



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

SUPPORTING DRESDEN UNITS 2 AND 3 COMPLIANCE WITH GDC-17

COMMONWEALTH EDISON COMPANY

DRESDEN NUCLEAR POWER STATION, UNIT NOS. 2 AND 3

DOCKET NOS. 50-237/249

1.0 INTRODUCTION

On August 16, 1985, Dresden Unit 2 scrambled on low reactor water level. The scram resulted from a loss of offsite power due to a fault on Unit 1 reserve auxiliary transformer TR-12. Transformer TR-12 was being powered from the same 138KV offsite power source as the Unit 2 reserve auxiliary transformer, TR-22. When protective relaying sensed the fault, the Unit 2 138KV offsite power source isolated and power to TR-22 was lost. Subsequently, two 4KV buses, Nos. 22 and 24, lost power when an automatic transfer from TR-22 to the unit auxiliary transformer, TR-21, did not occur. As a result, one of two running reactor feed pumps tripped and the standby reactor feedpump could not start due to bus undervoltage. The low water level scram and the complete loss of power to the unit resulted. Both emergency diesel generators started and the unit was placed in a safe shutdown condition. During the NRC staff review of this event, discussions with the licensee led to questions regarding the availability of a second access circuit for offsite power. As a result, the licensee agreed to review the design conformance to General Design Criterion-17 (GDC-17), "Electric Power Systems". This safety evaluation presents the staff review of the licensee's analysis of the event and conformance to GDC-17.

2.0 EVALUATION

The licensee forwarded initial descriptions of the event and immediate corrective actions by letters dated August 22, 1985 and September 11, 1985 (LER 85-034). Additional information in response to staff questions was provided by letter to the NRC dated December 13 and December 31, 1985.

Background

Figure 1 illustrates the configuration of offsite power at the switchyard. The electrical system for the Dresden station is shown in Figure 2. During normal power operation of each unit, one division of the safety-related electrical distribution system is energized from the plant's main generator via the unit auxiliary transformer (e.g., TR-22, for Unit 2). The design includes a feature to fast transfer the loads on the reserve auxiliary transformer to the unit auxiliary transformer in the event of a power loss.

8701080549 861216
PDR ADDCK 05000237
P PDR

Discussion

The event caused the staff to question the acceptability of plant operations with Unit 2 reserve auxiliary transformer TR-22 aligned to 138KV bus section 3 in addition to Unit 1 transformer TR-12 aligned to the same bus section. At issue is the increased vulnerability to loss of the GDC-17 immediate-access offsite power circuit for Unit 2 (TR-22) caused by electrical faults on Unit 1 equipment (TR-12) due to not feeding these transformers from separate bus sections of the 138 KV switchyard. The plant licensing basis (i.e., Final Safety Analysis Report (FSAR)) shows the Unit 1 transformer TR-12 powered from bus section 3 and the Unit 2 transformer TR-22 powered from either bus section 1 or 3, with the connection to section 1 being "normally closed". The staff's review of the August 1985 event revealed that the plant is operated with TR-22 energized preferentially from bus section 3, which is the same source used for TR-12. The licensee responded to staff concerns by letters dated August 22, December 13, and December 31, 1985. The licensee has described its basis for concluding that the offsite power alignment that was and is currently in use provides the best reliability and flexibility.

Licensee investigation of the 4KV breaker control circuitry determined that the feeder breakers for 4KV buses 22 and 24 were not designed, as believed, to automatically transfer power feed from the normal supply, reserve auxiliary transformer TR-21. Licensee review identified a design error in the closing control circuits of certain bus 22 and 24 feed breakers which prevented the automatic power transfer from TR-22 to TR-21. The design error resulted from a previous modification. Specifically, the modification was intended to cause a fast transfer of certain buses from the TR-22 as the source of power to TR-21; however, the design of the transfer logic assumed (and required) that any loss of TR-22 would involve a fault which would lead to the electrical lockout of the transformer. During the August 1985 event the transformer output ceased simply because of loss of incoming power, without an actuation of the lockout relay for the transformer. Therefore, the transfer did not function. This transfer feature is necessary to satisfy the portion of GDC-17 which requires that the loss of an offsite circuit not cause the loss of the plant main generator, which could happen if power is lost to certain equipment such as feedwater pumps which in turn cause a plant trip.

The design error has been corrected and the transfer scheme has been tested satisfactorily. NRC Region III has reviewed the modification and observed post-modification testing of the automatic transfer function from TR-22 to TR-21. The results of the Region III review were published in a letter to the licensee dated September 27, 1985.

Based on staff and regional review of licensee corrective actions relative to the automatic transfer of power feeds from transformer TR-22 to transformer TR-21, design is consistent with the guidelines of Regulatory Guide 1.32 and the commitments made in the updated FSAR.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

APPROVED DME NO. 215-1114
EXP. RES. 8/2/95

PLANT NAME Dresden Nuclear Power Station, Unit 2	DOCKET NUMBER (2) 0 5 0 0 0 2 3 7	LER NUMBER (6) 8 5 - 0 3 4 - 0 0			PAGE 5 1 1 OF 1 3
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	

TEXT: If more space is required, use additional NRC Form 266A's (17)

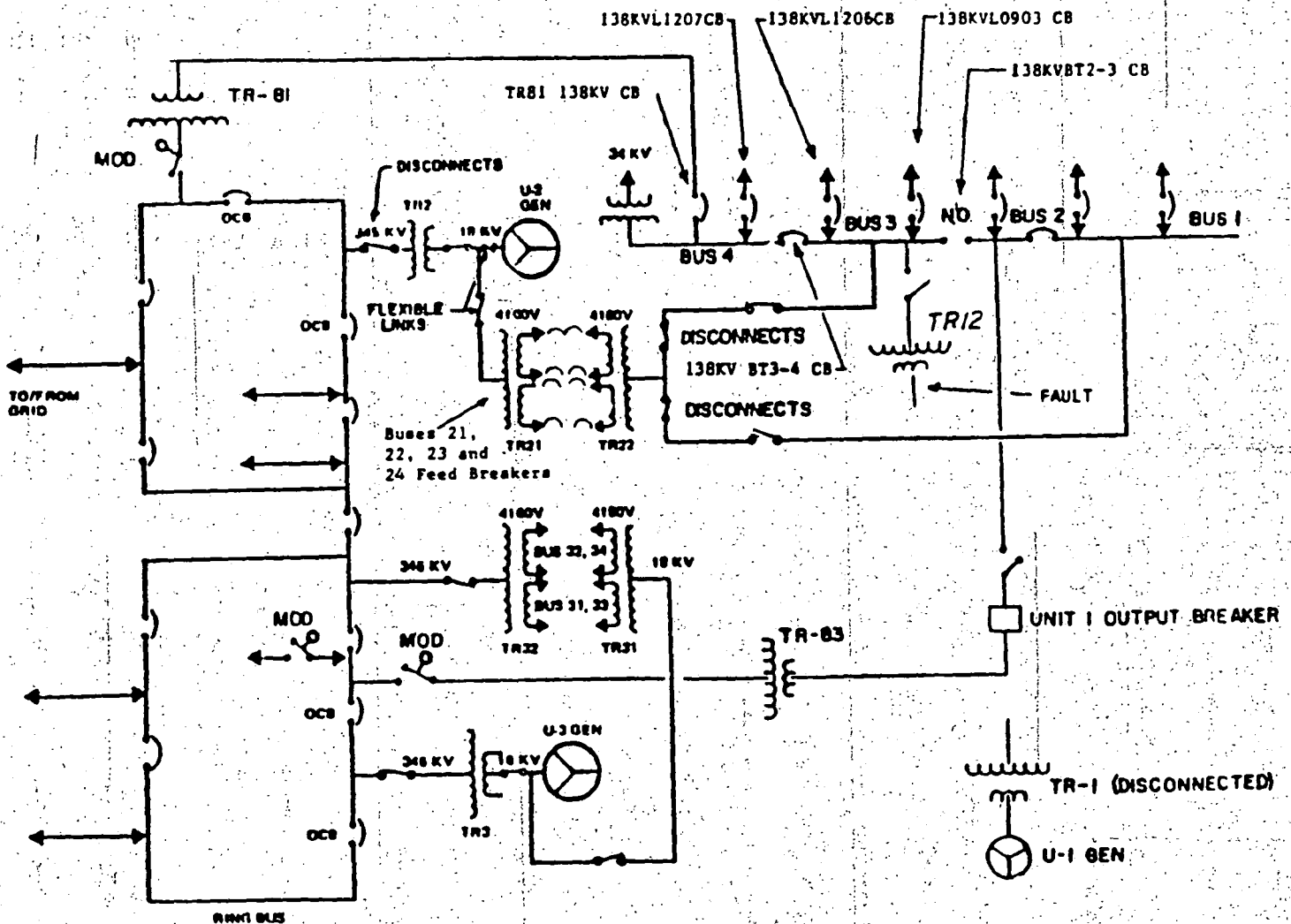


FIGURE 1. 345kV AND 138kV DISTRIBUTION

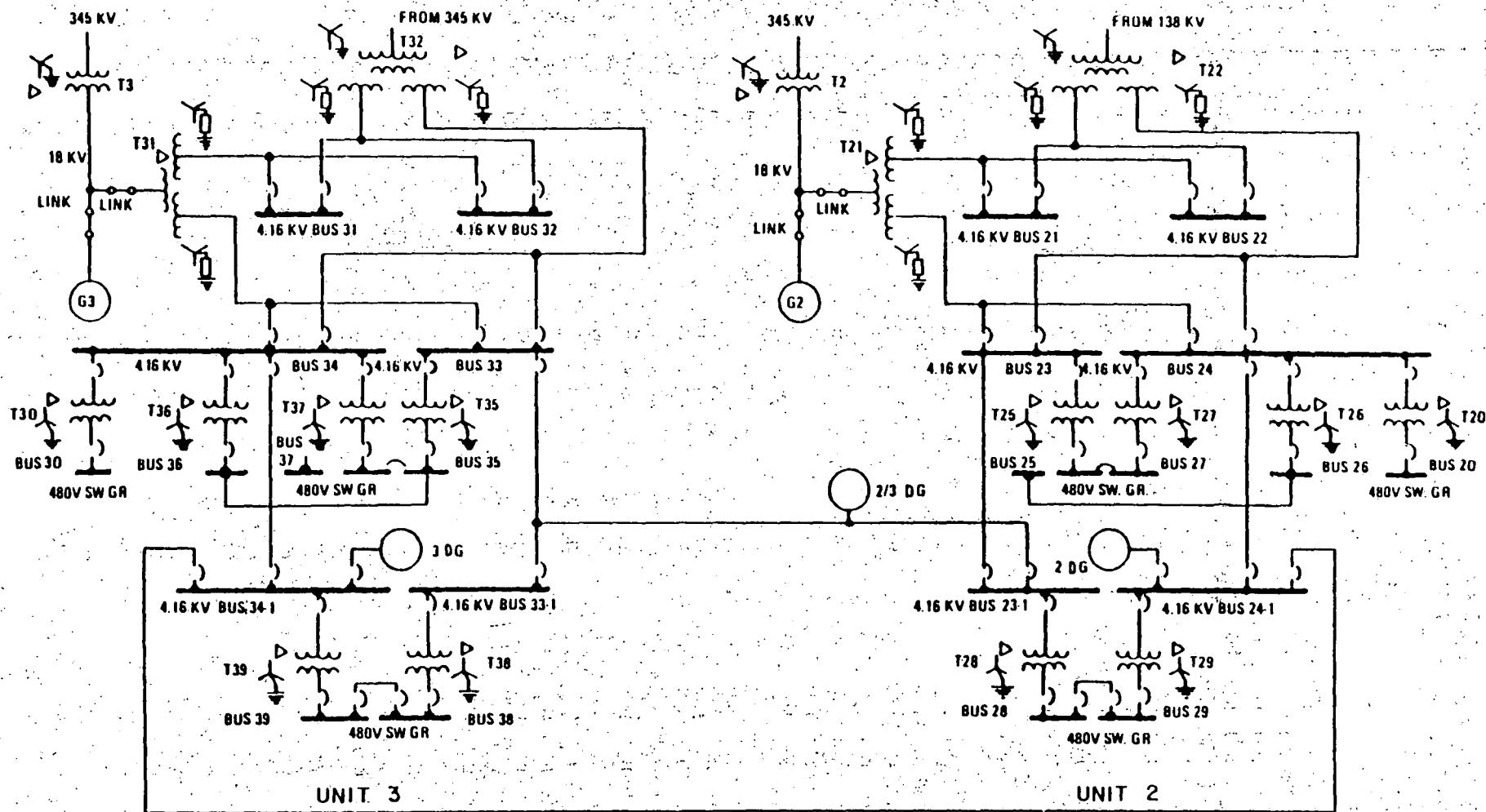


FIGURE ..2 AUXILIARY ELECTRICAL SYSTEM - 4160 VOLT AND 480 VOLT

The licensee's GDC-17 analysis states that the Unit 2 second access source of offsite power required by GDC-17 consists of a 4KV cross-tie between Unit 2 and Unit 3 via bus-tie 24-1/34-1. The second source of power is normally supplied from the Unit 3 345KV switchyard. The second source of offsite power can be activated from the main control room via two breaker control switches and was available during the August 16, 1985 event. The analysis states that the load carrying capability of the bus-tie has been evaluated and determined to be adequate to support the necessary emergency loads. The licensee load analysis includes only one division of emergency loads. This design satisfies the interpretation of GDC-17 that was used when Dresden 2 and 3 were licensed.

3.0 CONCLUSION

Based on the discussions in the Evaluation Section of this report, the licensee's approach to resolution of NRC questions regarding the corrective actions relative to the automatic transfer of power feeds and regarding the alignment of transformers TR-21 and TR-12 to the same offsite bus are considered acceptable. This design satisfies the interpretation of GDC-17 in use at the time that the Units were licensed (1969-1971). Based on the past operating experience of this and other plants that have only two half capacity lines, the staff does not believe that doubling the bus-tie capacity or implementing other modifications to meet the current, more stringent interpretation of GDC-17, would meet the test of 10 CFR 50.109 for significant improvement in the protection of public health and safety. Therefore, the staff considers the design acceptable.

In order to ensure the availability of the cross-tie between Units 2 and 3 for bus-tie 24-1/34-13, the licensee has proposed to submit a Technical Specification for NRC staff review. The staff will review this Technical Specification and address its acceptability in a separate licensing action.

Principal contributor: R. Scholl

Dated: December 16, 1986