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Omaha Public Power District

1623 HARNEY : OMAHA, NEBRASKA 68102 : TELEPHONE 536-4000 AREA CODE 402

February 21, 1980

Mr. K. V. Seyfrit, Director
U. S. Nuclear Regulatory Commission
Office of Inspection and Enforcement
Region IV
611 Ryan Plaza Drive
Suite 1000
Arlington, Texas 76011

Reference: Docket No. 50-285

Dear Mr. Seyfrit:

The Omaha Public Power District received IE Bulletin 79-27, dated November 30, 1979, requesting that certain evaluations be conducted to assess the consequences of control power system bus failure at the Fort Calhoun Station. Accordingly, the required evaluations have been completed and are described in the attached document.

Sincerely,

W. C. Jones
Division Manager
Production Operations

WCJ/KJM/BJH:jmm

Attach.

cc: U. S. Nuclear Regulatory Commission
Office of Inspection and Enforcement
Division of Reactor Operations Inspection
Washington, D. C. 20555

LeBoeuf, Lamb, Leiby & MacRae
1333 New Hampshire Avenue, N. W.
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OMAHA PUBLIC POWER DISTRICT
FORT CALHOUN STATION UNIT NO. 1
RESPONSE TO IE BULLETIN 79-27

Introduction

In accordance with the requirements of IE Bulletin 79-27, Loss of Non-Class IE Instrumentation and Control Power System Bus During Operation, the Omaha Public Power District has completed the required equipment review, emergency procedure preparation, and re-review of IE Circular 79-02.

The instrument bus system reviewed at the Fort Calhoun Station consists of two 130 VDC batteries, one associated with each train of the Engineered Safety Features System. These batteries supply power to the D.C. control power loads and the four instrument inverters (D.C. to A.C. 120V). Inverters A and C are supplied by battery #1 and inverters B and D are supplied by battery #2. The D.C. supply and A.C. supply are then distributed as shown in Figure 8.1.1 of the FSAR (attached).

During normal operation, the station instrument load is carried by the 480V three phase battery chargers (#1 charger on battery #1 and #2 charger on battery #2, charger #3 is an installed spare which can be connected to either battery). The batteries are on a float charge and will assume the load if the A.C. supply fails.

The distribution and supply system, as described in the preceding paragraphs, supplies both the safety and non-safety related loads. Isolation of the loads is accomplished by protective devices (fuse or circuit breaker) and/or isolation transformers.

As installed, automatic transfer switches exist only on the system level. These are installed on the D.C. supply to the computer, diesel generators, the A.C. supply to the feedwater regulation system, and the A.C. supply to the plant communications system. The remaining transfer switches or circuit breaker alignments are manual operation only.

The bus alignment, as shown in Figure 8.1.1, was used for the failure analysis performed in response to the bulletin. One exception was taken, that being each A.C. instrument bus distribution pair (A/A1, B/B1, C/C1, and D/D1) was treated as a single bus. This was because of their location in a single distribution panel.

The bulletin's requirements and the Omaha Public Power District's responses are discussed below.

Request 1

Review the class 1-E and non-class 1-E buses supplying power to safety and non-safety related instrumentation and control systems which could affect the ability to achieve a cold shutdown condition using existing procedures or procedures developed under item 2 below. For each bus:

a) identify and review the alarm and/or indication provided in the control room to alert the operator to the loss of power to the bus.

b) identify the instrument and control system loads connected to the bus and evaluate the effects of loss of power to these loads including the ability to achieve a cold shutdown condition.

c) describe any proposed design modifications resulting from these reviews and evaluations, and your proposed schedule for implementing those modifications.

Response 1

Based on this review, adequate indication and annunciation is presently available to identify a bus failure. Four non-safety related buses, #1 (D.C.), #2 (D.C.), #1A (A.C.), and #2A (A.C.), do not have available any direct failure indication. Failures can, however, be detected by failure of equipment electrically connected to the bus. Direct operator indication will be provided after an engineering evaluation is completed. It is anticipated that modifications will be installed during the 1981 refueling outage, scheduled to commence in March, 1981.

A table has been prepared which identifies all equipment and its electrical failure mode. This information did not indicate the necessity for modifications.

Request 2

Prepare emergency procedures or review existing ones that will be used by control room operators, including procedures required to achieve a cold shutdown condition, upon loss of power to each class 1-E and non-class 1-E bus supplying power to safety and non-safety related instrument and control systems. The emergency procedures should include:

a) the diagnostics/alarms/indicators/symptom resulting from the review and evaluation conducted per item 1 above.

b) the use of alternate indication and/or control circuits which may be powered from other non-class 1-E or class 1-E instrumentation and control buses.

c) methods for restoring power to the bus.

Describe any proposed design modification or administrative controls to be implemented resulting from these procedures, and your proposed schedule for implementing the changes.

Response 2

A draft emergency procedure has been written in the format suggested by the bulletin. It is anticipated that a final version of the emergency procedure will be fully implemented by May 1, 1980. This implementation schedule will permit a review by the plant staff, incorporation of any comments, and necessary operator training (in the normal six week training cycle) to be completed.

The draft emergency procedure indicates two areas of consideration in which potential modifications are desirable. The first area of consideration involves the failure position of the primary system makeup valves (HCV-238 and HCV-239) and the failure position of the auxiliary pressurizer spray valve (HCV-240). If D.C. bus #2 were lost, there would be no remote manual means to spray down the pressurizer. Currently planned modifications to provide for long term core cooling will provide a redundant valve to HCV-240 and redundant isolation valves to HCV-238 and HCV-239. This modification will resolve this concern. The modification will be implemented by the 1981 refueling outage, provided necessary equipment is available. In the interim, the valve will be locally manually operated.

The second area of consideration involves the shutdown cooling system interlocks. A failure of bus AI-40B will not allow the shutdown cooling valves to be opened. A wire would have to be lifted in the 480V three phase motor control circuit to permit opening of the valves. Since shutdown cooling is not required until the RCS is at a temperature less than 300°F and 265 psia, it is felt that adequate time exists to lift the wire. However, an engineering evaluation will be performed to investigate the need for a circuit modification.

Request 3

Re-review IE Circular No. 79-02, Failure of 120 Volt Vital AC Power Supplies, dated January 11, 1979, to include both class 1-E and non-class 1-E safety related power supply inverters. Based on a review of operating experience and your re-review of IE Circular No. 79-02, describe any proposed design modifications or administrative controls to be implemented as a result of the re-review.

Response 3

IE Circular 79-02 was re-reviewed with results as follows:

Trip circuits - the vital bus supply battery charger-battery-inverter (Fort Calhoun has no static switch on its vital bus distribution) protection is overcurrent only via circuit breaker. No shunt trips are provided. Off-normal conditions are annunciated only. No time delay circuits are used.

Inverter voltage range - it has been determined that the tap settings on the house service transformers and battery chargers were optimum for the projected range of operating voltages. In addition, the station battery chargers are provided with surge arrestors on the secondary of the charger input transformer. This should provide adequate assurance of proper terminal voltage on the inverters.

Automatic bus transfer - the alternate sources for vital buses are manual only, no automatic transfers exist. Automatic transfers are installed only on the supply to the computer, diesel generators, feedwater regulation, and communications. The only failure was that of an output wave shaping transformer on inverter B.

The nature of the operation of the Fort Calhoun vital bus system is such that after maintenance or testing of the components, the only requirements are the verification that the component is loading and proper voltage is being maintained. The plant has reviewed the maintenance procedures for the inverters to insure verification of voltage and current.

The Fort Calhoun vital bus system will require no equipment change as a result of IE Circular 79-02.

Conclusion

In the interim, before the draft emergency procedure is implemented, two emergency procedures, EP-18 and EP-19, are presently in effect which provide direction for the plant operators in the event of an instrument bus failure. These emergency procedures, in conjunction with other operating documents, will provide adequate assurance that instrument bus failures will not jeopardize the safe operation of the Fort Calhoun Station during this interim period. The draft emergency procedure, when implemented, will serve to provide additional clarification and guidance in the event of a loss of an instrument bus. Based on the design of the Fort Calhoun Station, it is highly unlikely that failures such as those addressed in the bulletin would occur.

FIGURE 8.1-1 "SIMPLIFIED ONE LINE DIAGRAM PLANT ELECTRICAL SYSTEM" AVAILABLE FOR REVIEW IN THE REGION IV PDR.