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Ref: TS 5.6.6

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August 24, 2000

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

**SUBJECT: COMANCHE PEAK STEAM ELECTRIC STATION (CPSES)**  
**DOCKET NOS. 50-445 AND 50-446**  
**TRANSMITTAL OF PRESSURE TEMPERATURE LIMITS REPORT**

Gentlemen:

CPSES Technical Specification (TS) 5.6.6 requires that the Pressure Temperature Limits Report (PTLR) be provided to the NRC upon issuance for each reactor vessel fluence period and for each revision or supplement thereto. The original Unit 1 and Unit 2 PTLRs were implemented in conjunction with the implementation of the improved Technical Specifications on July 27, 1999. It was subsequently discovered that the PTLRs had not been transmitted to the NRC.

Enclosed are the PTLRs for CPSES Units 1 and 2.

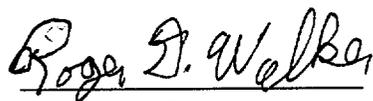
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TXX-00170  
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This communication contains no new licensing basis commitments regarding CPSES  
Units 1 and 2.

Sincerely,

C. L. Terry

By:   
Roger D. Walker  
Regulatory Affairs Manager

BSD/bd

Enclosures

c - E. W. Merschoff, Region IV  
J. I. Tapia, Region IV  
D. H. Jaffe, NRR  
Resident Inspectors, CPSES

CPSSES UNIT 1

PRESSURE AND TEMPERATURE LIMITS REPORT

(APPLICABLE UP TO 16 EFPY)

July 1999

Prepared: Parvez Salim Date: 7/16/99  
Parvez Salim  
Safety Analysis

Approved: Whee G. Choe Date: 7/19/99  
Whee G. Choe  
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Approved: Ben Mays Date: 7/19/99  
Ben Mays  
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Pressure and Temperature Limits Report for CPSES Unit 1  
(Applicable Up To 16 EFPY)

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Pressure and Temperature Limits Report for CPSES Unit 1  
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1.0 INTRODUCTION

This report presents the Reactor Coolant System (RCS) Pressure and Temperature (P/T) limits for Comanche Peak Steam Electric Station (CPSES) Unit 1 in accordance with the requirements of Technical Specification 5.6.6. A description of the Low Temperature Overpressure Protection (LTOP) System is also provided in this report. In addition, the requirements of the reactor vessel material surveillance program are discussed.

The following two Technical Specification Limiting Conditions of Operation (LCO) are addressed in this report:

LCO 3.4.3      RCS Pressure and Temperature (P/T) Limits  
LCO 3.4.12     Low Temperature Overpressure Protection (LTOP) System

The P/T Limits (Section 2.2) and the LTOP System Setpoints (Section 2.3) in this report shall not be revised without prior NRC approval.

The analytical methods used to determine the RCS P/T limits are consistent with the following guidance:

10 CFR 50 Appendices G and H	(References 1 & 2)
Regulatory Guide 1.99, Revision 2	(Reference 3)
NUREG-0800, Standard Review Plan Section 5.3.2	(Reference 4)
ASME Code Section III, Division 1, Appendix G	(Reference 5)

The LTOP limits are consistent with the following guidance:

10 CFR 50 Appendix G	(Reference 1)
NUREG-0800, Standard Review Plan Section 5.2.2	(Reference 6)

This report covers CPSES Unit 1 operation for 16 Effective Full Power Years (EFPY), which approximately corresponds to the Cycle 11 operation of the unit.

Pressure and Temperature Limits Report for CPSES Unit 1  
(Applicable Up To 16 EFPY)

2.0 OPERATING LIMITS

RCS P/T Limits

The RCS P/T limits presented in this report consist of the RCS (except the pressurizer) temperature rate-of-change limits and P/T limits during heatup, cooldown, inservice leak & hydrostatic testing, and criticality. The P/T limits for CPSES Unit 1 are based on the Westinghouse procedure outlined in Reference 7.

Appendix G of 10 CFR Part 50 [1] establishes specific fracture toughness requirements for ferritic materials in the Reactor Coolant Pressure Boundary (RCPB) in light water nuclear power reactors. An adequate margin to brittle failure during normal operation, anticipated operational occurrences, and system hydrostatic tests is also required by this reference. Furthermore, Reference 1 mandates the use of Appendix G, Section III of the American Society of Mechanical Engineers (ASME) Code [5] to establish P/T limits.

The RCS P/T limits for CPSES Unit 1 are presented in Reference 8.

LTOP System

The LTOP System acts as a backup to the reactor operators to mitigate RCS pressurization transients at low temperatures so the integrity of RCPB is not compromised by violating the pressure and temperature limits of Appendix G of 10 CFR 50 [1]. The reactor vessel is the limiting RCPB component for demonstrating such protection. The LTOP system provides the maximum allowable actuation logic setpoints for the Power Operated Relief Valves (PORVs) for the existing RCS cold leg

Pressure and Temperature Limits Report for CPSES Unit 1  
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temperature during cooldown, shutdown, and heatup to meet the Reference 1 requirements during the LTOP MODES.

The LTOP setpoints for CPSES Unit 1 is presented in Reference 9.

REACTOR VESSEL MATERIAL SURVEILLANCE PROGRAM

The reduction in toughness that results from neutron radiation is measured as an increase in the Nil Ductility Reference Temperature ( $RT_{NDT}$ ) and reduction of the upper-shelf energy of reactor vessel beltline materials, including welds. At CPSES, these quantities were predicted at 16 EFPY using the methods of Regulatory Guide 1.99, Revision 2 [3]. The predictions showed that the materials in the Unit 1 and Unit 2 reactor vessels responded similarly to neutron irradiation but at 16 EFPY, the plate material in the Unit 1 beltline was most limiting. Forecast properties of the limiting material were used to establish P/T limits for heatup and cooldown curves and LTOP setpoints.

The actual neutron-induced shifts in the  $RT_{NDT}$  and the upper-shelf energy is periodically measured by withdrawing a surveillance capsule and evaluating the specimens of the limiting beltline material that it contains. This evaluation of the irradiated reactor vessel material specimens is conducted in accordance with ASTM E 185-82 [10] and Appendix H of 10 CFR 50 [2]. The operating P/T limit curves are adjusted, as necessary, based on the evaluation findings and the recommendations of Regulatory Guide 1.99, Revision 2 [3].

The reactor vessel radiation surveillance program for CPSES Unit 1 is presented in Reference 11.

Pressure and Temperature Limits Report for CPSES Unit 1  
(Applicable Up To 16 EFPY)

2.1 RCS Temperature Rate-of-Change Limits (LCO 3.4.3)

2.1.1 Maximum Heatup Rate

The RCS heatup rate limit is 100°F in any 1-hour period.

2.1.2 Maximum Cooldown Rate

The RCS cooldown rate limit is 100°F in any 1-hour period.

2.1.3 Maximum Temperature Change During Inservice Leak and Hydrostatic Testing

During inservice leak and hydrostatic testing operations above the heatup and cooldown limit curves, the RCS temperature change limit is 10°F in any 1-hour period.

2.2 P/T Limits for Heatup, Cooldown, Inservice Leak & Hydrostatic Testing, and Criticality (LCO 3.4.3)

2.2.1 P/T Limits for Heatup, Inservice Leak & Hydrostatic Testing, and Criticality

The P/T limits for heatup, inservice leak & hydrostatic testing, and criticality are specified in Figure 2-1.

2.2.2 P/T Limits for Cooldown

The P/T limits for cooldown are specified in Figure 2-2.

2.3 LTOP System Setpoints (LCO 3.4.12)

The maximum allowable PORV pressure setpoints as a function of RCS temperature are shown in Figure 2-3.

Pressure and Temperature Limits Report for CPSES Unit 1  
(Applicable Up To 16 EFPY)

2.4 Reactor Vessel Material Surveillance Program

The vessel material surveillance schedule is provided in Table 2-1.

Table 2-1  
Reactor Vessel Material Surveillance Program - Withdrawal Schedule

<u>CAPSULE NUMBER</u>	<u>VESSEL LOCATION</u>	<u>LEAD FACTOR</u>	<u>WITHDRAWAL TIME</u>
U	58.5°	4.00	1 <sup>st</sup> Refueling
Y	241.0°	3.69	6 EFPY
V	61.0°	3.69	9 EFPY
X	238.5°	4.00	15 EFPY
W	121.5°	4.00	Standby
Z	301.5°	4.00	Standby

Pressure and Temperature Limits Report for CPSES Unit 1  
(Applicable Up To 16 EFPY)

MATERIAL PROPERTY BASIS

CONTROLLING MATERIAL: LOWER SHELL PLATE R1108-1

INITIAL RT<sub>NDT</sub>: 0°F

ART AT 16 EFPY: 1/4T : 84°F

3/4T : 69°F

APPLICABLE FOR HEATUP RATES UP TO 100°F/HR FOR THE SERVICE PERIOD UP TO 16 EFPY. CONTAINS MARGINS OF 10°F AND 110 PSIG FOR POSSIBLE INSTRUMENTATION ERRORS.

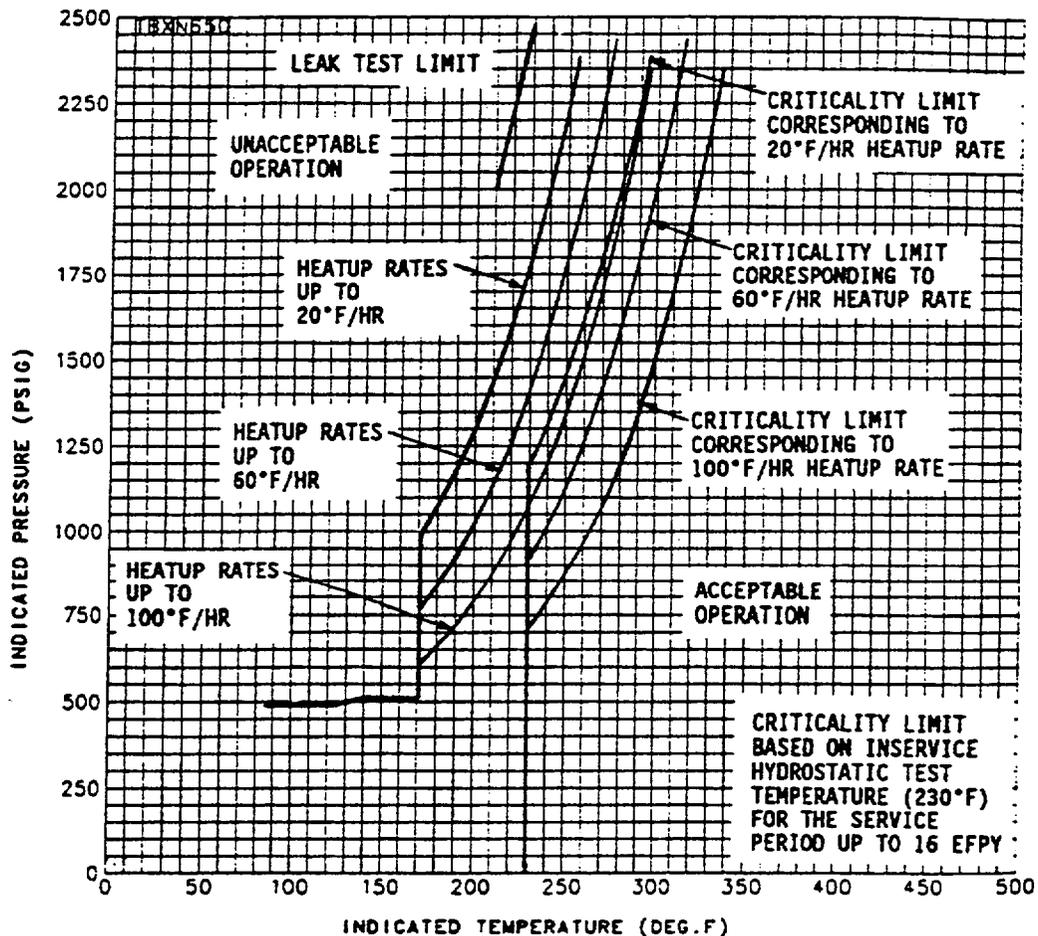


Figure 2-1

RCS Heatup Limitations - Applicable Up To 16 EFPY

Pressure and Temperature Limits Report for CPSES Unit 1  
(Applicable Up To 16 EFPY)

MATERIAL PROPERTY BASIS

CONTROLLING MATERIAL: LOWER SHELL PLATE R1108-1  
INITIAL  $RT_{NDT}$ : 0°F  
ART AT 16 EFPY: 1/4T : 84°F  
3/4T : 69°F

APPLICABLE FOR COOLDOWN RATES UP TO 100°F/HR FOR THE SERVICE PERIOD UP TO 16 EFPY. CONTAINS MARGINS OF 10°F AND 110 PSIG FOR POSSIBLE INSTRUMENTATION ERRORS.

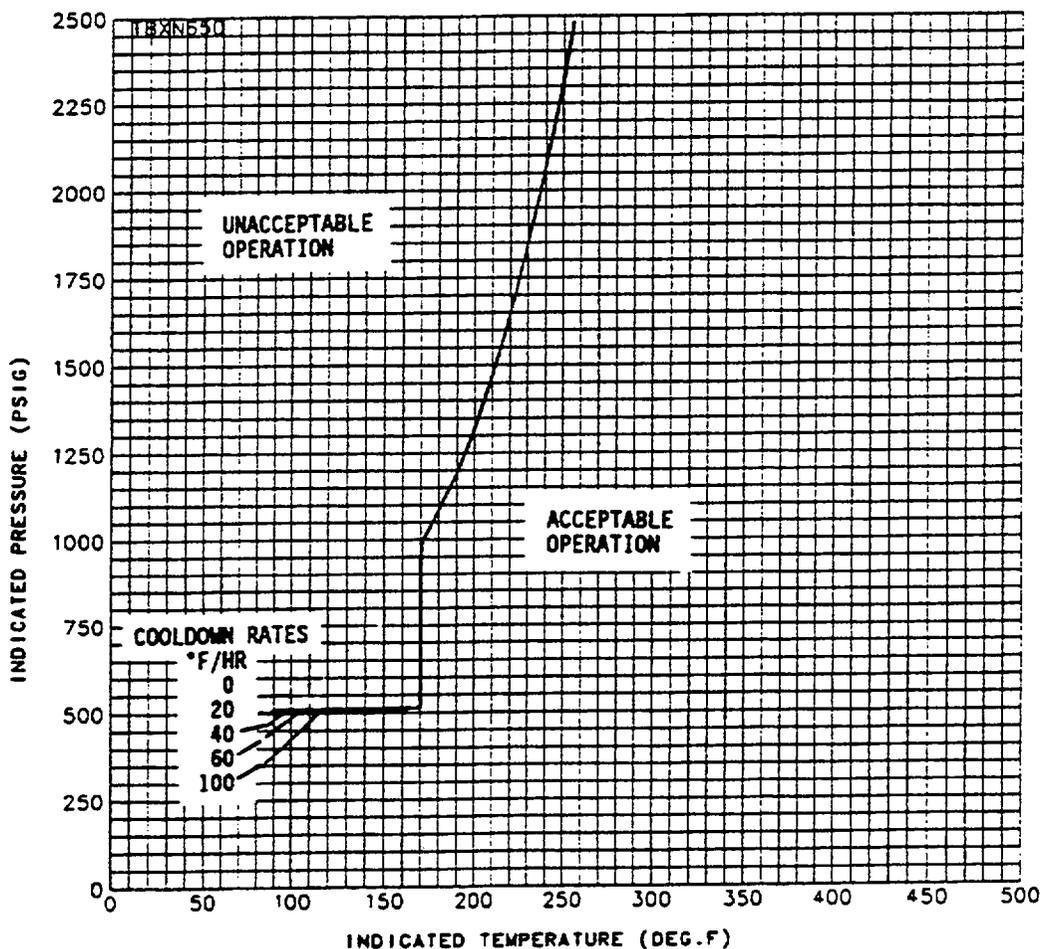


Figure 2-2

RCS Cooldown Limitations - Applicable Up To 16 EFPY

Pressure and Temperature Limits Report for CPSES Unit 1  
(Applicable Up To 16 EFPY)

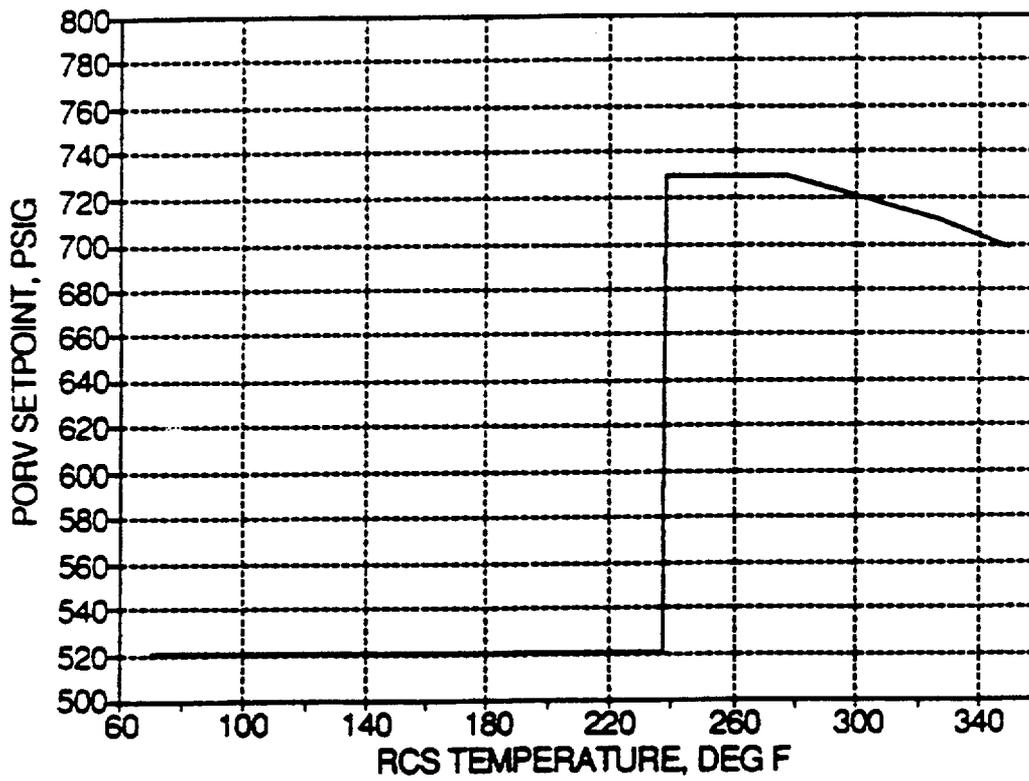


Figure 2-3  
PORV Setpoints for Overpressure Mitigation - Applicable Up To 16 EFPY

Pressure and Temperature Limits Report for CPSES Unit 1  
(Applicable Up To 16 EFPY)

3.0 REFERENCES

1. "Code of Federal Regulations, 10 CFR 50, Appendix G, "Fracture Toughness Requirements," U.S. Nuclear Regulatory Commission, Washington, D.C.
2. "Code of Federal Regulations, 10 CFR 50, Appendix H, "Reactor Vessel Material Surveillance Program Requirements," U.S. Nuclear Regulatory Commission, Washington, D.C.
3. Regulatory Guide 1.99, Revision 2, "Radiation Embrittlement of Reactor Vessel Materials," U.S. Nuclear Regulatory Commission, Washington, D.C., May 1988.
4. Branch Technical Position MTEB 5-2, "Fracture Toughness Requirements," NUREG-0800 Standard Review Plan 5.3.2, Pressure-Temperature Limits, July 1981, Rev. 1.
5. ASME Boiler and Pressure Vessel Code, Section III, Division 1 - Appendices, "Rules for Construction of Nuclear Power Plant Components, Appendix G, Protection Against Nonductile Failure," pp. 558-563, 1986 Edition, American Society of Mechanical Engineers, New York, 1986.
6. Branch Technical Position RSB 5-2, "Overpressurization Protection of Pressurized Water Reactors While Operating at Low Temperatures," NUREG-0800 Standard Review Plan 5.2.2, Overpressure Protection, November 1988, Rev. 2.

Pressure and Temperature Limits Report for CPSES Unit 1  
(Applicable Up To 16 EFPY)

7. "Procedure for Developing Heatup and Cooldown Curves," Westinghouse Electric Corporation, Generation Technology Systems Division Procedure GTSD-A-1.12 (Rev. 0), July 13, 1988.
8. "Comanche Peak Steam Electric Station Unit Numbers 1 & 2, Heatup and Cooldown Curves Using 110 psig and 10°F Margins for Instrument Error," Westinghouse Letter WPT-14868, October 12, 1992.
9. "Setpoint Program Determination for the Westinghouse Overpressure Mitigation System in Comanche Peak Units 1 and 2," Westinghouse Letter Report transmitted via Letter WPT-14228, January 3, 1992.
10. ASTM E 185-82, "Standard Practice for Conducting Surveillance Tests for Light-Water Cooled Nuclear Power Reactor Vessels, E706 (IF)."
11. "Analysis of Capsule U from the Texas Utilities Electric Company Comanche Peak Unit No. 1 Reactor Vessel Radiation Surveillance Program," Westinghouse Report WCAP-13422, July 1992.

CPSSES UNIT 2

PRESSURE AND TEMPERATURE LIMITS REPORT  
(APPLICABLE UP TO 16 EFPY)

July 1999

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Safety Analysis Manager

Approved: Ben Mays Date: 7-19-99  
Ben Mays  
Technical Programs Manager

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Pressure and Temperature Limits Report for CPSES Unit 2  
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2.0 OPERATING LIMITS

RCS P/T Limits

The RCS P/T limits presented in this report consist of the RCS (except the pressurizer) temperature rate-of-change limits and P/T limits during heatup, cooldown, inservice leak & hydrostatic testing, and criticality. The P/T limits for CPSES Unit 2 are based on the Westinghouse procedure outlined in Reference 7.

Appendix G of 10 CFR Part 50 [1] establishes specific fracture toughness requirements for ferritic materials in the Reactor Coolant Pressure Boundary (RCPB) in light water nuclear power reactors. An adequate margin to brittle failure during normal operation, anticipated operational occurrences, and system hydrostatic tests is also required by this reference. Furthermore, Reference 1 mandates the use of Appendix G, Section III of the American Society of Mechanical Engineers (ASME) Code [5] to establish P/T limits.

The RCS P/T limits for CPSES Unit 2 are presented in Reference 8.

LTOP System

The LTOP System acts as a backup to the reactor operators to mitigate RCS pressurization transients at low temperatures so the integrity of RCPB is not compromised by violating the pressure and temperature limits of Appendix G of 10 CFR 50 [1]. The reactor vessel is the limiting RCPB component for demonstrating such protection. The LTOP system provides the maximum allowable actuation logic setpoints for the Power Operated Relief Valves (PORVs) for the existing RCS cold leg

Pressure and Temperature Limits Report for CPSES Unit 2  
(Applicable Up To 16 EFPY)

temperature during cooldown, shutdown, and heatup to meet the Reference 1 requirements during the LTOP MODES.

The LTOP setpoints for CPSES Unit 2 is presented in Reference 9.

REACTOR VESSEL MATERIAL SURVEILLANCE PROGRAM

The reduction in toughness that results from neutron radiation is measured as an increase in the Nil Ductility Reference Temperature ( $RT_{NDT}$ ) and reduction of the upper-shelf energy of reactor vessel beltline materials, including welds. At CPSES, these quantities were predicted at 16 EFPY using the methods of Regulatory Guide 1.99, Revision 2 [3]. The predictions showed that the materials in the Unit 1 and Unit 2 reactor vessels responded similarly to neutron irradiation but at 16 EFPY, the plate material in the Unit 1 beltline was most limiting. Forecast properties of the limiting material were used to establish P/T limits for heatup and cooldown curves and LTOP setopints. For uniformity, the Unit 1 curves were adopted for Unit 2.

The actual neutron-induced shifts in the  $RT_{NDT}$  and the upper-shelf energy is periodically measured by withdrawing a surveillance capsule and evaluating the specimens of the limiting beltline material that it contains. This evaluation of the irradiated reactor vessel material specimens is conducted in accordance with ASTM E 185-82 [10] and Appendix H of 10 CFR 50 [2]. The operating P/T limit curves are adjusted, as necessary, based on the evaluation findings and the recommendations of Regulatory Guide 1.99, Revision 2 [3].

The reactor vessel radiation surveillance program for CPSES Unit 2 is presented in Reference 11.

Pressure and Temperature Limits Report for CPSES Unit 2  
(Applicable Up To 16 EFPY)

2.1 RCS Temperature Rate-of-Change Limits (LC0 3.4.3)

2.1.1 Maximum Heatup Rate

The RCS heatup rate limit is 100°F in any 1-hour period.

2.1.2 Maximum Cooldown Rate

The RCS cooldown rate limit is 100°F in any 1-hour period.

2.1.3 Maximum Temperature Change During Inservice Leak and Hydrostatic Testing

During inservice leak and hydrostatic testing operations above the heatup and cooldown limit curves, the RCS temperature change limit is 10°F in any 1-hour period.

2.2 P/T Limits for Heatup, Cooldown, Inservice Leak & Hydrostatic Testing, and Criticality (LC0 3.4.3)

2.2.1 P/T Limits for Heatup, Inservice Leak & Hydrostatic Testing, and Criticality

The P/T limits for heatup, inservice leak & hydrostatic testing, and criticality are specified in Figure 2-1.

2.2.2 P/T Limits for Cooldown

The P/T limits for cooldown are specified in Figure 2-2.

2.3 LTOP System Setpoints (LC0 3.4.12)

The maximum allowable PORV pressure setpoints as a function of RCS temperature are shown in Figure 2-3.

Pressure and Temperature Limits Report for CPSES Unit 2  
(Applicable Up To 16 EFPY)

2.4 Reactor Vessel Material Surveillance Program

The vessel material surveillance schedule is provided in Table 2-1.

Table 2-1

Reactor Vessel Material Surveillance Program - Withdrawal Schedule

<u>CAPSULE NUMBER</u>	<u>VESSEL LOCATION</u>	<u>LEAD FACTOR</u>	<u>WITHDRAWAL TIME</u>
U	58.5°	4.00	1 <sup>st</sup> Refueling
Y	241.0°	3.69	6 EFPY
V	61.0°	3.69	9 EFPY
X	238.5°	4.00	15 EFPY
W	121.5°	4.00	Standby
Z	301.5°	4.00	Standby

Pressure and Temperature Limits Report for CPSES Unit 2  
(Applicable Up To 16 EFPY)

MATERIAL PROPERTY BASIS

CONTROLLING MATERIAL: INTERMEDIATE SHELL PLATE R3807-2  
 INITIAL RT<sub>NDT</sub>: 10°F  
 ART AT 16 EFPY: 1/4T : 81°F  
 3/4T : 62°F

APPLICABLE FOR HEATUP RATES UP TO 100°F/HR FOR THE SERVICE PERIOD UP TO 16 EFPY. CONTAINS MARGINS OF 10°F AND 110 PSIG FOR POSSIBLE INSTRUMENTATION ERRORS.

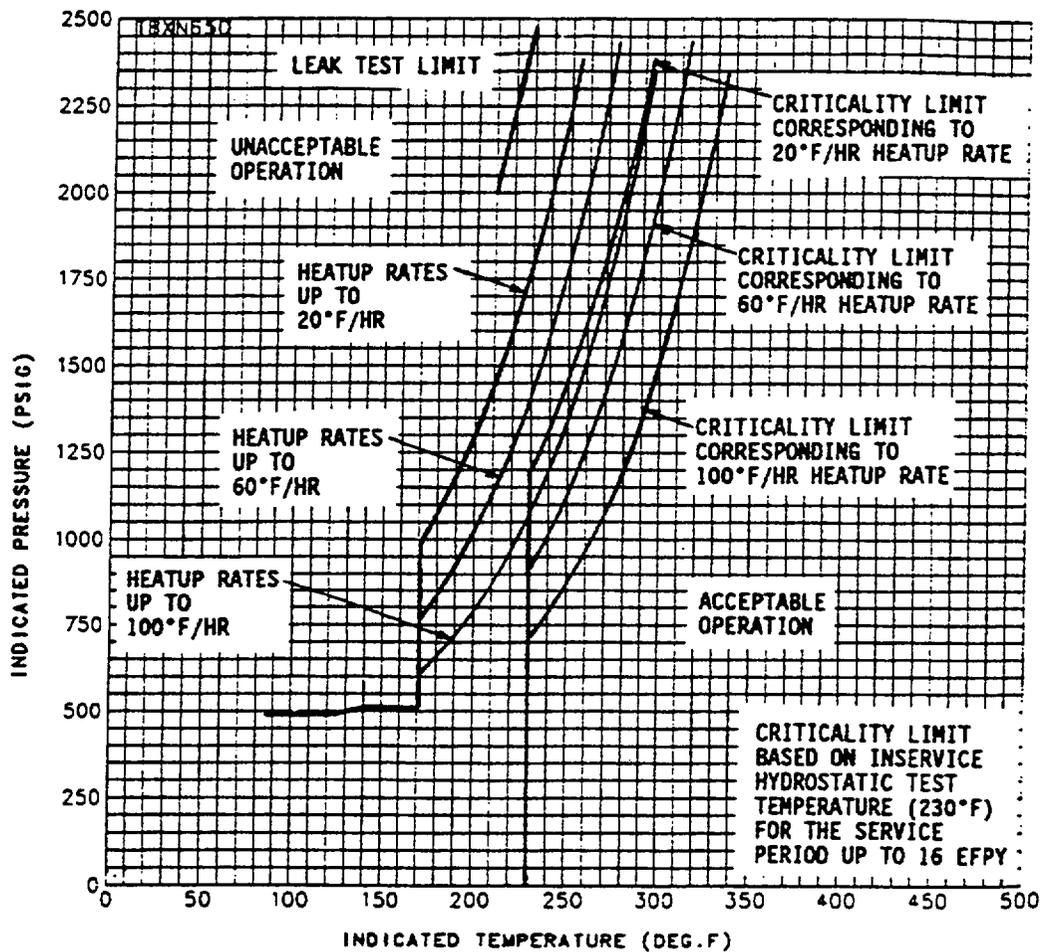


Figure 2-1  
RCS Heatup Limitations - Applicable Up To 16 EFPY

Pressure and Temperature Limits Report for CPSES Unit 2  
(Applicable Up To 16 EFPY)

MATERIAL PROPERTY BASIS

CONTROLLING MATERIAL: INTERMEDIATE SHELL PLATE R3807-2  
INITIAL RT<sub>NOT</sub>: 10°F  
ART AT 16 EFPY: 1/4T : 81°F  
3/4T : 62°F

APPLICABLE FOR COOLDOWN RATES UP TO 100°F/HR FOR THE SERVICE PERIOD UP TO 16 EFPY. CONTAINS MARGINS OF 10°F AND 110 PSIG FOR POSSIBLE INSTRUMENTATION ERRORS.

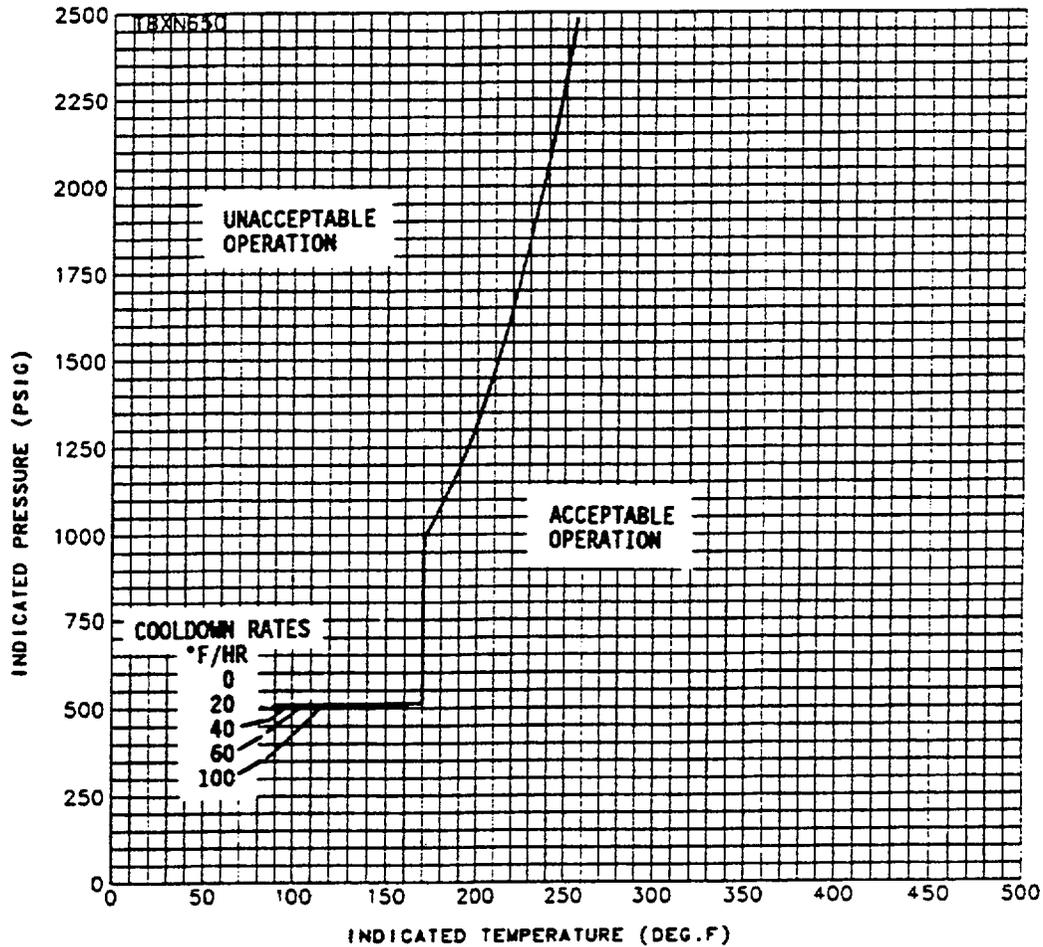


Figure 2-2  
RCS Cooldown Limitations - Applicable Up To 16 EFPY

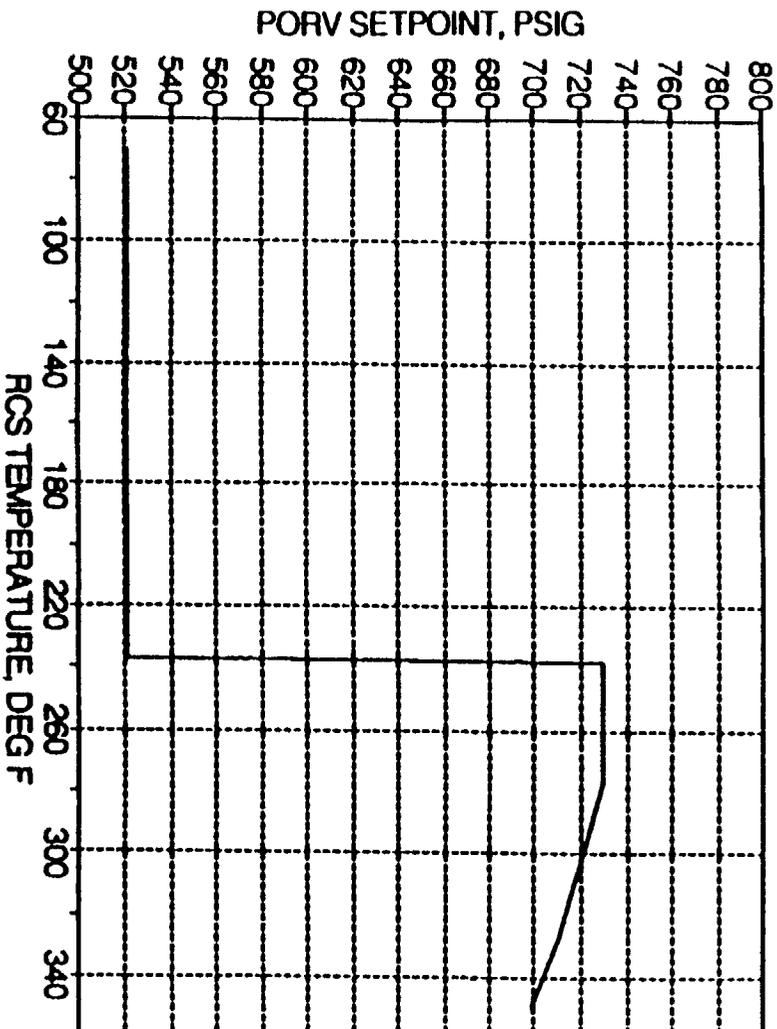


Figure 2-3

PORV Setpoints for Overpressure Mitigation - Applicable Up To 16 EFPY

Pressure and Temperature Limits Report for CPSES Unit 2  
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3.0 REFERENCES

1. "Code of Federal Regulations, 10 CFR 50, Appendix G, "Fracture Toughness Requirements," U.S. Nuclear Regulatory Commission, Washington, D.C.
2. "Code of Federal Regulations, 10 CFR 50, Appendix H, "Reactor Vessel Material Surveillance Program Requirements," U.S. Nuclear Regulatory Commission, Washington, D.C.
3. Regulatory Guide 1.99, Revision 2, "Radiation Embrittlement of Reactor Vessel Materials," U.S. Nuclear Regulatory Commission, Washington, D.C., May 1988.
4. Branch Technical Position MTEB 5-2, "Fracture Toughness Requirements," NUREG-0800 Standard Review Plan 5.3.2, Pressure-Temperature Limits, July 1981, Rev. 1.
5. ASME Boiler and Pressure Vessel Code, Section III, Division 1 - Appendices, "Rules for Construction of Nuclear Power Plant Components, Appendix G, Protection Against Nonductile Failure," pp. 558-563, 1986 Edition, American Society of Mechanical Engineers, New York, 1986.
6. Branch Technical Position RSB 5-2, "Overpressurization Protection of Pressurized Water Reactors While Operating at Low Temperatures," NUREG-0800 Standard Review Plan 5.2.2, Overpressure Protection, November 1988, Rev. 2.

Pressure and Temperature Limits Report for CPSES Unit 2  
(Applicable Up To 16 EFPY)

7. "Procedure for Developing Heatup and Cooldown Curves," Westinghouse Electric Corporation, Generation Technology Systems Division Procedure GTSD-A-1.12 (Rev. 0), July 13, 1988.
8. "Comanche Peak Steam Electric Station Unit Number 1 & 2, Heatup and Cooldown Curves Using 110 psig and 10°F Margins for Instrument Error," Westinghouse Letter WPT-14868, October 12, 1992.
9. "Setpoint Program Determination for the Westinghouse Overpressure Mitigation System in Comanche Peak Units 1 and 2," Westinghouse Letter Report transmitted via Letter WPT-14228, January 3, 1992.
10. ASTM E 185-82, "Standard Practice for Conducting Surveillance Tests for Light-Water Cooled Nuclear Power Reactor Vessels, E706 (IF)."
11. "Analysis of Capsule U from the Texas Utilities Electric Company Comanche Peak Unit No. 2 Reactor Vessel Radiation Surveillance Program," Westinghouse Report WCAP-14315, July 1995.