VIRGINIA ELECTRIC AND POWER COMPANY
RICHMOND, VIRGINIA 23261

November 29, 2001

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555

Serial No.	01-684
NL&OS/GSS/ETS	R0
Docket Nos.	50-338
	50-339
License Nos.	NPF-4
	NPF-7

Gentlemen:

VIRGINIA ELECTRIC AND POWER COMPANY
NORTH ANNA POWER STATION UNITS 1 AND 2
PROPOSED TECHNICAL SPECIFICATION CHANGES
REVISED CONTAINMENT ANALYSIS

Pursuant to 10 CFR 50.90, Virginia Electric and Power Company (Dominion) requests amendments, in the form of changes to the Technical Specifications to Facility Operating Licenses Numbers NPF-4 and NPF-7 for North Anna Power Station Units 1 and 2, respectively. The proposed changes will revise the Containment Air Partial Pressure versus Service Water Temperature to establish a new operating domain for containment air partial pressure. A discussion of the proposed Technical Specifications changes is provided in Attachment 1. The marked-up and typed pages to the current Technical Specifications are provided in Attachments 2 and 3, respectively. Changes will also be incorporated into the Improved Technical Specifications (ITS) license amendment request submitted to the NRC on December 11, 2000 (Serial No. 00-606). Attachments 4 and 5 provide the marked-up and typed pages for ITS.

We have evaluated the significant hazards considerations and have determined that the proposed Technical Specifications changes do not constitute a significant hazards consideration as defined in 10 CFR 50.92. The basis for our determination that the changes do not involve a significant hazards consideration is provided in Attachment 6. We have also determined that operation with the proposed changes will not result in any significant increases in the amounts of effluents that may be released offsite and in any significant increases in individual or cumulative occupational radiation exposure. Therefore, the proposed amendment is eligible for categorical exclusion as set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment is needed in connection with the approval of the proposed changes.

Because there are plant modifications inside containment necessary to implement the proposed Technical Specification changes, we plan to implement the changes during the North Anna Unit 1 Cycle 16/17 and Unit 2 Cycle 15/16 refueling outages. These outages are currently scheduled to begin in the fall of 2002 for Unit 2 and the spring of 2003 for Unit 1. To permit effective outage planning, it is requested that the NRC

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approve the proposed Technical Specification changes by August 2002. In addition, it is requested that the effective implementation date for the amendments be specified as the end of the Cycle 15/16 refueling outage for Unit 2 and end of the Cycle 16/17 refueling outage for Unit 1.

If you have any further questions or require additional information, please contact us.

Very truly yours,

Leslie N. Hartz
Vice President – Nuclear Engineering

Attachments:

Attachment 1	Discussion of Changes
Attachment 2	Mark-up of Technical Specifications Changes
Attachment 3	Proposed Technical Specifications Changes
Attachment 4	Mark-up of ITS Changes
Attachment 5	Proposed ITS Changes
Attachment 6	Significant Hazards Consideration Determination

Commitments made in this letter: None

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SN: 01-684
Docket Nos.: 50-338/339
Subject: Proposed TS Changes – Revised Containment Analysis

COMMONWEALTH OF VIRGINIA)
)
COUNTY OF HENRICO)

The foregoing document was acknowledged before me, in and for the County and Commonwealth aforesaid, today by Leslie N. Hartz, who is Vice President - Nuclear Engineering, of Virginia Electric and Power Company. She has affirmed before me that she is duly authorized to execute and file the foregoing document in behalf of that Company, and that the statements in the document are true to the best of her knowledge and belief.

Acknowledged before me this 29th day of November, 2001.

My Commission Expires: March 31, 2004.

Maggie McClure
Notary Public

(SEAL)

Attachment 1

Discussion of Changes

North Anna Power Station
Units 1 and 2
Virginia Electric and Power Company
(Dominion)

1.0 Introduction

Pursuant to 10 CFR 50.90, Virginia Electric and Power Company (Dominion) proposes to revise the North Anna Power Station Technical Specifications containment air partial pressure versus service water temperature operating limits and surveillance requirements for the recirculation spray pump start delay times. These changes reflect a revised containment analysis that was performed to incorporate changes in the plant design basis. One of the more significant changes is the incorporation of instrumentation uncertainty in areas of the analysis where nominal response had previously been assumed. The proposed Technical Specifications changes are applicable to North Anna Units 1 and 2.

2.0 Background

The current Technical Specifications containment air partial pressure versus service water temperature operating curve (TS Figure 3.6-1) was submitted by Dominion to increase the allowable containment temperature from 105°F to 120°F. The NRC approved the license amendment request for operation with the revised domain in Reference 1. The current containment design basis accident assessments that appear in the North Anna Power Station Updated Final Safety Analysis Report (UFSAR) were performed in support of the design change to replace the North Anna steam generators. These analyses validated the continued applicability of TS Figure 3.6-1 for operation with the replacement steam generators. Several supplemental evaluations to address varying plant design conditions have been incorporated into the station licensing basis via safety evaluation. For example, the casing cooling tank minimum design flow rate was found to be larger than that assumed in the previous analyses, and some design margin was consumed in the new analysis to provide operating margin. The revised analysis includes explicit assumptions to reflect such changes.

2.1 Design and Licensing Basis

The design of the North Anna Units 1 and 2 subatmospheric containment structure is based on the following criteria:

1. The peak calculated containment atmosphere pressure shall not exceed the design pressure of 45 psig.
2. The containment shall be depressurized following a design basis accident to below 1 atmosphere absolute pressure in less than 1 hour.
3. Once depressurized, the containment shall be maintained at a pressure less than 1 atmosphere absolute for the duration of the accident.

The peak containment pressure (Criterion 1) sets the maximum operating pressure for cold service water conditions and the containment depressurization system is sized in accordance with Criteria 2 and 3 for warm service water conditions. All three of the above design criteria are confirmed to be met by performing a series of analyses for which the containment air partial pressure and service water temperature are varied. The range of values over which the containment design criteria are satisfied establishes the acceptable operating region. Permissible air partial pressure as a function of service water temperature is specified in the Technical Specifications.

In addition to the structural design criteria, the low head safety injection (LHSI) and recirculation spray (RS) pumps are evaluated to ensure that adequate net positive suction head (NPSH) is available during the postulated accident. The calculated containment analysis pressure and temperature conditions are verified to remain within the existing envelopes used in the program for environmental qualification and operation of safety-related equipment located inside containment. The calculated peak pressure is used as a basis for the containment leak rate test pressure to ensure that dose limits will be met in the event of a release of radioactive material to containment. The minimum allowable operating pressure is used as an initial condition for the inadvertent quench spray (QS) incident to verify the design condition for the containment mat liner.

The containment analyses include the assumption of the most limiting single active failure and availability or unavailability of offsite power (depending on which assumption provides more conservative containment conditions). The revised analyses were performed with the Stone and Webster Engineering Corporation (SWEC) LOCTIC computer code (Reference 2), which is part of the existing containment analysis licensing basis for North Anna. The analysis methodology for the effects of sump debris upon head loss in the NPSH analysis is consistent with the current UFSAR analysis methodology.

3.0 Proposed Changes

Dominion proposes to change the surveillance tolerance on the recirculation spray (RS) pump delay timers based on the replacement of the current timers with more accurate instruments. To incorporate these changes in the plant design basis into the containment analysis basis, the operating curve for containment air partial pressure as a function of service water temperature is being revised. The proposed containment safety analysis may be implemented by the following modifications to the North Anna Units 1 and 2 Technical Specifications. Proposed changes are summarized for both Current and Improved Technical Specifications (ITS). Because the revised containment analysis and proposed Technical Specifications changes may be implemented after the approval and implementation of the North Anna ITS submittal, the ITS changes from the revised containment analysis are maintained separate from the ITS submittal.

3.1 Current Technical Specifications

3.1.1 Technical Specification 3.6.1.4, Containment Systems, Internal Pressure

The specifications on the containment air partial pressure will be revised to the proposed operating curve in TS Figure 3.6-1, Containment Air Partial Pressure Versus Service Water Temperature. In addition, the text will be slightly modified to remove the reference to a constant air partial pressure lower limit of 9.0 psia, which is not a feature of the revised figure.

3.1.2 Technical Specification 4.6.2.2.1, Containment Systems, Containment Recirculation Spray System

The surveillance value for nominal inside recirculation spray (IRS) pump start delay time will be changed from 195 to 400 seconds. The timer uncertainties for both IRS and outside recirculation spray (ORS) will be changed to 5.0 seconds, from 9.75 seconds for IRS and from 21.0 seconds for ORS, to reflect improved instrument accuracy. The reduced instrument uncertainties have been credited in the revised safety analyses.

3.1.3 Technical Specification 4.8.1.1.2, Electrical Power Systems, A.C. Sources

The surveillance for the emergency diesel generator load sequences are affected by the changes to TS 4.6.2.2.1 listed above. TS Table 4.8-1 will be updated with the revised IRS pump start delay time of 400 seconds and the revised delay timer tolerance of 5.0 seconds for both IRS and ORS pumps.

3.2 Improved Technical Specifications

3.2.1 ITS 3.6.4, Containment Pressure

The containment air partial pressure versus service water temperature operating curve in Figure 3.6.4-1 will be changed to the new curve. In addition, the text will be slightly modified to remove the reference to a constant air partial pressure lower limit of 9.0 psia, which is not a feature of the revised figure. The Bases to ITS 3.6.4 will be updated with applicable analysis inputs and results. These changes are consistent with the proposed CTS changes described in Section 3.1.1.

3.2.2 ITS 3.6.7 Bases, Recirculation Spray System

The IRS pump start delay time will be changed from 195 to 400 seconds and the timer uncertainties for both IRS and ORS will be changed to 5.0 seconds, from 9.75 seconds for IRS and from 21.0 seconds for ORS. These Bases changes are consistent with the proposed CTS changes described in Section 3.1.2.

The EDG load sequence times in the current TS 4.8.1.1.2 will be moved to the Technical Requirements Manual as part of the ITS implementation. Therefore, there is no required ITS change that corresponds to the proposed change to TS 4.8.1.1.2.

3.3 Implementation of Proposed Changes

Some RTDs that provide input to TS surveillance parameters (RWST temperature, service water temperature, containment temperature, containment air partial pressure, and casing cooling tank temperature) will be replaced to ensure that instrument uncertainties are consistent with the allowances assumed in the revised accident analysis. Since some of the RTDs that require replacement are located inside containment, the modifications are planned during refueling outages. Thus, it is requested that the NRC approve the proposed Technical Specifications changes by August 2002 and permit the effective date of the amendment to be after the refueling outages for both North Anna units subsequent to NRC approval.

4.0 Technical and Safety Evaluation

The revised containment analyses incorporated several revised design inputs assumptions into the LOCTIC computer code calculations. The parameter changes are associated with containment initial conditions and the containment heat removal systems. Other design inputs, such as mass and energy release data and containment geometry, are not changed from the current analysis. There are no parameter changes that affect the MSLB containment integrity analysis; therefore, reanalysis of the MSLB containment integrity analysis was not performed. Only the LOCA containment response was reanalyzed with the current containment analysis methodology as described in the North Anna UFSAR and the revised design inputs.

4.1 Changes from the Existing Analysis

The analysis does not change the Technical Specifications limits for containment temperature, RWST temperature, casing cooling tank temperature, accumulator pressure, and service water temperature. Other design inputs (e.g., recirculation spray flow rate, uncertainty on service water temperature) have been modified in the accident analysis to be consistent with the plant design basis and approach of including instrument uncertainties. The inside recirculation spray pump start delay time was changed to 400 seconds to ensure adequate NPSH margin consistent with the proposed containment air partial pressure operating limits. The key containment analysis parameters in the revised LOCTIC calculations are summarized in Table 4.1. The computer code inputs are provided and include instrument uncertainty for sensitive parameters.

4.2 Analytical Methodology

The LOCA containment integrity analyses were performed employing the SWEC LOCTIC containment analysis methodology. The LOCTIC computer code is part of the current North Anna containment analysis basis. LOCTIC calculates the pressure and temperature of the containment atmosphere as a function of time following a LOCA or MSLB inside containment. LOCTIC accounts for the containment heat sinks and sources, fission product decay heat, energy release due to steam generator equilibration, post-reflood boiloff, condensation heat and mass transfer, spray depressurization systems, mass and energy release from the LOCA, safety injection spill, and heat removal through the RS heat exchangers. The analytical methodology described in the North Anna UFSAR, Section 6.2.1.1.1, is employed in the revised containment analysis.

LOCTIC analyses were performed for the range of key parameter values in Table 4.1 to verify that the containment design criteria are satisfied. Instrumentation uncertainties were deterministically included for sensitive parameters. Analyses were performed to determine the containment peak pressure and temperature, depressurization time for the containment to reach subatmospheric pressure, and the available NPSH for the recirculation spray and low head safety injection (LHSI) pumps. The analyses were performed at the limiting break location and size and include the limiting single failure. The containment peak pressure and depressurization analyses establish the upper air pressure limit of the containment air partial pressure versus service water operating curve. The NPSH analyses establish the lower limit of the containment air partial pressure versus service water temperature operating domain. The NPSH analyses include the head loss through the sump screens due to insulation debris blockage caused by the jet forces from the postulated high-energy line break. The debris head loss methodology is consistent with the current licensing basis described in the North Anna UFSAR.

Each scenario was analyzed with the LOCTIC computer code. Each analysis result was verified against the applicable acceptance criteria to ensure the containment design criteria continue to be satisfied for the revised allowable containment operating conditions. The inadvertent QS actuation event was analyzed with the minimum containment pressure from the NPSH analyses and the minimum RWST temperature to ensure that the containment liner design criteria continue to be satisfied. Finally, the pressure and temperature results were verified to remain within the environmental zone description equipment qualification envelope.

It is important to note that the containment analysis methodology has not changed from the current North Anna licensing basis. Only specific design inputs related to heat removal systems and containment initial conditions are revised in this containment analysis.

4.3 Containment Analysis Description

The range of key input values in Table 4.1 is used to prepare input for each of the analysis cases. The following LOCA containment response cases are involved in the reanalysis:

- Containment Peak Pressure and Temperature (Section 4.3.1)
- Subatmospheric Peak Pressure/Depressurization Time (Section 4.3.2)
- LHSI Pump NPSH (Section 4.3.3)
- IRS/ORS Pumps NPSH (Section 4.3.4)

Each analysis case is summarized with results that are verified against the acceptance criteria. The inadvertent QS actuation event was analyzed assuming the minimum initial containment pressure consistent with the NPSH analyses to ensure that the containment liner design criteria continue to be satisfied. Finally, the maximum pressure and temperature results were verified to continue to be within the environmental zone description equipment qualification envelope.

4.3.1 Peak Pressure and Temperature Analysis

The peak containment pressure is a function of the initial total pressure and average temperature of the containment atmosphere, the containment free volume, the passive heat sinks in the containment, and the rates of mass and energy released to the containment. The passive heat sinks in the containment are considered to be at the same initial temperature as the initial average containment atmosphere temperature. Maximizing the initial containment total pressure and average atmospheric temperature maximizes the calculated peak pressure. Peak pressure cases support a maximum containment air partial pressure limit (including uncertainties) such that the calculated peak pressure during the design basis accident will be less than 44.1 psig. This value is the existing containment leakrate pressure limit as specified in Technical Specifications 3.6.1.2 and 3.6.1.3.

The hot leg double-ended rupture with maximum initial containment pressure, temperature, and relative humidity is the limiting LOCA case for containment peak pressure and temperature. The calculated peak containment pressure is 44.09 psig and the peak containment temperature is 272.5°F; the peak values occur at 18.7 seconds. A maximum operating containment air partial pressure of 11.7 psia ensures that the maximum containment leakrate pressure of 44.1 psig is not exceeded during the design basis LOCA. The 11.7 psia maximum initial air partial pressure is independent of service water temperature, because the peak pressure occurs before service water affects heat removal. A maximum operating containment temperature of 120°F ensures that the containment design temperature of 280°F is not exceeded.

4.3.2 Depressurization Analysis

The depressurization analysis was performed to show that the containment can conservatively be returned to subatmospheric conditions within one hour and remain subatmospheric thereafter. The time required to depressurize the containment and the capability to maintain it subatmospheric after a pump suction double-ended rupture (PSDER) depends on the mass of air in the containment, the design of the containment depressurization systems, and service water temperature. When the service water temperature is elevated, it is more difficult to depressurize the containment following a LOCA. Therefore, the acceptable range for containment air partial pressure is reduced at high service water temperatures.

The PSDER with one diesel generator as the single failure is the limiting case for containment depressurization. The single failure results in only one train of engineered safety features available. Minimum flow rates for IRS and ORS are assumed. The PSDER is analyzed at different initial service water temperatures and containment pressures to determine an upper limit on Figure 4.1 that satisfies the depressurization acceptance criteria. Analyses were performed for the current Technical Specifications service water temperature operating range of 35°F to 95°F. Minimum containment temperature and maximum RWST temperature are assumed. Table 4.2 summarizes the key results from the depressurization analyses. The longest depressurization time was found to be 3373 seconds at 38°F service water temperature. The analyses demonstrate that, for operation below the upper limit on Figure 4.1, the containment depressurizes to subatmospheric conditions in less than one hour and the pressure remains below 14.7 psia thereafter. The containment design criteria continue to be satisfied for the depressurization analyses.

4.3.3 LHSI Pump NPSH Evaluation

Analyses were performed to demonstrate that the LHSI pumps have adequate NPSH throughout the postulated LOCA. The NPSH available must be greater than the NPSH required at all times during the accident. The LHSI recirculation flow rate is based on one emergency bus as the most limiting single failure (leaving one LHSI and one HHSI pump available). The required LHSI pump NPSH is 13.4 ft at the analysis flow rate of 4030 gpm. The LHSI NPSH cases assume minimum IRS and ORS flow rates, minimum SW flow rate, and maximum containment temperature. The PSDER mass and energy data provide the limiting LHSI pump NPSH results. Sump debris head loss is included in the LHSI pump NPSH analysis. Acceptable operation is above the containment air partial pressure, at a specific SW temperature, that results in greater than 0 ft NPSH margin. However, for conservatism, the minimum containment air partial pressure limits in Technical Specifications (see Section 4.3.5) are based on ensuring a minimum 0.5-ft of available NPSH margin throughout the entire service water temperature operating range. This ensures the available LHSI pump NPSH is 0.5 ft greater than the required NPSH for operation in the acceptable region of Figure 4.1.

4.3.4 RS Pump NPSH Evaluation

Analyses were performed to demonstrate that the IRS and ORS pumps have adequate NPSH throughout the postulated LOCA. HLDER mass and energy data are conservative for maximizing the energy in the containment sump. One LHSI pump is the limiting single failure. The RS pump NPSH cases assume maximum RS pump flow rate, maximum SW flow rate, and maximum containment temperature. The ORS pump required NPSH is 11.3 ft at 3750 gpm, and the IRS pump required NPSH is 9.6 ft at 3450 gpm.

The RS NPSH calculation considers the break that potentially generates the largest quantity of insulation debris, the portion of that debris that could reach the sump screens, and the additional head loss across the sump screens because of the debris. The head loss reduces the available

NPSH. For the analyzed case, all debris accumulates on the sump screens within about 10 minutes following the LOCA.

The LOCTIC computer code was run for several combinations of service water temperature and containment pressure in order to establish a containment air partial pressure lower limit. The limiting acceptable operation occurs at containment air partial pressure and SW temperature that results in greater than 0 ft NPSH margin. The Technical Specification minimum containment air pressure lower limits (see Section 4.3.5) are based on 0.5-ft of available NPSH margin across the entire service water temperature operating range. Therefore, the available RS pump NPSH is at least 0.5 ft greater than the required NPSH for operation in the acceptable domain of Figure 4.1.

4.3.5 Revised Containment Pressure Operating Curve

Technical Specifications Figure 3.6-1, "Containment Air Partial Pressure Versus Service Water Temperature" was revised as a result of the new containment analyses. The revised operating curve is provided as Figure 4.1. The peak pressure analysis sets the upper pressure limit below 38°F service water, the point where the peak pressure and depressurization analyses converge at 11.7 psia. The depressurization analyses create the upper pressure limit between 38°F and 95°F service water. The lower bound of the Technical Specifications containment air partial pressure operating curve is defined by the LHSI pump NPSH results for service water temperature greater than 73°F and by the RS pumps NPSH results for service water temperature less than 73°F. The containment air partial pressure is 8.85 psia for 73°F service water, where the curves intersect. This represents the minimum operating containment air partial pressure on Figure 4.1.

The revised containment analyses meet all of the acceptance criteria, as specified in the plant UFSAR, for operation in the allowable range of the revised Technical Specification containment air partial pressure operating curve. Specifically,

- The containment peak pressure is less than the 44.1 psig containment leakrate pressure limit (Technical Specification 3.6.1.2 and 3.6.1.3), and the peak temperature is less than the design limit of 280°F.
- The containment depressurizes to less than 14.7 psia in less than one hour and remains subatmospheric thereafter.
- The LHSI and RS pumps available NPSH is greater than the required NPSH during the postulated LOCA.

4.3.6 Inadvertent QS Actuation Event

The lowest potential operating containment pressure is used as an initial condition for analysis of the inadvertent QS actuation event. The minimum credible pressure is calculated to demonstrate that different portions of the containment liner meet the design criteria. While the Technical Specification operating lower limit is based on 0.5 ft of NPSH margin, the initial pressure for the inadvertent QS event is conservatively obtained from an analysis with 0 ft NPSH margin. The minimum air pressure supported by the containment analysis is 8.43 psia at 55°F service water temperature. The inadvertent QS actuation analysis results in a total containment pressure of 7.07 psia, which is greater than the 5.5 psia minimum allowable internal pressure for structural considerations. Therefore, operation at any pressure in the allowable region of Figure 4.1 would not challenge the containment integrity for the inadvertent QS actuation event.

4.3.7 Equipment Environmental Qualification

The temperature and pressure results from the peak pressure and depressurization analyses were compared to the existing environmental zone description equipment qualification limits. The NPSH analyses minimize containment pressure and air temperature, so those analysis results are non-limiting for the purposes of equipment qualification. Consequently, the equipment qualification profiles remain bounding.

4.3.8 Main Steamline Break Evaluation

There are no parameter changes that affect the MSLB containment integrity analysis of record. The revised LOCA containment analyses support a maximum containment air partial pressure of 11.7 psia. The MSLB analyses of record were performed at 11.2 psia. The MSLB containment analysis of record has significant margin to the event acceptance criteria for the 1.4 ft^2 break, and an increase in initial pressure from 11.2 to 11.7 psia does not cause the MSLB accident to result in more severe containment pressurization than the LOCA analysis. Other initial conditions in the MSLB analysis are not affected by the revised containment design inputs or the Technical Specifications containment air partial pressure operating domain. The current MSLB containment integrity analysis remains bounded by the LOCA containment analyses, and explicit reanalysis of the MSLB containment integrity analysis was not performed.

4.3.9 Conclusions from Revised Containment Analysis

The North Anna containment integrity analyses were revised to incorporate changes in the plant design basis and to explicitly include several issues that are part of the current analysis basis but were not included in previous LOCTIC analyses. The Technical Specifications containment air partial pressure versus service water temperature operating curve will be revised based on the new accident analysis. Technical Specification changes are required for the IRS pump start delay time and the uncertainties associated with the IRS and ORS delay timers. The analyses meet all of the acceptance criteria, as specified in the plant UFSAR, for operation in the allowable range of the revised Technical Specification containment air partial pressure versus service water temperature operating curve. Specifically,

- The containment peak pressure is less than the 44.1 psig containment leakrate pressure limit (Technical Specification 3.6.1.2 and 3.6.1.3), and the peak temperature is less than the design limit of 280°F.
- The containment depressurizes to less than 14.7 psia in less than one hour and remains subatmospheric thereafter.
- The LHSI and RS pumps available NPSH is greater than the required NPSH during the postulated LOCA.
- The containment liner design criteria are satisfied based on analysis of the inadvertent QS actuation event from the minimum allowable containment air partial pressure.
- The environmental zone description equipment qualification profiles for pressure and temperature bound the predicted pressures and temperatures from the containment analyses.

4.4 Environmental Assessment

The revised containment analysis and the associated Technical Specifications changes for the containment air partial pressure operating curve and recirculation spray system delay times will not increase the individual or cumulative occupational radiation exposure. The containment system and the spray systems will remain operable to prevent the release of radioactivity. Thus, the risk of offsite release is not increased. The containment will continue to be operated and tested in the same manner. No new effluents or effluent release paths are created as a result of the proposed Technical Specifications changes. The proposed changes will continue to ensure the containment and spray systems are operable as assumed in the safety analysis to mitigate the consequences of the accidents. Therefore, the proposed amendment is eligible for categorical exclusion as set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment is needed in connection with the approval of the proposed change.

Table 4.1: Key Parameters in the Containment Analysis

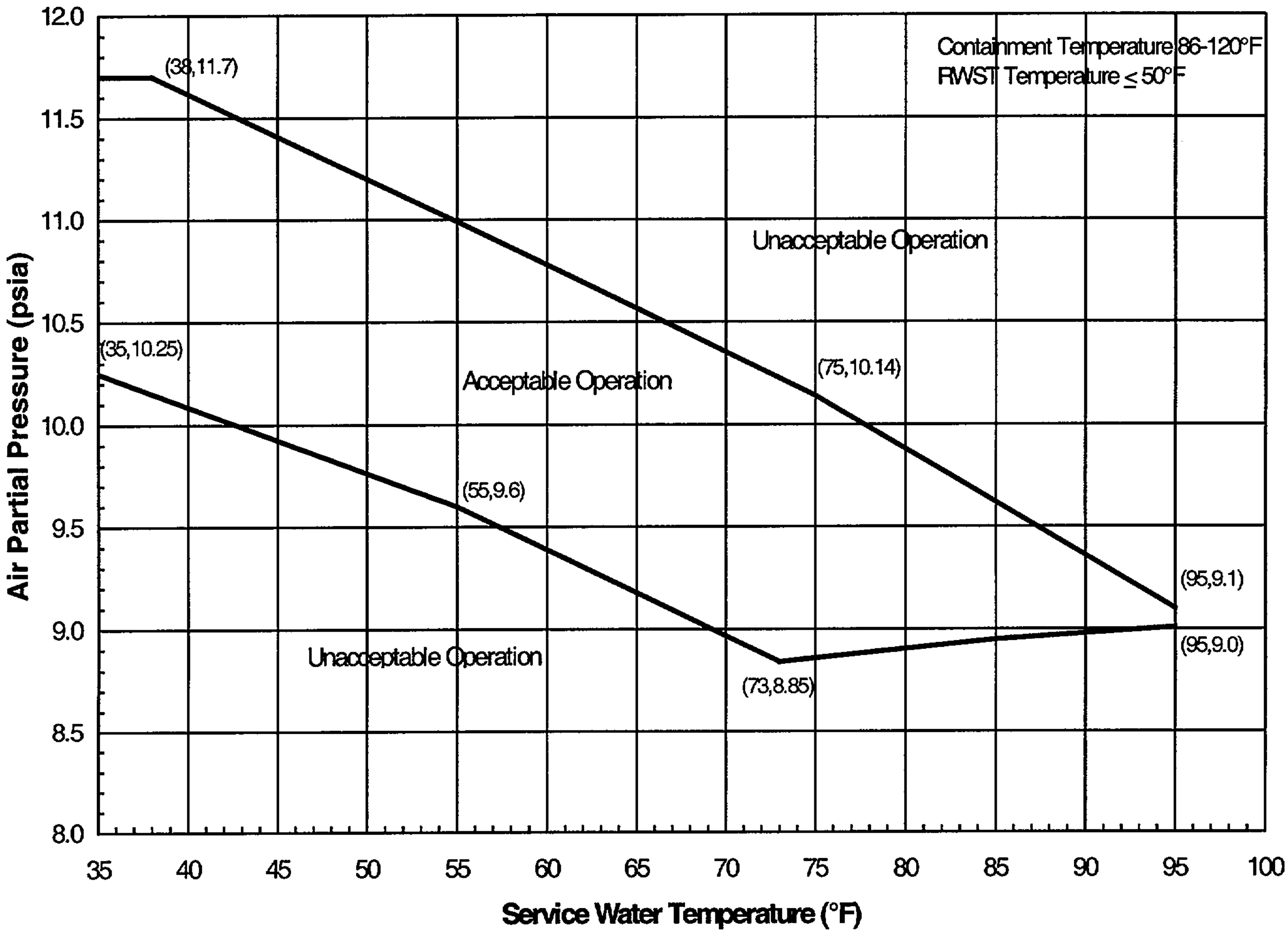
Parameter	Value[1]
Maximum Core Power, MWt	2951
Containment Pressure, psia	See Figure 4.1
Containment Temperature, °F	84.5-121.5
Service Water Temperature, °F	32-98
Maximum Casing Cooling Tank Temperature, °F	53
RWST Temperature, °F	38-52
Accumulator Pressure, psia	590-705
Accumulator Temperature, °F	84.5-121.5
Accumulator Water Volume, gallons	7545-7791
Service Water Flow Rate, gpm	4500-7900
ORS Flow Rate, gpm	3450-3750
IRS Flow Rate, gpm	3100-3400
LHSI Flow Rate, gpm	4030-4120
QS Bleed Flow Rate, gpm	145
Casing Cooling Minimum Flow Rate, gpm	700
High-high CLS Pressure, psia	30
Early RMT Switchover, RWST gallons	356,130
Late RMT Switchover, RWST gallons	386,200
QS Start Time Delay from CDA Signal, sec	70
IRS Tech Spec Allowable Delay Time, sec	395-405
ORS Tech Spec Allowable Delay Time, sec	205-215

1) Key parameter values include instrument uncertainty and flow degradation where applicable.

Table 4.2: Containment Depressurization Analysis Results

Initial TS SW Temperature (°F)	Initial TS Containment Air Partial Pressure (psia)	Temperature		Pressure		Depress-urization	Subatmospheric Pressure	
		Peak (°F)	Time (sec)	Peak (psig)	Time (sec)	Time (sec)	Peak (psig)	Time (sec)
38	11.70	267.11	18.6	41.29	18.6	3373	-0.08	6018
55	10.99	267.15	18.5	40.37	18.5	3267	-0.08	6278
75	10.14	267.22	18.5	39.30	18.5	3271	-0.07	6318
95	9.10	267.32	18.5	37.96	18.5	3309	-0.13	6571

Figure 4.1
Containment Air Partial Pressure versus Service Water Temperature
(Revised Tech Spec Figure 3.6-1)



5.0 Conclusions

Dominion proposes to modify the North Anna Units 1 and 2 Technical Specifications based on the results of revised containment integrity analyses that explicitly include changes to the plant design basis. The safety analyses conducted demonstrate that the containment design criteria continue to be satisfied for operation in the permissible range of the revised containment air partial pressure versus service water temperature curve. The analyses include instrumentation uncertainties on key parameters.

6.0 References

1. Letter from Leon B. Engle (USNRC) to W. R. Cartwright (VEPCO), "North Anna Units 1 and 2 – Issuance of Amendments Re: Containment Upper Limit Temperature (TAC Nos. 67535 and 67536)," December 14, 1988.

2. "LOCTIC-A Computer Code to Determine the Pressure and Temperature of Dry Containments to a Loss-of-Coolant Accident," SWND-1, Stone & Webster Engineering Corp., September 1971, Letter of December 6, 1971, from W. J. L. Kennedy, Chief Nuclear Engineer, Stone & Webster Engineering Corp., to P. A. Morris, Director, Division of Reactor Licensing, AEC.

Attachment 2

Mark-up of Unit 1 and Unit 2 Technical Specifications Changes

North Anna Power Station
Units 1 and 2
Virginia Electric and Power Company
(Dominion)

CONTAINMENT SYSTEMS

INTERNAL PRESSURE

LIMITING CONDITION FOR OPERATION

3.6.1.4 Primary containment internal air partial pressure shall be maintained ≥ 9.0 psia and within the acceptable operation region on Figure 3.6-1.

APPLICABILITY: MODES 1, 2, 3 and 4.

ACTION:

outside the acceptable operation region

With the containment internal air partial pressure < 9.0 psia or above the applicable limits shown on Figure 3.6-1, restore the internal air partial pressure to within the limits within 1 hour or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

SURVEILLANCE REQUIREMENTS

4.6.1.4 The primary containment internal air partial pressure shall be determined to be within the limits at least once per 12 hours.

Replace with revise Figure 3.6-1

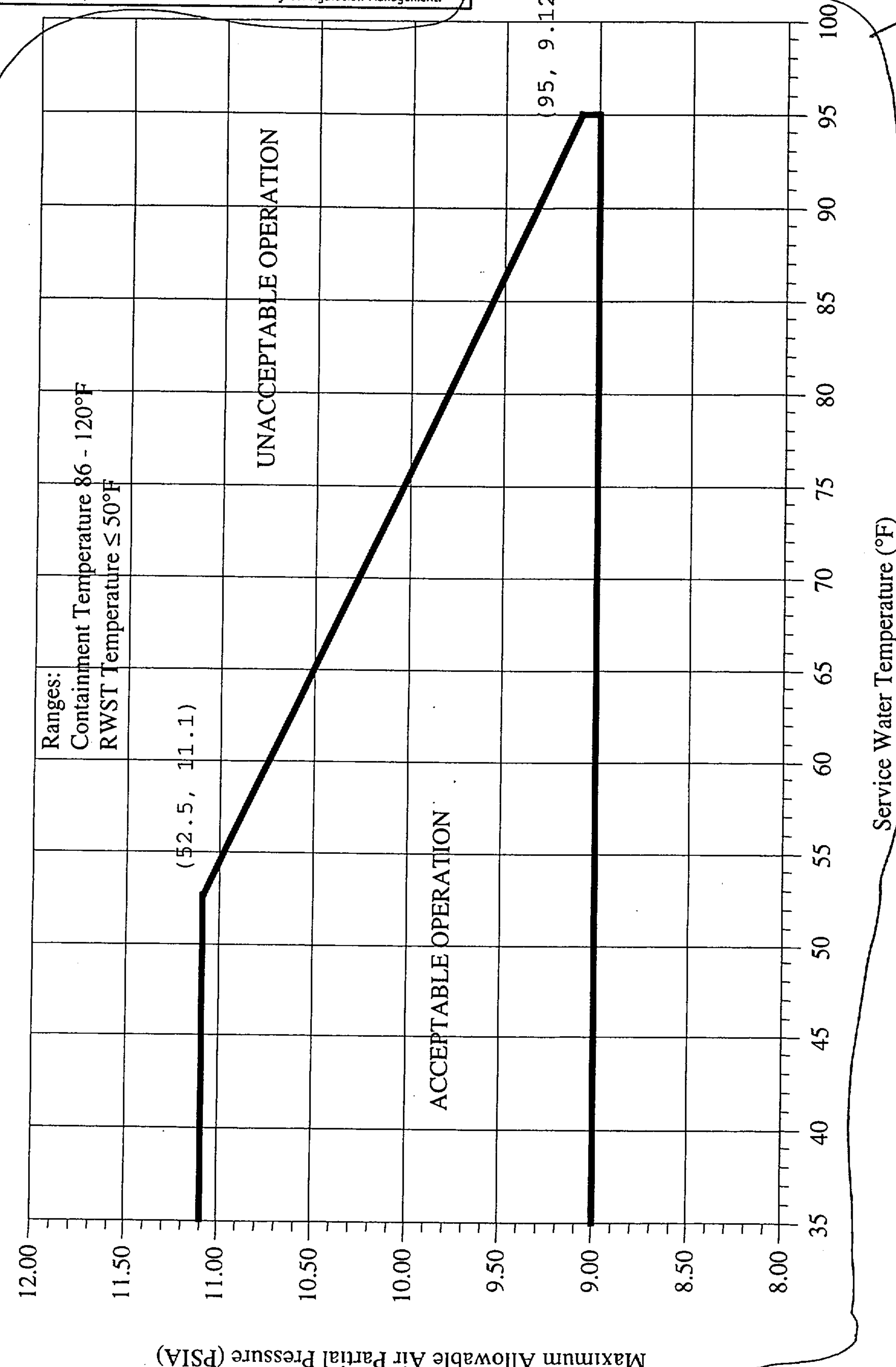
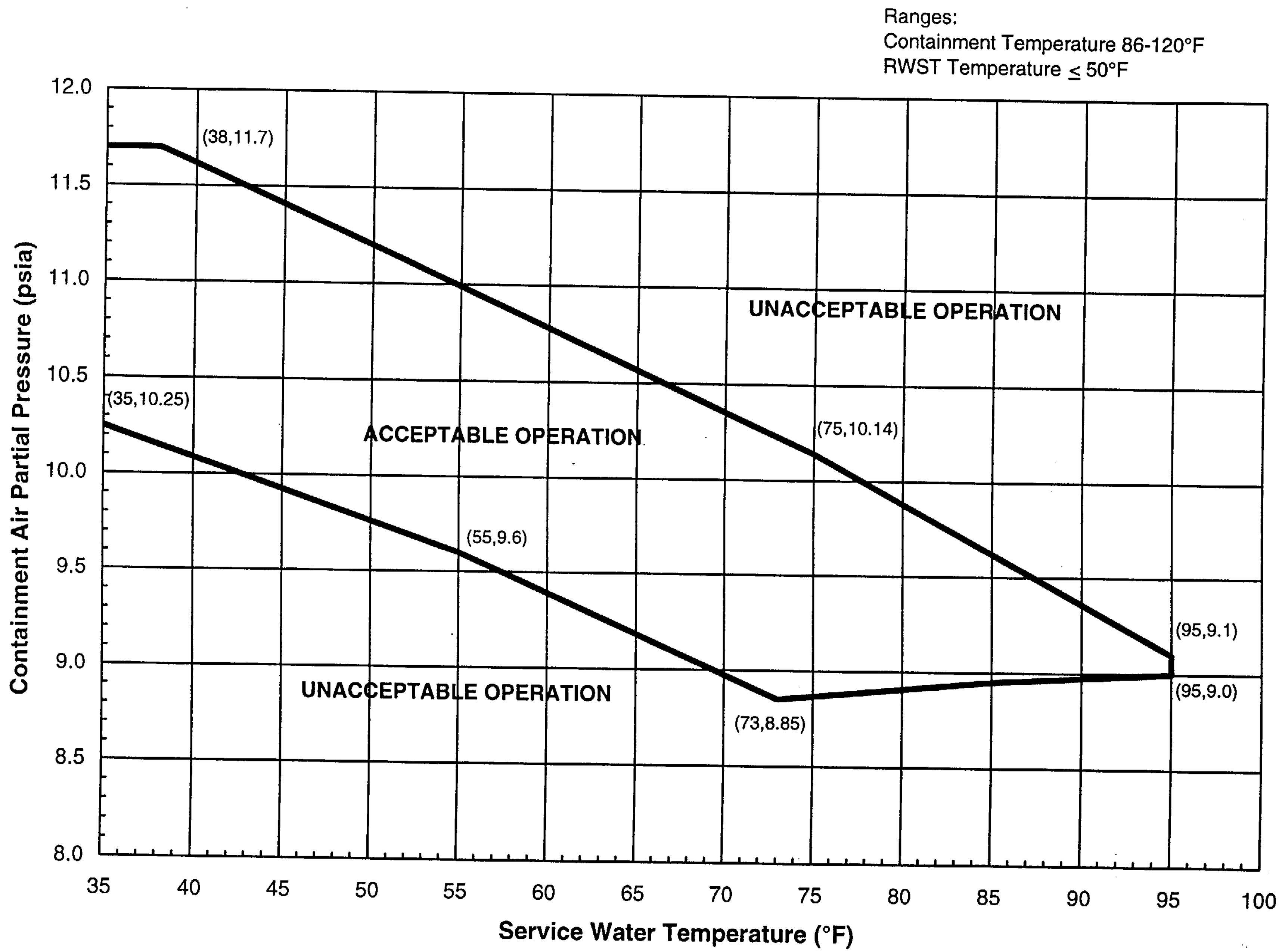


Figure 3.6-1 Containment Air Partial Pressure Versus Service Water Temperature

Figure 3.6-1: Containment Air Partial Pressure versus Service Water Temperature



SURVEILLANCE REQUIREMENTS

4.6.2.2.1 Each containment recirculation spray subsystem and casing cooling subsystem shall be demonstrated OPERABLE:

a. At least once per 31 days by verifying that each valve (manual, power operated or automatic) in the flow path that is not locked, sealed or otherwise secured in position, is in its correct position.

b. Verify each RS and casing cooling pump's developed head at the flow test point is greater than or equal to the required developed head. The frequency shall be in accordance with the Inservice Testing Program.

c. At least once per 18 months by:

1. Verifying that on a Containment Pressure High-High signal, each casing cooling pump starts automatically without time delay, and each recirculation spray pump starts automatically with the following time delays: inside 195 ± 9.75 seconds, outside 210 ± 21 seconds.
   5.0 400 5.0
2. Verifying that each automatic valve in the flow path actuates to its correct position on a containment pressure high-high test signal.

d. At least once per 10 years by performing an air or smoke flow test through each spray header and verifying each spray nozzle is unobstructed.

4.6.2.2.2 The casing coolant tank shall be demonstrated OPERABLE:

a. At least once per 7 days by:

1. Verifying the contained borated water volume in the tank, and
2. Verifying the boron concentration of the water.

b. At least once per 24 hours by verifying the casing cooling tank temperature.

TABLE 4.8-1

LIST OF LOAD SEQUENCING TIMERS AND DESIGN SETPOINTS

"H" BUS

TIMER IDENTIFICATION	SET POINT (SECONDS)	INITIATING[1] SIGNAL	TOLERANCE (SECONDS)
1FWEA01-62	20	SI	± 1.00
1FWEA01-62A	25	LOP	± 1.25
1SWEA03-62	10	LOP	± 0.50
1RS0A01-62B	35	LOP	± 1.75
1RS0A01-62A	210	CDA	± 21.0 5.0
1CCPA01-62Y	15	LOP	± 0.75
1CCPA01-62X	20	LOP	± 1.00
1RSIA01-62A	20	LOP	± 1.00
1RSIA01-62	195 400	CDA	± 9.75 5.0
1QSSA01-62A	15	LOP	± 0.75
1HVRA03-62	30	LOP	± 1.50
1HVRA04-62	10	LOP	± 0.50
1HVRB04-62	10	LOP	± 0.50
1PGSA02-62A	10	(2)	± 0.50
1ENSH06-62A	15	LOP	± 0.75
1HVRC04-62	10	LOP	± 0.50
1SWSA35-62A1A	15	SI	± 1.50
1SWSA35-62B1A	15	SI	± 1.50

TABLE 4.8-1 (CONTINUED)

LIST OF LOAD SEQUENCING TIMERS AND DESIGN SETPOINTS

"J" BUS

TIMER IDENTIFICATION	SET POINT (SECONDS)	INITIATING[1] SIGNAL	TOLERANCE (SECONDS)
1FWEB01-62	20	SI	± 1.00
1FWEB01-62A	25	LOP	± 1.25
1SWEB03-62	10	LOP	± 0.50
1RS0B01-62B	35	LOP	± 1.75
1RS0B01-62A	210	CDA	± ~~21.0~~ 5.0
1CCPB01-62Y	15	LOP	± 0.75
1CCPB01-62X	20	LOP	± 1.00
1RSIB01-62A	20	LOP	± 1.00
1RSIB01-62	~~195~~ 400	CDA	± ~~0.75~~ 5.0
1QSSB01-62A	15	LOP	± 0.75
1HVRB03-62	30	LOP	± 1.50
1HVRD04-62	10	LOP	± 0.50
1HVRE04-62	10	LOP	± 0.50
1HVRF04-62	10	LOP	± 0.50
1PGSB02-62A	10	(2)	± 0.50
1ENSJ06-62A	15	LOP	± 0.75
1SWSB35-62A1B	15	SI	± 1.50
1SWSB35-62B1B	15	SI	± 1.50

(1) SI - Safety Injection
LOP - Loss of Offsite Power
CDA - Containment Depressurization Actuation

(2) Low primary grade water header pressure

CONTAINMENT SYSTEMS

INTERNAL PRESSURE

LIMITING CONDITION FOR OPERATION

3.6.1.4 Primary containment internal air partial pressure shall be maintained greater than or equal to 9.0 psia and within the acceptable operation on Figure 3.6-1.

APPLICABILITY: MODES 1, 2, 3 and 4.

ACTION:

outside the acceptable operation region

With the containment internal air partial pressure less than 9.0 psia or above the applicable limit shown on Figure 3.6-1, restore the internal air partial pressure to within the limits within 1 hour or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

SURVEILLANCE REQUIREMENTS

4.6.1.4 The primary containment internal air partial pressure shall be determined to be within the limits at least once per 12 hours.

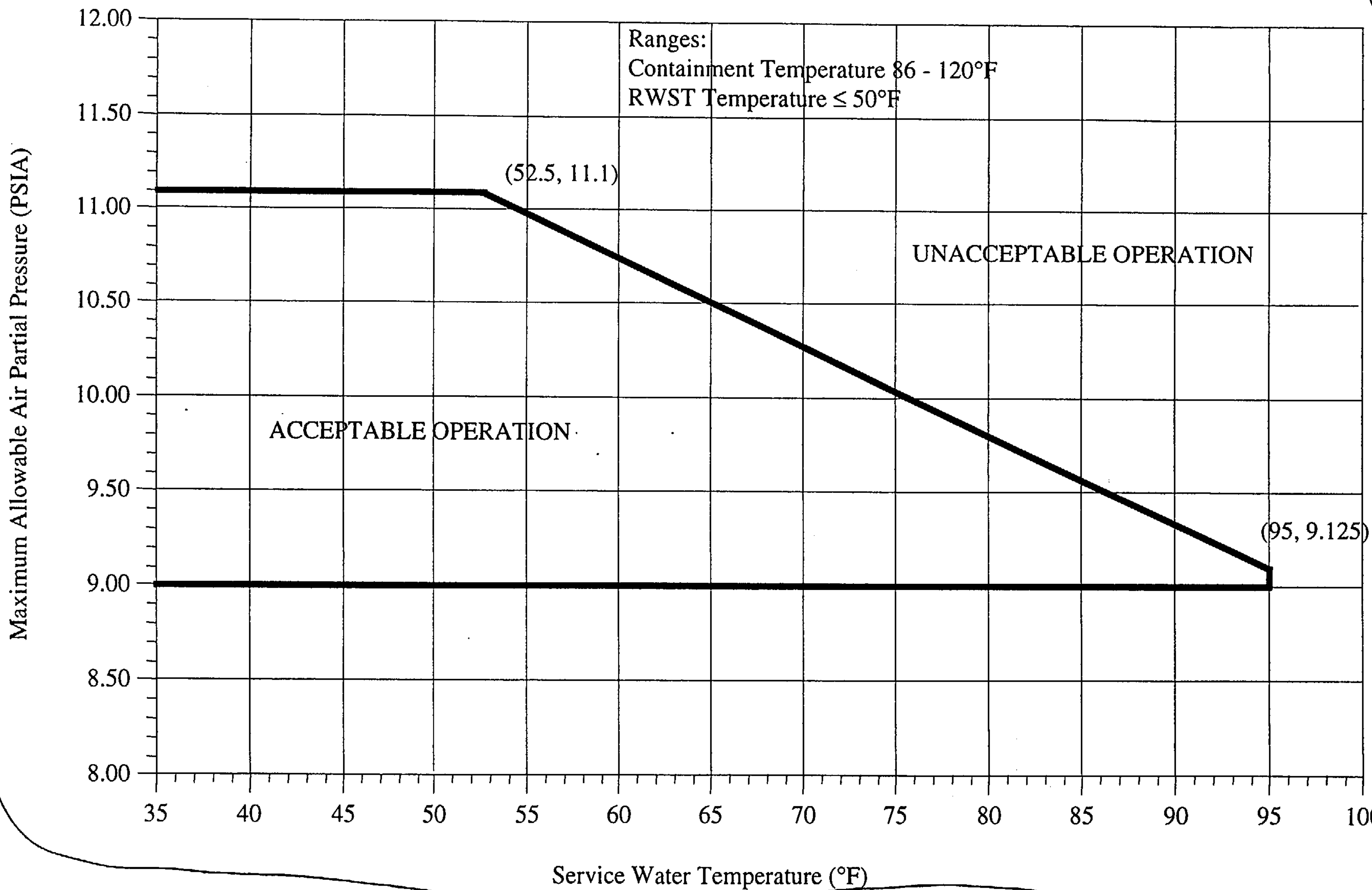
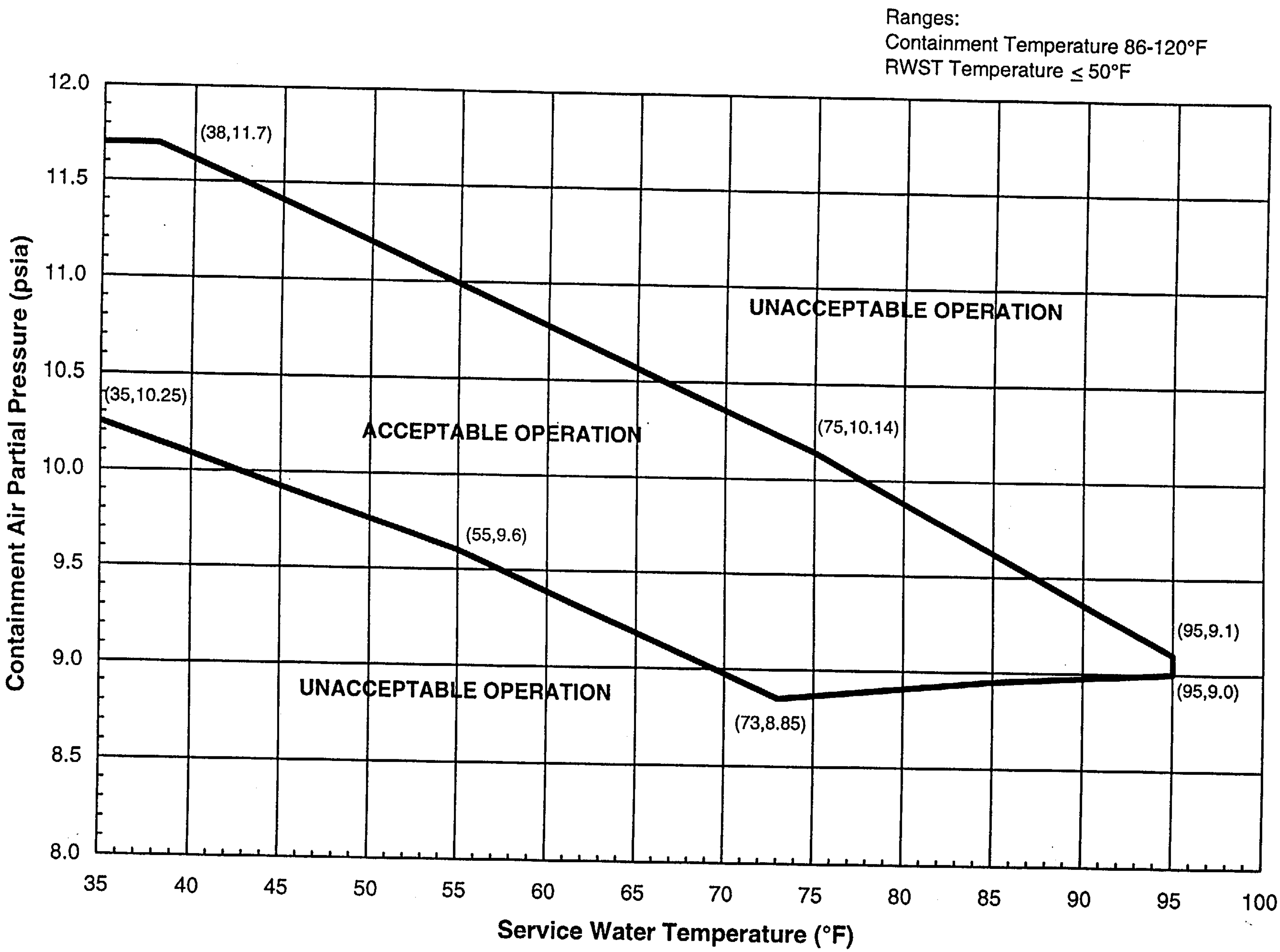


Figure 3.6-1 Containment Air Partial Pressure Versus Service Water Temperature

Replace w new Figure 3.6-1

Figure 3.6-1: Containment Air Partial Pressure versus Service Water Temperature



SURVEILLANCE REQUIREMENTS (Continued)

b. Verify each RS and casing cooling pump's developed head at the flow test point is greater than or equal to the required developed head. The frequency shall be in accordance with the Inservice Testing Program.

c. At least once per 18 months by:

1. Verifying that on a Containment Pressure–High-High signal, each casing cooling pump starts automatically without time delay, and each recirculation spray pump starts automatically with the following time delays: inside 195 ± 9.75 seconds, outside 210 ± 21 seconds. 400 ± 5.0 5.0
2. Verifying that each automatic valve in the flow path actuates to its correct position on a Containment Pressure – high-high test signal.

d. At least once per 10 years by performing an air or smoke flow test through each spray header and verifying each spray nozzle is unobstructed.

4.6.2.2.2 The casing coolant tank shall be demonstrated OPERABLE:

a. At least once per 7 days by:

1. Verifying the contained borated water volume in the tank, and
2. Verifying the boron concentration of the water.

b. At least once per 24 hours by verifying the casing cooling tank temperature.

TABLE 4.8-1

LIST OF LOAD SEQUENCING TIMERS AND DESIGN SETPOINTS

"H" BUS

TIMER IDENTIFICATION	SET POINT (SECONDS)	INITIATING[(1)] SIGNAL	TOLERANCE (SECONDS)
2FWEA01-62	20	SI	±1.00
2FWEA01-62A	25	LOP	±1.25
2SWEA03-62	10	LOP	±0.50
2RS0A01-62B	35	LOP	±1.75
2RS0A01-62A	210	CDA	±21.0 [5.0]
2CCPA01-62Y	15	LOP	±0.75
2CCPA01-62X	20	LOP	±1.00
2RSIA01-62A	20	LOP	±1.00
2RSIA01-62	195 [400]	CDA	±9.75 [5.0]
2QSSA01-62A	15	LOP	±0.75
2HVRA03-62	30	LOP	±1.50
2HVRA04-62	10	LOP	±0.50
2HVRB04-62	10	LOP	±0.50
2HVRC04-62	10	LOP	±0.50
2ENSH06-62A	15	LOP	±0.75
2SWSA35-62A2A	15	SI	±1.50
2SWSA35-62B2A	15	SI	±1.50

TABLE 4.8-1 (Continued)

LIST OF LOAD SEQUENCING TIMERS AND DESIGN SETPOINTS

"J" BUS

TIMER IDENTIFICATION	SET POINT (SECONDS)	INITIATING[1] SIGNAL	TOLERANCE (SECONDS)
2FWEB01-62	20	SI	±1.00
2FWEB01-62A	25	LOP	±1.25
2SWEB03-62	10	LOP	±0.50
2RS0B01-62B	35	LOP	±1.75
2RS0B01-62A	210	CDA	±21.0 5.0
2CCPB01-62Y	15	LOP	±0.75
2CCPB01-62X	20	LOP	±1.00
2RSIB01-62A	20	LOP	±1.00
2RSIB01-62	195 400	CDA	±9.75 5.0
2QSSB01-62A	15	LOP	±0.75
2HVRB03-62	30	LOP	±1.50
2HVRD04-62	10	LOP	±0.50
2HVRE04-62	10	LOP	±0.50
2HVRF04-62	10	LOP	±0.50
2ENSJ06-62A	15	LOP	±0.75
2SWSB35-62A2B	15	SI	±1.50
2SWSB35-62B2B	15	SI	±1.50

(1) SI - Safety Injection
LOP - Loss of Offsite Power
CDA - Containment Depressurization Actuation

Attachment 3

Proposed Technical Specification Changes

North Anna Power Station
Units 1 and 2
Virginia Electric and Power Company
(Dominion)

CONTAINMENT SYSTEMS

INTERNAL PRESSURE

LIMITING CONDITION FOR OPERATION

3.6.1.4 Primary containment internal air partial pressure shall be maintained within the acceptable operation region on Figure 3.6-1.

APPLICABILITY: MODES 1, 2, 3 and 4.

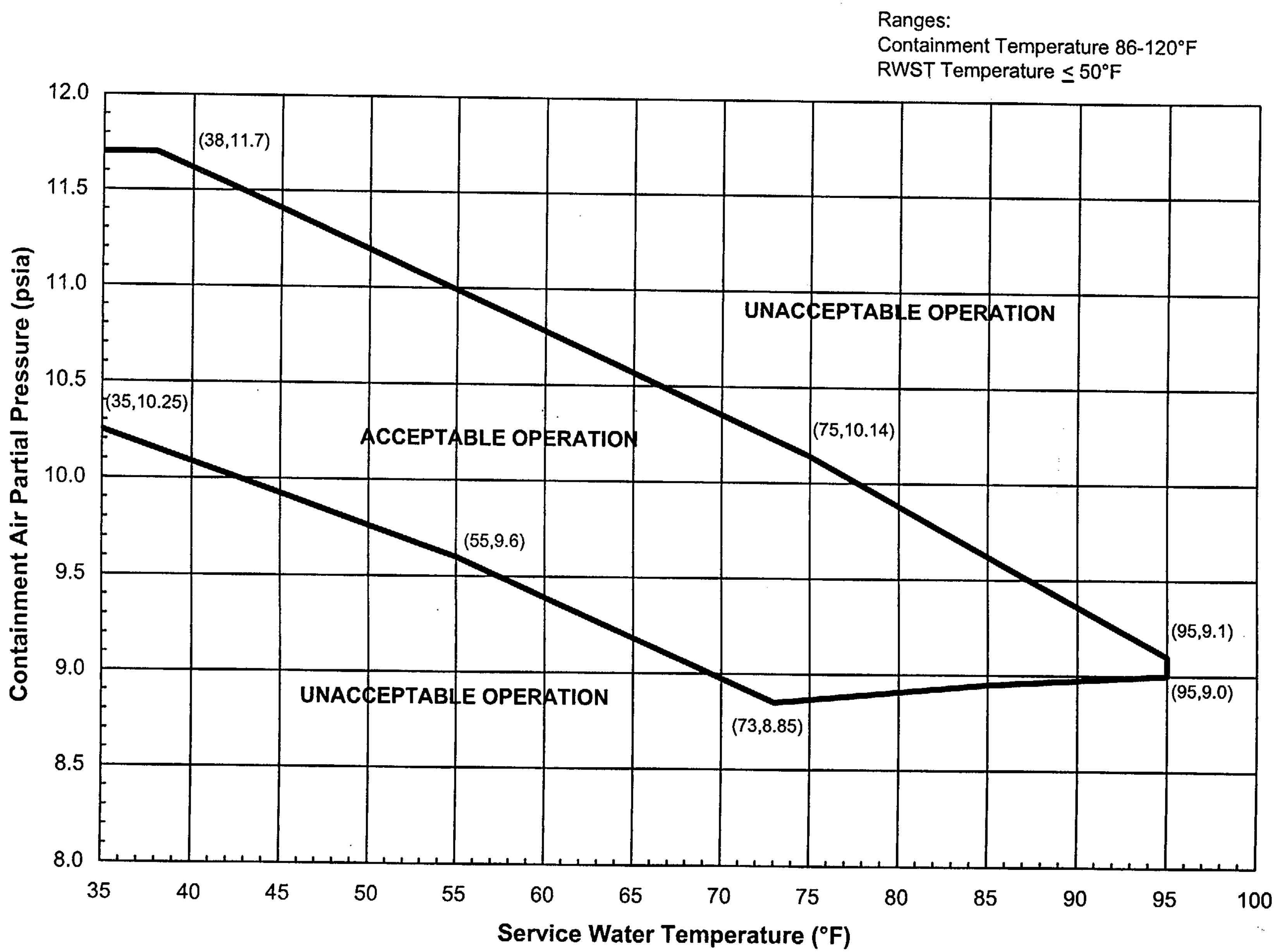
ACTION:

With the containment internal air partial pressure outside the acceptable operation region shown on Figure 3.6-1, restore the internal air partial pressure to within the limits within 1 hour or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

SURVEILLANCE REQUIREMENTS

4.6.1.4 The primary containment internal air partial pressure shall be determined to be within the limits at least once per 12 hours.

Figure 3.6-1: Containment Air Partial Pressure versus Service Water Temperature



CONTAINMENT RECIRCULATION SPRAY SYSTEM

SURVEILLANCE REQUIREMENTS

4.6.2.2.1 Each containment recirculation spray subsystem and casing cooling subsystem shall be demonstrated OPERABLE:

a. At least once per 31 days by verifying that each valve (manual, power operated or automatic) in the flow path that is not locked, sealed or otherwise secured in position, is in its correct position.

b. Verify each RS and casing cooling pump's developed head at the flow test point is greater than or equal to the required developed head. The frequency shall be in accordance with the Inservice Testing Program.

c. At least once per 18 months by:

1. Verifying that on a Containment Pressure High-High signal, each casing cooling pump starts automatically without time delay, and each recirculation spray pump starts automatically with the following time delays: inside 400 ±5.0 seconds, outside 210 ±5.0 seconds.

2. Verifying that each automatic valve in the flow path actuates to its correct position on a containment pressure high-high test signal.

d. At least once per 10 years by performing an air or smoke flow test through each spray header and verifying each spray nozzle is unobstructed.

4.6.2.2.2 The casing coolant tank shall be demonstrated OPERABLE:

a. At least once per 7 days by:

1. Verifying the contained borated water volume in the tank, and

2. Verifying the boron concentration of the water.

b. At least once per 24 hours by verifying the casing cooling tank temperature.

TABLE 4.8-1

LIST OF LOAD SEQUENCING TIMERS AND DESIGN SETPOINTS

"H" BUS

TIMER IDENTIFICATION	SET POINT (SECONDS)	INITIATING[(1)] SIGNAL	TOLERANCE (SECONDS)
1FWEA01-62	20	SI	± 1.00
1FWEA01-62A	25	LOP	± 1.25
1SWEA03-62	10	LOP	± 0.50
1RS0A01-62B	35	LOP	± 1.75
1RS0A01-62A	210	CDA	± 5.0
1CCPA01-62Y	15	LOP	± 0.75
1CCPA01-62X	20	LOP	± 1.00
1RSIA01-62A	20	LOP	± 1.00
1RSIA01-62	400	CDA	± 5.0
1QSSA01-62A	15	LOP	± 0.75
1HVRA03-62	30	LOP	± 1.50
1HVRA04-62	10	LOP	± 0.50
1HVRB04-62	10	LOP	± 0.50
1PGSA02-62A	10	(2)	± 0.50
1ENSH06-62A	15	LOP	± 0.75
1HVRC04-62	10	LOP	± 0.50
1SWSA35-62A1A	15	SI	± 1.50
1SWSA35-62B1A	15	SI	± 1.50

TABLE 4.8-1 (CONTINUED)

LIST OF LOAD SEQUENCING TIMERS AND DESIGN SETPOINTS

"J" BUS

TIMER IDENTIFICATION	SET POINT (SECONDS)	INITIATING[1] SIGNAL	TOLERANCE (SECONDS)
1FWEB01-62	20	SI	± 1.00
1FWEB01-62A	25	LOP	± 1.25
1SWEB03-62	10	LOP	± 0.50
1RS0B01-62B	35	LOP	± 1.75
1RS0B01-62A	210	CDA	± 5.0
1CCPB01-62Y	15	LOP	± 0.75
1CCPB01-62X	20	LOP	± 1.00
1RSIB01-62A	20	LOP	± 1.00
1RSIB01-62	400	CDA	± 5.0
1QSSB01-62A	15	LOP	± 0.75
1HVRB03-62	30	LOP	± 1.50
1HVRD04-62	10	LOP	± 0.50
1HVRE04-62	10	LOP	± 0.50
1HVRF04-62	10	LOP	± 0.50
1PGSB02-62A	10	(2)	± 0.50
1ENSJ06-62A	15	LOP	± 0.75
1SWSB35-62A1B	15	SI	± 1.50
1SWSB35-62B1B	15	SI	± 1.50

(1) SI - Safety Injection
LOP - Loss of Offsite Power
CDA - Containment Depressurization Actuation

(2) Low primary grade water header pressure

LIMITING CONDITION FOR OPERATION

3.6.1.4 Primary containment internal air partial pressure shall be maintained within the acceptable operation on Figure 3.6-1.

APPLICABILITY: MODES 1, 2, 3 and 4.

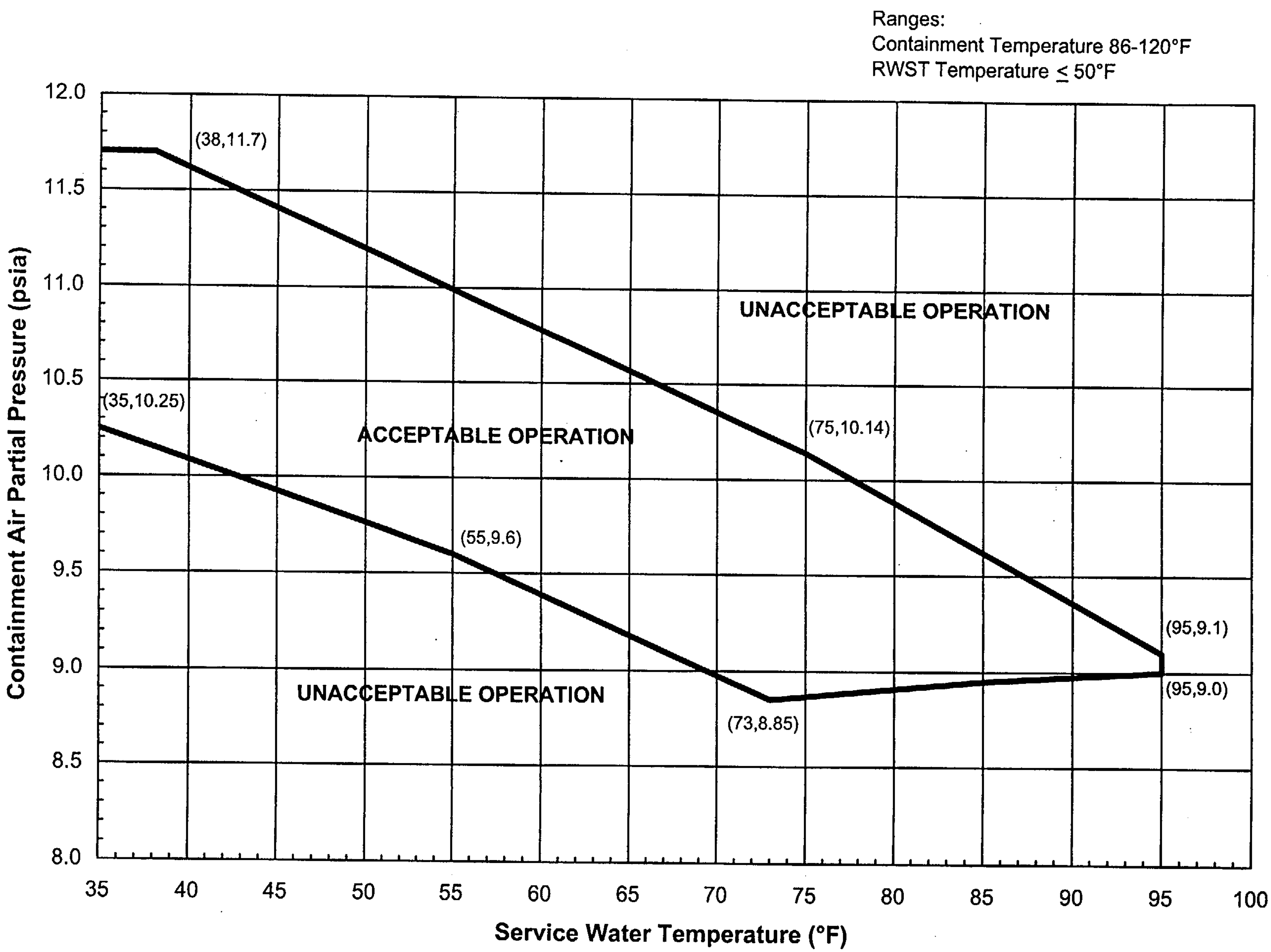
ACTION:

With the containment internal air partial pressure outside the acceptable operation region shown on Figure 3.6-1, restore the internal air partial pressure to within the limits within 1 hour or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

SURVEILLANCE REQUIREMENTS

4.6.1.4 The primary containment internal air partial pressure shall be determined to be within the limits at least once per 12 hours.

Figure 3.6-1: Containment Air Partial Pressure versus Service Water Temperature



SURVEILLANCE REQUIREMENTS (Continued)

b. Verify each RS and casing cooling pump's developed head at the flow test point is greater than or equal to the required developed head. The frequency shall be in accordance with the Inservice Testing Program.

c. At least once per 18 months by:

   1. Verifying that on a Containment Pressure–High-High signal, each casing cooling pump starts automatically without time delay, and each recirculation spray pump starts automatically with the following time delays: inside 400 ±5.0 seconds, outside 210 ±5.0 seconds.

   2. Verifying that each automatic valve in the flow path actuates to its correct position on a Containment Pressure – high-high test signal.

d. At least once per 10 years by performing an air or smoke flow test through each spray header and verifying each spray nozzle is unobstructed.

4.6.2.2.2 The casing coolant tank shall be demonstrated OPERABLE:

a. At least once per 7 days by:

   1. Verifying the contained borated water volume in the tank, and

   2. Verifying the boron concentration of the water.

b. At least once per 24 hours by verifying the casing cooling tank temperature.

TABLE 4.8-1

LIST OF LOAD SEQUENCING TIMERS AND DESIGN SETPOINTS

"H" BUS

TIMER IDENTIFICATION	SET POINT (SECONDS)	INITIATING[1] SIGNAL	TOLERANCE (SECONDS)
2FWEA01-62	20	SI	± 1.00
2FWEA01-62A	25	LOP	± 1.25
2SWEA03-62	10	LOP	± 0.50
2RS0A01-62B	35	LOP	± 1.75
2RS0A01-62A	210	CDA	± 5.0
2CCPA01-62Y	15	LOP	± 0.75
2CCPA01-62X	20	LOP	± 1.00
2RSIA01-62A	20	LOP	± 1.00
2RSIA01-62	400	CDA	± 5.0
2QSSA01-62A	15	LOP	± 0.75
2HVRA03-62	30	LOP	± 1.50
2HVRA04-62	10	LOP	± 0.50
2HVRB04-62	10	LOP	± 0.50
2HVRC04-62	10	LOP	± 0.50
2ENSH06-62A	15	LOP	± 0.75
2SWSA35-62A2A	15	SI	± 1.50
2SWSA35-62B2A	15	SI	± 1.50

TABLE 4.8-1 (Continued)

LIST OF LOAD SEQUENCING TIMERS AND DESIGN SETPOINTS

"J" BUS

TIMER IDENTIFICATION	SET POINT (SECONDS)	INITIATING[1] SIGNAL	TOLERANCE (SECONDS)
2FWEB01-62	20	SI	± 1.00
2FWEB01-62A	25	LOP	± 1.25
2SWEB03-62	10	LOP	± 0.50
2RS0B01-62B	35	LOP	± 1.75
2RS0B01-62A	210	CDA	± 5.0
2CCPB01-62Y	15	LOP	± 0.75
2CCPB01-62X	20	LOP	± 1.00
2RSIB01-62A	20	LOP	± 1.00
2RSIB01-62	400	CDA	± 5.0
2QSSB01-62A	15	LOP	± 0.75
2HVRB03-62	30	LOP	± 1.50
2HVRD04-62	10	LOP	± 0.50
2HVRE04-62	10	LOP	± 0.50
2HVRF04-62	10	LOP	± 0.50
2ENSJ06-62A	15	LOP	± 0.75
2SWSB35-62A2B	15	SI	± 1.50
2SWSB35-62B2B	15	SI	± 1.50

(1) SI - Safety Injection
LOP - Loss of Offsite Power
CDA - Containment Depressurization Actuation

Attachment 4

Mark-up ITS Changes

North Anna Power Station
Units 1 and 2
Virginia Electric and Power Company
(Dominion)

3.6 CONTAINMENT SYSTEMS

3.6.4 Containment Pressure

LCO 3.6.4 Containment air partial pressure shall be ≥ 9.0 psia and within the acceptable operation range shown on Figure 3.6.4-1.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Containment air partial pressure not within limits.	A.1 Restore containment air partial pressure to within limits.	1 hour
B. Required Action and associated Completion Time not met.	B.1 Be in MODE 3.	6 hours
	AND	
	B.2 Be in MODE 5.	36 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.6.4.1 Verify containment air partial pressure is within limits.	12 hours

Replace with new Figure 3.6.4-1

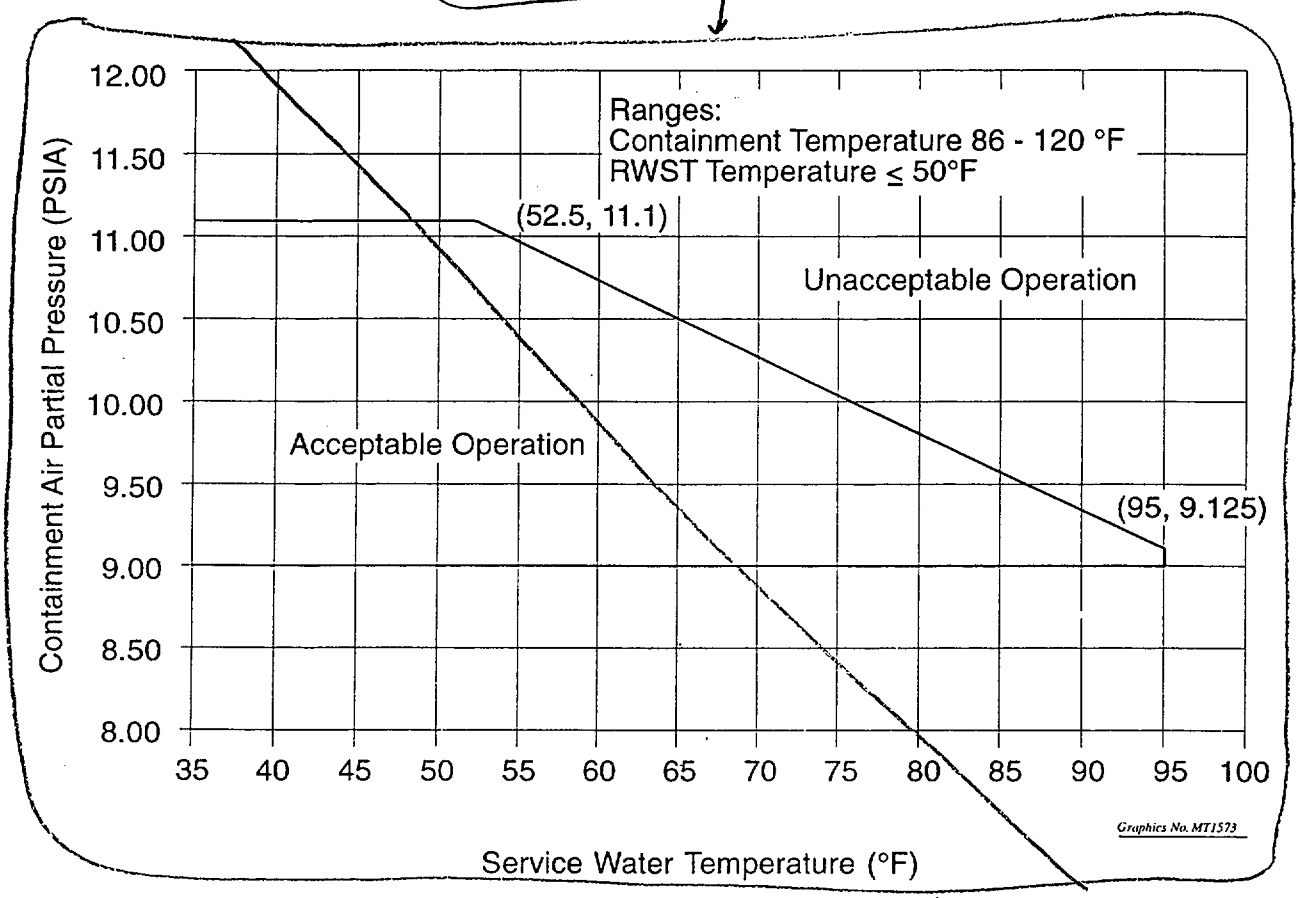


Figure 3.6.4-1 (page 1 of 1)
Containment Air Partial Pressure Versus
Service Water Temperature

The LOCA analyses establish the limits for the containment air partial pressure operating range.

BASES

APPLICABLE SAFETY ANALYSES (continued)

The maximum design internal pressure for the containment is 45.0 psig. The initial conditions used in the containment design basis analyses were an air partial pressure of 11.2 psia and an air temperature of 120°F. This resulted in a maximum peak containment internal pressure of 44.9 psig, which is less than the maximum design internal pressure for the containment.

The containment was also designed for an external pressure load of 9.2 psid (i.e., a design minimum pressure of 5.5 psia). The inadvertent actuation of the QS System was analyzed to determine the reduction in containment pressure (Ref. 1). The initial conditions used in the analysis were 8.6 psia and 120°F. This resulted in a minimum pressure inside containment of 7.4 psia, which is considerably above the design minimum of 5.5 psia.

For certain aspects of transient accident analyses, maximizing the calculated containment pressure is not conservative. In particular, the cooling effectiveness of the Emergency Core Cooling System during the core reflood phase of a LOCA analysis increases with increasing containment backpressure. For the reflood phase calculations, the containment backpressure is calculated in a manner designed to conservatively minimize, rather than maximize, the containment pressure response in accordance with 10 CFR 50, Appendix K (Ref. 2).

Containment pressure satisfies Criterion 2 of 10 CFR 50.36(c)(2)(ii).

LCO

Maintaining containment pressure within the limits shown in Figure 3.6.4-1 of the LCO ensures that in the event of a DBA the resultant peak containment accident pressure will be maintained below the containment design pressure. These limits also prevent the containment pressure from exceeding the containment design negative pressure differential with respect to the outside atmosphere in the event of inadvertent actuation of the QS System. The LCO limits also ensure the return to subatmospheric conditions within 60 minutes following a DBA.

BASES

BACKGROUND (continued)

cooling tank. The casing cooling pumps are considered part of the outside RS subsystems. Each casing cooling pump is powered from a separate ESF bus.

The RS System provides a spray of subcooled water into the upper regions of containment to reduce the containment pressure and temperature during a DBA. Upon receipt of a High-High containment pressure signal, the two casing cooling pumps start, the casing cooling discharge valves open, and the RS pump suction and discharge valves receive an open signal to assure the valves are open. After a ~~195±9.75~~ 400±5 second time delay, the inside RS pumps start, and after a 210±~~21~~ 5 second time delay, the outside RS pumps start. The RS pumps take suction from the containment sump and discharge through their respective spray coolers to the spray headers and into the containment atmosphere. Heat is transferred from the containment sump water to service water in the spray coolers.

The Chemical Addition System supplies a sodium hydroxide (NaOH) solution to the RWST water supplied to the suction of the QS System pumps. The NaOH added to the QS System spray ensures an alkaline pH for the solution recirculated in the containment sump. The resulting alkaline pH of the RS spray (pumped from the sump) enhances the ability of the spray to scavenge iodine fission products from the containment atmosphere. The alkaline pH of the containment sump water minimizes the evolution of iodine and minimizes the occurrence of chloride and caustic stress corrosion on mechanical systems and components exposed to the fluid.

The RS System is a containment ESF system. It is designed to ensure that the heat removal capability required during the post accident period can be attained. Operation of the QS and RS systems provides the required heat removal capability to limit post accident conditions to less than the containment design values and depressurize the containment structure to subatmospheric pressure in < 60 minutes following a DBA.

The RS System limits the temperature and pressure that could be expected following a DBA and ensures that containment leakage is maintained consistent with the accident analysis.

Attachment 5

Proposed ITS Changes

North Anna Power Station
Units 1 and 2
Virginia Electric and Power Company
(Dominion)

3.6 CONTAINMENT SYSTEMS

3.6.4 Containment Pressure

LCO 3.6.4 Containment air partial pressure shall be within the acceptable operation range shown on Figure 3.6.4-1.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Containment air partial pressure not within limits.	A.1 Restore containment air partial pressure to within limits.	1 hour
B. Required Action and associated Completion Time not met.	B.1 Be in MODE 3. AND B.2 Be in MODE 5.	6 hours 36 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.6.4.1 Verify containment air partial pressure is within limits.	12 hours

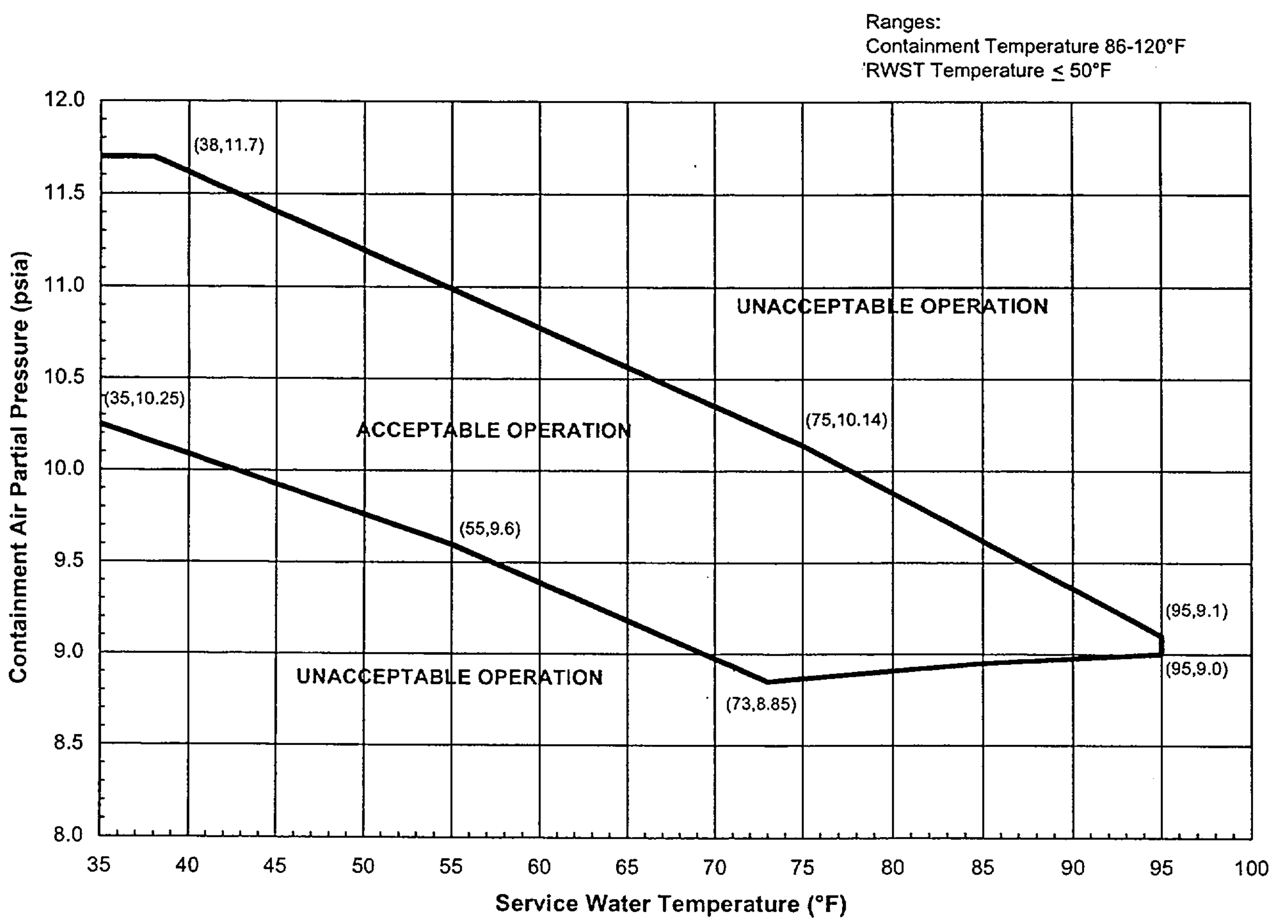


Figure 3.6.4-1 (page 1 of 1)
Containment Air Partial Pressure Versus
Service Water Temperature

BASES

APPLICABLE SAFETY ANALYSES (continued)

The maximum design internal pressure for the containment is 45.0 psig. The LOCA analyses establish the limits for the containment air partial pressure operating range. The initial conditions used in the containment design basis LOCA analyses were an air partial pressure of 11.7 psia and an air temperature of 120°F. This resulted in a maximum peak containment internal pressure of 44.1 psig, which is less than the maximum design internal pressure for the containment.

The containment was also designed for an external pressure load of 9.2 psid (i.e., a design minimum pressure of 5.5 psia). The inadvertent actuation of the QS System was analyzed to determine the reduction in containment pressure (Ref. 1). The initial conditions used in the analysis were 8.43 psia and 120°F. This resulted in a minimum pressure inside containment of 7.07 psia, which is considerably above the design minimum of 5.5 psia.

For certain aspects of transient accident analyses, maximizing the calculated containment pressure is not conservative. In particular, the cooling effectiveness of the Emergency Core Cooling System during the core reflood phase of a LOCA analysis increases with increasing containment backpressure. For the reflood phase calculations, the containment backpressure is calculated in a manner designed to conservatively minimize, rather than maximize, the containment pressure response in accordance with 10 CFR 50, Appendix K (Ref. 2).

Containment pressure satisfies Criterion 2 of 10 CFR 50.36(c)(2)(ii).

LCO

Maintaining containment pressure within the limits shown in Figure 3.6.4-1 of the LCO ensures that in the event of a DBA the resultant peak containment accident pressure will be maintained below the containment design pressure. These limits also prevent the containment pressure from exceeding the containment design negative pressure differential with respect to the outside atmosphere in the event of inadvertent actuation of the QS System. The LCO limits also ensure the return to subatmospheric conditions within 60 minutes following a DBA.

BASES

BACKGROUND (continued)

cooling tank. The casing cooling pumps are considered part of the outside RS subsystems. Each casing cooling pump is powered from a separate ESF bus.

The RS System provides a spray of subcooled water into the upper regions of containment to reduce the containment pressure and temperature during a DBA. Upon receipt of a High-High containment pressure signal, the two casing cooling pumps start, the casing cooling discharge valves open, and the RS pump suction and discharge valves receive an open signal to assure the valves are open. After a 400±5 second time delay, the inside RS pumps start, and after a 210±5 second time delay, the outside RS pumps start. The RS pumps take suction from the containment sump and discharge through their respective spray coolers to the spray headers and into the containment atmosphere. Heat is transferred from the containment sump water to service water in the spray coolers.

The Chemical Addition System supplies a sodium hydroxide (NaOH) solution to the RWST water supplied to the suction of the QS System pumps. The NaOH added to the QS System spray ensures an alkaline pH for the solution recirculated in the containment sump. The resulting alkaline pH of the RS spray (pumped from the sump) enhances the ability of the spray to scavenge iodine fission products from the containment atmosphere. The alkaline pH of the containment sump water minimizes the evolution of iodine and minimizes the occurrence of chloride and caustic stress corrosion on mechanical systems and components exposed to the fluid.

The RS System is a containment ESF system. It is designed to ensure that the heat removal capability required during the post accident period can be attained. Operation of the QS and RS systems provides the required heat removal capability to limit post accident conditions to less than the containment design values and depressurize the containment structure to subatmospheric pressure in < 60 minutes following a DBA.

The RS System limits the temperature and pressure that could be expected following a DBA and ensures that containment leakage is maintained consistent with the accident analysis.

Attachment 6

Significant Hazards Consideration Determination

North Anna Power Station
Units 1 and 2
Virginia Electric and Power Company
(Dominion)

SIGNIFICANT HAZARDS CONSIDERATION DETERMINATION

Virginia Electric and Power Company (Dominion) has reviewed the requirements of 10 CFR 50.92 as they relate to the proposed changes for the North Anna Units 1 and 2 and determined that a significant hazards consideration is not involved. The proposed amendment revises the containment air partial pressure versus service water temperature operating curve and recirculation spray delay timer surveillance acceptance criteria.

The following is provided to support the conclusion that the proposed changes do not create a significant hazards consideration.

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

The proposed changes to the containment air partial pressure versus service water temperature operating curve and recirculation spray timer delays will continue to ensure that the containment remains operable to mitigate Design Basis Accidents. The revised containment operating curve and timer delays do not affect the probability of occurrence of any accident previously analyzed. The revised containment licensing basis analyses use approved analytical methods and continue to demonstrate that the established accident analysis acceptance criteria are met. Therefore, there is no increase in the probability or consequences of any accident previously evaluated.

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

The proposed changes to the containment air partial pressure versus service water temperature operating curve and recirculation spray timer delays will not create any new accident or event initiators. The containment will continue to be operated in a similar manner. No systems, structures, or components are being physically modified such that design function is being altered. The proposed change does not alter the nature of events postulated in the UFSAR nor does it introduce any unique precursor mechanisms. Therefore, the proposed changes do not create the possibility of any accident or malfunction of a different type than previously evaluated.

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

The proposed changes to the containment air partial pressure versus service water temperature operating curve and recirculation spray time delays and supporting analyses maintain the existing safety margins. The revised containment analyses demonstrate that current acceptance criteria continue to be satisfied. Therefore, the proposed changes do not result in a significant reduction in margin of safety.