ILLINOIS POWER COMPANY

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500 SOUTH 27TH STREET, DECATUR, ILLINOIS 62525

December 3, 1981

Mr. James R. Miller, Chief
Standardization & Special Projects Branch
Division of Licensing
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Dear Mr. Miller:

Clinton Power Station Unit 1
Docket No. 50-461

The attached material represents responses which were discussed on December 1, 1981 with Messers. Ernie Rossi and Rick Kendall. These responses were found to be satisfactory and close these items which have been identified as confirmatory from the FSAR Chapter 7 review.

Sincerely,

G.E. Stuller for J.D. Geier
J.D. Geier
Manager, Nuclear Station Engineering

Attachments

cc: J.H. Williams, NRC Clinton Project Manager
H.H. Livermore, NRC Resident Inspector
R. Kendall, NRC ICSB

B001 Add: Ernie Rossi
S1/1 Rick Kendall

421.2 A detailed design description of the analog trip modules will be provided in Amendment 11 of CPS FSAR. A draft of the description is attached.

421.4 RCIC and HPCS mitigate only the water level effects of a rod drop accident by providing makeup water required as a consequence of this event. Chapter 15 analysis of the rod drop accident, however, takes no credit for either of these systems in mitigating the consequences of the event. The FSAR will be revised (Amendment 11) to clarify the roles of HPCS, RCIC and the low pressure systems in the rod drop accident.

421.10 There are no set-points associated with the suppression pool cooling mode of the RHR system. The FSAR will be revised to remove this discrepancy (Amendment 11).

421.17 NEDO-10466A is the NRC approved version of NEDO-10466. NEDO-10466, Revision 2, is an earlier revision of the same NEDO prior to NRC approval.

421.18 A separate submittal dealing with noise susceptability of NSPS will be submitted by December 11, 1981.

421.19 See the response to 421.15.

7.1.2.10 Analog Trip System

The Analog Trip System is a term which describes the hardware implementation of the process trip and testability characteristics of the analog section of NSPS channels. The Analog Trip System consists of Analog Trip Modules (ATM), Card Select Decoder (CSD), Data Acquisition and Display Controllers (DADC) and Display and Control Panels (DCPs), which are arranged as circuit cards in the control panels P661 thru P664. The use of these signal processing elements are universal between systems in NSPS (i.e., RPS, ECCS, NS4, etc.). An example of a typical arrangement together with system configuration limits is given in Figure 7.1.9.

7.1.2.10.1 General Description

Each Analog Trip Module (ATM) obtains an analog process monitoring input from a transmitter, compares it to an internal reference level and provides a maximum of three trip outputs, an analog signal out for display, and a gross fail indication signal (i.e., for either of high or low signal failure).

The ATM consists of two sections - the transmitter section and the trip section, which are electrically isolated from one another at all interfaces which prevents 2500 volt fault propagation protection from loop power supply terminal to backplane through the ATM.

The transmitter section is designed to take 5 standard input signal ranges which are signal conditioned to exclude potential sources of noise. The remote analog transmitter unit which is powered from a 24 volt power supply in the transmitter section provides the loop input signal through the isolation barrier. Test pulses from the Self Test System (STS) and calibration current are injected into the ATM logic into the transmitter section at this point.

The trip section is designed to compare a signal level proportional to the input signal level against predetermined reference level and provide the trip outputs to NSPS logic circuits and to provide the gross fail indication and analog output signals. Trip outputs may be upscale or downscale. Status indications are visible on the front of the cards. Reference levels are adjustable from the front of the card and backplane programming is used to eliminate operator error in setting test pulse priority and trip output configuration.

The Card Select Decoder (CSD) takes analog information from up to 12 ATMs, provides calibration capability for the ATMs and an interface for process and calibration data to the Data Acquisition and Display Controller (DADC). Such data can be stored and/or manipulated in the Data Acquisition and Display Controller, which, through keyboard control located in the Display and Control Panel (DCP) provides dispaly selection for process and calibration variables. Figure 7.1.10 shows in the DCP format. The panel can operate in three modes:

Randon Monitor Mode:

- Monitor any ATM transmitter signal among 4 divisions
- Turn on monitor indicator on ATM front panel for confirmation identification of the selected module
- Real-time display
- Simultaneously display any 2 ATM signals
- Provide % of full scale and engineering unit display format

Monitor Compare Mode:

- Simultaneously display the same field parameter from the 4 divisions for comparison
- Provide % of full scale and engineering unit display format
- Real-time display and data update
- Turn on monitor indicator on ATM front panel for confirmation identification of the selected modules

Calibration Mode:

- Operation is limited to the resident division
- Select system and ATM to be calibrated
- Option for zero and gain adjustment on selected ATM
- Provide simulated transmitter signal to the selected ATM for trip level and hysteresis adjustment
- Provide reference signal for verifying the accuracy of the calibration system
- Provision to measure impedance of the selected ATM input for detecting malfunction of transmitter signal simulation bus

The ATM, CSD, DADC and DCP are tested in accordance with the testability requirements for the NSPS concept (see Subsection 7.1.2.10.1.2) and are interrogated by the Self Test System (STS).

Test pulses injected into the ATM transmitter section propagate through the three trip outputs and the analog level outputs and emerge from the DADC for comparison by the STS. The pulse testing proceeds automatically, signal path by signal path. It takes thirty minutes to test each division. The pulse test changes the trip output state of an untripped condition independently of the trip set points but is designed not to interfere with the ability of the ATM to provide an alarm output in the event of a signal level alarm condition. The STS indicates the location of the fault through a diagnostic terminal.

A functional block diagram of the Analog Trip System is shown in Figure 7.1.11.

7.1.2.10.2 Evaluation

The Analog Trip System is part of the NSPS design concept and is designed to meet the IEEE standards and Regulatory Guides as described for the protection systems covered in the concept, i.e., RPS, NSSSS, RHR, LPCS, HPCS, RCIC, ADS, ECCS, NBS, LDS, HPCS Power Supply, NMS.

In particular, it is designed to meet IEEE 323-1974 and IEEE 344-1975. The equipment is located in the non-harsh environment of the control room and is subject to a preventive maintenance program supported by the self test system. It conforms to IEEE 338-1977 and RG 1.22, RG 1.118 with one exception. Automatic response time testing is addressed by the use of regular response time measurement as part of the maintenance program.

7.1.2.11 Protection System In-Service Testability

This subsection describes the equipment and features incorporated in the protection system design to facilitate in-service testability of non-NSPS equipment. For additional testability discussions refer to Topical Report NEDO-21617-A, dated December 1978, "Analog Transmitter/Trip Unit System for Engineered Safeguard Sensor Inputs" as approved by the NRC.

7.1.2.11.1 General Description

The Trip Unit/Calibration System represents a best approach to meet the desires for testability and increased reliability. The Trip Unit/Calibration System is an all solid-state electronic trip system designed to provide highly stable and accurate monitoring of critical process parameters.

The system consists of Analog Comparator Units (ACU) which may be Master Trip Assemblies, or Slave Trip Assemblies. Other accessories include Calibration Units and Card File Assemblies. The Master Trip Unit interfaces with a 4-20 ma transmitter located at some remote location within the power plant. The Slave Trip Unit is driven from the analog output of a Master Trip Unit. The Calibration Unit has the capability of providing either a stable or transient calibration current that can be routed by a switch to any master unit.

7.1.2.11.2 Evaluation

The Master Trip Unit is a plug-in printed circuit assembly designed to accept a 4-20 ma signal from a remote transmitter. The trip unit contains the circuitry necessary to condition the transmitter current and to provide the desired switching functions and analog output signals. The Master Trip Unit provides energizing current at any point in the 4-20 ma input signal range for testing a particular channel's trip circuitry. The Master Trip Unit also contains a panel meter that displays transmitter current and is scaled in the units of the process variable being measured by the transmitter wired to the Master

Trip Unit. A switch position selection internal to the Master Trip Unit allows for selection of either high trip pointor low trip point. This allows the testing of trip circuitry for a particular channel with the trip circuitry either energized or de-energized during normal operation. Calibration of the Master Trip Unit is performed by supplying stable and transient input currents of known accuracy. During calibration, the trip action is displayed on Display #2 of the Removable Display Assembly. The accruacy of the analog output of the Master Trip Unit may also be checked during the calibration procedure with an external meter or recorder.

The Slave Trip unit produces an output signal which performs trip function. The Slave Trip Unit is driven by the analog output signal from the Master Trip Unit. There is no direct connection to any 4-20 ma transmitter. No analog output signals are generated by the slave unit. Calibration of the Slave Unit is accomplished by commanding the Master Trip Unit which drives the Slave Unit under test into the calibration mode and then performing the normal calibration procedure. A Block Diagram of the Slave Trip Circuit is shown in Figure 7.1-12.

7.1.2.11.3 Surveillance and Testing

The function of the Calibration Unit is to furnish the means by which an inplace calibration check of the Master and Slave Trip Units can be performed. The calibrator contains a stable current source and a transient current source. Normal use of the stable current is for verification of the calibration point of any given channel. The transient current source is used to provide a step current input into a selected channel. A block diagram of the Calibration Unit is shown in Figure 7.1-13.