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

SAFETY EVALUATION REPORT BY THE OFFICE OF SPECIAL PROJECTS

EMPLOYEE CONCERN ELEMENT REPORT EN 24000

"CABLE DERATING"

TENNESSEE VALLEY AUTHORITY

SEQUOYAH NUCLEAR POWER PLANT, UNITS 1AND 2

DOCKET NOS. 50-327 AND 50-328

I. SUBJECT

Category: Engineering (20000)
Subcategory: Cable Ampacity (24000)
Element: Cable Derating (24000)

The basis for Element Report EN 24000, Revision 2, dated May 27, 1987 was the generic applicability determination resulting from employee concerns at all other nuclear plants. One specific concern was identified for Sequoyah Nuclear Plant (SQN).

Employee concerns: The cable ampacity and cable derating concerns are identified as follows:

WI-85-100-009	XX-85-122-027	XX-85-122-028	XX-85-027-029
IN-85-272-004	IN-85-289-006	IN-86-254-005	IN-86-262-002
IN-86-036			

II. SUMMARY OF ISSUE

Employee concerns have been expressed about cable derating in the following areas:

- Cables in general.
- Cables with fireproof coatings.
- Cable trays or conduit wrapped in a fire blanket.
- Cables in firestop or pressure seal barriers.
- Overfilled cables in conduit, trays, firestop or pressure seal barriers.

III. EVALUATION

Inadequacies had been found by Insitute of Nuclear Power Operations (INPO) in TVA's electrical design standards. These design standards had been used to size all the insulated power cable ampacities (auxiliary and control)

throughout all TVA nuclear plants prior to September, 1986. A new standard DS-E12.6.3, "Ampacity Tables for Auxiliary and Control Power Cables (0-15,000V)" has been developed. The standard also addresses ampacities for cable in conduit, cable tray and duct bank as well as derating factors for cable coatings, Appendix R fire wraps, tray covers and bottoms. The acceptability of this standard by the NRC staff is discussed in a separate safety evaluation.

A program to determine the adequacy of electric cables, with respect to ampacity ratings, using the new design standard has been developed. As a result of this program auxiliary AC and DC power cables (V3), operating at a voltage up to 277V and a current of less than 30 amperes, were acceptable as installed. This acceptability was based upon a sampling procedure.

Other power cables (V4) rated 600V with current greater than 30 ampere and (V5) rated voltage 5, 8, or 15KV were reverified 100%. A total of 1446 cables were reverified of which 457 were found to not meet the ampacity of the new standard. However, after further evaluation only 125 cable had to be replaced. The acceptability of this program including the results and corrective action is discussed in a separate safety evaluation report.

This safety evaluation discusses the effect of overfilled cable on conduits, cable trays, and wall & floor penetration firestops/pressure seals. Also discussed are the V4 (480V) power cable bundled in trays and coated with Flamemastic. Further, the application of multicoats of Flamemastic and the accuracy of the cable schedule data base is discussed.

- The fire stop test configuration will be reviewed by TVA to determine the effect of the overfilled conditions on the allowable ampacity. An appropriate derating factor will be determined to ensure that cables in an overfilled firestop do not exceed their qualified insulation temperature rating. The Design Standard DS-E12.6.3 will be revised to include the derating effects of overfilled trays in firestops.

- An analysis will be performed by TVA to determine the effect of ampacity of a cable due to bundling the cables in a portion of the tray, as opposed to spreading them out over the full width, as well as the application of multiple coats of Flamemastic. The analysis will be based on data on overfilled trays. Installation specification G-38 will be revised to mandate installation over the full tray width.

- The ampacities of cable in V4 tray are based on a maximum fill of 30%. All safety-related and associated nonsafety-related cables routed in V4 trays, which exceed the fill criteria, will be individually reviewed by TVA to ensure acceptability.

- Problems associated with the cable and raceway programs had caused overfilled raceways. Also, the validity of the cable and raceway program database will have to be established to assure accurate cable fill information. Accurate cable fill information is required to establish the validity of the cable ampacity reevaluation. These problems and corrective

action are addressed in Employee Concerns EN 23900 report and safety evaluation.

IV. CONCLUSION

The NRC staff concludes that the licensee's investigation of the concerns was adequate and the resolution of the concerns described in Element Report EN 24000-SQN, Revision 2, is acceptable.