10 CFR 50.90

VIRGINIA ELECTRIC AND POWER COMPANY
RICHMOND, VIRGINIA 23261

April 8, 2010

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

Serial No. 10-207
NL&OS/GSS R0
Docket Nos. 50-338/339
License Nos. NPF-4/7

VIRGINIA ELECTRIC AND POWER COMPANY (DOMINION)
NORTH ANNA POWER STATION UNITS 1 AND 2
RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION
PROPOSED LICENSE AMENDMENT REQUEST
TS 3.7.12 – ECCS PUMP ROOM EXHAUST AIR CLEANUP SYSTEM (PREACS)
ADDITION OF CONDITIONS/ACTION STATEMENTS

In a September 28, 2009 letter (Serial No. 09-034A), Dominion requested amendments, in the form of changes to the Technical Specifications to Facility Operating License Numbers NPF-4 and NPF-7 for North Anna Power Station Units 1 and 2, respectively. The proposed changes will add new Conditions B and C with associated Action Statements and Completion Times to TS 3.7.12 and modify Conditions A and D. The changes specifically address the filtration function of ECCS PREACS and are consistent with the associated design and licensing basis accident analysis assumptions. In a March 11, 2010 e-mail from Dr. V. Sreenivas, the NRC requested additional information to complete the review of the proposed amendments. Attachment 1 provides the requested information in accordance with the agreed upon schedule.

The information provided in the attachment does not impact the conclusion of the significant hazards consideration determination as defined in 10 CFR 50.92 or the evaluation for eligibility for categorical exclusion as set forth in 10 CFR 51.22(c)(9).

Dominion continues to request approval of the proposed changes by September 30, 2010 with a 60 day implementation period following NRC approval of the license amendments.

If you have any questions or require additional information, please contact Mr. Thomas Shaub at (804) 273-2763.

Very truly yours,

J. Alan Price
Vice President – Nuclear Engineering

Attachment

1. Response to Request for Additional Information

Commitments made in this letter: None.

COMMONWEALTH OF VIRGINIA)
)
COUNTY OF HENRICO)

The foregoing document was acknowledged before me, in and for the County and Commonwealth aforesaid, today by J. Alan Price, who is Vice President – Nuclear Engineering 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 8th day of April, 2010.

My Commission Expires: 4/30/13.

Notary Public

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My Commission Expires Apr 30, 2013

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Attachment

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION
PROPOSED LICENSE AMENDMENT REQUEST
TS 3.7.12 – ECCS PUMP ROOM EXHAUST AIR CLEANUP SYSTEM (PREACS)
ADDITION OF CONDITIONS/ACTION STATEMENTS

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

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION PROPOSED LICENSE AMENDMENT REQUEST TS 3.7.12 – ECCS PUMP ROOM EXHAUST AIR CLEANUP SYSTEM (PREACS) ADDITION OF CONDITIONS/ACTION STATEMENTS (TAC. NO. ME2413 & ME2414)

Background

In a September 28, 2009 letter (Serial No. 09-034A), Dominion requested amendments, in the form of changes to the Technical Specifications to Facility Operating License Numbers NPF-4 and NPF-7 for North Anna Power Station Units 1 and 2, respectively. The proposed changes will add new Conditions B and C with associated Action Statements and Completion Times to TS 3.7.12 and modify Conditions A and D. The changes specifically address the filtration function of ECCS PREACS and are consistent with the associated design and licensing basis accident analysis assumptions. In a March 11, 2010 e-mail from Dr. V. Sreenivas, the NRC requested additional information to complete the review of the proposed amendments. The following information is provided to address the NRC concerns/questions.

Request for Additional Information

A. Containment and Ventilation Branch, Division of Safety Systems

RAI SCVB-1:

Describe how the ECCS pump leakage will be monitored. Are the seals in a static condition (pump not operating) or dynamic condition (pump operating)? How is the volumetric leakage rate measured?

Dominion Response:

ECCS pump seals are monitored by Operations. The ECCS pumps consist of three Charging pumps per Unit (also referred to as High Head Safety Injection (HHSI) pumps), which are located in the Auxiliary Building and two Low Head Safety Injection (LHSI) pumps and two Outside Recirculation Spray (ORS) pumps per unit, which are housed in each Unit's Safeguard Buildings. The pump seals are monitored in a static condition, except for one Charging Pump [High Head Safety Injection (HHSI)] which is running during normal plant operation. The two Low Head Safety Injection (LHSI) pumps per unit are in Auto Standby during normal plant operation. The HHSI and LHSI pumps are operated for surveillance testing once every 92 days. Also, there are two Outside Recirculation Spray (ORS) Pumps that are operated every 18 months for surveillance testing. The Charging (HHSI) pumps are rotated approximately every 30 days to balance the run time and performance of inservice testing. Monitoring of these pump seals and associated valves/piping for leakage is performed by Operator rounds once per shift (currently 12 hours) for the running HHSI pump and the normally non-running LHSI and ORS pumps. The non-running HHSI pumps are monitored during operator rounds once daily. Specifically, any leakage is monitored and documented in

the ECCS Leakage Log (1-LOG-20 & 2-LOG-20). The quarterly surveillance testing of the HHSI and LHSI pumps and the 18 month surveillance testing of the ORS pumps directs Operations to inspect pumps and associated valves for leakage and to record any leakage in the ECCS Leakage Log. It should be noted that the LHSI and ORS pumps utilize a tandem seal arrangement with the inboard seal cooled by process fluid and the outboard seal cooled by RWST water and a seal head tank, respectively. Thus, any leakage from these seals is not considered ECCS leakage. The leak rate is estimated based on visual inspection (counting drops per minute or by measuring leakage in a graduated cylinder over a specific time period).

RAI SCVB-2:

Pump seals require some leakage while operating to prevent seal failure. If the ECCS pump leakage monitoring is performed with, the pump not operating, (seals in a static condition) provide justification why this is acceptable for predicting seal leakage when the pump is operating.

Dominion Response:

The charging pumps are provided with a mechanical seal design by Flowserve Nuclear Pump Division. The seal assembly is composed of both primary and secondary seals. The secondary seals (o-rings) are designed to run dry with no leakage. Primary sealing is controlled by the degree of separation between the rotating and stationary seal rings. When the pump is shut down, the two faces are in contact. When the pump is running, the seal faces separate. This allows for a thin film layer of pumping fluid to act as a lubricant and reduce the heat buildup on the seal faces. This thin film layer between the seal faces is not enough fluid to be measurable and will exit the seal housing, usually in the form of vapor, but occasionally the exit can be in the form of a drop.

On occasion, after a HHSI pump has been secured, traces of boric acid crystals may become lodged between the seal faces (micro-inches) when the seal faces cool. Consequently, some minor leakage may occur on the magnitude of a few drops per minute when the pump is secured. To date we have not seen any indication that a leaking seal in static condition will be degraded when the pump is running. In fact, static leakage usually goes to zero when the pump is started due to dynamic forces on the seal faces and the temperature increase between the seal faces to above the boric acid solubility curve.

As noted above in the response to RAI SCVB-1, pump leakage is also monitored during the performance of inservice testing and the ECCS leakage updated to reflect the leakage observed during inservice testing. This observed leakage value is used to calculate the total ECCS leakage. The total ECCS leakage value is not reduced if the pumps in a static condition exhibit lower leakage.

RAI SCVB-3:

Page 11 of the license amendment request says the proposed change includes a surveillance requirement to monitor ECCS leakage. This "surveillance requirement" is included as a Required Action for Conditions B, C, and D. No ECCS testing is being added TS 3.7.12 Surveillance Requirements. No ECCS test program is being added to section 5.5, "Programs and Manuals", of the Technical Specifications as part of this amendment request.

(a) Is the monitoring of the ECCS system leakage part of an existing technical specification other than TS 3.7.12?
(b) Is the new surveillance requirement added to meet the requirements of 10 CFR 50.36(c)(3), "Surveillance Requirements"?
(c) If not, provide justification for not having a technical specification surveillance requirement to assure that the condition of the system is within the limiting conditions for operation of the ECCS PREACS system with inoperable filter or filters will be met.

Dominion Response:

Dominion agrees that the use of the words "surveillance requirement" to monitor ECCS leakage when in Conditions B, C, or D is inappropriate. Consistent with 10 CFR 50.36, "Limiting Conditions for Operation" this surveillance should have been referred to as a remedial action to be performed until the condition could be met.

(a) Yes, TS 5.5.2, "Primary Coolant Outside Containment" requires that the leakage from those systems outside containment that could contain highly radioactive fluids during a serious transient or accident be minimized to levels as low as practicable. This program requires:

(1) Preventive maintenance and periodic visual inspections, and
(2) an 18 month integrated leak test for each of these systems

Within this program, leakage is monitored and if identified measured on a periodic basis consistent with the program requirements above. This monitoring is necessary to ensure the leakage is maintained below operational limits, which in turn ensures that the aggregate system leakage is below the leakage values for filtered and unfiltered leakage assumed in the accident dose analysis of record.

(b) No, The "new surveillance" required by the Conditions, B, C, and D is a remedial action "conditional surveillance," that requires monitoring/measuring of ECCS leakage at an increased frequency to ensure that the leakage remains below the operational limit for which filtration is not required to meet the accident dose analysis of record and, therefore, continued use of the extended Completion Time is permitted.

(c) If the extended Completion Times are entered for an inoperable filter train or filter trains, the TS Actions require a remedial action or "conditional surveillance," to verify that ECCS leakage is within operational limits every 12 hours during the extended Completion Time. During plant conditions when the filters are operable, the TS Program 5.5.2, "Primary Coolant Outside Containment" requires: (1) leakage be minimized, (2) periodic maintenance and inspection, and (3) an integrated leakrate test of the system, which is adequate to ensure that system leakage is maintained within design and analysis limits.

RAI SCVB-4:

Is the monitoring of the ECCS leakage through valve packing performed with the packing under the differential pressure expected when operating during a design basis accident?

Dominion Response:

In some cases, the system pressure expected during accident conditions will be higher than the operating system pressure. As described on page 7 of Attachment 1 of the license amendment request (LAR), procedures require any identified ECCS leakage to be adjusted by conservative calculation to reflect the accident conditions (i.e., higher leakage rate due to higher system operating pressure). The leakage logs described in SCVB-1 reflect this calculated higher value.

RAI SCVB-5:

What safety factor will be used for the maximum allowable ECCS leakage rate to assure that if an accident should occur any increase of leakage over the duration of the event would not cause dose limits to be exceeded?

Dominion Response:

As described on page 7 of Attachment 1 of the LAR, a safety factor of 2 is included in the ECCS leakage modeled in the analysis, i.e., the analyzed amount is 2 times the Allowable ECCS leakage.

RAI SCVB-6:

What ECCS leakage would be expected when operating under accident conditions with the maximum allowable unfiltered ECCS leakage and a single failure of the worst case pump seal or valve packing? Will off-site and control room radiological doses remain within limits with two trains of ECCS PREACS filters inoperable?

Dominion Response:

RG 1.183 removed the requirement to evaluate the impact of a gross passive failure (50 gpm leak for 30 minutes at 24 hours after the accident) on the design basis LOCA dose consequence analysis due to the arbitrary nature of the assumptions. Accordingly, this condition is outside of the licensing basis for North Anna.

Two independent evaluations (Westinghouse and Flowserve) have concluded that catastrophic failure of the HHSI pump seals due to debris loading is highly unlikely. In the unlikely event that the seals do fail in such a manner, the disaster bushing will keep leakage below 50 gpm. If this were to occur the leakage would be directed to the auxiliary building sump, which is equipped with two 50 gpm sump pumps and redundant high level alarms. An increasing tank level and/or alarm coupled with a continuously running auxiliary building sump pump would cause the operator to initiate an inspection of the auxiliary building. This inspection would start with active components in systems under high pressure, as they present the greatest leak potential. Thus, the running ECCS pumps would be among the first items checked. However, with beyond a licensing basis leakage rate, the accident dose for the control room operators would exceed the GDC 19 limits.

A review of seal leakages from all HHSI pumps since the installation of Flowserve seals beginning in December 2003 indicates the worst leak experienced was 20 ml/min or 1200 cc/hr. Therefore, based on our internal operating experience, the worst case expected increase in ECCS leakage due to the failure of a seal or valve packing since installation of Flowserve seals in 2004 was 1200 cc/hr.

The control room and offsite dose limits are reached when the ECCS leakage increases to the following approximate levels:

Control Room	5100 cc/hr (0.022 gpm)
Control Room	2900 cc/hr (0.013 gpm) increasing to 50 gpm for 0.5 hr at 24 hr
EAB	6 gpm
LPZ	18 gpm

Note that the above values do not include a safety factor of two. Also, the assessment is based on containment leakage at TS levels, RWST back-leakage of 4800 cc/hr (2400 cc/hr allowable), and control room unfiltered inleakage of 250 cfm. The ECCS leakage for the control room dose could be increased if measured values for containment leakage, RWST back-leakage and control room unfiltered in-leakage were used.

Based on the worst case expected increase in ECCS leakage due to the single failure of a seal or valve packing being 1200 cc/hr, the control room and offsite accident doses will be within the GDC 19 limits.

RAI SCVB-7:

A serial accounting of the time needed to perform the tasks needed to replace the filters, perform post-maintenance testing, and declaring the filters operable is used to justify the proposed 14-day allowed outage time for the filters. What is the estimated minimum time if some of the tasks are performed concurrently (such as removing the old charcoal concurrent with receipt of the new charcoal)?

Dominion Response:

It is possible that the time could be reduced if some tasks are performed in parallel, such as HP set-up and removing old charcoal while waiting for the new charcoal to arrive (potentially 7½ days). However, there are other variables that could negatively impact the duration, such as vendor unavailability or weekend delays. The postulated timeline is intended to represent an estimated duration based on best reasonable effort (expedited), without undue time pressure which could impact safety. The best estimate for the repair duration would be between 7-12 days. Without expedited attention, the repair would normally take significantly longer.

RAI SCVB-8:

The basis for 30-day completion time to restore a filter back to operable status (when only one filter train inoperable) is the time necessary to complete repairs on the filter assembly and/or its associated dampers. With two filter trains inoperable the basis for the 14-day completion time to return one filter train to operable status is that the time required to complete necessary repairs on a filter assembly and/or associated dampers. The license amendment request states that the replacement of a charcoal filter assemble takes only 9½ days even when all tasks are performed in sequence. Provide a discussion why the necessary repairs take longer when one filter train is inoperable as opposed to two filter trains inoperable.

Dominion Response:

The potential scenario used to identify repair time (i.e., need to replace all the charcoal in one or both filter banks) would apply equally to both conditions. If both trains of charcoal are determined to be inoperable and need replacement, repairs would focus on replacing one bank at a time to restore the system safety function. The duration identified (7-12 days) is for returning one bank to service. After that, maintenance efforts will focus on restoring the second train to operable. Since 7-12 days has passed while restoring the other train, the total time to restore both trains may take up to 24 days.

Repair time is only one of the factors on which the proposed action times are based. With only one train inoperable, the second train of ECCS filtration remains operable to perform its intended safety function, if needed. Consistent with Improved Technical Specifications, the proposed Completion Time is greater for one inoperable train than

for two trains or all inoperable trains. Two or all inoperable trains usually results in loss of safety function. The proposed Completion Times provide flexibility to manage plant risk and focus stations resources on existing plant conditions and/or inoperable risk/safety significant SSC and still complete the repairs in a controlled manner. In addition, the extended Completion Times are only permitted if the ECCS unfiltered leakage is verified to be below the 1700 cc/hr limit, for which the filtration is not necessary to meet the Accident Dose Analysis limits. If the unfiltered ECCS leakage would exceed the 1700 cc/hr limit while in the extended Completion Time, the Completion Time would be reduced to the current times and the station management would reassess risk and focus resources appropriately.

RAI SCVB-9:

How is the operability of the ECCS Pump room boundary determined? Do technical specification surveillance requirements exist for determining boundary operability? If there is, no surveillance requirements to determine the operability of the ECCS Pump room boundary provide a discussion for determining entrance into or exit from Condition D.

Dominion Response:

In addition to operator rounds once per shift (currently twelve hours) and monthly engineering walk-downs, the operability of the ECCS pump room boundary is determined by the verification of a negative pressure relative to the surrounding area in the pump rooms during accident alignment. If a negative pressure does not exist with the same suction flow conditions, this could be an indication that a breach of the pump room boundary exists. This negative pressure verification is a surveillance requirement (SR 3.7.12.5) and is performed as part of the PREACS performance test every 18 months. If a negative pressure cannot be verified during the performance of the surveillance test, the ECCS trains would be declared inoperable resulting in entry into TS Condition 3.7.12.B for inoperable pump room boundary.

RAI SCVB-10:

What is the expected frequency for entry into Condition C, "Two ECCS PREACS trains inoperable due to inoperable filtration capability"?

Dominion Response:

Since 2002, when North Anna converted to Improved Technical Specifications, North Anna entered TS 3.0.3 two times. In each case, the cause was inoperable filtration capability due to a leakage issue associated with dampers and not specifically attributed to charcoal. Corrective actions have been taken to increase the reliability of these dampers and the associated actuators as well as heightened awareness of the activities that could impact the charcoal (painting, cleaning, etc). However, due to the system configuration there is still a potential for an inoperable damper to cause entry into TS

3.0.3 or the proposed Condition C. As discussed above, the Completion Times proposed were to permit a planned completion of the repair activities while providing the station the flexibility to manage plant risk and focus station resources on the existing plant conditions or other inoperable risk/safety significant SSCs.

B. Technical Specification Branches, Division of Inspection and Regional Support, NRR

RAI TSB-1:

The regulatory analysis found on pages 14 and 15 of Attachment 1 of the LAR does not discuss the regulatory requirements of 10 CFR 50.36. State how the proposed TS meet regulatory requirements of 10 CFR 50.36.

Dominion Response:

10 CFR 50.36, "Technical Specifications," paragraph (c)(2)(ii) (C) specifies that a structure, system, or component that is part of the primary success path and which functions or actuates to mitigate a design basis accident or transient that either assumes the failure of or presents a challenge to the integrity of a fission product barrier be included into Technical Specifications. This system is required by Specification 3.7.12 "ECCS PREACS." The ECCS PREACS system is assumed to operate to mitigate the dose consequence associated with a design bases accident or transient that either assumes the failure of or presents a challenge to the integrity of a fission product barrier. Although assumed to be operable, during a design basis accident or transient, filtration is not necessary to meet the analyzed accident dose consequence when ECCS leakage is below the assumed value.

10 CFR 50.36, "Technical Specifications," paragraph (c)(2)(ii) requires that Technical Specifications include Limiting Conditions for Operation (LCO), which are the lowest functional capability or performance levels of equipment required for safe operation of the facility. When a LCO is not met, the licensee shall shut down the reactor or follow any remedial action permitted by the technical specifications until the condition can be met. The new Conditions and Required Actions do not conflict with this requirement. The proposed changes do not adversely impact the ability of the ECCS PREACS to function as designed and do not impact the system's conformance to the GDCs. Therefore, the proposed changes are consistent with all applicable regulatory requirements or criteria.