Eugene S. Grecheck
Vice President
Nuclear Development

Dominion Energy, Inc. • Dominion Generation
Innsbrook Technical Center
5000 Dominion Boulevard, Glen Allen, VA 23060
Phone: 804-273-2442, Fax: 804-273-3903
E-mail: Eugene.Grecheck@dom.com

Dominion®

June 9, 2011

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

Serial No. NA3-11-020RA
Docket No. 52-017
COL/DWL

DOMINION VIRGINIA POWER
NORTH ANNA UNIT 3 COMBINED LICENSE APPLICATION
SRPs 09.02.01 and 09.03.04: RESPONSE TO RAI LETTER 65

On April 14, 2011, the NRC requested additional information to support the review of certain portions of the North Anna Unit 3 Combined License Application (COLA). The response to three of the five RAI questions was previously submitted by Dominion letter NA3-11-020R on May 6, 2011. The responses to the two remaining Request for Additional Information (RAI) Questions are provided in Enclosures 1 and 2:

- RAI 5554, Question 09.02.01-14 ESWS Pumps and UHS Design
- RAI 5548, Question 09.03.04-1 CVCS Holdup Tank Connections

This information will be incorporated into a future submission of the North Anna Unit 3 COLA, as described in the enclosures.

Please contact Regina Borsh at (804) 273-2247 (regina.borsh@dom.com) if you have questions.

Very truly yours,

Eugene S. Grecheck

Enclosures:

1. Response to RAI Letter Number 65, RAI 5554, Question 09.02.01-14
2. Response to RAI Letter Number 65, RAI 5548, Question 09.03.04-1

D089
NRO

Commitments made by this letter:

1. Incorporate proposed changes in a future COLA submission.

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 Development of Virginia Electric and Power Company (Dominion Virginia Power). He has affirmed before me that he is duly authorized to execute and file the foregoing document on behalf of the Company, and that the statements in the document are true to the best of his knowledge and belief.

Acknowledged before me this 9th day of June, 2011
My registration number is 7173057 and my
Commission expires: August 31, 2012

Wanda K. Marshall
Notary Public

WANDA K. MARSHALL
Notary Public
Commonwealth of Virginia
7173057
My Commission Expires Aug 31, 2012

cc: U. S. Nuclear Regulatory Commission, Region II
C. P. Patel, NRC
T. S. Dozier, NRC
J. T. Reece, NRC

ENCLOSURE 1

Supplemental Response to NRC RAI Letter 65

RAI 5554, Question 09.02.01-14

SUPPLEMENTAL RESPONSE TO
REQUEST FOR ADDITIONAL INFORMATION

North Anna Unit 3

Dominion

Docket No. 52-017

RAI NO.: 5554 (RAI Letter 65)

SRP SECTION: 09.02.01 – STATION SERVICE WATER SYSTEM

QUESTIONS for Balance of Plant Branch 1(AP1000/EPR Projects (SBPA)

DATE OF RAI ISSUE: 04/14/2011

QUESTION NO.: 09.02.01-14

This Request for Additional Information (RAI) is necessary for the staff to determine if the application meets the requirements of General Design Criteria (GDC) 44.

The essential service water system (ESWS) must be capable of removing heat from systems, structures and components (SSCs) important to safety during normal operating and accident conditions over the life of the plant in accordance with General Design Criteria (GDC) 44 requirements. Standard Review Plan (SRP) Section 9.2.1, "Station Service Water System," Sections II and III provide guidance on the specific information that should be included in the application for evaluation by the staff.

US-APWR Design Control Document (DCD) Revision 2 COL 9.2 (1) requires the COL Applicant to provide the evaluation of the ESWS pump(s) at the lowest probable water level in the ultimate heat sink (UHS). DCD COL 9.2 (6) specifies that the COL Applicant should provide the ESWP design details including required total dynamic head and net positive suction head (NPSH) available. The ESWS pumps are important components used in part for heat transfer to satisfy GDC 44 and adequate ESWS pump performance including required NPSH for the ESWS pumps needs to be considered as part of the system design. For the above reasons, the NRC staff requests the applicant to consider providing the following information related to GDC 44 and NSPH consideration:

A. COL 9.2(1)

- Discuss pump vortex formation as part of the NPSH evaluation.
- Provide drawings indicating the elevation of the ESWS pump impellers.

- Include in the FSAR the low water level in the UHS to support adequate NPSH.
- Include in the FSAR the NPSH instrumentation for minimum water level to assure ESWS operability.
- Add the minimum water level to the Technical Specifications (TS), Section 3.7.9, "Ultimate Heat Sink," Surveillance Requirements. The TS currently addresses that the UHS basin is equal to or greater than the total volume of 10.6 million liters (2,800,000 gallons).

B. COL 9.2(6)

- Provide a clarification to the following FSAR sections related to basin level to support NPSH. FSAR Section 9.2.1.2.2.1, "ESWPS" describes the available NPSH with the lowest expected water level (after 30 days of accident mitigation) in the basin to be approximately 12.2 meters (40 feet). However the UHS basin level is described as 8.8 meters (29 feet) deep in FSAR Section 9.2.5.3, "Safety Evaluation".
- Provide in the FSAR the bases for the ESWS pump total dynamic head (TDH) of 67.1 meters (220 feet) and describe the margins available for the pump as related to system losses. Include in the FSAR a discussion related to TDH, flow requirements and time durations to the fire protection system that supports the reactor building and essential service water pump house.

Dominion Response

Background Discussion:

As noted in FSAR Section 9.2.5, each cooling tower structure consists of the Ultimate Heat Sink (UHS) basin, which is located underneath the tower, and the Essential Service Water (ESW) intake basin, which is located underneath the ESW pump house. Within each structure, the UHS basin and the ESW intake basin are interconnected and maintain the same water level. The ESW intake basin floor is 12 feet deeper than the UHS basin floor. During normal plant operation, a water level of approximately 34 feet above the UHS basin floor is maintained, which provides a water level of approximately 46 feet from the ESW intake basin floor. These elevations and configurations are shown in FSAR Figure 3.8-209 which provides a typical section view of the combined UHS basin and ESW intake basin structure including the ESW pump elevation. The minimum water level to guarantee the minimum Technical Specification UHS volume is 4 feet less than the normal operating water level or 30 feet above the UHS basin floor.

A. COL 9.2(1)

- Following 30 days of operation (without makeup) after a design basis accident, the water level in the ESW intake basin will be at elevation 282 feet which corresponds to the bottom of the UHS basin. This elevation is 12 feet above the ESW intake basin bottom and equates to an available NPSH of approximately 40 feet. (See response to the first item in B. COL 9.2(6) below.)

One ESW pump and one UHS transfer pump are located in each basin. The ESW pump is located approximately 10 feet from the nearest basin wall. The ESW pump and the UHS transfer pump from the same basin would not be operated simultaneously since it would be undesirable to be transferring water out of the UHS basin that is in service following a design basis accident. There is no other disturbance in the basin that would contribute to vortex formation. Thus the pump location, adequate submergence and the lack of competing pump suctions and disturbances make vortex formation highly unlikely.

- The attached Figure 1 depicts the cooling tower basin structure elevations of interest including the ESW pump impeller. The ESW intake basin floor elevation is 270 feet. and the UHS basin floor elevation is 282 feet. The normal operating water level is 316 feet. The minimum operating water level is 312 feet. The impeller (eye) of the ESW pump is located approximately 2 feet off of the ESW intake basin floor at an elevation of 272 feet. A vaned basket is installed at the suction of the vertical ESW pump. The actual ESW pump impeller elevation is subject to the final design details.

- During normal plant operation, the available NPSH for the ESW pump is approximately 74 feet with a corresponding water level of 46 feet above the ESW intake basin floor. As noted in the FSAR Subsection 9.2.1.2.2.1, the ESW pump available NPSH at the lowest expected water level in the intake basin is approximately 40 feet. This occurs after 30 days of accident mitigation without external make up and, as shown in the attached Figure 1. At this time, the water level will be approximately 12 feet above the ESW intake basin floor. The design of the ESW pumps will assure that adequate NPSH margin exists at these worst-case conditions and that the ESW pumps will remain capable of satisfying flow requirements.

  FSAR Subsection 9.2.1.2.2.1 will be revised to clarify the minimum water level and that adequate NPSH will be available at this condition.

- FSAR Subsection 9.2.5.5 describes UHS Level instrumentation to monitor and control the normal operating water level above UHS basin floor. FSAR Figure 9.2.5-201 shows the level instrumentation. UHS basin low water level of 30 feet (elevation 312 feet) is alarmed in the Main Control Room (MCR). Technical Specification (TS) 3.7.9 surveillance requirements associated with monitoring water level in the basin assure minimum required water inventory is maintained. As noted above in the second bullet, this assures that ESW pump NPSH requirements are satisfied.

  As noted in FSAR Subsection 9.2.5.5 water level is monitored in the MCR. During accident conditions, the instrumentation used to monitor the water level in the operating basins is used by the Control Room operators to start the UHS transfer pump to transfer water from the idle basin to the operating basins. Water inventory from three basins is used for accident mitigation and after 30 days expected minimum water level will be approximately 12 feet above ESW intake basin floor.

- A specific Technical Specifications Surveillance Requirement for UHS minimum water level is not necessary. As noted, the current Technical Specifications Surveillance Requirement, SR 3.7.9.1 requires verification of a minimum usable volume of 2.8 million gallons in each UHS basin. Technical Specifications Section B3.7.9, BACKGROUND, states that the stored water level corresponding to 2.8 million gallons usable volume provides adequate NPSH to the ESW pump during a 30-day period of operation following the design basis LOCA without makeup.

  The TS bases for this SR states that plant procedures provide the corresponding water level to be verified in each basin accounting for unusable volume and measurement uncertainty. This includes trending of sedimentation and instrument uncertainties. This ensures that the minimum usable volume requirement for each UHS train is met. Thus, the SR confirms minimum water level and adding the requirement to SR 3.7.9.1 would be redundant.

B. COL 9.2(6)

- The 40 feet NPSH from FSAR Section 9.2.1.2.2.1 and the 29 feet water depth from FSAR Section 9.2.5.3 are not comparable values.

  The 29 feet water depth in the UHS basin described in FSAR Subsection 9.2.5.3 is used to calculate available usable water volume (allowing for sedimentation and measurement uncertainties) from the low water level alarm point. Figure 1 provides the elevation and sediment information to illustrate the 29 feet water level in the UHS basin.

  As noted in item A.COL 9.2(1) above, following a design basis accident and after 30 days of pump operation without external makeup water supplied to the basin, the water level in the ESW intake basin will be approximately 12 feet. At these conditions, the available NPSH is computed as follows:

  NPSH = Atmospheric Pressure + Static Head – Pressure drop through suction piping - Vapor pressure corresponding to water temperature of 95 degrees F at pump suction

  = (14.61x2.31/0.995) ft + 10 ft (water level elevation above Impeller eye elevation) – 0.0 – 1.88 ft = 42.04 ft

  For conservatism 40 feet NPSH is used.

  FSAR Subsection 9.2.5.3 will be revised to clarify that adequate NPSH is available.

- Total dynamic head (TDH) is computed by adding the pressure drop through the flow path with higher resistance and the maximum static head (lift). Pressure drop across ESW users, including strainers, are conservatively estimated. Total calculated system losses are approximately 200 feet. The pump design TDH is 220 feet and thus provides ample (10%) margin. Also in this computation, static lift is calculated using the minimum expected water level in the basin (12 feet above ESW intake basin floor). At the initiation of an accident, water level will be a minimum of approximately 42 feet above the ESW intake basin floor, providing additional margin at the initiation of the accident and during subsequent mitigation.

FSAR Subsection 9.2.1.2.2.1 will be revised to reflect ESW pump TDH margin.

As noted in the FSAR Subsection 9.2.1.3, the ESW system may be used as a seismic category I backup source of water for the fire protection system. If required after the safe-shutdown earthquake, two hose stations supply a total of approximately 150 gpm for a maximum of two hours duration.

Total continuous flow required by all components supported by the ESW system during all modes of plant operation is 12,043 gpm per train (two trains operating during a design basis LOCA). Each ESW pump is designed for 13,000 gpm flow rate thus providing adequate flow margin. System losses from the pump discharge to the fire protection system tap in the reactor building are computed using design flow of 13,000 gpm and thus the additional fire protection flow usage of 150 gpm has no impact on the ESW pump TDH margin or pump design capacity.

FSAR Section 9.2.1.3 will be revised to clarify that this backup water supply for the fire protection system is not required for any accident condition other than a safe-shutdown earthquake.

Proposed COLA Revision

FSAR Sections 9.2.1.2.2.1, 9.2.1.3, and 9.2.5.3 will be revised as indicated on the attached markup.

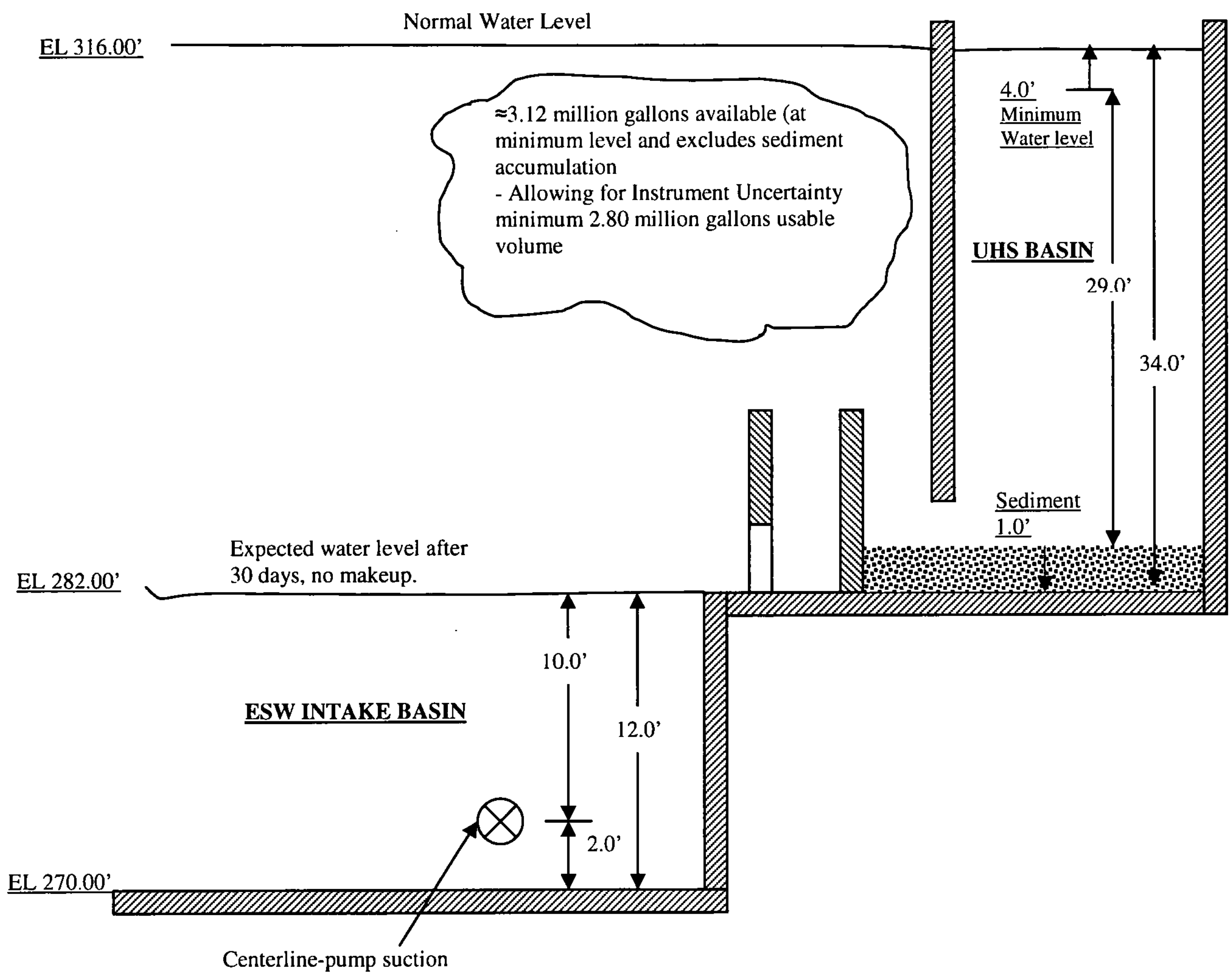
Normal Water Level
EL 316.00'
≈3.12 million gallons available (at minimum level and excludes sediment accumulation
- Allowing for Instrument Uncertainty minimum 2.80 million gallons usable volume
4.0'
Minimum Water level
UHS BASIN
29.0'
34.0'
Sediment 1.0'
Expected water level after 30 days, no makeup.
EL 282.00'
10.0'
12.0'
ESW INTAKE BASIN
2.0'
EL 270.00'
Centerline-pump suction

Figure 1

Markup of North Anna COLA

The attached markup represents Dominion's good faith effort to show how the COLA will be revised in a future COLA submittal in response to the subject RAI. However, the same COLA content may be impacted by revisions to the DCD, responses to other COLA RAIs, other COLA changes, plant design changes, editorial or typographical corrections, etc. As a result, the final COLA content that appears in a future submittal may be somewhat different than as presented herein.

9.2.1.2.2 Component Description

STD* COL 9.2(6)

Replace the sentence in DCD Subsection 9.2.1.2.2 with the following.

Table 9.2.1-1R shows the design parameters of the major components in the system.

9.2.1.2.2.1 ESWPs

STD* COL 9.2(6)

Replace the second sentence of the third paragraph in DCD Subsection 9.2.1.2.2.1 with the following.

~~Total dynamic head of the ESWP is 220 feet. Available net positive suction head (NPSH) with the lowest expected water level (after 30 days of accident mitigation) in the basin is approximately 40 feet.~~ Total dynamic head (TDH) of the ESWP is 220 feet. Total calculated system head losses including maximum expected static lift are approximately 200 feet. This provides approximately 20 feet margin. The static lift is based on the lowest expected water level in the ESW intake basin of approximately 12 feet. During plant operation and the initiation of the design basis accident, the water level will be minimum of approximately 42 feet above the ESW intake basin floor. This reduces the expected static lift by 30 feet, increasing the available margin.

Available net positive suction head (NPSH) with the lowest expected water level (after 30 days of accident mitigation) in the basin is approximately 40 feet. The minimum available NPSH is based on the lowest expected water level of approximately 12 feet, noted above and water temperature of 95°F. Available NPSH is approximately 70 feet based on the minimum expected water level of approximately 42 feet, noted above at the initiation of the accident.

9.2.1.3 Safety Evaluation

STD* COL 9.2(1)

Replace the twelfth paragraph in DCD Subsection 9.2.1.3 with the following.

Design of the basin provides adequate submergence of the pumps to assure the NPSH for the pumps. The basin is divided into two levels. One is approximately 12 feet lower than the other, and directly above it is installed the ESWP. The ESWP is designed to operate with the lowest expected water level (after 30 days of accident mitigation). The basins have sufficient water inventory to assure adequate cooling and NPSH for 30 days without makeup. This is discussed further in Subsection 9.2.5.2.

Recovery procedures contained in the Operating and Maintenance Procedures (see Subsection 13.5.2.1) are implemented if the UHS approaches low water level.

NAPS COL 9.2(2)

Replace the thirteenth paragraph in DCD Subsection 9.2.1.3 with the following.

The lowest ambient temperature anticipated at the site will be accommodated by operational features to prevent freezing of the ESW in the basin or the piping for the following reasons:

- The basins are located partially below grade and thus ground temperature helps to prevent the water from freezing.
- In the operating trains, water is continuously circulated which helps to prevent freezing. Ultimate heat sink (UHS) transfer pumps can be used to circulate water from the idle basins. This is further discussed in Subsection 9.2.5.3.
- UHS ESW pump house ventilation system maintains pre determined minimum temperature in the pump house areas. This is further described in Subsection 9.4.
- Any exposed essential piping that may be filled with water while the pump is not operating is heat traced. This is further discussed in Subsection 9.2.5.3.

For the thermal overpressure protection of the component cooling water heat exchanger ESW side, the valves located at the component cooling water heat exchanger ESW side inlet and outlet lines are administratively locked open valves. These locked open valves assure protection from the thermal overpressurization due to the erroneous valve operation coincident with the heat input from the component cooling water (CCW) side to ESW side.

STD* COL 9.2(7)

Replace the last two paragraphs in DCD Subsection 9.2.1.3 with the following.

The ESWS serves as a backup source of water for the FSS in the R/B and in the ESWP house. This is in conformance with the requirement for an alternative fire protection water supply from a seismic category I water system in the event of a safe-shutdown earthquake, in accordance with RG 1.189. Two hose stations at approximately 150 gpm total take water from the ESWS for a maximum of two hours. Approximately 18,000 gallons is consumed by the FSS. This water volume has minimal impact on the UHS water inventory and does not jeopardize the 30 day capacity requirement. Administratively locked closed valves in each of the fire protection water supply taps assure that water inventory loss is controlled.

Specific design conditions such as maximum operating water temperature and required UHS water volume are described in detail in Subsections 9.2.5.2.3 and 9.2.5.3.

The ESW system is not required to supply water to Fire Protection Water Supply System (FSS) during any other design basis event including LOCA.

9.2.1.5.4 ESWP Motor Essential Service Water Flow

STD COL 9.2(7)**

Replace the content of DCD Subsection 9.2.1.5.4 with the following.

Not applicable.

9.2.2.1.2.1 Normal Operation

NAPS DEP 9.2(1)

Replace the third sentence in DCD Subsection 9.2.2.1.2.1 with the following.

Normal operating heat loads are reactor coolant pump, charging pump, letdown heat exchanger, instrument air, spent fuel pool cooling heat exchanger, sample heat exchanger, seal water heat exchanger, blowdown sample cooler, degasifier, waste gas compressor, and other smaller loads.

9.2.2.2.2 System Operations

STD COL 9.2(27)

Replace the last paragraph in DCD Subsection 9.2.2.2.2 with the following.

The operating and maintenance procedures regarding water hammer are included in system operating procedures in Section 13.5.2.1. A milestone schedule for implementation of the procedures is also included in Subsection 13.5.2.1.

b. The ESW temperature rise (CR) was based on heat rate equation of H as

Heat Rate (H) = m × specific heat × CR,

where, m = mass flow rate

c. Accumulative evaporation (gallons/cooling tower) is calculated by multiplying the evaporation rate (gpm) and its corresponding time interval.

d. The total water loss due to evaporation and drift for the 30-day period is calculated and is defined as the plant unit minimum required water capacity for the basin design in accordance with RG 1.27.

Based on the above analyses, the governing case for the maximum required 30-day cooling water capacity is two-train operation during safe shutdown with LOOP condition, with a total required cooling water of approximately 8.40 million gallons. For the cooling tower design heat load the governing case is the safe shutdown conditions with LOOP for two-train operation, with a heat load of 196 million Btu/hr.

9.2.5.3 Safety Evaluation

NAPS COL 9.2(22) Replace the content of DCD Subsection 9.2.5.3 with the following.

The results of the UHS capability and safety evaluation are discussed in detail in Subsection 9.2.5.2.3 and in this Subsection. The UHS is capable of rejecting the heat under limiting conditions as discussed in Subsection 9.2.5.2.3.

The failure modes and effects analysis for the UHS are included in Table 9.2.5-202 and demonstrate that the UHS satisfies the single failure criteria.

The basin is designed to withstand the effect of natural phenomena, such as earthquake, tornado, hurricanes, and floods taken individually, without loss of capability to perform its safety function.

The combined volume of water in three basins is sufficient to provide at least 30 days required cooling capacity.

The total required 30 days cooling water capacity is approximately 8.40 million gallons, or approximately 2.80 million gallons per basin. Each basin dimension, not including any column or wall sections, is 120 feet x 120 feet with a water depth of 29 feet from the minimum maintained water level, the usable water volume available for each basin is approximately 3.12 million gallons. The water depth excludes one foot of unusable space from the basin floor, where sedimentation may accumulate. The UHS basin volume of 2.8 million gallons does not include water volume in the ESW intake basin below the UHS basin floor level.

As clarified in Subsection 9.2.1.2.2.1, 29 feet water depth in the UHS basin excluding 1 foot for sedimentation accumulation provides approximately 70 feet available NPSH at the initiation of an accident. This assures adequate pump NPSH for 30 days without make up under design basis event conditions.

During accident conditions, including LOCA and LOOP, makeup to the basin is presumed lost. During such conditions, the UHS transfer pump operates to permit the use of three of the four basin water volumes. The power supply for each transfer pump is from a different division than the ESWP and cooling tower in that basin. Therefore, loss of one electrical train does not compromise the ability to satisfy the short-term accident requirements.

Subsection 9.2.1.3 describes the features to prevent freezing of the ESWS and the UHS. The following design and operation features provide protection against freezing in the basin and ice formation on the cooling tower fill:

- [In operating trains, the water is manually bypassed directly to a basin without passing through spray nozzles, when the water temperature reaches pre-determined low value. The water flow is switched manually back to the spray nozzles at a pre-determined value of basin water temperature. Each UHS cooling tower bypass valve is interlocked with the UHS cooling tower isolation valve so it cannot be opened unless the UHS cooling tower isolation valve is closed. During accident conditions these valves will receive an automatic signal to realign to their normal position. When the operating trains are in winter mode or in normal mode, the cooling tower bypass valves are closed and the cooling tower isolation valves are open in the non-operating (i.e., standby) trains.
- The cooling tower fans are operated at lower speed reducing the cooling rate. The fans may be operated in the reverse direction for short periods of time to minimize ice buildup at the air inlets.

ENCLOSURE 2

Supplemental Response to NRC RAI Letter 65

RAI 5548, Question 09.03.04-1

SUPPLEMENTAL RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

North Anna Unit 3

Dominion

Docket No. 52-017

RAI NO.: 5548 (RAI Letter 65)

SRP SECTION: 09.03.04 – CHEMICAL VOLUME AND CONTROL SYSTEMS (PWR) (INCLUDING BORON RECOVERY SYSTEM)

QUESTIONS for Balance of Plant Branch 1(AP1000/EPR Projects (SBPA)

DATE OF RAI ISSUE: 04/14/2011

QUESTION NO.: 09.03.04-1

Figure 9.3.4-1R, "Chemical and Volume Control System Flow Diagram (Sheet 6 of 7)," shows a new connection via VLV-351-N and locked closed VLV-352-N to charging pump 4637 (N0-EE10024). Provide a discussion of this change and address the following concerns:

1. Since water can be added to the CVCS holdup tank at various times throughout plant operation, how will boric acid additions to the RCS be controlled now that a potential pathway exists connecting the holdup tanks directly to the charging pump suction? Also, how does this impact reactivity and pH control?

2. The CVCS holdup tanks are located at a lower elevation than the spent fuel pool and the refueling water storage auxiliary tank. Demonstrate, by quantitative assessment, that net positive suction head is maintained with respect to the charging pumps assuming this new line provides the only flow path. Include all calculation assumptions such as frictional losses that are appropriate for the 2" piping inner diameter.

<u>Dominion Response</u>

A boric acid evaporator provides a means to reuse boric acid in a PWR, thus minimizing the operational consumption of boric acid. Since North Anna Unit 3 has chosen not to include a boric acid evaporator in the plant design, a connection between the holdup tanks and the charging pumps was incorporated in to the plant design. This connection is intended to allow reuse or borated water in order to reduce the operational consumption of boric acid. The process and controls for the use of this new connection are discussed below:

1. Administrative procedures will be in place and additions to the RCS via the new connection between the holdup tanks and the charging pump suction will be strictly controlled. This connection is intended to be used during refueling only.

   During refueling, the RCS water level will be lowered as part of refueling operations. At this time, the RCS boron concentration would be at the elevated refueling concentration required by Technical Specifications. During the drain down of the RCS, surplus RCS inventory can be transferred to one of the three available holdup tanks. This water is stored until needed near the end of refueling operations when it can be transferred back to the RCS through valve VLV-351-N and locked closed valve VLV-352-N via the connection between the holdup tanks and the charging pump suction. This approach to reuse of the RCS inventory reduces boric acid consumption.

   Prior to transferring the stored water back to the RCS, the holdup tank contents will be sampled, analyzed, and confirmed to meet water quality requirements, including pH and Technical Specification boron concentration requirements. If the contents of the holdup tank do not meet the currently applicable RCS inventory requirements, the water will be treated and recycled back to the holdup tank or discharged. These controls will ensure that the water in the holdup tank is suitable for return to the RCS and that there are no impacts on reactivity and pH control. Because valve VLV-352 is administratively controlled and normally maintained in the locked-closed position, the inadvertent addition of water with unacceptable chemistry to the suction line of the charging pump is precluded.

2. During the operation to return the contents of a holdup tank to the RCS inventory using this charging pump flow path, adequate net positive suction head (NPSH) for the charging pumps would be provided from the volume control tank (VCT) through valves LCV 031-B and 031-C. With this alignment, the VCT flow path alone provides adequate NPSH and the additional flow from the holdup tank would only serve to increase NPSH to the charging pumps. The connection for transfer of contents from the holdup tank to the RCS via the charging pumps will only be used coincident with flow from the VCT to the charging pumps. As stated in the response to item 1 above, the flow through the connection from the holdup tanks to the charging pump suction will be strictly controlled by administrative procedures and would required the opening of the normally locked-closed valve VLV-352. The administrative procedures for the use of the new connection will prevent this flow path from the holdup tanks from being the sole source of suction for the charging pump.

Quantitative assessment of the NPSH depends upon the final pipe routing of the system. This information is not available at this time, however, confirmation of adequate NPSH with respect to the charging pumps will be determined during the detailed design phase of the CVCS system.

Proposed COLA Revision

None.