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 BYRAM, R.G. Pennsylvania Power & Light Co.
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SUBJECT: Responds to NRC 990525 RAI re proposed amends 225 & 190 re updating EDG day tank volume SR 3.8.1.4.

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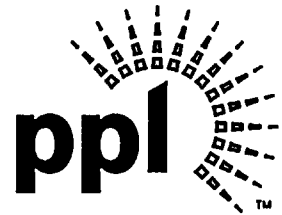
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JUN 25 1999

U.S. Nuclear Regulatory Commission
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**SUSQUEHANNA STEAM ELECTRIC STATION
REQUEST FOR ADDITIONAL INFORMATION REGARDING
PROPOSED AMENDMENT NO. 225 TO LICENSE NPF-14
AND AMENDMENT NO. 190 TO LICENSE NPF-22:
RISK INFORMED PLANT SPECIFIC LICENSING BASIS
CHANGE; EMERGENCY DIESEL GENERATOR
DAY TANK VOLUME
PLA-5073**

Docket Nos. 50-387
and 50-388

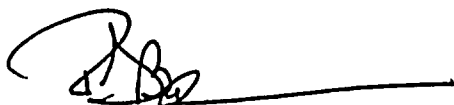
- Reference 1) NRC RAI, V. Nerses to R.G. Byram, "Request for Additional Information for Technical Specification Change Related to Emergency Diesel Generator Day Tank Storage Capacity (TAC Nos. MA4293 and MA4292)," dated May 25, 1999.
- 2) PLA-5007, R.G. Byram to USNRC, "Proposed Amendment No. 225 to License NPF-14 and Amendment No. 190 to License NPF-22 : Risk Informed Plant Specific Licensing Basis Change; Emergency Diesel Generator Day Tank Volume," dated November 20, 1998.

The purpose of this letter is to respond to your Request for Additional Information (RAI) [Reference 1] issued in response to the amendments proposed [Reference 2] to change the Unit 1 and Unit 2 Susquehanna Steam Electric Station (SSES) Technical Specifications. The proposed change updates the Emergency Diesel Generator (EDG) day tank volume Surveillance Requirement SR 3.8.1.4.

The RAI questions and our responses are contained in Attachment 1.

If you have any questions, please contact Mr. M. H. Crowthers at (610) 774-7766.

Sincerely,


R. G. Byram
Attachment

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copy: NRC Region I
Mr. S. L. Hansell, NRC Acting Sr. Resident Inspector
Mr. V. Nerses, NRC Sr. Project Manager
Mr. D.J. Allard, Pennsylvania DEP/BRP

BEFORE THE
UNITED STATES NUCLEAR REGULATORY COMMISSION

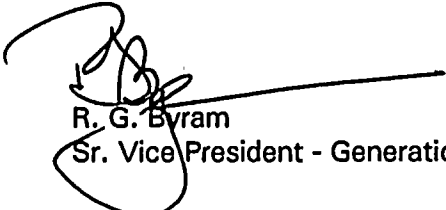
In the Matter of :
PP&L, INC. : Docket No. 50-388

ADDITIONAL INFORMATION TO PROPOSED AMENDMENT NO. 190
FACILITY OPERATING LICENSE NO. NPF-22
SUSQUEHANNA STEAM ELECTRIC STATION
UNIT NO. 2

Licensee, PP&L, Inc., hereby files additional information to proposed Amendment No. 190 to its Facility Operating License No. NPF-22 dated March 23, 1984.

This amendment contains a revision to the Susquehanna SES Unit 2 Technical Specifications.

PP&L, INC.
BY:

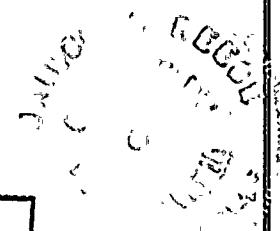


R. G. Byram
Sr. Vice President - Generation and Chief Nuclear Officer

Sworn to and subscribed before me
this 25th day of June, 1999.

Janice M. Reese
Notary Public

NOTARIAL SEAL
JANICE M. REESE, Notary Public
City of Allentown, Lehigh County, PA
Notary Commission Expires June 11, 2001





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**BEFORE THE
UNITED STATES NUCLEAR REGULATORY COMMISSION**

In the Matter of

:

Docket No. 50-387

PP&L, INC.

:


**ADDITIONAL INFORMATION TO PROPOSED AMENDMENT NO. 225
FACILITY OPERATING LICENSE NO. NPF-14
SUSQUEHANNA STEAM ELECTRIC STATION
UNIT NO. 1**

Licensee, PP&L, Inc., hereby files additional information to proposed Amendment No. 225 to its Facility Operating License No. NPF-14 dated July 17, 1982.

This amendment contains a revision to the Susquehanna SES Unit 1 Technical Specifications.

PP&L, INC.

BY:



R. G. Byram
Sr. Vice President - Generation and Chief Nuclear Officer

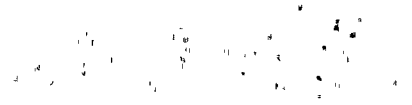
Sworn to and subscribed before me
this 25th day of June, 1999.

Janice M. Reese

Notary Public

NOTARIAL SEAL
JANICE M. REESE, Notary Public
City of Allentown, Lehigh County, PA
My Commission Expires June 11, 2001





Attachment 1 TO PLA-5073

**RESPONSE TO REQUEST FOR ADDITIONAL
INFORMATION**



Response to Request for Additional Information Emergency Diesel Generator Day Tank Capacity

RAI 1

1. *Each day tank for EDGs A, B, C and D has a capacity of 550-gallon. The day tank for EDG E has a capacity of 650-gallon. In April 1991, PP&L, Inc. performed an engineering study (SEA-ME-332) in response to the staff's concerns identified during an Emergency Diesel Safety Function Inspection (EDSFI) regarding day tank minimum volume requirement calculations. Results of the engineering study indicated¹ that in order to satisfy the requirements described in ANSI N195-1976, a minimum of 461 gallons are required to be maintained in each of the day tanks for EDGs A, B, C, and D and 528 gallons for EDG E. During a conference call on April 16, 1999, PP&L, Inc., staff stated that based on the latest calculation a minimum of 499 (instead of 461) gallons are required to be maintained in each of the day tanks for EDGs A, B, C, and D and 446.5 (instead of 528) gallons are required to be maintained in the day tank for EDG E. Provide the following information:*
 - a. *Detailed calculations of the minimum usable fuel oil (in gallons) required to be stored in each of the day tanks. Information should include all input parameters (e.g., EDG fuel oil consumption rates, level switch setpoints, etc.) and justifications for assumptions.*

Response 1a.

The minimum useable volume required to be stored in each day tank is calculated based on the following assumptions/inputs:

A. ASSUMPTIONS / INPUTS:

- The current level switch setpoint for the initiation of the fuel transfer pump for the EDG A, B, C and D is 56.25 inches from the outside bottom of the tank and the EDG E is 55.25 inches from the inside bottom of the tank.
- The level switch tolerance for initiation of the transfer pump is ± 1.0 inch for all diesels. This assumption is based on the 'as found' instrument tolerances.
- The top of the outlet pipe in the EDG's A, B, C and D day tank is 3.66 inches from the outside bottom of the tank and the EDG E day tank is 7.658 inches from the inside bottom of the tank.

¹ See page 4 in the Report Details of the NRC Special Inspection Report (50-387/98-08, 50-388/98-08) dated August 6, 1998.



- Gallons per inch of tank height is 7.67 gal/in for EDG's A, B, C, and D and 7.83 gal/in for EDG E.
- The day tank fuel consumption rate is equal to the diesel consumption rate plus the flow rate of fuel oil to the fuel oil storage tank (fuel that is not consumed by the EDG's but pumped from the day tank). The consumption rate is then adjusted for the specific gravity and temperature differences between the consumption rate test data and the worst case post accident conditions.

B. DAY TANK USABLE VOLUME CALCULATION:

The minimum useable day tank fuel oil volume is equal to the difference in elevation between the level switch set point (minus the set point tolerance) and the elevation of the top of the tank outlet pipe, multiplied by the volume per inch of tank height.

➤ EDG's A, B, C and D

The level switch setting is 56.25 inches and with minus 1.0 inch tolerance, the minimum actuation level = 55.25 inches from the outside bottom of the tank. With the top of the outlet pipe at 3.66 inches from the outside bottom of the tank, the difference between the two elevations is $55.25'' - 3.66'' = 51.59$ inches. The usable volume is 51.59 inches, which is equivalent to 395.7 gallons.

➤ EDG E

The level switch setting is 55.25 inches and with minus 1.0 inch tolerance, the minimum actuation level = 54.25 inches from the inside bottom of the tank. With the top of the outlet pipe at 7.658 inches from the inside bottom of the tank, the difference between the two elevations is $54.25'' - 7.658'' = 46.59$ inches. The usable volume is 46.59 inches, which is equivalent to 364.8 gallons.

Note that this shows that the EDG E has less useable volume than EDG's A, B, C and D.



C. THE CORRESPONDING EDG RUN TIMES ARE CALCULATED AS FOLLOWS:

The EDG run time, RT, is equal to the day tank usable volume divided by the day tank consumption rate.

➤ DAY TANK FUEL CONSUMPTION RATE CALCULATION:

The day tank consumption rate, CR, is equal to the EDG consumption rate plus the flow rate to the storage tank (fuel that is not consumed by the EDG's nor returned to the day tank) adjusted for two factors. These adjustments account for specific gravity and temperature differences between the test data and the postulated worst case post accident fuel oil conditions as described below.

- Diesel Consumption Rates (F_R)

For the EDG A, B, C and D, the highest consumption rate at 4,000 kW based on test data was 276.12 gallons/hour (gph).

For the EDG E, the highest consumption rate at 5,000 kW was 319.48 gph.

- Determine Flow Rate to Storage Oil Storage Tank. (F_S)

The fuel that is not consumed by the EDG's is returned to the fuel oil storage tank (not the Day Tank) via vents and drains, thus it is depleting the usable volume in the day tank.

For the EDG A, B, C and D injector pumps, the total fuel (flowing vents and injector pump pedestal drains) returned to the storage tank based on test data is:

$$F_S = 118.4 \text{ gph}$$

For the EDG E, only the injector pump pedestal drains return unused flow to the fuel oil storage tank, thus the total fuel returned to the storage tank based on test data is:

$$F_S = 1.73 \text{ gph}$$

Based on the design differences between the EDG A, B, C and D, and the EDG E fuel system's, EDG drain flow to the EDG Fuel Oil Storage Tanks (i.e. not the day tanks) is less for the EDG E than for the EDG A, B, C and D tanks.

- Determine Adjustment for Specific Gravity Changes (E₁)

E₁ = Adjustment of fuel consumption value for specific gravity changes between test value (assumed to be specific gravity .876) and the least heating value fuel at the lowest acceptable specific gravity (.816) per PP&L Specification.

A conservative approach is used and the fuel consumption rate will be adjusted assuming the highest specific gravity fuel (best low heating value) was utilized for the test, and the lowest specific gravity fuel allowable per the SSES Specification (lowest low heating value) are in the tank during accident conditions.

E₁ = Ratio of Low heating values, Test Vs Lowest Allowable = API 30 / API 41.9

Low Heating Value of fuel oil @ Specific Gravity of .876, API 30 = 133,312 BTU/gal

Low Heating Value of fuel oil @ Specific Gravity of .816, API 41.9 = 126,236 BTU/gal

E₁ = 133,312 / 126,236 = 1.056

- Determine Adjustment for Temperature Changes (E₂)

E₂ = Adjustment of value for changes in Fuel Oil Temperature.

This is the adjustment made to the volume of fuel required to account for the anticipated increase in temperature of the fuel oil in the day tank when compared to the temperature of the test fuel. F_R, the maximum fuel consumption measured at full load was conservatively assumed to be at 60°F so that the fuel's lbs. per unit volume is at a maximum. The worse case operating temperature in the day tank is assumed to be 120°F based on the maximum postulated room ambient temperature as noted in SSES FSAR Section 9.4.7.1. At the elevated temperature, a greater volume of fuel will be required to provide the same diesel run time as provided by the fuel at 60°F during the test.

In accordance with Flow of Fluids, Crane, Technical Paper 410 Appendix A pg. A-7, if .816 specific gravity fuel oil is present in the storage tank at 60°F it will be .788 specific gravity at 120°F. Therefore

the adjustment for the maximum temperature change between storage tank and day tank would result in a volume change of:

Fuel oil @ specific gravity of .816 @60°F

Fuel oil @ specific gravity of .788 @120°F

This will result in an additional correction factor as follows:

$$E_2 = .816 / .788 = 1.036$$

Based on the above, the consumption rates are calculated as follows:

➤ EDG's A, B, C, and D

$$F_R = 276.12 \text{ gph}; F_S = 118.4 \text{ gph}; E_1 = 1.056; E_2 = 1.036$$

$$CR = (276.12 + 118.4) \times 1.056 \times 1.036 = 432 \text{ gph}$$

➤ EDG E

$$F_R = 319.48 \text{ gph}; F_S = 1.73 \text{ gph}; E_1 = 1.056; E_2 = 1.036$$

$$CR = (319.48 + 1.73) \times 1.056 \times 1.036 = 351.4 \text{ gph}$$

➤ DIESEL RUN TIME CALCULATION:

As previously stated, the diesel run time, RT, is equal to the day tank usable volume divided by the day tank consumption rate.

• EDG's A, B, C and D

$$RT = 395.7 \text{ gal} / 432 \text{ gph} \times 60 \text{ min/hr} = 55.0 \text{ minutes}$$

• EDG E

$$RT = 364.8 \text{ gal} / 351.4 \text{ gph} \times 60 \text{ min/hr} = 62.3 \text{ minutes}$$

RAI 1

- b. *EDG E has a higher rating than EDGs A, B, C, and D (5000 kw vs 4000 kw), provide detailed discussion to show why (in the latest calculation) EDG E requires less fuel oil than EDGs A, B, C and D to satisfy the requirements described in ANSI N195-1976. Also, discuss why more (499 gallons vs 461 gallons) fuel oil is required for EDGs A, B, C, and D, and less (446.5 gallons vs 528 gallons) fuel oil for EDG E when compared with the previous calculations.*

RESPONSE 1.b:

EDG E requires less fuel from its day tank than EDG's A, B, C and D require from their day tanks. This is because the EDG A, B, C, D fuel systems return a significantly larger portion of their unconsumed fuel oil to their fuel oil storage tanks. The EDG E fuel oil system only directs 1.73 gph to the fuel oil storage tank while the EDG A, B, C and D fuel systems direct 118.4 gph to their Fuel Oil Storage Tanks.

More fuel oil is calculated (499 gallons) for the EDG A, B, C and D when compared to the previous PP&L, Inc. calculations (461 gallons) because of the calculation methodology differences identified in the table below.

Parameter Description	SEA-ME-332	Current Calculation
Fuel Oil Flow Rate to Fuel Oil Storage Tank	Determined theoretically.	Based on test data.
Fuel Oil Consumption Rate	Determined theoretically.	Based on test data.
Fuel Oil Temperature	Not accounted for.	Adjusted for temperature affect.

Less fuel oil is calculated (446.5 gallons) for EDG E when compared to the previous PP&L, Inc. calculation (528 gallons) because of calculation differences identified in the Table below:

Parameter Description	SEA-ME-332	Current Calculation
Fuel Oil Flow Rate to Fuel Oil Storage Tank	Based on EDG A,B,C,D.	Based on EDG E.
Fuel Oil Consumption Rate	Determined theoretically.	Based on test data.
Fuel Oil Temperature adjustment	Not accounted for.	Adjusted for temperature affect.
Unuseable volume in tank	Based on suction nozzle centerline.	Based on top of suction nozzle.

RAI 2

2. *In page 1 of Attachment 1 and page 1 of Attachment 2 to PP&L, Inc., letter PLA-5007 dated November 20, 1998, PP&L, Inc., stated that the proposed volumes (420 gallons for EDGs A, B, C and D and 425 gallons for EDG E) are sufficient to operate the EDGs for a minimum of 55 minutes at 100% of the EDG continuous rated load, and are equivalent to the levels at which fuel oil is automatically replenished.*

In page 3 of Attachment 1 to PLA-5007, PP&L, Inc., stated that all EDG day tanks are automatically refilled when the day tank level drops to a level that will support 55.6 minutes of operation for EDGs A, B, C, and D and 62 minutes of operation for EDG E at continuous rated loads.

Please provide detail discussions to clarify the above inconsistencies.

RESPONSE 2:

The PLA-5007 page 1 statement stating "... are sufficient to operate the EDGs for a minimum of 55 minutes at 100% rated load..." is a bounding statement applicable to all the EDG's reflecting the minimum run time capability of all the EDG's.

