VIRGINIA ELECTRIC AND POWER COMPANY
RICHMOND, VIRGINIA 23261

October 17, 2001

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

Serial No.	01-299A
SPS-Lic/CGL	R1
Docket Nos.	50-280
	50-281
License Nos.	DPR-32
	DPR-37

Gentlemen:

VIRGINIA ELECTRIC AND POWER COMPANY
SURRY POWER STATION UNITS 1 AND 2
RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION
PORV BACKUP AIR SUPPLY OPERABILITY/SURVEILLANCE REQUIREMENTS
PROPOSED TECHNICAL SPECIFICATION CHANGES

In a letter dated May 31, 2001 (Serial No. 01-299), Virginia Electric and Power Company (Dominion) submitted a license amendment request addressing operability and surveillance requirements for the pressurizer power operated relief valve (PORV) backup air supply. During the NRC's review of the submittal, the staff identified a need for additional information to facilitate their review. The staff's questions were provided to us on July 18, 2001 and discussed during a July 26, 2001 conference call. Our response to the NRC's request for additional information is provided in the attachment.

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

Very truly yours,

Eugene S. Grecheck
Vice President – Nuclear Support Services

Attachment – Response to NRC Request for Additional Information – PORV Backup Air Supply Operability and Surveillance Requirements

Commitments made in this letter: None.

A001

cc: U.S. Nuclear Regulatory Commission
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SN: 299A
Docket Nos.: 50-280/281
Subject: Proposed TS RAI –
PORV Backup Air Supply Op/Surv. Reqmts

COMMONWEALTH OF VIRGINIA)
)
COUNTY OF HENRICO)

The foregoing document was acknowledged before me, in and for the County and Commonwealth aforesaid, today by Eugene S. Grecheck, who is Vice President - Nuclear Support Services, of Virginia Electric and Power Company. He has affirmed before me that he 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 his knowledge and belief.

Acknowledged before me this 17th day of October, 2001.

My Commission Expires: 3-31-04.

Maggie McClure
Notary Public

(SEAL)

RESPONSE TO NRC REQUEST FOR ADDITIONAL INFORMATION – LICENSE AMENDMENT REQUEST ADDRESSING PORV BACKUP AIR SUPPLY OPERABILITY AND SURVEILLANCE REQUIREMENTS

1. *Please provide the following Tier 1 measures based on your current probabilistic safety assessment (PSA) model: baseline core damage frequency (CDF), baseline large early release frequency (LERF), incremental conditional core damage probability, incremental conditional large early release probability. Present this quantitative information for internal event risk, external event risk, and total (internal and external) risk as supported by your current PSA model.*

The following data are derived from the baseline Surry WinNUPRA model using average-maintenance histories. Changes are based upon a bounding, simultaneous failure of both trains of bottled air. (It is more likely that a single train, or a component of a single train, will fail.) Integrated probabilities are obtained by assuming that both trains remain simultaneously unavailable for a full 14-day AOT per year.

	Internal Events	External Events	Combined
Baseline CDF	3.83E-5/yr	3.70E-5/yr	7.53E-5/yr
Baseline LERF	2.72E-6/yr	N/A	2.72E-6/yr
Delta(CDF)	0.05E-5/yr	N/A	0.05E-5/yr
Delta(LERF)	0.09E-6/yr	N/A	0.09E-6/yr
ICCDP	1.7E-8	N/A	1.7E-8
ICLERP	3.5E-9	N/A	3.5E-9

The internal and external initiating events in the IPE/IPEEE which were not evaluated quantitatively in this assessment (i.e., internal flooding and internal fires) were evaluated qualitatively for impact from this change. The impact of the proposed TS change on these other initiating events was also found to be negligible. The bottled air system is a backup support system for the pressurizer power operated relief valves (PORVs), which function within the PRA model primarily as a backup to the AFW system for secondary heat removal. The negligible impact of the change in the quantified internal events analysis would also be reflected in a corresponding internal flooding and fire event analysis as well. The Maintenance Rule Working Group expert panel has reviewed and concurred with this position.

These numbers reflect an extremely low risk sensitivity to the total failure of the bottled air system.

2. *Discuss updates which have been made to your PSA model that are relevant to this proposed Technical Specification submittal. Please indicate when the last update was made, and when the next update is expected. Also, discuss your PSA model quality assurance practices.*

The original IPE analysis had no instrument air (IA) model. It was subsequently added and the current model now includes a detailed representation of the turbine building instrument air (TBIA) system, as well as the containment compressed air system and its bottled air backup. No model updates were required for this specific submittal. No hardware changes were made to support the submittal and no modeled surveillance frequencies were altered. The risk impact of the proposed 14-day AOT will be captured by the risk assessments under the Dominion Maintenance Rule (a)(4) program as described in the response to question #8 below.

The last major model update was completed in 1998. The IA system was added to the model at that time. The next model update is scheduled for completion later this year.

The PRA model and its documentation are controlled by the Dominion Quality Assurance (QA) program in compliance with 10 CFR 50, Appendix B. Specifically, the Nuclear Analysis & Fuel Department has established the following applicable implementing procedures, among others.

- NAF-003, **Nuclear Analysis & Fuel Department Document Control**
- NAF-100, **Preparation, Review, Approval & Revision of Calculations**
- NAF-104, **Software Control**
- NAF-108, **Development and Control of Nuclear Analysis & Fuel Models**
- NAF-239, **Probabilistic Safety Assessment Analysis**

In addition, the NAF department's PRA group has also established the following guidelines for model revision control:

- NSAM Part IV, Chapter J, **Probabilistic Risk Analysis Model Update Process**, major changes
- NSAM Part IV, Chapter K, **Probabilistic Risk Analysis Model Upgrade Process**, minor changes

3. *Consider uncertainties, qualitatively or quantitatively, in the Tier 1 risk assessment.*

The impact of uncertainties is minimal on this assessment. The Surry model is a full PRA model of the entire plant, with about 1400 separate systems, structures and components (SSCs) modeled for each unit. The model was developed and reviewed under the Dominion QA program. Furthermore, the Westinghouse Owners Group certification team has reviewed the PRA model as well. Basic event frequencies are based upon generic industry data. The risk sensitivities of the individual bottled air components are extremely low such that even a dramatic variation within the uncertainty band for these SSCs would have a negligible impact on risk. For example, the individual components of the bottled air trains do not even appear in the cutsets (i.e., they are truncated below 1.0E-10). If the actual failure or unavailability rates of these SSCs were substantially higher, the cutsets might not be truncated, but they would still only be minor contributors to overall risk.

4. *Discuss dominant sequences and Tier 2 controls as a result of the risk insights gained.*

The dominant accident sequences are as follows:

- Small LOCA with failure of HHSI and LHSI (12.4%)
- Medium LOCA with failure of HHSI (8.2%)
- Medium LOCA with failure of HHSI recirculation (6.9%)
- Small LOCA with failure of LHSI recirculation (5.9%)
- Large LOCA with failure of one accumulator to intact loop (5.5%)
- Loss of 1H 4160 VAC bus with failure of ESGR cooling and failure of CS/RS (5.5%)
- Small LOCA with failure of recirculation spray (4.3%)
- Interfacing System LOCA (4.2%)

These results were obtained with the baseline model. These relative contributions would be essentially the same, even with both trains of bottled air failed, consistent with the minimal impact noted in the response to question #1 above.

No additional controls have been identified as necessary as a consequence of the risk analysis. The dominant sequences listed above highlight the importance of Safety Injection, electrical power and the spray systems. Typically, the Technical Specifications for these systems restore sufficient defense-in-depth well before an integrated risk of 1.0E-6 is achieved.

The PORV bottled air subsystem supports cooldown and recovery following a steam generator tube rupture (SGTR). However, the bottled air reliability is not a major contributor to SGTR mitigation; consequently, the proposed TS change has a negligible risk impact from these events.

5. *Supplemental question: What is the estimated change in risk (CDF and LERF) if the Turbine Building Instrument Air (TBIA) or swing Emergency Diesel Generator (EDG) becomes unavailable while operating in the proposed allowed outage time (AOT)?*

These risks were estimated with the Safety Monitor zero-maintenance model. This code is used for the Dominion Maintenance Rule (a)(4) program. Consistent with the table provided in our response to Question #1 above, these results also show the risk impact of the bottled air system to be extremely small. Even when its effect is combined with the unavailability of the #3 EDG or the TBIA system, the bottled air system is only a small contributor to total risk.

	Risk (events/yr)	Risk Increase (events/yr)	Time until Risk Management Actions are Required (hours) *
Baseline CDF	2.73E-05		N/A
CDF w/o bottled air (both trains OOS)	2.74E-05	1.00E-07	indefinite
CDF w/o bottled air and #3 EDG	3.62E-05	8.90E-06	39 days
CDF w/o bottled air and TBIA	3.13E-05	4.00E-06	85 days
Baseline LERF	1.33E-06		N/A
LERF w/o bottled air	1.33E-06	0.00E+00	indefinite
LERF w/o bottled air and #3 EDG	1.41E-06	8.00E-08	indefinite
LERF w/o bottled air and TBIA	1.39E-06	6.00E-08	indefinite
*Based upon the numerical risk limits of NUMARC 93-01. These limits allow an integrated risk increase of 0.1E-5 for the core damage probability and 0.1E-6 for the large early release probability before corrective actions are required.			

6. *What is the unreliability of the Containment Instrument Air system, the Turbine Building Instrument Air (TBIA) system, and the pressurizer PORV air bottles as modeled in your PSA model? What is the logic relation between these air supply methods, given an internal or external initiating event? Discuss for the initiating events modeled.*

The containment instrument air system unavailability is 2.1E-4. The TBIA system unavailability is 8.1E-5. Each train of bottled air to the pressurizer PORVs has an unavailability of 7.4E-4. The bottled air and the containment instrument air systems are independent motive sources for each pressurizer PORV. The containment instrument air system is the primary source of air inside containment, backed up by TBIA. The pressurizer PORVs support recovery from a steam generator tube rupture, a loss of offsite power, a station blackout, a secondary transient, a loss of Circulating Water, or the loss of an emergency bus. For most of these events, the PORVs support feed and bleed cooling after a failure of auxiliary and/or main feedwater. In a few cases, the PORVs are used to support cooldown and depressurization of the RCS (following a SGTR, for example).

7. *What controls exist on the availability of the TBIA system and the swing Emergency Diesel Generator during the proposed 14 days allowed outage time (AOT) for the pressurizer power operated relief valve (PORV) air bottles? Do procedures assure their availability during the AOT? What compensatory measures exist if either of these systems become unavailable during the AOT? Can other diesels power the TBIA?*

In addition to the Technical Specifications, the Dominion Maintenance Rule (a)(4) program as described in the response to question #8 below manages risk associated with the IA and EDG systems. This program has specific risk management controls and actions that are implemented during periods of high instantaneous or prolonged risk. No additional procedures are required to assure their availability during the proposed 14-day AOT. Compensatory measures are established for protection and/or restoration of the key safety functions when the NUMARC 93-01 risk thresholds are reached.

The TBIA system is supplied by several different air compressors, each with its own unique power supply:

- 1-IA-C-1, powered by MCC 1J1-2
- 2-IA-C-1, powered by MCC 2J1-1
- 1-SA-C-1, powered by MCC 1C2
- 2-SA-C-1, powered by MCC 2A2

Each of these compressors and its unique power supply are modeled. On a loss of off-site power, the swing EDG will power either the 1J or the 2J bus (but not both). The SBO diesel is a separate generator with a direct feed to the D and E transfer buses. The SBO can thus power the 2H and (if needed) the 1J buses. In addition, both the 1J and 2J emergency buses can be backfed from Station Service.

The condensate polishing (CP) building air compressors can also support TBIA, as well as a diesel-driven air compressor. The CP compressors are not modeled.

8. *Discuss your configuration risk management program (procedures, risk assessment tools, expert panels, etc.).*

Surry's configuration risk management program has been set up to comply with the requirements of 10 CFR 50.65(a)(4) and the guidance document NUMARC 93-01. (The Surry Technical Specifications do not have an explicit requirement for a *Configuration Risk Management Program.*) Procedures require assessment and management of configuration risk for planned and emergent maintenance. The management process provides direction for compensatory and/or corrective steps when high instantaneous or integrated risk occurs. The Safety Monitor program is used to quantify the risk in a full fault tree solution for each configuration (i.e., each unique combination of equipment unavailability due to maintenance and testing) during power and transition operations. An expert panel, including representatives from the PRA, Operations and System Engineering groups, has reviewed the scope of SSCs in the model. In addition, an expert panel developed the performance criteria matrix, risk-ranked the functions and established functional performance criteria.

9. What are the Maintenance Rule performance criteria for the pressurizer PORVs?

Each of the two pressurizer PORVs (per unit) is included in the Maintenance Rule scoping and performance criteria matrix for Surry Power Station. The PORVs are classified as safety related risk significant components in the matrix, and each valve is allowed 100 hours of unavailability. The Station Administrative Procedure for the Maintenance Rule Program defines unavailability as follows:

> "An SSC is considered unavailable from the time it is declared inoperable until it is declared operable excluding specific conditions reviewed and approved by the working group. In addition, an SSC is not considered unavailable when the plant is in an operating or shutdown mode where the SSC is not required to support plant operation, safe shutdown, or accident mitigation. Inoperable SSCs may be considered available if: the SSC is aligned for service and capable of responding, existing procedures address operation of the equipment in the condition, and the situation is reviewed by the working group and verified to be consistent with NUMARC 93-01 assumptions. Unavailability will be evaluated in accordance with guidance from NUMARC 93-01 and PRA input and approved by the working group. Limited restoration actions are allowed if done in accordance with NUMARC 93-01 and the PRA."

The Maintenance Rule Working Group, referred to in the unavailability definition as the working group, acts as a station level expert panel.

10. What controls would be in place to reduce the potential for human error, or to mitigate human errors, while troubleshooting or otherwise working on the pressurizer PORV air bottles with the unit at power?

Practices in place to prevent human error during troubleshooting and maintenance on the pressurizer PORV air bottles include personnel training and qualifications, pre-job briefings, self checking, peer checking, procedure compliance, questioning attitude, and clear communications. In addition, scheduled maintenance on the PORV backup air supply is assessed using the Safety Monitor, discussed in the response to Question #8. These practices serve to minimize the potential for human error during troubleshooting and maintenance activities on the pressurizer PORV air bottles.

Additional considerations to minimize the potential for human error while working on the PORVs relate to the backup air supply configuration and layout. These considerations are:

- Each pressurizer PORV has four air bottles as a backup air supply, two of which are installed spares. In the event that a low pressure alarm is received or maintenance is needed, the spare bottles need only to be valved in.

- The air bottles for each PORV are located in bottle racks that are physically separated, thus reducing the possibility of manipulating the incorrect set of bottles.