ENERGY NORTHWEST

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GO2-10-039

10 CFR 50.55a

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

Subject: **COLUMBIA GENERATING STATION, DOCKET NO. 50-397**
REVISION REQUESTS TO THE THIRD TEN-YEAR INSERVICE INSPECTION PROGRAM FOR COLUMBIA GENERATING STATION

References:
1) Letter dated April 9, 2001, Jack Cushing, NRC to J.V. Parrish, Energy Northwest, "Approval of Boiling Water Reactor Vessel and Internals Project BWRVIP-75 Weld Examination Schedule for the Columbia Generating Station (TAC No. MB1357)"

2) Letter dated March 16, 2006, William H. Bateman, NRC to Bill Eaton, BWRVIP Chairman, "NRC Approval Letter for BWRVIP-75-A, 'BWR Vessel and Internals Project, Technical Basis for Revisions to Generic Letter 88-01 Inspection Schedules'"

Dear Sir or Madam:

This letter requests NRC approval of two items that would revise the Columbia Generating Station Third Ten-Year Interval Inservice Inspection (ISI) Program Plan as follows:

(1) Pursuant to 10 CFR 50.55a(a)(3)(i), Energy Northwest requests NRC approval of Relief Request 3ISI-10 regarding use of an updated method for the inspection of the RPV shell-to-flange weld and head-to-flange weld. The updated method would be implemented through the industry Performance Demonstration Initiative program. This request is described in Attachment 1.

(2) Pursuant to 10 CFR 50.55a(a)(3)(i), Energy Northwest requests approval of Relief Request 3ISI-11. This request proposes to use the requirements of BWRVIP-75-A in lieu of the ASME Section XI and other augmented requirements for the examination of Category B-F, Item 5.10, nozzle-to-safe end welds, NPS 4 or larger and Category B-J, Item B9.11 dissimilar metal welds NPS 4 or larger. This request is described in Attachment 2.

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Energy Northwest has concluded in the relief requests of Attachments 1 and 2, that the proposed alternatives provide an acceptable level of quality and safety pursuant to the provisions of 10 CFR 50 55a(a)(3)(i). When approved, Requests 3ISI-10 and 3ISI-11 will apply for the remainder of the Third Ten-Year ISI Inspection Interval for Columbia Generating Station.

Energy Northwest is seeking approval of the attached requests by February 18, 2011 to support a spring 2011 refuel outage.

There are no new commitments made in this submittal. If you have any questions or require additional information, please contact MC Humphreys at (509) 377-4025.

Respectfully,

WS Oxenford
Vice President, Nuclear Generation & Chief Nuclear Officer

Attachments: 1) 10 CFR 50.55a Request Number 3ISI-10
2) 10 CFR 50.55a Request Number 3ISI-11

cc: Regional Administrator – NRC RIV
Project Manager – NRC NRR
NRC Senior Resident Inspector/988C
RN Sherman – BPA/1399
WA Horin – Winston & Strawn

10 CFR 50.55a Request Number 3ISI-10

Proposed Alternative
In Accordance With 10 CFR 50.55a(a)(3)(i)

--Alternative Provides Acceptable Level of Quality and Safety--

1. ASME Code Component(s) Affected

The components in the following table are affected by this request.

Table 1

Identification Number	Description	Code Category	Item Number
AE	RPV Shell to Flange Weld	B-A	B1.30
AG	Top Head to Flange Weld	B-A	B1.40

2. Applicable Code Edition and Addenda

The applicable Code Edition and Addenda for Columbia Generating Station (Columbia) is ASME Section XI 2001 Edition through the 2003 Addenda as amended by 10 CFR 50.55a. ASME Section XI 2001 Edition is used for Appendix VIII.

3. Applicable Code Requirements

The NRC amended the use of the 2001 Edition through the 2003 Addenda in 10 CFR 50.55a(b)(2)(xxiv), which states, "The use of Appendix VIII and the supplements to Appendix VIII and Article I-3000 of ASME Section XI of the ASME BPV Code, 2002 Addenda through the latest edition and addenda incorporated by reference in paragraph (b)(2) of this section, is prohibited." Therefore, when referencing Appendix VIII, licensees are limited to using the 2001 Code.

The RPV shell-to-flange weld and the head-to-flange weld are currently required to be examined per Appendix I, I-2110(b) of the 2001 Edition of the ASME Section XI through the 2003 Addenda, which requires that the examination be conducted in accordance with ASME Section V, Article 4, except that alternative beam angles may be used. Additionally, there is a requirement to supplement the ASME Section V examinations with Table 1-2000-1. Section T-472.1 of the 2001 Edition of ASME Section V with the 2003 Addenda defines the ultrasonic scanning criteria for the examination of reactor vessel-to-flange welds and closure head-to-flange welds. These are:

- (T-472. 1.1) The beam angle shall be appropriate for the configuration being examined and that the beam angle shall be capable of detecting the calibration reflectors, over the required angle beam paths.

- (T-472.1.2) When scanning for reflectors parallel to the weld seam, the angle beam shall be directed at approximate right angles to the weld axis from both sides of the weld (i.e., from two directions) on the same surface when possible. The search unit shall be manipulated so that the ultrasonic energy passes through the required volume of weld and adjacent base material.
- (T-472.1.3) When scanning for reflectors transverse (perpendicular) to the weld seam, the angle beam shall be directed essentially parallel to the weld axis. The search unit shall be manipulated so that the ultrasonic energy passes through the required volume of weld and adjacent base material. The search unit shall be rotated 180 degrees and the examination repeated.
- (T-472.2) Welds that cannot be fully examined from two directions using the angle beam techniques shall also be examined if possible with a straight beam technique.
- (T-472.3) Welds that cannot be examined from at least one side (edge) using the angle beam technique shall be noted in the examination report. For flange welds, the weld may be examined with a straight beam or low angle longitudinal waves from the flange surface provided the examination volume can be covered.

4. Reason for Request

This proposed alternative represents the best available methodology in qualification of equipment and personnel performing ultrasonic examinations. It also uses an examination process that provides the highest practical quality and greatest amount of coverage for the performance of the flange weld examinations. As such, the proposed alternative methodology provides an acceptable level of quality and safety. In addition, the approval of this relief results in savings in the cost of performing the examinations, with not having to incorporate the use of two different sets of examination equipment, and also results in lower personnel radiation exposure from not having to use a different methodology for the flange welds.

5. Proposed Alternative and Basis for Use

PROPOSED ALTERNATIVE

In lieu of the Article 4 of ASME Section V angle beam examination, Columbia proposes to use an angle beam examination that will be performed using examination procedures, personnel, and equipment qualified in accordance with Appendix VIII, Supplements 4 and 6, as amended by the conditions set forth in 10 CFR 50.55a.

BASIS FOR USE

Appendix VIII requirements were developed to ensure the effectiveness of UT examinations within the nuclear industry by means of a rigorous, item-specific performance demonstration. The performance demonstration was conducted through industry's Performance Demonstration Initiative (PDI) on RPV mockups containing flaws of various size and allocations. The demonstration established the capability of

equipment, procedures, and personnel to find flaws that could be detrimental to the integrity of the RPV. The performance demonstration showed that for the detection of flaws in RPV welds, the UT techniques were equal to or surpassed the requirements of ASME Section V, Article 4 of the ASME Code. Additionally, the PDI qualified sizing techniques are considered to be more accurate than the techniques used in Article 4 of ASME Section V.

Although Appendix VIII is not required for the RPV shell-to-flange weld and RPV head-to-flange weld, the use of Appendix VIII criteria for detection and sizing of flaws in these welds will be equal to or will exceed the requirements established by Article 4 of ASME Section V. Therefore, the use of this proposed alternative will continue to provide an acceptable level of quality and safety, and approval is requested pursuant to 10 CFR 50.55a(a)(3)(i).

ALTERNATIVE EXAMINATION

In lieu of Article 4 of ASME Section V angle beam examination, Columbia proposes to use an angle beam examination that will be performed using examination procedures, personnel, and equipment qualified in accordance with ASME Section XI Appendix VIII, Supplements 4 and 6, as amended by the conditions set forth in 10 CFR 50.55a. Examination of each weld is described below (see Figure 1 for weld location).

AE - Vessel-to-Flange Weld

The ASME Section XI required examination volume will be scanned for flaws from the outside of the vessel using a 60-degree refracted longitudinal wave. However, the curvature of the flange surface above the weld will limit transducer travel such that examinations can only be performed from the shell side. Additionally, the refueling bellows prevent examinations from being performed from the vertical portion of the flange surface located directly above the curvature.

The projected single-side coverage for flaws located parallel to the weld is shown in Figure 2. Since the examination will be from a single side, the requirements of 10 CFR 50.55a (b)(2)(xvi)(A) apply. Therefore, examinations will be conducted with equipment, procedures, and personnel that have demonstrated proficiency with single-side examinations. To demonstrate equivalency to two-sided examinations, the demonstration must be performed to the requirements of Appendix VIII as modified by this paragraph and 10 CFR 50.55a(b)(2)(xv)(B) through (G), on specimens containing flaws with non-optimum sound energy reflecting characteristics or flaws similar to those in the vessel being examined. Examination of the ASME Section XI required volume will be performed as follows:

- Per 10 CFR 50.55a(b)(2)(xv)(G)(I), the clad-to-base metal interface, including a minimum of 15 percent T (measured from the clad-to-base metal interface), shall be examined from four orthogonal directions using procedures and personnel qualified in accordance with Supplement 4 to Appendix VIII.

- Per 10 CFR 50.55a(b)(2)(xv)(G)(2), if the clad-to-base-metal-interface procedure demonstrates detectability of flaws with a tilt angle relative to the weld centerline of at least 45 degrees, the remainder of the examination volume is considered fully examined if coverage is obtained in one parallel and one perpendicular direction. This must be accomplished using a procedure and personnel qualified for single-side examination in accordance with Supplement 6. Subsequent examinations of this volume may be performed using examination techniques qualified for a tilt angle of at least 10 degrees.
- Per 10 CFR 50.55a(b)(2)(xv)(G)(3), the examination volume not addressed by 10 CFR 50.50a(b)(2)(xv)(G)(1) is considered fully examined if coverage is obtained in one parallel and one perpendicular direction, using a procedure and personnel qualified for single-sided examination when the provisions of 10 CFR 50.55a(b)(2)(xv)(G)(2) are met.

AG - Closure Head-to-Flange Weld

The ASME Section XI required examination volume will be scanned for flaws using a 60-degree refracted longitudinal wave. Examinations will be performed from both the head and flange side of the weld; however, the short distance from the weld to the flange limits the examination on the flange side weld. The RPV head is not clad; therefore, when applying Appendix VIII, only Supplement 6 would normally be required. However, instead of using Supplement 6 to perform the examination of the entire examination volume, guidance will be taken from Code Case N-664 (which applies to unclad vessel welds, excluding flanges), to perform the examination of the inner 15% of the examination volume per Supplement 4 of Appendix VIII. The outer 85% of the examination volume will be examined using Supplement 6. The application of Code Case N-664 (and thus the use of Supplement 4 for the inner 15% on this flange configuration) is an acceptable practice because the PDI qualification using Supplement 4 clad specimens requires examiners to demonstrate more proficiency than the qualification using Supplement 6 specimens. By using this approach, weld AG will be examined using the same requirements as specified above for weld AE. The projected coverage for flaws located parallel to the weld is shown in Figure 3.

JUSTIFICATION FOR GRANTING RELIEF

Pursuant to 10 CFR 50.55a(a)(3)(i), approval is requested to use the proposed alternatives described above in lieu of the ASME Code Article 4 of ASME Section V. Compliance with the proposed alternatives will provide an adequate level of quality and safety for examination of the affected welds.

6. Duration of Proposed Alternate

The alternative program will be applicable to the Third Ten-Year Inservice Inspection Interval for Columbia which ends December 12, 2015.

7. Precedents

This request is similar to one approved for Susquehanna Units 1 and 2 on February 20, 2008 (Accession Number ML 071010140). In addition to Susquehanna numerous other plants have been authorized to use a similar request. The following are a few of the more recent authorizations:

Watts Bar, September 3, 2009, Accession Number ML092300608

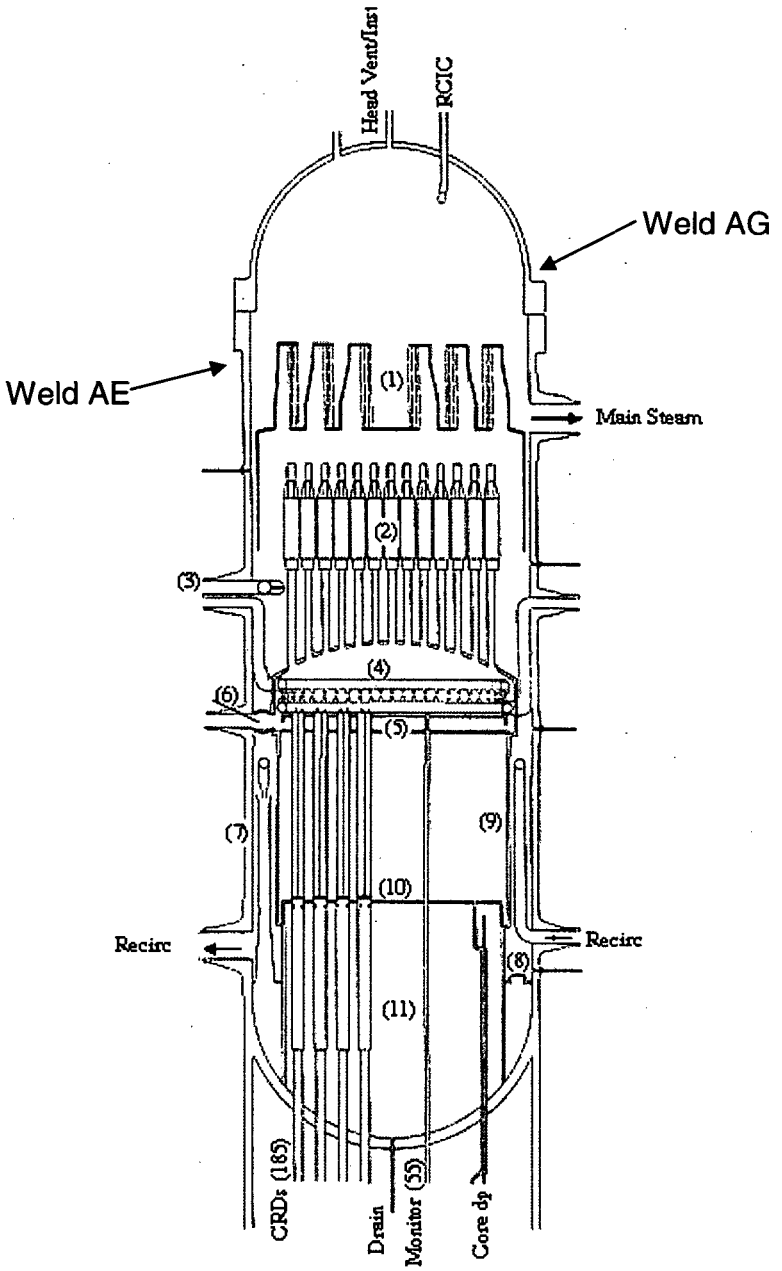
Indian Point, April 20, 2009, Accession Number ML090920046

Browns Ferry, October 3, 2008, Accession Number ML082630051

Millstone Power Station, December 24, 2009, Accession Number ML093240393

8. References

None



Reactor Pressure Vessel
Location of Welds
Figure 1

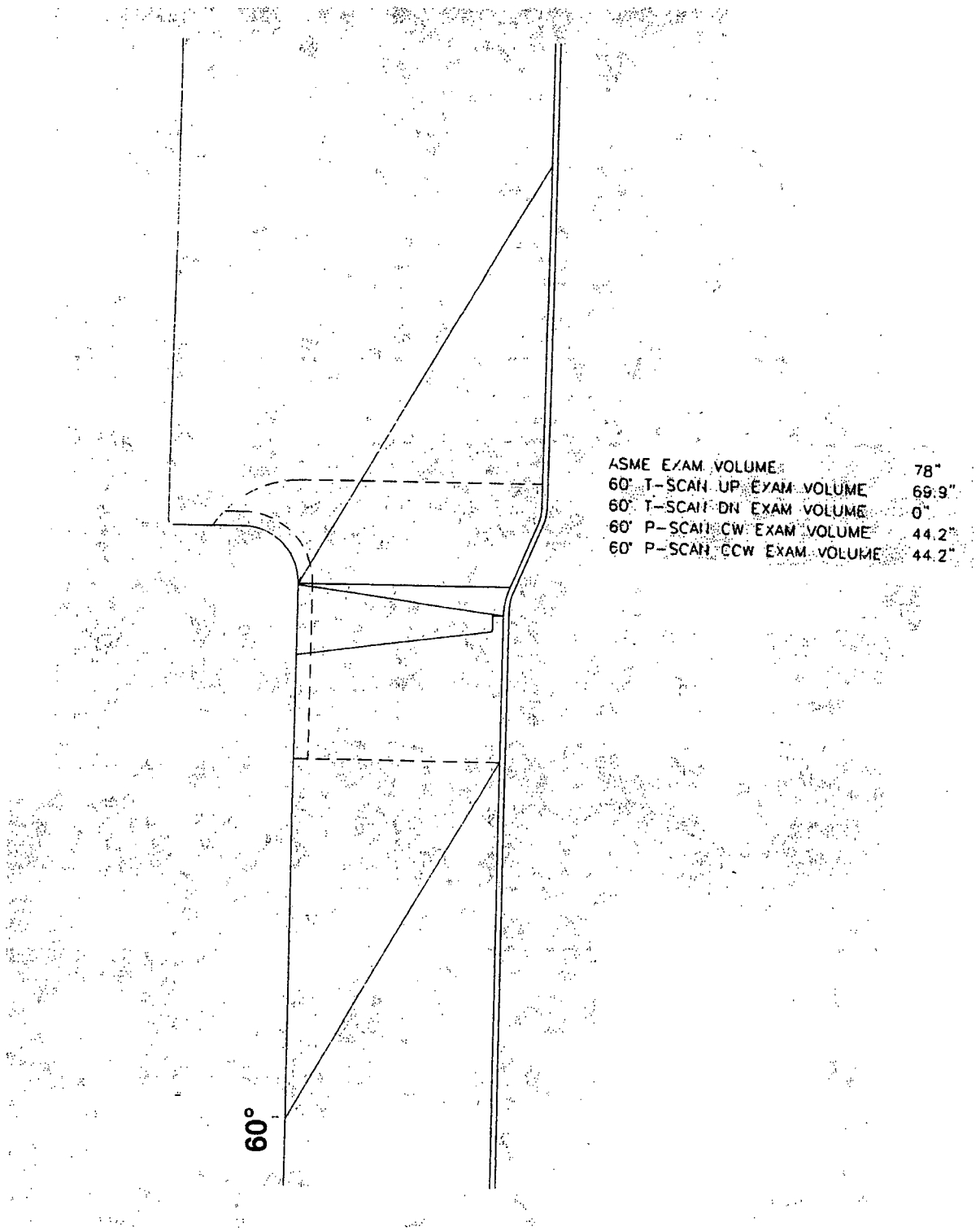


Figure 2
AE Shell-to-Flange Weld

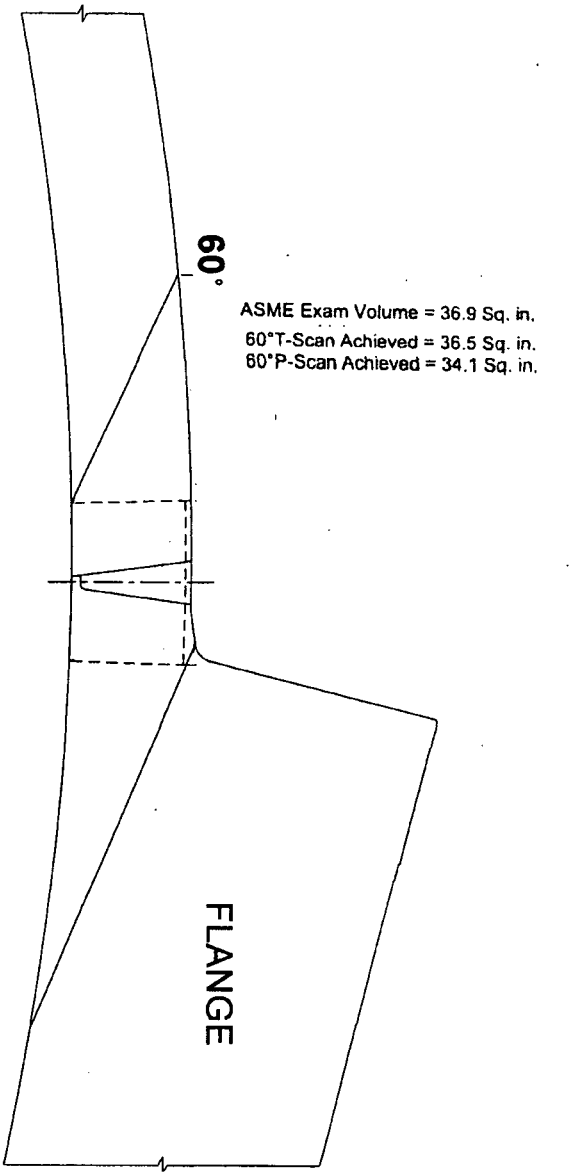


Figure 3
AG Closure Head-to-Flange Weld

10 CFR 50.55a Request Number 3ISI-11

Proposed Alternative
In Accordance With 10 CFR 50.55a(a)(3)(i)

--Alternative Provides Acceptable Level of Quality and Safety--

1. ASME Code Components Affected

Table 1			
Code Class	**Examination Category**	**Item Number**	**Description**
1	B-F	B5.10	Reactor Vessel Nozzle-to-Safe End Butt Welds, NPS 4 or larger
1	B-J	B9.11	Dissimilar metal circumferential welds NPS 4 or larger not included in Category B-F

List of affected welds is contained in Table 2 at the end of Section 8.

2. Applicable Code Edition and Addenda

The Code of Record for the Third Inservice Inspection Interval is ASME Section XI Code, 2001 Edition, 2003 Addenda.

3. Applicable Code Requirements

ASME Section XI Code, Subsection IWB-2412 requires the percentage of examinations be completed in accordance with Table IWB-2412-1, except for the examinations that may be deferred until the end of the Inspection Interval. Table IWB-2412-1 defines a minimum and maximum number of examinations to be performed each inspection period.

Columbia relief request 3ISI-08, authorized by NRC letter dated 12/3/2008 (Reference 9), defines the scope of the risk-informed inservice inspection program for Category B-J welds. This program excludes the dissimilar metal welds of Category B-J. Examination of Category B-J dissimilar metal welds is defined in Table IWB-2500-1.

ASME Section XI Code, Subsection IWB-2500 requires components to be examined as specified in Table IWB-2500-1. Table IWB-2500-1 column headed "Extent and Frequency of Examination" requires that all Category B-F welds and all dissimilar metal B-J welds be examined over the ten-year ISI interval as described in items B5.10 and B9.11 below:

B5.10 Examine the reactor vessel nozzle-to-safe end butt welds, NPS 4 or larger, by volumetric and surface examination method.

B9.11 Examine piping circumferential welds NPS 4 or larger by volumetric and surface examination method. Per Note (1)(c) examinations shall include all dissimilar metal welds not covered under Category B-F.

These welds are also covered by the augmented examination requirements of NUREG-0313 (Reference 1) and GL 88-01, including Supplement 1 (References 2 and 3). Energy Northwest implemented the inspection schedules of BWRVIP-75 for this augmented program in References 4 and 5.

4. Reason for Request

Energy Northwest proposes to use the schedules and frequencies specified in BWRVIP-75-A (Reference 6) in lieu of the Code requirements listed in Section 3 above. BWRVIP-75-A provides the technical basis for revisions to GL 88-01 inspection schedules, which supports a reduction in the number of welds to be examined in some categories or an increase in the time between inspections in other categories.

This proposed alternative inspection schedule will result in significant dose reduction over the existing schedule and frequency.

5. Proposed Alternative and Basis for Use

In lieu of the requirements of ASME Section XI, 2001 Edition, 2003 Addenda, the proposed alternative described below shall be used.

Proposed Alternative

Energy Northwest will examine the affected Category B-F and B-J welds (Table 2) in accordance with the BWRVIP-75-A schedule and frequency for normal water chemistry, as defined by the NRC Final Safety Evaluation (Reference 8). The examination methods listed in Table IWB-2500-1 are not affected by this request.

Basis for Use

By letter dated May 14, 2002 (Reference 7) the NRC issued their Final Safety Evaluation (SE) on BWRVIP-75. In that Safety Evaluation, the NRC staff concluded that, "licensee implementation of the guidelines of BWRVIP-75 report, as modified, will provide an acceptable level of quality for inspection of the safety-related components addressed". Additionally, the NRC concluded that, "the revised BWRVIP-75 guidance is acceptable for licensee referencing as the technical basis for relief from, or as an alternative to, the ASME Code and 10 CFR 55.55a, in order to use the sample schedules and frequencies specified in the revised BWRVIP-75 report that are less than those required by the ASME Code." BWRVIP-75-A is the updated version of the report which incorporated changes by BWRVIP in response to recommendations in the NRC SE and other necessary revisions identified since the previous publication of the report. BWRVIP-75-A was approved by the NRC March 16, 2006 (Reference 8).

Energy Northwest concludes that the use of BWRVIP-75-A, as defined by the NRC Final SE, in lieu of the above specified Code requirements, will provide an acceptable level of quality and safety. Therefore, approval is requested pursuant to 10 CFR 50.55a(a)(3)(i).

6. Duration of Proposed Alternative

Energy Northwest proposes to use this alternative for the remaining term of the Third Inservice Inspection Interval for Columbia which began 12/13/2005 and ends 12/12/2015.

7. Precedents

A similar relief request was approved for Edwin I. Hatch Nuclear Plant - Units 1 and 2 for their third Inservice Inspection Interval as RR-39 (Reference 10).

8. References

1. W.S. Hazelton and W.H. Koo, "Technical Report on Material Selection and Processing Guidelines for BWR Coolant Pressure Boundary Piping," NUREG-0313, Rev. 2, USNRC, January 1988.
2. USNRC Generic Letter 88-01, "NRC Position on IGSCC in BWR Austenitic Stainless Steel," January 25, 1988.
3. USNRC Generic Letter 88-01, Supplement 1, "NRC Position on Intergranular Stress Corrosion Cracking (IGSCC) in BWR Austenitic Stainless Steel," February 4, 1992.
4. Letter from RL Webring, Energy Northwest to NRC, "Columbia Generating Station, Operating License NPF-21; Request for Adoption of BWRVIP-75 Weld Examination Schedule," dated 2/9/2001, ML010510129.
5. Letter from Jack Cushing, NRC to Energy Northwest Mr. J.V. Parrish, "Approval of Boiling Water Reactor Vessel and Internals Project BWRVIP-75 Weld Examination Schedule for the Columbia Generating Station (TAC NO. MB1357)", dated 4/9/2001, ML010990083.
6. BWRVIP-75-A: BWR Vessel and Internals Project Technical Basis for Revisions to Generic Letter 88-01 Inspection Schedules, Final Report, October 2005. Report submitted to NRC by ERPI letter dated October 31, 2005, ML053070149.
7. Letter from William H. Bateman, NRC to Carl Terry, BWRVIP Chairman, "Final Safety Evaluation of the BWRVIP Vessel and Internals Project, BWR Vessel and Internals Project, Technical Basis for Revisions to Generic Letter 88-01 Inspection Schedules (BWRVIP-75)," EPRI Report TR-1 13932, October 1999 (TAC NO. MA5012) dated May 14, 2002, ML021350645.
8. Letter from William H. Bateman, NRC to Bill Eaton, BWRVIP Chairman, NRC Approval Letter for BWRVIP-75-A, "BWR Vessel and Internals Project, Technical Basis for Revisions to Generic Letter 88-01 Inspection Schedules," dated March 16, 2006, ML060760028.
9. Letter from Michael T. Markley, NRC to Mr. J.V. Parrish (EN), "Columbia Generating Station – Request for Relief No. 3ISI-08 for the Third 10-Year Inservice Inspection Program Interval (TAC NO. MD7507)," dated December 3, 2008, ML0832202.

10. Letter from Evangelos Marinos, NRC to Mr. H.L. Sumner, Jr, "Edwin I. Hatch Nuclear Plant, Units 1 And 2 Re: Request for Relief from the Requirements of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (Code) (TAC NOS. MC6532 and MC6533)," dated December 22, 2005, ML053330339.

Table 2

Identification Number	Description	Code Category	Item Number	BWRVIP-75-A Category	Material See Note Number	Mitigation	Drawing
10HPCS(1)-4	Safe-end to Nozzle	B-F	B5.10	C	4	MSIP	RPV-109
10LPCS(1)-4	Safe-end to Nozzle	B-F	B5.10	C	4	MSIP	RPV-109
12RFW(1)AC-13	Safe-end to Nozzle	B-F	B5.10	C	4	MSIP	RPV-108
12RFW(1)AB-11	Safe-end to Nozzle	B-F	B5.10	C	4	MSIP	RPV-108
12RFW(1)AA-11	Safe-end to Nozzle	B-F	B5.10	C	4	MSIP	RPV-108
12RFW(1)BF-14	Safe-end to Nozzle	B-F	B5.10	C	4	MSIP	RPV-108
12RFW(1)BE-11	Safe-end to Nozzle	B-F	B5.10	C	4	MSIP	RPV-108
12RFW(1)BD-11	Safe-end to Nozzle	B-F	B5.10	C	4	MSIP	RPV-108
12LPCI(1)A-6	Safe-end to Nozzle	B-F	B5.10	C	4	MSIP	RPV-110
12LPCI(1)B-6	Safe-end to Nozzle	B-F	B5.10	C	4	MSIP	RPV-110
12LPCI(1)C-6	Safe-end to Nozzle	B-F	B5.10	C	4	MSIP	RPV-110
4JP(NZ)A-1	Safe-end to Nozzle	B-F	B5.10	C	1	MSIP	RPV-115
4JP(NZ)B-1	Safe-end to Nozzle	B-F	B5.10	C	1	MSIP	RPV-115
24RRC(2)A-1	Safe-end to Nozzle	B-F	B5.10	C	2	MSIP	RPV-105
12RRC(1)-N2A-6	Safe-end to Nozzle	B-F	B5.10	C	3	MSIP	RPV-106
12RRC(1)-N2B-6	Safe-end to Nozzle	B-F	B5.10	C	3	MSIP	RPV-106
12RRC(1)-N2C-6	Safe-end to Nozzle	B-F	B5.10	C	3	MSIP	RPV-106
12RRC(1)-N2D-6	Safe-end to Nozzle	B-F	B5.10	C	3	MSIP	RPV-106
12RRC(1)-N2E-6	Safe-end to Nozzle	B-F	B5.10	C	3	MSIP	RPV-106
24RRC(2)B-1	Safe-end to Nozzle	B-F	B5.10	C	2	MSIP	RPV-105
12RRC(1)-N2F-6	Safe-end to Nozzle	B-F	B5.10	C	3	MSIP	RPV-106
12RRC(1)-N2G-6	Safe-end to Nozzle	B-F	B5.10	C	3	MSIP	RPV-106
12RRC(1)-N2H-6	Safe-end to Nozzle	B-F	B5.10	C	3	MSIP	RPV-106
12RRC(1)-N2J-6	Safe-end to Nozzle	B-F	B5.10	C	3	MSIP	RPV-106
12RRC(1)-N2K-6	Safe-end to Nozzle	B-F	B5.10	C	3	MSIP	RPV-106
10HPCS(1)-3	Safe-end Extension to Safe-end	B-J	B9.11	A	6	MSIP	RPV-109
10LPCS(1)-3	Safe-end Extension to Safe-end	B-J	B9.11	A	6	MSIP	RPV-109
12RFW(1)AC-11	Safe-end Extension to Safe-end Stub	B-J	B9.11	A	7	MSIP	RPV-108
12RFW(1)AB-9	Safe-end Extension to Safe-end Stub	B-J	B9.11	A	7	MSIP	RPV-108
12RFW(1)AA-9	Safe-end Extension to Safe-end Stub	B-J	B9.11	A	7	MSIP	RPV-108
12RFW(1)BF-12	Safe-end Extension to Safe-end Stub	B-J	B9.11	A	7	MSIP	RPV-108
12RFW(1)BE-9	Safe-end Extension to Safe-end Stub	B-J	B9.11	A	7	MSIP	RPV-108
12RFW(1)BD-9	Safe-end Extension to Safe-end Stub	B-J	B9.11	A	7	MSIP	RPV-108
12LPCI(1)A-5	Safe-end Extension to Safe-end	B-J	B9.11	A	6	MSIP	RPV-110
12LPCI(1)B-5	Safe-end Extension to Safe-end	B-J	B9.11	A	6	MSIP	RPV-110
12LPCI(1)C-5	Safe-end Extension to Safe-end	B-J	B9.11	A	6	MSIP	RPV-110
20RHR(2)-2	Safe-end to Valve	B-J	B9.11	B	8	IHSI	Figure 1
12RHR(1)A-14	Valve to Safe-end	B-J	B9.11	B	9	IHSI	Figure 2
12RHR(1)B-10	Valve to Safe-end	B-J	B9.11	B	9	IHSI	Figure 2

Table 2

Identification Number	Description	Code Category	Item Number	BWRVIP-75-A Category	Material See Note Number	Mitigation	Drawing
4JP(NZ)A-2	Safe-end to Fitting	B-J	B9.11	A	5	MSIP	RPV-115
4JP(NZ)B-2	Safe-end to Fitting	B-J	B9.11	A	5	MSIP	RPV-115
4RRC(4)A-11	Safe-end to Valve	B-J	B9.11	B	10	IHSI	Figure 3
4RRC(4)B-12	Safe-end to Valve	B-J	B9.11	B	10	IHSI	Figure 3

Abbreviations

HPCS – High Pressure Core Spray
IHSI –Induction Heating Stress Improvement
JP – Jet Pump
LPCI – Low Pressure Core Injection
LPCS – Low Pressure Core Spray
MSIP – Mechanical Stress Improvement Process
NZ - Nozzle
RFW – Reactor Feed water
RHR – Residual Heat Removal
RRC – Reactor Recirculation

Notes

1) SA 508 Cl 2 nozzle, buttered with Inconel 182 weld metal, welded to 336 F8 (0.025 C) Safe end with Inconel 82 weld metal
2) SA 508 Cl 2 nozzle, buttered with Inconel 182 weld metal. Post weld heat treated. Welded to SA 336 F8 Safe end (with 0.020 carbon content) with Inconel 82 weld metal for root/hot pass and Inconel 182 for balance.
3) SA 508 Cl 2 nozzle, buttered with Inconel 182. Original Inconel 600 safe-end removed. New 316L safe end with Inconel 182 butter on the nozzle side of the safe end welded to original Inconel 182 buttering with Inconel 82 weld metal for the butt weld. Original Inconel 182 buttering with Inconel 82 weld metal for the butt weld.
4) Inconel 182 buttering on safe end welded to Inconel 600 SE with Inconel 182 weld metal root/hot pass and Inconel 182 for balance.
5) SA 336 F8 Safe end with 0.025 % carbon
6) Inconel 600 safe end welded to carbon steel safe end extension with Inconel 82 weld material exposed to the fluid media.
7) Inconel 600 safe end, stub, and carbon steel safe end extension welded with Inconel 82 weld material exposed to the fluid media.
8) Valve body SA-352 welded to SA-182 F316 transition pipe (safe end) with SFA 5.4 filler material.
9) Valve body SA-350 welded to SA-182 F304 transition pipe (safe end) with SFA 5.4 filler material.
10) Valve body SA-350 welded to SA-182 F316 transition pipe (safe end) with SFA 5.1 and SFA 5.4 filler material.

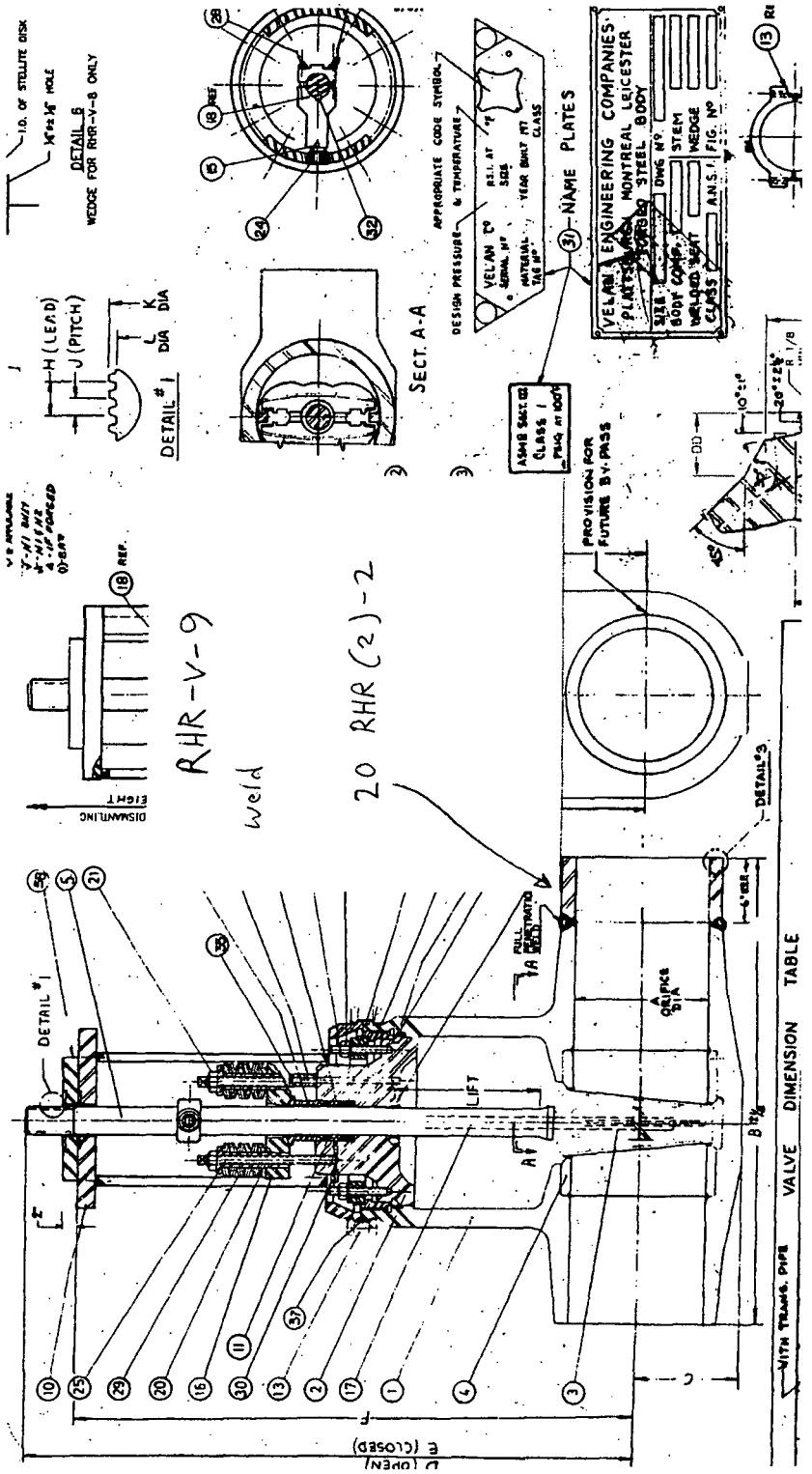

RHR-V-9
Weld
20 RHR (2)-2
SECT. A-A
DETAIL #1
DETAIL #2
DETAIL #3
NAME PLATES
VELAN ENGINEERING COMPANIES
PROVISION FOR FUTURE BY-PASS
LIFT
VALVE DIMENSION TABLE

Figure 1

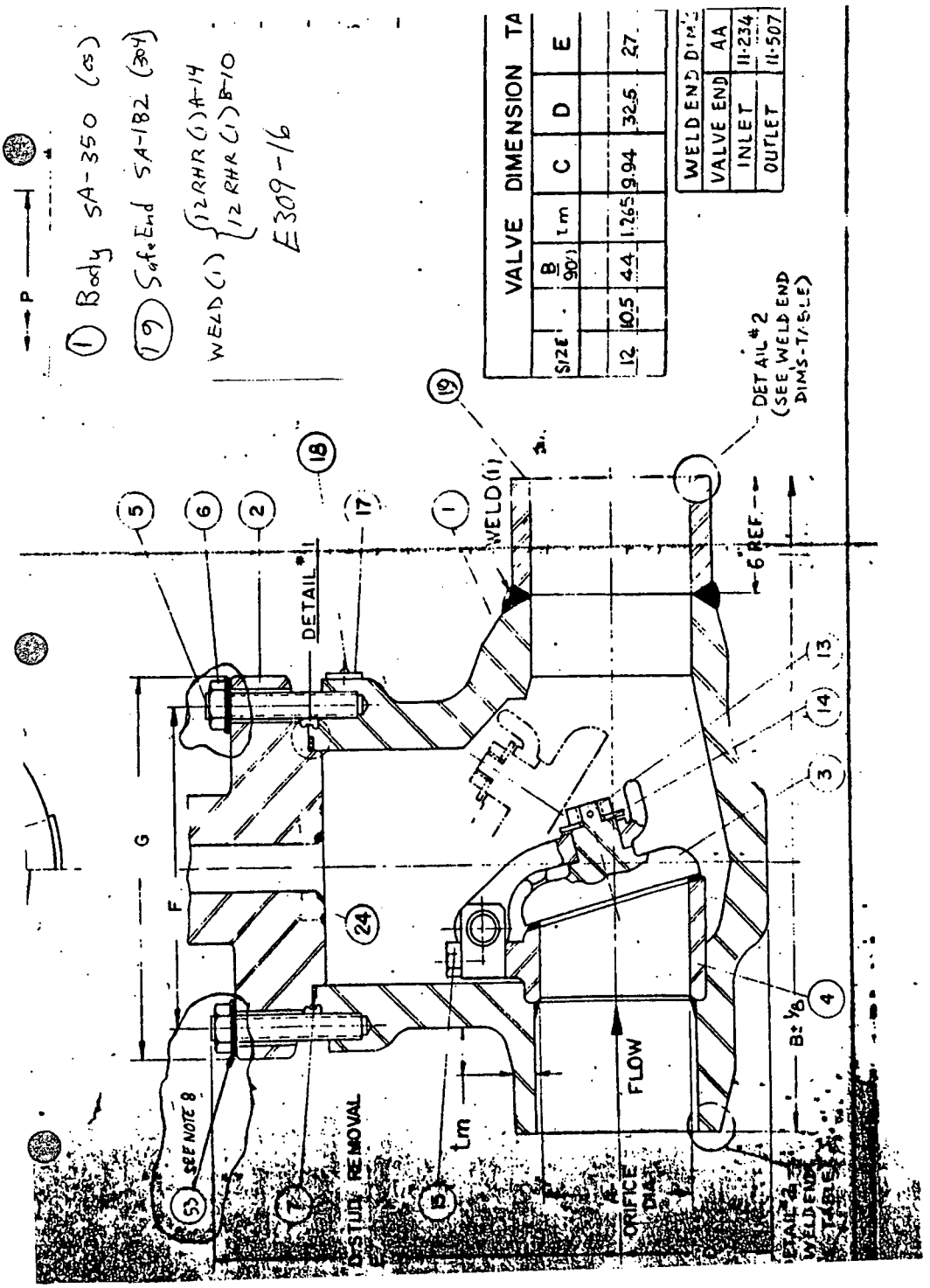
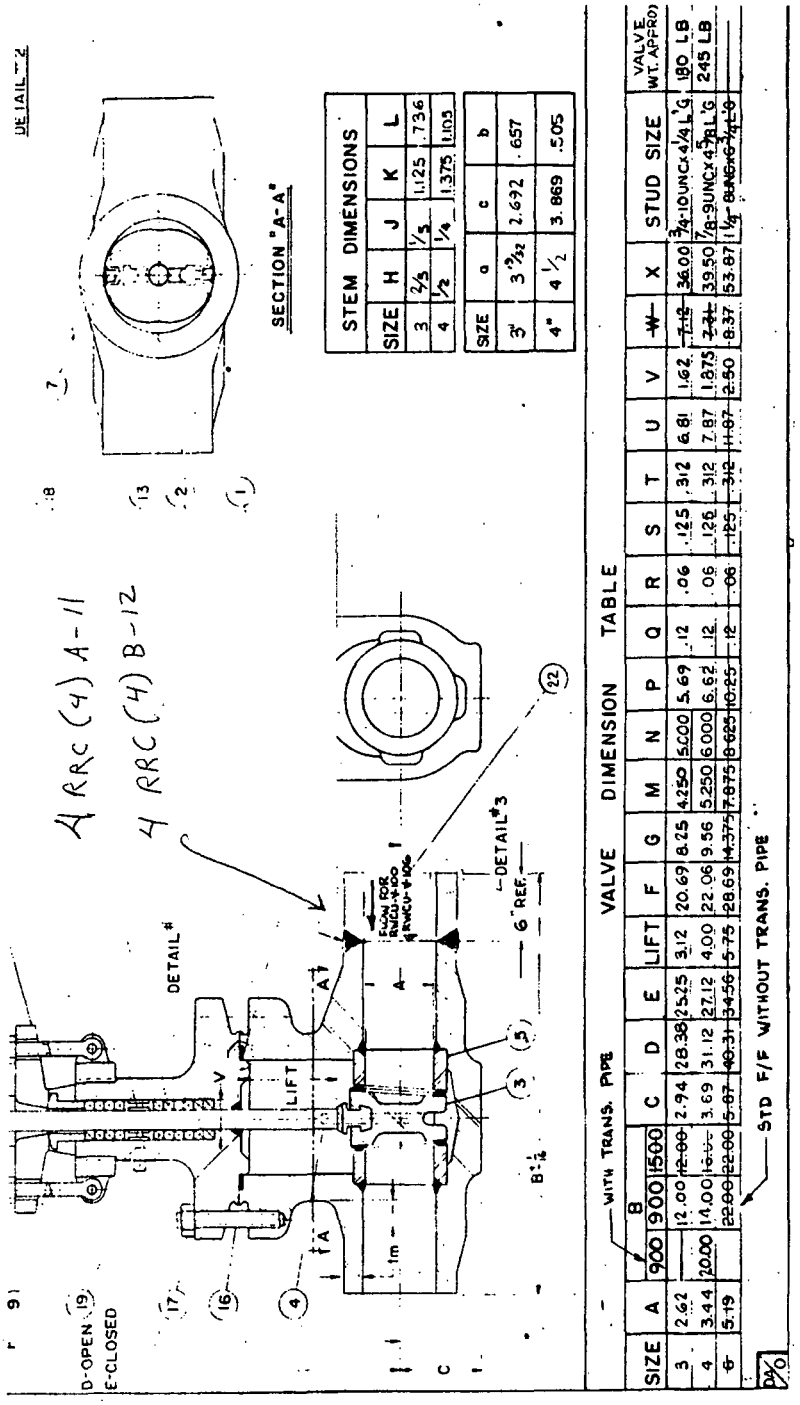
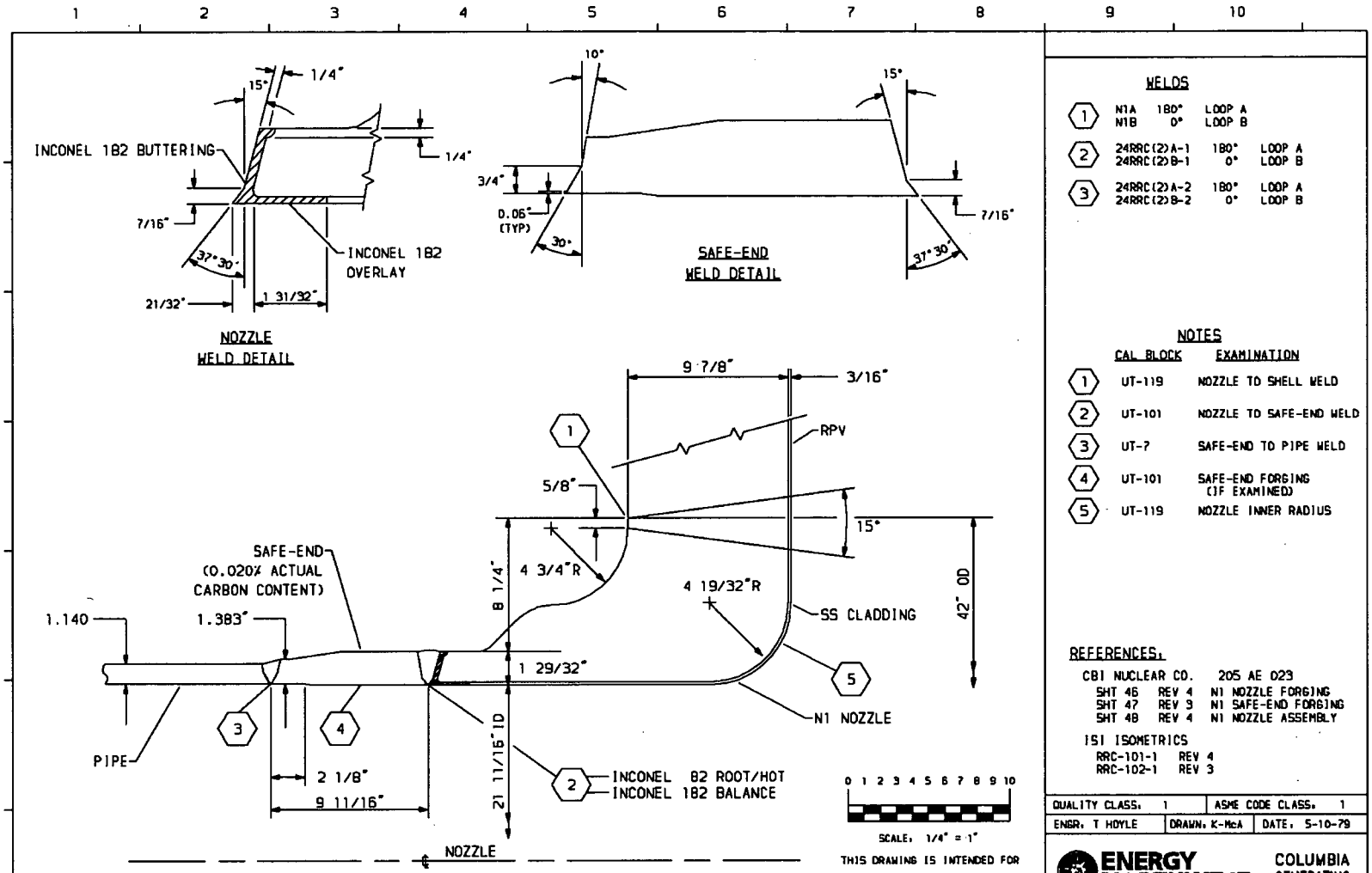

① Body SA-350 (CS)
⑲ Saf.End SA-182 (304)
WELD (1) {12 RHR (1) A-14 / 12 RHR (1) B-10
E309-16
VALVE DIMENSION TA
SIZE
B (90°)
t m
C
D
E
12
10.5
.44
1.265
9.94
32.5
27.
WELD END DIM'S
VALVE END
AA
INLET
11.234
OUTLET
11.507
DETAIL #2 (SEE WELD END DIMS-TABLE)
WELD (1)
DETAIL #1
6" REF.
G
F
FLOW
t m
B ± 1/16
SEE NOTE 8
STUD REMOVAL
ORIFICE DIA.
DETAIL #3 WELD END TABLE

Figure 2



SIZE	A	B 900	B 900	B 1500	C	D	E	LIFT	F	G	M	N	P	Q	R	S	T	U	V	W	X	STUD SIZE	VALVE WT. APPRO
3	2.62		12.00	~~12.00~~	2.94	28.38	25.25	3.12	20.69	8.25	4.250	5.000	5.69	.12	.06	.125	.312	6.81	1.62	~~7.12~~	36.00	3/4-10UNC×4 1/4 LG	180 LB
4	3.44	20.00	14.00	~~14.00~~	3.69	31.12	27.12	4.00	22.06	9.56	5.250	6.000	6.62	.12	.06	.126	.312	7.87	1.875	~~2.41~~	39.50	7/8-9UNC×4 5/8 LG	245 LB
~~6~~	5.19		~~22.00~~	~~22.00~~	~~5.87~~	~~40.31~~	~~34.56~~	~~5.75~~	~~28.69~~	~~14.375~~	~~7.875~~	~~8.625~~	~~10.25~~	.12	.06	.125	.312	~~11.87~~	2.50	8.37	53.87	1 1/4-8UNC×7 1/2 LG	

Figure 3



THIS DRAWING IS INTENDED FOR USE IN PRESERVICE AND INSERVICE INSPECTIONS PROGRAMS ONLY.

WELDS

1	N1A	180°	LOOP A
	N1B	0°	LOOP B
2	24RRC(2)A-1	180°	LOOP A
	24RRC(2)B-1	0°	LOOP B
3	24RRC(2)A-2	180°	LOOP A
	24RRC(2)B-2	0°	LOOP B

NOTES

	CAL BLOCK	EXAMINATION
1	UT-119	NOZZLE TO SHELL WELD
2	UT-101	NOZZLE TO SAFE-END WELD
3	UT-7	SAFE-END TO PIPE WELD
4	UT-101	SAFE-END FORGING (IF EXAMINED)
5	UT-119	NOZZLE INNER RADIUS

REFERENCES:

CBI NUCLEAR CO. 205 AE 023
- SHT 46 REV 4 N1 NOZZLE FORGING
- SHT 47 REV 3 N1 SAFE-END FORGING
- SHT 48 REV 4 N1 NOZZLE ASSEMBLY

ISI ISOMETRICS
- RRC-101-1 REV 4
- RRC-102-1 REV 3

PIPING SYSTEM	NOM DIA INCH	SCH	NOM WALL THICKNESS	MATERIAL SPEC	MATL TYPE	CAL BLOCK NUMBER
24"RRC(2)-4S	24	XXX	1.140	SA 358 GR 304 CL 1	SS	SEE NOTES
SAFE-END	—	—	—	SA 336 CL F8	SS	SEE NOTES
N1 NOZZLE	—	—	—	SA 508 CL 2	CS	SEE NOTES
RPV	—	—	9 7/8	SA 533 GR B CL 1	CS	SEE NOTES

NO	DATE	REVISION	BY	CHKD	APVD
2	5-25-06	REVISED LOGO	JL	DPR	TMC
1	2-20-92	UPDATED TO DOCUMENT THE SAFE-END AND INCONEL INFORMATION FOR AS-BUILT CONDITION. MODIFIED LOGO. REDRAWN	K-McA	OJ	DPR
0	7-31-79	ISSUED FOR USE	K-McA	TFH / DNP	LFB

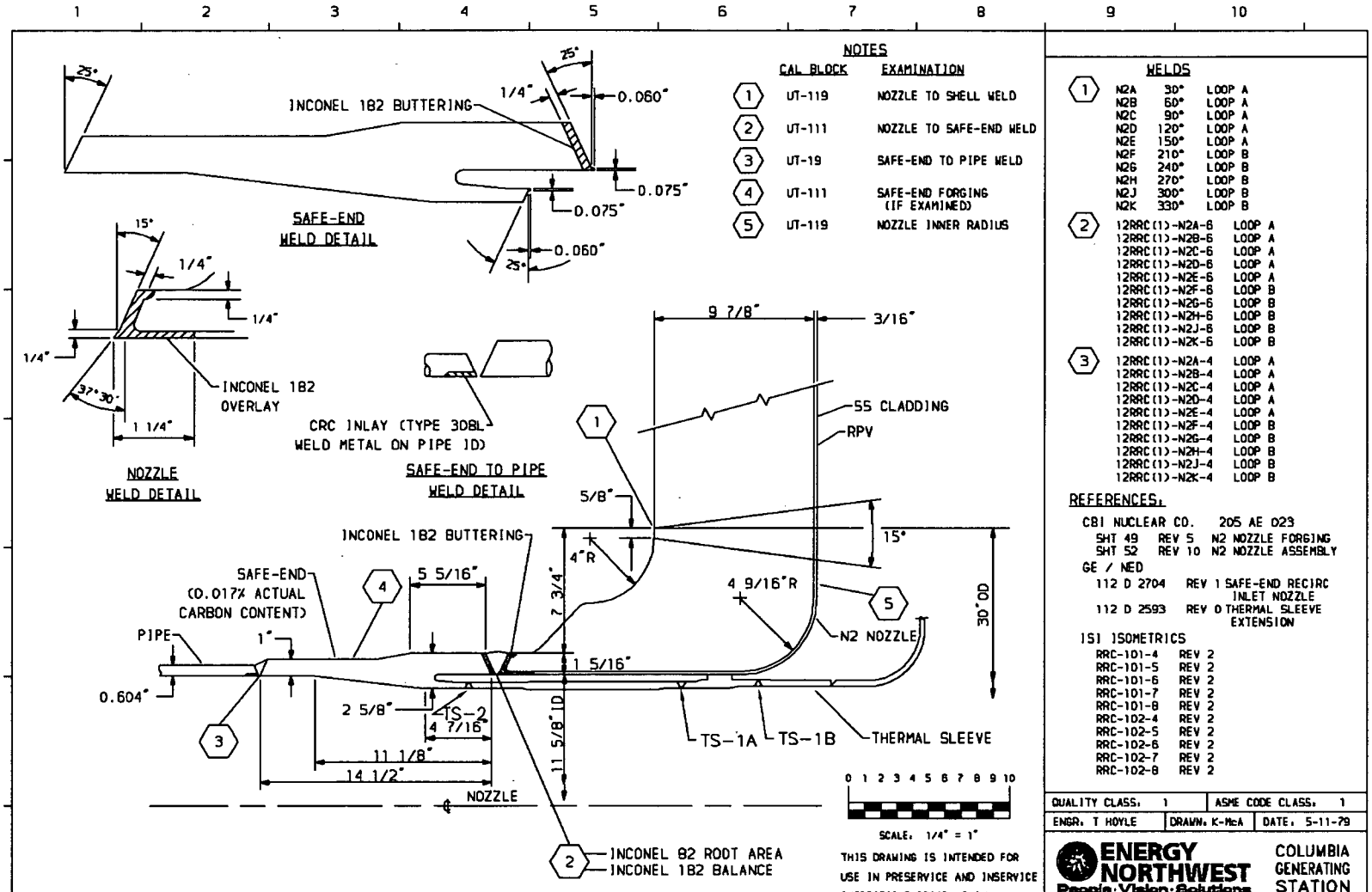
QUALITY CLASS: 1	ASME CODE CLASS: 1		
ENGR: T HOYLE	DRAWN: K-McA	DATE: 5-10-79	

ENERGY NORTHWEST
People·Vision·Solutions
COLUMBIA GENERATING STATION

WELD & COMPONENT IDENTIFICATION DIAGRAM

TITLE: RECIRC SUCTION N1 NOZZLE AT 0° & 180°

DWG NO. RPV-105 REV 2



NOTES

	CAL BLOCK	EXAMINATION
1	UT-119	NOZZLE TO SHELL WELD
2	UT-111	NOZZLE TO SAFE-END WELD
3	UT-19	SAFE-END TO PIPE WELD
4	UT-111	SAFE-END FORGING (IF EXAMINED)
5	UT-119	NOZZLE INNER RADIUS

WELDS

1	N2A 30°	LOOP A
	N2B 60°	LOOP A
	N2C 90°	LOOP A
	N2D 120°	LOOP A
	N2E 150°	LOOP A
	N2F 210°	LOOP B
	N2G 240°	LOOP B
	N2H 270°	LOOP B
	N2J 300°	LOOP B
	N2K 330°	LOOP B
2	12RRC(1)-N2A-6	LOOP A
	12RRC(1)-N2B-6	LOOP A
	12RRC(1)-N2C-6	LOOP A
	12RRC(1)-N2D-6	LOOP A
	12RRC(1)-N2E-6	LOOP A
	12RRC(1)-N2F-6	LOOP B
	12RRC(1)-N2G-6	LOOP B
	12RRC(1)-N2H-6	LOOP B
	12RRC(1)-N2J-6	LOOP B
	12RRC(1)-N2K-6	LOOP B
3	12RRC(1)-N2A-4	LOOP A
	12RRC(1)-N2B-4	LOOP A
	12RRC(1)-N2C-4	LOOP A
	12RRC(1)-N2D-4	LOOP A
	12RRC(1)-N2E-4	LOOP A
	12RRC(1)-N2F-4	LOOP B
	12RRC(1)-N2G-4	LOOP B
	12RRC(1)-N2H-4	LOOP B
	12RRC(1)-N2J-4	LOOP B
	12RRC(1)-N2K-4	LOOP B

REFERENCES:

CBI NUCLEAR CO. 205 AE 023
- SHT 49 REV 5 N2 NOZZLE FORGING
- SHT 52 REV 10 N2 NOZZLE ASSEMBLY

GE / NED
- 112 D 2704 REV 1 SAFE-END RECIRC INLET NOZZLE
- 112 D 2593 REV 0 THERMAL SLEEVE EXTENSION

ISI ISOMETRICS
- RRC-1D1-4 REV 2
- RRC-1D1-5 REV 2
- RRC-1D1-6 REV 2
- RRC-1D1-7 REV 2
- RRC-1D1-8 REV 2
- RRC-1D2-4 REV 2
- RRC-1D2-5 REV 2
- RRC-1D2-6 REV 2
- RRC-1D2-7 REV 2
- RRC-1D2-8 REV 2

THIS DRAWING IS INTENDED FOR USE IN PRESERVICE AND INSERVICE INSPECTIONS PROGRAMS ONLY.

PIPING SYSTEM	NOM DIA INCH	SCH	NOM WALL THICKNESS	MATERIAL SPEC	MATL TYPE	CAL BLOCK NUMBER
12"RRC(1)-4S	12	XXX	0.609	SA 358 GR 304 CL 1	SS	SEE NOTES
SAFE-END	—	—	—	SA 182 GR F316L	SS	SEE NOTES
N2 NOZZLE	—	—	—	SA 508 CL 2	CS	SEE NOTES
RPV	—	—	9 7/8	SA 533 GR B CL 1	CS	SEE NOTES

NO	DATE	REVISION	BY	CHKD	APVD
2	5-25-06	REVISED LOGO	JL	DPR	TMC
1	2-20-92	UPDATED TO DOCUMENT THE SAFE-END AND INCONEL INFORMATION FOR AS-BUILT CONDITION. MODIFIED LOGO. REDRAWN	K-McA	OJ	DPR
0	7-31-79	ISSUED FOR USE	K-McA	TFH / DNP	LFB

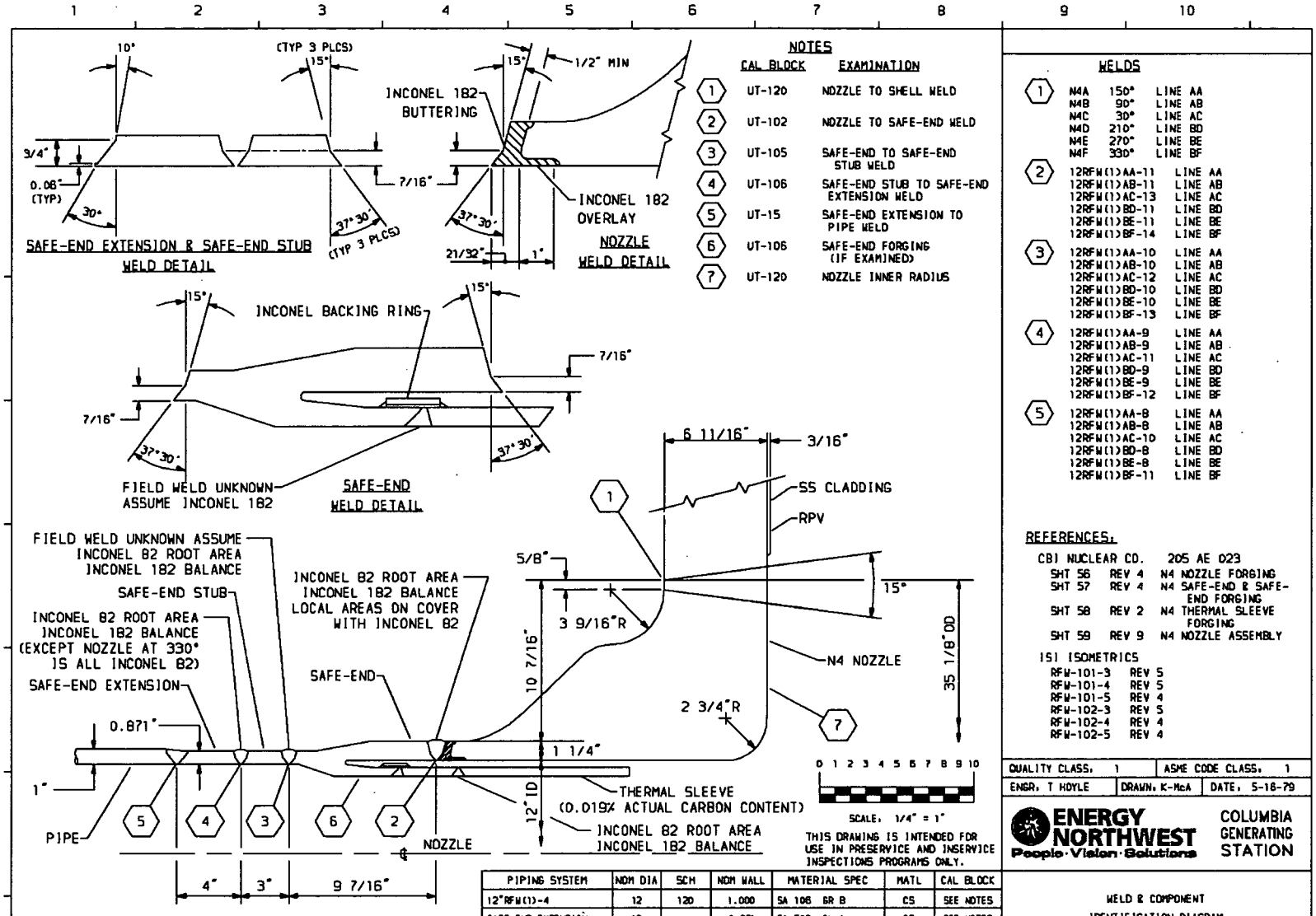
QUALITY CLASS: 1 | ASME CODE CLASS: 1
ENGR: T HOYLE | DRAWN: K-McA | DATE: 5-11-79

ENERGY NORTHWEST People·Vision·Solutions — COLUMBIA GENERATING STATION

WELD & COMPONENT IDENTIFICATION DIAGRAM

TITLE: RECIRC RETURN N2 NOZZLE AT 30°, 60°, 90°, 120°, 150°, 210°, 240°, 300° & 300°

DWG NO. RPV-106 | REV 2



NOTES

	CAL BLOCK	EXAMINATION
1	UT-120	NOZZLE TO SHELL WELD
2	UT-102	NOZZLE TO SAFE-END WELD
3	UT-105	SAFE-END TO SAFE-END STUB WELD
4	UT-106	SAFE-END STUB TO SAFE-END EXTENSION WELD
5	UT-15	SAFE-END EXTENSION TO PIPE WELD
6	UT-106	SAFE-END FORGING (IF EXAMINED)
7	UT-120	NOZZLE INNER RADIUS

WELDS

1	N4A 150°	LINE AA
	N4B 90°	LINE AB
	N4C 30°	LINE AC
	N4D 210°	LINE BD
	N4E 270°	LINE BE
	N4F 330°	LINE BF
2	12RFW(1)AA-11	LINE AA
	12RFW(1)AB-11	LINE AB
	12RFW(1)AC-13	LINE AC
	12RFW(1)BD-11	LINE BD
	12RFW(1)BE-11	LINE BE
	12RFW(1)BF-14	LINE BF
3	12RFW(1)AA-10	LINE AA
	12RFW(1)AB-10	LINE AB
	12RFW(1)AC-12	LINE AC
	12RFW(1)BD-10	LINE BD
	12RFW(1)BE-10	LINE BE
	12RFW(1)BF-13	LINE BF
4	12RFW(1)AA-9	LINE AA
	12RFW(1)AB-9	LINE AB
	12RFW(1)AC-11	LINE AC
	12RFW(1)BD-9	LINE BD
	12RFW(1)BE-9	LINE BE
	12RFW(1)BF-12	LINE BF
5	12RFW(1)AA-8	LINE AA
	12RFW(1)AB-8	LINE AB
	12RFW(1)AC-10	LINE AC
	12RFW(1)BD-8	LINE BD
	12RFW(1)BE-8	LINE BE
	12RFW(1)BF-11	LINE BF

REFERENCES:

CBI NUCLEAR CO. 205 AE 023
- SHT 56 REV 4 N4 NOZZLE FORGING
- SHT 57 REV 4 N4 SAFE-END & SAFE-END FORGING
- SHT 58 REV 2 N4 THERMAL SLEEVE FORGING
- SHT 59 REV 9 N4 NOZZLE ASSEMBLY

ISI ISOMETRICS
- RFW-101-3 REV 5
- RFW-101-4 REV 5
- RFW-101-5 REV 4
- RFW-102-3 REV 5
- RFW-102-4 REV 4
- RFW-102-5 REV 4

PIPING SYSTEM	NOM DIA	SCH	NOM WALL	MATERIAL SPEC	MATL	CAL BLOCK
12"RFW(1)-4	12	120	1.000	SA 106 GR B	CS	SEE NOTES
SAFE-END EXTENSION	12	——	0.871	SA 508 CL 1	CS	SEE NOTES
SAFE-END STUB	12	——	0.871	SB 168 (600)	INCONEL	SEE NOTES
SAFE-END	12	——	1.125	SB 168 (600)	INCONEL	SEE NOTES
N4 NOZZLE	12	——	——	SA 508 CL 2	CS	SEE NOTES
RPV	——	——	8 11/16	SA 533 GR B CL 1	CS	SEE NOTES
THERMAL SLEEVE	——	——	——	SA 368 TP F304	SS	SEE NOTES

NO	DATE	REVISION	BY	CHKD	APVD
2	5-25-06	REVISED LOGO	JL	DPR	TMC
1	2-20-92	UPDATED TO DOCUMENT THE SAFE-END AND INCONEL INFORMATION FOR AS-BUILT CONDITION. MODIFIED LOGO. REDRAWN	K-McA	OJ	DPR
0	7-31-79	ISSUED FOR USE	K-McA	TFH / DWP	LFB

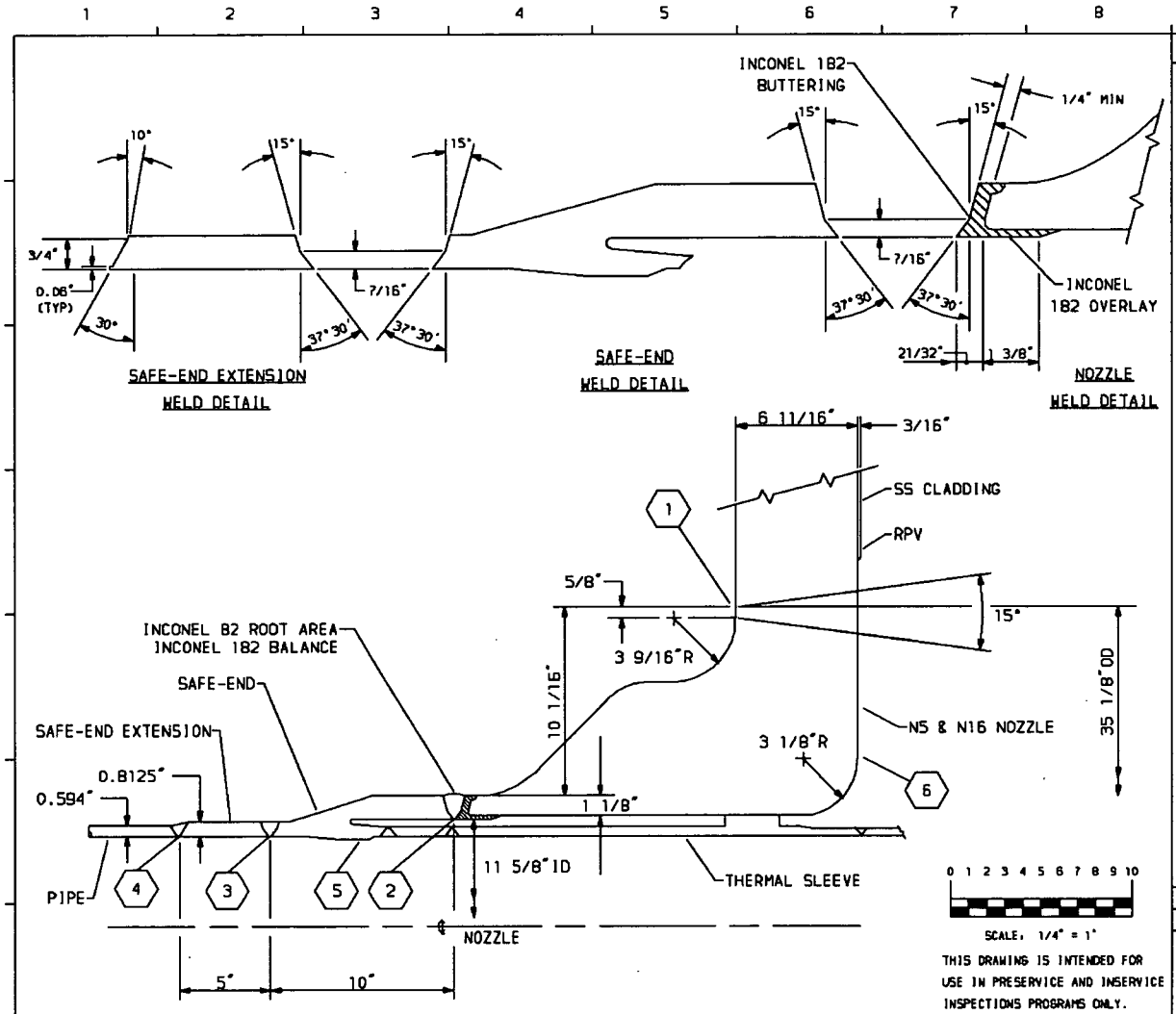
QUALITY CLASS: 1 | ASME CODE CLASS: 1
ENGR: T HOYLE | DRAWN: K-McA | DATE: 5-18-79

ENERGY NORTHWEST People·Vision·Solutions
COLUMBIA GENERATING STATION

WELD & COMPONENT IDENTIFICATION DIAGRAM

TITLE: FEEDWATER N4 NOZZLE AT 30°, 90°, 150°, 210°, 270° & 330°

DWG NO. RPV-108 REV 2



WELDS

1. N5 120° LPCS; N16 240° HPCS
2. 10LPCS(1)-4; 10HPCS(1)-4
3. 10LPCS(1)-3; 10HPCS(1)-3 ⚠
4. 10LPCS(1)-2; 10HPCS(1)-2 ⚠

NOTES

	WELD	EXAMINATION
1	UT-120	NOZZLE TO SHELL WELD
2	UT-102	NOZZLE TO SAFE-END WELD
3	UT-106	SAFE-END TO SAFE-END EXTENSION WELD
4	UT-22	SAFE-END EXTENSION TO PIPE WELD
5	UT-108	SAFE-END FORGING (IF EXAMINED)
6	UT-119	NOZZLE INNER RADIUS

REFERENCES:

CBI NUCLEAR CO. 205 AE 023
- SHT 60 REV 3 N5 NOZZLE FORGING
- SHT 61 REV 2 N5 SAFE-END & SAFE-END EXTENSION
- SHT 63 REV 5 N5 NOZZLE ASSEMBLY
- SHT 88 REV 4 N16 NOZZLE FORGING
- SHT 89 REV 2 N16 SAFE-END & SAFE-END EXTENSION
- SHT 91 REV 5 N16 NOZZLE ASSEMBLY

ISI ISOMETRICS
- LPCS-101-2 REV 5
- HPCS-101-2 REV 6

QUALITY CLASS: 1	ASME CODE CLASS: 1	
ENGR: T HOYLE	DRAWN: K-McA	DATE: 5-15-79

ENERGY NORTHWEST People·Vision·Solutions — COLUMBIA GENERATING STATION

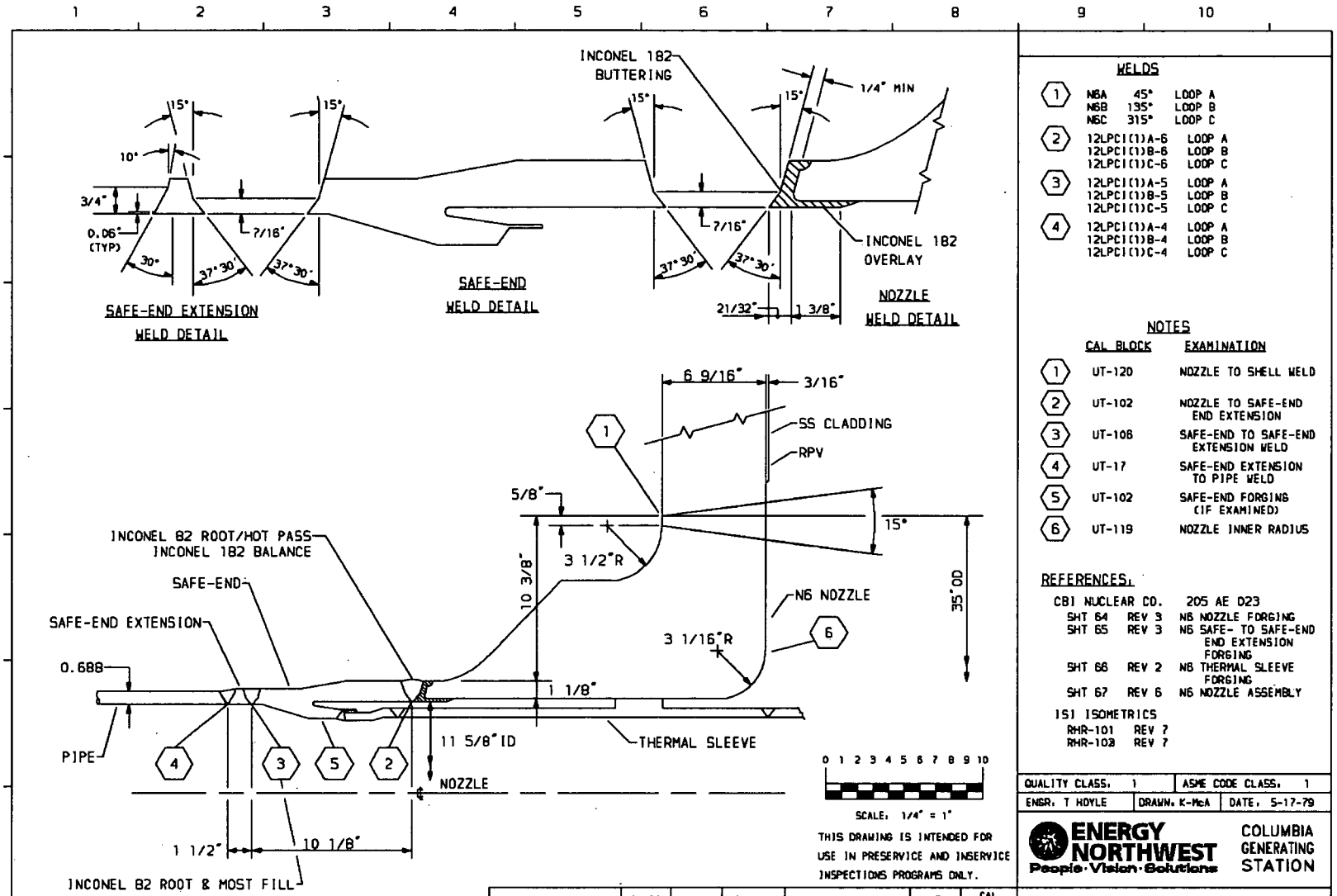
WELD & COMPONENT IDENTIFICATION DIAGRAM

TITLE: LPCS / HPCS DISCHARGE
N5 NOZZLE AT 120° N16 NOZZLE AT 240°

DWG NO. RPV-109 REV 3

NO	DATE	REVISION	BY	CHKD	APVD
3	5-25-06	REVISED LOGO	JL	DPR	TMC
2	10/18/95	CORRECTED WELD NUMBERS 3 AND 4.	DLE	DPR	CMK
1	2-20-92	UPDATED TO DOCUMENT THE SAFE-END AND INCONEL INFORMATION FOR AS-BUILT CONDITION. MODIFIED LOGO. REDRAWN	K-McA	DJ	DPR
0	7-31-79	ISSUED FOR USE	K-McA	TFH / DHP	LFB

PIPING SYSTEM	NOM DIA INCH	SCH	NOM WALL THICKNESS	MATERIAL SPEC	MATL TYPE	CAL BLOCK NUMBER
10"LPCS(1)-4	10	80	0.594	SA 106 GR B	CS	SEE NOTES
10"HPCS(1)-4	10	80	0.594	SA 106 GR B	CS	SEE NOTES
SAFE-END EXTENSION	—	—	—	SA 508 CL 1	CS	SEE NOTES
SAFE-END	—	—	—	SB 166 (600)	INCONEL	SEE NOTES
N5 NOZZLE	—	—	—	SA 508 CL 2	CS	SEE NOTES
RPV	—	—	6 11/16	SA 533 GR B CL 1	CS	SEE NOTES



WELDS

1	N6A	45°	LOOP A
	N6B	135°	LOOP B
	N6C	315°	LOOP C
2	12LPCI(1)A-6		LOOP A
	12LPCI(1)B-6		LOOP B
	12LPCI(1)C-6		LOOP C
3	12LPCI(1)A-5		LOOP A
	12LPCI(1)B-5		LOOP B
	12LPCI(1)C-5		LOOP C
4	12LPCI(1)A-4		LOOP A
	12LPCI(1)B-4		LOOP B
	12LPCI(1)C-4		LOOP C

NOTES

	CAL BLOCK	EXAMINATION
1	UT-120	NOZZLE TO SHELL WELD
2	UT-102	NOZZLE TO SAFE-END END EXTENSION
3	UT-108	SAFE-END TO SAFE-END EXTENSION WELD
4	UT-17	SAFE-END EXTENSION TO PIPE WELD
5	UT-102	SAFE-END FORGING (IF EXAMINED)
6	UT-119	NOZZLE INNER RADIUS

REFERENCES:

CBI NUCLEAR CO. 205 AE D23
- SHT 64 REV 3 N6 NOZZLE FORGING
- SHT 65 REV 3 N6 SAFE- TO SAFE-END END EXTENSION FORGING
- SHT 66 REV 2 N6 THERMAL SLEEVE FORGING
- SHT 67 REV 6 N6 NOZZLE ASSEMBLY

ISI ISOMETRICS
- RHR-101 REV 7
- RHR-103 REV 7

QUALITY CLASS: 1		ASME CODE CLASS: 1	
ENGR: T HOYLE	DRAWN: K-McA	DATE: 5-17-79	

ENERGY NORTHWEST People·Vision·Solutions — COLUMBIA GENERATING STATION

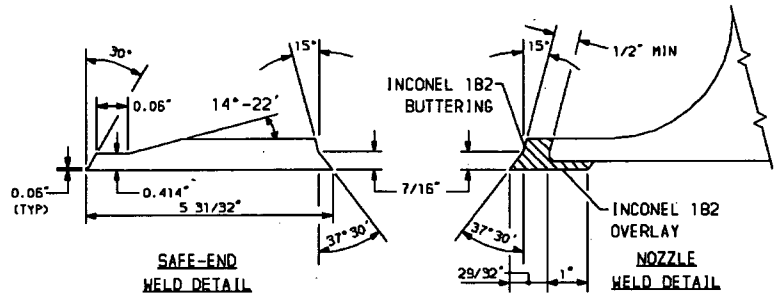
PIPING SYSTEM	NOM DIA INCH	SCH	NOM WALL THICKNESS	MATERIAL SPEC	MATL TYPE	CAL BLOCK NUMBER
12"RHR(1)-4	12	80	0.688	SA 106 GR B	CS	SEE NOTES
SAFE-END EXTENSION	——	——	——	SA 508 CL 1	CS	SEE NOTES
SAFE-END	——	——	——	SB 166 (600)	INCONEL	SEE NOTES
N6 NOZZLE	——	——	——	SA 508 CL 2	CS	SEE NOTES
RPV	——	——	6 9/16	SA 533 GR B CL 1	CS	SEE NOTES

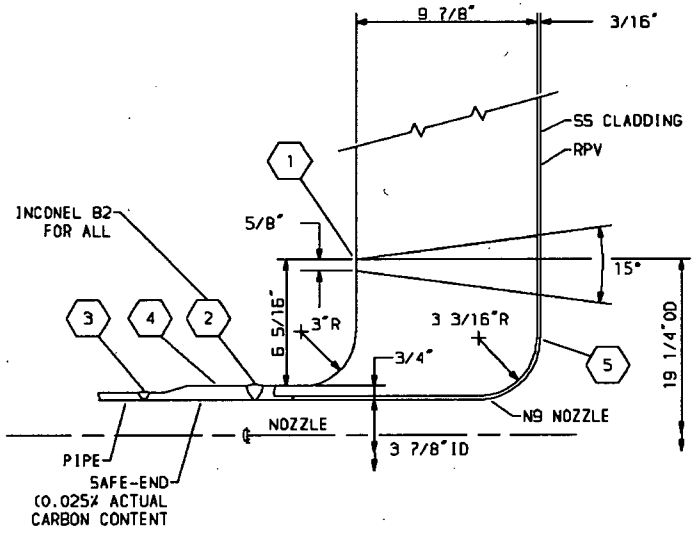
NO	DATE	REVISION	BY	CHKD	APVD
2	5-25-06	REVISED LOGO	JL	DPR	THC
1	2-20-92	UPDATED TO DOCUMENT THE SAFE-END AND INCONEL INFORMATION FOR AS-BUILT CONDITION. MODIFIED LOGO. REDRAWN	K-McA	DJ	DPR
0	7-31-79	ISSUED FOR USE	K-McA	TFH/DMH	LFB

WELD & COMPONENT IDENTIFICATION DIAGRAM

TITLE: RHR / LPCI N6 NOZZLE AT 45°, 135° & 315°

DWG NO: RPV-110 REV 2





WELDS

1. N9A 105°, N9B 285°
2. 4JP(NZ)A-1, 4JP(NZ)B-1
3. 4JP(NZ)A-2, 4JP(NZ)B-2

NOTES

	CAL BLOCK	EXAMINATION
1	UT-119	NOZZLE TO SHELL WELD
2	UT-109	NOZZLE TO SAFE-END WELD
3	UT-29	SAFE-END TO FITTING WELD
4	UT-109	SAFE-END FORGING (IF EXAMINED)
5	UT-119	NOZZLE INNER RADIUS

REFERENCES:

CBI NUCLEAR CO. 205 AE 023
SHT 72 REV 2 N9 NOZZLE FORGING
SHT 73 REV 2 N9 SAFE-END FORGING
SHT 74 REV 2 N9 NOZZLE ASSEMBLY

0 1 2 3 4 5 6 7 8 9 10

SCALE: 1/4" = 1"

THIS DRAWING IS INTENDED FOR USE IN PRESERVICE AND INSERVICE INSPECTIONS PROGRAMS ONLY.

PIPING SYSTEM	NOM DIA INCH	SCH	NOM WALL THICKNESS	MATERIAL SPEC	MATL TYPE	CAL BLOCK NUMBER
SAFE-END	4		3/4	SA 336 CL F8	SS	SEE NOTES
N9 NOZZLE				SA 508 CL 2	CS	SEE NOTES
RPV			9 7/16	SA 533 GR B	CS	SEE NOTES

NO	DATE	REVISION	BY	CHKD	APVD
2	5-25-06	REVISED LOGO	JL	DPR	TMC
1	2-20-92	UPDATED TO DOCUMENT THE SAFE-END AND INCONEL INFORMATION FOR AS-BUILT CONDITION. MODIFIED LOGO. REDRAWN	K-McA	OJ	DPR
0	7-31-79	ISSUED FOR USE	K-McA	TFH / DNP	LFB

QUALITY CLASS: 1 | ASME CODE CLASS: 1
ENGR: T HOYLE | DRAWN: K-McA | DATE: 10-4-79

ENERGY NORTHWEST People·Vision·Solutions — COLUMBIA GENERATING STATION

WELD & COMPONENT IDENTIFICATION DIAGRAM

TITLE: JET PUMP INSTRUMENTATION
N9 NOZZLE AT 105° & 285°

DWG NO. RPV-115 REV 2