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RECIP.NAME RECIPIENT AFFILIATION
Document Control Branch (Document Control Desk)

SUBJECT: Forwards proposed alternative exams for 10CFR50.55a(g)(6), augmented exam of RV & requests that proposed alternate to 10CFR50.55a(g)(6) be accepted as revised relief request 2-ISI-001 for first 10-yr ISI interval.

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December 15, 1995
GO2-95-275

Docket No. 50-397

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

Gentlemen:

Subject: **WNP-2, OPERATING LICENSE NPF-21**
ALTERNATIVE TO 10 CFR 50.55a (g)(6)(ii)(A), AUGMENTED EXAMINATION OF REACTOR VESSEL

References:

1) Letter G02-93-166, dated June 24, 1993, JV Parrish (SS) to NRC, "Inservice Inspection Program Plan Relief Requests 2-ISI-001 and 2-ISI-010"

2) NRC letter dated June 8, 1994, TR Quay (NRC) to JV Parrish (SS), "Inservice Inspection Relief Requests - WPPSS Nuclear Project No 2 (TAC No. M87253)"

3) NRC letter dated February 1, 1995, JW Clifford (NRC) to JV Parrish (SS), "Evaluation of the First 10-Year Interval Inservice Inspection Program Plan, Amendment 1, for Washington Public Power Supply System Nuclear Project No. 2 (TAC No. M87807)"

4) Letter GO2-85-274 dated May 29, 1985, GC Sorensen (SS) to WR Butler (NRC), "Nuclear Plant No. 2, Inservice Inspection Program Plan, Relief Requests"

5) Letter dated March 27, 1987, EG Adensam (NRC) to GC Sorensen (SS), "Safety Evaluation for 1st Ten-Year Interval Inspection Program and Requests for Relief from Certain Requirements"

This letter submits for NRC review, the Supply System's proposed alternative examinations for 10 CFR 50.55a(g)(6). The Supply System also requests that the proposed alternate to 10 CFR 50.55a(g)(6) be accepted as the revised relief request 2-ISI-001 for the first 10-year inservice inspection interval. The alternative proposal is attached to this letter.

A047

ALTERNATIVE TO 10 CRF 50.55a (g)(6)(ii)(A), AUGMENTED EXAMINATION OF REACTOR VESSEL

By Reference 1, the Supply System submitted revised relief request 2-ISI-001 in response to 10 CFR 50.55a(g)(6) with the intent that this was for the augmented reactor pressure vessel (RPV) examinations. Reference 2 denied the relief request stating that it was not presented as an alternate to 10 CFR 50.55a(g)(6). Reference 3 stated that the matter was still open and was to be resolved by the end of the first inspection period of the second inspection interval which ends April, 1998.

During the fall of 1994, the BWR Vessel and Internals Project (BWRVIP) began work on an industry alternative to 10 CFR 50.55a(g)(6). As a subscriber of the BWRVIP, the Supply System decided to wait for the conclusion of the BWRVIP work before presenting our response to 10 CFR 50.55a(g)(6). On September 28, 1995 BWRVIP submitted their recommendations to the NRC as ERPI report TR-105697 (BWRVIP-05). It is understood by the Supply System that this report has not been endorsed by the NRC at this time. However certain information from the report has been referenced to provide additional support for the Supply System position for our alternate proposal.

It is also requested that Table 2 from the alternative proposal (attachment) be used as a replacement for the coverage obtained for all RPV welds in relief request 2-ISI-001. Table 2 provides for more coverage of the RPV than what was originally submitted to the NRC in revision 0 of the ISI Program Plan for the first inspection interval (Reference 4). This relief request, 2-ISI-001, was approved by Reference 5.

Should you have any questions or desire additional information regarding this matter, please call me or D.A. Swank at (509) 377-4563.

Sincerely,

J. V. Parrish (Mail Drop 1023)
Vice President, Nuclear Operations

DPR/lm
Attachment

cc: LJ Callan - NRC RIV
KE Perkins, Jr. - NRC RIV, Walnut Creek Field Office
NS Reynolds - Winston & Strawn
JW Clifford - NRC
DL Williams - BPA/399
NRC Sr. Resident Inspector - 927N

ALTERNATIVE TO 10 CFR 50.55a (g)(6)(ii)(A) dated August 31, 1992

WNP-2 has determined that the augmented examinations required by 10 CFR 50.55a (g)(6)(ii)(A), dated August 31,1992[1], cannot be performed completely. This submittal proposes alternative examinations that would provide an acceptable level of quality and safety.

1. Required Examinations

The examination requirements of 10 CFR 50.55a (g)(6)(ii)(A), dated August 31,1992[2] require that all licensees augment their reactor vessel (RPV) examinations for ASME Section XI Examination Category B-A, Item Number B1.10, by implementing once, as part of the inservice inspection interval in effect on September 8, 1992, the examination requirements for reactor vessel shell welds specified in Item B1.10 of Examination Category B-A of the 1989 Edition of ASME Section XI. These requirements specify that essentially 100% of the weld for each weld be examined. The regulations define "essentially 100%" as more than 90% of the examination volume of each weld [10 CFR 50.55a (g)(6)(ii)(A)(2)].

2. Proposed Alternative Examinations

The alternative examinations proposed in place of the augmented examinations defined in 10 CFR 50.55a are to perform examinations of greater than 90% of the total weld volume in Examination Category B-A, Item Number B1.10 and greater than 80% of the total weld volume in Examination Category B-A (Item Numbers B1.10, B1.21, B1.22, B1.30, and B1.40) during the first inspection interval, rather than 90% of the weld volume for each weld. It is requested that the examinations performed during the first inspection interval be regarded as the alternative examinations as allowed in 10 CFR 50.55a (g)(6)(ii)(A)(4)[3].

Weld volume is defined as that area requiring examination per ASME Section XI, 1989 Edition, Figures IWB-2500-1, IWB-2500-2, IWB-2500-3, IWB-2500-4, and IWB-2500-5.

3. Basis for Requesting Alternative Examinations

During the performance of the examinations it was determined that two of the 18 item number B1.10 welds could not be examined to the full ASME Section XI Code coverage required by 10 CFR 50.55a (g)(6)(ii)(A). Weld AB (see Figure 1, RPV-101) received a 79% examination volume coverage and weld AD (see Figure 1, RPV-101) received 83% examination volume coverage. The total weld volume coverage for all item B1.10 welds exceeded 90%. The total weld volume for all Examination Category B-A welds examined exceeded 84%. WNP-2 was in the first inspection interval when the augmented examinations became effective and was scheduled to perform examinations on essentially 100% of the welds volume per the requirements of the 1980 Edition, Winter 1980 Addenda of Section XI. The examination requirements for the first inspection interval from the 1980 Edition, Winter 1980 Addenda are the same as that required by the 1989

Edition referenced in 10 CFR 50.55a.

4. Justification for Using Alternate Examinations

The Supply System has reviewed the Boiling Water Reactor Vessel and Internals Project report "BWR Reactor Pressure Vessel Shell Weld Inspection Recommendations (BWRVIP-05)"[4] submitted to the NRC September 28, 1995[5]. After reviewing BWR fabrication practices, inservice inspection data, operational issues, degradation mechanisms, non-destructive examination capabilities and probabilistic fracture mechanics analysis results, the report concluded that 50% of the longitudinal shell welds (Category B-A, Item No. B1.12 should be volumetrically examined and that no volumetric examinations should be performed on the circumferential shell welds (Category B-A, Item No. B1.11). The alternative proposed by the Supply System exceeds this recommendation in that over 90% of the total weld volume of Category B-A, Item No. B1.11 and B1.12 is examined.

Augmented RPV examinations were mandated by 10 CFR 50.55a (g)(6)(ii)(A) due to NRC concerns of RPV degradation due to irradiation, stress corrosion cracking, service induced cracking and early Editions of ASME Section XI only requiring a small percentage of the RPV welds to be examined in later inspection intervals[6]. The following sections address these concerns as they relate to WNP-2.

Irradiation Effects

Radiation embrittlement (at the end of 40 years) is not a problem outside of the vessel beltline region because the irradiation of those areas is less than 1 X 10^{18} nvt with neutron energies in excess of 1 MeV[7]. At the conclusion of cycle 11 in Spring, 1996, WNP-2 will have approximately 8 effective full power years. This corresponds to a fluence of less than 1 X 10^{18} n/cm^2 with neutron energies in excess of 1 MeV[8] at the RPV. Therefore at the end of cycle 11, irradiation contribution to brittle fracture of the RPV including the beltline region is not a concern at WNP-2. In general, due to the design and operating conditions of BWRs, irradiation contributes little to the brittle fracture of the vessels[9].

Stress Corrosion Cracking (SCC) at WNP-2

The Supply System has been committed to the BWR Water Chemistry Guidelines[10,11] since their inception. These guidelines and other proactive efforts have enabled the Supply System to maintain a high level of water quality that helps mitigate SCC.

Yearly averages of reactor water conductivity during the first inservice inspection interval are[12]:

Cycle	Cond. μS/cm
1 - 1986	.344
2 - 1987	.237
3 - 1988	.241
4 - 1989	.218
5 - 1990	.170
6 - 1991	.196
7 - 1992	.192
8 - 1993	.154
9 - 1994	.162
10- 1995	.175[13]

The only instances of stress corrosion cracking in BWR vessel shells have been associated with attachments and cladding, and these are self limiting due to the lack of a sustained driving force[14]. There has been no identified instances of stress corrosion cracking at WNP-2.

Service Induced Cracking

WNP-2 has had three incidents of service induced (fatigue) cracking of internal components. Two are attributed to vibrational fatigue. The third is also thought to be due to vibrational fatigue. None of the cracking involved the RPV shell. The cracking has not been associated with vessel internals that are attached to the RPV shell.

Failure of the weld holding one of the surveillance specimen holders was found during refueling outage four (4). Failure was attributed to vibration fatigue and an under sized weld.

During refueling outage nine (9) a crack was discovered in one jet pump sensing line. The crack is attributed to vibration fatigue.

Two of the 80 tack welds on the jet pump adjusting screws were found cracked during refueling outage ten (10). The cracking is attributed to fatigue.

The significant inservice cracking which has occurred in large pressure vessels designed and fabricated to the ASME Code has been limited to PWRs. No instances of significant service induced cracking of BWR pressure vessel low alloy shell material have been identified[15]. Instances of inservice cracking at WNP-2 have been associated with vessel internals and have not involved the vessel shell.

Examination Volume Obtained

Code Volume of B1.10 welds Examined

During the first inservice inspection interval greater than 91% of the total ASME Code weld volume for item B1.10 welds received a complete Code examination (see Table I). Two welds, AB and AD, did not receive the 10 CFR 50.55a (g)(6)(ii)(A) required minimum examination coverage of greater than 90% of weld volume.

Circumferential weld AB, in the beltline region, was examined to 79% of the full ASME Code coverage requirements. Transducer contact was lost due to the transition from a 9-7/16" plate to a 6-7/16" plate. The coverage for this weld is diagramed in Figures 2 through 7.

Circumferential weld AD was examined to 83% of full ASME Code coverage. The lack of coverage from one side is due to the RPV stabilizer lugs welded to the vessel wall which limited transducer access. The weld received 100% scan coverage (entire weld length) from one side and 83% scan coverage from the other side.

The BWRVIP-05 report concluded that the probability of circumferential welds developing unacceptable flaws was very low[16]. Both AB and AD are circumferential welds.

Volume of RPV welds covered

Total RPV weld volume (Examination Category B-A, item numbers B1.10, B1.21, B1.22, B1.30 and B1.40) examined is greater than 84% of the Code required volume. As can be seen in Table II, they are representative of all locations within the vessel. In particular, 4 of the 5 beltline region welds have received coverage of over 90% of the Code required volume. The fifth weld, AB, received coverage of 79%. The major repair area within the beltline region received a 100% Code volume examination. The repair area measures 15 inches wide, 30 inches high and ranged from 2-3/4 to 3-7/8 inches deep. Greater than 86% of the beltline weld volume has been examined.

Results of First Inspection Interval RPV ISI Examinations

No indications that exceed ASME Section XI acceptance criteria were found during the first inspection interval.

Results of RPV Preservice Inspection Examination (PSI)

A manual preservice UT examination of essentially 100% of the RPV circumferential and longitudinal welds was performed prior to RPV installation[17]. Results of PSI examination found no unacceptable indications[18].

Examinations from Internal Surface (ID) of RPV

To assess what examination volume coverage was possible by doing the examinations using a technique that examined the welds from the inside (ID) of the RPV, General Electric performed an access study[19] from the inside of the RPV. The study estimated that approximately 84% of the RPV shell welds (B1.10) can be fully examined per ASME Code requirements using a combination of ID and OD techniques[20]. This coverage was approximately the same percentage coverage that could be obtained using only the OD technique with some improvements to the tooling to increase coverage. When the OD tooling was used with the improved tooling greater than 90% of the shell welds volume received a full Code examination.

When the OD Technique is supplemented by the ID tooling, the only definitive benefit from using ID tooling would be to increase coverage of weld AD by 7%. Adding ID tooling may increase total coverage of shell welds by less than 1% based on the access study. There is no assurance from the study that the coverage of weld AB would be increased by using the ID technique.

Plant design provided for access from the OD not from the ID. It was therefore prudent to perform the examinations from the OD where there was a known coverage, a known baseline, and known access to the welds.

Examination history of the BWR fleet

As part of BWRVIP efforts a survey was conducted of the 37 domestic BWRs requesting information on their vessel weld examination history. Twenty-nine responded. Based on these responses 5,236 feet of vessel weld have been examined with 16 indications exceeding Section XI acceptance criteria detected. All 16 flaws were determined to be subsurface and acceptable per IWB-3600 analysis. The survey concluded that the BWRs were free of unacceptable fabrication defects and no flaw has developed during operation. Evaluation supports the conclusion that there are no degradation mechanisms that have affected the BWR fleet's shell welds. (BWRVIP-05[21])

4. Conclusions

1. Irradiation embrittlement is minimal for the relatively low fluence environment of a BWR and the low EFPY that WNP-2 has experienced.

2. WNP-2 has had good water chemistry from start-up so stress corrosion cracking concerns are minimal. The only instances of SCC in BWRs has been associated with attachments and cladding which these augmented examinations would not detect. WNP-2 has not experienced any instances of SCC.

3. Greater than 91% of the total weld volume of Examination Category B-A, Item Number B1.10 is receiving a full ASME Section XI Code volume examination.

4. Greater than 86% of the total weld volume in the beltline region, including 100% of the repair area, is receiving a full ASME Section XI Code volume examination.

5. Greater than 84% of the entire RPV weld volume is receiving a full ASME Section XI Code volume examination.

6. A large percentage of the RPV shell weld (B1.10) volume is being examined.

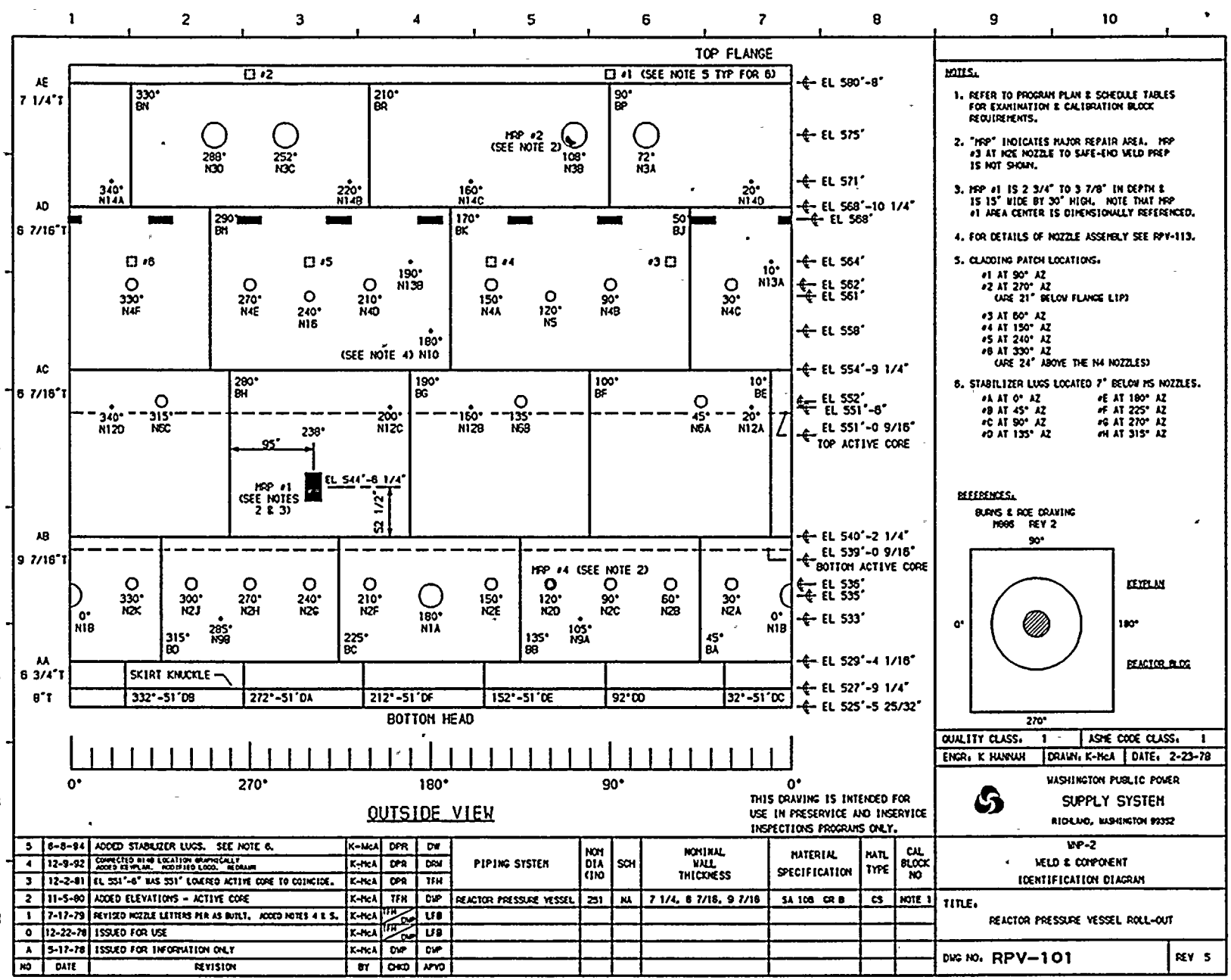
7. A large percentage of the RPV weld volume as a whole is being examined. This volume represents every weld in the RPV.

8. Results from the first interval examinations found no unacceptable indications. This parallels the findings of the BWR fleet.

9. Use of ID tooling would not significantly increase the examination volume covered over that achieved only with OD tooling.

10. WNP-2 was in its first inspection interval when the augmented requirements were issued and was therefore required by Section XI Code to perform 100% examination of Category B-A welds.

The proposed alternative examinations meet the technical objective of the augmented examinations defined in 10 CFR 50.55a (g)(6)(ii)(A), dated August 31,1992 in that a large percentage of the RPV is being examined. The proposed alternative, performed within the time frame called out in the regulation, demonstrated that there are no unacceptable indications within the volume examined which provides assurance of RPV shell weld integrity. The large volume of weld that has been examined without any unacceptable indications demonstrates that the RPV weld integrity has been maintained. The alternative examinations proposed provide an acceptable alternative to 10 CFR 50.55a (g)(6)(ii)(A) for managing the integrity of the RPV welds.



NOTES:

1. REFER TO PROGRAM PLAN & SCHEDULE TABLES FOR EXAMINATION & CALIBRATION BLOCK REQUIREMENTS.
2. "MRP" INDICATES MAJOR REPAIR AREA. MRP #3 AT N2E NOZZLE TO SAFE-END WELD PREP IS NOT SHOWN.
3. MRP #1 IS 2 3/4" TO 3 7/8" IN DEPTH & IS 15" WIDE BY 30" HIGH. NOTE THAT MRP #1 AREA CENTER IS DIMENSIONALLY REFERENCED.
4. FOR DETAILS OF NOZZLE ASSEMBLY SEE RPV-113.
5. CLADDING PATCH LOCATIONS.
   #1 AT 90° AZ
   #2 AT 270° AZ
   (ARE 21" BELOW FLANGE LIP)
   #3 AT 60° AZ
   #4 AT 150° AZ
   #5 AT 240° AZ
   #6 AT 330° AZ
   (ARE 24" ABOVE THE N4 NOZZLES)
6. STABILIZER LUGS LOCATED 7" BELOW N5 NOZZLES.
   #A AT 0° AZ #E AT 180° AZ
   #B AT 45° AZ #F AT 225° AZ
   #C AT 90° AZ #G AT 270° AZ
   #D AT 135° AZ #H AT 315° AZ

REFERENCES:
BURNS & ROE DRAWING M986 REV 2

5	6-8-94	ADDED STABILIZER LUGS. SEE NOTE 6.	K-McA	DPR	DW	PIPING SYSTEM	NOM DIA (IN)	SCH	NOMINAL WALL THICKNESS	MATERIAL SPECIFICATION	MATL TYPE	CAL BLOCK NO
4	12-9-92	CORRECTED N14B LOCATION GRAPHICALLY. ADDED KEYPLAN. MODIFIED LOCO. REDRAWN	K-McA	DPR	DRM							
3	12-2-81	EL 551'-6" WAS 551' LOWERED ACTIVE CORE TO COINCIDE.	K-McA	DPR	TFH							
2	11-5-80	ADDED ELEVATIONS - ACTIVE CORE	K-McA	TFH	DMP	REACTOR PRESSURE VESSEL	251	NA	7 1/4, 6 7/16, 9 7/16	SA 108 GR B	CS	NOTE 1
1	7-17-79	REVISED NOZZLE LETTERS PER AS BUILT. ADDED NOTES 4 & 5.	K-McA	TFH/DMP	LFB							
0	12-22-78	ISSUED FOR USE	K-McA	TFH/DMP	LFB							
A	5-17-78	ISSUED FOR INFORMATION ONLY	K-McA	DMP	DMP							
NO	DATE	REVISION	BY	CHKD	APVD							

QUALITY CLASS: 1 | ASME CODE CLASS: 1
ENGR: K HANNAH | DRAWN: K-McA | DATE: 2-23-78

WASHINGTON PUBLIC POWER SUPPLY SYSTEM
RICHLAND, WASHINGTON 99352

WNP-2
WELD & COMPONENT IDENTIFICATION DIAGRAM

TITLE:
REACTOR PRESSURE VESSEL ROLL-OUT

DWG NO. RPV-101 | REV 5

Figure 1

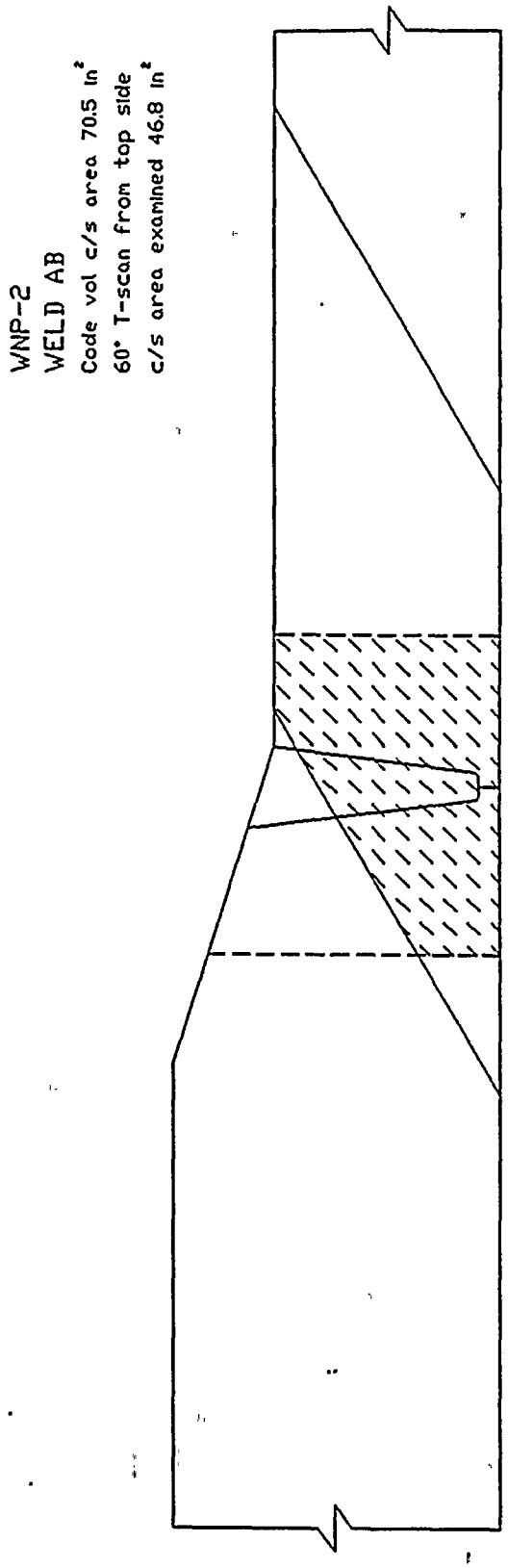

WNP-2
WELD AB
Code vol c/s area 70.5 in²
60° T-scan from top side
c/s area examined 46.8 in²

Figure 2

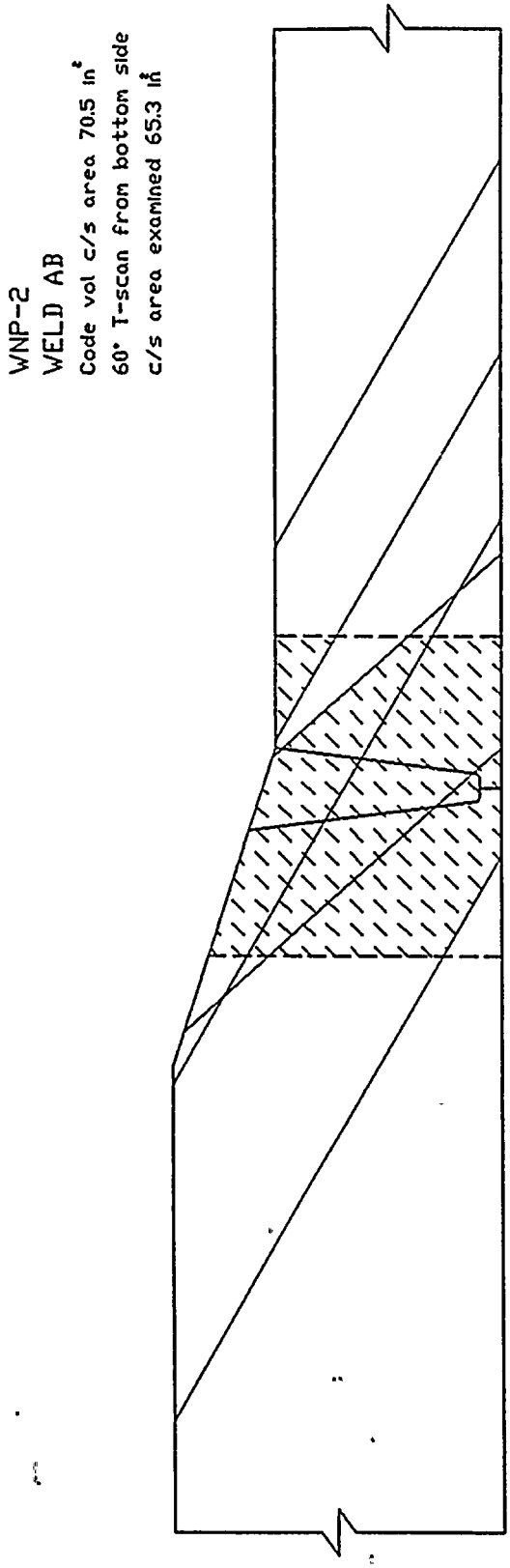

WNP-2
WELD AB
Code vol c/s area 70.5 in²
60° T-scan from bottom side
c/s area examined 65.3 in²

Figure 3

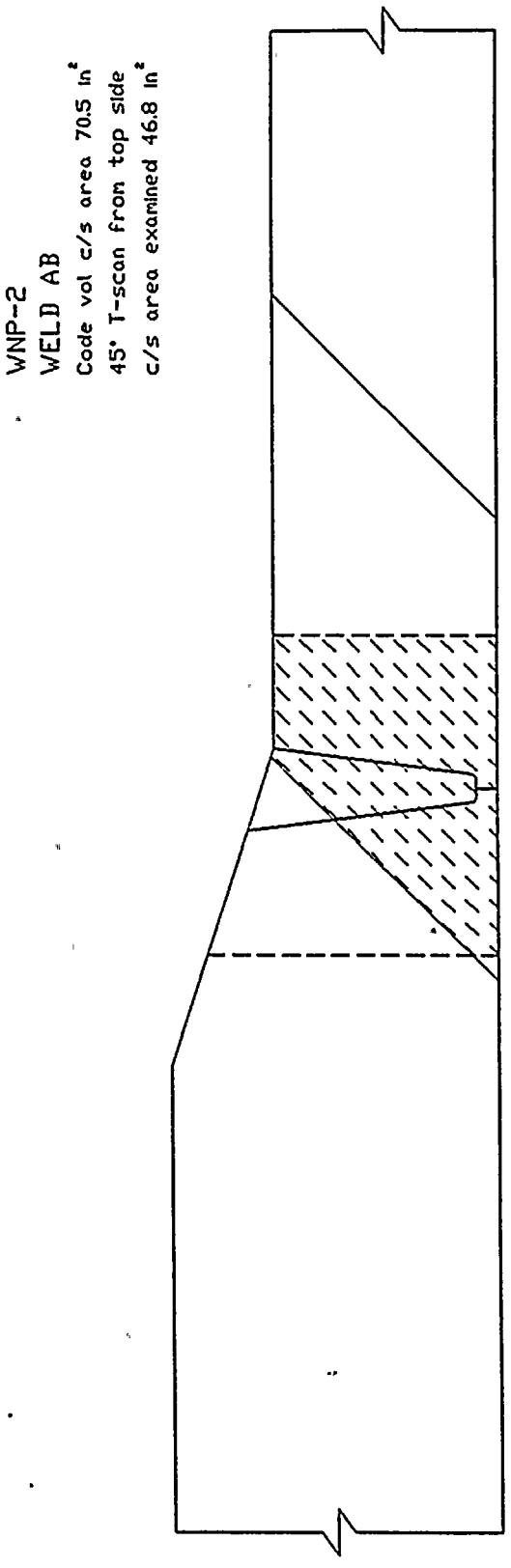

WNP-2
WELD AB
Code vol c/s area 70.5 in²
45° T-scan from top side
c/s area examined 46.8 in²

Figure 4

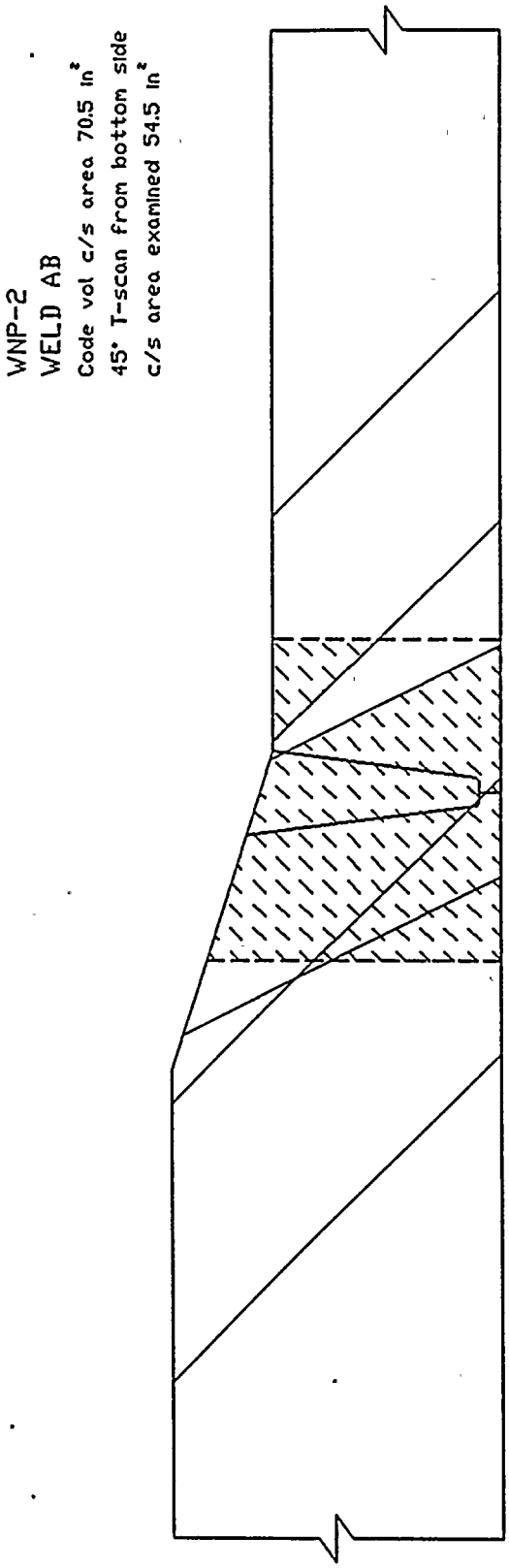

WNP-2
WELD AB
Code vol c/s area 70.5 in²
45° T-scan from bottom side
c/s area examined 54.5 in²

Figure 5

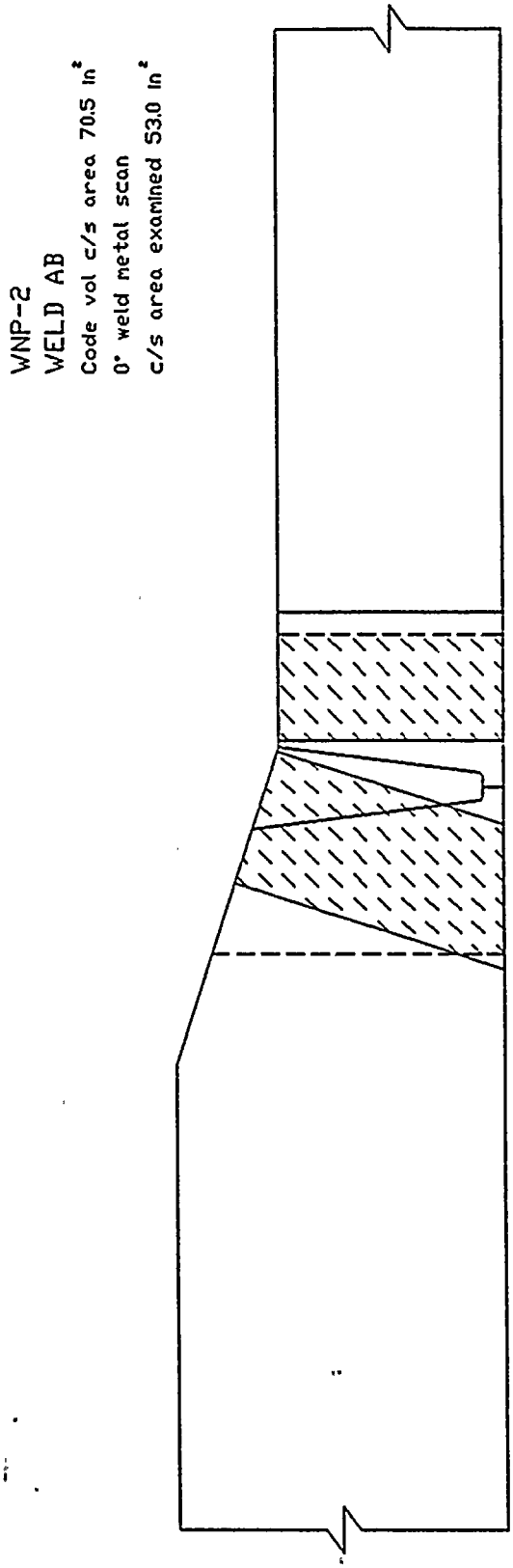

WNP-2
WELD AB
Code vol c/s area 70.5 in²
0° weld metal scan
c/s area examined 53.0 in²

Figure 6

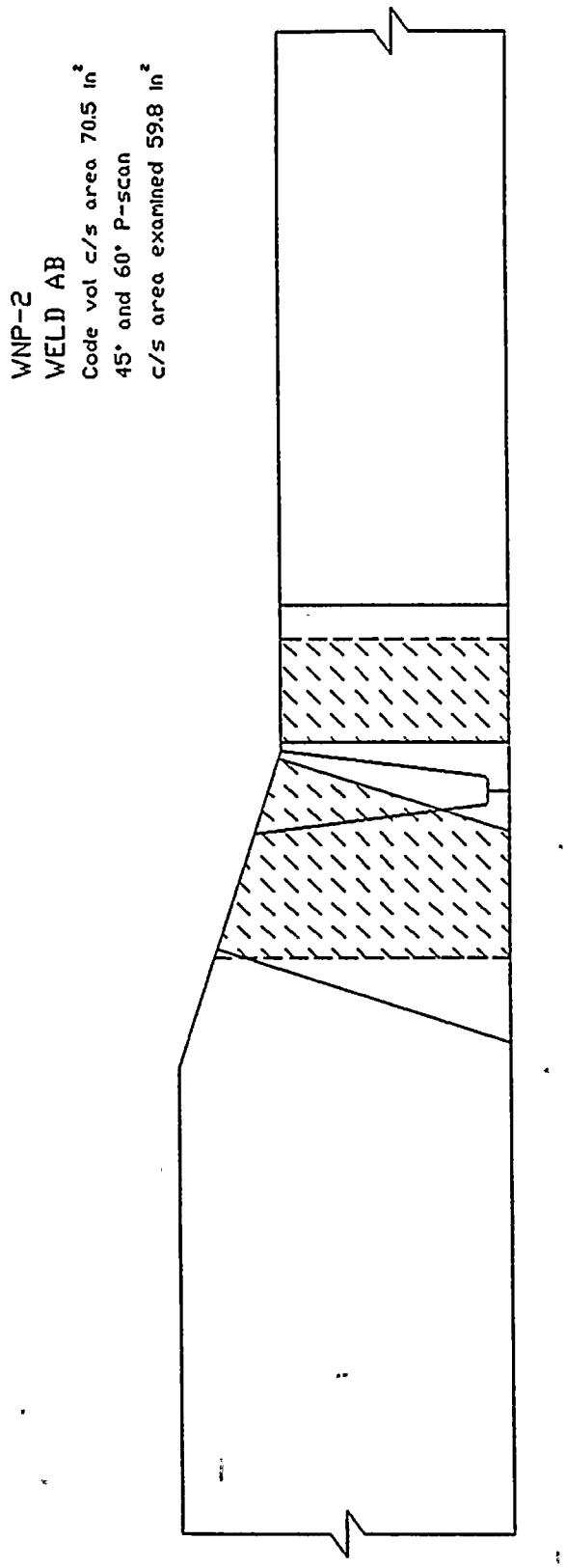

WNP-2
WELD AB
Code vol c/s area 70.5 in²
45° and 60° P-scan
c/s area examined 59.8 in²

Figure 7

Table I Examination Coverage Obtained During First Inspection Interval for Examination Category B-A, Item B1.10 Welds

Ident. No.	Description	Weld length (inches)	Weld Area (square inch)	Code Weld Volume (cubic inches)	Percent Examined	Code Volume Scanned (cubic inches)
AA	BTM HD-SC#1 WD	840	71.8	60312	99.8	60191
AB	#1-#2 SC CRC WD	840	70.5	59220	79.7	47198
AC	#2-#3 SC CRC WD	840	57.9	48636	92.4	44940
AD	#3-#4 SC CRC WD	840	60.7	50988	83.6	42626
BA	#1 SC VRT WD@45	130	119.8	15574	90.8	14141
BB	#1 SC VRT W@135	130	119.8	15574	91.9	14313
BC	#1 SC VRT W@225	130	119.8	15574	91.2	14203
BD	#1 SC VRT W@315	130	119.8	15574	92.8	14453
BE	#2 SC VRT W@ 10	175	53.2	9310	98.1	9133
BF	#2 SC VRT W@100	175	53.2	9310	95.6	8900
BG	#2 SC VRT W@190	175	53.2	9310	98.1	9133
BH	#2 SC VRT W@280	175	53.2	9310	93.7	8723
BJ	#3 SC VRT W@ 50	169	61.9	10461	91.7	9593
BK	#3 SC VRT W@170	169	61.9	10461	96.8	10126
BM	#3 SC VRT W@290	169	61.9	10461	92.1	9635
BN	#4 SC VRT W@330	146	66.8	9746	100.0	9746
BP	#4 SC VRT W@ 90	146	66.8	9746	100.0	9746
BR	#4 SC VRT W@210	146	66.8	9746	100.0	9746

Total Weld Length
5,525 inches

Total Weld Volume
379,314 cubic inches

Total Code Weld Volume Scanned
346,547 cubic inches

Percent of Total Code Weld Volume Examined = 91.4

Table II Examination Coverage Obtained During First Inspection Interval Examination Category B-A

RPV COVERAGE

Ident. No.	Item No.	Description	Weld length (inches)	Weld Area (square inch)	Code Weld Volume (cubic inches)	Percent Examined	Code Volume Scanned (cubic inches)
AA	B1.10	BTM HD-SC#1 WD	840	71.8	60312	99.8	60191
AB	B1.10	#1-#2 SC CRC WD	840	70.5	59220	79.7	47198
AC	B1.10	#2-#3 SC CRC WD	840	57.9	48636	92.4	44940
AD	B1.10	#3-#4 SC CRC WD	840	60.7	50988	83.6	42626
AE	B1.30	#4 SC-FL CRC WD	792	74.3	58846	49.4	29070
AG	B1.40	TOP HD-FLG WELD	783	36.6	28658	95.1	27254
AH	B1.21	TOP HD DOL PLT	516	31.4	16202	100.0	16202
AJ	B1.21	BOT HD DOL WELD	684	70.4	48154	100.0	48154
BA	B1.10	#1 SC VRT WD@45	130	119.8	15574	90.8	14141
BB	B1.10	#1 SC VRT W@135	130	119.8	15574	91.9	14313
BC	B1.10	#1 SC VRT W@225	130	119.8	15574	91.2	14203
BD	B1.10	#1 SC VRT W@315	130	119.8	15574	92.8	14453
BE	B1.10	#2 SC VRT W@ 10	175	53.2	9310	98.1	9133
BF	B1.10	#2 SC VRT W@100	175	53.2	9310	95.6	8900
BG	B1.10	#2 SC VRT W@190	175	53.2	9310	98.1	9133
BH	B1.10	#2 SC VRT W@280	175	53.2	9310	93.7	8723
BJ	B1.10	#3 SC VRT W@ 50	169	61.9	10461	91.7	9593
BK	B1.10	#3 SC VRT W@170	169	61.9	10461	96.8	10126
BM	B1.10	#3 SC VRT W@290	169	61.9	10461	92.1	9635
BN	B1.10	#4 SC VRT W@330	146	66.8	9746	100.0	9746
BP	B1.10	#4 SC VRT W@ 90	146	66.8	9746	100.0	9746
BR	B1.10	#4 SC VRT W@210	146	66.8	9746	100.0	9746
DA	B1.22	BOT HD MRD @272	56	62.7	3499	78.6	2750
DB	B1.22	BOT HD MRD @332	56	62.7	3499	78.6	2750
DC	B1.22	BOT HD MRD @ 32	56	62.7	3499	78.6	2750
DD	B1.22	BOT HD MRD @ 92	56	62.7	3499	78.6	2750
DE	B1.22	BOT HD MRD @152	56	62.7	3499	78.6	2750
DF	B1.22	BOT HD MRD @212	56	62.7	3499	78.6	2750
DG	B1.21	BOT HD DOL /270	219	77.3	16944	16.7	2830
DH	B1.22	TOP HD MRD @15	78	41.0	3198	100.0	3198
DJ	B1.22	TOP HD MRD @75	78	41.0	3198	100.0	3198
DK	B1.22	TOP HD MRD @135	78	41.0	3198	100.0	3198
DM	B1.22	TOP HD MRD @195	78	41.0	3198	100.0	3198
DN	B1.22	TOP HD MRD @255	78	41.0	3198	100.0	3198
DP	B1.22	TOP HD MRD @315	78	41.0	3198	100.0	3198
DR	B1.21	BOT HD DOL / 90	219	77.3	16944	16.7	2830

Total Weld Length 9,541 inches

Total Weld Volume 605,241 cubic inches

Total Code Weld Volume Scanned 508,574 cubic inches

Percent of Total Code Weld Volume Examined = 84.0

References

1. Part 10 Code of Federal Regulations 50.55a, published August 31, 1992

2. ibid.

3. ibid.

4. "BWR Vessel and Internals Project, BWR Reactor Pressure Vessel Shell Weld Inspection Recommendations (BWRVIP-05)", EPRI TR-105697, September 1995

5. Letter dated September 28, 1995, JT Beckham, Jr, BWR Vessel & Internals Project, to NRC, Attention: CE Carpenter, "BWR Reactor Pressure Vessel Shell Weld Inspection Recommendations (BWRVIP-05)", EPRI TR-105697, September 1995

6. Federal Register, Volume 56, No. 21, Published January 31, 1991

7. WNP-2 FSAR section 5.3.3.1.1.1, pg 5.3-14

8. Calculation ME-02-89-58, Revision 1, dated November 8, 1993

9. EPRI Report TR-105697, "BWR Reactor Pressure Vessel Shell Weld Inspection Recommendations (BWRVIP-05)", September 1995, pg 1-2

10. EPRI TR-103515, "BWR Water Chemistry Guidelines - 1993 Revision; Normal and Hydrogen Water Chemistry, February, 1994

11. Guidelines for Chemistry at Nuclear Power Stations, INPO 88-021 Revision 1, September 1991

12. Data for cycles 1 to 9 from Supply System Letter GO2-94-202, JV Parrish to NRC, "WNP-2, Operating License NPF-21 Response to Generic Letter 94-03, "Intergranular Stress Corrosion Cracking of Core Shroud", dated August 24, 1994

13. Data for cycle 10 is from Statistic Report CM-RP-ST-R1 (internal Supply System document)

14. EPRI Report TR-105697, "BWR Reactor Pressure Vessel Shell Weld Inspection Recommendations (BWRVIP-05)", September 1995, pg 1-3

15. ibid., pg 1-3

16. "BWR Vessel and Internals Project, BWR Reactor Pressure Vessel Shell Weld Inspection Recommendations (BWRVIP-05)", EPRI TR-105697, September 1995, pg 9-2

17. "Manual Ultrasonic Pre-Service Examination of WNP-2 Reactor Pressure Vessel", Nuclear Energy Services, Inc., February, 1977

18. ibid., page 3 of 3

19. RDE No. 54-0991 Rev 0, Accessibility of the Hanford Unit 2 Reactor Pressure Vessel Seam Welds for an Ultrasonic Examination, General Electric Nuclear Energy, November 1, 1991.

20. ibid, page 3

21. EPRI Report TR-105697, "BWR Reactor Pressure Vessel Shell Weld Inspection Recommendations (BWRVIP-05)", September 1995, pg 4-9