VIRGINIA ELECTRIC AND POWER COMPANY
RICHMOND, VIRGINIA 23261

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

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License No. DPR-37

VIRGINIA ELECTRIC AND POWER COMPANY
SURRY POWER STATION UNIT 2
ASME SECTION XI FOURTH INSERVICE INSPECTION (ISI) INTERVAL UPDATE
RISK INFORMED INSERVICE INSPECTION (RI-ISI) PROGRAM

Previously, Virginia Electric and Power Company (Dominion) submitted for your approval an ASME Section XI Class 1 RI-ISI program for Surry Unit 2. This program was approved for the third ISI interval in an NRC letter dated January 26, 2001. Pursuant to 10 CFR 50.55a(a)(3)(i), Dominion requests that the Surry Unit 2 RI-ISI program be approved for the ASME Section XI fourth ISI interval. The ASME Section XI code of reference for the fourth interval is the 1998 Edition through the 2000 Addenda.

Consistent with the Westinghouse Owners Group (WOG) RI-ISI methodology documented in WCAP-14572, Rev. 1-NP-A, new information has been incorporated into our RI-ISI analysis as part of the "living program." The new information was limited to changes to the Probabilistic Risk Assessment (PRA) model and deterministic information supplied to the expert panel since the last evaluation. Failure probability information for Surry Unit 2 remained unchanged during that time involved. (Note: Surry Unit 2 does not include Alloy-600 within the piping welds of the RI-ISI program.)

The changes to the PRA model required re-performing the risk evaluation; however, no previously identified low safety significant (LSS) segments were reclassified as high safety significant (HSS). One segment previously identified as HSS was reanalyzed as moderate safety significant (Risk Reduction Worth (RRW) <1.005 and >1.001) numerically, but was retained as HSS by the expert panel.

The expert panel concurred with the existing classifications, except for segments ECC-008, 009, 010, 011, 012, and 013. These segments are the ASME Class 1 portion of the safety injection system. The expert panel originally classified these segments as high safety significant (HSS) even though numerically they were low safety significant (LSS). The basis for this decision was a subjective concern about the possibility of the single check valve boundary failing (i.e., stuck-open) between the segments in question and the connecting HSS segments. However, as part of the review of the updated results, the expert panel noted that new testing confirming check valve closure was now required when the check valves in question were flowed. Because of the new testing requirement for the check valves, the expert panel voted unanimously to return the classification of these segments to LSS in agreement with the numerical results. The expert panel did retain the six volumetric examinations associated with these segments

to maintain the original selection number. As such, the number and location of the volumetric examinations between the intervals remains the same for Surry Unit 2. The new LSS classification for the segments above eliminates six visual VT-2 exams previously required for the RI-ISI program; however, Code pressure testing is still being performed.

The change-in-risk analysis was also re-performed in accordance with WCAP-14572 to compare the original Section XI program with the revised fourth interval RI-ISI program. One segment was identified as needing to be added to maintain overall risk neutrality. This resulted in the requirement that one additional visual VT-2 exam be performed.

The attached Table 1 provides more detailed information regarding the RI-ISI program and changes between the intervals.

Additionally, Relief Request R-1 was approved per 10 CFR50.55a(a)(3)(ii) in the third ISI interval by the letter referenced above. (Note: The branch connection addition was approved by letter dated September 23, 2003). This relief request represented a deviation from the WOG methodology with regard to inspection of socket welds and their branch connections. The relief request is again being requested pursuant to 10 CFR 50.55a(a)(3)(ii) for the fourth ISI interval and is attached as Relief Request R-1.

The changes in the RI-ISI program for Surry Unit 2 between the third and fourth ISI intervals are considered minor. We do not believe that a detailed NRC review of the RI-ISI program is necessary, since the evaluation of the third ISI interval program would still be applicable to the fourth ISI interval as supporting acceptable levels of quality and safety.

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

Very truly yours,

Leslie N. Hartz
Vice President-Nuclear Engineering

Attachments

Commitments made by this letter: None

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Attachment 1

TABLE 1

STRUCTURAL ELEMENT SELECTION RESULTS AND COMPARISON TO ASME SECTION XI 1989 EDITION REQUIREMENTS

ASME Section XI Fourth ISI Interval Update
Risk Informed Inservice Inspection (RI-ISI) Program

SURRY POWER STATION UNIT 2
VIRGINIA ELECTRIC AND POWER COMPANY
(DOMINION)

Table – 1

STRUCTURAL ELEMENT SELECTION
RESULTS AND COMPARISON TO ASME SECTION XI
1989 EDITION REQUIREMENTS

System	Number of High Safety Significant Segments (No. of HSS in Augmented Program / Total No. of Segments in Augmented Program)	Degradation Mechanism(s)	Class	ASME Code Category	Weld Count[1]		Previous ASME XI Examination Volumetric & Surface or Surface Only	3rd Interval RI-ISI		4th Interval RI-ISI	
					Butt	Socket		SES Matrix Region	Number of Exam locations	SES Matrix Region	Number of Exam Locations
ACC	0	TF	Class 1	B-J	34	0	10	-	0	-	0
CH	6 (0)	TF, VF	Class 1	B-J	83	182	70	1a	6[a]	1a	6[a]
ECC	7 (0)	TF, Stratification	Class 1	B-J	70	157	45	1a,1b	7[b] + 18[c]	1a,1b,3	1[b] + 12[c] + 6[d]
RC	35(3/3)	TF, VF, Striping/ Stratification, SCC	Class 1	B-F	18	0	18	1a, 1b, 2	6[c]	1a,1b,2	6[c]
				B-J	246	285	166		12[a] + 1[b] + 26[c]		12[a] + 2[b] + 26[c]
RH	0	TF	Class 1	B-J	19	0	4	-	0	-	0
TOTAL	48 (3/3)		Class 1	B-F	18	0	18		6[c]		6[c]
				B-J	452	624	295		18[a] + 8[b] + 44[c]		18[a] + 3[b] + 38[c] + 6[d]
			Total		470	624	313		18[a] + 8[b] + 50[c]		18[a] + 3[b] + 44[c] + 6[d]

Notes:

1) Section XI nonexempt welds only (> 1 inch)

a) VT-2 examination of segment due to failure mechanism postulated as vibration fatigue.

b) Scheduled VT-2 examination of segment socket welds.

c) HSS scheduled volumetric examinations.

d) LSS scheduled volumetric examinations.

ACC – Safety injection piping associated with the accumulators

CH – Chemical and Volume Control piping

ECC – High pressure and low pressure safety injection common header piping

RC – Reactor coolant piping

RH – Residual Heat Removal piping

TF – Thermal Fatigue (normal heat-up and cool-down, with and without snubber malfunctions)

VF – Vibratory Fatigue

SCC – Stress Corrosion Cracking

Attachment 2

Relief Request R-1

ASME Section XI Fourth ISI Interval Update
Risk Informed Inservice Inspection Program

SURRY POWER STATION UNIT 2
VIRGINIA ELECTRIC AND POWER COMPANY
(DOMINION)

Relief Request R-1
Surry Unit 2

I. Identification of Components

ASME Class 1 socket weld connections and their branch connections, nominal pipe size 2 inches (NPS 2) and smaller, identified as being high safety significant (HSS).

II. Impractical Requirements

Surry Unit 2 has previously received NRC approval to use an alternative Class 1 RI-ISI program per WCAP-14572, Rev. 1-NP-A, (WCAP) in lieu of ASME Section XI requirements for piping (Categories B-F and B-J). WCAP-14572, Rev. 1-NP-A, Table 4.1-1, requires examination of HSS components based upon the postulated failure mechanism for the element of piping being examined. This requirement does not consider the geometric limitations imposed by socket welds and their branch connections, NPS 2 and smaller, when volumetric examinations are specified. As such, the current WCAP examination requirement is considered impractical.

III. Basis for Relief

Pursuant to WCAP-14572, Rev. 1-NP-A, certain socket weld connections and their branch connections, NPS 2 and smaller, have been identified as HSS and require volumetric examination for their postulated failure mechanism. Currently only 3 piping segments have been identified for Surry Unit 2. These volumetric examinations are associated with a postulated thermal fatigue damage mechanism, which is selected as the default mechanism for HSS segments when there is no assumed active mechanism or other postulated mechanism occurring. Performing a volumetric examination on a socket weld connection or the branch connection, NPS 2 and smaller, provides little or no benefit, due to limitations imposed by the joint configuration and the smaller pipe size. The socket welds are partial penetration welds and the branch connections may be partial or full penetration welds. These weld designs and pipe sizes under current Category B-J requirements would only require a surface examination.

The only thermal fatigue that could credibly affect the subject piping would be the low cycle fatigue previously considered in the design. Low cycle fatigue has a very low probability of causing cracking. Furthermore, even if cracking were to occur, it would most likely originate on the inside diameter of the pipe. In addition, the Class 1 RI-ISI program did not identify any locations susceptible to external chloride stress corrosion cracking. The Class 1 piping is not located in areas that are subject to an aggressive environment that would promote external chloride stress corrosion cracking (i.e., there are very low levels of chloride (if any) and moisture is not typically present on the pipe). No other externally driven

damage mechanism can reasonably be postulated for this piping. Cosequently, a surface exam would be of negligible benefit.

The ASME Code Committee has recognized the problem this relief request is addressing and has substituted the VT-2 examination method for all damage mechanisms on socket weld connections selected as HSS. ASME Code Case N-577-1 has been issued and provides the requested substitution in Note 12 of Table 1 of the Code Case. Incorporation of the branch connection, NPS 2 and smaller, into the Code Case is now under consideration by the committee for similar size and joint configuration limitation reasons.

The industry is evaluating volumetric examination methods for socket welded connections for certain damage mechanisms. Dominion is following this effort and will address these developments as part of the WCAP-14572 "living program" process, if applicable.

Performing volumetric examinations on socket weld connections or their branch connections, NPS 2 and smaller, would result in unusual difficulty without providing any meaningful results or compensating increase in the level of quality and safety. Therefore, relief is requested per 10 CFR 50.55a(a)(3)(ii). Substituting a VT-2 examination as an alternative on a refueling outage frequency for these locations ensures reasonable assurance of component integrity.

IV. Proposed Alternative

A VT-2 exam will be performed on the subject socket weld connections and their branch connections, NPS 2 and smaller, on a refueling outage frequency while the component is pressurized.

The VT-2 examination and pressure test required by Relief Request R-1 will conform to the requirements of ASME Section XI IWA-2000 & 5000 of the 1998 Edition through 2000 Addenda. Additionally, NRC approved Code Case N-498-1 (or later revision as approved by the NRC) may be applied for the end of interval testing.

The following pressure test hold times will apply:

- Insulated components – 4 hours minimum at test pressure
- Non-insulated components – 10 minutes minimum at test pressure

A similar relief request was recently approved for Surry Unit 1 (3rd ISI Interval) in an NRC letter to Virginia Electric and Power Company dated September 23, 2003. This precedent is directly applicable to Surry Unit 2.