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February 17, 1986
ST-HL-AE-1608
File No.: G9.17

Mr. Vincent S. Noonan, Project Director
PWR Project Directorate #5
U. S. Nuclear Regulatory Commission
Washington, DC 20555

South Texas Project
Units 1 and 2
Docket Nos. STN 50-498, STN 50-499
Diesel Generator Exhaust

Dear Mr. Noonan:

Enclosed are mark-ups of FSAR pages which provide the details on the final design of the diesel generator exhaust. In previous discussions with the Power Systems Branch reviewers, a concern was raised with respect to the vulnerability of the exhaust to tornado missiles. In response to this concern, a commitment was made to provide a breakaway design for the portion of the exhaust which extends beyond the edge of the diesel generator (DG) building wall. The design described in the attached pages is the result of design evolution. The DG exhaust will be cut such that approximately 3" of the pipe will extend beyond the edge of the building. In addition, an exhaust hood, designed to breakaway on impact, will be installed above the exhaust piping. This will provide weather protection without causing increased risk of blockage of the exhaust in the event of a missile strike.

If you should have any questions on this matter, please contact Mr. M. E. Powell at (713) 993-1328.

Very truly yours,

M. R. Wisenburg
Manager, Nuclear Licensing

REP/yd

Attachments: FSAR Pages 3.8-68a, 9.5-53b, Vol. 2 Q&R 3.5-7N

A001
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L1/NRC/gd

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L1/NRC/gd

from the others by reinforced-concrete slabs and walls. The exterior walls and roof slab are designed to prevent tornado-missile penetration, except at the DG exhaust penetrations ~~where a brush seal flange is provided~~ (see ~~Sectin~~ Section 9.5.8.~~3~~2 for details).

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PAGE 2 OF 3

Outside air for combustion is drawn into the building through a separate missile protected opening above the maximum flood level. Intake air velocity is limited to prevent the entry of rain or snow, thus eliminating the possibility of clogging the air intake or otherwise degrading performance. All portions of the DGCAIES, except for the air intake opening and the end of the exhaust pipe, are located within the DGB. | 2 Q40. 35

Air is drawn in through the combustion air intake filter and silencer and flows through the connecting piping and expansion joints to the overspeed shutdown valve and into the compressor stage of the turbocharger. From the turbocharger, the air flows through the air heaters/intercoolers and into the combustion air manifolds, where it becomes available to the power cylinders on demand. | 41

The exhaust gases are released into the exhaust manifold and into the turbine of the turbocharger. The exhaust gases expand through the turbocharger turbine and flow through the interconnecting piping and expansion joints to the exhaust silencer. From the silencer, the exhaust gases are routed out of the DGB, via a horizontal pipe approximately 65 ft above grade (See Figure 1.2-10). ~~A The exhaust pipe is beveled at the discharge to prevent entry of rain, snow, and freezing rain into the exhaust pipe.~~ It should be noted that ice, snow, and freezing rain are considered insignificant since STP is located in a subtropical maritime climate (refer to FSAR Section 2.3.1.2.3 and 2.3.1.2.4). The effects of dust accumulation on the exhaust is not considered significant based on the height of the exhaust above the ground (approximately 65 ft) and the layout of the facilities in the area of the exhaust. The discharge is also provided with a ~~bird~~ screen. | 2 Q40. 35 | 52

The exhaust hood which extends approximately 2 ft from the building is designed as a break-off section. In the unlikely event a missile strikes the exhaust hood, the break-off section will separate from the building thereby not inhibiting engine exhaust performance. ~~flush with~~ The exhaust piping extends only 3" beyond the wall thus providing minimal exposure to tornado missiles.

The overspeed shutdown valve located in the turbocharger is controlled by the engine overspeed protection device. Upon a signal from the overspeed protection device, the overspeed shutdown valve closes, shutting off the combustion air supply to the engine, thus providing a positive shutdown. | 41

9.5.8.3 Safety Evaluation. The Combustion Air Intake and Exhaust System for each DG is completely independent of the Intake and Exhaust System of the other two DGs. Consequently, failure of one Intake and Exhaust System will result in the failure of only that DG. The remaining DGs will be able to safely shut down the plant or mitigate the effects of an LOCA in the event of a coincident LOOP. | 41

Air from outside the DGB is drawn through fixed louvers and the intake air filter. These louvers are surrounded by a missile wall barrier such that an external missile cannot penetrate and cause damage to any of the DG components. The louvers are located above the design flood level. | 41

A hood attached to the building extends partially around ~~the~~ exhaust pipe to prevent ~~the~~ entry of rain, snow, and freezing rain into the exhaust.

Question 410.04N

Provide the results of an analysis which shows that the diesel generator exhaust on the side of the building at elevation 65 ft. 8 in. above plant grade are not subject to the larger missiles of SRP 3.5.1.4 (utility pole); i.e., there is no elevation 35 feet or higher within 1/2 mile of the plant. Furthermore if blockage of exhaust opening by smaller size missiles such as 4 x 12 plank would prevent diesels from starting provide protection for the exhaust or perform a PRA to demonstrate that the probability of significant damage to the diesel generator exhaust piping due to tornado missiles causing a release of radioactivity in excess of 10 CFR Part 100 limits shall be less than or equal to a median valve (realistic) 10^{-7} per year or a mean valve (conservative) of 10^{-6} per year. The loss of offsite power should be assumed in the PRA.

Response

Figure 1.2-10 provides a drawing showing the layout and location of the DG exhaust. The tornado missiles considered at STP can be found in Table 3.5-9. As noted in this table the automobile and utility pole are only assumed up to an elevation of 30 ft above grade. A review of Figure 1.2-10 shows the intakes to be greater than 30 ft above the grade elevation. thus utility poles and automobile missiles need not be considered.

~~To preclude damage of the external portion of the exhaust a breakaway design is employed. This will allow the external exhaust piping to breakoff flush with the DG building wall, thus allowing continued operation of the diesel generator. With an allowable blockage of up to 40% of the diesel exhaust (OD 32") it is not considered credible that the missiles describe din Table 3.5-9 could cause sufficient blockage to adversely affect the DG operation~~

In addition, an evaluation has been performed which shows the probability of a tornado missile strike on the DG exhaust is less than 10^{-7} per year. (See Section 3.5.4)

An exhaust hood (Sect 9.5.8.2) which extends approximately 2 ft from the building is designed as a break-off hood section. In the unlikely event a missile strikes the exhaust, the break-off section will separate ~~from~~ the building thereby not inhibiting engine exhaust performance. The exhaust piping extends only 3" beyond the wall thus providing minimal exposure to tornado missiles.

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