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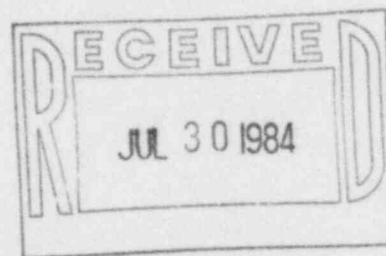
OSCAR R. LEE
VICE PRESIDENT

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July 18, 1984
Fort St. Vrain
Unit #1
P-84221

Mr. E. H. Johnson, Chief
Reactor Project Branch 1
Region IV
Nuclear Regulatory Commission
611 Ryan Plaza Drive, Suite 1000
Arlington, TX 76011



SUBJECT: PSC Actions in Response To NRC
Evaluation of Fort St. Vrain

Dear Mr. Johnson:

This letter is to provide you with a summary of PSC actions to date with respect to control rod drive inspections and to inform you of future control rod inspections and testing as well as planned actions in the other areas addressed in the NRC inspection conducted the week of July 9, 1984.

Motor power consumption profiles have been obtained and scram verifications have been made for all 37 control rod drive and orifice assemblies (CRDOA's) resident in the core on June 23, 1984. We have completed our examination of the control rod drives from Regions 7 and 14, and are currently in the process of examining the control rod drive from Region 10. Testing and inspection of the two CRDOAs recently examined consisted of the following:

- 1) Overall visual inspections of the CRDOAs in the "as found" condition.
- 2) Collection of free rotational torque data from the 200 Assembly gear train and the motor-brake assemblies.
- 3) Disassembly and visual inspection of the motor-brake assemblies including one motor rotor bearing from each of the CRDOAs.
- 4) Disassembly and visual inspection of the Region 7 CRDOA 200 Assembly gear train.

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Testing has also been performed on a spare CRDOA motor-brake assembly to establish the sensitivity of the brake to moisture with no sensitivity being detected.

Motor power consumption profiles and scram time data for the 37 CRDOAs were compared to historical data. No significant differences were noted, and all data were within design expectations.

Overall visual examinations of the CRDOAs, thus far, have revealed evidence of minor oxidation of the carbon steel components, previous moisture condensation, and small quantities of unidentified particulate matter. No indications that the CRDOAs had experienced excessive temperatures were noted. Free rotational torque data obtained from the 200 Assemblies and the motor-brake assemblies showed no evidence of unacceptable performance, but variations were observed in the individual motor rotor bearings. These variations were not significant to the operability of the CRDOA. The specific visual examinations of the CRDOA subassemblies showed no evidence of excessive wear, pitting, improper lubrications, gear misalignment, or other conditions which could have resulted in CRDOA inoperability.

A review of historical information and design documents has revealed no correlation between the CRDOAs that failed to scram and the CRDOA removal/replacement activities during the third refueling, or their purified helium purge flow supplies (subheaders). A correlation was observed, however, relative to the specific circumstances prevailing at the time of the June 23, 1984 incident and those which prevailed during the only other similar event. This similar event occurred on February 22, 1982, and was reported to the NRC via Reportable Occurrence No. 82-007. In both events, high moisture levels in the primary coolant led to icing of the helium purification train low temperature gas-to-gas heat exchanger which resulted in a temporary loss of train flow and hence a loss of purge flow to the CRDOA penetrations. Additionally, operational data taken prior to each event established that affected withdrawn CRDOAs were operable to scram before the above conditions existed.

Based on the information above, we believe that further investigations should concentrate on potential failure modes associated with these coincident conditions. It is anticipated that investigation results will dictate that immediate corrective actions be taken to shutdown the reactor whenever high moisture levels (limiting dewpoint temperature to be determined) are coincident with a loss of CRDOA purge flow.

With respect to an immediate plan of action, PSC intends to pursue the following:

- 1) Continue investigations into the effects of purge flow loss coincident with high primary coolant moisture levels,
- 2) Continue to collect particulate matter found in the CRDOA subassemblies, and analyze it for constituent parts. (NOTE: Successful analysis is contingent upon sufficient particulate being available for collection),
- 3) Disassemble and inspect the motor-brake assemblies of the remaining four CRDOAs that failed to scram on June 23, 1984 (Regions 6, 10, 25, and 28),
- 4) Disassemble and inspect the CRDOA 200 Assembly gear train from Region 25,
- 5) Functionally test one 30 weight percent and one 40 weight percent reserve shutdown hopper,
- 6) Perform a physical examination of the Reserve Shutdown material subsequent to testing,
- 7) Clean disassembled components of the CRDOAs inspected, as appropriate, using wet or dry wiping, nitrogen blowdown, or alcohol solution methods.
- 8) Perform a test to determine the back EMF generated during scram for all 37 CRDOAs,
- 9) Perform a test to determine the sensitivity of the motor bearing assembly to moisture relative to free rotational torque,
- 10) Perform a test to determine the effects of exercising a CRDOA to ascertain the self clearing characteristics of the assembly,
- 11) Disassemble and inspect the motor-brake assemblies of two CRDOAs which properly scrambled on June 23, 1984. In addition, one of the selected CRDOAs will undergo disassembly and inspection of its 200 Assembly gear train.

It is PSC's position that inspection of additional CRDOAs to those planned would not provide any more significant information relative to identifying the mechanism for the affected CRDOAs failing to scram and would not improve the performance of the CRDOAs. This position is based on the following:

- 1) Inspections to date have not revealed any CRDOA physical abnormalities which could have resulted in a loss of scram function.
- 2) Motor power consumption profiles for all 37 CRDOAs subsequent to the event illustrate that they are functioning properly and well within design expectations.
- 3) Free rotational torque data taken before and after disassembly and cleaning of the inspected CRDOA 200 Assembly have revealed no significant changes in performance.
- 4) Scram verification data for all 37 CRDOAs taken subsequent to the event are well within FSAR limits. This suggests that no physical degradation is present which would inhibit the CRDOA's scram functions.
- 5) Since all withdrawn CRDOAs had been verified operable prior to this event (and the same was true with respect to the February 22, 1982 event), abnormal degradation of the CRDOAs is not indicated as the failure mechanism. The event appears to be due primarily to the specific plant conditions that existed at the time: high primary coolant moisture levels coincident with a loss of CRDOA purge flow.

It must be emphasized that this position is founded on experience to date. If future findings suggest the need for further testing and inspections, PSC will reassess this position.

With respect to remaining CRDOA issues, prior to startup, PSC commits to:

- 1) Evaluate a CRDOA preventive maintenance program for future refuelings,
- 2) Develop a surveillance test to assure that Control Rod Drive motor temperatures (for those with installed instrumentation) will be monitored in conjunction with the weekly rod drop test throughout the remainder of Cycle 3 whenever power levels are above 30%.

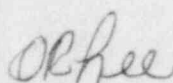
- 3) Evaluate the adequacy of the weekly rod drop test to demonstrate CRDOA operability.

Regarding other subjects discussed with the NRC the week of July 9, 1984, PSC provides the following:

- 1) Moisture Ingress Committee modification recommendations will be evaluated and finalized. An installation schedule will be developed and submitted in future correspondence.
- 2) PSC recognizes the need to upgrade the Fort St. Vrain Technical Specifications and, as indicated in discussions held with the NRC, fully intends to submit all upgrade revisions by the end of 1985. Preliminary schedule estimates indicate, however, that the NRC recommended submittal date of January 1, 1985, is not feasible. A proposed schedule for this activity will be submitted as soon as it is developed.
- 3) A schedule for evaluating improvements in the conduct of operations and maintenance activities will be submitted prior to startup.

We believe that this information provides an up to date summary of our current knowledge and planned actions associated with those items discussed with the NRC during the inspection conducted the week of July 9, 1984. As indicated previously, we are performing our engineering evaluations concurrent with our CRDOA inspection program with the intent of providing a final report as soon as possible upon completion of the inspection program. If you have any questions or require further clarifications, please contact Mr. Don Warembourg at (303) 785-2223.

Very truly yours,


O. R. Lee
Vice President,
Electric Production

ORL/djm