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GO2-07-115

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555-0001

Subject: **COLUMBIA GENERATING STATION, DOCKET NO. 50-397
RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION
REGARDING SECOND 10-YEAR INSERVICE INSPECTION INTERVAL
REQUEST FOR RELIEF 2ISI-32**

References: 1) Letter dated May 29, 2007, CF Lyon (NRC) to JV Parrish (Energy Northwest), "Columbia Generating Station – Request for Additional Information Related to Relief Request 2ISI-32 (TAC NO. MD3905)"
3) Letter dated December 14, 2006, GO2-06-156, WS Oxenford (Energy Northwest) to NRC, "Second Ten Year Interval ISI Request 2ISI-32"

Dear Sir or Madam:

In the letter of reference 2, Energy Northwest submitted its second ten year interval Inservice Inspection (ISI) request 2ISI-32. To complete the Staff's review, additional information was requested by letter of reference 1. Attached hereto is Energy Northwest's response to the requested information. There are no new commitments contained in this response.

If you have any questions or require additional information, please contact Mr. GV Cullen at (509) 377-6105.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the date of this letter.

Respectfully,

SK Gambhir
Vice President, Technical Services

Attachment: Response to Request for Additional Information

cc: BS Mallett – NRC RIV
CF Lyon – NRC NRR
NRC Senior Resident Inspector/988C
RN Sherman – BPA/1399
WA Horin – Winston & Strawn

A047
NRR

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

Topic 1

General Information

NRC Question 1.1

In Paragraph 7 (page 12 of 12) of the licensee's submittal, it is stated that the second 10-year ISI interval began on February 10, 1995, and ended on December 12, 2005. It is unclear why the end date of the interval was not February 9, 2005, as this would have been 10 years. Please discuss this issue and provide an explanation for the end date of December 12, 2005. In addition, if the end date was actually December 12, 2005, and since the licensee's requests were submitted on December 14, 2006, explain why CGS did not meet the requirement to submit these requests for relief within 1 year from the end of the subject interval as per 10 CFR 50.55a(g)(iv).

Energy Northwest Response to 1.1

The end date of the second 10-year ISI interval for Columbia Generating Station (CGS) was not February 9, 2005 because the interval was extended 10 months, to December 12, 2005, to accommodate the transition to a 24-month refueling cycle (Ref: letter dated May 20, 1999, NRC to J. V. Parrish). Pursuant to 10 CFR 50.55a(g)(5)(iv), the requests of reference 2 were required to be submitted by December 12, 2006. The requests were not submitted until December 14, 2006 due to an administrative oversight.

Topic 2

Request for Relief 2ISI-32-1 and -2, Examination Category B-D, Item B3.90, Full Penetration Welded Nozzles in Vessels

The licensee proposed an alternative (2ISI-24), which was approved by safety evaluation (SE), dated April 25, 2001 (ADAMS Accession No. ML011150323), to limit the examination volume of Category B-D welds to the weld and 1/2-inch of adjoining base material on each side, in lieu of the ASME Code-required examination volume of 1/2-T, where T is the vessel thickness. In accordance with 10 CFR 50.55a(g)(5)(iii), the current Requests for Relief 2ISI-32-1 and -2 have been submitted to demonstrate that achieving greater than 90 percent is impractical for reactor pressure vessel (RPV) top head nozzle-to-vessel Welds N7 and N18.

NRC Question 2.1

From the examination report included in the licensee's submittal, it appears that Weld N7 was examined on May 5, 1998, prior to the alternative authorized above, and would have been subject to standard ASME Code volumetric requirements. Please confirm that Weld N7 was performed before the authorized alternative, state whether Weld N7 was examined to original ASME Code volumetric requirements (including the weld and

1/2-T of adjacent base material), and verify that the reported 88 percent coverage applies to the volume of the weld and 1/2-T of adjacent base material.

Energy Northwest Response to 2.1

Weld N7 examination was performed prior to alternative 2ISI-24 approval and examined to the original ASME Code volumetric requirements. The reported 88% coverage is based on the volume of the weld and ½ -T of the adjacent base material.

NRC Question 2.2

In the submittal's Section 4, "Impracticality and Compliance," there is no impracticality basis for Weld N7. Please state the impracticality basis and discuss any proposed alternative examination methods and techniques for Weld N7. In addition, state the entire population of Category B-D welds on the RPV at CGS, and discuss how many were fully examined to ASME Code volumetric requirements during the subject inspection interval.

Energy Northwest Response to 2.2

The basis for the impracticality for compliance is that only 88% examination coverage of weld N7 was obtainable due to the configuration of the nozzle to vessel weld design. Full code examination volume was obtained in both axial directions and one circumferential direction. The other circumferential direction scan was limited by the nozzle radius configuration.

The proposed alternative is to examine the weld to achieve at least 88% examination coverage. A significant volume of the weld and base material was examined to provide a reasonable assurance that any service induced flaws would be detected. The weld volume was interrogated using 0, 45, 60, and 70RL transducers. The examinations applied the current knowledge and techniques available to obtain the maximum amount of coverage to the extent practical within the limitations of design, geometry, and materials of construction of the component. No indications were detected in the base material or weld.

There are 33 Category B-D welds on the RPV. Of these, four welds were examined to the required greater than 90% coverage. Approved relief request 2ISI-02 addresses the limited coverage (less than or equal to 90%) for 27 of the welds and the remaining two, N7 and N18 are the subject of relief requests 2ISI-32-1 and 2ISI-32-2.

NRC Question 2.3

Weld N18, as shown in an examination report included in the licensee's submittal, was examined on June 2, 2001, which is after the authorized alternative referenced above. However, for previously approved alternatives, there is no method for evaluating a subsequent request for relief under 10 CFR 50.55a(g)(5)(iii), i.e., requests for relief to existing alternatives authorized under 10 CFR 50.55a(a)(3) are not permitted, nor are

requests to retroactively approve an alternative permitted. Therefore, it appears the licensee has failed to meet the alternative approved by the SE referenced above for Weld N18. Please discuss this issue, and propose an effective action for how CGS will ensure that the authorized alternative or the ASME Code of record requirement will be fully implemented.

Energy Northwest Response to 2.3

Alternative 2ISI-24 defines the examination volume to be used (1/2 inch from the widest part of the weld for Figure IWB-2500-7) and is the code volume required to be examined at Columbia. Request 2ISI-32-2 does not modify this required volume or any other aspect of 2ISI-24. 2ISI-32-2 identifies that it is not possible to examine essentially 100% of the entire required volume. A similar request was approved by the staff for Southern California Edison by Safety Evaluation dated July 29, 2004 (TAC NOS. MC2736 and MC2737). Based upon the above discussion, CGS is requesting acceptance of Request 2ISI-32-2.

Topic 3

Request for Relief 2ISI-32-3, -4, and -5, Examination Category B-F, Item B5.130, Pressure Retaining Dissimilar Metal Welds

NRC Question 3.1

The drawing in the licensee's submittal, RPV-109, Rev. 2, depicts the typical configuration of several welds associated with the High Pressure Core Spray (HPCS) nozzle and safe end. The licensee is requesting relief for Weld 10HPCS(1)-3, which is shown to be a circumferential butt weld joining an Alloy 600 forged safe-end to an SA-508 wrought carbon steel safe-end extension. Please state the weld root and identify the filler materials for Weld 10HPCS(1)-3.

Energy Northwest Response to 3.1

The weld root is Inconel 82 (exposed to the process fluid) with Inconel 182 filler.

NRC Question 3.2

Please identify the base and weld materials associated with Welds 12RHR(1)A-14 and 12RHR(1)B-10.

Energy Northwest Response to 3.2

The valve body is SA-350; the safe end or transition piece is SA-182 type 304. The weld material is E309.

NRC Question 3.3

Confirm that mock-up(s) with the configurations of the subject welds (i.e., safe-end and safe-end extension, and valve-to-pipe), at CGS were included in the procedure scope and were part of the performance demonstration for Appendix VIII, Supplement 10 qualifications. If not, verify that CGS has augmented the Performance Demonstration Initiative mock-ups with site-specific configurations that would simulate the configuration of the subject welds.

Energy Northwest Response to 3.3

All subject weld configurations at CGS are included in the mock-up sets and procedure scope, and are part of the Performance Demonstration Initiative (PDI) for Appendix VIII, Supplement 10 qualifications.

NRC Question 3.4

State the total population of ASME Code Category B-F welds at CGS, and list completed volumetric coverage percentages associated with each. In addition, confirm that the ASME Code-required surface examination was completed for the subject welds.

Energy Northwest Response to 3.4

The following table lists the 42 Category B-F welds and the coverage percentages for each. Surface examinations that were performed on these welds are also identified in the table.

Identification	Description	% Code Coverage	Surface Examination
10HPCS(1)-3	Safe End Extension To Safe End	85	*
10LPCS(1)-3	Safe End Extension To Safe End	>90	*
12RFW(1)AC-11	Safe End Extension-Safe End Stub	>90	*
12RFW(1)AB-9	Safe End Extension-Safe End Stub	>90	Yes
12RFW(1)AA-9	Safe End Extension-Safe End Stub	>90	Yes
12RFW(1)BF-12	Safe End Extension-Safe End Stub	>90	Yes
12RFW(1)BE-9	Safe End Extension-Safe End Stub	>90	Yes
12RFW(1)BD-9	Safe End Extension-Safe End Stub	>90	Yes
12LPCI(1)A-5	Safe End Extension To Safe End	>90	Yes
12LPCI(1)B-5	Safe End Extension To Safe End	>90	Yes
12LPCI(1)C-5	Safe End Extension To Safe End	>90	*
12RHR(1)A-14	Valve To Safe End	26	Yes
12RHR(1)B-10	Valve To Safe End	29	*
4JP(NZ)A-2	Safe End To Pipe	>90	*
4JP(NZ)B-2	Safe End To Pipe	>90	*
4RRC(4)A-11	Safe End To Valve	>90	Yes
4RRC(4)B-12	Safe End To Valve	>90	*
10HPCS(1)-4	Safe End To Nozzle	>90	*
10LPCS(1)-4	Safe End To Nozzle	>78**	*
12RFW(1)AC-13	Safe End To Nozzle	>90	Yes
12RFW(1)AB-11	Safe End To Nozzle	>90	*
12RFW(1)AA-11	Safe End To Nozzle	>90	*

Identification	Description	% Code Coverage	Surface Examination
12RFW(1)BF-14	Safe End To Nozzle	>90	Yes
12RFW(1)BE-11	Safe End To Nozzle	>90	Yes
12RFW(1)BD-11	Safe End To Nozzle	>90	Yes
12LPCI(1)A-6	Safe End To Nozzle	>90	Yes
12LPCI(1)B-6	Safe End To Nozzle	>90	Yes
12LPCI(1)C-6	Safe End To Nozzle	>90	*
4JP(NZ)A-1	Nozzle To Safe End	>90	*
4JP(NZ)B-1	Nozzle To Safe End	>90	*
24RRC(2)A-1	Nozzle To Safe End	>90	Yes
12RRC(1)-N2A-6	Safe End To Nozzle	>90	Yes
12RRC(1)-N2B-6	Safe End To Nozzle	>90	Yes
12RRC(1)-N2C-6	Safe End To Nozzle	>90	*
12RRC(1)-N2D-6	Safe End To Nozzle	>90	*
12RRC(1)-N2E-6	Safe End To Nozzle	>90	*
24RRC(2)B-1	Nozzle To Safe End	>90	*
12RRC(1)-N2F-6	Safe End To Nozzle	>90	*
12RRC(1)-N2G-6	Safe End To Nozzle	>90	*
12RRC(1)-N2H-6	Safe End To Nozzle	>90	*
12RRC(1)-N2J-6	Safe End To Nozzle	>90	*
12RRC(1)-N2K-6	Safe End To Nozzle	>90	*

* Surface examination was not completed due to utilization of Code Case N-663
** Coverage addressed by approved relief request 2ISI-017

NRC Question 3.5

The licensee should discuss the applicability of new technology, such as ultrasonic phased array, for achieving greater coverage of these welds, and explain why this technology cannot be implemented at CGS.

Energy Northwest Response to 3.5

New technology, such as ultrasonic phased array on dissimilar metal piping welds, had not been successfully demonstrated when the subject welds were examined at CGS. Now that phased array ultrasonic examination on dissimilar metal piping welds has been successfully demonstrated and qualified through the PDI, it can be employed in examinations in future refueling outages. However, the use of ultrasonic phased array would be used based on improved ability for defect detection, not on code coverage. Dissimilar metal piping welds are historically single sided, and as such any significant increase in coverage may not be achievable.

Topic 4

Request for Relief 2ISI-32-6 through -20, Examination Category B-J, Item B9.11, Pressure Retaining Welds in Piping

NRC Question 4.1

Column 2 of Table 3 in the licensee's submittal notes the associated damage mechanism that might be expected for each of the subject Examination Category B-J welds (e.g., thermal transient, thermal stratification cycling and striping, and intergranular stress-corrosion cracking). This would imply that the subject welds are part of a Risk-Informed ISI (RI-ISI) program. Please confirm this.

Energy Northwest Response to 4.1

The welds in this relief request are part of the RI-ISI program.

NRC Question 4.2

If these welds are part of a RI-ISI program, the alternatives approved by NRC generally have specific criteria for addressing limited coverage. Discuss the effects that limited coverage will have on future examinations of these and other welds in the risk-informed program. Additionally, state the total population of Examination Category B-J piping welds in the RI-ISI program, and list how many welds in this population have limited volumetric coverage, including the subject welds. Finally, discuss whether additional welds (similar in risk-ranking) could be examined to augment the limited volumetric coverages on the subject welds.

Energy Northwest Response to 4.2

There are a total of 830 Category B-J welds in the RI-ISI program. Eighty-four were selected for examination. The number of welds with limited coverage out of the 830, including the subject welds, is summarized below.

Description of limitation	Number of Welds
Limited by valve configuration	23
Limited by sweep-o-let configuration	39
Limited by pump nozzle	4
Total	66

During the second inspection interval, 181 category B-J welds were examined and 80 were examined during the first inspection period prior to RI-ISI implementation. The remaining 101 were examined during the second and third inspection periods after RI-ISI implementation. Of the 101 welds examined, 66 are credited to the RI-ISI program.

The Risk Category 5 weld, 6RCIC(1)-40 (relief request 2ISI-32-6), was chosen to represent the Thermal Transient (TT) and Thermal Stratification Cycling and Striping (TASCS) damage mechanisms. There are a total of 6 welds in this risk category with this damage mechanism. Two welds in this risk category were examined during the second interval prior to RI-ISI implementation. Another two of the welds were examined under the RI-ISI program. With 4 out of the 6 welds in this category receiving examination, there is reasonable assurance that service induced flaws would be found even with the subject weld examination coverage at 86%. These same 4 welds will be examined in the next inspection interval under the RI-ISI program. Limited coverage of weld 6RCIC(1)-40 will not affect future RI-ISI examinations of Risk Category 5 welds with damage mechanisms TT and TASCS since 4 out of 6 of the welds in this category will be examined.

As discussed above, two welds in risk category 5 that are not in the RI-ISI examination population were examined during the second inspection interval. Since a significant number of welds in this risk category apart from those required for RI-ISI program were examined, no additional welds would be necessary to compensate the limited coverage of the weld in request 2ISI-32-6 in order to provide reasonable assurance that service induced flaws will be found.

Limited coverage of the welds associated with the Intergranular Stress Corrosion Cracking (IGSCC) damage mechanism in requests 2ISI-32-7 through 2ISI-32-20 will have no effect on the future examinations of the risk-informed program because these welds will not be examined as part of the next interval RI-ISI program due to changes in their risk category. The welds were in risk category 2 during the second inspection interval. They will be in the lower risk category 5 during the next inspection interval due to an update of the CGS probabilistic risk assessment.

The welds identified in requests 2ISI-32-7 through 2ISI-32-20 are in risk category 2 associated with the IGSCC damage mechanism. There were 38 welds in category 2 subject to IGSCC that were examined as part of the RI-ISI program. There were 19 category 2 welds outside the RI-ISI examination population subject to the IGSCC damage mechanism that were also examined as part of the augmented Generic Letter 88-01 program during the second inspection interval. Since a significant number of additional category 2 welds were examined, no additional weld exams would be necessary to augment the subject welds with limited coverage. The total number of welds examined in category 2 for the IGSCC damage mechanism should provide reasonable assurance that flaws due to IGSCC would be found even with the limited examination volumes of the subject welds.

NRC Question 4.3

Dissimilar metal welds (DMWs) are normally examined with single-sided qualified procedures and personnel. The differences between DMWs and austenitic-piping welds may be the weld surface condition and adjoining base-metal contour. Discuss the applicability of using ASME Code, Section XI, Appendix VIII, Supplement 10 qualified procedures and personnel in lieu of Supplement 2 qualifications to achieve increased

coverage on the subject welds. Include a discussion on the efforts to achieve an inspectable single-side access configuration for Supplement 2 welds, and the demonstrations on mock-ups for testing different nondestructive examination methods and techniques.

Energy Northwest Response to 4.3

Supplement 2 personnel and procedure qualification with single side access for detection is normally used at CGS. This qualification is not recognized for obtaining single side length and through-wall sizing examination results at CGS. It is not certain that utilizing Supplement 10 qualifications would increase coverage for the subject welds. Even with the use of newer techniques, such as phased array, it may not be possible to claim any greater coverage as the inside diameter surface geometry on components such as pumps or valves may not be obtainable due to tapers, material, etc. The weld crown surface, even after being ground to "flush" for surface examination, is still a taper surface with regard to the pipe, with yet a steeper taper on a pump or valve. This profile cannot be further blended without violating the weld design. Therefore, scanning across the weld surface is generally not possible due to physical limitations. Claiming a higher percent coverage with single side access in austenitic materials is not reasonably justifiable with these conditions.

NRC Question 4.4

The licensee should discuss whether any new technology such as phased array would provide additional coverage for these welds, and why this technology cannot be implemented at CGS.

Energy Northwest Response to 4.4

The latest in improved NDE technology for weld examination is currently focused on ultrasonic phased array. The phased array technique can be utilized at CGS as it becomes qualified through PDI. However, even though phased array may lend defects to become more "visible," it is not Energy Northwest's position that it can be utilized for claiming additional code coverage especially in austenitic piping, similar, or dissimilar welds.

Topic 5

Request for Relief 2ISI-32-21, Examination Category C-F-2, Item C5.51, Pressure Retaining Welds in Carbon or Low Alloy Steel Piping

Energy Northwest Response to Topic 5

This request is being withdrawn.

A total of 96 C-F-2 welds and one 6 inch Main Steam (MS) line weld were required to be examined under the C-F-2 program during the second inspection interval. One hundred five C-F-2 welds were examined and two similar 6 inch MS line welds (6MS(1)A-2 and

6MS(1)B-1) were examined during this inspection interval. Because the required population of C-F-2 and MS welds has been examined, this relief request is not needed and is being withdrawn.

NRC Question 5.1

Provide further text and/or a cross-sectional sketch describing the basis for impracticality and showing volumetric and surface coverage for Weld 6MS(1)B-2. In addition, state or show the material, thicknesses, and outside diameters for the subject component.

Energy Northwest Response to 5.1

No response, this request is being withdrawn.

NRC Question 5.2

State whether the volumetric examination was performed with procedures and personnel that have been qualified in accordance with ASME Code, Section XI, Appendix VIII, Supplement 2 or 3, as applicable.

Energy Northwest Response to 5.2

No response, this request is being withdrawn.

NRC Question 5.3

State the total population of ASME Code Examination Category C-F-2 welds at CGS, and discuss how many of these welds had limited volumetric and surface coverages, including the subject weld.

Energy Northwest Response to 5.3

No response, this request is being withdrawn.