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Docket No. 50-286

Mr. Leroy W. Sinclair, President
and Chief Operating Officer
Power Authority for the State
of New York
10 Columbus Circle
New York, New York 10019

Dear Mr. Sinclair:

SUBJECT: ADEQUACY OF STATION ELECTRIC DISTRIBUTION SYSTEM VOLTAGES

The staff has completed its review of your submittals concerning adequacy of station electrical distribution system voltages. We find the voltage analysis submitted by PASNY to be acceptable providing three conditions are satisfied. First, a verification test of system voltages as described in the enclosed SER is completed. Second, a transient voltage analysis is conducted on motors as described in the SER. Third, technical specification changes as described in the SER and our August 8, 1979 letter are implemented. Accordingly you are requested to provide a schedule for submitting the results of your testing and analysis and proposed technical specifications within 30 days of receipt of this letter. We will supplement our evaluation upon receipt of your results.

The reporting and/or recordkeeping requirements contained in this letter affect fewer than ten respondents; therefore, OMB clearance is not required under P.L. 96-511.

Sincerely,

Original signed by:
S. A. Varga

Steven A. Varga, Chief
Operating Reactors Branch #1
Division of Licensing

Enclosure:
As stated

cc w/enclosure:
See next page

*Previous concurrence see next page

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DATE	02/17/82	02/ /82	02/ /82				

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ENCLOSURE

SAFETY EVALUATION
INDIAN POINT NUCLEAR STATION - UNIT NO. 3
DOCKET NO. 50-286
ADEQUACY OF STATION ELECTRIC DISTRIBUTION
SYSTEM VOLTAGES

INTRODUCTION AND SUMMARY

Power Authority of the State of New York (PASNY) was requested by NRC letter dated August 8, 1979 to review the electric power system at Indian Point Nuclear Station Unit No. 3. The review was to consist of:

(a) Determining analytically the capacity and capability of the offsite power system and the onsite distribution system to automatically start as well as operate all required loads within their required voltage ratings in the event of (1) an anticipated transient, or (2) an accident (such as LOCA) without manual shedding of any electric loads.

(b) Determining if there are any events or conditions which could result in the simultaneous or, consequential loss of both required circuits from the offsite network to the onsite electric distribution system and thus violating the requirements of GDC 17.

The August 8, 1979 letter included staff guidelines for performing the required voltage analysis and the licensee was further required to perform a test in order to verify the validity of the analytical results. PASNY responded by letters dated February 11, 1980, May 30, 1980 and June 12, 1981.

The Final Safety Analysis Report (FSAR) was used to clarify provided information. A detailed review and technical evaluation of the submittal was performed by EG&G under contract to NRC, and with general supervision by NRC staff. This work was reported in EG&G's Technical Evaluation Report (TER), "Adequacy of Station Electric Distribution System Voltages, Indian Point Nuclear Station Unit No. 3" dated July 1981. Based upon our review of the EG&G report, the background correspondence, and the Indian Point Unit 3 electrical distribution system, we conclude that after satisfactory results are obtained from the voltage analysis verification testing and proper operation of 480-V motor starters during transient voltage conditions is verified, the offsite power system and onsite distribution system will be capable of providing acceptable voltages at the terminals of the Class 1E equipment for the worst case station electric load and grid voltages.

EVALUATION CRITERIA

The criteria used by EG&G in this technical evaluation of the analysis includes GDC 5 ("Sharing of Structures, Systems and Components"), GDC 13 ("Instrumentation and Control"), and GDC 17 ("ETectric Power Systems") of Appendix A to 10 CFR 50; IEEE Standard 308-1974 ("Class 1E Power Systems for Nuclear Power Generating Stations"); ANSI C84.1-1977 ("Voltage Ratings for Electric Power Systems and Equipment - 50 Hz"); and the staff positions and guidelines in NRC letter to PASNY dated August 8, 1979.

ANALYSIS AND TEST FEATURES

The analysis was performed using the 138 kv offsite power source (station auxiliary transformer) and the 13.8 kv offsite source under the extremes of load and offsite voltage conditions. The station auxiliary transformer utilizes automatic load tap changes to maintain 1.0 per unit voltage on the 6.9 kv station buses, and voltage on the 13.8 kv offsite system is maintained by automatic load tap changers between 14.1 to 13.7 kv depending on system load. The analysis has shown that all safety related equipment operate within their required voltage ratings except for a slight no-load overvoltage condition for 440 volt motors which will drop to an acceptable level when load is applied. PASNY, however, did not provide any voltage values at 440 volt motor starters during transient voltage conditions.

PASNY also did not provide an analysis for the use of a Unit 2/Unit 3 tie breaker. However, this is a third source of offsite power not required by GDC 17 and use of the tie breaker requires manual operator action under the administrative control of the Indian Point Unit 3 operator (plant procedure SOP-EL-5). We consider these provisions on the use of the tie breaker acceptable.

PASNY has included a requirement in the Indian Point Unit 3 Standard Operating Procedures No. SOP-EL-5 that a bus automatic fast transfer (which would overload the 13.8/6.9 kv transformer) be defeated by the operator by placing the 6.9 kv bus tie breakers' control switches in the "pull-out" position and tagging them whenever the 138 kv power source is lost. This requirement should also be incorporated into the Indian Point Unit 3 Technical Specifications.

In addition to the normal grid interties, the offsite system at the Indian Point plants has three gas turbine generators which can be made available to the stations. Since the licensee has provided the required maximum and minimum grid voltage variations, further specific analysis on the use of these gas turbine generators to provide adequate station voltages is beyond the scope of this generic review; however, it is noted that the technical specifications do have controls on the minimum power available from the gas turbines together with a minimum number of 13.8 kv offsite feeders prior to accomplishing an emergency Black Start of the unit.

PASNY has indicated they will supply the required verification test results. This verification test should be in accordance with the following guidelines:

a) Loading the station distribution buses, including all Class 1E buses down to the 120/208 v level, to at least 30%;

b) recording the existing grid and Class 1E bus voltages and bus loading down to the 120/208 volt level at steady state conditions and during the starting of both a large Class 1E and non-Class 1E motor (not concurrently);

Note: To minimize the number of instrumented locations, (recorders) during the motor starting transient tests, the bus voltages and loading need only be recorded on that string of buses which previously showed the lowest analyzed voltages.

c) using the analytical techniques and assumptions of the previous voltage analyses and the measured existing grid voltage and bus loading conditions recorded during conduct of the test, calculate a new set of voltages for all the Class 1E buses down to the 120/208 volt level;

d) compare the analytically derived voltage values against the test results.

With good correlation between the analytical results and the test results, the test verification requirement will be met. That is, the validity of the mathematical model used in performance of the analyses will have been established; therefore, the validity of the results of the analyses is also established. In general the test results should not be more than 3% lower than the analytical results; however, the difference between the two when subtracted from the voltage levels determined in the original analyses should never be less than the Class 1E equipment rated voltages.

CONCLUSIONS

Based upon our review of the EG&G plant, the background correspondence and the Indian Point Unit 3 electrical distribution system, we conclude that:

(1) PASNY has provided voltage analyses to demonstrate that the Class 1E equipment terminal voltages remain within acceptable operating limits for the postulated worst case conditions provided the automatic fast

transfer to the 13.8/6.9 kv transformer is defeated by the operator as required by Standard Operating Procedure No. SOP-EL-5.

(2) PASNY should propose a technical specification modification to defeat the fast transfer to the 13.8/6.9 kv transformer similar to that contained in SOP-EL-5.

(3) The test proposed by PASNY, if performed under our guidelines contained in this report, will provide verification of their analyses.

(4) PASNY should verify that no Class 1E motor stater will drop out during start of any large Class 1E or non-Class 1E load at minimum grid and maximum load condition, and that the starter will pickup to start its load when called on during minimum grid and maximum load conditions.

(5) PASNY's reaffirmation of compliance with GDC 17 requirements is acceptable.

(6) Upon the review and approval of the degraded grid voltage protection modifications proposed by PASNY and currently being reviewed by EG&G, there will be acceptable assurance that spurious tripping of the offsite power to Class 1E equipment will not take place upon starting a large non-Class 1E load.

We, therefore, find the Indian Point Nuclear Station Unit No. 3 design to be acceptable with respect to the adequacy of station electric distribution system voltages subject to the satisfactory completion of the verification testing and motor starter voltage analysis required above. We shall address the verification testing and motor starter voltage analysis in a supplement to this report.