

VIRGINIA ELECTRIC AND POWER COMPANY
RICHMOND, VIRGINIA 23261

June 21, 2016

10 CFR 50.55a

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

Serial No. 16-227
NLOS/GDM R1
Docket No. 50-280
License No. DPR-32

VIRGINIA ELECTRIC AND POWER COMPANY
SURRY POWER STATION UNIT 1
ASME SECTION XI INSERVICE INSPECTION PROGRAM
RELIEF REQUESTS FOR LIMITED COVERAGE EXAMINATIONS
PERFORMED IN THE FOURTH 10-YEAR INSERVICE INSPECTION INTERVAL
RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

By letter dated October 9, 2015 (Serial No. 15-446), Virginia Electric and Power Company (Dominion) submitted relief requests for the Surry Power Station Unit 1 fourth 10-year ISI interval. The relief requests were for limited examinations where the required examination coverage was impractical due to physical obstructions and limitations imposed by design, geometry and materials of construction of the subject components. On May 17, 2016, the NRC Surry Project Engineer provided requests for additional information associated with Relief Requests LMT-R01, LMT-R02, LMT-R03 and LMT-P01. Dominion's response to the NRC RAs is provided in Attachments 1 through 4, respectively.

If you have any questions or require additional information, please contact Mr. Gary D. Miller at (804) 273-2771.

Sincerely,



Mark D. Sartain
Vice President – Nuclear Engineering

Commitments made in this letter: None

Attachments:

1. Response to NRC Request for Additional Information, Relief Request LMT-R01
2. Response to NRC Request for Additional Information, Relief Request LMT-R02
3. Response to NRC Request for Additional Information, Relief Request LMT-R03
4. Response to NRC Request for Additional Information, Relief Request LMT-P01

A047
NRR

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

Ms. K. R. Cotton-Gross, NRC Project Manager - Surry
U. S. Nuclear Regulatory Commission
One White Flint North
Mail Stop O8 G9A
11555 Rockville Pike
Rockville, Maryland 20852

Dr. V. Sreenivas, NRC Project Manager – North Anna
U. S. Nuclear Regulatory Commission
One White Flint North
Mail Stop O8 G9A
11555 Rockville Pike
Rockville, Maryland 20852

NRC Senior Resident Inspector
Surry Power Station

Mr. R. A. Smith
Authorized Nuclear Inspector
Surry Power Station

Attachment 1

Response to NRC Request for Additional Information
Relief Request LMT-R01

**Virginia Electric and Power Company
(Dominion)
Surry Power Station Unit 1**

Request for Additional Information
Relief Request LMT-R01 Regarding Weld Examination Coverage
Surry Power Station, Unit 1

By letter dated October 9, 2015 (Accession Number ML15293A124), Virginia Electric and Power Company - Dominion (the licensee) requested relief from the requirements of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (B&PV Code) specifically related to ASME Code Case N-460 "Alternative Examination Coverage for Class 1 and Class 2 Welds, Section XI, Division 1." Relief request LMT-R01 pertains to the examination coverage of the Class 1 and 2 piping welds at the Surry Power Station (Surry), Unit 1.

To complete its review, the NRC staff requests the following additional information.

- 1. Tables 4a, 4b, and 4c of the relief request show pipe material. The NRC staff assumes that the weld and the associated components (branch connection, valve, elbow, and pump) are made of the same material as the pipe. Confirm that the weld and the associated components are also made of the pipe material. If branch connection, valve, elbow, pump and weld material are made of different materials, please describe.*

Dominion Response

With two exceptions, Surry has verified that the weld material in all cases is stainless steel material. Additionally, all associated component materials (branch connection, valve, elbow and pump) have been verified to be stainless steel.

There are two welds that Surry was unable to verify the weld filler material used. They are as follows:

Weld 1-01BC on drawing 11448-WMKS-0127J2

Weld 1-01BC on drawing 11448-WMKS-0127J3

Based on research of available documentation, it appears these welds are associated with branch connections on reactor coolant piping that was provided by Westinghouse as part of original plant construction. No documentation could be located that identified the specific weld filler material used. However, in both cases, the branch connection material is stainless steel and the reactor coolant piping is also stainless steel. Based on the other records reviewed for this relief request, the weld filler material would have been stainless steel. This is consistent with past and current Surry Power Station welding practices.

2. *In Section 4a of the relief request, the licensee stated that the mode of degradation for the welds listed in Table 4a is thermal fatigue. The NRC staff assumes that the subject welds are potentially susceptible to low cycle thermal fatigue. If the subject weld[s] are susceptible to high cycle thermal fatigue, please describe.*
3. *In Section 4c of the relief request, the licensee stated that the mode of degradation for some of the welds listed in Table 4c is thermal fatigue. The NRC staff assumes that these weld[s] are potentially susceptible to low cycle thermal fatigue. If these welds are susceptible to high cycle thermal fatigue, please describe.*

Dominion Response to NRC Questions 2 and 3

The Surry Power Station Unit 1 fourth interval Risk-Informed Inservice Inspection (ISI) Program was based on: 1) Code Case N-577, "Risk-Informed Requirements for Class 1, 2, and 3 Piping, Method A; 2) Westinghouse Owners Group WCAP-14572, Revision 1, "Westinghouse Owners Group Application of Risk-Informed Methods to Piping Inservice Inspection Topical Report; and 3) WCAP-14572, Revision 1, Supplement 1, "Westinghouse Structural Reliability and Risk Assessment (SRRRA) Model for Piping Risk-Informed Inservice Inspection."

As part of the development of the fourth interval Risk-Informed ISI Program, a Dominion subpanel determined failure probability estimates for the postulated failure mechanism of each piping segment. The Westinghouse SRRRA software program was used by the subpanel in conjunction with industry failure history, plant specific failure history and other relevant information to determine the final failure estimates. Guidance for determining these inputs was flexible enough to address low cycle thermal fatigue attributable to normal plant transients and high cycle thermal fatigue such as that resulting from thermal stratification of fluids. An experienced expert panel provided input as well.

Therefore, consideration of both high cycle and low cycle thermal fatigue was included in the calculation of failure probability for each risk segment. This concept was acknowledged in the NRC Safety Evaluation Report letter dated December 15, 1998, Subject: Safety Evaluation of Topical Report WCAP-14572, Revision 1, "Westinghouse Owners Group Application of Risk-Informed Methods to Piping Inservice Inspection Topical Report", paragraph A.4.2 discussion on Fatigue. However, thermal fatigue was not specifically identified in the Risk-Informed ISI Program as high cycle or low cycle when failure mechanism assignment was made for the segments. Consideration for both high and low cycle thermal fatigue was given in the development of the fourth interval Risk-Informed ISI Program, but no distinction exists in program documentation.

4. Provide operating temperature and pressure for each weld.

Dominion Response

Table	Drawing / Line# / ID System / Class Risk-Informed Segment	Operating Temperature (Estimated)	Operating Pressure (Estimated)
4a	11448-WMKS-0100AZ-1 27.5"-RC-3-2501R / 1-12 Reactor Coolant / 1 Segment RC-010	540 °F	2235 psig
4a	11448-WMKS-0101AZ-1 27.5"-RC-6-2501R / 1-12 Reactor Coolant / 1 Segment RC-011	540 °F	2235 psig
4a	11448-WMKS-0102AZ-1 27.5"-RC-9-2501R / 1-12 Reactor Coolant / 1 Segment RC-012	540 °F	2235 psig
4b	11448-WMKS-0122K1 / 6-RC-18 / 2-08 Reactor Coolant / 1 Segment RC-017	606 °F	2235 psig
4b	11448-WMKS-0122J1 / 6-RC-21 / 1-08 Reactor Coolant / 1 Segment RC-018	606 °F	2235 psig
4b	11448-WMKS-0122H1 / 6-RC-16 / 1-09 Reactor Coolant / 1 Segment ECC-005	606 °F	2235 psig
4b	11448-WMKS-0122H1 / 6-RC-16 / 1-10 Reactor Coolant / 1 Segment ECC-005	606 °F	2235 psig

Table	Drawing / Line# / ID System / Class Risk-Informed Segment	Operating Temperature (Estimated)	Operating Pressure (Estimated)
4b	11448-WMKS-0122J1 / 6-RC-21 / 1-09 Reactor Coolant / 1 Segment ECC-007	606 °F	2235 psig
4b	11448-WMKS-0122J1 / 6-RC-21 / 1-10 Reactor Coolant / 1 Segment ECC-007	606 °F	2235 psig
4b	11448-WMKS-0127J2 / 6-RC-19 / 1-02 Reactor Coolant / 1 Segment RC-042	540 °F	2235 psig
4b	11448-WMKS-0127J2 / 6-RC-19 / 1-04 Reactor Coolant / 1 Segment RC-042	540 °F	2235 psig
4b	11448-WMKS-0127J2 / 6-RC-19 / 1-01BC Reactor Coolant / 1 Segment RC-042	540 °F	2235 psig
4b	11448-WMKS-0127J3 / 6-RC-20 / 1-01BC Reactor Coolant / 1 Segment RC-043	540 °F	2235 psig
4b	11448-WMKS-0127J3 / 6-RC-20 / 1-02 Reactor Coolant / 1 Segment RC-043	540 °F	2235 psig
4b	11448-WMKS-0127J3 / 6-RC-20 / 1-03A Reactor Coolant / 1 Segment RC-043	540 °F	2235 psig

Table	Drawing / Line# / ID System / Class Risk-Informed Segment	Operating Temperature (Estimated)	Operating Pressure (Estimated)
4c	11448-WMKS-0122K1 / 6-SI-48 / 2-09 Safety Injection / 1 Segment ECC-006	606 °F*	2235 psig*
4c	11448-WMKS-0122K1 / 6-SI-48 / 2-10 Safety Injection / 1 Segment ECC-006	606 °F*	2235 psig*
4c	11448-WMKS-1101A5 / 12-RS-7 / 1-06 Recirculation Spray / 2 Segment RS-004A	Ambient	Slight vacuum***
4c	11448-WMKS-1101A5 / 12-RS-8 / 1-03 Recirculation Spray / 2 Segment RS-003A	Ambient	Slight vacuum***
4c	11448-WMKS-1106A4 / 3-SI-70 / 5-AF Safety Injection / 2 Segment HHI-011	540 °F**	2235 psig**
4c	11448-WMKS-1106A7 / 12-SI-1 / 1-13 Safety Injection / 2 Segment LHI-004A	Ambient	Slight vacuum***
4c	11448-WMKS-1106A7 / 12-SI-2 / 1-15 Safety Injection / 2 Segment LHI-003A	Ambient	Slight vacuum***
4c	11448-WMKS-0122A1 / 3-RH-13 / 3-02 Residual Heat Removal / 2 Segment RH-013	350 °F	450 psig

Table	Drawing / Line# / ID System / Class Risk-Informed Segment	Operating Temperature (Estimated)	Operating Pressure (Estimated)
4c	11448-WMKS-0122A1 / 3-RH-13 / 3-03 Residual Heat Removal / 2 Segment RH-013	350 °F	450 psig

* This is an emergency system, normally not in operation. Under unit operation, this segment has typically equalized to the reactor coolant nominal operating pressure and temperature for the Hot Leg. These are maximum pressure and temperature values.

** This is an emergency system, normally not in operation. Under unit operation, this segment has typically equalized to the reactor coolant nominal operating pressure and temperature for the Cold Leg. These are maximum pressure and temperature values.

*** This is an emergency system, normally not in operation. Maintained water filled; however, at a slight vacuum, pump suction piping from sub-atmospheric containment sump.

5. For the welds listed in Table 4b, discuss whether the Electric Power Research Institute (EPRI) interim guidance MRP 2015-025 "EPRI-MRP Interim Guidance for Management of Thermal Fatigue" (Accession Number ML15189A100) is applicable. If yes, please describe.

Dominion Response

The Electric Power Research Institute (EPRI) interim guidance MRP 2015-025, "EPRI-MRP Interim Guidance for Management of Thermal Fatigue," is applicable to the welds listed in Table 4b with respect to MRP-146. The Surry Power Station Augmented Program, "MRP-146 Thermal Stratification Inspections," has been updated with the guidance of MRP-146, Rev. 1, Final Report, June 2011, "Materials Reliability Program Management of Thermal Fatigue on Normally Stagnant Non-isolable Reactor Coolant System Branch Lines," and MRP 2015-019 letter, "Implementation of NEI 03-08 Needed and Good Practice Interim Guidance Requirements for Management of Thermal Fatigue." MRP-192, "Materials Reliability Program: Assessment of Residual Heat Removal Mixing Tee Thermal Fatigue in PWR Plants," is not applicable to these welds.

6. *Confirm that the welds in Tables 4a and 4c are not part of an augmented inspection program (for example: ASME Code Case N-770-1, MRP-146, and/or the EPRI interim guidance MRP 2015-025 "EPRI-MRP Interim Guidance for Management of Thermal Fatigue" (Accession Number ML15189A100)). If these welds are part of an augmented program, please describe.*

Dominion Response

The welds included in Tables 4a and 4c are not part of an augmented inspection program.

Attachment 2

Response to NRC Request for Additional Information
Relief Request LMT-R02

**Virginia Electric and Power Company
(Dominion)
Surry Power Station Unit 1**

Request for Additional Information
Relief Request LMT-R02 Regarding Weld Examination Coverage
Surry Power Station, Unit 1

By letter dated October 9, 2015 (Accession Number ML15293A124), Virginia Electric and Power Company - Dominion (the licensee) requested relief from the requirements of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (B&PV Code) specifically related to ASME Code Case N-460 "Alternative Examination Coverage for Class 1 and Class 2 Welds, Section XI, Division 1." Relief request LMT-R02 pertains to the examination coverage of the Class 2 and non-Class welds at the Surry Power Station (Surry), Unit 1.

To complete its review, the NRC staff requests the following additional information.

1. Table R02 of the relief request shows pipe material (i.e., "600 lb ASA Std."). The NRC staff assumes that the weld and the associated components (valve) are made of the same material as the pipe. Confirm that the weld and the associated components are also made of the pipe material. If valve and weld material are made of different materials, please describe. Please also describe in detail this material type "600 lb ASA Std."

Dominion Response

The weld metal and associated valve components described in Relief Request LMT-R02, Table R02, have been verified as carbon steel.

The specified pipe material for the welds in this relief request is "600 lb. ASA Std". This pipe material is Surry pipe classification 601, 600 lb. carbon steel lines up to 775° F. This specification describes the material as ASTM A106, Grade B, 600 lb. carbon steel for 12" to 24" lines, and ASTM A691, Grade CMS75, Class 32 for lines 26" and larger.

2. Provide operating temperature and pressure for each weld.

Dominion Response

Table	Drawing / line# / ID System / Class Risk-Informed Segment	Operating Temperature (Estimated)	Operating Pressure (Estimated)
R02N	11448-WMKS-0103A2-1 / 30- SHP-1 / 2-28 Main Steam / 2 Segment MS-004	505 °F	760 psig

Table	Drawing / line# / ID System / Class Risk-Informed Segment	Operating Temperature (Estimated)	Operating Pressure (Estimated)
R02Y	11448-WMKS-0103A2-1 / 30-SHP-1 / 2-31 Main Steam / 2 Segment MS-007	505 °F	760 psig
R02	11448-WMKS-0103A2-2 / 30-SHP-2 / 4-31 Main Steam / Non Class Segment MS-008	505 °F	760 psig
R02N	11448-WMKS-1018A3 / 14-WFPD-17 / 1-22 Feedwater / Non Class Segment FW-012	435 °F	900 psig
R02	11448-WMKS-1018A3 / 14-WFPD-9 / 3-19 Feedwater / 2 Segment FW-016	435 °F	900 psig

3. *Confirm that the welds under consideration are not part of any augmented inspection program (for example: ASME Code Case N-770-1 or MRP-146). If these welds are part of an augmented program, please describe.*

Dominion Response

The welds listed below were not selected to receive specific volumetric or surface examination, but were included in the weekly visual walkdown of high energy lines outside of containment to detect through-wall leakage. This high energy line walkdown originated in Surry Technical Specification 4.15, "Augmented Inservice Inspection Program for High Energy Lines Outside of Containment". However, this requirement has since been relocated to the Surry Technical Requirements Manual, Section 6.2.

- Weld 11448-WMKS-0103A2-1 / 30-SHP-1 / 2-28
- Weld 11448-WMKS-0103A2-1 / 30-SHP-1 / 2-31
- Weld 11448-WMKS-0103A2-2 / 30-SHP-2 / 4-31
- Weld 11448-WMKS-1018A3 / 14-WFPD-17 / 1-22
- Weld 11448-WMKS-1018A3 / 14-WFPD-9 / 3-19

The discussion presented in the relief request addressed the entire segment for each individual weld.

Attachment 3

Response to NRC Request for Additional Information
Relief Request LMT-R03

**Virginia Electric and Power Company
(Dominion)
Surry Power Station Unit 1**

Request for Additional Information
Relief Request LMT-R03 Regarding Weld Examination Coverage
Surry Power Station, Unit 1

By letter dated October 9, 2015 (Accession Number ML15293A124), Virginia Electric and Power Company - Dominion (the licensee) requested relief from the requirements of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (B&PV Code) specifically related to ASME Code Case N-460 "Alternative Examination Coverage for Class 1 and Class 2 Welds, Section XI, Division 1." Relief request LMT-R03 pertains to the examination coverage of the Class 1 steam generator (SG) nozzle to safe end dissimilar metal (DM) welds at the Surry Power Station (Surry), Unit 1.

To complete its review, the NRC staff requests the following additional information.

- 1. In Attachment 3 to the relief request, the licensee provided the following materials of construction for the welds and associated components:*

*"Material: Steam Generator Side: Carbon Steel SA-216 with
Stainless Steel Buttering
Safe End Side: Cast Stainless Steel"*

Also, Table R03 of Attachment 3 to the relief request contains the following,

*"S/G side: SA-216 Gr. WCC with SS buttering
RCS pipe: SA-351
Safe End Side: Cast SS"*

Furthermore, the licensee stated that,

"Welds 1-05 and 1-06 are the hot and cold leg, respectively, dissimilar metal nozzle to safe-end welds on "C" steam generator (S/G). The carbon steel nozzles were buttered with stainless steel to assist the welding process to the stainless steel pipe."

The NRC staff notes that materials of construction are provided for the nozzle, the buttering, and the safe end. The NRC staff assumes that the weld material is also stainless steel. Please confirm the weld filler metal used.

Dominion Response

The weld filler material for both welds described in Relief Request LMT-R03 has been verified as stainless steel.

2. *The licensee stated that,*

“Examinations were performed using personnel, equipment and procedures qualified in accordance with ASME Section XI, Appendix III.”

Paragraph 6 line 5 of the request states that the original classification of this weld was B-P. The NRC staff believes that a more appropriate classification would be B-J item B9.11. Please justify the classification of these welds and their inspection requirements especially with respect to the use of Appendix III instead of Appendix VIII.

Dominion Response

Relief Request LMT-R03, paragraph 6, includes a description of the on-going ASME Section XI system pressure testing that is performed on these Class 1 welds. Category B-P is the correct reference for this discussion as taken from the IWB 2500-1 Tables in ASME Section XI. There is no reference to the original ASME Section XI classification of the dissimilar metal welds.

These welds are cast stainless steel to carbon steel. The ultrasonic (UT) scanning could only be performed from the cast stainless steel side of the weld. No qualified Section XI, Appendix VIII, UT techniques exist for performance on cast stainless steel. Therefore, Appendix III was used.

3. *Please confirm that the welds under consideration are not part of an augmented inspection program such as ASME Code Case N-770-1 or MRP-146. If these welds are part of an augmented program, please describe.*

Dominion Response

These dissimilar metal welds are not examined under an augmented inspection program.

Attachment 4

Response to NRC Request for Additional Information
Relief Request LMT-P01

**Virginia Electric and Power Company
(Dominion)
Surry Power Station Unit 1**

Request for Additional Information
Relief Request LMT-P01 regarding Weld Examination Coverage
Surry Power Station, Unit 1

By letter dated October 9, 2015 (Accession Number ML15293A124), Virginia Electric and Power Company - Dominion (the licensee) requested relief from the requirements of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (B&PV Code) specifically related to ASME Code Case N-460 "Alternative Examination Coverage for Class 1 and Class 2 Welds, Section XI, Division 1." Relief request LMT-P01 pertains to the examination coverage of the Class 2 piping welds at the Surry Power Station (Surry), Unit 1, during preservice inspection (PSI).

To complete its review, the NRC staff requests the following additional information.

- 1. For the subject welds, did the licensee achieve essentially 100 percent coverage of the required surface area during the ASME Code required surface examinations following reconstruction and before returning to service?*

Dominion Response

In all three cases, there were no limitations documented on the NDE reports regarding the ASME Code required surface examinations, i.e., 100% coverage was obtained.

- 2. Table P01 of the relief request shows pipe material. The NRC staff assumes that the weld and the associated components (valve, elbow, and flange) are made of the same material as the pipe. Confirm that the weld and the associated components are also made of the pipe material. If valve, elbow, flange, and weld are made of different materials, please describe.*

Dominion Response

It has been verified that the weld and the associated components are made of the same material as the pipe.

3. Provide operating temperature and pressure for each weld.

Dominion Response

Table	Drawing / line# / ID System / Class ASME Category	Operating Temperature (Estimated)	Operating Pressure (Estimated)
P01	11448-WMKS-1105B5 / 3-CH-3 / 2-AW-B Chemical and Volume Control / 2	Ambient	2500 psig
P01	11448-WMKS-0118A2-1 / 6-WAPD-1 / 0-34A Feedwater / 2	Containment Ambient	900 psig*
P01	11448-WMKS-0118G1-1 / 6-WAPD-2 / 0-1A Feedwater / 2	Ambient	900 psig*

*Auxiliary feedwater system is normally not inservice, maximum back pressure from the feedwater system.

4. Confirm that the welds under consideration are not part of any augmented inspection program (for example: ASME Code Case N-770-1 or MRP-146). If these welds are part of any augmented program, please describe.

Dominion Response

The welds discussed in Relief Request LMT-P01 are not part of an augmented inspection program.