Consumers Power Company

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Regulatory File Cy

Director of Nuclear Regulation
US Nuclear Regulatory Commission
Washington, DC 20555

DOCKETS 50-155 AND 50-255 -
LICENSES DPR-6 AND DPR-20 -
BIG ROCK POINT AND PALISADES PLANTS -
RESPONSE TO LETTER DATED MAY 20, 1977 -
REACTOR VESSEL SURVEILLANCE

By letter dated May 20, 1977, Consumers Power Company was requested to provide specific information concerning reactor vessel materials and associated surveillance programs for the Big Rock Point and Palisades plants. The respective reactor vessel vendors have been contacted and requested to provide the required data. However, much of the data is unavailable at this time. The information that is available is being provided. For those responses stipulating "to be supplied," the required information will be forwarded when received from the vendor. As yet, no specific date can be provided for a full response.

Item

1. Provide the estimated maximum fluence (E>1 Mev) at the inner surface of the reactor vessel wall as of March 31, 1977.

Response

1. Big Rock Point - 1.5×10^{19} n/cm^2.
   Palisades - 1.82×10^{18} n/cm^2.

Item

2. Provide the effective full power years (EFPY) of operation accumulated as of March 31, 1977.

Response

2. Big Rock Point - approximately 10.5 EFPY.
   Palisades - approximately 2.2 EFPY.

Item

3. Identify the firm or firms that fabricated your reactor vessel.

Response

3. Big Rock Point - The vessel was fabricated by Combustion Engineering for General Electric.
Palisades - The vessel was fabricated by Combustion Engineering.

Item

4. a. Provide a sketch of the reactor vessel showing all materials welds, in the beltline region and provide an identification number for each material.

Response

4. a. Big Rock Point - To be supplied.
Palisades - To be supplied.

Item

4. b. Provide the following information for each of the welds in the beltline region:

(1) Shop control number or procedure qualification number;
(2) Filler metal and heat number;
(3) Type of flux and batch number;
(4) Welding process (sub arc, electroslag, manual metal arc, etc);
(5) Post-weld heat treatment;
(6) Chemical composition (particularly Cu, P and S content);
(7) Drop weight T_{ndt};
(8) RT_{ndt};
(9) Charpy upper shelf energy (unirradiated);
(10) Tensile properties (unirradiated);
(11) Firm performing weld if more than one firm participated in welding;
(12) The maximum end-of-life fluence at the vessel inner wall.

Response

4.b(1-12) Big Rock Point - To be supplied.
Palisades - To be supplied.

Item

4. c. Provide the following information for each of the plates or forgings in the beltline region:

(1) Plate or forging serial number;
(2) Plate or forging heat number;

(3) Plate or forging material specification number;
(4) Plate or forging supplier;
(5) Plate or forging heat treatment;
(6) Chemical composition (particularly Cu, P and S content);
(7) Drop weight T_{ndt};
(8) RT_{ndt} (unirradiated);
(9) Charpy upper shelf energy (unirradiated);
(10) Tensile properties (unirradiated);
(11) The maximum end-of-life fluence at the vessel inner wall.

Response

4.c (1 & 2) Big Rock Point: Six plates were used to fabricate the vessel beltline region. These plates and their heat numbers are:

Plate No (CE)	Heat No (Lukens Steel)
S-5503-3	19246-3
S-5503-2	19246-2
S-5503-1	19246-1
S-5503-4	19246-4
S-5501	A-1054-3D
S-5502	A-1917-3

Palisades: Six plates were used to fabricate the vessel beltline region. These plates and their heat numbers are:

Plate No	Heat No
D-3803-1	C-1279-3
D-3803-2	A-0313-2
D-3803-3	C-1279-1
D-3804-1	C-1308-1
D-3804-2	C-1308-3
D-3804-3	B-5294-2

4.c (3) Big Rock Point: To be supplied.
Palisades: To be supplied.

4.c (4) Big Rock Point: The plate supplier was Lukens Steel.
Palisades: To be supplied.

4.c (5) Big Rock Point: The plate was supplied to Combustion Engineering in the hot rolled condition. The plate was heat-treated as full plate as follows:

1) 1600 ± 25°F for 4 hours.
2) Brine quenched.
3) 1225 ± 25°F for 4 hours.
4) Furnace cooled.
5) 1125 ± 25°F for 20 hours.
6) Furnace cooled.

Palisades: To be supplied.

4.c (6) Big Rock Point: To be supplied.
Palisades: The chemical composition of the plates with respect to sulfur, phosphorus, and copper are documented for three of the plates as follows:

Plate	Cu	P	S
D-3803-1	.25	.011	.019
D-3803-2	.25	.012	.021
D-3803-3	.25	.010	.020

All figures in weight percent

4.c (7 & 9) Big Rock Point: To be supplied.
Palisades: Drop weight and Charpy V-notch upper shelf energies are as follows:

Plate No	T_{ndt}(°F)	V-Notch (Ft Lb - 160°F)
D-3803-1	-30	138.0
D-3803-2	-30	132.0
D-3803-3	-30	140.3
D-3804-1	-30	109.0
D-3804-2	-40	117.0
D-3804-3	-30	110.0

4.c (8, 10 & 11) Big Rock Point: To be supplied.
Palisades: To be supplied.

Item

5. a. List the weld, plate and forging materials included in the vessel material surveillance program.

Response

5. a. Big Rock Point: For the surveillance program, the ends of two plates were provided to General Electric Company by Combustion Engineering. These were taken from plate numbers S-5503-2 and S-5503-3.
Palisades: For the reactor vessel surveillance program: All base metal specimens were taken from plate D-3803-1. All weld specimens were taken from the weld between plates D-3803-1 and D-3803-2.

All HAZ specimens were those affected by the weld between plates D-3803-2 and D-3803-3. The specimens themselves were all taken from plate D-3803-3.

Item

5. b. For each weld listed in 5.a, provide the information requested in items (1) through (11) of question 4.b.

Response

5.b (4.c (1 & 2)) Big Rock Point: The plate for the surveillance material was identified as:

Plate No	Heat No	Size
S-5503-2	19246-2	6 x 10 x 54"
S-5503-3	19246-3	6 x 10.5 x 78"

Palisades: To be supplied.

5.b (4.c (3 & 4)) Big Rock Point: To be supplied.
Palisades: To be supplied.

5.b (4.c (5)) Big Rock Point: For the surveillance program, the two plate ends were given a simulated post-weld heat treatment of 1125°F for 20 hours. This treatment was followed by furnace cooling.
Palisades: To be supplied.

5.b (4.c (6)) Big Rock Point: Chemical tests for the plate ends from plate S-5503-3 from heat 19246-3 showed .016 weight percent phosphorus and .021 weight percent sulphur.
Palisades: The chemistries of the surveillance weld specimens are as follows:

Welds Connecting

	D-3803-1 to D-3803-2			D-3803-2 to D-3803-3	
	Root	Face		Root	Face
S	.010	.010	S	.009	.010
P	.011	.011	P	.011	.012
Cu	.26	.22	Cu	.25	.20

Quantities in Weight Percent

5.b (4.c (10)) Big Rock Point: Tensile properties from Lukens Steel Test Data showed from plate S-5503-3:

Yield Strength - 52.3 ksi.
Tensile Strength - 86.4 ksi.

Palisades: To be supplied.

5.b (4.c (7, 8, 9 & 11)) Big Rock Point: To be supplied.
Palisades: To be supplied.

Item

5. c. For each plate or forging specimen listed in 5.a, provide the information listed in items (1) through (10) of question 4.c.

Response

5. c. Big Rock Point: To be supplied.
Palisades: To be supplied.

Item

5. d. Provide a copy of the report which describes the surveillance program for your reactor vessel(s), if available.

Response

5. d. Big Rock Point: To be supplied.
Palisades: To be supplied.

D A Bixel
Nuclear Licensing Administrator

CC: JGKeppler, USNRC