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November 04, 2010

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-10301

Subject: **MHI's Responses to US-APWR DCD RAI No.618-4829 Revision 2 (SRP 09.05.08)**

Reference: 1) "Request for Additional Information No. 618-4829 REVISION 2, SRP Section: 09.05.08 – Emergency Diesel Engine Combustion Air Intake and Exhaust System, Application Section: 9.5.8, dated August 13, 2010.

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.618-4829 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,

Atsushi Kumaki for

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

Enclosure:

1. Responses to Request for Additional Information No.618-4829 Revision 2

CC: J. A. Ciocco
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Enclosure 1

UAP-HF-10301
Docket No. 52-021

Response to Request for Additional Information No. 618-4829
Revision 2

November 2010

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

11/04/2010

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.:	**NO. 618-4829 REVISION 2**
SRP SECTION:	**09.05.08 - Emergency Diesel Engine Combustion Air Intake and Exhaust System**
APPLICATION SECTION:	**9.5.8**
DATE OF RAI ISSUE:	**08/13/2010**

QUESTION NO. : 09.05.08-27

In response to RAI No. 557-4415, Question No. 09.05.08-26, the applicant stated that the emergency power supply gas turbine generator combustion air intake filter would be added back to the scope of this system. The NRC staff accepts this change, however, additional design information is needed in the DCD to address the NUREG-0800, Section 9.5.8, acceptance criteria for this system. Specifically, the design description should state how the air filters are designed to minimize the potential for clogging due to dust storms, rain, ice, or snow during system operation. While the applicant (and the proposed DCD revision) states that a differential pressure alarm is provided for the intake filters, what provisions are included to ensure continued operation and performance of the emergency power supply in the event that a high differential pressure occurs during a loss of offsite power? The response should address the protection from atmospheric conditions that could adversely impact the performance of multiple GTGs concurrently.

Reference: MHI's Response to US-APWR DCD RAI No. 557-4415; MHI Ref: UAP-HF-10170; dated June 14, 2010; ML101680362.

ANSWER:

In MHI's response to RAI No. 557-4415, MHI stated that we had decided to install a GTG air intake filter. However, as a result of study with the manufacturer, MHI reached the conclusion that this had to be changed again to be excluded from the scope of the system for the following reason.

First, MHI agrees with all the previous RAI that it is important to provide measures to ensure the operation and performance of GTGs when a loss of offsite power occurs in a bad weather condition that could generate larger foreign objects.
However, since the GTG is assumed to be operated for a limited time, as long as the same effect as an air filter can be achieved by installing the weather louver and screens, MHI considers it may be better to avoid the risk of the reliability decrease of GTG caused by a failure of devices such as air filter and a differential pressure gauge.

Below is the manufacturer's perspective on an air filter of GTG:

✓ "Allowable particle size of less than 10μm" is a general value used in common GTG's

specification and does not mean that intake of particles of more than 10μm directly causes improper function of GTG. But this is the requirement that can be met if GTGs are located in an average atmospheric environment. For reference, Table 1 below shows sample data of particle size distribution measured internally in a general atmospheric environment. According to the table, there are very few particles larger than 5μm.

- ✓ Output power is not affected without installing an air filter. The starting time may be delayed because acceleration speed could be affected if particles build up on the compressor and the amount of air reduces during acceleration. However, as the GTGs normally stay in standby state and no air is drawn into them, the amount of particles that would enter GTG should be so small that deterioration of compressor would not occur.
- ✓ The manufacturer relies on a user whether an air intake filter should be installed or not. The hundreds of the same GTGs as for US-APWR, designed specifically for emergency power supply, have been installed in Japan as a dedicated standby power and most of the Japanese users do not use a filter. The GTGs installed in domestic or overseas plants have never shown any signs of malfunctions, troubles, extreme life shortening caused by not installing an air filter.

After discussing with the manufacturer, the following measures should be taken to prevent invasion of foreign objects:

- ✓ Using the compressor of a centrifugal type that prevents collection of dust in the turbine blades.
- ✓ Installing screens and weather louver to protect the GTG from large flying object like birds, stones, and insects that would cause damage on the turbine blades. The screen opening size will be approximately 0.2 inches. The weather louver will be placed outside the screens and these should be robust enough to prevent damage from high wind and tornado. This protection structure will be applied to all the GTGs to prevent concurrent damage of them in the adverse atmospheric conditions.

Particle size distribution		
Item	Size	Upstream of cartridge
Average number of particles	0.3 - 0.5	679831.4
	0.5 - 1	383987.6
	1 - 2	50646.2
	2 - 5	1148.8
	5 <	13.9
	Total	1115627.9
Percentage	0.3 - 0.5	60.94%
	0.5 - 1	34.42%
	1 - 2	4.54%
	2 - 5	0.10%
	5 <	0.00%
	Total	100.00%

Table 1: Measurement data of level of particles contained in the air

Impact on DCD

Item (1) of Subsection 9.5.8.2.1 will be revised as below:

(1) A combustion air intake and exhaust system consisting of **air intake weather louver and screens**, silencer, and associated piping and flexible connections.

First and second sentences of Subsection 9.5.8.2.3 will be revised as below:

Upon initiation of a GTG start signal, combustion air is drawn into the **air intake weather louver and screens and passes through the intake piping** to the GT intake duct. The combustion air intake **filter**, silencer, and the combustion air piping are sized to supply an adequate supply of air to the GT while operating at 110% of nameplate rating.

Subsection 9.5.8.2.2.3 will be revised to add following new paragraph as first paragraph.

The intake piping, weather louver and screens are provided to supply combustion air to each GTG.

Figure 9.5.8-1 will be revised as shown in Attachment-A.

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.

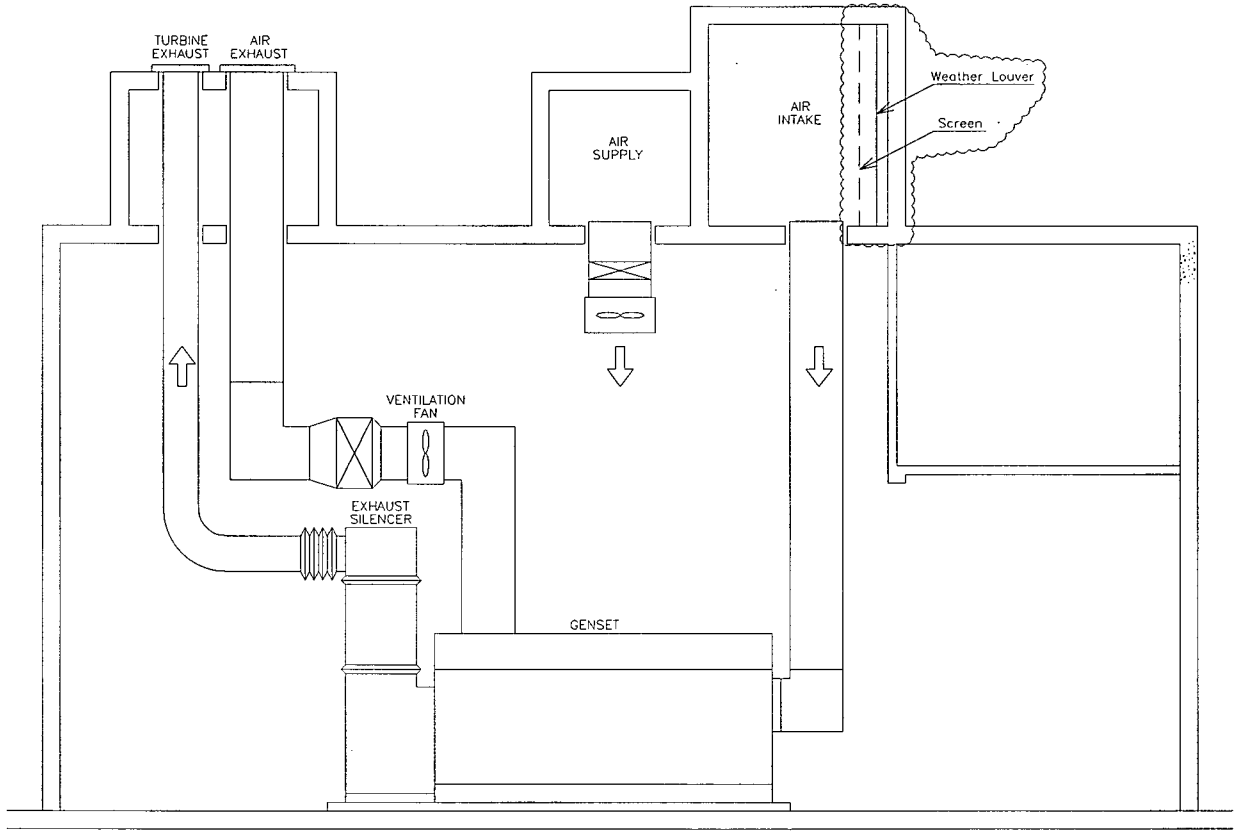

Figure 9.5.8-1 Gas Turbine Generator Air Intake and Exhaust Component Schematic Diagram