Entergy

Entergy Nuclear Operations, Inc.
Palisades Nuclear Plant
27780 Blue Star Memorial Highway
Covert, MI 49043
Tel 269 764 2000

Thomas P. Kirwin
Site Vice President

PNP 2011-016

March 7, 2011

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

SUBJECT: License Amendment Request for Primary Coolant System Pressure-Temperature Limits

Palisades Nuclear Plant
Docket 50-255
License No. DPR-20

Dear Sir or Madam:

In accordance with the provisions of 10 CFR 50.90, Entergy Nuclear Operations, Inc. (ENO) is submitting a license amendment request (LAR) to revise the Technical Specifications (TS) for Palisades Nuclear Plant (PNP).

TS Limiting Condition for Operation (LCO) 3.4.3 Figures 3.4.3-1 and 3.4.3-2 contain the pressure – temperature (P/T) limit curves for primary coolant system (PCS) heatup and cooldown, and LCO 3.4.12 Figure 3.4.12-1 contains the low temperature overpressure protection (LTOP) setpoint limit curve. This LAR proposes to add an applicability period of 42.1 effective full power years (EFPY) to each of these figures.

An applicability period of 42.1 EFPY has been documented and verified to be conservative for operation through the expiration of the operating license on March 24, 2031. The applicability period was evaluated in the attached report WCAP-17341-NP, "Palisades Nuclear Power Plant Heatup and Cooldown Limit Curves for Normal Operation and Upper-Shelf Energy Evaluation."

A current evaluation of the existing PCS P/T limits and LTOP setpoint limits indicates that they are valid for a reactor vessel beltline wall fluence that may be reached as soon as March 2012. Therefore, ENO requests that this LAR and the supporting WCAP-17341-NP be approved by January 31, 2012. The amendment will be implemented within 25 days of approval.

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ENO has evaluated the proposed changes in accordance with 10 CFR 50.91(a)(l) using criteria in 10 CFR 50.92(c) and has determined that the proposed changes do not involve a significant hazards consideration. The bases for these determinations are included in Attachment 1 along with a detailed description of the proposed changes, background and technical evaluation, and an environmental review consideration.

Attachment 2 provides TS page change instructions and the revised TS pages that reflect the proposed changes. Attachment 3 provides the annotated TS pages showing the proposed changes. Attachment 4 provides the annotated TS Bases pages that reflect the proposed changes. Attachments 5 and 6 provide non-proprietary documents supporting this LAR.

In accordance with 10 CFR 50.91, ENO is notifying the State of Michigan of this proposed license amendment by transmitting a copy of this letter to the designated state official.

This letter contains no new commitments and no revisions to existing commitments.

I declare under penalty of perjury that the foregoing is true and correct. Executed on March 7, 2011.

Sincerely,

Thomas P Kurwin

tpk/jse

Attachments:
1. Description and Evaluation of Requested Change
2. Revised Technical Specification Pages and Renewed Operating License Page Change Instructions
3. Mark-up of Technical Specification Pages
4. Mark-up of Technical Specification Bases Pages
5. WCAP-17341-NP, "Palisades Nuclear Power Plant Heatup and Cooldown Limit Curves for Normal Operation and Upper-Shelf Energy Evaluation"
6. Structural Integrity Associates, Inc. Report No. 1001026.401, "Basis for Period of Validity of the Palisades Pressure-Temperature (P-T) Limit Curves"

cc: Administrator, Region III, USNRC
Project Manager, Palisades, USNRC
Resident Inspector, Palisades, USNRC
State of Michigan

ATTACHMENT 1

EVALUATION OF PROPOSED CHANGES

1.0 DESCRIPTION

Entergy Nuclear Operations, Inc. (ENO) requests amending the Renewed Facility Operating License DPR-20 for Palisades Nuclear Plant (PNP) to revise Appendix A, Technical Specifications (TS).

TS Limiting Condition for Operation (LCO) 3.4.3 Figures 3.4.3-1 and 3.4.3-2 contain the pressure – temperature (P/T) limit curves for primary coolant system (PCS) heatup and cooldown. TS LCO 3.4.12 contains the low temperature overpressure protection (LTOP) setpoint limit curve in Figure 3.4.12-1.

This license amendment request proposes to add an applicability period of 42.1 effective full power years (EFPY) to each of the following TS figures:

- TS Figure 3.4.3-1, "Pressure – Temperature Limits for Heatups,"
- TS Figure 3.4.3-2, "Pressure – Temperature Limits for Cooldown," and
- TS Figure 3.4.12-1, "LTOP Setpoint Limit."

An applicability period of 42.1 EFPY has been documented and verified to be conservative for operation through the expiration of the operating license on March 24, 2031. The applicability period was evaluated in the attached report WCAP-17341-NP, "Palisades Nuclear Power Plant Heatup and Cooldown Limit Curves for Normal Operation and Upper-Shelf Energy Evaluation" (Attachment 5).

ENO requests approval of the proposed changes to the TS and the supporting report, WCAP-17341-NP.

2.0 PROPOSED CHANGE

The proposed change affects the following TS:

- LCO 3.4.3, "PCS Pressure and Temperature (P/T) Limits"
- LCO 3.4.12, "Low Temperature Overpressure Protection (LTOP) System"

The proposed change revises the figures referenced in LCO 3.4.3 and LCO 3.4.12 by adding the applicability period of 42.1 EFPY to Figure 3.4.3-1, "Pressure – Temperature Limits for Heatups," Figure 3.4.3-2, "Pressure – Temperature Limits for Cooldown," and Figure 3.4.12-1, "LTOP Setpoint Limit."

These changes are based on an updated PCS P/T heatup and cooldown

limit curves evaluation documented in WCAP-17341-NP (Attachment 5). This evaluation uses an updated methodology that is in accordance with current industry practice, and that has previously been reviewed and approved by the NRC.

Conforming revisions to the TS Bases for these changes are included in this application, as information only. The changes to the affected TS Bases pages will be incorporated in accordance with the TS Bases Control Program.

3.0 BACKGROUND

The current P/T limit curves (TS Figures 3.4.3-1 and 3.4.3-2), along with the current LTOP setpoint limit curve (TS Figure 3.4.12-1), were developed and submitted for NRC approval in 1994 (Reference 2). The curves were based on a postulated cumulative RV inner surface fluence of 2.192×10^{19} n/cm^2 and specified material properties for the limiting RV weld. The curves were subsequently approved by the NRC (Reference 3).

NUREG-1871, "Safety Evaluation Report Related to the License Renewal of Palisades Nuclear Plant" (Reference 4), which was published in January 2007, states in Section 4.2.3.1:

> "The current pressure/temperature analyses are valid beyond the current operating license period, but not to the end of the period of extended operation. These analyses are estimated to expire in 2014."

Subsequent to the publication of NUREG-1871, to further verify the applicability date of the current P/T limit curves, ENO performed two analyses as part of the license renewal implementation project under 10 CFR 54.21. These two analyses determined that the RV limiting circumferential weld metal would reach the fluence limit corresponding to the current heatup and cooldown P/T limit curves (TS Figures 3.4.3-1 and 3.4.3-2) prior to 2014.

The first analysis, based on the latest PNP fluence calculation reported in WCAP-15353 Supplement 1-NP (Reference 5), indicates that this target fluence will be reached in May 2011. The second analysis, based on a slightly improved, and NRC approved, chemistry for the limiting RV weld, reveals that the target fluence corresponding to the limiting adjusted reference temperature (ART) value would be reached in March 2012. Both of these analyses are documented in Structural Integrity Associates, Inc. Report No. 1001026.401, "Basis for Period of Validity of the Palisades Pressure-Temperature (P-T) Limit Curves" (Attachment 6). This Structural Integrity Associates report is referenced in WCAP-17341-NP.

WCAP-17341-NP (Attachment 5) references several reports that were previously provided to the NRC as part of an updated RV pressurized thermal shock evaluation submittal (Reference 10). These previously submitted reports are:

- WCAP-15353-NP, Supplement 1 – NP, Revision 0, "Palisades Reactor Pressure Vessel Fluence Evaluation" (Reference 5),

- Structural Integrity Associates, Inc. Report No. 1000915.401, Revision 1, "Revised Pressurized Thermal Shock Evaluation for the Palisades Reactor Pressure Vessel" (Reference 11), and

- Structural Integrity Associates, Inc. Report No. 0901132.401, Revision 0, "Evaluation of Surveillance Data for Weld Heat No. W5214 for Application to Palisades PTS Analysis" (Reference 12).

The existing P/T limit curves and LTOP setpoint curve were created using a very conservative methodology and inputs relative to more recent NRC-approved methods. Newer methodologies in the American Society of Mechanical Engineers (ASME) Code, which have been approved by the NRC, have been found to provide substantial margin relative to the older methodologies. The newer, and NRC approved, methods are documented in WCAP-14040-A (Reference 1). This margin resulted in the P/T limit curves with the newer methodologies bounding the existing P/T limit and LTOP setpoint limit curves. The conservatism of the existing P/T limit and LTOP setpoint limit curves, in combination with the ENO resources that would be required to revise site procedures and retrain plant operators, led to a decision by ENO to extend the applicability date of the existing P/T limit curves and the LTOP setpoint limit curve until the operating license expiration date as opposed to operating the plant with the new P/T limit curves and a new LTOP setpoint limit curve. The pressure and temperature limits in the existing P/T limit curves are shown in Figures 6-1 through 6-4 in WCAP-17341-NP to be conservative relative to the pressure and temperature limits in the new P/T limit curves.

4.0 TECHNICAL ANALYSIS

The technical approach used in this license amendment request generates new P/T limit curves based upon current NRC approved methods and then compares these new combinations of allowable pressure and temperature values to those of the existing P/T limit curves to ensure that the existing P/T limit curves would remain conservative through the expiration of the operating license on March 24, 2031. The new P/T limit curves are shown in Figures 5-1 and 5-2 of WCAP-17341-NP. The new P/T limit curves are compared to the existing P/T limit curves in Figures 6-1 through 6-4 of WCAP-17341-NP. Finally, the existing P/T limit curves with an applicability date of 42.1 EFPY, which has been shown to be conservative for operation through the operating license expiration date, are presented in Figures 7-1 and 7-2 of WCAP-17341-NP. This approach to extend the applicability date of the existing P/T limit curves is desirable relative to using new P/T limit curves in order to avoid revisions of plant procedures and retraining of plant operators. Details regarding the generation of the new P/T limit curves along with the comparison of the allowable pressure and temperature values to those of the existing P/T limit curves are contained in WCAP-17341-NP. WCAP-17341-NP also justifies the continued use of the existing LTOP setpoint curve, PORV setpoints, and LTOP enable temperature through the operating license expiration date of March 24, 2031.

WCAP-17341-NP documents the analysis approach and the new heatup and cooldown P/T limit curves related to normal plant operating conditions. The heatup and cooldown P/T limit curves were generated using the limiting ART values pertaining to the RV. The limiting ART values specifically pertain to axially oriented welds located in the intermediate and lower shells, identified as axial welds 2-112 and 3-112 (heat no. W5214 using the Position 2.1 chemistry factor and a full margin term) at both 1/4 thickness (1/4T) and 3/4 thickness (3/4T) locations. The new P/T limit curves have been developed using "Axial Flaw" limiting ART values. The methodology of the 1998 through the 2000 Addenda Edition of the ASME B&PV Code, Section XI, Appendix G, along with ASME Code Case N-641 was used in the development of the new P/T limit curves. Code Case N-641 removes some of the conservatism in the P/T limit curves by allowing the use of the K_{Ic} reference toughness curve, instead of the older, more conservative K_{IR} reference toughness curve, which was used in the development of the existing P/T limit curves. Additionally, the 1998 through the Summer 2000 Addenda Edition of the ASME Code Section XI, Appendix G methodology allows use of the less restrictive "Circ-Flaw" methodology, which postulates circumferentially oriented reference defects in circumferential weld materials. Development of the new P/T limit curves took advantage of these updates to the ASME P/T limit methodology and have been shown to contain additional operating margin not present in the curves developed using the older methodology.

WCAP-15353 (Reference 6) documents the RV as-built (measured) dimensions. The RV dimensions for the existing P/T limit curves are documented in the submittal for the existing curves (Reference 2) and are based on design values. The RV dimensions from WCAP-15353 were used for the new P/T limit curves in order to be consistent with the fluence evaluation and because they more accurately reflect the RV.

The P/T limit curves were generated for operation through the operating license expiration date of March 24, 2031, which corresponds to 42.1 EFPY, using heatup rates of 0, 20, 40, 60, 80 and 100°F/hr, and cooldown rates of 0, 20, 40, 60, 80 and 100°F/hr. The curves were developed without margin for instrumentation errors and with a delta pressure correction for static and dynamic head loss. The curves account for the lowest service temperature requirement of Combustion Engineering designed plants as well as the flange requirements of 10 CFR 50, Appendix G. The margin from equation 1 of Regulatory Guide 1.99, Revision 2, used for the new P/T limit curves is 65.5°F and is documented in WCAP-17341-NP. The margin from equation 1 of Regulatory Guide 1.99, Revision 2, used for the existing P/T limit curves is 66°F and is documented in PNP engineering analysis EA-A-PAL-92-095-01 (Reference 2). Note: The margin term for the existing P/T limit curves was rounded up from 65.5°F to 66°F for conservatism.

Appendix B of WCAP-17341-NP calculates a minimum required LTOP enable temperature of 313.2°F. The LTOP system is designed to mitigate PCS mass and energy addition transients at low temperatures. The TS require that the LTOP

system be operable when a PCS cold leg temperature is less than 430°F. With the PCS pressurized, two PORVs must be operable. Below 300°F, except for during LOCA conditions, the high pressure safety injection pumps are rendered inoperable to ensure mass injection transients beyond the capability of the LTOP system do not occur. For the energy addition transient, operation of the primary coolant pumps (PCPs) is limited during LTOP enable conditions to preclude start of the first idle PCP when steam generator secondary temperature is significantly above PCS temperature. Comparison of the existing P/T limit curves to the new P/T limit curves in WCAP-17341-NP indicates that the existing P/T limit curves are conservative for operation through the operating license expiration date. Because the existing LTOP setpoint curve is constructed to prevent the PCS pressure limit from exceeding the current P/T curve limits and because the current P/T limit curves are conservative for operation through the operating license expiration date, the existing LTOP setpoint curve is also conservative for operation through the operating license expiration date. Since the LTOP system is required to be operable when the PCS is less than 430°F, the LTOP enable temperature of 313.2°F is fully satisfied.

The differences between methods and inputs used to construct the new and existing P/T limit curves are listed below:

- The new curves are based on the K_{Ic} reference toughness curve while the existing curves are based upon the K_{IR} reference roughness curve.

- The new curves use ASME Section XI Appendix G while the existing curves use ASME Section III Appendix G. ASME Section XI Appendix G has improved solutions for calculating K_{Im} and K_{It}.stress intensity factors.

- The new curves use heat W5214, an axial weld, for the limiting beltline material while the existing curves use heat 27204, a circumferential weld, for the limiting beltline material. The limiting material changed because of the projected ART values for the RV beltline materials and use of surveillance data.

- The new curves are limited by an axial defect postulated in the limiting axial weld metal. The existing curves are limited by an axial defect postulated in the limiting circumferential weld metal.

- The new curves are postulated for 42.1 EFPY (projected to be March 24, 2031) while the existing curves were projected to be applicable to 2014, at the time of license renewal, or approximately March 2012 by the latest fluence and limiting ART value projections.

- Fluence projections for the new curves are from WCAP-15353, Supplement 1-NP, Revision 0 (Reference 5) (including ten more years of operating history) while the fluence projections for the existing curves are from WCAP-15353 (Reference 6).

- The limiting ART and chemistry factor (CF) values for the new curves are based upon surveillance capsule data with full margin term, while the limiting ART and CF values for the existing curves are based upon %Cu and %Ni with full margin term.

- The new curves are based upon a margin term of 65.5°F while the existing curves use a margin term of 66°F for weld metal, which was rounded up from 65.5°F for conservatism.

- The new curves are based upon the 1998 through the Summer 2000 Addenda Edition of the ASME Code Section XI, Appendix G methodology which allows use of the less restrictive "Circ-Flaw" methodology for circumferential welds, while the existing curves postulated an axial flaw in the circumferential weld.

- The new curves do not make use of a 10% increase in allowable pressure outlined in Code Case N-514 while the existing curves took advantage of the 10% increase for LTOP.

- Future fluence projections for the new curves are based upon an assumed 95% projected capacity factor while future fluence for the existing curves through 2014 were based upon an 89% projected capacity factor.

- The instrument uncertainty margins are the same for the new and existing curves.

- Instrument margins at PNP remain unchanged.

- No physical changes have occurred at PNP to invalidate the input parameters for the LTOP setpoint or P/T limit curves.

- The new curves are based on the following revised RV beltline dimensions: inner radius is 86.35 inches, outer radius is 95.14 inches, and thickness is 8.79 inches. The current curves are based on the following RV beltline dimensions: inner radius is 86.25 inches, outer radius is 94.75 inches, and thickness is 8.5 inches.

- The new LTOP enabling temperature is based upon ASME Code Case N-641 (Reference 21), which was approved by NRC under WCAP-14040-A, while the enabling temperature for the existing curves was conservatively established to be 430°F by Palisades.

In addition, the following supporting information is contained in WCAP-17341-NP:

- WCAP-17341-NP, Appendix A, contains the thermal stress intensity factors for the maximum heatup and cooldown rates at 42.1 EFPY.

- WCAP-17341-NP, Appendix B, contains the determination of the LTOP system minimum required enable temperature at 42.1 EFPY.

- WCAP-17341-NP, Appendix C, contains heatup and cooldown P/T limit curves that were developed with margins for instrument errors and with a delta pressure correction for static and dynamic head loss. The curves can be found in Figures C-1 and C-2.

- WCAP-17341-NP, Appendix D, contains the upper-shelf energy evaluation at 42.1 EFPY. Two materials in the RV beltline, the lower shell plate D-3804-1 and intermediate shell to lower shell circumferential weld 9-112 (heat #27204), using Regulatory Guide 1.99, Revision 2, Position 1.2 data, are predicted to drop below the 10 CFR 50, Appendix G, screening criteria (50 ft-lbs) prior to the operating license expiration date (42.1 EFPY). The limiting plate material is predicted to drop below the upper-shelf energy (USE) screening limit in December of 2016 (see Tables D-5 and D-6). The limiting weld material is predicted to drop below the USE screening limit in November of 2027 (see Tables D-7 and D-8). Per 10 CFR 50, Appendix G, an equivalent margin analysis will need to be submitted to the NRC at least three years prior to the date when the predicted Charpy upper-shelf energy will fall below 50 ft-lbs. ENO committed to submit an Appendix G equivalent margin analysis, as documented in NUREG-1871 (Reference 4). All of the remaining RV beltline materials are projected to remain above the upper-shelf energy screening criterion value of 50 ft-lbs through the operating license expiration date.

In summary, the new P/T heatup and cooldown limit curves generated in WCAP-17341-NP were compared to the current P/T limit curves to verify that adequate margin exists to justify continued use of the existing P/T limit curves. The existing P/T limit curves, including a 10% increase in pressure to account for changes between the K_{Ic} and K_{IR} curve methodology, remain conservative through the operating license expiration date when compared to the new curves documented in WCAP-17341-NP using the latest methodologies detailed in the 1998 through the 2000 Addenda Edition of the ASME Code, Section XI, Appendix G, and ASME Code Case N-641. Additionally, the existing LTOP setpoint curve, PORV setpoints, and LTOP enable temperature are conservative and adequate for operation through the operating license expiration date when compared to the new curves documented in WCAP-17341-NP, also using the latest methodologies detailed in the 1998 through the 2000 Addenda Edition of the ASME Code, Section XI, Appendix G, and ASME Code Case N-641. Therefore, the applicability date of the existing P/T limit curves and the LTOP setpoint limit curve will be extended through the operating license expiration date as opposed to operating with the new P/T limit curves.

5.0 REGULATORY SAFETY ANALYSIS

Applicable Regulatory Requirements/Criteria

Requirements established in 10 CFR Part 50 protect the integrity of the reactor coolant pressure boundary in nuclear power plants. The P/T limit curves and LTOP setpoints are evaluated based on the following regulations and guidance:

- Appendix G to 10 CFR Part 50 (Reference 9)

  Requires that P/T limit curves for the RV be at least as conservative as those obtained by applying the methodology of Appendix G to Section XI of the ASME Boiler and Pressure Vessel Code.

- Regulatory Guide (RG) 1.99, Revision 2 (Reference 7)

  Contains methodologies for determining the increase in transition temperature and the decrease in upper-shelf energy resulting from neutron radiation.

- Memorandum from Keith R. Wichman (NRC), "Meeting Summary for November 12, 1997 Meeting with Owners Group Representatives and NEI Regarding Review of Response to Generic Letter 92-01, Revision 1, Supplement 1 Responses," dated November 19, 1997 (Reference 15).

  This meeting concerned Generic Letter 92-01, Revision 1, and included discussion of weld wire heat best-estimate chemistry, the evaluation and use of surveillance data, and variability in plant-specific initial reference temperature values for RV welds from the same weld wire heat.

- Generic Letter (GL) 88-11 (Reference 17)

  Advised licensees that the NRC staff would use RG 1.99, Revision 2, to review P/T limit curves.

- GL 92-01, Revision 1 (Reference 18)

  Requested that licensees submit their RV data for their plants to the NRC staff for review.

- GL 92-01, Revision 1, Supplement 1 (Reference 19)

  Requested that licensees provide and assess data from other licensees that could affect their RV integrity evaluations.

- Standard Review Plan Section 5.3.2 (Reference 20)

  Provides an acceptable method of determining the P/T limit curves for ferritic materials in the beltline of the RV based on the linear elastic fracture mechanics methodology of Appendix G to Section XI of the ASME Code.

GL 88-11 advised licensees that the NRC staff would use RG 1.99, Revision 2, to review P/T limit curves. RG 1.99, Revision 2, contains methodologies for determining the increase in transition temperature and the decrease in upper-shelf energy resulting from neutron radiation. GL 92-01, Revision 1, requested that licensees submit RV data for their plants to the NRC staff for review. GL 92-01, Revision 1, Supplement 1, requested that licensees provide and assess data from other licensees that could affect their RV integrity evaluations. These data are used by the NRC staff as the basis for the review of P/T limit curves. Appendix G to 10 CFR Part 50 requires that P/T limit curves for the RV be at least as conservative as those obtained by applying the methodology of Appendix G to Section XI of the ASME Boiler and Pressure Vessel Code.

In conclusion, based on the considerations discussed above, (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public

No Significant Hazards Consideration

Entergy Nuclear Operations, Inc. (ENO) has evaluated the proposed changes to the Technical Specifications (TS) using the criteria in 10 CFR 50.92 and has determined that the proposed changes do not involve a significant hazards consideration.

The proposed changes revise the TS by adding the applicability period of 42.1 effective full power years (EFPY) to Limiting Condition of Operation (LCO) 3.4.3 Figure 3.4.3-1, "Pressure – Temperature Limits for Heatups" and Figure 3.4.3-2, "Pressure – Temperature Limits for Cooldown."

The 42.1 EFPY applicability period is also added to LCO 3.4.12 Figure 3.4.12-1, "LTOP Setpoint Limit."

As required by 10 CFR 50.92(c), an analysis of the issue of no significant hazards consideration is presented below:

1. Does the proposed change involve a significant increase in the probability or consequences of an accident previously evaluated?

   Response: No.

   No changes are being made to the existing pressure – temperature (P/T) limit curves in TS Limiting Condition for Operation (LCO) 3.4.3 Figures 3.4.3-1 and 3.4.3-2 and the low temperature overpressure (LTOP) setpoint limit curve in LCO 3.4.12 Figure 3.4.12-1. The P/T limits curves and the LTOP setpoint limit curve are only being revised to add the applicability period of 42.1 effective full

power years. This applicability period has been verified to be conservative for operation through the expiration of the operating license on March 24, 2031.

The changes to the TS figures are applicable to normal plant operations and do not influence the probability of occurrence or safety analysis considerations for design basis accidents. Consequently, there will be no change to the probability or consequences of accidents previously evaluated. Operating the facility in accordance with the P/T limit and LTOP setpoint limit curves ensures that stresses caused by the thermal gradient through the RV beltline material remain bounded by the stress analyses. The proposed amendment does not involve operation of required structures, systems, or components in a manner or configuration different than previously recognized or evaluated. No radiological barriers are affected by the change.

Therefore, the proposed change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. Does the proposed change create the possibility of a new or different kind of accident from any accident previously evaluated?

   Response: No.

   No changes are being made to the existing P/T limit curves in TS Figures 3.4.3-1 and 3.4.3-2 and or in the existing LTOP setpoint limit curves in TS Figure 3.4.12-1. The TS figures are only being changed to add the applicability period of 42.1 effective full power years for the P/T limits and LTOP setpoint limit curves. Adding the applicability periods to the TS figures will not create the possibility of any new or different kind of accidents.

   The change does not involve a modification of plant structures, systems, or components. The change will not affect the manner in which the plant is operated and will not degrade the reliability of structures, systems, or components. Equipment protection features will not be deleted or modified, equipment redundancy or independence will not be reduced, and supporting system performance will not be affected. No new failure modes or mechanisms will be introduced as a result of this proposed change.

   Therefore, the proposed change does not create the possibility of a new or different kind of accident from any previously evaluated.

3. Does the proposed change involve a significant reduction in a margin of safety?

   Response: No.

   Appendix G to 10 CFR 50 describes the conditions that require P/T limits and provides the general bases for these limits. Operating limits based on the criteria of Appendix G, as defined by applicable regulations, codes and

standards, provide reasonable assurance that non-ductile or rapidly propagating failure will not occur. The P/T limits are prescribed for all plant modes to avoid encountering pressure, temperature, and temperature rate of change conditions that might cause undetected flaws to propagate and cause non-ductile failure of the reactor coolant pressure boundary. Calculation of P/T limits in accordance with the criteria of Appendix G to 10 CFR 50 and applicable regulatory requirements ensures that adequate margins of safety are maintained and there is no significant reduction in a margin of safety.

No change is being made to the existing P/T limit curves or LTOP setpoint curve. Only the applicability period associated with the P/T Limits and LTOP setpoints is being extended. Since the P/T limits and LTOP setpoint limits remain unchanged there is no reduction in a margin of safety.

The proposed change does not alter the manner in which safety limits, limiting safety system settings, or limiting conditions for operation are determined. There is no change or impact on any safety analysis assumption or on any other parameter affecting the course of an accident analysis supporting the basis of any Technical Specification. The proposed change does not involve any increase in calculated off-site dose consequences.

Therefore, the proposed change does not involve a significant reduction in a margin of safety.

Based on the above, ENO concludes that the proposed amendment(s) present no significant hazards consideration under the standards set forth in 10 CFR 50.92(c), and, accordingly, a finding of "no significant hazards consideration" is justified.

6.0 ENVIRONMENTAL CONSIDERATION

The proposed amendment does not involve (i) a significant hazards consideration, (ii) a significant change in the types or significant increase in the amounts of any effluent that may be released offsite, or (iii) a significant increase in individual or cumulative occupational radiation exposure. Accordingly, the proposed amendment meets the eligibility criterion for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the proposed amendment.

7.0 REFERENCES

1. WCAP-14040-A, Revision 4, "Methodology Used to Develop Cold Overpressure Mitigating System Setpoints and RCS Heatup and Cooldown Limit Curves," May 2004.
2. Letter from Consumers Power to NRC, "Palisades Plant - Technical Specifications Change Request - Primary Coolant System Pressure - Temperature Limits," October 5, 1994 (includes engineering analysis EA-A-PAL-92-095-01, Revision 0, "Pressure-Temperature Curves and LTOP Setpoint Curve for Maximum Reactor Vessel Fluence of 2.192×10^{19} Neutrons/cm^2," GF Pratt, August 1994).
3. Letter from NRC to Consumers Power, "Palisades Plant – Issuance of Amendment RE: Pressure-Temperature Limits (TAC No. M90650)," March 2, 1995 (ADAMS Accession Number: ML020840184).
4. NUREG-1871, Revision 0, "Safety Evaluation Report Related to the License Renewal of Palisades Nuclear Plant," Docket No. 50-255, Nuclear Management Company LLC, January 2007 (ML070600578).
5. WCAP-15353, Supplement 1-NP, Revision 0, "Palisades Reactor Pressure Vessel Fluence Evaluation," May 2010 (ML110060695).
6. WCAP-15353, Revision 0, "Palisades Reactor Pressure Vessel Neutron Fluence Evaluation," January 2000 (ML003686582).
7. Regulatory Guide 1.99, Revision 2, "Radiation Embrittlement of Reactor Vessel Materials," Nuclear Regulatory Commission, May 1988.
8. Appendix G to the 1998 through the 2000 Addenda Edition of the ASME Boiler and Pressure Vessel (B&PV) Code, Section XI, Division 1, "Fracture Toughness Criteria for Protection Against Failure."
9. Code of Federal Regulations, 10 CFR Part 50, Appendix G, "Fracture Toughness Requirements."
10. Letter from ENO to NRC, "Updated Palisades Reactor Vessel Pressurized Thermal Shock Evaluation," December 20, 2010 (ML110060692).
11. Structural Integrity Associates, Inc. Report No. 1000915.401, Revision 1, "Revised Pressurized Thermal Shock Evaluation for the Palisades Reactor Pressure Vessel," TJ Griesbach, November 2010 (ML10060694).
12. Structural Integrity Associates, Inc. Report No. 0901132.401, Revision 0, "Evaluation of Surveillance Data for Weld Heat No. W5214 for Application to Palisades PTS Analysis," TJ Griesbach, April 2010 (ML110060693).
13. NRC Standard Review Plan, NUREG-0800, Section 5.3.1, "Reactor Vessel Materials," Revision 1, July 1981.
14. "Reactor Vessel Assembly Instruction Manual – Palisades Plant, Consumers Power Company," Combustion Engineering Book No. 2966-A, May 1969.

15. Memorandum from Keith R. Wichman (NRC), "Meeting Summary for November 12, 1997 Meeting with Owners Group Representatives and NEI Regarding Review of Response to Generic Letter 92-01, Revision 1, Supplement 1 Responses," dated November 19, 1997.

16. ASME Boiler and Pressure Vessel Code, Section III, Division 1, Subsection NB, Section NB-2300, "Fracture Toughness Requirements for Material."

17. Generic Letter 88-11, "NRC Position on Radiation Embrittlement of Reactor Vessel Materials and Its Impact on Plant Operations," July 12, 1988.

18. Generic Letter 92-01, Revision 1, "Reactor Vessel Structural Integrity, 10 CFR 50.54(f)."

19. Generic Letter 92-01, Revision 1, Supplement 1, "Reactor Vessel Structural Integrity," May 19, 1995.

20. NRC Standard Review Plan, NUREG-0800, Section 5.3.2, "Pressure-Temperature Limits," Revision 1, July 1981.

21. ASME Code Case N-641, "Alternative Pressure-Temperature Relationship and Low Temperature Overpressure Protection System Requirements, Section XI, Division 1."

22. Letter from NRC to Nuclear Management Company, "Palisades Nuclear Power Plant – Issuance of Emergency Amendment Re: Additional Restrictions to Primary Coolant System Cooldown Rate Limits (TAC No. MC4992)," November 8, 2004 (ML043090322 and ML043140030).

ATTACHMENT 2

REVISED TECHNICAL SPECIFICATION PAGES

AND

RENEWED OPERATING LICENSE PAGE CHANGE INSTRUCTIONS

3.4.3-3,

3.4.3-4,

and

3.4.12-4

4 Pages Follow

ATTACHMENT TO LICENSE AMENDMENT NO.

RENEWED FACILITY OPERATING LICENSE NO. DPR-20

DOCKET NO. 50-255

Remove the following pages of Appendix A Technical Specifications and replace with the attached revised pages. The revised pages are identified by amendment number and contain lines in the margin indicating the areas of change.

REMOVE	INSERT
Page 3.4.3-3	Page 3.4.3-3
Page 3.4.3-4	Page 3.4.3-4
Page 3.4.12-4	Page 3.4.12-4

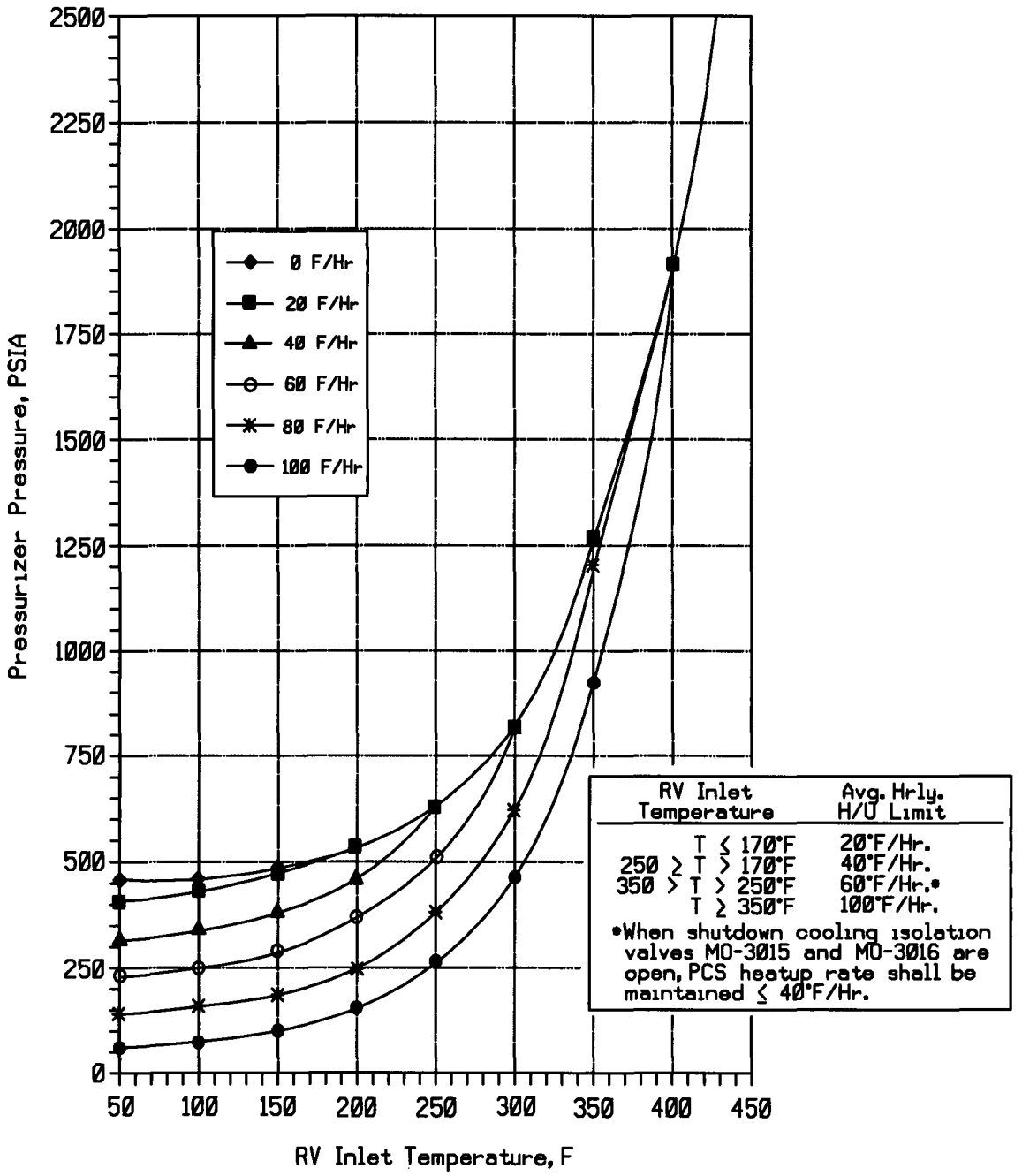
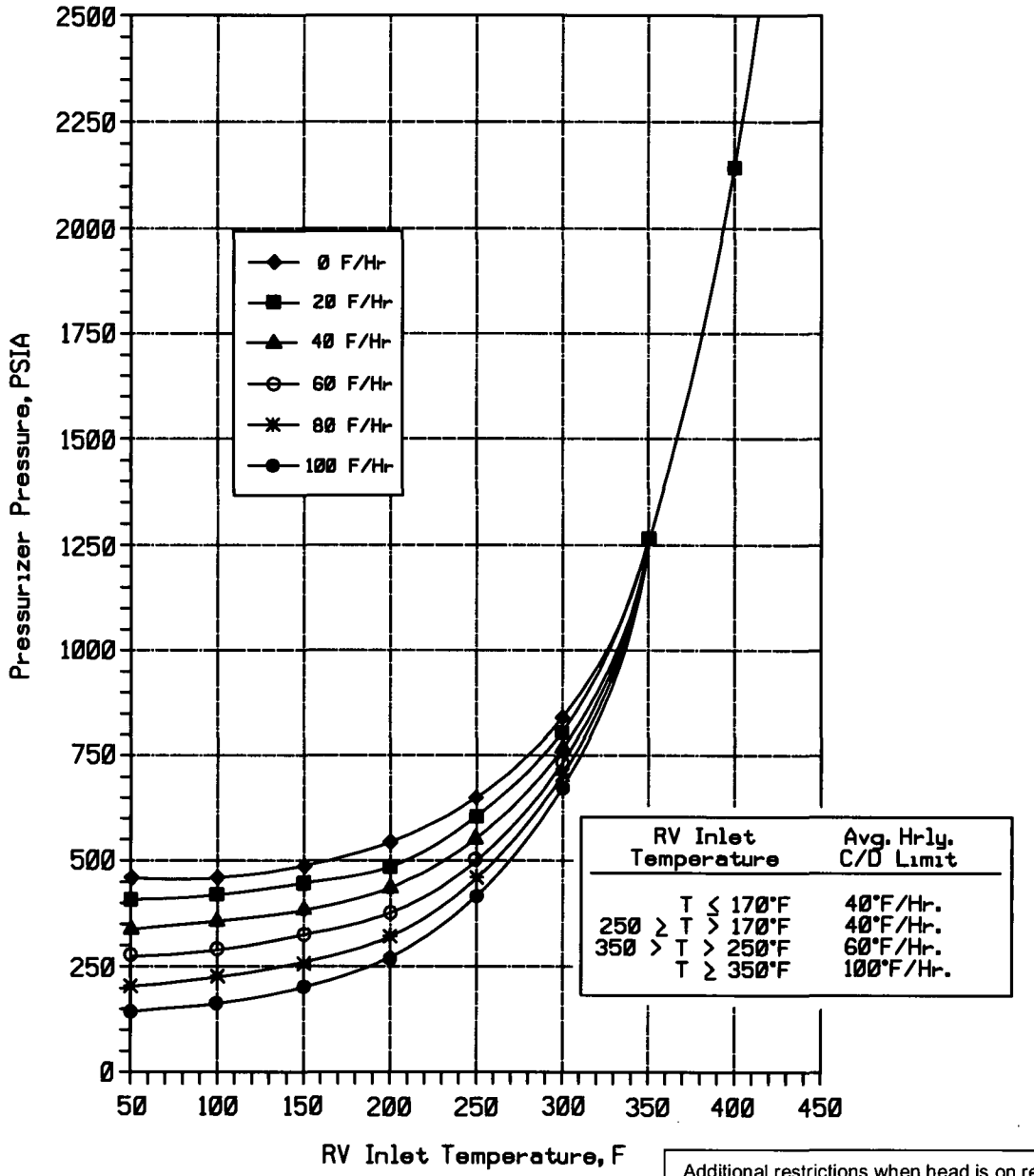


Figure 3.4.3-1 (Page 1 of 1)
Pressure – Temperature Limits for Heatups
Applicable up to 42.1 EFPY



Additional restrictions when head is on reactor vessel:

1. Maintain average core exit temperature: 135°F ≥ T ≥ 110°F for ≥ 3 hours.
2. Following completion of item 1, maintain average hourly cooldown (C/D) limit of 20°F/hour based on core exit temperature indication.

Figure 3.4.3-2 (Page 1 of 1)
Pressure – Temperature Limits for Cooldown
Applicable up to 42.1 EFPY

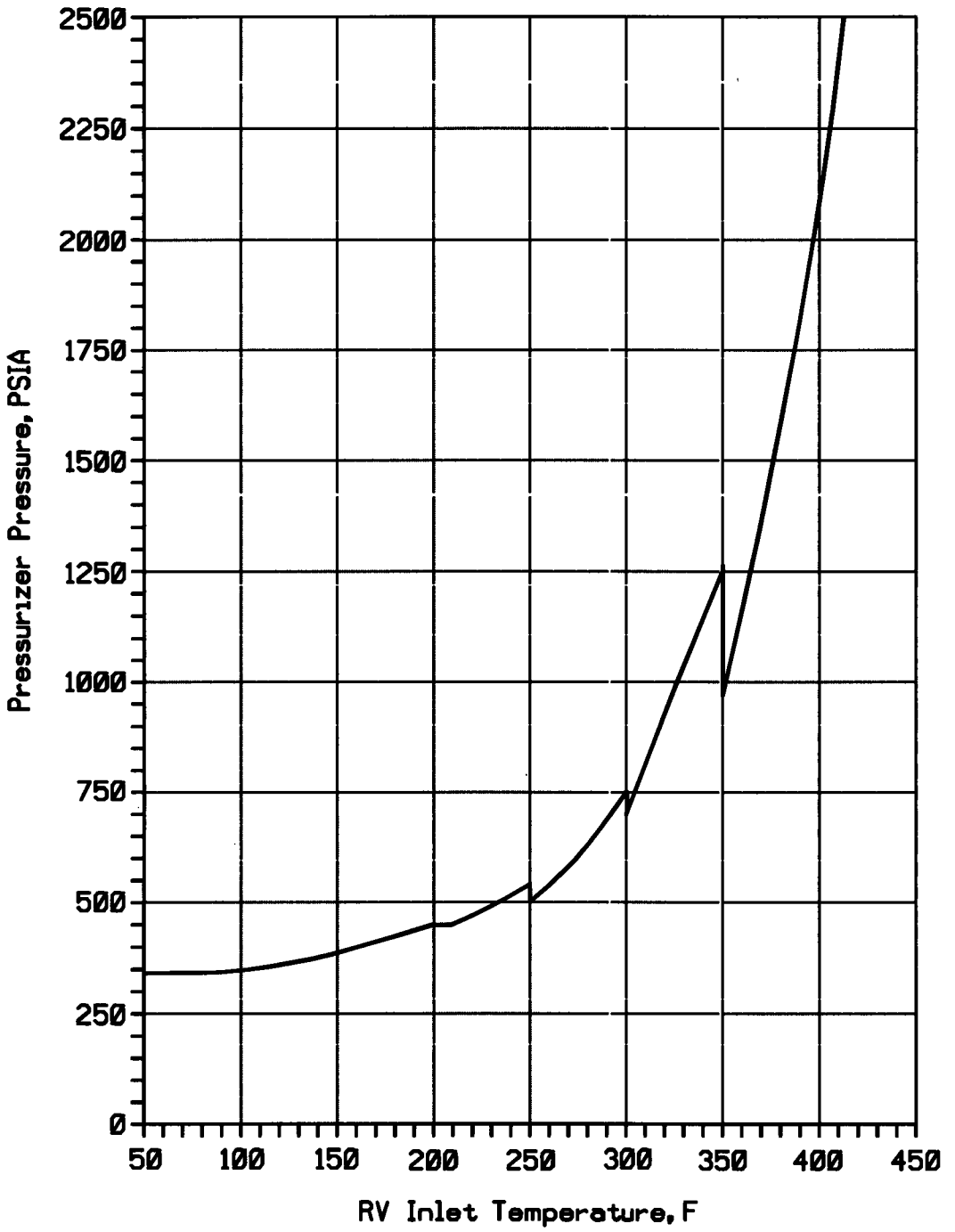


Figure 3.4.12-1 (Page 1 of 1)
LTOP Setpoint Limit
Applicable up to 42.1 EFPY

ATTACHMENT 3

MARK-UP OF TECHNICAL SPECIFICATION PAGES

(showing proposed changes; additions are highlighted and deletions are strikethrough)

3 Pages Follow

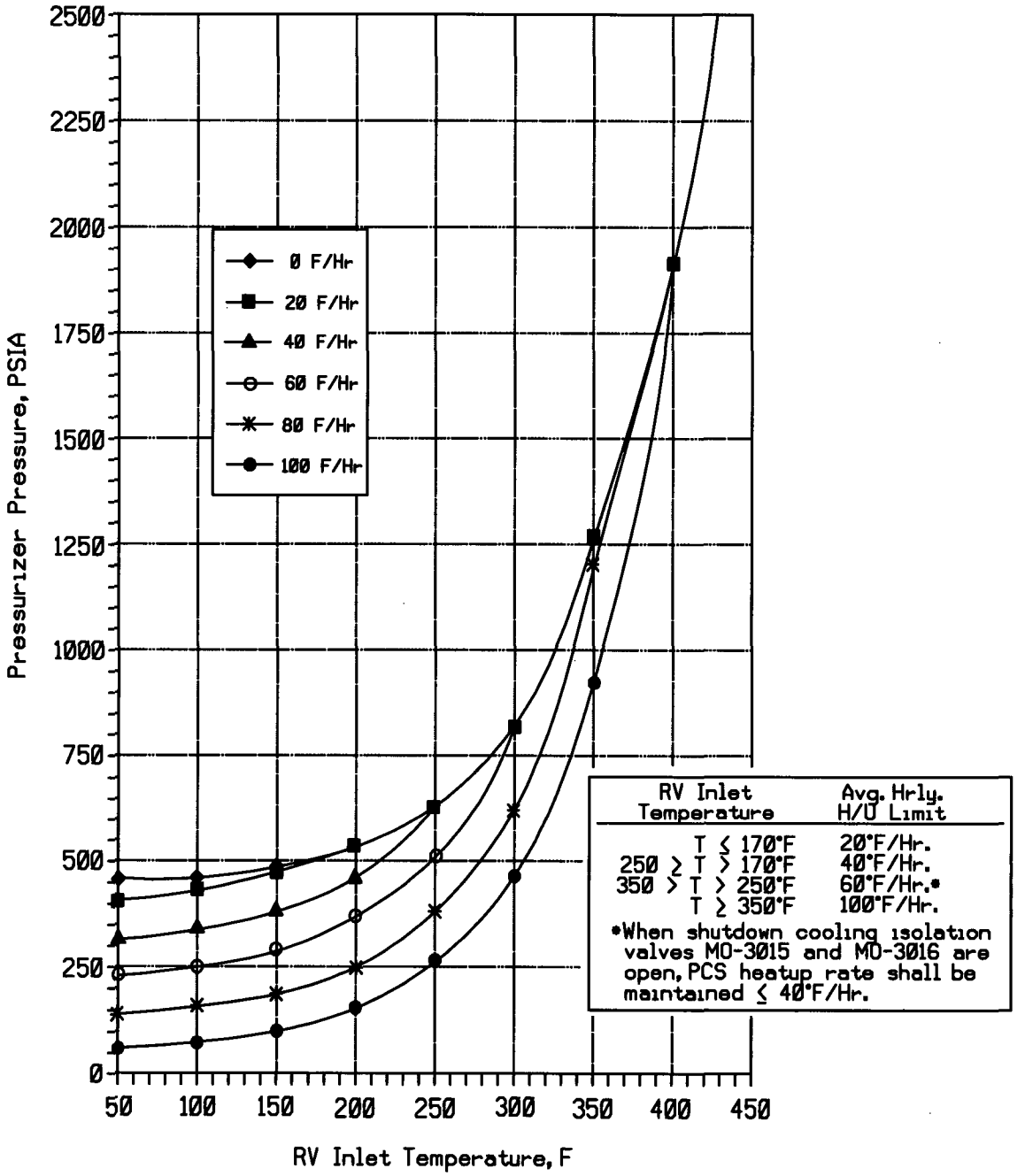
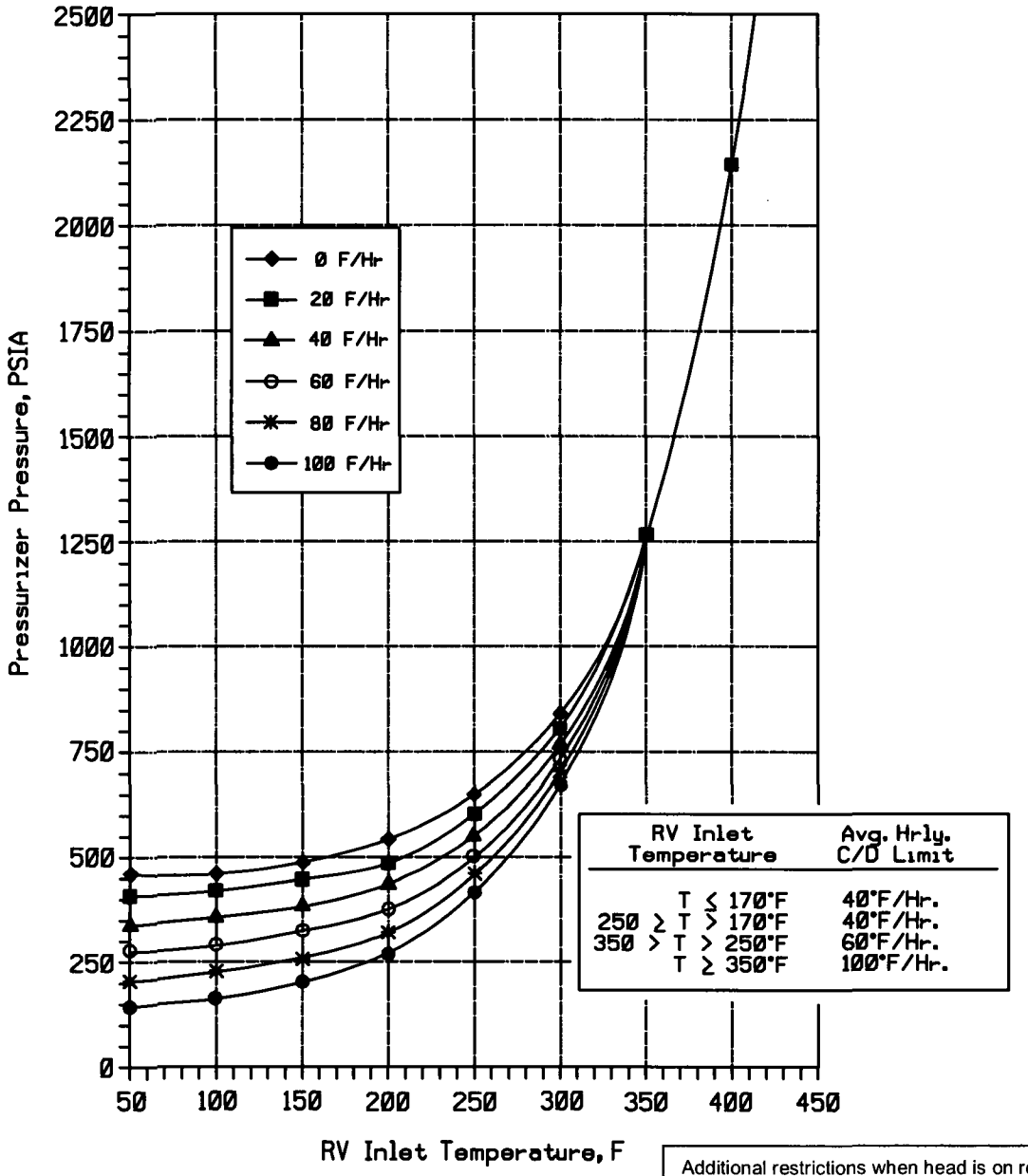


Figure 3.4.3-1 (Page 1 of 1)
Pressure – Temperature Limits for Heatups
Applicable up to 42.1 EFPY



Additional restrictions when head is on reactor vessel:

1. Maintain average core exit temperature: 135°F ≥ T ≥ 110°F for ≥ 3 hours.
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Figure 3.4.3-2 (Page 1 of 1)
Pressure – Temperature Limits for Cooldown
Applicable up to 42.1 EFPY

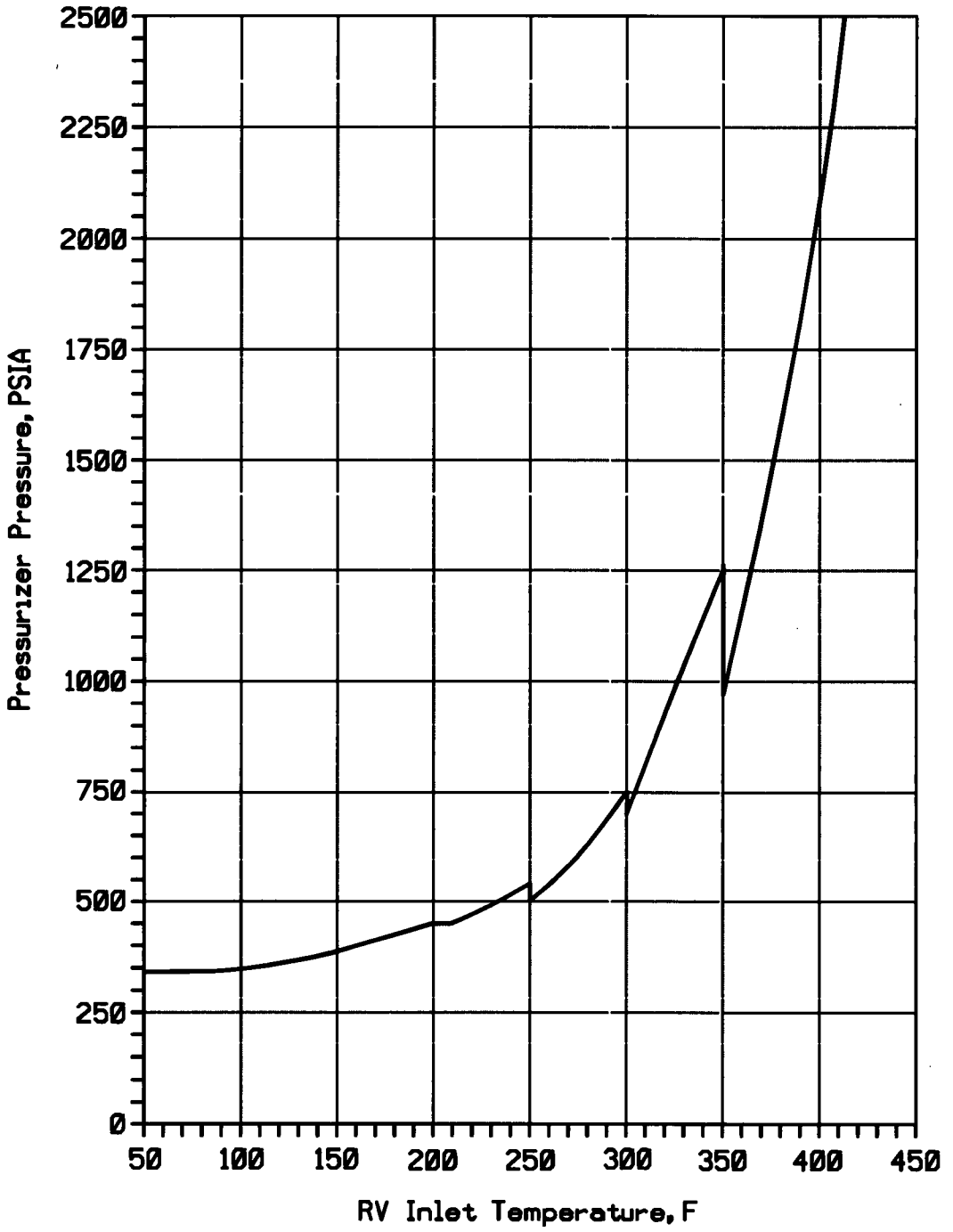

Figure 3.4.12-1 (Page 1 of 1)
LTOP Setpoint Limit
Applicable up to 42.1 EFPY

ATTACHMENT 4

MARK-UP OF TECHNICAL SPECIFICATION BASES PAGES

B 3.4.3-1, 2, 8, and 9

and

B 3.4.12-4, 5, and 13

(showing proposed changes; additions are highlighted and deletions are strikethrough)

(For Information)

7 Pages Follow

B 3.4 PRIMARY COOLANT SYSTEM (PCS)

B 3.4.3 PCS Pressure and Temperature (P/T) Limits

BASES

BACKGROUND

All components of the PCS are designed to withstand effects of cyclic loads due to system pressure and temperature changes. These loads are introduced by startup (heatup) and shutdown (cooldown) operations, power transients, and reactor trips. This LCO limits the pressure and temperature changes during PCS heatup and cooldown, within the design assumptions and the stress limits for cyclic operation.

Figures 3.4.3-1 and 3.4.3-2 contain P/T limit curves for heatup, cooldown, and Inservice Leak and Hydrostatic (ISLH) testing, and data for the maximum rate of change of primary coolant temperature.

Each P/T limit curve defines an acceptable region for normal operation. The P/T limit curves include an allowance to account for the fact that pressure is measured in the pressurizer rather than at the vessel beltline and to account for primary coolant pump discharge pressure. The use of the curves provides operational limits during heatup or cooldown maneuvering, when pressure and temperature indications are monitored and compared to the applicable curve to determine that operation is within the allowable region.

The LCO establishes operating limits that provide a margin to brittle failure of the reactor vessel and piping of the Primary Coolant Pressure Boundary (PCPB). The vessel is the component most subject to brittle failure, and the LCO limits apply to the vessel.

10 CFR 50, Appendix G (Ref. 2), requires the establishment of P/T limits for material fracture toughness requirements of the PCPB materials. Reference 2 requires an adequate margin to brittle failure during normal operation, anticipated operational occurrences, and system hydrostatic tests. It mandates the use of the ASME Code, Section III, Appendix G (Ref. 3).

The neutron embrittlement effect on the material toughness is reflected by increasing the nil ductility reference temperature (RT_{NDT}) as neutron fluence increases.

The actual shift in the RT_{NDT} of the vessel material will be established periodically by removing and evaluating the irradiated reactor vessel material specimens, in accordance with ASTM E 185 (Ref. 4) and Appendix H of 10 CFR 50 (Ref. 5). The operating P/T limit curves will be adjusted, as necessary, based on the evaluation findings and the

recommendations of Reference 3.

A discussion of the methodology for the development of the P/T limit curves is provided in Reference 1 and Reference 7. The P/T limit curves were originally developed to be valid up to an accumulated reactor vessel wall fluence at the limiting circumferential weld of 2.192×10^{19} n/cm^2 (E >1.0 MeV). It was subsequently determined that this fluence would be reached prior to the operating license expiration date of March 24, 2031. In order to continue to use the existing P/T limit curves, an evaluation (Ref. 8) using more recently approved NRC methods was performed to demonstrate that the P/T limit curves are valid through the operating license expiration date, equivalent to 42.1 Effective Full Power Years (EFPY). This evaluation was performed using the adjusted RT_{NDT} (ART) corresponding to the limiting beltline region material of the reactor vessel. The ART is defined as the sum of the initial reference temperature (RT_{NDT}) of the material, the mean value for the adjustment in RT_{NDT} caused by neutron irradiation, and a margin term to account for uncertainties in RT_{NDT}, percent nickel, percent copper, neutron fluence and calculational procedures (Ref. 9).

The specific input parameters below were used to validate that the existing P/T limit curves are conservative through an applicability period of 42.1 EFPY. The input parameters are for the limiting reactor vessel material, which are the intermediate and lower shell axial welds 2-112 and 3-112.

1. A peak reactor vessel wall surface fluence of 2.161×10^{19} n/cm^2 (E > 1.0 MeV)
2. ART values, at 1/4T = 252.7°F, and at 3/4T = 185.8°F
3. Initial RT_{NDT} = -56 °F
4. Margin term = 65.5 °F

BASES

SURVEILLANCE REQUIREMENTS

SR 3.4.3.1

Verification that operation is within the limits of Figure 3.4.3-1 and Figure 3.4.3-2 is required every 30 minutes when PCS pressure and temperature conditions are undergoing planned changes. This Frequency is considered reasonable in view of the control room indication available to monitor PCS status. Also, since temperature rate of change limits are specified in hourly increments, 30 minutes permits assessment and correction for minor deviations within a reasonable time. Calculation of the average hourly cooldown rate must consider changes in reactor vessel inlet temperature caused by initiating shutdown cooling, by starting primary coolant pumps with a temperature difference between the steam generator and PCS, or by stopping primary coolant pumps with shutdown cooling in service. The additional restrictions in Figure 3.4.3-2, required for the reactor vessel head nozzle repairs, use the average core exit temperature to provide the best indication available of the temperature of the head inside material temperature. This indication may be either the average of the core exit thermocouples or the vessel outlet temperature.

Surveillance for heatup and cooldown operations may be discontinued when the definition given in the relevant plant procedure for ending the activity is satisfied.

This SR is modified by a Note that requires this SR be performed only during PCS heatup and cooldown operations. No SR is given for criticality operations because LCO 3.4.2 contains a more restrictive requirement.

REFERENCES

1. Safety Evaluation for Palisades Nuclear Plant License Amendment No. ~~163, dated March 2, 1995~~ [Note: information for this reference to be added later]

2. 10 CFR 50, Appendix G

3. ASME, Boiler and Pressure Vessel Code, Section III, Appendix G

4. ASTM E 185-82, July 1982

5. 10 CFR 50, Appendix H

6. ASME, Boiler and Pressure Vessel Code, Section XI, Appendix E

7. Safety Evaluation for Palisades Nuclear Plant License Amendment No. 218, dated November 8, 2004

BASES

8. WCAP-17431-NP, Revision 0, "Palisades Nuclear Power Plant Heatup and Cooldown Limit Curves for Normal Operation and Upper-Shelf Energy Evaluation," Westinghouse Electric Co., February 2011

9. Regulatory Guide 1.99, Revision 2, May 1988

BASES

BACKGROUND (continued)

Reference 4 determined that venting the PCS through MV-PC514 and MV-PC515 provided adequate flow area. The other listed examples provide greater flow areas with less piping restriction and are therefore acceptable. Other vent paths shown to provide adequate capacity could also be used. The vent path(s) must be above the level of reactor coolant, to prevent draining the PCS.

One open PORV provides sufficient flow area to prevent excessive PCS pressure. However, if the PORVs are elected as the vent path, both valves must be used to meet the single failure criterion, since the PORVs are held open against spring pressure by energizing the operating solenoid.

When the shutdown cooling system is in service with MO-3015 and MO-3016 open, additional overpressure protection is provided by the relief valves on the shutdown cooling system. References 5 and 6 show that this relief capacity will prevent the PCS pressure from exceeding its pressure limits during any of the above mentioned events.

APPLICABLE SAFETY ANALYSES

Safety analyses (Ref. 7) demonstrate that the reactor vessel is adequately protected against exceeding the Reference 1 P/T limits during shutdown. In MODES 1 and 2, and in MODE 3 with all PCS cold leg temperature at or exceeding 430°F, the pressurizer safety valves prevent PCS pressure from exceeding the Reference 1 limits. Below 430°F, overpressure prevention falls to the OPERABLE PORVs or to a depressurized PCS and a sufficiently sized PCS vent. Each of these means has a limited overpressure relief capability.

The actual temperature at which the pressure in the P/T limit curve falls below the pressurizer safety valve setpoint increases as the reactor vessel material toughness decreases due to neutron embrittlement. Each time the P/T limit curves are revised, the LTOP System should be re-evaluated to ensure its functional requirements can still be satisfied using the PORV method or the depressurized and vented PCS condition.

Reference 3 contains the acceptance limits that satisfy the LTOP requirements. When originally generated, the validity period for the LTOP Setpoint Limit curve in Figure 3.4.12-1, which is based on the Reference 3 analysis, ended prior to the operating license expiration date of March 24, 2031. A subsequent analysis was performed (Reference 9) which demonstrated that the current LTOP Setpoint Limit curve is valid through the operating license expiration date, equivalent to 42.1 effective full power years of operation. Any change to the PCS must be evaluated against these analyses to determine the impact of the change on the LTOP acceptance limits.

BASES

APPLICABLE SAFETY ANALYSES (continued)

Transients that are capable of overpressurizing the PCS are categorized as either mass injection or heatup transients

Mass Injection Type Transients

a. Inadvertent safety injection; or

b. Charging/letdown flow mismatch.

Heatup Type Transients

a. Inadvertent actuation of pressurizer heaters;

b. Loss of Shutdown Cooling (SDC); or

c. PCP startup with temperature asymmetry within the PCS or between the PCS and steam generators.

Rendering both HPSI pumps incapable of injection is required during the LTOP MODES to ensure that mass injection transients beyond the capability of the LTOP overpressure protection system, do not occur. The Reference 3 analyses demonstrate that either one PORV or the PCS vent can maintain PCS pressure below limits when three charging pump are actuated. Thus, the LCO prohibits the operation of both HPSI pumps and does not place any restrictions on charging pump operation.

Fracture mechanics analyses were used to establish the applicable temperature range for the LTOP LCO as below 430°F. At and above this temperature, the pressurizer safety valves provide the reactor vessel pressure protection.

The P/T limit curve analysis (Ref. 9) determined an LTOP enable temperature that is bounded by the LTOP LCO. The vessel materials in this analysis were assumed to have a neutron irradiation accumulation equal to 42.1 effective full power years of operation ~~2.192 E19 nvt~~.

BASES

REFERENCES

1. 10 CFR 50, Appendix G
2. Generic Letter 88-11
3. CPC Engineering Analysis, EA-A-PAL-92-095-01
4. CPC Engineering Analysis, EA-TCD-90-01
5. CPC Engineering Analysis, EA-E-PAL-89-040-1
6. CPC Corrective Action Document, A-PAL-91-011
7. FSAR, Section 7.4
8. Generic Letter 90-06
9. WCAP-17431-NP, Revision 0, "Palisades Nuclear Power Plant Heatup and Cooldown Limit Curves for Normal Operation and Upper-Shelf Energy Evaluation," Westinghouse Electric Co., February 2011