U. S. NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT
REGION IV

IE Inspection Report No. 50-267/76-13 Docket No. 50-267

Licensee: Public Service Company of Colorado License NO. DPR-34

Facility: Fort St. Vrain Nuclear Generating Station Category B

Location: Platteville, Colorado

Type of Licensee: Power Reactor (HTGR 330, MWe-GGA)

Type of Inspection: Routine, Announced

Dates of Inspection: November 15-17, November 29 - December 3 and December 7-8, 1976

Dates of Previous Inspection: October 4-7, 10-14, and 28-29, 1976

Inspector: T. F. Westerman, Reactor Inspector — 12/29/76 Date

Accompanying Inspectors: E. J. Johnson, Reactor Inspector — 12/29/76 Date

G. L. Madsen, Chief, Reactor Operations and Nuclear Support branch — 12/29/76 Date

Reviewed By: G. L. Madsen, Chief, Reactor Operations and Nuclear Support Branch — 12/29/76 Date

SUMMARY OF FINDINGS

Enforcement Action

A. Violations

None

B. Infractions

Contrary to Criterion V of Appendix B to 10 CFR 50, Section B.5(c) of the licensee's approved QA plan, and Internal Work Procedure IWP-2, a Controlled Work Procedure was not issued for the replacement of electrical system breakers initiated under Field Change Notice 3385(A). (DETAILS, Section 4.b(1))

C. Deficiencies

None

Licensee Action on Previously Identified Enforcement Items

Previous items of noncompliance associated with the following inspection reports were inspected for completion of corrective action.

Inspection Report 50-267/75-04
" " 50-267/75-07
" " 50-267/76-09

The status of these items of noncompliance is as discussed in the Details, paragraph 7, of this report.

Design Changes

None

Other Significant Findings

A. Current Unresolved Items

1. 7613-01 Shift Turnover Instructions

The November 17, 1976 issuance of Amendment 16 to the Facility Technical Specification incorporates Regulatory Guide 1.33 requirements for shift turnover instructions. Plant instructions have not yet been developed. (DETAILS, paragraph 9.c)

(continued)

2. 7613-02 LCO 4.2.11 Loop Impurity Level, Low Temperature, LCO

   A record of integrated time has not been maintained of critical reactor operation between 725°F and 1100°F average outlet temperature. (DETAILS, paragraph 5.b(4))

3. 7613-03 Failure to Include Limiting Conditions in Surveillance Procedures

   Several surveillance procedures reviewed during inspection 76-09 were noted to lack the appropriate limiting condition for operation (LCO) within the body of the procedure. This could result in the violation of an LCO during the performance of a surveillance test. (DETAILS, paragraph 9.e)

4. 7613-04 Penetration Seals in the Confinement Building

   Two penetration seals in the confinement building had been breached to permit the routing of temporary piping. (DETAILS, paragraph 3.c(1))

D. Status of Previously Identified Unresolved Items

The following previously unresolved items were reviewed during this inspection:

7504-3	Backup Bearing Water System
7512-1	Records Procedure
7607-4	Seismic and Environmental Qualification
7607-5	ASCO Solenoid Valves
7609-3	NI Calibration Criteria
7609-4	Administrative Control of Nondestructive Examination (NDE)
7609-5	Contractor Design Verification
7601-4	System 91 Hydraulic
7608-1	Calibration of Test Equipment

Previously unresolved items 7609-3, 7609-5 and 7608-1 are considered resolved. (DETAILS, paragraph 8)

Entrance and Exit Meetings

An entrance meeting was held with Mr. Swart on November 15, 29 and December 7, 1976.

Exit interviews were held w[illegible] Mr. Brey on December 3, 1976 and Mr. Swart on December 8, 19[illegible] Mr. Swart was contacted by telephone on December 19, 1976.

(continued)

A. General

The purpose of the inspection was stated to be to review plant operations; fire protection/prevention; Stage 2 corrective action; review of safety limits, limiting safety system setting, and limiting conditions for operation; the November 23, 1976 simultaneous opening of steam/water dump valves; previous items of noncompliance; previous unresolved items; and other previously identified inspection followup items.

B. Items of Noncompliance

The item of noncompliance identified in the summary section of this report was reviewed.

C. Unresolved Items

The unresolved items identified in the summary section of this report were reviewed.

(continued)

1. Persons Contacted

Public Service Company of Colorado

J. H. Gahm, Training Coordinator
B. W. Warembourg, Director Quality Assurance
C. E. Tracy, Superintendent Operations QA
J. C. Solodiewicz, QA Engineer
F. Swart, Superintendent Nuclear Production
P. Mathie, Superintendent - Maintenance
W. Billyard, Supervisor Technical Services
M. Ferris, Engineer Technical Services
D. Frost, Engineer Technical Services
W. Rodgers, Operations Supervisor
M. McBride, Resident Engineer
S. McCabe, Resident Engineer
C. Bissett, QA Engineer
H. Revie, QA Engineer
L. Brey, Superintendent - Operations
O. Lewis, Maintenance
H. Wiggins, Reactor Operator
L. Singleton, Shift Supervisor
L. Evans, Auxiliary Equipment Operator
D. Hood, Shift Supervisor
J. Vandyke, Acting Supervisor of Operations
J. Reesy, Home Office Electrical Engineering

General Atomic

J. Wange, Site Project Manager
J. Bowers, Engineering
J. Loops, QA Engineer
D. Pettycord, Manager of QA

2. Fire Prevention/Protection

a. Objective

The objective of this inspection effort was to verify that the licensee had developed, implemented and is maintaining an effective fire prevention/protection program throughout the facility.

b. Areas Reviewed

The inspector reviewed the licensee's administrative, quality assurance and emergency procedures to verify that:

(continued)

(1) Work control procedures which define requirements for operations personnel approval and control of all construction, modification, and maintenance activities performed within the plant boundary or within the proximity of vital equipment have been developed as a part of the plant administrative procedures.

(2) Work control procedures require special authorization for activities involving welding, open flame, or the use of other ignition sources and that they take cognizance of nearby flammable material, cable trays, or critical process equipment.

(3) Work control procedures for construction, modification, or maintenance activities require a firewatch, with capability for communication with the control room, if an activity identified in '2' above is to be performed in the proximity of flammable material, cable trays, or vital process equipment.

(4) Quality Assurance procedures have been established which require periodic audit of Work Requests for construction, modification, and maintenance activities.

(5) Quality assurance surveillance is periodically performed during construction, modification, and maintenance activities to assure proper operations personnel authorization, and conformance with established controls (especially ignition source control provisions and firewatch adequacy).

(6) If any cable penetration seals have been installed, replaced, or modified, a quality assurance verification was performed to confirm that the seal material was not flammable.

(7) Administrative controls have been imposed that require review of all replacement cable penetration seals to assure flammable materials are not used.

(8) Emergency fire fighting procedures have been prepared for specific vital areas such as the control room and the cable spreading room, and that fire drills are required on an established frequency.

The inspector also performed the following:

(9) A review of the results and corrective action for the licensee's most recent fire inspection.

(continued)

(10) A detailed inspection of the control room, auxiliary electrical room, 480 V switchgear room and 40' of the reactor building. This inspection was to examine:

(a) The fire alarms for these areas

(b) The extinguishing equipment available

(c) The actuating controls available.

(11) A review of the results of recently conducted fire drills.

(12) A review of the preventive maintenance program in use to maintain fire fighting equipment.

c. Findings

(1) The following administrative procedures were reviewed to determine if the above items were adequately addressed:

ADM-12 "Maintenance and Repair Procedures"

Specifies that maintenance and modification procedures require that replacement material be procured per IWF-1, establishes the administrative approvals needed to perform maintenance or modification activities.

ADM-27 "Maintenance/Repair/Modification/Testing Requested or Performed by Outside Personnel, Contractors or Agencies"

Specifies the administrative approvals necessary for such activities, requires special precautions to avoid damage to critical equipment, to maintain control over combustibles and specifies use of ADM-29 procedures for welding or cutting operations.

ADM-29 "Control of Ignition Sources During Maintenance"

Specifies procedures and precautions to be observed for welding or cutting operations including approvals, use of fire watch, etc.

ADM-30 "Control of Combustibles"

Defines combustible material and specifies requirements for handling this material in the plant.

(continued)

IWP-1 "Interdepartmental Work Procedure for the Procurement and Control of Quality Related Material and Services"

Specifies fire stop material as Q (quality) items.

IWP-2 "Interdepartmental Work Procedure for Modifications to Plant Systems, Equipment or Structures"

Specifies controlled use of combustibles and indicates precautions to ensure that fire stops are not violated.

(2) The inspector reviewed the Quality Assurance Surveillance results for the most recent inspection of the fire prevention area. This consisted of OASP 1801, Attachment 6.1, "Fire Prevention" performed on August 17, 1976. This surveillance covered the major aspects of the fire prevention program with the exception of a review of the preventive maintenance program for fire prevention/protection equipment. A licensee representative indicated that the preventative maintenance program is covered under a separate surveillance procedure at which time the maintenance of fire equipment would be reviewed.

(3) The inspector reviewed the licensee's firefighting training program. This consists of a nine hour initial course for all employees with a two hour annual refresher course. An advanced firefighting course is provided for all shift personnel and the standby assistance personnel. In addition, plant familiarization was conducted for the local fire department during the past year. The licensee schedules six fire drills annually and the inspector reviewed results of drills conducted May 19, August 24 and September 16, 1976. The inspector had no questions in this area.

(4) The inspector reviewed a portion of the licensee's preventative maintenance program for fire protection equipment. This consisted of:

Surveillance Test 5.4.2-A "Control Room Smoke Detector Functional" - annual test of response of the smoke detectors mounted in control room panels.

Weekly Fire Hazard Inspection - a weekly walk-though of the plant by operations personnel to determine if any fire hazards are present.

(continued)

[illegible] "[illegible] Fire Extinguishers" [illegible] inspect, [illegible] and overhaul [illegible].

[illegible] "Inspection of Fire Hoses" [illegible] periodic hydrostatic test [illegible] stations outside the plant.

[illegible]-2 "Inspection of Fire Hose Stations" covers routine maintenance of hose stations within the plant.

PTT-3 "Standby Diesel Generator and Controls" checks actuation and operation of CARDOX system in the D/G rooms.

The inspector determined that the above preventative maintenance checks were in close agreement with those presented in the National Fire Protection Association Codes and had no further questions at this time.

(5) The inspector examined the fire protection and prevention measures for the control room, auxiliary electric room and 480V switchgear room. The measures provided consist of:

(a) Control Room -

Two emergency air breathing manifolds, one by each entrance

Halon system with manual initiation feature

CO_2 extinguishers

HVAC surge and vent system control

Smoke detectors mounted in control room panels

Master Pyralarm indicators for reactor building, 480V switchgear room alarm panels

Annunciators for position indicators on key valves in the fire hose riser system

Annunciators for deluge system actuation

(b) Auxiliary Electric Room -

Two Scott Air Packs near one entrance

Halon system with manual initiation control at door

(continued)

CO_2 extinguishers

Two emergency air breathing manifolds, one by each entrance

Hose station near door

(c) 480 V Switchgear Room -

Two Scott Air Packs near entrance

Emergency air breathing manifold near door

Halon system with manual initiation feature outside entrance

CO_2 extinguishers

Dry chemical extinguisher

Smoke detectors and local indicating panel at door with master alarm in control room

Hose station near door

CARDOX station outside door with sufficient scope to reach any interior point of the room.

The inspector had no questions in this area.

(6) A tour of the reactor building was conducted to examine the fire protection/prevention equipment installed. Each level in the reactor building is equipped with several hose stations (one in each corner) and approximately six CO_2 or dry chemical extinguishers. The inspector noted one hose reel that was not hung properly and four hose nozzles that were not stored in the fully shut position. These items were brought to the attention of the licensee. The inspector had no further questions in this area.

(7) The inspector examined six recently completed modifications (WA75E 3290, WA75E 3159C, CN 302, CN 414, CN 327 and CN 453) to determine that they included appropriate controls to ensure that fire stops disturbed during the modification were restored and that new penetrations made were provided with protection. No discrepancies were noted in this area.

The inspector had no further questions in this area.

3. Review of Plant Operations

a. Objective

The objective of this inspection effort was to ascertain whether or not facility log books are in conformance with licensee administrative procedures, whether licensee personnel conduct plant patrols consistent with quality assurance program or Technical Specification requirements and whether shift and control room manning is in compliance with 10 CFR 50 or Technical Specification requirements.

b. Areas Reviewed

Within the scope of this inspection effort the following areas were reviewed.

(1) Log books and operating records including:

(a) Shift supervisor and control room logs for the period November 16-26, 1976.

(b) Operating Orders book entries from September 16, 1976.

(c) Jumper log (ADM-22 Form 1's).

(d) Plant Trouble Reports issued since September 16, 1976.

(2) Drop-in inspections of the control room throughout the period of the inspection to determine that manning requirements are met and that operations are being conducted in a formal manner.

(3) A tour of accessible areas to include the following:

(a) Selected monitoring instrumentation recording as required.

(b) Plant housekeeping conditions.

(c) Existence of fluid leaks.

(d) Existence of excessive piping vibrations.

(e) Radiation controls properly established.

(f) Pipe hanger/seismic restraint settings and oil levels.

(continued)

(g) Selected valve positions or equipment start positions.

(h) Equipment lockout tag information.

(4) Discussions with control room operators pertaining to the reasons for lighted annunciators.

(5) Verification that plant tours are being conducted by plant supervisory personnel as required by the Quality Assurance Program.

c. Findings

(1) During a tour of the facility, the inspector noted that two pipe penetration seals from the Liquid Nitrogen bottle area (outside the confinement building) to the interior of the confinement had been breached by what appeared to be temporary lines. In one case, the penetration seal boot had been cut to allow a run of copper tubing into the confinement. In the other case a penetration seal had been removed entirely to allow a hose into the confinement. The inspector noted that the confinement was under a negative pressure, at the time of this tour, and air flow through these breached penetrations was into the confinement.

Technical Specification 4.5 requires in part that: "The plant shall not be operated at power . . . unless: (a) Reactor Building Integrity is maintained as follows: . . . ." Although the specification specifically addresses only truck doors or personnel access doors, the intent is to preclude a ground level release point for radioactivity for any postulated occurrence.

During this segment of the inspection, the plant was shutdown. The inspector indicated that this item would remain unresolved until a future inspection when the plant was at power.

(2) In his review of current operating orders, the inspector noted that an audit had recently been conducted of the orders. Many of the orders contained in the book had been noted by the auditor to be outdated or needed within the operating procedures. The inspector expressed his concern that the operating orders be kept up to date.

(3) The inspector reviewed all Plant Trouble Reports (PTR) issued since September 16, 1976 for the following systems: 11, 12, 21, 22, 25, 31, 42, 45, 62, 63, 92 and 93. The

(continued)

inspector verified that there were no noncompliance items that were not reported as required by the Technical Specifications and to determine that the limiting conditions for operation were satisfied for the items identified on the PIR.

The inspector selected 24 PIR reports for detailed review with the plant technical service staff to satisfy the above requirements. No items of noncompliance were noted in this review.

One PIR (9-173 dated September 16, 1976) described the failure of a rod drive relay which caused one of the control rod drives to occasionally insert when the rod actuate switch was set to withdraw. The cause and corrective action indicated on the PIR was a loose screw on the relay which led to single phasing in the rod; tightening the screw apparently corrected this malfunction. The inspector discussed this ite with the licensee representative who evaluated the malfunction and determined that a sampling of similar relays in the rod control system was not investigated to determine if a similar malfunction could occur. The inspector expressed his concern that the investigation of an occurrence should include a review of similar components in order to determine if a single isolated failure had occurred or if g eric problems were indicated.

(4) The inspector noted in his review of the licensee's station log that times were not indicated for many of the entries. The inspector expressed his concern that this hampers the transmission of a precise history of plant operatons from shift to shift. A licensee representative indicated that a change to the administrative procedure governing the maintenance of con trol room logs had been prepared and was to be issued soon. This new procedure will be reviewed during a future inspection to determine if this concern has been satisfied.

4. Stage 2 Operation (>40% Power Level)

The inspector verified the status of the remaining open corrective action items outlined in the Details Section 3 of Inspection Report 50-267/76-11.

(continued)

a. Fiberoptic Application

(1) Three Room Complex Cable Cocooning

Following the derating study, the licensee measured actual loads for the five cables whose derated ampacity exceeded the cables calculated ampacity. The results of these measurements are as follows:

Cable No.	Type	Derated Amps	Measured Load
3280	4/0 AWG	152.0	142
3318	4 AWG	53.2	39
3460	4 AWG	53.2	4
3540	4/0 AWG	152.0	150
3600	4/0 AWG	152.0	148

This item is considered resolved.

The inspector found that Change Notice CN 321, which reset the breaker relays associated with cables 3766 and 3535, has been completed (PORC 178/11-17-76).

The licensee revised, by memo dated November 5, 1976, his previous memo of October 21, 1976. The memo clarified that only the power cables previously found to be jumpers in the 480 volt now comply with the licensee's June 10, 1976 letter to the NRC. The licensee's previous November 5, 1976 memo had implied that all power cables in the 480 volt room complied with the June 10, 1976 letter.

IE:IV now considers the cocooning of the cables in the 480 volt room and Auxiliary Electric Equipment Room to be complete.

b. Licensee's June 10, 1976 Letter/Over-Current Protection for Nonconforming Cables

This letter was previously identified incorrectly in Inspection Report 50-267/76-11 to be dated April 10, 1976.

(1) Breaker Changes

The six breakers under FCN 3385(A) were verified by the inspector to have been tested. This includes the breakers associated with cables 5925, 6152, 6079, 6018, 5810 and 5430.

(continued)

During review of the breaker changes (Group 4 Cables) identified in the June 10, 1976 letter, the breaker associated with cable no. 6018 was found to have been omitted. The licensee informed the inspector that the starter circuit associated with this cable is protected on each phase by a T-50 class overload with a trip setting in the range of 24.3 amps to 27.1 amps. The protection for this cable is considered to be adequate. The inspector did find, however, that the change-out of the Group 4 cable breakers by a Work Request is contrary to the licensee's Internal Work Procedure IWP-2. IWP-2, Section 4.4, specifies with regard to Controlled Work Procedures, "CWP's are required for all Safety Related CR's installed by PSC personnel, and will be prepared as directed by the responsible supervisor in accordance with plant procedures." The failure to follow procedure is contrary to Criterion V of Appendix B to 10 CFR 50 and the licensee's approved QA Plan, Final Safety Analysis Section B.5(c). The inspector did find that the licensee has initiated corrective action in that a Quality Assurance Deficiency Report (QADR-252) has been issued.

(2) Cable Study

Based on further evaluation of Riser 104, the licensee has concluded that the acceptance of Riser 104 with an 89% current loading is acceptable based on the fact that the heat generated by a tray is proportional to the square of the current and the 100% current loading allowed by IPCEA on a continuous basis. An 89% current load equates to a 79.1% value for heat generation. This tray is also within the design 40% fill criteria. This item is considered resolved.

c. Interim Alternate Cooling Method (IACM)

(1) Technical Specifications (TS)

Proposed Technical Specifications are currently under review by the Nuclear Reactor Regulation (NRR).

(2) Procedures

Following further review, it has been determined that depressurization must be initiated within two hours. This finding was submitted in Licensee Event Report UE 50-267/ 76-07 and was further analyzed in the licensee's November 16, 1976 letter to the NRR. Subsequently, the following procedures were verified by the inspector to have been revised to include the two hour depressurization requirement:

(continued)

SOP 48 Interim Alternate Cooling Method (Rev. 5)

SOP Safe Shutdown with Highly Degraded Conditions (Rev. 3)

Emergency Procedure 6 Extended Loss of Active Core Cooling (Rev. 14)

SOP Safe Shutdown with Highly Degraded Conditions also included revisions to the depressurization rate from 150 pounds/hour to 150 cubic feet/minute, and a resequencing of events to assure that depressurization occurs in the proper sequences.

Revision to SOP 48 was also made to assure that a maximum depressurization rate was achieved.

d. Fire Protection/Detection

(1) Halon System

(a) Installation

The inspector verified the installation of the three zone sampling stations (CN 453/WA 239-45/FT 3378).

The inspector also verified that a three channel portable halon analyzer has been fabricated and is ready for plant use.

The installation of the Stage 2 halon system is considered complete by IE:IV.

(b) Testing

The inspector verified that the major leakage paths had been closed off (WA 3290). A functional test "Ft. McBride" was conducted to identify significant leakage paths.

The modification to assure positive mating between the damper shaft and actuating arm has provided adequate air balance in the Auxiliary Electric Equipment Room for purging.

The inspector verified that three fans have been provided for mixing to prevent stratification of the halon.

A draft of the final test report, as forwarded in a November 11, 1976 letter to the Nuclear Reactor Regulation, concludes the following:

(continued)

"1. The Fort St. Vrain Halon 1301 Fire Protection System meets all requirements of PSC's Halon System Design Specification, the specified HVAC system modifications, applicable sections of the NFPA standards, and the applicable requirements set forth in Attachment No. 3 of PSC letter P-75024, dated December 15, 1975 . . . .

"2. A concentration of Halon greater than 3% by volume in air can be maintained for up to 4 hours in any room of the three-room control complex. A 3% concentration of Halon in air is greater than the minimum concentration level needed to extinguish an electrical cable type fire. The test results, show that a holding period of 3-1/2 hours was achieved in the 480V Room. It is believed that, by similar planned improvements to minimize room leakage, a 4-hour holding period should be conservatively attained and considered as a repeatable design value for the three rooms.

"3. Mechanical mixing should be provided for the rooms by the use of one or more portable fans, pending the installation of permanent fans."

The inspector concurs in the test conclusions with the exception of the statement that the Halon 1301 Fire Protection System meets all requirements of the PSC Halon System Design Specification. The holding time and the variation of concentration within an individual room were outside the PSC Specification limitations. The licensee stated that the final report would be corrected.

The licensee test results are being reviewed by NRR, Technical Review. Any further action by IE:IV is dependent on that review.

(2) Air Breathing System

(a) Installation

The inspector verified completion of the Change Notices (CN's) and Work Authorizations (WA's) involved in the installation of the Air Breathing System. This included the following:

CN 327(B) WA 194-45, 195-45, 196-45, 197-45, 226-45

NC 405 WA 191-45

(continued)

IE:IV considers the installation of the air breathing system complete.

(b) Test

A Functional Test has not been completed.

(3) Heat Ventilation and Air Conditioning System (HVAC)

(a) Installation

The inspector verified the completion of the following Field Change Notices (FCN's) and Work Authorizations (WA's) associated with the HVAC system.

FCN 554	WA 3166
FCN 579	WA 3004
FCN 588	WA 3220
FCN 589	WA 3065
FCN 590	WA 3063
FCN 598	WA 3052
FCN 595	WA 3159
FCN 600	WA 3198
FCN 587	WA 3148
FCN 606	WA 3160
FCN 608	WA 3168
FCN 613	WA 3133
FCN 618	WA 3203
FCN 3378	--
FCN 624	WA 3213
FCN 642	--
FCN 3500	WA 3294
FCN 645	WA 3289
FCN 656	WA 3357
FCN 657	WA 3358
FCN 3500A	WA 3294
FCN 659	WA 3374
FCN 608A	--
FCN 618A	--
FCN 587A	--
FCN 588A	--
FCN 657A	WA 3358
FCN 3500B	--
FCN 661	--
FCN 3378A	--
FCN 595A	WA 3159

IE:IV considers the installation of the HVAC System Modification complete.

(continued)

(4) Communication System Work

(a) The inspector verified completion of the following Change Notices (CN's) and Work Authorizations (WA's):

CN 317A — WA 203-83, WA 216-83, WA 241-80

CN 459 — CWP 174, WA 242-83

IE:IV considers the installation of the communication system modification complete.

(b) Functional Testing

The inspector verified functional testing of the system on November 15, 1976.

(5) T-37 Ambient Air Temperature in the Three Room Control Complex, Following a Prolonged Shutdown of the HVAC System (FORC 169)

Following completion of T-37, the data was compared to the contractors heat model and the model was found to be conservative. The following is a summary of the maximum equilibrium temperatures in the three room complex.

	Calculated	FSAR Limit
Control Room	111	120
Auxiliary Electric Equipment Room	113	120
480V Room (Full heat load)	158	140
480V Room (Emergency Diesel Operation)	111	140

This review indicates that the transformer loads in the 480V room must be transferred to the Emergency Diesel in order to preclude exceeding 140°F. SOP 75-03 and Emergency Procedure I.1 have been revised accordingly to provide for transfer of transformer loads to the Emergency Diesels in the event of the loss of the HVAC System in the 480V room.

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(6) Plant Procedures Associated with Stage 2 Operation

The inspector verified the status of the previous incomplete SOP 45-02 Control Room, Auxiliary Electric Equipment and 480V Switchgear Room Halon Fire Extinguishing System. The licensee's actions with respect to this procedure include the following:

Instruction for the use of the remote three zone sampling stations have been included in the procedure.

Signs and bottle labeling have been provided to assure that in the event of a manual release of halon to the control room and auxiliary electric equipment room such a release would be initiated simultaneously.

An Operator's Order has been issued (12/17/76) to provide control of air breathing masks and hoses, halon detectors, and portable fans for halon mixing.

Laboratory equipment has been obtained for determining air breathing system quality.

All plant procedures associated with Stage 2 operation are considered complete.

5. Review of Safety Limits (SL), Limiting Safety System Settings (LSSS) and Limiting Conditions for Operations (LCO)

a. Inspection Scope

The inspector verified that reactor operations are in conformance with Technical Specification (TS) SL's, LSSS's and LCO's by audit of the following TS sections, procedure requirements, alarm indications and plant data:

(1) 3.1 Reactor Core Safety Limit

Reviewed period of November 23, 1976 (Alarm Data Print Test, Power to Flow Recorder, Control Channel Average Log Power Recorder, and Reactor Scram).

(2) 3.2 Reactor Vessel Pressure Safety Limit

Safety Valve lift points have not been exceeded.

(continued)

(3) 3.3 LSSS

No safety system settings have been reached due to actual conditions.

(4) LCO 4.1.2 Operable Control Rods, LCO

Weekly Reactivity Test SR 5.1.4-W-2
Monthly Rod Stroke SR 5.1.1.b-M
Startup Check OPO-1 III

(5) LCO 4.1.3 Rod Sequence, LCO

SOP 12-01, Table 1, Sequence of Withdrawal satisfies this LCO.

(6) LCO 4.1.4 Partially Inserted Rods, LCO

SOP 12-01 and 12-02 satisfy this LCO.

(7) LCO 4.1.5 Reactivity Change with Temperature, LCO

Not specifically verified by procedure.

(8) LCO 4.1.6 Reserve Shutdown System, LCO

Low Pressure Hopper Alarms provide indication.
Surveillance Tests are performed on this system.

(9) LCO 4.1.7 Core Inlet Orifice Valves, LCO

Not specifically verified by procedure. Plant computer has routine to compute, also there may be times when plant computer is not available.

(10) LCO 4.1.8 Reactivity Status, LCO

SOP 12-02 satisfies this LCO.

(11) LCO 4.1.9 Core Region Temperature Rise, LCO

SOP 12-04 requires verification by computer routine only during equalization of orifice flow. Not specified by procedure for periodic verification. Actions in event plant computer is not available are not specified.

(12) LCO 4.2.6 Fire Water Pumps, LCO

SR 5.2.10 W satisfies this LCO. Licensee indicated that notation of the TS fuel storage limit in the Station Log is to be considered.

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(13) LCO 4.7.9 Closure Plate

Indication is provided by an alarm on the flow rate up of 16.7 lbs/hour. The inspector noted that if the associated flow element or alarm became inoperable, the licensee would be unable to determine compliance with this LCO.

(14) LCO 4.2.11 Loop Impurity Level, Low Temperature, LCO

Recorded in OPOP III during rise from 2% to 30% power.

No record of integrated time that reactor was in this condition has been maintained. LCO would appear applicable any time reactor is critical and not just between 2% to 30% power if the average outlet temperature is between 725°F and 1200°F.

(15) LCO 4.2.15 PCRV Cooling Water System Temperature, LCO

Adequate records are maintained to determine that this LCO is being complied with; however, present procedures do not provide for periodic determination that this LCO is being complied with.

(16) LCO 4.3.3 Steam/Water Dump Tank Inventory, LCO

Indication is provided by red light alarm only on 105 board.

(17) LCO 4.3.5 Storage Ponds

Same comment as LCO 4.2.15.

(18) LCO 4.6.1(g) Auxiliary Electric System, LCO (Fuel Storage)

Same comment as LCO 4.2.15.

b. Findings

(1) Due to short period of actual operations, this inspection concentrated primarily on determining that adequate procedural requirements have been established.

(2) The inspector's only comment with regard to safety limits was that for a short term power to flow incident, the alarm data printout is the only plant record that provides the capability for short term resolution, i.e., 1/10 of a second.

(continued)

(3) LCO 4.1.3, 4.1.7, 4.1.9, 4.2.6, 4.2.7, 4.3.2, and 4.6.1(3) are to be reviewed further by the licensee. The licensee further stated that all sections of the TS's would be reviewed to determine that periodic verification of certain LCO is performed.

(4) LCO 4.2.11 is considered to be unresolved. Subsequent audit of records will be performed. The licensee stated that reactor operation with the average outlet temperature between 2700F and 1200F, concurrent with a dew point in excess of -20F, has been limited.

6. Simultaneous Opening of Steam/Water Dump Valves

The simultaneous opening of steam/water dump valves on November 23 1976, one in each loop, was reviewed with the licensee. The initiating cause was due to an improper DC bus line-up in which the normal 1A charger and battery were removed from the #1 DC bus without closing the DC tie breaker between DC bus 1 and 2. The #1 DC bus in this configuration was being supplied by the supplementary 1D DC charger. Upon startir, the DC lube oil pump for the main turbine, the #1 DC bus voltage dropped to 60 volts. Consequently, the #1 instrument bus (AC) voltage also dropped to some unknown value. This resulted in a simultaneous trip of the corresponding low set point moisture monitors (one in each loop and one of the high set point moisture monitors). Due to an earlier failure of one low set point moisture monitors, both of the low moisture monitor trip logics were in a 1 of 2 trip configuration. The simultaneous trips that occurred resulted in simultaneous opening of one steam/water dump valve in each loop. The loss of instrument bus #1 (AC) voltage precluded the opening of the steam/water dump in each loop that did not open during the incident. Control power for these two valves is supplied from instrument bus #1.

During a subsequent test (T-62), which was witnessed by the inspector, simultaneous moisture monitor trips similar to the November 23, 1976 event were initiated. Instrument bus power was normal during these tests. The test results were as follows:

Run	Steam Generator Feed Water Valves	Steam Water Dump Valves
1	All 4 closed.	All 4 opened.
2	3 of 4 closed.	All 4 opened.
3	All 4 closed.	3 of 4 opened.

The results of this test confirm that simultaneous trips could cause loss of feedwater (secondary forced circulation) and opening of all 4 steam/water dump valves. Simultaneous signals out of the solid state

(continued)

PPS logic into the relay logic of the steam/water dump and loop shutdown circuitry may produce inconsistent system operation due to the inherent relay related actuating response characteristics.

The licensee has installed a temporary fix which provides for a time delay in the steam/water dump and loop shutdown loop 1 circuitry. The proposed fix was discussed by the licensee with NRR Projects and Technical Review by conference calls during the week of November 29 - December 3, 1976. The IE:IV inspector was present during these discussions. Subsequently, a site visit was also made by NRR, Technical Review, on December 6 and 7, 1976. It has been concluded by the NRC (NRR/IE) that the present temporary fix is acceptable and does preclude simultaneous steam/water dumps of both loops. Simultaneous signals will produce a preference dump of loop 2 due to the time delay in loop 1. A permanent fix is to be made during a future plant shutdown. This will include a manual switch in the PPS system. The switch must be actuated by the operator in the event a low trip point moisture monitor channel is made inoperative. The switch inserts the 1/2 vice 2/3 trip logic. In addition, consideration is being given to changing the low moisture monitor trip circuitry to transmission logic (i.e., loss of power not produce a trip). A final test is to be performed following the permanent fix which is to assimulate the conditions of November 23, 1976.

The consequences of the accident were reviewed with the licensee since there was (1) a period of time, approximately 30 seconds, that dump valves were open in both loops simultaneously with secondary coolant at 2,490 psig/670°F; (2) two circulator trips; and (3) a feedwater flow loss for approximately 12-13 minutes. The licensee has indicated that the nearest primary system temperature limit reached was 750°F on the inlet of the circulators (800°F Design Limitation).

The licensee concluded that no design pressure limitations were reached in the mechanical portion of the steam/water dump piping and tank since no relief valves were lifted during the period of time that one dump valve was open in each loop. The system description of the steam water dump system indicates a system design of 15 full dumps per loop.

The 14-day report of the occurrence was received by IE:IV on December 13, 1976. The licensee has been requested by telephone on December 16, 1976 to supplement this report with a more detailed narrative of the sequence of events that occurred and an analysis of the consequences to demonstrate that an unsafe plant condition did not exist.

The licensee is to review plant procedures to verify in all cases that steam generator feedwater flow is established prior to restarting a circulator in situations where circulator inlet temperature may exceed 800°F. Also, plant procedures are to be reviewed to determine that in the event feedwater flow is lost (where operator actions are necessary to preclude the circulator inlet temperatures from exceeding 800°F) the operator is made aware of the actions he must take to preclude circulator damage.

During the functional testing that followed the installation of the temporary fix, a logic chip malfunctioned in the moisture monitor circuitry. Bench testing of the failed logic chip did not repeat the malfunction. The licensee is to review the adequacy of the existing bench testing procedures. The inspector indicated that this area would be subject to further inspection.

The licensee has also indicated that the necessity to establish administrative controls for maintaining records of plant operational type cycles is to be reviewed. The limitation of 15 steam/water dumps per loop was identified by the inspector as an example of a limited operational cycle.

7. Previous Items of Noncompliance

The inspector verified by record review, observation and discussion with licensee personnel (as appropriate) the following areas relating to the followup on all items of noncompliance.

Receipt on-site
Assignment of responsibility for review and corrective action
Timeliness of response.
Review as prescribed by Technical Specifications.
Corrective actions.

The following items of noncompliance were reviewed:

a. Inspection Report 50-267/75-04

(1) Infraction Number 8

Amendment 16 to the Facility Technical Specifications now requires that the Nuclear Facility Safety Committee only review proposed tests and experiments which involve an unreviewed safety question as defined in 10 CFR 50.59.

This item is considered closed.

b. Inspection Report 50-267/75-07

(1) Infraction A.2.e

Metal tray covers have been installed with exception of the 12-foot area along the J wall in the Auxiliary Electric Equipment Room. This deviation from FSAR commitments is to be handled as a 10 CFR 50.59 change to the FSAR.

This item remains open pending final review of the 10 CFR 50.59 documentation.

(2) Infraction B

The inspector will perform a selected audit of drawing revision at a subsequent inspection.

This item remains open.

(3) QA Audit 1402/Engineering Review of Completed Acceptance Testing (Licensee Identified)

Engineering Procedure ENG-1 was issued effective October 18, 1976 (Issue A) as specified in QA Audit 1402.

This item is considered closed.

(4) QADR 173/Control Work Procedure for Change Notice 59

This item remains open pending the closeout of QADR 173.

c. Inspection Report 50-267/76-09

(1) Infraction A.1.a

The inspector verified that the licensee has reviewed outstanding "N" purchase orders for status of inspection. The results of this inspection was documented by QAIF No. 294 (10/18/76).

This item is considered closed.

(2) Infraction A.1.b

The inspector reviewed GA's audit of their architecture engineering firm on September 29 and 30, 1976. The inspector was informed that reaudit is scheduled for July 1977.

This item is considered closed.

(3) Infraction A.2

The licensee's November 3, 1976 letter commits to the completion of corrective action by January 15, 1977 with regard to establishment of records of as-found calibration conditions.

This item remains open.

(4) Infraction B

The inspector verified that a memo dated October 6, 1976 was issued to all storekeepers which specifies the steps to be taken to assure proper storage conditions for quality related items.

This item is considered closed.

(5) Infraction C

A response with respect to the PSC commitments to provide a plant training program is to be forwarded to IE:IV by January 1977.

This item remains open.

(6) Infraction D

Change Notice (CN) 471 was in preparation to provide proper documentation of the arc suppressers. The delay in issuing CN 471 was stated to be due to the delay in researching all the plant systems that arc suppressors had been installed in.

This item remains open.

(7) Infraction E

The inspector verified that Technical Services Procedure #8 was issued (PORC 175) to outline the formal review of modifications by Technical Services.

The inspector also verified that ADM-27 (Rev. 3) requires Technical Services sign-off on each Work Authorization prior to returning a system to an operable status. This resolves the issue of contractor initiated design changes which necessitate procedure revision.

(continued)

During the review of licensee initiated design changes, the inspector found that Internal Work Procedure IWP-2 does require Technical Services review of all Change Notices (CN's) for procedure revision. There was, however, no formal sign-off in the CN review process to assure that this review was completed prior to returning the affected system to operable status. The licensee stated that the Control Work Procedure form would be changed accordingly.

The licensee has committed to the review of facility change documents by April 1, 1977 to identify all required procedure revisions as the result of past design changes. The inspector informed the licensee that the revision of the associated procedures is considered to require timely action following the completion of the review in process.

This item remains open.

(8) Infraction F

It is the licensee's position at this time that the review by Operator personnel of procedure revisions will provide for timely review of design changes. This area will be the subject of a routine IE:IV audit of training.

This item is considered closed.

d. Nuclear Facility Safety Committee (NFSC) Review

The inspector verified the NFSC review of the items of noncompliance identified during inspections 50-267/76-07 and 76-08 (meeting #41, September 14, 1976). The inspector also verified that during meeting #42 (October 26, 1976), the items of noncompliance identified during inspection 50-267/76-09 were reviewed.

8. Previously Identified Unresolved Items

a. 7504-3 Backup Bearing Water System

Nuclear Reactor Regulation is reviewing the circulator operating history.

This item remains unresolved.

(continued)

b. 7514-1 Records Procedure

An implementing procedure for records is anticipated by January 1, 1977.

This item remains unresolved.

c. 7607-4 Seismic and Environmental Qualification

Final action remains incomplete.

This item remains unresolved.

d. 7607-5 ASCO Solenoid Valves

Change Notice (CN) 451 was issued September 27, 1976 to provide formal documentation of the ASCO valve modifications. The CN is pending Engineering Department approval. QA Deficiency Report 154 remains open.

This item remains unresolved.

e. 7609-4 Administrative Control of Nondestructive Examination (NDE)

The licensee stated that the development of administrative controls for NDE is to be included in the final inspection program as described in the licensee's approved QA Plan.

This item remains unresolved.

f. 7609-5 Contractor Design Verification

The inspector found that Contractor Procedure AP-4, Preparation of Field Change Notices, Issue C, has been revised to include detailed steps for independent design verification.

This item is considered resolved.

g. 7601-4 System 91 Hydraulic

QADR 207 remains outstanding. Sampling procedures have not been established.

This item remains unresolved.

h. 7608-01 Calibration of Test Equipment

This item was addressed as an item of noncompliance during inspection 50-267/76-09 and will no longer be carried as an unresolved item.

(continued)

i. 7609-3 NI Calibration Criteria

During inspection 76-09 it was noted that surveillance tests 5.4.1.1.5 c-m and 5.4.1.1.4 c-d allowed a 10% difference between indicated NI power and computed plant power from a calorimetric before a readjustment was required. During this inspection, the inspector noted that the linear power range channel procedure 5.4.1.1.4 c-d had been changed to specify a readjustment is required whenever a difference is noted between the indicated and computed power. Procedure 5.4.1.1.5 c-m was not changed. The inspector discussed this with a licensee representative who indicated that this channel (logarithmic power) provided only a rate of power increase trip signal and by the nature of the logarithmic presentation an accuracy of ± 10% power is all that is achievable for the indication. The inspector concurred with this.

This item is resolved.

9. Items Identified During Previous Inspection for Followup

a. PTR Format (Inspection Report 50-267/76-07)

The licensee has no further plans to modify PTR format.

This item is considered closed.

b. ANSI 45.2.6 Inspection Program (Inspection Report 50-267/76-09)

Program development is to be completed by December 1976.

c. Shift Turnover Instructions (Inspection Report 50-267/76-09)

The November 17, 1976 issuance of Amendment 16 to the Facility Technical Specifications incorporates Regulatory Guide 1.33 requirements for shift turnover instructions. The licensee is cognizant of the requirements and action is being taken to provide appropriate instructions. This item is now considered to be an unresolved item.

d. PSC QA Audit of General Atomic (Inspection Report 50-267/76-09)

Quality Assurance Audit 1701 was conducted October 13-15, 1976.

This item is considered closed.

(continued)

v. Surveillance Test Procedures (Inspection Report 50-267/76-02)

During Inspection 76-19 the inspector noted that several surveillance tests did not appear to provide clear guidance in the precautions section of the procedure as to the required conditions to be satisfied for performing the test. Most notable of these items is the specification of the appropriate Limiting Condition for Operation (LCO) to ensure that TS requirements are satisfied when an engineered safeguards system is taken out of service. This item was indicated at that time as an inspector concern.

During this inspection these surveillance tests were reviewed again and no change was noted. The inspector noted that the licensee's Quality Assurance Program section 2.5.19.15 commits to ANSI Standard N18.7 - 1972. Section 6.2.5 of this standard states in part, "Test procedures shall contain . . . limiting conditions . . . ." This item was discussed with the licensee and indicated to be unresolved.

END

DATE FILMED

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