

TENNESSEE VALLEY AUTHORITY

CHATTANOOGA, TENNESSEE 37401
400 Chestnut Street Tower II

USNRC REGION II
ATLANTA, GEORGIA

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July 27, 1983

SQRD-50-328/81-29

U.S. Nuclear Regulatory Commission
Region II
Attn: Mr. James P. O'Reilly, Regional Administrator
101 Marietta Street, NW, Suite 2900
Atlanta, Georgia 30303

Dear Mr. O'Reilly:

SEQUOYAH NUCLEAR PLANT UNIT 2 - 460-VOLT MOTOR DOCUMENTATION -
SQRD-50-328/81-29 - FINAL REPORT

The subject deficiency was initially reported to NRC-OIE Inspector R. V. Crlenjak on April 13, 1981 in accordance with 10 CFR 50.55(e) as NCR SQN EEB 8115. Interim reports were submitted on April 28, August 25, and November 17, 1981 and August 27, 1982. Enclosed is our final report of the subject deficiency.

If you have any questions, please get in touch with R. H. Shell at FTS 858-2688.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

D S Kammer

for L. M. Mills, Manager
Nuclear Licensing

Enclosure

cc (Enclosure):

Mr. Richard C. DeYoung, Director
Office of Inspection and Enforcement
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

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ENCLOSURE

SEQUOYAH NUCLEAR PLANT UNIT 2
460-VOLT MOTOR DOCUMENTATION
NCR SQN EEB 8115
SQRD-50-328/81-29
10 CFR 50.55(e)
FINAL REPORT

Description of Deficiency

TVA's Division of Engineering Design (EN DES) calculations for voltage analysis of the Class 1E 480-volt ac auxiliary power system assumed, where vendor documentation of minimum starting voltage was not available, that 460-volt motors could start with 85 percent of rated voltage at their terminals. NEMA MB-120.45, 1969, requires induction motors to operate within ± 10 percent of their rated voltage. There are 145 460-volt motors fed from the 480-volt Class 1E ac auxiliary power system of units 1 and 2 for which TVA does not have documented minimum starting voltage and that could have less than 90-percent rated voltage at their terminals during starting under worst case conditions (i.e., two-unit full-load rejection).

Safety Implications

Motors which have less than rated starting voltage could be slow in accelerating or, if the voltage is sufficiently low, fail to accelerate and thus prevent them from performing their safety functions.

Corrective Action

The worst case voltage conditions occur during a one-unit LOCA with a simultaneous full-load rejection of the other unit; therefore, only Class 1E motors must be capable of startup at 85 percent of rated voltage. Non-1E loads are not tripped during an accident; however, they do not receive a safety-injection (SI) start signal nor are they required to operate during an accident. To obtain the worst case loading on the boards, it was assumed that the Non-1E loads were running before and during the SI signal-initiated starting voltage transient; however, they would not receive either an operator manual start signal or a process control start signal until the SI-initiated voltage transient ends and steady-state voltage conditions are resumed. At this point, should the terminal voltage be too low for the Non-1E motors to accelerate their loads to rated speed within approximately 10 seconds, the motor overload protection will cause the motor to be tripped from the boards. This will not cause a degraded voltage condition on the Class 1E 480-volt auxiliary power system or prevent it from performing its intended safety function.

Information has been received to effectively deal with 143 items. In summary, 68 motors were Non-1E loads, and 13 Class 1E motors are being replaced under NUREG-0588 with motors capable of starting at 80 percent of rated voltage. Documentation has been received on 46 Class 1E motors stating that they can start at 85 percent of rated voltage or less. Five Class 1E motors were calculated to have 90 percent of rated voltage or better available while starting during an SI-initiated voltage transient with the 6900/480-volt transformers at .975 tap. Four motors are no longer used and six motors are NUREG-0588 Category C, i.e., failure is not detrimental to plant safety or accident mitigation. One load was a heating load which would not be adversely affected. The remaining two motors drive the Electrical Board Room Air Handling Units. An engineering analysis was performed on these two motors because documentation concerning starting the motors under degraded voltage conditions could not be obtained. Using typical engineering data obtained from the equipment manufacturers, the engineering analysis showed that the motors for this equipment could successfully start at 85 percent of rated voltage without adversely affecting the motor insulation.

All analysis required by this NCR has been completed; ECNs L5370, L5745, and L5746 are being issued to replace the existing motors with motors that meet the requirements of NUREG-0588. The work associated with these ECNs is expected to be completed on or before March 31, 1985, which is the date for compliance with the requirements of NUREG-0588.