Public Service

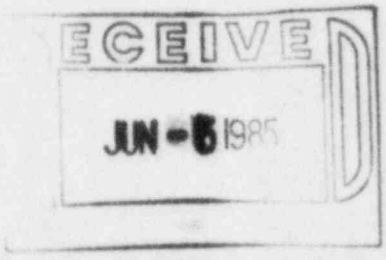
Public Service
Company of Colorado

16805 WCR 19 1/2, Platteville, Colorado 80651

May 23, 1985
Fort St. Vrain
Unit No. 1
P-85115

Regional Administrator
Region IV
Nuclear Regulatory Commission
611 Ryan Plaza Drive, Suite 1000
Arlington, Texas 76011

Attention: Mr. E. H. Johnson



Docket No. 50-267

SUBJECT: PCRV Tendon System Nitrogen Blanket

REFERENCE: 1.) PSC Letter from D. W. Warembourg to E. H. Johnson dated 3/18/85 (P-85084)

2.) PSC Letter from D. W. Warembourg to E. H. Johnson dated 12/31/84 (P-84543)

Dear Mr. Johnson:

As you are aware, Public Service Company has been investigating methods to control the tendon corrosion one of which involves establishing a nitrogen blanket on the PCRV tendon system. The nitrogen blanket would displace oxygen out from the tendon tubes, thus eliminating one of the necessary components for the continuation of microbiological corrosion.

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Public Service Company decided to establish the nitrogen blanket on the tendon groups (bottom crosshead and longitudinal) which have experienced the majority of corrosion. The feasibility of a nitrogen blanket system for all tendon groups would then be determined by the ability to maintain a blanket on these first two tendon groups. The ability to maintain a nitrogen blanket is dependent upon the integrity of the tendon tubes, the bearing plate to concrete joint, the tendon tube to bearing plate joint and the cap to bearing plate joint. The cap to the bearing plate joint was modified on the longitudinal and bottom crosshead tendons to insure a leak tight joint under internal pressure (new o-rings and o-ring retainers were installed). Due to limited accessibility, we did not undertake any modifications to any of the other areas.

After we began work modifying the tendon end caps, work activities associated with the CRDOA's and the helium circulators seriously impacted both top and bottom head work activities to the extent that we had to notify you of our inability to meet our original date of June, 1985 (see Reference 1).

Recognizing the delays and the many uncertainties involved with establishing a nitrogen blanket we proceeded to install a test system using six (6) of the bottom crosshead tendons as a test group to determine the leak tight integrity of the tendon assemblies. The test included a load cell tendon to determine if these instrumented tendons leaked at the same rate. Test T-265 was performed at 10 psig and allowed the pressure to decay to below 5 psi. It was discovered that the load cell tendon leaked substantially more than the other tendons (0.4498 cfm at 10 psig for load cell compared to the average leak rate for the other tendons of 0.0495 cfm at 10 psig). Because of the load cell tendon leak rate, it was eliminated from the rest of the test and another tendon was chosen to replace the load cell tendon.

The final six (6) tendons (minus the load cell tendon) were then connected to a common header and a constant nitrogen pressure of 6 psig was established. From the pressure decay test described above, enough data was collected to generate a curve from which a predicted leak rate for the six tendons at a constant pressure could be determined. At 6 psig, the predicted leak rate was 0.1745 cfm. The actual leak rate (with pressure decay) was 0.1282 cfm. The pressure was then dropped to 2 psig where the predicted leak rate was 0.0518 cfm and the actual was 0.0505 cfm.

The leak rates do not seem substantial until scaled up to 448 tendons. Based on the average leak rate of these six (6) tendons at 2 psig, for 421 tendons without load cells, is 5236.6 cu-ft/day which is approximately one trailer of nitrogen every 28.6 days. The 27 tendons with load cells would require 4069.2 cu-ft/day which is about 36.9 days per trailer of nitrogen. In total (448 tendons) the blanket system would require one trailer of nitrogen every 16 days. It should be noted, that this pressure (2 psig) may not be sufficient to maintain a high quality nitrogen blanket at all times.

We readily recognize that using only six (6) tendons as a data base does not represent a large statistical sample upon which to base total population scaling calculations. We do believe however, that the test is more than adequate to provide general nitrogen use rates.

Given these leak rates, we feel that establishing and maintaining an overall nitrogen blanket system for the tendons is highly questionable. Therefore, Public Service Company is currently investigating where the leaks are located and possible methods to seal the leaks. From preliminary assessments the major leak path appears to be at the bearing plate to concrete joint. Sealing methods being investigated are surface concrete sealants which could penetrate to the joint and "liquid gasket" type of products which can be applied during a tendon liftoff. Public Service Company believes that it is important to find a method to seal the leaks without detensioning the tendons prior to establishing a nitrogen blanket system. Therefore, we have not given up on the nitrogen blanket system, but it is obvious that other investigation will make it impossible to establish a permanent nitrogen blanket on all of the bottom crosshead and longitudinal tendons by the end of June, 1985. We will keep you informed of the sealing investigations and the progress associated with this project on a regular basis.

We are also pursuing other possible resolutions both from short term as well as long term basis. As soon as we have sufficient preliminary information on these other resolutions, we will inform you of possible alternatives and plans. In the interim, we are continuing with our interim surveillance program which provides increased inspection activities to ensure tendon and PCRV integrity.

If you have any questions please feel free to contact Mr. M. H. Holmes at (303) 571-8409.

Very truly yours,

D. W. Warembourg

D. W. Warembourg, Manager
Nuclear Engineering Division

DWW/MJF/ldr

cc: R. L. Craun

Reviewed by: Scott Hopkins 5/24/85