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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-09555

Subject: MHI's Response to US-APWR DCD RAI No.468-3360 Revision 1

References: 1) "Request for Additional Information No. 468-3360 REVISION 1, SRP Section: 09.05.04 - Emergency Diesel Engine Fuel Oil Storage and Transfer System, Application Section: Tier 2 Section 9.5.4," dated October, 6, 2009

With this letter, Mitsubishi Heavy Industries, Ltd. ("MHI") transmits to the U.S. Nuclear Regulatory Commission ("NRC") a document entitled "Responses to Request for Additional Information No. 468-3360 Revision 1."

Enclosed are the responses to 5 RAIs contained within Reference 1. Of the RAIs in Reference 1, one will not be answered within this package. This is;

> Question 09.05.04-49 will be responded within December 2009 by a separate transmittal, because ISO 3977 has many requirements and conformances with the requirements are being checked presently.

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. Response to Request for Additional Information No.467 Revision 1

CC: J. A. Ciocco
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D081
NRO

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Enclosure 1

UAP-HF-09555
Docket No. 52-021

Responses to Request for Additional Information No. 467-3609
Revision 1

December 2009

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

12/10/2009

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.:	**468-3360 REVISION 1**
SRP SECTION:	**09.05.04 – Emergency Diesel Engine Fuel Oil Storage and Transfer System**
APPLICATION SECTION:	**TIER 2 9.5.4**
DATE OF RAI ISSUE:	**10/6/2009**

QUESTION NO: 09.05.04-44

Supplemental to Question No. 09.05.04-10 (RAI 9.5.4-05; RAI Set No. SBPB 318-2227, Rev. 1; MHI Ref: UAP-HF-09292, dated 6/9/09): The following MHI responses provided in the ANSI/ANS 59.51 comparison table provided in response to the referenced RAI are not acceptable and should be revised (section numbers are per the ANSI/ANS standard):

- Section 5.5.1 – The response states that "part of the pump discharge flow is returned to the fuel oil storage tank via the recirculation line." As stated in the response to RAI 09.05.04-27 (9.5.4-22, see UAP-HF-09292, top of page 9.5.4- 12), this recirculation function is only for periodic filtration and the revised Figure 9.5.4-1 shows the recirculation valve normally closed. The response to Section 5.5.1 should be revised accordingly.

- Section 6.2.4 – The response (bottom of page 9.5.4-15) states for the fuel oil storage tank enclosure that "In regions where low temperature exists for extended durations, a space heater, and/or tank heater, may also be provided to maintain fuel oil temperature within specification." How and when will this requirement be determined? If this is a COL applicant's responsibility, then a COL Action Item should be added. If MHI will make this determination, then the DCD should include this statement. For either approach, the criteria for when a heater is needed, should be provided in the DCD. In addition, any heating requirements for the fuel oil piping located in the pipe tunnel between the fuel oil storage tank enclosure and the GTG building should also be addressed.

- Section 6.2.4 – The response (bottom of page 9.5.4-15) states that ventilation is addressed in Section 9.5.8. However Section 9.5.8 does not address ventilation of the fuel oil storage tank enclosure. This is an accessible area and should be adequately ventilated or MHI should provide adequate justification for not providing ventilation. See also the response to Section 6.3.4 which states that "There is no ventilation provided for the fuel oil system."

- Section 6.2.4 – The response (top of page 9.5.4-16) states that "fill and sample connections are located at grade elevation...". However the revised Figure 9.5.4-1 shows the sample connection within the tank enclosure. Revise the response or figure to be consistent. Also, the 6.2.5 response states that "The fill line is above grade."

- Section 6.2.5 – The response states that "fill line has a strainer located downstream of the isolation valve..." The revised Figure 9.5.4-1 identifies this as a duplex filter which is the ANSI/ANS requirement. Revise the response to change "strainer" to "filter".

- Section 6.2.5 – The response to the ANSI/ANS fire protection requirements for fuel oil system does not mention fire detection or suppression for this system. According to Section 9.5.1 of the US-APWR DCD, automatic sprinklers and smoke detectors are provided in the Class 1E GTG rooms which also house the fuel oil day tanks. The provision of sprinklers in the GTG rooms meets the guidance of RG 1.189, Regulatory Position 6.1.8 for emergency diesel generators. However, the fuel oil storage tank enclosure is not addressed in Appendix 9A. Regulatory Position 7.4 notes that automatic fire suppression should be provided for aboveground oil storage, including those tanks located in separate buildings. While the US-APWR fuel oil storage tanks are not aboveground, they are located in a separate building that contains safety-related equipment. Based on the quantity of combustible material in the storage tank enclosure, the NRC staff believes that detection and automatic suppression should be provided for these areas. In addition, Regulatory Position 6.1.8 notes that automatic suppression should be provided for any lubricating oil fires. At elevation 26'-4" of the power source building there are rooms shown on Figure 9A-11 and identified as GTG Auxiliary Component Room. The Table 9A-2 indicates that these rooms contain lube oil. MHI should provide justification for not protecting these rooms with automatic suppression systems in accordance with RG 1.189.

- Section 6.3.3.1 – The response notes that "pressure indicators and a differential pressure alarm on the fuel oil transfer pump discharge strainers are provided." This should refer to the fuel oil transfer pump suction strainers. The response should be revised to be consistent with Figure 9.5.4-1, etc.

- Revised DCD Text – A statement has been added regarding the aboveground protection for the fill and vent lines. If the sample line also extends aboveground, as noted elsewhere and questioned by the NRC staff, it should be protected as well.

Additional changes may be required based on the response to this supplemental Question/RAI.

ANSWER:

A comparison to ANSI/ANS 59.51-1997 is presented in the following table for the sections being questioned by the NRC based on the supplemental **to Question No. 09.05.04-10 (RAI 9.5.4-05; RAI Set No. SBPB 318- 2227, Rev. 1; MHI Ref: UAP-HF-09292, dated 6/9/09).** The answer related to Section 6.2.5 (section numbers are per the ANSI/ANS standard), sixth bullet above is provided in detail after the comparison table. Any changes to the DCD are discussed in the "MHI US-APWR Response" and described in the "Impact on DCD" section below.

ANSI/ANS-59.51-1997 Section	ANSI/ANS-59.51-1997 Requirement	MHI US-APWR Response	DCD Section
5.5.1	The day or integral tanks should be located physically above the supply tank. When this configuration is used, an overflow line from the day or integral tank to the supply tank shall be provided.	The FOS is shown in Figure 9.5.4-1. The fuel oil day tanks are elevated above the GTGs to maintain a positive pressure at the suction of each gas turbines startup and main shaft driven fuel oil pumps. One of the two 100% fuel oil transfer pumps takes suction from its fuel oil storage tank and discharges fuel oil to its associated GTG fuel oil day tank. Each pump is capable of supplying its GTG and, simultaneously, increasing the inventory in the fuel oil day tank. The fuel oil transfer pump is automatically started and stopped on day tank level control. Any overflow is returned to the fuel oil storage tank via the recirculation line.	Figure 9.5.4-1 Section 9.5.4.2.2.3 Section 9.5.4.2.4 (Consistent with Question No. : 09.05.04-27RAI 9.5.4-22, RAI Set No SBPB 318-2227, Impact on DCD)
6.2.4	Minimum and maximum fuel oil temperature conditions required by the fuel specifications shall be satisfied by the arrangement and location of components.	**The fuel oil storage tank is located in an underground vault and is provided with a manually operated ventilation system for personnel safety to remove any fumes when personnel enter the area. The Power Source Fuel Storage Vault is 33 feet underground. This provides a natural insulation and a stable ground temperature below grade that maintains acceptable fuel oil temperature protection against minimum and maximum conditions. An in-duct electric heater is provided on the supply air duct so that during the winter, whenever the ventilation system is used the incoming cold outside air is heated and the vault area will be able to be maintained above freezing. Unit heaters are provided to maintain fuel oil temperature within specification, when the Power Source Fuel Storage Vault temperature may drop below 35°F in regions where low temperature exists for extended durations. The COL applicant is to address the need for installing unit heaters in the Power Source Fuel Storage Vault. One side of the tunnel between the Power Source Fuel**	**9.5.4.2.2.1** **9.5.4.3 (Refer to Impact on DCD)**

ANSI/ANS-59.51-1997 Section	ANSI/ANS-59.51-1997 Requirement	MHI US-APWR Response	DCD Section
		Storage Vault and the PS/B is part of the PS/B, which is a normally heated building. The other side of the tunnel is separated from the PS/B by a 3-hour fire rated barrier and considered a part of the Power Source Fuel Storage Vault. This is one of the locations that would have a unit heater if required as part of the COL item evaluation of extreme cold conditions.	
6.2.4	Adequate illumination, heating, and ventilation shall be provided for the system.	Lighting system is described in 9.5.3 HVAC is described in 9.4 for the different buildings **The Power Source Fuel Storage Vaults are considered confined spaces and are provided with a manually operated ventilation system for personnel safety. It is not a continuously running ventilation system. A vapor detection system is installed in each vault.** Appropriate lighting will be provided as needed for performing maintenance and inspection. The Power Source Building (PS/B) is provided with adequate illumination and ventilation as required by appropriate building codes. The ventilation of each GTG area is shown on DCD Figure 9.5.8-1, "Gas Turbine Generator Air Intake and Exhaust Component".	**9.5.4.2.2.1** **(Refer to Impact on DCD)**
6.2.4	For fuel oil supply tanks installed underground, the supply tank vent, stick gauge, or other level instrumentation and. fill connections extending above ground shall be protected from severe natural phenomena and man-made hazards, including the maximum flood level.	The fill connection is located at grade elevation with locked-closed isolation valves and are capped and locked to prevent entry of moisture. The fuel oil storage tanks are vented to atmosphere, and the vent connection is located above the grade elevation. The vent is located above the maximum flood level. **Vent and fill connections are designed with a level of protection equivalent to that for components located in the vital area.** **Sample connections for sampling of oil, sediments and water contents in the Fuel Oil Storage Tanks are located outside the vault. The flowing sample connections are located inside the PS/B close to the fuel oil day tanks.**	**9.5.4.2.2.1 (Refer to Impact on DCD)** **9.5.4.2.2.1 (Refer to Impact on DCD)**

ANSI/ANS-59.51-1997 Section	ANSI/ANS-59.51-1997 Requirement	MHI US-APWR Response	DCD Section
6.2.5	A fill line filter shall be provided. The fill line shall include such design features, and features for administrative control, that protection is provided against accidental contamination or siphoning.	Each Fuel Oil Storage Tank fill line incorporates a normally closed valve and a filler cap at the end to preclude the entrance of water. The fill line is at grade elevation. The fill line has a **filter** located downstream of the isolation valve to prevent entrance of solid material into the tank.	9.5.4.2.4 (Consistent with Question No. : 09.05.04-26, RAI 9.5.4-21, RAI Set No SBPB 318-2227, Impact on DCD)
6.2.5	Fire protection for the diesel generator fuel oil system shall be provided in accordance with the applicable requirements of local, state, and federal law and the requirements of NFPA 30-1996 [11] and NFPA 37-1994 [12]. In the event of a conflict among these requirements, the most stringent shall govern.	Each fuel oil storage tank and fuel oil day tank is enclosed in its respective enclosure/GTG room which is fire rated for three hours of fire separation. The redundant FO Storage Tank compartments/GTG rooms are separated from each other by concrete walls, which are three hour rated fire barriers. **Each Power Source Fuel Storage Vault is protected by a dry-pipe sprinkler system. Vapor and liquid detection system is also provided. The Class 1E GTG rooms [Fire Zones FA3-103-03, FA3-104-03, FA3-109-03 and FA3-111-03] and the Alternate AC GTG rooms [Fire Zones FA3-105-02, FA3-113-02], which also house the fuel oil day tanks are protected by wet-pipe automatic sprinkler systems, manual hose stations, automatic smoke detection, and manual fire alarm pull stations.**	9.5.4.3 **9.5.4.2.2.1**
6.3.3.1	The following instruments and controls shall be provided in the design of the system: (1) One local pressure indicator, to be located in the discharge line from the fuel oil transfer pump. (2) One differential pressure indicator, which should be located in the engine control room, and one alarm for each set of parallel strainers.	Pressure indicators and a differential pressure alarm on the fuel oil transfer pump **suction** strainers are provided. The filter in the discharge line to the fuel oil day tank is monitored by measuring differential pressures across the filter and by providing a high differential pressure alarm. Instrumentation has been added to Figure 9.5.4-1.	9.5.4.5 (consistent with Question No.: 09.05.04-25, RAI 9.5.4-20, RAI Set No SBPB 318-2227, Impact on DCD) Figure 9.5.4-1
6.3.4	Ventilation systems that serve components of the fuel oil system shall be designed to meet the applicable design criteria set forth	**Power Source Fuel Storage Vault ventilation system is described in DCD Subsection 9.5.4.2.2.1.**	**9.5.4.2.2.1.**

ANSI/ANS-59.51-1997 Section	ANSI/ANS-59.51-1997 Requirement	MHI US-APWR Response	DCD Section
	in American National Standard Safety Criteria for HV AC Systems Located Outside Primary Containment, ANSI/ANS-59.2-1985 [16].		

Answer related to Section 6.2.5 (section numbers are per the ANSI/ANS standard), sixth bullet above is described in detail below. The NRC question is responded to as four separate issues as indicated below:

ISSUE No.1: The response to the ANSI/ANS fire protection requirements for fuel oil system does not mention fire detection or suppression for this system. According to Section 9.5.1 of the US-APWR DCD, automatic sprinklers and smoke detectors are provided in the Class 1E GTG rooms which also house the fuel oil day tanks. The provision of sprinklers in the GTG rooms meets the guidance of RG 1.189, Regulatory Position 6.1.8 for emergency diesel generators.

ISSUE No.2A: However, the fuel oil storage tank enclosure is not addressed in Appendix 9A.

ISSUE No.2B: Regulatory Position 7.4 notes that automatic fire suppression should be provided for aboveground oil storage, including those tanks located in separate buildings. While the US-APWR fuel oil storage tanks are not aboveground, they are located in a separate building that contains safety-related equipment. Based on the quantity of combustible material in the storage tank enclosure, the NRC staff believes that detection and automatic suppression should be provided for these areas.

ISSUE No.3 In addition, Regulatory Position 6.1.8 notes that automatic suppression should be provided for any lubricating oil fires. At elevation 26'-4" of the power source building there are rooms shown on Figure 9A-11 and identified as GTG Auxiliary Component Room. The Table 9A-2 indicates that these rooms contain lube oil. MHI should provide justification for not protecting these rooms with automatic suppression systems in accordance with RG 1.189.

ANSWER TO ABOVE ISSUES:

There are multiple issues stated in the RAI requiring several autonomous responses as follows:

ISSUE NO.1:

The text of the existing Section 6.2.5 response to the description of the fire protection provided for the gas turbine generator fuel oil system found on page 9.5.4-18 of the aforementioned RAI response will be expanded / revised to include a reference to detection and suppression as follows:

> Each Power Source Fuel Storage Vault is protected by a dry-pipe sprinkler system. Vapor and liquid detection system is also provided. The Class 1E GTG rooms [Fire Zones FA3-103-03, FA3-104-03, FA3-109-03 and FA3-111-03] and the Alternate AC GTG rooms [Fire Zones FA3-105-02, FA3-113-02], which also house the fuel oil day tanks are protected by wet-pipe automatic sprinkler systems, manual hose stations, automatic smoke detection, and manual fire alarm pull stations.

ISSUE NO.2A:

Although the fuel oil tank vaults is addressed in detail in DCD Section 9.5.4, the RAI is correct in stating that fire protection is not addressed in Appendix 9A of the DCD. Appendix 9A and Table 9A-2 will be revised to add an analysis of the fire risk and fire protection requirements for the fuel oil storage system including the storage tank enclosures.

ISSUE NO.2B:

1. The RAI states in part that, "While the US-APWR fuel oil storage tanks are not aboveground, they are located in a separate building that contains safety-related equipment. Based on the quantity of combustible material in the fuel oil tank vault, the NRC staff believes that detection and automatic suppression should be provided for these areas."

   a. This statement is only partially accurate. There is safety-related equipment located in the same area as each fuel oil tank but the tanks are not in a separate building.

      Each of the four GTG fuel oil tanks are actually located in separate, reinforced concrete seismic category I, and missile protected underground compartments (i.e. storage vaults) rather than separate buildings [Ref: DCD Section 9.5.4.2.1].

      DCD Section 9.5.4.3 states in part that all components of the GTG FOS are designed to ASME Section III, Class 3 (equipment Class 3) and seismic category I requirements. "The seismic category I portions of GTG fuel oil piping is routed in tunnels between the storage tank concrete vaults and the power source building. ..." "All fuel lines are routed so that they are remote from heat producing components and equipment, which may be located in the same compartment."

      There are two sets of vaults - one each on the east and west sides of the reactor building at the south end. They are illustrated and labeled on Figure 9A-27 of the DCD as "Power Source Fuel Storage Vaults".

   b. Chapter 25 of NFPA 30 does not specifically require automatic suppression for fuel oil storage tank vaults. Section 25.6 states only that, "Each vault shall be provided with means to admit a fire suppression agent." However, this requirement is based on the absence of other combustibles in a tank vault. The current configuration of each vault compartment includes not only a fuel oil storage tank but the safety-related fuel oil transfer pump skids related to the tank. To accommodate this arrangement, regulatory position 2.1.3 in RG 1.189 Rev 1 states that special protection should be provided to prevent a fire from defeating the safety system function. Such protection involves an automatic fire suppression system. Please note that the storage tank and transfer pump in each vault are part of the same safety train and the failure of the storage tank or the transfer pump in one train is the same functional loss for the plant. The other remaining three safety trains are available. Therefore, enclosing the transfer pump in a 3-hour rated enclosure serves no purpose other than to minimize the size and spread of a fire within the same fire area, which is not necessary. However, the fire will be minimized by the fact that there is a fire suppression system in the fuel storage vault. In addition, Several sprinkler heads will be placed in close proximity to the transfer pumps to insure that a fire originating at the pump area will open a sprinkler head sooner and extinguish the fire promptly.

      To comply with this regulatory position, automatic sprinkler protection will be provided for each fuel oil tank vault. The new fire area discussion to be added to Appendix 9A in

response to Issue No.2A herein and Table 9A-2 of the DCD will be modified to added dry-pipe sprinkler protection for the fuel storage vaults.

In addition, to comply with Section 25.15 of NFPA 30, each vault shall be provided with an approved vapor and liquid detection system that is equipped with on-site audible and visual warning devices with battery backup.

ISSUE NO.3:

The fire hazard analysis summery Table 9A-2 was examined for the fire areas FA3-103-01, FA3-104-01, FA3-109-01, and FA3-111-01 to determine if a water suppression system would be required. The only combustible material listed is lube oil. However, it appears that the amount of lube oil in these areas is about 3 gallons and the fire loading is about 800 Btu/ft2. This is considered very low. There are also smoke detectors in these fire areas, which provide early detection and response to a fire and since all walls floors and ceilings for each fire area is 3-hour rated, the spread of a fire is not possible for this low a fire loading. Local portable extinguishers and hose station is more than adequate to suppress the fire by the plant fire brigade. Therefore, the installation of a water suppression system is not warranted for these fire areas.

Impact on DCD

DCD Subsection 9.5.4.2.2.1, third paragraph will be revised as follows and followed by six new paragraphs:

Each fuel oil storage tank has a fill connection **located at grade elevation with locked-closed isolation valves and is capped and locked to prevent entry of moisture. The fill connection** terminates in a box allowing replenishment of fuel from an outside supply source (e.g., truck) without interrupting operation of the GTG. **The fuel oil storage tank fill connection is located above flood level to prevent flood water from entering the FOS.** The fuel oil storage tank fill connection includes an internal pipe and diffuser to limit inlet filling velocities to prevent turbulence of sediment on the bottom of the tank. In addition, the fuel oil storage tank outlet connections are 6 inches above the tank bottom, to reduce the potential of sediment entry into the pipeline. A moisture separator and duplex filters are provided in the fuel oil piping and a duplex fuel oil filter is provided on each GTG to prevent detrimental effects on performance from sediment.

The fuel oil storage tanks are vented to atmosphere, and the vent connection is located above the grade elevation. The vent is located above the maximum flood level. The vent has a flame arrester and fine wire mesh to prevent insects from entering. Vent and fill connections are designed with a level of protection equivalent to that for components located in the vital area.

Sample connections for sampling of oil, for sediments and water contents in the Fuel Oil Storage Tanks are located outside the vault. The sample connection is capped and locked to prevent entry of moisture. The flowing sample connections are located inside the PS/B close to the fuel oil day tanks.

Each Power Source Fuel Storage Vault is provided with a vapor and liquid detection system that is equipped with on-site audible and visual warning devices with battery backup.

Each fuel oil storage tank and the transfer pumps are located in an underground vault identified as the Power Source Fuel Storage Vaults and each vault is provided with a manually operated ventilation system for personnel safety to remove any vapors when personnel enter the area. The Power Source Fuel Storage Vault will not have a normally running ventilation system. The ventilation system consists of a supply air opening with a backdraft damper at the ceiling of the vault from the outside, and ducted to the bottom of one side of the vault. This duct will have an in-duct electric heater controlled by a local thermostat in the downstream ductwork. An exhaust fan at the ceiling with a backdraft damper to the outside is ducted to the bottom other side of the vault. This local ventilation system will be turned on locally (or from the MCR) only when personnel are required to enter the area for the performance of surveillances, inspections and maintenance activities.

The Power Source Fuel Storage Vault is 33 feet underground. This provides a natural insulation and a constant ground temperature below grade that maintains the vault temperature within the required temperature limits for the fuel oil. The in-duct electric heater is provided on the supply air duct so that during the winter, whenever the ventilation system is used the incoming cold outside air is heated and the vault area will be able to be maintained above freezing

Unit heaters are provided to maintain fuel oil temperature within specification for when the Power Source Fuel Storage Vault temperature may drop below 35°F. The COL applicant is to address the need for installing unit heaters in the Power Source Fuel Storage Vault. The tunnel between the fuel oil tank room and the PS/B is where the fuel oil piping is passing through. Within the tunnel is a 3-hour fire rated wall that separates the PS/B from the Power Source Fuel Storage Vault. The door and penetrations through this wall are all 3-hour fire rated. One side of the tunnel is part of the PS/B, which is a normally heated building. The other side of the tunnel is considered a part of the Power Source Fuel Storage Vault and has the same conditions of the vault area and is one of

the locations that would have a unit heater if required as part of the COL applicant evaluation of extreme cold conditions.

Revise DCD Subsection 9.5.4.3, Safety Evaluation, by adding the following paragraphs to the end of the section.

The Power Source Fuel Storage Vault ventilation system is classified as equipment class 5 (Non-Safety) and seismic category II. This equipment is in a seismic category I structure with equipment classified as safety-related.

The ventilation openings at the ceiling will have a seismic missile enclosure to protect the safety-related fuel oil tank. The ventilation backdraft dampers and exhaust fans for ease of access for maintenance are to be located within these missile enclosures. The backdraft damper is designed to withstand the effects of a tornado.

The unit heaters in the Power Source Fuel Storage Vault are explosion proof, safety-related and Seismic Category I.

Revise DCD Subsection 9.5.4.5, Instrumentation Requirements, by adding the following sentences to the end of the section.

The Power Source Fuel Storage Vault ventilation system can be operated from the MCR.

The vapor and liquid detection systems alarm locally and in the MCR.

Add the following new COL item 9.5(12) to DCD Section 9.5.9, Combined License Information:

"COL 9.5(12) The COL applicant is to address the need for installing unit heaters in the Power Source Fuel Storage Vault during the winter for site locations where extreme cold temperature conditions exist."

Revise DCD subsections 9A.3.136, 9A.3.137, 9A.3.138, 9A.3.139, 9A.3.140 and 9A.3.141 and associated Fire Area in Table 9A-2 as follows.

9A.3.136 FA7-401 Power Source Fuel Storage Vault

Figure~~s~~ 9A-27 shows the location of this fire area adjacent to the south portion of the **East** PS/B. This fire area consists of the single fire zone, FA7-401-01, A-Class 1E GTG Fuel Storage Vault. This **vault** accommodates **the** GTG fuel **storage** tank **with a** capacity **of** 119,000 gallons. ~~The borders of this fire area are constructed using reinforced concrete and other material which results in fire resistance that provides at least a 3-hour ASTM E-119 fire rating. Openings and penetrations into this fire area are protected with fire protection features provide at least 3-hour fire resistance. The area is identified as being associated with safety train A.~~ **Also, in this vault are the fuel oil transfer pumps and associated equipment.**

Fire Detection and Suppression Features

FA7-401-01 is provided with **a dry-pipe automatic sprinkler system for primary fire suppression** ~~automatic heat detection,~~ and **a** manual fire alarm pull station is installed as **primary manual fire** detection. ~~Primary fire suppression is provided from wet pipe automatic sprinkler system.~~ Secondary suppression is provided **by a** manual hose station **and a portable fire extinguisher**. **Vapor and liquid detection systems are provided in accordance with NFPA 30. They alarm locally and to the MCR.**

Smoke Control Features
Smoke removal as required due to fire within the area can be accomplished by **existing ventilation system for the power source fuel storage vault.**

Fire Protection Adequacy Evaluation

The fire area boundaries are constructed with concrete walls in excess of 8 inches thick and 3-hour rated fire doors**. 3-hr fire-rated penetration seals are provided for all penetrations into the vault.**

Fire suppression is provided by a **dry** -pipe sprinkler system in accordance with **NFPA 13** and regulatory guidance. The fire area has substantial concrete reinforced walls that are designed to seismic category I criteria. **They** provide **more than the required** minimum 3-hour fire resistance rating. Additional fire suppression capability is provided **by** fire hose streams and portable fire extinguishers. In addition**,** the area is provided with ~~automatic fire detection and~~ **a** manual **fire** alarm **pull station** as backup. The combination of structural confinement **with fire rated barriers**, automatic fire suppression **system**, the **manual fire hose station,** automatic fire **detection system** and manual **pull station as a** backup provides a defense-in-depth approach toward assuring the fire protection adequacy of this fire area **and preventing the spread of a fire outside this fire area**.

The fire **suppression** system**s** for this **vault** is designed in accordance with NFPA **13. The** manual hose station is also provided **and designed in accordance with NFPA 14**. On this basis, there is adequate fire protection provided for this compartment (fire area).

Fire Protection System Integrity

The **dry-pipe** sprinkler system within the room is designed to NFPA 13 and is seismically supported to **ensure that the system maintains its pressure boundary integrity and does not fall on the safety-related equipment during a safe shutdown earthquake (SSE)**. The manual fire hose **station can only** discharge water by deliberate manual action. The **dry- pipe sprinkler** system is designed to ~~contain the pressure of the water and sprinkler heads are designed to only~~ discharge **only when the thermal element of the sprinkler reaches its actuation temperature,** which would indicated a fire condition. On this basis, there is little potential for an unintended actuation of the fire suppression system adversely affecting the operation of the plant.

The **manual** fire protection capability for this area is provided by manual hose streams applied by the plant fire brigade. The standpipe is designed to ~~code (~~NFPA 14~~)~~ and **is** unlikely to release water **without an operator manual action**. Since this is a safety-related area, all fire **hose standpipe** system piping is seismically supported to **maintain its pressure boundary integrity and does not** falling on safety related equipment during **a SSE causing unacceptable** damage. Unintended operation of the fire **hose standpipe system** is not expected since deliberate manual activation is required. In the event of a fire, electrical cables and equipment in the area would be protected from significant water intrusion since they are installed above the floor elevation above expected flooding levels.

Safe Shutdown Evaluation

A fire in this area has the potential to damage the following typical system of safe-shutdown function.

- A-Class 1E Power system (Fuel Oil)

This fire area is separated from the Train B, C, and D areas by 3-hour fire rated barriers. This separation will ensure that other safety trains will not be affected by a fire originating in this area and the remaining safety trains of equipment in other fire areas can achieve and maintain safe-shutdown of the plant. Therefore, a fire originating in one of the GTG fuel oil storage vaults will not adversely impact the ability to achieve and maintain safe-shutdown.

Radioactive Release to Environment Evaluation

This area is located in non-radiological area. There are no piping systems in the area that could contain fluids with radiological content. As such, a fire in this area is not deemed credible of causing a radioactive release to the environment.

9A.3.137 FA7-402 Power Source Fuel Storage Vault

Figure~~s~~ 9A-27 shows the location of this fire area adjacent to the south portion of the **East** PS/B. This fire area consists of the single fire zone, FA7-402-01, B-Class 1E GTG Fuel Storage Vault. This **vault** accommodates GTG fuel tank whose capacity is 119,000 gallons. **Also, in this vault are the fuel oil transfer pumps and associated equipment.**

~~The borders of this fire area are constructed using reinforced concrete and other material which results in fire resistance that provides at least a 3-hour ASTM E-119 fire rating. Openings and penetrations into this fire area are protected with fire protection features provide at least 3-hour fire resistance.~~
~~The area is identified as being associated with safety train B.~~

Fire Detection and Suppression Features

FA7-402-01 is provided with a **dry-pipe automatic sprinkler system for primary fire suppression** ~~automatic heat detection~~, and **a** manual fire alarm pull station is installed as **primary manual fire** detection. ~~Primary fire suppression is provided from wet pipe automatic sprinkler system.~~ Secondary suppression is provided **by a** manual hose station **and a portable fire extinguisher. Vapor and liquid detection systems are provided in accordance with NFPA 30. They alarm locally and to the MCR.**

Smoke Control Features

Smoke removal as required due to fire within the area can be accomplished by the **existing ventilation system for the power source fuel storage vault.**

Fire Protection Adequacy Evaluation

The fire area boundaries are constructed with concrete walls in excess of 8 inches thick and 3-hour rated fire doors. **3-hr fire-rated penetration seals are provided for all penetrations into the vault.**

Fire suppression is provided by a **dry-**pipe sprinkler system in accordance with **NFPA 13** and regulatory guidance. The fire area has substantial concrete reinforced walls that are designed to seismic category I criteria. **They** provide **more than the required** minimum 3-hour fire resistance rating. Additional fire suppression capability is provided with fire hose streams and portable fire extinguishers. In addition, the area is provided with ~~automatic fire detection~~ and **a** manual **fire** alarm **pull station** as backup. The combination of structural confinement **with fire rated barriers**, automatic fire suppression **system**, the **manual fire hose station**, **automatic fire detection system and the manual fire alarm pull station as a** backup provides a defense-in-depth approach toward assuring the fire protection adequacy of this fire area.

The fire **suppression** system for this **vault** is designed in accordance with NFPA **13**. **The** manual hose station is also provided **and designed in accordance with NFPA 14**. On this basis, there is adequate fire protection provided for this compartment (fire area).

Fire Protection System Integrity

The **dry-pipe** sprinkler system within the room is designed to NFPA 13 and is seismically supported to **ensure that system maintains its pressure boundary integrity and does not fall on the safety-related equipment during a safe shutdown earthquake (SSE)**. The manual fire hose **station** ~~are in an alternate area and~~ can only discharge water by deliberate manual action. The **dry-pipe sprinkle**r system

is designed to ~~contain the pressure of the water and sprinkler heads are designed to only~~ discharge water **only when the thermal element of the sprinkler reaches its actuation temperature which would indicate** a fire condition. On this basis, there is little potential for an unintended actuation of the fire suppression system adversely affecting the operation of the plant.

The **manual** fire protection capability for this area is provided by manual hose streams applied by the plant fire brigade. The standpipe is designed to ~~code (~~NFPA 14~~)~~ and **is** unlikely to release water **without an operator manual action**. Since this is a safety-related area, all fire **hose standpipe** system piping is seismically supported to **maintain its pressure boundary integrity** and not ~~prevent its~~ fall~~ing~~ on safety related equipment during **a SSE causing unacceptable damage** damage. Unintended operation of the fire **hose standpipe system** is not expected since deliberate manual activation is required. In the event of a fire, electrical cables and equipment in the area would be protected from significant water intrusion since they are installed above the floor elevation above expected flooding levels.

Safe Shutdown Evaluation

A fire in this area has the potential to damage the following typical system of safe-shutdown function.

- B-Class 1E Power system (Fuel Oil)

This fire area is separated from the Train A, C, and D areas by 3-hour fire rated barriers. This separation will ensure that other safety trains will not be affected by a fire originating in this area and the remaining safety trains of equipment in other fire areas can achieve and maintain safe-shutdown of the plant. Therefore, a fire originating in one of the GTG fuel oil storage vaults will not adversely impact the ability to achieve and maintain safe-shutdown.

Radioactive Release to Environment Evaluation

This area is located in non-radiological area. There are no piping systems in the area that could contain fluids with radiological content. As such, a fire in this area is not deemed credible of causing a radioactive release to the environment.

9A.3.138 FA7-403 Power Source Fuel Storage Vault

Figure~~s~~ 9A-27 shows the location of this fire area adjacent to the south portion of the **East** PS/B. This fire area consists of the single fire zone, FA7-403-01, A-AAC GTG Fuel Storage Vault. This room accommodates GTG fuel **storage** tank **with a** capacity **of** 119,000 gallons. **Also, in this vault are the fuel oil transfer pumps and associated equipment.**

~~The borders of this fire area are constructed using reinforced concrete and other material which results in fire resistance that provides at least a 3-hour ASTM E-119 fire rating. Openings and penetrations into this fire area are protected with fire protection features provide at least 3-hour fire resistance.~~
~~The area is identified as being associated with non-safety train.~~

Fire Detection and Suppression Features

FA7-403-01 is provided with **a dry-pipe automatic sprinkler system for primary fire suppression** ~~automatic heat detection~~, and **a** manual fire alarm pull station is installed as **primary manual** detection. ~~Secondary fire suppression is provided from wet pipe automatic sprinkler system.~~ Secondary suppression is provided **by a** manual hose station **and a portable fire extinguisher**. **Vapor and liquid detection systems are provided in accordance with NFPA 30. They alarm locally and to the MCR.**

Smoke Control Features

Smoke removal as required due to fire within the area can be accomplished by **the existing ventilation system for the fuel storage vault.**

Fire Protection Adequacy Evaluation

The fire area boundaries are constructed with concrete walls in excess of 8 inches thick and 3-hour rated fire doors**. 3-hr fire-rated penetration seals are provided for all penetrations into the vault.**

Fire suppression is provided by a **dry** -pipe sprinkler system in accordance with **NFPA 13** and regulatory guidance. The fire area has substantial concrete reinforced walls that are designed to seismic category I criteria**. They** provide **more than the required** minimum 3-hour fire resistance rating. Additional fire suppression capability is provided **by** fire hose streams and portable fire extinguishers. In addition**,** the area is provided with ~~automatic fire detection and~~ **a** manual alarm **pull station** as backup. The combination of structural confinement **with fire rated barriers**, automatic fire suppression **system**, the manual fire hose station ~~automatic fire alarm notification~~ and **the** manual **fire alarm pull station as a** backup provides a defense-in-depth approach toward assuring the fire protection adequacy of this fire area **and preventing the spread of a fire outside this fire area**.

The fire **suppression** system for this **vault** is designed in accordance with NFPA **13**. **The m**anual hose station is **designed in accordance with NFPA 14**. On this basis, there is adequate fire protection provided for this compartment (fire area).

Fire Protection System Integrity

The **dry-pipe** sprinkler system within the room is designed to NFPA 13 and is seismically supported to **ensure that system maintains its pressure boundary integrity and does not** fall~~ing~~ on the ~~safety-related~~ equipment during a **safe shutdown** earthquake **(SSE)**. The manual fire hose **station** ~~are in an alternate area and~~ can only discharge water by deliberate manual action. The **dry-pipe sprinkler** system is designed to ~~contain the pressure of the water and sprinkler heads are designed to only~~ discharge **water only when the thermal element of the sprinkler reaches its actuation temperature which would** ~~if their thermal element~~ indicate~~d~~ a fire condition. On this basis, there is little potential for an unintended actuation of the fire suppression system adversely affecting the operation of the plant.

The **manual** fire **suppression** capability for this area is provided by manual hose streams applied by the plant fire brigade. The standpipe is designed to ~~code (~~NFPA 14~~)~~ and unlikely to release water **without an operator manual action**. ~~Since this is a safety-related area, all fire protection system piping is seismically supported to prevent its falling on safety-related equipment during an event and causing damage.~~ Unintended operation of the fire **hose standpipe system** is not expected since deliberate manual activation is required. In the event of a fire, electrical cables and equipment in the area would be protected from significant water intrusion since they are installed above the floor elevation above expected flooding levels.

Safe Shutdown Evaluation

A fire in this area **will not impact any** safe-shutdown function**s**, **and the equipment in 4 safety trains will remain unaffected by the fire**. The fire in this fire area, therefore, will not adversely impact the ability to achieve and maintain safe-shutdown.

Radioactive Release to Environment Evaluation

This area is located in non-radiological area. There are no piping systems in the area that could contain fluids with radiological content. As such, a fire in this area is not deemed credible of causing a radioactive release to the environment.

9A.3.139 FA7-404 Power Source Fuel Storage Vault

Figure~~s~~ 9A-27 shows the location of this fire area adjacent to the south portion of the **West** PS/B. This fire area consists of the single fire zone, FA7-404-01, A-Class 1E GTG Fuel Storage Vault. This **vault**

accommodates GTG fuel **storage** tank with a capacity of 119,000 gallons. **Also, in this vault are the fuel oil transfer pumps and associated equipment.**

~~The borders of this fire area are constructed using reinforced concrete and other material which results in fire resistance that provides at least a 3-hour ASTM E-119 fire rating. Openings and penetrations into this fire area are protected with fire protection features provide at least 3-hour fire resistance.~~
~~The area is identified as being associated with safety train C.~~

Fire Detection and Suppression Features

FA7-404-01 is provided with **a dry-pipe automatic sprinkler system for primary fire suppression** ~~automatic heat detection,~~ and manual fire alarm pull station is installed as **primary manual fire** detection. ~~Primary fire suppression is provided from wet pipe automatic sprinkler system.~~ Secondary suppression is provided **by a** manual hose station **and a portable fire extinguisher. Vapor and liquid detection systems are provided in accordance with NFPA 30. They alarm locally and to the MCR.**

Smoke Control Features

Smoke removal as required due to fire within the area can be accomplished by the **existing ventilation system for the fuel storage vault.**

Fire Protection Adequacy Evaluation

The fire area boundaries are constructed with concrete walls in excess of 8 inches thick and 3-hour rated fire doors. **3-hr fire-rated penetration seals are provided for all penetrations into the vault**.

Fire suppression is provided by a **dry** -pipe sprinkler system in accordance with **NFPA 13** and regulatory guidance. The fire area has substantial concrete reinforced walls that are designed to seismic category I criteria**. They** provide **more than the required** minimum 3-hour fire resistance rating. Additional fire suppression capability is provided **by** fire hose streams and portable fire extinguishers. In addition**,** the area is provided with ~~automatic fire detection and~~ **a** manual alarm **pull station** as backup. The combination of structural confinement **with fire rated barriers**, automatic fire suppression **system**, **the manual fire hose station,** ~~automatic fire alarm notification~~ and **the** manual fire alarm pull station as a backup provides a defense-in-depth approach toward assuring the fire protection adequacy of this fire area **and preventing the spread of a fire outside this fire area**.

The fire protection system for this room is designed in accordance with NFPA 13. **The m**anual hose station is **designed in accordance with NFPA 14**. On this basis, there is adequate fire protection provided for this compartment (fire area).

Fire Protection System Integrity

The **dry-pipe** sprinkler system within the room is designed to NFPA 13 and is seismically supported to **ensure that system maintains its pressure boundary integrity and does not** fall~~ing~~ on the safety-related equipment during **safe shutdown earthquake (SSE)**. The manual fire hose **station** ~~are in an alternate area and~~ can only discharge water by deliberate manual action. The **dry-pipe sprinkler** system is designed to ~~contain the pressure of the water and sprinkler heads are~~ designed to **discharge water** only **when the thermal element of the sprinkler reaches its actuation temperature which would** indicate~~d~~ a fire condition. On this basis, there is little potential for an unintended actuation of the fire suppression system adversely affecting the operation of the plant.

The **manual fire suppression** capability for this area is provided by manual hose streams applied by the plant fire brigade. The standpipe is designed to ~~code (~~NFPA 14~~)~~ and unlikely to release water **without an**

operator manual action. Since this is a safety-related area**. The fire hose standpipe system** piping is seismically supported to **maintain its pressure boundary integrity and** not fall~~ing~~ on safety-related equipment during a **SSE causing unacceptable damage**.
Unintended operation of the fire **hose standpipe system** is not expected since deliberate manual activation is required. In the event of a fire, electrical cables and equipment in the area would be protected from significant water intrusion since they are installed above the floor elevation above expected flooding levels.

Safe Shutdown Evaluation

A fire in this area has the potential to damage the following typical system of safe-shutdown function.

- C-Class 1E Power system (Fuel Oil)

This fire area is separated from the Train A, B, and D areas by 3-hour fire rated barriers. This separation will ensure that other safety trains will not be affected by a fire originating in this area and the remaining safety trains of equipment in other fire areas can achieve and maintain safe-shutdown of the plant. Therefore, a fire originating in one of the GTG fuel oil storage vaults will not adversely impact the ability to achieve and maintain safe-shutdown.

Radioactive Release to Environment Evaluation

This area is located in non-radiological area. There are no piping systems in the area that could contain fluids with radiological content. As such, a fire in this area is not deemed credible of causing a radioactive release to the environment.

9A.3.140 FA7-405 Power Source Fuel Storage Vault

Figure~~s~~ 9A-27 shows the location of this fire area adjacent to the south portion of the **West** PS/B. This fire area consists of the single fire zone, FA7-405-01, B-Class 1E GTG Fuel Storage Vault. This **vault** accommodates GTG fuel **storage** tank **with a** capacity **of** 119,000 gallons. **Also, in this vault are the fuel oil transfer pumps and associated equipment.**

~~The borders of this fire area are constructed using reinforced concrete and other material which results in fire resistance that provides at least a 3-hour ASTM E-119 fire rating. Openings and penetrations into this fire area are protected with fire protection features provide at least 3-hour fire resistance.~~
~~The area is identified as being associated with safety train D.~~

Fire Detection and Suppression Features
FA7-405-01 is provided with **a dry-pipe automatic sprinkler system for primary fire suppression** ~~automatic heat detection~~, and **a** manual fire alarm pull station is installed as **primary manual fire** detection. ~~Primary fire suppression is provided from wet pipe automatic sprinkler system.~~ Secondary suppression is provided **by a** manual hose station **and a portable fire extinguisher. Vapor and liquid detection systems are provided in accordance with NFPA 30. They alarm locally and to the MCR**.

Smoke Control Features

Smoke removal as required due to fire within the area can be accomplished by the **existing ventilation system for the fuel storage vault**.

Fire Protection Adequacy Evaluation

The fire area boundaries are constructed with concrete walls in excess of 8 inches thick and 3-hour rated fire doors**. 3-hr fire-rated penetration seals are provided for all penetrations into the vault.**

Fire suppression is provided by a **dry**-pipe sprinkler system in accordance with **NFPA 13** and regulatory guidance. The fire area has substantial concrete reinforced walls that are designed to seismic category I criteria**. They** provide **more than the required** minimum 3-hour fire resistance rating. Additional fire suppression capability is provided **by** fire hose streams and portable fire extinguishers. In addition**,** the area is provided with ~~automatic fire detection and~~ **a** manual **fire** alarm **pull station** as backup. The combination of structural confinement **with fire rated barriers**, automatic fire suppression **system**, ~~automatic fire alarm notification~~ **the manual fire hose station** and **manual fire alarm pull station as** backup provides a defense-in-depth approach toward assuring the fire protection adequacy of this fire area **and preventing the spread of a fire outside this fire area**.

The fire protection system for this **vault** is designed in accordance with NFPA **13**. **The m**anual hose station is **designed in accordance with NFPA 14**. On this basis, there is adequate fire protection provided for this compartment (fire area).

Fire Protection System Integrity

The **dry-pipe** sprinkler system within the room is designed to NFPA 13 and is seismically supported to **ensure that system maintains its pressure boundary integrity and does not** fall~~ing~~ on the safety-related equipment during a **safe shutdown earthquake (SSE)**. The manual fire hose **station** ~~are in an alternate area and~~ can only discharge water by deliberate manual action. The **dry-pipe sprinkler** system is designed to ~~contain the pressure of the water and sprinkler heads are designed to only~~ discharge water **only when the** thermal element **of the sprinkler reaches its actuation temperature which would** indicated a fire condition. On this basis, there is little potential for an unintended actuation of the fire suppression system adversely affecting the operation of the plant.

The **manual fire suppression** capability for this area is provided by manual hose streams applied by the plant fire brigade. The standpipe is designed to ~~code (~~NFPA 14~~)~~ and unlikely to release water **without an operator manual action**. Since this is a safety related area, **the fire hose standpipe** system piping is seismically supported to **maintain its pressure boundary integrity and not** fall~~ing~~ on safety related equipment during a **SSE causing unacceptable damage**. Unintended operation of the fire **hose standpipe** system is not expected since deliberate manual activation is required. In the event of a fire, electrical cables and equipment in the area would be protected from significant water intrusion since they are installed above the floor elevation above expected flooding levels.

Safe Shutdown Evaluation

A fire in this area has the potential to damage the following typical system of safe-shutdown function.

- D-Class 1E Power system (Fuel Oil)

This fire area is separated from the Train A, B, and C areas by 3-hour fire rated barriers. This separation will ensure that other safety trains will not be affected by a fire originating in this area and the remaining safety trains of equipment in other fire areas can achieve and maintain safe-shutdown of the plant. Therefore, a fire originating in one of the GTG **power source** fuel ~~oil~~ storage vaults will not adversely impact the ability to achieve and maintain safe-shutdown.

Radioactive Release to Environment Evaluation

This area is located in non-radiological area. There are no piping systems in the area that could contain fluids with radiological content. As such, a fire in this area is not deemed credible of causing a radioactive release to the environment.

9A.3.141 FA7-406 Power Source Fuel Storage Vault

Figur~~es~~ 9A-27 shows the location of this fire area adjacent to the south portion of the **West** PS/B. This fire area consists of the single fire zone, FA7-406-01, **B**-AAC GTG Fuel Storage Vault. This vault

accommodates GTG fuel **storage** tank **with a** capacity **of** 119,000 gallons. **Also, in this vault are the fuel oil transfer pumps and associated equipment.**

~~The borders of this fire area are constructed using reinforced concrete and other material which results in fire resistance that provides at least a 3-hour ASTM E-119 fire rating. Openings and penetrations into this fire area are protected with fire protection features provide at least 3-hour fire resistance. The area is identified as being associated with non-safety train~~.

Fire Detection and Suppression Features

FA7-406-01 is provided with **a dry-pipe automatic sprinkler system for primary fire suppression** ~~automatic heat detection,~~ and **a** manual fire alarm pull station is installed as **primary manual fire detection**. ~~Primary fire suppression is provided from wet pipe automatic sprinkler system.~~ Secondary suppression is provided **by a** manual hose station **and a portable fire extinguisher**. **Vapor and liquid detection systems are provided in accordance with NFPA 30. They alarm locally and to the MCR.**

Smoke Control Features

Smoke removal as required due to fire within the area can be accomplished by the **existing ventilation system for the fuel storage vault.**

Fire Protection Adequacy Evaluation

The fire area boundaries are constructed with concrete walls in excess of 8 inches thick and 3-hour rated fire doors**. 3-hr fire-rated penetration seals are provided for all penetrations into the vault**.

Fire suppression is provided by a **dry**-pipe sprinkler system in accordance with **NFPA 13** and regulatory guidance. The fire area has substantial concrete reinforced walls that are designed to seismic category I criteria**. They** provide **more than the required** minimum 3-hour fire resistance rating. Additional fire suppression capability is provided **by** fire hose streams and portable fire extinguishers. In addition**,** the area is provided with ~~automatic fire detection and~~ **a** manual **fire** alarm **pull station** as backup. The combination of structural confinement **with fire rated barriers**, automatic fire suppression **system**, ~~automatic fire alarm notification~~ **the manual fire hose station,** and **the** manual **fire alarm pull station as a** backup provides a defense-in-depth approach toward assuring the fire protection adequacy of this fire area.

The fire protection system for this room is designed in accordance with NFPA **13**. **The m**anual hose station is **designed in accordance with NFPA 14**. On this basis, there is adequate fire protection provided for this compartment (fire area).

Fire Protection System Integrity

The **dry-pipe** sprinkler system within the room is designed to NFPA 13 and is seismically supported to **ensure that system maintains its pressure boundary integrity and does not** fall~~ing~~ on the ~~safety-related~~ equipment during a safe **shutdown earthquake (SSE)**. The manual fire hose **station** ~~are in an alternate area and~~ can only discharge water by deliberate manual action. The **dry-pipe sprinkler** system is designed to ~~contain the pressure of the water and sprinkler heads are designed to only~~ discharge water only when **the thermal element of the sprinkler reaches its actuation temperature which would** indicated a fire condition. On this basis, there is little potential for an unintended actuation of the fire suppression system adversely affecting the operation of the plant.

The **manual** fire **suppression** capability for this area is provided by manual hose streams applied by the plant fire brigade. The standpipe is designed to ~~code (~~NFPA 14~~)~~ and unlikely to release water **without an operator manual action**. ~~Since this is a safety-related area, all fire protection system piping is seismically supported to prevent its falling on safety-related equipment during an event and causing damage.~~ Unintended operation of the fire **hose standpipe system** is not expected since deliberate manual

activation is required. In the event of a fire, electrical cables and equipment in the area would be protected from significant water intrusion since they are installed above the floor elevation above expected flooding levels.

Safe Shutdown Evaluation

A fire in this area has no potential to damage the ability of safe-shutdown functions, and the **equipment in 4 safety trains will remain unaffected by the fire**. The fire in this fire area, therefore, will not adversely impact the ability to achieve and maintain safe-shutdown.

Radioactive Release to Environment Evaluation

This area is located in non-radiological area. There are no piping systems in the area that could contain fluids with radiological content. As such, a fire in this area is not deemed credible of causing a radioactive release to the environment.

Table 9A-3R Fire Hazard Analysis Summary (Sheet 288 of 293)

Fire Zone:	FA7-401-01
Building:	O/B
Floor(s):	
DCD Fig:	9A-27
DCD Sect:	3.97
Area Designation:	Power Source Fuel Storage Vault
Zone Designation:	A-Class 1E GTG Power Source Fuel Storage Vault
Associated Safety Division(s)	A

Applicable Regulatory and Code Ref(s):
IBC, RG 1.189; NFPA 10, 13, 14, 30, 72 and 804

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-4R For Complete Listing)	Wall	Wall	Floor & Ceiling
	FA3-103-02 FA3-104-02 FA7-102-01 FA7-103-01	FA7-402-01 FA7-403-01	

Fire Barrier Description:
Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. The door to the room is 3-hour fire rated and all openings and penetrations into the room are rated to provide 3-hour fire resistance.

Potential Combustibles	
Item	Heat Release (Btu)
Fuel oil	1.7E+10

Fire Detection – Primary	Fire Detection - Backup
Automatic Heat Detection	Manual Fire Alarm Pull Station located in the tunnel from the PS/B.
Fire Suppression – Primary	**Fire Suppression - Backup**
Dry-Pipe Sprinkler	Manual Hose Station located in the tunnel from the PS/B. Portable fire extinguishers located as appropriate for hazards and work activities during maintenance outages.

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	A fire has the potential to damage the safe-shutdown functions associated with safety train A. Train B, C and D remain free from the damage to achieve safe-shutdown.

Fire Zone Combustible Summary	BTU/ft^2
Anticipated Combustible Loading:	9.2E+06
Maximum Anticipated Combustible Loading:	

Floor Area (ft^2)
1850

Table 9A-3R Fire Hazard Analysis Summary (Sheet 289 of 293)

Fire Zone:	FA7-402-01
Building:	O/B
Floor(s):	
DCD Fig:	9A-27
DCD Sect:	3.97
Area Designation:	Power Source Fuel Storage Vault
Zone Designation:	B-Class 1E GTG Power Source Fuel Storage Vault
Associated Safety Division(s)	B

Applicable Regulatory and Code Ref(s):
IBC, RG 1.189; NFPA 10, 13, 14, 30, 72 and 804

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-4R For Complete Listing)	Wall	Wall	Floor & Ceiling
	FA3-103-02 FA3-104-02 FA7-102-01 FA7-103-01	FA7-103-01 FA7-104-01	

Fire Barrier Description:
Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. The door to the room is 3-hour fire rated and all openings and penetrations into the room are rated to provide 3-hour fire resistance.

Potential Combustibles	
Item	Heat Release (Btu)
Fuel oil	1.7E+10

Fire Detection - Primary	Fire Detection - Backup
Automatic Heat Detection	Manual Fire Alarm Pull Station located in the tunnel from the PS/B.
Fire Suppression - Primary	**Fire Suppression - Backup**
Dry-Pipe Sprinkler	Manual Hose Station located in the tunnel from the PS/B. Portable fire extinguishers located as appropriate for hazards and work activities during maintenance outages.

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	A fire has the potential to damage the safe-shutdown functions associated with safety train A. Train B, C and D remain free from the damage to achieve safe-shutdown.

Fire Zone Combustible Summary	BTU/ft^2
Anticipated Combustible Loading:	9.2E+06
Maximum Anticipated Combustible Loading:	

Floor Area (ft^2)
1850

Table 9A-3R Fire Hazard Analysis Summary (Sheet 290 of 293)

Fire Zone:	FA7-403-01
Building:	O/B
Floor(s):	
DCD Fig:	9A-27
DCD Sect:	3.97
Area Designation:	Power Source Fuel Storage Vault
Zone Designation:	A-AAC GTG Power Source Fuel Storage Vault
Associated Safety Division(s)	N

Applicable Regulatory and Code Ref(s):
IBC, RG 1.189; NFPA 10, 13, 14, 30, 72 and 804

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-4R For Complete Listing)	Wall	Wall	Floor & Ceiling
	FA3-105-03 FA7-102-01 FA7-103-01 FA7-401-01	FA7-103-01 FA7-104-01	

Fire Barrier Description:
Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. The door to the room is 3-hour fire rated and all openings and penetrations into the room are rated to provide 3-hour fire resistance.

Potential Combustibles	
Item	Heat Release (Btu)
Fuel oil	1.7E+10

Fire Detection - Primary	Fire Detection - Backup
Automatic Heat Detection	Manual Fire Alarm Pull Station located in the tunnel from the PS/B.
Fire Suppression - Primary	**Fire Suppression - Backup**
Dry-Pipe Sprinkler	Manual Hose Station located in the tunnel from the PS/B. Portable fire extinguishers located as appropriate for hazards and work activities during maintenance outages.

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	There is no safe-shutdown circuit in this zone to be damaged.

Fire Zone Combustible Summary	BTU/ft^2
Anticipated Combustible Loading:	9.2E+06
Maximum Anticipated Combustible Loading:	

Floor Area (ft^2)
1850

Table 9A-3R Fire Hazard Analysis Summary (Sheet 291 of 293)

Fire Zone:	FA7-404-01
Building:	O/B
Floor(s):	
DCD Fig:	9A-27
DCD Sect:	3.97
Area Designation:	Power Source Fuel Storage Vault
Zone Designation:	C-Class 1E GTG Power Source Fuel Storage Vault
Associated Safety Division(s)	C

Applicable Regulatory and Code Ref(s):
IBC, RG 1.189; NFPA 10, 13, 14, 30, 72 and 804

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-4R For Complete Listing)	Wall	Wall	Floor & Ceiling
	FA3-109-02 FA7-102-02 FA7-103-01 FA7-405-01	FA7-103-01 FA7-104-01	

Fire Barrier Description:
Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. The door to the room is 3-hour fire rated and all openings and penetrations into the room are rated to provide 3-hour fire resistance.

Potential Combustibles	
Item	Heat Release (Btu)
Fuel oil	1.7E+10

Fire Detection - Primary	Fire Detection - Backup
Automatic Heat Detection	Manual Fire Alarm Pull Station located in the tunnel from the PS/B.
Fire Suppression - Primary	**Fire Suppression - Backup**
Dry-Pipe Sprinkler	Manual Hose Station located in the tunnel from the PS/B. Portable fire extinguishers located as appropriate for hazards and work activities during maintenance outages.

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	A fire has the potential to damage the safe-shutdown functions associated with safety train C. Train A, B and D remain free from the damage to achieve safe-shutdown.

Fire Zone Combustible Summary	BTU/ft^2
Anticipated Combustible Loading:	9.2E+06
Maximum Anticipated Combustible Loading:	

Floor Area (ft^2)
1850

Table 9A-3R Fire Hazard Analysis Summary (Sheet 292 of 293)

Fire Zone:	FA7-405-01
Building:	O/B
Floor(s):	
DCD Fig:	9A-27
DCD Sect:	3.97

Area Designation:	Power Source Fuel Storage Vault
Zone Designation:	D-Class 1E GTG Power Source Fuel Storage Vault
Associated Safety Division(s)	D

Applicable Regulatory and Code Ref(s):
IBC, RG 1.189; NFPA 10, 13, 14, 30, 72 and 804

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-4R For Complete Listing)	Wall	Wall	Floor & Ceiling
	FA3-111-02 FA3-102-01 FA7-103-01 FA7-404-01 FA7-406-01	FA7-103-01 FA7-104-01	

Fire Barrier Description:
Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. The door to the room is 3-hour fire rated and all openings and penetrations into the room are rated to provide 3-hour fire resistance.

Potential Combustibles	
Item	Heat Release (Btu)
Fuel oil	1.7E+10

Fire Detection - Primary	Fire Detection - Backup
Automatic Heat Detection	Manual Fire Alarm Pull Station located in the tunnel from the PS/B.
Fire Suppression - Primary	**Fire Suppression - Backup**
Dry-Pipe Sprinkler	Manual Hose Station located in the tunnel from the PS/B. Portable fire extinguishers located as appropriate for hazards and work activities during maintenance outages.

Fire Zone Combustible Summary	
	BTU/ft^2
Anticipated Combustible Loading:	9.2E+06
Maximum Anticipated Combustible Loading:	

Floor Area (ft^2)
1850

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	A fire has the potential to damage the safe-shutdown functions associated with safety train D. Train A, B and C remain free from the damage to achieve safe-shutdown.

Table 9A-3R Fire Hazard Analysis Summary (Sheet 293 of 293)

Fire Zone:	FA7-406-01
Building:	O/B
Floor(s):	
DCD Fig:	9A-27
DCD Sect:	3.97
Area Designation:	Power Source Fuel Storage Vault
Zone Designation:	B-AAC GTG Power Source Fuel Storage _Vault
Associated Safety Division(s)	N

Applicable Regulatory and Code Ref(s):
IBC, RG 1.189; NFPA 10, 13, 14, 30, 72 and 804

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-4R For Complete Listing)

Wall	Wall	Floor & Ceiling
FA3-113-03 FA7-102-01 FA7-103-01 FA7-405-01	FA7-103-01 FA7-104-01	

Fire Barrier Description:
Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. The door to the room is 3-hour fire rated and all openings and penetrations into the room are rated to provide 3-hour fire resistance.

Potential Combustibles	
Item	Heat Release (Btu)
Fuel oil	1.7E+10

Fire Detection - Primary	Fire Detection - Backup
Automatic Heat Detection	Manual ~~Fire Alarm~~ Pull Station located in the tunnel from the PS/B.
Fire Suppression - Primary	**Fire Suppression - Backup**
Dry-Pipe Sprinkler	Manual Hose Station located in the tunnel from the PS/B. Portable fire extinguishers located as appropriate for hazards and work activities during maintenance outages.

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	There is no safe-shutdown circuit in this zone to be damaged.

Fire Zone Combustible Summary	
	BTU/ft^2
Anticipated Combustible Loading:	9.2E+06
Maximum Anticipated Combustible Loading:	

Floor Area (ft^2)
1850

Impact on COLA

FSAR Subsection 9.5.4.2.2.1 will be revised to add resolution of COL 9.5(12).

Impact on PRA

There is no impact on the PRA.

This completes MHI's response to the NRC's question.

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

12/10/2009

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.:	**NO. 468-3360 REVISION 1**
SRP SECTION:	**09.05.04 – Emergency Diesel Engine Fuel Oil Storage and Transfer System**
APPLICATION SECTION:	**TIER 2 9.5.4**
DATE OF RAI ISSUE:	**10/6/2009**

QUESTION NO: 09.05.04-45

Supplement to Question No. 09.05.04-11 (RAI 9.5.4-06; RAI Set No. SBPB 318-2227, Rev. 1; MHI Ref: UAP-HF-09292, dated 6/9/09): As noted in the discussion for Question 09.05.04-10, the termination of the sample connection is not consistently described by MHI. In addition, this response states that the sample is from the top of the tank and measures sediment and water. MHI should describe how the sample will be removed against gravity from the top of the tank and explain how a sample from the top will monitor sediment and water, both of which are most likely to be on the bottom of the tank.

ANSWER:

In accordance with ANSI/ANS 59.51-1997, there are provisions in the Fuel Oil Transfer System for both a flowing and a tank aggregate sample. The Fuel Oil Storage Tanks are located in underground vaults. Sample connections for sampling of oil, sediments and water contents in the Fuel Oil Storage Tanks are located outside the vault at grade level. The flowing sample connections are located inside the PS/B close to the fuel oil day tanks.

A tank sampler is used to collect samples at the desired depth of the Fuel Oil Storage Tank. Samples at the bottom of the tank may be collected. The tank sampler includes a sample head (300 ml) with approximately 4 feet graduated extensions. The sampler head is available with several quick coupling extensions to allow the sampling at depths up to 50 feet deep. The tank sampler is lowered inside the tank by adding the required extensions to reach the desired depth in the tank to be sampled. Once the desired sample depth is achieved, a rotating handle is fitted to the sample extension and the sample is drawn into the chamber by cranking the handle manually or with a battery powered portable drill. The extensions and the sample head are then removed from the tank. The handle is then fitted to the sample head and rotated to extract the sample in a sample container.

The flowing sample is collected in a sampling container by opening the sample line during filling the Fuel Oil Day Tank or recirculating the contents of the Fuel Oil Storage Tank.

Impact on DCD

See attached markup for revision to Figure 9.5.4-1 (Attachment A). DCD Section 9.5.4.2.2.1, revised with new paragraphs added after the third paragraph, as revised per Question 44 "Impact on DCD".

Impact on COLA

There is no impact on the COLA

Impact on PRA

There is no impact on the PRA.

This completes MHI's response to the NRC's question.

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

12/10/2009

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.:	**NO. 468-3360 REVISION 1**
SRP SECTION:	**09.05.04 – Emergency Diesel Engine Fuel Oil Storage and Transfer System**
APPLICATION SECTION:	**TIER 2 9.5.4**
DATE OF RAI ISSUE:	**10/6/2009**

QUESTION NO: 09.05.04-46

Supplement to Question No. 09.05.04-13 (RAI 9.5.4-08; RAI Set No. SBPB 318-2227, Rev. 1; MHI Ref: UAP-HF-09292, dated 6/9/09): A goose neck and screen do not necessarily prevent plugging of vents. Insects can build nests over the screen that could potentially block the flow path. Outdoor vents should be periodically inspected for any obstructions. Revise the DCD to address this inspection requirement.

ANSWER:

The DCD will be revised to include periodic inspection of the fuel oil storage tank vents to ensure that there are no obstructions

Impact on DCD

DCD Section 9.5.4.4, first paragraph will be revised to read as follows:

The FOS is tested prior to initial startup. Preoperational testing is described in Section 14.2. System performance is verified during periodic GTG testing. **Periodic inspection of the fuel oil storage tank vents is performed to assure there are no obstructions.**

Impact on COLA

There is no impact on the COLA

Impact on PRA

There is no impact on the PRA.

This completes MHI's response to the NRC's question.

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

12/10/2009

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.:	**NO. 468-3360 REVISION 1**
SRP SECTION:	**09.05.04 – Emergency Diesel Engine Fuel Oil Storage and Transfer System**
APPLICATION SECTION:	**TIER 2 9.5.4**
DATE OF RAI ISSUE:	**104/6/2009**

QUESTION NO: 09.05.04-47

Supplement to Question No. 09.05.04-22 (RAI 9.5.4-17; RAI Set No. SBPB 318-2227 Rev. 1; MHI Ref: UAP-HF-09292, dated 6/9/09): While the NRC recognizes that Figure 9.5.4-1 is a schematic diagram, the revised drawing clearly indicates that the pump suction connection on the tank is at the top of the tank and extends down internally from the top of the tank to the bottom of the tank. This diagram leaves in question the means of ensuring a flooded suction for the pumps. The check valve shown on the revised figure may maintain a flooded suction once the suction line is filled, but check valves can leak and create an air gap that could prevent the oil transfer function. The design should provide assurance that adequate suction pressure will be maintained.

ANSWER:

Figure 9.5.4-1 is a sketch, not meant to show the actual elevations of the equipment; however this figure is being revised for clarity as shown in the attached drawing. As addressed in RAI No. 09.05.04-08, these pumps are located in the storage tank vault, below the tank outlet, and are therefore able to operate with flooded suction.

The fuel oil transfer pumps are located in the fuel oil storage tanks vaults, as shown in the updated Figure 9.5.4-1, such that sufficient net positive suction head is available under all design conditions, including pump runout. The available NPSH is calculated based on all pump design operating conditions and is incorporated as part of the oil transfer pumps specifications to provide assurance from the pump vendor to properly design and fabricate the oil transfer pumps for their intended purpose. Once a vendor has been selected, the specific parameters for the pumps, including available NPSH, will be confirmed based on vendor documents.

Figure 9.5.4-1 will be revised to indicate that the pump suction connection is at the side of the tank at 6 inches from the tank bottom per DCD Section 9.5.4.2.2 this will assure that adequate suction pressure will be maintained.

Impact on DCD

Figure 9.5.4-1 will be updated as shown in the attached markup (see Attachment A).

Impact on COLA

There is no impact on the COLA

Impact on PRA

There is no impact on the PRA.

This completes MHI's response to the NRC's question.

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

12/10/2009

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.:	**NO. 468-3360 REVISION 1**
SRP SECTION:	**09.05.04 – Emergency Diesel Engine Fuel Oil Storage and Transfer System**
APPLICATION SECTION:	**TIER 2 9.5.4**
DATE OF RAI ISSUE:	**10/6/2009**

QUESTION NO: 09.05.04-48

Supplement to Question No. 09.05.04-42 (RAI 9.5.4-37; RAI Set No. SBPB 318-2227, Rev.1; MHI Ref: UAP-HF-09292, dated 6/9/09): While RG 1.189 permits day tanks to be located in the same room as the engine-generator, the acceptance criteria also stipulates that the tank be located within a diked enclosure with 110% capacity or a drain to a safe location. Revised Figure 9.5.4-1 indicates a curb, but does not state that the curb will hold 110% of the day tank volume or that the curbed area is drained to a safe location. The DCD should be revised to state how the spill containment design conforms to the guidance in RG 1.189.

ANSWER:

There is sufficient area around each fuel oil day tank to design a curb to hold 110% of the day tank volume (870 gallons each tank is equivalent to approximately 117 cubic feet. To accommodate 110% tank volume which is equivalent to 130 cubic feet; an area approximately 8 ft x 10 ft x 1.8 ft is required). US-APWR Standard Plant Power Supply Building (East) Elevation 3'-7" General Arrangement shows a dike having a footprint of approximately 8ft x 10ft around each fuel oil day tank. The DCD will be revised and a note will be added to Figure 9.5.4-1 to state that the diked enclosure for each fuel oil day tank shall have sufficient capacity to hold 110% of contents of the day tank

Impact on DCD

DCD Section 9.5.4.2.2.3, first paragraph will be revised to read as follows:

Each GTG fuel oil day tank provides one and half (1 ½) hours of operation for its associated GTG at continuous rating without refilling from the corresponding fuel oil storage tank. The fuel oil day tanks are located separately from the adjacent GTG compartments by 3-hour rated fire barriers. **Each fuel oil day tank is in a diked enclosure designed to hold 110% of the contents of the day tank.**

Figure 9.5.4-1 will be updated as shown in the attached markup (see Attachment A).

Impact on COLA

There is no impact on the COLA

Impact on PRA

There is no impact on the PRA

This completes MHI's response to the NRC's question.

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

12/10/2009

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.:	**NO. 468-3360 REVISION 1**
SRP SECTION:	**09.05.04 – Emergency Diesel Engine Fuel Oil Storage and Transfer System**
APPLICATION SECTION:	**TIER 2 9.5.4**
DATE OF RAI ISSUE:	**10/6/2009**

QUESTION NO: 09.05.04-49

The draft interim guidance document, "Interim Guidance on the Review of Nuclear Power Plant Designs using a Gas Turbine Driven Standby Emergency AC Power System", includes the following guidance:

The emergency gas turbine generator should be designed and built to appropriate standards such as ISO 3977 "Gas Turbine Procurement Part 3 Design Requirements," 2004. Add this standard as a design basis for the US-APWR GTGs and identify and justify any deviations from this standard. As an alternative, propose some other appropriate industry standard that is specific to the type of gas turbine generators proposed for the US-APWR and address any deviations.

ANSWER:

Response to this question will be issued within December 2009, because ISO 3977 has many requirements and conformances with the requirements are being checked presently.

Impact on DCD

There is no impact on the DCD

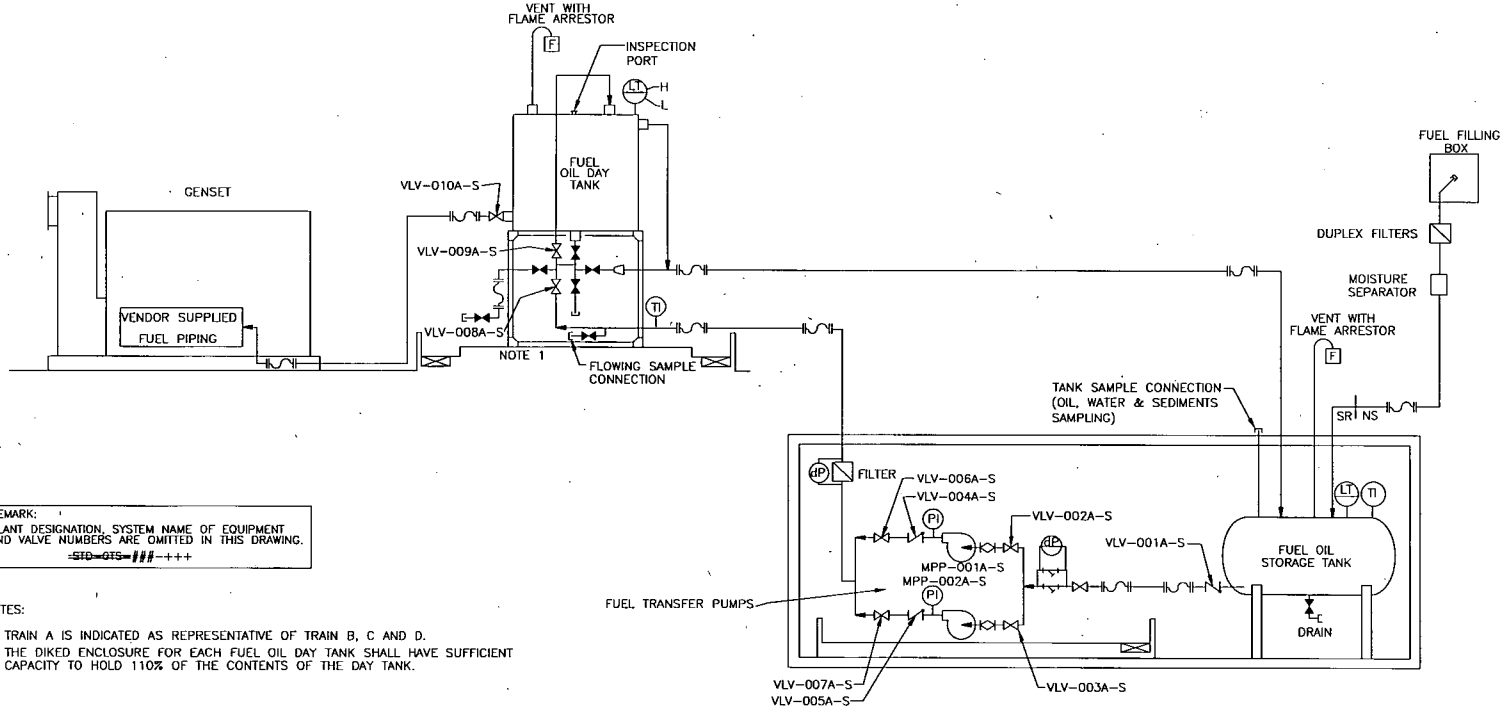
Impact on COLA

There is no impact on the COLA

Impact on PRA

There is no impact on the PRA

This completes MHI's response to the NRC's question.



REMARK:
PLANT DESIGNATION, SYSTEM NAME OF EQUIPMENT AND VALVE NUMBERS ARE OMITTED IN THIS DRAWING.
~~STD-GTS-~~###-+++

NOTES:

1. TRAIN A IS INDICATED AS REPRESENTATIVE OF TRAIN B, C AND D.
2. THE DIKED ENCLOSURE FOR EACH FUEL OIL DAY TANK SHALL HAVE SUFFICIENT CAPACITY TO HOLD 110% OF THE CONTENTS OF THE DAY TANK.

FIQURE 9.5.4-1 GAS TURBINE GENERATOR FUEL OIL STORAGE AND TRANSFER SYSTEM SCHEMATIC DIAGRAM.