**SNUPPS**

**Standardized Nuclear Unit Power Plant System**

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**Nicholas A. Petrick**
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February 23, 1984

SLNRC 84-0035 FILE: 0278
SUBJ: Instrumentation and Control Systems Branch Review

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Docket Nos. STN 50-482 and STN-483

Dear Mr. Denton:

Enclosed are SNUPPS responses to various Instrumentation and Control Systems Branch (ICSB) issues which have been identified during the ICSB audit of the SNUPPS plants and in recent discussions with the NRC staff.

Very truly yours,

N A Petrick

Nicholas A. Petrick

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Enclosure

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ISSUE Provide detailed design information for the Automatic Test and Indication System.

RESPONSE

Detailed design information for the SNUPPS Automatic Test Indication (ATI) circuit was provided to the ICSB reviewer on February 14, 1984. This information included technical manual information discussing ATI design and operation and ATI block diagrams and logic diagrams.

ISSUE Provide additional information to justify the absence of low temperature monitors in the auxiliary building to detect freezing conditions during all modes of plant operation.

RESPONSE

Following the issuance of NRC Bulletin 79-24, a review of the SNUPPS design was conducted to determine if any safety-related fluid system could be subject to freezing during periods of extremely cold weather. This review included instrument lines associated with safety-related systems within the auxiliary building. It was concluded that ambient temperatures are maintained as to preclude freezing by unit heaters in all areas containing safety-related equipment. Also it was determined that all safety-related systems, including sample and instrument lines, are located sufficiently remote from cold walls and exterior openings to preclude local freezing problems.

In addition, the bases for the design of the Auxiliary Building included maintaining the building at 60°F, included no equipment heat loads (i.e., complete plant shutdown) and a minimum outside design temperature of -25°F. Based on the minimum Callaway and Wolf Creek site design temperatures (6°F and 7°F respectively) and the plant being operational with lighting, switchgear, etc. energized, the existing heating system design capacity is at least 40% higher than required.

Also 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 building, as a whole, are minimal. It should also be noted that due to the location and quantity of unit heaters provided and the above noted margins, individual unit heater failures will not effect the building or localized area temperatures to the point where freezing could occur. In fact in many areas of the Auxiliary Building, the operational equipment heat loads exceed the area heat losses, thus requiring cooling even during the winter months.

Even if the plant heating system failed, the building equipment heat loads coupled with the large amounts of concrete and steel would prevent any larger of sudden changes in the interior temperatures.

Further protection against the possibility of freezing conditions developing in the Auxiliary Building is provided by the plant operating staff. At least every 12 hours, plant operators will patrol general areas of the Auxiliary Building. These patrols, together with the information in the preceding paragraph, provide adequate assurance that plant operators would detect a low temperature condition in the Auxiliary Building.

ISSUE Provide drawings that confirm the design associated with isolation (cabinets RP 334 and RP 335) of the requested control function from the control room circuitry.

RESPONSE

In response to this issue, SNUPPS drawings E-03AL02B-01 and E-03BB24-01 were provided to the NRC reviewer. These drawings show the isolation of control function performed in panels RP 334 and RP 335 for two typical control circuits.

ISSUE Provide drawings M-865-0268-02 and M-865-0265 as confirmation of the installed design.

RESPONSE

The requested drawings were provided to the ICSB reviewer on February 14, 1984.

ISSUE FSAR Table 7.4-1 indicates that both Class 1E and non-Class 1E wide range reactor coolant temperature indicators are installed on the Auxiliary Shutdown Panel. Verify that the non-1E indicators are identical to the Class 1E indicators.

RESPONSE

The Class 1E and non-Class 1E reactor coolant temperature indicators are Westinghouse model 252 indicators. This is documented in the Bill of Materials (BOM) for the Auxiliary Shutdown Panel. The BOM was provided to the NRC ICSB reviewer in December, 1983 following the ICSB audit of the SNUPPS plants. The Class 1E indicators are qualified both seismically and environmentally in the SNUPPS design.

ISSUE At Wolf Creek, the RWST doghouse was flooded with water to a depth of approximately four feet. Some conduit and a junction box were partly submerged. Provide information to assure this condition will not occur during plant operation.

RESPONSE

During the site audit, the RWST doghouse was observed to be partially flooded. The RWST doghouse design provides features to prevent flooding such as:

1) all SNUPPS site grade elevations (i.e., 2000 ft.) are situated well above the local flood plains at the respective sites;

2) the top of the RWST doghouse base slab is 6" above grade and the fill around the doghouse is sloped away from the structure such that drainage is directed to site drainage; and

3) the doghouse roof piping penetrations are provided with waterproof seals.

Therefore, water is prevented from entering the RWST doghouse. However, due to the intermediate stage of construction of the doghouse roof, the temporary RWST flush piping that prevented the doghouse door from being closed and the rainy weather during the week of the ICSB audit, water was apparently allowed to enter the doghouse. This is a temporary condition that is a function of the construction process. When construction of the RWST doghouse is completed and the doghouse becomes operational, the introduction of water will be prevented by the design features described above.

ISSUE Update the information provided in letter SLNRC 84-0012 (1/31/84) regarding the boron dilution mitigating system to address compliance with IEEE Standard 279.

RESPONSE

As indicated in section 7.6.7.3 of the Safety Evaluation Reports for the SNUPPS plants, the SNUPPS Utilities have committed to install a boron dilution mitigating system identical in design to that of the Comanche Peak Steam Electric Station (CPSES). The SNUPPS system will meet the same design criteria and standards as the CPSES system. To document this fact, the SNUPPS FSAR will be modified to include the following statement in section 7.6.12.1: "The boron dilution control system is identical to that reviewed and approved by the in the NRC "Safety Evaluation Report for Comanche Peak Units 1 and 2 (Docket Nos. 50-445 and 50-446), NUREG-0797, July 1981."

ISSUE Provide additional information regarding the "conventional" methods which will be used to perform sensor response time testing as discussed in letter SLNRC 84-0015, dated February, 1984.

RESPONSE

The term "conventional methods" refers to the response time testing methods which have been tried and proven in the nuclear industry. The noise analysis method of response time testing discussed in the SNUPPS FSAR is a relatively new and unproven method. To document the response

time testing methods, both primary and backup, to be used by the SNUPPS Utilities, the SNUPPS FSAR will be updated in the next revision as shown on the attached marked-up FSAR page. Plant surveillance procedures will define the applicable test method to be applied to the different types of sensors.

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For sensors, the method used will function on the principle that, in the protection system, sensors are sensitive to process noise created by natural perturbations in variables, including temperature, pressure, and flow. Nuclear instrumentation detectors are excluded since delays attributable to them are negligible in the overall channel response time required for safety.

The noise method testing system is designed to measure sensor response time and/or assess degradation by measurement of the sensor's efficiency to detect high-frequency noise. Data collected from each sensor is conditioned, amplified, digitized, and analyzed by an on-board microcomputer. Two analyses are performed. One compares the obtained frequency signature with a baseline signature for checking degradation, the other compares the cutoff frequency of the power density spectrum to estimate response time.

The sensor response time testing system is mobile and can collect and analyze data from four primary or secondary system detectors at the same time. RTDs, pressure transmitters, and DP cells can be tested with the reactor between 50- and 100-percent power.

The measurement of response time at the specified time intervals provides assurance that the protective and engineered safety feature action function associated with each channel is completed within the time limit assumed in the accident analyses.

b. The reliability goals specified in Section 4.2 of IEEE Standard 338-1971 are consistent with the test frequency in Chapter 16.0.

c. The periodic time interval discussed in Section 4.3 of IEEE Standard 338-1971, and specified in Chapter 16.0, is selected to ensure that equipment associated with protection functions has not drifted beyond its minimum performance requirements. The adequacy of the interval will be verified by results of testing or the interval will be reevaluated on the basis of actual experience.

d. The test interval discussed in Section 5.2 of IEEE Standard 338-1971 is developed primarily on past operating experience and modified, if necessary, to ensure that system and subsystem protection is reliably provided. Analytic methods for determining reliability are not used to determine test interval.

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For sensors, the SNUPPS design permits periodic response time testing. The methods of testing fall into two categories as follows:

PRIMARY - For Resistance Temperature Detectors (RTD's), a Loop Current Step Response methodology is used as endorsed in NUREG-0809 and described in detail in Electric Power Research Institute (EPRI) Report NP-834 (Vol. 1).

For Pressure Sensors, the EPRI developed method described in Report NP-267 shall be used. This pressure ramp testing is also discussed in ISA dS-67.06.

BACKUP - RTD's and Pressure Sensors may be tested using the Noise Analysis method which will function on the principle that, in the protection system, sensors are sensitive to process noise created by natural perturbations in variables, including temperature, pressure and flow. The noise analysis method testing system is designed to measure sensor response time and/or assess degradation by measurement of sensor efficiency to detect high-frequency noise.

Nuclear instrumentation detectors are excluded since delays attributable to them are negligible in the overall channel response time required for safety.