ArevaEPRDCPEm Resource

From: Pederson Ronda M (AREVA NP INC) [Ronda.Pederson@areva.com]
Sent: Friday, July 24, 2009 4:45 PM
To: Tesfaye, Getachew
Cc: BENNETT Kathy A (OFR) (AREVA NP INC); DELANO Karen V (AREVA NP INC); KOWALSKI David J (AREVA NP INC); HARRIS Carolyn A (AREVA NP INC)
Subject: Response to U.S. EPR Design Certification Application RAI No. 251, FSAR Ch. 9
Attachments: RAI 251 Response US EPR DC.pdf

Getachew,

Attached please find AREVA NP Inc.'s response to the subject request for additional information (RAI). The attached file, "RAI 251 Response US EPR DC.pdf" provides technically correct and complete responses to 4 of the 6 questions.

Appended to this file are affected pages of the U.S. EPR Final Safety Analysis Report in redline-strikeout format which support the response to RAI 251 Questions 09.05.04-20, and 09.05.06-11.

The following table indicates the respective pages in the response document, "RAI 251 Response US EPR DC.pdf," that contain AREVA NP's response to the subject questions.

Question #	Start Page	End Page
RAI 251 — 09.05.04-20	2	2
RAI 251 — 09.05.05-7	3	3
RAI 251 — 09.05.06-9	4	5
RAI 251 — 09.05.06-10	6	6
RAI 251 — 09.05.06-11	7	8
RAI 251 — 09.05.07-11	9	9

A complete answer is not provided for 2 of the 6 questions. The schedule for a technically correct and complete response to these questions is provided below.

Question #	Response Date
RAI 251 — 09.05.05-7	September 25, 2009
RAI 251 — 09.05.06-10	September 25, 2009

Sincerely,

Ronda Pederson
ronda.pederson@areva.com
Licensing Manager, U.S. EPR Design Certification
AREVA NP Inc.
An AREVA and Siemens company
3315 Old Forest Road
Lynchburg, VA 24506-0935
Phone: 434-832-3694
Cell: 434-841-8788

From: Tesfaye, Getachew [mailto:Getachew.Tesfaye@nrc.gov]
Sent: Thursday, June 25, 2009 7:07 AM
To: ZZ-DL-A-USEPR-DL

Cc: Wolfgang, Robert; Segala, John; Bloom, Steven; Hearn, Peter; Colaccino, Joseph; ArevaEPRDCPEm Resource
Subject: U.S. EPR Design Certification Application RAI No. 251(3070,3062,3064,3066), FSAR Ch. 9

Attached please find the subject requests for additional information (RAI). A draft of the RAI was provided to you on May 18, 2009, and on June 24, 2009, you informed us that the RAI is clear and no further clarification is needed. As a result, no change is made to the draft RAI. The schedule we have established for review of your application assumes technically correct and complete responses within 30 days of receipt of RAIs. For any RAIs that cannot be answered within 30 days, it is expected that a date for receipt of this information will be provided to the staff within the 30 day period so that the staff can assess how this information will impact the published schedule.

Thanks,
Getachew Tesfaye
Sr. Project Manager
NRO/DNRL/NARP
(301) 415-3361

Hearing Identifier: AREVA_EPR_DC_RAIs
Email Number: 688

Mail Envelope Properties (5CEC4184E98FFE49A383961FAD402D310117CE26)

Subject: Response to U.S. EPR Design Certification Application RAI No. 251, FSAR Ch. 9
Sent Date: 7/24/2009 4:45:09 PM
Received Date: 7/24/2009 4:45:15 PM
From: Pederson Ronda M (AREVA NP INC)

Created By: Ronda.Pederson@areva.com

Recipients:
"BENNETT Kathy A (OFR) (AREVA NP INC)" <Kathy.Bennett@areva.com>
Tracking Status: None
"DELANO Karen V (AREVA NP INC)" <Karen.Delano@areva.com>
Tracking Status: None
"KOWALSKI David J (AREVA NP INC)" <David.Kowalski@areva.com>
Tracking Status: None
"HARRIS Carolyn A (AREVA NP INC)" <Carolyn.Harris@areva.com>
Tracking Status: None
"Tesfaye, Getachew" <Getachew.Tesfaye@nrc.gov>
Tracking Status: None

Post Office: AUSLYNCMX02.adom.ad.corp

Files	**Size**	**Date & Time**
MESSAGE	2617	7/24/2009 4:45:15 PM
RAI 251 Response US EPR DC.pdf	141748	

Options
Priority: Standard
Return Notification: No
Reply Requested: No
Sensitivity: Normal
Expiration Date:
Recipients Received:

Response to

Request for Additional Information No. 251

6/25/2009

U.S. EPR Standard Design Certification
AREVA NP Inc.
Docket No. 52-020
SRP Section: 09.05.04 - Emergency Diesel Engine Fuel Oil Storage and Transfer System
SRP Section: 09.05.05 - Emergency Diesel Engine Cooling Water System
SRP Section: 09.05.06 - Emergency Diesel Engine Starting System
SRP Section: 09.05.07 - Emergency Diesel Engine Lubrication System

Application Section: FSAR Ch. 9

QUESTIONS for Balance of Plant Branch 1 (AP1000/EPR Projects) (SBPA)

Question 09.05.04-20:

SRP Section 9.5.4, "Emergency Diesel Engine Fuel Oil Storage and Transfer System," Revision 3, paragraph 9.5.4.III.6.A, specifies that each storage tank has a stick gauge connection for determining its fuel level. Verify that each storage tank has a stick gauge connection for determining its fuel level.

The FSAR should be changed to reflect this information.

Response to Question 09.05.04-20:

The emergency diesel generator (EDG) fuel oil storage tanks do not have a provision for stick measurements. The type, size, and location of the tanks preclude the use of a stick gauge to measure fuel oil level. The fuel oil tanks are large above-ground storage tanks containing around 120,000 gallons of diesel fuel oil. The storage tanks are located in a dedicated room within the emergency power generating building (EPGB). Access to the top of the tank is at elevation +27 feet. Using a stick to measure tank levels is a common method for underground storage tanks; however, using the stick method to verify tank level on large above-ground storage tanks is impractical and generally not an accepted practice.

Non-intrusive level indication verification eliminates the potential for foreign material contamination associated with open tank verification. The storage tanks are equipped with electronic measurement instrumentation that provides local and remote indication of the storage tank oil level. In addition, the tanks are equipped with an independent visual level indication system that provides local indication of the tank level. The application of an independent visual indication of tank level provides the same information that is obtained by the stick method and meets the intent of the SRP, Section 9.5.4 to provide an alternate method of determining the tank level.

U.S. EPR FSAR Tier 2, Section 9.5.4.2.2 will be revised to clarify the method of determining the EDG fuel oil storage tank level.

FSAR Impact:

U.S. EPR FSAR Tier 2, Section 9.5.4.2.2 will be revised as described in the response and indicated on the enclosed markup.

Question 09.05.05-7:

In RAI 09.05.05-6 the staff asked the applicant to provide descriptions and ITAAC for EDG cooling water system instrumentation and alarms. The applicant responded that the EDG cooling water system does not have alarms, displays, or controls that are required to perform emergency operating procedures. The staff did not concur with the applicant's conclusion. The staff found that some automatic controls are essential for emergency EDG operation (such as controls for the jacket water and intercooler three-way valves and the automatic EDG trips on loss of ESWS flow), and therefore there was no relevance to the applicant's assertion that alarms, controls, or displays were not required for the emergency operating procedures. The staff also noted that a general EDG trouble alarm is annunciated in the main control room.

In view of the above, justify not including these alarms or controls in FSAR Tier 2 Table 18.7-1 or FSAR Tier 1 Table 2.5.4-3. In the absence of ITAAC items to confirm the adequacy of essential EDG cooling water system alarms, displays or controls, justify the satisfactory operations of the EDG under postulated.

Response to Question 09.05.05-7:

A response to this question will be provided by September 25, 2009.

Question 09.05.06-9:

In Supplement 1 to RAI No. 109, the applicant stated in response to question 03.05.01.01-1g that FSAR Tier 1 Table 2.1.2-2 Items 4.2 and 4.3 would be revised, but the staff did not find the marked up table in Supplement 1 to RAI No. 109.

Provide marked up FSAR pages showing proposed changes to FSAR Tier 1 Table 2.1.2-2 Items 4.2 and 4.3 in accordance with the response to RAI question 03.05.01.01-1g in Supplement 1 to RAI No. 109.

Response to Question 09.05.06-9:

Design commitments in U.S. EPR FSAR Tier 1, Section 2.1.1, Section 2.1.2, and Section 2.1.5 for Seismic Category I structures were revised in the Response to RAI 109, Supplement 1, Question 03.05.01.01-1g; however, the associated inspection, test, analysis and acceptance criteria (ITAAC) table changes were inadvertently omitted.

Subsequently, the Response to RAI 132, Supplement 1, Question 14.03.02-11 revised ITAAC for Seismic Category I structures. Major ITAAC changes included separating ITAAC for the nuclear island structures by building, adding numerous ITAAC, and re-numbering ITAAC. Table 09.05.06-9-1 shows the matrix of ITAAC referenced in RAI 109, Question 03.05.01.01-1g and RAI 132, Question 14.03.02-11.

The U.S. EPR FSAR changes that were omitted from the Response to RAI 109, Supplement 1, Question 03.05.01.01-1g are provided in the Response to RAI 132, Supplement 1, Question 14.03.02-11 as the following ITAAC:

- U.S. EPR FSAR Tier 1, Table 2.1.1-8, Item 2.4.
- U.S. EPR FSAR Tier 1, Table 2.1.1-10, Item 2.1.
- U.S. EPR FSAR Tier 1, Table 2.1.1-11, Item 2.1.
- U.S. EPR FSAR Tier 1, Table 2.1.2-3, Item 3.4.
- U.S. EPR FSAR Tier 1, Table 2.1.5-3, Item 3.5.

FSAR Impact:

The U.S. EPR FSAR will not be changed as a result of this question.

Table 09.05.06-9-1—Matrix of RAI 109 and RAI 132 ITAAC for Seismic Category I Structures

Structure	U.S. EPR FSAR Tier 1 Sections Referenced in the Response to RAI 109, Question 03.05.01.01-1g	U.S. EPR FSAR Tier 1 Sections Referenced in the Response to RAI 132, Question 14.03.02-11.
Nuclear Island Structures	Section 2.1.1, Item 4.2	Section 2.1.1.1, Item 2.4 (Reactor Building) Section 2.1.1.2, Item 2.1 (Safeguard Buildings) Section 2.1.1.3, Item 2.1 (Fuel Building)
Emergency Power Generating Buildings	Section 2.1.2, Item 4.3	Section 2.1.2, Item 3.4
Essential Service Water Buildings	Section 2.1.5, Item 4.3	Section 2.1.5, Item 3.5

Question 09.05.06-10:

In replying to RAI No. 09.05.06-7, the applicant noted that the RAI implied that a design description and ITAAC for EDG starting air system instrumentation and alarms are needed. The applicant stated that the EDG starting air system does not have alarms, displays, or controls that are required to perform emergency operating procedures. Therefore, the applicant stated, there are no EDG starting air system instrumentation and alarms, included in FSAR Tier 1, Table 2.5.4-3, Emergency Diesel Generator Electrical Equipment Design.

Although individual alarms are annunciated on local EDG control panels, a general EDG trouble alarm is annunciated in the main control room. The staff does not concur with the applicant's conclusion regarding descriptions and ITAAC for EDG starting air system instrumentation and alarms. Whether alarms, displays, or controls are required to perform emergency operating procedures is not relevant to implementing automatic controls that are essential to emergency operation.

Provide further information relative to ITAAC items needed to confirm the adequacy of essential alarms, displays, or controls that are required to assure proper EDG operations under postulated accident conditions.

Response to Question 09.05.06-10:

A response to this question will be provided by September 25, 2009.

Question 09.05.06-11:

SRP Section 9.5.6, "Emergency Diesel Engine Starting System," Revision 3, paragraph 9.5.6.I.1.H, specifies that the design include the capability to detect and control system leakage, including the isolation of portions of the system for excessive leakage or component malfunction. Describe the system design for the capability to detect and control system leakage, including isolating system portions in the event of excessive leakage or component malfunction.

The FSAR should be changed to reflect this information.

Response to Question 09.05.06-11:

The diesel generator starting air system (DGSAS) is designed and fabricated to minimize the potential for system leaks by incorporating welded and flanged connections, and minimizing the use of threaded connections in the system piping and components. The system is monitored and alarms will indicate if the system parameters exceed predetermined limits. Degraded conditions will also be identified by operations and maintenance personnel during surveillance testing, routine operator rounds, and scheduled maintenance activities. The system has manual isolation valves on non-essential portions of the system, which are not required for engine operation.

U.S. EPR FSAR Tier 2, Section 9.5.6 contains the following information:

U.S. EPR FSAR Tier 2, Section 9.5.6.1

“The capability to isolate components, system, or piping is provided, where possible, so that the system safety function is not compromised. This includes isolation of components to deal with leakage or malfunctions and to isolate non-safety-related potions of the system.”

U.S. EPR FSAR Tier 2, Section 9.5.6.2.1

“The DGSAS is shown schematically in Figure 9.5.6-1—Emergency Diesel Generator Starting Air System. This schematic shows valve arrangements to provide component isolation capability in the event of system leakage.”

U.S. EPR FSAR Tier 2, Section 9.5.6.2.2

“Tank pressure instrumentation provides indication for local and remote monitoring panels, and on local gauges on each receiver.”

U.S. EPR FSAR Tier 2, Section 9.5.6.4

“Section 9.5.6.2 describes provisions to identify and isolate leakage or malfunction and to provide isolation of the non-safety-related portions of the system.”

The U.S. EPR FSAR will be revised to provide additional information concerning the detection and control of system leakage in the DGSAS.

U.S. EPR FSAR Tier 2, Section 9.5.6.2.1 will be revised to include:

"The DGSAS is designed and fabricated to minimize the potential for system leaks by incorporating welded and flanged connections, and minimizing the use of threaded connections in the system piping and components."

U.S. EPR FSAR Tier 2, Section 9.5.6.3.2 will be revised to include:

"In case of abnormal conditions such as systems leaks identified by operations and maintenance personnel during surveillance testing, routine operator rounds, and scheduled maintenance activities, the system has manual isolation valves on non-essential portions of the system, which are not required for engine operation."

U.S. EPR FSAR Tier 2, Section 9.5.6.4 will be revised to include:

"The DGSAS is designed and fabricated to minimize the potential for system leaks. The system is monitored and alarms will indicate if the system parameters exceed predetermined limits. The starting air receivers have inlet check valves to isolate safety-related and non-safety-related portions of the starting air system during normal operation. Manual isolation valves are provided for abnormal conditions to prevent leaks between safety-related portions of the system and the non-safety-related portions of the system that are not required for engine operation."

FSAR Impact:

U.S. EPR FSAR Tier 2, Sections 9.5.6.2.1, 9.5.6.3.2, and 9.5.6.4 will be revised as described in the response and indicated on the enclosed markup.

Question 09.05.07-11:

RAI No. 09.05.07-9 stated that Emergency Diesel Generator Auxiliaries Test No. 106 of FSAR Tier 2 Section 14.2 confirms the 7-day requirement for fuel oil storage, but does not confirm the 7-day requirement for lubricating oil storage. The applicant was asked to provide assurance that the lubricating oil storage design will confirm to the 7-day storage requirement.

The applicant responded by stating that a requirement will be added to FSAR Tier 2, Section 14.2.12.9.16, "Emergency Diesel Generator Auxiliaries (Test No. 106)," to determine lube oil consumption during the loaded run and perform an analysis to verify that each EDG has sufficient lube oil for seven days of continuous operation.

However, the staff noted that the calculated lube oil consumption used for the determination that lube oil storage is adequate to support a bounding 7-day EDG run is based on performance of a new engine.

Provide additional details to justify the determination that lube oil storage is adequate to support the bounding 7-day EDG run to verify that the oil consumption observed for a new engine during startup testing is also applicable for the design life of the EDG during plant operation for 60 years.

Response to Question 09.05.07-11:

U.S. EPR FSAR Tier 2, Section 14.2.12.9.16, Test #106, Step 3.22 determines that the lube oil capacity is sufficient for no less than seven days with the emergency diesel generator (EDG) supplying the power requirements of the most limiting design basis accident. The measured lube oil consumption rate is compared to the lube oil consumption rate specified in Technical Specification 3.8.3.b to determine if the preoperational test performance is within predicted values.

The statement in Question 09.05.07-11 that “the lube oil performance corresponds to a new engine” is correct. Lube oil consumption rate is similar to safety-related pump performance in that “new performance” is compared to “expected new performance,” and if the measured performance is within design limits, preventive and predictive maintenance along with Technical Specification surveillance testing will confirm that performance is maintained within design limits for the life of the engine.

FSAR Impact:

The U.S. EPR FSAR will not be changed as a result of this question.

U.S. EPR Final Safety Analysis Report Markups

The external fill locations are designed to meet local, state, and federal regulations for spill protection. The operational structures, systems, and components (SSC) of the system inside the EPGB are located above ground. Leakage in the system will be identified during diesel surveillance runs or routine operator rounds. In the event of a large leak during unattended periods, the fuel tanks are equipped with low level alarms and the fuel drains to the local building sump. The local building sump is equipped with a level alarm that notifies operations of abnormal conditions. Supply and branch lines have isolation valves that can be operated to minimize the impact of leaks. SSC not required for EDG operation can be isolated to maintain EDG operability.

9.5.4.2.2 Component Description

The major components of the DGFOSTS are described in the following paragraphs. The safety classification and seismic design classification for these components, along with their design and fabrication code, are provided in Table 3.2.2-1.

The DGFOSTS is designed and constructed in accordance with quality group C and Seismic Category I.

Main Fuel Oil Storage Tank

One vertical cylindrical fuel oil storage tank is provided for each EDG. The tanks are located adjacent to their respective divisions in separate rooms located at each end of the EPGBs. This separation provides a missile barrier, serves as a spill reservoir, and provides a three hour firewall between the fuel oil tanks and the diesel engine room. The capacity of each tank is based on the fuel consumption by one diesel engine for operation at the continuous rating for seven days, plus an additional ten percent for surveillance testing. The tank is vented, via a flame arrester, to the atmosphere outside the EPGB at a location above the tank connections. Each fuel oil storage tank has two vent paths leading to the outside of the EPGB. The vents are located on the exterior of the upper level of the EPGB, and the locations are separated from each other by line of sight and distance.

The tank has a manway that allows access for cleaning bottom sediment and inspecting the tank lining. The tank bottom is constructed so that a low point sump exists for collection and drainage of any water or sediment that may be present. Additionally, the system incorporates the pumps, the pump discharge piping, and conduits.

09.05.04-20

Fill lines and transfer pump suction lines are located above the sump to preclude disturbance of sediment or water which might lead to the introduction of contaminants into the fuel oil system. The fuel oil storage tanks are equipped with sample ~~lines, level transmitters, manual level gauges~~ and drain lines for sampling the fuel oil~~,~~ and draining the tanks~~., and monitoring tank levels.~~ The storage tanks are equipped with electronic measurement instrumentation that provides local and

09.05.04-20

remote indication of the storage tank oil level. In addition, the tank is equipped with an independent visual level indication system that provides local indication of the tank level.

The exterior surfaces of the tanks are painted for corrosion protection. The interior surfaces of the tanks are coated with a corrosion resistant material.

Fuel Oil Unloading Station

The fuel oil unloading station enables the transfer of fuel oil from a bulk fuel oil carrier to the storage tank. There are two unloading stations for each fuel oil storage tank. The unloading stations are separated by distance and out of line of sight. The unloading stations are located above the flood level. The fill and pump-out lines are equipped with locking caps. Federal, state, and local codes and regulations (e.g., NFPA30, and 40 CFR Part 112) apply to the fuel unloading station. The design provides sufficient features and administrative control on the storage tank outside fill, and pump-out lines to protect against damage from vehicles, tornado, missiles, floods, extreme cold, and accidental contamination.

The fill piping contains an inline filter to preclude sediment particles from being introduced into the storage tank during fuel unloading. Each of the four fuel oil storage tanks is equipped with a pump-out line. The configuration is in conjunction with the fill line to provide connection of a temporary filtration unit for periodic recirculation and filtration of the fuel inventory when the sampling and testing program shows a need to reduce entrained particulate matter.

Fuel Oil Transfer Pump

Two 100 percent transfer pumps are provided for each EDG. Each pump motor is powered from the same Class IE bus associated with its EDG. The capacity of each transfer pump is approximately twice the consumption rate of the EDG at its continuous rating. The pumps are protected by a common duplex suction strainer and individual pressure relief valves. The pumps discharge to a common duplex filter prior to fuel oil entering the fuel day tank. One pump is designated as the primary pump and the second pump is designated as the standby pump, the latter serving in the event of a failure of the primary pump.

Fuel Oil Transfer Pump Duplex Suction Strainers

The function of the strainer is to remove any entrained contaminants to protect the pump. There is a single set of duplex strainers in the supply line to the transfer pumps. Each element is sized for operation of both transfer pumps simultaneously. The fuel oil duplex strainers are designed for servicing on line.

The non-safety-related portion of the DGSAS performs the following functions:

- The DGSAS air compressors supply the starting air receivers for the diesel engines with compressed air.
- Additionally, each compressor is equipped with an air dryer which reduces the moisture content of the compressed air supplied to the starting air receivers.

9.5.6.2 System Description

9.5.6.2.1 General Description

09.05.06-11

The DGSAS is shown schematically in Figure 9.5.6-1—Emergency Diesel Generator Starting Air System. The DGSAS is designed and fabricated to minimize the potential for system leaks by incorporating welded and flanged connections, and minimizing the use of threaded connections in the system piping and components. This schematic shows valve arrangements to provide component isolation capability in the event of system leakage. The starting air receiver inlet check valves provide isolation between the safety-related and non-safety-related portions of the system.

Each EDG has its own starting system. The starting system for each diesel engine is a dedicated and independent starting air system. Each starting air system consists of two electrically driven compressors, two air dryers and filters, two starting air receivers, compressed air piping, valves, controls, and instruments. Each engine has its own engine-driven air start distributor with a pilot air connection to each cylinder for operating air starting valves.

Starting air pressure is also used to operate the governor servo rack booster which opens the fuel injection pump racks to provide adequate fuel at startup. For emergency shutdown, the governor shutdown solenoid internal to the governor operates which causes the governor to close the fuel racks.

The layout of the piping and main components (i.e., compressors, air dryers, air receivers, valves and filters) provides the space required to permit inspection, cleaning, maintenance, and repair of the system.

The pressure transmitters associated with the pressure indicators on the local control panel are supplied with air from the starting air system.

9.5.6.2.2 Component Description

The major components of the DGSAS are described in the following paragraphs. The safety classification and seismic design classification for these components, along with their design and fabrication code, are provided in Table 3.2.2-1—Classification Summary.

All other alarmed conditions will require operator evaluation to determine if continued operation is feasible. Operators can activate a manual trip at any time.

In case of abnormal operation during periodic start, an alarm signal is provided to the MCR. If the failure jeopardizes the equipment during a test or surveillance start, a trip signal is activated.

09.05.06-11

In case of abnormal conditions such as system leaks identified by operations and maintenance personnel during surveillance testing, routine operator rounds, and scheduled maintenance activities, the system has manual isolation valves on non-essential portions of the system, which are not required for engine operation.

9.5.6.4 Safety Evaluation

- The safety-related portion of the DGSAS is located in the EPGBs. The EPGB is designed to withstand the effects of earthquakes, tornadoes, hurricanes, floods, external missiles, and other similar natural phenomena. Sections 3.3, 3.4, 3.5, 3.7(B), and 3.8 provide the bases for the adequacy of the structural design of these buildings.

- The safety-related portion of the DGSAS is designed to remain functional after an SSE. Sections 3.7(B).2 and 3.9(B) provide the design loading conditions that were considered. There are no high- or moderate-energy lines in the EPGB whose failure could alter the function of more than one DGSAS. Sections 3.5, 3.6, and 9.5.1 provide the hazards analyses to make sure that a safe shutdown, as outlined in Section 7.4, can be achieved and maintained.

- The DGSAS for each diesel engine is independent of any other diesel engine system. This precludes the sharing of any systems and components important to safety that could prevent those systems or components from performing required safety functions.

- The four-division design of the EDGs provides complete redundancy. A single failure in one division of the DGSAS safety-related portion will not compromise the EDG safety function. All vital power can be supplied from either onsite or offsite power systems, as described in Chapter 8. This meets the recommendation of NUREG/CR-0660 (Reference 1).

- The DGSAS is initially tested using the program described in Chapter 14. Periodic inservice functional testing is carried out in accordance with Section 9.5.6.5.

- Section 3.2 delineates the quality group classification, seismic category, and design and fabrication codes applicable to the safety-related portion of this system and supporting systems. The power supplies and control functions necessary for safe function of the DGSAS are Class IE, as described in Chapters 7 and 8.

09.05.06-11

- ~~Section 9.5.6.2 describes provisions to identify and isolate leakage or malfunction and to provide isolation of the non-safety-related portions of the system.~~The DGSAS is designed and fabricated to minimize the potential for system leaks. The

09.05.06-11

system is monitored and alarms will indicate if the system parameters exceed predetermined limits. The starting air receivers have inlet check valves to isolate safety-related and non-safety-related portions of the starting air system during normal operation. Manual isolation valves are provided for abnormal conditions to prevent leaks between safety-related portions of the system and the non-safety-related portions of the system that are not required for engine operation.

- Each engine starting air system has independent starting air receivers. Each set of receivers has a sufficient capacity to provide at least five diesel engine starts. A start cycle is defined as an air admission of at least three seconds resulting in two to three revolutions of the engine.

- The safety-related function of the DGSAS is to start the EDG. No starting air is required for continued diesel operation once the engine is running.

9.5.6.5 Inspection and Testing Requirements

Tests will be conducted concurrently with the qualification testing of the EDGs to verify the capability of the DGSAS to start the diesel engine. Preoperational testing is described in Chapter 14 and Section 14.2, tests #104, 105, and 106.

The DGSAS will be subjected to preservice inspection and testing in accordance with applicable codes, regulatory requirements, and manufacturer recommendations to prove its design adequacy and performance per RG 1.9. The DGSAS will be subjected to inservice inspections and testing in accordance with applicable codes, regulatory requirements and manufacturer's recommendations to confirm its availability in case of LOOP per RG 1.9.

When the engine is on standby, the starting air system is normally pressurized up to the air start solenoid valves. Instrumentation is provided to indicate and alarm when there is a loss of air pressure.

The safety-related portions of the DGSAS are designed and located to permit required Section XI testing.

9.5.6.6 Instrumentation Requirements

Each diesel engine is provided with instrumentation to monitor the operation of the DGSAS. Alarms are separately annunciated on the local diesel engine control panel which also signals a general diesel trouble alarm in the MCR. The DGSAS is provided with the indicators and alarms as shown in Table 9.5.6-1.

Instrumentation and controls for the DGSAS are designed to provide the following safety-related control functions:

- Control air regulation – The air control pressure is controlled with an autonomous pressure reducing valve. The actuator used to perform this function is as follows: