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ADEQUACY OF STATION ELECTRIC DISTRIBUTION SYSTEM VOLTAGES, CRYSTAL RIVER UNIT 3, DOCKET NO. 50-302, TAC NO. 12743

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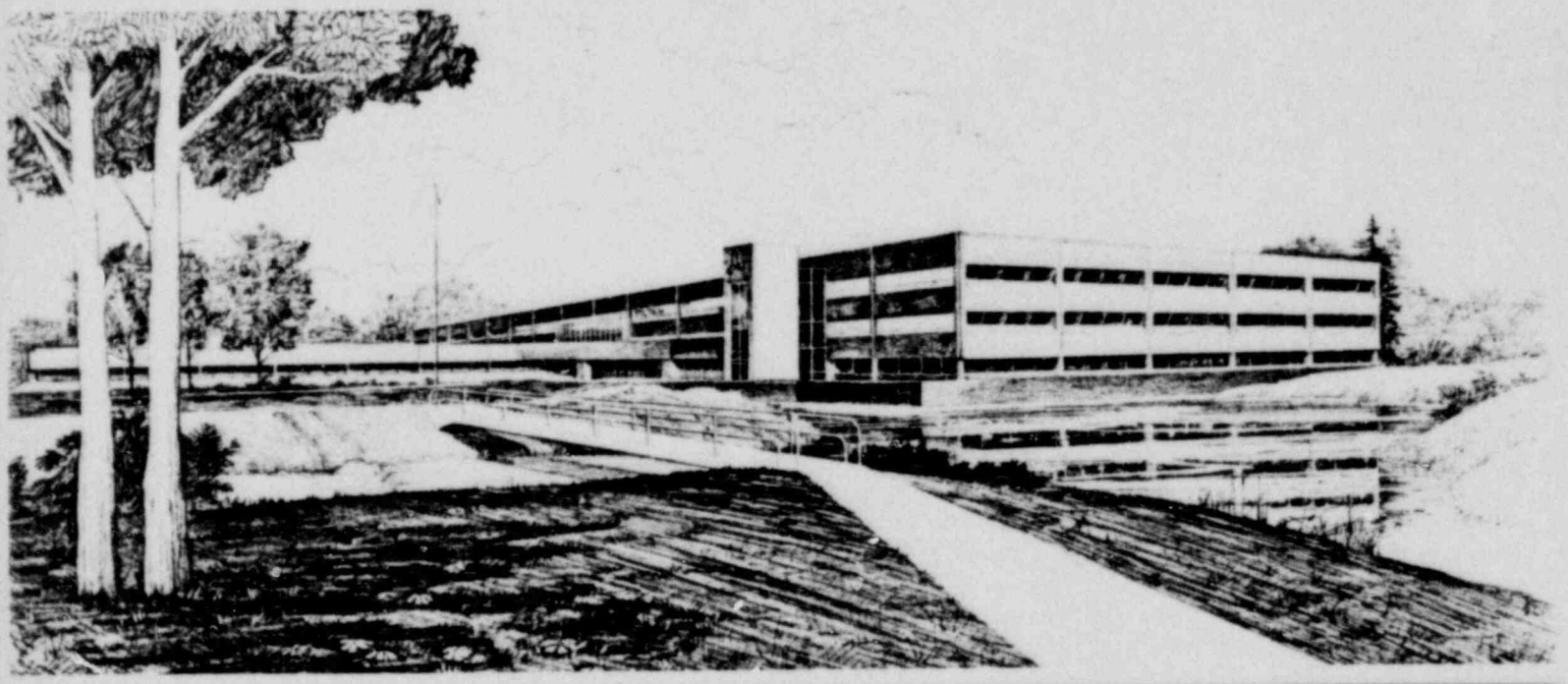
Idaho Operations Office • Idaho National Engineering Laboratory



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INTERIM REPORT

0032J

ADEQUACY OF STATION ELECTRIC DISTRIBUTION SYSTEM VOLTAGES

CRYSTAL RIVER UNIT 3

Docket No. 50-302

March 1981

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Reliability and Statistics Branch
Engineering Analysis Division
EG&G Idaho, Inc.

TAC No. 12743

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FIGURE

TABLE

ADEQUACY OF STATION ELECTRIC DISTRIBUTION SYSTEM VOLTAGES

CRYSTAL RIVER UNIT 3

1.0 INTRODUCTION

An event at the Arkansas Nuclear One station on September 16, 1978 is described in NRC IE Information Notice No. 79-04. As a result of this event, station conformance to General Design Criteria (GDC) 17 is being questioned at all nuclear power stations. The NRC, in the generic letter of August 8, 1979, "Adequacy of Station Electric Distribution Systems Voltages,"[1] required each licensee to confirm, by analysis, the adequacy of the voltage at the class 1E loads. This letter included 13 specific guidelines to be followed in determining if the load terminal voltage is adequate to start and continuously operate the class 1E loads.

Florida Power Corporation (FPC) responded to the NRC letter[1] with a letter of April 3, 1980.[2] The Final Safety Analysis Report and the FPC response to questions regarding Reference 2, dated December 22, 1980,[3] were also reviewed for this report. A telephone call on January 5, 1981,[4] clarified portions of the Reference 3 response.

Based on the information supplied by FPC, this report addresses the capacity and capability of the onsite distribution system of Crystal River Unit 3, in conjunction with the offsite power system, to maintain the voltage for the required class 1E equipment within acceptable limits for the worst-case starting and load conditions.

2.0 DESIGN BASIS CRITERIA

The positions applied in determining the acceptability of the offsite voltage conditions in supplying power to the class 1E equipment are derived from the following:

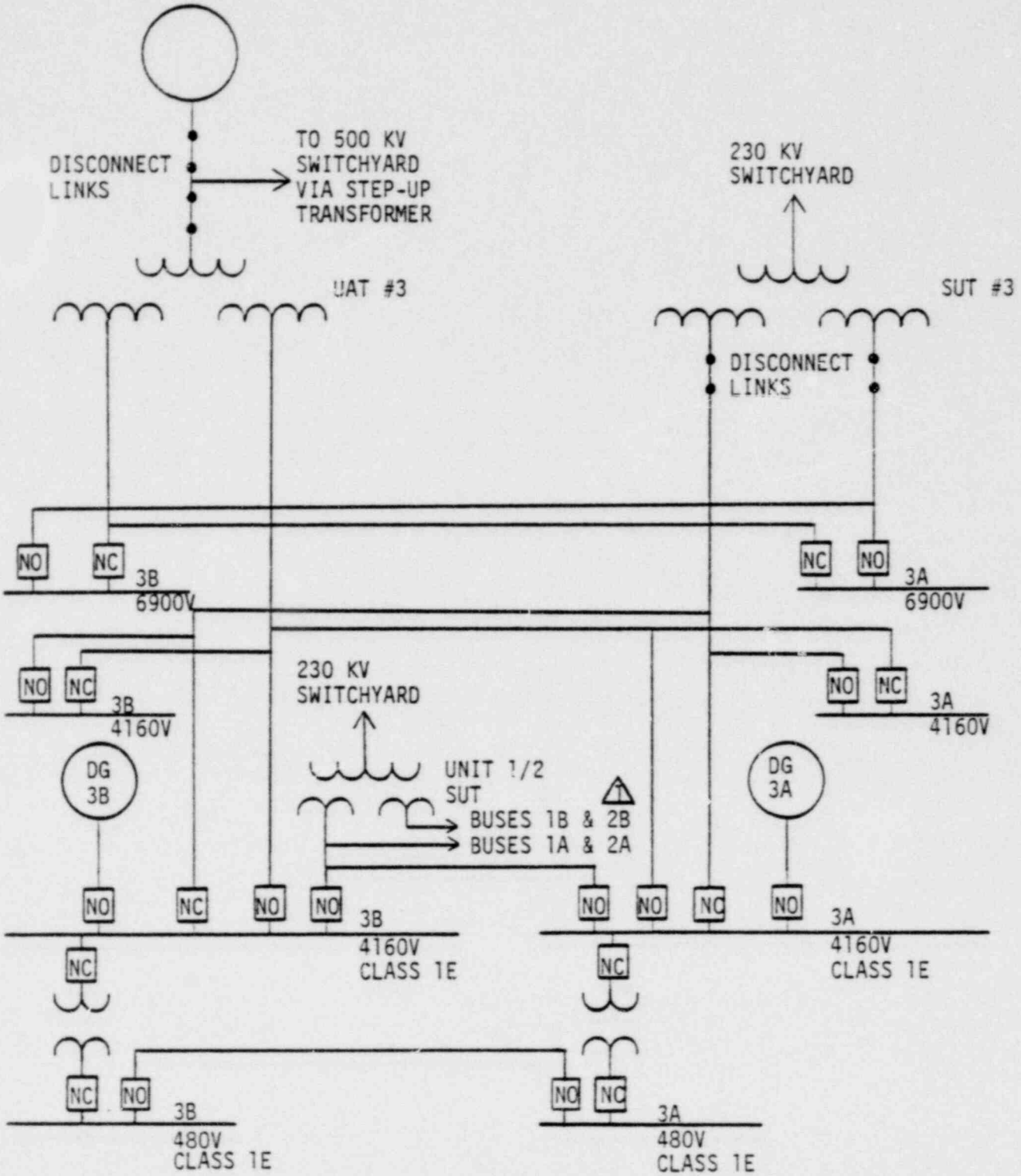
1. General Design Criterion 17 (GDC 17), "Electrical Power Systems," of Appendix A, "General Design Criteria for Nuclear Power Plants," of 10 CFR 50.

2. General Design Criterion 5 (GDC 5), "Sharing of structures, Systems, and Components," of Appendix A, "General Design Criteria for Nuclear Power Plants," of 10 CFR 50.

3. General Design Criterion 13 (GDC 13), "Instrumentation and Control," of Appendix A, "General Design Criteria for Nuclear Power Plants," of 10 CFR 50.

4. IEEE Standard 308-1974, "Class 1E Power Systems for Nuclear Power Generating Stations."

5. Staff positions as detailed in a letter sent to the licensee, dated August 8, 1979.[1]



CRYSTAL RIVER
UNIT 3
ONE LINE DIAGRAM
FICURE 1

1. THESE 4160V BUSES ARE IN FOSSIL FUELED UNITS 1 AND 2.
2. UNITS 1 AND 2 OUTPUT CONNECTED TO 230 KV SWITCHYARD.

4.3 Analysis Result. Table 1 shows the projected worst case class 1E equipment terminal voltages.

4.4 Analysis Verification. FPC has proposed to record bus voltages on the plant auxiliary and class 1E buses while Crystal River Unit 3 is operating.

These recorded voltages would be compared to calculated voltages.

5.0 EVALUATION

Six review positions have been established from the NRC analysis guidelines[1] and the documents listed in Section 2.0 of this report. Each review position is stated below followed by an evaluation of the licensee submittals. The evaluations are based on completion of the design change described in Section 4.1.

Position 1--With the minimum expected offsite grid voltage and maximum load condition, each offsite source and distribution system connection combination must be capable of starting and of continuously operating all class 1E equipment within the equipment voltage ratings.

FPC has shown, by analysis, that Crystal River Unit 3 has sufficient capability and capacity for starting and continuously operating the class 1E loads within the equipment voltage ratings (Table 1).

Position 2--With the maximum expected offsite grid voltage and minimum load condition, each offsite source and distribution system connection combination must be capable of continuously operating the required class 1E equipment without exceeding the equipment voltage ratings.

FPC has shown, by analysis, that the voltage ratings of the class 1E equipment will not be exceeded.

Position 3--Loss of offsite power to either of the redundant class 1E distribution systems due to operation of voltage protection relays, must not occur when the offsite power source is within expected voltage limits.

EG&G Idaho, Inc., will verify, in a separate report, that the requirements of this position are satisfied (TAC No. 10017).

Position 4--The NRC letter[1] requires that test results verify the accuracy of the voltage analyses supplied.

FPC has proposed a test[3] to verify the accuracy of the submitted analysis. This proposed test is acceptable if the test values can be shown to accurately show feeder and transformer voltage drops. Further, this test should verify that the feeder cable voltage drops are negligible as assumed (see footnote a of Table 1).

Position 5--No event or condition should result in the simultaneous or consequential loss of both required circuits from the offsite power network to the onsite distribution system (GDC 17).

4. Telecon, A. C. Udy, EG&G Idaho, Inc., and K. Baker, FPC, January 5, 1981.

5. Allen-Bradley letter, Van Smith & Co., Tampa District Office, to FPC, Att: Gary Castleberry, "Crystal River Unit #3," December 3, 1980