



**Consumers  
Power  
Company**

General Offices: 212 West Michigan Avenue, Jackson, Michigan 49201 • (517) 788-0550

February 27, 1980

Director, Nuclear Reactor Regulation  
Att Mr Dennis L Ziemann, Chief  
Operating Reactors Branch No 2  
US Nuclear Regulatory Commission  
Washington, DC 20555

DOCKET 50-255 - LICENSE DPR-20 -  
PALISADES PLANT - RESPONSE TO  
ADDITIONAL INFORMATION FOR  
DEGRADED GRID VOLTAGE

By letter dated June 3, 1977 from Mr A Schwencer (NRC) to Mr D A Bixel (CP Co), Consumers Power Company was informed that the NRC was reviewing the on-site emergency power systems of all operating nuclear power facilities. This review was to assess the susceptibility of safety-related electrical equipment to (1) sustained degraded voltage conditions at the off-site power source; and (2) interaction between the off-site and on-site emergency power systems.

Specifically, the NRC requested that Consumers Power Company compare the current design of the emergency power systems with the staff's position stated in the enclosure of the June 3, 1977 letter and:

1. Propose plant modifications, as necessary, to meet the staff's positions, or
2. Provide a detailed analysis which shows that the Palisades Plant design has equivalent capabilities and protective features, and
3. Model certain Technical Specifications, consistent with the staff positions as in Enclosure 2 of the June 3, 1977 letter.

By letter dated July 28, 1977, Consumers Power Company responded to the NRC's June 3, 1977 letter and on October 2, 1977 we revised our July 28, 1977 letter by deleting a proposed change to the plant Technical Specifications. Specifically, Position 1f of the October 2, 1977 response stated that detrimental minimum voltage levels will only occur during a shutdown mode and, therefore, no limiting of operating conditions are necessary.

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The NRC Letter dated June 6, 1979 from Mr D L Ziemann (NRC) to Mr D A Bixel (CP Co) informed Consumers Power Company that, based on NRC review, additional information was needed.

Additional information is attached.

A handwritten signature in cursive script that reads "Steven R Frost". The signature is written in dark ink and is positioned above the typed name.

Steven R Frost  
Palisades Licensing Engineer

CC JGKepler, USNRC

REQUEST FOR ADDITIONAL INFORMATIONPalisades Plant  
Degraded Grid VoltageItem 1

In your response to position 1f, you state that detrimental minimum voltage levels will only occur during a shutdown mode and, therefore, no limiting conditions of operation are necessary. It is our position that a reactor trip while the grid is in a degraded state would be a situation in which the protective relays would have to operate correctly and that Technical Specifications for voltage protection are necessary. Therefore, please submit Technical Specifications changes to comply with our June 3, 1977 letter. These changes should comply as close as possible to the Model Technical Specifications (MTS) and should also include the limiting conditions for operation, surveillance requirements, and nominal set points with minimum and maximum limits for first level voltage protection (loss of voltage) as shown in the MTS.

Response to Item 1

Technical Specifications and/or surveillance testing changes for the modifications for the degraded grid voltage will be completed 30 days after plant start-up of the present refueling outage. Due to the present workload at the plant with the TMI modifications and the revision/review of plant procedures, an earlier time schedule would be extremely difficult to meet.

Item 2

Please explain why your choice of a 3/3 coincident logic is acceptable from a safety standpoint (as contrasted to a 2/3 coincident scheme). Schematics of the proposed relaying circuits and types of relays being used are also requested.

Response to Item 2

A Bechtel review has indicated that the 3 out of 3 logic is to be preferred for the following reasons:

1. Historically the off-site (grid) power sources have been known to have a high degree of availability and reliability. It is, therefore, necessary to ensure that the high level of availability is not degraded due to unintentional trips such as might be caused due to PT fuse blowing.

Three out of 3 logic prevents the maloperation of the proposed undervoltage scheme when a single fuse blows out in the 120 V a-c potential transformer secondary circuit. Such maloperation will lead to unwanted trip of the off-site power source ACBs and the transfer of the safety-related buses to the on-site emergency diesel generators.

2. The existing undervoltage protection scheme for the 2400 V safety-related buses 1-C and 1-D utilizes 3 out of 3 logic. To be consistent, it is preferable to use 3 out of 3 logic for the proposed addition, also.

A description of the types of relays being used is as follows:

1. Adjustable definite time delay (0.1 to 1 second) undervoltage relays with high pickup to drop-out ratio (guaranteed value not to exceed 103.5), frequency compensated with transient immunity, suitable for use in potential transformer secondary circuits rated 120 volts a-c. Control voltage shall be 125 volts d-c. The relay setting ranges 60 volts to 110 volts. In combination with the front tap settings and internal potentiometer, it shall be suitable for continuous adjustments in this setting range. The output contacts shall be self-reset and rated for 125 volts d-c, 5 amps, continuous duty, relay type No ITE-27D (by Gould ITE). Buyer's tag number for three (3) relays shall be 127-7 and for the remaining relays the tag number shall be 127-8.
2. ITE extender board assemblies for use with the undervoltage relays of Item 1 above, ITE catalog No 200X0018 (by Gould ITE).

Buyer's tag numbers for these two extender board assemblies shall be 127-7 and 127-8.

3. Timing relays with adjustable delay on pickup and with fast resetting time. Setting ranges 0 to 10 seconds. Control voltage 125 volts d-c. Furnished with two Form C output contacts. Buyer's tag numbers for these two timing relays shall be 162-153 and 162-154. Relay type ITE-62K (by Gould ITE).

The enclosed Figure 1 is the proposed relaying circuit scheme to be used at the Palisades Plant.

#### Item 3

Will the proposed relays and other components of the circuit be seismically and environmentally qualified?

#### Response to Item 3

All the above relays, Items 1 and 3, will be used on nuclear plant safety-related circuits and shall be capable of meeting the test requirements per IEEE-STD-501 (1978) - Seismic Testing of Protective Relays. These relays will be located in a controlled atmosphere and, therefore, no special qualification is required.

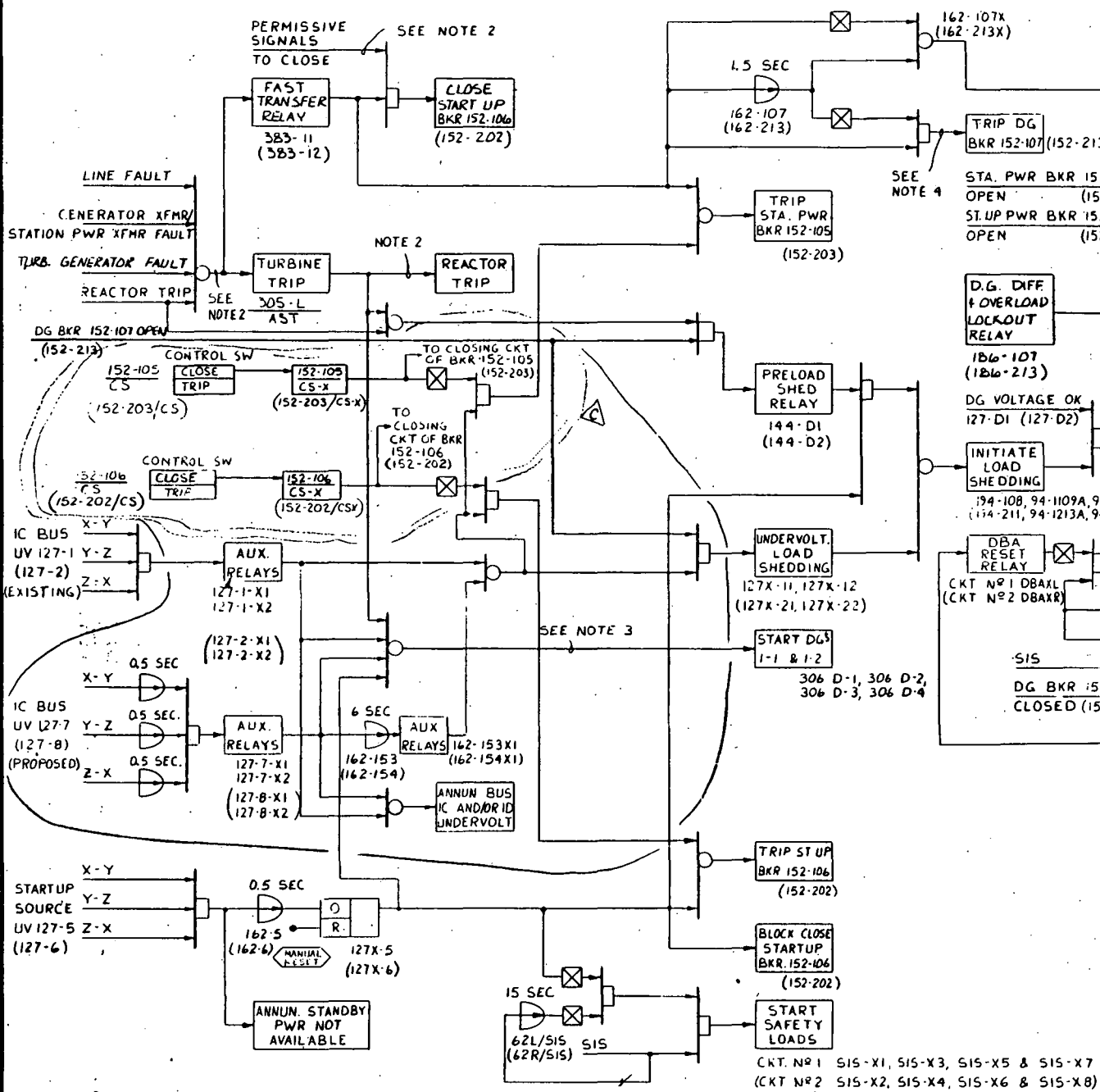
#### Item 4

Has an analysis been performed to determine if the proposed 6-second time delay is of long enough duration to take into account the starting time and consequential voltage drops from large motors on the bus?

An analysis has been performed and based on this analysis, frequent spurious shedding from the off-site source will not occur under normal worse case conditions and, therefore, modifications involving sequential loading or partial shedding are not necessary.

The plant's second level of undervoltage protection is designed to protect the ESF loads from sustained degraded voltage (approximately equal to .91 pu to .70 pu) in excess of 6.5 seconds.

Figure 1



- NOTES:**
1. THE LOGIC SHOWN IS FOR BUS I-C. EQUIPMENT NUMBERS FOR BUS I-D ARE SHOWN IN PARENTHESIS.
  2. FOR DETAILS REFER TO LOGIC AND SCHEMATIC DWGS E-17 SH 1 & E-121
  3. FOR DETAILS ON DIESEL GENERATOR START IN NORMAL/TRANSFER CUTOFF MODES SEE LOGIC AND SCHEMATIC DWGS. E-17 SH 2 & E-136
  4. FOR DETAILS ON DIESEL GENERATOR TRIP/CLOSE SEE LOGIC AND SCHEMATIC DWGS E-16 AND E-139 SH.1.

UNDERVOLTAGE RELAY MODIFICATIONS SHOWN THUS:

LATEST CHANGES TO UV RELAY MODIFICATIONS SHOWN THUS:

△	11/77	REVISED TO INCLUDE CLIENTS COMMENTS AND REISSUED FOR REVIEW	St	1	10/20/77														
△	4/1/79	ADDED DEAD BUS CLOSE P/B. REISSUED FOR REVIEW	M/G	1	3/20/79														
△	5-19-79	ISSUED FOR REVIEW	M/G	1	5-15-79														
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**BECHTEL**  
ANN ARBOR, MICHIGAN

**PALISADES PLANT**  
**CONSUMERS POWER COMPANY**  
GWO 8538

**UNDERVOLTAGE MODIFICATIONS**

LOGIC DIAGRAM  
2.4KV SAFETY BUSES I-C & I-D UNDERVOLTAGE PROTECTION

	JOB No.	DRAWING No.	REV.
	12447-022	SK-E-100	C