April 8, 2005

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

SUBJECT: SURRY POWER STATION, UNIT 1 - AMERICAN SOCIETY OF MECHANICAL ENGINEERS INSERVICE TESTING PROGRAM FOURTH 10-YEAR INTERVAL REQUEST FOR REVISED RELIEF P-8 (TAC NO. MC6258)

Dear Mr. Christian:

By letter dated February 28, 2005, Virginia Electric and Power Company (VEPCO) requested relief from certain American Society of Mechanical Engineers *Code for Operation and Maintenance of Nuclear Power Plants* inservice testing (IST) requirements for its containment spray pumps at Surry Power Station, Unit 1. In its submittal, VEPCO had requested approval of Revised Relief Request P-8. The Nuclear Regulatory Commission (NRC) staff has completed its review of this relief request and our evaluation and conclusion are contained in the enclosed Safety Evaluation.

The NRC staff has reviewed Revised Relief Request P-8 and concludes that VEPCO's proposed alternative provides an acceptable level of quality and safety. Therefore, Revised Relief Request P-8 is authorized pursuant to Title 10 of the *Code of Federal Regulations* Section 50.55a(a)(3)(i) for the fourth 10-year IST interval at Surry, Unit 1.

Sincerely,

/RA/
John A. Nakoski, Chief, Section 1
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-280

Enclosure: As stated

cc w/encl: See next page

April 8, 2005

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

SUBJECT: SURRY POWER STATION, UNIT 1 - AMERICAN SOCIETY OF MECHANICAL ENGINEERS INSERVICE TESTING PROGRAM FOURTH 10-YEAR INTERVAL REQUEST FOR REVISED RELIEF P-8 (TAC NO. MC6258)

Dear Mr. Christian:

By letter dated February 28, 2005, Virginia Electric and Power Company (VEPCO) requested relief from certain American Society of Mechanical Engineers *Code for Operation and Maintenance of Nuclear Power Plants* inservice testing (IST) requirements for its containment spray pumps at Surry Power Station, Unit 1. In its submittal, VEPCO had requested approval of Revised Relief Request P-8. The Nuclear Regulatory Commission (NRC) staff has completed its review of this relief request and our evaluation and conclusion are contained in the enclosed Safety Evaluation.

The NRC staff has reviewed Revised Relief Request P-8 and concludes that VEPCO's proposed alternative provides an acceptable level of quality and safety. Therefore, Revised Relief Request P-8 is authorized pursuant to Title 10 of the *Code of Federal Regulations* Section 50.55a(a)(3)(i) for the fourth 10-year IST interval at Surry, Unit 1.

Sincerely,

/RA/
John A. Nakoski, Chief, Section 1
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-280

Enclosure: As stated

cc w/encl: See next page

Distribution:

PUBLIC	EDunnington	KLandis, RII	JNakoski	EHackett
SMonarque	PDII-1 R/F	ACRS	DTerao	OGC
DLPM DPR				

ADAMS ACCESSION NO.: ML051020486 NRR-028

OFFICE	PM/PDII-1	LA/PDII-2	SC/EMEB	OGC	SC/PDII-1
NAME	SMonarque	EDunnington	DTerao	JHull	JNakoski
DATE	03/ 30 /05	03/ 30 / 05	03/28/2005	04 / 07 / 05	04/ 08 / 05

OFFICIAL RECORD COPY

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO THE FOURTH 10-YEAR INTERVAL INSERVICE INSPECTION PROGRAM

SURRY POWER STATION, UNIT 1

VIRGINIA ELECTRIC AND POWER COMPANY

DOCKET NO.50-280

1.0 INTRODUCTION

By letter dated February 28, 2005, Virginia Electric and Power Company (the licensee) submitted Revised Relief Request P-8 for its containment spray pumps 1-CS-P-1A and 1-CS-P-1B at Surry Power Station, Unit 1. The licensee had requested this relief as part of its inservice testing (IST) program for the fourth 10-year interval. The licensee's program was developed in accordance with the requirements of the 1998 Edition up to and including the 2000 Addenda of the American Society of Mechanical Engineers (ASME) *Code for Operation and Maintenance of Nuclear Power Plants* (OM Code).

2.0 REGULATORY REQUIREMENTS

Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.55a requires that IST of certain ASME Code Class 1, 2, and 3 pumps and valves be performed in accordance with the ASME OM Code and applicable addenda, except where alternatives have been authorized or relief has been requested by the licensee and granted by the Commission pursuant to paragraphs (a)(3)(i), (a)(3)(ii), or (f)(6)(i) of 10 CFR 50.55a. The Code of record for Surry, Unit 1 is the 1998 Edition up to and including the 2000 Addenda of the ASME OM Code. In proposing alternatives or requesting relief, the licensee must demonstrate that: (1) the proposed alternative provides an acceptable level of quality and safety, (2) compliance would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety, or (3) conformance is impractical for its facility. The regulations in 10 CFR 50.55a authorize the Commission to approve alternatives and to grant relief from ASME Code requirements upon making the necessary findings. NRC guidance contained in Generic Letter (GL) 89-04, "Guidance on Developing Acceptable Inservice Testing Programs," provides alternatives to the Code requirements that are acceptable to the NRC staff. Further guidance is given in GL 89-04, Supplement 1, and NUREG-1482, "Guidelines for Inservice Testing at Nuclear Power Plants." The fourth 10-year IST interval at Surry, Unit 1 began on May 10, 2004, and will end on May 9, 2014.

Enclosure

3.0 SAFETY EVALUATION - Revised Relief Request P-8

In Relief Request P-8, the licensee has requested relief from the comprehensive pump testing requirements of OM Code, subparagraph ISTB-3300(e)(1). Paragraph ISTB-3300(e)(1) states, "Reference values shall be established within ± 20% of pump design flow rate for the comprehensive test."

The licensee proposes to perform quarterly Code-required testing of the containment spray pumps at or near 80 percent, but not less than 76 percent, of the pump design flow rate.

In addition to the flow testing, the containment spray pumps are included in the Surry Predictive Maintenance Program. This program employs predictive monitoring techniques, such as vibration monitoring and analysis beyond that required by ISTB, and oil sampling and analysis. If the measured parameters are outside the normal operating range or are determined by analysis to be trending toward an unacceptable degraded state, the licensee has stated that appropriate actions will be taken that may include monitoring additional parameters, reviewing component-specific information to identify the cause, or removing the pump from service to perform maintenance.

3.1 Component Identification

The components affected by this relief request are Containment Spray Pumps 1-CS-P-1A and 1-CS-P-1B. The containment spray pumps provide a cooled, chemically treated, borated spray to reduce containment pressure following a loss-of-coolant accident. These pumps are classified as ASME Class 2, Group B pumps in the IST Program.

3.2 Basis for Requesting Relief

The test loop for the containment spray pumps consists of an 8-inch pump discharge line feeding into a 4-inch recirculation line that connects to a 6-inch header that discharges to the reactor water storage tank (RWST). The containment spray pumps take suction from the RWST. With this test loop, the licensee states that it is difficult to consistently achieve reference flow rates that are within 80 percent (1600 gallons per minute (gpm)) of the pump design flow rate of 2000 gpm. Also, the current discharge piping was not designed to be temporarily reconfigured to achieve pump design flow.

The containment spray system is a fixed-resistance system, and the test flow rates tend to vary several gpm based on initial RWST level. Although the containment pumps have met the Code-required flow rate of 1600 gpm during some of the previous flow tests, there will likely be future tests where the 1600 gpm flow rate cannot be achieved. The average test flow rate for tests conducted since 1999 is 1593 gpm.

During initial plant construction, a temporary drain connection was installed to support the pre-operational testing of the pumps. The containment spray headers were fitted with blind flanges that allowed the connection of temporary drain lines. After the subsystem was completely installed, temporary connections between the spray headers were made, and pipe plugs were placed in the spray nozzle sockets. The containment spray pumps were then started and operated over a range of flows, circulating water through the spray header supply line to the spray headers, out the temporary drain connections, and into to the opposite

spray headers. The water was then directed to the RWST through the 4-inch recirculation line. Although the pre-operational test did not produce full-flow conditions, it provided a full-system capability test and demonstrated that the pumps were operating on the manufacturer's pump curve. This test also served to flush the system of particulate matter that could potentially plug the spray nozzles. After the completion of this test, the temporary drain connections were removed, the blind flanges replaced, the pipe plugs removed, the nozzle pipe nipple inspected, and the spray nozzles installed.

Currently, reference flows are typically established near 1600 gpm, approximately 80 percent of design flow. The licensee states that this is the highest flow that can be measured while maintaining stable test conditions, and that testing at the reference flows will detect pump degradation because the pump curve is well sloped at the point of testing. Testing the containment spray pumps at or near 1600 gpm will detect hydraulic degradation and verify that the pumps are operating acceptably. The licensee indicated that the proposed minimum test point of 76 percent of design flow, which is approximately 1520 gpm, is on a portion of the pump curve where degradation may be detected. Also, there is significant margin available above the minimum acceptable pump curve when testing the pump on the test loop.

The containment spray pumps are included in the Surry Predictive Maintenance Program. For the containment spray pumps, this program employs predictive monitoring techniques, such as vibration monitoring, and oil sampling and analysis.

3.3 Alternate Testing

The licensee proposes that comprehensive pump test reference flows be established at or near 80 percent of the pump design flow rate, but not less than 76 percent of design flow rate (1520 gpm).

In addition to the flow testing, the containment spray pumps are included in the Surry Predictive Maintenance Program. This program employs predictive monitoring techniques, such as vibration monitoring and analysis beyond that required by ISTB, and oil sampling and analysis. The licensee states that if the measured parameters are outside the normal operating range or are determined by analysis to be trending toward an unacceptable degraded state, then appropriate actions will be taken that may include monitoring additional parameters, reviewing component-specific information to identify cause, or removing the pump from service to perform maintenance.

3.4 NRC Staff Evaluation

The containment spray pumps fall within the scope of the ASME OM Code and are defined as Class 2, Group B Pumps. As such, these pumps are subject to quarterly Group B tests and a biennial comprehensive pump test. Pump speed as well as differential pressure or flow rate are required to be monitored for the Group B test. Additionally, speed, differential pressure, flow rate, discharge pressure, and vibration are required for the comprehensive pump test. ASME OM Code, paragraph ISTB 3300(e)(1) requires the establishment of reference values for the comprehensive pump test to be within $\pm$ 20 percent of pump design flow.

The comprehensive pump test, which first appeared in the 1995 Edition of the OM Code, results in a more accurate assessment of the pump's operational readiness and performance characteristics at a reduced frequency (once every refueling cycle versus once every 3 months). The test is intended to be conducted at or near a pump's design flow rate because this area of the pump curve is considered to be most representative of the pump's design performance characteristics.

Currently, the test flows for the containment spray pumps are established near 1520 to 1600 gpm. This is approximately 76 to 80 percent of design flow. A review of the submitted pump curves confirms that they are well sloped in the areas of the proposed testing. Testing on a well-sloped portion of the operating curve aids in the detection of pump degradation and verification that the pumps are operating acceptably. Currently, the quarterly Group B test is also performed in this flow range.

In addition to the ASME OM Code-required flow testing, the containment spray pumps are included in the Surry Predictive Maintenance Program. This program employs predictive monitoring techniques, such as vibration monitoring and analysis beyond that required by ISTB, and oil sampling and analysis. If the measured parameters are outside the normal operating range or are determined by analysis to be trending toward an unacceptable degraded state, the licensee has stated that appropriate actions will be taken that may include monitoring additional parameters, reviewing component-specific information to identify cause, or removing the pump from service to perform maintenance.

The proposed alternative test method monitors vibration on a more frequent basis than is currently required by the ASME OM Code for Group B pumps. Increased monitoring of vibration may detect minor imbalances and aids in condition assessment and assessment of pump degradation. The use of lube oil sampling and analysis is a good practice and can also aid in the condition assessment of rotating equipment. The additional monitoring and sampling provides additional confidence in the licensee's ability to detect and respond to mechanical degradation.

The combination of testing the containment spray pumps consistently in the vicinity of 80 percent of design flow on a well sloped portion of the pump curve, and the enhanced use of predictive maintenance techniques provides reasonable assurance that the licensee can detect and monitor pump degradation. Based upon the above review, the NRC staff finds that the proposed alternative provides an acceptable level of quality and safety.

4.0 CONCLUSIONS

Based on a review of Revised Relief Request P-8 for the fourth 10-year interval IST program at Surry Unit 1, the NRC staff finds that the licensee's proposed alternative provides an acceptable level of quality and safety and is, therefore, authorized pursuant to 10 CFR 50.55a(a)(3)(i). The alternative is authorized for the fourth 10-year IST interval at Surry, Unit 1.

Principal Contributor: S. Unikewicz

Date: April 8, 2005

Surry Power Station, Units 1 & 2

cc:

Ms. Lillian M. Cuoco, Esq.
Senior Counsel
Dominion Resources Services, Inc.
Building 475, 5th Floor
Rope Ferry Road
Waterford, Connecticut 06385

Mr. Donald E. Jernigan
Site Vice President
Surry Power Station
Virginia Electric and Power Company
5570 Hog Island Road
Surry, Virginia 23883-0315

Senior Resident Inspector
Surry Power Station
U. S. Nuclear Regulatory Commission
5850 Hog Island Road
Surry, Virginia 23883

Chairman
Board of Supervisors of Surry County
Surry County Courthouse
Surry, Virginia 23683

Dr. W. T. Lough
Virginia State Corporation Commission
Division of Energy Regulation
Post Office Box 1197
Richmond, Virginia 23218

Dr. Robert B. Stroube, MD, MPH
State Health Commissioner
Office of the Commissioner
Virginia Department of Health
Post Office Box 2448
Richmond, Virginia 23218

Office of the Attorney General
Commonwealth of Virginia
900 East Main Street
Richmond, Virginia 23219

Mr. Chris L. Funderburk, Director
Nuclear Licensing & Operations Support
Dominion Resources Services, Inc.
Innsbrook Technical Center
5000 Dominion Blvd.
Glen Allen, Virginia 23060-6711