

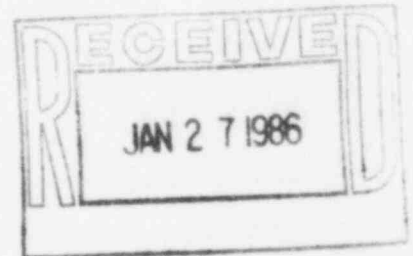
Public Service
Company of Colorado

2420 W. 26th Avenue, Suite 100D, Denver, Colorado 80211

January 21, 1986
Fort St. Vrain
Unit No. 1
P-86036

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

Attn: Mr. E. H. Johnson



Docket No. 50-267

SUBJECT: 10CFR50.59 Safety Evaluation
for Change Notice CN-1622

REFERENCE: PSC Letter Dated 07/20/84,
Warembourg to Johnson
(P-84224)

Dear Mr. Johnson:

In a letter dated July 20, 1984 (referenced above), Public Service Company of Colorado (PSC) submitted a report, in accordance with 10CFR50.59(b), of changes, tests and experiments not requiring prior Commission approval which were made to the Fort St. Vrain (FSV) facility.

Change Notice CN-1622 (addressed in the referenced letter) authorized the removal of Class 1E functions from the 4160 Volt undervoltage system and the installation of new undervoltage protection on the 480 Volt essential buses. The 10CFR50.59 report correctly states, "It was determined that an occurrence of loss of offsite power will initiate identical results with the new relaying modifications as with the previous undervoltage system."

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The Hot Reheat Steam Line Safety Valves are addressed in FSAR Section 10.2.5.3. A Change Notice Reissue (Reissue B) to CN-1622 authorized a change in the actuation mode for these valves. The reissue removed the Turbine trip and Reserve Auxiliary Transformer lockout signals in addition to the 4160 Volt undervoltage signals and replaced them with appropriate trip signals from the 480 Volt essential buses undervoltage scheme. The 10CFR50.59 Safety Evaluation for this Change Notice stated:

"All incidents described in the Final Safety Analysis Report concerning a loss of offsite power (with or without a loss of the unit generator and one emergency generator) will have identical results with the relaying modification."

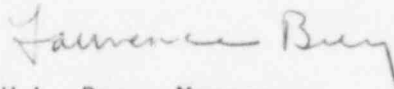
Updating the FSAR in accordance with 10CFR50.71, the description of the actuation mode was changed from "...two power operated relief valves actuated by turbine trip,..." in Revision 2 to "... two power operated relief valves actuated by loss of or degraded voltage on two of the three 480 VAC essential buses,..." for Revision 3.

Reviews by Nuclear Reactor Regulation (NRR) and NRC Region IV Inspection & Enforcement (I&E) have indicated to PSC that the Safety Evaluation of the change to the facility as described in the FSAR does not either explicitly address the change to the Hot Reheat Steam Line Safety Valve actuation mode authorized by the Change Notice Reissue (B) or reference the applicable FSAR section for change.

Enclosed please find a copy of the reissued Safety Evaluation which includes reference to the specific change in the Hot Reheat Steam Line Safety Valve actuation mode and applicable FSAR sections.

Should you have any questions concerning this matter, please contact Mr. M.H. Holmes at (303) 480-6960.

Very truly yours,



H.L. Brey, Manager
Nuclear Licensing and Fuels Division

HLB/JS:pa

Enclosure

cc: M. Skow, Region IV, NRC



SAFETY EVALUATION

CATEGORY

TYPE:

- CN OVERALL
- CN SUBMITTAL
- SETPOINT CHANGE REPORT
- TEST REQUEST
- TEMPORARY CONFIGURATION REPORT
- PROCEDURE CHANGE (FSAR)
- OTHER

CLASSIFICATION: ARE THE SYSTEM(S) EQUIPMENT OR STRUCTURES INVOLVED, OR DOES THE ACTIVITY AFFECT:

- | | | | | | |
|----------------|---|-----------------------------|-------------------------|---|--|
| CLASS I | <input checked="" type="checkbox"/> YES | <input type="checkbox"/> NO | ENGINEERED SAFEGUARD | <input checked="" type="checkbox"/> YES | <input type="checkbox"/> NO |
| SAFE SHUTDOWN | <input checked="" type="checkbox"/> YES | <input type="checkbox"/> NO | PLANT PROTECTIVE SYSTEM | <input checked="" type="checkbox"/> YES | <input type="checkbox"/> NO |
| SAFETY RELATED | <input checked="" type="checkbox"/> YES | <input type="checkbox"/> NO | SECURITY SYSTEM | <input type="checkbox"/> YES | <input checked="" type="checkbox"/> NO |

REMARKS

EVALUATION

Use Additional Sheets if Required

- DOES THIS ACTIVITY AFFECT STRUCTURES, SYSTEMS, COMPONENTS, EQUIPMENT, TESTS, EXPERIMENTS OR PROCEDURES DESCRIBED IN THE FSAR OR TECH SPECS? YES NO
 LIST THE APPLICABLE SECTIONS REVIEWED: FSAR Sections reviewed: 7, 8, 10.2, 10.3, Appendix C.
 Tech Specs reviewed: LCO 4.4.1, 4.6.1, SR 5.4.1, SR 5.6.1, and SR 5.3.3.
- DOES THE ACTIVITY REQUIRE THAT CHANGE(S) BE MADE TO THE FSAR OR TECH SPEC? YES NO
 LIST SECTIONS TO BE CHANGED AND THE CHANGES TO BE MADE: FSAR Sections: 7.1.2.3, 8.2.5.3.2, 10.2.5.3; Tables 7.1-3; Figures 7.1-1, 8.2-5, 8.2-9, 8.2-10 must be revised to describe the new relaying scheme. Tech Specs: LCO 4.4.1, Table 4.4-1 note d and e, the basis for LCO 4.6.1, SR 5.4.1, Table 5.4-1 all must be revised to describe the new relaying scheme.
- DETERMINE WHETHER OR NOT THE ACTIVITY INVOLVED IS AN UNREVIEWED SAFETY QUESTION UTILIZING THE FOLLOWING GUIDELINES.
 - HAS THE PROBABILITY OF OCCURRENCE OR THE CONSEQUENCES OF AN ACCIDENT OR MALFUNCTION OF EQUIPMENT IMPORTANT TO SAFETY PREVIOUSLY EVALUATED IN THE FSAR BEEN INCREASED?
 YES NO STATE BASIS: The modifications to the protective relaying associated with this CN remove Class 1E functions from undervoltage relays on the low voltage side of the Reserve Aux. Transformer. These undervoltage relays are not Class 1E and should not be relied upon to invoke Class 1E safety actions. The Class 1E functions being removed are now being placed on a new 2 out of 3 coincidence protective relaying scheme located on the
 (Continued...)
 - HAS THE POSSIBILITY OF AN ACCIDENT OR MALFUNCTION OF A DIFFERENT TYPE THAN ANY EVALUATED PREVIOUSLY IN THE FSAR BEEN CREATED? YES NO STATE BASIS: The only sequence of events that could change associated with this modification would be a loss of power to the Reserve Aux. Transformer when the main generator is on the line and in house loads are being fed from the Unit Aux. Transformer. With the present system, the emergency
 (Continued...)
 - HAS THE MARGIN OF SAFETY, AS DEFINED IN THE BASIS FOR ANY TECHNICAL SPECIFICATION OR IN THE FSAR BEEN REDUCED?
 YES NO STATE BASIS: No margin of safety exists, as defined in the basis for a technical specification or in the FSAR that describes the method of protective relay design used for protection of the auxiliary power system.

DOES THE ACTIVITY APPEAR TO: INVOLVE AN UNREVIEWED SAFETY QUESTION YES NO

BE SAFETY SIGNIFICANT YES NO

BY

James C. Sch...
(SIGNATURE)

1/9/86
(DATE)

APPROVED

JL John...
(SIGNATURE)

1-9-86
(DATE)

Continued from page 1....

- 3.a 480 Volt essential (Class 1E) switchgear. A description of this and additional protective relaying changes for the essential 480V buses are described in EGG-EA-5926, Rev. 1 which begins on page B2 of this CN. A safety evaluation written by the NRC is associated with this modification and is attached to this safety evaluation. All incidents described in the Final Safety Analysis Report concerning a loss of offsite power (with or without a loss of the unit generator and one emergency generator) will have identical results with the new relaying modification. The probability of occurrence or the consequences of an accident or malfunction described in the FSAR will therefore not be increased. The non Class 1E main turbine trip and reserve auxiliary transformer lockout signals are being replaced with appropriate Class 1E actuation signals from the 480 VAC essential undervoltage relaying scheme to initiate the required operation of the Hot Reheat Steam Line safety valves.
- 3.b generators would be automatically started; however, no load shedding etc. functions would occur. Due to the voltage monitoring at the Reserve Aux. Transformer no longer initiating a diesel start, after the modification is installed, this auto diesel start could be eliminated. A manual start would be required. Because no vital timing requirements exist, this does not facilitate the creation of a new accident mode.

James C. Sal 1/9/86

J R Johns 1-9-86



From G-82338, DATED 10/12/82

SAFETY EVALUATION
FORT ST. VRAIN NUCLEAR GENERATING STATION
DOCKET NO. 50-267
DEGRADED GRID VOLTAGE PROTECTION FOR THE CLASS 1E SYSTEM

INTRODUCTION AND SUMMARY

The criteria and staff positions pertaining to degraded grid voltage protection were transmitted to Public Service Company of Colorado (PSC) by NRC Generic Letter dated June 3, 1977. In response to this, by letters dated October 15, 1980, October 20, 1980, December 16, 1981, May 28, 1982, June 7, 1982 and June 23, 1982, the licensee proposed certain design modifications and changes to the Technical Specifications. A detailed review and technical evaluation of these proposed modifications and changes to the Technical Specifications was performed by EG&G, under contract to the NRC, and with general supervision by NRC staff. This work is reported by EG&G in "Degraded Grid Protection for Class 1E Power Systems Fort St. Vrain Nuclear Generating Station" (attached). We have reviewed this technical evaluation report and concur in the conclusion that the proposed electrical design modifications are acceptable.

EVALUATION CRITERIA

The criteria used by EG&G in its technical evaluation of the proposed changes include GDC-17 ("Electric Power Systems") of Appendix A to 10 CFR 50; IEEE Standard 279-1971 ("Criteria for Protection Systems for Nuclear Power Generating Stations"); IEEE Standard 308-1977 ("Voltage Ratings for Electrical Power Systems and Equipment - 60 Hz"); and staff positions defined in NRC Generic Letter to PSC dated June 3, 1977.

PROPOSED CHANGES, MODIFICATIONS AND DISCUSSION

The existing undervoltage protection at Fort St. Vrain consist of the following:

Two non-Class 1E undervoltage relays set a 79.7% of nominal monitor the 4160 volt output of the reserve auxiliary transformer. Actuation of one of these relays, when the unit is being supplied by the reserve auxiliary transformer, will result in shedding of all three 480 volt essential buses, automatic starting of the diesel generators, initiation of load sequencing and actuation of an alarm in the control room.

Actuation of both relays will result in disconnection of the 4 kV non-essential buses, through which the offsite power is fed to the 480 volt essential buses. Auxiliary contacts on the circuit breaker for the diesel generator disable the load shed feature when the emergency diesel generators are supplying the 480 volt Class 1E buses. The load shed feature will be reinstated when the diesel generator output breakers are tripped.

The following electrical system design modifications and technical specification changes were proposed by PSC:

1. Installation of three undervoltage relays (ITE-27H) arranged in a two-out-of-three logic per 480 volt Class 1E bus with a setpoint of 416 ± 20 volts (86.7% of 480 volt nominal). Each relay is connected to a 120 ± 5 second timer. Actuation of any one relay will provide an alarm in the control room. Actuation of two of the three for longer than 120 seconds will separate the affected bus from the offsite power system.

2. Installation of three undervoltage relays (ITE-27H) arranged in a two-out-of-three logic per 480 volt Class 1E bus. These relays have a setpoint of 288 ± 14.4 volts (60% of 480 volt nominal) with a timer set at 30 ± 1.5 seconds. Actuation of two-out-of-three of these relays on two-out-of-three of the 480 volt Class 1E buses will after a 30 second time delay initiate a reactor scram.

3. Installation of three inverse time (CV-2) undervoltage relays arranged in a two-out-of-three logic per 480 volt Class 1E bus. These relays are set at 93 volts $\pm 3\%$ time dial 5 (77.5% of 480 volt nominal). Actuation of two of these relays on a bus will restore power to the affected bus by automatic throwover to its adjacent bus. There are three 480 volt Class 1E buses. This automatic throwover will allow connection of bus 1 and bus 2 or bus 2 and bus 3 to the same power source. These relays only affect an automatic throwover for a loss of offsite power to the 480 volt Class 1E buses. Interlocks are provided to prevent connecting more than two Class 1E buses together. In addition interlocks will prevent a second automatic throwover if the first automatic throwover fails to restore power to the affected bus.

4. Installation of three inverse time (CV-2) undervoltage relays arranged in a two-out-of-three logic per 480 volt Class 1E bus. These relays are set at 82 volts, time dial 6 (68.3% of 480 volt nominal). Actuation of two-out-of-three of these relays on two-out-of-three 480 volt Class 1E buses will trip the offsite source breakers to all three 480 volt Class 1E

buses, start both emergency diesel generators, and initiate load shedding on all three 480 volt Class 1E buses. Upon achieving satisfactory voltage and frequency diesel generator 1A breaker will close and loads will be sequenced on 480 volt bus 1 and similarly diesel generator 1B breaker will close and loads will be sequenced on 480 volt bus 3. The 480 volt bus 2, which does not have a connected diesel generator, will be connected by the automatic throwover switch to either 480 volt bus 1 or bus 3. The power source selected for bus 2 is determined by which of the diesel generator buses first achieves satisfactory frequency and voltage. Circuitry which incorporates timers, lock out relays and throwover switch auxiliary contacts is used to provide interlocks that will prevent the closure of more than one throwover attempt, i.e., bus 2 to 1 or bus 2 to 3. Once the selection of power to bus 2 has been made and the applicable throwover switch has been positioned, these interlocks and relays will prevent any additional automatic operation to connect bus 2 to an alternate power source. If power to bus 2 should be subsequently lost, this circuitry will require manual operator action, controlled by plant procedures, to reset the lockout relay prior to transferring bus 2 to an alternate source.

5. The technical specification changes and additions required for the proposed modifications have not been formally submitted by the licensee. However, they have provided preliminary information which will be required in the technical specifications. PSC has committed to formally submit the finalized technical specifications in October, 1982. This will coincide with equipment installation.

We find that the proposed modifications will ensure that the Class 1E equipment is protected from the effects of degraded voltage. However; the existing undervoltage protection uses two non-Class 1E relays to monitor the 4160 volt output of the reserve auxiliary transformer. Spurious actuation or failure of one of these relays will lead to undesired separation of the 480 volt essential buses from the preferred offsite power system, initiation of load shedding on the Class 1E buses and result in unnecessary challenges to the onsite emergency diesel generators. An example, on June 5, 1982, while the reactor was at 15% power, inadvertent actuation of one of these existing non-Class 1E relays resulted in a temporary loss of AC power to all 480 volt Class 1E buses. The proposed protective relay system for the 480 volt Class 1E buses meets staff requirements and provides the necessary undervoltage protection for all Class 1E equipment without reliance on the existing non-Class 1E protective relays.

The above concerns regarding the existing undervoltage protection have been discussed with the licensee. If the existing non-Class 1E undervoltage protective relays are to be retained as protection for the 4160 volt non-Class 1E buses, we require that the Class 1E functions i.e., diesel generator starting, 480 volt bus breaker tripping and load shedding on the 480 volt Class 1E buses be deleted from these relays. These safety functions shall be carried out only by the proposed Class 1E protective relay system to be installed on the 480 volt Class 1E buses.

CONCLUSIONS

We have reviewed the EG&G technical evaluation report and the licensee's submittals and find that:

1. The proposed degraded grid modifications will protect the Class 1E equipment from sustained degraded voltage of the offsite power system.
2. The existing load shedding circuit will block load shedding once the emergency diesel generators are supplying the safety loads. The load shedding feature will be reinstated if the diesel generator breaker should trip.
3. The preliminary technical specification information supplied by the licensee is acceptable. However; we require that a formal submittal be made of the changes and additions to technical specifications prior to installation of the proposed modification.
4. If the non-Class 1E undervoltage protective relays which presently monitor the 4160 volt output of the reserve auxiliary transformer are to be retained as protection for the non-Class 1E 4160 volt bus and equipment, we require that the Class 1E functions i.e., diesel generator starting, 480 volt bus breaker tripping and load shedding on the 4160 volt Class 1E buses be deleted from these relays.

We therefore find the licensee's proposed modifications acceptable subject to completion of items 3 and 4 above. After resolution of these items with PSC, PSB will issue a supplement to this evaluation report.

Attachment:
EG&G Technical Evaluation
Report