

REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

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 FACIL: 50-400 Shearon Harris Nuclear Power Plant, Unit 1, Carolina 05000400
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 DENTON, H.R. Office of Nuclear Reactor Regulation, Director.

SUBJECT: Forwards addl info re RCS overpressure protection during low temp operation in response to Instrumentation & Control Sys Branch SER Confirmatory Item 18.

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TITLE: THE ARMY'S POLICY ON THE USE OF
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Carolina Power & Light Company

SEP 26 1984

SERIAL: NLS-84-410

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
United States Nuclear Regulatory Commission
Washington, DC 20555

SHEARON HARRIS NUCLEAR POWER PLANT
UNIT NO. 1 - DOCKET NO. 50-400
LOW TEMPERATURE OVERPRESSURE PROTECTION

Dear Mr. Denton:

Carolina Power & Light Company (CP&L) hereby submits additional information concerning Reactor Coolant System Overpressure Protection during Low Temperature Operation at the Shearon Harris Nuclear Power Plant. This information is in response to Safety Evaluation Report Confirmatory Item No. 18 from the Instrumentation and Control Systems Branch.

If you have any questions or require additional information, please contact me.

Yours very truly,

S. R. Zimmerman
Manager

Nuclear Licensing Section

JHE/pgp (597JHE)

Attachment

cc: Mr. B. C. Buckley (NRC)
Mr. G. F. Maxwell (NRC-SHNPP)
Mr. J. P. O'Reilly (NRC-RII)
Mr. Travis Payne (KUDZU)
Mr. Daniel F. Read (CHANGE/ELP)
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Shearon Harris Nuclear Power Plant
SER Confirmatory Item No. 18
RCS Overpressure Protection During
Low Temperature Operation

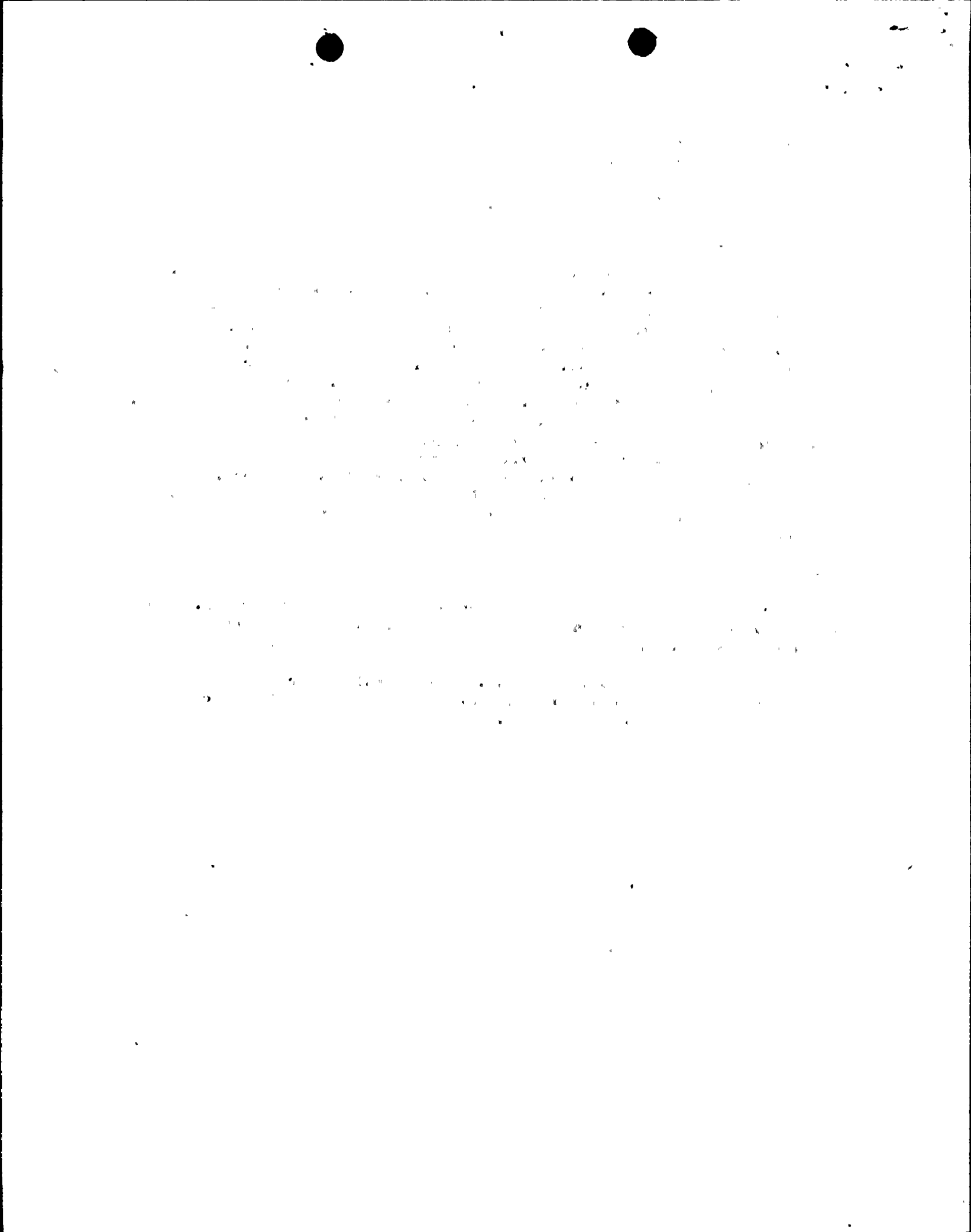
Confirmatory Item:

The overpressure protection during low temperature operation is provided by automatic actuation of the pressurizer PORVs. In its review of the automatic control logic for these valves, the staff found that a failure resulting in a high output signal from either of the two auctioneers would prevent both of the valves from opening when needed. Because no indication of the auctioneered safety output signals is provided to the operator, such a failure could remain undetected. Furthermore, even if such a failure would be detected, the system would remain inoperative. By letter dated September 19, 1983, the applicant has committed to install redundant auctioneering devices. The control logic for the low temperature overpressure protection system will be modified so that a single failure would not prevent both of the PORVs from opening when needed. The staff finds that design acceptable subject to staff review of updated drawings and FSAR changes for this system to be submitted by the applicant.

Response:

The Reactor Coolant System Pressure Control Logic Diagram (Figure 7.6.1-7 in the FSAR) depicts the current logic for the system. The addition of redundant auctioneers is internal to Process Control Cabinets 5 and 8.

Attached are marked-up FSAR pages 7.6.1-5 and 7.6.1-6 which have been amended to reflect the revised functional logic. These changes will be incorporated into a future amendment to the FSAR.



letdown, thereby maintaining RCS pressure within allowable limits. Refer to Sections 5.4.7, 5.4.10, 5.4.13, 7.7 and 9.3.4 for additional information on RCS pressure and inventory control during other modes of operation.

Analyses have shown that one PORV is sufficient to prevent violation of allowable limits due to anticipated mass and heat input transients. The mitigation system is required only during low temperature water solid operation. See Section 5.2.2.11 for a discussion of the analysis. The function of this actuation logic is to continuously monitor RCS temperature and pressure conditions, with the actuation logic only unblocked when plant operation is at a temperature below the reference nil ductility temperature (RNDDT). The monitored system temperature signals are processed to generate the reference pressure limit program which is compared to the actual monitored RCS pressure. The system logic will first annunciate a main control board alarm whenever the measured pressure approaches within a pre-determined amount, thereby indicating a pressure transient is occurring, and on a further increase in measured pressure, an actuation signal is transmitted to the power operated relief valves when required to mitigate the pressure transient. See Figure 7.6.1-7 for the block diagram showing the interlocks for RCS pressure control during low temperature operation. This control system is non-safety related.

As shown on this figure the generating station variables required for this interlock are channelized as follows:

- a) Protection Set I
 - 1) Wide range RCS temperatures from hot legs
 - 2) Wide range RCS pressure (PT 403)
- b) Protection Set IV
 - 1) Wide range RCS pressure (PT 402)
- c) Protection Set II
 - 1) Wide range RCS temperatures from cold legs

The wide range temperature signals, as inputs to the Protection Sets I and II, continuously monitor RCS temperature conditions whenever plant operation is at a temperature below the RNDDT. In Protection Set I, each of the existing RCS hot leg wide range temperature channels will supply continuous analog input through an isolator to ~~an~~ ^{redundant} auctioneering devices which ~~is~~ ^{are} located in the Process Control Cabinet 5.

The lowest reading will be selected ^{by one of the auctioneers as} ~~and~~ input to a function generator which calculates the reference pressure limit program considering the plant's allowable pressure and temperature limits. Also available from Protection Set I is the wide range RCS pressure signal which is sent through an isolation device to Process Control Cabinet 5. The reference pressure from the function generator is compared to the actual RCS pressure monitored by the wide range pressure channel. The error signal derived from the difference between the reference pressure and the actual measured pressure will first annunciate a

the lowest
auctioneered
temperature in

main control board alarm whenever the actual measured pressure approaches, within a predetermined amount, the reference pressure. On a further increase in measured pressure, the error signal will generate an annunciated actuation signal. The actuation signal available from auxiliary rack "A" will control PORV "A" whenever a temperature-dependent permissive signal from Process Control Cabinet 8 is present. The temperature-dependent permissive to the PORV's actuation device effectively disarms (blocks) the actuation signal at temperatures greater than the range of concern. This will prevent unnecessary system actuation when at normal RCS operating conditions as a result of a failure in the process sensors.

The monitored generating station variables that generate the actuation signal for the "B" PORV are processed in a similar manner. In the case of PORV "B", the reference temperature available from Protection Set II is generated in Process Control Cabinet 8 from the lowest auctioneered wide range cold leg temperature; and the actual measured pressure signal is available from Protection Set IV. Therefore, the generating station variable signals from which the error signal is derived are provided from redundant and independent protection sets. The error signal derivation itself used for the actuation signals is available from the control group.

Upon receipt of the actuation signal, the actuation device will automatically cause the PORV to open. Upon sufficient RCS inventory letdown, the operating RCS pressure will decrease, clearing the actuation signal. Removal of this signal causes the PORV to close.

The lowest temperature is generated by both of the auctioneers. One derivation provides a permissive for the opposite train and one is used in the reference pressure limit program for PORV "B".