TENNESSEE VALLEY AUTHORITY

CHATTANOOGA, TENNESSEE 37401

400 Chestnut Street Tower II

January 21, 1982

Mr. James P. O'Reilly, Director
Office of Inspection and Enforcement
U.S. Nuclear Regulatory Commission
Region II - Suite 3100
101 Marietta Street
Atlanta, Georgia 30303

Dear Mr. O'Reilly:

BELLEFONTE NUCLEAR PLANT UNITS 1 AND 2 - WATER FOUND IN ROCK ANCHOR TENDON HEAD PROTECTIVE GREASE CANS - NCR 1005 - SIXTH INTERIM REPORT

On May 23, 1979, R. W. Wright, NRC-OIE Region II, was informed that the subject nonconformance was determined to be reportable in accordance with 10 CFR 50.55(e). This was followed by our interim reports dated June 22 and November 23, 1979, March 21 and September 24, 1980, and August 24, 1981. An extension for submitting our next report was discussed with R. V. Crlenjak by telephone on January 5, 1982. Enclosed is our sixth interim report. We expect to submit our next interim report by May 12, 1982.

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

Very truly yours,

TENNESSEE VALLEY AUTHORITY

L. M. Mills, Manager
Nuclear Regulation and Safety

Enclosure
cc: Mr. Richard C. DeYoung, Director (Enclosure)
Office of Inspection and Enforcement
U.S. Nuclear Regulatory Commission
Washington, DC 20555

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ENCLOSURE
BELLEFONTE NUCLEAR PLANT UNITS 1 AND 2
WATER FOUND IN ROCK ANCHOR TENDON HEAD PROTECTIVE GREASE CANS
NCR 1005
10 CFR 50.55(e)
SIXTH INTERIM REPORT

Description of Deficiency

Inspection of approximately 20 (10 randomly chosen on each unit) rock anchor tendon head protective grease cans indicates ground water is infiltrating up along the grouted tendon through the grout hole in the shim stack and into the grease cans. The grease cans are filled with grease to protect the tendons and anchorheads from corrosion. Any water entering the grease cans has the potential for causing corrosion. No other TVA plants have a prestressed tendon system.

Interim Progress

To decrease the amount of ground water infiltrating into the grease can, TVA began pumping ground water from 23 holes located in the unit 1 tendon gallery floor in an effort to lower the ground water level in the area of the tendons. These holes are approximately 52-feet deep and were drilled through the floor of the tendon gallery into the rock below. Based on a program set up to monitor the ground water level in the grease cans, it has been determined that pumping of water from the holes will keep most ground water out of the grease cans.

Pumping of water from these 23 dewatering holes located in the unit 1 tendon gallery floor is continuing. Based on the results of the unit 1 monitoring program discussed below, and because ground water infiltration into the unit 2 grease cans is not as severe as for unit 1, drilling of dewatering holes in the unit 2 tendon gallery has been postponed until a 90-day surveillance of the unit 2 membranes is performed. If this monitoring of unit 2 indicates that no water is infiltrating into the grease cans, drilling of the dewatering holes may not be necessary. After plant operation begins, all dewatering holes will be routinely inspected to detect any pump malfunctioning.

The 90-day monitoring program for the unit 1 membranes to determine the amount of ground water, if any, that is infiltrating into the area beneath the membrane has just recently been completed. Results of this monitoring program indicate that there is water infiltrating into only 1 of the unit 1 grease cans (V41), the remaining grease cans show no evidence of water inleakage. This indicates that the dewatering program in conjunction with the grease in the grease cans is preventing ground water from infiltrating into the cans. A determination of the corrective action required for grease can V41 will be made after our review of the corrosion testing program.

The unit 2 membranes have been installed and the 90-day monitoring program will begin as soon as all unit 2 vertical tendons are greased.

Before coupling the unit 2 vertical tendons to the rock anchor tendons, a final visual corrosion inspection of each rock anchor tendon bushing, buttonhead, and anchorhead was perfomed. Results of this inspection, which involved extensive cleaning of all rock anchor components subjected to inspection, revealed that the majority of the components showed an insignificant amount of corrosion with the remaining components showing no evidence of corrosion. Corrosion observed on all but two of the rock anchor tendon components was classified as grade A using the Swedish Standards Institution Standard SIS 05 59 00-1967. Corrosion observed on the remaining two rock anchor tendon components was classified as grade B. Results of this corrosion inspection will be used during the inservice surveillance to determine if additional corrosion has developed since coupling.

The corrosion testing has begun and preliminary results of test 1 and 2 as outlined on the attached revised work schedule are given below. Additional results of the tests previously discussed in addition to results of tests outlined on the attached revised testing schedule will be provided in the next interim report.

Discussion of Test 1

Preliminary results of test 1 affirm that the general corrosion rate of steels depends largely on the amount of oxygen present in the ground water. The tests indicate that for de-oxygenated ground water the corrosion rate ranges from 0.002-0.12 mils/year whereas oxygenated ground water has a corrosion rate ranging from 1.2-2.5 mils/year. Investigations have been initiated to determine the oxygen content of the ground water in the vicinity of the rock anchor tendons.

Discussion of Test 2

Test 2 involved the placement of equal parts (by volume) of water and grease into glass jars. Four samples of ground water with various pH's were introduced to a grease environment. Subsequently, the pH's of each sample was measured over a period of 36 days. Results indicated that the ground water samples having initial pH's of 6.0 and 7.2 showed an initial increase in pH after which the pH remained constant and basic. Ground water samples having initial pH's of 9.0 and 11.0 showed an initial decrease in pH after which the pH remained constant and basic. The actual pH of the ground water at the Bellefonte Nuclear Plant (BLN) has been determined to be 7.2 and the pH of the grease is basic at 8.55.

ATTACHMENT

CORROSION TESTING PROGRAM - TIMETABLE

	Test	Completion Date
1.	General corrosion rate of AISI 4140 (anchorhead material) and ASTM A421 (tendon wire material) steels using electrochemical methods	December 12, 1981
2.	Effect of tendon wire grease on the pH of neutral ground water	November 20, 1981
3.	Stress-corrosion cracking of stressed AISI 4140 steel	March 7, 1982
4.	General corrosion rate of AISI 4140 and ASTM A421 steels by immersion in a ground water environment	March 7, 1982
5.	Stress-corrosion cracking of stressed ASTM A421 steel	September 3, 1982