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March 31, 2011

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-11095

Subject: MHI's Responses to US-APWR DCD RAI No. 703-5458 Revision 2 (SRP Section 08.03.01)

Reference: 1) "Request for Additional Information No. 703-5458 Revision 2, SRP Section: 08.03.01 – AC Power Systems (Onsite)" dated February 28, 2011.

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. 703-5458 Revision 2."

Enclosed is the response to an RAI contained within Reference 1.

Please contact Dr. C. Keith Paulson, Senior Technical Manager, Mitsubishi Nuclear Energy Systems, Inc. if the NRC has questions concerning any aspect of the submittals. His contact information is below.

Sincerely,



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

Enclosure:

1. Responses to Request for Additional Information No. 703-5458 Revision 2

CC: J. A. Ciocco
C. K. Paulson

Contact Information

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NRO

Docket No. 52-021
MHI Ref: UAP-HF-11095

Enclosure 1

UAP-HF-11095
Docket No. 52-021

Response to Request for Additional Information No. 703-5458
Revision 2

March 2011

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

03/31/2011

**US-APWR Design Certification
Mitsubishi Heavy Industries
Docket No. 52-021**

RAI NO.: NO. 703-5458 REVISION 2

SRP SECTION: 08.03.01 - AC Power Systems (Onsite)

Application Section: Tier 2, Section 08.03.01-

DATE OF RAI ISSUE: 2/28/2011

QUESTION NO. : 08.03.01-39

MHI's letter of December 28, 2010, transmitted Revision 0 of Technical Report MUAP-10023, "Initial Type Test Result of Class 1E Gas Turbine Generator System," dated December 2010. This test report does not appear to address the impact of variable intake air temperature and other ambient conditions on GTG performance, other than on the ability to start. The tests were performed at the prevailing ambient conditions, including average intake air temperatures ranging from 56F to 81F. However, the USAPWR GTGs are rated for operation up to 115F. Since increasing intake air temperatures cause a reduction in GT output, the test report should include a description of and the results of an analysis using methodology similar to that described in Section 5.4 of the ASME "Performance Test Code on Gas Turbines," PTC 22, which demonstrates that the GTGs will meet the rated output at the design ambient conditions (temperature, humidity, and atmospheric pressure, as applicable) using the manufacturer's published performance curves. The test report should also address any potential impact of variable design ambient conditions on the ability to meet the other GTG performance requirements for load rejection, load acceptance, margin, etc., included in this test program.

ANSWER:

The Technical Report MUAP-10023 describes the results of "initial type tests" as defined in Section 6.2 of IEEE-387-1995, considering the changes identified in ISG -21 "Interim Staff Guidance on Review of Nuclear Power Plant Designs using a Gas Turbine Driven Standby Emergency Alternating Current Power System" DC/COL-ISG-021. These initial type tests form only a part of the overall testing and analysis required to qualify and apply a GTG as a safety related standby or Alternate AC power source. It was not the intent to demonstrate the impacts of variable intake air temperature and other ambient conditions on the gas turbine engine output.

The purpose of the initial type tests, which are part of the Qualification Requirements, is to assure that the GTG can perform within its specifications as a unit. These were defined at the time of procurement of the major component making up the prototype. System specifications are included in Section 5.2 of the report. The test results for the initial type tests performed indicate the unit met or exceeded the acceptance criteria defined in Section 6.2 of IEEE-387-1995.

The service or design conditions along with margins were considered during the specification and selection of the major components. (Those within the test scope as defined in Figure 4.0-1 of the technical report). The selection considered air intake temperature, humidity (minimum, maximum and average with durations) as well as possible combustion air contaminants. Consequently, the impacts from variable ambient conditions were factored into the overall GTG unit rating. Any addition adjustment of the GTG unit rating due to elevation, intake temperature range or other environmental parameters is not necessary to demonstrate meeting or exceeding the acceptance criteria of the initial type tests. Technical Report MUAP 07024-P (R1) Appendix B contains the technical specifications for the gas turbine engine and includes specific performance compensation information. Figure B.3.1-1 (page B-16) is the factory performance curve showing turbine output in KW, fuel flow rates, and exhaust gas temperature versus air intake temperature. Section 5.0 of Technical Report MUAP-07024-P(R1) includes a discussion and analysis of the gas turbine engine and gear box output performance compensation. Please note that the turbine is rated at 5300 KW_M and the performance curve is flat from -4°F (-20°C) thru 104°F (40°C), then begins to fall off linearly. At 122°F (50°C) the output power of the turbine remains well above the unit rating of 4500 KWe. The factory performance test were conducted using ISO 2314 -2009 Gas Turbine – Acceptance Tests.

The full GTG qualification report will be prepared during the engineering and procurement process for each specific COL application. The individual site characteristics will be factored into the development of the specifications. The procurement specifications will include testing and analysis requirements to establish and document full compliance in accordance with IEEE-387 for each individual application. These testing requirements will include factory production tests, initial type tests, address aging, seismic qualification, surveillance requirements, as well as site testing. This full qualification package will include an analyses to address the full range of site specific environmental variables. A subsection to MUAP-10023 addressing the performance effects across the range of the service environment parameters will be added. The performance effects will be determined using similar methodologies to those in ASME PTC 22-2005 "Performance Test Code on Gas Turbines" May 30, 2006.

Impact on DCD

There is no impact on the DCD

Impact on COLA

There is no impact on the COLA

Impact on PRA

There is no impact on the PRA