R Stevens
(PF)

APR 13 1984

MEMORANDUM FOR: B. J. Youngblood, Chief, Licensing Branch #1
Division of Licensing

FROM: F. Rosa, Chief, Instrumentation & Control Systems Branch
Division of Systems Integration

SUBJECT: SNUPPS SITE VISIT - ICSB

Plant Name: SNUPPS - Callaway Plant, Unit 1; Wolf Creek Generating Station
Docket Nos.: 50-483/482
Licensing Status: OL
Responsible Branch: LB #1
Project Manager: J. Holonich
Review Branch: ICSB
Review Status: Incomplete for Site Visit (Additional Information Required From Applicants)

Enclosed is the Instrumentation and Control Systems Branch (ICSB) trip report for the SNUPPS (Callaway and Wolf Creek) site visit performed the week of October 31, 1983. The purpose of the site visit is to confirm that the physical arrangement and installation of electrical, instrumentation and control equipment are in accordance with design criteria and descriptive information reviewed by the staff. A site visit is part of the normal review process and is conducted in accordance with the Standard Review Plan, NUREG-0800, Appendix 7-B, General Agenda, Station Site Visit.

In general, the instrumentation and control systems inspected appeared to be installed in accordance with the applicable design criteria. A few minor deviations and areas of concern were noted during the site visit. These were brought to the attention of the applicants and are discussed in the enclosed ICSB trip report (Section B: Items I.c, II.f, II.h, IV.d, VI.a, VI.c, VI.i, VI.k.(1), VI.k.(2), and IX.e). Some issues were resolved during the site visit based on commitments made by or further discussion with the applicants. For other issues, the applicants submitted additional information to either resolve or further confirm the items of concern. One issue (Section B of the enclosed trip report: Item XII.b) requires that the applicants submit information to further confirm the design.

The enclosed trip report should be made available to the Region III and Region IV offices. The regional offices should pay particular attention to the items in Section B that are marked with an asterisk which signify specific concerns that resulted from ICSB's site visit. Each regional

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office may want to include these particular areas in its audit program to verify that commitments are followed and that various equipment installations are satisfactorily completed prior to core load. It should be noted that the issue (Section B: Item I.c) related to the RWST valve house flooding concern requires that the respective regions verify (as part of pre-fuel load inspection) that appropriate precautions have been taken to correct the situation. Refer to Section B (Item I.c) of the enclosed trip report for details on this issue.

Section C of the enclosed trip report identifies those SER confirmatory items which have been resolved based on the ICSB site visit. It should be noted that the ICSB determined that further consideration should be given to the control room layout as it relates to auxiliary feedwater control. For details see Item VI.a. in Section B of the enclosed trip report. This issue should be included as part of the Human Factors Engineering Branch (HFEB) detailed control room design review.

The site visit, which was performed in accordance with Section 7.1.3.4 of the SNUPPS SER, confirmed that the design, in general, has been properly implemented to meet the applicable criteria. For the confirmatory issue listed above, the applicants have been requested to provide the additional information required in Section B. Based on the enclosed trip report and pending receipt of the additional confirmatory information, the staff considers that the purpose of the site visit has been satisfactorily accomplished.

"Original Signed By:
Faust Rosa"

Faust Rosa, Chief
Instrumentation & Control Systems Branch
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Enclosure:
As stated

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Enclosure

ICSB TRIP REPORT
SITE VISIT - SNUPPS PLANTS (CALLAWAY/WOLF CREEK)
(OCTOBER 31 - NOVEMBER 4, 1983)

Section A

An official site visit by the Instrumentation and Control Systems Branch (ICSB) was conducted at the Callaway Plant, Unit 1 and Wolf Creek Generating Station during the week of October 31, 1983.

In general, the installation of the various I&C systems appeared to follow the guidelines of applicable design criteria. Only a few minor deviations and areas of concern were noted during the site visit and are described in Section B of this report. Some issues were resolved during the site visit; others required additional information to be submitted from the applicants beyond that supplied to the staff during the site visit.

The inspection of selected I&C equipment and systems followed the outline of an agenda which was submitted to the SNUPPS applicants several weeks prior to the NRC audit. The site visit agenda is described below:

(Asterisked items were performed at Wolf Creek on Thursday 11/3/83)

I. Preliminary Discussion

*a. Plan for audit including a general discussion of the plant layout and plant evolutions in progress.

b. Isolation devices for BOP ESFAS actuation signals. Should include discussion (using drawings) of the interconnection between separation groups.

c. Environmental control systems (HVAC/Heat Tracing) required for safety related systems. Should include discussion on freeze protection for instrumentation sensing lines and on control room annunciation to alert the operator to take corrective actions in case of failure of required environmental control systems.

d. Preoperational testing to verify that safety related systems will not change state upon reset (i.e., remains in emergency mode after reset).

II. Shutdown from Outside the Control Room

*a. Location of remote shutdown panel

*b. General layout of panel

*c. Identification of controls

*d. Habitability of remote shutdown panel location

*e. Potential for damage from missiles, flooding, pipe whip, etc.

*f. Verify that physical separation and electrical isolation requirements for redundant instrumentation and controls are met

*g. Examine the manual transfer switches

*h. Verify hot and cold leg temperature indications on the remote shutdown panel

III. Reactor Building, Auxiliary and Turbine Building

a. Arrangement of instrument panels/racks associated with plant protection systems (separation and layout)

b. Potential for instrument damage due to missiles, flooding, pipe whip, etc.

c. Component separation and isolation

d. Panel wiring separation and isolation

e. Separation and independence of piping and wiring to redundant or diverse instruments

f. Provisions for testing protection instruments

IV. Cable Runs and Cable Spreading Area

*a. General layout

b. Implementation of separation criteria (Verify identification of Class 1E raceways and check cable identification)

c. Check routing of power cables (embedded conduit, separate safety-class structure)

d. Verify that cable penetrations meet physical separation and electrical isolation requirements

V. Vital Instrumentation and Control Power Supply Installation

a. General layout

b. Physical and electrical separation

c. Potential for damage from missiles, high energy line break, etc.

d. Batteries, inverters, etc.

VI. Control Room

*a. Review general layout of the control room

b. Examine manual reactor trip controls to verify that separation and isolation requirements are met

c. Examine overall display instrumentation important to safety

- Concentration will be on the bypassed and inoperable status indication for ESFAS and RPS as it relates to R.G. 1.47. Particular attention will be paid to the automatic indication of the block of the signals which initiate auxiliary feedwater on loss of both main feedwater pumps.

d. Inspect instrument cabinets, engineered safeguard cabinets, RPS cabinets, isolation cabinets (arrangements, layout, separation, etc.). (SA036, SB038, SB029A)

e. Review Rod position indication

f. Review Protection system initiation and status panels

g. Review Engineered safety feature initiation and status panels

h. Inspect operation of the safety injection accumulator isolation valves

- Review procedure for removing power from these valves when they are locked in the open position

- Check visual indication of the open or close status of the valves per requirements of ICSB BTP 18

- Check for the independent audible and visual alarm provided when the valves are not fully open

i. Examine the readouts provided to determine the position of the pressurizer safety valves and the PORV's

j. Check for temperature, pressure and level indication for pressurizer relief tank

k. Review Panel Cabling/Wiring

- Inspect redundant components and wiring on control panels
- Verify that physical separation and electrical isolation requirements are met
- Verify that protection system wiring and control wiring are properly separated

l. Examine the routing of non-safety related and safety related cables within the NSSS - supplied cabinets

m. Verify the position indication for isolation valves associated with the essential water to the air compressors

n. Examine control switches for hydrogen recombiners

*o. Verify control room annunciation for operation of transfer switches

VIII. Remote Shutdown Procedure Walkthrough

a. Physical walkthrough using emergency procedure required in case of control room evacuation (should include discussion on the number of people that would be required to achieve shutdown from outside the control room, the accessibility/security of the remote shutdown station(s), etc.)

IX. Reactor Trip System

a. Motor Generator Sets

b. Switchgear

c. Physical and electrical independence

d. Provisions for testing (should include walkthrough of typical actuation channel test per technical specifications from sensor to and including actuation of reactor trip breakers)

e. Examine test jacks required to facilitate testing of P-4 interlocks

X. ESF Systems and Pump Rooms

a. General arrangements

b. Switchgear rooms

c. Physical and electrical independence

d. Potential for damage due to flooding, missiles, etc.

e. Cabling and equipment identification

XI. Instrument Piping

a. Physical examination

b. Potential for damage from missiles, flooding, pipe whip, etc.

XII. Circuit Traces from Sensors to Final Actuation Devices

a. Check the wiring and circuitry associated with the turbine trip input to the reactor protection system. Trace wiring for redundant channels of the trip system from the trip devices (sensors) through to the RPS cabinets. Check isolation devices

*b. Trace the instrument piping and circuits for redundant channels of the pressurizer inputs to the protection system (from instrument piping to transmitter to RPS and ESFAS cabinets to final actuated devices)

c. Trace selective non-safety related cables associated with the NSSS supplied cabinets

d. Trace the instrument piping and circuits for the redundant channels of the steam generator low level inputs to the protection system (from instrument piping to transmitter to RPS and ESFAS cabinets to final actuated devices). Concentration will be on the ESFAS portion related to the isolation devices associated with the interconnection between separation groups used for initiation of auxiliary feedwater

e. Trace the turbine trip upon reactor trip circuitry. Verify that the maximum credible faults were considered in routing of these circuits within the turbine building. Check isolation devices used to prevent degradation of RPS due to credible faults within the turbine building

Section B (Detailed Discussion)

Following is a detailed summary and discussion on the instrumentation and control systems and equipment observed. The summary below follows the agenda outline given in Section A above. The items preceded by an asterisk denote specific areas of concern that resulted from ICSB's site visit.

I. Preliminary Discussion

a. The site visit began with a brief discussion of the plan for the plant audit including the general plant layout and evolutions in progress. The staff confirmed that the design bases for Callaway are identical to that for Wolf Creek in the I&C area.

b. The applicants provided a discussion (using drawings) describing the use of isolation devices for the BOP ESFAS actuation channels where interconnections exist between various separation groups. The staff also verified the separation by actually viewing the BOP ESFAS cabinets. Separation appeared adequate. (See SER Section 7.3.2.6)

There was some discussion on the Automatic Test and Indication (ATI) System. The overall test concept appeared to be acceptable to the staff. To further support the BOP ESFAS design, the staff

audited design documentation on the ATI system. No problems were identified.

*c. The environmental control systems (HVAC/heat tracing) required for safety-related systems were discussed. The staff verified that ambient temperature alarms exist in the main control room to alert the operator should the ventilation systems malfunction. There was one exception related to freeze protection within the auxiliary building. Unit heaters are placed in various areas throughout the auxiliary building to protect against freezing. However, there are no low temperature alarms used to alert the operator that the heaters have failed. Sensors are used throughout the auxiliary building to alarm in the control room high temperature conditions. The applicants stated that these high temperature alarms are electrically independent of ventilation systems such that a failure of the environmental control system(s) will not disable the operability of the alarming system.

The applicants provided additional information to justify the design as it relates to the auxiliary building freeze protection concern discussed above. Following the issuance of NRC IE Bulletin 79-24, the applicants reviewed the SNUPPS design

to determine if any safety-related instrument lines could be subject to freezing during periods of extremely cold weather. The applicants determined that all safety-related sample and instrument lines are to be located sufficiently remote from cold walls and exterior openings to preclude local freezing problems. Only the roof, the south wall, and a portion of the west wall are exposed to the outside ambient conditions so that the effects of the ambient temperature on the auxiliary building, as a whole, are minimal. Even with a complete loss of the auxiliary heat system, there should be no sudden changes in the interior temperatures. Also, at least every 12 hours, plant operators will patrol general areas of the auxiliary building. Based on the above discussion, the staff concludes that the SNUPPS design and operations will provide adequate freeze protection for safety-related instrument lines routed within the auxiliary building.

The refueling water storage tank (RWST) has safety-related I&C which is located within the RWST valve house structure. The RWST is heated with auxiliary steam and has associated with it two redundant, Class 1E temperature sensors which provide indication and alarms in the control room. A heated valve house is provided which houses safety-related instrumentation. A temperature sensor is provided to alert the operator of a low temperature in the RWST valve house. The alarm is electrically independent of the unit heater power supply.

It should be noted that while observing the RWST valve house structure at Wolf Creek, the staff noticed a considerable amount (4 feet) of water standing in the bottom (underneath ground level flooring). The staff expressed a concern because the four divisional, Class 1E termination cabinets associated with the RWST were half submerged. The applicants were alerted to the fact that they should provide information to describe what precautions will be taken to ensure that such apparent flooding will not detrimentally affect safety-related I&C associated with the RWST. The applicants responded by letter (N. Petrick of SNUPPS to H. Denton of NRC) dated February 23, 1984. The applicants stated that, due to the intermediate stage of construction of the roof, water was apparently allowed to enter the RWST valve house. Upon observation by the staff, the applicants had the water pumped out immediately. The applicants have stated that water will be prevented from entering the subject structure because of site grading and elevations in combination with waterproof seals for roof piping penetrations. It should be noted that the Class 1E junction boxes are about 10 feet below grade level.

The ICSB was informed by the Wolf Creek NRC Resident Inspector on March 28, 1984 that there was approximately 2 feet of water

still standing in the bottom of the RWST valve house and that the roof appeared to be adequately covered. Also, the ICSB was notified that the Class 1E termination cabinets had not been opened for inspection and cleaning since being submerged. Based on these recent findings, the Resident Inspector felt it necessary and, therefore, planned to notify responsible plant management personnel of this situation so that corrective actions could be taken (i.e., ensure that the Class 1E cabinets will be inspected and cleaned, installation of a sump pump and/or level monitoring instrumentation, relocate the Class 1E termination cabinets, etc.). Therefore, this issue should be included in the list of items to be verified (as being adequately resolved by the applicants) by respective regional personnel as part of pre-fuel load inspection. The staff considers this issue to be resolved pending final verification by regional personnel that appropriate precautions have been taken by the applicants to ensure that flooding will not detrimentally affect safety-related I&C associated with the RWST. No further evaluation is necessary unless unanticipated problems are found as a result of the Region pre-fuel load inspections.

*d. The preoperational testing required by IE Bulletin 80-06 was discussed to verify that safety related systems will not change state upon reset (i.e., remains in emergency mode after reset). The applicants stated that this testing has not been performed but will be completed in two phases just prior to fuel load. The staff finds this acceptable. (See SER Section 7.3.2.1)

II. Shutdown from Outside the Control Room

The staff's final conclusions on remote shutdown have been reported in a supplemental safety evaluation report (memorandum from R.W. Houston to T. Novak dated March 1, 1984). The site visit showed that the overall remote shutdown scheme for SNUPPS appears to be adequate.

a. The auxiliary shutdown panel room is located in the northeast corner of the auxiliary building one level below the control room.

b. There are two distinct auxiliary shutdown panels at this location; one panel (118A) is associated with instrumentation

and control circuits used for controlling safe shutdown equipment in train A; the other panel (118B) is associated with instrumentation and control circuits used for controlling safe shutdown equipment in train B. The panels are separated by a cinder-block wall (approximately 8 inches thick).

c. Controls and indicators appeared to be adequately identified.

d. The room containing the auxiliary shutdown panels appeared to have adequate ventilation and is of sufficient size to accommodate several people. The room is provided with a temperature sensor which provides a high alarm in the control room.

e. The potential for damage from missiles, flooding, pipe whip, etc. is minimized by a concrete block enclosure around the panel.

*f. The guidelines for physical separation and electrical isolation of redundant safety and nonsafety-related controls, indicators, and associated wiring have been adhered to for the auxiliary shutdown panels with two exceptions. Each panel contains redundant divisions of safety-related wiring in combination with non-safety circuits. Panel 118A at Callaway showed a lack of adequate separation between wiring for Division 1 and Division 3 instruments (Tag numbers AL-HK-9B and AB-PIC-3B respectively).

Also, the staff noticed the lack of adequate separation at Wolf Creek (panel 118B) between wiring for Division 2 and Division 4 instruments (Tag number FC-H1K-313B for Division 2 instrument). The applicants stated that work plans are still underway for these panels and will require that barriers be installed to adequately separate these channels. It should be noted that the Wolf Creek situation was more of a concern since it appeared that the installation of a barrier would be very difficult and did not show indications that a barrier was to be installed.

g. During the site visit the NRC staff walked through the procedural steps required in the event of control room evacuation. This provided the NRC staff with a clear understanding of the functions involved such as transfer capability, security systems, control locations, etc.

Transfer switches are located on auxiliary shutdown panel 118B which isolate and remove control from the control room for train B safe shutdown equipment necessary to take the plant to (and maintain the plant in) a hot standby condition independent of the control room. The staff verified that process cabinets are located outside the control room for train B component isolation. Drawings were looked at for the required analog (indication) isolation. The staff also reviewed various electrical schematics

to confirm the isolation for the control functions.

h. The staff verified the redundant hot and cold leg temperature indications on the auxiliary shutdown panels. It should be noted that the ICSB site visit confirmed that only Train B indication for the subject parameter is seismically qualified. The staff's position is that the remote shutdown equipment, including the indicators, required for hot standby should be redundant and seismically qualified. This issue was resolved as part of the overall staff remote shutdown review on SNUPPS and was reported in a supplement to the SER by memorandum (R. Houston to T. Novak) dated March 1, 1984.

III. Reactor Building, Auxiliary Building and Turbine Building

a. Redundant protection system instruments located throughout the reactor, auxiliary, and turbine buildings were found to be adequately separated. Separate mounts are used for each instrument instead of multiple instrument racks. This approach appeared to allow for more efficient routing of instrument piping to ensure compliance (to the maximum extent possible) to regulatory separation and independence criteria. It should be noted that although all instruments were tagged with labels, channel identification was not obvious. The color coding on associated wiring and conduit had to be ascertained to identify the channel.

b. The instruments observed appeared to be located so as to prevent damage due to missiles, flooding, pipe whip, etc. The applicants stated that hazards analyses are performed, taking into account potential events, to ensure proper routing of instrument piping and placement of its associated instrument.

c. See item a. and b. above.

d. Various auxiliary relay rack cabinets were inspected. These cabinets are typically used for solenoid valve control circuits and for multiplying functions for starters. The staff concentrated on the routing of nonsafety cables within the cabinets. Isolation devices (coil-to-contact) were observed whereby safety circuits send signals to the control room for alarms. It appeared that the separation between safety and nonsafety wiring was adequate. Each cabinet is an enclosed metal structure and is associated with only one division of safety-related power.

e. Separation and independence of piping and wiring to redundant and diverse instruments appeared to be maintained throughout the plants. (See item XII. below)

f. Plant personnel discussed procedures for testing the instrumentation. Adequate provisions appeared to be provided for testing the protection instrumentation.

IV. Cable Runs and Cable Spreading Area

a. The Callaway and Wolf Creek plants both utilize two separate cable spreading rooms (one directly below the control room and the other directly above). The cable spreading rooms essentially consist of several stacks of cable trays.

b. The installation of the cables and cable trays appeared to follow the physical separation and electrical isolation guidelines recommended by R.G. 1.75. Trays and cables were color coded for identification.

c. Both upper and lower cable spreading rooms have power cables (480 Vac) routed through them. These power cables are associated with control room HVAC equipment and are routed in conduit within the cable spreading rooms. Separation appears to be adequate between the I&C circuits and the power circuits.

*d. During overall inspection of the penetration assembly separation at Callaway, the staff noticed that redundant divisional (Divisions 1 and 3) conduits fed penetration Box ZNI-288. This was in conflict with the SNUPPS proposed containment penetration assembly design whereby each penetration is to be associated with only one division. The applicants looked into this potential concern and verified (thru drawings) that the Division 3 (blue) conduit

should have gone to Box ZNI-295 (a Division 3 penetration). The drawings showed that this mistake had already (prior to site visit by ICSB) been identified and corrected. The staff inspected the interior of Box ZNI-288 and noted that it contained only Division 1 (red) cables pulled through the appropriate conduit. No cables were pulled through the Division 3 (blue) conduit. This issue is considered resolved.

V. Vital Instrumentation and Control Power Supply Installation

a. The SNUPPS plants vital instrumentation and control power supply (chargers, inverters, AC/DC distribution panels) are located in four separate distribution rooms.

b. Adequate physical and electrical separation appeared to be provided between redundant power supply groups.

c. Adequate isolation of batteries, inverters, battery chargers, etc. appeared to be provided to protect for damage from missiles, high energy line breaks, floods, etc.

d. The four divisional (safety-related) battery systems are each located in its own separate enclosed room. The staff verified that the battery rooms are fed from safety-related ventilation systems. Drawings were reviewed as part of verification.

VI. Control Room

a. The general layout of the control room was reviewed. All controls and indicators inspected were found to be quickly and easily accessible.

The ICSB staff did notice that the auxiliary feedwater (AFW) control scheme layout may require further consideration. The system level initiation switches are located on the engineered safety features (ESF) panel; The component level AFW controls are to be operated from the operator's console which is about 15 feet away from the ESF panel. It was not made clear as to why these controls and indications were split up this way. This issue should be included as part of the control room design review which is performed by the Human Factors Engineering Branch (HFEB).

b. The manual reactor trip controls were inspected and found to be acceptable. (See Section 7.2.2.5 of the SER)

c. The staff examined the overall display instrumentation important to safety and found it to be sufficient with one exception related to bypassed and inoperable status indication (R.G. 1.47). Overall, the bypassed and inoperable status indication system appeared to provide adequate annunciation for the ESF systems on

the main control board. Particular attention was paid to the interaction between the diesel generators (DG) and the bypassed and inoperable status system. When the DG is rendered inoperable, indication of this is provided automatically on the bypassed and inoperable status panel. However, this will not indicate that all train associated ESF systems are also in effect rendered inoperable. The staff was concerned that this could lead to a situation whereby redundant ESF trains may be rendered inoperable simultaneously without operator awareness (i.e., DG is inoperable and ESF system in redundant train is removed from service for maintenance or repair). Through subsequent discussions with the applicants, it was revealed that the loss of offsite power coincident with an inoperable DG will result in automatic indication (on the bypassed and inoperable panel) of all train associated ESF systems affected. Based on this design feature, the staff considers the DG inoperable issue resolved.

The staff verified implementation of the automatic indication of the block of the signals which initiate auxiliary feedwater on loss of both main feedwater pumps. This resolves SER confirmatory items (33) and B (30) for Callaway and Wolf Creek respectively. (See SER Sections 7.2.3, 7.3.2.7, and 7.5.1)

d. The layout of the instrumentation cabinets (NSSS engineered safeguard cabinets, RPS cabinets, and BOP ESFAS cabinets) in the control room provide easy accessibility, both front and rear. Separation between safety divisions/channels appeared to be maintained in accordance with R.G. 1.75 with one exception associated with the NSSS 7300 process cabinets (See item 1. below). The BOP ESFAS cabinets were inspected to verify separation and isolation between redundant divisions. The routing of the circuits were found acceptable.

e. The rod position indication methods were inspected. The SNUPPS plants have two methods for obtaining rod position which are 1) the digital rod position indication system and 2) the demand position system. Also, rod bottom alarms are provided in the control room through the digital rod position indication system.

f. & g. Upon examination, it was concluded that sufficient instrumentation and controls exist in the main control room to provide initiation and status of both the engineered safety features system and reactor trip system.

h. The controls for operating the safety injection tank accumulator isolation valves were examined. Redundant, visual indication of the open or closed status of the valves is provided in the control room as well as independent audible and visual alarms if the valves are not fully open. Also, power is removed after the valves are opened.

*i. The staff verified that readouts will be provided in the control room to determine the position of the pressurizer safety valves and the power operated relief valves (PORVs). Redundant, Class 1E position indication is provided through the use of limit switches. The control board labeling was not complete for the PORV's at Callaway. Also, the installation of the block valve and PORV controls was not complete at Wolf Creek. The location for the controls (RL-21) was verified. The PORV and block valve I&C should be implemented prior to core load.

j. Temperature, pressure, and level indications are provided on the main control board for the pressurizer relief tank. These indications serve as a backup to the limit switch indication described in item i. above.

k. Redundant control and indicator components mounted on the control boards and cabinets were examined to ensure that adequate

physical and electrical separation was maintained. Overall, inspection of the cabling entering the control boards and cabinets verified that the guidelines for separation between redundant protection wiring and for separation between protection wiring and control wiring appeared to be followed. A few minor problem areas were noted as follows:

*(1) While inspecting the rear section of the Callaway main control boards (Panels RL 17 & 18), a situation was found where separation was not adequate between safety and nonsafety-related cables. Nonsafety-related cables associated with the 7300 process cabinets were routed within 6 inches of two redundant safety divisions (red and yellow) without any barrier. The applicants stated that installation of the safety-related cables was incomplete and that a portion of the safety cables will be mounted on a vertical steel bar to obtain adequate separation (greater than 6 inch air space). The staff inspected the referenced mount and verified that this should correct the situation. Further, the applicants stated that final Quality Control (QC) inspections had not been performed yet and that such specific instances as described above should be found during the QC inspection phase.

*(2) While inspecting the rear section of the Callaway and Wolf Creek main control board panels RL 23 & 24, the staff noticed the lack of sufficient separation between nonsafety-related circuits (Tag Nos. FAP 1-13, FAL 1-7A, and KAP-1-10) and Division 4 cables. To correct this problem, the applicants issued field reports (SFR-RL35A and SFR-RL 64I respectively) which will require that the cables be relocated and secured to obtain at least a 6 inch air space. The staff finds this acceptable.

1. The staff examined the routing of the nonsafety-related and safety-related cables within the NSSS supplied cabinets. The nonsafety-related cables are not separated from the safety-related cables within the cabinets. The applicants reconfirmed the staff that analyses and tests have been performed to ensure that credible faults in the nonsafety-related cables will not degrade the safety-related circuits below an acceptable level. The applicant referenced WCAP-8892-A which has been reviewed and accepted by the staff. The staff traced selective nonsafety-related cables to verify that these circuits were indeed low voltage and were routed so as not to allow faults greater than those analyzed for by the WCAP (500 Vac, 250 Vdc). The majority of the nonsafety cables are routed directly from the

7300 process rack to the main control boards. Several are routed from the 7300 cabinet to the auxiliary shutdown panels (ASPs). The applicants verified that the circuits associated with the ASPs are routed in low level cable trays - typically 48 to 24 volts d.c. or 120 volts a.c.. No problems were found by the staff. (See SER Section 7.2.2.7)

m. The staff verified that position indication exists for isolation valves associated with the essential service water to the air compressors. (See SER Section 7.6.5)

n. Control switches for the hydrogen recombiners were examined. (See SER Section 7.3.1.6)

o. Annunciation is provided in the control room to indicate those components whose control functions have been transferred to the remote shutdown location.

VIII. Remote Shutdown Procedure Walkthrough

(See item II.g.).

IX. Reactor Trip System

a. Two independent motor-generator sets are provided for control rod power. Separation was found acceptable.

b.& c. Adequate physical and electrical separation of the motor-generator sets, associated cabling, and associated switchgear are provided. The staff concluded upon inspection of the reactor trip breaker cabinets that there appeared to be adequate space for mounting the automatic shunt trip equipment.

d. The staff walked through typical test procedures for RTS initiating trip circuitry. It appeared that adequate provisions exist for testing the RTS initiating trip circuitry including the reactor trip breakers while the plant is at full power.

*e. Examined the location for the equipment (to be installed) to allow periodic verification of the P-4 interlocks. Installation to be complete prior to fuel load. (See SER Section 7.3.2.2)

X. ESF Systems and Pump Rooms

a.& c. Overall, the SNUPPS plants appeared to have adequate physical separation between the redundant ESF equipment trains. For example, the ESF pumps are located in separate rooms or bays.

b. The staff examined the ESF switchgear rooms. There are two rooms (One Division 4 and the other Division 1). No problems were identified.

d. Instruments/equipment are located behind walls or other barriers to provide protection against damage from missiles, pipe whip, etc.

e. Cabling and conduit are color-coded to indicate channel identification. However, instrument identification labels, in general do not provide channel identification. (See item III.a)

XI. Instrument Piping

a. Several spot checks were made of the instrument piping from the reactor vessel or process pipe to the sensor. In all cases, adequate separation was noted between redundant channels and between safety and nonsafety-related channels.

b. For the process lines observed, stainless steel tubing is utilized. Adequate protection appeared to be provided to protect against damage from missiles, flooding, pipe whip, etc.

XII. Circuit Traces from Sensors to Final Actuation Devices

a. The staff examined the wiring and circuit routing associated with the turbine trip input to the reactor protection system. The staff confirmed that the circuitry used for input of turbine trip signals is Class 1E and is routed in such a manner that it wouldn't degrade the functional performance required of the reactor trip system. (See SER Section 7.2.1)

b. The instrument piping to the four pressurizer pressure transmitters and the wiring from the transmitters to the RTS and ESFAS cabinets were traced. Adequate identification and physical separation appeared to be provided. The staff requested the applicants to submit a complete set of "interconnecting wiring diagrams" and "process control block diagrams" associated with the pressurizer pressure input channels as further verification of the installed design. The applicants agreed to do this upon formal request from the staff. This trip report will be used to state such a request.

c. (See item VI.1).

d. The staff traced the instrument piping and circuits for a redundant channel of the steam generator low level inputs to the protection system. The installation was found acceptable. (See SER Section 7.3.2.6)

e. The staff traced the turbine trip caused by reactor trip circuitry to verify that maximum credible faults were considered during routing of these circuits. The staff verified that the circuits are routed in conduit from the turbine building to the cable spreading room. The staff reviewed GE drawings M-865-0268-02 and M-865-0265 to further confirm the installed design. (See Section 7.2.2.3)

Section C (SNUPPS SER Confirmatory Items)

The following confirmatory items for Callaway and Wolf Creek, respectively, are considered resolved based on the ICSB site audit.

(7), B (8) Steam generator level control and protection - The staff verified that the design is implemented such that a two-out-of-four high steam generator level signal will isolate main feedwater flow. (SER Section 7.3.2.8)

(33), B (30) Automatic indication of block of signals initiating auxiliary feedwater following trip of the main feedwater pumps - See item VI.c. of Enclosure 1. (SER Section 7.3.2.7)

(34), B (33) Indicator, alarm, and test features provided for instrumentation used for safety functions - The staff verified that the applicant has implemented, on the plant computer, the additional indications and alarms accepted by the staff. The staff's verification of this consisted of a review of the SNUPPS BOP computer system input/output summary (Revision 13).

(35), B (31) Actuation of valve component level windows on the bypassed and inoperable status panel - The staff verified (through the review of drawings) that bypass indication for the accumulator valves occurs when the valves leave the full open position. (SER Section 7.5.2.2)