

ATTACHMENT

Letter Phillips to Knuth  
September 10, 1973

LOSS OF POWER TO VITAL BUSES

Description of Incident

During a full load test run on Emergency Diesel Generator "A" on August 5, 1973, the Engineered Safeguard Bus feeder breaker tripped at 6:00 a.m., due to a malfunction. When the fault occurred, the diesel generator was at 100% rated load. When the feeder breaker tripped, Diesel Generator "A" became isolated to the 4160 volt Engineered Safeguard Bus, the 480 volt Load Center Bus, and the connected loads on the two 480 volt Motor Control Centers. When the operator tripped Diesel Generator "A" breaker, trouble alarms noted the loss of the two inverters that feed the Channel 1 and Channel 3 Reactor Protection and Engineered Safeguard Systems.

Subsequent investigation revealed the voltage regulator malfunctioned due to the failure of an isolation potential transformer located in the diesel generator excitation control cubicle. Failure of this transformer was apparently caused because the thermal tolerance of the insulating material was exceeded.

Safety Implications

It should be noted that the incident described above occurred during the pre-operational testing phase of the diesel generator. It is the function of these tests to bring to light any abnormal performance of systems or equipment, to allow for diagnosis of the apparent problems and to implement any required modification prior to subsequent fuel loading and plant operation. It has been identified that the "triggering factor" of the described incident was the overheating of the potential transformer. This overheating had not been predicted on an analytical basis because of the complex interaction of heat outputs from all of the surrounding equipment, and in particular, the less than favorable location of the potential transformer in respect to temperature variation within the cubicle. Since these facts were revealed during the pre-operational testing, the incident being reported thereby had no effect on the safety of the plant or the public.

The diesel generator malfunction caused a temporary loss of one engineered safeguard bus and its associated inverters. This resulted in a loss of one train of the non-nuclear instrumentation (NNI) of the reactor protection system. At no time during this incident was the integrity of the redundant diesel generator or that of its associated

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safeguard bus, inverters, or NNI compromised. Consequently, even if this event had occurred during power operation, sufficient capability would have been available to bring the plant to a safe shutdown condition in a timely manner without hazard to public health and safety.

#### Corrective Action Taken

In order to correct the thermal problem of the potential isolation transformer (which has definitely been identified as the cause of the incident), additional ventilation openings have been provided in the lower and upper part of the excitation cubicle. The transformer has also been relocated in the lower and relatively cooler region of this cubicle. Subsequent tests conducted at full load under high ambient temperature have proven that these modifications restored the safe operating condition of the voltage regulator. As a further step to preventing a similar occurrence, we are evaluating the possibility of providing a means for detecting a loss of voltage regulation in the voltage regulator potential transformer.

With the modifications already implemented and the considerations described above, the voltage surge experienced during this incident by the 120 AC regulated inverter will not be likely to occur again. Additional consideration is also being given to modify the inverter circuitry so that the inverter would not malfunction even if it experiences voltage or frequency surges similar to those which occurred during the incident.

The details of any further modifications will be provided as they are adopted.