VIRGINIA ELECTRIC AND POWER COMPANY
RICHMOND, VIRGINIA 23261

July 15, 2002

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

Serial No. 02-452
NL&OS/ETS R0
Docket Nos. 50-338/-339
License Nos. NPF-4/-7

Gentlemen:

**VIRGINIA ELECTRIC AND POWER COMPANY**
**NORTH ANNA POWER STATION UNITS 1 AND 2**
**REQUEST FOR ADDITIONAL INFORMATION**
**PROPOSED TECHNICAL SPECIFICATION CHANGES**
**QUENCH SPRAY AND RECIRCULATION SPRAY NOZZLES**
**SURVEILLANCE FREQUENCY**

In a February 26, 2002 letter (Serial No. 02-124), Virginia Electric and Power Company (Dominion) requested 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 surveillance frequency of the Quench Spray and Recirculation Spray System spray header nozzles from a periodic surveillance to a performance-based surveillance. In a June 27, 2002 letter and a July 8 telephone conference call, the NRC staff requested additional information to complete the review of the proposed amendments. The attachment to this letter provides the requested information to support the proposed Technical Specifications amendments.

As noted in our initial submittal, a periodic surveillance test of the spray nozzles is currently scheduled for the Unit 2 Fall refueling outage. To permit effective outage planning, it is requested that the NRC approve the proposed Technical Specification changes by August 2002.

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

Very truly yours,

Leslie N. Hartz
Vice President – Nuclear Engineering

Attachment

Commitments made in this letter: None

A001

cc: U.S. Nuclear Regulatory Commission
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SN: 02-452
Docket Nos.: 50-338/339
Subject: RAI – Proposed TS Changes
QS & RS Nozzles Surveillance Frequency

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 15th day of July, 2002.

My Commission Expires: March 31, 2004.

Maggie McClure
Notary Public

(SEAL)

**Attachment**

**Request for Additional Information**
**Quench Spray and Recirculation Spray Nozzle**
**Technical Specification Surveillance Frequency Change**

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

NRC Question 1

"Experience at D. C. Cook, Units 1 and 2 (Licensee Event Report (LER) 98-027-02) indicates that boric acid plate-out with the potential to block flow through the containment spray headers and nozzles can occur following an inadvertent spray actuation.

(a) Please indicate if there ever has been an inadvertent actuation of the containment spray at North Anna Power Station.

(b) If an inadvertent actuation of containment spray had occurred, describe the type of inspection that was done of the spray system, including piping and nozzles, and what other steps were taken to ensure that no boric acid plate-out occurred.

(c) If an inadvertent actuation of containment spray had not occurred, describe what type of inspection would be conducted following an inadvertent spray actuation including why this method is sufficient to detect blockage due to boric acid plate-out."

Response to 1(a), (b), and (c):

Based on a review of the LER database, North Anna has previously had three inadvertent actuations of the Quench Spray or Recirculation Spray System. However, as a result of prompt operator action and the specific equipment configuration, an actual injection of borated water through the spray ring header did not occur for any of these three events. If an inadvertent actuation were to occur with injection of borated water through the spray ring header, a Plant Issue would be initiated which would require an evaluation of the circumstances and appropriate corrective actions to ensure the spray nozzles are operable and prevent recurrence. Corrective actions may include performance of an air/smoke flow surveillance test to ensure the spray nozzles are not obstructed and capable of performing their safety function.

NRC Question 2

"Experience at D. C. Cook, Units 1 and 2 (LER 98-027-02) indicates that the typical test for blockage in the containment spray lines and nozzles may not be effective in detecting debris in the spray lines at the amounts reported in this LER.

Please indicate if your testing records show any evidence that the containment spray flow blockage test may have a sensitivity to debris in the lines or nozzles, which cannot be detected by this test. For example, has construction debris or other debris been found in the containment spray system from later inspections, tests or repair work that was not discovered by the containment spray system blockage test required by your technical specifications?"

Response to 2:

UFSAR Sections 6.2.2.4.1 and 6.2.2.4.2 describe testing and inspections performed on the Quench Spray (QS) and Recirculation Spray (RS) subsystems. A partial description of the testing performed on each system is provided below.

Following installation of the QS subsystems, temporary drain lines were connected to blind flanges and pipe plugs were placed in the spray nozzle sockets. The QS pumps were started and water was circulated through the spray header supply lines to the spray headers and out the temporary drain connections. This pre-operational testing provided a full system capability test and provided a complete system flush to remove all particulate matter prior to installation of the spray nozzles. At the completion of this testing, the temporary drain lines were removed, blind flanges were replaced, pipe plugs removed, and the spray nozzles were installed. After installation of the nozzles, a nozzle air test was conducted and verified that the spray nozzles remained unobstructed after the full-flow testing. The QS system pre-operational flow and air/smoke tests established that the QS spray headers and spray nozzles were free of debris.

A pre-operational, full-flow system test was performed with water on the RS subsystems. With the spray nozzle sockets plugged, permanently installed spray header drain lines running between the spray nozzle headers and the containment sump were temporarily connected. Water was then added to the containment sump, surrounded by a portable dike so that each RS pump could circulate water up through its respective heat exchanger and spray nozzle headers. The full flow test through the shell side of each RS heat exchanger ensured that the required flow and head for effective spray nozzle operation and system operation was achieved. This testing also provided a complete system flush to remove all particulate matter prior to installation of the spray nozzles. Upon completion of the system test, water was drained, temporary connections were removed and the spray nozzles were installed. A nozzle air test was conducted and verified that the spray nozzles remained unobstructed after the full-flow testing. The RS system pre-operational flow and air/smoke tests established that the RS spray headers and spray nozzles were free of debris.

Based on this pre-operational testing, it is assumed that construction debris was removed from the QS and RS systems prior to declaring them operable. Subsequent 10-year air/smoke tests performed to date have not identified any nozzle blockage caused by debris in the spray ring headers. These air tests are performed with station service air, which provides air at approximately 100 psig, to verify the nozzles are unobstructed.

Since the original pre-operational testing, the QS and RS spray ring headers have not been opened for maintenance, inspection, or testing. Therefore, we have not identified any additional construction debris in the spray headers during maintenance or testing of the spray system headers and nozzles.

NRC Question 3

"Describe any previous maintenance activities on the containment spray system that had the potential to introduce debris. What assurance is there that no such debris presently exists (including debris from construction)?"

Response to 3:

As indicated in our initial correspondence (Serial No. 02-124), the maintenance and test history since the last air/smoke test was reviewed to identify any activity that could have inadvertently introduced debris into the Quench Spray and Recirculation Spray Systems. This review concluded that the maintenance/testing activities that were performed since the last air/smoke test of the spray nozzles have not introduced debris into the spray ring headers for either system. This conclusion is based on the administrative controls implemented for the Foreign Material Exclusion (FME) program, as described in the response to Question 4. The FME program ensures that debris is not introduced into systems when they are opened for periodic maintenance. In addition, the pre-operational testing performed on the Quench Spray and Recirculation Spray Systems, as described in response to Question 2, ensures any construction related debris was flushed from these systems prior to declaring them operable.

NRC Question 4 (a)

"Describe how the plant's foreign material exclusion program would prevent debris from remaining in the containment spray system piping, headers and nozzles following maintenance, testing or inspections which result in opening the system."

Response to 4(a)

Virginia Power Administrative Procedure (VPAP) 1302, Foreign Material Exclusion Program, provides administrative guidelines to prevent the introduction of foreign material, (e.g., maintenance residue, dirt, debris, and tools) into open systems or components during maintenance and maintenance related activities. Foreign material exclusion (FME) controls are required to be established any time a system/component is opened for maintenance, regardless of size. If it is determined that FME controls are not required, this is documented in the work package. Only qualified workers may perform work independently in a FME area. Non-qualified personnel must be escorted by a qualified worker while in a FME designated boundary area. The following provides a partial list of attributes for the FME Program as described in VPAP 1302.

- The component/system being opened is inspected as soon as it is open to note any missing or damaged parts and components prior to starting work.

- No clear plastic, poly sheeting, or other transparent materials shall be taken into an FME area unless it is clearly marked in such a way that it is no longer transparent.

- Tools and equipment are required to be fail-safe and logged in/out as necessary.

- Consumables must be used in accordance with approved Consumable Material Evaluations. If a container must be taken into the work area then all parts are made fail-safe.

- The following guidelines are provided for maintaining cleanliness during work activities on open systems/components:

  a. Whenever possible, the system cavity should be drained, wipe cavity clean, and allowed to dry.
  b. Whenever possible, the accumulation of dirt and debris should be reduced by using methods that effectively shrink the work area as follows:
     - Blocking pipe runs by using dams or baffles.
     - Coating the walls of the cavity with a protective film or cover that can be peeled off once work is completed.
     - Installing a cover prior to scraping or cleaning gasket surfaces.
  c. Prior to grinding or using a wire wheel with air tools the spread of debris should be reduced by scraping, vacuuming, and wiping up loose debris.
  d. Inspect tools and materials required for the activity to ensure they are clean and in good condition. Any cables, cords, or hoses with deteriorated, aged, or spalled surfaces shall not be used.
  e. Internal and external surfaces of replacement parts, and parts removed for repair should be thoroughly cleaned before installing or reinstalling the item in the system/component.
  f. Cleaning tasks that increase system cleanliness should be performed immediately before starting another stage of the task.
  g. When performing lapping or mechanical seat repair to valve seats internal plugs should be installed whenever possible. All lapping compound and filings must be removed from the system component using approved solvents. All bluing should be removed after surfaces have been checked in the same manner.
  h. Debris that was added by the work process should be removed from the system. Examples include: grinding dust, welding slag, lapping compound, metal chips, tape residue, marking ink, dye penetrant.
  i. System openings (cavities) should be covered with temporary covers when leaving work area unattended (e.g., end of work shift, work delays) to prevent intrusion of foreign material. The work area shall be cleaned at the end of each shift to ensure entry of foreign material does not occur.

- When temporary systems are to be attached to systems/components that are sensitive to foreign materials the temporary system components should meet the same cleanliness requirements as the system to which they are being attached.

- A clamshell cutter or grinding to a "blue line" should be used in vertical pipe runs or on any FME sensitive system. The use of a porta-band saw, reciprocating saw, or a cutting torch are not to be used without the consent of the cognizant supervisor. Blue Line is that technique where, when a through wall cut of a pipe is desired but you want to minimize to the greatest extent possible debris entering the pipe, a cut is

made externally on the pipe surface toward the pipe internal. As you cut deeper into the pipe, the friction of the cutting tool will cause the base metal remaining to be cut to turn blue just prior to entering the pipe. At this point, the cutting evolution is stopped and the process repeated for the remaining portions of the area to be cut until a blue line encircles the pipe. To complete the through wall cutting of the pipe, a sharp chisel is used at the blue line to establish separation of the base metal.

- Guidelines have been established for a loss of FME control, which includes initiation of a Plant Issue upon discovery of loss of FME control. These guidelines would be taken for a discrepancy in the FME Control Log or if it is suspected that foreign material has been introduced into the component/system.

- A closeout inspection shall be performed by an appropriately certified inspector prior to system/component closure for safety related and NSQ piping, valves, oil reservoir, and flanges, greater than 2 inches nominal size. The closeout inspection is documented with the work order that authorized the maintenance activity.

- Station management review of the effectiveness of the FME Program in their respective departments shall be conducted by periodically monitoring work activities involving cleanliness of open systems and components, reviewing internal and external audit reports related to the FME Program, reviewing the number of items unaccounted for during FME area activities.

These administrative controls are considered to be sufficient to assure foreign material is excluded from open systems and components during maintenance and maintenance related activities.

NRC Question 4(b)

"Demonstrate why your foreign material exclusion program is sufficient, following any opening of the system, to ensure that nothing remains in the system sufficient to block the system and cause a decrease in spray flow. Shouldn't a blockage test be run to provide a defense in depth that the containment spray system is still capable of performing its safety function after the system is opened?"

Response to 4(b)

The attributes of the FME Program described above provide adequate assurance that debris or foreign material will not be left in the Quench Spray or Recirculation Spray System that could significantly reduce the systems' ability to perform its intended function. When the spray systems are opened for maintenance or testing, appropriate FME controls are established to ensure the system is free of debris. In addition, post-maintenance testing is performed on the active components (pumps and valves) which further confirms that the system is free of debris and establishes that the system is fully operable. From a review of records, there has been no maintenance on the spray headers or the spray nozzles that could have caused any debris or blockage of the spray nozzles that has not been addressed by initial testing and the FME program.

As for the prudence of performing a Technical Specification air/smoke surveillance test after every maintenance activity, it is noted that the air/smoke spray nozzle test only establishes that the piping and nozzles in the spray system headers are unobstructed. Therefore, performing an air/smoke test of the spray systems' headers and spray nozzles would not provide any significant increase in the assurance that the spray systems could perform their intended safety function after another portion of the spray system (e.g., pumps, valves, heat exchangers etc.) was opened. Regardless, if a spray ring header is opened for maintenance, the Post Maintenance Testing Matrix will require an evaluation to be performed of the work activity to determine if a air/smoke test is warranted even with the FME controls in place to preclude the entry of materials that could cause nozzle obstruction.

NRC Question 4(c)

"Following maintenance on a component of the containment spray system, what specific criteria are used to determine whether a flow blockage test of the containment spray system is required? At what level of management is this decision approved?"

Response to 4(c)

As indicated in our initial correspondence, an initial evaluation of the spray systems has been performed to determine those portions of the spray systems that an air/smoke test could be used to verify that the nozzles remain unobstructed after maintenance or testing. The Post Maintenance Testing (PMT) matrix will be modified to address the need for a specific engineering evaluation to determine if a spray nozzle inspection or test is necessary after maintenance on those portions of the spray systems identified in the initial evaluation as noted above.