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July 4, 2011

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

Attention: Mr. Jeffrey A. Ciocco

Docket No. 52-021
MHI Ref: UAP-HF-11207

Subject: MHI's Responses to US-APWR DCD RAI No.704-5248 REVISION 2 (SRP 09.05.08)

References: 1) " Request for Additional Information No. 704-5248 Revision 2, SRP Section: 09.05.08, Application Section: TIER 2, SECTION 9.5.8," dated (February, 28, 2011)

With this letter, Mitsubishi Heavy Industries, Ltd. ("MHI") transmits to the U.S. Nuclear Regulatory Commission ("NRC") a document entitled "Response to Request for Additional Information No. 704-5248 Revision 2."

Enclosed are the responses to the RAIs contained within Reference 1.

As indicated in the enclosed materials, this document contains information , designated pursuant to Commission guidance as sensitive unclassified non-safeguards information and referred to as security-related information ("SRI"), that is to be withheld from public disclosure under 10 C.F.R. § 2.390. The information that is SRI is identified by brackets. A SRI Excluded version of the document is also being submitted with the information identified as SRI redacted and replaced by the designation "[Security-Related Information - Withheld under 10 CFR 2.390].".

This letter includes a copy of the SRI Included version (Enclosure 1), a copy of the SRI Excluded version (Enclosure 2),

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

Sincerely,

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

DO81
NRD

Enclosures:

1. Responses to Request for Additional Information No. 704-5248 Revision 2
   (SRI Included Version)

2. Responses to Request for Additional Information No. 704-5248 Revision 2
   (SRI Excluded Version)

CC: J. A. Ciocco
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Docket No. 52-021
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Enclosure 2

UAP-HF-11207
Docket Number 52-021

Response to Request for Additional Information
No. 704-5248 Revision 2

July 2011
(SRI Excluded)

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

7/4/2011

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.:	**NO. SBPB 704-5248 REVISION 2**
SRP SECTION:	**09.05.08 – Emergency Diesel Engine Combustion Air Intake and Exhaust System**
APPLICATION SECTION:	**TIER 2, SECTION 9.5.8**
DATE OF RAI ISSUE:	**2/28/2011**

QUESTION NO. : 09.05.08-28

In response to US-APWR RAI No. 618-4829, Rev 2, MHI states that the inlet air filters for the emergency power supply gas turbine generators (GTGs) will be deleted from the MHI design and replaced with weatherproof louvers and screen. While the staff finds the justification provided by MHI for deletion of the inlet filters acceptable, the proposed new arrangement may not be adequate to ensure that freezing rain and/or snow could not obstruct the screen and degrade the performance of the GTGs. GE Energy provides guidance for a weatherproof gas turbine inlet design in their technical paper GER-3419A, "Gas Turbine Inlet Air Treatment." One approach acceptable to the staff is a weather hood over the inlet, sized to minimize the ingestion of snow and rain to an acceptable level. The applicant should provide justification for the current design or propose an alternate design with a description of how the design will ensure that rain and/or snow cannot degrade the performance of the GTGs.

ANSWER:

The ductwork for both the intake combustion air supply for the GTG and the ventilation supply air for the rooms originate at the roof of the Power Source Building. Depending upon the individual machine, the edge of the supply duct opening penetrates the GTG room roof between 5 to 15 feet to the edge of the structures air inlet opening. The missile barrier structure contains a screen. This air inlet opening is positioned on this structure to prevent a direct path for a missile to travel and strike these supply air intake duct openings on the roof.

Both intake openings are horizontal, parallel with the roof and inside a missile barrier enclosure, which protects them from hurricane and tornado generated missiles. This missile barrier also functions as a weather hood preventing the entry of any rain and snow into the structure and into the GTG.

The missile/Barrier / intake structure extends beyond the edge and below the roof of the Power Source Building. The air inlet opening in the structure is in a horizontal position facing downward and is approximately 31 feet above grade. The height of the opening

is well above the 5 feet as recommended by the manufacture to avoid the entrainment of ground dust, dirt, and debris that may accumulate. The inlet is also well above where snow could accumulate and potentially restrict the air flow. With this configuration the air flow path begins at the outdoor air inlet; flows up through the missile barrier / air intake structure; horizontally along the structure to the combustion air and room ventilation air inlet duct, and finally downward thru separate ducts into the GTG enclosure and the GTG room for ventilation, combustion and machine cooling.

Please refer to the attached sketch 1 (Attachment 1, Annotated Figure 9.5.8-1) of the missile barrier/air Intake structure for the GTG. Sketch 1 shows the typical section for all GTG intakes, differing in the distance between the entry point for the outside air and the GTG inlet duct work. Sketch 2 (Attachment 2, Annotated Figure 1.2-27) is the plan view of the Power source building roof, the individual GTG intake structures are indicated

Impact on DCD

Subsection 9.5.8.2.1, 9.5.8.2.2.3 and 9.5.8.2.3 will be revised as attachment 3.

Following Figures will be revised as shown in Attachment 4.
Chapter 9
Figure 9.5.8-1 Gas Turbine Generator Air Intake And Exhaust Component Schematic Diagram

Chapter 1
Figure 1.2-7 Power Block at Elevation 35'-2" - Plan View
Figure 1.2-13 Power Block Sectional Views B-B and C-C
Figure 1.2-27 Power Source Building at Elevations 3'-7", 24'-2" and 39'-6" – Plan Views
Figure 1.2-28 Power Source Building Sectional View A-A

Following Figures will be revised.
Markups of following figures are omitted.
Chapter 3
Figure 3.8.4-1 (Sheet 2 of 2) Identification of Areas for PS/B Temperature Gradients in Table 3.8.4-2
Figure 3.8.4-10 FE Model of West PS/B (Sheet 1 of 2)
Figure 3.8.4-10 FE Model of West PS/B (Sheet 2 of 2)
Figure 3K-12 Location of Watertight Doors and Flood Barrier Walls PS/Bs Plan View Elevation 3'-7", 24'-2", 39'-6"

Chapter 9
Figure 9A-12 Fire Zones and Fire Areas PS/B EL 3'-7", EL 24'-2", EL 39'-6" (1F, 1MF, Roof)

Chapter 11
Figure 11.5-2f Location of Radiation Monitors at Plant (Power Block at Elevation 35'-2")

Chapter 12
Figure 12.3-2 General Plant Arrangement with Post Accident Vital Areas (Sheet 6 of 10) Power Block at Elevation 35'-2"
Figure 12.3-3 Post Accident Radiation Zone MAP:1hour After Accident (Sheet 6 of 10) Power Block at Elevation 35'-2"
Figure 12.3-4 Post Accident Radiation Zone MAP:1day After Accident (Sheet 6 of 10) Power Block at Elevation 35'-2"

Figure 12.3-5 Post Accident Radiation Zone MAP:1week After Accident (Sheet 6 of 10) Power Block at Elevation 35'-2"
Figure 12.3-6 Post Accident Radiation Zone MAP:1month After Accident (Sheet 6 of 10) Power Block at Elevation 35'-2"
Figure 12.3-11 Post Accident Radiation Zone MAP: 1week After Accident (Sheet 6 of 10) Power Block at Elevation 35'-2"

Impact on R-COLA

There is no impact on the R-COLA

Impact on S-COLA
Following Figures will need to be revised.
FSAR Chapter 1
Figure 1.2-13 Power Block Sectional Views B-B and C-C

FSAR Chapter 3
Figure 3NN-17 PS/B: ACS SASSI Model of Surface Foundation
Figure 3NN-18 PS/B: ACS SASSI Model of Embedded Foundation

Impact on PRA

There is no impact on the PRA

Attachment 1

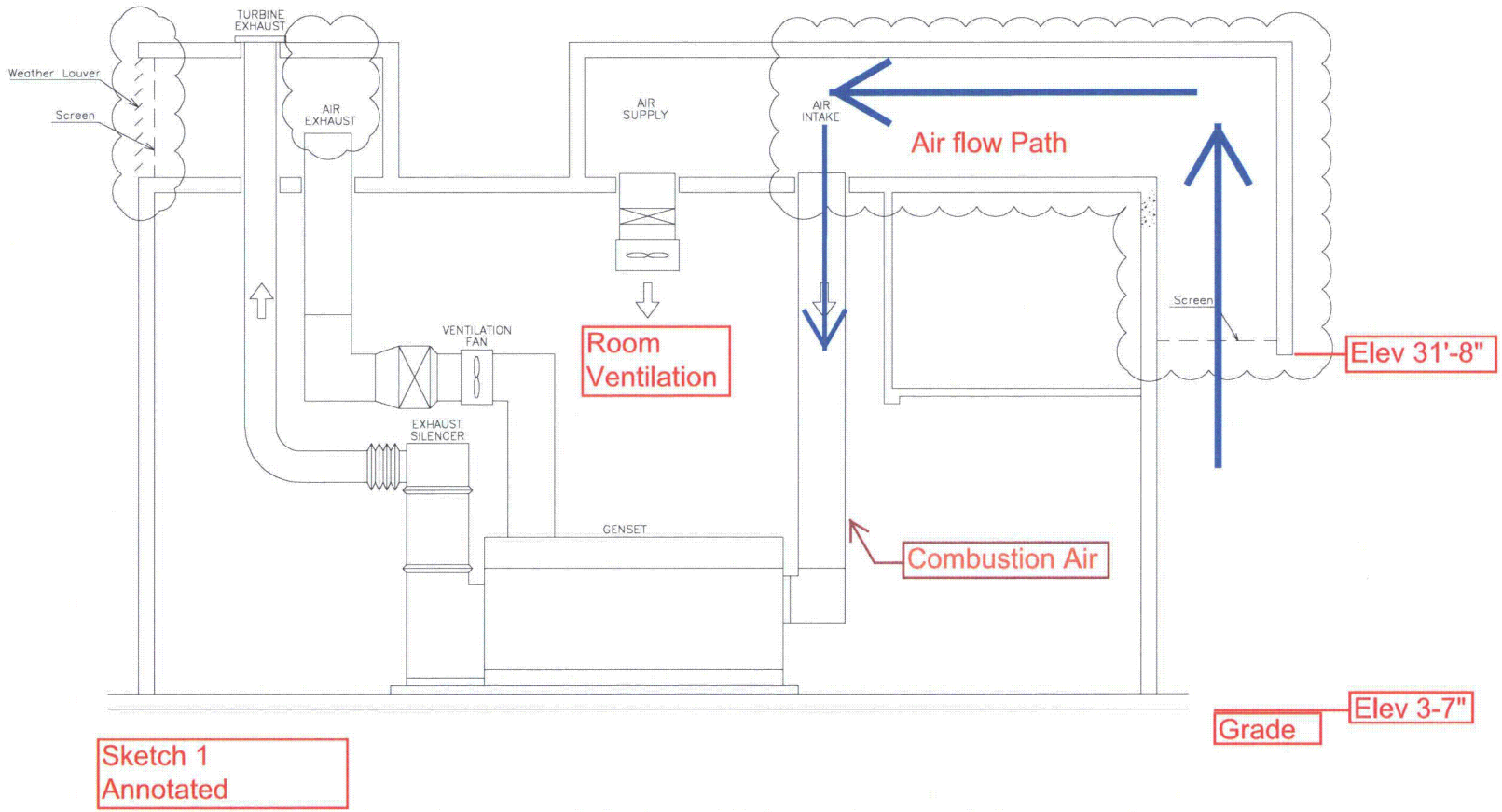

Figure 9.5.8-1 Gas Turbine Generator Air Intake and Exhaust Component Schematic Diagram

Attachment 2

Security-Related Information - Withheld Under 10 CFR 2.390

Sketch 2
Annotated

Figure 1.2-27 Power Source Building at Elevations 3'-7", 24'-2" and 39'-6" – Plan Views

- The GTG combustion air intake and turbine exhaust system is capable of being tested during plant operation in accordance with 10 CFR 50, Appendix A, GDC 18 (Ref. 9.5.2-4).
- The ventilation/cooling portion of the system is designed to remain functional during and after a SSE.
- The ventilation/cooling portion of the system is designed so that a single failure of any component, assuming a LOOP, cannot result in complete loss of the power source.
- The ventilation/cooling portion of the system is capable of being tested during plant operation in accordance with 10 CFR 50, Appendix A, GDC 18 (Ref. 9.5.2-4).
- The emergency power supply equipment floors are painted with concrete or masonry type paint in all rooms to prevent concrete abrasive dust from becoming airborne and causing malfunctions of electric contacts.

The GTG ventilation/cooling function components apply the equivalent of codes and standards for plant safety-related HVAC components.

9.5.8.2 System Description

9.5.8.2.1 General Description

air intake screen, air exhaust weather louver and screen,

As shown in Figure 9.5.8-1, each gas turbine is provided with:

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

(2) Ventilation/cooling air to the GTG assembly consisting of ventilation fan and duct work. The system maintains GTG room temperature of 122 °F or less.

9.5.8.2.2 Component Description

9.5.8.2.2.1 Combustion Air Intake and Exhaust Silencers

A Silencer is installed in the intake system to minimize the noise level within the GTG enclosure. A silencer is installed in the turbine exhaust system to reduce the noise emitted from the system.

9.5.8.2.2.2 Ventilation Fan

Each GTG package contains a ventilation fan.

9.5.8.2.2.3 Piping/ducts

delete ", weather louver"

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

The turbine and air exhaust piping is made of carbon steel. Duct work is made of galvanized steel. Expansion joints are strategically located to accommodate the thermal growth of the exhaust piping. The piping is of adequate size so that it can accommodate the total pressure drop when the engine is operating at 110% of continuous rating.

9.5.8.2.3 System Operation

delete " weather louver and"

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 ~~weather louver and~~ screens, 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. The turbine exhaust gases enter the turbine exhaust pipe, pass through the turbine exhaust silencer, and are then ducted out of the building. The exhaust piping and silencer are sized to prevent excessive backpressure on the engine when operating at 110% nameplate rating.

delete " weather louver and"

Cooling air is supplied and exhausted out of the building through the air exhaust piping.

9.5.8.3 Safety Evaluation

A. The GTG combustion air intake and exhaust system is capable of supplying an adequate quantity of combustion air to the GT and of disposing the exhaust gases without creating an excessive backpressure on the GT when operating at 110% of nameplate rating. Cooling air is supplied to the GTG and exhausted from the building.

   The power source buildings (PS/Bs) are equipped with a fire suppression system.

   US-APWR power block general arrangement drawings (Chapter 1) show the physical relationship of the PS/B to those plant features, which could affect the system. The PS/B is not located near any gas storage facilities. The hydrogen storage facility is 600 ft. away, and the nitrogen bulk storage is 600 ft. away.

   The distances between the PS/B and those facilities are adequate to ensure that an accidental release of these gases does not degrade GTG performance.

   The turbine intake and exhaust openings above the roof of the PS/B, and the portion of the piping/ducts above the roof is protected by a guard structure against precipitation and tornado missiles. The reinforced concrete guard structures are integrally attached to the roofs and act as extensions of the seismic category I PS/Bs. The guard structures are designed as seismic category I to withstand the effects of natural phenomena in accordance with GDC 2 and to withstand environmental effects in accordance with GDC 4. The turbine exhaust is located appropriately away from the engine air intake, thereby minimizing the chances of the turbine exhaust being drawn into the combustion air intake.

B. The combustion air intake, turbine exhaust, room air supply and air exhaust system are designed to seismic category I requirements as specified in Section 3.2. Systems, equipment, and components which are not seismic category I and whose failure might impair the functioning of the combustion air intake and

Attachment 4

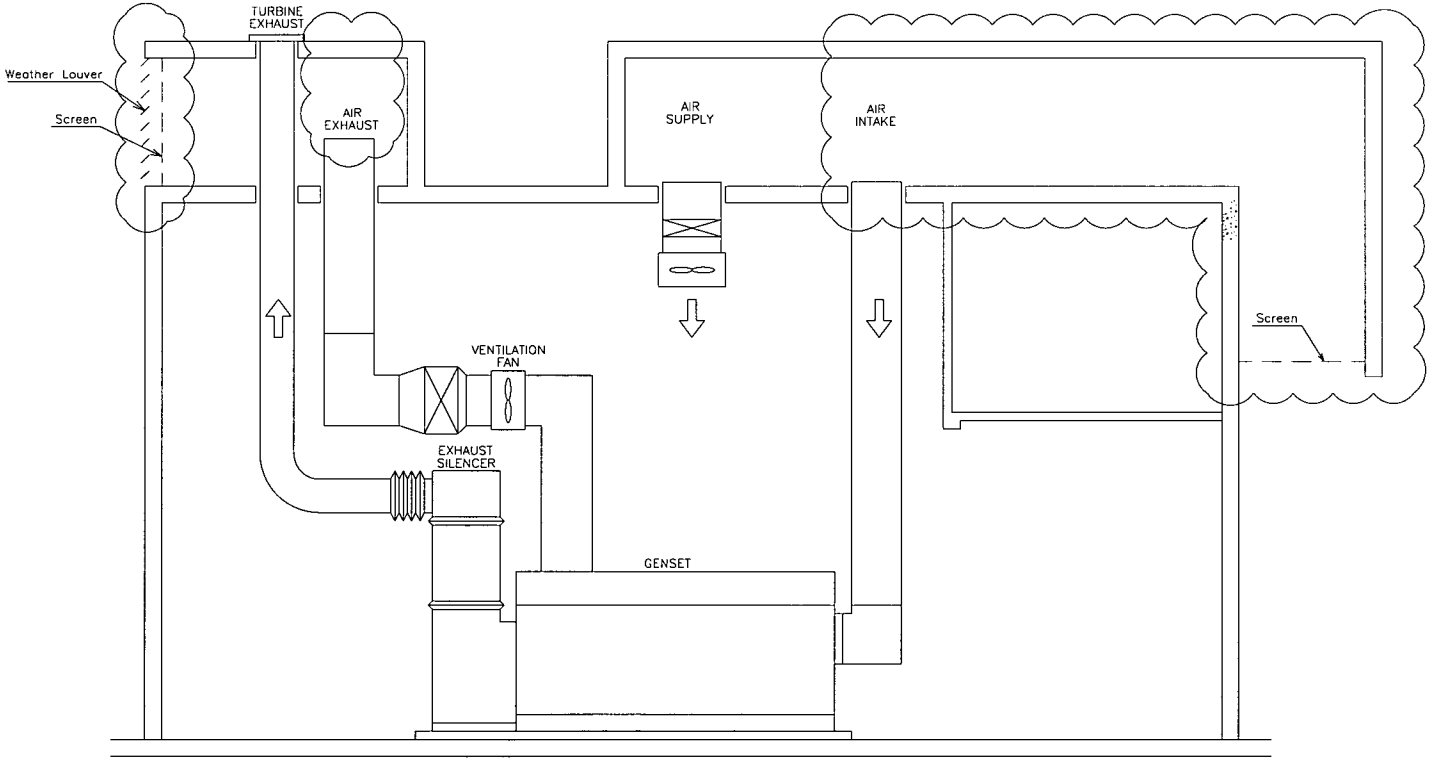

Figure 9.5.8-1 Gas Turbine Generator Air Intake and Exhaust Component Schematic Diagram

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(SRI)

Figure 1.2-7 Power Block at Elevation 35'-2" - Plan View

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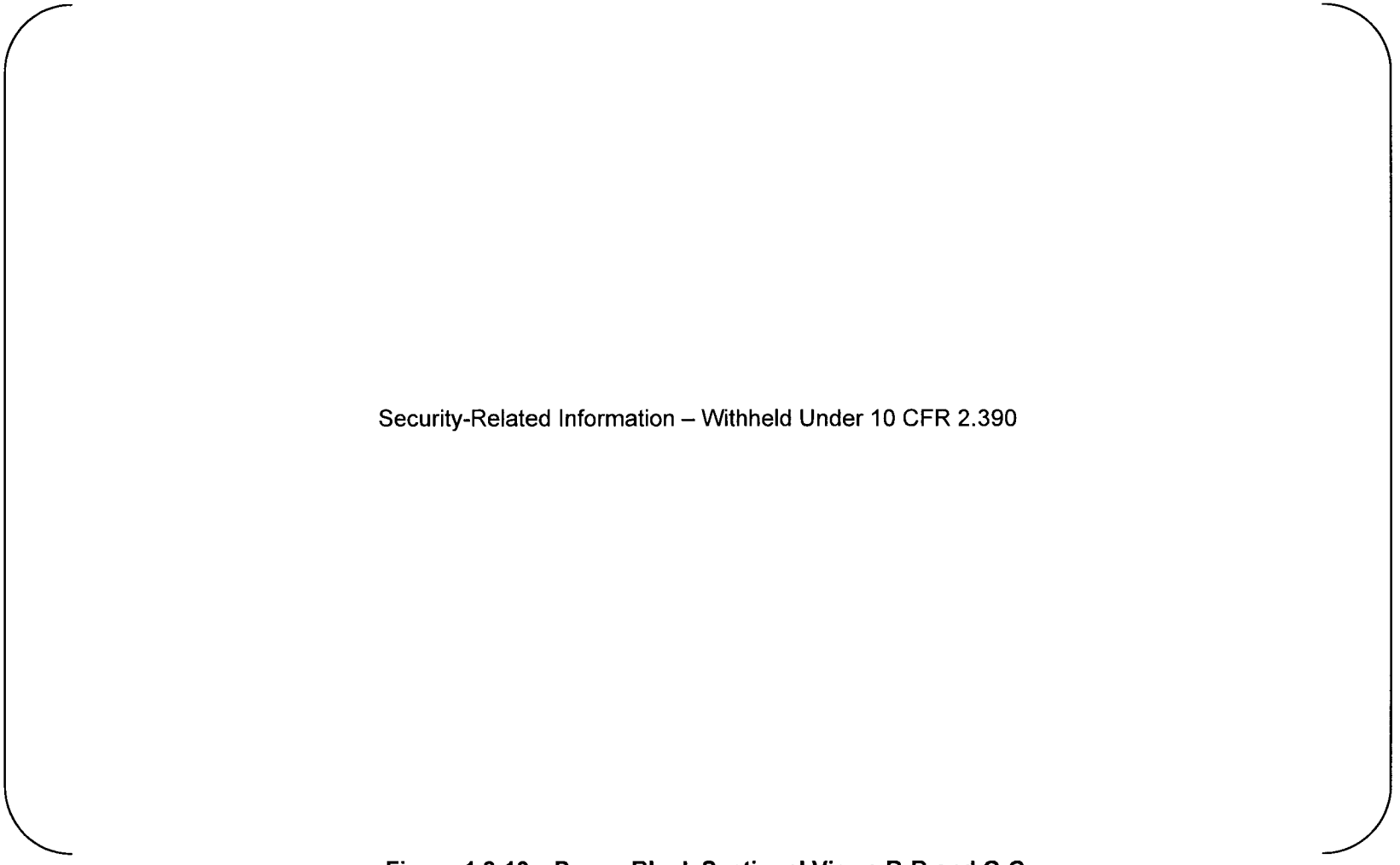

(SRI)

Figure 1.2-13 Power Block Sectional Views B-B and C-C

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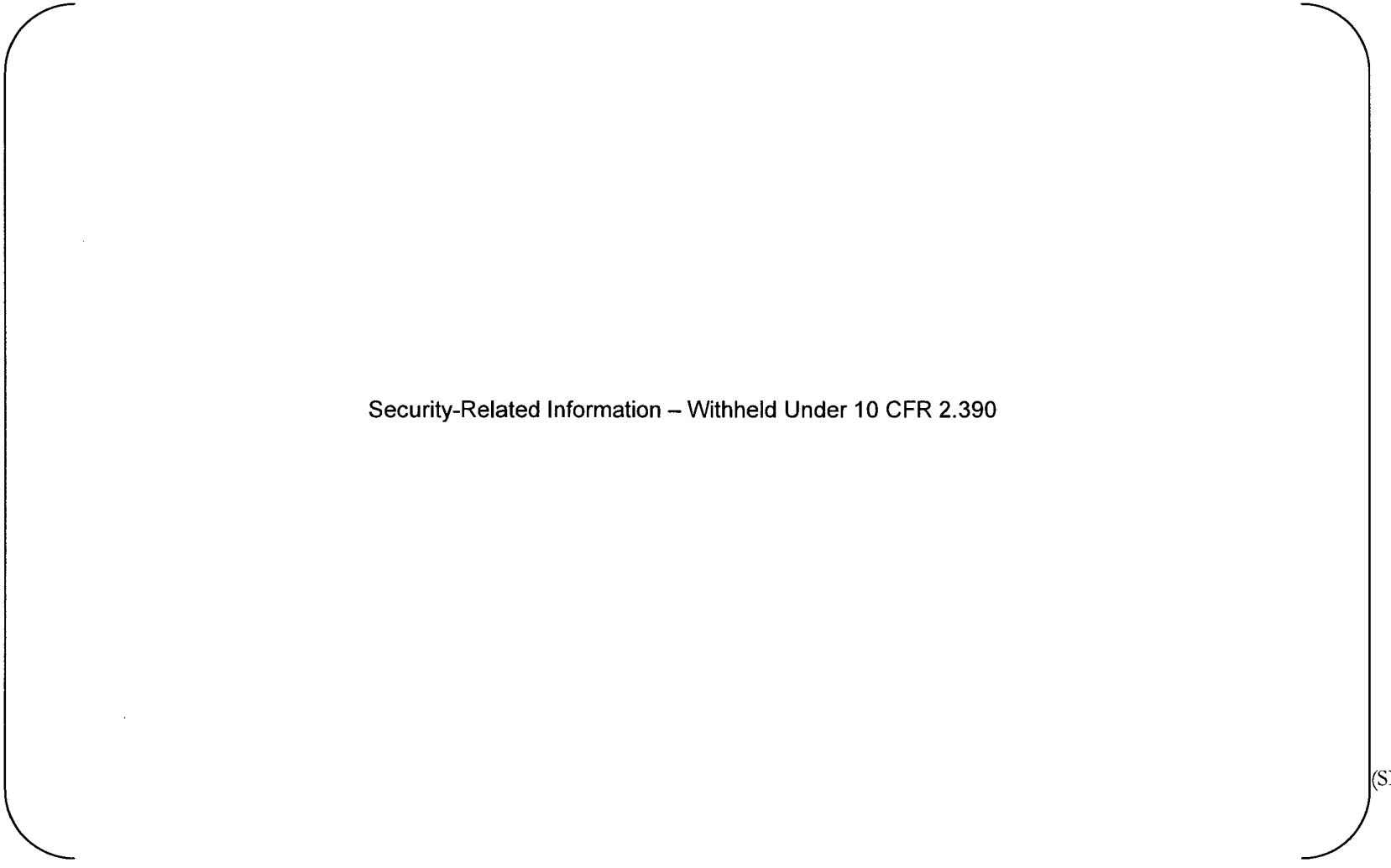

(SRI)

Figure 1.2-27 Power Source Building at Elevations 3'-7", 24'-2" and 39'-6" – Plan Views

Security-Related Information – Withhold Under 10 CFR 2.390

Security-Related Information – Withheld Under 10 CFR 2.390

(SRI)

Figure 1.2-28 Power Source Building Sectional View A-A