Consumers Power Company

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Director, Nuclear Reactor Regulation
Att Mr Dennis L Ziemann, Chief
Operating Reactors Branch No 2
US Nuclear Regulatory Commission
Washington, DC 20555

DOCKET 50-255 - LICENSE DPR-20 - PALISADES PLANT - IE BULLETIN 79-17 - PIPE CRACKS IN STAGNANT BORATED WATER SYSTEMS AT PWR PLANTS

Consumers Power Company's response to Item 1 of IE Bulletin 79-17 is provided below. Response to Items 2 through 7 will be submitted prior to October 25, 1979, as directed by the Bulletin.

Item 1

Conduct a review of safety related stainless steel piping systems within 30 days of the date of this Bulletin to identify systems and portions of systems which contain stagnant oxygenated borated water. These systems typically include ECCS, decay/residual heat removal, spent fuel pool cooling, containment spray and borated water storage tank (BWST-RWST) piping.

a. Provide the extent and dates of the hydrotests, visual and volumetric examinations performed per 10 CFR 50.55a(g) (Re: IE Circular 76-06 enclosed) of identified systems. Include a description of the nondestructive examination procedures, procedure qualifications and acceptance criteria, the sampling plan, results of the examinations and any related corrective actions taken.

b. Provide a description of water chemistry controls, summary of chemistry data, any design changes and/or actions taken, such as periodic flushing or recirculation procedures to maintain required water chemistry with respect to pH, B, CL^-, F^-, O_2.

c. Describe the preservice NDE performed on the weld joints of identified systems. The description is to include the applicable ASME Code sections and supplements (addenda) that were followed, and the acceptance criterion.

d. Facilities having previously experienced cracking in identified systems, Item 1, are requested to identify (list) the new materials utilized in repair or replacement on a system-by-system basis. If a report of this information and that requested above has been previously submitted to the NRC, pleae reference the specific report(s) in response to this Bulletin.

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Response

The identification of safety-related stainless steel piping systems and portions of systems which contain stagnant oxygenated borated water is contained in Attachment I.

a. The extent and dates of the hydrotests, visual and volumetric examinations performed per IE Circular 76-06 is contained in Attachment II.

b. The Palisades Plant controls water chemistry as follows:

1. Periodic sampling of borated water (see Attachment III for areas sampled, parameters measured, and frequency of sampling).

2. Recirculation through demineralizers (Note: Recirculation is not applicable to the SI bottles).

3. Control of makeup water quality.

The following actions control the water chemistry of lines containing boric acid.

1. Subsequent to each period of shutdown cooling, the Engineered Safeguards System (ESS) is flushed to raise the boron level in these lines to greater than 1720 ppm.

2. Section XI monthly pump testing routinely flushes out many small diameter lines.

3. Concentrated boric acid lines are routinely flushed during shutdown/start-up to verify flow paths.

NOTE: 2. and 3. above are not designed to provide chemistry control but they do provide a degree of control over the water chemistry of the affected lines.

c. A description of the preservice NDE performed on weld joints of identified systems (Attachment I) is contained in Attachment IV.

d. The Palisades Plant has experienced no cracking on systems identified in Attachment I.

David P Hoffman
Assistant Nuclear Licensing Administrator

CC JGKeppler, USNRC

PALISADES PLANT

Compilation of Safety Related Stainless Piping Runs*
Postulated to Contain Stagnant Borated Oxygenated Water

SYSTEM	PIPING RUNS	PIPE CLASS	SCHEDULE wall
Containment Spray	ESS-10-CSS-SLB	GC-1-10"	.250"
	ESS-8-CSS-SLB	GC-1-8"	40S
High Pressure Safety Injection	ESS-6-S1S-1HP	DC-1-6"	80S
	ESS-6-S1S-2HP	CC-6-6"	120
	ESS-6-S1S-3HP	CC-6-6"	120
	ESS-6-S1S-HPB	DC-1-6"	80S
	ESS-4-S1S-2HP	CC-6-4"	120
	ESS-4-S1S-HPB	DC-1-4"	80S
	ESS-3-S1S-3HP	CC-6-3"	160
	ESS-3-S1S-HPA	DC-1-3"	80S
	ESS-3-S1S-HPB	DC-1-3"	80S
	ESS-3-S1S-HPC	DC-1-3"	80S
	ESS-2.5-S1S-1A1**	CC-4-2½"	160
	ESS-2.5-S1S-1B1**	CC-4-2½"	160
	ESS-2.5-S1S-2A1**	CC-4-2½"	160
	ESS-2.5-S1S-2B1**	CC-4-2½"	160
	ESS-2-S1S-1A1**	CC-4-2"	160
	ESS-2-S1S-1A2**	CC-6-2"	160
	ESS-2-S1S-1B1**	CC-4-2"	160
	ESS-2-S1S-1B2**	CC-6-2"	160
	ESS-2-S1S-2A1**	CC-4-2"	160
	ESS-2-S1S-2A2**	CC-6-2"	160
	ESS-2-S1S-2B1**	CC-4-2"	160
	ESS-2-S1S-2B2**	CC-6-2"	160
	CVC-2-CHP-RHP	CC-7-2"	160
	ESS-2-S1S-1A4**	DC-1-2"	80 S
	ESS-2-S1S-1B4**	DC-1-2"	80S
	ESS-2-S1S-2A4**	DC-1-2"	80S
	ESS-2-S1S-2B4**	DC-1-2"	80S
	ESS-2-S1S-1A3**	CC-6-2"	160
	ESS-2-S1S-1B3**	CC-6-2"	160
	ESS-2-S1S-2A3**	CC-6-2"	160
	ESS-2-S1S-2B3**	CC-6-2"	160
Low Pressure Safety Injection/ Shut Down Cooling	ESS-24-S1S-SH1	HC-3-24"	.375"
	ESS-24-S1S-SH2	HC-3-24"	.375"
	ESS-14-SFP-TEM	GC-8-14"	.250"
	ESS-14-SCS-2H1**	GC-8-14"	.250"
	ESS-14-SDC-LPC	GC-8-14"	.250"
	ESS-14-SDC-LPD	GC-8-14"	.250"
	ESS-12-SCS-2H1**	CC-9-12"	140
	ESS-12-S1S-SDC	GC-1-12"	.250"

SYSTEM	PIPING RUNS	PIPE CLASS	SCHEDULE
Low Pressure Safety Injection/ Shut Down Cooling (Cont'd)	ESS-12-SDC-XCO	GC-1-12"	.250"
	ESS-12-S1S-1LP**	GC-1-12"	.250"
	ESS-12-S1S-1A6**	GC-1-12"	.250"
	PCS-12-S1S-1A1**	CC-4-12"	140
	PCS-12-S1S-1B1**	CC-4-12"	140
	PCS-12-S1S-2A1**	CC-4-12"	140
	PCS-12-S1S-2B1**	CC-4-12"	140
	PCS-12-SCS-2H1**	CC-9-12"	140
	ESS-10-S1S-LPA	GC-1-10"	.250"
	ESS-10-S1S-LPB	GC-1-10"	.250"
	ESS-10-SDC-X1A	GC-1-10"	.250"
	ESS-10-SDC-X1B	GC-1-10"	.250"
	ESS-10-SDC-XOA	GC-1-10"	.250"
	ESS-10-SDC-XOB	GC-1-10"	.250"
	ESS-B-S1S-1A6**	GC-1-8"	40S
	ESS-B-S1S-1B6**	GC-1-8"	40S
	ESS-B-S1S-2A6**	GC-1-8"	40S
	ESS-B-S1S-2B6**	GC-1-8"	40S
	ESS-8-SFP-TEM	GC-8-8"	40S
	ESS-8-SDC-RL1	GC-1-8"	40S
	ESS-6-S1S-1A1**	CC-4-6"	40S
	ESS-6-S1S-1B1**	CC-4-6"	40S
	ESS-6-S1S-2A1**	CC-4-6"	40S
	ESS-6-S1S-2B1**	CC-4-6"	40S
	ESS-6-S1S-1A6**	GC-1-6"	40S
	ESS-6-S1S-1B6**	GC-1-6"	40S
	ESS-6-S1S-2A6**	GC-1-6"	40S
	ESS-6-S1S-2B6**	GC-1-6"	40S
	ESS-6-SDC-RE1	HC-23-6"	10S
	ESS-4-SDC-RE2	GC-4-4"	40S
	ESS-4-SDC-RE3	GC-4-4"	40S
	ESS-2-SDH-1P2	GC-9-2"	40S
	ESS-2-S1S-DL1	HC-1-2"	40S
SI Bottle Discharge	ESS-12-S1S-1A5	GC-1-12"	.250"
	ESS-12-S1S-1B5	GC-1-12"	.250"
	ESS-12-S1S-2A5	GC-1-12"	.250"
	ESS-12-S1S-2B5	GC-1-12"	.250"
Spent Fuel Pool	SFP-14-FPF-RL1	HC-4-14"	.250"
	SFP-8-CPL-DL1	HC-4-8"	10S
	SFP-6-CPL-SL1	HC-4-6"	10S
	SFP-6-SRT-SL1	HC-4-6"	10S
	SFP-6-SRT-RL1	HC-4-6"	10S
	SFP-6-FPF-RL1	HC-4-6"	10S
	SFP-6-FPF-RL2	HC-4-6"	10S
	SFP-4-FPF-SL1	HC-4-4"	10S
	SFP-3-FPP-FPB	HC-4-3"	10S

SYSTEM	PIPING RUNS	PIPE CLASS	SCHEDULE
Concentrated Boric Acid	CVC-4-BAP-SBL	HC-6-4"	10S
	CVC-4-BAI-1P4	HC-7-4"	10S
	CVC-4-BAI-1P5	HC-7-4"	10S
	CVC-4-BAI-1P6	HC-7-4"	10S
	CVC-3-BAI-1P2	HC-7-3"	10S
	CVC-3-BAI-1P7	HC-7-3"	10S
	CVC-3-BAI-1P8	HC-7-3"	10S
	CVC-2-BAP-RE6	HC-7-2"	40S
	CVC-2-BAP-RE3	HC-7-2"	40S
	CVC-2-BAI-1P4	HC-7-2"	40S
	CVC-2-BAI-FB1	HC-7-2"	40S
Primary Coolant System Drain	PCS-3-DTH-1P2**	HC-1-3"	10S
	PCS-2-DTH-1P1**	HC-1-2"	40S
	PCS-2-DTH-1P2**	HC-1-2"	40S
	PCS-2-DTH-1P3**	HC-1-2"	40S
	PCS-2-DRL-1A1**	CC-10-2"	160
	PCS-2-DRL-1B1**	CC-10-2"	160
	PCS-2-DRL-2A1**	CC-10-2"	160
	PCS-2-DRL-2B1**	CC-10-2"	160
	PCS-2-DRL-1H1**	CC-10-2"	160
	RWS-2-DRL-1A1**	CC-10-2"	160
	RWS-2-DRL-1B1**	CC-10-2"	160
	RWS-2-DRL-2A1**	CC-10-2"	160
	RWS-2-DRL-2B1**	CC-10-2"	160
	RWS-2-DRL-1H1**	CC-10-2"	160
Chemical & Volume Control (Auxiliary Spray Line)	CVC-2-PSS-1P1**	CC-5-2"	160
	PCS-2-PSS-1P1**	CC-5-2"	160
Radwaste System	RWS-6-CWR-SL4	HC-2-6"	10S
	RWS-4-CWT-1P1	HC-2-4"	10S
	RWS-3-CWR-SL5	HC-2-3"	10S

* It should be noted that the piping runs delineated above may not be stagnant over the the entire length of the run since a given pipe run may serve more than one purpose.

** All or portions of these piping runs are not normally accessible during reactor operation.

Attachment II

RESULTS OF TESTING PERFORMED PER IE CIRCULAR 76-06

1. Hydrostatic Testing

A. Safeguard Pump Suction from SIRW Tank

1) Date of Test: April 22, 1977

2) Pressure (Minimum): 127 Psig (Suction side of Pumps)
255 Psig (Discharge side of Pumps)

3) Test Results: No visible leakage

4) Scope:

ESS-18-SIS-SH1	ESS-12-SDC-XCO
ESS-18-SIS-SH2	ESS-10-CSS-SLA
ESS-14-SIS-LPA	ESS-10-CSS-SLB
ESS-14-SIS-LPB	ESS-8-CSS-SLA*
ESS-14-SIS-HPA	ESS-8-CSS-SLB*
ESS-14-CSS-1PA	ESS-8-SDC-RL1*
ESS-14-CSS-1PB	ESS-6-SDC-RE1*
ESS-14-CSS-1PC	ESS-8-SIS-HPB
ESS-8-CSS-1PA	ESS-6-SIS-HPA
ESS-8-CSS-1PB	ESS-6-SIS-HPB
ESS-8-CSS-1PC	ESS-6-SIS-HPC
ESS-10-CSS-1P3	ESS-3-SIS-HPA*
ESS-10-SIS-LPA	ESS-3-SIS-HPB*
ESS-10-SIS-LPB	ESS-3-SIS-HPC*
ESS-14-SFP-TEM	ESS-8-SIS-1A6
ESS-8-SFP-TEM	ESS-8-SIS-2A6
ESS-12-SIS-1LP	ESS-8-SIS-1B6
ESS-10-SDC-XIA	ESS-8-SIS-2B6
ESS-10-SDC-XIB	ESS-6-SIS-1A6
ESS-10-SDC-XOA	ESS-6-SIS-2A6
ESS-10-SDC-XOB	ESS-6-SIS-1B6
ESS-12-SIS-SDC	ESS-6-SIS-2B6
	ESS-12-SIS-1A6

*Only portions of these lines were tested.

B. Charging Pump Suction and Boric Acid Injection Lines

1) Date of Test: April 2, 1978

2) Pressure (Minimum): 32 Psig (For piping designed for 25 Psig)
138 Psig (For piping designed for 125 Psi)

3) Test Results: No visible leakage

4) Scope:

CVC-4-BAI-1B4	CVC-4-BAI-1P6	CVC-1.5-BAI-1P3
CVC-3-BAI-1P2	CVC-2-BAI-FB1*	CVC-4-CHL-1P2
CVC-3-BAI-1P7*	CVC-2-BAI-1P4*	CVC-3-CHL-1P2
CVC-4-BAI-1P5	CVC-2-BAP-RE6*	CVC-3-CHL-1PC
CVC-2-BAI-1P4	CVC-3-BAI-1P2	CVC-3-CHP-1PB
		CVC-2-CHP-PBB
		CVC-2-CHP-PBC

B. Charging Pump Suction and Boric Acid Injection Lines (Cont'd)

*Only portions of these lines were hydro tested.

2. NDE Performed on Stagnant Piping System

1) Scope:

Examination	NDT Method
ESS-14-CSS-1PA-201	UT
ESS-14-CSS-1PB-203	UT
ESS-10-CSS-1PB-223	UT
ESS-14-SIS-HPA-207/ESS-6-SIS-HPA	UT
ESS-6-SIS-HPA-212	UT
ESS-14-SIS-LPA-203PR	VT
ESS-14-SIS-LPA-210	UT
ESS-12-SIS-1C5-222	UT
ESS-12-SIS-1LP-205	UT
ESS-8-SIS-HPB-208	UT
ESS-14-SDC-LPC-213	UT

2) Results of NDE: All components examined were found to be acceptable.

3) Date of Testing: All components identified above were examined during the Palisades refueling outage, January through April, 1978.

4) NDE Procedures used:

Method	Procedure	Thickness Range
UT	SwRI-NDT-800-36, Rev 13	0.1" to 0.4"
VT	SwRI-NDT-900-4, Rev 14	NA

5) Procedural Acceptance Criteria:

a) Ultrasonic reflectors were recorded at 50% DAC; reflectors exceeding 100% DAC were reported and sized at 50% DAC. Note that UT Calibration blocks for thin walled piping contained Appendix III, Section XI type notches for reflectors.

b) Reporting criteria for Visual Examination results was as a minimum: Evidence of cracks, cuts, gouges, leakage, pipe clamps and U-Bolts loose, and hanger springs sheared.

6) Referencing Code: ASME B&PV Code, Sections V and XI, 74S75.

Attachment III

PALISADES PLANT

Summary of Borated Water Sampling

System/Component	Measured Parameter	Limiting Value	Typical Value
Primary Coolant System[a]			
	pH		5-8
	Conductivity		4-13 μmhos
	B		0-1750 ppm
	Cl^-	< .12 ppm	< .10 ppm
	Dissolved O_2	< .1 ppm	< .02 ppm
	F^-	< .1 ppm	< .1 ppm
	Li^+		.1-1.0 ppm
	Na^+		.01 ppm
	H_2	15-50 cc/kg	20 cc/kg
	N_2		5 cc/kg
	Total Gas		25 cc/kg
Safety Injection & Refueling Water Tank[b] T-58			
	pH		5
	conductivity		8 μmhos
	B	1720-2000 ppm	1800-2000
	Cl^-		< .1 ppm
	F^-		< .1 ppm
	Li^+		< .1 ppm
	Na^+		< .005 ppm
Spent Fuel Pool[c]			
	pH		5
	Conductivity		8
	B	$\geq$ 1720 ppm	2000 ppm
	Cl^-		.1 ppm
	F^-		.1 ppm
	Li^+		.1 ppm
	Na^+		.005 ppm
Boric Acid Storage Tanks[d] T-53A & T-53B			
	pH		3.3
	conductivity		125 μmhos
	B	$\geq$ 10937-17500 ppm	14000 ppm
	Cl^-		< .1 ppm
	F^-		< .1 ppm
	Li^+		< .1 ppm
	Na^+		< .005-.5 ppm

SI Bottles[e] T-82A, T-82B, T-82C, T-82D	B Cl^-	1720-2000 ppm	1800 < .1
Make-Up Water[f] T-90, T-91	pH Conductivity Cl^- Na^+ F B		6 2 μmhos < .1 ppm < .005 ppm < .1 ppm < 1 ppm

a PCS is sampled daily
b T-58 is sampled weekly
c Spent Fuel Pool is sampled weekly
d T-53A & T-53B are sampled weekly
e SI Bottles are sampled monthly
f Make-up water is sampled weekly

PRESERVICE NDE PERFORMED ON STAGNANT LINES

1) Scope

PCS-12-SIS-1A1
PCS-12-SIS-1B1
PCS-12-SIS-2A1
PCS-12-SIS-2B1
ESS-12-SIS-1A1
ESS-12-SIS-1B1
ESS-12-SIS-2A1
ESS-12-SIS-2B1
ESS-6-SIS-1A1
ESS-6-SIS-1B1
ESS-6-SIS-2A1
ESS-6-SIS-2B1
PCS-12-SCS-2H1

2) Referencing Code: ASME B&PV Code, Section III, Appendix IX, 1968 Edition.

3) Acceptance Criteria: Recording/Acceptance Level at 100% DAC.

4) Results: All welds were acceptable.