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FACIL:50-388 Susquehanna Steam Electric Station, Unit 2, Pennsylva 05000388
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CURTIS,N.W. Pennsylvania Power & Light Co.
RECIP.NAME RECIPIENT AFFILIATION
SCHWENCER,A. Licensing Branch 2

SUBJECT: Forwards results of study to verify validity of analytical model used for plant voltage study.Nameplate data for const transformer also encl.

DISTRIBUTION CODE: B001S COPIES RECEIVED:LTR 1 ENCL 1 SIZE: 4
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NOTES:1cy NMSS/FCAF/PM. LPDR 2cys. 05000388

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[illegible] study [illegible]
[illegible] volts [illegible]

[illegible] plates [illegible]

[illegible]	[illegible]	[illegible]	[illegible]

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NOV 17 1983

Director of Nuclear Reactor Regulation
Attention: Mr. A. Schwencer, Chief
Licensing Branch No. 2
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

SUSQUEHANNA STEAM ELECTRIC STATION
REQUEST FOR ADDITIONAL INFORMATION
ER 100508 FILE 520, 821-10
PLA-1953

Docket No. 50-388

Reference: (1) PLA-1370 dated 11/3/83
(2) PLA-1839 dated 9/26/83

Dear Mr. Schwencer:

In response to a request from your Mr. Sang Rhow, attached are the results of a study run to verify the validity of the analytical model used for the plant voltage study. Also attached is the nameplate data for the Construction Transformer (FSAR 8.2.1.3.7).

Very truly yours,

N W Curtis

N. W. Curtis
Vice President-Engineering & Construction-Nuclear

cc: Mr. R. Perch - NRC
Mr. S. Rhow - NRC
Mr. G. Rhoads - NRC
Mr. L. Plisko - NRC

Attachment 1: Analytical Model Validity Study
Attachment 2: Tabulation of Study Assuming all Loads are Non-motor Loads
Attachment 3: Construction Transformer Nameplate Data

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ATTACHMENT 1

Analytical Model Validity Study

During a discussion regarding FSAR changes associated with the additional ESS Transformers (Reference 2), Mr. Sang Rhow (NRC) requested information to verify that test voltages were not more than ±3% different than the voltages predicted by the analytical model.

The test voltages were previously analyzed to insure that they were not more than 3% lower than the voltages predicted by the analytical model in accordance with BTP PSB-1 "Adequacy of Station Electric Distribution System Voltages." Mr. Rhow indicated that the intent of the 3% figure is to gauge the accuracy of the analytical results; therefore, an analysis enveloping a range of ±3% is more appropriate.

The voltages predicted by the computer for the test condition is a function of the load model used. A fixed KVA (motor) load will produce lower calculated voltages than a fixed impedance (non-motor) load. The proportion of motor to non-motor load actually running during the test is not known. For our initial analysis the test assumed all load to be motor load since motor load is a significant portion of the total load. The result was that all calculated voltages were below the test voltages by 0.5 to 5%.

The study was rerun assuming all loads to be non-motor loads. Non-motor (fixed impedance) loads yield the highest calculated voltages. The result of this run produced calculated voltages 1.2% above to 1.1% below the test voltages (see Attachment 2).

Since the actual load condition during the test was an indeterminate mix of both load types, the actual error between analytical and test results can not be determined. However, the study does demonstrate that under the most conservative assumptions the analytical voltage does not exceed the test voltage by more than 1.2%. The introduction of motor loads (as in the plant voltage study) makes the study even more conservative. In conclusion, the results obtained meet the 2% design margin for starting and steady state conditions at the 4kV and 480 volt class 1E busses committed to in Reference (1).

TABULATION OF STUDY ASSUMING ALL LOADS ARE NON-MOTOR LOADS

START SECOND SET RHR PUMPS

BUS	PRE START STUDY (VOLTS)	PRE START TEST (VOLTS)	PRE START E VOLTS	START RHR C&D STUDY (VOLTS)	START RHR C&D STUDY VOLTS PLUS E	START RHR C&D TEST (VOLTS)	START RHR C&D ERROR (VOLTS)
20 Source							
S/V Bus	14.48kv	14.50kv	+ .20kv	13.56kv	13.58kv	13.56kv	- .02kv
4kv Bus	4297	4296	-1.0	3437	3436	3411	-25v
1B220	504.8	505	.2	403.9	404.1	404	0.1v
1B230	487.8	488	.2	390	390.2	385	-5.2
1B240	491.6	491	- .6	393.3	392.7	388	-4.7
1B226	504.6	504.5	- .1	403.7	403.6	407	3.4v
0B136	483.8	490	6.2	387	393.2	387.5	5.7v
1Y226	125.9	127.7	1.8	100.7	102.5	102.6	0.1v
10 Source							
S/V Bus	14.5kv	14.60kv	.05kv	13.43kv	13.8kv	13.46kv	.08kv
4kv Bus	4320	4319	-1.0	3407	3406	3406	0.0
1B220	507.6	507	- .6	400.3	399.7	404.5	4.8
1B230	487.6	484.5	-3.13	384.6	381.4	379.5	-1.97
1B240	497.9	499.5	1.6	392.7	394.3	392.5	-2.04
1B226	507.36	507.5	.14	400.1	399.7	403	3.03
0B136	483.5	483	- .5	381.4	379.9	379.5	- .4
1Y226	126.6	128.9	2.3	99.8	102.1	102.8	.7

dar/chk005c:pas

ATTACHMENT 3

Construction Transformer Nameplate Date

12/16/20 MVA, 30, OA/FA/FA, 55°C

13.44/17.92/22.4 MVA, OA/FA/FA, 65°C

23.0" 13.2 kV Grd. Y/7.62 kV

Z = 6.85% at 12 MVA