May 20, 1993

Docket No. 50-305

LICENSEE: Wisconsin Public Service Corporation

FACILITY: Kewaunee Nuclear Power Plant

SUBJECT: RESOLUTION OF OUTSTANDING ISSUES ASSOCIATED WITH GENERIC LETTER 90-06, "RESOLUTION OF GENERIC ISSUE 70, 'POWER-OPERATED RELIEF VALVE AND BLOCK VALVE RELIABILITY,' AND GENERIC ISSUE 94, 'ADDITIONAL LOW-TEMPERATURE OVERPRESSURE PROTECTION FOR LIGHT-WATER REACTORS,' PURSUANT TO IO CFR 50.54(f)"

On April 22, 1993, the staff met with representatives of Wisconsin Public Service Corporation (WPSC), the licensee for the Kewaunee Nuclear Power Plant, at One White Flint North, Rockville, Maryland. Enclosure 1 lists the meeting participants and observers. The purpose of this meeting was to discuss the licensee's proposed resolution to concerns raised by the staff in a letter dated January 2I, 1993 resulting from review of WPSC's response of July 24, 1992 to Generic Letter (GL) 90-06.

WPSC representatives presented background information regarding the design of the low temperature overpressure protection (LTOP) system at Kewaunee, and the recent determination that the setpoint for the LTOP system safety valve was potentially non-conservative with regard to current Technical Specifications (TSs). WPSC staff then discussed their engineering review of the system, including details regarding plant operating restrictions (see Enclosure 2). The review determined that the setpoint was acceptable as the basis met all applicable regulations. The licensee also reviewed their approach to the development of TSs for LTOP.

The meeting concluded with a review of their approach to other questions posed by the staff regarding WPSC's response to GL 90-06, including 18-month power operated relief valve (PORV) stroke testing and PORV control air valve testing. The licensee had previously committed to provide their response to all questions raised during the staff's review of their approach to the resolution of GL 90-06 by May 4, 1993, and they reaffirmed that commitment at the close of this meeting.

Original Signed By:

Allen G. Hansen, Project Manager
Project Directorate III-3
Division of Reactor Projects III/IV/V
Office of Nuclear Reactor Regulation

Enclosures:
As stated

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

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Division of Reactor Projects III/IV/V
Office of Nuclear Reactor Regulation

Enclosures:
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Enclosure 1

Participants and Observers

NRC

A. Hansen
L. Lois
R. Frahm
B. Elliot

WPSC

R. Pulec
V. Cuneo

Observers

No observers were present

LTOP SETPOINT EVALUATION FOR NSAL 93-005B

10 CFR 50 Appendix G Pressure Temperature Limits Established

* Used Reg. Guide 1.99, Rev 2 Position C.2
* Used surveillance capsule data to determine chemistry factor
* Used limited fluence period (through end of cycle 20)

Evaluation of LTOP Setpoint at 500 #

* Included RXCP & RHR flow induced differentials not previously considered

* Retained existing licensing basis transients

  Mass input - inadvertant SI pump start at 100 F, (with 2 RXCPs and 2 RHR pumps running)

  Energy input - start of first RXCP with SG to RCS temperature differential of 100 F, (with 2 RHR pumps running)

* Calculated maximum pressures that could occur during licensing basis transients noted above

* Incorporated transient specific calculated accumulation values

* Verified backpressure due to flashing in relief valve discharge was negligible

* Compared calculated LTOP transient pressures to 10 CFR 50 Appendix G maximum allowable pressure-temperature limits

* Determined existing 500 # setpoint capable of preventing LTOP transient from exceeding 10 CFR 50 Appendix G limits for all RCS temperatures of 120 F or greater.

Evaluation of RXCP restrictions

* At RCS temperatures of less than 120 F, 1 RXCP in pull to lock and tagged. Single failure review of start circuitry performed.

Future LTOP Considerations for KNPP

* ASME Code Case N-514
* Lower setpoint to eliminate RXCP restrictions
* Redefinition of licensing basis transients

  mass input - inadvertant SI start not credible, use charging with L/D isolation

  energy input - use 50 degree Δ T (industry standard)

COMMITMENT TO INCLUDE LTOP DESIGN CURVES IN TS

Proposed TS will include:

1) New Figure 3 entitled "LTOP Limitation Curve"

   * will reflect 10 CFR 50 Appendix G limits calculated above

   * will be applicable up to end of cycle (EOC) 20 only

   * will be used to determine TS violation if LTOP were to occur

   * curve will "expire" at EOC 20 - with no action, would be required to comply with Figures 1 & 2 for LTOP evaluation

2) Changes to TS 3.1.b.1 (Heatup and Cooldown Limit Curves for Normal Operation) to refer to LTOP limits

3) Plant heatup and cooldown will comply with existing heatup and cooldown curves.

LTOP TS UPGRADES: Concern #3 of January 21, 1993 NRC letter

* Kewaunee LTOP system is passive ASME code safety relief valve

* Two normally open flowpaths from RCS join to RHR common suction piping with LTOP valve

* NUREG 1326 presents technical basis for reducing 7 day AOT to 8 hours.

  * Majority of LTOP systems rely on active instrumentation loops for opening PORVs

  * Conclusions typically based on dual active instrumentation channel failures

  * Decision to reduce AOT based on dual-channel system being operable to satisfy single failure criterion of 10 CFR 50 Appendix A

* Kewaunee design is passive - does not rely on instrumentation channels or external power sources

* Proposed TS previously submitted

  * No restrictions on AOT with one flowpath closed if second flowpath valves open and de-energized

  * Met BTP RSB 5-2 Position B.3 "system should be able to perform its function assuming any single active component failure"

* Revised TS to be submitted will impose 7 day AOT when one flow path inoperable. Operable flow path valves will be verified open and valves de-energized.

    * Exceeds BTP RSB requirements since no single active failure could isolate flowpath

18 MONTH PORV STROKE TEST: Concern 2 of 1/21/93 letter

* IST plan will be revised to perform test during KNPP Hot Shutdown or Intermediate Shutdown per staff position
* PORV block valve will be closed just prior to stroking PORV
    * Will limit RCS losses and prevent overpressurization and challenge of Pressurizer Relief Tank Rupture disc
    * Pressure and temperatures representative of normal required system operating conditions will exist between PORV and block

TESTING OF PORV CONTROL AIR VALVES: Concern 1 of 1/21/93 letter

* Industry installation of accumulators resulted from PORVs being used as LTOP
* At Kewaunee, accumulators were not required for NUREG 0578 or 0737 compliance
* Accumulators installed to assure PORV availability after containment isolation signal closed IA 101 as design enhancement, not regulatory requirement
* IA supply highly redundant
    * Six Station Air Compressors, 3 are emergency powered
    * Three IA dryers, all are emergency powered
    * Two additional supply headers to containment for Appendix R
* IA 101 not a "CIV". Containment isolation for IA supply provided by two check valves.
* IA 101 containment isolation signal removed. DCR also changed from fail close to fail open on loss of power.
* Of three safety related functions identified in GL 90-06:
    * Kewaunee does not use PORVs for LTOP
    * Kewaunee does not use PORVs for cooldown per BTP RSB 5-1 to SRP 5.4.7
    * Normal pzr spray is first choice for depressurization during SGTR. PORVs used as second choice if pzr spray not available (i.e. loss of offsite power). Aux spray is third choice.

* Periodic leak testing of accumulators, check valves, piping and operators been performed since 1989

  * Normal air supply isolated, Volumetric Monitor 342-3 Leak Rate Tester used

  * Acceptance criteria derived assuming 2 cycles within 72 hours.

  * WPS position that failure to meet leak rate acceptance criteria is not indicative of PORV inoperability

    - highly reliable IA configuration
    - single active failure not credible

* WPSC belief that elimination of accumulators justified

SUMMARY OF PROPOSED TS SUBMITTAL ON MAY 5, 1993

Submittal will contain proposed TS as follows:

1) LTOP enable temperature of ART + 90 F per BTP RSB 5-2, B.2 (no change from previous submittal)

2) Restrictions on start of RXCP with greater than 100 F SG to RCS temperature differential (no change from previous submittal)

3) 7 Day AOT for one RCS to LTOP flowpath inoperable (changed from no limitation in previous submittal)

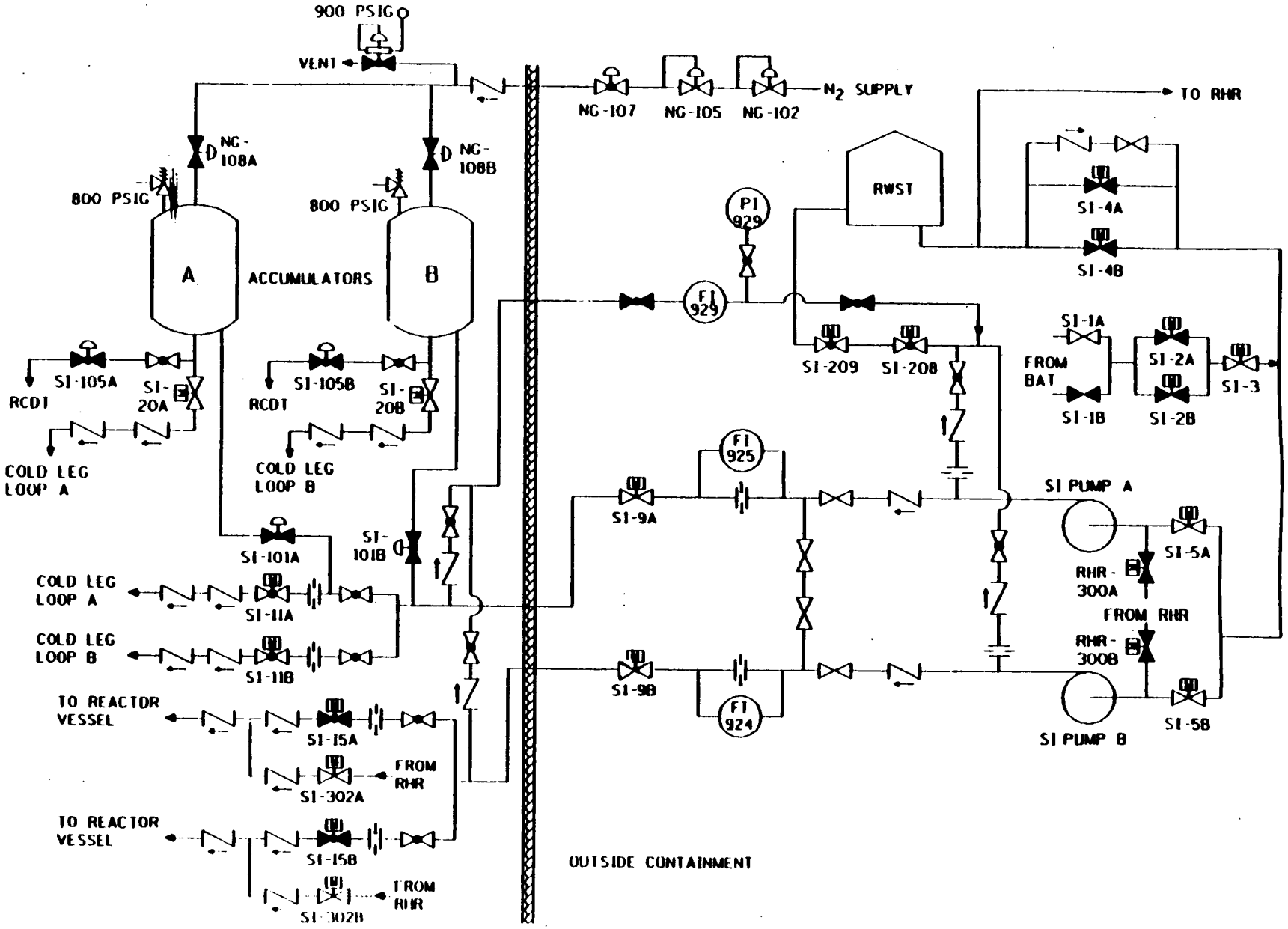
4) LTOP Design Curves (as committed by WPS)

Submittal will contain:

1) Commitment for stroke testing PORVs during hot shutdown or intermediate shutdown (per staff position)

2) Description of IA system, TMI requirements, limited safety function for PORV, & justification for removal of PORV accumulators

SAFETY INJECTION SYSTEM



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WPS-SI01
OPERXK-100-28, Rev. AB
OPERXK-100-29, Rev. P

b. Heatup and Cooldown Limit Curves for Normal Operation

1. The reactor coolant temperature and pressure and system heatup and cooldown rates (with the exception of the pressurizer) shall be limited in accordance with Figures TS 3.1-1, TS 3.1-2, and TS 3.1-3. Figures TS 3.1-1 and 3.1-2 are applicable for the service period of up to 20 EFPY. Figure TS 3.1-3 is applicable through the end of operating cycle 20.

   A. Allowable combinations of pressure and temperature for specific temperature change rates are below and to the right of the limit lines show. Limit lines for cooldown rates between those presented may be obtained by interpolation.

   B. Figures TS 3.1-1 and TS 3.1-2 define limits to assure prevention of non-ductile failure only. For normal operation other inherent plant characteristics, e.g., pump heat addition and pressurization heater capacity may limit the heatup and cooldown rates that can be achieved over certain pressure-temperature ranges.

   C. Figure TS 3.1-3 defines limits to assure prevention of non-ductile failure applicable to low temperature overpressurization events only. Application of this curve is limited to evaluation of LTOP events when reactor coolant temperature is less than or equal to the LTOP enabling temperature of 338 degrees F.

KEWAUNEE UNIT NO. 1 LOW TEMPERATURE OVERPRESSURIZATION PROTECTION CURVE

APPLICABLE FOR PERIODS UP TO END OF OPERATING CYCLE 20

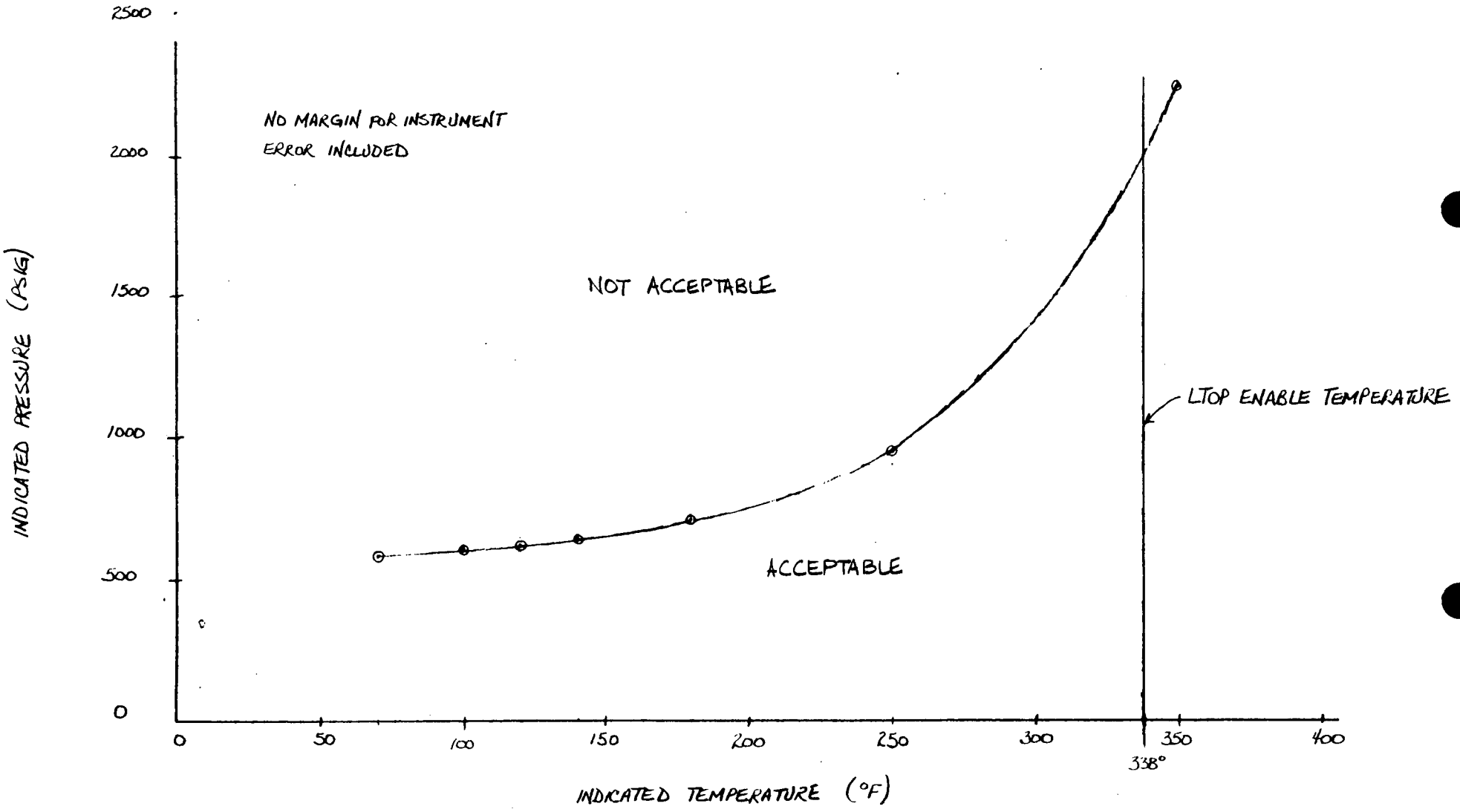
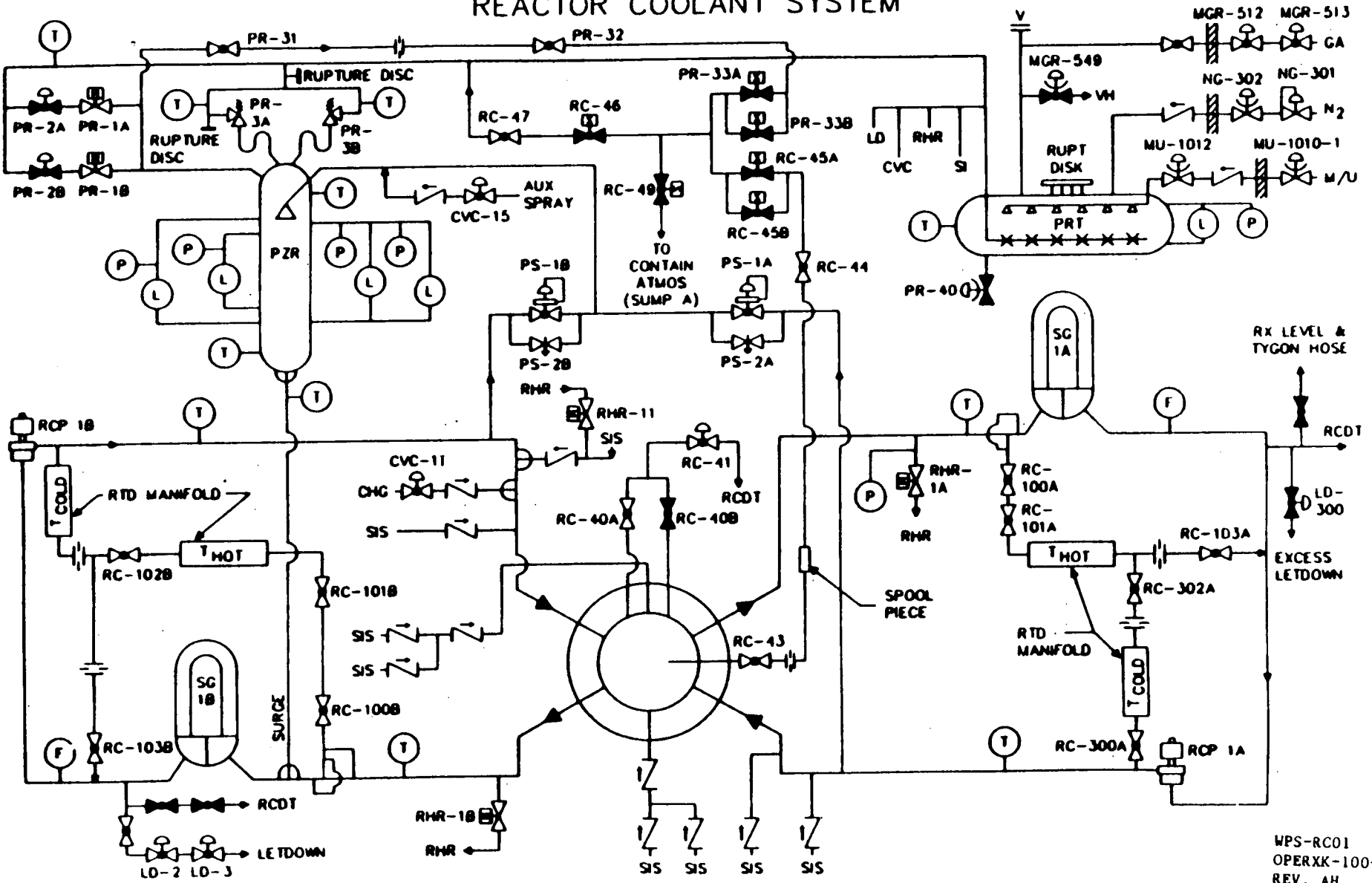


FIGURE TS 3.1-13

REACTOR COOLANT SYSTEM



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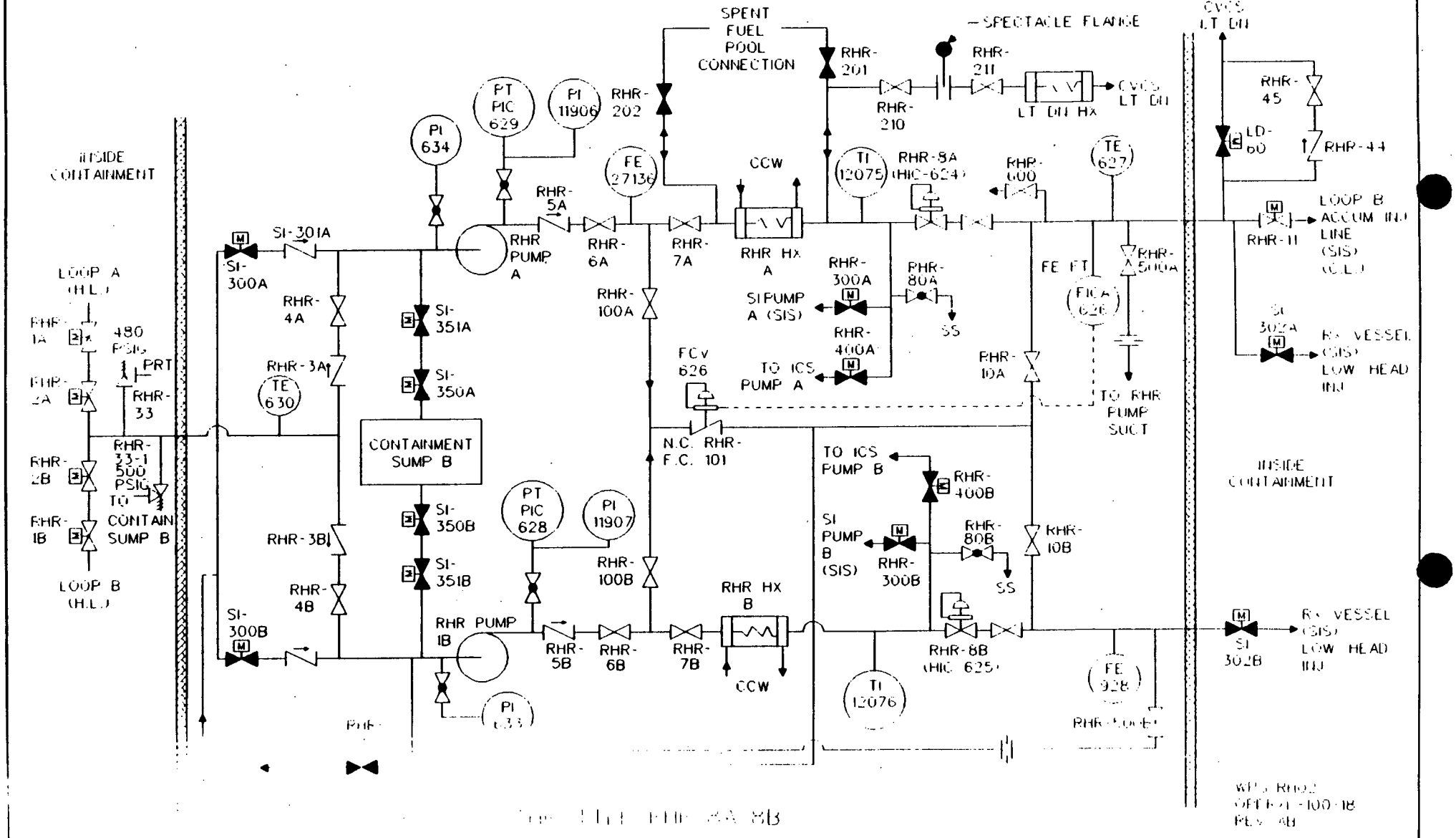
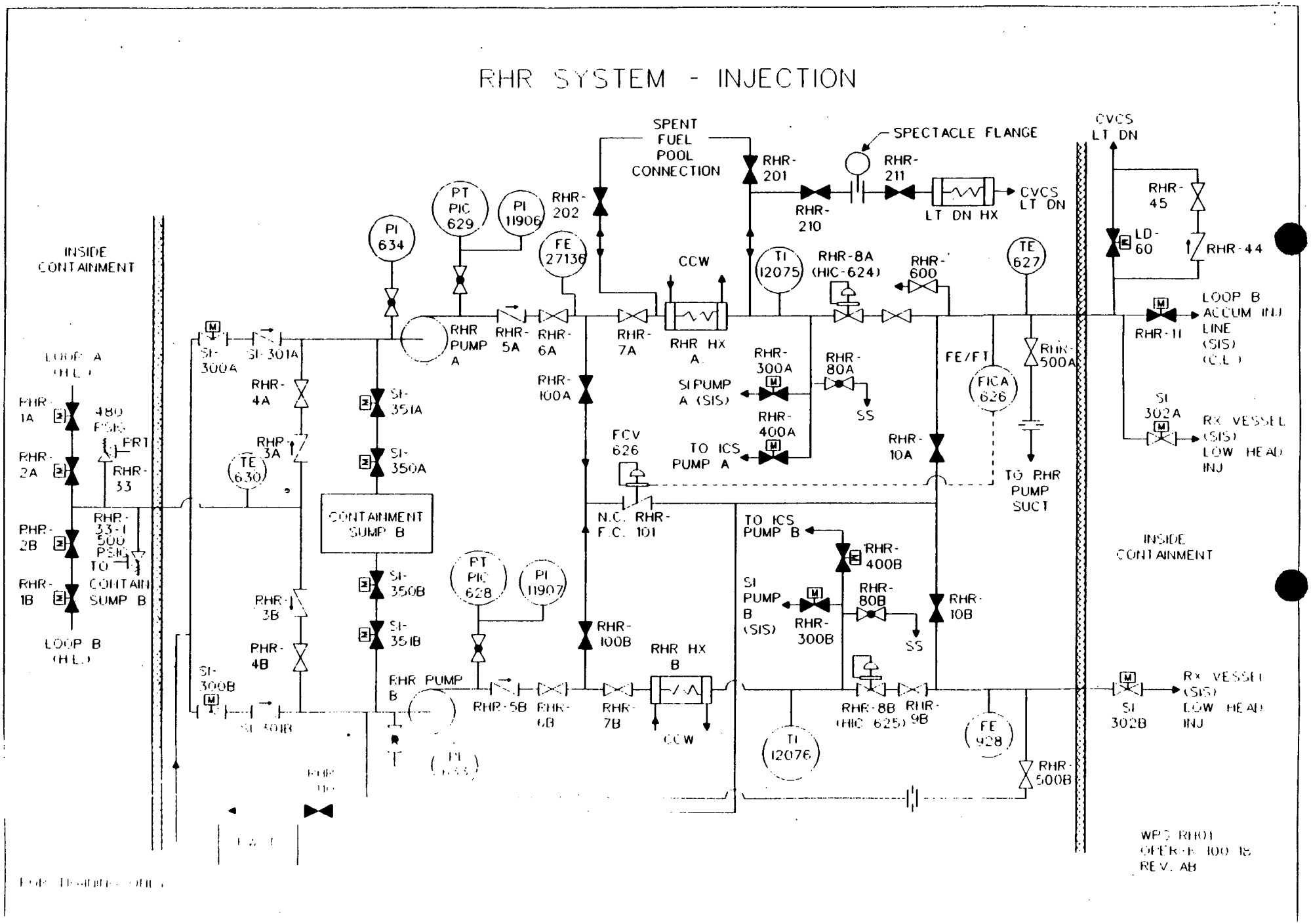
RHR SYSTEM - COOLDOWN



RHR SYSTEM - INJECTION



4. The Overpressure Protection System for low temperature operation shall be operable whenever the RCS average temperature is $\leq$ 338 F, and the reactor vessel head is installed. The system shall be considered operable when at least one of the following conditions is satisfied:

   A. The overpressure relief valve on the Residual Heat Removal System (RHR 33-1) shall have a lift setting of less than or equal to 505 psig and shall be aligned to the RCS by maintaining valves RHR 1A, 1B, 2A, and 2B open.

      1. With one flow path inoperable, the valves in the parallel flow path shall be verified open, with the associated motor breakers for the valves locked in the off position. Restore the inoperable flow path within 7 days, or complete depressurization and venting of the RCS through a 6.4 square inch vent within a total of 32 hours.

      2. With both flow paths or RHR 33-1 inoperable, complete depressurization and venting of the RCS through at least a 6.4 square inch vent pathway within 8 hours.

   B. A vent pathway shall be provided with an effective flow cross section $\geq$ 6.4 square inches.

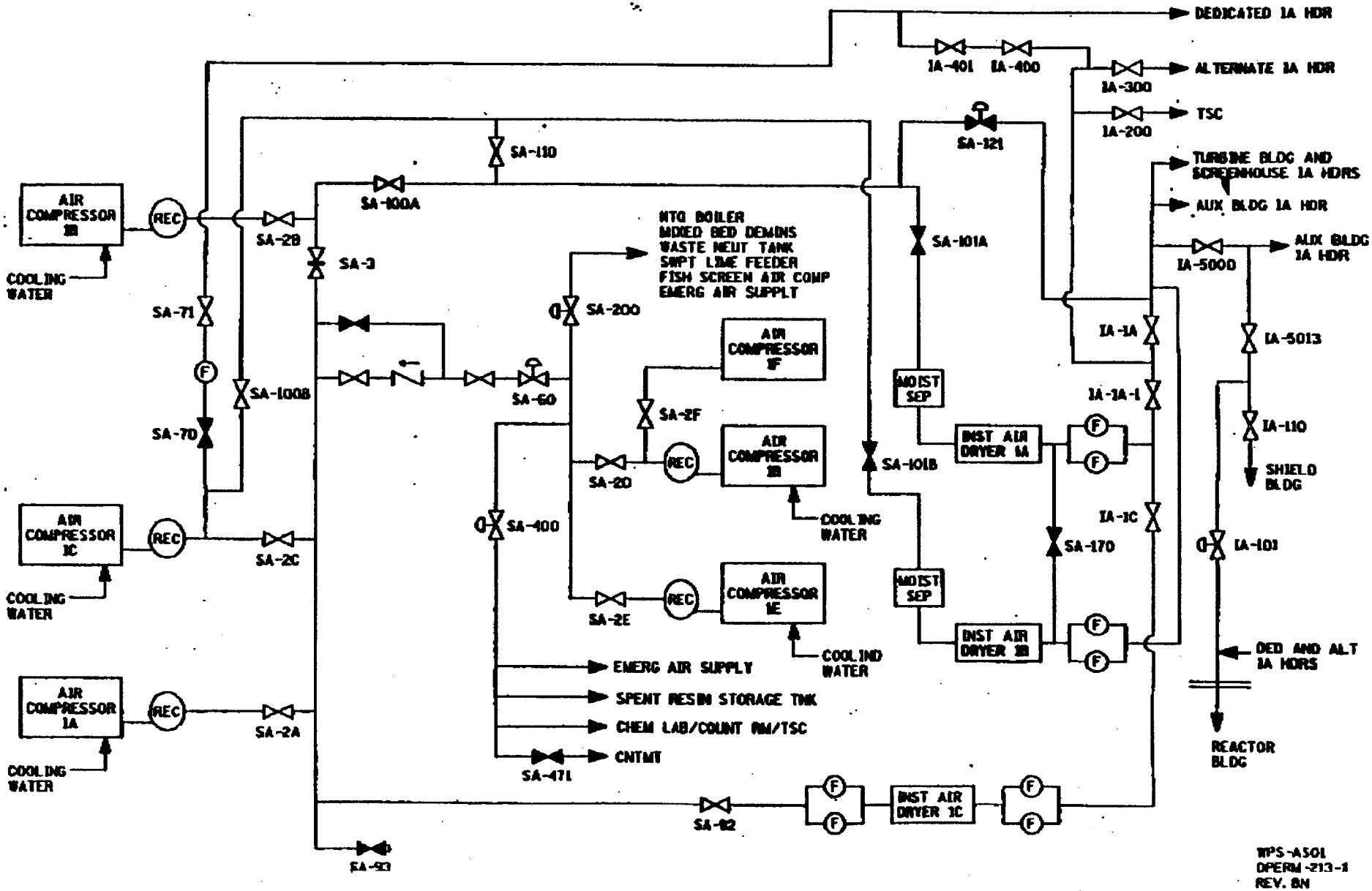
      1. When low temperature overpressure protection is provided via a vent pathway, verify the vent pathway at least once per 31 days when the pathway is provided by a valve(s) that is locked, sealed, or otherwise secured in the open position. If the vent path is provided by any other means, verify the vent pathway every 12 hours.

BASES

If one train of RHR suction piping to RHR 33-1 is isolated, the valves and valve breakers in the other train shall be verified open, and the isolated flowpath must be restored within 24 hours. If the isolated flowpath cannot be restored within 7 days, the RCS must be depressurized and vented through at least a 6.4 square inch vent within 32 hours of the occurrence of the isolation.

If both trains of RHR suction are isolated or valve RHR 33-1 is inoperable, system can still be considered operable if an alternate vent path is provided which has the same or greater effective flow cross section as the LTOP safety valve ($\geq$ 6.4 square inches).

STATION AND INSTRUMENT AIR



WPS-ASOL
OPERM-213-1
REV. 8N

PORV HISTORICAL SUMMARY

Original KNPP design (FSAR 5.3):

* Normal instrument air supply to primary PORVs via IA 101. (No backup supply accumulators)

* IA 101 not a Containment Isolation Valve, 2 check valves in line inet CIV requirement. However, IA 101 designed to close on containment isolation signal, and loss of power.

August 1976	LTOP becomes issue: (NRC 08/11/76)
December 1976	WPS submits proposed design criteria for "Reference Mitigating System" (COMS/LTOP) Industry design uses dual setpoint PORVs for LTOP. WPSC indicates intent to install seismic designed accumulators sized for 5 cycles by end of 77. (WPS 12/09/76)
June 1977	WPS changes LTOP design from PORVs to passive code relief valve on RHR suction piping. No PORV modifications made. (WPS 06/24/77)
July 1979	NUREG 0578, Item 2.1.1 "Power Supply for Pressurizer Relief and Block Valves and Pressurizer Level Indicators" (NRC) "Motive and control components of the power-operated relief valves (PORVs) shall be capable of being supplied from either the offsite power source or the emergency power source when the offsite power is not available"
October 1979 November 1979 December 1979	WPS notifies NRC that PORV control & motive power supplied by emergency power. Air compressors are supplied from emergency AC buses. Control power from instrument buses supplied by station DC (which is charged by emergency AC) WPS satisfies NUREG 0578, 2.1.1 (WPS 10/19/79, WPS 11/20/79, WPS 12/31/79)
November 1979	WPS decides to add PORV accumulators as design enhancement since IA 101 will close on containment isolation signal. (DCR 876 initial PORC 11/26/79) (5 cycles operation)
February 1980	NRC site visit, NRC becomes aware of WPSC plans to install accumulators
April 1980	PORC approves DCR to add accumulators (DCR 876 final PORC 04/07/80)

April 1980	NRC SER "Compliance with Category A TMI Lessons Learned" reflects WPS plans to add accumulators (NRC 04/18/80)
June 1980	Accumulators installed (DCR 876 field work complete 06/14/80)
October 1980	NUREG 0737 II.G.1 Position (1) "Motive and control components of the power-operated relief valves (PORVs) shall be capable of being supplied from either the offsite power source or the emergency power source when the offsite power is not available" NUREG 0737 II.G.1 Clarifcation (4) "For those designs in which instrument air is needed for operation, the electrical power supply should be required to have the capability to be manually connected to the emergency power sources."
December 1980	WPS position that PORVs don't belong in TS. However, WPS has recognized importance and upgraded accordingly. Have added accumulators to PORVs to assure availability after containment isolation. (WPS 12/23/80)
Mid 1980's	Appendix R Compliance takes credit for PR 2B accumulators
January 1989	Internal SSFI - no evidence of Appendix R accumulator testing.
Refueling 1989	DCR 1824 removed containment isolation signal from IA 101. Changed operation of IA 101 from fail close to fail open.
Refueling 1989	DCR 2338 installs test manifolds. Periodic test program begins. Calculations establish leak rate acceptance criteria based on 72 hours, assuming 2 cycles of PORVs
Refueling 1989	DCR 2350 installs "dedicated" IA supply header and "alternate" IA supply header - eliminates need for other accumulators in CNTMT for Appendix R response