VIRGINIA ELECTRIC AND POWER COMPANY
RICHMOND, VIRGINIA 23261

July 29, 2010

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
One White Flint North
11555 Rockville Pike
Rockville, MD 20852-2738

Serial No: 10-398
NLOS/ R4
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
GENERIC LETTER 2008-01, MANAGING GAS ACCUMULATION IN EMERGENCY CORE COOLING, DECAY HEAT REMOVAL, AND CONTAINMENT SPRAY SYSTEMS

By letters dated October 14, 2008 (Serial No. 08-0013B) (ADAMS Accession No. ML092360423), January 15, 2009 (Serial No. 08-0013F) (ML090150579), and July 6, 2009 (Serial No. 09-389) (ML091880506), Dominion submitted information in response to Generic Letter (GL) 2008-01 "Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems," for North Anna Units 1 and 2. Subsequent to these submittals, the NRC requested additional information in an email dated June 2, 2010. Dominion's response to the NRC request is provided in the attachment.

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

Sincerely,

J. Alan Price
Vice President – Nuclear Engineering

VICKI L. HULL
Notary Public
Commonwealth of Virginia
140542
My Commission Expires May 31, 2014

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 29TH day of July, 2010.

My Commission Expires: May 31, 2014

Vicki L. Hull
Notary Public

A134
NRR

Commitments made in this letter:

1. Upon NRC approval of the TSTF traveler, Dominion will evaluate it for applicability to North Anna Units 1 and 2. If a license amendment is determined to be necessary, Dominion will submit a license amendment(s) within one year of NRC approval of the TSTF traveler.

Attachment:
- Response to GL 2008-01 Request for Additional Information

cc: U.S. Nuclear Regulatory Commission
Region II
Marquis One Tower
245 Peachtree Center Avenue, NE
Suite 1200
Atlanta, Georgia 30303-1257

NRC Senior Resident Inspector
North Anna Power Station

Ms. K. R. Cotton
NRC Project Manager
U. S. Nuclear Regulatory Commission
One White Flint North
Mail Stop 08 G-9A
11555 Rockville Pike
Rockville, Maryland 20852-2738

Dr. V. Sreenivas
NRC Project Manager
U. S. Nuclear Regulatory Commission
One White Flint North
Mail Stop 08 G-9A
11555 Rockville Pike
Rockville, Maryland 20852-2738

Mr. J. E. Reasor, Jr.
Old Dominion Electric Cooperative
Innsbrook Corporate Center, Suite 300
4201 Dominion Blvd.
Glen Allen, Virginia 23060

ATTACHMENT

Response to GL 2008-01 Request for Additional Information

VIRGINIA ELECTRIC AND POWER COMPANY
(DOMINION)
NORTH ANNA POWER STATION UNITS 1 AND 2

Response to Generic Letter 2008-01 Request for Additional Information

North Anna Station Units 1 and 2

NRC Comment:

By letters dated October 14, 2008 (Serial No. 08-0013B) (ADAMS Accession No. ML092360423), January 15, 2009 (Serial No. 08-0013F) (ML090150579), and July 6, 2009 (Serial No. 09-389) (ML091880506), Dominion submitted information in response to Generic Letter (GL) 2008-01 "Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems," for North Anna Units 1 and 2. On the basis of the provided information, the NRC Staff has concluded that additional information is required to determine that the licensee has acceptably demonstrated "that the subject systems are in compliance with the current licensing and design bases and applicable regulatory requirements, and that suitable design, operational, and testing control measures are in place for maintaining this compliance" as stated in GL 2008-01. Guidance on Nuclear Regulatory Commission (NRC) staff expectations is provided by Reference 1 which is generally consistent with Nuclear Energy Institute (NEI) guidance provided to industry in Reference 2 as clarified in later NEI communications. The NRC staff recommends that the licensee consult Reference 1 when responding to the following RAIs:

NRC Question 1

Provide a regulatory commitment and a schedule for applying the Technical Specification Task Force (TSTF) process to any Technical Specification (TS) changes resulting from GL 2008-01.

Dominion Response

Upon NRC approval of the TSTF traveler, Dominion will evaluate it for applicability to North Anna Units 1 and 2. If a license amendment is determined to be necessary, Dominion will submit a license amendment(s) within one year of NRC approval of the TSTF traveler.

NRC Question 2

Discuss the surveillance criteria, surveillance methods, and surveillance locations for ECCS, decay heat removal, and containment spray systems.

Dominion Response

North Anna currently performs periodic venting at various locations in the high head safety injection (HHSI) and low head safety injection (LHSI) piping outside of containment. Periodic venting procedures (1/2-PT-14.5) specify high point vents that are used to ensure the subject system piping is sufficiently full of water.

Static venting is performed at system piping high points outside of containment in accordance with existing station procedures for each Safety Injection (SI) System piping train upon return to service and every 92 days in accordance with Technical Specifications. These vented system local high points were previously confirmed to be located correctly using detailed isometrics, laser scanning techniques and piping walkdowns. If any gas is found during quarterly venting, the procedure is stopped and the gas accumulation analyzed. Potential methods for analyzing gas accumulation include ultrasonic testing (UT) or use of a rotometer to determine the volume and chemical analysis to determine the source of the gas.

Periodic venting is not performed for the Recirculation Spray (RS), Quench Spray (QS), and Residual Heat Removal (RHR) Systems. These systems are not susceptible to gas accumulation. Operating and maintenance procedures ensure these systems are filled and vented prior to returning them to service following maintenance.

NRC Question 3

Discuss the surveillance intervals for the monitored locations, including justification for surveillance intervals greater than 31 days for emergency core cooling system, decay heat removal, and containment spray systems.

Dominion Response

The RS, QS, and RHR Systems are not susceptible to gas accumulation. Operating and maintenance procedures ensure these systems are filled and vented prior to returning them to service following maintenance.

Full flow testing and system flow sweeping are performed each refueling outage in accordance with existing station procedures to provide dynamic venting of the system high points both outside and inside containment for each SI System piping train. In addition, static venting is performed at system piping high points outside of containment in accordance with existing station procedures for each SI System piping train upon return to service and every 92 days in accordance with Technical Specifications. These vented system local high points were previously confirmed to be located correctly using detailed isometrics, laser scanning techniques and piping walkdowns.

TS Surveillance Requirement (SR) 3.5.2.3 requires verification that the Emergency Core Cooling System (ECCS) piping is sufficiently full of water every 92 days.

Operating experience at North Anna in trending the volume of gas accumulation during the venting operations, discussed above, has indicated that there is no appreciable gas buildup. Therefore, Dominion concludes that the vents in place are effective and that little gas accumulation remains in the ECCS systems during operations. Frequent actuation of the LHSI discharge piping thermal relief valve was a maintenance concern in the early 1990's, however, it has not been a concern since dynamic and static venting was implemented. The favorable operating experience result also justifies surveillance intervals greater than 31 days.

NRC Question 4

Describe the "alternate monitoring methodology" for low head safety injection discharge piping discussed in Reference 3. Describe how pump start pressure transient recording, thermal relief valve monitoring, pump discharge header temperature monitoring and refueling water storage tank level trending will be used to monitor for gas.

Dominion Response

Since a significant portion of the LHSI pump discharge piping is inside containment and impractical to monitor for gas using the traditional means of ultrasonic test (UT) inspection or high point venting, an alternate monitoring methodology is being utilized to assess for gas accumulation. The alternate methodology is a combination of monitoring the identified piping high points in the LHSI discharge piping outside containment by venting or UT inspection, as well as 1) monitoring of the LHSI pump discharge piping to Reactor Coolant System (RCS) cold leg isolation check valves by monitoring the RCS isolation check valve leakage tests for values greater than 0 gpm, 2) monitoring the RWST for increasing level, and 3) monitoring the LHSI pump discharge header entering the containment for temperature increases. Each of these alternate methods is an indicator of potential RCS leakage into the LHSI system, which is the only external source of gas accumulation into the LHSI discharge piping. Should any of the monitored parameters increase, then a confirmation of the gas volume is obtained through use of the LHSI pump inservice testing (IST) quarterly testing procedure in conjunction with recording of the pressure transient at the LHSI pump discharge header. If the transient peak pressure during LHSI pump start is less than the relief valve setpoint and the peak pressure occurs immediately after pump start, then the LHSI discharge piping to RCS cold legs has an acceptable gas void volume of approximately 1.0 ft^3 or less with pressure corresponding to the RWST head. If the transient peak pressure recorded during this test exceeds the relief valve setpoint or if the transient pressure does not immediately peak but more gradually ramps to the steady state pressure, then the LHSI discharge piping has a larger than 1.0 ft^3 volume of gas accumulation, which must be assessed and handled accordingly removed.

LHSI Thermal Relief Valves - It was previously determined that the total void volume in the LHSI discharge piping needs to remain below 1.0 ft^3 to prevent lifting the relief

valves, which are set at 264 psig. The LHSI pump test procedures include provisions to monitor the discharge piping thermal relief valves when starting a LHSI pump. Upon LHSI pump start, transient peak pressures will remain under the relief valve setpoint for gas void volumes of less than 1.0 ft^3 in the LHSI discharge piping to the RCS cold legs. Although much larger voids (> 20 ft^3) may also result in lower pressure pulses below the relief valve setpoint, periodic venting and system monitoring as described below preclude voids of that magnitude from occurring. Consequently, if the thermal relief valves do not lift when the pump is started, it provides further indication that gas accumulation is not a concern.

LHSI Pump Discharge Peak Pressure - During a pump start, gas entrained in a dead-ended water piping system creates an air spring effect, and a peak pressure pulse is generated that is a function of the amount of gas present. The LHSI pump test procedure includes the option of recording the LHSI pump discharge peak pressure to facilitate void size determination. If the thermal relief valve lifts during pump test, a Condition Report is submitted, gas accumulation is evaluated (e.g., ultrasonic testing (UT) or a rotometer) and the pump discharge piping and/or seals are vented as necessary. Also, the option of recording peak pressure at the start of the next pump test is exercised.

LHSI Pump Discharge Header Temperature Monitoring – The LHSI pipe temperature outside containment is monitored on a monthly basis during system walkdowns to determine whether the pipe temperature is higher than normal. A higher than normal pipe temperature would be indicative of RCS back leakage past the SI check valves and the possibility of gas accumulation due to degassing hydrogen. This indication is further validated by checking for RWST inleakage as discussed below.

RWST Level Inleakage - The RWST contains a useable volume of 487,000 gallons of borated water maintained between 2600 and 2800 ppm. The tank is equipped with high level alarms to prevent inadvertent overfilling. Should RCS back leakage past the SI check valves occur, it eventually flows to the RWST. Check valve back leakage is indicated by increasing RWST level and chemistry changes. RWST level monitoring and trending is accomplished using engineering walkdowns, operator logs, and the plant computer system. Indication of back leakage into the RWST requires entry of the back leakage concern into the corrective action system for resolution and an assessment of the SI piping for gas accumulation and the need for venting.

NRC Question 5

Training was not identified in the GL 2008-01 but is considered to be a necessary part of applying procedures and other activities when addressing the issues identified in the GL 2008-01. Briefly discuss training.

Dominion Response

As part of the response to Institute of Nuclear Power Operations (INPO) Significant Operating Experience Report (SOER) 97-1, *Potential Loss of High Pressure Injection and Charging Capability from Gas Intrusion*, and Significant Event Report (SER) 2-05, Revision 1, *Gas Intrusion in Safety Systems*, Dominion provided initial training and committed to continuing training of station personnel who design, operate, or maintain systems and components that are susceptible to, or may cause, gas intrusion. In addition, Dominion is supporting the industry and NEI Gas Accumulation Management Team activities regarding the development of training requirements considered necessary for the successful implementation of a gas management program. Separately, Dominion has received training modules from NEI that were developed by INPO for operations, engineering, maintenance and general nuclear personnel training. This material has been provided to the Dominion nuclear training group for review and incorporation into training programs.

References

1. Ruland, William H., "Preliminary Assessment of Responses to Generic Letter 2008-01, "Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems," and Future NRC Staff Review Plans," NRC letter to James H. Riley, Nuclear Energy Institute, ML091390637, May 28, 2009.

2. Riley, James H., "GL 2008-01, 'Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Contain Spray Systems' Evaluation and 3 Month Response Template," Letter to Administrative Points of Contact from Director, Engineering, Nuclear Generation Division, Nuclear Energy Institute, Enclosure 2, "Generic Letter 2008-01 Response Guidance," March 20, 2008.

3. Price, J. Alan, "Nine Month Response to NRC GL 2008-01, Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems," Letter from Vice President, Nuclear Engineering, Virginia Electric and Power Company (Dominion) ML082890094, October 14, 2008.