APPENDIX

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

NRC Inspection Report: 50-267/88-01 License: DPR-34

Docket: 50-267

Licensee: Public Service Company of Colorado (PSC)

Facility Name: Fort St. Vrain Nuclear Generating Station

Inspection At: Fort St. Vrain (FSV) Nuclear Generating Station, Platteville, Colorado

Inspection Conducted: January 1-31, 1988

Inspectors: Robert E. Farrell 2-9-88
R. E. Farrell, Senior Resident Inspector (SRI) Date

Paul W. Michaud 2-3-88
P. W. Michaud, Resident Inspector (RI) Date

Approved: T. F. Westerman 2-16-88
T. F. Westerman, Chief Date
Reactor Projects Section B

Inspection Summary

Inspection Conducted January 1-31, 1988 (Report 50-267/88-01)

Areas Inspected: Routine, unannounced inspection of operational safety verification, followup of NRC bulletin, licensee action on licensee event reports (LERs), core safety limit, monthly surveillance observation, monthly maintenance observation, radiological protection, and monthly security observation.

Results: Within the eight areas inspected, no violations or deviations were identified.

DETAILS

1. Persons Contacted

Principal Licensee Employees

D. Alps, Supervisor, Security
*M. Block, Superintendent, Nuclear Betterment
*L. Brey, Manager, Nuclear Licensing and Fuels
*R. Craun, Manager, Nuclear Site Engineering
*J. Eggebroten, Superintendent, Technical Services Engineering
D. Evans, Superintendent, Operations
*M. Ferris, Manager, QA Operations
*C. Fuller, Station Manager
*J. Gramling, Supervisor, Nuclear Licensing Operations
*M. Holmes, Manager, Nuclear Licensing
*M. Niehoff, Manager, Nuclear Design
*F. Novachek, Manager, Technical/Administrative Services
*J. Reesy, Staff Assistant, Nuclear Engineering
*R. Sargent, Assistant to Vice President, Nuclear Operations
*L. Scott, Manager, QA Services
*P. Tomlinson, Manager, QA
R. Walker, Chairman of the Board and CEO
*D. Warembourg, Manager, Nuclear Engineering
*R. Williams Jr., Vice President, Nuclear Operations

The NRC resident inspectors also contacted other licensee and contractor personnel during the inspection.

*Denotes those attending the exit interview conducted February 2, 1988.

2. Operational Safety Verification

The NRC resident inspectors reviewed licensee activities to ascertain that the facility is being operated safely and in conformance with regulatory requirements and that the licensee's management control system is effectively discharging its responsibilities for continued safe operation.

The NRC resident inspectors toured the control room on a daily basis during normal working hours and at least twice weekly during backshift hours. The reactor operator and shift supervisor logs and Technical Specification compliance logs were reviewed daily. The NRC resident inspectors observed proper control room staffing at all times and verified operators were attentive and adhered to approved procedures. Control room instrumentation was observed and the operability of the plant protective system and nuclear instrumentation system were verified by the NRC resident inspectors on each control room tour. Operator awareness and understanding of abnormal or alarm conditions were verified. The NRC resident inspectors reviewed the operations order book, operations deviation report (ODR) log, clearance log, and temporary configuration

report (TCR) log to note any out-of-service safety-related systems and to verify compliance with Technical Specification requirements.

The licensee's station manager and superintendent of operations were observed in the control room on a daily basis, with the superintendent of operations frequently in the control room during the day and during testing or other evolutions.

The NRC resident inspectors verified the operability of a safety-related system on a weekly basis. The reactor building ventilation system, emergency condensate system, 125 VDC essential power distribution system, and primary coolant moisture monitoring system were verified operable by the NRC resident inspectors during this report period. During plant tours, particular attention was paid to components of these systems to verify valve positions, power supplies, and instrumentation were correct for current plant conditions. General plant conditions and housekeeping were noted and found to be acceptable.

Shift turnovers were observed at least weekly by the NRC resident inspectors. The information flow appeared to be good, with the shift supervisors routinely soliciting comments or concerns from reactor operators, equipment operators, and auxiliary tenders.

While investigating a problem with "C" helium circulator buffer helium supply valve on January 14, 1988, a technician tapped on an instrument air regulator on the valve actuator, which caused the valve to open and resulted in a trip of "C" helium circulator. The NRC resident inspectors verified the appropriate actions were taken by the control room operators, including a power reduction to less than 30 percent in accordance with the licensee's commitment to have 4 circulators in operation above 30 percent power. Following repairs to the valve as described in paragraph 7 of this report, "C" helium circulator was returned to operation and no further problems were encountered during this report period. Although repairs to this valve indicated the problem to be of an individual nature, the NRC resident inspectors questioned the licensee's preventive maintenance activities for the instrument air system. The licensee is presently conducting an indepth evaluation of the instrument air system, including operability and maintenance issues, and informed the NRC resident inspectors that this event will be considered in this evaluation. The NRC resident inspectors are working closely with the licensee's system engineer to keep informed of the licensee's evaluation and any problems or concerns encountered.

On January 27, 1988, the licensee installed a new initial pressure regulator feedback controller in the turbine EHC system. This new controller allowed 10 percent stroke testing of fully open valves in the turbine steam supply lines while at power without a loss of load. Previously, this test was performed manually with an associated load reduction. The new controller functioned in a nominally acceptable manner, however, a 2 to 3 MW change in turbine load did occur during the valve stroke test. This change in turbine load was reflected in the flux

controller as a significantly larger signal due to instrument interactions and amplifications. The changing load signal from the new controller resulted in a cycling load signal in the flux controller, which responded by inserting and withdrawing the regulating control rod. Reactor power cycled approximately 3 percent from its original level of 77.6 percent in response to the rod motion. A rod withdrawal prohibit, presently set at 82 percent plus or minus 0.75 percent, was received during the transient. The control room operators promptly took manual control of the flux controller, which stopped the transient, and returned the reactor power to match secondary power. The NRC resident inspectors reviewed data from chart recorders, data logger file, and alarm printouts and concluded that at no time did reactor power exceed the license limitation of 82 percent. The highest recorded average reactor power level was 81.4 percent. The licensee is working with the turbine vendor to determine whether testing of the turbine steam supply valves can be accomplished in the manner attempted without a load reduction and without a cycling load signal. The NRC resident inspectors will monitor the licensee's actions in this area.

No violations or deviations were identified in the review of this program area.

3. Followup of NRC Bulletin

The NRC resident inspectors reviewed the documentation and correspondence associated with IE Bulletin 80-11, "Masonry Wall Design." In a letter dated January 15, 1986 (Berkow to Walker), the NRC issued a supplemental safety evaluation, which concluded the safety-related masonry wall design is adequate and the requirements of IE Bulletin 80-11 were fully implemented. The NRC resident inspectors performed an additional walkdown of safety-related masonry walls and reinforcements and verified that all modifications were completed. Based on the documentation referenced above and the physical inspection, IE Bulletin 80-11 is considered closed.

No violations or deviations were identified in the review of this program area.

4. Licensee Action on Licensee Event Reports (LERs)

The following LERs were reviewed to verify the specified corrective actions had been completed and to ensure the corrective actions were effective in preventing a recurrence:

- LER 78-02 reported that control rod drive and orificing assembly (CRDOA) operating temperatures were greater than expected. Additional temperature monitoring instrumentation was installed on each CRDOA under Change Notice (CN) 1709 during the 1984 refueling outage. The surveillance frequency for exercising CRDOAs during operation has been increased to a weekly requirement in accordance with Interim Technical Specification 4.1.1.B. These actions were committed to in the LER and have been performed. In addition, any CRDOAs whose temperature exceeds 215°F is monitored hourly and a

partial scram test is performed daily on the CRDOA with the highest temperature above 215°F, in accordance with Interim Technical Specification 4.1.1.A.1. These actions are considered sufficient to close LER 78-02.

LER 80-12 reported an incorrect interpretation of Technical Specification LCO 4.1.9 by operations personnel, which resulted in exceeding the temperature limits of this LCO. This condition was due, in part, to the inability to close a stuck orifice valve, which was subsequently corrected. The operations personnel were instructed to make literal interpretations of LCOs and to log any interpretations made. Changes to LCO 4.1.9 were submitted to the NRC in 1983 and, after numerous revisions, were accepted in November 1987 (License Amendment No. 57). This revised LCO 4.1.9 requires higher primary coolant flows, but allows more flexibility in orifice position configurations. The NRC inspectors consider the corrective actions in response to this LER to be sufficient and no further problems of this type have been observed. LER 80-12 is considered closed.

LER 81-25 reported operation of the liquid nitrogen storage system outside the requirements of LCO 4.2.12. A level of 600 gallons was reached due to a loss of electrical power to the fill valve; the LCO requires 650 gallons in the liquid nitrogen storage tank. CN 1932 installed a manual handjack on the fill valve to allow operation of the valve in the event of a loss of electrical power. The corrective actions in response to this LER have been determined to be sufficient and LER 81-25 is considered closed.

LER 86-22 identified a design error in corrective action being taken to correct an NRC identified single failure point in the 480 VAC essential bus relay logic. The NRR staff reviewed this logic in 1985 (TIA 85-02, Revision 1) and concluded that although this deficiency in relay logic design could have precluded auto start of the diesel generators, manual operation of the diesel generators was sufficient at FSV to protect public health and safety. However, the NRC staff also required that the single failure point in the 480 VAC essential bus relay logic be corrected. In July 1986, with the plant in an extended outage for equipment environmental qualification, the licensee identified a design error in the earlier corrective action while doing a related design change. The problem was due to a design oversight. A new design change was completed on February 6, 1987, and was inspected and verified by the NRC resident inspectors as documented in paragraph 8 of NRC Inspection Report 50-267/87-05. This design change eliminated the NRC identified single failure point and corrected the licensee's identified error which was reported in LER 86-22. The capability for manual operation of the diesel generators has always existed. The licensee's designers and independent reviewers have subsequently received special training on design requirements and the two individuals involved in this specific oversight have been reprimanded. This LER is considered closed.

LER 86-30 reported a lack of seismic qualification and documentation for the emergency diesel generator exhaust temperature switches and clutch position switches. The licensee's corrective actions included testing and qualification of the exhaust temperature switches, replacement of the clutch position switches with qualified switches, additional training of personnel involved in design change activities, and a review of procedures governing plant modifications and design document changes. The NRC resident inspectors verified each of these corrective actions have been completed satisfactorily. This LER is considered closed.

No violations or deviations were identified in the review of this program area.

5. Core Safety Limit

The NRC resident inspectors reviewed the licensee's Technical Specification Safety Limit 3.1, "Reactor Core - Safety Limit," and associated Technical Specification SR 5.1.6, "Core Safety Limit Surveillance." The core safety limit for the high temperature gas cooled reactor limits the total power to flow ratio integrated over time for the lifetime of each fuel segment. The Technical Specification contains a graph which shows limiting power to flow ratios and limiting times at each power to flow ratio as a function of core power. Allowable power to flow ratios range from 1.05 at 15 percent core thermal power to a maximum allowable of 1.17 at 40 percent core thermal power decreasing to 1.05 at 100 percent core thermal power.

The licensee is required by Technical Specification Safety Limit 3.1 and Surveillance SR 5.1.6 to record and monitor the total time of each fuel segment above the permitted range of power to flow ratios. The concern here is migration of fuel particle kernels through the carbide coating at elevated temperature due to carbon sublimation.

The licensee performs Surveillance 5.1.6 weekly. During the current fuel cycle, which began in June 1984, there has been no operation with power to flow ratios that have counted towards the total allowable time at such power to flow ratios listed in Safety Limit 3.1.

The licensee's related Technical Specifications governing total primary coolant flow at low power, power peaking, and primary coolant flow orifice position effectively require operations with a power to flow ratio less than 1.0. The power to flow ratio increases towards 1.0 but does not reach 1.0 as core power is increased to the licensee's authorized maximum power of 82 percent of licensed design power.

The licensee's Procedure SR 5.1.6-W, Issue 28, "Core Safety Limit," requires in Step 5.4.4 that the technical services department supervisor be notified immediately if a core safety limit may have been violated.

The licensee's Technical Specification 7.2.a requires an immediate reactor shutdown with restart only after NRC authorization should a safety limit be violated.

The NRC resident inspectors concluded that the licensee's observed operational practice and procedures precluded violation of the core safety limit. Surveillance of this limit as required by Technical Specification SR 5.1.6 is being performed. The NRC resident inspectors routinely monitor power to flow ratios when the reactor is operating and have detected no times when the power to flow ratio exceeded 1.

No violations or deviations were identified in the review of this program area.

6. Monthly Surveillance Observation

The NRC resident inspectors witnessed the performance of the surveillance activities listed below. Each test procedure was reviewed for conformance with Technical Specification requirements and administrative controls. The NRC resident inspectors verified the qualifications of personnel performing each surveillance test and independently verified the accuracy of selected test results. The surveillance activities observed during this report period were:

- SR 4.1.1.A.1A-X, "High Motor Temperature Partial Scram Test," which is performed every 24 hours on the control rod drive motor with the highest temperature above 215°F. Rod Drive Motor No. 12 has consistently run hot at higher power levels and was tested on a daily basis when its temperature was above 215°F. The NRC resident inspector observed four of these daily tests and verified the tests had been performed as required during this report period. No degradation or abnormal characteristics were observed during the performance of this surveillance.

- SR 4.1.1.B.1-2-W, "Weekly 10 Inch Scram Test," which verifies the operability of all control rods which are not fully inserted into the core. A 10-inch scram of each applicable control rod pair is performed individually from the control room, with the time to scram 10 inches indicative of the rod drive mechanism's operability. Additionally, back EMF readings were taken on each control rod drive motor during the performance of this surveillance test. The NRC inspectors also reviewed data from the other tests performed during this inspection period. No discrepancies were noted.

- SR-RE-17-W, Circulator Speed and Wobble Check, is required to be performed daily on all operating circulators in accordance with the licensee's commitments expressed in letter P-87327 dated September 21, 1987 (Williams to Calvo), and accepted by the NRC in a letter dated November 20, 1987 (Heitner to Williams). The NRC

resident inspectors verified this surveillance is being performed daily and after any unexpected speed change. No discrepancies were noted.

No violations or deviations were identified in the review of this program area.

7. Monthly Maintenance Observation

A problem with the "C" helium circulator buffer helium supply was identified by the licensee. The controller in the control room appeared to be making large swings in its output in order to achieve small changes in the buffer helium flow. An examination of the supply valve's motion showed only a small movement in response to the controller's large output, so the licensee's maintenance technician tapped on the valve's instrument air pressure regulator. This caused the valve to respond to the controller's signal and go rapidly in the open direction. An excessive amount of buffer helium was supplied to "C" helium circulator, which resulted in an automatic trip of the circulator. The NRC resident inspectors observed troubleshooting efforts and repairs to the valve and its associated instrument air regulator. The air regulator was removed and disassembled. The NRC resident inspectors examined the internals of the regulator and found no indications of abnormal conditions. In particular, no evidence of moisture or desiccant breakthrough was found. The NRC resident inspectors monitored the installation of a new instrument air pressure regulator which was obtained from the warehouse onto the "C" helium circulator buffer helium supply valve. A review of the associated procurement records verified the new part was the correct replacement item. The NRC resident inspectors observed the installation and post-maintenance testing of the valve and the subsequent return of "C" helium circulator to operation. A cause for the old instrument air regulator's malfunction cannot be established because no visible abnormalities were present. The licensee has claimed that this occurrence was an isolated incident due to the regulator sticking for an unknown reason and then being freed when hit by the maintenance technician. The licensee has instructed all maintenance personnel not to disturb instrumentation or equipment in a random manner in order to preclude other occurrences of this type.

A steam leak incident in the turbine building was followed by the NRC resident inspectors. Although this was not safety-related, the leak presented a potential challenge to other equipment and presented an opportunity to observe the licensen's response and resolution of a problem of this nature.

On January 28, 1988, a 1-inch root valve to PT-5243, "Turbine Throttle Pressure Transmitter," blew its packing, resulting in a small mainsteam leak to the turbine building atmosphere. The NRC resident inspectors observed the licensee's evaluation of the situation and determination of parallel action paths to be taken in response. Since the output of PT-5243 feeds into the feedwater flow control circuitry and thus affects

the integrated plant control system, the control room operators placed the affected controller, PT-5243, and both feedwater flow controllers and the flux controller in manual until the leak was repaired. The NRC resident inspectors observed that an extra shift supervisor was stationed in the control room and the operators were standing at the control boards under these conditions. The leaking valve was shut and repacked while plant operation continued. All systems were returned to automatic control in approximately 4 hours.

No violations or deviations were identified in the review of this program area.

8. Radiological Protection

The NRC resident inspectors verified that required area surveys of exposure rates were made and posted at entrances to radiation areas and in other appropriate areas. The NRC resident inspectors observed health physics professionals on duty on all shifts including the backshift. The NRC resident inspectors observed the health physics technicians checking area radiation monitors, air samplers, and doing area surveys for radioactive contamination.

The NRC resident inspectors observed that when workers were required to enter areas where radiation exposure is probable or contamination possible, the health physics technicians were present and available to provide assistance.

No violations or deviations were identified in the review of this program area.

9. Monthly Security Observation

The NRC resident inspectors verified that there was a lead security officer (LSO) on duty authorized by the facility security plan to direct security activities onsite for each shift. The LSO did not have duties that would interfere with the direction of security activities.

The NRC resident inspectors verified, randomly and on the backshift, that the minimum number of armed guards required by the facility's security plan were present. Search equipment, including the X-ray machine, metal detector, and explosive detector, were operational or a 100 percent hands on search was being utilized.

The protected area barrier was surveyed by the NRC resident inspectors. The barrier was properly maintained and was not compromised by erosion, openings in the fence fabric or walls, proximity of vehicles, or crates or other objects that could be used to scale the barrier. The NRC resident inspectors observed the vital area barriers were well maintained and not compromised by obvious breaches or weaknesses. The NRC resident inspectors observed that persons granted access to the site are badged indicating whether they had unescorted or escorted access authorization.

The NRC resident inspectors monitored the licensee's actions following the loss of the normal electrical power supply to security systems on December 28, 1987. Because the system was being powered from a non-vital source while repairs were being made, compensatory measures were taken by the licensee to augment the number of security officers on duty in order to be capable of manning each post immediately should the backup power source fail. The NRC resident inspectors verified that the complement of security officers on duty during all shifts met this level. The security system's power supply was restored to normal on January 22, 1988.

No violations or deviations were identified in the review of this program area.

10. Exit Meeting

An exit meeting was conducted on February 2, 1988, attended by those identified in paragraph 1. At this time, the NRC resident inspectors reviewed the scope and findings of the inspection.