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October 5, 2012

Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Attention: Mr. Jeffrey A. Ciocco

Docket No. 52-021
MHI Ref: UAP-HF-12275

Subject: MHI's Response to US-APWR DCD RAI No. 959-6765 (SRP 09.04.01)

Reference: 1) "Request for Additional Information No. 959-6765, SRP Section 09.04.01 – CONTROL ROOM AREA VENTILATION SYSTEM – Application Section: 9.4.1", dated September 10, 2012.

With this letter, Mitsubishi Heavy Industries, Ltd. ("MHI") transmits to the U.S. Nuclear Regulatory Commission ("NRC") a document entitled "Response to Request for Additional Information No. 959-6765."

Enclosed is the response to one RAI question contained within Reference 1.

Please contact Mr. Joseph Tapia, General Manager of Licensing Department, Mitsubishi Nuclear Energy Systems, Inc. if the NRC has questions concerning any aspect of this submittal. His contact information is provided below.

Sincerely,

Y. Ogata

Yoshiki Ogata,
Director- APWR Promoting Department
Mitsubishi Heavy Industries, LTD.

Enclosure:

1. Response to Request for Additional Information No. 959-6765

D081
NRO

CC: J. A. Ciocco
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Enclosure 1

UAP-HF-12275
Docket No. 52-021

Response to Request for Additional Information No. 959-6765

October 2012

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

10/05/2012

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

rai No.:	**959-6765**
SRP Section:	**09.04.01 - Control Room Area Ventilation System**
APplication Section: 9.4.1	
DATE of RAI issue:	**09/10/2012**

QUESTION NO.: 09.04.01-33

RAI follow-up to MHI Response to RAI No. 883-6063 Question No. 09.04.01-30 In your response to Question No. 09.04.01-30, the commitment was made to establish an initial reliability for each of the individual AAC GTGs by performing a series of start-and-run tests during the start-up phase of plant operation. The testing would be performed until 25 consecutive such tests were successful for each AAC GTG. This approach is fully acceptable to the staff.

However, the subject response goes on to say that after a sufficient number of successful starts via this process, future COLs will then be able to simply reference the accumulated data utilizing 'NSAC 108 methodology' and no further individual AAC GTG units will be tested to demonstrate their own individual reliability. This portion of your response is unacceptable to the staff.

During a June 6, 2012 conference call on this subject, the staff stated that all new AAC GTGs need to be put through this 25 start and run testing without a failure to demonstrate their individual reliability. The staff explained that NSAC 108 methodology only applied to power sources that have an operating history and that it therefore cannot be applied to new GTG units as they do not have a unit specific operating history.

The staff recognizes that RG 1.155 (1988) appears to allow the use of this methodology for all plants because the distinction between in-service power units and new power units is not made. The NSAC 108 study was performed in 1986 and the RG was developed in 1988 with an essentially total focus on the operating fleet, as there were no new reactor operating licenses on the near horizon.

The staff's position on this issue is that all new AAC power sources (across all 'active plant' design centers) must meet the start and run testing requirement to demonstrate an initial reliability for each and every new AAC power unit in accordance with the 25 consecutive starts program discussed above. Please provide an amended response that reflects this position.

ANSWER:

In the response to RAI 883-6063 Question 09.04.01-30, submitted by MHI letter UAP-HF-12193 dated August 2, 2012, MHI added a 25 consecutive start preoperational test. MHI described that this test will be performed for each AAC GTG, until there are sufficient U.S. plant data for the AAC GTGs to demonstrate 95% or greater reliability, for the standard US-APWR, in accordance with NSAC-108 or equivalent methodology, to meet the requirements of Criterion 5 of Section 3.3.5, RG 1.155. This approach appropriately demonstrates consistency with the intent of RG 1.155 95% reliability criterion.

The intent of adding this exception to the 25 start preoperational testing was that there would eventually be sufficient test data for the AACs such that their reliability could be shown to meet the RG 1.155 reliability requirements similar to as is done for operating plants. However, based on this RAI question, the NRC interprets the reference to NSAC-108 in RG 1.155 as only being applicable to operating plants that had an existing alternate AC power source. For new plants, since the alternate AC power source will have no operating experience at that site, the NRC is requiring the preoperational test as the means to demonstrate reliability.

Therefore, MHI will revise DCD Subsections 8.4.2.2 and 14.2.12.1.46 to remove the discussion of using NSAC-108 methodology to discontinue the 25 start preoperational testing. Thus, the 25 start preoperational test of each AAC will be performed for each unit with no exception.

Impact on DCD

DCD Subsections 8.4.2.2 and 14.2.12.1.46 will be revised as described in the answer above and as shown in the attached DCD markup.

Impact on R-COLA

There is no impact on the R-COLA.

Impact on S-COLA

There is no impact on the S-COLA.

Impact on PRA

There is no impact on the PRA.

Impact on Technical / Topical Reports

There is no impact on the Technical / Topical Reports.

Each AAC GTG has sufficient capacity to operate the systems necessary for coping with an SBO event for the time required to bring and maintain the plant in safe shutdown condition. Two AAC GTGs are provided even though the provision of only one is adequate to meet the regulatory requirements. This meets the contingency of one AAC GTG not available. Single failure for the AAC GTGs need not be considered in accordance with Appendix B, RG 1.155 (Reference 8.3.1-21). Each AAC GTG has adequate fuel to operate the systems required for coping with an SBO for 8 hours. Therefore, the AAC GTGs meet Criterion 4 of Section C.3.3.5, RG 1.155 (Reference 8.3.1-21).

A 25 consecutive start preoperational test, without loading, will be performed for each AAC GTG. DCD_09.04.01-30 DCD_09.04.01-33

The AAC power system will be inspected and tested periodically based on manufacturer's recommendations and Reg 1.155 to demonstrate operability and reliability. The surveillance test interval does not exceed 3 months (Quarterly). During the quarterly test the AAC is started and brought to operating conditions. Additionally, during every refueling outage, the AAC generator is tested by performing a timed start and rated load capacity test. Following preoperational testing,~~The reliability of~~ the AAC power system will be maintained to meet or exceed 95% reliability as determined in accordance with NSAC-108 (Reference 8.4-2) or equivalent methodology to meet Criterion 5 of Section C.3.3.5, RG 1.155 (Reference 8.3.1-21). Testing and maintenance of the AAC is evaluated under the reliability assurance program and the maintenance rule program. DCD_09.04.01-30

Procedures to cope with SBO are addressed in Section 13.5 and the training is addressed in Section 13.2. These include all operator actions necessary to cope with SBO for at least the duration in accordance with Subsection 8.4.2.1.1 and to restore normal long-term core cooling/decay heat removal once ac power is restored. This meets the requirement of Regulatory Position C.3.4 of RG 1.155.

The quality assurance of AAC GTG is controlled in accordance with DCD Chapter 17 and related topical report PQD-HD-19005 Revision 2 (Reference 8.4-3). This meets the requirements of Regulatory Position C.3.5 of RG 1.155.

8.4.3 Combined License Information

No additional information is required to be provided by a COL Applicant in connection with this section.

8.4.4 References

8.4-1 Guidelines and Technical Bases for NUMARC Initiatives Addressing Station Blackout at Light Water Reactors, NUMARC 87-00, Revision. 1, August 1991.

8.4-2 Reliability of Emergency Diesel Generators at U.S Nuclear Power Plants, NSAC-108, September 1986.

8.4-3 Quality Assurance Program (QAP) Description For Design Certification of the US-APWR, PQD-HD-19005 Revision 3, September 2009.

1. The PSMS, the bus undervoltage relays, and the degraded voltage relays operate in accordance with design (see Subsection 8.3.1.1.3).

2. The loading intervals for supplying from Class 1E gas turbine generator are within the design limits.

3. Each train loads are sequenced on the bus by initiating of an ECCS actuation signal.

4. Each electrical division operates independently of other divisions.

5. All associated indications and alarms operate per design.

14.2.12.1.46 Alternate ac Power Sources for Station Black Out Preoperational Test

A. Objectives

1. Demonstrate the operability of each alternate ac power source breaker and associated interlocks.

2. Demonstrate the operation of air start and fuel systems.

3. Demonstrate alternate ac power source reliability by performing 25 consecutive starts with no failures on each alternate ac power source. DCD_09.04.01-30

4. Demonstrate the ability of the alternate ac power source to synchronize with the offsite power system.

5. Determine the fuel oil consumption of each alternate ac power source while operating under continuous rating load conditions.

6. Verify that, with the alternate ac power source operating in the test mode connected to its bus, an automatic start signal overrides the test mode by returning the alternate ac power source to standby operation.

B. Prerequisites

1. Required construction acceptance tests are completed.

2. Required electrical power supplies and control circuits are operational.

3. The alternate ac power source fuel oil system is available.

4. Adequate ventilation for the alternate ac power source area is available.

5. ~~A report exists that demonstrates the reliability of the alternate ac power sources meets or exceeds 95% as determined in accordance with NSAC-108 (Reference 8.4-2) or equivalent methodology to meet the Criterion 5 of Section C.3.3.5, RG~~ DCD_09.04.01-30 DCD_09.04.01-33

~~1.155, based on historical data of the similar type of the ac alternate power sources.~~ DCD_09.04.01-30

C. Test Method

1. Fuel oil is transferred from the fuel oil storage tank to the fuel oil day tanks by means of the transfer pumps. Appropriate flow parameters are recorded.

2. The control logic of the alternate ac power source breaker, alternate ac power source start circuit, and support pumps and valves are verified.

3. The operability of the alternate ac power source starter is verified.

4. <u>Twenty-five consecutive starts of each alternate ac power source, without loading, is verified.</u> DCD_09.04.01-30 DCD_09.04.01-33

5. The alternate ac power source is started, voltage and frequency control demonstrated, phase rotation verified, and the backup generator synchronized to offsite power and loads.

6. During the testing, fuel oil consumption is monitored with the alternate ac power source operating at the continuous load rating.

7. With a simulated LOOP signal, the proper alternate ac power source trips is verified.

8. With the alternate ac power source connected to its bus, an automatic start signal causes it to return to standby operation.

9. Verify all associated indications and alarms during test sequences.

D. Acceptance Criteria

1. The controls, interlocks, and operation of the alternate ac power source breakers and support systems operate as designed (see Subsection 8.3.1.1.1).

2. Each alternate ac power source can be synchronized with offsite power.

3. Upon the receipt of automatic start signals, the alternate ac power sources operate as designed.

4. The alternate ac power source fuel oil consumption does not exceed the design requirements.

5. All associated indications and alarms operate per design.

14.2.12.1.47 125 V dc Class 1E Preoperational Test

A. Objectives

14.2-27 Code on Nuclear Air and Gas Treatment, ASME/ANSI AG-1-1997, American Society of Mechanical Engineers

14.2-28 Control Room Habitability at Light-Water Nuclear Power Reactors, Regulatory Guide 1.196, Rev. 1, U.S. Nuclear Regulatory Commission, Washington, DC January 2007

14.2-29 US-APWR Test Program Description Technical Report, MUAP-08009, Revision 1, October, 2009

14.2-30 Rules for Construction of Overhead and Gantry Cranes (Top Running Bridge, Multiple Girder), ASME NOG-1-2004, American Society of Mechanical Engineers.

14.2-31 Below-the-Hook Lifting Devices, ASME B30.20-2006, American Society of Mechanical Engineers.

14.2-32 Performance-Based Containment Leak-Test Program, Regulatory Guide 1.163, Rev. 0, U.S. Nuclear Regulatory Commission, Washington, DC September 1995

14.2-33 Industry Guideline for Implementing Performance-Based Option of 10 CFR 50 Appendix J, NEI 94-01, Rev. 0, Nuclear Energy Institute, July 1995

14.2-34 Containment System Leakage Testing Requirements, ANSI/ANS-56.8-1994, American National Standard Institute, January 1994

14.2-35 Pressurizer Surge Line Thermal Stratification. NRC Bulletin No. 88-11, U.S. Nuclear Regulatory Commission, Washington, DC, 1988 DCD_3.12-25 DCD_09.04.01-30 DCD_09.04.01-33