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T. C. NICHOLS, JR.
VICE PRESIDENT AND GROUP EXECUTIVE
NUCLEAR OPERATIONS

April 8, 1982

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

Subject: Virgil C. Summer Nuclear Station
Docket No. 50/395
Cold Overpressure Protection

Dear Mr. Denton:

South Carolina Electric and Gas Company (SCE&G) herein responds to the request by your staff regarding pressurizer PORV variable setpoints and adherence to 10 CFR 50 Appendix G limits, by providing a mark-up of FSAR Section 5.2.2.5. These changes will be incorporated into Amendment 31 to the FSAR.

Additionally, in response to concerns from your Materials Engineering Branch, SCE&G provides the following:

1. The expected fast neutron fluence at the peak location on the reactor vessel wall prior to startup after first refueling is estimated to be 2.0×10^{18} n/cm^2.

2. The number of expected full power years (EFPY) prior to first refueling is estimated to be 1.07 years EFPY.

If you have any questions, please let us know.

Very truly yours,

T. C. Nichols, Jr.

T. C. Nichols, Jr.

APJ:TCN:lkb
Attachment
cc: V. C. Summer (w/o attach.)
G. H. Fischer (w/o attach.)
H. N. Cyrus
T. C. Nichols, Jr. (w/o attach.)
M. B. Whitaker, Jr.
J. P. O'Reilly
H. T. Babb
D. A. Nauman
C. L. Ligon (NSRC)
W. A. Williams, Jr.
R. B. Clary
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A. R. Koon
M. N. Browne
G. J. Braddick
J. C. Ruoff
J. L. Skolds
J. B. Knotts, Jr.
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NPCF
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inclusion of leak detection criteria in the Technical Specifications is not necessary with respect to these check valves since they are tested during the plant startup following a refueling shutdown. Should a valve be found leak excessively, it will be repaired and retested prior to a return to normal operation.

Check valves on the discharge side of the high head safety injection, charging and boron injection systems, which are classified as Category AC, are tested as described in Section 6.2.6.3. Acceptance criteria for such tests are discussed in Section 6.2.6.2.4. Scheduling and reporting of such tests are addressed in Section 6.2.6.4.

5.2.2.5 RCS Pressure Control During Low Temperature Operation

Administrative procedures are developed to aid the operator in controlling RCS pressure during low temperature operation. However, to provide a backup to the operator and to minimize the frequency of RCS over-pressurization, an automatic overpressurization MITIGATION system (OMS) is provided to maintain pressures within allowable limits.

Pressurizer power operated relief valves (PORVs) are used to provide protection against exceeding 10CFR50 Appendix G limits, as defined by Virgil C. Summer Nuclear Station Technical Specifications, during periods of water solid operation. Analyses have shown that one PORV is sufficient to prevent violation of ~~these~~ 10CFR50 Appendix G limits due to anticipated mass and heat input transients.

Insert A

However, redundant protection against such over-pressurization event is provided through use of two PORV's to mitigate any potential pressure transients. The protection system is required only during low temperature water solid operation and is automatically enabled at reactor coolant system temperatures below 300°F.

Each of the two PORV's is supplied with an independent, seismically designed supply of nitrogen which is sized to assure that no operator action is required to terminate the transient to 10 minutes. The nitrogen supply is shown on FSAR Figure 5.2-8a. High pressure nitrogen will be regulated down to the required operating pressure for the PORV actuators. Relief valves provide protection against over-pressurizing the actuators due to regulator failure.

5.2.2.5.1 System Operation

Two pressurizer power operated relief valves are supplied with actuation logic to ensure that a completely automatic and independent RCS pressure control backup feature is provided for the operator during low temperature operations. ~~This system~~ The OMS provides the capability for additional RCS inventory letdown, thereby maintaining RCS pressure within allowable limits. Refer to Sections 5.5.7, 5.5.10, 5.5.13, 7.6.6 and 9.3.4 for additional information on RCS pressure and inventory control during other modes of operation.

The basic function of the ~~system~~ OMS logic is to continuously monitor RCS temperature and pressure conditions whenever plant operation is at a temperature below ~~RNDT~~ 300°F. An auctioneered system temperature will be continuously converted to an allowable pressure and then compared to the actual RCS pressure. This comparison would provide an actuation signal to the power operated relief valves when required to prevent pressure temperature conditions from exceeding allowable limits.

Insert A to Page 5.2-45a

The OMS utilizes the PORVs with setpoints that vary depending on the average reactor coolant system temperature (T_{avg}). The lift settings are less than or equal to maximum setpoints defined by Figure 5.2-15.

5.2.2.5.2 Evaluation of Low Temperature Overpressure Transients

Pressure Transient Analyses

ASME Section III, Appendix G, establishes guidelines and limits for RCS Pressure primarily for low temperature conditions ($\leq 350^{\circ}F$). The relief system discussed in 5.2.2.5 satisfies these conditions as discussed in the following paragraphs.

Insert B →

Transient analyses was performed to determine the maximum pressure for the postulated worst case mass input and heat input events.

The mass input transient analysis was performed assuming the inadvertent actuation of a safety injection pump, which, in combination with other misoperation, pressurizes the RCS. The results show that a maximum pressure of 575 psig will be reached.

The heat input analysis was performed for an incorrect reactor coolant pump start assuming that the RCS was water solid at the initiation of the event and that a 50°F mismatch existed between the RCS (250°F) and the secondary side of the steam generators (300°F). (At lower temperatures, the mass input case is the limiting transient condition.) The results show that a maximum pressure of a 640 psig will be reached in the RCS for this particular transient.

Insert C

Both analyses took into account the single failure criteria and therefore, the operation of one ~~Power Operated Relief Valve~~ (PORV) in the OMS was assumed to be available for pressure relief. The above events have been evaluated against the allowable pressure/temperature limits established in Figures 5.2-13 and 5.2-14. The evaluation of the transient results conclude that the allowable limits will not be exceeded and therefore will not constitute an impairment to vessel integrity and plant safety.

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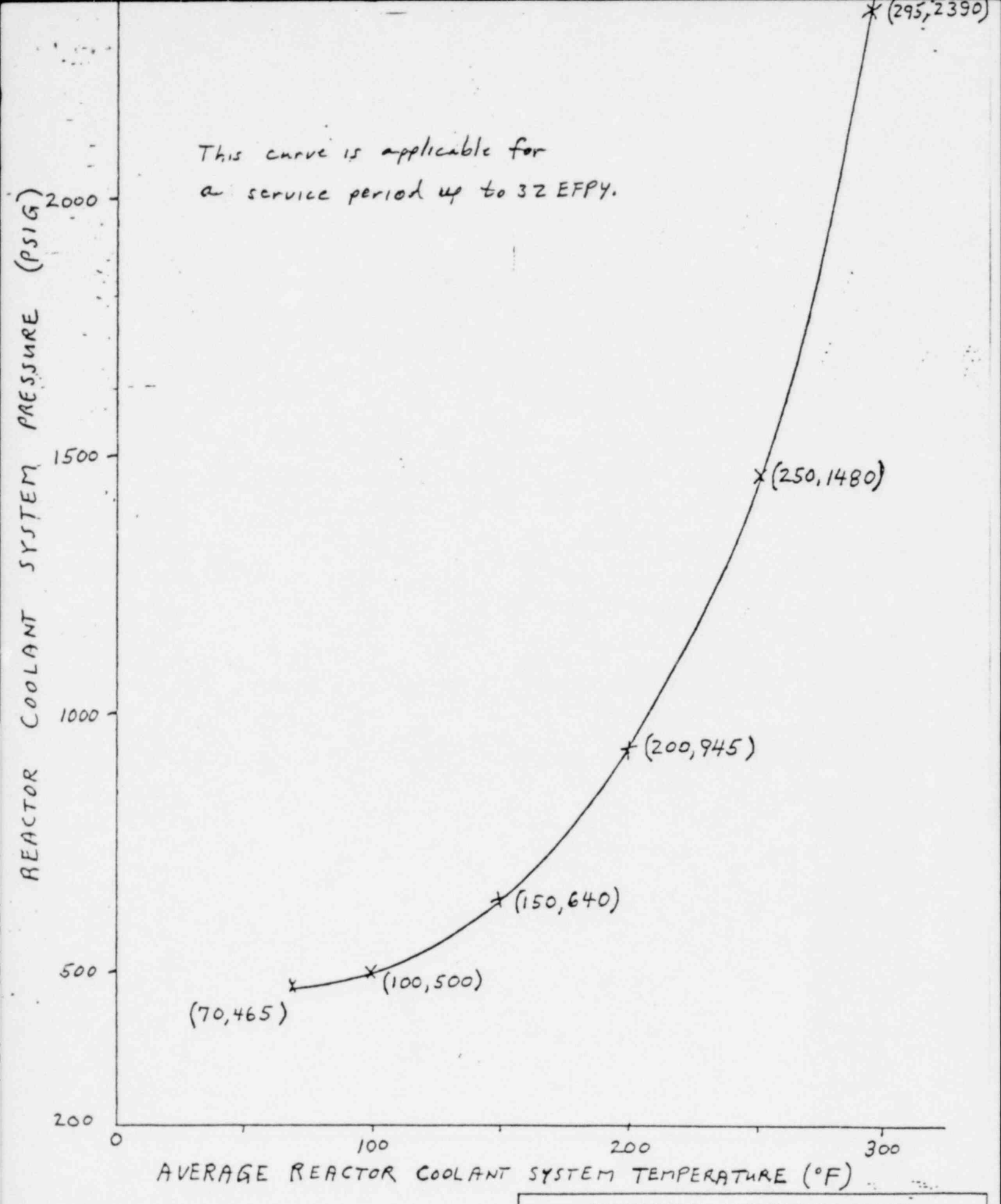
Insert B to Page 5.2-45b

Transient analyses were performed to establish a PORV lift setpoint program for the Overpressur Mitigating System (OMS) to be applied during shutdown operation of the plant. This program maintains reactor coolant system pressure within acceptable limits following all credible overpressurization incidents occurring in the plant during low temperature, water solid operation.

The mass input transient analysis was performed assuming the most severe event involving a single centrifugal charging pump. Specifically, a loss of air incident is postulated, whereby the flow control valve on the charging line fails open and, simultaneously, the flow control valve on the letdown line fails closed.

Insert C to Page 5.2-45b

The heat input mechanism considered for analysis involved a RCS pump startup in one loop with a water solid condition and temperature assymmetry in the reactor coolant system, whereby the steam generators were at a higher temperature than the remainder of the system.



SOUTH CAROLINA ELECTRIC & GAS CO.
VIRGIL C. SUMMER NUCLEAR STATION

LOW TEMPERATURE RCS PRESSURE CONTROL
MAXIMUM PORV LIFT SETPOINTS

Figure 5.2-15