DUKE POWER COMPANY

OCONEE NUCLEAR STATION

ATTACHMENT 1a

IMPROVED TECHNICAL SPECIFICATIONS

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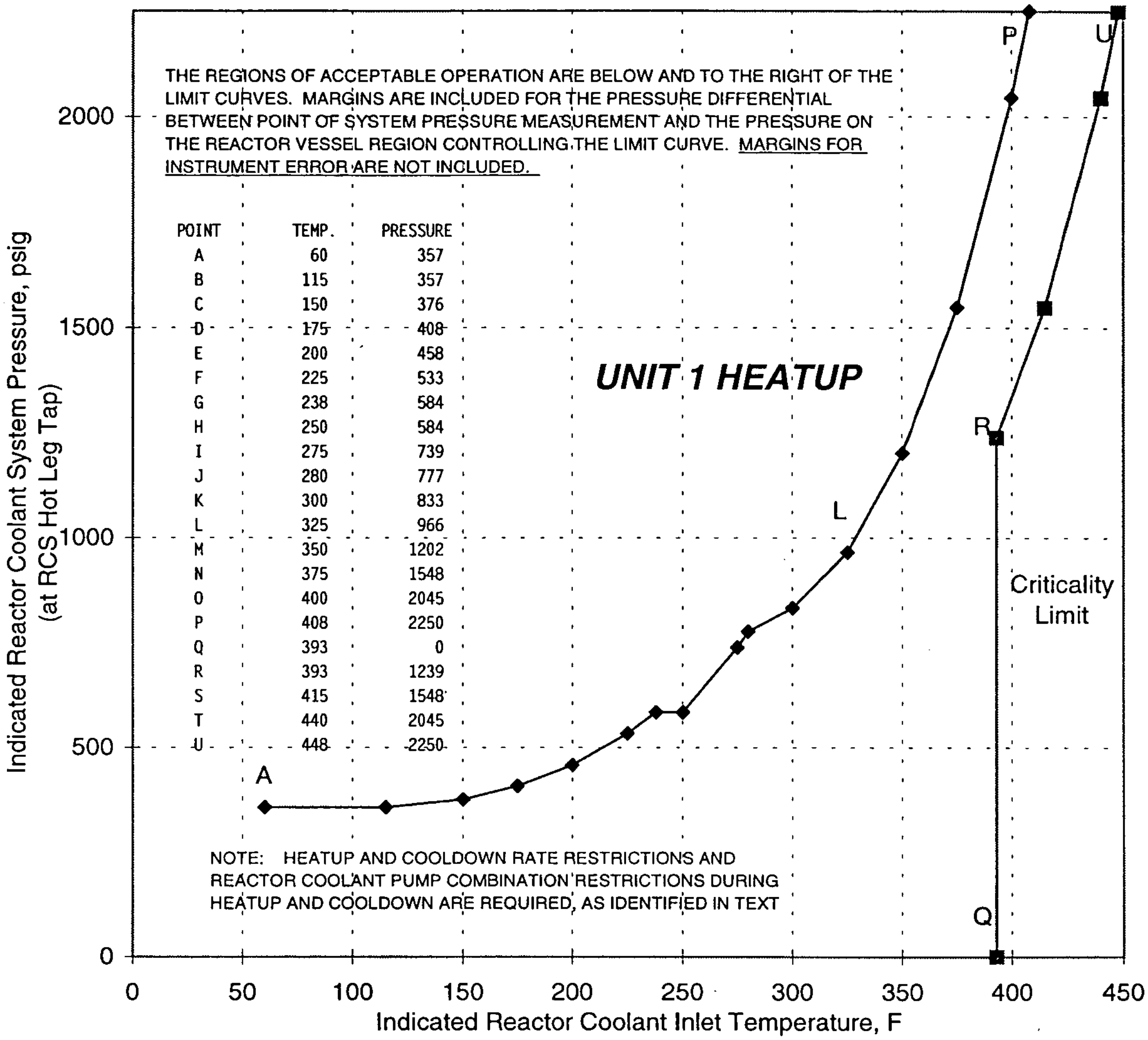
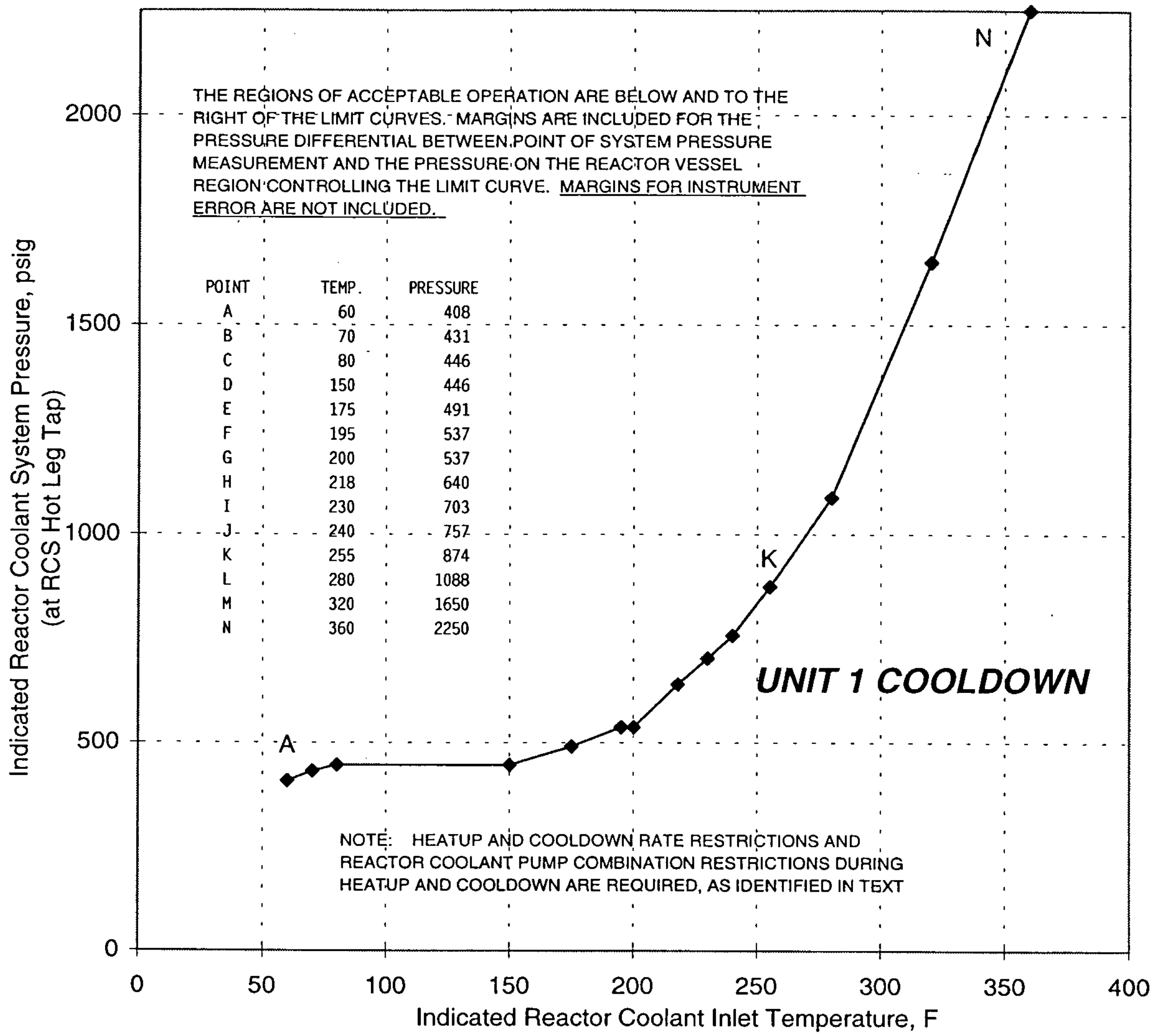
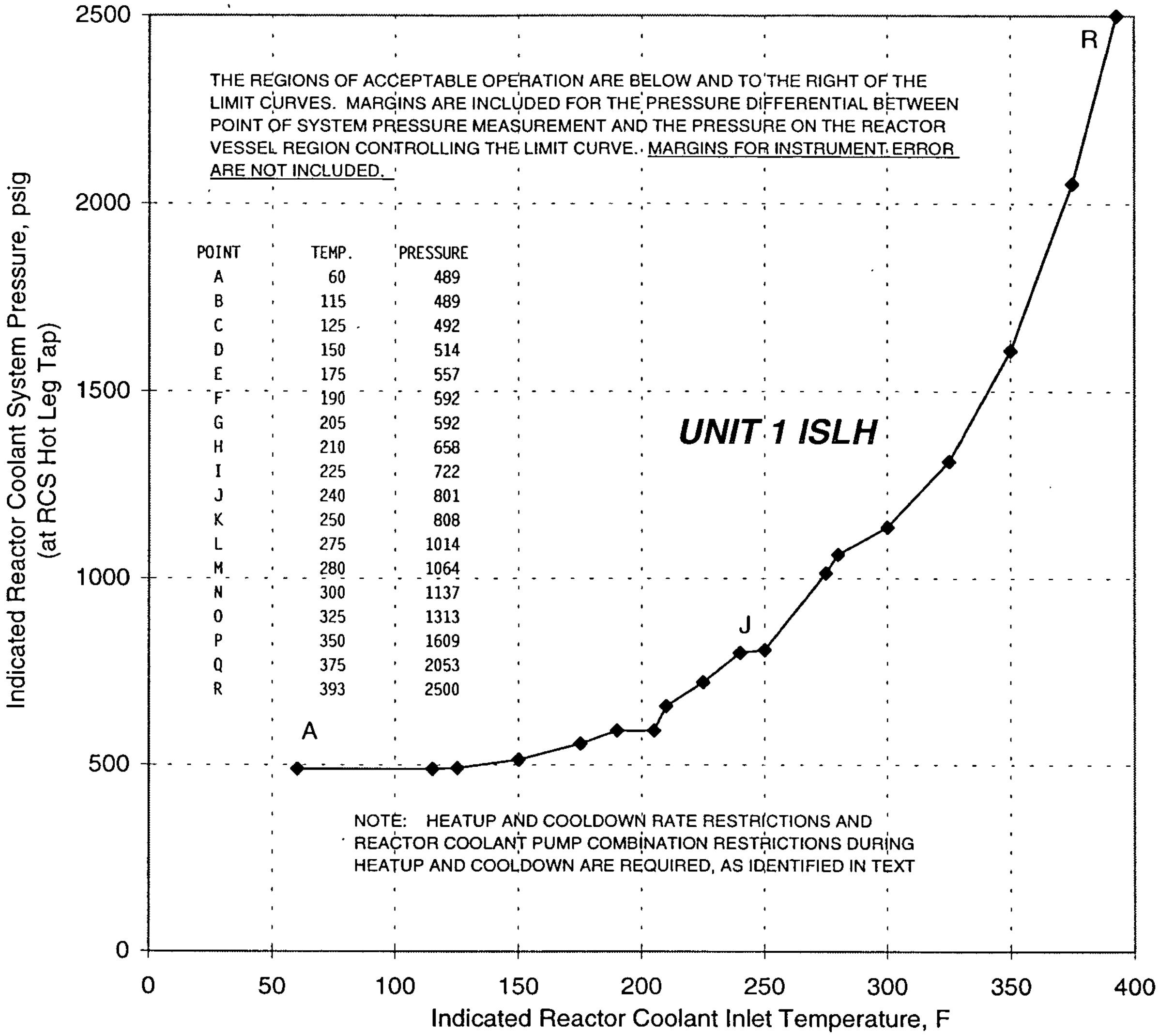


Figure 3.4.3-1 (page 1 of 1)
RCS Normal Operational Heatup Limitations
Applicable for the First 26 EFPY - Oconee Nuclear Station Unit 1



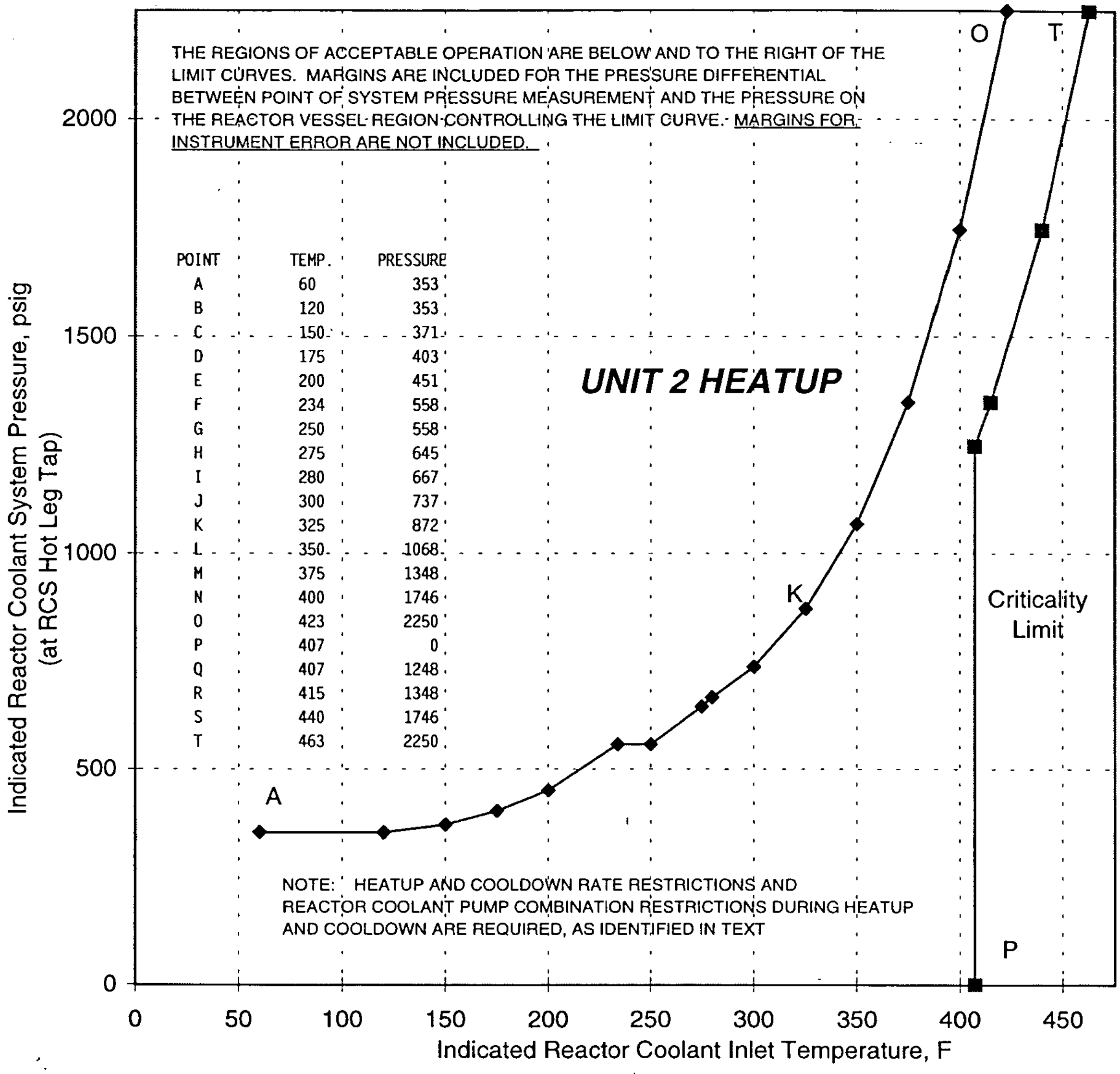
POINT	TEMP.	PRESSURE
A	60	408
B	70	431
C	80	446
D	150	446
E	175	491
F	195	537
G	200	537
H	218	640
I	230	703
J	240	757
K	255	874
L	280	1088
M	320	1650
N	360	2250

Figure 3.4.3-2 (page 1 of 1)
RCS Normal Operational Cooldown Limitations
Applicable for the First 26 EFPY - Oconee Nuclear Station Unit 1



POINT	TEMP.	PRESSURE
A	60	489
B	115	489
C	125	492
D	150	514
E	175	557
F	190	592
G	205	592
H	210	658
I	225	722
J	240	801
K	250	808
L	275	1014
M	280	1064
N	300	1137
O	325	1313
P	350	1609
Q	375	2053
R	393	2500

Figure 3.4.3-3 (page 1 of 1)
RCS Leak and Hydrostatic Test Heatup and Cooldown Limitations
Applicable for the First 26 EFPY - Oconee Nuclear Station Unit 1



POINT	TEMP.	PRESSURE
A	60	353
B	120	353
C	150	371
D	175	403
E	200	451
F	234	558
G	250	558
H	275	645
I	280	667
J	300	737
K	325	872
L	350	1068
M	375	1348
N	400	1746
O	423	2250
P	407	0
Q	407	1248
R	415	1348
S	440	1746
T	463	2250

Figure 3.4.3-4 (page 1 of 1)
RCS Normal Operational Heatup Limitations
Applicable for the First 26 EFPY - Oconee Nuclear Station Unit 2

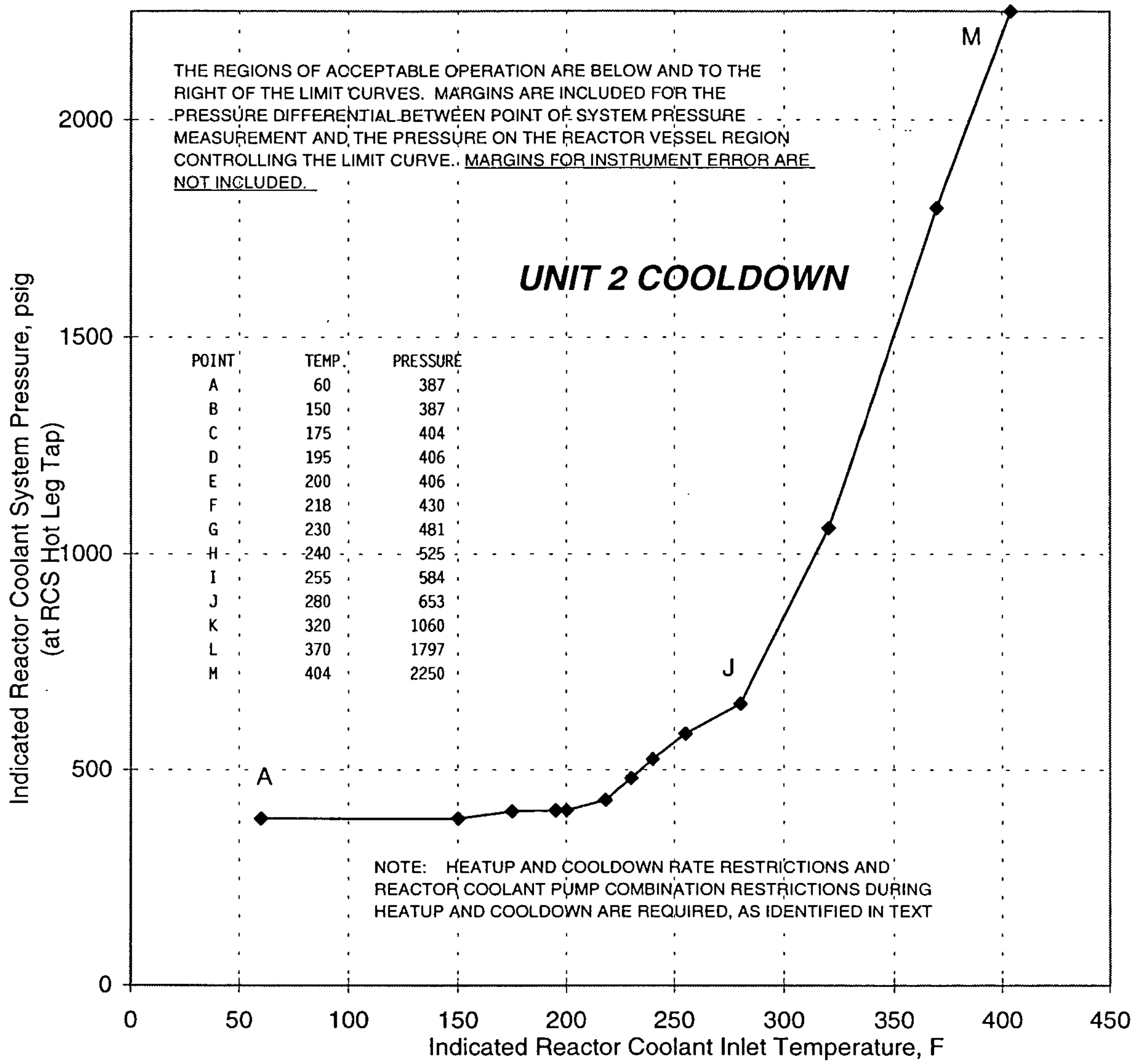
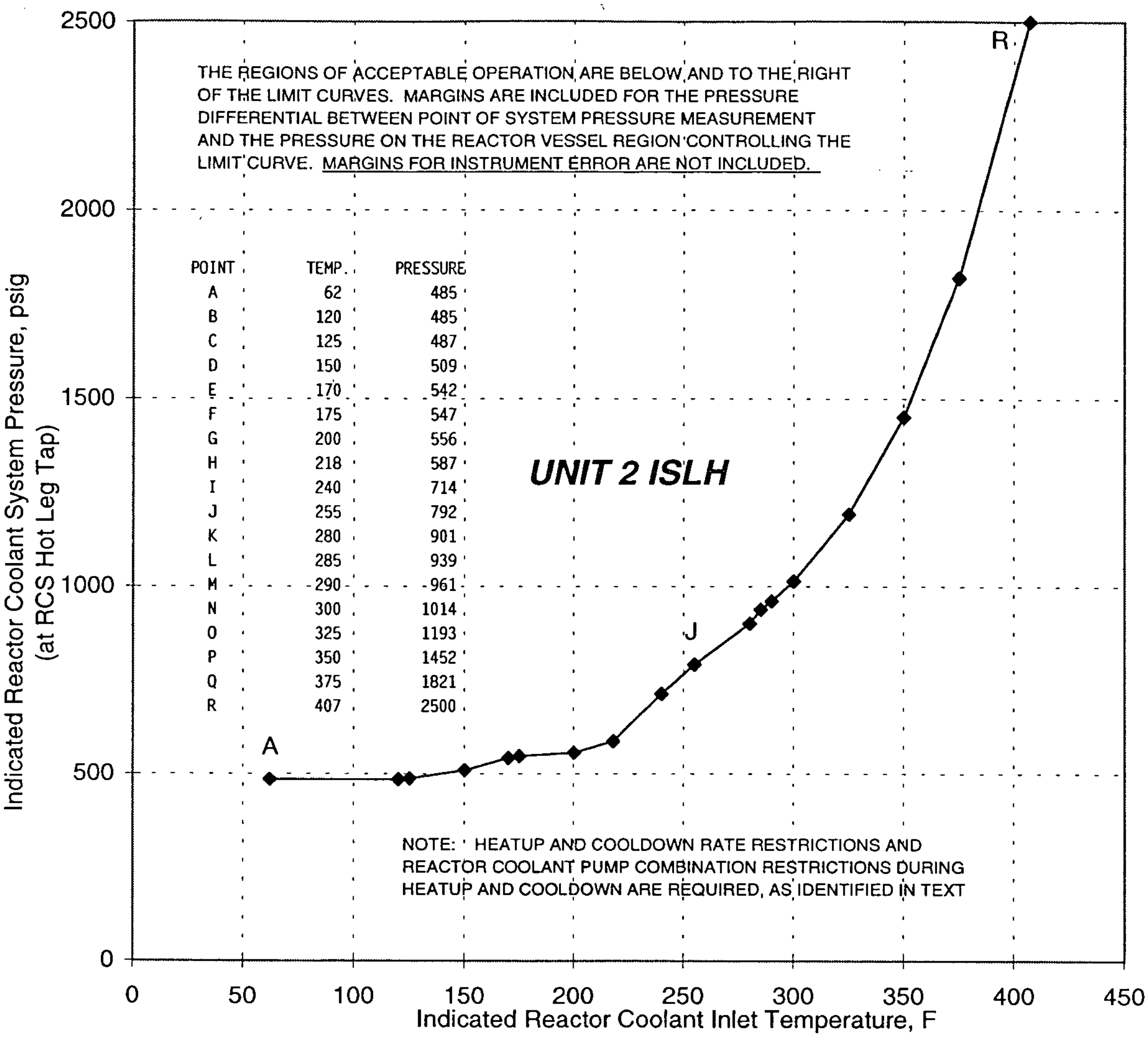
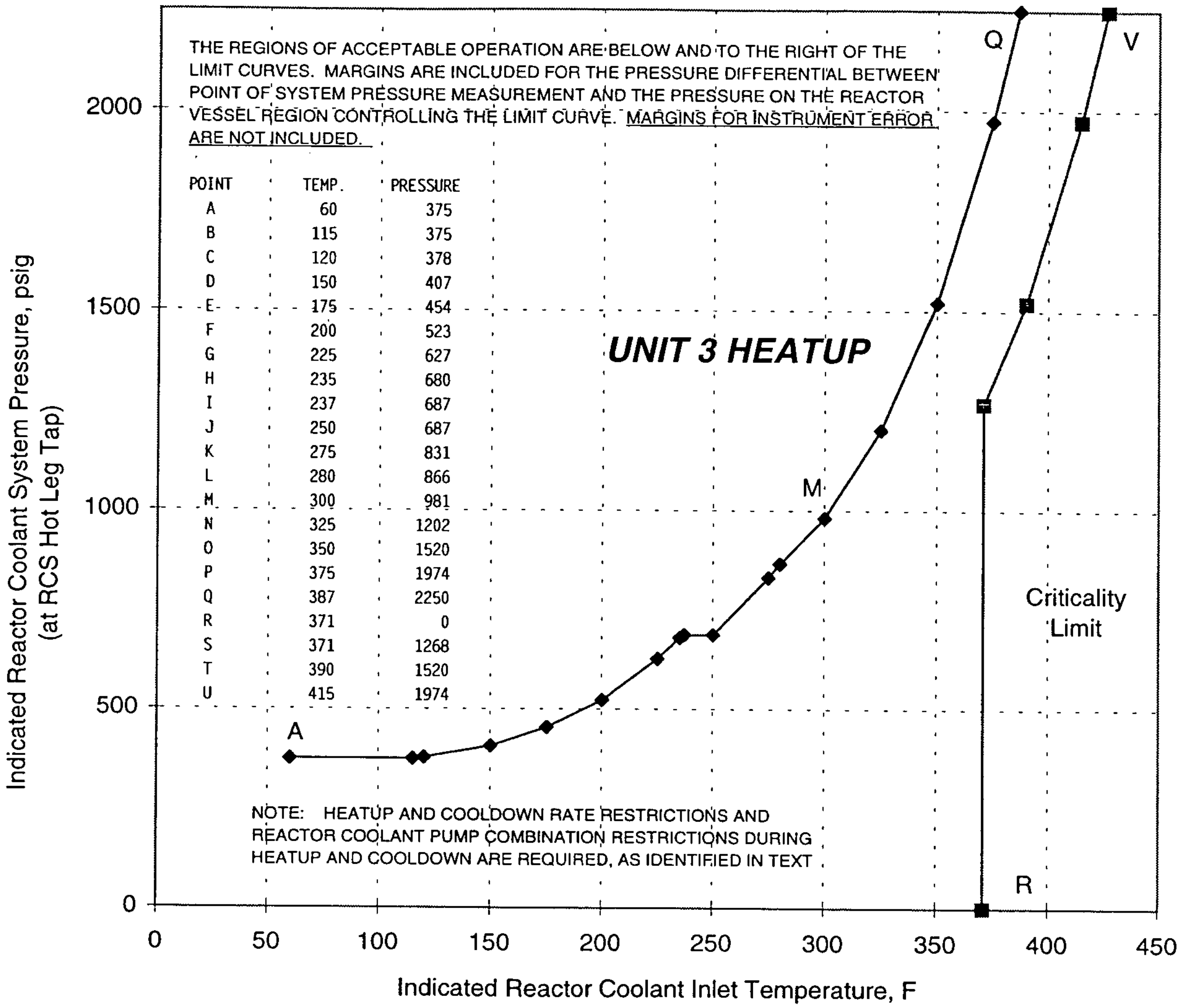


Figure 3.4.3-5 (page 1 of 1)
RCS Normal Operational Cooldown Limitations
Applicable for the First 26 EFPY - Oconee Nuclear Station Unit 2



POINT	TEMP.	PRESSURE
A	62	485
B	120	485
C	125	487
D	150	509
E	170	542
F	175	547
G	200	556
H	218	587
I	240	714
J	255	792
K	280	901
L	285	939
M	290	961
N	300	1014
O	325	1193
P	350	1452
Q	375	1821
R	407	2500

Figure 3.4.3-6 (page 1 of 1)
RCS Leak and Hydrostatic Test Heatup and Cooldown Limitations
Applicable for the First 26 EFPY - Oconee Nuclear Station Unit 2



POINT	TEMP.	PRESSURE
A	60	375
B	115	375
C	120	378
D	150	407
E	175	454
F	200	523
G	225	627
H	235	680
I	237	687
J	250	687
K	275	831
L	280	866
M	300	981
N	325	1202
O	350	1520
P	375	1974
Q	387	2250
R	371	0
S	371	1268
T	390	1520
U	415	1974

Figure 3.4.3-7 (page 1 of 1)
RCS Normal Operational Heatup Limitations
Applicable for the First 26 EFPY - Oconee Nuclear Station Unit 3

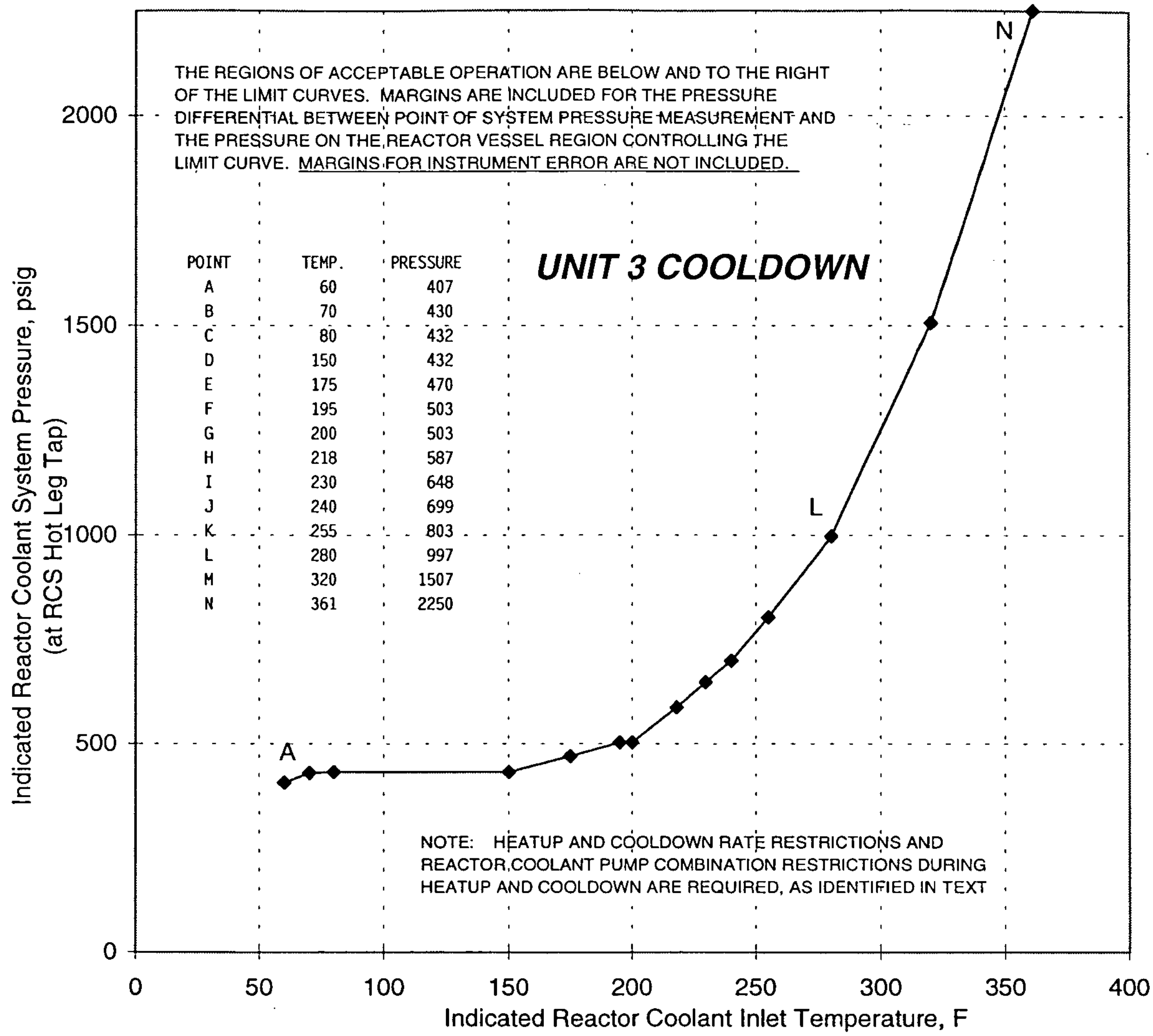


Figure 3.4.3-8 (page 1 of 1)
RCS Normal Operational Cooldown Limitations
Applicable for the First 26 EFPY - Oconee Nuclear Station Unit 3

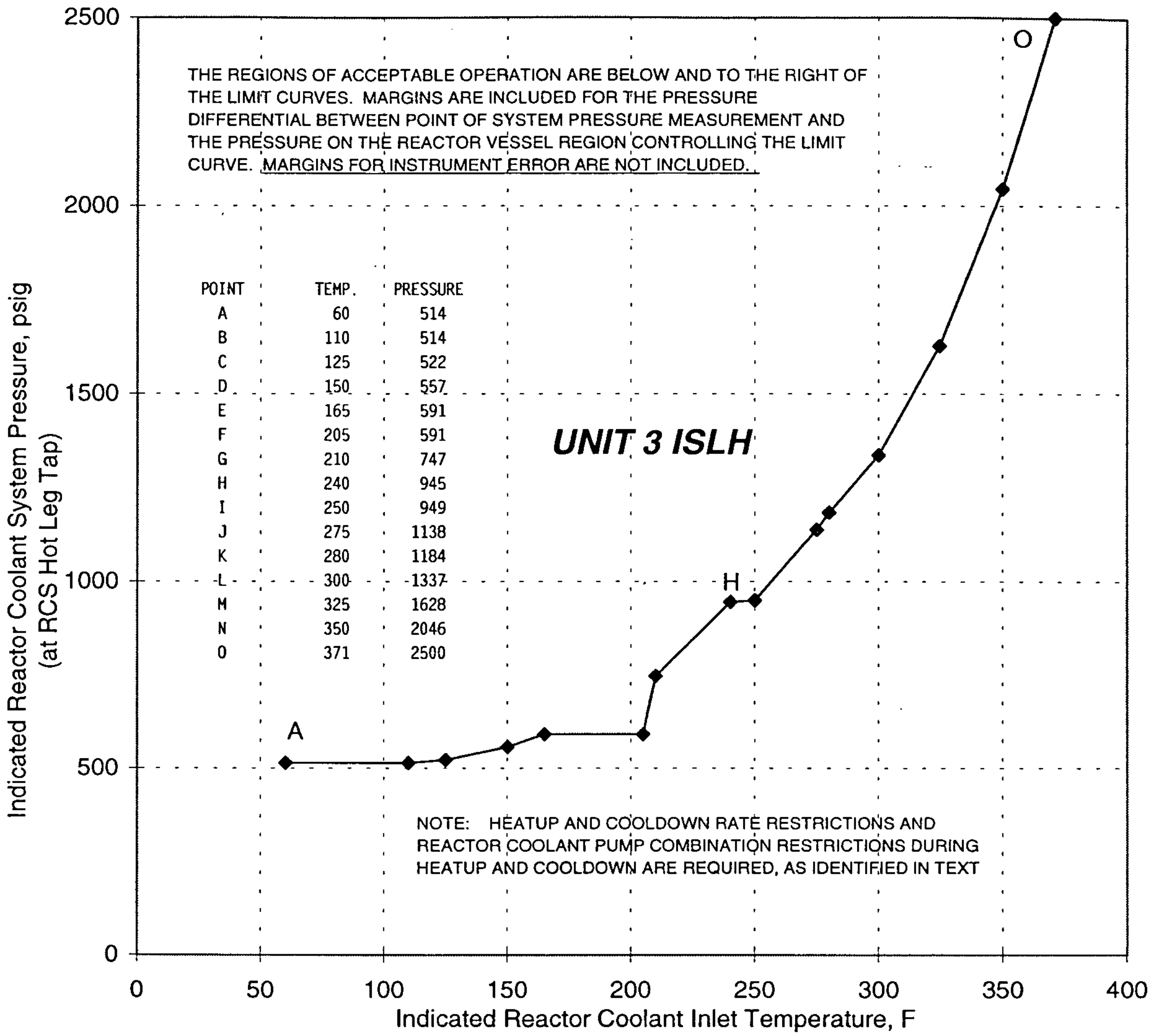


Figure 3.4.3-9 (page 1 of 1)
RCS Leak and Hydrostatic Test Heatup and Cooldown Limitations
Applicable for the First 26 EFPY - Oconee Nuclear Station Unit 3

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.12 Low Temperature Overpressure Protection (LTOP) System

LCO 3.4.12 An LTOP System shall be OPERABLE with high pressure injection (HPI) deactivated, and the core flood tanks (CFTs) isolated and:

a. An OPERABLE power operated relief valve (PORV) with a lift setpoint of ≤ 460 psig; and

b. Administrative controls implemented that assure ≥ 10 minutes are available for operator action to mitigate an LTOP event.

APPLICABILITY: MODE 3 when any RCS cold leg temperature is ≤ 325°F, MODES 4, 5, and 6 when an RCS vent path capable of mitigating the most limiting LTOP event is not open.

-------------------------NOTES-------------------------

1. CFT isolation is only required when CFT pressure is greater than or equal to the maximum RCS pressure for the existing RCS temperature allowed by the pressure and temperature limit curves provided in Specification 3.4.3.

2. The PORV is not required to be OPERABLE when no HPI pumps are running and RCS pressure < 100 psig.

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.4.12.6	Verify Administrative Controls, other than limits for pressurizer level, that assure ≥ 10 minutes are available for operator action to mitigate an LTOP event are implemented for the following: a. RCS pressure when RCS temperature is < 325°F; b. Makeup flow rate; c. Alarms; d. High pressure Nitrogen System; and e. Verify pressurizer heater bank 3 or 4 is deactivated.	12 hours
SR 3.4.12.7	Perform CHANNEL CALIBRATION for PORV.	18 months

B 3.4 REACTOR COOLANT SYSTEM (RCS)

B 3.4.12 Low Temperature Overpressure Protection (LTOP) System

BASES

BACKGROUND

The LTOP System limits RCS pressure at low temperatures so the integrity of the reactor coolant pressure boundary (RCPB) is not compromised by violating the pressure and temperature (P/T) requirements of 10 CFR 50, Appendix G (Ref. 1). The reactor vessel is the limiting RCPB component for providing such protection. LCO 3.4.3, "RCS Pressure and Temperature (P/T) Limits," provides the allowable combinations for operational pressure and temperature during cooldown, shutdown, and heatup to keep from violating the Reference 1 limits.

The reactor vessel material is less ductile at reduced temperatures than at normal operating temperature. Also, as vessel neutron irradiation accumulates, the material becomes less resistant to pressure stress at low temperatures (Ref. 2). RCS pressure must be maintained low when temperature is low and may be increased only as temperature is increased.

Operational maneuvering during cooldown, heatup, or related anticipated transients must be controlled to not violate LCO 3.4.3. Exceeding these limits could lead to brittle fracture of the reactor vessel. LCO 3.4.3 presents requirements for administrative control of RCS pressure and temperature to prevent exceeding the P/T limits.

This LCO provides RCS overpressure protection in the applicable MODES by ensuring an adequate pressure relief capacity and a limit on coolant addition capability. The pressure relief capacity requires the power operated relief valve (PORV) lift setpoint to be reduced and administrative controls implemented which assure ≥ 10 minutes available for operator action to mitigate an LTOP event. The administrative controls include limits on pressurizer level, limits on RCS pressure when RCS temperature is < 325°F, limits on RCS makeup flow, the number of available pressurizer heater banks, requirements for alarms and restrictions upon use of the High Pressure Nitrogen System.

(continued)

BASES

BACKGROUND (continued)

The LTOP approach to protecting the vessel by limiting coolant addition capability requires administrative controls upon RCS makeup flow, the number of available pressurizer heater banks, and requires deactivating HPI, and isolating the core flood tanks (CFTs).

Should an HPI pump inject on an HPI actuation, the pressurizer level and PORV may not prevent overpressurizing the RCS.

The administrative controls upon pressurizer level provides a compressible vapor space or cushion (either steam or nitrogen) that can accommodate a coolant insurge and prevent a rapid pressure increase, allowing the operator time to stop the increase. The PORV, with reduced lift setting, is the overpressure protection device that acts as backup to the operator in terminating an increasing pressure event.

With HPI deactivated, the ability to provide RCS coolant addition is restricted. To balance the possible need for coolant addition, the LCO does not require the makeup system to be deactivated. Due to the lower pressures associated with the LTOP MODES and the expected decay heat levels, the makeup system can provide flow with the HPI pumps providing RCS makeup through the makeup control valve.

PORV Requirements

As required for the LTOP, the PORV is signaled to open if the RCS pressure approaches a limit set in the LTOP actuation circuit. The LTOP actuation circuit monitors RCS pressure and determines when an overpressure condition is approached. When the monitored pressure meets or exceeds the setting, the PORV is signaled to open. Maintaining the setpoint within the limits of the LCO ensures the Reference 1 limits will be met in any event analyzed for LTOP.

When a PORV is opened in an increasing pressure transient, the release of coolant causes the pressure increase to slow and reverse. As the PORV releases steam, the RCS pressure decreases until a reset pressure is reached and the valve is signaled to close. The pressure continues to decrease below the reset pressure as the valve closes.

(continued)

BASES

BACKGROUND (continued)

Administrative Control Requirements

Administrative controls are necessary to assure the operator has at least ten minutes available to mitigate the most limiting LTOP event. These administrative controls include the following:

1) Limits on RCS pressure based on RCS temperature;

2) Limits upon pressurizer level;

3) Limits upon makeup flow capability;

4) OPERABLE Alarms;

5) Controls upon use of the High Pressure Nitrogen System; and

6) Restricting the number of available pressurizer heater banks.

Limiting RCS pressure based on RCS temperature provides a minimum margin to the RCS P/T limit. Restricting RCS makeup flow capability and pressurizer level and controls on the use of high pressure nitrogen limit the pressurization rate during an LTOP event. Restricting the number of available pressurizer heater banks limits the pressurization rate during an LTOP event. Alarms ensure early operator recognition of the occurrence of an LTOP event. The combination of minimum margin to the limit, limited pressurization rate and OPERABLE alarms ensure ten minutes are available for operator action to mitigate an LTOP event.

APPLICABLE SAFETY ANALYSES

Safety analyses (Ref. 3) demonstrate that the reactor vessel can be adequately protected against overpressurization transients during shutdown. In MODES 1, 2, and in MODE 3 with RCS temperature exceeding 325°F, the pressurizer safety valves will prevent RCS pressure from exceeding the Reference 1 limits. At nominally 325°F and below, overpressure prevention falls to an OPERABLE PORV, a restricted coolant level in the pressurizer and other administrative controls.

(continued)

BASES

APPLICABLE SAFETY ANALYSIS (continued)

The actual temperature at which the pressure in the P/T limit curve falls below the pressurizer safety valve setpoint increases as vessel material toughness decreases due to neutron embrittlement. Each time the P/T limit curves are revised, the LTOP System will be re-evaluated to ensure that its functional requirements can still be met with the PORV and pressurizer level/administrative controls method.

Transients that are capable of overpressurizing the RCS have been identified and evaluated. These transients relate to either mass input or heat input: actuating the HPI System, discharging the CFTs, energizing the pressurizer heaters, failing the makeup control valve open, losing decay heat removal, starting a reactor coolant pump (RCP) with a large temperature mismatch between the primary and secondary coolant systems, and adding nitrogen to the pressurizer.

HPI actuation and CFT discharge are the transients that may result in exceeding P/T limits within < 10 minutes in which time no operator action is assumed to take place. Starting an RCP and adding nitrogen to the pressurizer are self limiting events. In the rest, operator action after that time precludes overpressurization. The analyses demonstrate that the time allowed for operator action is adequate, or the events are self limiting and do not exceed P/T limits.

The following are required during the LTOP MODES to ensure that transients do not occur, which either of the LTOP overpressure protection means cannot handle:

a. Limiting RCS makeup flow capability;

b. Deactivating HPI;

c. Immobilizing CFT discharge isolation valves in their closed positions; and

d. Limiting the number of available pressurizer heater banks.

The Reference 3 analyses demonstrate the PORV can maintain RCS pressure below limits when both makeup flow capability and the number of available pressurizer heater banks are restricted. Consequently, the administrative controls

(continued)

BASES

APPLICABLE SAFETY ANALYSES (continued)

require makeup flow capability and the number of available pressurizer heater banks to be limited in the LTOP MODES.

Since the PORV cannot do this for one HPI pump, or discharging the CFTs, the LCO also requires the HPI actuation circuits deactivated and the CFTs isolated.

The isolated CFTs must have their discharge valves closed and the valve power breakers fixed in their open positions.

Fracture mechanics analyses established the temperature of LTOP Applicability at 325°F. Above this temperature, the pressurizer safety valves provide the reactor vessel pressure protection. The vessel materials were assumed to have a neutron irradiation accumulation equal to 26 effective full power years (EFPYs) of operation for Units 1, 2 and 3.

This LCO will deactivate the HPI actuation when the RCS temperature is ≤ 325°F.

Reference 3 contains the acceptance limits that satisfy the LTOP requirements. Any change to the RCS must be evaluated against these analyses to determine the impact of the change on the LTOP acceptance limits.

<u>PORV Performance</u>

The fracture mechanics analyses show that the vessel is protected when the PORV is set to open at ≤ 460 psig. The setpoint is derived by modeling the performance of the LTOP system for different LTOP events. The PORV setpoint at or below the derived limit ensures the Reference 1 limits will be met.

The PORV setpoint is re-evaluated for compliance when the revised P/T limits conflict with the LTOP analysis limits. The P/T limits are periodically modified as the reactor vessel material toughness decreases due to embrittlement induced by neutron irradiation. Revised P/T limits are determined using neutron fluence projections and the results of examinations of the reactor vessel material irradiation surveillance specimens. The Bases for LCO 3.4.3 discuss these examinations.

(continued)

BASES

APPLICABLE SAFETY ANALYSES (continued)

The PORV is considered an active component. Therefore, its failure represents the worst case LTOP single active failure.

Administrative Controls Performance

Limiting RCS pressure when RCS temperature is < 325°F provides a minimum margin to the RCS P/T limit. Restricting RCS makeup flow capability, the number of available pressurizer heater banks, pressurizer level, and controls on the use of high pressure nitrogen limit the pressurization rate during an LTOP event. Alarms ensure early operator recognition of the occurrence of an LTOP event. The combination of minimum margin to the limit, limited pressurization rate and OPERABLE alarms ensure ten minutes are available for operator action to mitigate an LTOP event.

The LTOP System satisfies Criterion 2 and Criterion 3 of 10 CFR 50.36 (Ref.6).

LCO

The LCO requires an LTOP System OPERABLE with a limited coolant input capability and a pressure relief capability. The LCO requires HPI to be deactivated and the CFTs to be isolated. For pressure relief, it requires the pressurizer coolant at or below a maximum level and the PORV OPERABLE with a lift setting at the LTOP limit, with other specified administrative controls.

The pressurizer is OPERABLE with a coolant level limited such that ≥ 10 minutes are available for operator action to mitigate the consequences of an LTOP event.

The PORV is OPERABLE when its block valve is open, its lift setpoint is set at ≤ 460 psig and testing has proven its ability to open at that setpoint, and power is available to the two valves and their control circuits.

APPLICABILITY

This LCO is applicable in MODE 3 when any RCS cold leg temperature is ≤ 325°F, and in MODES 4, 5 and 6 when an RCS vent capable of mitigating the most limiting LTOP event is not open. The Applicability temperature of 325°F is

(continued)

BASES

APPLICABILITY (continued)

established by fracture mechanics analyses. The pressurizer safety valves provide overpressure protection to meet LCO 3.4.3 P/T limits above 325°F. With the vessel head off, overpressurization is not possible. With an RCS vent capable of mitigating the most limiting LTOP event open, an LTOP event (including HPI actuation or CFT discharge) is incapable of pressuring the RCS above the RCS P/T limits.

LCO 3.4.3 provides the operational P/T limits for all MODES. LCO 3.4.10, "Pressurizer Safety Valves," requires the pressurizer safety valves OPERABLE to provide overpressure protection during MODES 1, 2, and 3 above 325°F.

The Applicability is modified by two Notes. Note 1 states that CFT isolation is only required when the CFT pressure is more than or equal to the maximum RCS pressure for the existing RCS temperature, as allowed in LCO 3.4.3. This Note permits the CFT discharge valve surveillance performed only under these pressure and temperature conditions.

Note 2 permits the PORV to be inoperable when no HPI pumps are running and RCS pressure is < 100 psig. PORV operability is not required when RCS pressure is < 100 psig and HPI pumps are not operating since credible LTOP events progress relatively slowly, thus giving the operator ample time to respond.

ACTIONS

<u>A.1</u>

With the HPI activated, immediate actions are required to deactivate HPI. Emphasis is on immediate deactivation because inadvertent injection with one or more HPI pump OPERABLE is the event of greatest significance, since these events cause the greatest pressure increase in the shortest time.

The immediate Completion Times reflect the urgency of quickly proceeding with the Required Actions.

(continued)

BASES

ACTIONS (continued)

B.1, C.1, and C.2

An unisolated CFT requires isolation within 1 hour only when the CFT pressure is at or more than the maximum RCS pressure for the existing temperature allowed in LCO 3.4.3.

If isolation is needed and cannot be accomplished in 1 hour, Required Action C.1 and Required Action C.2 provide two options, either of which must be performed in 12 hours. By placing the unit in MODE 4 with the RCS temperature > 233°F, the CFT pressure of 650 psig cannot exceed the LTOP limits if both tanks are fully injected. Depressurizing the CFTs below the LTOP limit of 373 psig also prevents exceeding the LTOP limits in the same event.

The Completion Times are based on operating experience that these activities can be accomplished in these time periods and on engineering judgement indicating that a limiting LTOP event is not likely in the allowed times.

D.1, E.1, and E.2

With the PORV inoperable, overpressure relieving capability is lost, and restoration of the PORV within 1 hour is required.

If restoration cannot be completed within 1 hour, either Required Action E.1 or Required Action E.2 must be performed. Required Action E.1 requires increasing RCS temperature within 23 hours to exit the Applicability of the specification. With RCS temperature > 325°F, the CFTs are not required to be isolated. Required Action E.2 requires the RCS be depressurized to less than 100 psig within 35 hours. With reactor pressure < 100 psig more time is available for operator action to mitigate an LTOP event.

These Completion Times also consider these activities can be accomplished in these time periods. A limiting LTOP event is not likely in these times.

F.1 and G.1

With Administrative Controls that assure ≥ 10 minutes are available to mitigate the consequences of an event not

(continued)

BASES

ACTIONS

F.1 and G.1 (continued)

implemented, the capability for operator action to mitigate an LTOP event may be lost. In this circumstance, compensatory measures must be established to monitor for initiation of an LTOP event. Establishing a dedicated operator within 4 hours to monitor for initiation of an LTOP event is sufficient to compensate for inoperability of makeup flow restrictions, having too many pressurizer heater banks available, inoperability of required alarms, or deviation from pressure, temperature or level limits. Establishing a dedicated operator is not sufficient to compensate for not deactivating HPI or isolating CFTs. If the Required Action and associated Completion Time of Condition F is not met, the RCS must be depressurized and an RCS vent path capable of mitigating the most limiting LTOP event must be established within 12 hours. These Completion Times also consider that these activities can be accomplished in these time periods. A limiting LTOP event is not likely in these periods.

H.1

With administrative controls which assure ≥ 10 minutes are available to mitigate the consequences of an LTOP event not implemented and the PORV inoperable; or the LTOP System inoperable for any reason other than cited in Condition A through G, Required Action H.1 requires the RCS depressurized and vented within 12 hours.

One or more vents may be used. A vent path capable of mitigating the most limiting LTOP event is specified. Because makeup may be required, the vent size accommodates inadvertent full makeup system operation. Such a vent keeps the pressure from full flow of the makeup pump(s) with a wide open makeup control valve within the LCO limit.

The Completion Time is based on operating experience that these activity can be accomplished in this time period and on engineering judgement indicating that a limiting LTOP transient is not likely in this time.

(continued)

BASES (continued)

SURVEILLANCE REQUIREMENTS

SR 3.4.12.1 and SR 3.4.12.2

Verifications must be performed that HPI is deactivated, and the CFTs are isolated. These Surveillances ensure the minimum coolant input capability will not create an RCS overpressure condition to challenge the LTOP System. The Surveillances are required at 12 hour intervals.

The 12 hour intervals are shown by operating practice to be sufficient to regularly assess conditions for potential degradation and verify operation within the safety analysis.

SR 3.4.12.3

Verification that the pressurizer level is less than the volume necessary to assure ≥ 10 minutes are available for operator action to mitigate an LTOP event by observing control room or other indications ensures a cushion of sufficient size is available to reduce the rate of pressure increase from potential transients.

The 30 minute Surveillance Frequency during heatup and cooldown must be performed for the LCO Applicability period when temperature changes can cause pressurizer level variations. This Frequency may be discontinued when the ends of these conditions are satisfied, as defined in plant procedures. Thereafter, the Surveillance is required at 12 hour intervals.

These Frequencies are shown by operating practice sufficient to regularly assess indications of potential degradation and verify operation within the safety analysis.

SR 3.4.12.4

Verification that the PORV block valve is open ensures a flow path to the PORV. This is required at 12 hour intervals.

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.4.12.5.4 (continued)

The interval has been shown by operating practice to be sufficient to regularly assess conditions for potential degradation and verify operation is within the safety analysis.

SR 3.4.12.5.5

A CHANNEL FUNCTIONAL TEST is required within 12 hours after decreasing RCS temperature to ≤ 325°F and every 31 days thereafter to ensure the setpoint is proper for using the PORV for LTOP. PORV actuation is not needed, as it could depressurize the RCS.

The 12 hour Frequency considers the unlikelihood of a low temperature overpressure event during the time. The 31 day Frequency is based on industry accepted practice and is acceptable by experience with equipment reliability.

SR 3.4.12.6

Verification that administrative controls, other than limits for pressurizer level, that assure ≥ 10 minutes are available for operator action to mitigate the consequences of an LTOP event are implemented is necessary every 7 days. This verification consists of a combination of administrative checks for alarm availability, verification that pressurizer heater bank 3 or 4 is deactivated, appropriate restrictions on pressurizer level, controls for High Pressure Nitrogen, etc., as well as visual confirmation using available indications that associated physical parameters are within limits.

The Frequency is shown by operating practice sufficient to regularly assess indications of potential degradation and verify operation within the safety analysis.

SR 3.4.12.7

The performance of a CHANNEL CALIBRATION is required every 18 months. The CHANNEL CALIBRATION for the LTOP setpoint ensures that the PORV will be actuated at the appropriate

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.4.12.7 (continued)

RCS pressure by verifying the accuracy of the instrument string. The calibration can only be performed in shutdown.

The Frequency considers a typical refueling cycle and industry accepted practice.

REFERENCES

1. 10 CFR 50, Appendix G.
2. Generic Letter 88-11.
3. UFSAR, 5.2.3.7.
4. 10 CFR 50.46.
5. 10 CFR 50, Appendix K.
6. 10 CFR 50.36.

DUKE POWER COMPANY

OCONEE NUCLEAR STATION

ATTACHMENT 1b

IMPROVED TECHNICAL SPECIFICATIONS

MARKED UP PAGES

Table 3.4.3-1 (page 1 of 1)
Operational Requirements for Unit Heatup

CONSTRAINT	RC TEMPERATURE[a]	MAXIMUM HEATUP RATE	ALLOWED PUMP COMBINATION
RC Temperature[a]	T ≤ 280°F T > 280°F	50°F/hr 100°F/hr	NA NA
RC Pumps	T > 250°F T ≤ 250°F	NA NA	Any ≤ one pump per loop

(a) RC Temperature is cold leg temperature if one or more RC pumps are in operation; otherwise it is the LPI cooler outlet temperature.

FOR INFORMATION ONLY

Table 3.4.3-2 (page 1 of 1)
Operational Requirements for Unit Cooldown

CONSTRAINT	RC TEMPERATURE[a]	MAXIMUM COOLDOWN RATE[b]	ALLOWED PUMP COMBINATION
RC Temperature[a]	T > 280°F	≤ 50°F in any 1/2 hour period	NA
	150°F < T ≤ 280°F	≤ 25°F in any 1/2 hour period	NA
	T ≤ 150°F	≤ 10°F in any one hour period	NA
	RCS depressurized[c]	≤ 50°F in any one hour period	NA
RC Pumps	T > 270°F	NA	Any
	200°F < T ≤ 270°F	NA	≤ one pump/loop
	T ≤ 200°F	NA	≤ one pump

(a) RC Temperature is cold leg temperature if one or more RC pumps are in operation or if on natural circulation cooldown; otherwise it is the LPI cooler outlet temperature.

(b) These rate limits must be applied to the change in temperature indication from cold leg temperature to LPI cooler outlet temperature per Note (a).

(c) When the RCS is depressurized such that all three of the following conditions exist:

a) RCS temperature < 200°F,
b) RCS pressure < 50 psig,
c) All RC Pumps off,

the maximum cooldown rate shall be relaxed to ≤ 50°F in any 1 hour period.

FOR INFORMATION ONLY

INSERT REVISED FIGURE

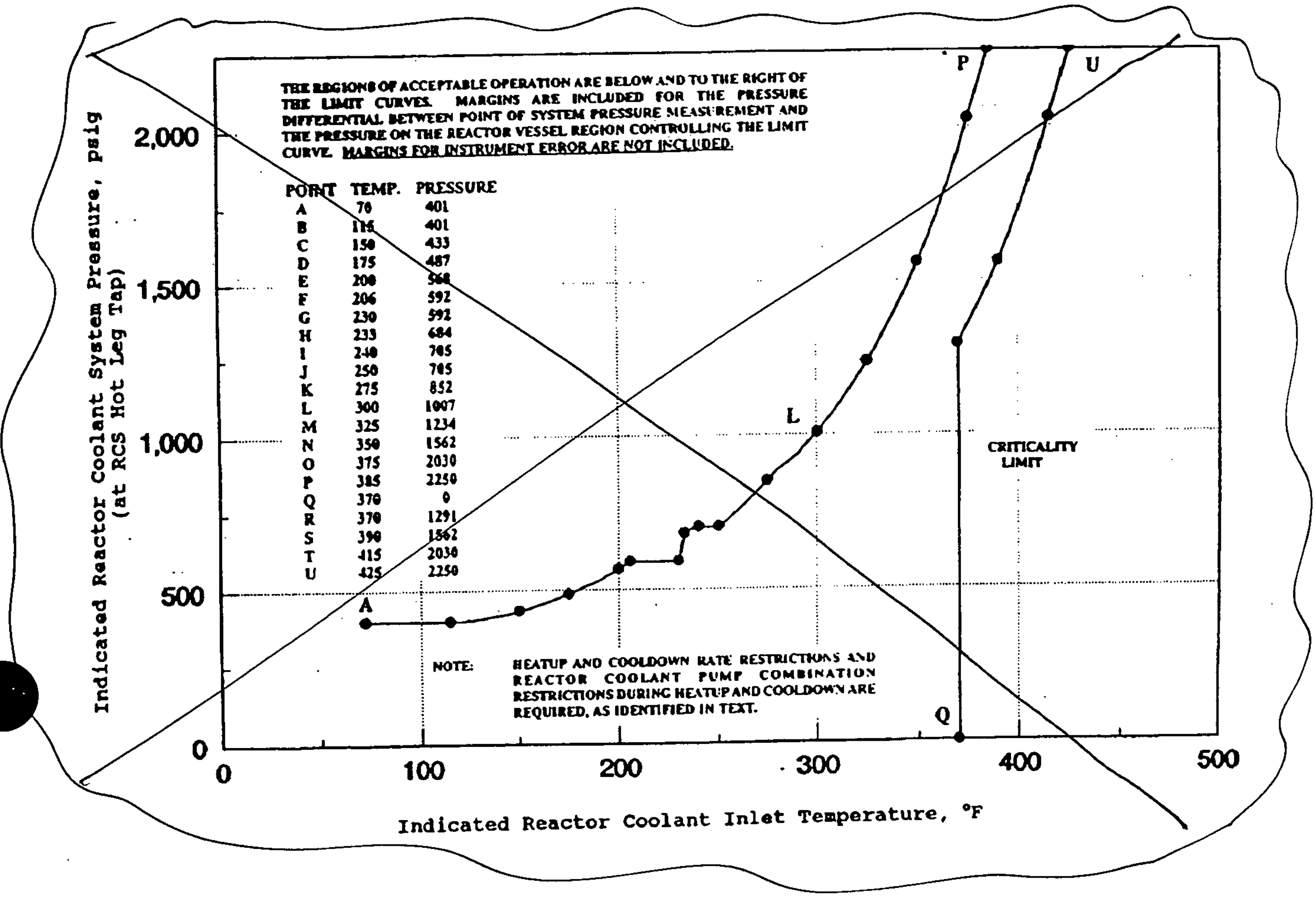
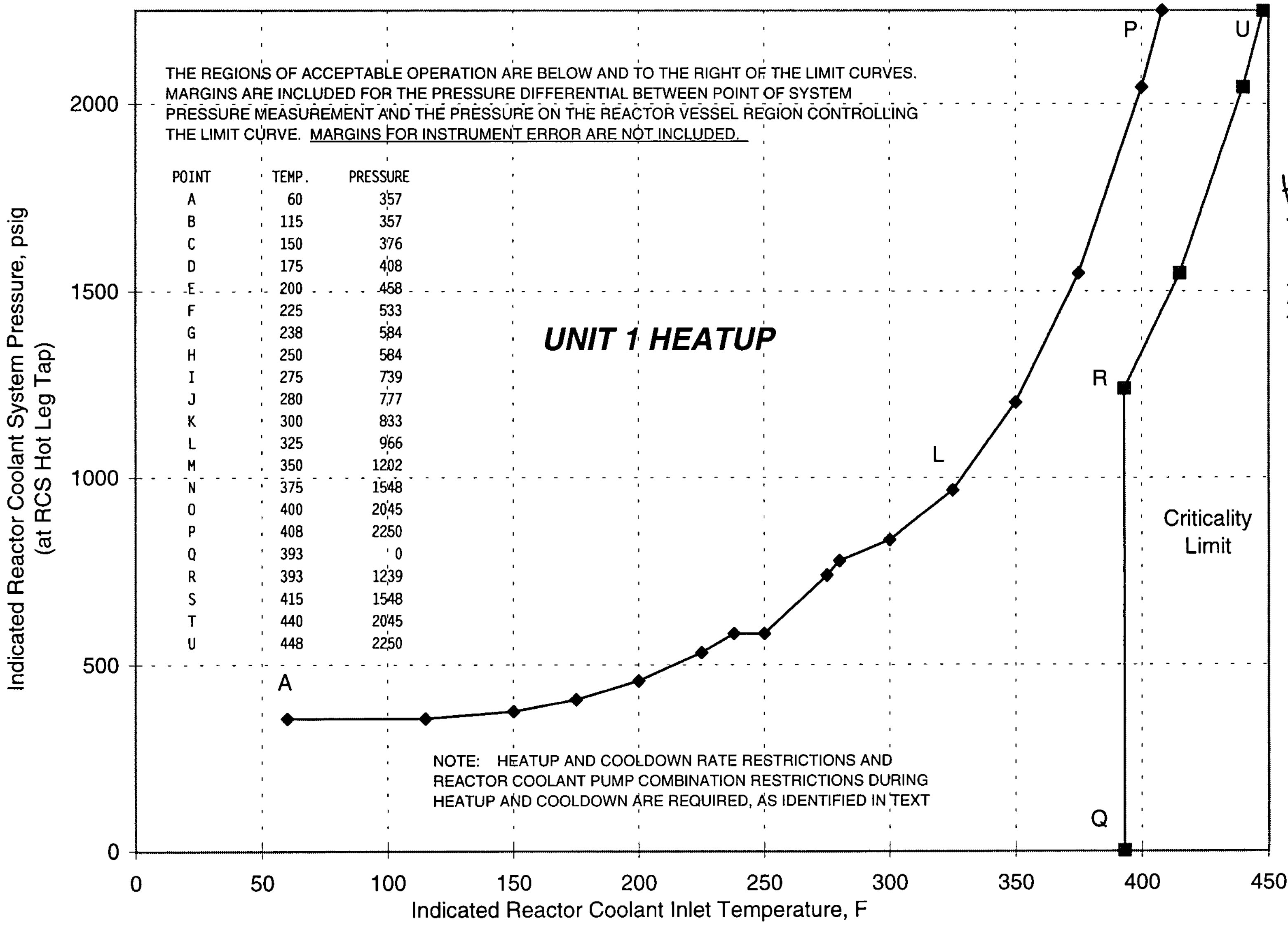


Figure 3.4.3-1 (page 1 of 1)
RCS Normal Operational Heatup Limitations
Applicable for the First ~~21~~ 26 EFPY - Oconee Nuclear Station Unit 1



INSERT FOR FIGURE 3.4.3-1

INSERT REVISED FIGURE

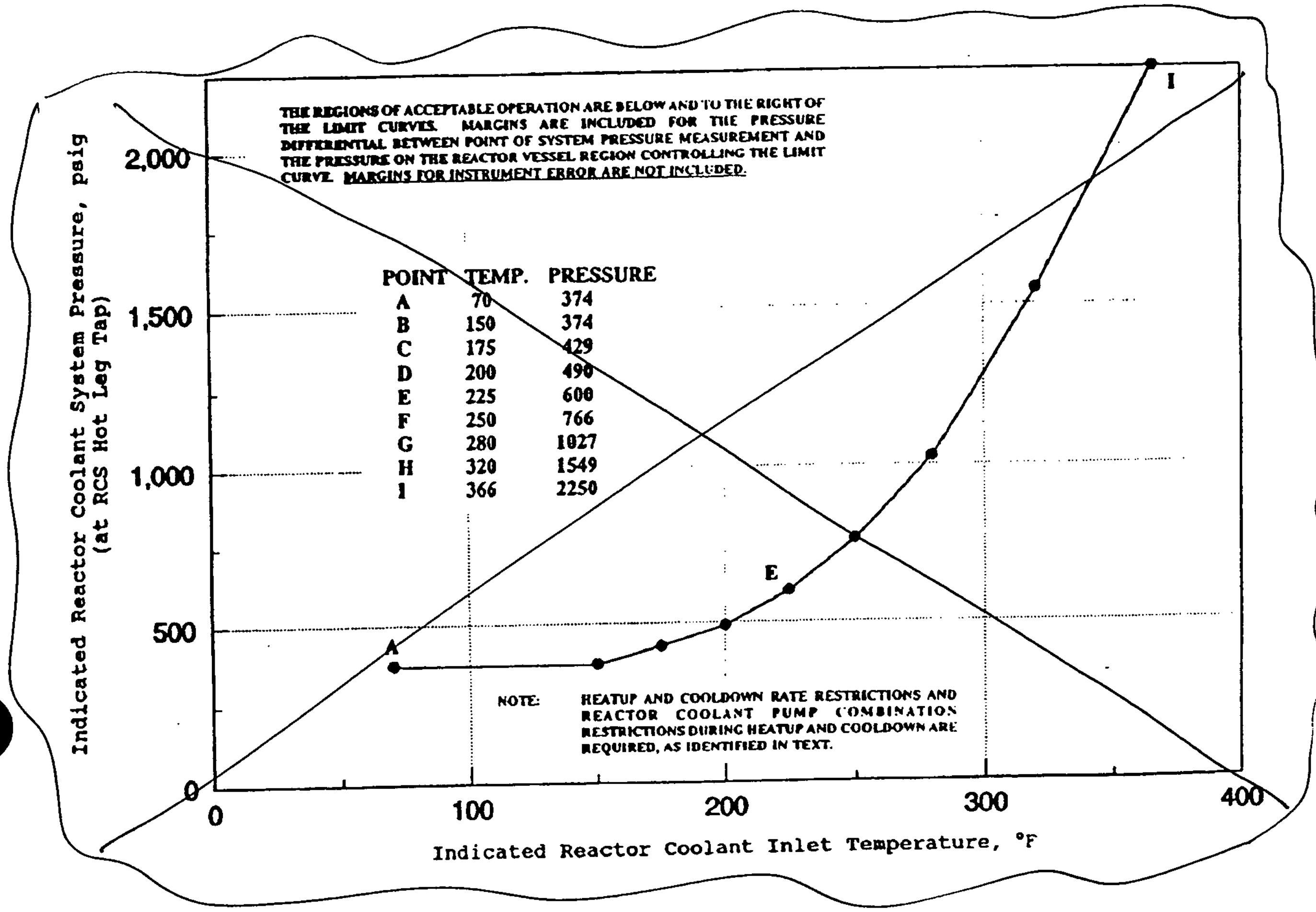
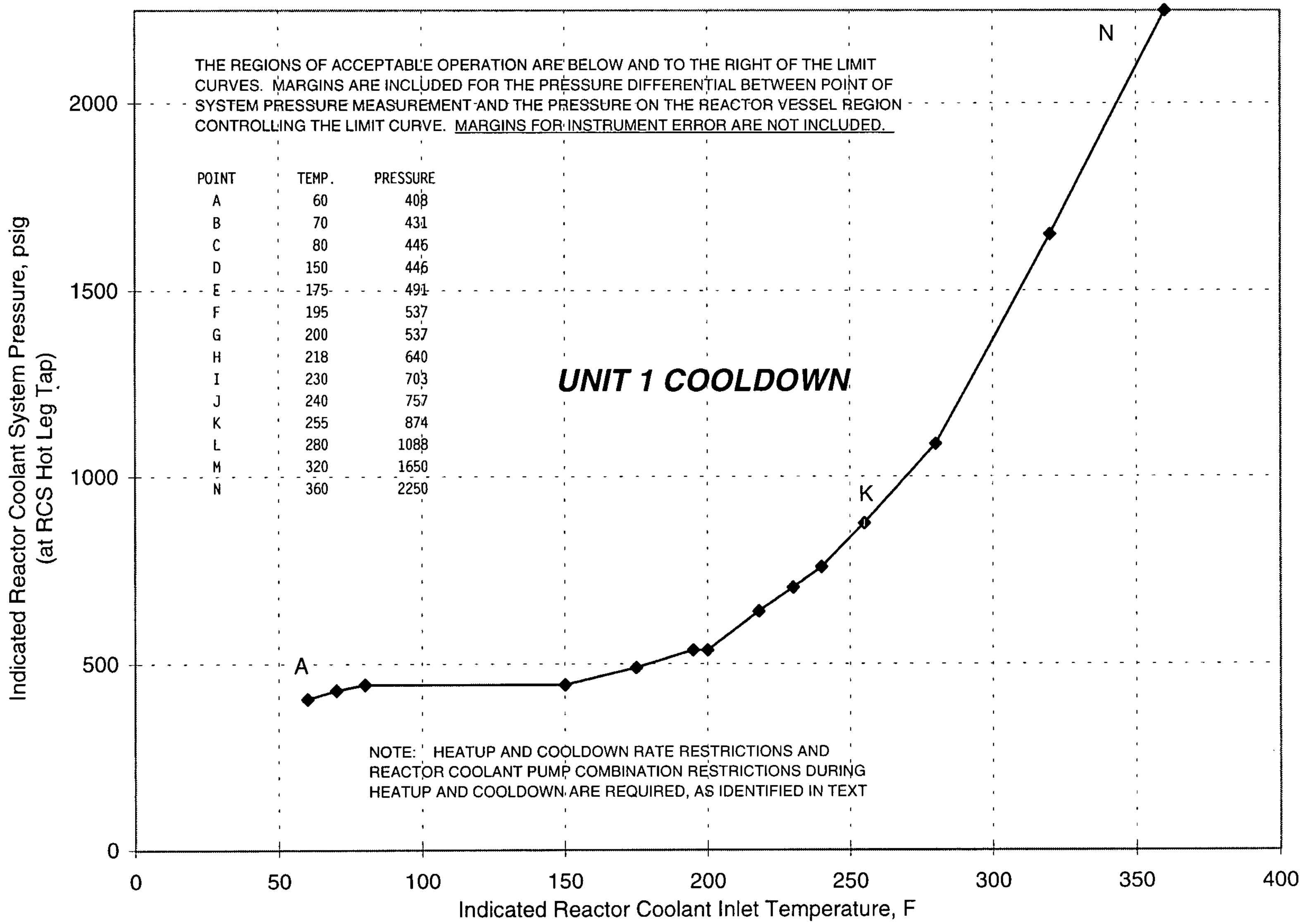


Figure 3.4.3-2 (page 1 of 1)
RCS Normal Operational Cooldown Limitations
Applicable for the First 21 EFPY - Oconee Nuclear Station Unit 1

26



POINT	TEMP.	PRESSURE
A	60	408
B	70	431
C	80	446
D	150	446
E	175	491
F	195	537
G	200	537
H	218	640
I	230	703
J	240	757
K	255	874
L	280	1088
M	320	1650
N	360	2250

INSERT FOR FIGURE 3.4.3-2

INSERT REVISED FIGURE

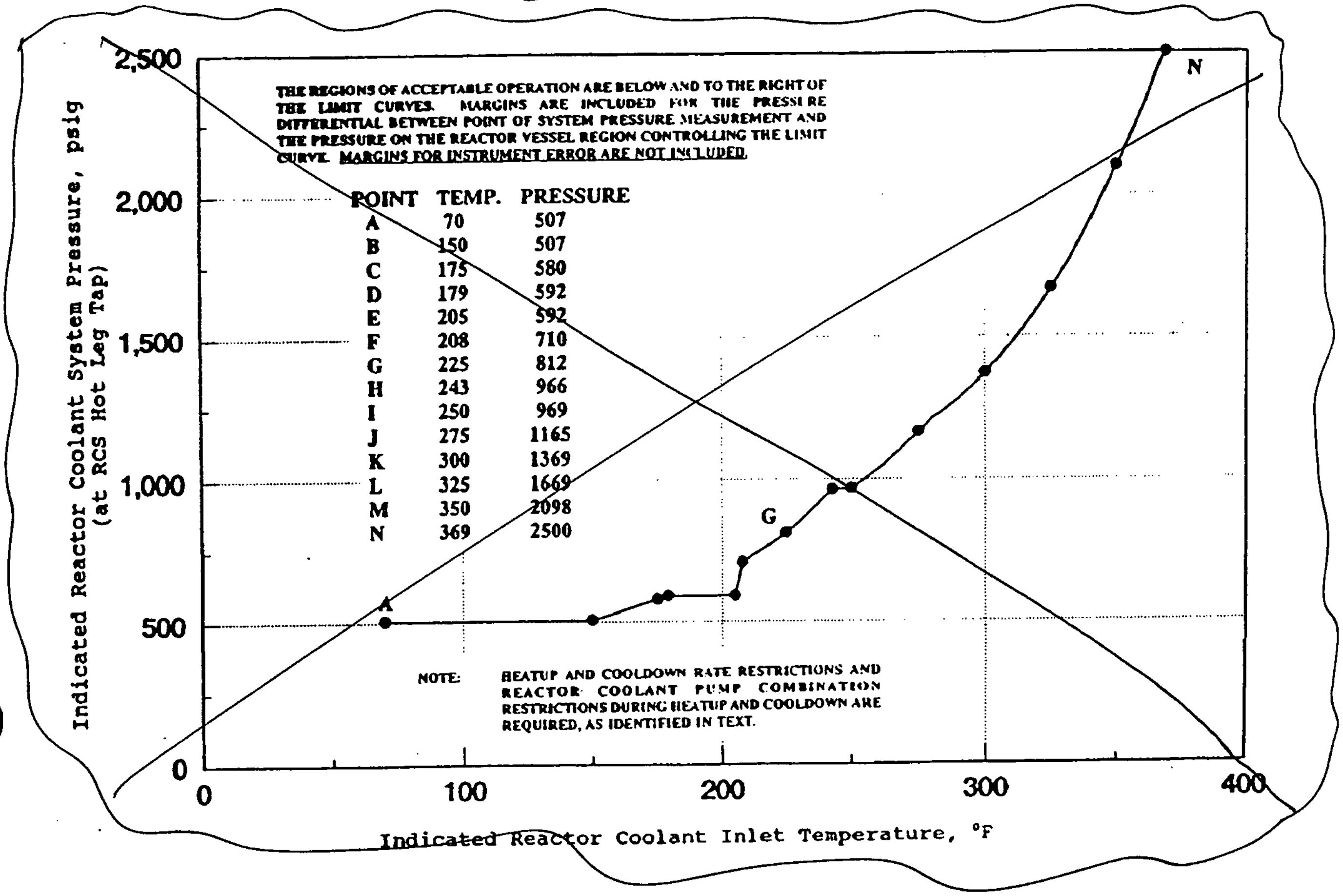
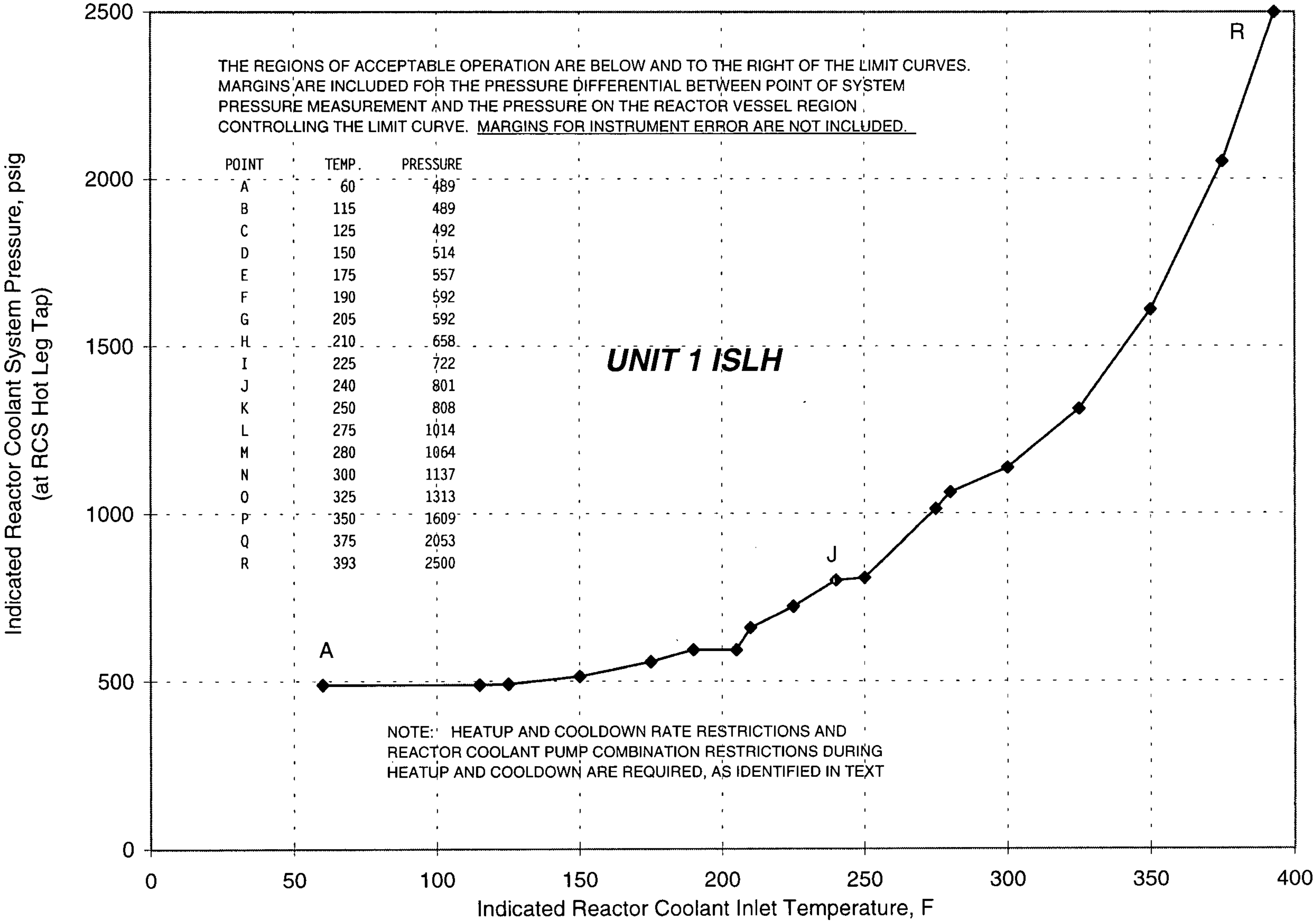


Figure 3.4.3-3 (page 1 of 1)
RCS Leak and Hydrostatic Test Heatup and Cooldown Limitations
Applicable for the First 21 EFPY - Oconee Nuclear Station Unit 1

26



POINT	TEMP.	PRESSURE
A	60	489
B	115	489
C	125	492
D	150	514
E	175	557
F	190	592
G	205	592
H	210	658
I	225	722
J	240	801
K	250	808
L	275	1014
M	280	1064
N	300	1137
O	325	1313
P	350	1609
Q	375	2053
R	393	2500

INSERT FOR FIGURE 3.4.3-3

INSERT REVISED FIGURE

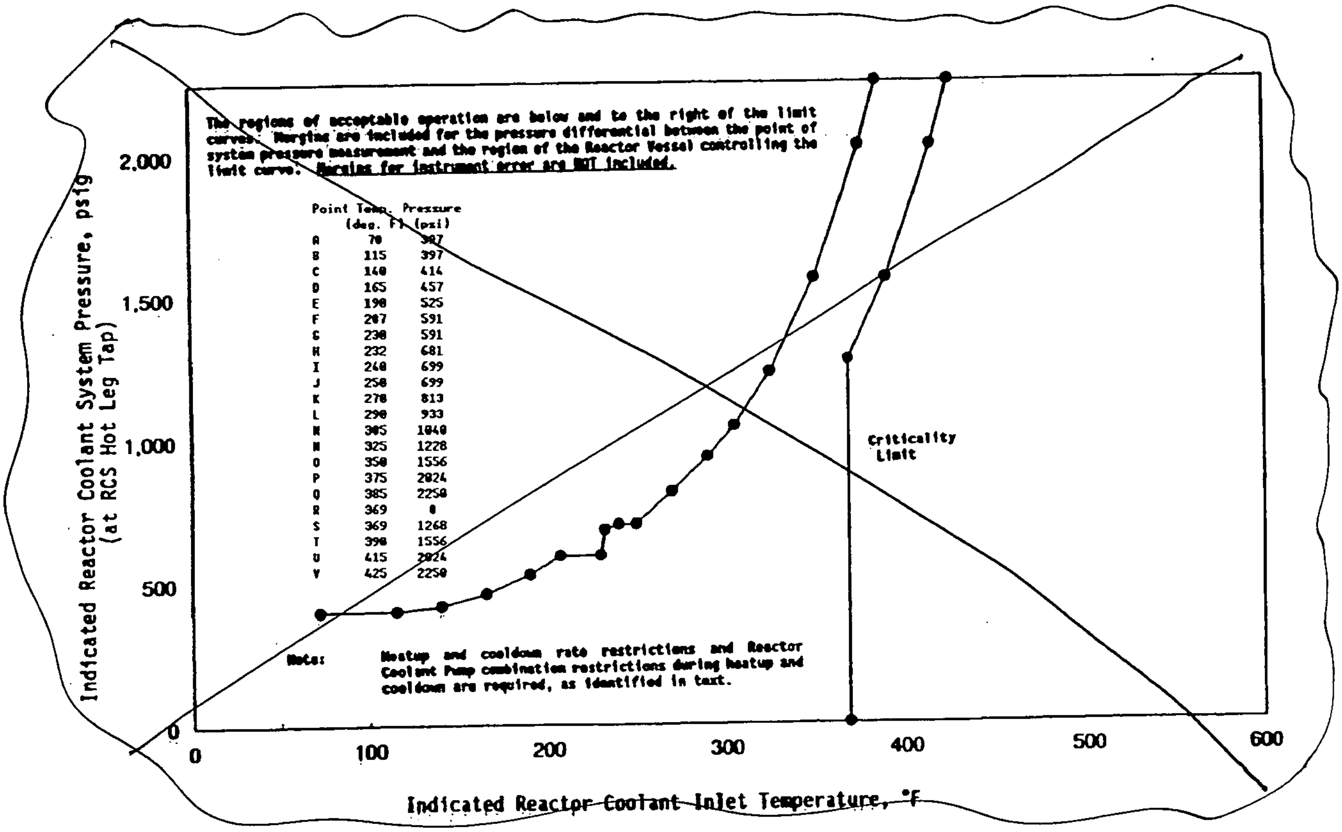
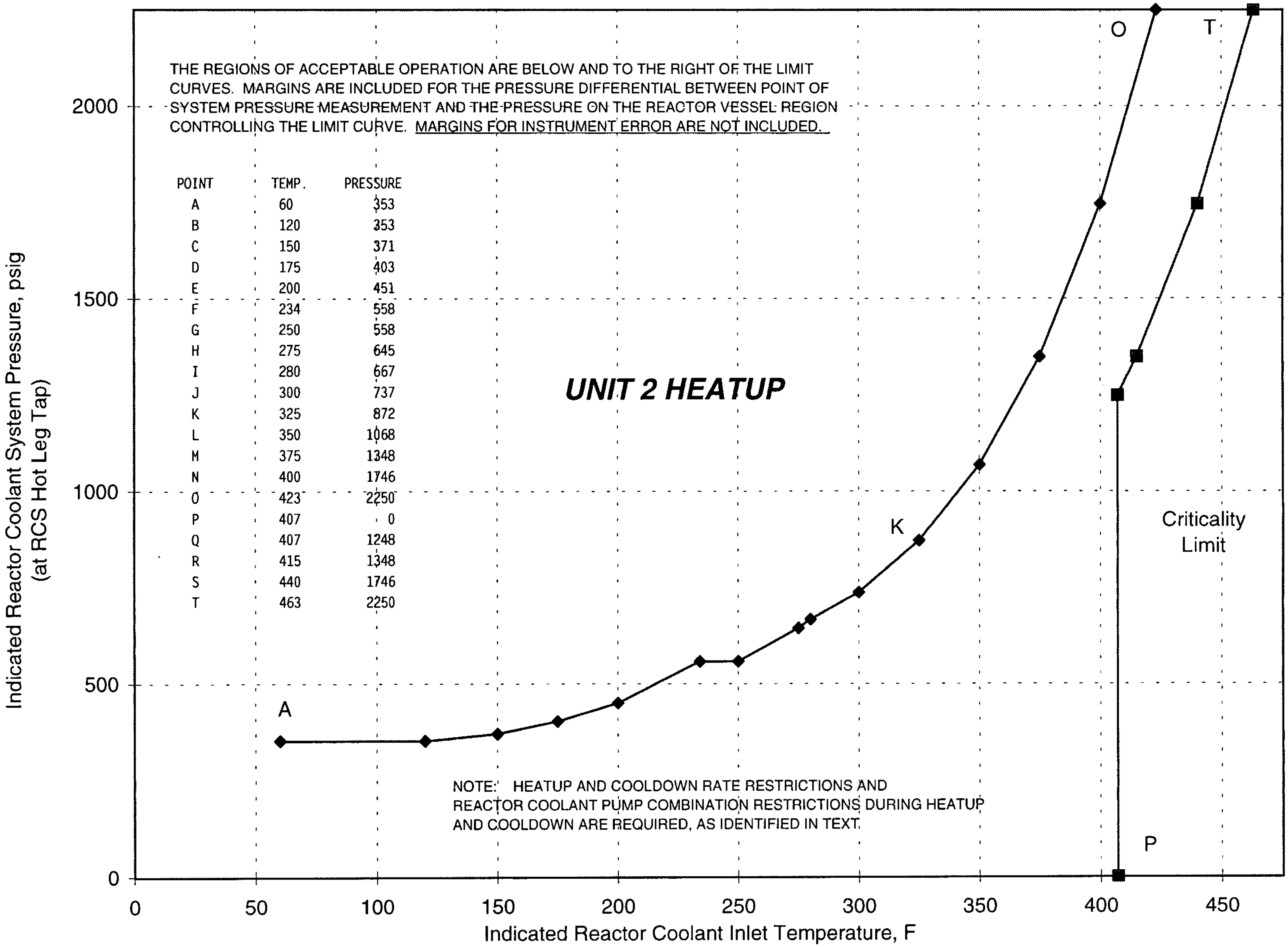


Figure 3.4.3-4 (page 1 of 1)
RCS Normal Operational Heatup Limitations
Applicable for the First 19 (26) EFPY - Oconee Nuclear Station Unit 2



POINT	TEMP.	PRESSURE
A	60	353
B	120	353
C	150	371
D	175	403
E	200	451
F	234	558
G	250	558
H	275	645
I	280	667
J	300	737
K	325	872
L	350	1068
M	375	1348
N	400	1746
O	423	2250
P	407	0
Q	407	1248
R	415	1348
S	440	1746
T	463	2250

INSERT FOR FIGURE 3.4.3-4

INSERT REVISED FIGURE

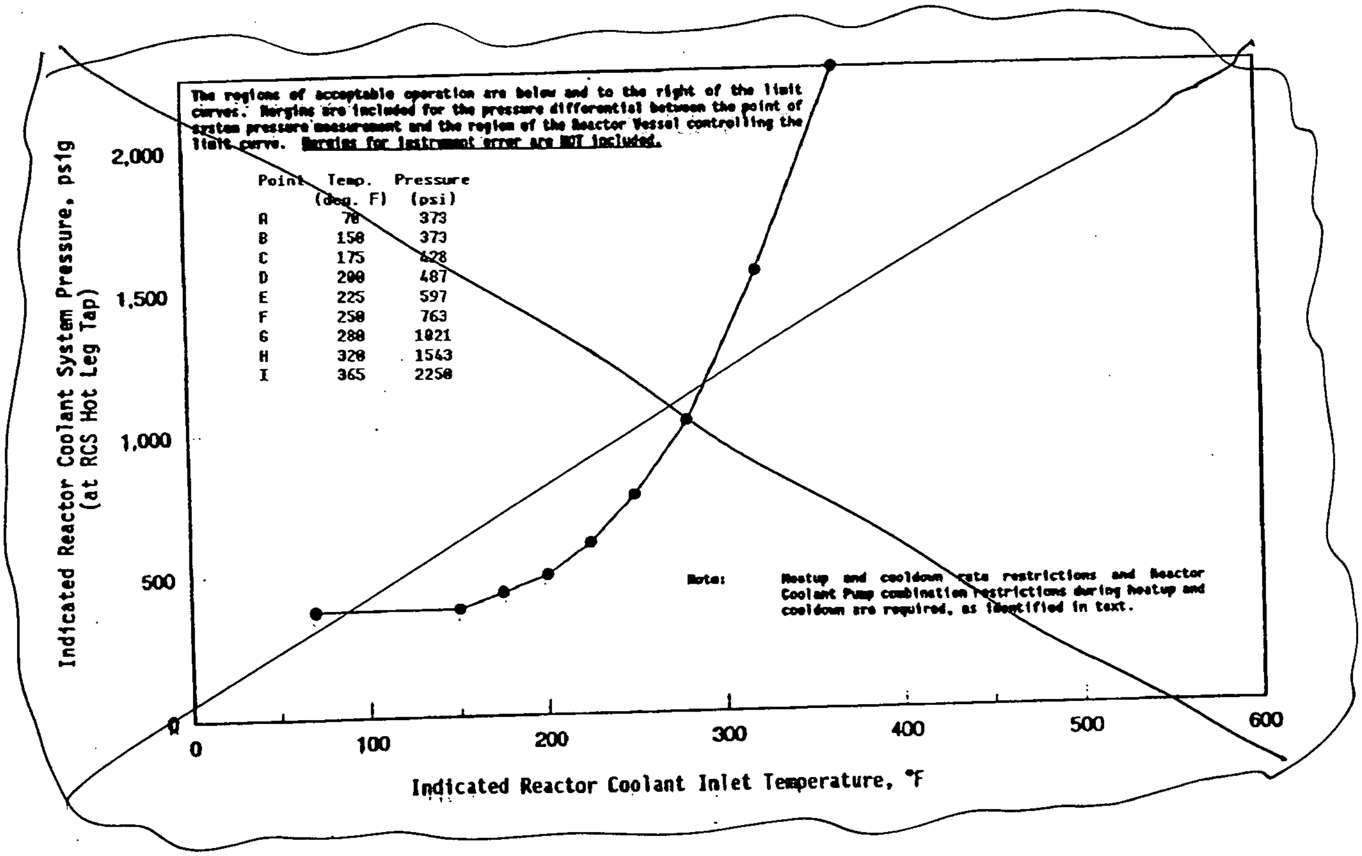
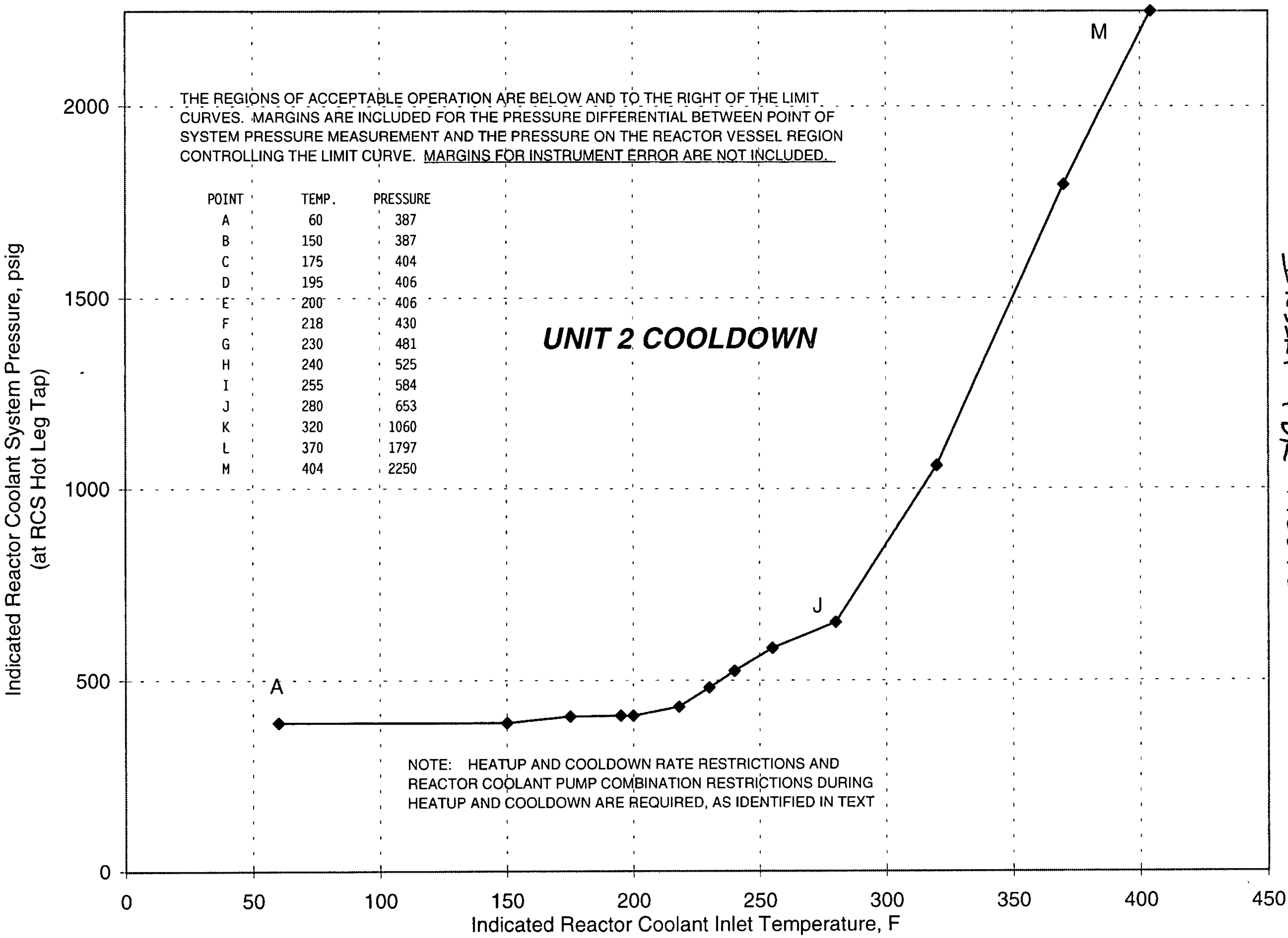


Figure 3.4.3-5 (page 1 of 1)
RCS Normal Operational Cooldown Limitations
Applicable for the First 19 EFPY - Oconee Nuclear Station Unit 2

26



POINT	TEMP.	PRESSURE
A	60	387
B	150	387
C	175	404
D	195	406
E	200	406
F	218	430
G	230	481
H	240	525
I	255	584
J	280	653
K	320	1060
L	370	1797
M	404	2250

INSERT FDR FIGURE 3.4.3-5

INSERT REVISED FIGURE

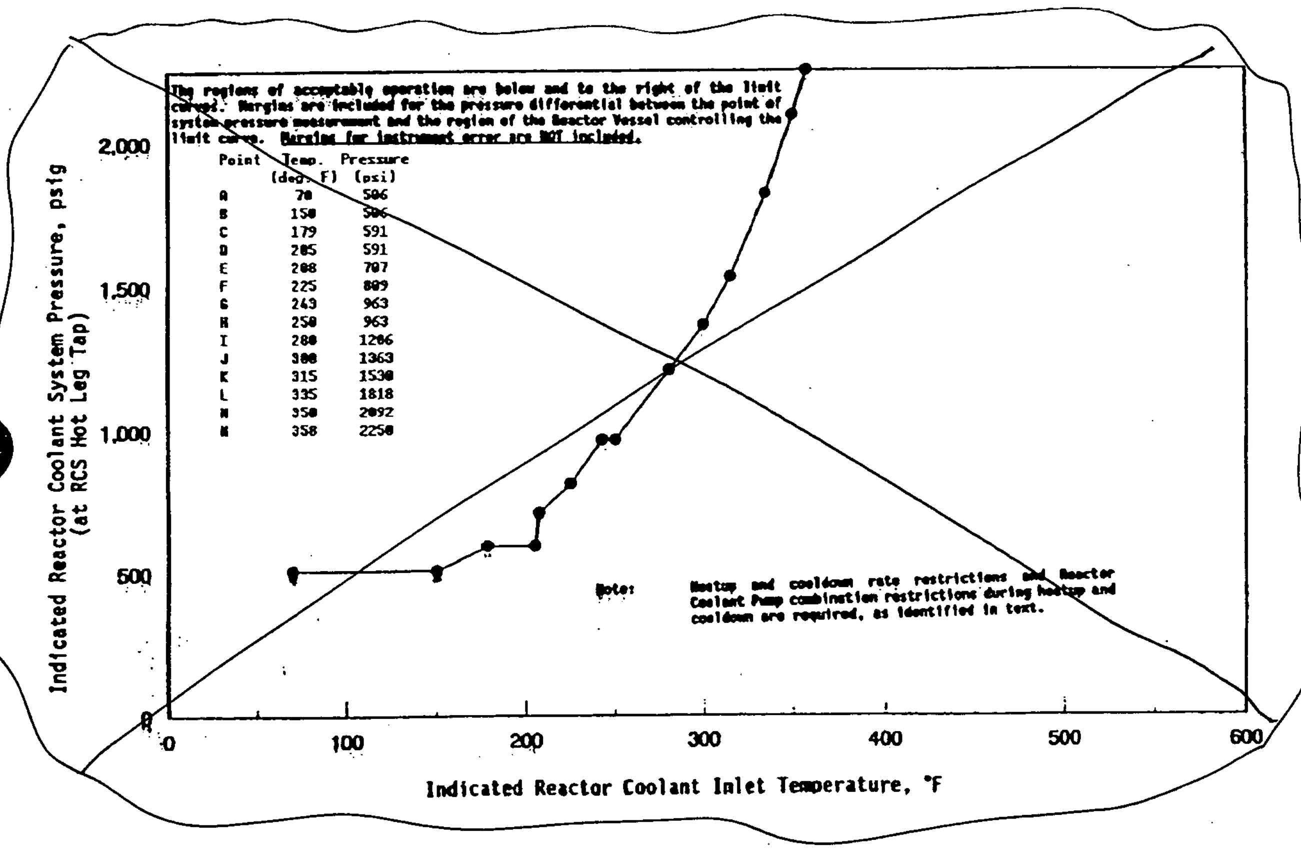
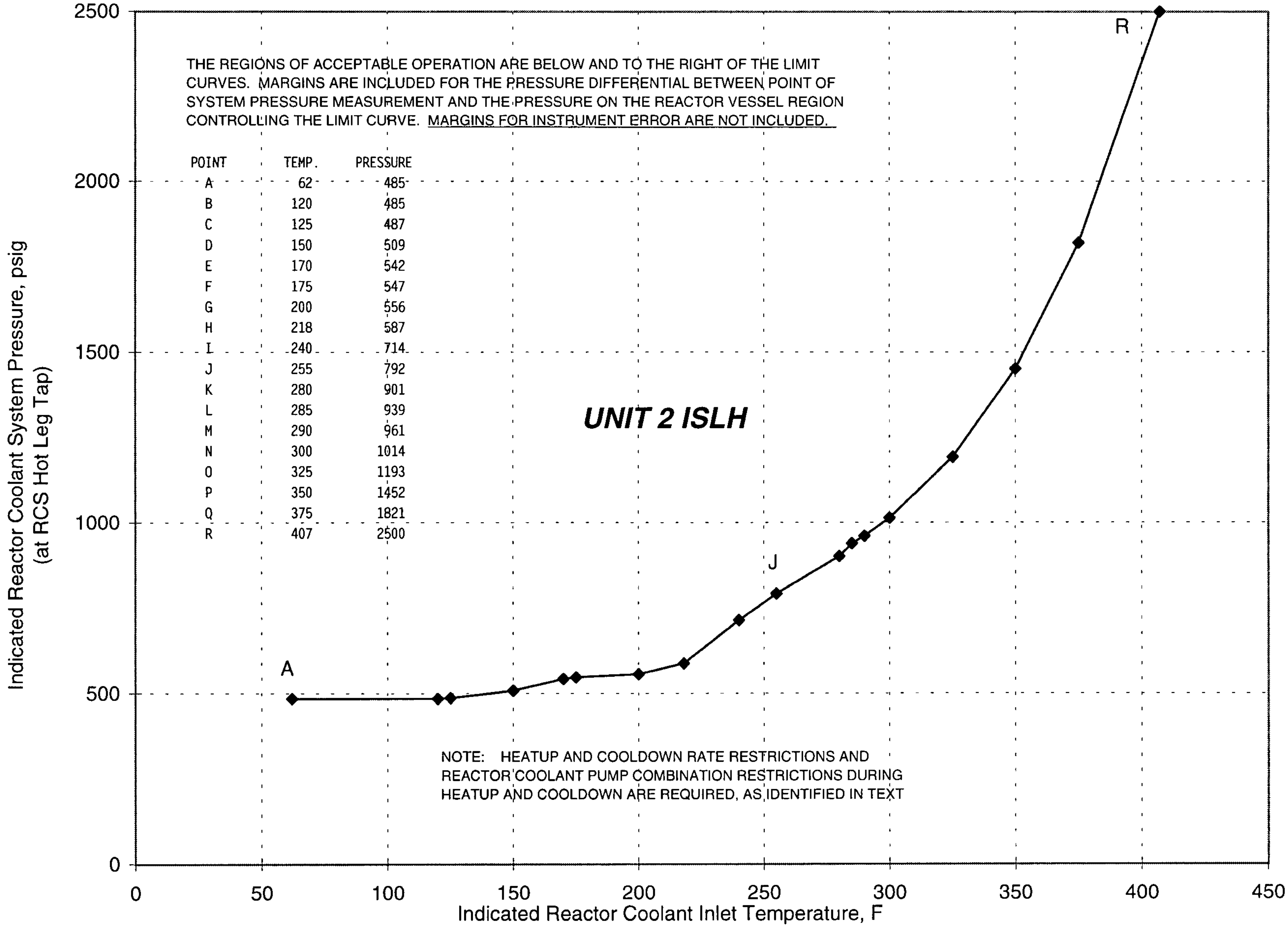


Figure 3.4.3-6 (page 1 of 1)
RCS Leak and Hydrostatic Test Heatup and Cooldown Limitations
Applicable for the First ~~19~~ 26 EFPY - Oconee Nuclear Station Unit 2



INSERT FOR FIGURE 3.4.3-6

INSERT REVISED FIGURE

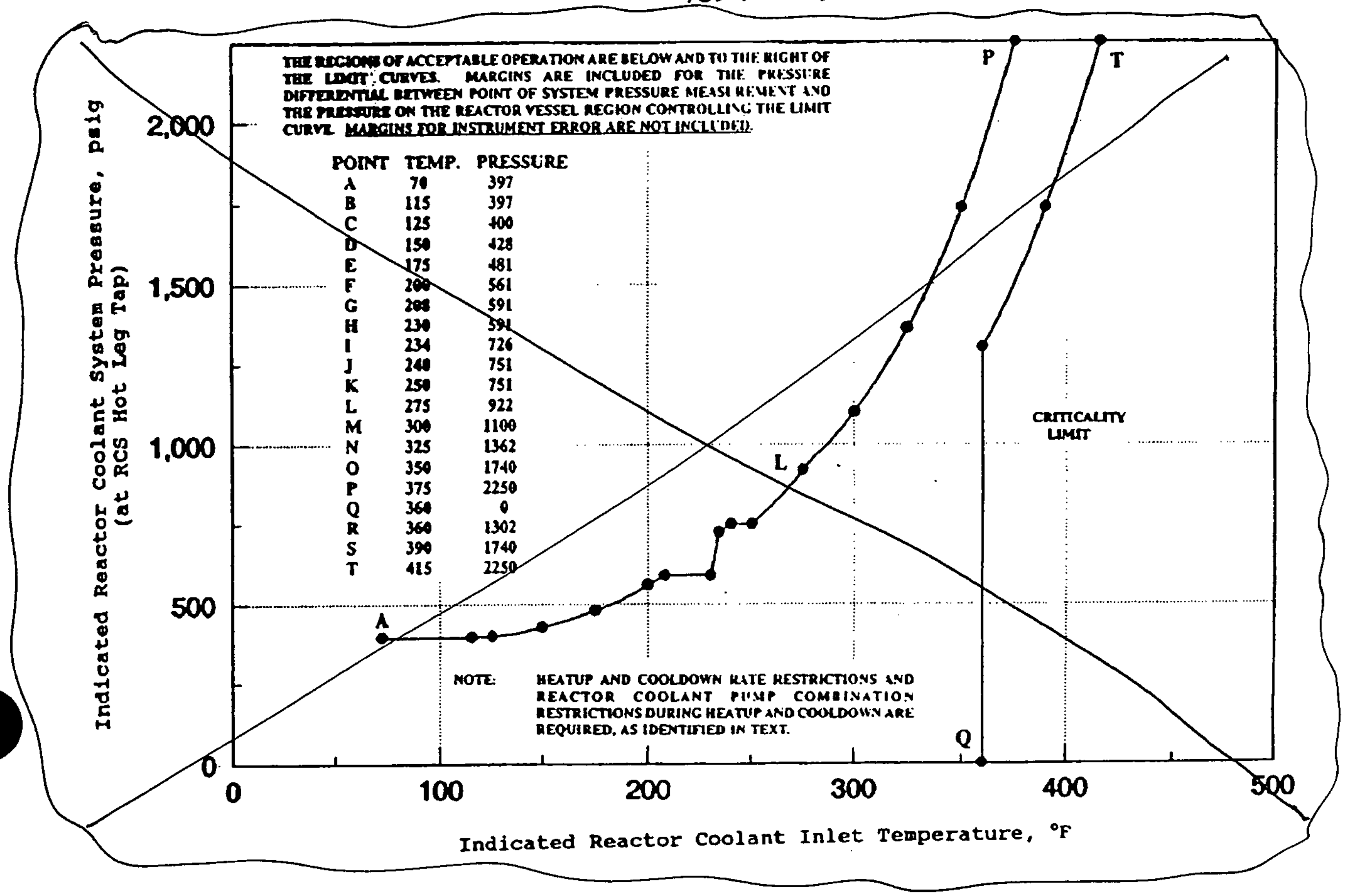
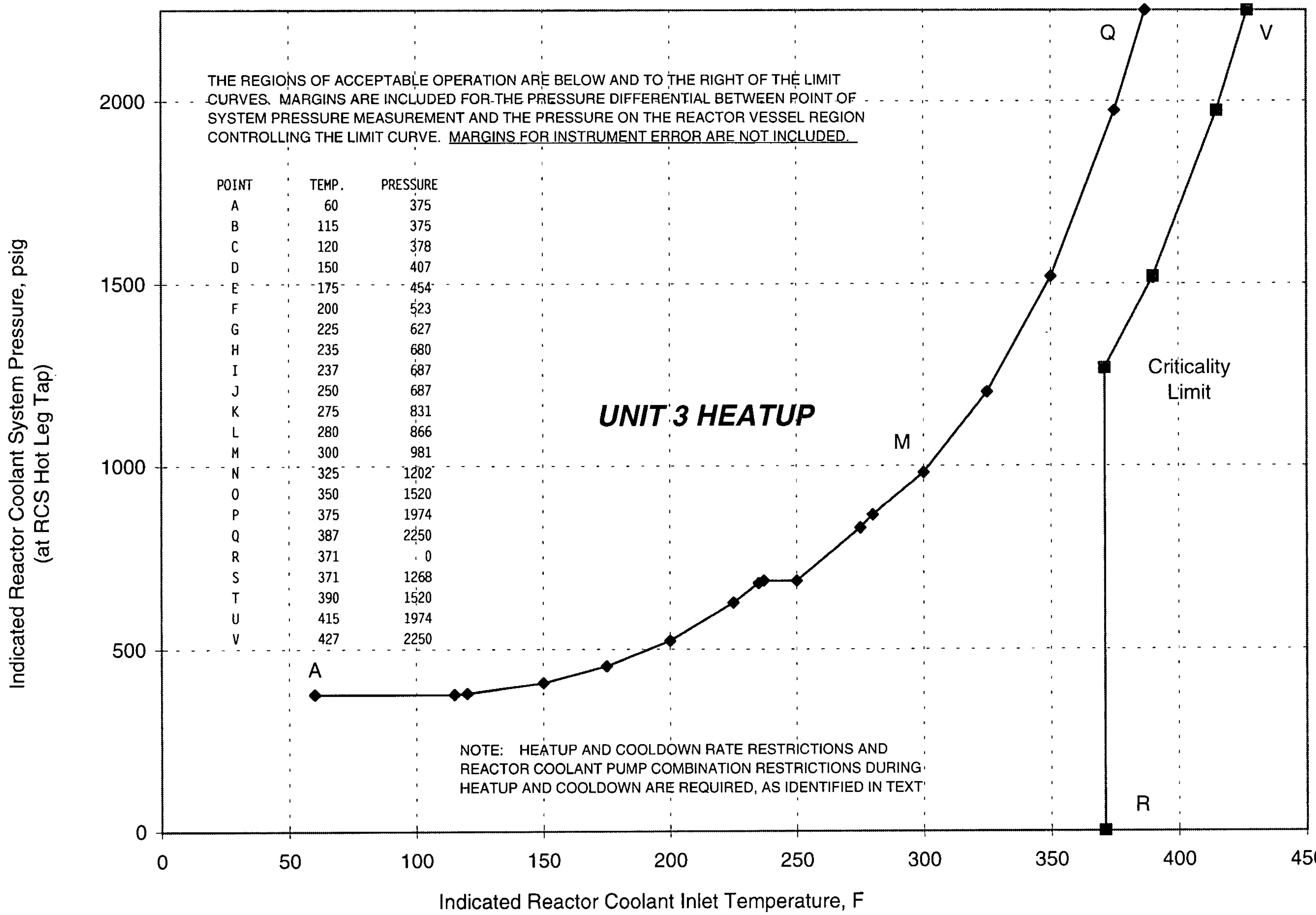


Figure 3.4.3-7 (page 1 of 1)
RCS Normal Operational Heatup Limitations
Applicable for the First ~~21~~ (26) EFPY - Oconee Nuclear Station Unit 3



POINT	TEMP.	PRESSURE
A	60	375
B	115	375
C	120	378
D	150	407
E	175	454
F	200	523
G	225	627
H	235	680
I	237	687
J	250	687
K	275	831
L	280	866
M	300	981
N	325	1202
O	350	1520
P	375	1974
Q	387	2250
R	371	0
S	371	1268
T	390	1520
U	415	1974
V	427	2250

INSERT FOR FIGURE 3.4.3-7

INSERT REVISED FIGURE

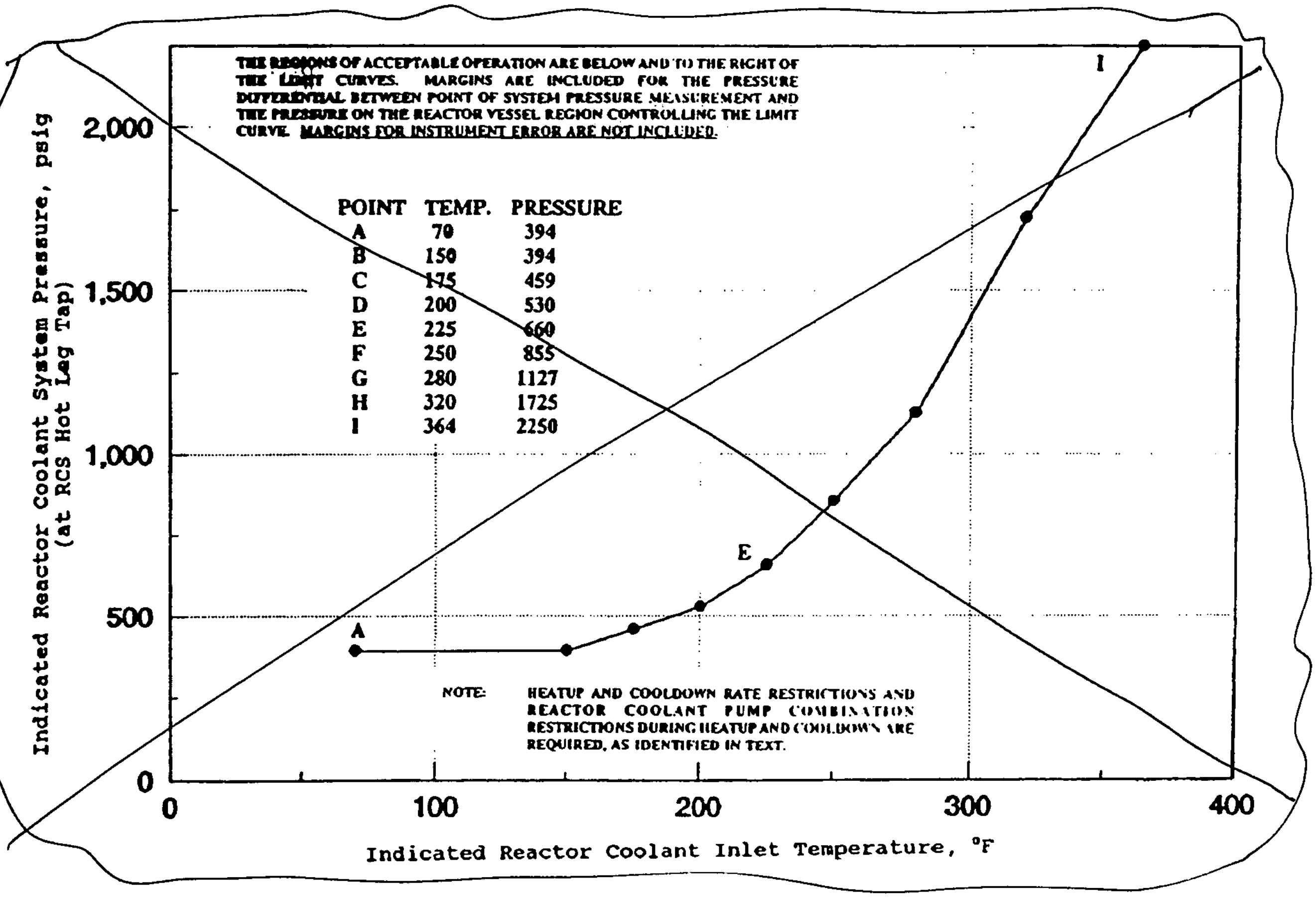
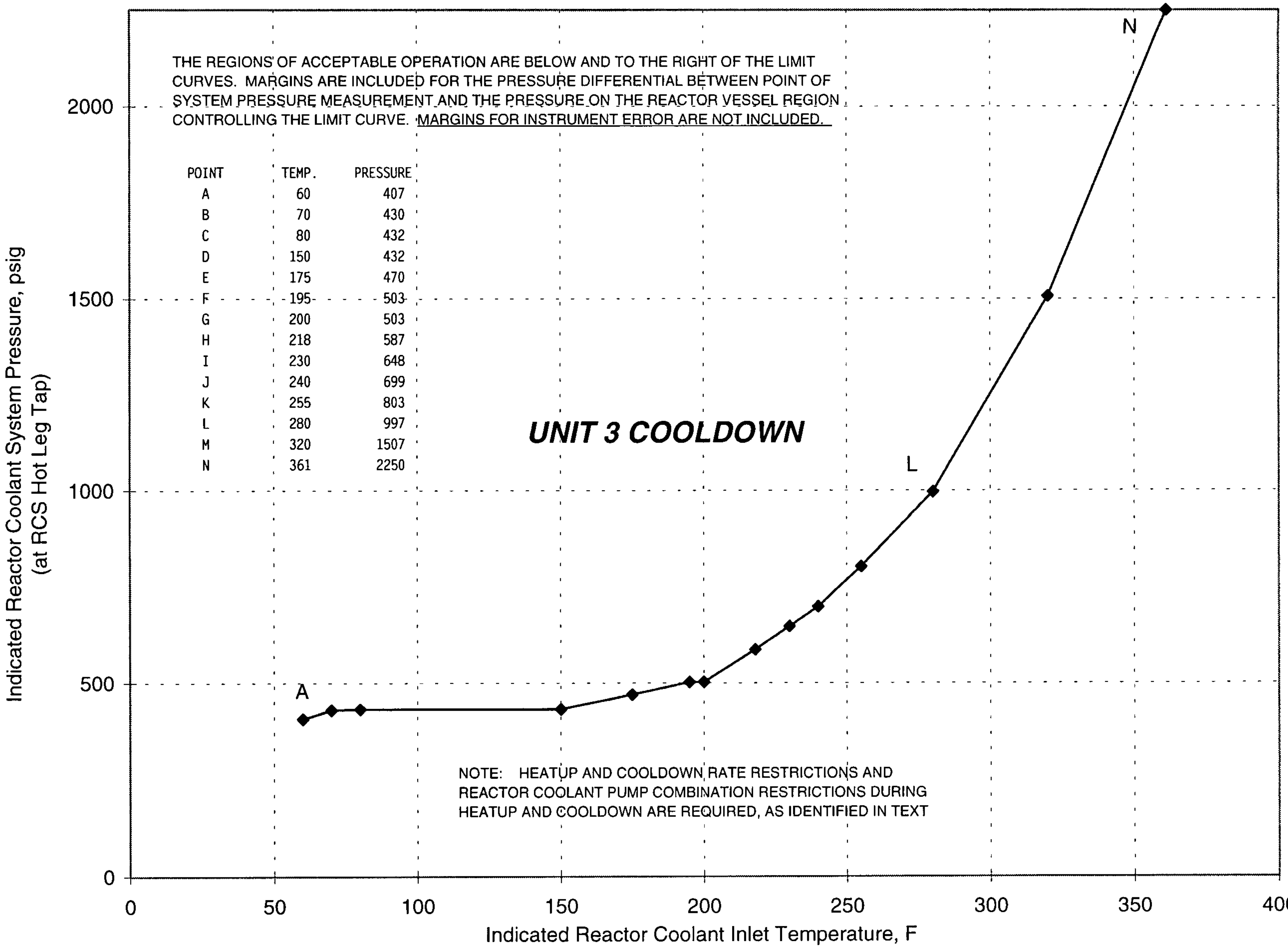


Figure 3.4.3-8 (page 1 of 1)
RCS Normal Operational Cooldown Limitations
Applicable for the First ~~21~~ 26 EFPY - Oconee Nuclear Station Unit 3



INSERT FOR FIGURE 3.4.3-8

INSERT REVISED FIGURE

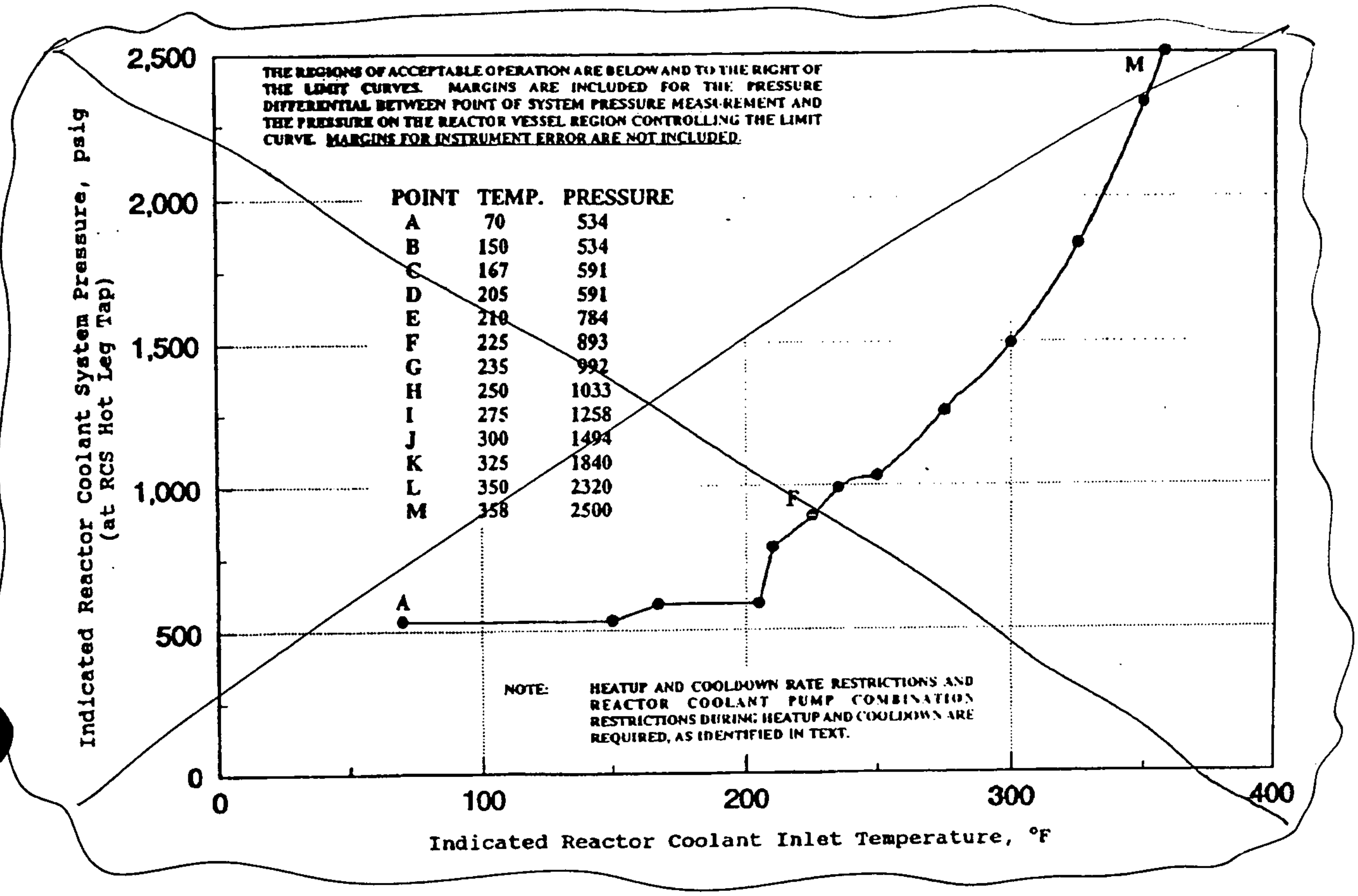
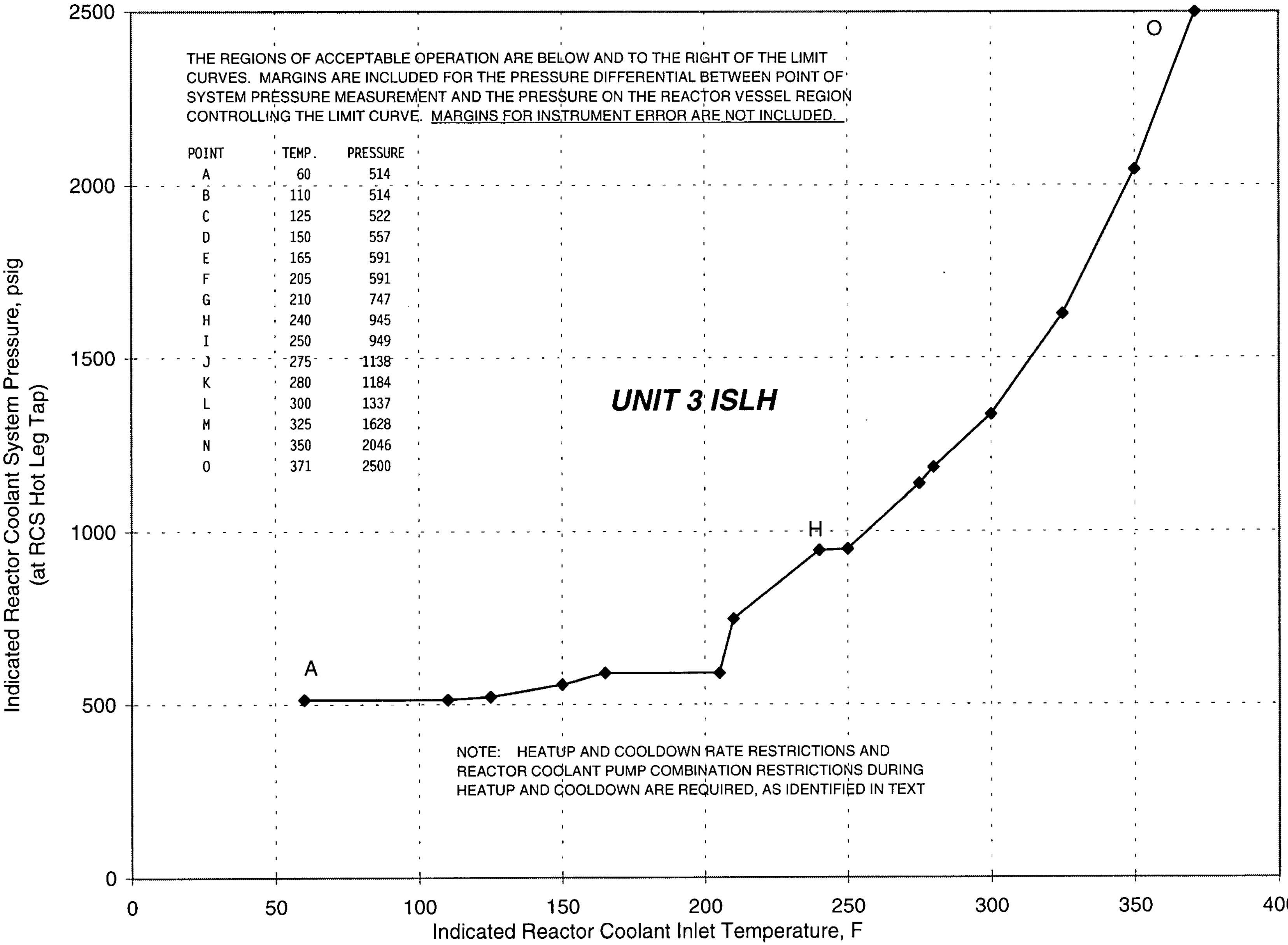


Figure 3.4.3-9 (page 1 of 1)
RCS Leak and Hydrostatic Test Heatup and Cooldown Limitations
Applicable for the First 21 EFPY - Oconee Nuclear Station Unit 3

26



THE REGIONS OF ACCEPTABLE OPERATION ARE BELOW AND TO THE RIGHT OF THE LIMIT CURVES. MARGINS ARE INCLUDED FOR THE PRESSURE DIFFERENTIAL BETWEEN POINT OF SYSTEM PRESSURE MEASUREMENT AND THE PRESSURE ON THE REACTOR VESSEL REGION CONTROLLING THE LIMIT CURVE. <u>MARGINS FOR INSTRUMENT ERROR ARE NOT INCLUDED.</u>

POINT	TEMP.	PRESSURE
A	60	514
B	110	514
C	125	522
D	150	557
E	165	591
F	205	591
G	210	747
H	240	945
I	250	949
J	275	1138
K	280	1184
L	300	1337
M	325	1628
N	350	2046
O	371	2500

NOTE: HEATUP AND COOLDOWN RATE RESTRICTIONS AND REACTOR COOLANT PUMP COMBINATION RESTRICTIONS DURING HEATUP AND COOLDOWN ARE REQUIRED, AS IDENTIFIED IN TEXT

INSERT FOR FIGURE 3.4.3-9

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.12 Low Temperature Overpressure Protection (LTOP) System

LCO 3.4.12 An LTOP System shall be OPERABLE with high pressure injection (HPI) deactivated, and the core flood tanks (CFTs) isolated and:

a. An OPERABLE power operated relief valve (PORV) with a lift setpoint of ≤ ~~480~~ 460 psig; and

b. Administrative controls implemented that assure ≥ 10 minutes are available for operator action to mitigate an LTOP event.

APPLICABILITY: MODE 3 when any RCS cold leg temperature is ≤ 325°F,
MODES 4, 5, and 6 when an RCS vent path capable of mitigating the most limiting LTOP event is not open.

---------------------------NOTES---------------------------

1. CFT isolation is only required when CFT pressure is greater than or equal to the maximum RCS pressure for the existing RCS temperature allowed by the pressure and temperature limit curves provided in Specification 3.4.3.

2. The PORV is not required to be OPERABLE when no HPI pumps are running and RCS pressure < 100 psig.

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.4.12.6	Verify Administrative Controls, other than limits for pressurizer level, that assure ≥ 10 minutes are available for operator action to mitigate an LTOP event are implemented for the following: a. RCS pressure when RCS temperature is ≤ 220°F; 325 b. Makeup flow rate; c. Alarms; and d. High pressure Nitrogen System. e. VERIFY PRESSURIZER HEATER BANK 3 OR 4 IS DEACTIVATED.	12 hours
SR 3.4.12.7	Perform CHANNEL CALIBRATION for PORV.	18 months

B 3.4 REACTOR COOLANT SYSTEM (RCS)

B 3.4.12 Low Temperature Overpressure Protection (LTOP) System

BASES

BACKGROUND

The LTOP System limits RCS pressure at low temperatures so the integrity of the reactor coolant pressure boundary (RCPB) is not compromised by violating the pressure and temperature (P/T) requirements of 10 CFR 50, Appendix G (Ref. 1). The reactor vessel is the limiting RCPB component for providing such protection. LCO 3.4.3, "RCS Pressure and Temperature (P/T) Limits," provides the allowable combinations for operational pressure and temperature during cooldown, shutdown, and heatup to keep from violating the Reference 1 limits.

The reactor vessel material is less ductile at reduced temperatures than at normal operating temperature. Also, as vessel neutron irradiation accumulates, the material becomes less resistant to pressure stress at low temperatures (Ref. 2). RCS pressure must be maintained low when temperature is low and may be increased only as temperature is increased.

Operational maneuvering during cooldown, heatup, or related anticipated transients must be controlled to not violate LCO 3.4.3. Exceeding these limits could lead to brittle fracture of the reactor vessel. LCO 3.4.3 presents requirements for administrative control of RCS pressure and temperature to prevent exceeding the P/T limits.

This LCO provides RCS overpressure protection in the applicable MODES by ensuring an adequate pressure relief capacity and a limit on coolant addition capability. The pressure relief capacity requires the power operated relief valve (PORV) lift setpoint to be reduced and administrative controls implemented which assure ≥ 10 minutes available for operator action to mitigate an LTOP event. The administrative controls include limits on pressurizer level, limits on RCS pressure when RCS temperature is < 220°F 325, limits on RCS makeup flow, THE NUMBER OF AVAILABLE PRESSURIZER HEATER BANKS, requirements for alarms and restrictions upon use of the High Pressure Nitrogen System.

(continued)

THE NUMBER OF AVAILABLE PRESSURIZER HEATER BANKS,

BACKGROUND (continued)

The LTOP approach to protecting the vessel by limiting coolant addition capability requires administrative controls upon RCS makeup flow, and requires deactivating HPI, and isolating the core flood tanks (CFTs).

Should an HPI pump inject on an HPI actuation, the pressurizer level and PORV may not prevent overpressurizing the RCS.

The administrative controls upon pressurizer level provides a compressible vapor space or cushion (either steam or nitrogen) that can accommodate a coolant insurge and prevent a rapid pressure increase, allowing the operator time to stop the increase. The PORV, with reduced lift setting, is the overpressure protection device that acts as backup to the operator in terminating an increasing pressure event.

With HPI deactivated, the ability to provide RCS coolant addition is restricted. To balance the possible need for coolant addition, the LCO does not require the makeup system to be deactivated. Due to the lower pressures associated with the LTOP MODES and the expected decay heat levels, the makeup system can provide flow with the HPI pumps providing RCS makeup through the makeup control valve.

<u>PORV Requirements</u>

As required for the LTOP, the PORV is signaled to open if the RCS pressure approaches a limit set in the LTOP actuation circuit. The LTOP actuation circuit monitors RCS pressure and determines when an overpressure condition is approached. When the monitored pressure meets or exceeds the setting, the PORV is signaled to open. Maintaining the setpoint within the limits of the LCO ensures the Reference 1 limits will be met in any event analyzed for LTOP.

When a PORV is opened in an increasing pressure transient, the release of coolant causes the pressure increase to slow and reverse. As the PORV releases steam, the RCS pressure decreases until a reset pressure is reached and the valve is signaled to close. The pressure continues to decrease below the reset pressure as the valve closes.

(continued)

BASES

BACKGROUND (continued)

Administrative Control Requirements

Administrative controls are necessary to assure the operator has at least ten minutes available to mitigate the most limiting LTOP event. These administrative controls include the following: LIMITS ON RCS PRESSURE BASED ON RCS TEMPERATURE;

1) ~~Maintaining RCS pressure ≤ 345 psig when RCS temperature < 220°F;~~

2) Limits upon pressurizer level;

3) Limits upon makeup flow capability;

4) OPERABLE Alarms; ~~and~~

5) Controls upon use of the High Pressure Nitrogen System~~.~~ AND;

6) RESTRICTING THE NUMBER OF AVAILABLE PRESSURIZER HEATER BANKS

Limiting RCS pressure ~~when RCS temperature is < 220°F~~ BASED ON RCS TEMPERATURE provides a minimum margin to the RCS P/T limit. Restricting RCS makeup flow capability and pressurizer level and controls on the use of high pressure nitrogen limit the pressurization rate during an LTOP event. RESTRICTING THE NUMBER OF AVAILABLE PRESSURIZER HEATER BANKS LIMITS THE PRESSURIZATION RATE DURING AN LTOP EVENT. Alarms ensure early operator recognition of the occurrence of an LTOP event. The combination of minimum margin to the limit, limited pressurization rate and OPERABLE alarms ensure ten minutes are available for operator action to mitigate an LTOP event.

APPLICABLE SAFETY ANALYSES

Safety analyses (Ref. 3) demonstrate that the reactor vessel can be adequately protected against overpressurization transients during shutdown. In MODES 1, 2, and in MODE 3 with RCS temperature exceeding 325°F, the pressurizer safety valves will prevent RCS pressure from exceeding the Reference 1 limits. At nominally 325°F and below, overpressure prevention falls to an OPERABLE PORV, a restricted coolant level in the pressurizer and other administrative controls.

The actual temperature at which the pressure in the P/T limit curve falls below the pressurizer safety valve setpoint increases as vessel material toughness decreases

(continued)

BASES

APPLICABLE SAFETY ANALYSES (continued)

due to neutron embrittlement. Each time the P/T limit curves are revised, the LTOP System will be re-evaluated to ensure that its functional requirements can still be met with the PORV and pressurizer level/administrative controls method.

Transients that are capable of overpressurizing the RCS have been identified and evaluated. These transients relate to either mass input or heat input: actuating the HPI System, discharging the CFTs, energizing the pressurizer heaters, failing the makeup control valve open, losing decay heat removal, starting a reactor coolant pump (RCP) with a large temperature mismatch between the primary and secondary coolant systems, and adding nitrogen to the pressurizer.

HPI actuation and CFT discharge are the transients that may result in exceeding P/T limits within < 10 minutes in which time no operator action is assumed to take place. Starting an RCP and adding nitrogen to the pressurizer are self limiting events. In the rest, operator action after that time precludes overpressurization. The analyses demonstrate that the time allowed for operator action is adequate, or the events are self limiting and do not exceed P/T limits.

The following are required during the LTOP MODES to ensure that transients do not occur, which either of the LTOP overpressure protection means cannot handle:

a. Limiting RCS makeup flow capability;

b. Deactivating HPI; ~~and~~

(2) c. Immobilizing CFT discharge isolation valves in their closed positions~~.~~; AND

d. LIMITING THE NUMBER OF PRESSURIZE HEATERS

The Reference 3 analyses demonstrate the PORV can maintain RCS pressure below limits when [BOTH] makeup flow capability ~~is~~ [AND THE NUMBER OF PRESSURIZER HEATER BANKS ARE] restricted. Consequently, the administrative controls require makeup flow capability ~~be~~ [AND THE NUMBER OF AVAILABLE PRESSURIZER HEATER BANKS TO BE] limited in the LTOP MODES.

(2) Since the PORV cannot do this for one HPI pump, or discharging the CFTs, the LCO also requires the HPI actuation circuits deactivated and the CFTs isolated.

(continued)

BASES

APPLICABLE SAFETY ANALYSES (continued)

The isolated CFTs must have their discharge valves closed and the valve power breakers fixed in their open positions.

Fracture mechanics analyses established the temperature of LTOP Applicability at 325°F. Above this temperature, the pressurizer safety valves provide the reactor vessel pressure protection. The vessel materials were assumed to have a neutron irradiation accumulation equal to 21 effective full power years (EFPYs) of operation for Units 1 ~~and 3, and 19 EFPY for Unit 2.~~ , 2 AND 3.

This LCO will deactivate the HPI actuation when the RCS temperature is ≤ 325°F.

Reference 3 contains the acceptance limits that satisfy the LTOP requirements. Any change to the RCS must be evaluated against these analyses to determine the impact of the change on the LTOP acceptance limits.

PORV Performance

The fracture mechanics analyses show that the vessel is protected when the PORV is set to open at ≤ 480 psig. The setpoint is derived by modeling the performance of the LTOP system for different LTOP events. The PORV setpoint at or below the derived limit ensures the Reference 1 limits will be met.

The PORV setpoint is re-evaluated for compliance when the revised P/T limits conflict with the LTOP analysis limits. The P/T limits are periodically modified as the reactor vessel material toughness decreases due to embrittlement induced by neutron irradiation. Revised P/T limits are determined using neutron fluence projections and the results of examinations of the reactor vessel material irradiation surveillance specimens. The Bases for LCO 3.4.3 discuss these examinations.

The PORV is considered an active component. Therefore, its failure represents the worst case LTOP single active failure.

(continued)

, THE NUMBER OF AVAILABLE PRESSURIZER HEATER BANKS,

BASES

APPLICABLE SAFETY ANALYSES (continued)

Administrative Controls Performance

325

Limiting RCS pressure when RCS temperature is < 220°F provides a minimum margin to the RCS P/T limit. Restricting RCS makeup flow capability and pressurizer level and controls on the use of high pressure nitrogen limit the pressurization rate during an LTOP event. Alarms ensure early operator recognition of the occurrence of an LTOP event. The combination of minimum margin to the limit, limited pressurization rate and OPERABLE alarms ensure ten minutes are available for operator action to mitigate an LTOP event.

The LTOP System satisfies Criterion 2 and Criterion 3 of 10 CFR 50.36 (Ref.6).

LCO

The LCO requires an LTOP System OPERABLE with a limited coolant input capability and a pressure relief capability. The LCO requires HPI to be deactivated and the CFTs to be isolated. For pressure relief, it requires the pressurizer coolant at or below a maximum level and the PORV OPERABLE with a lift setting at the LTOP limit, with other specified administrative controls.

The pressurizer is OPERABLE with a coolant level limited such that ≥ 10 minutes are available for operator action to mitigate the consequences of an LTOP event.

460

The PORV is OPERABLE when its block valve is open, its lift setpoint is set at ≤ 480 psig and testing has proven its ability to open at that setpoint, and power is available to the two valves and their control circuits.

APPLICABILITY

This LCO is applicable in MODE 3 when any RCS cold leg temperature is ≤ 325°F, and in MODES 4, 5 and 6 when an RCS vent capable of mitigating the most limiting LTOP event is not open. The Applicability temperature of 325°F is established by fracture mechanics analyses. The pressurizer safety valves provide overpressure protection to meet LCO 3.4.3 P/T limits above 325°F. With the vessel head off, overpressurization is not possible. With an RCS vent capable of mitigating the most limiting LTOP event open, an

(continued)

BASES

APPLICABILITY (continued)

LTOP event (including HPI actuation or CFT discharge) is incapable of pressuring the RCS above the RCS P/T limits.

LCO 3.4.3 provides the operational P/T limits for all MODES. LCO 3.4.10, "Pressurizer Safety Valves," requires the pressurizer safety valves OPERABLE to provide overpressure protection during MODES 1, 2, and 3 above 325°F.

(2) The Applicability is modified by two Notes. Note 1 states that CFT isolation is only required when the CFT pressure is more than or equal to the maximum RCS pressure for the existing RCS temperature, as allowed in LCO 3.4.3. This Note permits the CFT discharge valve surveillance performed only under these pressure and temperature conditions.

Note 2 permits the PORV to be inoperable when no HPI pumps are running and RCS pressure is < 100 psig. PORV operability is not required when RCS pressure is < 100 psig and HPI pumps are not operating since credible LTOP events progress relatively slowly, thus giving the operator ample time to respond.

ACTIONS

A.1

With the HPI activated, immediate actions are required to deactivate HPI. Emphasis is on immediate deactivation because inadvertent injection with one or more HPI pump OPERABLE is the event of greatest significance, since these events cause the greatest pressure increase in the shortest time.

The immediate Completion Times reflect the urgency of quickly proceeding with the Required Actions.

B.1, C.1, and C.2

(2) An unisolated CFT requires isolation within 1 hour only when the CFT pressure is at or more than the maximum RCS pressure for the existing temperature allowed in LCO 3.4.3.

(2) If isolation is needed and cannot be accomplished in 1 hour, Required Action C.1 and Required Action C.2 provide

FOR INFORMATION ONLY

(continued)

BASES

ACTIONS

B.1, C.1, and C.2 (continued)

two options, either of which must be performed in 12 hours. By placing the unit in MODE 4 with the RCS temperature > 233°F, the CFT pressure of 650 psig cannot exceed the LTOP limits if both tanks are fully injected. Depressurizing the CFTs below the LTOP limit of 373 psig also prevents exceeding the LTOP limits in the same event.

The Completion Times are based on operating experience that these activities can be accomplished in these time periods and on engineering judgement indicating that a limiting LTOP event is not likely in the allowed times.

D.1, E.1, and E.2

With the PORV inoperable, overpressure relieving capability is lost, and restoration of the PORV within 1 hour is required.

If restoration cannot be completed within 1 hour, either Required Action E.1 or Required Action E.2 must be performed. Required Action E.1 requires increasing RCS temperature within 23 hours to exit the Applicability of the specification. With RCS temperature > 325°F, the CFTs are not required to be isolated. Required Action E.2 requires the RCS be depressurized to less than 100 psig within 35 hours. With reactor pressure < 100 psig more time is available for operator action to mitigate an LTOP event.

2

These Completion Times also consider these activities can be accomplished in these time periods. A limiting LTOP event is not likely in these times.

F.1 and G.1

With Administrative Controls that assure ≥ 10 minutes are available to mitigate the consequences of an event not implemented, the capability for operator action to mitigate an LTOP event may be lost. In this circumstance, compensatory measures must be established to monitor for initiation of an LTOP event. Establishing a dedicated operator within 4 hours to monitor for initiation of an LTOP

FOR INFORMATION ONLY

(continued)

HAVING TOO MANY PRESSURIZER HEATER BANKS AVAILABLE,

BASES

ACTIONS

F.1 and G.1 (continued)

event is sufficient to compensate for inoperability of makeup flow restrictions, inoperability of required alarms, or deviation from pressure, temperature or level limits. Establishing a dedicated operator is not sufficient to compensate for not deactivating HPI or isolating CFTs. If the Required Action and associated Completion Time of Condition F is not met, the RCS must be depressurized and an RCS vent path capable of mitigating the most limiting LTOP event must be established within 12 hours. These Completion Times also consider that these activities can be accomplished in these time periods. A limiting LTOP event is not likely in these periods.

(2)

H.1

With administrative controls which assure ≥ 10 minutes are available to mitigate the consequences of an LTOP event not implemented and the PORV inoperable; or the LTOP System inoperable for any reason other than cited in Condition A through G, Required Action H.1 requires the RCS depressurized and vented within 12 hours.

One or more vents may be used. A vent path capable of mitigating the most limiting LTOP event is specified. Because makeup may be required, the vent size accommodates inadvertent full makeup system operation. Such a vent keeps the pressure from full flow of the makeup pump(s) with a wide open makeup control valve within the LCO limit.

The Completion Time is based on operating experience that these activity can be accomplished in this time period and on engineering judgement indicating that a limiting LTOP transient is not likely in this time.

SURVEILLANCE REQUIREMENTS

SR 3.4.12.1 and SR 3.4.12.2

(2)

Verifications must be performed that HPI is deactivated, and the CFTs are isolated. These Surveillances ensure the minimum coolant input capability will not create an RCS overpressure condition to challenge the LTOP System. The Surveillances are required at 12 hour intervals.

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.4.12.1 and SR 3.4.12.2 (continued)

The 12 hour intervals are shown by operating practice to be sufficient to regularly assess conditions for potential degradation and verify operation within the safety analysis.

SR 3.4.12.3

Verification that the pressurizer level is less than the volume necessary to assure ≥ 10 minutes are available for operator action to mitigate an LTOP event by observing control room or other indications ensures a cushion of sufficient size is available to reduce the rate of pressure increase from potential transients.

The 30 minute Surveillance Frequency during heatup and cooldown must be performed for the LCO Applicability period when temperature changes can cause pressurizer level variations. This Frequency may be discontinued when the ends of these conditions are satisfied, as defined in plant procedures. Thereafter, the Surveillance is required at 12 hour intervals.

These Frequencies are shown by operating practice sufficient to regularly assess indications of potential degradation and verify operation within the safety analysis.

SR 3.4.12.4

Verification that the PORV block valve is open ensures a flow path to the PORV. This is required at 12 hour intervals.

The interval has been shown by operating practice to be sufficient to regularly assess conditions for potential degradation and verify operation is within the safety analysis.

FOR INFORMATION ONLY

(continued)

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.4.12.5

A CHANNEL FUNCTIONAL TEST is required within 12 hours after decreasing RCS temperature to ≤ 325°F and every 31 days thereafter to ensure the setpoint is proper for using the PORV for LTOP. PORV actuation is not needed, as it could depressurize the RCS.

The 12 hour Frequency considers the unlikelihood of a low temperature overpressure event during the time. The 31 day Frequency is based on industry accepted practice and is acceptable by experience with equipment reliability.

SR 3.4.12.6

Verification that administrative controls, other than limits for pressurizer level, that assure ≥ 10 minutes are available for operator action to mitigate the consequences of an LTOP event are implemented is necessary every 7 days. This verification consists of a combination of administrative checks for alarm availability, appropriate restrictions on pressurizer level, controls for High Pressure Nitrogen, etc., as well as visual confirmation using available indications that associated physical parameters are within limits.

The Frequency is shown by operating practice sufficient to regularly assess indications of potential degradation and verify operation within the safety analysis.

VERIFICATION THAT PRESSURIZER HEATER BANK 3 OR 4 IS DEACTIVATED,

SR 3.4.12.7

The performance of a CHANNEL CALIBRATION is required every 18 months. The CHANNEL CALIBRATION for the LTOP setpoint ensures that the PORV will be actuated at the appropriate RCS pressure by verifying the accuracy of the instrument string. The calibration can only be performed in shutdown.

The Frequency considers a typical refueling cycle and industry accepted practice.

(continued)

BASES (continued)

REFERENCES

1. 10 CFR 50, Appendix G.
2. Generic Letter 88-11.
3. UFSAR, 5.2.3.7.
4. 10 CFR 50.46.
5. 10 CFR 50, Appendix K.
6. 10 CFR 50.36.

FOR INFORMATION ONLY

DUKE POWER COMPANY

OCONEE NUCLEAR STATION

ATTACHMENT 2a

CURRENT TECHNICAL SPECIFICATIONS

Remove Page	Insert Page
3.1-3a	3.1-3a
3.1-3b	3.1.3b
3.1-4	3.3-4
3.1-4a	3.1-4a
3.1-4b	3.1-4b
------	3.1-4c
------	3.1-4d
3.1-6	3.1-6
3.1-6a	3.1-6a
3.1-6b	3.1-6b
3.1-7	3.1-7
3.1.7a	3.1.7a
3.1-7b	3.1-7b
3.1-7c	3.1-7c
3.1-7d	3.1-7d
3.1-7e	3.1-7e

3.1.2.8 Not Used

3.1.2.9

1. The following requirement of 2 below shall be met when both of the following conditions apply:

   a) The temperature of one or more of the RCS cold legs is ≤ 325°F, and

   b) An RCS vent path capable of mitigating the most limiting LTOP event is not open.

2. a) Two trains of the low temperature overpressure protection (LTOP) system shall be operable,

   b) HPI train A and B shall be deactivated, and

   c) Both core flood tanks shall be deactivated.

3. One LTOP train is comprised of the PORV with a lift setting of ≤ 460 psig.

   a) The PORV is not required to be operable when no HPI pumps are running and RCS pressure is < 100 psig.

4. The second LTOP train is comprised of the controls which assure that 10 minutes are available for operator action to mitigate an LTOP event. The following controls comprise the second LTOP train:

   a) Limits are placed on RCS pressure based on RCS temperature.

   b) Pressurizer level shall be controlled such that 10 minutes are available for operator action to mitigate an LTOP event.

   c) Makeup flow shall be restricted such that 10 minutes are available for operator action to mitigate an LTOP event.

   d) Alarms shall be provided such that 10 minutes are available for operator action to mitigate an LTOP event.

   e) The high pressure nitrogen system shall be controlled such that 10 minutes are available for operator action to mitigate an LTOP event.

f) Pressurizer heater bank 3 or 4 shall be deactivated such that 10 minutes are available for operator action to mitigate an LTOP event.

5. a. If one or more HPI trains or CFTs are not deactivated, the HPI trains and CFTs shall be deactivated immediately.

b. If the PORV is inoperable, the PORV shall be returned to operable status or the RCS shall be heated above 325°F within 24 hours, or within 36 hours the RCS shall be depressurized to < 100 psig and HPI shall be removed from service.

c. If the second LTOP train is inoperable, the second train shall be restored to operable status or compensatory measures shall be provided to monitor for initiation of an LTOP even within 4 hours, or within 16 hours the RCS shall be depressurized and a vent path capable of mitigating the most limiting LTOP event shall be opened.

<u>Bases - Units 1, 2 and 3</u>

All components in the Reactor Coolant System are designed to withstand the effects of cyclic loads due to system temperature and pressure changes. These cyclic loads are introduced by normal load transients, reactor trips, startup and shutdown operations, and inservice leak and hydrostatic tests. The various categories of load cycles used for design purposes are provided in Table 5.2-1 of the FSAR.

The major components of the reactor coolant pressure boundary have been analyzed in accordance with Appendix G to 10 CFR 50. Results of this analysis are given in References 1, 2 and 3. The actual pressure-temperature limitations of the reactor coolant pressure boundary are given in Refences 4, 5 and 6.

The Figures specified in 3.1.2-1, 3.1.2-2 and 3.1.2-3 present the pressure-temperature limit curves for normal heatup, normal cooldown and hydrostatic tests respectively. The limit curves are applicable up to the indicated effective full power years of operation. These curves will be adjusted to include possible errors in the pressure and temperature sensing instruments. The pressure limit is also adjusted for the pressure differential between the point of system pressure measurement and the limiting component for all operating reactor coolant pump combinations.

The cooldown limit curves are not applicable to conditions of off-normal operation (e.g., small LOCA and extended loss of feedwater) where cooling is achieved for extended periods of time by circulating water from the HPI through the core. If core cooling is restricted to meet the cooldown limits under other than normal operation, core integrity could be jeopardized.

The pressure-temperature limit lines shown on the figures specified in 3.1.2-1 for reactor criticality and on the figures referred to in 3.1.2-3 for hydrostatic testing have been provided to assure compliance with the minimum temperature requirements of Appendix G to 10 CFR 50 for reactor criticality and for inservice hydrostatic testing.

The limitations on steam generator pressure and temperature provides protection against nonductile failure of the secondary side of the steam generator. At metal temperatures lower than the RT_{NDT} of +60°F, the protection against nonductile failure is achieved by limiting the secondary coolant pressure to 20 percent of the preoperational system hydrostatic test pressure.

The limitations of 110°F and 237 psig are based on the highest estimated RT_{NDT} of +40°F and the preoperational system hydrostatic test pressure of 1312 psig. The average metal temperature is assumed to be equal to or greater than the coolant temperature. The limitations include margins of 25 psi and 10°F for possible instrument error.

The requirements to perform leakage tests of systems outside of containment which could potentially contain radioactivity were established by the NRC following TMI. Oconee performs the leak test of LPI by establishing RCS pressure at about 300 psig and with LPI at this same pressure, checking for leakage. Such a test is within the scope of testing upon which the curves referenced in Specification 3.1.2.2 are based--that is, they are not routine evolutions, such as heatup and cooldown, but rather infrequent leak tests conducted on a refueling outage basis. As such, the hydrostatic/leak test pressure-temperature limitations are applicable for the RCS when performing leak tests of the LPI system.

The spray temperature difference is imposed to maintain the thermal stresses at the pressurized spray line nozzle below the design limit.

The reactor vessel is protected against damage due to excessive pressures at low temperatures by the Low Temperature Overpressure Protection (LTOP) System. LTOP vulnerability is assumed when RCS cold leg temperature is ≤ 325°F and a RCS vent path is not capable of mitigating the most liming LTOP event. The LTOP enable temperature of 325°F is based on adjusted RT_{NDT} + 50°F per Reference 7, with additional margin.

The LTOP System consists of two trains. One train is the pressurizer PORV calibrated to a low setpoint of less than or equal to 460 psig. The PORV block valve must be open, both trains of LPI must be deactivated, and both CFTs must be deactivated for the PORV to be operable. The capacity of the pressurizer PORV is sufficient to maintain the RCS pressure below the appropriate brittle fracture pressure limits during LTOP events in which boiling does not occur in the core. PORV operability is not required when RCS pressure is < 100 psig and HPI pumps are not operating since credible LTOP events progress relatively slowly, thus giving the operator ample time to respond. In addition, the PORV cannot be tested until there is sufficient RCS pressure. The remaining train is operator action and is based on an operating philosophy that precludes the plant from being in a water solid condition (except for system hydrotests). The fact that the Oconee units are operated with a steam or gas space in the pressurizer allows sufficient time for operator action to terminate an LTOP event prior to exceeding the appropriate brittle fracture pressure limits. Assuming an LTOP event was to occur at Oconee, and a single failure disables either train, the remaining train must be capable of maintaining RCS pressure below the appropriate brittle fracture pressure limits.

The Oconee LTOP System provides protection from pressure transients at low temperatures, by limiting the pressure of such a transient to below the limits set by 10 CFR 50 Appendix G. In addition, the following conditions are imposed by the NRC for the evaluation of the acceptability of LTOP Systems:

a. The most limiting initial conditions must be used.
b. The most limiting single failure, distinct from the initiating event, must be used.
c. No credit can be taken for mitigative operator action until 10 minutes after the operators become aware that a pressure transient is in progress.

For the Oconee units, the most limiting single failure is failure of the single pressurizer PORV to open at its low pressure setpoint. Operator awareness is assumed to be achieved by actuation of control room alarms. The following scenarios have the potential to result in an LTOP event:

1) Makeup Control Valve (HP-120) fails full open.

2) Erroneous opening of a core flood tank (CFT) discharge valve.

3) Erroneous actuation of the HPI system.

4) Pressurizer heaters erroneously energized.

5) Temporary loss of decay heat removal.

6) Thermal expansion of the RCS after starting an RCP due to stored energy in the steam generator.

7) Erroneous addition of high pressure nitrogen.

Specification 3.1.2.9.2 requires that both CFTs and both HPI trains be isolated from the RCS, thus preventing these scenarios. PORV capacity may not be sufficient to mitigate the erroneous opening of a CFT discharge valve or HPI actuation. Physical restriction of makeup flow, control of pressurizer level, the number of available pressurizer heater banks, and alarms ensure that at least 10 minutes are available for operator action to mitigate the remaining events. Unit specific values required to meet the 10 minute operator action criterion and the description of RCS vent paths capable of mitigating the most limiting LTOP event are provided within the Selected Licensee Commitment Manual.

In order to assure 10 minutes are available for operator action, the operational restrictions of Specification 3.1.2.9.4 must be implemented:

Deactivating train A of HPI is accomplished by one of the following methods:

1) Shutting and deactivating valve HP-26 by tagging open the valve breaker and tagging the valve handwheel in the closed position, shutting valve HP-410 and tagging the valve switch in the closed position.

2) Deactivating all HPI pumps aligned at A HPI train and tagging the pump breakers open.

Deactivating train B of HPI is accomplished by one of the following methods:

1) Shutting and deactivating valve HP-27 by tagging open the valve breaker and tagging the valve handwheel in the closed position, shutting valve HP-409 and tagging the valve switch in the closed position.

2) Deactivating all HPI pumps aligned to B HPI train and tagging the pump breakers open.

Deactivating both core flood tanks is accomplished by shutting valves CF-1 and CF-2, tagging open the valve breaker, and tagging the valves in the closed position. Alternately, core flood tanks may be deactivated by maintaining core flood tank pressure below the maximum allowable RCS pressure for the existing RCS temperature (per Figures 3.1.2-1 and 3.1.2-2).

Deactivating pressurizer heater bank 3 or 4 is accomplished by tagging that bank's circuit breaker open.

Makeup flow must be restricted such that 10 minutes are available for operator actions to mitigate the event.

Audible alarms must be provided such that 10 minutes are available for operator action to mitigate the event.

The high pressure nitrogen system shall be controlled such that 10 minutes are available for operator action to mitigate an LTOP event.

The intent of the action statements provided in Specification 3.1.2.9.5 is to place the reactor vessel in a condition in which it is not vulnerable to an LTOP event via the safest and most prompt course of action. In some cases, it may be more prudent to heat up above 325°F (cold leg temperature) rather than depressurize and open an RCS vent.

The allowable outage times (AOTs) provided in Specification 3.1.2.9.5 have been established based on the following considerations:

a. In the event one or more HPI trains or CFTs are not deactivated, the HPI trains and CFTs must be deactivated immediately since PORV capacity may not be sufficient, nor are 10 minutes available for operator action, to mitigate these LTOP events.

b. When the PORV is inoperable, 24 hours is an acceptable period of time to restore the PORV to operable status based on the low likelihood of an LTOP event requiring actuation of the PORV and the time available for operator action to mitigate the event.

c. In the event of "2nd train" inoperabilities, a time period of 4 hours is sufficient to return the train to operable status or to implement the compensatory measures. For example, establishing a dedicated operator to monitor for initiation of an LTOP event, is sufficient to compensate for inoperability of the makeup flow restriction, pressurizer heater bank 3 or 4 not deactivated, inoperability of required alarms, or deviation from Specification 3.1.2.9.4 pressure, temperature, or level limits. Establishing a dedicated operator is not sufficient to compensate for not deactivating HPI or CFTs.

REFERENCES

(1) FTI Document 32-1266230-00, "ONS-1 PT Fluence Analysis Results - Cycles 11-16," S. Q. King, January 1998.

(2) FTI Document 86-1258198-00, "ONS-2 PT Fluence Analysis Results - Cycles 9-14," January 1998.

(3) FTI Document 32-1266234-00, "ONS-3 PT Fluence Analysis Results - Cycles 12-15," S. Q. King, January 1998.

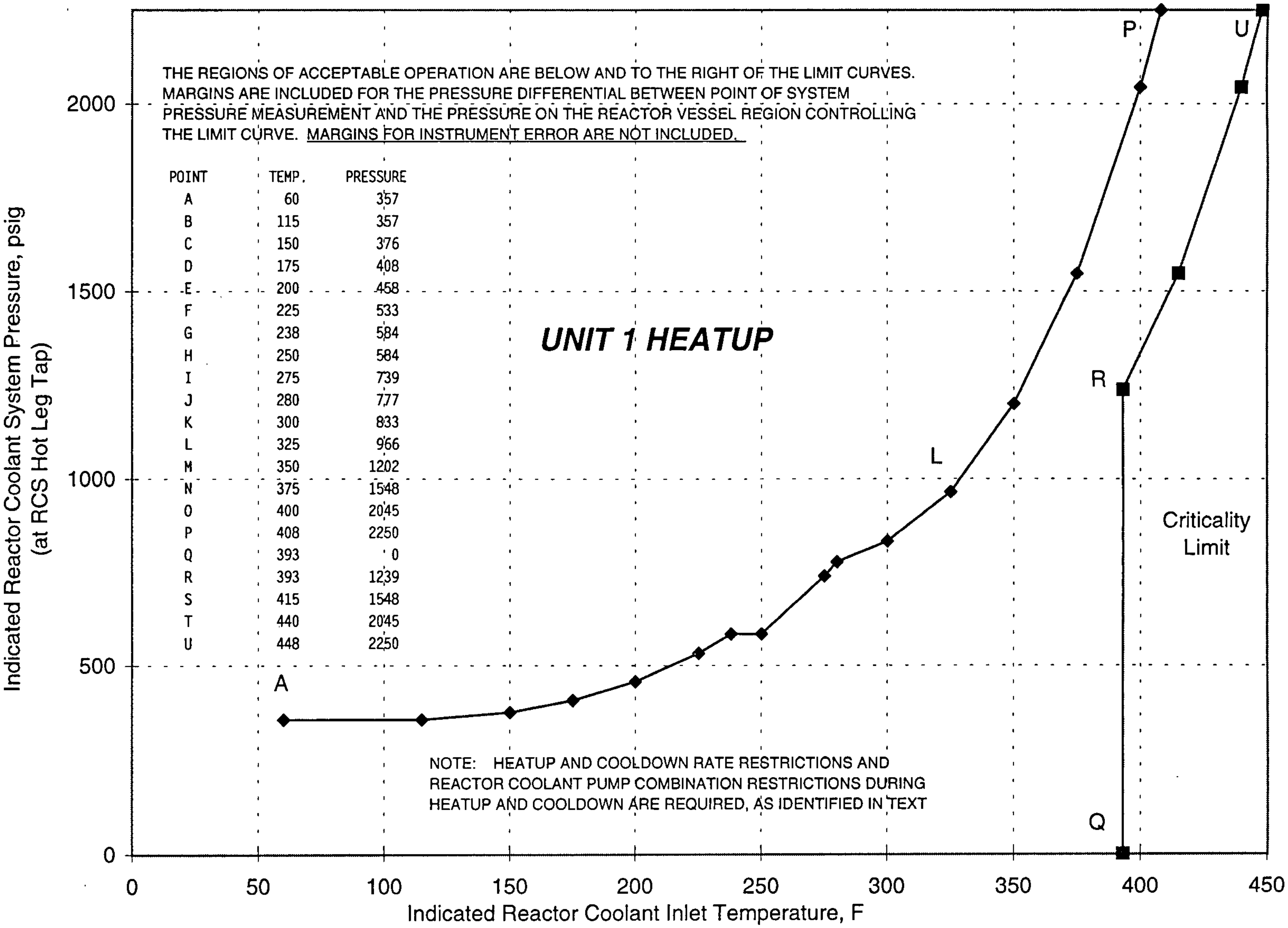
<u>REFERENCES</u> (Continued)

(4) FTI Document 32-5001202-00, "OC-1 P/T Limits at 26 & 33 EFPY," A. D. Nana, February 1998.

(5) FTI Document 32-5000576-00, "OC-2 P/T Limits at 26 & 33 EFPY," A. D. Nana, January 1998.

(6) FTI Document 32-5001238-01, "OC-3 P/T Limits at 26 & 33 EFPY," A. D. Nana, August 1998.

(7) ASME Code Case N-514, "Low Temperature Overpressure Protection, Section XI, Division I," approved February 12, 1992.



POINT	TEMP.	PRESSURE
A	60	357
B	115	357
C	150	376
D	175	408
E	200	458
F	225	533
G	238	584
H	250	584
I	275	739
J	280	777
K	300	833
L	325	966
M	350	1202
N	375	1548
O	400	2045
P	408	2250
Q	393	0
R	393	1239
S	415	1548
T	440	2045
U	448	2250

Figure 3.1.2-1A
Reactor Coolant Normal Operational Heatup Limitations
Application for First 26.0 EFPY - Unit 1 Oconee Nuclear Station

Amendment No. (Unit 1)
Amendment No. (Unit 2)
Amendment No. (Unit 3)

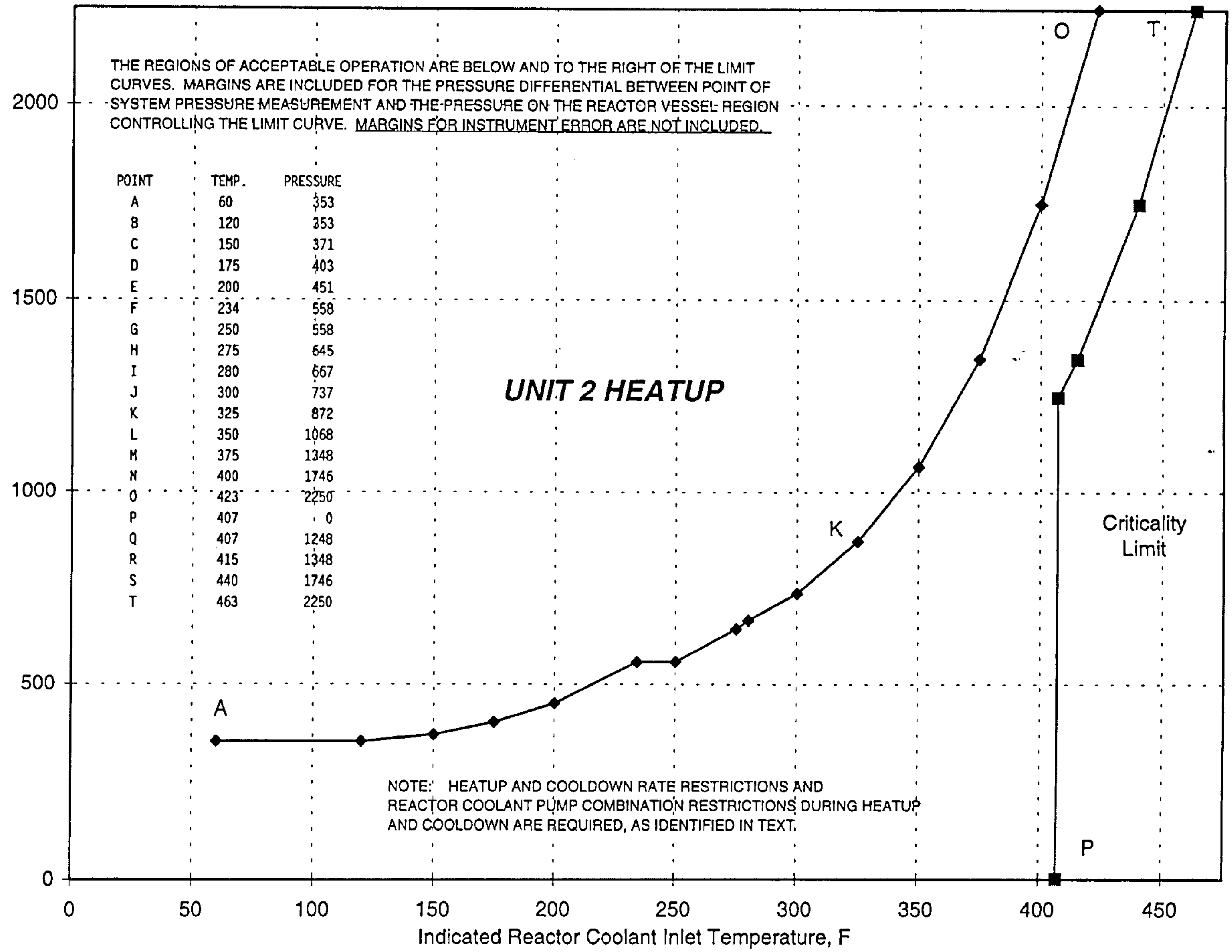
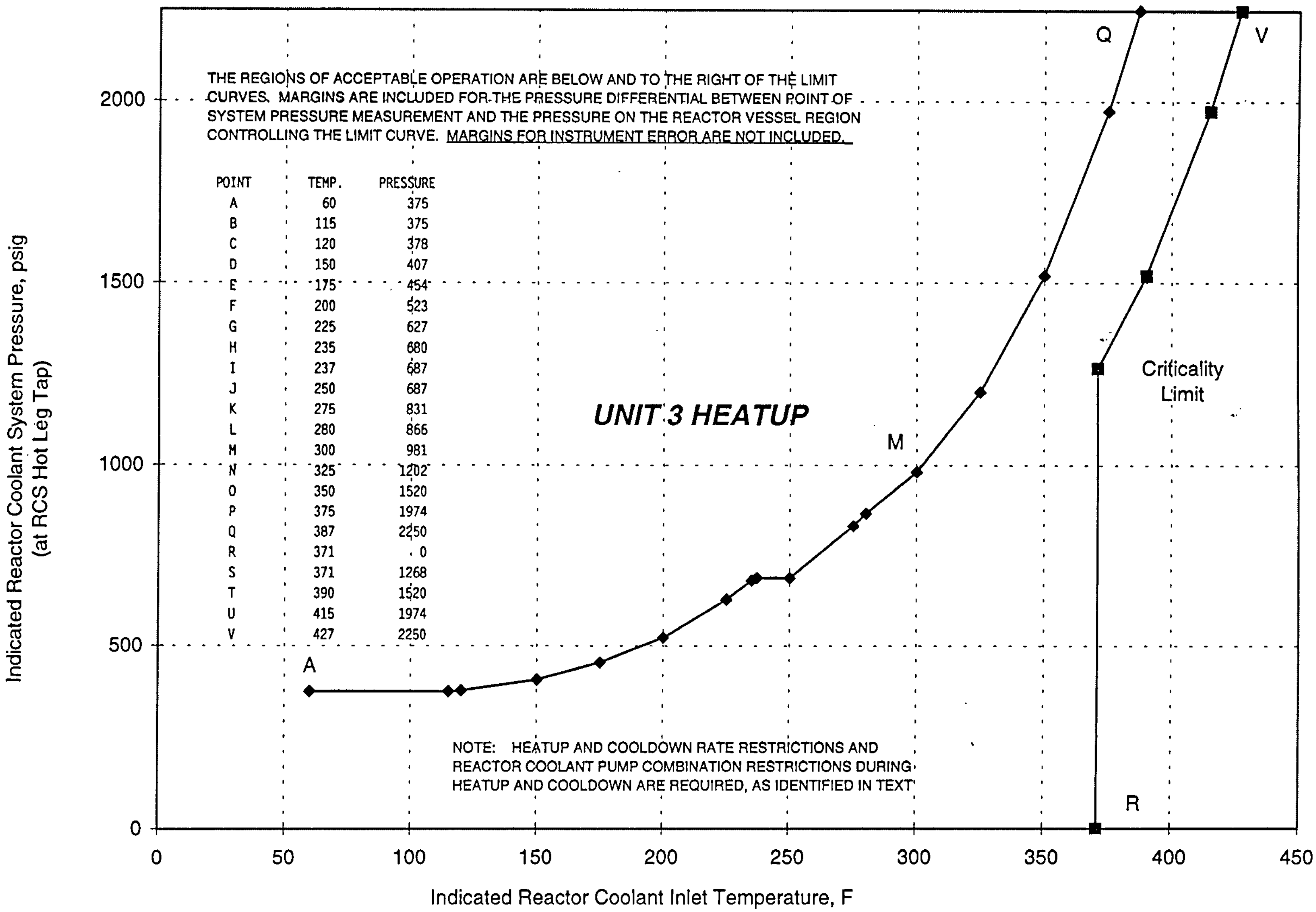


Figure 3.1.2-1B

Reactor Coolant Normal Operational Heatup Limitations
Application for First 26.0 EFPY - Unit 2 Oconee Nuclear Station



POINT	TEMP.	PRESSURE
A	60	375
B	115	375
C	120	378
D	150	407
E	175	454
F	200	523
G	225	627
H	235	680
I	237	687
J	250	687
K	275	831
L	280	866
M	300	981
N	325	1202
O	350	1520
P	375	1974
Q	387	2250
R	371	0
S	371	1268
T	390	1520
U	415	1974
V	427	2250

Figure 3.1.2-1C

Reactor Coolant Normal Operational Heatup Limitations
Application for First 26.0 EFPY - Unit 3 Oconee Nuclear Station

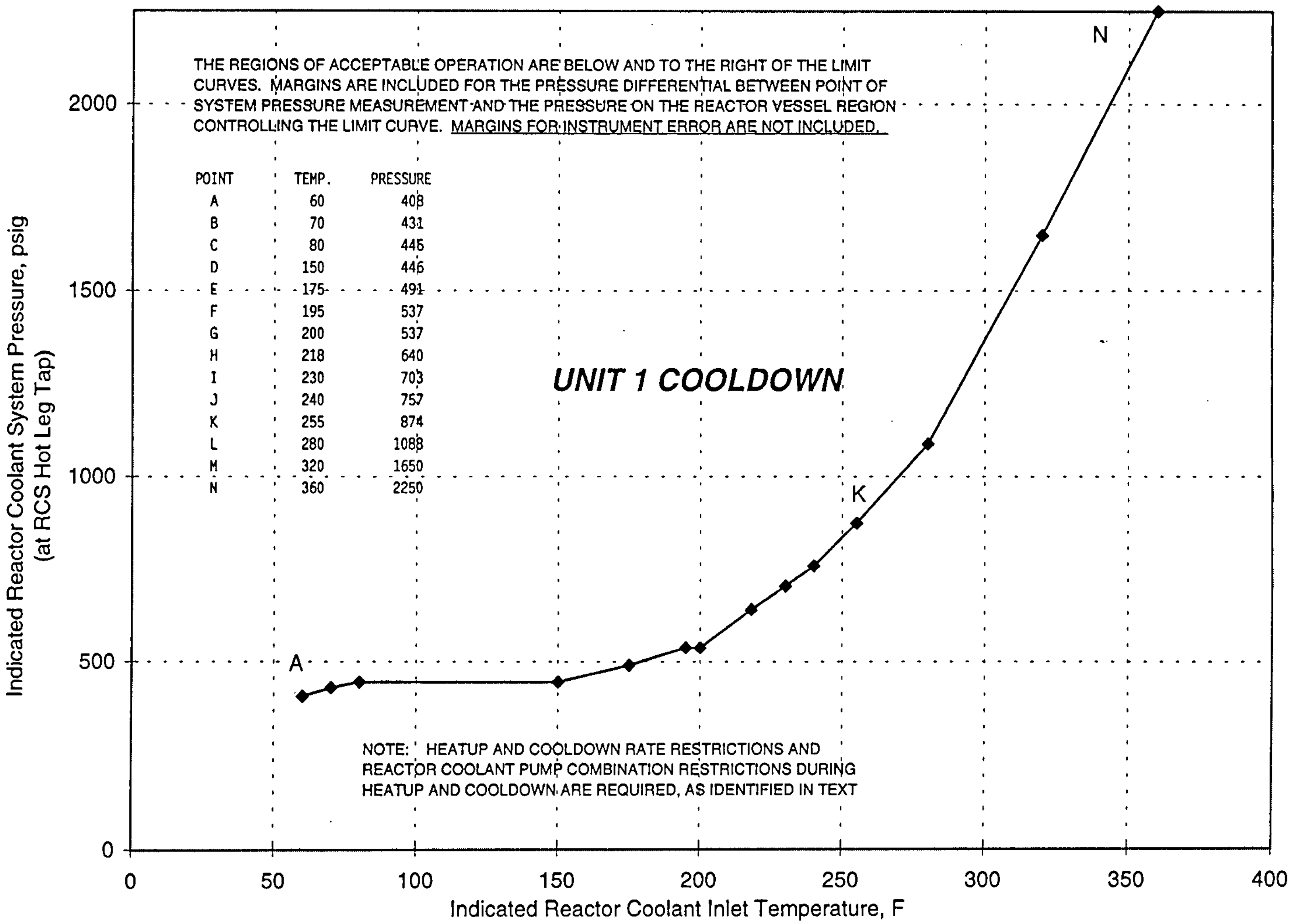
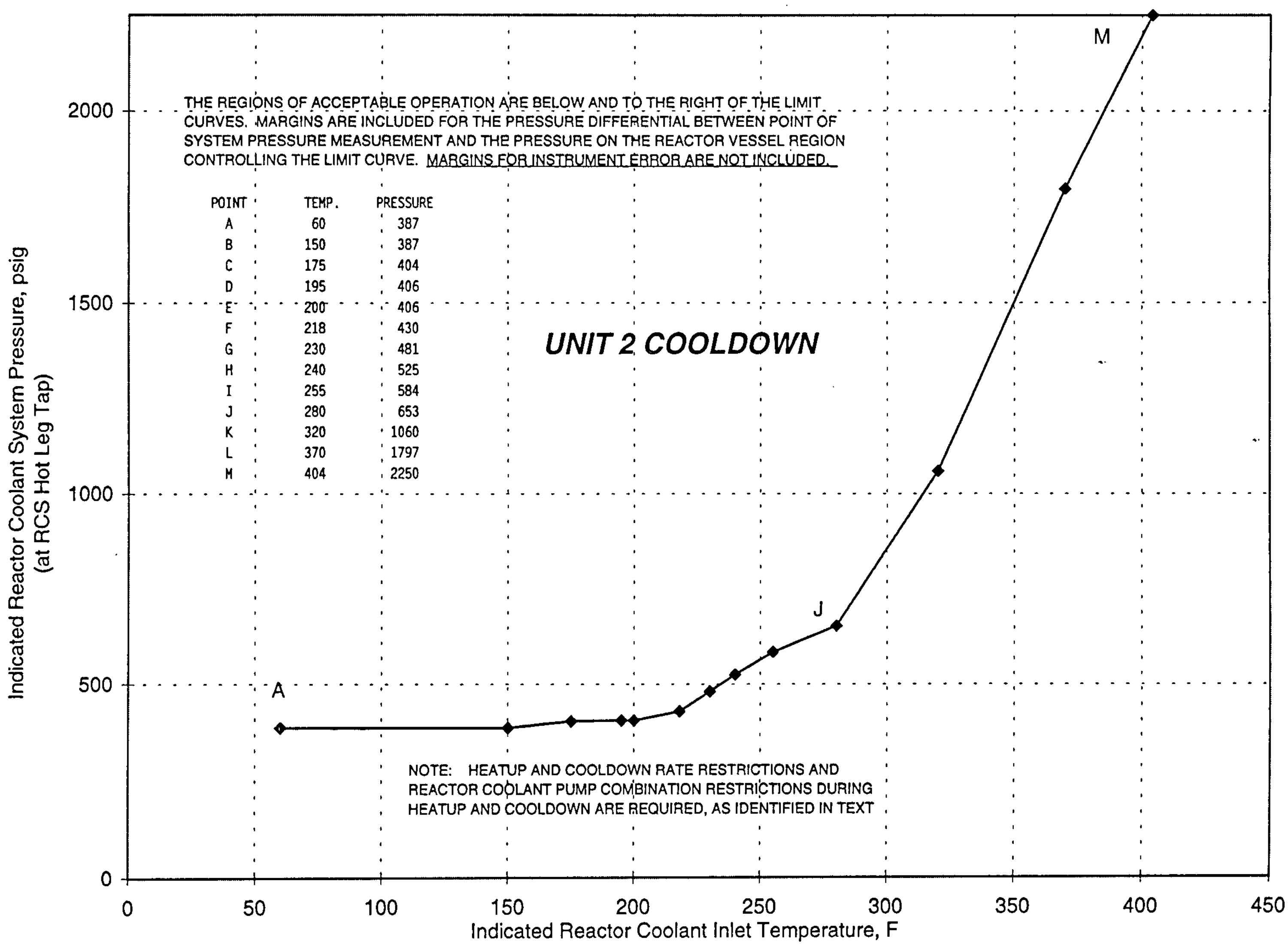


Figure 3.1.2-2A

Reactor Coolant Normal Operational Cooldown Limitations
Application for First 26.0 EFPY - Unit 1 Oconee Nuclear Station

Figure 3.1.2-2B

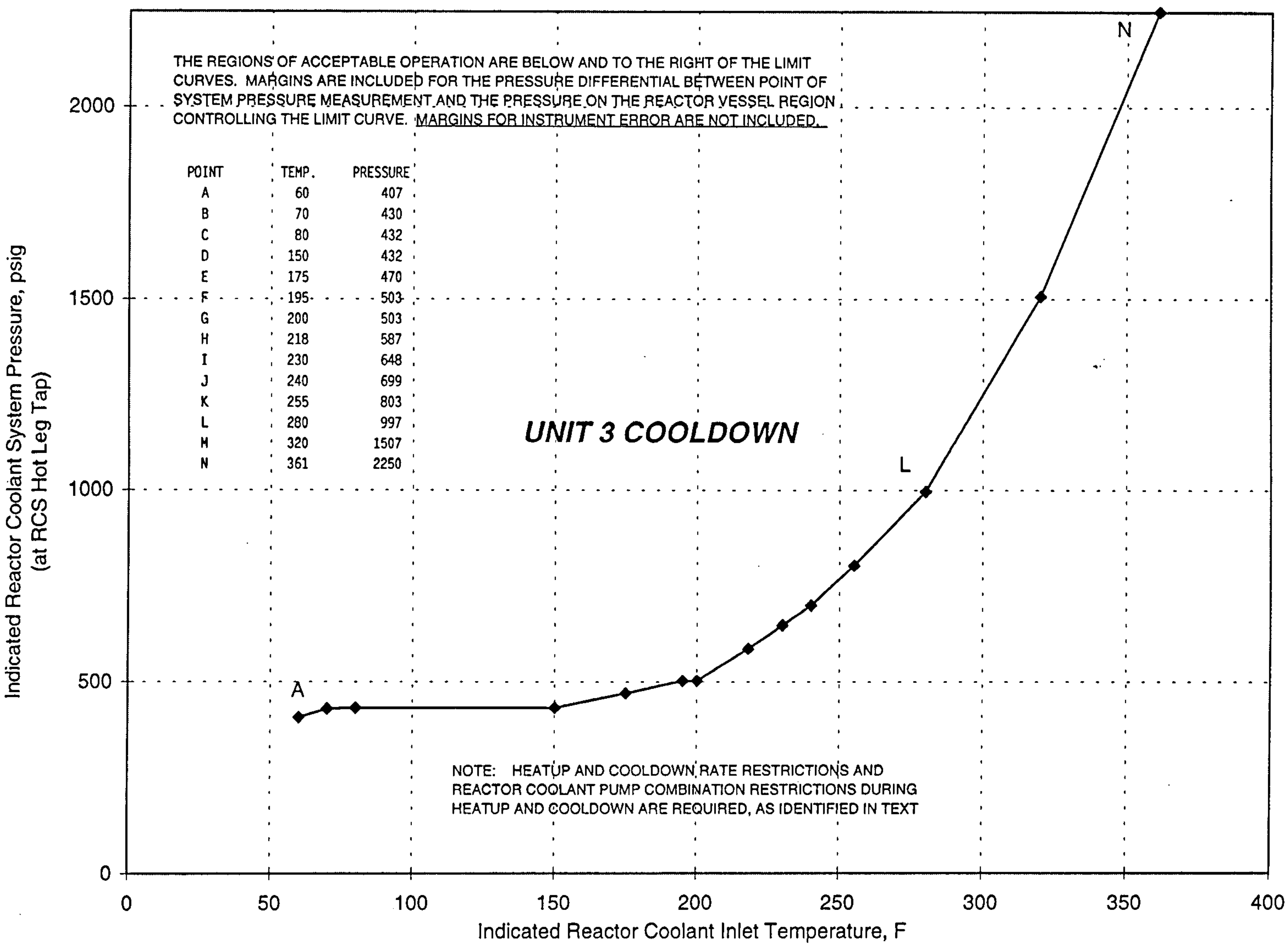
Reactor Coolant Normal Operational Cooldown Limitations
Application for First 26.0 EFPY - Unit 2 Oconee Nuclear Station



POINT	TEMP.	PRESSURE
A	60	387
B	150	387
C	175	404
D	195	406
E	200	406
F	218	430
G	230	481
H	240	525
I	255	584
J	280	653
K	320	1060
L	370	1797
M	404	2250

Figure 3.1.2-2C

Reactor Coolant Normal Operational Cooldown Limitations
Application for First 26.0 EFPY - Unit 3 Oconee Nuclear Station



POINT	TEMP.	PRESSURE
A	60	407
B	70	430
C	80	432
D	150	432
E	175	470
F	195	503
G	200	503
H	218	587
I	230	648
J	240	699
K	255	803
L	280	997
M	320	1507
N	361	2250

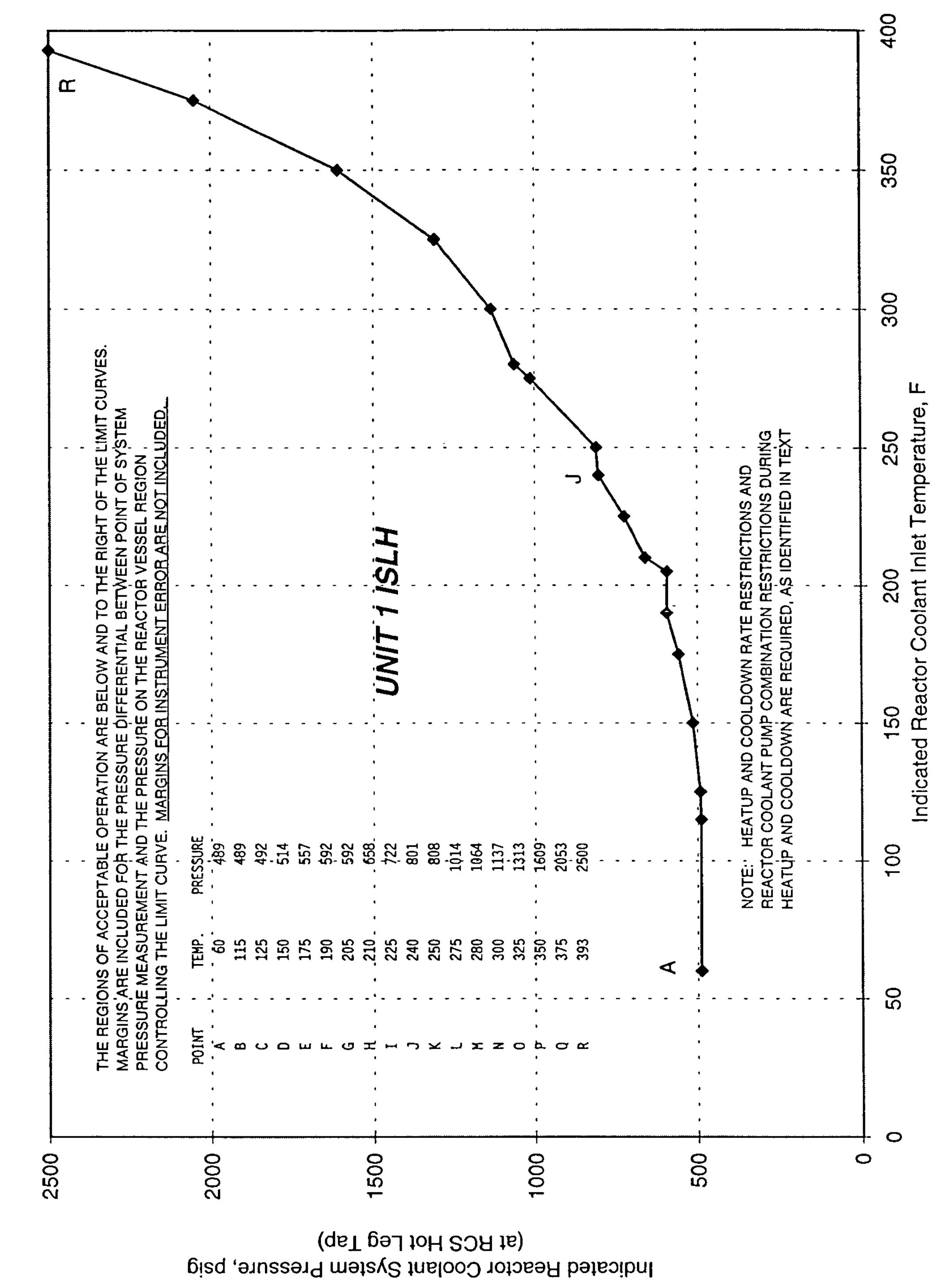
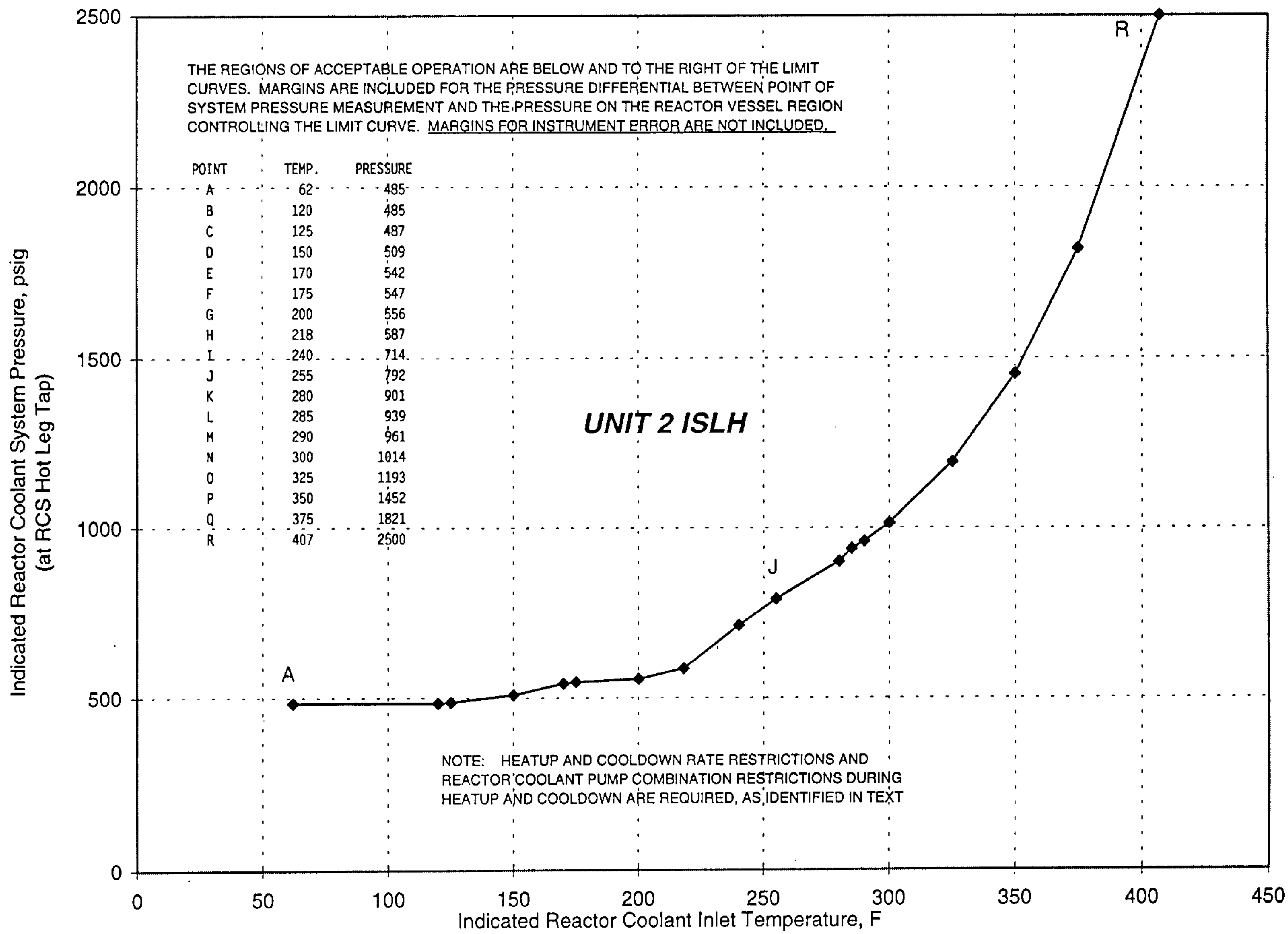


Figure 3.1.2-3A

Reactor Coolant System Inservice Leak and Hydrostatic Test Heatup and Cooldown Limitation Applicable for First 26.0 EFPY - Unit 1 Oconee Nuclear Station

Amendment No. (Unit 1)
Amendment No. (Unit 2)
Amendment No. (Unit 3)



POINT	TEMP.	PRESSURE
A	62	485
B	120	485
C	125	487
D	150	509
E	170	542
F	175	547
G	200	556
H	218	587
I	240	714
J	255	792
K	280	901
L	285	939
M	290	961
N	300	1014
O	325	1193
P	350	1452
Q	375	1821
R	407	2500

Figure 3.1.2-3B

Reactor Coolant System Inservice Leak and Hydrostatic Test Heatup and Cooldown Limitation Applicable for First 26.0 EFPY - Unit 2 Oconee Nuclear Station

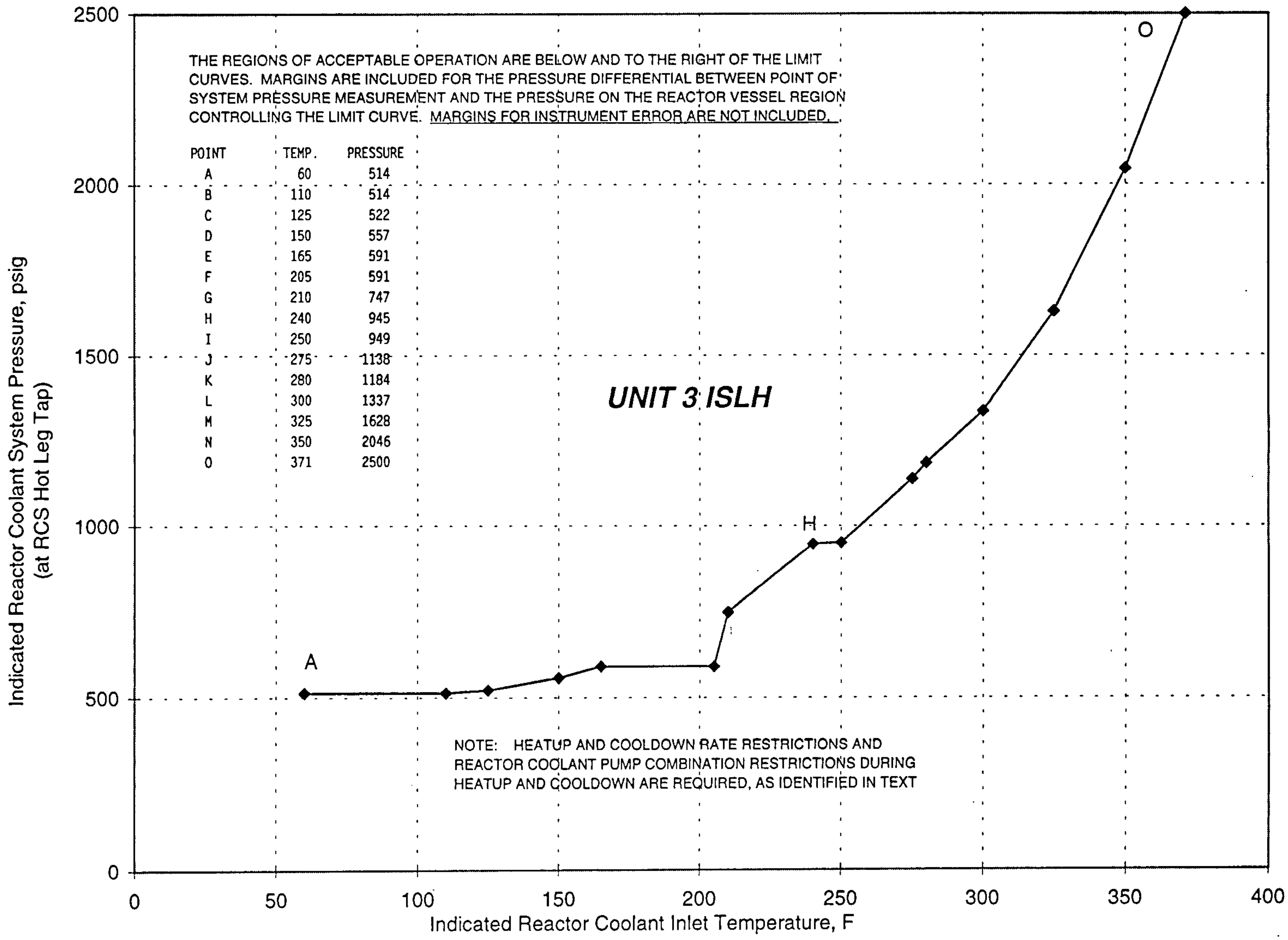


Figure 3.1.2-3C

Reactor Coolant System Inservice Leak and Hydrostatic Test Heatup and Cooldown Limitation Applicable for First 26.0 EFPY - Unit 3 Oconee Nuclear Station

DUKE POWER COMPANY

OCONEE NUCLEAR STATION

ATTACHMENT 2B

CURRENT TECHNICAL SPECIFICATIONS
MARKED UP PAGES

1.2.7 Not used

1.2.8 Not used

3.1.2.9 1. The requirements of 2 below shall be met when both of the following conditions apply:

a) The temperature of one or more of the RCS cold legs is ≤ 325°F, and

b) An RCS vent path capable of mitigating the most limiting LTOP event is not open.

2. a) Two trains of the low temperature overpressure protection (LTOP) system shall be operable,

b) HPI train A and B shall be deactivated, and

c) Both core flood tanks shall be deactivated.

3. One LTOP train is comprised of the PORV with a lift setting of ≤ ~~480~~ 460 psig.

a) The PORV is not required to be operable when no HPI pumps are running and RCS pressure is < 100 psig.

4. The second LTOP train is comprised of the controls which assure that 10 minutes are available for operator action to mitigate an LTOP event. The following controls comprise the second LTOP train: LIMITS ARE PLACED ON RCS PRESSURE BASED ON RCS TEMPERATURE.

a) ~~RCS pressure is limited to ≤ 345 psig for an RCS temperature ≤ 220°F.~~

b) Pressurizer level shall be controlled such that 10 minutes are available for operator action to mitigate an LTOP event.

c) Makeup flow shall be restricted such that 10 minutes are available for operator action to mitigate an LTOP event.

d) Alarms shall be provided such that 10 minutes are available for operator action to mitigate an LTOP event.

e) The high pressure nitrogen system shall be controlled such that 10 minutes are available for operator action to mitigate an LTOP event.

f) PRESSURIZER HEATER BANK 3 OR 4 SHALL BE DEACTIVATED SUCH THAT 10 MINUTES ARE AVAILABLE FOR OPERATOR ACTION TO MITIGATE AN LTOP EVENT.

5. a. If one or more HPI trains or CFTs are not deactivated, the HPI trains and CFTs shall be deactivated immediately.

b. If the PORV is inoperable, the PORV shall be returned to operable status or the RCS shall be heated above 325°F within 24 hours, or within 36 hours the RCS shall be depressurized to < 100 psig and HPI shall be removed from service.

c. If the second LTOP train is inoperable, the second train shall be restored to operable status or compensatory measures shall be provided to monitor for initiation of an LTOP event within 4 hours, or within 16 hours the RCS shall be depressurized and a vent path capable of mitigating the most limiting LTOP event shall be opened.

<u>Bases - Units 1, 2 and 3</u>

All components in the Reactor Coolant System are designed to withstand the effects of cyclic loads due to system temperature and pressure changes. These cyclic loads are introduced by normal load transients, reactor trips, startup and shutdown operations, and inservice leak and hydrostatic tests. The various categories of load cycles used for design purposes are provided in Table 5.2-1 of the FSAR.

The major components of the reactor coolant pressure boundary have been analyzed in ccordance with Appendix G to 10 CFR 50. Results of this analysis~~, including the ual pressure-temperature limitations of the reactor coolant pressure boundary, given in BAW-1699 and BAW-1697~~.

The Figures specified in 3.1.2-1, 3.1.2-2 and 3.1.2-3 present the pressure-temperature limit curves for normal heatup, normal cooldown and hydrostatic tests respectively. The limit curves are applicable up to the indicated effective full power years of operation. These curves will be adjusted to include possible errors in the pressure and temperature sensing instruments. The pressure limit is also adjusted for the pressure differential between the point of system pressure measurement and the limiting component for all operating reactor coolant pump combinations.

The cooldown limit curves are not applicable to conditions of off-normal operation (e.g., small LOCA and extended loss of feedwater) where cooling is achieved for extended periods of time by circulating water from the HPI through the core. If core cooling is restricted to meet the cooldown limits under other than normal operation, core integrity could be jeopardized.

The pressure-temperature limit lines shown on the figures specified in 3.1.2-1 for reactor criticality and on the figures referred to in 3.1.2-3 for hydrostatic testing have been provided to assure compliance with the minimum temperature requirements of Appendix G to 10 CFR 50 for reactor criticality and for inservice hydrostatic testing.

RE GIVEN IN REFERENCES 1, 2 AND 3. THE ACTUAL PRESSURE-TEMPERATURE MITATIONS OF THE REACTOR COOLANT PRESSURE BOUNDARY ARE GIVEN IN REFERENCES 4, 5 AND 6.

e limitations on steam generator pressure and temperature provide protection ;ainst nonductile failure of the secondary side of the steam generator. At metal emperatures lower than the RT_{NDT} of +60°F, the protection against nonductile failure is achieved by limiting the secondary coolant pressure to 20 percent of the preoperational system hydrostatic test pressure.

The limitations of 110°F and 237 psig are based on the highest estimated RT_{NDT} of +40°F and the preoperational system hydrostatic test pressure of 1312 psig. The average metal temperature is assumed to be equal to or greater than the coolant temperature. The limitations include margins of 25 psi and 10°F for possible instrument error.

The requirements to perform leakage tests of systems outside of containment which could potentially contain radioactivity were established by the NRC following TMI. Oconee performs the leak test of LPI by establishing RCS pressure at about 300 psig and with LPI at this same pressure, checking for leakage. Such a test is within the scope of testing upon which the curves referenced in Specification 3.1.2.2 are based--that is, they are not routine evolutions, such as heatup and cooldown, but rather infrequent leak tests conducted on a refueling outage basis. As such, the hydrostatic/leak test pressure-temperature limitations are applicable for the RCS when performing leak tests of the LPI system.

The spray temperature difference is imposed to maintain the thermal stresses at the pressurized spray line nozzle below the design limit.

e reactor vessel is protected against damage due to excessive pressures at low nperatures by the Low Temperature Overpressure Protection (LTOP) System. LTOP ilnerability is assumed when RCS cold leg temperature is ≤ 325°F and a RCS vent path is not capable of mitigating the most limiting LTOP event . The LTOP enable temperature of 325°F is based on RT_{NDT} + 90°, with additional margin.

ADJUSTED 50 PER REFERENCE 7

The LTOP System consists of two trains. One train is the pressurizer PORV calibrated to a low setpoint of less than or equal to 480 psig. The PORV block valve must be open, both trains of HPI must be deactivated, and both CFTs must be deactivated for the PORV to be operable. The capacity of the pressurizer PORV is sufficient to maintain the RCS pressure below the appropriate brittle fracture pressure limits during LTOP events in which boiling does not occur in the core. PORV operability is not required when RCS pressure is < 100 psig and HPI pumps are not operating since credible LTOP events progress relatively slowly, thus giving the operator ample time to respond. In addition, the PORV cannot be tested until there is sufficient RCS pressure. The remaining train is operator action and is based on an operating philosophy that precludes the plant from being in a water solid condition (except for system hydrotests). The fact that the Oconee units are operated with a steam or gas space in the pressurizer allows sufficient time for operator action to terminate an LTOP event prior to exceeding the appropriate brittle fracture pressure limits. Assuming an LTOP event was to occur at Oconee, and a single failure disables either train, the remaining train must be capable of maintaining RCS pressure below the appropriate brittle fracture pressure limits.

The Oconee LTOP System provides protection from pressure transients at low nperatures, by limiting the pressure of such a transient to below the limits set 10CFR 50 Appendix G ~~utilizing a conservative safety factor of 1.5~~. In addition, e following conditions are imposed by the NRC for the evaluation of the

eptability of LTOP Systems:

a. The most limiting initial conditions must be used.
b. The most limiting single failure, distinct from the initiating event, must be used.
c. No credit can be taken for mitigative operator action until 10 minutes after the operators become aware that a pressure transient is in progress.

For the Oconee units, the most limiting single failure is failure of the single pressurizer PORV to open at its low pressure setpoint. Operator awareness is assumed to be achieved by actuation of control room alarms. The following scenarios have the potential to result in an LTOP event:

1) Makeup control Valve (HP-120) fails full open.

2) Erroneous opening of a core flood tank (CFT) discharge valve.

3) Erroneous actuation of the HPI system.

4) All pressurizer heaters erroneously energized.

5) Temporary loss of decay heat removal.

6) Thermal expansion of the RCS after starting an RCP due to stored energy in the steam generator.

7) Erroneous addition of high pressure nitrogen.

THE NUMBER OF AVAILABLE PRESSURIZER HEATER BANKS,

Specification 3.1.2.9.2 requires that both CFTs and both HPI trains be isolated from the RCS, thus preventing these scenarios. PORV capacity may not be sufficient to mitigate the erroneous opening of a CFT discharge valve or HPI actuation. Physical restriction of makeup flow, control of pressurizer level, and alarms ensure that at least 10 minutes are available for operator action to mitigate the remaining events. Unit specific values required to meet the 10 minute operator action criterion and the description of RCS vent paths capable of mitigating the most limiting LTOP event are provided within the Selected Licensee Commitment Manual.

In order to assure 10 minutes are available for operator action, the operational restrictions of Specification 3.1.2.9.4 must be implemented:

Deactivating train A of HPI is accomplished by one of the following methods:
1) Shutting and deactivating valve HP-26 by tagging open the valve breaker and tagging the valve handwheel in the closed position, shutting valve HP-410 and tagging the valve switch in the closed position.
2) Deactivating all HPI pumps aligned to A HPI train and tagging the pump breakers open.

Deactivating train B of HPI is accomplished by one of the following methods:
1) Shutting and deactivating valve HP-27 by tagging open the valve breaker and tagging the valve handwheel in the closed position, shutting valve HP-409 and tagging the valve switch in the closed position.
2) Deactivating all HPI pumps aligned to B HPI train and tagging the pump breakers open.

4 DEACTIVATING PRESSURIZER HEATER BANK 3 OR 4 IS ACCOMPLISHED BY TAGGING THAT BANK'S CIRCUIT BREAKER OPEN.

Deactivating both core flood tanks is accomplished by shutting valves CF-1 and CF-2, tagging open the valve breaker, and tagging the valves in the closed position. Alternately, core flood tanks may be deactivated by maintaining core flood tank pressure below the maximum allowable RCS pressure for the existing RCS temperature (per Figures 3.1.2-1 and 3.1.2-2).

Makeup flow must be restricted such that 10 minutes are available for operator action to mitigate the event.

Audible alarms must be provided such that 10 minutes are available for operator action to mitigate the event.

The high pressure nitrogen system shall be controlled such that 10 minutes are available for operator action to mitigate an LTOP event.

The intent of the action statements provided in Specification 3.1.2.9.5 is to place the reactor vessel in a condition in which it is not vulnerable to an LTOP event via the safest and most prompt course of action. In some cases, it may be more prudent to heat up above 325°F (cold leg temperature) rather than depressurize and open an RCS vent.

The allowable outage times (AOTs) provided in Specification 3.1.2.9.5 have been established based on the following considerations:

a. In the event one or more HPI trains or CFTs are not deactivated, the HPI trains and CFTs must be deactivated immediately since PORV capacity may not be sufficient, nor are 10 minutes available for operator action, to mitigate these LTOP events.

b. When the PORV is inoperable, 24 hours is an acceptable period of time to restore the PORV to operable status based on the low likelihood of an LTOP event requiring actuation of the PORV and the time available for operator action to mitigate the event.

c. In the event of "2nd train" inoperabilities, a time period of 4 hours is sufficient to return the train to operable status or to implement the compensatory measures. For example, establishing a dedicated operator to monitor for initiation of an LTOP event, is sufficient to compensate for inoperability of the makeup flow restriction, [PRESSURIZER HEATER BANK 3 OR 4 NOT DEACTIVATED,] inoperability of required alarms, or deviation from Specification 3.1.2.9.4 pressure, temperature, or level limits. Establishing a dedicated operator is not sufficient to compensate for not deactivating HPI or CFTs.

REFERENCES

INSERT FROM FOLLOWING PAGE

~~(1) Analysis of Capsule OCII-E from Duke Power Company Oconee Unit 2 Reactor Vessel Materials Surveillance Program, BAW-2051, October, 1988.~~

~~(2) Analysis of Capsule OCIII-D from Duke Power Company Oconee Unit 3 Reactor Vessel Materials Surveillance Program, BAW-2128, Rev. 1, May 1992.~~

~~(3) Analysis of Capsule OCI-C from Duke Power Company Oconee Unit 1 Reactor Vessel Materials Surveillance Program, BAW-2050, October, 1988.~~

Insert for page 3.1-4b

(1) FTI Document 32-1266230-00, "ONS-1 PT Fluence Analysis Results - Cycles 11-16," S. Q. King, January 1998.

(2) FTI Document 86-1258198-00, "ONS-2 PT Fluence Analysis Results - Cycles 9-14," January 1998.

(3) FTI Document 32-1266234-00, "ONS-3 PT Fluence Analysis Results - Cycles 12-15," S. Q. King, January 1998.

(4) FTI Document 32-5001202-00, "OC-1 P/T Limits at 26 & 33 EFPY," A. D. Nana, February 1998.

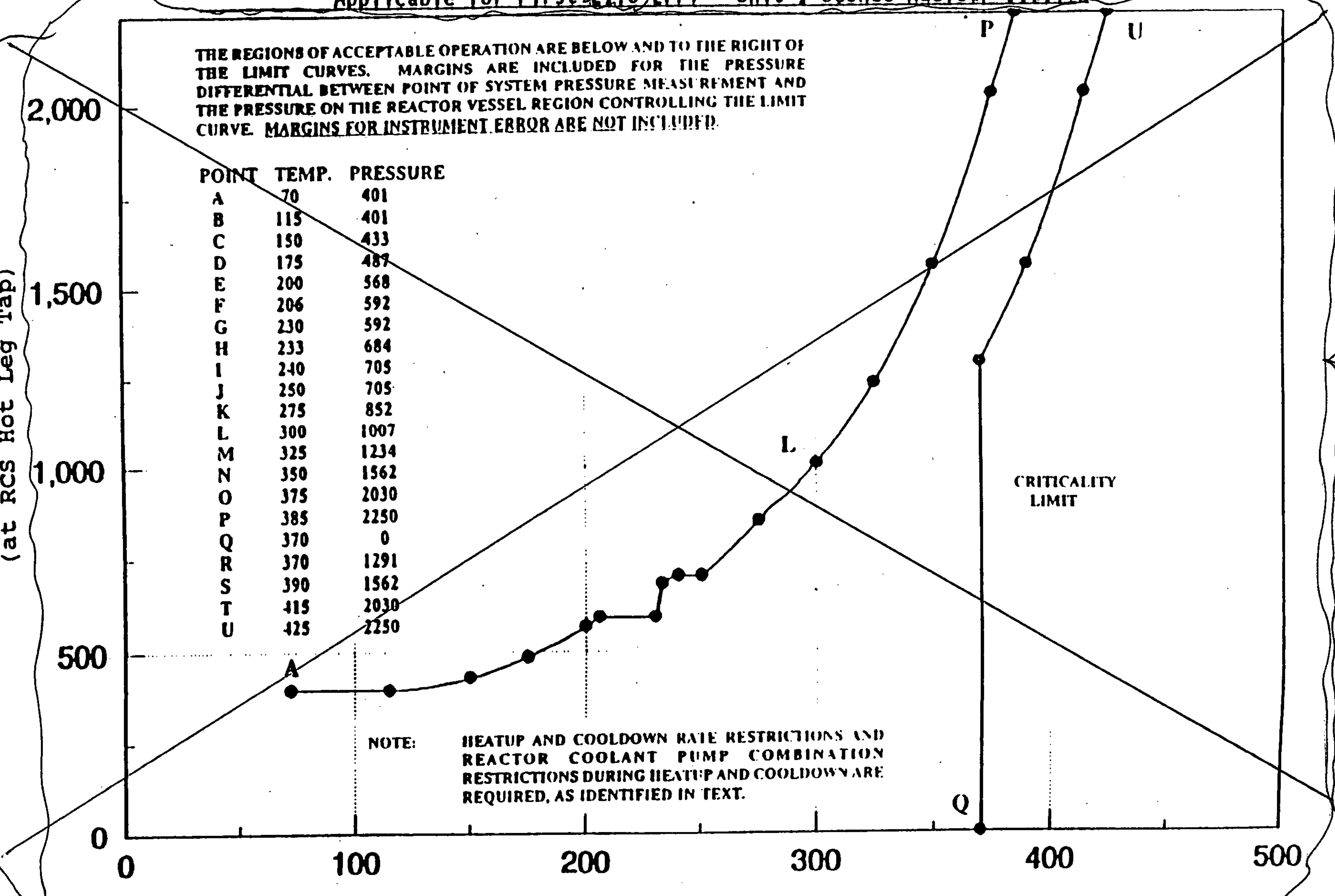
(5) FTI Document 32-5000576-00, "OC-2 P/T Limits at 26 & 33 EFPY," A. D. Nana, January 1998.

(6) FTI Document 32-5001238-01, "OC-3 P/T Limits at 26 & 33 EFPY," A. D. Nana, August 1998.

(7) ASME Code Case N-514, "Low Temperature Overpressure Protection, Section XI, Division I," approved February 12, 1992.

(26.0) Figure 3.1.2-1A

Reactor Coolant System Normal Operational Heatup Limitations Applicable for First 21.0 EFPY - Unit 1 Oconee Nuclear Station



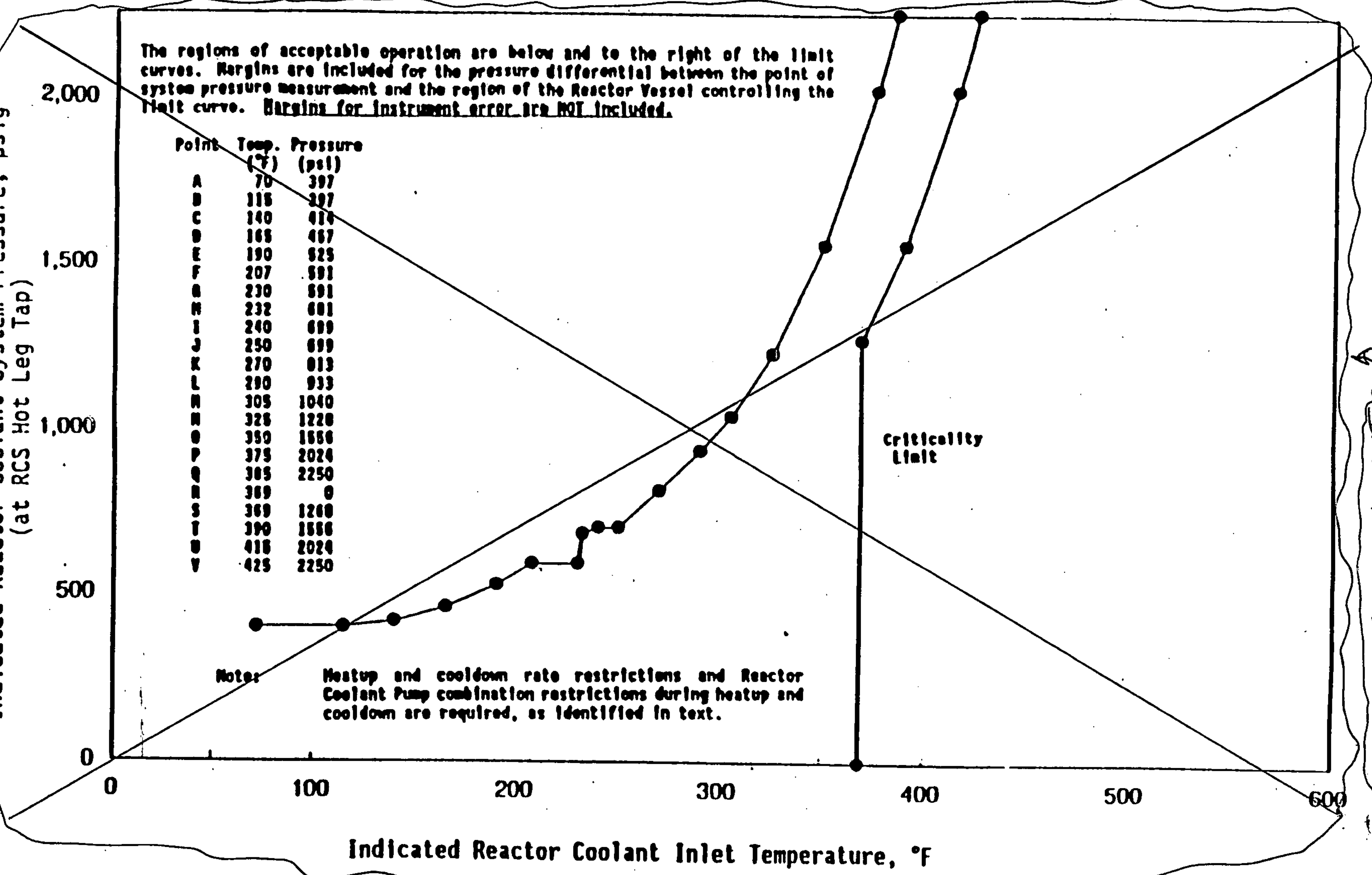
POINT	TEMP.	PRESSURE
A	70	401
B	115	401
C	150	433
D	175	487
E	200	568
F	206	592
G	230	592
H	233	684
I	240	705
J	250	705
K	275	852
L	300	1007
M	325	1234
N	350	1562
O	375	2030
P	385	2250
Q	370	0
R	370	1291
S	390	1562
T	415	2030
U	425	2250

26.0

Figure 3.1.2-1B

Reactor Coolant System Normal Operational Heatup Limitations

Applicable for First 19.0 EFPY - Unit 2 Oconee Nuclear Station



The regions of acceptable operation are below and to the right of the limit curves. Margins are included for the pressure differential between the point of system pressure measurement and the region of the Reactor Vessel controlling the limit curve. <u>Margins for instrument error are NOT included.</u>

Point	Temp. (°F)	Pressure (psi)
A	70	397
B	115	397
C	140	418
D	165	467
E	190	525
F	207	581
G	230	581
H	232	681
I	240	699
J	250	699
K	270	813
L	290	933
M	305	1040
N	325	1228
O	350	1556
P	375	2024
Q	385	2250
R	369	0
S	369	1268
T	390	1556
U	418	2024
V	425	2250

Notes: Heatup and cooldown rate restrictions and Reactor Coolant Pump combination restrictions during heatup and cooldown are required, as identified in text.

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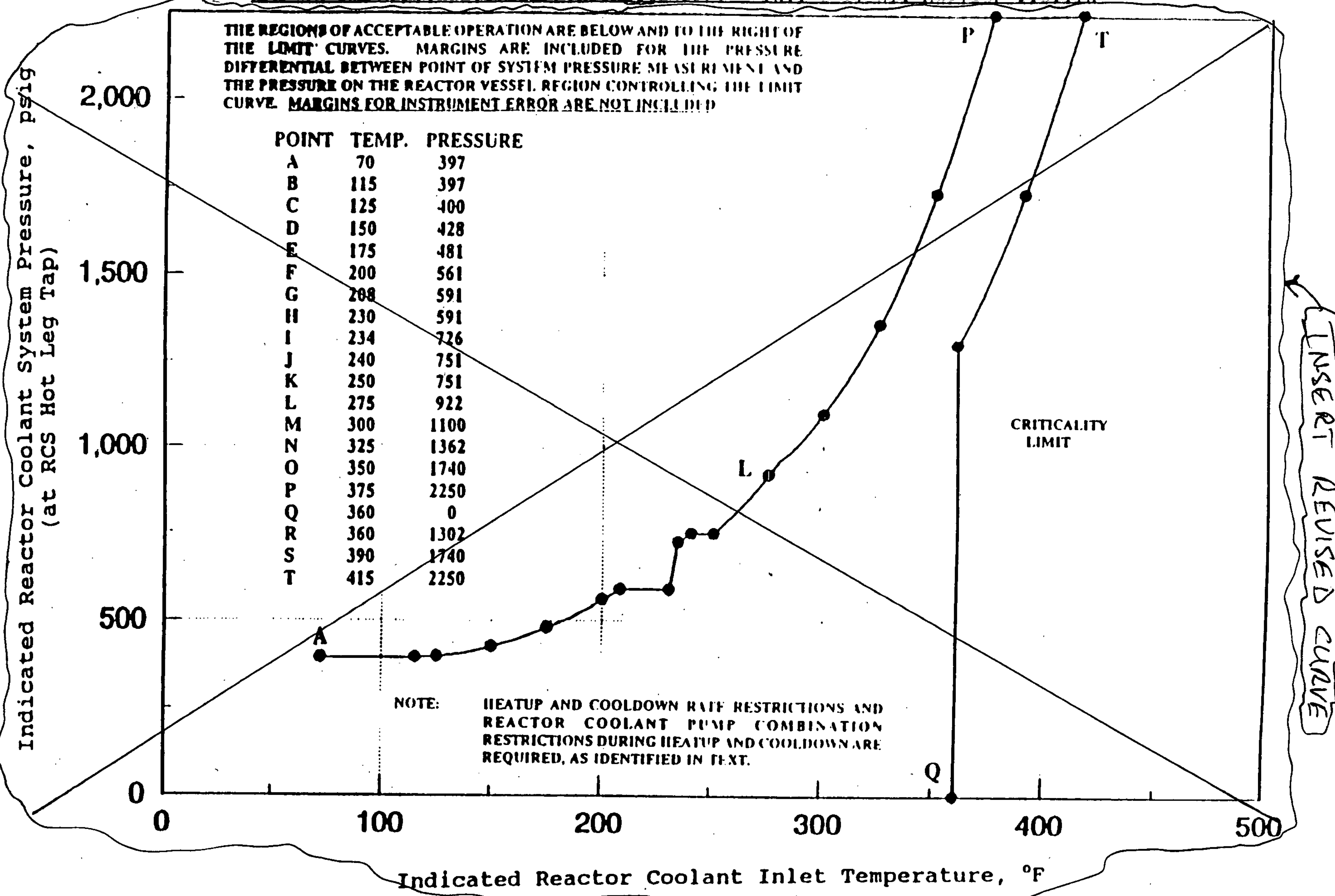
Figure 3.1.2-1C

Reactor Coolant System Normal Operation Heatup Limitations
Applicable for First ~~21.0~~ 26.0 EFPY - Unit 3 Oconee Nuclear Station



POINT	TEMP.	PRESSURE
A	70	397
B	115	397
C	125	400
D	150	428
E	175	481
F	200	561
G	208	591
H	230	591
I	234	726
J	240	751
K	250	751
L	275	922
M	300	1100
N	325	1362
O	350	1740
P	375	2250
Q	360	0
R	360	1302
S	390	1740
T	415	2250

Amendment No. 204 (Unit 1)
Amendment No. 204 (Unit 2)
Amendment No. 201 (Unit 3)

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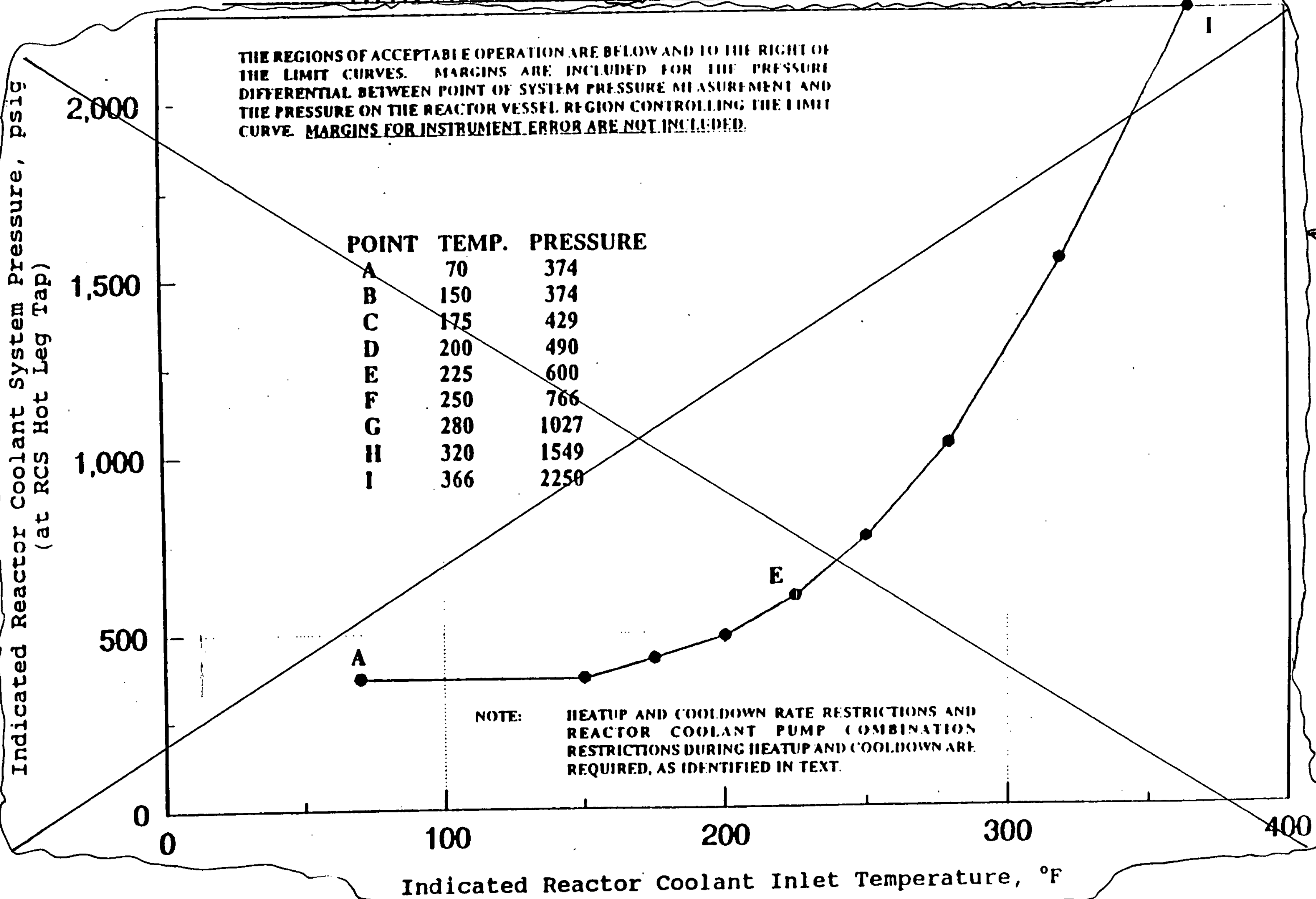
Figure 3.1.2-2A

Reactor Coolant System Normal Operational Cooldown Limitations

Applicable for First 21.0 EFPY - Unit 1 Oconee Nuclear Station

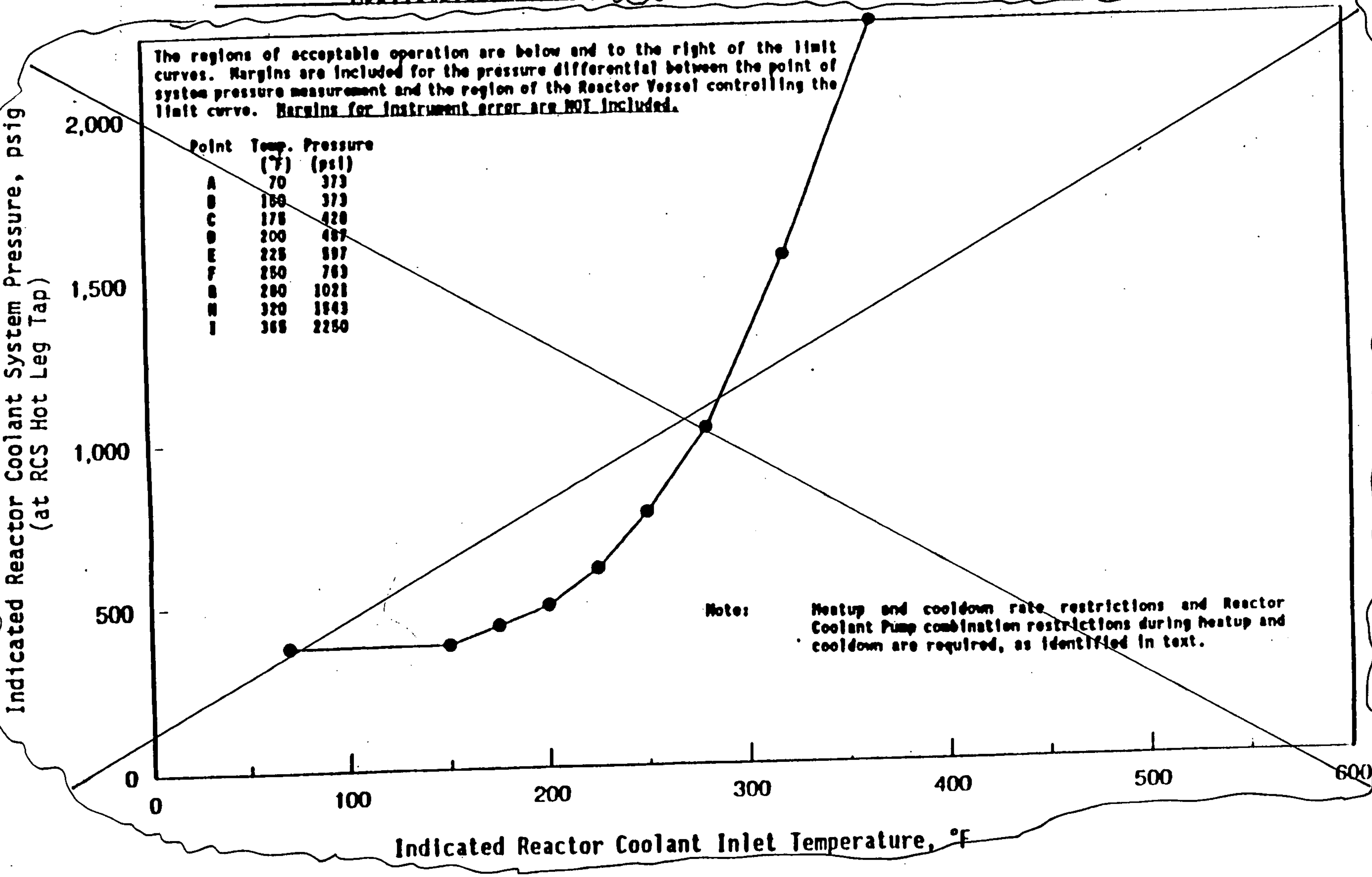


INSERT REVISED CURVE

Figure 3.1.2-2B

Reactor Coolant System Normal Operational Cooldown Limitations

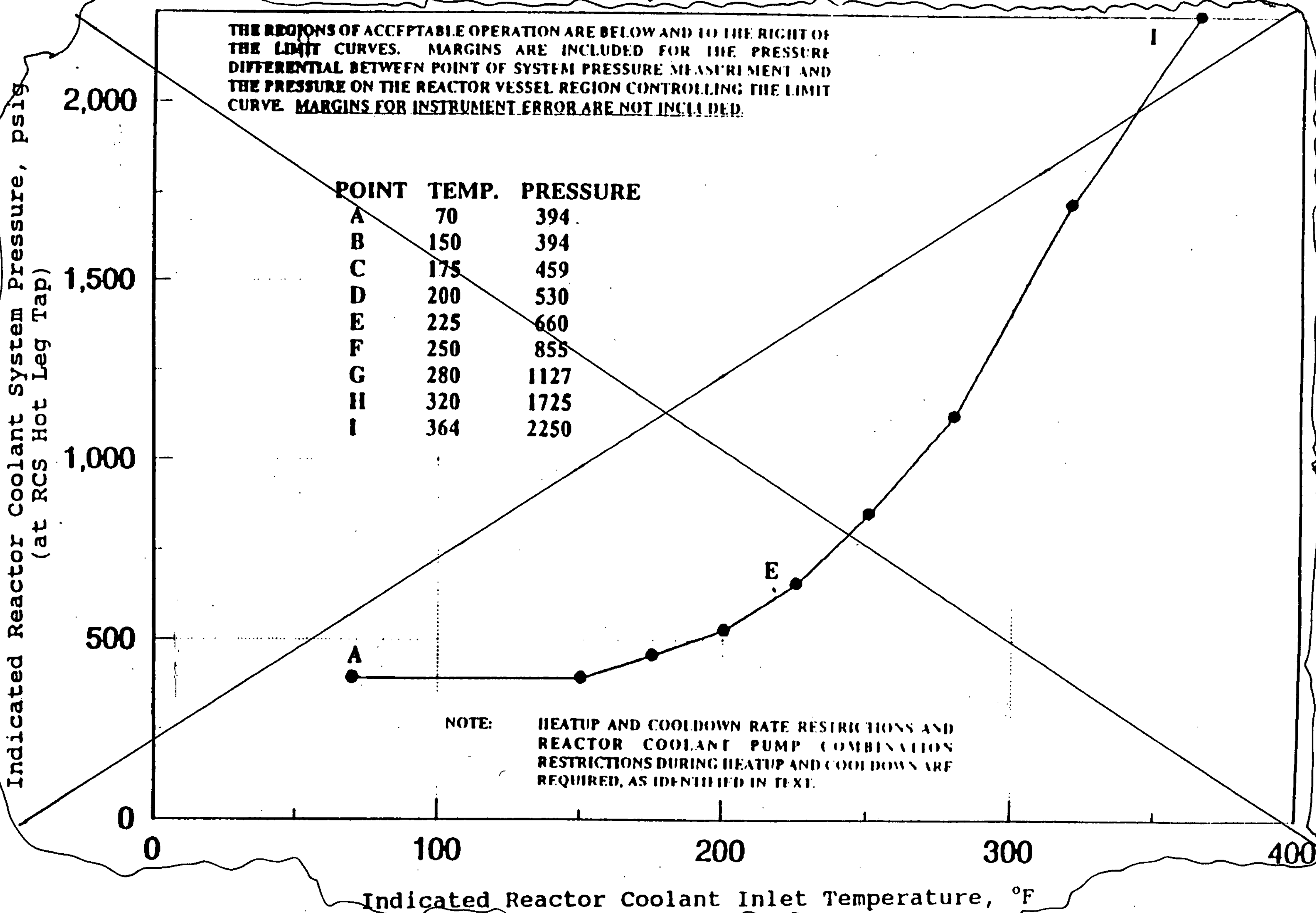
Applicable for First 19.0 EFPY - Unit 2 Oconee Nuclear Station



26.0

Figure 3.1.2-2C

Reactor Coolant System Normal Operation Cooldown Limitations
Applicable for First 21.0 EFPY - Unit 3 Oconee Nuclear Station



POINT	TEMP.	PRESSURE
A	70	394
B	150	394
C	175	459
D	200	530
E	225	660
F	250	855
G	280	1127
H	320	1725
I	364	2250

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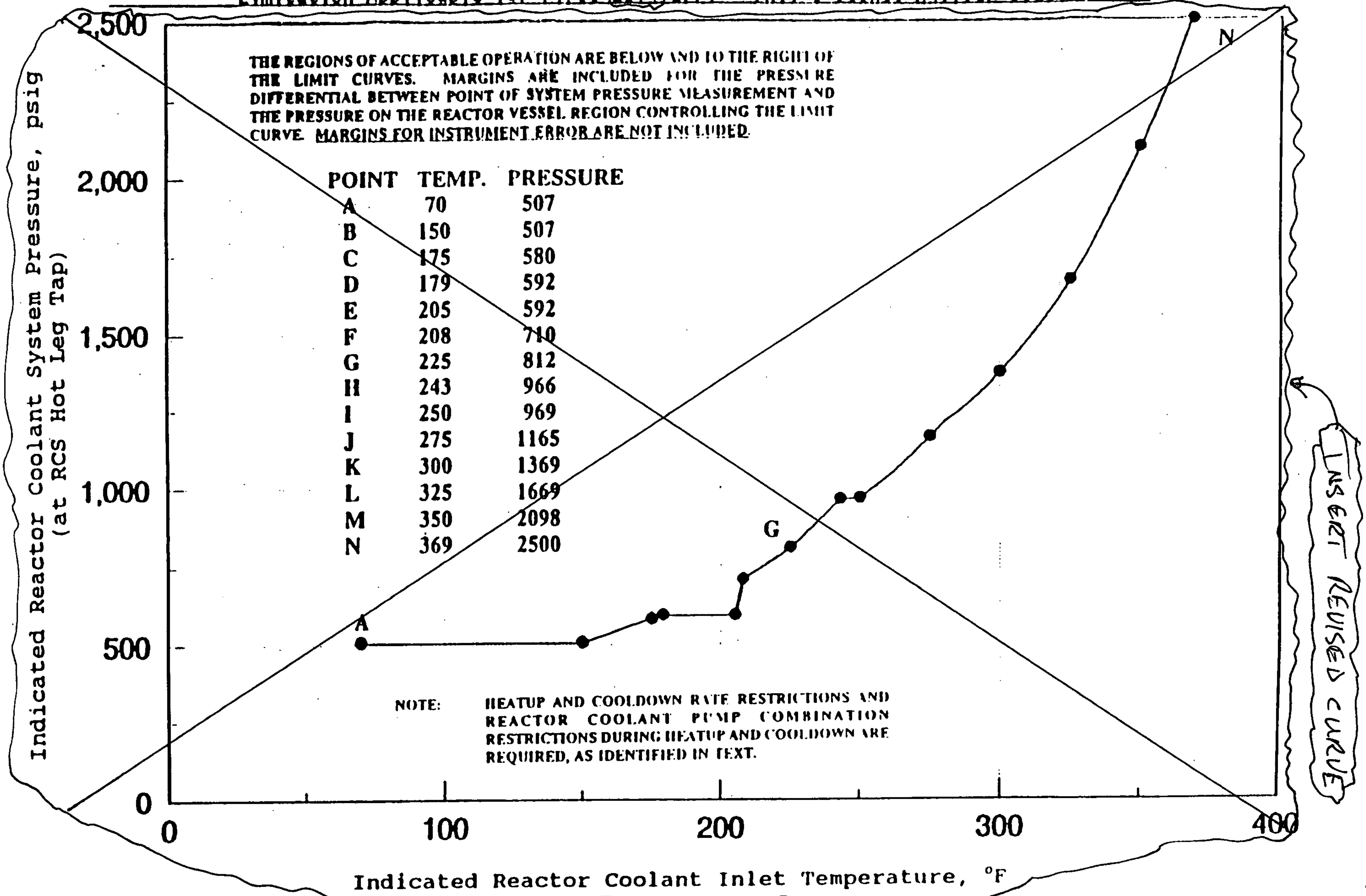
Figure 3.1.2-3A

Reactor Coolant System Inservice Leak and Hydrostatic Test Heatup and Cooldown Limitation Applicable for First ~~21.0~~ (260) EFPY - Unit 1 Oconee Nuclear Station



POINT	TEMP.	PRESSURE
A	70	507
B	150	507
C	175	580
D	179	592
E	205	592
F	208	710
G	225	812
H	243	966
I	250	969
J	275	1165
K	300	1369
L	325	1669
M	350	2098
N	369	2500

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Figure 3.1.2-3B

Reactor Coolant System Inservice Leak and Hydrostatic Test Heatup and Cooldown Limitation Applicable for First 19.0 EFPY - Unit 2 Oconee Nuclear Station

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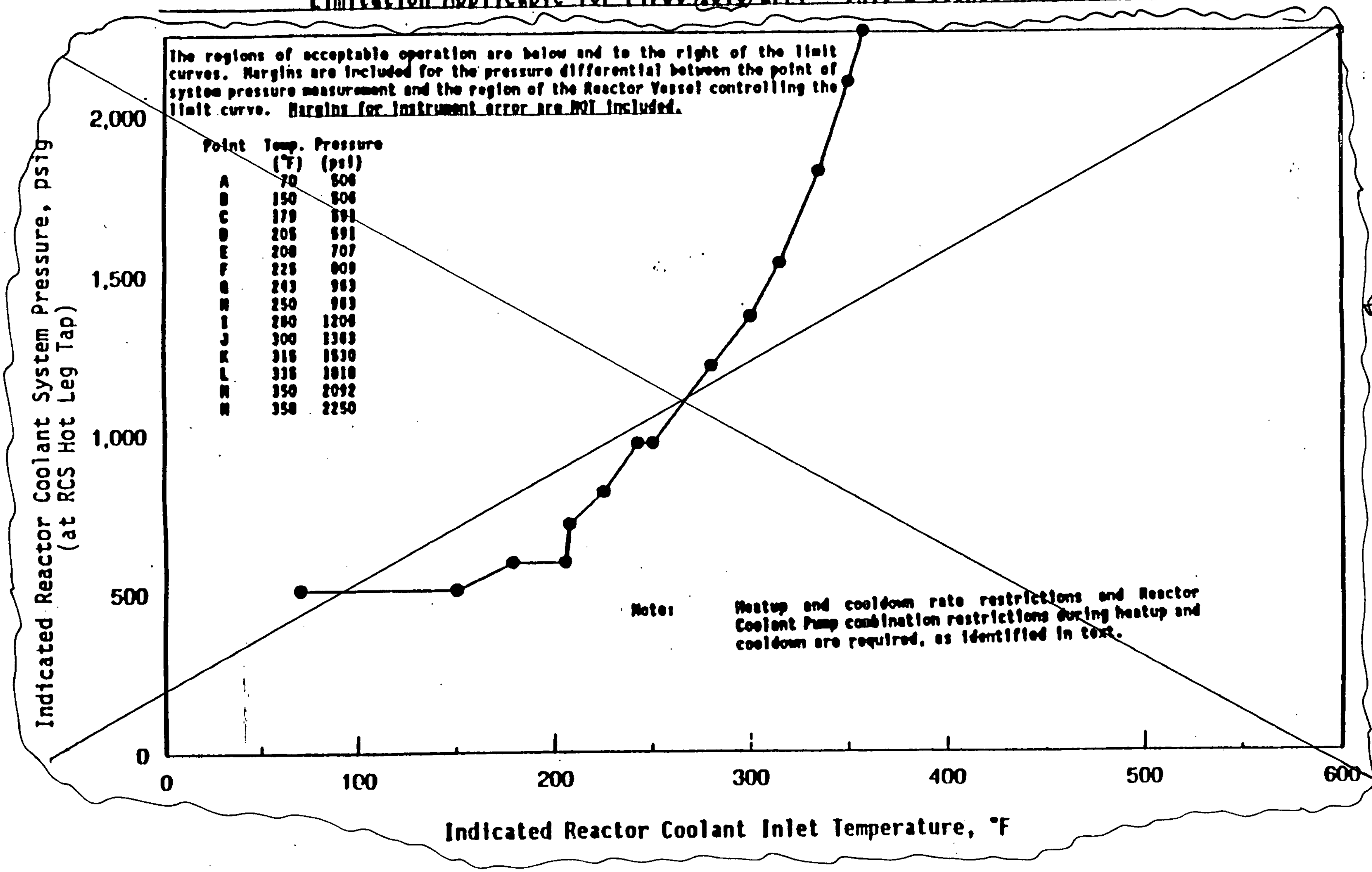
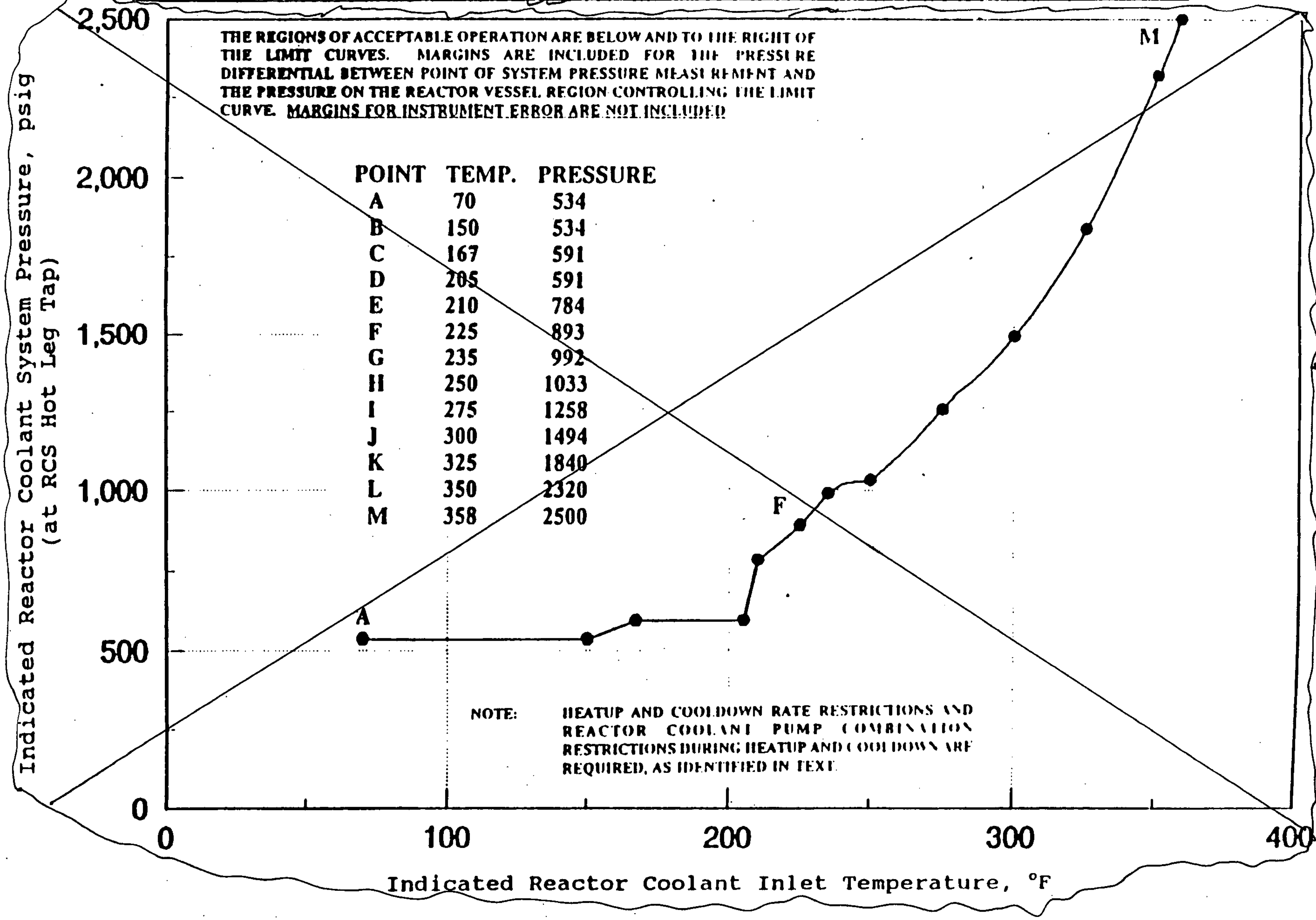


Point	Temp. (°F)	Pressure (psi)
A	70	506
B	150	506
C	179	591
D	205	591
E	208	707
F	225	809
G	243	983
H	250	983
I	280	1208
J	300	1363
K	315	1530
L	335	1818
M	350	2092
N	358	2250

Amendment No. 204 (Unit 1)
Amendment No. 204 (Unit 2)

Figure 3.1.2-3C

Reactor Coolant System Inservice Leak and Hydrostatic Test Heatup and Cooldown Limitations for First 21.0 (26.0) EFPY - Unit 3 Oconee Nuclear Station



POINT	TEMP.	PRESSURE
A	70	534
B	150	534
C	167	591
D	205	591
E	210	784
F	225	893
G	235	992
H	250	1033
I	275	1258
J	300	1494
K	325	1840
L	350	2320
M	358	2500

Amendment No. 204 (Unit 1)
Amendment No. 204 (Unit 2)
Amendment No. 201 (Unit 3)

ATTACHMENT 3

TECHNICAL JUSTIFICATION

1.0 Description of Proposed Changes:

This proposed amendment revises the pressure-temperature limits of Improved Technical Specification (ITS) 3.4.1 and Current Technical Specification (CTS) 3.1.2 for Oconee Units 1, 2, and 3. The proposed amendment will revise the heatup, cooldown, and inservice test limitations for the reactor coolant system of each unit. For Units 1, 2, and 3, the current pressure-temperature limits are established to 21, 19, and 21 effective full power years (EFPY), respectively. The service period for the new pressure temperature limits will be to a maximum of 26 EFPY for Units 1, 2 and 3.

The proposed change also corrects an error in CTS Figure 3.1.2-3B, concerning the maximum test pressure for the Unit 2 inservice leak and hydrostatic test heatup and cooldown limits. Due to an oversight, the curve produced by Babcock and Wilcox (B&W) which became the CTS Figure 3.1.2-3B, indicated an upper pressure temperature limit of 2250 psig when it should have provided a pressure temperature limit of 2500 psig. The upper pressure temperature limit had been at 2500 psig prior to approval of the current pressure-temperature limits by the NRC on January 25, 1994. This correction also applies to ITS curve, ITS Figure 3.4.3-6. During the effective period of CTS Figure 3.1.2-3B, Unit 2 Reactor Coolant System pressure has not exceeded 2250 psig.

This proposed amendment also revises ITS 3.4.12, Low Temperature Overpressure Protection (LTOP) System setpoints and the corresponding CTS 3.1.2.9. The Power Operated Relief Valve (PORV) low setpoint is being reduced from 480 psig to 460 psig as a result of the pressure-temperature limit changes as modified by application of ASME Code Case N-514. Other setpoints are revised to be consistent with the revised pressure-temperature limits. Administrative controls are added to limit the number of energized pressurizer heater banks.

2.0 Background:

Currently, Oconee Unit 1, 2, and 3 pressure-temperature limits have been evaluated for up to 21, 19, and 21 EFPY, respectively. Since the Unit 2 pressure-temperature limits are only effective until 19 EFPY, Unit 2 is considered the most limiting unit. Duke has applied the ratio procedure of Regulatory Guide 1.99, Revision 2, Position, 2.1, in

accordance with the guidance of Generic Letter 92-01, Revision 1, Supplement 1, to the current pressure-temperature limit curves and in calculating the new pressure-temperature limit curves described in this amendment request. Application of the ratio procedure methodology reduces the validity of the Unit 2 curves to approximately 18.6 EFPY. As of August 1, 1998, Oconee Units 1, 2, and 3 were at 18.18, 17.92, and 17.72 EFPY, respectively. Unit 2 is projected to reach 18.6 EFPY in April 1999. As a result, Duke requests approval of this proposed amendment by January 29, 1999, to support continued operation of Unit 2 and implementation of the new pressure-temperature limits.

Duke requested that Framatome Technologies, Inc. (FTI), generate new pressure-temperature limit curves for Units 1, 2, and 3. These curves have been developed and envelope operation up to 26 EFPY for all three units.

3.0 Technical Justification:

3.1 Pressure-Temperature Curves Justification:

Fluence Program:

In 1976 several utilities with reactor vessels designed by Babcock & Wilcox (B&W), including Duke Power, requested exemptions from the 10 CFR 50, Appendix H requirement for an in-vessel material surveillance program. The Staff reviewed and evaluated each licensee's request for an exemption and the plan for an integrated surveillance program. The staff then granted the requested exemption.

A revised 10 CFR 50, Appendix H became effective in July 1983. Section II. C of the revised Appendix H allows an integrated surveillance program provided it was approved by the Director, Office of Nuclear Reactor Regulation. The revised Appendix H provided criteria that were to be used in the evaluation of the surveillance program. In a letter dated March 14, 1984, the B&W Owners Group submitted an updated integrated surveillance program for Staff review and approval. The program was documented in BAW-1543A, Revision 2, Integrated Reactor Vessel Surveillance Program (Reference 1). In the SER for BAW-1543A, the Staff concluded that the topical report meets the evaluation criteria of Sections

II.C of Appendix H. The following statements are from the conclusions section of the SER.

> In-cavity dosimetry testing should continue in order to reduce uncertainties in neutron fluence for vessels that do not contain in-vessel dosimetry. If these test results provide an effective method of monitoring vessel neutron fluence, the in-cavity dosimetry should be incorporated in plants.

In a letter dated September 16, 1985, the B&W Owner Group requested an evaluation of a "Cavity Dosimetry Program" under development for use in B&W plants. This program is described in Topical Report BAW-1875 (Reference 2). This report was approved by the Staff in June 1986. It was noted in BAW-1875 that the material surveillance program will have provided all the required empirical information for the fluence-toughness relationship by the early 1990's. During this time, a portion of the surveillance capsules would have been removed. The cavity dosimetry program will then continue to provide vessel irradiation data beyond the end of the integrated surveillance capsule dosimetry program in an accurate and convenient manner.

The calculational methodology for predicting the fluence using the cavity dosimetry was validated in the benchmark phase of the cavity dosimetry program. The benchmark consisted of both surveillance capsule and cavity dosimetry comparisons of calculations to dosimetry measurements. The results of these benchmarks are documented in FTI topical report BAW-2205-00 (Reference 3). The results demonstrate that the conclusions of the Oconee Units 1, 2, and 3 fluence data used to develop the pressure-temperature limits are sufficient for safety and licensing evaluations of reactor vessel embrittlement.

Fluence values used for this pressure-temperature limit submittal are based on calculations provided in References 4, 5, and 6 for Units 1, 2, and 3, respectively.

<u>Determination of Adjusted RT_{NDT} (ART)</u>:

The projected 26 EFPY ART values at the 1/4 Thickness (1/4T) and 3/4 Thickness (3/4T) locations for the beltline regions of the ONS reactor vessels were calculated by FTI (References 7, 8, 9 for Units 1, 2, and 3, respectively).

ATTACHMENT 3

TECHNICAL JUSTIFICATION

These calculations were in accordance with Regulatory Guide 1.99, Revision 2, and the guidelines presented by the NRC in the November 12, 1997, briefing concerning review of responses to Generic Letter 92-01, Revision 1, Supplement 1. The calculations determined the ART for the various reactor Vessel (RV) materials using Regulatory Guide 1.99, Revision 2, Regulatory Positions 1.1 and 2.1. The selected controlling values are those RV locations with the highest ART for 1/4T and 3/4T whether determined using Regulatory Position 1.1 or 2.1 methodology. The controlling values for Unit 1 were determined to be the circumferential weld of the intermediate shell plates to the upper shell plates. The controlling values for Units 2 and 3 were determined to be those of the circumferential weld of the RV upper shell forging to the lower shell forging. The maximum fluence values and controlling ART values for 26 EFPY, as determined by FTI in References 7, 8, and 9, are summarized in Tables 1, 2, and 3 to this attachment for Units 1, 2, and 3, respectively.

Determination of Pressure-Temperature Limits:

The proposed pressure-temperature limits for Units 1, 2, and 3 were developed using FTI computer code PTPC 3.3 (Reference 10). The methods and criteria employed to establish operating pressure and temperature limits are described in NRC approved topical report BAW-10046A (Reference 11). The method of analysis consists of determining the pressure-temperature limits for the beltline region, the nozzle region and the closure head region of the reactor vessel for normal heatup, normal cooldown, and inservice leak and hydrostatic test. At the request of Duke, FTI conservatively provided 110% of the steady-state Appendix G limits. Since appropriate instrument error allowances are included in the operating procedures, the technical specification pressure-temperature limit curves do not include margins for instrument error. The analyses for Units 1, 2, and 3 are documented in References 12, 13, and 14, respectively.

FTI's calculations of the proposed pressure-temperature limits utilized the following inputs:

- The operational reactor coolant pump constraints were those listed in the Technical Specifications for various RCS temperature bands.

ATTACHMENT 3

TECHNICAL JUSTIFICATION

- The following linear heatup ramps which bound the limits of the Technical Specification:

60 - 280 °F:	50 °F/hr
280 - 570 °F:	100 °F/hr

- The cooldown transient was analyzed as a step transient which bounds the Technical Specification and is defined as follows:

570 °F - 280 °F:	50 °F steps with 30 minute hold periods or equivalent
280 °F - 150 °F:	25 °F steps with 30 minute hold periods or equivalent
At 240 °F:	Decay heat removal system initiated which is modeled as a step change from 240 °F to 207 °F and held at 207 °F for one minute. Following this hold period, a step temperature increase to 227 °F is made. It is assumed that one RCP per loop is operating during this transient.
150 °F - 60 °F:	10 °F steps with 60 minute hold periods or equivalent

For a given transient, the maximum allowable pressure as a function of fluid temperature was obtained through a point-by-point comparison of the results at the 1/4T and 3/4T locations of the limiting beltline weld, the nozzle region and the closure head region. The maximum allowable pressure was taken to be the lowest of the calculated allowable pressures for a given time point. The resulting loci of the points determine the pressure-temperature limit curves. The Technical Specification pressure-temperature limit curves do not include margins for instrument error since allowances for the instrument uncertainty associated with operation within the limits represented by the curves are factored into the operating procedures.

FTI also provided steady state pressure-temperature limits for the development of the LTOP limits using ASME Code Case N-514 (Reference 15). These steady-state limits are multiplied by a factor of 1.1 per ASME Code Case N-514 and subsequently location adjusted. The LTOP pressure-temperature limits and usage of Code Case N-514 are further discussed in the following sections.

In addition to the changes for neutron embrittlement of the reactor vessel, Duke is also proposing to extend the pressure-temperature limit curves from a minimum of 70 °F to 60 °F since operation with the RCS less than 70 °F during refueling outages may be necessary. For operation at temperatures less than 70 °F, the pressure limit does not change as a function of temperature. During operation at less then 60 °F, the RCS is in the refueling mode, open to the atmosphere and depressurized. LTOP limits are not applicable when the RV head is removed.

In preparation for implementation of the requested change in the minimum RCS temperature from 70 °F to 60 °F, the core reload calculations and safety evaluations for all Oconee units will be revised to ensure adequate shutdown margin at the new lower RCS temperature. Implementation of this aspect of the change will include modifying the Bases shutdown margin discussion of either CTS Section 3.2 or ITS Section B.3.1.1, as applicable, to address the temperature change.

3.2 LTOP Limits Justification:

The low temperature pressure-temperature limits provide restrictions for the protection from non-ductile failure of the RCS under transient conditions. The LTOP System protects the reactor vessel from excessive pressures at low temperature conditions. The design basis events for the LTOP System are as follows:

1. Erroneous actuation of the High Pressure Injection System.

2. Erroneous opening of the core flood tank discharge valve.

3. Erroneous addition of nitrogen to the pressurizer.

4. Makeup control valve (makeup to the RCS) fails full open.

5. Pressurizer heaters erroneously energized.

6. Temporary loss of the Decay Heat Removal System's capability to remove decay heat from the RCS.

7. Thermal expansion of the RCS after starting a reactor coolant pump, as a result of the stored energy in the steam generators.

The LTOP transient pressure-temperature limits have been calculated in accordance with the methodology described in ASME Section XI, Code Case N-514. ASME Code Case N-514 was prepared to provide an alternate approach to ASME Section XI, Appendix G, for determining loads and temperature conditions during reactor startup and shutdown. NRC Regulatory Guides 1.84, 1.85, and 1.147 list the ASME Code Cases that have been approved by the NRC. Code Case N-514 has been previously approved on a plant specific basis for other utilities. However, the content of Code Case N-514 has been incorporated into Appendix G of Section XI of the ASME Code and published in the 1993 Addenda to Section XI. 10CFR50.60 allows licensees to use proposed alternatives under 10CFR50.12. Therefore, pursuant to 10CFR50.12, an exemption to 10CFR50.60 is requested to use Code Case N-514 for Oconee Units 1, 2, and 3. Justification for use of the code case is provided in Section 3.3 of this technical justification.

The code case limits the maximum pressure in the vessel to 110% of the pressure determined to satisfy Appendix G, paragraph G-2215 of ASME Section XI, Division 1, as a design limit. Code Case N-514 defines the enable temperature as the greater of the coolant temperature corresponding to a metal temperature of the ART + 50 °F or a minimum of 200 °F. The ARTs are provided in Tables 1, 2, and 3 to this Technical Justification for Units 1, 2, and 3, respectively. The ART has been determined to be 236 °F for Oconee Unit 2 using the methodology described in the above Section 3.1. Therefore, this resulted in a LTOP enable temperature of 286 °F (236 °F + °50 °F) for the limiting weld material (WF-25). The current LTOP enable temperature specified in

ITS 3.4.12 and CTS 3.1.2.9 is 325 °F. Since this accounts for instrument uncertainty and provides additional margin, it will remain unchanged. The Oconee Unit 2 ART is the most limiting (i.e., the highest temperature and bounds the enable temperatures for Oconee Units 1 and 3), and is therefore used for the LTOP enable temperature for all three Oconee units. Instrument uncertainties are factored into the RCS pressure-temperature limits of the LTOP Technical Specifications.

The present Technical Specification requirement to limit RCS pressure to less than 345 psig whenever RCS temperature is less than 220 °F is incomplete in that there are multiple limits. These multiple limits are currently controlled via Selected Licensee Commitment (SLC) 16.5.2, item 1). The SLC will be revised to incorporate limits applicable to the new pressure-temperature and LTOP limits addressed in this submittal. These limits are necessary to maintain operability of the second LTOP train by allowing at least 10 minutes for operator action to terminate the transient. The current Technical Specification requirement is replaced with a statement that RCS pressure limits are based on RCS temperature.

In order to maintain the low temperature transient pressure-temperature limits within acceptable limits it became necessary to limit the rate of energy addition by pressurizer heaters to the pressurizer. This is accomplished by deactivating pressurizer heater bank 3 or 4 along with the other "second train" of LTOP administrative controls when the RCS temperature is at or below the LTOP enable temperature and an RCS vent path capable of mitigating an LTOP event is not open.

The minimum temperature for reactor head bolt-up or RCS pressurization is 60 °F excluding instrument uncertainty. This minimum temperature is based on 10 CFR 50, Appendix G. Procedures involving operation below the LTOP enable temperature, including RV head removal and installation, will be changed to reflect the reduction in minimum allowable RV temperature from 70 °F to 60 °F including an allowance for instrument uncertainty.

ATTACHMENT 3

TECHNICAL JUSTIFICATION

3.3 Justification for ASME Code Case N-514 Exemption Request:

The following information provides the basis for the exemption request to 10CFR50.60 for use of ASME Section XI Code Case N-514, "Low Temperature Overpressure Protection Section XI, Division 1", in lieu of 10CFR50, Appendix G.

10CFR50.12 Requirements: The requested exemption to allow use of ASME Code Case N-514 for determining the LTOP enable temperature meets this criteria as discussed below. 10CFR50.12 states that the Commission may grant an exemption from requirements contained in 10CFR50 provided that:

1. The requested exemption is authorized by law: No law exists which precludes the activities covered by this exemption request. 10CFR50.60(b) allows the use of alternatives to 10CFR50, Appendices G and H when an exemption is granted by the Commission under 10CFR50.12.

2. The requested exemption does not present an undue risk to the public health and safety: A revised LTOP relief valve enable point is being proposed, as described in Section 3.2 above, for Oconee Units 1, 2, and 3. The enable temperature has been developed to provide bounding reactor vessel low temperature integrity protection during the LTOP design basis transients. The LTOP setpoint will utilize 110% of the pressure determined to satisfy Appendix G, paragraph G-2215 of ASME Section XI, Division 1, as a design limit. The approach is justified by consideration of the overpressurization design basis events and the resulting margin to reactor vessel failure.

   Restrictions on allowable operating conditions and equipment operability requirements have been established to ensure that operating conditions are consistent with the assumptions of the accident analysis. Specifically, RCS pressure and temperature must be maintained within the heatup and cooldown rate dependent pressure-temperature limits specified in ITS 3.4.3 and CTS 3.1.2. Therefore, this exemption does not present an undue risk to the public health and safety.

TECHNICAL JUSTIFICATION

3. The requested exemption will not endanger the common defense and security: The common defense and security are not endangered by this exemption request.

4. Special circumstances are present which necessitate the request for an exemption to the regulations of 10CFR50.60: Pursuant to 10CFR50.12(a)(2), the NRC will consider granting an exemption to the regulations if special circumstances are present. This exemption meets the special circumstances of paragraphs:

   (a)(2)(ii) - demonstrates that the underlying purpose of the regulation will continue to be achieved;
   (a)(2)(iii) - would result in undue hardship or other cost that are significant if the regulation is enforced and;
   (a)(2)(v) - will provide only temporary relief from the applicable regulation and the licensee has made good faith efforts to comply with the regulations.

   10CFR50.12(a)(2)(ii): ASME Code Case N-514 recognizes the conservatism of the ASME Appendix G curves and allows setting the LTOP setpoint such that the ASME Section XI, Appendix G limits are not exceeded by more than 10%. The code case permits use of an LTOP enable temperature equal to an [adjusted] RT_{NDT} + 50 °F or 200 °F, whichever is greater for the limiting material. This allows for implementation of a LTOP setpoint that preserves an acceptable margin of safety while maintaining operational margins for reactor coolant pump operation at low temperatures and pressures. The LTOP setpoint established in accordance with ASME Code Case N-514 will also minimize the unnecessary actuation of protection system pressure relieving devices. Therefore, establishing the LTOP setpoint in accordance with ASME Code Case N-514 criteria satisfies the underlying purpose of the ASME Code and the NRC regulations to ensure an acceptable level of safety.

   10CFR50.12(a)(2)(iii): The Reactor Coolant System pressure-temperature operating window at low temperatures is defined by the LTOP setpoint. Implementation of a LTOP setpoint without the additional margin allowed by ASME Code Case N-514 would restrict the pressure-temperature operating window and would potentially result in undesired actuation of the LTOP

System. This constitutes an unnecessary burden that can be alleviated by the application of Code Case N-514. Implementation of an LTOP setpoint as allowed by ASME Code Case N-514 does not significantly reduce the margin of safety associated with normal operational heatup and cooldown limits. Further, the LTOP guidelines will reduce the potential for an undesired lift of the LTOP valve.

10CFR50.12(a)(2)(v): The exemption provides only temporary relief from the applicable regulation and ONS has made a good faith effort to comply with the regulation. We request that the exemption be granted until such time that the NRC generically approves ASME Code Case N-514 for use by the nuclear industry. However, to retain sufficient pressure-temperature operating margin to the end of the proposed Oconee Units 1, 2 and 3 Technical Specification pressure-temperature limits, we require the exemption to use Code Case N-514.

Code Case N-514, Conclusion for Exemption Acceptability: Compliance with the specified requirements of 10CFR50.60 would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety. ASME Code Case N-514 allows setting the LTOP actuation setpoint and enable temperature such that the ASME Section XI, Appendix G, limits are not exceeded by more than 10%. This proposed alternative is acceptable because the Code Case recognizes the conservatism of the ASME Appendix G curves and allows establishing a LTOP setpoint which retains an acceptable margin of safety while maintaining operational margins for reactor coolant pump operation at low temperatures and pressures. As discussed above, the Code Case provides an acceptable margin of safety to prevent reactor vessel failure, and reduces the potential for an undesired LTOP actuation. Therefore, application of Code Case N-514 for ONS will ensure an acceptable level of safety.

4.0 Affected UFSAR Sections:

Section 5.2.3.7 of the Oconee UFSAR will be revised to reflect the changes to the LTOP analysis described in this amendment application. This UFSAR change will be made in accordance with 10 CFR50.71(e).

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TECHNICAL JUSTIFICATION

5.0 <u>References:</u>

1. BAW-1543A, Revision 2, "Integrated Reactor Vessel Material Surveillance Program," A. L. Lowe, Jr., et al., B&W Nuclear Division, May 1985.

2. BAW-1875, "The B&WOG Cavity Dosimetry Program," S. Q. King, August 1985.

3. BAW-2205-00, "B&WOG Cavity Dosimetry Benchmark Program," C. Garat, et al., B&WOG Materials Committee, December 1994.

4. FTI Document 32-1266230-00, "ONS-1 PT Fluence Analysis Results - Cycles 11-16," S. Q. King, January 1998.

5. FTI Document 86-1258198-01, "ONS-2 PT Fluence Analysis Results - Cycles 9-14," January 1998.

6. FTI Document 32-1266234-00, "ONS-3 PT Fluence Analysis Results - Cycles 12-15," S. Q. King, January 1998.

7. FTI Document 32-5000879-00, "Adjusted Reference Temperature for 26 & 33 EFPY for ONS-1," M. J. Devan, January 1998.

8. FTI Document 32-5000558-01, "Adjusted Reference Temperature for 26 & 33 EFPY for ONS-2," M. J. Devan, January 1998.

9. FTI Document 32-5000880-00, "Adjusted Reference Temperature for 26 & 33 EFPY for ONS-3," M. J. Devan, February 1998.

10. FTI Document 32-1171775-05, Verification of PTPC & Users Manual," J. W. Moore, III, March 1994.

11. BAW-10046A, Rev. 2, "Methods of Compliance with Fracture Toughness and Operational Requirements of 10CFR50, Appendix G," H. W. Behnke, et al., BWNT, Lynchburg, VA, June 1986.

12. FTI Document 32-5001202-00, "OC-1 P/T Limits at 26 & 33 EFPY," A. D. Nana, February 1998.

13. FTI Document 32-5000576-00, "OC-2 P/T Limits at 26 & 33 EFPY," A. D. Nana, January 1998.

14. FTI Document 32-5001238-01, "OC-3 P/T Limits at 26 & 33 EFPY," A. D. Nana, August 1998.

15. ASME Code Case N-514, "Low Temperature Overpressure Protection, Section XI, Division 1," February 12, 1992.

ATTACHMENT 3

TECHNICAL JUSTIFICATION

7.0 Attached Tables:

1. Data for Preparation of Pressure-Temperature Limit Curves for Oconee Unit 1 - Applicable Through 26 EFPY

2. Data for Preparation of Pressure-Temperature Limit Curves for Oconee Unit 2 - Applicable Through 26 EFPY

3. Data for Preparation of Pressure-Temperature Limit Curves for Oconee Unit 2 - Applicable Through 26 EFPY

Attachment 3 - Technical Justification

Table 1

Data for Preparation of Pressure-Temperature Limit Curves for Oconee Unit 1 - Applicable Through 26 EFPY

Material Description				Chemical Composition				26 EFPY Fluence, n/cm²			ΔRT_{NDT}, F at 26 EFPY		Margin		ART, F at 26 EFPY	
Reactor Vessel Beltline Region Location	Matl. Ident.	Heat Number	Type	Cu wt%	Ni wt%	Initial RT_{NDT}	Chemistry Factor	Inside Surface	T/4 Location	3/4T Location	T/4 Location	3/4T Location	T/4 Location	3/4T Location	T/4 Location	3/4T Location
Regulatory Guide 1.99, Revision 2, Position 1.1																
Lower Nozzle Belt Forging	AHR 54	ZV-2861	A 508 Cl. 2	0.16	0.65	+3	119.3	6.65E+17	4.01E+17	1.46E+17	30.9	16.8	69.3	64.2	103.2	84.0
Intermediate Shell Plate	C2197-2	C2197-2	SA-302 Gr. BM*	0.15	0.50	+1	104.5	7.09E+18	4.27E+18	1.55E+18	79.8	53.3	63.6	63.6	144.5	118.0
Upper Shell Plate	C3265-1	C3265-1	SA-302 Gr. BM*	0.10	0.50	+1	65.0	7.88E+18	4.75E+18	1.72E+18	51.5	34.7	63.6	63.6	116.2	99.4
Upper Shell Plate	C3278-1	C3278-1	SA-302 Gr. BM*	0.12	0.60	+1	83.0	7.88E+18	4.75E+18	1.72E+18	65.8	44.4	63.6	63.6	130.4	109.0
Lower Shell Plate	C2800-1	C2800-1	SA-302 Gr. BM*	0.11	0.63	+1	74.5	7.86E+18	4.74E+18	1.72E+18	58.9	39.8	63.6	63.6	123.6	104.4
Lower Shell Plate	C2800-2	C2800-2	SA-302 Gr. BM*	0.11	0.63	+1	74.5	7.86E+18	4.74E+18	1.72E+18	58.9	39.8	63.6	63.6	123.6	104.4
LNB to IS Circ. Weld (100%)	SA-1135	61782	ASA/Linde 80	0.23	0.52	-5	157.4	6.65E+17	4.01E+17	1.46E+17	40.8	22.1	56.7	45.2	92.5	62.3
IS Longit. Weld (Both 100%)	SA-1073	1P0962	ASA/Linde 80	0.21	0.64	-5	170.6	5.54E+18	3.34E+18	1.21E+18	119.1	77.9	68.5	68.5	182.6	141.4
IS to US Circ. Weld (ID 61%)	SA-1229	71249	ASA/Linde 80	0.23	0.59	+10	167.6	7.14E+18	4.30E+18	N/A	128.3	N/A	56.0	N/A	[194.3]	N/A
IS to US Circ. Weld (OD 39%)	WF-25	299L44	ASA/Linde 80	0.34	0.68	-5	220.6	N/A	N/A	1.56E+18	N/A	113.0	N/A	68.5	N/A	176.4
US Longit. Weld (Both 100%)	SA-1493	8T1762	ASA/Linde 80	.019	0.55	-5	149.3	6.72E+18	4.05E+18	1.47E+18	111.8	74.4	68.5	68.5	175.3	137.9
US to LS Circ. Weld (100%)	SA-1585	72445	ASA/Linde 80	0.22	0.54	-5	158.0	7.61E+18	4.59E+18	1.67E+18	123.7	83.2	68.5	68.5	187.2	146.7
LS Longit. Weld (100%)	SA-1426	8T1762	ASA/Linde 80	0.19	0.55	-5	149.3	6.49E+18	3.91E+18	1.42E+18	110.4	73.2	68.5	68.5	173.9	136.7
LS Longit. Weld (100%)	SA-1430	8T1762	ASA/Linde 80	0.19	0.55	-5	149.3	6.49E+18	3.91E+18	1.42E+18	110.4	73.2	68.5	68.5	173.9	136.7
Regulatory Guide 1.99, Revision 2, Position 2.1																
LNB to IS Circ. Weld (100%)	SA-1135	61782	ASA/Linde 80	0.23	0.52	-5	133.0	6.65E+17	4.01E+17	1.46E+17	34.5	18.7	48.3	43.6	77.8	57.3
IS to US Circ. Weld (OD 39%)	WF-25	299L44	ASA/Linde 80	0.34	0.68	-5	223.7	N/A	N/A	1.56E+18	N/A	114.5	N/A	68.5	N/A	[178.0]
US to LS Circ. Weld (100%)	SA-1585	72445	ASA/Linde 80	0.22	0.54	-5	151.8	7.61E+18	4.59E+18	1.67E+18	118.9	79.9	48.3	48.3	162.2	123.3

* - SA-302 Gr. B modified by ASME Code Case 1339.

[ ] - Controlling values of the adjusted RT_{NDT}.

Attachment 3 - Technical Justification

Table 2

Data for Preparation of Pressure-Temperature Limit Curves for Oconee Unit 2 - Applicable Through 26 EFPY

Material Description				Chemical Composition				26 EFPY Fluence, n/cm²			ΔRT_{NDT}, F at 26 EFPY		Margin		ART, F at 26 EFPY	
Reactor Vessel Beltline Region Location	Matl. Ident.	Heat Number	Type	Cu wt%	Ni wt%	Initial RT_{NDT}	Chemistry Factor	Inside Surface	T/4 Location	3/4T Location	T/4 Location	3/4T Location	T/4 Location	3/4T Location	T/4 Location	3/4T Location
Regulatory Guide 1.99, Revision 2, Position 1.1																
Lower Nozzle Belt Forging	AMX 77	123T382	A 508 Cl. 2	0.13	0.76	+3	95.0	7.03E+18	4.24E+18	1.54E+18	72.3	48.3	70.7	70.7	146.1	122.0
Upper Shell Forging	AAW 163	3P2359	A 508 Cl. 2	0.04	0.75	+20	26.0	7.61E+18	4.59E+18	1.67E+18	20.4	13.7	20.4	13.7	60.7	47.4
Lower Shell Forging	AWG 164	4P1885	A 508 Cl. 2	0.02	0.80	+20	20.0	7.53E+18	4.54E+18	1.65E+18	15.6	10.5	15.6	10.5	51.2	41.0
LNB to US Circ. Weld (100%)	WF-154	406L44	ASA/Linde 80	0.28	0.59	-5	185.7	7.03E+18	4.24E+18	1.54E+18	141.4	94.4	68.5	68.5	204.8	157.9
US to LS Circ. Weld (100%)	WF-25	299L44	ASA/Linde 80	0.34	0.68	-5	220.6	7.34E+18	4.42E+18	1.61E+18	170.6	114.3	68.5	68.5	234.0	177.8
Regulatory Guide 1.99, Revision 2, Position 2.1																
Upper Shell Forging	AAW 163	3P2359	A 508 Cl. 2	0.04	0.75	+20	8.9	7.61E+18	4.59E+18	1.67E+18	7.0	4.7	7.0	4.7	33.9	29.4
US to LS Circ. Weld (100%)	WF-25	299L44	ASA/Linde 80	0.34	0.68	-5	223.7	7.34E+18	4.42E+18	1.61E+18	173.0	115.9	68.5	68.5	[236.4]*	[179.4]*

* [ ] - Controlling values of the adjusted RT_{NDT}.

Attachment 3 - Technical Justification

Table 3

Data for Preparation of Pressure-Temperature Limit Curves for Oconee Unit 2 - Applicable Through 26 EFPY

Material Description				Chemical Composition				26 EFPY Fluence, n/cm²			ΔRT_{NDT}, F at 26 EFPY		Margin		ART, F at 26 EFPY	
Reactor Vessel Beltline Region Location	Matl. Ident.	Heat Number	Type	Cu wt%	Ni wt%	Initial RT_{NDT}	Chemistry Factor	Inside Surface	T/4 Location	3/4T Location	T/4 Location	3/4T Location	T/4 Location	3/4T Location	T/4 Location	3/4T Location
Regulatory Guide 1.99, Revision 2, Position 1.1																
Lower Nozzle Belt Forging	4680	4680	A 508 CL 2	0.13	0.91	+3	96.0	6.81E+18	4.10E+18	1.49E+18	72.3	48.1	70.7	70.7	146.0	121.8
Upper Shell Forging	AWS 192	522314	A 508 CL 2	0.01	0.73	+40	20.0	7.52E+18	4.53E+18	1.65E+18	15.6	10.5	15.6	10.5	71.2	61.0
Lower Shell Forging	ANK 191	522194	A 508 CL 2	0.02	0.76	+40	20.0	7.50E+18	4.52E+18	1.64E+18	15.6	10.5	15.6	10.5	71.2	60.9
LNB to US Circ. Weld (100%)	WF-200	821T44	ASA/Linde 80	0.25	0.63	-5	181.0	6.81E+18	4.10E+18	1.49E+18	136.2	90.7	68.5	68.5	199.7	154.2
US to LS Corc. Weld (ID 75%)	WF-67	72442	ASA/Linde 80	0.26	0.60	-5	180.0	7.26E+18	4.38E+18	1.59E+18	138.6	92.8	68.5	68.5	[202.1]	[156.3]
US to LS Circ. Weld (OD 25%)	WF-70	72105	ASA/Linde 80	0.32	0.58	-26	199.3	N/A	N/A	1.59E+18	N/A	102.8	N/A	56.0	N/A	132.8
Regulatory Guide 1.99, Revision 2, Position 2.1																
Upper Shell Forging	AWS 192	522314	A 508 CL 2	0.01	0.73	+40	47.4	7.52E+18	4.53E+18	1.65E+18	37.0	24.8	34.0	24.8	111.0	89.7
Lower Shell Forging	ANK 191	522194	A 508 CL 2	0.02	0.76	+40	32.5	7.50E+18	4.52E+18	1.64E+18	25.3	17.0	17.0	17.0	82.3	74.0

[ ] - Controlling values of the adjusted RT_{NDT}.

ATTACHMENT 4
NO SIGNIFICANT HAZARDS CONSIDERATION EVALUATION

Duke Energy Corporation (Duke) has made the determination that this amendment request involves a No Significant Hazards Consideration by applying the standards established by NRC regulations in 10CFR50.92. This ensures that operation of the facility in accordance with the proposed amendment will not:

A. Involve a significant increase in the probability or consequences of an accident previously evaluated?

NO.

Each accident analysis addressed in the Oconee UFSAR has been examined with respect to the changes to the Reactor Pressure Vessel (RPV) pressure-temperature limit curves and related Low Temperature Overpressure settings. The probability of any design basis accident (DBA) is not affected by this change, nor are the consequences of a DBA affected by this change. The revised pressure-temperature limits, which were developed based on NRC approved methodology or ASME Code Case N-514 as described in the Technical Justification, are not considered to be an initiator or contributor to any accident analysis addressed in the Oconee UFSAR. The added requirement to deactivate one pressurizer heater bank during low temperature operation does not significantly change the probability or consequence of any accident previously analyzed. No existing Technical Specification requirements are being deleted with this revision.

B. Create the possibility of a new or different kind of accident from the accident previously evaluated?

NO.

This license amendment revises Oconee RPV pressure-temperature limits. The revised pressure-temperature limits were developed based on NRC approved methodology or ASME Code Case N-514 as described in the Technical Justification. Operation of Oconee in accordance with these proposed new Technical Specifications will not create any failure modes not bounded by previously evaluated accidents. Consequently, this change will not create the possibility of a new or different accident from any accident previously evaluated.

C. Involve a significant reduction in a margin of safety?

NO.

This license amendment revises Oconee RPV pressure-temperature limits. The revised pressure-temperature limits were developed based on NRC approved methodology or ASME Code Case N-514 as described in the Technical Justification. The purpose of this license amendment is to assure that sufficient operating margin to safety is maintained in the operation of the Oconee reactor pressure vessels by establishing new, more limiting pressure-temperature limit curves and adding the requirement to deactivate one pressurizer heater bank. No plant safety limits, set points, or design parameters are adversely affected. The fuel, fuel cladding, and Reactor Coolant System are not impacted. Therefore, there will be no significant reduction in any margin of safety.

Duke has concluded based on this information that there are no significant hazards considerations involved in this amendment request.

ATTACHMENT 5

ENVIRONMENTAL IMPACT ANALYSIS

Pursuant to 10CFR51.22 (b), an evaluation of the proposed amendments has been performed to determine whether or not it meets the criteria for categorical exclusion set forth in 10CFR51.22 (c) 9 of the regulations. The proposed amendment does not involve:

1) A significant hazards consideration.

   This conclusion is supported by the No Significant Hazards Consideration Evaluation which is contained in Attachment 4.

2) A significant change in the types or significant increase in the amounts of any effluents that may be released offsite.

   This amendment will not significantly change the types or amounts of any effluents that may be released offsite.

3) A significant increase in the individual or cumulative occupational radiation exposure.

   This amendment will not significantly increase the individual or cumulative occupation radiation exposure.

In summary, this amendment request meets the criteria set forth in 10CFR51.22 (c) 9 of the regulations for categorical exclusion from an environmental impact statement.