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

SAFETY EVALUATION REPORT BY OFFICE OF SPECIAL PROJECTS

EMPLOYEE CONCERN ELEMENT REPORT 24101

"INADEQUATE SPLICING AND TERMINATION PRACTICES AND PROCEDURES"

TENNESSEE VALLEY AUTHORITY

SEQUOYAH NUCLEAR POWER PLANT, UNITS 1 AND 2

DOCKET NOS. 50-327/328

I. SUBJECT

Category:	Engineering (20,000)
Subcategory:	Cable Terminations and Splices (24,100)
Element:	Inadequate Splicing and Terminations Practices and Procedures (24101)
Employee Concern:	IN-85-392-01

Element Report 24101, Revision 2 prepared April 6, 1987, involves an employee concern which asked "What would happen with the large number of electrical splices located underground if the system became flooded? (1) Would the splice hold up under long exposure to moisture? (2) If the splice failed, would a safety related problem occur? (3) Would a back up system be activated?" The employee concern was raised for the Watts Bar facility, but is considered to be generic to Sequoyah since cable splice requirements are similar for all plants.

II. SUMMARY OF ISSUE

TVA Design Criteria SQN-DC-V-12.4 specifies that cables required to maintain the plant in safe shutdown or flooded condition be suitable for submersible operation. The design criteria further states that these cables shall be continuous (not spliced), unless qualified waterproof splices are used based on manufacturers testing to TVA standard specifications which demonstrate proper performance.

As part of TVA's program to qualify cable splices that may be subject to design basis flood levels, TVA provided cable samples to Raychem for test purposes. The samples included low voltage (600 V) power and control cables, signal cables, and medium voltage (8 kV) cables.

Raychem prepared several test configurations of splices on low voltage power, control, and signal cables, using the Raychem Heat Shrink Tubing WCSF-N. The

spliced cables were subjected to 100-day immersion in a pressurized cylinder and tested to pressure and temperature parameters supplied by TVA. Raychem reported test results showing that the samples performed satisfactorily. Raychem also performed the successful test on medium voltage cable splices.

Upon completion of the Raychem tests, the TVA EEB issued the "Criteria and Procedures for Making Splices of Insulated Cables in Manholes and Handholes," for interim use by Construction and for incorporation in standard drawings and Construction Specification G-38.

Additionally, TVA issued three electrical standard drawings to delineate cable splicing procedures and materials. TVA also issued TVA Modifications and Additions Instruction M&AI-7 in 1979 which discusses splicing guidelines and references the electrical standard drawings.

Nevertheless, the adequacy of splices before issuance of the above guidance and all splices prior to 1977 could not be determined. As a result, TVA has initiated corrective action to address and to resolve, if necessary, the matter of underground cable splices. The corrective action includes: (1) a determination of the number and location of all 1E cable splices; (2) a special inspection of all manholes and handholes; and (3) a resolution/repair of any inadequate splices identified above.

III. EVALUATION

NRC and its consultant, SAIC, reviewed the employee concern and the TVA response. A request for additional information (RAI) was sent to TVA in order to obtain a better understanding of the Raychem testing, an adequacy assessment of the 100-day test, a clarification of voltages tested and actual voltage levels at TVA Sequoyah, and additional information on the manhole and handhole walkdown. TVA provided its responses to these questions in their August 13, 1987, letter from TVA to NRC. Basically, TVA clarified the Raychem testing of cable splices, but more importantly, TVA committed to 100% megger and hi-pot testing of all ERCW pumps and MCC cables, and all fire pump cables are being meggered. In addition, TVA will meggar test 50% of the diesel auxiliary boards while 50% of the diesel supply cables are being meggered and hi-potted. Moreover, TVA has committed to performing annual manhole inspections.

IV. CONCLUSION

The NRC staff concludes that the employee concerns were valid and that TVA's investigation, evaluation and corrective action plan for the concerns, as described in element report EN-24101 SQN, Rev. 2, and in their letter of August 13, 1987 are adequate. We further believe that implementation of these actions will close the issue of cable splices in manholes/handholes. Verification of corrective actions which TVA has identified as a restart item, should be verified by NRC inspectors in a future inspection.