

October 15, 2007

Mr. David A. Christian
President and Chief Nuclear Officer
Virginia Electric and Power Company
Innsbrook Technical Center
5000 Dominion Boulevard
Glen Allen, VA 23060-6711

SUBJECT: SURRY POWER STATION, UNIT NOS. 1 AND 2, ISSUANCE OF AMENDMENTS REGARDING THE REVISION OF TECHNICAL SPECIFICATION SURVEILLANCE REQUIREMENTS FOR THE INSPECTION OF THE CONTAINMENT RECIRCULATION SUMP (TAC NOS. MD3168 AND MD3169)

Dear Mr. Christian:

The U.S. Nuclear Regulatory Commission has issued the enclosed Amendment No. 255 to Renewed Facility Operating License No. DPR-32 and Amendment No. 254 to Renewed Facility Operating License No. DPR-37 for the Surry Power Station, Unit Nos. 1 and 2, respectively. The amendments change the Technical Specifications (TSs) in response to your application dated October 3, 2006, as supplemented by letters dated March 28 and June 19, 2007.

These amendments revise the TS Surveillance Requirements (SR) to: (1) change the required frequency of containment sump inspections, and (2) replace specific terminology associated with the existing sump screen design with generic terminology applicable to both the existing design and the replacement strainer being installed in response to the Nuclear Regulatory Commission's Generic Letter 2004-02, "Potential Impact of Debris Blockage on Emergency Recirculation during Design Basis Accidents at Pressurized-Water Reactors."

A copy of the Safety Evaluation is also enclosed. The Notice of Issuance will be included in the Commission's biweekly *Federal Register* notice.

Sincerely,

/RA/

Siva P. Lingam, Project Manager
Plant Licensing Branch II-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-280 and 50-281

Enclosures:

1. Amendment No. 255 to DPR-32
2. Amendment No. 254 to DPR-37
3. Safety Evaluation

cc w/encls: See next page

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VIRGINIA ELECTRIC AND POWER COMPANY

DOCKET NO. 50-280

SURRY POWER STATION, UNIT NO. 1

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 255
Renewed License No. DPR-32

1. The Nuclear Regulatory Commission (the Commission) has found that:
 - A. The application for amendment by Virginia Electric and Power Company (the licensee) dated October 3, 2006, as supplemented by letters dated March 28 and June 19, 2007, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act) and the Commission's rules and regulations set forth in 10 CFR Chapter I;
 - B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;
 - C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;
 - D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and
 - E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 3.B of Renewed Facility Operating License No. DPR-32 is hereby amended to read as follows:

(B) Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 255, are hereby incorporated in the renewed license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of its date of issuance and shall be implemented at the completion of Unit 1 fall 2007 refueling outage.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA by RMartin for/

Evangelos C. Marinos, Chief
Plant Licensing Branch II-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment:
Changes to License No. DPR-32
and the Technical Specifications

Date of Issuance: October 15, 2007

VIRGINIA ELECTRIC AND POWER COMPANY

DOCKET NO. 50-281

SURRY POWER STATION, UNIT NO. 2

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 254
Renewed License No. DPR-37

1. The Nuclear Regulatory Commission (the Commission) has found that:
 - A. The application for amendment by Virginia Electric and Power Company (the licensee) dated October 3, 2006, as supplemented by letters dated March 28 and June 19, 2007, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act) and the Commission's rules and regulations set forth in 10 CFR Chapter I;
 - B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;
 - C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;
 - D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and
 - E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 3.B of Renewed Facility Operating License No. DPR-37 is hereby amended to read as follows:

(B) Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 254, are hereby incorporated in the renewed license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of its date of issuance and shall be implemented at the completion of Unit 1 fall 2007 refueling outage.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA by RMartin for/

Evangelos C. Marinos, Chief
Plant Licensing Branch II-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment:
Changes License No. DPR-37
and the Technical Specifications

Date of Issuance: October 15, 2007

ATTACHMENT

TO LICENSE AMENDMENT NO. 255

RENEWED FACILITY OPERATING LICENSE NO. DPR-32

DOCKET NO. 50-280

AND

TO LICENSE AMENDMENT NO. 254

RENEWED FACILITY OPERATING LICENSE NO. DPR-37

DOCKET NO. 50-281

Replace the following pages of the Licenses and the Appendix A Technical Specifications (TSs) with the attached revised pages. The revised pages are identified by amendment number and contain marginal lines indicating the areas of change.

Remove Pages

License

License No. DPR-32, page 3

License No. DPR-37, page 3

TSs

4.5-2

4.5-4

4.11-3

4.11-4

Insert Pages

License

License No. DPR-32, page 3

License No. DPR-37, page 3

TSs

4.5-2

4.5-4

4.11-3

4.11-4

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO AMENDMENT NO. 255 TO
RENEWED FACILITY OPERATING LICENSE NO. DPR-32
AND
AMENDMENT NO. 254 TO RENEWED FACILITY OPERATING LICENSE NO. DPR-37
VIRGINIA ELECTRIC AND POWER COMPANY
SURRY POWER STATION, UNIT NOS. 1 AND 2
DOCKET NOS. 50-280 AND 50-281

1.0 INTRODUCTION

By letter dated October 3, 2006 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML062770208), as supplemented by letters dated March 28 (ADAMS Accession No. ML070871222) and June 19, 2007 (ADAMS Accession No. ML071710608), Virginia Electric and Power Company (the licensee) submitted a request for changes to the Surry Power Station, Unit Nos. 1 and 2 (Surry 1 and 2), Technical Specifications (TSs). The requested changes would modify containment recirculation sump surveillance requirements located in TS 4.5, "Spray Systems," and TS 4.11 "Safety Injection System Tests." The supplements dated March 28 and June 19, 2007, provided additional information that clarified the application, did not expand the scope of the application as originally noticed and did not change the Nuclear Regulatory Commission (NRC) staff's original proposed no significant hazards consideration determination as published in the *Federal Register* (FR) on November 7, 2006 (71 FR 65146).

The licensee's proposed revisions to the surveillance requirements (SRs) in TS 4.5 and TS 4.11 would replace existing references to the specific components that are within the scope of the SRs with the generic term "containment sump components." The licensee indicated that the purpose of this proposed change is to provide a revised wording that is applicable to both the design of the existing sump screen/trash rack and the planned replacement strainers that will be installed to address the sump performance issues described in Generic Letter (GL) 2004-02, "Potential Impact of Debris Blockage on Emergency Sump Recirculation at Pressurized-Water Reactors."

The licensee also stated that the revised SRs would delete the existing TS requirement for performing containment sump inspections after major maintenance activities in containment. The licensee stated that including this requirement in the TSs is unnecessary because inspections are performed as part of normal work practices and because post-maintenance testing is required to declare equipment operable.

On December 28, 2006, and May 3, 2007, the NRC staff transmitted a request for additional information (RAI) to the licensee concerning the proposed TS changes. The licensee responded to the NRC staff's RAI with letters dated March 28, 2007, and June 19, 2007, respectively.

2.0 BACKGROUND

The Surry 1 and 2 containment sump strainer assemblies provide a long-term source of cooling water to the containment spray (CS) system and recirculation spray (RS), and low head safety injection (LHSI) system. The CS and RS systems operating together reduce the containment temperature, return the containment pressure to subatmospheric, and remove heat from the containment. The RS system, which includes the inside recirculation spray (IRS) and outside recirculation spray (ORS) subsystems, maintains the containment subatmospheric and transfers heat to the service water system.

The current containment sump design consists of two sumps, the aerated drains (DA) sump and the RS sump, separated by a small dam providing suction points for the four RS pumps and the two LHSI pumps in the recirculation mode. Both the DA sump and RS sump are enclosed by a platform and trash gate assembly. The existing containment sump screen surrounds the containment sump and is designed to exclude debris large enough to cause the RS ring nozzles to become clogged or to affect the operability of the RS and LHSI pumps/systems. The total strainer area for RS is approximately 162 square feet, and for LHSI is approximately 55 square feet.

The replacement sump design consists of two separate strainer assemblies, one for the RS system piping and the other for LHSI system piping. Each sump strainer assembly design utilizes modular strainer assemblies and eliminates the existing sump trash racks and screens. Each strainer assembly is designed to be mounted on the containment floor and around the containment sump. Each module contains a number of fins attached to the module, and each module is bolted to the containment floor and connected to each other by flexible metal seals. Pump suction openings located in the sump will be connected to their associated strainer assemblies by installing new piping. The new piping within the sump will be designed and installed to accommodate the existing sump instrumentation, piping, and IRS pumps. The new strainer assembly will be designed to provide access to the sump piping for testing. The material used in the construction of the strainer modules including fins, base plates, and piping will be corrosion resistant stainless and compatible with the existing suction piping of RS and LHSI pumps. The strainer assemblies are designed to prevent particles larger than 0.0625 inches from entering the RS and LHSI systems. The total strainer area for the modified strainer assemblies for the RS is approximately 6200 square feet and for LHSI is approximately 2200 square feet.

3.0 REGULATORY EVALUATION

The licensee has proposed changes to SRs in TS 4.5 and TS 4.11, which relate to the periodic inspection of the containment sump strainers, IRS pump wells, and the sump suction inlets for the LHSI pumps and ORS pumps.

The licensee's October 3, 2006, submittal describes the NRC's regulatory requirements regarding the long-term functionality of emergency core cooling systems (ECCS) and CS systems that are applicable to the proposed changes to the Surry 1 and 2 TSs, as summarized in the list below. Note that the LHSI pumps are subcomponents of the ECCS and that both the IRS and ORS are categorized as CS systems. Furthermore, the licensee stated that, while Surry 1 and 2 are not subject to the General Design Criteria (GDC) requirements in Appendix A to Title 10 of the *Code of Federal Regulations* (10 CFR), Part 50, because their construction permits were issued prior to the GDCs' becoming effective, Surry 1 and 2 were designed to meet the intent of the draft GDCs.

- Paragraph (b)(5) of 10 CFR 50.46, "Acceptance criteria for emergency core cooling systems for light-water nuclear power reactors," states that after any calculated successful initial operation of the ECCS, the calculated core temperature shall be maintained at an acceptably low value and decay heat shall be removed for the extended period of time required by the long-lived radioactivity remaining in the core.
- GDC 35, "Emergency core cooling," states that a system to provide abundant emergency core cooling shall be provided. The system safety function shall be to transfer heat from the reactor core following any loss of reactor coolant at a rate such that (1) fuel and clad damage that could interfere with continued effective core cooling is prevented and (2) clad metal-water reaction is limited to negligible amounts.
- GDC 36, "Inspection of emergency core cooling system," states that the emergency core cooling system shall be designed to permit appropriate periodic inspection of important components, such as spray rings in the reactor pressure vessel, water injection nozzles, and piping, to assure the integrity and capability of the system.
- GDC 38, "Containment heat removal," states that a system to remove heat from the reactor containment shall be provided. The system safety function shall be to reduce rapidly, consistent with the functioning of other associated systems, the containment pressure and temperature following any loss-of-coolant accident (LOCA) and maintain them at acceptably low levels.
- GDC 39, "Inspection of containment heat removal system," states that the containment heat removal system shall be designed to permit appropriate periodic inspection of important components, such as the torus, sumps, spray nozzles, and piping to assure the integrity and capability of the system.

The basis for pressurized-water reactor (PWR) licensees to demonstrate compliance with the above requirements is documented in GL 2004-02. The primary purpose of GL 2004-02 was to request that PWR licensees evaluate the performance of their containment recirculation sumps and implement any modifications necessary to assure compliance with applicable regulatory requirements on a mechanistic basis in light of the technical issues associated with Generic Safety Issue 191 (GSI-191), "Assessment of Debris Accumulation on PWR Sump Performance." The GL requested that PWR licensees complete actions necessary to assure compliance with applicable regulatory requirements using the updated information associated with GSI-191 by December 31, 2007. Prior to this date, GL 2004-02 concluded that licensees' compliance with their current licensing bases was sufficient to support continued plant operation.

In light of the regulatory framework established by GL 2004-02, this safety evaluation reviews the licensee's proposed TS changes to ensure that consistency with the current licensing basis is maintained. Assurance that PWR licensees' proposed sump modifications are adequate in light of the technical issues associated with GSI-191 will be provided separately through the NRC staff's review of GL 2004-02 supplemental responses, through selected sample audit reviews of PWR licensee's sump performance calculations, and through reviews of standardized industry guidance and vendor practices.

4.0 TECHNICAL EVALUATION

4.1 Proposed TS Changes

The licensee has proposed changes to surveillance requirements provided by TS 4.5, "Spray Systems," and TS 4.11, "Safety Injection System Tests," for Surry Power Station, Units 1 and 2.

The first proposed change is to TS 4.5.D, which currently reads as follows:

A visual inspection of the containment sump and the inside recirculation spray pump wells and the engineered safeguards suction inlets shall be performed once per 18 months and/or after major maintenance activities in the containment. The inspection should verify that the containment sump and pump wells are free of debris that could degrade system operation and that the containment sump components (i.e., trash racks, screens) are properly installed and show no sign of structural distress or excessive corrosion.

The licensee has proposed the following revised version of TS 4.5.D:

Verify, by visual inspection once per 18 months, that the recirculation spray containment sump components are not restricted by debris and show no evidence of structural distress or abnormal corrosion.

The second proposed change is to TS 4.11.C.5.c, which currently reads as follows:

Verifying, by visual inspection, that each low head safety injection pump suction inlet from the containment sump is free of debris that could degrade system operation. Perform each refueling outage and/or after major maintenance activities in the containment.

The licensee has proposed the following revised version of TS 4.11.C.5.c:

Verifying by visual inspection that the low head safety injection containment sump components are not restricted by debris and show no evidence of structural distress or abnormal corrosion.

For both proposed changes, the associated TS basis will be modified to reflect the proposed revisions to these TS SRs.

4.2 Licensee's Justification for Proposed TS Changes

In its submittal dated October 3, 2006, the licensee indicated that the existing containment sump

screen assembly at each Surry unit is being replaced by a modular strainer design to address issues identified through activities undertaken in response to GL 2004-02. The licensee stated that the proposed revisions to TS 4.5.D and TS 4.11.C.5.c are worded more generically than the current requirements in order to encompass both the existing sump screen configuration and the planned replacement strainer design.

The current requirements in TS 4.5.D and TS 4.11.C.5.c for performing containment sump surveillances after major maintenance activities in the containment would be removed in the revised SRs. The licensee stated that post-maintenance inspections need not be explicitly included in the TSs because containment closeout inspections are performed after activities in containment as part of normal work practices to ensure that the containment is free of debris. The scope of the licensee's visual containment closeout inspection for debris and foreign material encompasses accessible areas of containment, including the containment sump strainers and their surrounding area. In addition, upon completion of maintenance work, appropriate post-maintenance testing is required to declare equipment operable. The licensee stated that containment sump inspections will still be required every 18 months, coincident with planned refueling outages, which is typically when major maintenance activities are performed.

The licensee stated that, to the extent practicable, the changes proposed to TS 4.5.D and TS 4.11.C.5.c (as well as the planned changes to the associated TS bases) were intended to be consistent with the language in Revision 3 of NUREG-1431, the Standard Technical Specifications for Westinghouse Plants.

The licensee further provided background on the origin of the existing TS SRs for the inspection of the containment recirculation sump. The existing SRs were incorporated into the Surry 1 and 2 TSs in August 1989 in response to the discovery of containment sump screen design deficiencies and the presence of debris in the sumps of both units. The licensee stated that these adverse conditions were documented in Licensee Event Report 88-017-01, dated November 7, 1988.

4.3 NRC Staff's Evaluation

After reviewing the licensee's submittal, the NRC staff identified several areas where additional information was necessary to support the proposed TS changes. These areas included (1) the licensee's use of a generic term (i.e., containment sump components) as opposed to referencing specific containment sump components, (2) the results of past containment sump inspections, (3) the potential for debris introduction downstream of the strainers during internal recirculation spray (IRS) pump testing, and (4) the dynamic effects evaluation for the replacement strainers. On December 28, 2006, the NRC staff transmitted an RAI to request this additional information from the licensee. The licensee replied to the NRC staff's RAI with a supplementary submittal dated March 28, 2007. The NRC staff's RAI and the licensee's response are discussed in detail below.

4.3.1 Generic Terminology in Proposed TS Changes

The NRC staff noted that the existing TS surveillance requirements refer to specific components, including the containment sump, pump wells, engineered safeguards suction inlets, trash racks, and screens. However, neither the generically worded proposed TS SRs, the accompanying TS Basis discussions, nor the original submittal specifically referenced which containment sump

components would be considered within the scope of the proposed sump inspection. As a result, the NRC staff requested further information from the licensee to determine the inspection scope and to justify that the wording of the proposed SRs was sufficiently clear and inspectable.

In response, the licensee stated that the existing sump screens and trash racks will be replaced by large, passive strainers and that the pump wells and suction inlets will no longer be open for inspection following the strainer replacement modification. Specifically, the licensee stated that the IRS pump wells and the suction inlets for the ORS and LHSI pumps will be hard-piped directly to their respective strainer assemblies. Therefore, the licensee stated that these components are not open to debris larger than the size of the strainer perforations. As a result, the licensee indicated that the "containment sump components" referred to in proposed TS 4.5.D and TS 4.11.C.5.c are simply the strainer assemblies serving the IRS, ORS, and LHSI pumps. The licensee further stated that wording identical to that proposed for Surry 1 and 2 TS 4.5.D and TS 4.11.C.5.c was recently approved for North Anna Power Station, Units 1 and 2.

The NRC staff noted that the scope of the proposed containment sump inspection described by the licensee is reduced from the current requirement. However, the NRC staff considers this reduction to be acceptable based upon the design of the replacement strainer, which incorporates closed piping from the pump wells and suction inlets to the replacement strainer assemblies. As a result, these areas will no longer be accessible for external visual inspections and will have protection from the intrusion of detrimental debris from the containment. Based upon this additional information and the licensee's clarification that the term "containment sump components" refers to the replacement sump strainers, the NRC staff considered the proposed generic wording of TS 4.5.D and TS 4.11.C.5.c to be appropriate.

4.3.2 Results of Past Containment Sump Inspections

As the licensee noted in its original submittal, the current containment sump SRs were implemented in the late 1980s following the discovery of debris in the containment sump and other degraded sump conditions. The NRC staff requested that the licensee provide additional information concerning the results of past containment sump debris inspections to support the proposed deletion of the requirement for performing sump inspections following major maintenance activities in containment.

In response, the licensee stated that Surry 1 and 2 plant procedures provide detailed inspection requirements for the containment sump and for documenting any debris found during the inspection. The licensee stated that this procedure also addresses the setup and restoration of the IRS system for full-flow recirculation tests, as well as the foreign material exclusion (FME) controls that are associated with IRS pump flow testing. The licensee stated that the sump inspection procedure was reviewed for the last 5 years for Surry 1 and 2, and that no debris of significance had been found (i.e., no debris larger than 3/16 of an inch). The licensee added that an NRC component design basis inspection (CDBI) report dated February 10, 2006, discussed an NRC staff inspection of the LHSI containment sump suction inlets. The report stated that maintenance history, plant issue reports, FME controls, and design changes were reviewed to assess the potential for flowpath obstruction and material degradation. The report identified no findings of significance.

Based upon the additional information provided by the licensee, the NRC staff considers the results of the past containment sump inspections to be consistent with the proposed TS changes.

As noted by the licensee, following the proposed changes to TS 4.5.D and TS 4.11.C.5.c, the Surry TS would still require periodic containment sump inspections to be performed every 18 months. These periodic sump inspections are typically performed during refueling outages, when most major maintenance activities occur. In addition, as noted above, the licensee indicated that plant procedures specify that containment closeout inspections be performed following activities in containment to ensure that foreign materials are not inadvertently left in the containment. Furthermore, the NRC staff considers the hard-piped connection that will be installed between the replacement strainers and the pump wells and suction inlets to provide an increased degree of resistance to the intrusion of foreign material, as compared to the existing open sump configuration. Finally, the NRC staff notes that the SR in the Standard Technical Specifications, NUREG-1431, Revision 3 (SR 3.5.2.8), that corresponds to Surry 1 and 2 TS 4.5.D and TS 4.11.C.5 does not include a specific requirement for conducting containment recirculation sump inspections following major maintenance activities in containment.

In light of the discussions above, the NRC staff does not consider it necessary for TS 4.5.D and TS 4.11.C.5.c to include a specific requirement for performing a visual inspection of the containment sump following major maintenance activities in containment and finds the proposed deletion of this requirement in TS 4.5.D and TS 4.11.C.5.c to be acceptable.

4.3.3 Control of Debris During IRS Pump Flow Testing

The NRC staff understood that periodic flow tests are performed for the IRS pumps at Surry 1 and 2. As described in the TS Basis discussion for TS 4.5, these tests are conducted by installing a temporary dike in containment and making temporary physical modifications to the IRS pump discharge piping. The NRC staff requested that the licensee provide further information demonstrating that this testing would not result in debris or foreign materials bypassing the sump strainers.

In response, the licensee indicated that Surry plant procedures include steps for preventing the intrusion of debris during IRS pump flow testing and outlined thirteen specific procedural requirements that were intended to prevent debris intrusion. These procedural requirements are summarized by the NRC staff below:

- Inspection hold points are provided at key points in the procedure to verify that debris and foreign materials are not present and to ensure that the test inlet plates on the containment sump strainer header are properly re-installed after the completion of the flow test.
- Installation of FME covers and flanges is called for at various points in the procedure to prevent potentially debris-laden water from bypassing the strainers.
- Installation of a cone strainer in the test line to capture any debris that could potentially be in the piping is required by the procedure.

Based upon the information provided by the licensee, the NRC staff concluded that appropriate considerations have been made to prevent debris and foreign materials from bypassing the sump strainers during IRS pump flow testing.

4.3.4 Dynamic Effects of Piping Ruptures

The NRC staff has reviewed the licensee's regulatory and technical analyses in support of its proposed license amendment, which are described in the licensee's submittal. The licensee provided sketches showing the arrangement of the existing and modified containment sump strainer designs. The NRC staff noted that the licensee's original submittal did not specifically address considerations associated with the dynamic effects of piping ruptures, such as jet impingement, whipping pipes, and missile impacts. Therefore, the NRC staff requested that the licensee provide additional information to demonstrate that the proposed strainer modification satisfies NRC requirements with respect to dynamic effects.

In response to the NRC staff's request concerning the evaluation of the modified strainer assemblies for dynamic effects associated with pipe rupture including jet impingement, pipe whip, and missile impact, the licensee stated that the RS and LHSI strainers are located in the basement annulus area of the containment. Based on a review of piping in the containment basement, the licensee concluded that there are no high energy lines in the basement that would require the ECCS system to initiate the recirculation phase requiring the operability of the strainers. The licensee also stated that the strainer assemblies are not located in areas that are subject to missile impact or jet impingement. The new strainer assemblies are protected from the reactor coolant system (RCS) piping and components by the RCS missile barriers. The NRC staff finds the licensee's conclusion regarding the dynamic effects acceptable.

The NRC staff reviewed licensee's response regarding the load components, the load combinations, and the design basis used in the structural design of the sump replacement strainers. The licensee stated that the sump replacement strainers have been analyzed for normal and accident conditions inside the containment. Stresses and stability were determined in accordance with American Society of Mechanical Engineers (ASME), *Boiler and Pressure Vessel Code* (Code), Section III, Subsection NF for class 3 component supports. The load components considered are dead weight, debris load, hydrodynamic forces due to dynamic effects of surrounding water on the submerged strainer structure for seismic analysis, thermal loads, OBE and DBE seismic loads, loads due to differential pressure of 9 psi, head loss loads, and other dynamic effects due to bleed line piping loads. In response to NRC questions, the licensee provided the following load combination table.

Service Limits	Load Cases	Load Combination	Category	Sump Condition	Comment
Level A	LC-1	DW+LL	Normal	Dry	Material Properties at T ₁
Level B	LC-2	DW+OBE	Upset	Dry	Material Properties at T ₁
Level C	LC-3	DW+ SP+ SSE + Hydrodynamics	Accident	Wet Submerged	Material Properties at T ₂

Notations: DW=Deadweight; LL=Live Load= 60 psf from platform;
 OBE=Operating Basis Earthquake; SSE=Safe Shutdown Earthquake
 SP=Differential Suction Pressure= 9 psi;
 Hydrodynamics=Forces from water acting on the strainer during an earthquake
 T₁=Maximum air temperature under normal condition = 125 °F
 T₂=Maximum sump water temperature under accident condition = 280 °F

The strainer assemblies are designed to withstand the force of full debris loading in conjunction with design basis conditions without collapse or structural damage. The ECCS structures are passive assemblies with no moving parts, and the NRC staff finds the load combinations used in the structural design of the sump strainer acceptable.

The licensee responded to NRC's question regarding the structural evaluation summary, design margins, and codes used in the structural design. The licensee stated that the stress levels meet the 1989 edition of the ASME Code, Section III, Subsection NF, and the deflections of the strainer during a DBE and LOCA will not open up additional leakage paths. Most components were determined to have significant margins, and the stresses in every analyzed strainer component were within the allowable stress limits. The NRC staff finds the structural evaluation summary, design margins, and design codes used by the licensee acceptable.

The NRC staff finds the structural design of the new strainer assembly and its support system acceptable, and the strainer assembly will perform its intended function.

4.3.5 Replacement Strainer Design Consistency with Current Licensing Basis

In determining the adequacy of the licensee's proposed TS changes, the NRC staff evaluated whether the planned replacement strainer assemblies are capable of fulfilling the design functions of the existing screen and trash rack configuration under the current licensing basis.

According to Section 6.3.1 of the Surry 1 and 2 Updated Final Safety Analysis Report (UFSAR), the current sump screen assembly is designed to prevent debris large enough to clog containment spray nozzles from reaching the recirculation spray subsystems. This design function is accomplished by designing the screen perforations (noted to be 3/16 of an inch in the licensee's RAI response) smaller than the minimum spray nozzle size. The screen assembly for the pump suction is divided into two stages. The first stage is a trash rack and roughing screen arrangement with a surface area of 150 ft² that completely surrounds the sump. The second stage consists of cylindrical screens of fine mesh over each suction point, with a total fine screen area

of approximately 82 ft². Although separate suction screens are provided, Section 6.3.1 of the UFSAR indicates that 12-inch cross-tie piping connects the LHSI pump suctions and the recirculation spray pump suctions. Section 6.3.1 of the UFSAR further states that sufficient screen area is provided to ensure that system operation during design-basis conditions is not impaired and that entrance flow velocities are low enough to prevent entrainment of most small particles. The licensee stated that system over-design allows for some screen plugging with debris or loss of function. The licensee stated that the trash racks and all screening and screen supports are designed to Seismic Class I requirements.

Based upon discussions with the licensee during a June 2006 trip to observe strainer head loss testing for Surry 1 and 2 (ML062020596), the NRC staff understood that the planned replacement strainer assemblies will have a surface area of over 5,000 ft². This surface area is considerably larger than the combined area of all stages of the existing sump screen assembly. The planned replacement strainer assemblies are single-stage debris filters that do not have a trash rack or pre-screen to intercept large pieces of debris prior to their arrival on the strainer surfaces. Nevertheless, the NRC staff considers the replacement strainer configuration as meeting the intent of the current sump performance licensing basis because the filtration capacity associated with the replacement strainers' large, complex surface is significantly in excess of the filtration capability of the existing screen assembly and trash racks.

The licensee's RAI response stated that the maximum clearance allowed for the replacement strainer is 1/16 of an inch, which represents an improvement in the capability to filter out fine debris that could affect downstream components such as spray nozzles. Furthermore, based on additional discussions with the licensee during the June 2006 trip to observe head loss testing, the NRC staff understood that the replacement strainer assemblies would be fully submerged by the post-accident containment pool, which is an improvement over the existing screens that may be required to function under partially submerged conditions. Therefore, the NRC staff considers the replacement strainer design to be a significant enhancement as compared to the existing screen assembly and trash racks with respect to reducing the potential for a loss of net positive suction head margin due to excessive head loss across a post-accident debris bed.

Based upon the above discussion, the NRC staff considers the replacement strainers to be functionally equivalent to the existing trash-racks/screen assembly under the non-mechanistic current licensing basis for satisfying the requirements of 10 CFR 50.46(b)(5) for long-term reactor core cooling and the other regulatory requirements applicable to Surry 1 and 2 listed above in Section 2.0 of this evaluation. Consistent with the intent of GL 2004-02, current licensing basis compliance is sufficient until December 31, 2007. No later than this date, the NRC staff has requested that licensees complete modifications to their licensing bases for containment recirculation sump performance to ensure consistency with the mechanistic methodology associated with GSI-191. Assurance that the licensee's replacement strainer design is adequate for satisfying the intent of GL 2004-02 will be provided by the NRC staff's efforts on GL 2004-02 and GSI-191, including reviews of licensees' supplemental responses to GL 2004-02, sample audits of licensees' sump performance calculations, and reviews of generic industry guidance and practices. Therefore, the NRC staff considers the licensee's proposed modifications to TS 4.5.D and TS 4.11.C.5.c acceptable.

The NRC staff has reviewed the licensee's proposed changes to TS 4.5.D and TS 4.11.C.5.c of the Surry 1 and 2 TS. As described above, the proposed TS changes would (1) replace the terminology associated with the existing sump screen design (i.e., screens and trash racks) with generic terminology applicable to both the existing design and the replacement strainers being

installed in response to GL 2004-02 and (2) delete the existing TS requirement for performing containment sump inspections after major maintenance activities in containment. The NRC staff found that, under the current licensing basis, the planned replacement strainers are functionally equivalent to the existing trash racks and screens for meeting the requirements of 10 CFR 50.46(b)(5) for Long Term Cooling and the other regulatory requirements applicable to Surry 1 and 2 listed in Section 2.0 of this evaluation. The NRC staff further noted that generic review activities associated with GL 2004-02 will provide assurance that PWR licensees' replacement strainer designs are adequate to satisfy applicable regulatory requirements in accordance with the mechanistic criteria associated with GSI-191. Based upon these findings, the NRC staff has concluded that the proposed changes to TS 4.5.D and TS 4.11.C.5.c are acceptable.

5.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Virginia State official was notified of the proposed issuance of the amendments. The State official had no comments.

6.0 ENVIRONMENTAL CONSIDERATION

The amendments change requirements with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20 and change surveillance requirements. The NRC staff has determined that the amendments involve no significant increase in the amounts and no significant change in the types of any effluents that may be released offsite and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendments involve no significant hazards consideration, and there has been no public comment on such finding (71 FR 65146). Accordingly, the amendments meet the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendments.

7.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendments will not be inimical to the common defense and security or to the health and safety of the public.

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