REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

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FACIL:50-335 St. Lucie Plant, Unit 1, Florida Power & Light Co. 05000335
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UHRIG,R.E. Florida Power & Light Co.
RECIP.NAME RECIPIENT AFFILIATION
EISENHUT,D.G. Division of Licensing

SUBJECT: Forwards response to NRC 801216 ltr requesting addl info re adequacy of station electric distribution voltages. Each startup transformer ensures automatic start & continuous operation of all Class IE equipment of respective train.

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FLORIDA POWER & LIGHT COMPANY

February 10, 1981
L-81-44

Office of Nuclear Reactor Regulation
Attention: Mr. Darrell G. Eisenhut, Director
Division of Licensing
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Eisenhut:

Re: St. Lucie Unit 1
Docket No. 50-335
ADEQUACY OF STATION VOLTAGES

Florida Power & Light's response to an NRC letter dated December 16, 1980, requesting additional information on the adequacy of station electric distribution voltages is attached.

Very truly yours,

Robert E. Uhrig
Vice President
Advanced Systems & Technology

REU/PLP/mbd

cc: J. P. O'Reilly, Region II
Harold F. Reis, Esquire

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ATTACHMENT

Re: St. Lucie Unit 1
Docket No. 50-335
ADEQUACY OF STATION VOLTAGES

REQUEST FOR ADDITIONAL INFORMATION
ST. LUCIE #1
ADEQUACY OF STATION ELECTRIC DISTRIBUTION SYSTEM VOLTAGES

Reference 1: Florida Power & Light Company's letter (L-80-304) to NRC (D.G. Eisenhut) dated September 12, 1980.

RESPONSE TO QUESTION 1:

Table A of this Response demonstrates that each of the startup transformers (1A or 1B) has the capacity to ensure the automatic start and continuous operation of all the Class 1E equipment of its respective train. The two St. Lucie 1 startup transformers have no electrical intertie connections between them. Each startup transformer feeds its own train of auxiliary loads. If, for example, startup transformer 1A is removed from service, its respective diesel generator (A) will load on that train (A) of Class 1E equipment and continue to maintain operation. Since train B is being fed independently by startup transformer 1B, it will be unaffected by the loss of startup transformer 1A. Thus, train B will still be maintained operational by startup transformer 1B.

Parallel operation of Unit 1 and Unit 2 4.16 KV power can be achieved under administrative control by manually switching the startup transformers when Unit 2 becomes operational. Should it be considered desirable at some future date to align the Unit 2 startup transformers to provide 4.16 KV power to both operating units, appropriate operating procedures and administrative controls will be developed. These procedures and controls as stated in the FSAR, will assure that the startup transformer is not over-loaded should an accident condition occur.

RESPONSE TO QUESTIONS 2 AND 3:

Table A provides the load terminal voltages for the cases previously analyzed (Reference 1.).

RESPONSE TO QUESTION 4:

Table B contains the test data compiled at the St. Lucie Plant. The data was obtained using standard plant test methodology. This included the use of a voltmeter to measure the secondary voltages of the potential transformers for the 4.16 KV SWGR and 480 V. load centers. The bus amperes and the 480V MCC voltages were read from the cabinet's panel board meters. These readings were then averaged and their respective transformer ratios were used to calculate the actual voltage and current on the bus.

RESPONSE TO QUESTION 5:

Backfeeding through the main transformer bank to the class 1E buses will only be done in a reactor shutdown mode.

RESPONSE TO QUESTION 6:

If the conditions set forth in Question 6 are assumed, the second level of undervoltage protection will be actuated. It is highly unlikely that this occurrence will be experienced due to the sequence of events which must occur. For example, a low bus voltage condition resulting from switchyard voltage has to pre-exist. A simultaneous accident signal has to occur and all Class 1E loads have to be running. The largest non-Class 1E loads are the condensate pumps which would be operating. An operator would have to manually stop one of the pumps. This action would only be taken after an analysis of the plant's conditions were made. The operator would then have to manually restart the pump which would again require the plant's conditions to be analyzed prior to the action being taken.

There exists no intertie between the A and B undervoltage tripping logics. Should a relay actuation occur on one bus, only that bus would be loaded on its respective emergency diesel generator. The other bus will still be connected to its offsite source. The relays are set to protect the safety-related equipment. If the voltage on a bus becomes low enough for whatever reason, the equipment's operability will be protected by the actuation of the undervoltage relay. Therefore, the consequences of the set of conditions stated in Question 6 although unlikely, are not considered to have any adverse effect on the plant's capability to achieve and maintain safe shutdown.

TABLE A

BUS VOLTAGES

BUS

BUS	CASE 1	CASE 2	CASE 3
4.16 KV SWGR 1A-3 AND 1B-3	4007.03	3768.25	4259.86
480 V SWGR 1A-2 AND 1B-2:	458.15	423.31	488.10
480 V MCC 1A-5 AND 1B-5:	449.88	408.42	479.83
480 V MCC 1A-6 AND 1B-6:	450.08	407.31	480.03
480 V MCC 1A-7 AND 1B-7:	449.03	407.76	478.98

CASE 1: Normal running loads being supplied by the start up transformer (unit trip from full load with transfer of the loads to the start up transformer).

CASE 2: Same as Case 1 with a concurrent accident condition.

CASE 3: Same as Case 1at maximum grid voltage.

LOAD TERMINAL VOLTAGES

4.16 kV SWGR 1A-3 (SA)

	CASE 1	CASE 2	CASE 3
H. P. SAF INJ 1A:	4004.08	3753.86	4256.91
L. P. SAF INJ 1A:	4005.03	3759.18	4257.86
CONT SPRAY PUMP 1A:	4003.79	3752.54	4256.62
COMP COOL PUMP 1A:	3994.03	3755.52	4246.86
INTAKE COOL PUMP 1A:	3982.93	3744.42	4235.76
AUX. F. W. PUMP 1A:	4000.83	3740.61	4253.66

LOAD TERMINAL VOLTAGES

4.16 kV SWGR 1B-3(SA)

	CASE 1	CASE 2	CASE 3
COMP COOL PUMP 1B:	3995.41	3756.90	4248.24
H. P. SAF INJ 1B:	4002.52	3746.10	4255.35
L. P. SAF INJ 1B:	4003.09	3750.06	4255.92
CONT. SPRAY PUMP 1B:	4002.20	3744.70	4255.03
INTAKE COOL PUMP 1B:	3982.46	3743.95	4235.29
AUX. F. W. PUMP 1B:	4002.49	3742.03	4255.32

LOAD TERMINAL VOLTAGES

480V SWGR. 1A-2 (SA)

	CASE 1	CASE 2	CASE 3
CONT FAN COOLER HVS-1A	448.69	413.85	478.64
CONT FAN COOLER HVS-1B	447.47	412.63	477.42
CHARGE PUMP 1A:	438.04	403.20	467.99

LOAD TERMINAL VOLTAGES

480V SWGR 1B-2 (SA)

	CASE 1	CASE 2	CASE 3
CONT FAN COOLER HVS-1C	443.85	409.01	473.80
CONT FAN COOLER HVS-1D	441.13	406.29	471.08
CHARGE PUMP 1B:	440.89	406.05	470.84

LOAD TERMINAL VOLTAGES

480V MCC 1A-5(SA)

	CASE 1	CASE 2	CASE 3
BATTERY CHARGER 1A:	445.75	404.29	475.70
H_2 RECOMB 1A:	426.75	387.27	456.70
AUX. BLDG. SUPPLY FAN HVS-4A:	441.70	400.24	471.65
REAC. PURGE FAN HVE-8A	439.86	398.40	469.81
AUX BLDG. SWGR SUPPLY FAN HVS-5A	448.63	407.17	478.58
REAC.BLDG. SUP. COOL. UNIT HVE-3A:	449.95	403.49	474.90
CHEM & VOL CNTL SYS H. T. TF A:	447.12	405.66	477.07
MAINT BY-PASS TF 1A:	446.83	405.37	476.78
BORIC ACID MAKE-UP TK HTR. A:	443.60	402.14	473.55
F. W. PUMP 1A DISCH. VLV. MV-09-1:	436.00	377.17	465.95
REAC.COOL OIL LIFT PUMP P-1A1-A:	443.61	402.15	473.56
REAC.BLDG. CAVITY SUP. FAN HVS-2A:	441.17	399.71	471.12
REAC.COOL OIL LIFT PUMP P-1B1-B:	445.46	404.00	475.41
F. W. PUMP 1B DISCH. VLV MV-09-2:	434.15	384.00	464.10
REAC.CAVITY SUMP PUMP 1A:	441.71	400.25	471.66
AUX HPSI FLOW CONTROL VLV HCV-3647:	448.51	406.84	478.46
AUX HPSI FLOW CONTROL VLV HCV-3617:	448.67	407.03	478.62
ELECT. EQUIP. RM RF VENT RV-3:	449.26	405.71	479.21
SHUTDOWN COOL ISO VLV V-3651:	447.52	406.39	477.47
HPSI PUMP DISCH VLV V-3656:	443.31	402.97	473.26
KITCHEN EXH FAN ISO VLV FCV-25-24:	449.09	407.88	479.04

LOAD TERMINAL VOLTAGES - 480V MCC 1A-5(SA) - continued

	CASE 1	CASE 2	CASE 3
CONTROL RM S ISO VLV FCV-25-17:	449.31	407.98	479.26
AUX. F. W. PUMP 1A DISCH VLV MV-09-9:	448.95	407.64	478.90
AUX. F. W. PUMP 1A DISCH VLV MV-09-13:	447.39	405.20	477.34
MAIN STEAM ISO BY-PASS MV-08-1A:	447.45	406.28	477.40
SHUTDOWN COOLING ISO VLV V-3481:	443.59	403.79	473.54
HIGH PRESS SUCTION C/O VLV V-3633:	449.45	408.05	479.40
CONTROL RM. N. OA1 ISO VLV FCV-25-16:	449.41	408.10	479.36
SHIELD BLDG. VENT VLV FCV-25-11:	448.69	407.61	478.64
MAKE-UP BY-PASS TO CHG PUMPS V-25-14:	448.38	407.38	478.33
INST. AIR. ISO VLV MV-18-1:	449.27	407.72	479.22
SAF. INJ. TK 1B2 DIS VLV V-3644:	447.44	405.58	477.39
LPSI FLOW CONTROL VLV HCV-3615:	447.74	406.56	477.69
AIR RECIRC COOL IN HDRA VLV MV-14-6:	448.95	407.71	478.90
AIR RECIRC COOL IN HDRA VLV MV-14-8:	448.95	407.67	478.90

LOAD TERMINAL VOLTAGES

480V MCC 1B-5 (SA)

	CASE 1	CASE 2	CASE 3
REA. PURGE FAN HVE-8B:	438.59	397.13	468.54
AUX. BLDG SUPPLY FAN HVS-4B:	440.60	399.14	470.55
BATTERY CHARGER 1B:	445.09	403.63	475.04
AUX. BLDG. SWGR EXH FAN HVS-5B:	448.43	406.97	478.38
REAC BLDG SUP COOL UNIT HVE-3B:	444.19	402.73	474.14
CHEM & VOL CNTL H T TRF 1B:	448.07	406.61	478.02
REAC BLDG. CAV SUP FAN HVS - 2B:	440.51	399.05	470.46
BORIC ACID MAKE-UP TK 1A HTR B:	446.33	404.87	476.28
REAC CAVITY SUMP PUMP 1B:	442.06	400.60	472.01
MAIN BY-PASS TRANSF 1B:	446.83	405.67	476.78
BORON LOAD CONTROL VLV V-2525:	448.53	405.97	478.48
MN STEAM 1S BY-PASS VLV MV-08-1B:	447.47	406.61	477.42
HIGH PRES. SUCT. C/O VLV V-3662:	449.34	408.03	479.29
SHUTDOWN COOL ISO VLV V-3480:	442.35	402.88	472.30
TOILET EXH FAN ISO VLV FCV-25-19:	449.17	407.37	479.12
BORIC ACID GRAV. FD. VLV V-2508:	448.51	406.96	478.46
VOL. CONT. TK OUT TO CHG. PMPS V-2501:	449.43	407.92	479.38
AIR RECIRC COOL IN HDR. B VLV MV-14-5:	448.97	407.73	478.92
AIR RECIRC COOL OUT HDR. B VLV MV-14-7:	449.50	407.93	479.45
SAF INJ TK 1A-2 DISCH VLV V-3614:	443.22	401.31	473.17

LOAD TERMINAL VOLTAGES - 480V MCC 1B-5(SA) - continued

	CASE 1	CASE 2	CASE 3
LPSI FLOW CONTROL VLV V-3645:	446.88	405.59	476.83
BORIC ACID GRAV FD. VLV. V-2509:	448.45	407.02	478.40
HPSI FLOW CONTROL VLV V-3646:	447.97	406.71	477.92
HPSI FLOW CONTROL VLV V-3616:	447.94	406.20	477.89
SHIELD BLDG VENT VLV FCV-25-12:	448.83	407.76	478.78
AUX F. W. PUMP 1B DISCH VLV MV-09-10:	448.89	407.52	478.84
AUX F. W. PUMP 1B DISCH. TIE VLV MV-09-14:	447.18	405.63	477.13
HPSI PUMP DISCH VLV V-3654:	447.68	406.59	477.63
KITCHEN EXH FAN ISO VLV FCV-25-25:	449.40	408.13	479.35
CONTROL ROOM N. OAI ISO VLV FCV-25-14:	449.51	407.99	479.46

LOAD TERMINAL VOLTAGES

480V MCC 1A-6(SA)

	CASE 1	CASE 2	CASE 3
SHIELD BLDG EXH FAN HVE-6A:	441.15	398.38	471.10
AUX BLDG EM EXH FAN HVE-9A:	444.39	401.84	474.36
OUTDOOR: HVA-3A, ACC-3A:	446.61	403.84	476.56
BORIC ACID MAKE-UP PUMP 1B:	447.32	404.55	477.27
BORIC ACID MAKE-UP PUMP 1A:	447.37	404.60	477.32
HVE-6A (EMC-HVE-6A1-HTR):	444.46	401.69	474.41
BORIC ACID MAKE-UP TK 1B HTRA:	447.62	404.85	477.57
INTAKE COOL WTR NON-EM ISO VLV MV-21-3:	445.40	403.92	475.35
POST ACC. HYD. PURGE FAN HVE-7A:	446.27	403.50	476.22
ELEC. EQUIP. RM EXH FAN HVE-11:	446.61	403.84	476.56
SAF INJ. TK 1A1 DISCH VLV V-3624:	444.29	400.78	473.50
LPSI FLOW CONT VLV HCV-3635:	447.30	404.90	477.25
AUX HPSI FLOW CONT VLV HCV-3637:	448.40	405.49	478.35
CONT RM A/C INDOOR HVA-3A:	447.56	404.79	477.51
AUX HPSI FLOW CONT VLV HCV-3627:	448.86	406.01	478.81
TOILET EXH FAN ISO VLV FCV-25-18:	448.91	406.52	478.86
CONTR RM BOOSTER FAN HVE-13A:	448.95	406.18	478.90
REACT SUMP PUMP VLV MV-07-2A:	449.22	406.27	479.17
REFUEL WTR TK VLV MV-07-1A:	447.49	404.96	477.44
MIN FLOW ISO VLV V-3659:	448.67	406.00	478.62
HVE-6B (EHC-HVE 6A2 HTR):	447.52	404.75	477.47

LOAD TERMINAL VOLTAGES

480V MCC 1-B6 (SB)

	CASE 1	CASE 2	CASE 3
SHIELD BLDG EXH FAN HVE-6B:	442.93	400.16	472.88
BORIC ACID BATCHING TK HTR:	448.43	405.66	478.38
H_2 RECOMBINER 1B:	441.41	398.64	471.36
OUTDOOR: HVA-3B, ACC-3B:	443.91	401.14	473.86
F. W. PUMP 1A/1B DISCH TO S/G 1A MV-09-7:	445.52	396.03	475.47
F. W. PUMP 1A/1B DISCH TO S/G 1B MV-09-8:	445.52	396.03	475.47
AUX BLDG. EM. EXH. FAN HVE-9B:	446.35	403.58	476.30
HVE-6B (EMC-HVE-6B1 HTR):	445.71	402.94	475.66
BORIC ACID MAKE-UP TK 1B HTR B:	447.56	404.79	477.51
INTAKE COOL WTR NON-EM ISO VLV MV-21-2:	445.34	403.88	475.29
POST ACC. HYD. PURGE FAN HVE-7B:	446.53	403.76	476.48
SHUTDOWN COOLING ISO VLV V-3652:	442.94	402.06	472.89
PRIM. WTR. ISO VLV MV-15-1:	449.32	406.76	479.27
SAF. INJ. TK 1B1 DISCH VLV-3634:	443.74	400.17	473.69
LPSI FLOW CONT. VLV HCV-3625:	446.30	403.64	476.25
ELECT. EQUIP. RM. EXH FAN HVE-12:	440.94	398.17	470.89
ELECT. EQUIP. RM. ROOF VENT RV-4:	448.98	400.95	478.93
CONST. RM. A/C INDOOR UNIT HVA-3B:	445.74	402.97	475.69
HPSI FLOW CONT. VLV. HCV-3636:	447.89	404.94	477.84
HPSI FLOW CONT. VLV HCV-3626:	447.79	404.55	477.74
CONT. RM. BOOSTER FAN HVE-13B:	448.33	405.56	478.28

LOAD TERMINAL VOLTAGES - 480V MCC 1-B6 (SB) continued

	CASE 1	CASE 2	CASE 3
CONT. RM. S. OAI ISO VLV FCV-25-15:	449.65	407.02	479.60
REFUEL WTR TK. VLV. MV-07-1B:	446.94	404.47	476.89
REAC SUMP PUMP VLV MV-07-2B:	448.42	405.31	478.37
MIN FLOW ISO VLV V-3660 R. C.:	449.33	406.58	479.28
HVE-6A (EHC-HVE-6B2 HTR):	448.10	405.33	478.05

LOAD TERMINAL VOLTAGES

480V MCC 1A-7 (SA)

	CASE 1	CASE 2	CASE 3
OIL CIRC PUMP FOR 12 CYL ENGINE:	448.73	407.46	478.68
OIL CIRC PUMP FOR 16 CYL ENGINE:	448.73	407.46	478.68
AIR COMPR. MOTOR:	447.40	406.13	477.35
FUEL TRANS. PUMP 1A:	445.87	404.60	475.82
DIESEL GEN. 1A FAN RV-5:	448.52	407.25	478.47

LOAD TERMINAL VOLTAGES

480V MCC 1B-7(SA)

	CASE 1	CASE 2	CASE 3
OIL CIRC PUMP FOR 12 CYL ENGINE:	448.73	407.46	478.68
OIL CIRC PUMP FOR 16 CYL ENGINE:	448.73	407.46	478.68
AIR COMPR. MOTOR:	447.40	406.13	477.35
FUEL TRANS. PUMP 1B:	445.87	404.60	475.82
DIESEL GEN 1B FAN RV-6:	448.52	407.25	478.47

TABLE B

SWITCHGEAR/MCC
VOLTAGE/LOAD READINGS

Plant Status: Generator Load 840 MW gross
Volts 22.3 KV

SWITCHGEAR	BUS VOLTS	BUS AMPS
4.16 KV. SWGR. 1A3	4245.5	260
4.16 KV. SWGR. 1B3	4245.5	277
480 V. SWGR. 1A2	484.8	900
480 V. SWGR. 1B2	484.3	1,100

MOTOR CONTROL CENTER	VOLTAGE AVERAGE	CURRENT AMPS
480V MCC 1A5	475	245
480V MCC 1B5	475.2	250
480V MCC 1A6	475.3	50
480V MCC 1B6	474.7	185
480V MCC 1A7	476	90*
480V MCC 1B7	474	50

*Note: MCC1A7 assumed connect to MCC 1AB

FLORIDA POWER & LIGHT COMPANY
POWER PLANT ENGINEERING DEPARTMENT