



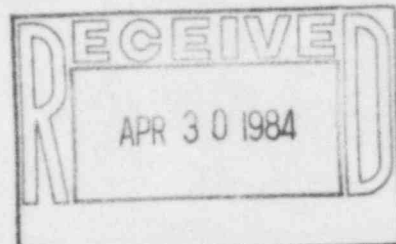
# Public Service Company of Colorado

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50-267

April 25, 1984  
Fort St. Vrain  
Unit #1  
P-84119

Mr. John T. Collins, Regional Administrator  
U. S. Nuclear Regulatory Commission  
611 Ryan Plaza Drive, Suite 1000  
Arlington, Texas 76011



SUBJECT: Fort St. Vrain  
PCRV Tendons

REF: 1) P-84110, Warembourg to  
Collins, dated 04/12/84  
2) G-84120, Collins to Lee,  
dated 04/19/84

Dear Mr. Collins:

As requested in your letter (Ref. 2), we are providing relaxation curves for the Fort St. Vrain PCRV tendon system (Attachment 1). A few words of explanation are in order:

1. For all graphs, the curve labeled "Load Cell" is the alarm setpoint for those tendons equipped with load cells. The curve labeled "Maximum" is the tension expected in the tendons assuming relaxation losses corresponding to the maximum (i.e., Final Safety Analysis Report design) relaxation. The curve labeled "Minimum" is the tension expected in the tendons assuming relaxation losses corresponding to the minimum expected relaxation. Note that neither the "Maximum" nor "Minimum" relaxation curves should be construed as "limits" for the current situation, but are being provided for reference purposes.
2. From the Final Safety Analysis Report, the minimum design initial tendon stress is 1,395 KIPS for 169 wire tendons and 1,255 KIPS for 152 wire tendons (corresponding to 70% GUTS). These minimum values were used in the development of the graphs. In all cases, the actual initial tendon stresses were above these minimum values.
3. For all tendons tested thus far, the lift off has been above the curves of maximum relaxation (again, for reference purposes).

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To bring you up to date on our program, we have completed lift off tests of all accessible longitudinal (vertical) top head tendons. The results of these lift off tests are shown in Attachment 2. Since these tendons were initially stressed in early 1970, the required tension (based only on the maximum relaxation curve at 14 years) is about 1,175 KIPS. Attachment 2 data confirms that all accessible vertical tendon lift off tests are well above this value.

Caution should be used when attempting to make a direct comparison between the values cited as original lift off and those for current lift off. Although we believe a reasonable correlation can be made, it must be remembered that different personnel, equipment, and methods were used for the two different data sets.

We expect to have the rebuild of a borrowed tendon jack completed shortly. Our intent would then be to perform double ended lift off tests on BILU3, detension this tendon, remove one good and one bad wire for evaluation, and then retension the tendon. A similar program for removal of wires from a circumferential and a top cross head tendon will also be performed. Our commitment to perform an expanded-scope surveillance test remains unchanged.

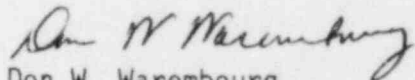
We are continuing our evaluation to determine the minimum required tendon tension to meet the design requirements of the PCRV at any time in plant life. Although independent reviews of this evaluation are still in progress we can state that this "Design Minimum" tension will be a horizontal line which is below the "Load Cell" alarm setpoints shown in Attachment 1. Since our lift-off data to date is above the Maximum Relaxation curve, we have even further margin above any Design Minimum requirements.

In response to your inquiry concerning moisture within the tendon sleeves, as I have previously stated, there is no immediate mechanism for controlling the sleeve atmosphere. However, we have taken the precaution of regreasing the areas of indicated corrosion for the vertical tendons and of removing visible moisture from tendon caps. We would have a similar program for accessible portions of other tendons. Our program for wire removal will provide additional information concerning possible corrosion in the mid-length portion of other tendons including, the bottom cross head tendons.

In the long term, design modifications may be warranted to minimize tendon corrosion, and these modifications are being evaluated presently. However, Public Service Company's position continues to be that the Fort St. Vrain prestressing system is operable and that any future degradation will be detected before minimum requirements are encountered. This position is based on the successful lift-off tests to date, the continuous monitoring provided by the load cells, and the enhanced awareness of the tendon condition provided by our expanded surveillance testing. Therefore, we again request a release from the Commission to return to power operation.

If I can be of further assistance, please let me know.

Very truly yours,



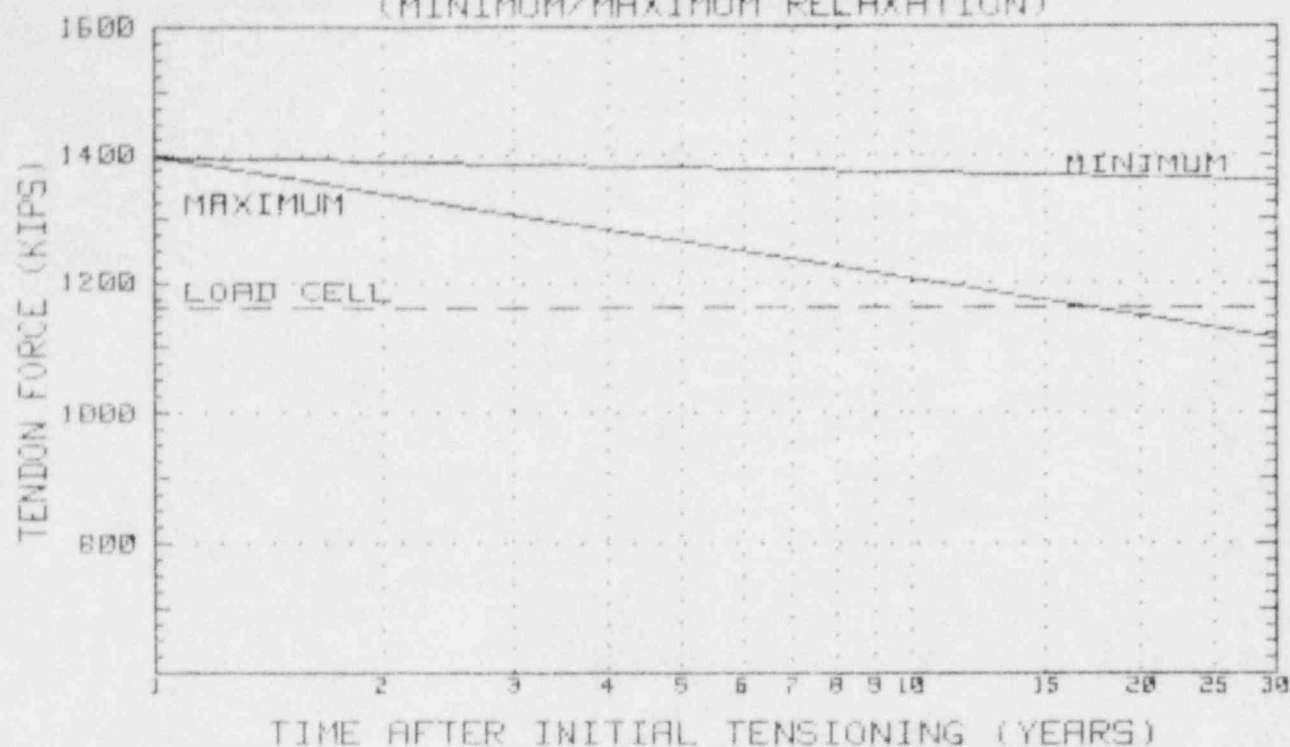
Don W. Warembourg  
Manager, Nuclear Production  
Fort St. Vrain Nuclear  
Generating Station

DWW/alk

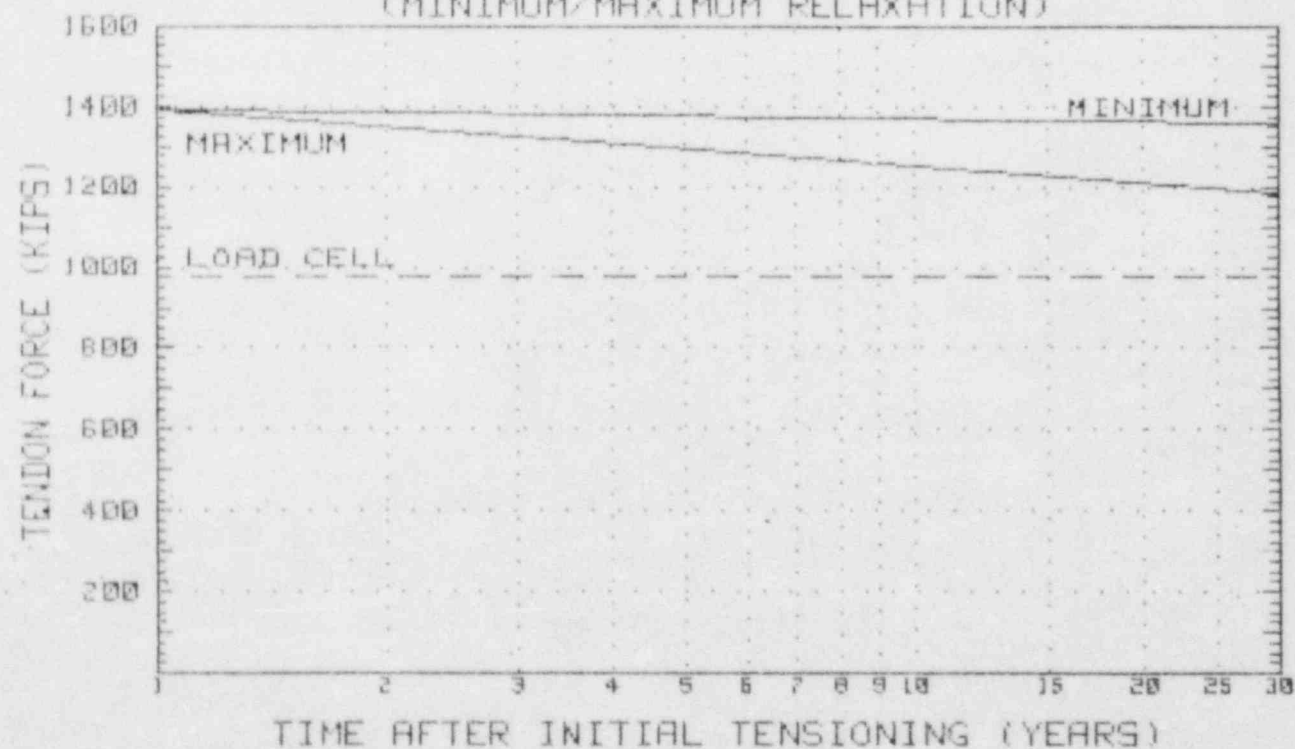
Attachments

ATTACHMENT 1

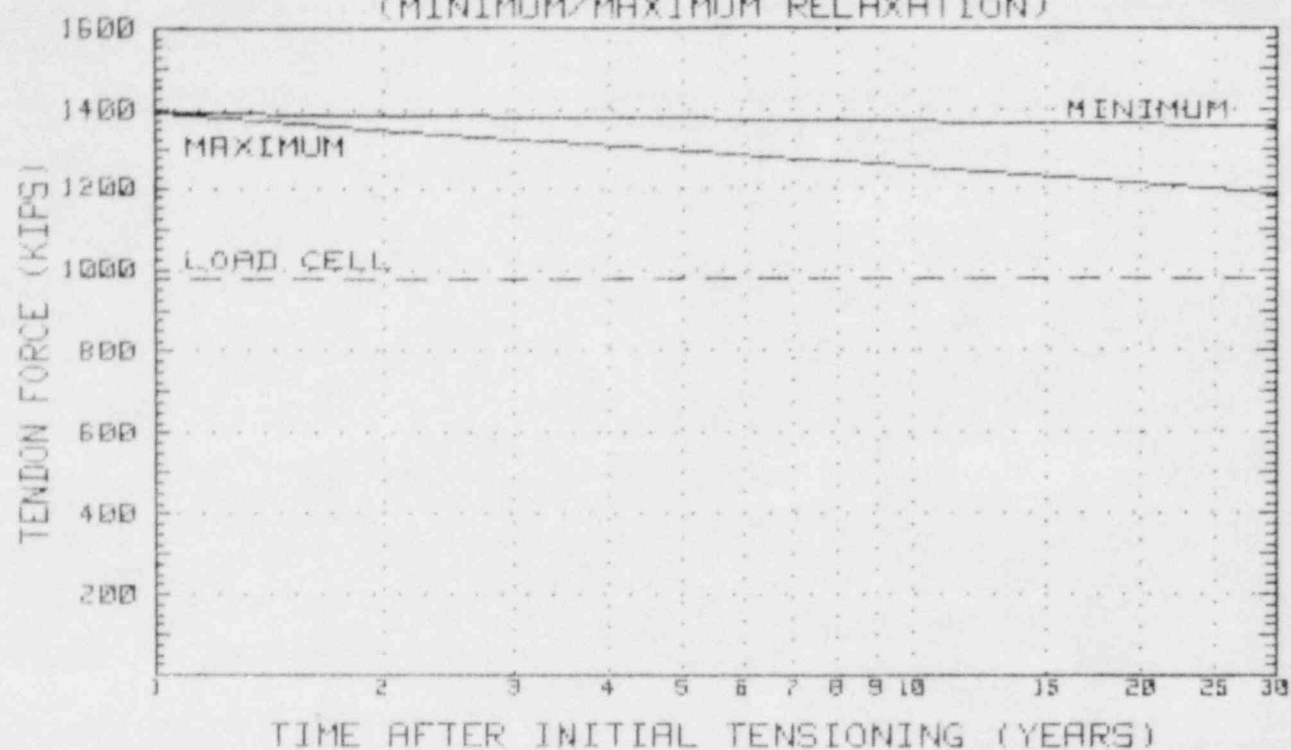
LONGITUDINAL TENDON  
(MINIMUM/MAXIMUM RELAXATION)



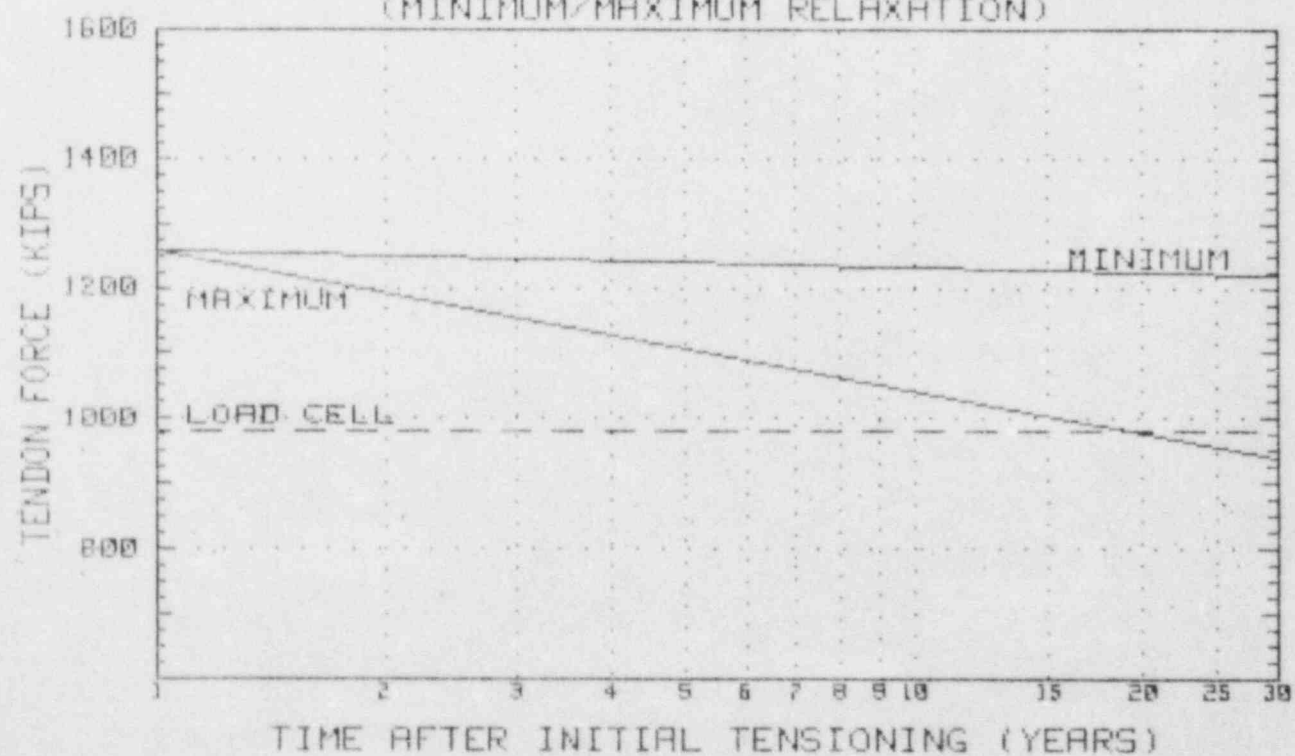
CROSS HEAD TENDON  
(MINIMUM/MAXIMUM RELAXATION)



# CIRCUMFERENTIAL HEAD TENDON (MINIMUM/MAXIMUM RELAXATION)



# CIRCUMFERENTIAL WALL TENDON (MINIMUM/MAXIMUM RELAXATION)



ATTACHMENT 2

ATTACHMENT 2

<u>TENDON NUMBER</u>	<u>ORIGINAL LIFT OFF KIPS</u>	<u>CURRENT LIFT OFF KIPS</u>	<u>NUMBER OF BROKEN WIRES</u>	<u>REMARKS</u>
VI-1	1,440	1,432	0	
VM-1	1,440	1,409	0	
VI-2	1,440	1,348	5	
VM-2	1,430	1,404	0	
VI-3	1,438	Not Accessible	0	
VM-3	1,470	1,445	0	Load Cell Alarm Low = 1,160 KIPS
VI-4	1,440	1,422	0	
VM-4	1,480	1,438	0	
VI-5	1,450	Not Accessible	0	
VM-5	1,440	1,412	0	
VI-6	1,460	Not Accessible	Not Accessible	
VM-6	1,425	1,412	0	
VI-7	1,440	1,430	0	
VM-7	1,445	1,403	0	
VO-7	1,430	1,398	0	
VI-8	1,455	1,438	0	
VM-8	1,445	1,385	3	
VI-9	1,445	Not Accessible	0	
VM-9	1,460	1,451	0	

ATTACHMENT 2

<u>TENDON NUMBER</u>	<u>ORIGINAL LIFT OFF KIPS</u>	<u>CURRENT LIFT OFF KIPS</u>	<u>NUMBER OF BROKEN WIRES</u>	<u>REMARKS</u>
VI-10	1,470	1,390	5	Load Cell Alarm Low = 1,160 KIPS
VM-10	1,450	1,344	3	
VI-11	1,440	1,423	0	
VM-11	1,440	1,380	1	
VI-12	1,435	Not Accessible	0	
VM-12	1,460	1,438	0	
VI-13	1,445	Not Accessible	0	
VM-13	1,440	1,424	0	
VI-14	1,440	1,443	0	
VM-14	1,460	1,430	0	
VO-14	1,440	1,380	4	
VI-15	1,455	1,427	0	
VM-15	1,450	1,417	0	
VI-16	1,450	1,422	0	
VM-16	1,460	1,438	0	
VI-17	1,450	1,433	0	
VM-17	1,484	1,454	5	Load Cell Alarm Low = 1,160 KIPS
VI-18	1,450	1,417	0	
VM-18	1,450	1,438	0	

ATTACHMENT 2

<u>TENDON NUMBER</u>	<u>ORIGINAL LIFT OFF KIPS</u>	<u>CURRENT LIFT OFF KIPS</u>	<u>NUMBER OF BROKEN WIRES</u>	<u>REMARKS</u>
VI-19	1,430	1,406	0	
VM-19	1,450	1,438	0	
VI-20	1,450	1,443	0	
VM-20	1,460	1,448	0	
VI-21	1,455	1,443	0	
VM-21	1,445	1,442	0	
VO-21	1,440	1,401	0	
VI-22	1,455	1,444	0	
VM-22	1,420	1,412	0	
VI-23	1,425	1,433	0	
VM-23	1,440	1,417	0	
VI-24	1,440	1,430	0	Load Cell Alarm Low = 1,160 KIPS
VM-24	1,425	1,422	0	
VI-25	1,430	1,428	0	
VM-25	1,460	1,443	0	
VI-26	1,445	Not Accessible	0	
VM-26	1,450	1,433	0	
VI-27	1,450	1,454	0	
VM-27	1,450	1,428	0	
VI-28	1,440	Not Accessible	0	

ATTACHMENT 2

<u>TENDON NUMBER</u>	<u>ORIGINAL LIFT OFF KIPS</u>	<u>CURRENT LIFT OFF KIPS</u>	<u>NUMBER OF BROKEN WIRES</u>	<u>REMARKS</u>
VM-28	1,440	1,417	0	
VO-28	1,440	Not Accessible	0	
VI-29	1,460	1,446	0	
VM-29	1,430	1,404	1	
VI-30	1,420	1,406	0	
VM-30	1,460	1,296	21	
VI-31	1,450	1,438	0	
VM-31	1,450	1,429	0	Load Cell Alarm Low = 1,160 KIPS
VI-32	1,430	Not Accessible	0	
VM-32	1,448	1,423	0	
VI-33	1,440	Not Accessible	0	
VM-33	1,460	1,449	0	
VI-34	1,440	Not Accessible	0	
VM-34	1,450	1,443	0	
VI-35	1,430	1,433	0	
VM-35	1,450	1,428	0	
VO-35	1,480	Not Accessible	0	
VI-36	1,445	1,460	0	

ATTACHMENT 2

<u>TENDON NUMBER</u>	<u>ORIGINAL LIFT OFF KIPS</u>	<u>CURRENT LIFT OFF KIPS</u>	<u>NUMBER OF BROKEN WIRES</u>	<u>REMARKS</u>
VM-36	1,450	Not Accessible	0	
VI-37	1,430	Not Accessible	0	
VM-37	1,430	1,444	1	
VI-38	1,450	1,431	0	Load Cell Alarm Low = 1,160 KIPS
VM-38	1,460	1,438	0	
VI-39	1,445	1,438	0	
VM-39	1,450	1,438	0	
VI-40	1,440	1,438	0	
VM-40	1,450	1,433	0	
VI-41	1,440	Not Accessible	0	
VM-41	1,450	1,440	0	
VI-42	1,460	1,464	0	
VM-42	1,450	1,425	1	
VO-42	1,480	1,459	0	