

REQUEST FOR ADDITIONAL INFORMATION NO. 182-1888 REVISION 0

2/9/2009

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

SRP Section: 14.03.06 - Electrical Systems - Inspections, Tests, Analyses, and Acceptance Criteria
Application Section: DCD Section 2.6

QUESTIONS for Construction Inspection and Allegations Branch (CCIB)

14.03.06-6

The following typographical or editorial errors were noted in US-APWR Tier 2, Chapter 14, Section 14.3.4.6 and Tier 1, Chapter 2, Section 2.6:

1. Page 2.6-6, Table 2.6.1-3, Item 5, Design Commitment description: "Each Class 1E EPS is located in separate rooms" should be "Each Class 1E EPS is located in a separate room."
2. Page 2.6-6, Table 2.6.1-3, Item 5, Acceptance Criteria description: "The as-built each EPS is located in the separate rooms in the seismic Category I buildings" should be "Each as-built EPS is located in a separate room in the seismic Category I buildings."
3. Page 2.6-7, Table 2.6.1-3, Items 10, and 11b, Acceptance Criteria description: "The results of analyses" should be "The results of the analyses."
4. Pages 2.6-8 and 2.6-9, Table 2.6.1-3, Items 11b, 12, and 18, Acceptance Criteria description: "The result of analysis" should be "The results of the analysis."
5. Page 2.6-14, Table 2.2.2-2, Item 2, Acceptance Criteria description: "and/or analysis" should be "and/or analyses."
6. Pages 2.6-14-2.6-16, Table 2.6.2-2, Items 3, 6, 11, 12, and 14, Acceptance Criteria description: "The result of analysis" should be "The results of the analysis."
7. Page 2.6-15, Table 2.6.2-2, Item 7, Acceptance Criteria description: "The result of test concludes" should be "The results of the test conclude."
8. Page 2.6-15, Table 2.6.2-2, Item 9, Design Commitment and Acceptance Criteria statements, Last Word: "room" should be "rooms."
9. Page 2.6-18, Section 2.6.3.1, Third Paragraph, First Sentence, "power supply system division are located in separate rooms" should be "power supply system division is located in a separate room."
10. Page 2.6-18, Section 2.6.3.1, Fourth Paragraph, "Transfer from UPS unit" should be "Transfer from the UPS unit."
11. Page 2.6-18, Section 2.6.3.1, Fourth Paragraph, "automatic on undervoltage" should be "automatic on an undervoltage"
12. Page 2.6-21, Table 2.6.3-3, Item 2, Acceptance Criteria description: "result of analysis concludes" should be "result of the analysis concludes."
13. Page 2.6-21, Table 2.6.3-3, Item 3, Design Commitment description: "Tabel" should be "Table."
14. Page 2.6-21, Table 2.6.3-3, Item 3, Acceptance Criteria description: "type tests and/or analysis" should be "type tests and/or analyses."

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15. Page 2.6-21, Table 2.6.3-3, Item 3, Acceptance Criteria description: “is designed seismic Category I” should be “is designed as seismic Category I.”
16. Page 2.6-21, Table 2.6.3-3, Item 5, Design Commitment description: “Each Class 1E I&C power system equipment is located in separate rooms” should be “Equipment for each Class 1E I&C power supply system is located in a separate room.”
17. Page 2.6-21, Table 2.6.3-3, Item 5, Inspection, Tests, Analyses description: “system equipment.” should be “system equipment will be performed.”
18. Page 2.6-21, Table 2.6.3-3, Item 5, Acceptance Criteria description: “Each as-built Class 1E I&C power system equipment is located in separate rooms” should be “Equipment for each as-built Class 1E I&C power supply system is located in a separate room.”
19. Page 2.6-22, Table 2.6.3-3, Item 8, Design Commitment description: “Power supply to Class 1E panel board from Class 1E UPS unit is transferred to transformer automatically on undervoltage signal” should be “The Power supply to the Class 1E panel board from the Class 1E UPS unit is transferred to the transformer automatically on an undervoltage signal.”
20. Page 2.6-22, Table 2.6.3-3, Item 8, Inspection, Tests, Analyses description: “performed to verify that power supply” should be “performed to verify that the power supply.”
21. Page 2.6-22, Table 2.6.3-3, Item 8, Inspection, Tests, Analyses description: “automatically on undervoltage signal.” should be “automatically on an undervoltage signal.”
22. Page 2.6-22, Table 2.6.3-3, Item 8, Acceptance Criteria description: “The result of test concludes that power supply to the” should be “The results of the test conclude that the power supply to the.”
23. Page 2.6-22, Table 2.6.3-3, Item 8, Acceptance Criteria description: “automatically on undervoltage signal.” should be “automatically on an undervoltage signal.”
24. Page 2.6-22, Table 2.6.3-3, Item 9, Acceptance Criteria description: “The result of test concludes” should be “The results of the test conclude.”
25. Page 2.6-23, Table 2.6.3-3, Item 11, Acceptance Criteria description: “The result of analysis” should be “The results of the analysis.”
26. Page 2.6-23, Table 2.6.3-3, Item 14, Acceptance Criteria description: “The result of test concludes” should be “The results of the test conclude.”
27. Page 2.6-23, Table 2.6.3-3, Item 14, Design Commitment description: “The alarms initiate in MCR” should be “Alarms initiate in the MCR.”
28. Page 2.6-25, Section 2.6.4.1, EPS Design Description, First Paragraph, First Sentence: “Emergency power supply” should be “The emergency power supply.”
29. Page 2.6-25, Section 2.6.4.1, EPS Design Description, First Paragraph, First Sentence: “provided by an Class 1E” should be “provided by a Class 1E.”
30. Page 2.6-25, Section 2.6.4.1, EPS Design Description, Second Paragraph, First Sentence: “The Class 1E” should be “Each Class 1E.”
31. Page 2.6-25, Section 2.6.4.1, EPS Design Description, Second Paragraph, Second Sentence: “are required to perform safety” should be “are required for the Class 1E EPS to perform the safety.”
32. Page 2.6-25, Section 2.6.4.1, EPS Design Description, Third Paragraph: “The Class 1E EPSs are sized to provide power to safety-related loads subsequent to LOOP or LOOP and concurrent LOCA conditions.” should be “The Class 1E EPSs are sized to provide power to safety-related loads subsequent to a LOOP or a LOOP and concurrent LOCA conditions.”

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33. Page 2.6-25, Section 2.6.4.1, EPS Design Description, Fifth Paragraph: "The Class 1E EPSs are capable to provide power at set voltage and frequency to the Class 1E 6.9kV buses within 100 seconds from the start signal." should be "The Class 1E EPSs are capable of providing power at a set voltage and frequency to the Class 1E 6.9kV buses within 100 seconds from a start signal."
34. Page 2.6-25, Section 2.6.4.1, EPS Design Description, Seventh Paragraph, First Sentence: "initiates automatic start" should be "initiates an automatic start."
35. Page 2.6-25, Section 2.6.4.1, EPS Design Description, Ninth Paragraph: "capable to respond" should be "capable of responding."
36. Page 2.6-26, Section 2.6.4.2, EPS Fuel Oil Storage and Transfer Systems (FOS) Design Description, Paragraph One, First Bullet: "The FOS is a safety-related system." should be The FOS are safety-related systems.
37. Page 2.6-26, Section 2.6.4.2, EPS Fuel Oil Storage and Transfer Systems (FOS) Design Description, Paragraph One, Bullets Two and Three: "FOS systems" should be "FOS."
38. Page 2.6-26, Section 2.6.4.2, EPS Fuel Oil Storage and Transfer Systems (FOS) Design Description, Paragraph Five: "fuel oil storage tank and" should be fuel oil storage tanks and."
39. Pages 2.6-28-2.6-30, In Table 2.6.4-1, Items 2, 7, 9, 10, 13, 14a, 14b, 14c, 15a, 15b, 16, 17, & 18, Acceptance Criteria description: "The result of test (analysis) concludes" should be "The results of the test (analysis) conclude."
40. Page 2.6-28, Table 2.6.4-1, Item 6, Design Commitment description: "The Class 1E EPS and the associated equipment are as designed Class 1E and seismic category I." should be "Each Class I EPS and its associated equipment are designed as Class 1 E and seismic Category I."
41. Page 2.6-28, Table 2.6.4-1, Item 6, Inspections, Tests, Analyses description: "of the Class 1E EPS" should be "Each Class I EPS."
42. Page 2.6-28, Table 2.6.4-1, Items 6 & 8, Acceptance Criteria description: "The results of tests and/or analysis conclude that the Class 1E EPS" should be "The results of tests and/or analyses conclude that each Class I EPS."
43. Page 2.6-28, Table 2.6.4-1, Item 7, Design Commitment description; The support systems for piping that is required to perform safety functions of starting and operating the Class 1E EPS are classified ASME Section III." should be "The support systems that are required for the Class 1E EPS to perform the safety functions of starting and operating the Class 1E EPS are classified ASME Code Section III, Class 3."
44. Page 2.6-29, Table 2.6.4-1, Item 9, Design Commitment, Inspections, Tests, Analyses, and Acceptance Criteria descriptions: "EPS is sized" should be "EPS are sized," and "to LOOP or LOOP" should be "to a LOOP or a LOOP."
45. Page 2.6-29, Table 2.6.4-1, Item 9, Inspections, Tests, Analyses description: "capable to provide" should be "capable of providing."
46. Page 2.6-29, Table 2.6.4-1, Item 13, Design Commitment description: "1E EPS is capable of" should be "1E EPS are capable of" and "the starting signal" should be "a start signal."
47. Page 2.6-29, Table 2.6.4-1, Item 13, Inspections, Tests, Analyses description, "receiving signal" should be "receiving a start signal."
48. Page 2.6-29, Table 2.6.4-1, Item 14, Design Commitment and Inspections, Tests, Analyses descriptions, "condition" should be "conditions."
49. Page 2.6-30, Table 2.6.4-1, Item 14c, Inspections, Tests, Analyses description: "Class 1E buses." should be "Class 1E buses are started in sequence by the ECCS load sequencer."

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50. Page 2.6-30, Table 2.6.4-1, Item 15a, Design Commitment description: "initiates automatic" should be "initiates an automatic."
 51. Page 2.6-30, Table 2.6.4-1, Item 15a, Inspections, Tests, Analyses description: "verify that operation upon" should be "verify operation of the respective Class 1E EPSs upon."
 52. Page 2.6-30, Table 2.6.4-1, Item 15b, Inspections, Tests, Analyses description: "verify operation after" should be "verify operation of the LOOP sequencer after" and "1E EPS." should be "1E EPS circuit breaker."
 53. Page 2.6-30, Table 2.6.4-1, Item 16, Inspections, Tests, Analyses description: "verify operation of the as-built all Class" should be "verify operation of all the as-built Class."
 54. Page 2.6-30, Table 2.6.4-1, Item 16, Acceptance Criteria description: "that the as-built all Class" should be "that all the as-built Class."
 55. Page 2.6-31, Table 2.6.4-1, Item 19, Design Commitment and Acceptance criteria descriptions: Subsection 2.6.4.1" should be "Subsection 2.6.4.2."
 56. Page 2.6-31, Table 2.6.4-1, Items 23, 24, and 25, Acceptance Criteria description: "result of test concludes" should be "results of the test conclude."
 57. Page 2.6-32, Section 2.6.5.2, AAC Fuel Oil Storage and Transfer Systems (FOS) Design Description, Paragraph One, First Bullet: "The FOS is a non safety-related system." should be "The FOS are non safety-related systems."
 58. Page 2.6-34, Table 2.6.5-1, Item 3, Design Commitment, Inspections, Tests, Analyses, and Acceptance Criteria descriptions: "The AAC power source" should be "Each AAC power source."
 59. Page 2.6-34, Table 2.6.5-1, Item 3, Acceptance Criteria description: "the Class 1E circuit breaker" should be "a Class 1E circuit breaker."
 60. Page 2.6-34, Table 2.6.5-1, Item 3, Inspections, Tests, Analyses Description: "AAC power source" should be "AAC power sources."
 61. Page 2.6-34 and 2.6-35, Table 2.6.5-1, Items 6 and 9, Acceptance Criteria description: "result of test concludes" should be "results of the test conclude."
 62. Page 2.6-34, Table 2.6.5-1, Item 8, Design Commitment and Acceptance Criteria descriptions: "power source are" should be "power sources are."
 63. Page 2.6-35, Table 2.6.5-1, Item 9, Design Commitment description: "power source is capable to provide power at the set" should be "power sources are capable of providing power at the set."
 64. Page 2.6-35, Table 2.6.5-1, Item 9, Design Commitment description: "receiving the start signal" should be "receiving a start signal."
 65. Page 2.6-35, Table 2.6.5-1, Item 11, Design Commitment and Acceptance Criteria description: "Subsection 2.6.5.1" should be "Subsection 2.6.5.2."
 66. Page 2.6-38, Section 2.6.7.1, Paragraph 3, Last Sentence: "voltage neutrals is grounded" should be "voltage neutrals are grounded."
 67. Page 2.6-38, Section 2.6.7.1, Last Paragraph, First Sentence: "exposed structure" should be "exposed structures."
- Page 2.6-39, Table 2.6.7-1, Item 1, Design Commitment and Inspections, Tests, Analyses descriptions: "system connects" should be "systems connect."

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14.03.06-7

ITAAC Item 2 in Table 2.6.1-3

The AC of this ITAAC is confusing after words 'under test'. What is meant by the words 'in the each division system.'?

Also applicable to ITAAC:

ITAAC Item 4 in Table 2.6.2-2

ITAAC Item 6 in Table 2.6.3-3

14.03.06-8

ITAAC Item 6a in Table 2.6.1-3

This ITAAC should be similar to ITAAC Item 5 in Table 2.4.6-5 by listing the three steps. The qualifications for environmental conditions should be a separate ITAAC and include both inspection and analyses.

Also applicable to ITAAC:

ITAAC Item 2 in Table 2.6.2-2

ITAAC Item 3 in Table 2.6.3-3

ITAAC Item 6 in Table 2.6.4-1

ITAAC Item 5 in Table 2.6.6-1

14.03.06-9

ITAAC Item 6.b in Table 2.6.1-3

The AC should be more definitive than the design commitment not vice versa. Simply repeat the design commitment in the AC.

Also applicable to ITAAC

ITAAC Item 6.c in Table 2.6.1-3

ITAAC Item 7 in Table 2.6.1-3

ITAAC Item 8 in Table 2.6.1-3

ITAAC Item 9 in Table 2.6.5-1

ITAAC Item 1 in Table 2.6.7-1

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14.03.06-10

ITAAC Item 10 in Table 2.6.1-3

The ITA should include an inspection to verify that the items listed are the ones analyzed in regard to ratings and type of cooling.

Also applicable to ITAAC.

ITAAC Item 11.a in Table 2.6.1-3

ITAAC Item 11.b in Table 2.6.1-3

ITAAC Item 12 in Table 2.6.1-3

ITAAC Item 6 in Table 2.6.2-2

ITAAC Item 12 in Table 2.6.2-2

ITAAC Item 2 in Table 2.6.3-3

ITAAC Item 11 in Table 2.6.3-3

ITAAC Item 9 in Table 2.6.4-1

ITAAC Item 5 in Table 2.6.8-1

ITAAC Item 6 in Table 2.6.8-1

14.03.06-11

ITAAC Item 11 in Table 2.6.2.-2

Revise the Design Commitment statement on Page 2.6-15, Table 2.6.2-2, Item 11 to be consistent with the design description on Page 2.6-12, Section 2.6.2.1, Fourth Paragraph from the end.

The design description in Section 2.6.2.1, Fourth Paragraph from the end discusses cable sizing for dc power systems. The cables are sized to carry load currents and provide design basis voltage at the load terminals considering derating due to ambient temperature and raceway loading; however, the design commitment in Table 2.6.2-2, Item 11 does not indicate this additional information.

Also applicable to ITAAC:

ITAAC Item 6 in Table 2.6.3-3

Revise the Design Commitment statement in Table 2.6.3-3, Item 6, Page 2.6-22 to be consistent with the Design Description on Page 2.6-18, Section 2.6.3.1, Third Paragraph.

The design description on Page 2.6-18, Section 2.6.3.1, in the Third Paragraph does not specify how many divisions there are in the Class 1E I&C power supply system, but the Design Commitment of Table 2.6.3-3, Item 6 indicates there are four divisions. These two descriptions should both indicate how many divisions there are.

ITAAC Item 8 in Table 2.6.3-3

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Revise the Design Description on Page 2.6-18, Section 2.6.3.1, Fourth Paragraph so that it is more specific as to what is to be transferred from the UPS unit and to which transformer. Also, revise the Design Commitment and Acceptance Criteria statements in Table 2.6.3.-3, Item 8, Page 2.6-22 to be consistent with the design description on Page 2.6-18, Section 2.6.3.1, Fourth Paragraph.

The design description on Page 2.6-18, Section 2.6.3.1, in the Fourth Paragraph does not specify what is transferred from the UPS unit to the transformer as indicated in the table; however, Table 2.6.3-3, Item 8 indicates the Class 1E panel board is transferred from UPS to the transformer. In addition, the same description does not identify which transformer is receiving the load from the UPS unit, this is also reflected in the ITAAC of Table 2.6.3-3, Item 8 on Page 2.6-22.

ITAAC Item 2 in Table 2.6.4-1

Clarify the Design Commitment statement on Page 2.6-25, Section 2.6.4.1, in the First, Fifth and Sixth Paragraphs so that the paragraphs are consistent with one another.

Paragraph One of the Design Commitment statement in Section 2.6.4.1 on Page 2.6-25 indicates in the Second Sentence that the Class 1E EPS provide power to the 6.9kV buses in the event that offsite power sources are lost; however, in the Fifth and Sixth paragraphs of the same section a “start” or “actuation” signal is referred to as the mechanism that starts the Class 1E EPS. Verify that “start or actuation signal” is the same as loss of offsite power sources cited in the second sentence of the first paragraph in Section 2.6.4.1.

ITAAC Item10 in Table 2.6.4-1

Revise the EPS Design Description on Page 2.6-25 of Section 2.6.4.1 to be consistent with Table 2.6.4-1, Item 10 on Page 2.6-29.

Table 2.6.4-1, Item 10 indicates the Design Commitment, Inspections, Tests, Analyses, and Acceptance Criteria for the Class 1E EPS stored-air starting system; however, the air start system for the Class 1E EPS is not discussed or mentioned in Section 2.6.4.1

ITAAC Item7 in Table 2.6.5-1

Specify in Section 2.6.5.1 on Page 2.6-32 in the AAC Design Description the coping capability of the AAC power source.

Table 2.6.5-1, Item 7 on Page 2.6-34 indicates in the Design Commitment and Acceptance Criteria descriptions that the AAC power source has adequate fuel to operate the required system while coping with an SBO for 8 hours; however, Section 2.6.5.1 does not discuss the coping capability of the AAC power source

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during an SBO.

ITAAC Item9 in Table 2.6.5-1

Specify in Section 2.6.5.1, on Page 2.6-32 in the AAC Design Description the capability of the AAC power to provide power at the set voltage and frequency to the non Class 1E 6.9kV buses within 100 seconds of receiving a start signal.

Table 2.6.5-1, Item 9 on Page 2.6-35 indicates in the Design Commitment and Acceptance Criteria descriptions that the AAC power source is capable of providing power to the non Class 1E 6.9kV buses within 100 seconds of receiving a start signal; however, Section 2.6.5.1 does not discuss the time limit for providing this power.

ITAAC Item10 in Table 2.6.5-1

Explain the Design Commitment and Acceptance Criteria descriptions of Table 2.6.5-1, Item 10 on Page 2.6-35.

The Design Commitment and Acceptance Criteria descriptions of Table 2.6.5-1, Item 10 on Page 2.6-35 are not consistent with the ACC Design Description of Section 2.6.5.1 on Page 2.6-32. Section 2.6.5.1 indicates the AAC power source and circuit breaker status information are available in the MCR; however, the status of each of the 6.9kV breakers of the engineered safety features are not included or explained in this discussion; however, this information is discussed in Table 2.6.5-1, Item 10 on Page 2.6-35.

ITAAC Item3 in Table 2.6.6-1

Revise Section 2.6.6.1, Design Description on Page 2.6-36 of the plant lighting systems to be consistent with Table 2.6.6-1, Item 3, Design Commitment and Acceptance Criteria descriptions on Page 2.3-37.

Table 2.6.6-1, Item 3 indicates that the normal/emergency lighting system is power from the 480V AAC buses; however, the design description of Section 2.6.6.1 does not have this information.

ITAAC Item6 in Table 2.6.6-1

Revise Table 2.6.6-1, Item 6, Design Commitment and Acceptance Criteria descriptions on Page 2.3-37 to be consistent with Section 2.6.6.1.

Section 2.6.6.1, Design Description of the plant lighting system discusses on Page 2.3-36 that the self-contained battery pack emergency lighting system is normally powered from the ac power systems; however, in Table 2.6.6-1, Item 6 the Design Commitment and Acceptance Criteria descriptions indicate that the self-contained battery packs have self-contained battery packs.

14.03.06-12

ITAAC Item 13 in Table 2.6.2-2

Typically selective coordination is determined by analysis and inspection. The ITA should be revised to indicate both inspection and analysis. The acceptance criterion should be revised accordingly. Coordination requires analysis to verify whether the protective devices coordinate with each other, and inspection should be done to verify that the protective devices used in the analysis are the ones installed in the field.

14.03.06-13

Revise the Inspections, Tests, Analyses statement in Table 2.6.2-2, Item 11, Page 2.6-15 to also include an inspection as well as the analysis of the as-built cables.

Section 2.6.2.1, in the Fourth Paragraph from the end of the design description discusses cable sizing for dc power systems. The description indicates the cables are sized to carry load currents and provide design basis voltage at the load terminals considering derating due to ambient temperature and raceway loading; however, the Inspections, Tests, Analyses in Table 2.6.2-2, Item 11 do not require any such inspection.

14.03.06-14

ITAAC Item 4 in Table 2.6.4-1

Typically independence is established by both test and inspection. Inspection by itself can not verify electrical independence.

Also applicable to ITAAC:

ITAAC Item 12 in Table 2.6.4-1