Long term actions to be taken:

As part of the corrective actions, KHNP has determined that a further review of design changes in DCD related to AIA is to be performed by the AIA consulting companies. This review of design changes will also include a review of success criteria and systems interactions to ensure that no other systems require assessment in the AIA. This will address the extent of condition for failure to include ECWS in the AIA assessment. Also, it satisfies the need to improve the process for incorporating AIA results back into the design documents.

Extent of review:

As a result of the “extent of review”, no additional items are identified except as noted below;

KHNP has extended its review beyond the samples identified during the inspection. The extent of condition review resulted in only one additional finding on AIA 5-psid barrier DBD. In order to prevent the fire propagation between HELB area on El. 120’-0” and El. 137’-6”, a 5-psid barrier was designated. However, 5-psid barrier was not identified on the drawings on column 26 of 5-psid barrier DBD for Auxiliary Building El. 137’-6”. Therefore, it will be revised for 5-psid barrier DBD and DCD Figure 19.5-6.

b. Corrective actions for the second example of Violation.

The ECW was not identified as a key feature and damage to the ECWS was not assessed in the Heat Removal assessment. Evaluation and assessment of the potential physical damage to the ECWS has been initiated. A complete assessment of the location of ECW piping for each strike will be determined to ensure that there are no other locations that are problematic. The Heat Removal part of AIA report will be updated to include a discussion of the ECWS assessment and to identify the ECWS as a key design feature.

AIA report will be reviewed and updated by authorized personnel due to SGI nature. The revision of AIA report(TeR), therefore, will be performed by cognizant representatives of the consulting company.

Immediate actions taken:

Design information on ECWS was added to Section 19.5.4.4 in DCD as a key design feature. Also, description of piping routing for ECWS was added to Section 19.5.4.4 and 19.5.6 in DCD.

Long term actions to be taken:

From preliminary assessments, it is anticipated that strengthening measures are needed in both the AB and EDGB for physical protection of some of the ECW equipment. The following actions are identified for the structural assessment part of AIA;

Protection of ECW in AB
This effort will perform the structural assessments needed to identify strengthening measures sufficient to protect the ECWS on West side of AB at El 174'. An existing finite element model will be modified to configure the exterior and first interior wall so that the ECWS is protected from a strike from the West between El 174' and 195'. It is anticipated that some increased reinforcement in these walls and/or a steel plate on the interior wall will be sufficient protection without changing the thickness of either wall.

Protection of ECW in EDGB
This effort will perform the structural assessments needed to identify strengthening measures sufficient to protect the South side ECWS in the EDGB for a strike from the North and the North side ECWS in the EDGB for a strike from the South. The proposed approach is to strengthen the interior E-W running interior wall that separates the two divisions so that all debris will stop at the interior wall, either from a North or South strike. Again, it is desired to strengthen the wall with added reinforcement or a steel plate so as not to change the thickness of the interior wall.

The GA drawing for EDGB will be revised to incorporate required modification and DCD chapter 1 will be revised accordingly. Through a peer review, the relocation of Cubicle Cooler in EDGB was one possible solution to avoid common failure for a strike from the East side.

In the heat removal assessment, there were four strikes that incorrectly identified the RSR as the control location instead of RCC. Therefore, the Heat Removal part of AIA report will be updated to show the RCC as the location for plant control for these strikes.

Extent of Review:

The extent of condition review has been initiated and the result of the extent of condition review will be included in the final revised AIA report which are expected to be completed by end of November 2017.

c. Corrective action for the third example of Violation.

Immediate actions taken:

The following key design features are added to Section 19.5.4.1; nominal strength of AB concrete to reach 5700 psi in 28 days, and nominal strength of RCB concrete to reach 6900 psi in 28 days. The structural assessment part of AIA report will also be modified to clearly include the above as key design features.

Long term actions to be taken: N/A

Extent of Review:

The NRC inspection team found that, with the exception of the examples of Violation 05200046/2016-202-01, the structural damage assessment performed by KHNP for the APR1400 AIA is consistent with the regulatory requirements of 10 CFR 50.150.

4. Date when full compliance will be achieved

The plans for corrective action of NOV are as follows;

a. APR1400 DCD markup which includes the result of corrective actions for the first example of Violation is included in Attachment as a result of immediate actions.

b. The AIA report will be revised according to the result of corrective actions for the second example of Violation by the end of November 2017.

c. APR1400 DCD markup which includes the result of corrective actions for the third example of Violation is included in Attachment as a result of immediate actions.

Attachment

Docket No. 05200046

DCD markups

September 2017

Attachment (1/17)

Table 3.8A-29

Required Reinforcement and Margins of Safety for the AB Shear Wall

Critical Section	Zone	Elevation	Horizontal			Vertical			Shear		
			Required in^2	Provided	Ratio[(1)]	Required in^2	Provided	Ratio[(1)]	Required in^2	Provided	Ratio[(1)]
North wall of north MSIV house	1	55′-0″ to 100′-0″	3.6	2-#11@9″	1.16	3.23	2-#11@9″	1.29	-	-	-
	2	100′-0″ to 120′-0″	3.49	2-#11@9″	1.19	3.58	2-#11@9″	1.16	0.18	#6@9″	3.26
	3	120′-0″ to 137′-6″	3.23	2-#11@9″	1.29	2.76	2-#11@9″	1.51	-	-	-
	~~4~~	~~137′-6″ to 174′-0″~~	~~3.59~~	~~2-#11@9″~~	~~1.16~~	~~4.13~~	~~2-#14@9″~~	~~1.45~~	~~0.29~~	~~#5@9″~~	~~1.43~~
	4 ~~(For AIA)~~	137′-6″ to 174′-0″	- 3.59	3-#14@9″	- 2.51	- 4.13	3-#14@9″	- 2.18	- 0.29	~~#6@9″~~ #9@9"	- 4.60
North wall of north AFWST	1	100′-0″ to 137′-6″	3.16	2-#11@9″	1.32	2.97	2-#11@9″	1.40	-	-	-
West wall of MCR	1	55′-0″ to 100′-0″	2.7	2-#11@12″	1.56	2.85	2-#11@12″	1.10	0.22	#5@12″	1.41
	2	100′-0″ to 137′-6″	2.59	2-#11@12″	1.20	2.71	2-#11@12″	1.15	-	-	-
	3	137′-6″ to 156′-0″	2.39	2-#10@12″	1.06	2.03	2-#10@12″	1.25	-	-	-
	4	156′-0″ to 174′-0″	1.28	#11@12″	1.22	1.31	2-#10@12″	1.94	0.27	#6@12″	1.63
	5	174′-0″ to 195′-0″	1.42	#11@12″	1.10	1.13	#11@12″	1.38	-	-	-
West wall of SFP	1	114′-0″ to 156′-0″	4.79	2-#14@9″	1.25	4.82	3-#11@9″	1.29	0.19	#5@12″	1.63
East wall of FHA area	1	156′-0″ to 174′-0″	2.73	2-#11@9″	1.52	2.78	2-#14@9″	2.16	0.16	#7@9″	5.00
	2	174′-0″ to 213′-6″	2.67	2-#10@9″	1.27	2.61	2-#11@9″	1.59	-	-	-

(1) Ratio = Provided Reinforcement / Required Reinforcement

Attachment (2/17)

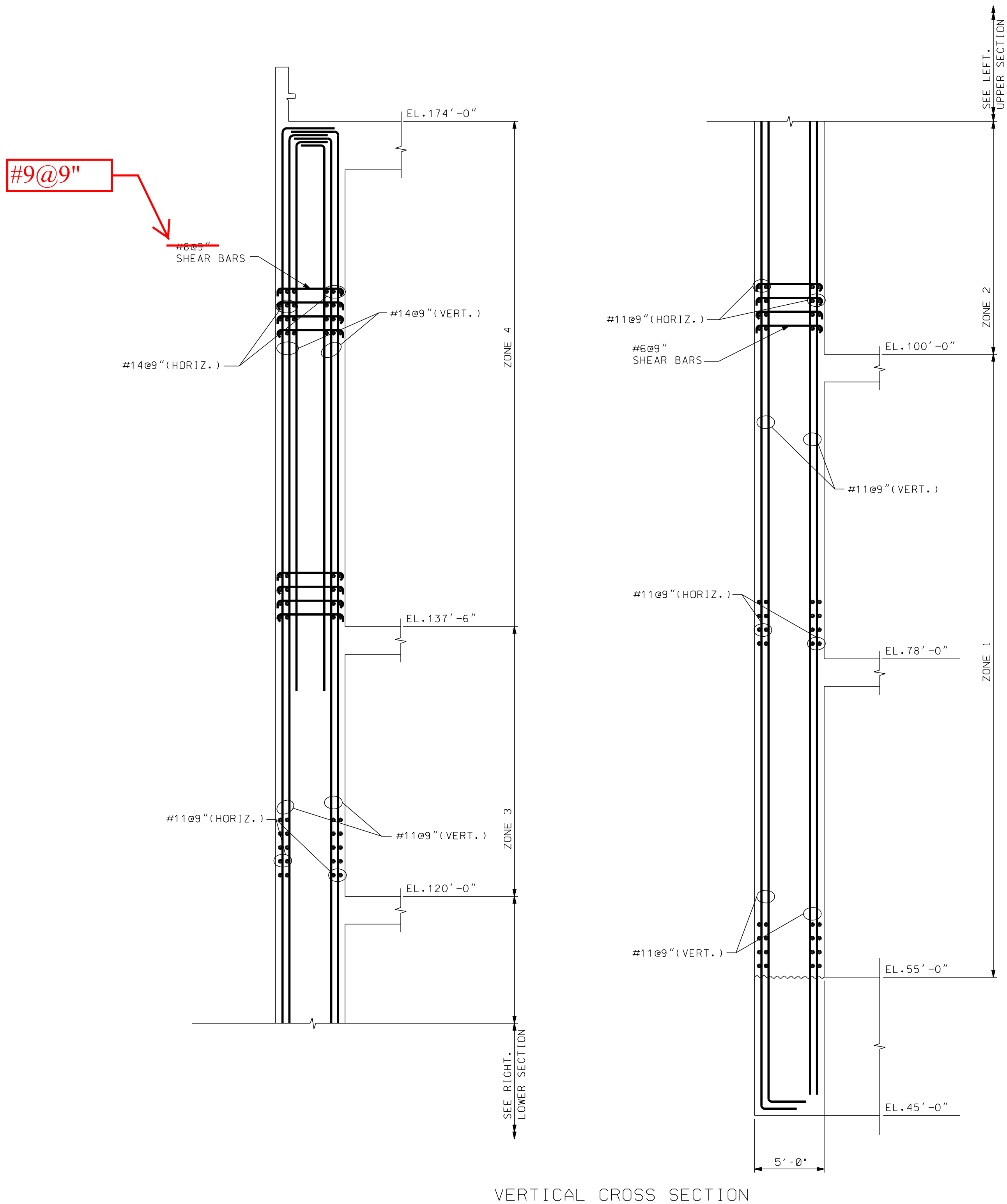

Figure 3.8A-40 Reinforcement Arrangement of the AB MSIV House Wall (Section 1)

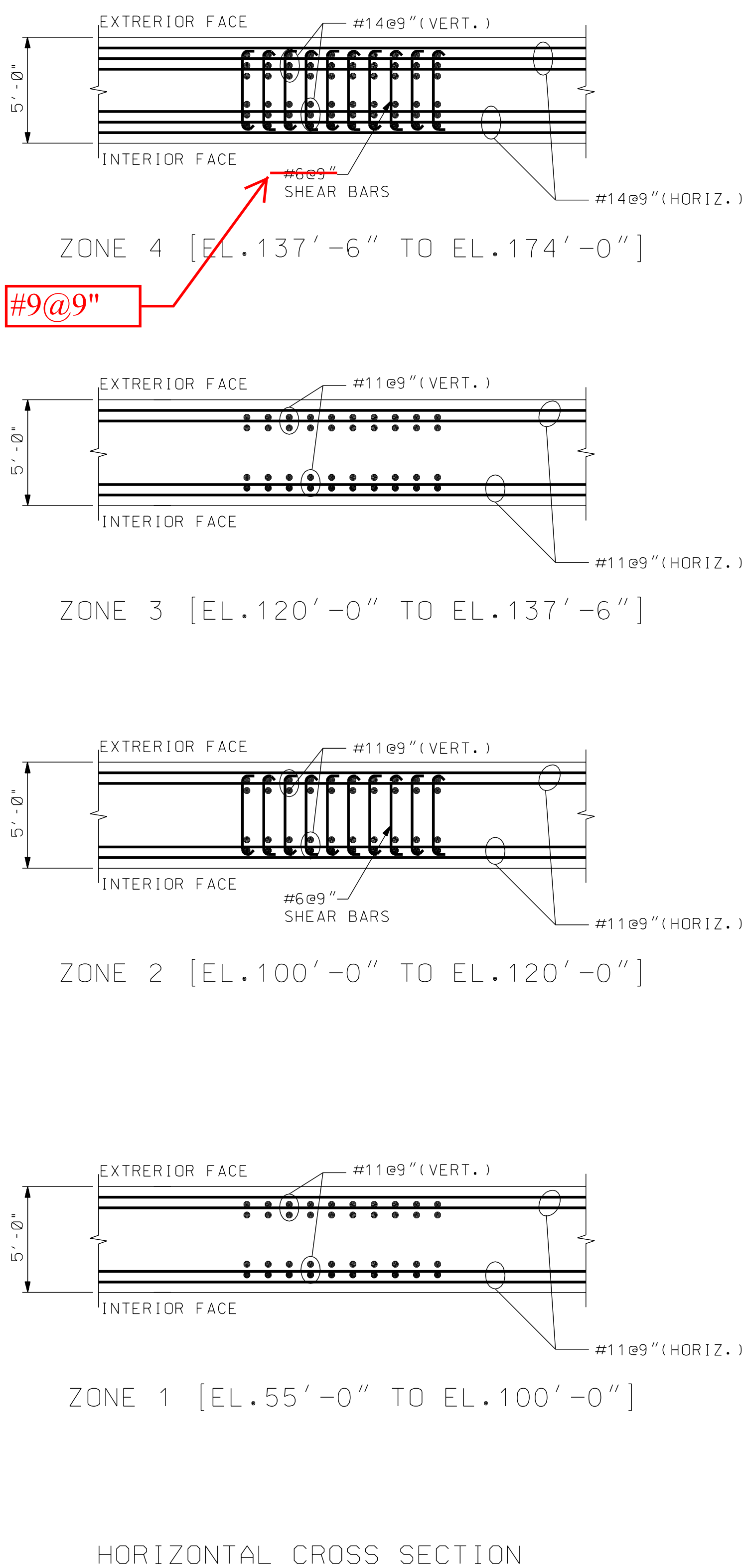

Figure 3.8A-41 Reinforcement Arrangement of the AB MSIV House Wall (Section 2)

19.5.4.1 RCB and SFP

The RCB, as described in Sections 3.8.1 and 3.8.2 and shown on Figures 3.8-1 and 3.8-2 is a key design feature for the protection of the safety systems located inside containment from the impact of a large commercial aircraft. The assessment concludes that a strike upon the RCB would not result in the perforation of the containment, such as to cause direct damage or exposure to jet fuel of the systems within the containment.

A key design feature is the nominal compressive strength of the RCB concrete reaching 6900 psi at 28 days.

The polar crane bracket and rail girder shown in Figure 19.5-11, are key design features to protect the safety system located inside containment from the drop of polar crane due to the impact of a large commercial aircraft. The polar crane brackets and girders shall be ASTM A588 Grade A or B and the bolts for the connection between polar crane bracket and rail girder shall be minimum 1.5" diameter ASTM A490X. The design of polar crane bracket and rail girder is performed to maintain adequate design margins. The summary of design results and material properties are shown in Table 19.5-1.

The assessment also determined that key components located inside the RCB, including the reactor pressure vessel, steam generators, reactor coolant loop piping, pilot operated safety relief valves, control element drive mechanism, the safety injection and shutdown cooling system suction line motor operated valves, discharge line check valves and instrumentation and control equipment associated with core cooling are unaffected by shock-induced vibrations resulting from the impact of a large commercial aircraft.

The location and design of the control element drive mechanism described in Sections 3.9.4 and 4.6, with the control element drive mechanism located inside of the RCB on top of the reactor vessel closure head such that upon loss of internal power distribution the control rods drop into the reactor core by gravity, are key design features for ensuring that the reactor will be tripped following the impact of an aircraft.

Regarding the SFP, the assessment determined that there are no aircraft impact scenarios that result in leakage from the SFP below the required minimum water level. The pool liner is not perforated and all SFP piping attachments are configured such that they will not allow water in the SFP to drain below the minimum water level. The design and location of the SFP and its supporting structures as described in Sections 3.8A.2 and 9.1.2 are key design features for protecting the integrity of the SFP such that an impact of a large commercial aircraft would not result in leakage from the SFP below the required minimum water level.

19.5.4.2 Plant Arrangement

The APR1400 plant design and arrangement of major structures described in Section 1.2.14 and Figures 1.2-1 through 1.2-27 are key design features. Specifically, the assessment credited the arrangement of, and design of, the following building features to limit the location and effects of potential aircraft strikes on the RCB and AB in the following locations:

The configurations of the AB credited as key design features for aircraft impact are shown in Table 19.5-2 and Figures 19.5-12 through 19.5-16.

a. The location and design of the Auxiliary Building (AB) structure as described in Section 3.8.4 are key design features in protecting the RCB [ ]SRI from the impact of a large commercial aircraft. Additionally, portions of quadrant B, C, and D of the AB provide protection of the RCB on the northeast sides [ ]SRI.

and window size of [ ]SRI on veiwing areas in the A and B diesel generator control room are

b. The location and design of the EDGB as described in Section 3.8.4 are key design features including protecting portions of the adjacent wall of the AB [ ]SRI from the impact of a large commercial aircraft.

features

c. The physical separation of the EDGs in AB and EDGB, as described in Section 8.3, Figure 1.2-14 and Figure 1.2-21, ~~is a~~ key design ~~feature~~ in limiting the loss of electrical power to key core cooling systems from the impact of a large commercial aircraft.

A key design feature is the nominal compressive strength of the AB concrete reaching 5900 psi at 28 days.

d. Properties of concrete and reinforcement bars, as described in Appendix 3.8A, are key design features in protecting key equipment in the AB and EDGB. These properties meet the minimum requirements for physical damage rule sets as shown in Table 3-2 of NEI 07-13 Revision 8.

e. The location of the AAC GTG as shown on Figure 1.2-1 relative to the EDGs is a key design feature in limiting the loss of electrical power to key safety systems from the impact of a large commercial aircraft. The AAC GTG building will be located at least 100 yards from the auxiliary building.

as shown on Figure 1.2-21

f. The separation between electrical divisions, specifically EDGs, is adequate to preclude the failure of both electrical divisions due to smoke effects.

as shown on Figure 1.2-16

19.5.4.3 Fire Barriers and Fire Protection Features

The design and location of 3-hour fire barriers, including fire doors, penetration seals and dampers within the AB and EDGB are key design features for the protection of core cooling equipment within these buildings from the impact of a large commercial aircraft. The assessment credited the design and location of fire barriers (including doors) as depicted on Figures 9.5A-1 through 9.5A-11 to limit the effects of internal fires created by the impact of a large commercial aircraft. The EDGB contains key design features and fuctions for emergency AC power, such as the emergency diesel generators and associated components. In addition, certain fire barriers, including blast doors, fast-acting blast dampers and penetration seals, are credited for 5 psid. These 5 psid barriers are identified on Figures 19.5-1 through 19.5-10. These key design features ensure at least one complete train of secondary heat removal equipment and necessary support systems to include cooling water, electrical power supply and distribution, and instrument and control within the AB and EDGB is available to provide core cooling following the impact of a large commercial aircraft.

19.5.4.4 Core Cooling Features

The piping layout of safety - related cooling water system is to be designed so that piping failure from an aircraft impact shall not cause the total loss of cooling capability.(COL 19.5(2))

The design and physical separation (by fire barriers as described in Section 9.5A) of the safety injection and shutdown cooling system (described in Sections 6.3 and 5.4.7), of the auxiliary feedwater system (described in Section 10.4.9), of the main steam safety valves and main steam atmospheric dump valves (described in Sections 10.3.2.2.3 and 10.3.2.2.4) and of the charging pumps and auxiliary charging pump (described in Section 9.3.4) are key system design features for assuring core cooling following a reactor trip in response to an aircraft impact event. The design of the RPV and associated reactor coolant system components located in the RCB as described in Sections 5.3 and 5.4 are key design features.

~~The design and physical separation of the component cooling water system (CCWS) (described in Section 9.2.2), of those portions of the essential service water system located in the ESW Building (described in Section 9.2.1),~~ of the Class 1E electrical power supply and distribution system (described in Section 8.3), and of the safety-related instrumentation and control system (described in Chapter 7) including the physical separation between the MCR, RSR and the RCC and the ability to power the SI pumps, charging pumps, CS pumps and SC pumps from the AAC GTG (described in section 8.4.1.3) are key supporting system design features for assuring core cooling following a reactor trip in response to an aircraft impact event. The action of tripping or shutting down the reactor ensures that the fuel in the reactor is kept subcritical.

Following shutdown from power operation, core cooling is maintained by the auxiliary feedwater system as described in Section 10.4.9. Primary system is maintained at operating pressure and temperature by adjusting auxiliary feedwater flow to match the decay heat rate from the reactor core. Heat is discharged to the atmosphere using the main steam safety valves or main steam atmospheric dump valves. Under these conditions, additional boration is unnecessary to maintain subcriticality.

Cables between channel "A" & "B" I&C equipment and RCC shall be routed via each of division I & II areas through the embedded conduits and this design is also one of key supporting system design features.

The design and physical separation of those portion of the essential service water system (ESWS)(described in section 9.2.1), the component cooling water system (CCWS)(described in section 9.2.2), and the ultimate heat sink (UHS)(described in section 9.2.5), the essential chilled water system (ECWS)(described in section 9.2.7),

19.5.6 Combined License Information

COL 19.5(1) When the reactor head is untensioned and before the refueling pool is flooded up, administrative controls will be in place to ensure that no trains of SI and shutdown cooling, including the necessary power and cooling water support systems are out of service for maintenance.

COL 19.5(2) When the piping layout of essential chilled water system on auxiliary building FL EL. 174'-0" is designed, at least their piping of one train in the corridor should be survived from effect of an aircraft impact.

19.5.7 References

1. NEI 07-13, "Methodology for Performing Aircraft Impact Assessments for New Plant Designs," Revision 8, April 2011.

Table 19.5-1

Material property and Member Stress Check of Polar Crane Bracket and Rail Girder

Member	Property and Size	Interaction Ratio (IR)
Polar Crane Bracket	ASTM A588 Grade A or B	0.412
Rail Girder	ASTM A588 Grade A or B	0.538
Connection Bolt	ASTM A490X, 1.5 inch	0.397

Add table 19.5-1 and 19.5-2

Table 19.5-2

Required Rebar Area of Wall & Slab for AIA in Auxiliary Building

Section	Thickness (ft)	Elevation	Required Horizontal Rebar (in^2)	Required Vertical Rebar (in^2)	Required Shear Rebar (in^2)	Remark
Typical Wall with 4ft thickness (A.B exterior wall)	4	-	2-#11@9"	2-#11@12"	-	-
Typical Wall with 3ft thickness (A.B interior wall)	3	-	2-#11@9"	2-#11@12"	-	-
Typical Wall with 2ft thickness (A.B interior wall)	2	-	#11@12"	2-#10@9"	-	-
Typical Wall with 1.5ft thickness (A.B interior wall)	1.5	-	#10@9"	#11@9"	-	-
North wall of SFP area (A.B exterior wall)	4	100'-6" to 156'-0"	1-#14@12" 1-#11@12"	2-#11@9"	-	-
East wall of SFP area (A.B exterior wall)	4	100'-6" to 137'-6"	1-#14@12" 1-#11@12"	2-#11@12"	-	-
West Wall of MCR	3	156'-0" to 174'-0"	2-#10@12"	2-#11@12"	-	For required design rebar area, See Table 3.8A-29
Interior Wall of MCR	3	156'-0" to 174'-0"	#11@9"	2-#10@12"	-	-
North/South Wall of MSIV House (A.B exterior wall)	5	137'-6" to 174'-0"	3-#14@9"	3-#14@9"	#9@9"	See Table 3.8A-29
East Wall of MSIV House (A.B interior wall)	4	137'-6" to 174'-0"	2-#10@12"	#10@9"	-	-
East Wall of FHA (A.B exterior wall)	4	Above 137'-6"	2-#11@12"	2-#14@12"	-	-
West Wall of FHA	3	Above 156'-0"	2-#10@12"	2-#11@12"	-	-
North Wall of FHA (A.B exterior wall)	4	Above 156'-0"	2-#11@9"	2-#14@12"	-	-
South Wall of FHA (A.B exterior wall)	4	Above 156'-0"	2-#11@9"	2-#14@12"	-	-
Wall of SFP (East)	7	114'-0" to 156'-0"	2-#11@9"	2-#14@9"	-	-
Wall of SFP (West)	7	114'-0" to 156'-0"	2-#11@9"	2-#14@9"	-	For required design rebar area, See Table 3.8A-29
Wall of SFP (North)	5.5	114'-0" to 156'-0"	2-#11@9"	2-#14@9"	-	-
Wall of SFP (South)	7	114'-0" to 156'-0"	3-#11@9"	2-#14@9"	-	-
Floor slab of SFP	6.08	114'-0"	2-#14@12"	2-#14@12"	#4@9"	For required design rebar area, See Table 3.8A-33

Add table 19.5-1 and 19.5-2

Security-Related Information – Withhold Under 10 CFR 2.390

Replaced with a figure in next page

Figure 19.5-6 5-psid barrier – AB El. 137’-6”

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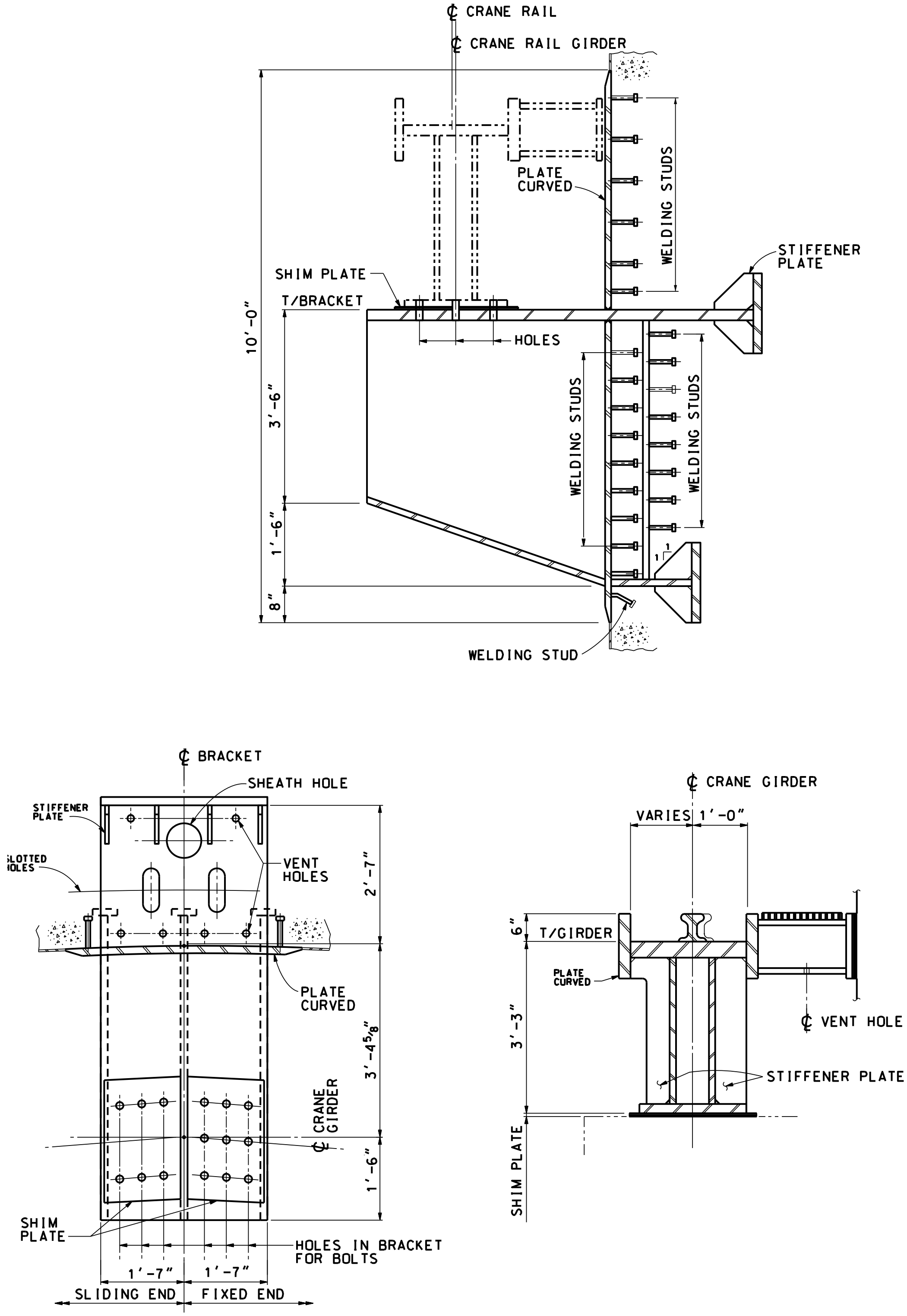

Figure 19.5-11 Polar Crane Bracket

Add figures 19.5-11 through 19.5-16

Security-Related Information – Withhold Under 10 CFR 2.390

Figure 19.5-12 Minimum Required Section for AIA, Auxiliary Building El. 120′-0″

Add figures 19.5-11 through 19.5-16

Security-Related Information – Withhold Under 10 CFR 2.390

Figure 19.5-13 Minimum Required Section for AIA, Auxiliary Building El. 137′-6″

Add figures 19.5-11 through 19.5-16

Security-Related Information – Withhold Under 10 CFR 2.390

Figure 19.5-14 Minimum Required Section for AIA, Auxiliary Building El. 156′-0″

Add figures 19.5-11 through 19.5-16

Security-Related Information – Withhold Under 10 CFR 2.390

Figure 19.5-15 Minimum Required Section for AIA, Auxiliary Building El. 174′-0″

Add figures 19.5-11 through 19.5-16

Security-Related Information – Withhold Under 10 CFR 2.390

Figure 19.5-16 Minimum Required Section for AIA, Auxiliary Building Roof El. 195′-0″

Add figures 19.5-11 through 19.5-16