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Nuclear Department

MAY 28 1993

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United States Nuclear Regulatory Commission  
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Washington, DC 20555

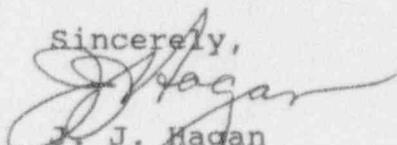
Gentlemen:

RESPONSE TO REQUEST FOR ADDITIONAL  
INFORMATION ON EMERGENCY DIESEL GENERATOR  
FUEL OIL STORAGE AND DAY TANKS  
HOPE CREEK GENERATING STATION  
DOCKET NO. 50-254

Public Service Electric and Gas received your Request for Additional Information, dated April 23, 1993, on May 11, 1993. The following attachment provides our response to the NRC questions raised during the review of our amendment request to change the UFSAR commitments for the emergency diesel generator fuel oil transfer pump start level and fuel oil storage tank capacity requirements.

If you should have any questions regarding this information please contact us.

Sincerely,



J. J. Hagan  
Vice President -  
Nuclear Operations

Attachment (1)

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The power is in your hands.

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ATTACHMENT  
NLR-N93081

RESPONSE TO REQUEST FOR ADDITIONAL  
INFORMATION ON EMERGENCY DIESEL GENERATOR  
FUEL OIL STORAGE AND DAY TANKS  
HOPE CREEK GENERATING STATION  
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Fuel Oil Transfer Pump Start Level

1. To what extent are the power supplies for the fuel oil transfer pumps independent (i.e. not subject to a common fault)?

The primary and alternate fuel oil transfer pumps, for each diesel, are fed from separate class 1E 480 VAC Motor Control Centers (MCC). These MCC's are eventually tied back to the same 4.16 KV bus via their individual transformers. A fault at the 4.16 KV bus level could affect both fuel oil transfer pumps for a particular diesel, but will have no impact on the fuel oil transfer pumps of the other three diesels.

2. To what extent is the logic for starting one pump vs. the alternate pump independent (i.e. not subject to common fault)?

The logic circuits for the primary and alternate fuel oil transfer pumps are not completely independent. They maintain separate power sources up to their individual MCC's and have separate control switches. However, a number of control relays are common to the logic of both pumps (UPSAR Figure 9.5-21a). Since the only faults that disable the start of the transfer pumps are a loss of the 4.16KV bus feeding the MCC's or loss of a relay in the logic itself, these faults would have no impact on the fuel oil transfer pumps of the other three diesels.

3. How will operators be alerted to a problem concerning the fuel oil transfer pump operation? How would a blown fuse or erroneous fuel oil storage tank low level condition be identified?

Operators are alerted to problems related to fuel oil transfer operations via control room annunciator summary alarm window E4-A3 "Diesel Eng Pnl A/B/C/D C423". Operators respond to this window by procedures HC.OP-AR.KJ-0001 (A EDG), -0003 (B EDG), -0005 (C EDG) and -0007 (D EDG). While a blown fuse or erroneous fuel oil storage tank low level condition are not alarmed directly, some of the alarm inputs (as described in procedure HC.OP-AR.ZZ-0017) are as follows: fuel oil day tank level low, loss of AC control power, fuel oil day tank level

high, fuel oil transfer pump no. 1 malfunction, fuel oil transfer pump no. 2 malfunction, fuel oil storage tank no. 1 level low low, fuel oil storage tank no. 1 level low, fuel oil storage tank no. 2 level low low, fuel oil storage tank no. 2 level low and fuel oil transfer system not in automatic.

4. Verify that the flow paths from each fuel oil transfer pump to the fuel oil day tank are completely independent (UFSAR Figure 9.5-22 shows that the lines are independent; however, UFSAR Table 9.5-5 states that a pipe failure in one line will cause a complete loss of fuel supply to the EDG).

Upon examination of Figure 9.5-22 it can be shown that the lines are completely independent. And upon initial examination of Table 9.5-5, it does look as if there is a discrepancy between the Figure and the Table. However, the Table represents a conservative approach to the evaluation of the effects of a single failure. If the line between the transfer pump and the day tank were to sever, only the contents of that particular fuel oil storage tank would be unavailable for that EDG. However, it would be difficult to quantify how much fuel oil would overflow from the day tank into that particular storage tank line and it would be difficult to quantify how much fuel oil would go into that particular storage tank as wastage from the fuel oil racks on that particular EDG. Therefore, the UFSAR takes the conservative approach and evaluates that particular failure as if that EDG were unavailable.

5. What specific administrative controls are being implemented to address this situation?

Operators daily log HC.OP-DL.ZZ-0006(Q) was revised to require the EDG fuel oil day tanks to be maintained at 440 gallons or greater. If the volume falls below this level the operators are instructed to fill the day tank.

6. How frequently will each fuel oil transfer pump cycle on and off if the setpoint were changed to comply with the Standard Review Plan guidance? Is this frequency of operation outside of the pump and motor design rating?

At present, the fuel oil transfer pump for a storage tank starts on a level in the day tank of 248 gallons and stops when the level in the day tank reaches 489 gallons. Using a consumption rate of 5.8 gal/min with 100% load on the EDG and a transfer pump flowrate of 37 gal/min (UFSAR Table 9.5-4), with the way the fuel oil transfer pump system is designed, each transfer pump will run for approximately 7.72 minutes and be idle for approximately 93.1 minutes. If the setpoint for transfer pump start was set at a point to comply with the Standard Review Plan guidance (458 gallons), a particular

transfer pump will run for approximately 1 minute and be idle for approximately 11.68 minutes.

The increased operating frequency was discussed with the Vendor. The Vendor has stated that the pump is capable of up to a maximum of 6 starts per hour. Since operation of the transfer pump at a start level consistent with the Standard Review Plan would result in the transfer pump being operated between 5-6 times an hour, the pump and motor would be within their design ratings. Even though the pump and motors would be within their design ratings, increasing the cycling of the pump and motor would increase the component degradation (i.e., increased maintenance, early component replacement) beyond the benefit gained from raising the transfer pump start level.

#### Fuel Oil Storage Tank Capacity

1. What are the maximum run times if all four diesels are operating after the design basis accident?

Using UFSAR Table 8.3-2 for loadings of the EDG's after a design basis accident and assuming that fuel oil can be transferred between all four EDG's, the EDG's will run for approximately 223 hours. Looking at each EDG independently, the maximum run times for each EDG based only on the fuel oil contained in the storage tanks are 163 hours for A EDG, 353 hours for B EDG, 195 hours for C EDG and 238 hours for D EDG.

2. What is the basis for the 6 days 16 hours run time? Is this based on the "worst case" diesel consumption, or is this based on the total consumption of all operating EDG's and then averaged? If this is based on the worst case diesel consumption, what is the maximum run time for the two other EDG's? What will the run times be if the fuel oil from the idle EDG is used?

The 6 days 16 hours run time is based on the highest total KW loading of 3 EDG's utilizing the numbers for KW loading located in the UFSAR Tables 8.3-2 through 8.3-6. The assumption in the run time number is that fuel oil can be transferred between the 3 operating EDG's since their fuel oil transfer pumps will have power available for such an operation. If the idle EDG fuel oil storage tanks were available for use and assuming that fuel oil can be transferred between the remaining EDG's as needed, the same 3 EDG's will run for approximately 58.5 additional hours. This additional time due to the use of the extra tanks does not take into account the 10% margin required by the Standard Review Plan.

3. What fuel oil rating is credited for determining the diesel engine consumption rate? What assurance is there that a lesser quality fuel oil will not be used?

The specification for the fuel oil used in the manufacturer's tests was that the fuel oil would have a LHV of 18190 BTU/lb and a HHV of 19350 BTU/lb. Using Mark's Standard Handbook for Mechanical Engineers, this corresponds to a Deg API at 60°F of approximately 28. The actual HV's used during the manufacturer's consumption rate test were 19266 for A, 19272 for B, and 19273 for C and D. By Technical Specification requirements (TS 4.8.1.1.2.f.1.c), the lowest specific gravity fuel oil that is acceptable is 28 Deg API at 60°F.

4. How do you intend to transfer the fuel oil from the idle EDG's storage tanks to the active EDGs' storage tanks (i.e., what are the applicable details such as pumps required, power supplies, temporary hoses used, etc.)? The reliability of this contingency must be understood by the staff.

Abnormal operating procedure HC.OP-AB.ZZ-0135(Q) has been revised to require the control room to contact the TSC, in the event that an emergency diesel generator (EDG) can not be started in an emergency, to have engineering develop a plan to transfer the fuel from the inoperable EDG storage tanks to the operable EDG storage tanks. Due to the number of equipment failures that can be postulated to cause the EDG failure, PSE&G believes that developing specific procedures to address this concern is not prudent. PSE&G believes that the amount of time provided by the remaining EDG's (6 days 16 hours worst case) would be sufficient to develop and implement a plan to transfer fuel from the inoperable EDG storage tanks to the operable EDG storage tanks.

5. Provide the following details on the EDG load/fuel consumption determinations:
  - a. Day tank total capacity and usable volume, including the consideration for vortex effects.
  - b. The fuel oil storage tank total capacity and usable volume.
  - c. The worst-case fuel consumption rate over time, based on the load calculations. How is the fuel oil consumption rate adjusted for different diesel loads?

The day tank is a 550 gallon tank. At the current transfer pump stop setpoint level, there are 489 gallons in the tank. The amount of fuel oil that is unavailable due to vortex effects is approximately 47.3 gallons. This makes the total useable volume of the tank 441.7 gallons. At the current low level setpoint in one fuel oil storage tank (there are two

fuel oil storage tanks per EDG), there are approximately 24436.4 useable gallons in the tank. This number takes into account the amount of fuel oil that is unavailable due to vortex effects. The unusable volume in the tank is approximately 1192.4 gallons. The total capacity of the storage tanks is 26500 gallons. The worst case fuel oil consumption over time was determined by examining the UFSAR Tables 8.3-2 through 8.3-6. The worst case fuel oil consumption rate over time is for the case of the highest total KW loading for 3 EDG's with the D EDG unavailable. Using these UFSAR tables, it was determined to base the fuel oil consumption rate on the loading of the EDG's that occur at the 60 minutes & beyond point, after a design basis accident, since the loads for the less than 60 minutes time period have no significant impact on fuel oil consumption over 6+ days.

6. What administrative controls will be implemented to ensure that fuel oil is available on site in time to ensure continued diesel operation during an event?

In response to NRC FSAR Question 430.88, PSE&G evaluated the ability to refuel the EDG fuel oil storage tanks within the seven day time period under severe weather conditions. This evaluation states that while extremely adverse wind, weather and tidal conditions at the Hope Creek Site could interfere with diesel fuel oil delivery for approximately 24-36 hours, it would be a very improbable situation that would preclude delivery by truck or barge for as long as 60 hours.

In accordance with procedure HC.OP-AB.ZZ-0139(Q), "Acts of Nature," if severe flooding is forecast and the Delaware River level is steadily increasing, the operators are instructed to make arrangements to obtain diesel fuel in advance of and during the anticipated flooding. If high winds, tornadoes, or hurricane warnings are forecast, the operators are instructed to order a diesel fuel oil shipment to top off all the storage tanks.

During daily operator rounds (procedure HC.OP-DL-ZZ-0006(Q)) the EDG fuel oil storage tank levels are recorded. If the fuel oil storage tank level is below 24400 gallons (Technical Specification minimum level is 48800 gallons for each EDG and there are two storage tanks per diesel), the operator will notify the SNSS/NSS. The SNSS/NSS will order fuel oil for the EDGs IAW Operations Department Directive HC.OP-DD.ZZ-0015(Z). Typically EDG fuel oil is ordered before the fuel oil storage tanks reach their Technical Specification minimum volume. During normal operation, actual fuel oil delivery from time of order to transfer to the EDG storage tanks has been accomplished in less than one day.