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TOKYO, JAPAN

ORIGINAL

December 21, 2009

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-09570

Subject: MHI's Responses to the Questions at ACRS Subcommittee Meeting on May 21, 2009

With this letter, Mitsubishi Heavy Industries, Ltd. ("MHI") transmits to the U.S. Nuclear Regulatory Commission ("NRC") the responses to questions that have been discussed during the ACRS Subcommittee meeting on May 21, 2009.

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,

Y. Ogata

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

Enclosure:

1. MHI's Responses to the Questions at ACRS Subcommittee meeting regarding Mitsubishi Fuel Design Criteria and Methodology

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

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Docket No. 52-021
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Enclosure 1

UAP-HF-09570
Docket No. 52-021

MHI's Responses to the Questions at ACRS Subcommittee Meeting regarding Qualification and Test Plan of Class 1E Gas Turbine Generator System

December 2009

RESPONSE ON ACRS SUBCOMMITTEE MEETING

US-APWR Technical Report

Mitsubishi Heavy Industries, Ltd.

REPORT NO.:	**MUAP-07024**
REPORT TITLE:	**QUALIFICATION AND TEST PLAN OF CLASS 1E GAS TURBINE GENERATOR SYSTEM**
DATE OF MEETING:	**5/21/2009**

QUESTION:

Particular gas turbine is driven in two parallel gas turbines actually.
Isn't it a single machine like a diesel generator?

ANSWER:

Class 1E gas turbine generator is not a machine like a diesel generator which is driven by ten-odd cylinder engines. Each generator is driven by single shaft which is rotated by two parallel gas turbine engines.

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QUESTION NO. :

Does it need both gas turbines operating to be able to take the full electrical capacity of the generator?

ANSWER:

US-APWR safety-related system consists of four train system. Therefore, US-APWR has four systems of gas turbine generators so that 50 percent time four trains. And gas turbine generator is driven by twin engine. It's mean a twin engine counts power supply as 50 percent.

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QUESTION NO. :

MHI mentioned cooling water is not required. Does that mean external cooling water is not required and internal cooling water is required?
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ANSWER:

Gas turbine engine is cooled by surface air ventilation. Therefore, gas turbine engine does not have cooling water externally and internally.

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QUESTION:

MHI is requested to confirm whether class 1E GTG has intercooler.

ANSWER:

Class 1E GTG does not have an intercooler. Typically, intercooler is used for large engine such as co-generation use in order to raise the combustion efficiency.

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QUESTION:

Although a safety-related gas turbines uses air start, in non-safety gas turbines air start or DC which is used?

ANSWER:

Non-safety gas turbine generators are started with using dc motors supplied from batteries, to be different from starting system of safety-related gas turbine generators.

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QUESTION:

Is air start system separated from plant compressed air system?

ANSWER:

Basically those designs are almost the same as typical diesel generator.
Therefore, Class 1E gas turbine has the compressed air system separated from plant system.

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QUESTION:

MHI is requested to clarify to the sheet-16.

ANSWER:

Figure of sheet 16 of presentation document explained by MHI on meeting was not correct. Figure-1 is correct figure. "Zero (0)" of Figure-1 means timing when starting signal is initiated. The Class 1E GTG is started by starting signal. It reaches the rated voltage and frequency, and breaker is closed within 100 seconds. After that, each load is started in accordance with sequence logic.

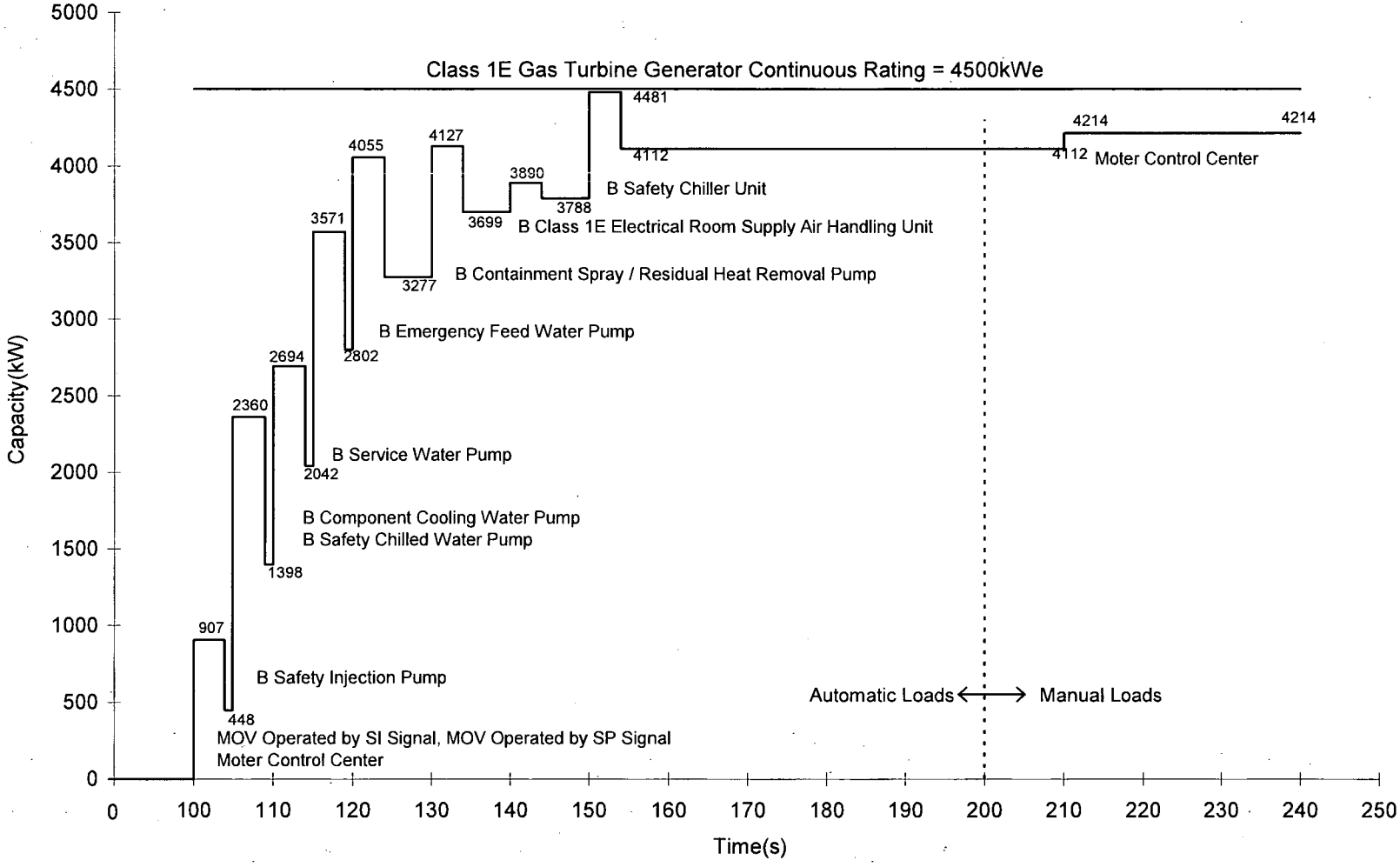
Class 1E Gas Turbine Generator Continuous Rating = 4500kWe
Capacity(kW)
Time(s)
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
0
100
110
120
130
140
150
160
170
180
190
200
210
220
230
240
250
907
448
B Safety Injection Pump
MOV Operated by SI Signal, MOV Operated by SP Signal
Moter Control Center
2360
1398
B Component Cooling Water Pump
B Safety Chilled Water Pump
2694
2042
B Service Water Pump
3571
2802
B Emergency Feed Water Pump
4055
3277
B Containment Spray / Residual Heat Removal Pump
4127
3699
B Class 1E Electrical Room Supply Air Handling Unit
3890
3788
B Safety Chiller Unit
4481
4112
4214
4112
Moter Control Center
4214
Automatic Loads
Manual Loads

Figure-1

RESPONSE ON ACRS SUBCOMMITTEE MEETING

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QUESTION:

At the slide number 19, is the allowable temperature range is 41 to 104 degree F?
There are a lot of places where temperature goes way below 41 degree F.

Is that the intake air temperature or is that the room temperature?

ANSWER:

This is typical value recommended by Kawasaki who is the supplier of the gas turbine engine.
Therefore, this value range is actually the typical specification for the commercial catalogue.
The specification in the application for the nuclear power plant is changed.

This temperature range indicates intake air temperature.

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QUESTION:

MHI is requested to provide explanation of the air system.
- The number of air tank should be clearly described.
- Does one tank supply air to both of engine units?

ANSWER:

In the standard design, one GTG unit consisted with two engines has two air tanks. One tank supplies air to only one engine. There is no tie line between outlet of air tanks and engines. Please see the Figure 9.5.6-1 in DCD rev.2.

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QUESTION:

MHI Technical Report (MUAP-07024 R0) indicates number of start attempt is 7,394 as operating experience data from industrial field data. How MHI does collect and calculate the reliability data of "fail to start" for Bayesian approach?

ANSWER:

In the Technical Report (MUAP-07024 R0), experience data for starting reliability was collected widely from all lineups (capacity and starting system).

MHI selected appropriate experience data for calculating Bayesian approach. This means to collect starting experience data for same type of engine and starting system as US-APWR Class 1E GTG. As a result, starting experience data were collected from 4000 kVA to 6000 kVA capacity GTG which consists of twin engine and additionally has air starting system.

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QUESTION:

Each AAC GTG has different kind of starting system and different machines that have different capability. Is this purpose diversity argument for station blackout?

ANSWER:

AAC GTG has different kind of starting system and different capability from Class 1E GTG for diversity argument.

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QUESTION:

Although slide 49 indicates that each AAC gas turbine has three output circuit breakers, is it actual design? Are there three separate output circuit breakers?

ANSWER:

Only breaker to permanent bus is controlled automatically. Other two circuit breakers for Class 1E buses will be operated manually in SBO condition.

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QUESTION:

On slide #57, AAC has eight of starting motors. How many actually have to work to start AAC?

ANSWER:

Each AAC needs eight motors, in order to maintain starting time within the 100 seconds. But the AAC can start with expanding of starting time in some starting motors failure condition.