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AUTH.NAME AUTHOR AFFILIATION
HAMPTON,J.W. Duke Power Co.
RECIP.NAME RECIPIENT AFFILIATION
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SUBJECT: Forwards discussion on acceptability of providing offsite power from 100kV transmission sys to standby buses.Current plans to utilize alignment during upcoming Unit 2 refueling outage begins 930429.

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Duke Power Company
Oconee Nuclear Site
P.O. Box 1439
Seneca, SC 29679

J. W. HAMPTON
Vice President
(803)885-3499 Office
(803)885-3564 Fax

DUKE POWER

April 14, 1993

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555

Subject: Oconee Nuclear Station
Docket Nos. 50-269,-270,-287
Offsite Power from the 100kV Transmission System

Attached for your information is a discussion of the acceptability of providing offsite power from the 100kV transmission system to the standby buses. Current plans are to utilize this alignment during portions of the upcoming Unit 2 refueling outage beginning April 29, 1993.

Very Truly Yours,

J. W. Hampton

xc: P. E. Harmon, Senior Resident Inspector
Oconee Nuclear Station

L. A. Wiens, Project Manager
ONRR

S. D. Ebneter, Regional Administrator
Region II

A001

100KV SYSTEM DEGRADED GRID PROTECTION

Electrical power can be supplied to the standby buses at Oconee from standby Transformer CT5. Transformer CT5 is connected to the standby buses through two safety related breakers (SL1 and SL2). Power to Transformer CT5 can either be fed from the 100KV Central Switchyard or from one of the Lee combustion turbines through a dedicated 100KV line. The dedicated line from a Lee combustion turbine is normally used as part of technical specification action statement associated with one or both Keowee hydro units inoperability. The 100KV Central Switchyard is used to provide auxiliary power to a cold shutdown unit during periods of testing and maintenance involving other available offsite power sources.

The standby buses are shared among the three Oconee units. The emergency power switching logic would automatically transfer unit auxiliaries to the standby buses for events involving normal offsite power (230KV Switchyard) and overhead path unavailability. This transfer would take place regardless of the source of power to the standby buses.

Transformer CT5 is adequately sized for maximum possible emergency loads on the standby buses (one unit LOCA loads followed by two units LOOP loads). If voltage is not adequate from CT5, it would be essential to trip the SL Breakers, thus allowing the standby buses to receive emergency power from the Keowee underground feeder through CT4 and the SK Breakers.

A modification, NSM ON-52878, was installed to add degraded grid protection for offsite power received from the 100KV Switchyard through Transformer CT5 and the SL Breakers. The modification added control logic that would automatically trip the SL Breakers if the 100KV System voltage decreases to a point where accident mitigation is not assured.

This mod also provides a control room alarm which alerts the Control Room operator of unacceptable degradation of the 100KV System voltage. This is an anticipatory alarm that actuates when voltage from CT5 drops to a level that would still be adequate for normal unit shutdown loads but may not be adequate after loading of maximum possible emergency loads.

This newly installed degraded grid protection logic can be defeated from the Control Room by the operation of two defeat switches. This logic is defeated when CT5 is isolated from the Duke grid and is fed through a dedicated line from a Lee combustion turbine. The alarm, however, would continue to be operational.

In addition to the existing loss of voltage undervoltage relays, this modification added two new levels of undervoltage detection.

The higher undervoltage level is set at approximately 0.95 PU relay tolerance with margin included (on a 102.5KV basis). This value represents the minimum voltage level at the secondary of Transformer CT5 prior to loading, that will result in acceptable voltage level after maximum loading of emergency loads. At or above this voltage level, analysis indicates that voltage is adequate for maximum emergency loading. Below this level, voltage may still be adequate for various loading levels but adequacy is not assured for maximum loading level. Offsite power from Central is normally used when one Oconee unit is in cold shutdown. The maximum emergency loading on the standby bus under this condition is LOCA loads of one unit, LOOP loads of another unit, and cold shutdown loads of one unit. This is less than loading assumed in the analysis (one unit LOCA loads plus two units LOOP loads). Therefore, the Auxiliary Power System would be capable of tolerating voltage levels lower than that calculated.

The undervoltage relays associated with this level are three single phase relays (one per phase)(27CT5/A, 27CT5/B, 27CT5/C) arranged in a two-out-of-three logic arrangement. This level performs two functions. One is to actuate a nine second time delay. This time delay is provided to override system and initial loading transients. The second function is to provide a Control Room alarm alerting the operator of a potential degradation in the 100KV System voltage.

The lower undervoltage level is set at approximately 0.935 PU relay tolerance with margin included (on 102.5KV basis). This level is considered to be the logic providing degraded grid protection to connected equipment when supplied from the 100KV System through Transformer CT5.

The undervoltage relays associated with this level are two single phase relays monitoring different phases. The actuating logic is arranged in a one-out-of-two relay logic arrangement. The function of this logic is to automatically trip the SL Breakers (through two separate channels each) if the lower level undervoltage relays are actuated and the nine second time delay associated with the higher level has elapsed, provided that the logic is not defeated by the two defeat switches provided in the Control Room.

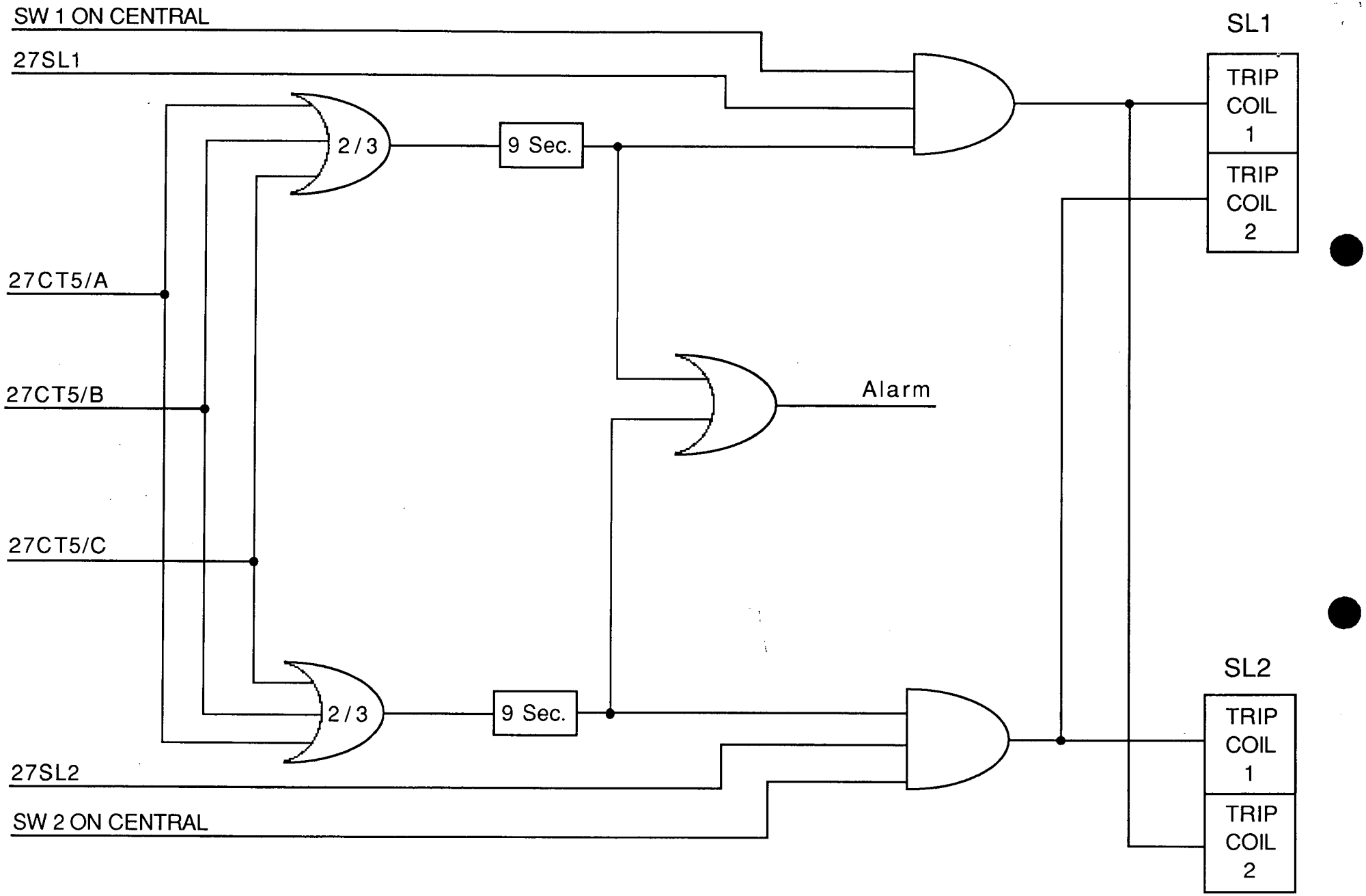
All equipment added by this modification is safety related. The undervoltage relays utilized were ABB 27N solid state undervoltage relays. The timers were Cutler-Hammer D87 solid state timers. Auxiliary relays were Cutler-Hammer D26 relays.

Two overall channels of degraded grid protection are provided, each powered from a separate safety related plant DC source. All undervoltage relays are connected to potential transformers which sense voltage at the bus between the secondary side of Transformer

CT5 and the SL Breakers. Transformer CT5 and the portion of the bus where voltage is sensed is not considered to be safety related. However, failure modes of this bus would be such that is would produce an output at the relays, thereby automatically tripping the SL Breakers. This circuit is designed with specific consideration for postulated failures of components and control power sources. The design is such that the failure of any single DC source or component will not prevent the capability to automatically trip the SL Breakers.

The philosophy used in designing this circuit considered the offsite power source from the 100KV System as an available source, but utilized a very conservative approach that would alert the operator of potential degradation in system voltage prior to reaching the actual unacceptable degraded voltage level. It would automatically remove this power source upon any significant loading on the standby bus after the alarm is actuated. Sustained voltage levels, on the standby buses, below those judged acceptable for maximum loading conditions will not be permitted by this logic with a single failure considered.

A simplified one-line drawing and logic diagram is provided to aid in the understanding of this modification.


SW 1 ON CENTRAL
27SL1
2 / 3
9 Sec.
27CT5/A
27CT5/B
27CT5/C
Alarm
SL1
TRIP COIL 1
TRIP COIL 2
2 / 3
9 Sec.
27SL2
SW 2 ON CENTRAL
SL2
TRIP COIL 1
TRIP COIL 2

OCONEE NUCLEAR STATION
Emergency Power System