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AUTH.NAME AUTHOR AFFILIATION
VAN BRUNT,E.E. Arizona Public Service Co.
RECIP.NAME RECIPIENT AFFILIATION
TEDESCO,R.L. Assistant Director for Licensing

SUBJECT: Forwards responses to NRC questions 251.2,251.3,251.5 & 251.7 re fracture toughness.Responses will be incorporated info FSAR in future amend.

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ARIZONA PUBLIC SERVICE COMPANY

STA. _____ P.O. BOX 21666 - PHOENIX, ARIZONA 85036

September 16, 1981
ANPP-18929-JMA/TFQ

Mr. R. L. Tedesco
Assistant Director for Licensing
Division of Licensing
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Subject: Palo Verde Nuclear Generating Station (PVNGS) Units 1, 2 and 3
Docket Nos. STN-50-528/529/530
File: 81-056-026; G.1.10

References: A) Letter from R. L. Tedesco, NRC, to E. E. Van Brunt, Jr., dated August 13, 1981; Subject: Request for Additional Information and Draft SER Inputs (Materials Engineering Branch) (MTEB)
B) Letter from EEVBJr. to R. L. Tedesco, dated August 28, 1981, ANPP-18793

Dear Mr. Tedesco:

Attached are responses to NRC questions 251.2, 251.3, 251.5 and 251.7 for your use. Some of these responses refer to FSAR sections and tables which have not yet been incorporated by amendment, but were transmitted to you through Reference(B). These responses will be incorporated into the FSAR in a future amendment.

Please contact me if you have any further questions on these matters.

Very truly yours,

E. E. Van Brunt

E. E. Van Brunt, Jr.
APS Vice President
Nuclear Projects
ANPP Project Director

EEVBJr/TFQ/bj

Attachment

cc: J. Kerrigan (w/a)
P. Hourihan "
A. C. Gehr "

B001
S1

STATE OF ARIZONA)
) ss.
COUNTY OF MARICOPA)

I, Edwin E. Van Brunt, Jr., represent that I am Vice President Nuclear Projects of Arizona Public Service Company, that the foregoing document has been signed by me on behalf of Arizona Public Service Company with full authority so to do, that I have read such document and know its contents, and that to the best of my knowledge and belief, the statements made therein are true.

Edwin E. Van Brunt, Jr.

Sworn to before me this 17th day of September, 1981.

Connie Lou Armstrong
Notary Public

My Commission expires:

June 24, 1983

Question 251.2 (a) "To demonstrate compliance with the fracture toughness requirements of paragraph IV.A.1 of Appendix G, 10 CFR Part 50:

Provide a schematic of the reactor vessel showing all welds, plates and/or forgings in the beltline. Welds should be identified by shop control number, weld procedure qualification number, the heat of filler metal, and type and batch of flux. Provide the chemical composition for these welds (particularly Cu, P, and S content). Identify material specification, type and grade of all base metal."

Reply:

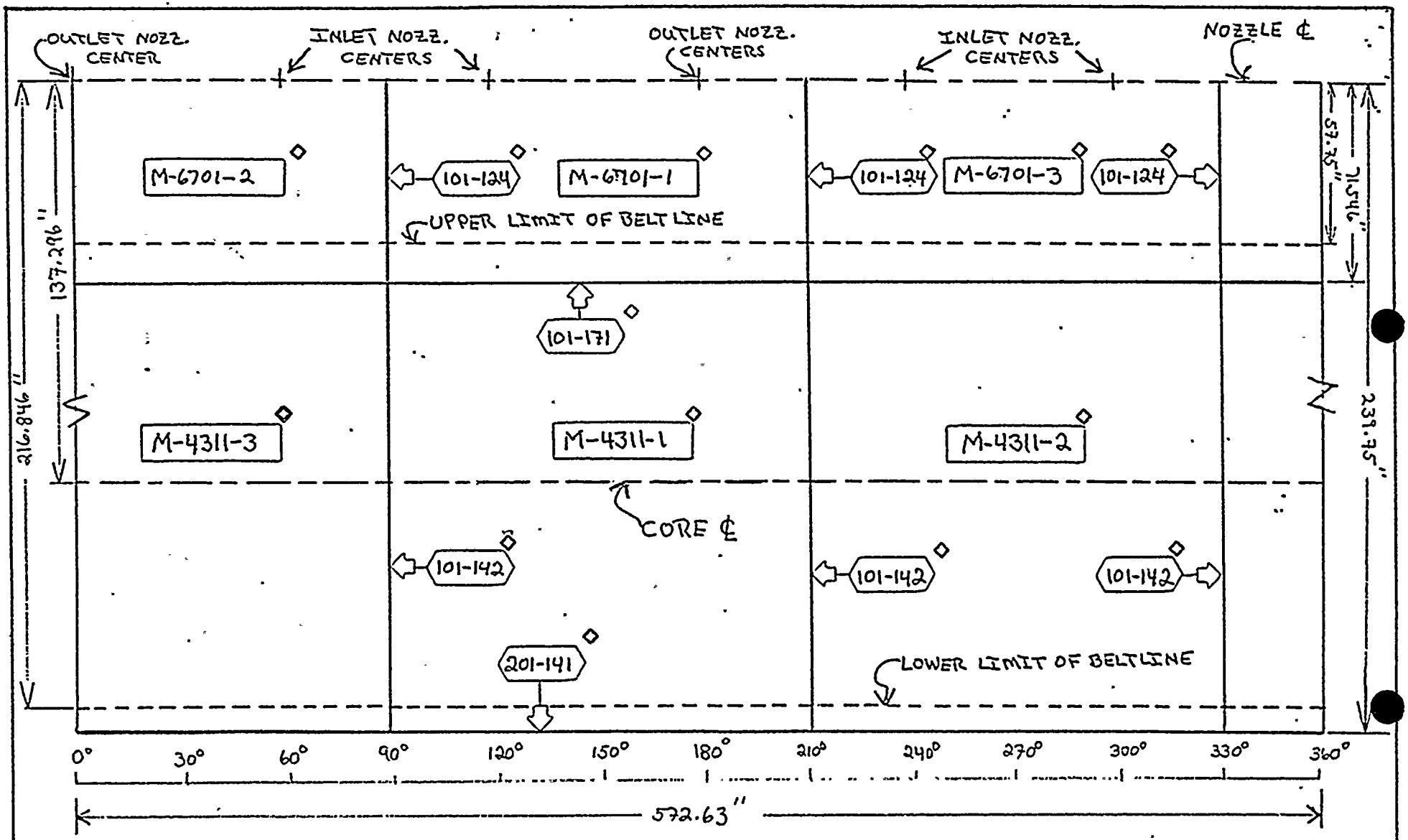
(a) A schematic of the reactor vessel beltline region showing weldseam numbers and plate code numbers is shown in figure 1 of this document.

(b) Weld procedure qualification numbers and associated fracture toughness data from weld procedure qualification tests for the reactor vessel will be provided in the WNP-1 FSAR (Table 5.2.3-4) by 10/1/81.

(c) Weld metal used in the fabrication of the R.V. beltline and its fracture toughness properties from weld metal certification tests will be provided in the WNP-1 FSAR (Tables 5.2.3-3A) by 10/1/81

(d) For chemical composition of welds in the R.V. beltline, see Table 5.3.1-2 of the WNP-1 FSAR.

(e) For chemical composition of plates in the beltline, see Table 5.3.1-1 of the WNP-1 FSAR.



ARIZONA NUCLEAR POWER PROJECT
PALO VERDE UNIT NO. 1
R.V. BELTLINE REGION

LEGEND

Plate Material Code No.

Weld Seam Number

(SKETCH NOT TO SCALE)

◇ See table I

TABLE 1

Reference Tables For Figure "R.V. Beltline Region"

Material Code #	FSAR Table Numbers (PVNGS I FSAR) Fracture Toughness	Chemistry
M-4311-1	5.2.3-1	5.3.1-1
M-4311-2	5.2.3-1	5.3.1-1
M-4311-3	5.2.3-1	5.3.1-1
M-6701-1	5.2.3-1	5.3.1-1
M-6701-2	5.2.3-1	5.3.1-1
M-6701-3	5.2.3-1	5.3.1-1

Weld Seam No.	FSAR Table Numbers (PVNGS I FSAR)(a) Fracture Toughness		Chemistry
	Weld Metal Test	WPQR (b)	
101-124 A-C	5.2.3-3A	5.2.3-4	5.3.1-2
101-171	5.2.3-3A	5.2.3-4	5.3.1-2
101-142 A-C	5.2.3-3A	5.2.3-4	5.3.1-2
201-141(c)	5.2.3-3A	5.2.3-4	N/A

(a) Fracture toughness Tables 5.2.3-3A & 5.2.3-4 will be provided by 10/1/81.

(b) WPQR - Weld procedure qualification tests. (Weld & HAZ).

(c) Seam 201-141 is not part of the beltline region and, hence, full chemical analysis is not required.

Question 251.2 (b) "To demonstrate compliance with the fracture toughness requirements of paragraph IV.A.1 of Appendix G, 10 CFR Part 50:

Provide dropweight NDT and complete CVN curves of energy and lateral expansion versus temperature for the weld-metal(s), in the beltline."

Reply:

(a) Dropweight NDT and ~~RTNDT~~ RT_{NDT} for weld metal used in the beltline of the reactor vessel will be provided in the PVNGS FSAR (Table 5.2.3-3A) by 10/15/81.

(b) Full CVN curves for the weld metals in the beltline will be provided in the PVNGS FSAR (Fig. 5.2.3-7 through Fig. 5.2.3-20) by 10/15/81.

Question 251.2 (c) "To demonstrate compliance with the fracture toughness of paragraph IV.A.1 of Appendix G, 10 CFR Part 50:

Provide dropweight NDT and complete CVN curves of energy and lateral expansion versus temperature for the base-metal in the beltline."

Reply:

(a) Dropweight NDT and ~~RTNDT~~ RT_{NDT} for the base metal used in the beltline of the reactor vessel are provided in the PVNGS FSAR (Table 5.2.3-1).

(b) Full CVN curves for the base metal in the reactor vessel beltline will be provided in the PVNGS FSAR (Fig. 5.1.3-1 through Fig. 5.2.3-6) by 10/1/81

Question 251.2 (d) "To demonstrate compliance with the fracture toughness requirements of paragraph IV.A.1 of Appendix G, 10 CFR Part 50:

If beltline welds were fabricated using submerged arc or shielded metal arc electrode, the heat affected zones are considered acceptable and no additional data is required; otherwise, fracture toughness data in accordance with paragraph NB-2330 of the ASME Code must be provided."

Reply:

All beltline welds are fabricated using submerged arc and shielded metal arc technique.

Question 251.2 (e) "To demonstrate compliance with the fracture toughness requirements of paragraph IV.A.1 of Appendix G, 10 CFR Part 50:

Indicate the post weld heat treatment used in the fabrication of the test welds."

Reply:

Post weld heat treatment of the test welds* is as follows:

Stress relief - 1150°F ± 50°F for 40 hours
Furnace cool to 800°F.

* All test welds are performed in accordance with ASME Boiler and Pressure Vessel Code Section III, Article NB-4330 (General Requirements for Welding Procedure Qualification Tests).

Question 251.2 (f) "To demonstrate compliance with the fracture toughness requirements of paragraph IV.A.1 of Appendix G, 10 CFR Part 50:

Identify the plates used to fabricate the test welds."

Reply:

Plates used to fabricate test welds* are:

SA 533 Grade B, Class 1, Quenched and Tempered (~~thickness 12"~~) on both sides of the weld. Test welds are made with the same P number classification for both base metals as used for the fabrication of the beltline region. The same type of filler material and welding conditions are also used.

*All test welds are performed in accordance with ASME Boiler and Pressure Vessel Code Section III, Article NB-4330 (General Requirements for Welding Procedure Qualification Tests).

Question 251.2 (g) "To demonstrate compliance with the fracture toughness requirements of paragraph IV.A.1 of Appendix G, 10 CFR Part 50:

Indicate whether the test specimen for the longitudinal seams were removed from excess material and welds in the vessel shell course following completion of the longitudinal weld joint."

Reply:

(a) Test specimen for the longitudinal seams are not removed from excess material and welds in the vessel shell course following completion of the longitudinal weld joint. However, the procedure utilized in fabricating these seams are qualified in accordance with ASME Boiler and Pressure Vessel Code Section III, Article NB-4330 (General Requirements for Welding Procedure Qualification Tests). Fracture toughness data from these procedure qualification tests will be provided in the [illegible] FSAR (Table 5.2.3-4) by 3/10/81.

10

Question 251.3 (a) "To demonstrate compliance with the fracture toughness requirements of paragraph IV.A.1 of Appendix G, 10 CFR Part 50:

Provide the RT_{NDT} for all RCPB welds and ferritic base metals which may be limiting for operation of the reactor vessel. If the RT_{NDT} has been determined by methods other than that specified in Paragraph NB-2330 of the ASME Code, identify the method and provide technical justification."

Reply:

Limiting RT_{NDT} values for the RCPB base metals and weld metals which may be limiting for operation of the reactor vessel will be provided along with the pressure temperature limit curves (Question 251.6) at a later date.

Question 251.3 (b) "To demonstrate compliance with the fracture toughness requirements of paragraph IV.A.1 of Appendix G, 10 CFR Part 50:

Indicate whether there are any RCPB heat affected zones which require CVN impact testing per Paragraph NB-4335.7 of the ASME Code. Provide CVN impact test data for these heat affected zones which may be limiting for operation of the reactor vessel."

Reply:

(a) All base metal used in the fabrication of the reactor vessel are of P number 3 classification. The heat affected zone CVN impact test data obtained from weld procedure qualification tests (NB-4335.2) will be provided in the FSAR (Table 5.2.3-4) by 1/16/81.

(b) The RT_{NDT} in the reactor vessel heat affected zone that may be limiting for operation of the reactor vessel will be provided along with the pressure temperature limit curves (Question 251.6) at a later date.

Question 251.5 "Provide data on the qualifications of the personnel performing the fracture toughness tests to demonstrate compliance with Paragraph 111.B.4 of Appendix G, 10 CFR Part 50."

Reply:

The personnel performing the charpy and drop ~~weight~~ Weight impact testing were qualified by schooling, training, and many years of experience. Their qualification to perform work was certified by qualified supervisory personnel. Records of the certification of personnel are maintained and available for review at C-E's Chattanooga facility.

Question 251.7 "Provide the following data on the surveillance materials:

(a) Origin of heat affected zone and base materials (heat number, plate identification number, and chemical composition),

(b) Origin of weld metal (weld wire type, heat of filler metal, production welding process, plate material used to make weld specimens, chemical composition of deposited weld metal),

(c) The lead factor of each surveillance capsule with respect vessel inner wall."

Reply: The requested data is provided in the [illegible] FSAR section 5.3.1.6 (Reactor Vessel Material Surveillance Program) Table 5.3.1-6.