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BOUCHEY,G.D. Washington Public Power Supply System
RECIP.NAME RECIPIENT AFFILIATION
SCHWENCER,A. Licensing Branch 2

- SEE RPTS -

SUBJECT: Forwards pump & valve operability assurance review audit forms,in response to 820809 request for addl info.Components identified by EG&G via telcon.Valves MS-RV-1A & RCIC-V-19 not installed,however,remaining 12 components installed.

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	NRR/DHFS/OLB	34	1	0	NRR/DHFS/PTRB	20	1	0
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	NRR/DSI/CPB	10	1	1	NRR/DSI/CSB	09	1	1
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	NRR/DSI/PSB	19	1	0	NRR/DSI/RAB	22	1	0
	NRR/DSI/RSB	23	1	0	NRR/DST/LGB	33	1	0
	REG FILE	04	1	1	RGN5		2	0
	RM/DDAMI/MIB		1	0				
EXTERNAL:	ACRS	41	6	0	BNL(AMDTS ONLY)		1	0
	DMB/DSS (AMDTS)		1	0	FEMA-REP DIV	39	1	0
	LPDR	03	1	1	NRC PDR	02	1	1
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Washington Public Power Supply System
P.O. Box 968 3000 George Washington Way Richland, Washington 99352 (509) 372-5000

October 29, 1982
G02-82-880
Docket No. 50-397

Mr. A. Schwencer, Chief
Licensing Branch No. 2
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Schwencer:

Subject: NUCLEAR PROJECT NO. 2
PVORT AUDIT FORM SUBMITTAL

Reference: NRC Letter, A. Schwencer (NRC) to R.L. Ferguson (SS), "Request for Additional Information - PVORT Audit", dated August 9, 1982

In response to the reference letter, the PVORT audit forms have been completed and are attached for your use. By separate mail, copies are being simultaneously transmitted to Mr. J.N. Singh of EG&G in Idaho Falls. Mr. C.J. Foley has been selected as the Supply System PVORT audit team leader.

These particular components were identified by EG&G by telecon. Confirming a conversation between Mr. Foley and Mr. C.F. Miller of EG&G, valves MS-RV-1A and RCIC-V-19 are not presently installed; the remaining twelve (12) components are installed in the plant.

Very truly yours,

Bool
S
1/10
Limited Dist

for G. D. Bouchey
Manager, Nuclear Safety and Regulatory Programs

CJF/jca
Attachment

cc: R Auluck - NRC
TY Chang - NRC
WS Chin - BPA
R Feil - NRC
CF Miller - EG&G
JN Singh - EG&G

PUMP AND VALVE OPERABILITY ASSURANCE REVIEW

PLANT INFORMATION

1. Name: WNP-2 Unit No.: ___ 2. Docket No.: 50-397
3. Utility: Washington Public Power Supply System
4. NSSS: General Electric [ ] PWR [X] BWR
5. A/E: Burns and Roe

II. GENERAL COMPONENT* INFORMATION

1. Supplier: [X] NSSS [ ] BOP
2. Location: a. Building/Room Reactor Building K/4.0
   b. Elevation 426
   c. System Low Pressure Core Spray
3. Component number on in-house drawings: LPCS-P-1
4. If component is a [X] Pump complete II.5.
   If component is a [ ] Valve complete II.6.
5. General Pump Data

a. Pump		b. Prime-mover	
Name	LPCS-P-1	Name	LPCS-M-1
Mfg.	Ingersoll-Rand	Mfg.	General Electric
Model	29APKD-5	Model	5K6347XC65A
S/N	0573277	S/N	AJK116029
Type	Vertical Shaft Centrifugal	Type	K, Squirrel Cage Induction Motor

*The component, whether pump or valve, is considered to be an assembly composed of the body, internals, prime-mover (or actuator) and functional accessories.

8211080002

a. Pump (continued)

Size 36"DIA x 284" OVERALL (PUMP 203 5/8)

Weight 11700# (DRY)

Mounting Method Vertical Mount: Flanged to Mounting Ring

Required B.H.P.

Paremeter	Design	Operating
Press psig	100 (SUCTION) 500 (DISCH)	150
Temp ^{o}F	212	40 - 212
Flow gpm	6350/7200	6350/7200
Head ft	715/560	715/560

Required NPSH at maximum flow 30 feet

Available NPSH 49.1 feet

Operating Speed 1780 rpm

Critical Speed

b. Prime-mover (continued)

Size Frame 6347PZ42

Weight 10,300#

Mounting Method Vertical Mount: Flanged to Pump

H.P. 1500

Power requirements: (include normal, maximum and minimum)

Electrical

4000 VAC; 3Ø; 60 Hz

FL AMPS = 192

If MOTOR list:

Duty cycle Continuous: Service Factor = 1.0

Stall current 1250 amps; 14 seconds @ 80^{o}C

Class of insulation B

List functional accessories:* Asson Piping & Engineering Company

Srainger; S/NM5647; Rating 100 psi/212^{o}F; ASME III - NC

List control signal inputs: Remote manual switch plus automatic initiation by reactor protection system

*Functional accessories are those sub-components not supplied by the manufacturer that are required to make the pump assembly operational, (e.g., coupling, lubricating oil system, etc.)

Weig

ounting Ring

Mountin Method

H.P. 150

Power require maximum and mi

Electrical 4000 VAC; 3Ø; 60 Hz

FL AMPS = 192

If MOTOR list:

Duty cycle Continuous; Service Fa

Stall current 1250 amps; 14 seconds

Class of insulation B

	Design	Operating
Press psig	100 (Suction) 500 (Disch)	150
Temp °F	212	40 - 212
Flow gpm	6350/7200	6350/7200
Head ft	715/560	715/560

Required NPSH at maximum flow 30 feet

Available NPSH 49.1 feet

Operating Speed 1780 rpm

Critical Speed

List functional accessories:* Asson Piping & Engineering Company

Srainger; S/NM5647; Rating 100 psi/212°F; ASME III - NC

List control signal inputs: Remote manual switch plus automatic initiation by reactor protection system

*Functional accessories are those sub-components not supplied by the manufacturer that are required to make the pump assembly operational, (e.g., coupling, lubricating oil system, etc.)

5. General Valve Data.

a. Valve		b. Actuator (if not an integral unit)	
Name	______	Name	______
Mfg.	______	Mfg.	______
Model	______	Model	______
S/N	______	S/N	______
Type	______	Type	______
Size	______	Size	______
Weignt	______	Weight	______
Mounting Method	______	Mounting Method	______
Required Torque	______	Torque	______

<u>Parameter</u>	______	______	Power requirements: (include normal, maximum and minimum)
Press	______	______	Electrical ______
Temp	______	______	______
Flow	______	______	______

Max P across valve ______ ______

Closing time @ max P ______ Other: [ ] Pneumatic [ ] Hydraulic

Opening time @ max P ______ ______

Power requirements for functional ______

accessories, (if any) ______ ______

______ ______

List control signal inputs: ______

______

______

List functional accessories:* ______________________

____

III. FUNCTION

1. Briefly describe components normal and safety functions: This pump has no "normal" function. Its safety function is to supply coolant to the reactor core upon loss of normal reactor coolant to prevent core damage.

2. The components normal state is: [ ] Operating [X] Standby

3. Safety function:

   a. [ ] Emergency reactor shutdown
   b. [ ] Containment heat removal
   c. [ ] Containment isolation
   d. [ ] Reactor heat removal
   e. [X] Reactor core cooling
   f. [ ] Prevent significant release of radioactive material to environment
   g. [X] Does the component function to mitigate the consequences of one or more of the following events? [X] Yes [ ] No
      If "Yes", identify.

      [X] LOCA [ ] HELB [X] MSLB

      [ ] Other ______________________

4. Safety requirements:

   [ ] Intermittent Operation [X] During postulated event

   [ ] Continuous Operation [X] Following postualted event

   If component operation is required following an event, give approximate length of time component must remain operational.

   4320 hours (e.g., hours, days, etc.)

____

*Functional accessories are those sub-components not supplied by the manufacturer that are required to make the valve assembly operational, (e.g., limit switches).

5. For VALVES:

does the component [ ] Fail open [ ] Fail closed [ ] Fail as is
Is this the fail-safe position [ ] Yes [ ] No
Is the valve used for throttling purposes? [ ] Yes [ ] No
Is the valve part of the reactor coolant pressure boundary? [ ] Yes [ ] No
Does the valve have a specific limit for leakage? [ ] Yes [ ] No
If "Yes" give limit: ______________________

IV. QUALIFICATION

1. Reference by specific number those applicable sections of the design codes and standards applicable to the component: ASME Section III-NC;

GE specs: 209A4280; 21A9222 21A9222DK; 21A9243; 21A9243DF

2. Reference those qualification standards, used as a guide to qualify the component:

IEEE-344-1971 (Re-evaluated to IEEE-344-1975) NUREG-0588 CAT. II

3. Identify those parts of the above qualification standards deleted or modified in the qualification program.

Deleted: None

Modified: None

4. Have acceptance criterias been established and documented in the test plan(s) for the component? [X] Yes [ ] No

5. What is the expected failure mode that would keep the pump or valve assembly from performing its safety function? Pump bearing failure; thrust bearing wearout; lateral shaft deflection in excess of allowable.

6. Are the margins* identified in the qualification documentation? [X] Yes [ ] No

---

*Margin is the difference between design basis parameters and the test parameters used for equipment qualification.

If component is a PUMP, complete IV.7.

If component is a VALVE, complete IV.8.

7. Pump operability has been demonstrated by: [X] Analysis
[ ] Test [X] Combination

Identify PUMP tests performed:

a. [X] Shell hydrostatic (ASME Section III)

b. [ ] Bearing temperature evaluations

c. [X] Seismic loading Analysis only

d. [ ] Vibration levels

e. [X] Exploratory vibration Analysis only (Fundamental Freq.______)

f. [X] Seal leakage & hydro press

g. [X] Aging: [X] Thermal [X] Mechanical (motor only)

h. [X] Flow performance
Are curves provided [X] Yes [ ] No

i. [X] Pipe reaction end (Analysis only) loads (nozzle loads)

j. [X] Others Computer aided Dynamic Frequency & Stress Analysis

k. [X] Extreme environment: Motor
[X] Humidity
[ ] Chemical
[X] Radiation

8. Valve operability has been demonstrated by: [ ] Analysis
[ ] Test [ ] Combination

Identify VALVE tests performed:

a. [ ] Shell hydrostatic (ASME Section III)

b. [ ] Cold cyclic List times:
Open ______
Closed ______

c. [ ] Seismic loading

d. [ ] Hot cyclic List times:
Open ______
Closed ______

e. [ ] Exploratory vibration (Fundamental Freq.______)

f. [ ] Main seat leakage

g. [ ] Aging: [ ] Thermal
[ ] Mechanical

h. [ ] Back seat leakage

i. [ ] Pipe reaction end loading

j. [ ] Disc hydrostatic

k. [ ] Extreme environment:

[ ] Humidity

[ ] Chemical

[ ] Radiation

l. [ ] Flow interruption capability

m. [ ] Flow characteristics

Are curves provided?

[ ] Yes [ ] No

n. [ ] Others ____________________

____

____

9. As a result of any of the tests (or analysis), were any deviations from design requirements identified? [ ] Yes [X] No If "Yes", briefly describe any changes made in tests (or analysis) or to the component to correct the deviation.

____

____

____

10. Was the test component precisely identical (as to model, size, etc.) to the in-plant component? [ ] Yes [X] No If "No", is installed component [ ] oversized or [ ] undersized?

Tests performed on motorettes of comparable insulation.

11. If type test was used to qualify the component, does the type test meet the requirements of IEEE 323-1974, Section 5.? [ ] Yes [X] No

12. Is component orientation sensitive? [X] Yes [ ] No [ ] Unknown If "Yes", does installed orientation coincide with test orientation? [X] Yes [ ] No

13. Is the component mounted in the same manner in-plant as it was during testing (i.e., welded, same number and size bolts, etc.)? [X] Yes [ ] No [ ] Unknown

Component is mounted consistent with analytical model.

14. Were the qualification tests performed in sequence and on only one component? [ ] Yes [ ] No Not Applicable

If "Yes" identify sequence, (e.g., radiation, seismic, cyclic, thermal, etc.): Thermal Aging, Radiation, Steam-Temp, 100% RH-Temperature

15. If "aging"* was performed, identify the significant aging mechanisms:

Thermal (motor)

Mechanical (motor)

16. Identify loads imposed (assumed) on the component for the qualification tests (analysis) performed:

a. [X] Plants (shutdown loads)

b. [X] Extreme environment

c. [X] Seismic load

d. [ ] Others

17. Have component design specifications been reviewed in-house to assure they envelope all expected operating, transient, and accident conditions? [X] Yes [ ] No

18. Does the component utilize any unique or special materials? (Examples are special gaskets or packing, limitations on nonferrous materials, or special coatings or surfaces.) [X] Yes [ ] No

If "Yes", identify:

19. Does component require any special maintenance procedures or practices, (including shorter periods between maintenance)? [X] Yes [ ] No

If "Yes", identify: Plant Procedure Manual; ASME Section XI Tests performed quarterly to check discharge pressure, differential pressure, flowrate vibration level & motor lubrication level.

20. Is the qualified life for the component less than 40 years? [ ] Yes [ ] No If "Yes", what is the qualified life?

See Attachment

*As outlined in Section 4.4.1 of IEEE-627 1980.

21. Information Concerning Qualification Documents for the Component

Report Number	Report Title	Date	Company/Organization Preparing Report	Company/Organization Reviewing Report
QID 233011	Supply System EQ File			
QID 213032	Supply System EQ File			
QID 213033	Supply System EQ File			

EQUIPMENT QUA[illegible]TION DOCUMENT LIST

QID NO. 233011

COMPONENT: Pump

MANUFACTURER: Ingersoll-Rand (I075)

MANUFACTURER MODEL NO:

29APKD
29APKD-3
29APKD-5 STAGE

CONTRACT(S): 2

DOCUMENTATION:

1.0 SEISMIC

REF. NO.	COMPANY	REPORT TITLE	REPORT NO.	REPORT DATE	REV.	B&R TRANS. #	PUBLICATION NO.
1.1	Ingersoll-Rand	Design Report of I-R Model 29-APKD-3 (RHR-P-2A, B, C)	-------	4/15/73	--	-------	VPF 2993-126-1
1.2	Ingersoll-Rand	Design Report for I-R Model 29-APKD-5 (LPCS-P-1)	-------	4/25/73	--	-------	VPF 2981-88-1
*1.3	General Electric	Dynamic Math Model, Seismic Analysis & Response Spectra	---	Rec'd 4/27/81	-	---	---
*1.4	General Electric	Hanford 2 New Loads Analysis of Floor Mounted Equipment	---	10/3/80	-	---	DRF E12-44
*1.5	General Electric	Hanford 2 New Loads Analysis of Over-loaded Floor Mounted Equipment	---	6/26/81	-	---	DRF E21-41 DRF E12-45
**1.6	General Electric	NSSS New Loads Design Adequacy Evaluation Summary Report	NLDAE	9/25/81	-	---	File No. 2.8.11

*References 1.3, 1.4, 1.5 filed under QID 179002
**Report NLDAE filed under QID 361964

2.0 ENVIRONMENTAL

2.1

2.2

2.3

2.4

2.5

2.6

Attachment to Item 20.

The prediction of a "qualified life" through accelerated aging is generally not feasible at the present state of the art. An aging analysis has been performed for electrical equipment located in potentially harsh environmental areas. The results of these studies are contained in a report to the NRC titled, "WNP-2 Environmental Equipment Qualification Report for Safety-Related Equipment, September 1982". Attached are the summary sheets for the electrical components associated with the selected equipment located in poter harsh environments.

Results of the aging analysis will be used to define recommended maintenance/ replacement interval for inclusion in the WNP-2 maintenance and surveillance procedures.

WPPSS

QID213032

EQUIPMENT QUALIFICATION REPORT

OWNER: WPPSS
FACILITY: WNP-2
SPEC: 2808-02E21

MPL: E21-C001 A
PPD:

PAGE NO. 150
REVISION: 2
DATE: 8-25-82

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENT REF.		QUALIFICATION METHOD	OUTSTANDING ITEMS
	PARAMETER	FSAR	QUALIFICATION	FSAR	QUAL.		
SYSTEM Low Pressure Core Spray	OPERATING TIME	24 hours	94,746 hours	5	3,4 7,8	Sequential Engineering Analysis	None
TAG NUMBER LPCS-M-1	TEMPERATURE (F)	90 max normal 104 max abnormal 126 max accident	212	1,6	3,4 7, 8	Simultaneous Engineering Analysis	None
MANUFACTURER General Electric	PRESSURE (PSIA)	14.7	N/R	1	N/A	N/A	None
MODEL NUMBER 5K6347XC65A; COMPONENT Motor	RELATIVE HUMIDITY (%)	40 normal 90 max abnormal 100 max accident	100% & Steam	1	3,4 7,8	Simultaneous Engineering Analysis	None
FUNCTION/SERVICE	CHEMICAL SPRAY	N/A	N/A	1	N/A	N/A	None
Drive Pump	RADIATION (RAD)	1.7×10^6	5.5×10^6	2	3,4 7,8	Sequential Engineering Analysis	None
	AGING	40 years	40 years	1	3, 7,8	Sequential Engineering Analysis	None
LOCATION: BLDG R; ELEVATION 429; COLUMN K2/3.8	ACCURACY	N/A	N/A	N/A	N/A	N/A	None

FLOOD LEVEL ELEV:
ABOVE FLOOD LEVEL?
YES NO

Prepared by: J.S. Sullivan

Reviewed by: R.L. Abbott

DOCUMENTATION REFERENCES

1. FSAR Par. 3.11
2. EDS Study 0740-004-422C
3. GE #22A4722 (BWR 11-A-05)
4. GE #NEDM-10672, 8/72 (BWR 111-A-05)
5. WNP-2 Class 1E Equipment List
   B&R Calculation 9-46-02
   GE #456HA898
   Calculations 213032-1, -2, -3, -4

NOTES

1. Qualified.

PUMP HPCS-P-2
P&ID M 524

PUMP AND VALVE
OPERABILITY ASSURANCE REVIEW

I. PLANT INFORMATION

1. Name: WNP-2 Unit No.: ____ 2. Docket No.: 50-397

3. Utility: Washington Public Power Supply System

4. NSSS: General Electric [ ] PWR [X] BWR

5. A/E: Burns and Roe

II. GENERAL COMPONENT* INFORMATION

1. Supplier: [X] NSSS [ ] BOP

2. Location: a. Building/Room Pumphouse A A8/1.9

   b. Elevation 448

   c. System High Pressure Core Spray

3. Component number on in-house drawings: HPCS-P-2

4. If component is a [X] Pump complete II.5.

   If component is a [ ] Valve complete II.6.

5. General Pump Data

a. Pump		b. Prime-mover	
Name	HPCS-P-2	Name	HPCS-M-2
Mfg.	Pacific Pumps	Mfg.	General Electric
Model	6X14M-WY-25T	Model	5K6257XH672A
S/N	48153	S/N	FKJ626453
Type	Vertical Shaft Centrifugal	Type	K; Squirrel Cage Induction

---

*The component, whether pump or valve, is considered to be an assembly composed of the body, internals, prime-mover (or actuator) and functional accessories.

a. Pump (continued)			b. Prime-mover (continued)	
Size	6 x 14 M		Size	Frame B364TP16
Weight	2526# (4086# TOTAL WEIGHT FLOODED)		Weight	600#
Mounting Method	VERTICAL MOUNT; FLANGED TO MOUNTING RING		Mounting Method	Vertical Mount; Flange to Pump
Required B.H.P.			H.P.	60

Paremeter		Design	Operating
Press	psig	115	56
Temp	^{o}F	32-100	100°F
Flow	gpm	1200	1200
Head		130	130

Power requirements: (include normal, maximum and minimum)

Electrical 460 VAC; 30; 60 Hz

Full Load Amps = 74.5

Required Submergence at maximum flow 2 ft @ 1200 gpm

Available NPSH 4 ft

Operating Speed 1750 rpm

Critical Speed 5470 rpm

If MOTOR list:

Duty cycle Continuous; Service Factor = 1.15

Stall current 435 Amps. @ 460 VAC @ 14 Second

Class of insulation B

List functional accessories:* None

List control signal inputs: Remote manual switch interlocked with discharge valve SW-V-2B and HPCS diesel engine pump will start when SW-V-2B is closed and diesel engine starts.

*Functional accessories are those sub-components not supplied by the manufacturer that are required to make the pump assembly operational, (e.g., coupling, lubricating oil system, etc.)

6. General Valve Data.

a. Valve

Name ____________________

Mfg. ____________________

Model ____________________

S/N ____________________

Type ____________________

Size ____________________

Weight ____________________

Mounting Method ____________________

Required Torque ____________________

Parameter		
Press		
Temp		
Flow		

Max P across valve ____________________

Closing time @ max P ____________________

Opening time @ max P ____________________

Power requirements for functional accessories, (if any) ____________________

b. Actuator (if not an integral unit)

Name ____________________

Mfg. ____________________

Model ____________________

S/N ____________________

Type ____________________

Size ____________________

Weight ____________________

Mounting Method ____________________

Torque ____________________

Power requirements: (include normal, maximum and minimum)

Electrical ____________________

Other: [ ] Pneumatic [ ] Hydraulic

List control signal inputs: ____________________

List functional accessories:* ______________________________

____

III. FUNCTION

1. Briefly describe components normal and safety functions: This pump has no "normal" function. The safety function is to provide cooling water to the HPCS diesel heat exchangers and to the atmospheric cooling units for the diesel room and pump room.

2. The components normal state is: [ ] Operating [X] Standby

3. Safety function:

a. [ ] Emergency reactor shutdown
b. [ ] Containment heat removal
c. [ ] Containment isolation
d. [ ] Reactor heat removal
e. [X] Reactor core cooling
f. [ ] Prevent significant release of radioactive material to environment
g. [X] Does the component function to mitigate the consequences of one or more of the following events? [X] Yes [ ] No If "Yes", identify.

[ ] LOCA [ ] HELB [ ] MSLB

[X] Other Loss of offsite power

4. Safety requirements:

[ ] Intermittent Operation [X] During postulated event

[ ] Continuous Operation [X] Following postualted event

If component operation is required following an event, give approximate length of time component must remain operational.

24 Hours (e.g., hours, days, etc.)

*Functional accessories are those sub-components not supplied by the manufacturer that are required to make the valve assembly operational, (e.g., limit switches).

5. For VALVES:

does the component [ ] Fail open [ ] Fail closed [ ] Fail as is

Is this the fail-safe position [ ] Yes [ ] No

Is the valve used for throttling purposes? [ ] Yes [ ] No

Is the valve part of the reactor coolant pressure boundary? [ ] Yes [ ] No

Does the valve have a specific limit for leakage? [ ] Yes [ ] No

If "Yes" give limit: ______________________

IV. QUALIFICATION

1. Reference by specific number those applicable sections of the design codes and standards applicable to the component: ______

   ASME Section III-ND; GE Specification 21A 1776

2. Reference those qualification standards, used as a guide to qualify the component: IEEE 344-1971 (requalified to IEEE 344-1975);

3. Identify those parts of the above qualification standards deleted or modified in the qualification program.

   Deleted: None

   Modified: None

4. Have acceptance criterias been established and documented in the test plan(s) for the component? [X] Yes [ ] No

5. What is the expected failure mode that would keep the pump or valve assembly from performing its safety function? Thrust bearing wearout; pump shaft bearing failure; shaft lateral deflection greater than allowable.

6. Are the margins* identified in the qualification documentation? [X] Yes [ ] No

*Margin is the difference between design basis parameters and the test parameters used for equipment qualification.

If component is a PUMP, complete IV.7.

If component is a VALVE, complete IV.8.

7. Pump operability has been demonstrated by: [X] Analysis
[ ] Test [ ] Combination

Identify PUMP tests performed:

a. [X] Shell hydrostatic (ASME Section III)

b. [ ] Bearing temperature evaluations

c. [X] Seismic loading Analysis Only

d. [ ] Vibration levels

e. [ ] Exploratory vibration

(Fundamental Freq.______)

f. [ ] Seal leakage & hydro press

g. [ ] Aging: [ ] Thermal
[ ] Mechanical

h. [X] Flow performance
Are curves provided [X] Yes
[ ] No

i. [X] Pipe reaction end (Analysis Only) loads (nozzle loads)

j. [X] Others Computer aided dynamic frequency and stress analysis supplemented by hand calculations.

k. [ ] Extreme environment:

[ ] Humidity

[ ] Chemical

[ ] Radiation

8. Valve operability has been demonstrated by: [ ] Analysis
[ ] Test [ ] Combination

Identify VALVE tests performed:

a. [ ] Shell hydrostatic (ASME Section III)

b. [ ] Cold cyclic List times:
Open ______
Closed ______

c. [ ] Seismic loading

d. [ ] Hot cyclic List times:
Open ______
Closed ______

e. [ ] Exploratory vibration

(Fundamental Freq.______)

f. [ ] Main seat leakage

g. [ ] Aging: [ ] Thermal
[ ] Mechanical

h. [ ] Back seat leakage

i. [ ] Pipe reaction end loading

j. [ ] Disc hydrostatic

k. [ ] Extreme environment:

[ ] Humidity

[ ] Chemical

[ ] Radiation

l. [ ] Flow interruption capability

m. [ ] Flow characteristics

Are curves provided?

[ ] Yes [ ] No

n. [ ] Others ______________

____

____

9. As a result of any of the tests (or analysis), were any deviations from design requirements identified? [ ] Yes [ ] No If "Yes", briefly describe any changes made in tests (or analysis) or to the component to correct the deviation.

____

____

____

10. Was the test component precisely identical (as to model, size, etc.) to the in-plant component? [X] Yes [ ] No If "No", is installed component [ ] oversized or [ ] undersized?
QUALIFIED BY ANALYSIS ONLY

11. If type test was used to qualify the component, does the type test meet the requirements of IEEE 323-1974, ~~Section 5.?~~ [-] Yes [-] No
TYPE TEST NOT USED

12. Is component orientation sensitive? [ ] Yes [ ] No [ ] Unknown
If "Yes", does installed orientation coincide with test orientation?
[ ] Yes [ ] No Analytical model conforms to installed orientation

13. Is the component mounted in the same manner in-plant as it was during testing (i.e., welded, same number and size bolts, etc.)?
[ ] Yes [ ] No [ ] Unknown Analytical Model conforms to installed orientation.

14. Were the qualification tests performed in sequence and on only one component? [ ] Yes [ ] No

If "Yes" identify sequence, (e.g., radiation, seismic, cyclic, thermal, etc.): ______

15. If "aging"* was performed, identify the significant aging mechanisms:

NO AGING REQUIRED BECAUSE EQUIPMENT LOCATED IN MILD ENVIRONMENT

16. Identify loads imposed (assumed) on the component for the qualification tests (analysis) performed:

a. [X] Plants (shutdown loads) b. [ ] Extreme environment

c. [X] Seismic load d. [ ] Others ______

17. Have component design specifications been reviewed in-house to assure they envelope all expected operating, transient, and accident conditions? [X] Yes [ ] No

18. Does the component utilize any unique or special materials? (Examples are special gaskets or packing, limitations on nonferrous materials, or special coatings or surfaces.) [ ] Yes [ ] No

If "Yes", identify: Not Applicable

19. Does component require any special maintenance procedures or practices, (including shorter periods between maintenance)? [X] Yes ~~[ ] No~~

If "Yes", identify: ASME Section XI Tests performed Quarterly to check discharge pressure, flowrate, vibration levels and Motor lubrication levels

20. Is the qualified life for the component less than 40 years? [ ] Yes [ ] No If "Yes", what is the qualified life? ______

(See attachment)

*As outlined in Section 4.4.1 of IEEE-627 1980.

21. Information Concerning Qualification Documents for the Component

Report Number	Report Title	Date	Company/Organization Preparing Report	Company/Organization Reviewing Report
VPF-3412-59-1	Seismic Analysis	3/16/81	General Electric	Supply System
VPF-3412-2-3	Seismic Analysis	3/16/81	General Electric	Supply System
QID 233009	Supply System EQ File			
QID 213031	Supply System EQ File			
21A1776	Specification, pump, HPCS diesel service water		General Electric	Supply System

Specific equipment aging analysis for electrical and mechanical equipment located in mild environmental areas is not a part of the WNP-2 equipment qualification program. Normal maintenance as recommended by the manufacturer and performed in accordance with the WNP-2 operational maintenance program is considered sufficient.

PUMP LPCS-P-2 ✓
P&ID M520

PUMP AND VALVE
OPERABILITY ASSURANCE REVIEW

I. PLANT INFORMATION

1. Name: WNP-2 Unit No.: ___ 2. Docket No.: 50-397

3. Utility: Washington Public Power Supply System

4. NSSS: General Electric [ ] PWR [X] BWR

5. A/E: Burns and Roe

II. GENERAL COMPONENT* INFORMATION

1. Supplier: [ ] NSSS [X] BOP

2. Location: a. Building/Room REACTOR BUILDING J7/B6

   b. Elevation 424

   c. System LOW PRESSURE CORE SPRAY

3. Component number on in-house drawings: LPCS-P-2

4. If component is a [ ] Pump complete II.5.

   If component is a [ ] Valve complete II.6.

5. General Pump Data

a. Pump		b. Prime-mover	
Name	LPCS-P-2	Name	LPCS-M-2
Mfg.	CRANE CO.	Mfg.	WESTINGHOUSE
Model	3065-1055-6599	Model	TBDP 7504786
S/N	NDC-000-721	S/N	NONE
Type	CENTRIFUGAL, HORIZONTAL	Type	K, SQIRREL CAGE INDUCTION

*The component, whether pump or valve, is considered to be an assembly composed of the body, internals, prime-mover (or actuator) and functional accessories.

a. Pump (continued)

Size CRANE #A05

Weight 150#

Mounting Method HORIZONTAL SHAFT; SKID MOUNTED

Required B.H.P. ______

Paremeter	Design	Operating
Press psig	150	50
Temp ^{o}F	212	120
Flow gpm	25	25
Head ft.	200	200

Required NPSH at maximum flow 14 ft. @ 64 GPM

Available NPSH 20 Feet

Operating Speed 3500 RPM

Critical Speed Not Available

b. Prime-mover (continued)

Size FRAME 256T

Weight 527#

Mounting Method HORIZONTAL SHAFT; SKID MOUNTED

H.P. 15HP

Power requirements: (include normal, maximum and minimum)

Electrical 460 VAC PH 3 60 Hz

18.5 Amps

If MOTOR list:

Duty cycle Continuous; Service Factor = 1.15

Stall current 91.4 Amps

Class of insulation H

List functional accessories:* None

List control signal inputs: Remote manual switch

*Functional accessories are those sub-components not supplied by the manufacturer that are required to make the pump assembly operational, (e.g., coupling, lubricating oil system, etc.)

6. General Valve Data

a. Valve

Name ________________

Mfg. ________________

Model ________________

S/N ________________

Type ________________

Size ________________

Weight ________________

Mounting Method ________________

Required Torque ________________

Parameter		
Press		
Temp		
Flow		

Max P across valve ________________

Closing time @ max P ________________

Opening time @ max P ________________

Power requirements for functional accessories, (if any) ________________

____

b. Actuator (if not an integral unit)

Name ________________

Mfg. ________________

Model ________________

S/N ________________

Type ________________

Size ________________

Weight ________________

Mounting Method ________________

Torque ________________

Power requirements: (include normal, maximum and minimum)

Electrical ________________

____

____

____

Other: [ ] Pneumatic [ ] Hydraulic

____

____

____

____

List control signal inputs: ________________

____

____

List functional accessories:*

Not Required

III. FUNCTION

1. Briefly describe components normal and safety functions:

The safety function is to maintain the LPCS Piping in a Waterfilled Mode, when LPCS is in standby.

2. The components normal state is: [X] Operating [ ] Standby

3. Safety function: (SEE III-1 ABOVE)

a. [ ] Emergency reactor shutdown

b. [ ] Containment heat removal

c. [ ] Containment isolation

d. [ ] Reactor heat removal

e. [ ] Reactor core cooling

f. [ ] Prevent significant release of radioactive material to environment

g. [ ] Does the component function to mitigate the consequences of one or more of the following events? [X] Yes [ ] No
If "Yes", identify.

[ ] LOCA [ ] HELB [ ] MSLB

[X] Other PROVIDES SYSTEM READINESS CAPABILITY TO LPCS SYSTEM

4. Safety requirements:

[ ] Intermittent Operation [ ] During postulated event

[X] Continuous Operation [ ] Following postuatled event

If component operation is required following an event, give approximate length of time component must remain operational.

Not Applicable (e.g., hours, days, etc.)

*Functional accessories are those sub-components not supplied by the manufacturer that are required to make the valve assembly operational, (e.g., limit switches).

5. For VALVES:

does the component [ ] Fail open [ ] Fail closed [ ] Fail as is

Is this the fail-safe position [ ] Yes [ ] No

Is the valve used for throttling purposes? [ ] Yes [ ] No

Is the valve part of the reactor coolant pressure boundary? [ ] Yes [ ] No

Does the valve have a specific limit for leakage? [ ] Yes [ ] No

If "Yes" give limit: ______________________

IV. QUALIFICATION

1. Reference by specific number those applicable sections of the design codes and standards applicable to the component: ____________

ASME Section III/NC; Burns and Roe SPEC 2808-35 (Section 15A and 1-1B)

2. Reference those qualification standards, used as a guide to qualify the component: IEEE 344-1975 (Reevaluated to 344-1975)

NUREG-0588 Cat. II

3. Identify those parts of the above qualification standards deleted or modified in the qualification program.

Deleted:	Modified:
None	None

4. Have acceptance criterias been established and documented in the test plan(s) for the component? [X] Yes [ ] No Preop Only

5. What is the expected failure mode that would keep the pump or valve assembly from performing its safety function? Motor or pump bearing failure; coupling deflection greater than allowable.

6. Are the margins* identified in the qualification documentation? [X] Yes [ ] No (For Pump)

*Margin is the difference between design basis parameters and the test parameters used for equipment qualification.

If component is a PUMP, complete IV.7.

If component is a VALVE, complete IV.8.

7. Pump operability has been demonstrated by: [X] Analysis
[ ] Test [ ] Combination

Identify PUMP tests performed:

a. [ ] Shell hydrostatic (ASME Section III)

b. [ ] Bearing temperature evaluations

c. [X] Seismic loading

d. [ ] Vibration levels

e. [ ] Exploratory vibration

(Fundamental Freq.______)

f. [ ] Seal leakage & hydro press

g. [ ] Aging: [ ] Thermal
[ ] Mechanical

h. [ ] Flow performance
Are curves provided [ ] Yes
[ ] No

i. [X] Pipe reaction end
PUMP ONLY, BY ANALYSIS
loads (nozzle loads)

j. [ ] Others Analysis -
Dynamic computer frequency
and stress analysis with
supportive hand calculations

k. [ ] Extreme environment:

[ ] Humidity

[ ] Chemical

[ ] Radiation

8. Valve operability has been demonstrated by: [ ] Analysis
[ ] Test [ ] Combination

Identify VALVE tests performed:

a. [ ] Shell hydrostatic (ASME Section III)

b. [ ] Cold cyclic List times:
Open ______
Closed ______

c. [ ] Seismic loading

d. [ ] Hot cyclic List times:
Open ______
Closed ______

e. [ ] Exploratory vibration

(Fundamental Freq.______)

f. [ ] Main seat leakage

g. [ ] Aging: [ ] Thermal
[ ] Mechanical

h. [ ] Back seat leakage

i. [ ] Pipe reaction end loading

j. [ ] Disc hydrostatic

k. [ ] Extreme environment:

[ ] Humidity

[ ] Cnemical

[ ] Radiation

l. [ ] Flow interruption capability

m. [ ] Flow characteristics

Are curves provided?

[ ] Yes [ ] No.

n. [ ] Others ____________________

9. As a result of any of the tests (or analysis), were any deviations from design requirements identified? [ ] Yes [X] No If "Yes", briefly describe any changes made in tests (or analysis) or to the component to correct the deviation.

10. Was the test component precisely identical (as to model, size, etc.) to the in-plant component? [ ] Yes [X] No If "No", is installed component [ ] oversized or [ ] undersized? (Not Applicable) For Pump Moterettes were tested. The bearings, leadwires and other components were qualified by operating experience and similarity.

11. If type test was used to qualify the component, does the type test meet the requirements of IEEE 323-1974, Section 5 ? [ ] Yes [X] No

12. Is component orientation sensitive? [X] Yes [ ] No [ ] Unknown If "Yes", does installed orientation coincide witn test orientation? [X] Yes [ ] No Installed orientation concides with analytical orientation.

13. Is the component mounted in the same manner in-plant as it was during testing (i.e., welded, same number and size bolts, etc.)? [X] Yes [ ] No [ ] Unknown
Component is mounted consistent with analytical model.

14. Were the qualification tests performed in sequence and on only one component? [X] Yes Motor [ ] No Not Applicable for Pump

If "Yes" identify sequence, (e.g., radiation, seismic, cyclic, thermal, etc.): Thermal aging, radiation, mechanical stress, moisture, voltage test

15. If "aging"* was performed, identify the significant aging mechanisms: Insulation is aging susceptible

16. Identify loads imposed (assumed) on the component for the qualification tests (analysis) performed:

a. [ ] Plants (shutdown loads) b. [ ] Extreme environment

c. [X] Seismic load d. [ ] Others

17. Have component design specifications been reviewed in-house to assure they envelope all expected operating, transient, and accident conditions? [X] Yes [ ] No

18. Does the component utilize any unique or special materials? (Examples are special gaskets or packing, limitations on nonferrous materials, or special coatings or surfaces.) [ ] Yes [ ] No

If "Yes", identify:

19. Does component require any special maintenance procedures or practices, (including shorter periods between maintenance)? [ ] Yes [ ] No

If "Yes", identify: Technical Specification has requirements

20. Is the qualified life for the component less than 40 years? [ ] Yes [ ] No If "Yes", what is the qualified life?

See Attachment

*As outlined in Section 4.4.1 of IEEE-627 1980.

21. Information Concerning Qualification Documents for the Component

Report Number	Report Title	Date	Company/Organization Preparing Report	Company/Organization Reviewing Report
ME 209	Seismic Analysis	3/19/75	McDonald Engineering	Supply System
QID 233006/ 213016	Qualification File		Supply System	Supply System

Attachment to Item 20.

The prediction of a "qualified life" through accelerated aging is generally not feasible at the present state of the art. An aging analysis has been performed for electrical equipment located in potentially harsh environmental areas. The results of these studies are contained in a report to the NRC titled, "WNP-2 Environmental Equipment Qualification Report for Safety-Related Equipment, September 1982". Attached are the summary sheets for the electrical components associated with the selected equipment located in potential harsh environments.

Results of the aging analysis will be used to define recommended maintenance/replacement interval for inclusion in the WNP-2 maintenance and surveillance procedures.

QID #213016

WASHINGTON PUBLIC PLY SYSTEM

EQUIPMENT QUALIFIC ON REPORT

OWNER: WPPSS
FACILITY: WNP-2
SPEC: 2808-35A

MPL:
PPD:

PAGE NO: 150A
REVISION: 0
DATE: October 1982

EQUIPMENT DESCRIPTION

SYSTEM
Low Pressure Core Spray

TAG NUMBER
LPCS-M-2

MANUFACTURER
Westinghouse

MODEL NUMBER 7504786

COMPONENT

FUNCTION/SERVICE
15hp motor for LPCS-P-2

LOCATION: BLDG R
ELEVATION 424
COLUMN J.7/3.6

ENVIRONMENT			DOCUMENT REF.		QUALIFICATION METHOD	OUTSTANDING ITEMS
PARAMETER	FSAR	QUALIFICATION	FSAR	QUAL.		
OPERATING TIME	6 months	6 months	1	4	Simultaneous Test and Engineering Analysis	None
TEMPERATURE (F)	90 Mx Normal 104 Max Abnormal Accident Profile 4,8	410	2	4	Simultaneous Test and Engineering Analysis	None
PRESSURE (PSIA)	Normal 14.7 Accident Profile 8	Accident Profile 8	2	4	Engineering Analysis	None
RELATIVE HUMITY (%)	40 Normal 90 Abnormal 100 Accident	100	2	4	Sequential Test	None
CHEMICAL SPRAY	N/A	N/A	2	N/A	N/A	None
RADIATION (RAD)	1.9×10^6	2×10^8	3	4	Sequential Test	None
AGING	40 years	5 years	2	4	Simultaneous Test Engineering Analysis	None
ACCURACY	N/A	N/A	N/A	N/A	N/A	None

FLOOD LEVEL ELEV:
ABOVE FLOOD LEVEL?
YES NO

Prepared by: R L Abbott

Reviewed by: J Sullivan

DOCUMENTATION REFERENCES

1. WNP-2 Class 1E Equipment List, dated 9/82
2. FSAR Paragraph 3.11
3. EDS Report #0740-004-422M
4. QID #213017

NOTES

Qualified

WP-1881

PUMP AND VALVE
OPERABILITY ASSURANCE REVIEW

I. PLANT INFORMATION

1. Name: WNP-2 Unit No.: ____ 2. Docket No.: 50-397
3. Utility: Washington Public Power Supply System
4. NSSS: General Electric [ ] PWR [X] BWR
5. A/E: Burns and Roe

II. GENERAL COMPONENT* INFORMATION

1. Supplier: [ ] NSSS [X] BOP
2. Location: a. Building/Room Pumphouse B3/12.5
   b. Elevation 444
   c. System Service Water
3. Component number on in-house drawings: SW-P-1B
4. If component is a [X] Pump complete II.5.
   If component is a [ ] Valve-complete II.6.
5. General Pump Data

	a. Pump		b. Prime-mover
Name	SW-P-1B	Name	SW-M-1B
Mfg.	B 580	Mfg.	General Electric
Model	28KXH-3	Model	5K6348XC76A
S/N	735-S-0013	S/N	FKJ52203
Type	Vertical Shaft Centrifugal	Type	K, Induction, Square Frame

*The component, whether pump or valve, is considered to be an assembly composed of the body, internals, prime-mover (or actuator) and functional accessories.

a. Pump (continued)			b. Prime-mover (continued)
Size			Size Frame 6348P42
Weight	14,000# Dry 19,000# Wet		Weight 15,100#
Mounting Method	Flanged to Mounting Ring		Mounting Method Flanged to Pump
Required B.H.P.	1542		H.P. 1750
Parameter	Design	Operating	Power requirements: (include normal, maximum and minimum)
Press psi	216	216	Electrical 4000 VAC; 30; 1185 rpm
Temp ^{o}F	150	32 - 106	60 Hz
Flow gpm	10,500	10,500	Full load amps = 222
Head ft	500	500	

Required submergence at maximum flow 3 ft @ 10,500 gpm

Available NPSH 11 ft 9 in

Operating Speed 1185 rpm

Critical Speed

If MOTOR list:

Duty cycle Continuous; service factor 1.15

Stall current 177.2 amps per phase

Class of insulation B

List functional accessories:*

List control signal inputs: Remote manual switch, interlocked with valve SW-V-2B to require discharge valve to be closed as pump start prerequisite

*Functional accessories are those sub-components not supplied by the manufacturer that are required to make the pump assembly operational, (e.g., coupling, lubricating oil system, etc.)

6. General Valve Data.

a. Valve

Name

Mfg.

Model

S/N

Type

Size

Weight

Mounting Method

Required Torque

Parameter

Press

Temp

Flow

Max P across valve

Closing time @ max P

Opening time @ max P

Power requirements for functional accessories, (if any)

b. Actuator (if not an integral unit)

Name

Mfg.

Model

S/N

Type

Size

Weight

Mounting Method

Torque

Power requirements: (include normal, maximum and minimum)

Electrical

Other: [ ] Pneumatic [ ] Hydraulic

List control signal inputs:

List functional accessories:* ______________________________

____

III. FUNCTION

1. Briefly describe components normal and safety functions: This pump normally supplies cooling water to the residual heat removal system heat exchangers (secondary) to remove decay heat from the RHR system. The safety function is to provide backup cooling water essential for continued operation of critical components.

2. The components normal state is: [ ] Operating [X] Standby

3. Safety function:

a. [ ] Emergency reactor shutdown

b. [X] Containment heat removal

c. [ ] Containment isolation

d. [X] Reactor heat removal

e. [ ] Reactor core cooling

f. [X] Prevent significant release of radioactive material to environment

g. [X] Does the component function to mitigate the consequences of one or more of the following events? [X] Yes [ ] No
If "Yes", identify.

[X] LOCA [X] HELB [X] MSLB

[ ] Other BACK-UP COOLING SUPPLY

4. Safety requirements:

[X] Intermittent Operation [X] During postulated event

[ ] Continuous Operation [X] Following postualted event

If component operation is required following an event, give approximate length of time component must remain operational.

4320 hours (e.g., hours, days, etc.)

*Functional accessories are those sub-components not supplied by the manufacturer that are required to make the valve assembly operational, (e.g., limit switches).

5. For VALVES:

does the component [ ] Fail open [ ] Fail closed [ ] Fail as is

Is this the fail-safe position [ ] Yes [ ] No

Is the valve used for throttling purposes? [ ] Yes [ ] No

Is the valve part of the reactor coolant pressure boundary? [ ] Yes [ ] No

Does the valve have a specific limit for leakage? [ ] Yes [ ] No

If "Yes" give limit: ______

IV. QUALIFICATION

1. Reference by specific number those applicable sections of the design codes and standards applicable to the component: ______

   Burns and Roe Spec 2808-23 Section F23

   ASME Section III-ND

2. Reference those qualification standards, used as a guide to qualify the component: ______

   IEEE-344-1971 (reevaluated to IEEE-344-1975)

3. Identify those parts of the above qualification standards deleted or modified in the qualification program.

Deleted:	Modified:
None	None

4. Have acceptance criterias been established and documented in the test plan(s) for the component? [X] Yes [ ] No

5. What is the expected failure mode that would keep the pump or valve assembly from performing its safety function? Shaft bearing failure; thrust bearing wearout; impeller shaft deflection greater than 0.020 inches.

6. Are the margins* identified in the qualification documentation? [X] Yes [ ] No

______

*Margin is the difference between design basis parameters and the test parameters used for equipment qualification.

If component is a PUMP, complete IV.7.

If component is a VALVE, complete IV.8.

7. Pump operability has been demonstrated by: [X] Analysis [ ] Test [ ] Combination

Identify PUMP tests performed:

a. [X] Shell hydrostatic (ASME Section III)

b. [ ] ~~Bearing temperature~~ evaluations

c. [X] Seismic loading Analysis only

d. [ ] Vibration levels

e. [X] Exploratory vibration (Computer Analysis) (Fundamental Freq.______)

f. [ ] Seal leakage & hydro press

g. [ ] Aging: [ ] Thermal [ ] Mechanical NOT APPLICABLE

h. [X] Flow performance Are curves provided [X] Yes [ ] No

i. [X] Pipe reaction end (Analysis only) loads (nozzle loads)

j. [X] Others Computer Aided Dynamic Frequencey & Stress Analysis

k. [ ] Extreme environment:

[ ] Humidity

[ ] Chemical

[ ] Radiation

8. Valve operability has been demonstrated by: [ ] Analysis [ ] Test [ ] Combination

Identify VALVE tests performed:

a. [ ] Shell hydrostatic (ASME Section III)

b. [ ] Cold cyclic List times: Open ______ Closed ______

c. [ ] Seismic loading

d. [ ] Hot cyclic List times: Open ______ Closed ______

e. [ ] Exploratory vibration (Fundamental Freq.______)

f. [ ] Main seat leakage

g. [ ] Aging: [ ] Thermal
[ ] Mechanical

h. [ ] Back seat leakage

i. [ ] Pipe reaction end loading

j. [ ] Disc hydrostatic

k. [ ] Extreme environment:

[ ] Humidity

[ ] Chemical

[ ] Radiation

l. [ ] Flow interruption capability

m. [ ] Flow characteristics

Are curves provided?

[ ] Yes [ ] No

n. [ ] Others ______________________

____

____

9. As a result of any of the tests (or analysis), were any deviations from design requirements identified? [ ] Yes [X] No If "Yes", briefly describe any changes made in tests (or analysis) or to the component to correct the deviation.

____

____

____

10. Was the test component precisely identical (as to model, size, etc.) to the in-plant component? [ ] Yes [ ] No If "No", is installed component [ ] oversized or [ ] undersized?
Not tested, not applicable

11. If type test was used to qualify the component, does the type test meet the requirements of IEEE 323-1974, Section 5.? [ ] Yes [ ] No
NOT APPLICABLE

12. Is component orientation sensitive? [X] Yes [ ] No [ ] Unknown
If "Yes", does installed orientation coincide with test orientation?
[X] Yes [ ] No

13. Is the component mounted in the same manner in-plant as it was during testing (i.e., welded, same number and size bolts, etc.)?
[X] Yes [ ] No [ ] Unknown

Analytical model conforms to installed orientation.

14. Were the qualification tests performed in sequence and on only one component? [ ] Yes [ ] No Not applicable

If "Yes" identify sequence, (e.g., radiation, seismic, cyclic, thermal, etc.): Not applicable

15. If "aging"* was performed, identify the significant aging mechanisms: Not applicable

16. Identify loads imposed (assumed) on the component for the qualification tests (analysis) performed:

a. [X] Plants (shutdown loads) b. [ ] Extreme environment

c. [X] Seismic load d. [X] Others Operating Loads

17. Have component design specifications been reviewed in-house to assure they envelope all expected operating, transient, and accident conditions? [X] Yes [ ] No

18. Does the component utilize any unique or special materials? (Examples are special gaskets or packing, limitations on nonferrous materials, or special coatings or surfaces.) [ ] Yes [X] No

If "Yes", identify:

19. Does component require any special maintenance procedures or practices, (including shorter periods between maintenance)? [X] Yes [ ] No

If "Yes", identify: ASME Section XI tests performed quarterly to check discharge pressure, flow rate, vibration level and motor lubrication level.

20. Is the qualified life for the component less than 40 years? [ ] Yes [ ] No If "Yes", what is the qualified life?
See attachemnt (2.0)

*As outlined in Section 4.4.1 of IEEE-627 1980.

21. Information Concerning Qualification Documents for the Component

Report Number	Report Title	Date	Company/Organization Preparing Report	Company/Organization Reviewing Report
TCF-1002-DES	Design Report for Standby Service Water Pump	9/8/75	Byron Jackson Pump Co.	Supply System
QID 233017	Supply System EQ File			
QID 213034 Job #82044 FIB OL.01/F	Seismic Requalification	7/8/82	Cygna Services	Supply System
B&R Print File 23-00-0044	SEISMIC ANALYSIS	4/3/74	General Electric	Supply System

Attachment to Item 20.

Specific equipment aging analysis for electrical and mechanical equipment located in mild environmental areas is not a part of the WNP-2 equipment qualification program. Normal maintenance as recommended by the manufacturer and performed in accordance with the WNP-2 operational maintenance program is considered sufficient.

EQUIPMENT QUALIFICATION DOCUMENT LIST

COMPONENT: Pump (SW)

QID NO. 2330

MANUFACTURER: Byron-Jackson Pumps (B580)

MANUFACTURER MODEL NO:

CONTRACT(S): 23

28KXH
28 IN KXH-3 STAGE

DOCUMENTATION:

1.0 SEISMIC

REF. NO.	COMPANY	REPORT TITLE	REPORT NO.	REPORT DATE	REV.	B&R TRANS. #	PUBLICATION NO.
1.1	Borg-Warner Corp. (Byron Jackson Div.)	Design Report of Standby Service Water Pump 28KXH 3STAGE VCT	TCF-1002-DES	9/22/75	A	T-23B	23-00-0030
*1.2	General Electric	Seismic Qualification of Standby Service Water Pump Motors	---	11/13/74	-	T-27	23-00-0044
1.3	CYGNA	Requalification of Stantby Service Water Pumps	01..01/F	9-22-82	---	----	------
1.4							
1.5							
1.6							

*Filed under C1E QID 213034

2.0 ENVIRONMENTAL

2.1

2.2

2.3

2.4

2.5

2.6

PUMP SLC-P-1A
P&ID M522 Zone F6

PUMP AND VALVE
OPERABILITY ASSURANCE REVIEW

PLANT INFORMATION

1. Name: WNP-2 Unit No.: ____ 2. Docket No.: 50-397
3. Utility: Washington Public Power Supply System
4. NSSS: General Electric [ ] PWR [X] BWR
5. A/E: Burns and Roe

II. GENERAL COMPONENT* INFORMATION

1. Supplier: [X] NSSS [ ] BOP
2. Location: a. Building/Room Reactor Building N2/3.7 Room R513
   b. Elevation 548
   c. System Standby Liquid Control
3. Component number on in-house drawings: SLC-P-1A
4. If component is a [ ] Pump complete II.5.
   If component is a [ ] Valve complete II.6.
5. General Pump Data

	a. Pump		b. Prime-mover
Name	SLC-P-1A	Name	SLC-M-1A
Mfg.	Union Pump Company	Mfg.	General Electric
Model	2X3 TD-60	Model	5K324AK2120
S/N	284228	S/N	LG2463202
Type	Positive Displacement Piston Type, Triplex	Type	K, Squirrel Cage Induction

*The component, whether pump or valve, is considered to be an assembly composed of the body, internals, prime-mover (or actuator) and functional accessories.

a. Pump (continued)			b. Prime-mover (continued)
Size	Skid overall: 40x56x21-5/8 high		Size 324T
Weight	2200# (skid weight).		Weight 409# motor only
Mounting Method	Horizontal Shaft; Skid Mounted; Bolted		Mounting Method Horizontal Shaft; Skid Mounted; Bolted
Required B.H.P.	33.8		H.P. 40
Paremeter	Design	Operating	Power requirements: (include normal, maximum and minimum)
Press psi	1400	1220 max	Electrical
Temp ^{o}F	150	80	
Flow gpm	43	43	460 VAC; 3 phase; 60 Hz; 1750 rpm
Head	12.9		Full load amps = 53 amp @ 460 VAC
			Starting Load (Max) = 88.5 KW

Required NPSH at maximum flow 12.9 psia

If MOTOR list:

Duty cycle continuous; service factor = 1.15

Available NPSH When tank is empty 13.25 psia

Stall current 290 amps @ 460 VAC

Operating Speed 370 rpm

Class of insulation B

Critical Speed not available

List functional accessories:* Borg Warner strainer model 76790-1; S/N49547; Rating 3600 psi @ 100^{o}F.

List control signal inputs: Keylock remote manual switch.

*Functional accessories are those sub-components not supplied by the manufacturer that are required to make the pump assembly operational, (e.g., coupling, lubricating oil system, etc.)

6. General Valve Data.

a. Valve			b. Actuator (if not an integral unit)
Name ______			Name ______
Mfg. ______			Mfg. ______
Model ______			Model ______
S/N ______			S/N ______
Type ______			Type ______
Size ______			Size ______
Weight ______			Weight ______
Mounting Method ______			Mounting Method ______
Required Torque ______			Torque ______
Parameter	______	______	Power requirements: (include normal, maximum and minimum)
Press	______	______	Electrical ______
Temp	______	______	______
Flow	______	______	______
Max P across valve	______		______
Closing time @ max P	______		Other: [ ] Pneumatic [ ] Hydraulic
Opening time @ max P	______		______
Power requirements for functional			______
accessories, (if any)	______		______
______			______

List control signal inputs: ______

______

______

List functional accessories:* ______________________________

____

III. FUNCTION

1. Briefly describe components normal and safety functions: This pump has no "normal" function. The safety function is to inject neutron absorber solution into the reactor primary should it become necessary to go from full power to cold subcritical without use of control rods.

2. The components normal state is: [ ] Operating [X] Standby

3. Safety function:

a. [X] Emergency reactor shutdown

b. [ ] Containment heat removal

c. [ ] Containment isolation

d. [ ] Reactor heat removal

e. [ ] Reactor core cooling

f. [ ] Prevent significant release of radioactive material to environment

g. [X] Does the component function to mitigate the consequences of one or more of the following events? [ ] Yes [X] No
If "Yes", identify.

[ ] LOCA [ ] HELB [ ] MSLB

[ ] Other ______________________________

4. Safety requirements:

[ ] Intermittent Operation [X] During postulated event

[ ] Continuous Operation [ ] Following postualted event

If component operation is required following an event, give approximate length of time component must remain operational.

24 hours (e.g., hours, days, etc.)

*Functional accessories are those sub-components not supplied by the manufacturer that are required to make the valve assembly operational, (e.g., limit switches).

5. For VALVES:

does the component [ ] Fail open [ ] Fail closed [ ] Fail as is

Is this the fail-safe position [ ] Yes [ ] No

Is the valve used for throttling purposes? [ ] Yes [ ] No

Is the valve part of the reactor coolant pressure boundary? [ ] Yes [ ] No

Does the valve have a specific limit for leakage? [ ] Yes [ ] No

If "Yes" give limit: ______

IV. QUALIFICATION

1. Reference by specific number those applicable sections of the design codes and standards applicable to the component: ______

ASME Section III -NC; GE APED Spec #21A9342

2. Reference those qualification standards, used as a guide to qualify the component: IEEE 344-1971 (Reevaluated to IEEE 344-1975);

NUREG 0588 Cat. II

3. Identify those parts of the above qualification standards deleted or modified in the qualification program.

Deleted: N/A

Modified:

4. Have acceptance criterias been established and documented in the test plan(s) for the component? [X] Yes [ ] No

5. What is the expected failure mode that would keep the pump or valve assembly from performing its safety function? ______

NONE, FROM QUALIFICATION VIEWPOINT

6. Are the margins* identified in the qualification documentation? [ ] Yes [X] No See attachment

*Margin is the difference between design basis parameters and the test parameters used for equipment qualification.

If component is a PUMP, complete IV.7.

If component is a VALVE, complete IV.8.

7. Pump operability has been demonstrated by: [ ] Analysis
[ ] Test [ ] Combination See attachment

Identify PUMP tests performed:

a. [X] Shell hydrostatic (ASME Section III)

b. [ ] Bearing temperature evaluations

c. [ ] Seismic loading

d. [ ] Vibration levels

e. [ ] Exploratory vibration (Fundamental Freq.______)

f. [ ] Seal leakage & hydro press

g. [ ] Aging: [ ] Thermal [ ] Mechanical

h. [ ] Flow performance Are curves provided [ ] Yes [ ] No

i. [ ] Pipe reaction end loads (nozzle loads)

j. [ ] Others ______________________

k. [ ] Extreme environment:
[ ] Humidity
[ ] Chemical
[ ] Radiation

8. Valve operability has been demonstrated by: [ ] Analysis
[ ] Test [ ] Combination

Identify VALVE tests performed:

a. [ ] Shell hydrostatic (ASME Section III)

b. [ ] Cold cyclic List times: Open ________ Closed ________

c. [ ] Seismic loading

d. [ ] Hot cyclic List times: Open ________ Closed ________

e. [ ] Exploratory vibration (Fundamental Freq.______)

f. [ ] Main seat leakage

g. [ ] Aging: [ ] Thermal
[ ] Mechanical

h. [ ] Back seat leakage

i. [ ] Pipe reaction end loading

j. [ ] Disc hydrostatic

k. [ ] Extreme environment:

[ ] Humidity

[ ] Chemical

[ ] Radiation

l. [ ] Flow interruption capability

m. [ ] Flow characteristics

Are curves provided?

[ ] Yes [ ] No

n. [ ] Others ____________________

9. As a result of any of the tests (or analysis), were any deviations from design requirements identified? [ ] Yes [X] No If "Yes", briefly describe any changes made in tests (or analysis) or to the component to correct the deviation.

Pending review

10. Was the test component precisely identical (as to model, size, etc.) to the in-plant component? [ ] Yes [ ] No If "No", is installed component [ ] oversized or [ ] undersized?

See attachment

11. If type test was used to qualify the component, does the type test meet the requirements of IEEE 323-1974, Section 5.? [ ] Yes [X] No

12. Is component orientation sensitive? [X] Yes [ ] No [ ] Unknown If "Yes", does installed orientation coincide with test orientation? [ ] Yes [ ] No

See attachment

13. Is the component mounted in the same manner in-plant as it was during testing (i.e., welded, same number and size bolts, etc.)?
[ ] Yes [ ] No [ ] Unknown

See attachment

14. Were the qualification tests performed in sequence and on only one component? [ ] Yes [ ] No

If "Yes" identify sequence, (e.g., radiation, seismic, cyclic, thermal, etc.):

See Attachment

15. If "aging"* was performed, identify the significant aging mechanisms:

See Attachment

16. Identify loads imposed (assumed) on the component for the qualification tests (analysis) performed:

a. [ ] Plants (shutdown loads) b. [ ] Extreme environment

c. [ ] Seismic load d. [ ] Others

SEE ATTACHMENT

17. Have component design specifications been reviewed in-house to assure they envelope all expected operating, transient, and accident conditions? [ ] Yes [X] No

18. Does the component utilize any unique or special materials? (Examples are special gaskets or packing, limitations on nonferrous materials, or special coatings or surfaces.) [ ] Yes [X] No

If "Yes", identify:

19. Does component require any special maintenance procedures or practices, (including shorter periods between maintenance)? [X] Yes [ ] No

If "Yes", identify: Plant Maintenance Procedure Manual; ASME Section XI tests performed quarterly to check discharge pressure, flowrate, and pump lubrication level.

20. Is the qualified life for the component less than 40 years? [ ] Yes [ ] No If "Yes", what is the qualified life? SEE ATTACHMENT

*As outlined in Section 4.4.1 of IEEE-627 1980.

21. Information Concerning Qualification Documents for the Component

Report Number	Report Title	Date	Company/Organization Preparing Report	Company/Organization Reviewing Report
QID 233016	Supply System EQ Files			
QID 133030	Supply System EQ Files			

EQUIPMENT QUALIFICATION DOCUMENT LIST

COMPONENT: Pump (SLC)

QID NO. 23301[illegible]

MANUFACTURER: Union Pump (U055)

MANUFACTURER MODEL NO: 2X3 TD-60

CONTRACT(S): 02C41

DOCUMENTATION:

1.0 SEISMIC

REF. NO.	COMPANY	REPORT TITLE	REPORT NO.	REPORT DATE	REV.	B&R TRANS. #	PUBLICATION NO.
1.1	Union Pump Co.	Design Calculations	S.O. DN-2355-Q	7/13/71	-	---	VPF 3159-66-1
* 1.2	General Electric	NSSS New Loads Design Adequacy Evaluation Summary Report	NLDAE	9/25/81	-	---	File No. 2.8.11
1.3	Nutech	Seismic & Hydrodynamic Loads Requalification Certification	---	3-18-81		---	----
1.4							
1.5							
1.6							

*Report NLDAE filed under QID 361964

2.0 ENVIRONMENTAL

2.1

2.2

2.3

2.4

2.5

2.6

Attachment to Item 20.

The prediction of a "qualified life" through accelerated aging is generally not feasible at the present state of the art. An aging analysis has been performed for electrical equipment located in potentially harsh environmental areas. The results of these studies are contained in a report to the NRC titled, "WNP-2 Environmental Equipment Qualification Report for Safety-Related Equipment, September 1982". Attached are the summary sheets for the electrical components associated with the selected equipment located in potential harsh environments.

Results of the aging analysis will be used to define recommended maintenance/replacement interval for inclusion in the WNP-2 maintenance and surveillance procedures.

ATTACHMENT

The letter in Reference 3) asks General Electric to provide the documentation upon which Section 3.3.4 of Reference 1) was based. GE was also asked to address points concerning operability and support bolt loads. This information will complete the qualification documentation on this SRM component.

References:
1) NLDAE (File No. 2.8.11) WPPSS No. 2, NSSS New Loads Design Adequacy Evaluation Summary Report, 9/25/81
2) Letter GEWP-2-82-109, August 9, 1982
3) Letter WPGE-2-82-198, October 1982

WPPSS QID #213030

WASHINGTON PUBLIC POWER SUPPLY SYSTEM

EQUIPMENT QUALIFICATION REPORT

OWNER: WPPSS
FACILITY: WNP 2
SPEC: 2808-02

MPL:
PPD:

REVISION: 2
DATE: September 1982

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENT REF.		QUALIFICATION METHOD	OUTSTANDING ITEMS
	PARAMETER	FSAR	QUALIFICATION	FSAR	QUAL.		
SYSTEM Standby Liquid Control TAG NUMBER SLC-M-1A, B	OPERATING TIME	24 hours		3			Note 1
	TEMPERATURE (F)	90 max. normal 104 max. abnormal Accident profile 4	150	1			Note 1
MANUFACTURER G.E.	PRESSURE (PSIA)	14.7	R/R	1	N/A	N/A	None
MODEL NUMBER 5K324AK2120/324T COMPONENT Electric Motor	RELATIVE HUMITY (%)	40 normal 90 max. abnormal Accident profile 4	100	1			None
FUNCTION/SERVICE	CHEMICAL SPRAY	N/A	N/A	1	N/A	N/A	None
Drive SLC Pumps	RADIATION (RAD)	1.1×10^4		2			Note 1
	AGING	40 years	Note 2	N/A			
LOCATION: BLDG R ELEVATION 548 COLUMN M2/3.7,M2/3.8	ACCURACY	N/A	N/A	N/A	N/A	N/A	None

FLOOD LEVEL ELEV:
ABOVE FLOOD LEVEL? YES X NO

Prepared by: Aran Seila 9/1/82 Reviewed by: A. Nader 9/1/82

DOCUMENTATION REFERENCES

1. FSAR Par. 3.11
2. EDS Report 0740-0040548C
3. WNP-2 Class 1E Equipment List, dated September 1982

NOTES

1. Similar motors have been tested to more severe conditions. A detailed comparison is being made to confirm applicability of the test date.
2. An evaluation is being performed to identify age susceptible parts and is scheduled for completion December 1, 1982.

WP-1001

Valve MS-V-22C
P&ID M-529 Zone F5

PUMP AND VALVE OPERABILITY ASSURANCE REVIEW

PLANT INFORMATION

1. Name: WNP-2 Unit No.: ___ 2. Docket No.: 50-397
3. Utility: Washington Public Power Supply System
4. NSSS: General Electric [ ] PWR [X] BWR
5. A/E: Burns and Roe

II. GENERAL COMPONENT* INFORMATION

1. Supplier: [X] NSSS [ ] BOP
2. Location: a. Building/Room Primary Containment 315^{o} Azimuth, R-32
   b. Elevation 506
   c. System Main Steam
3. Component number on in-house drawings: MS-V-22C
4. If component is a [ ] Pump complete II.5.
   If component is a [X] Valve complete II.6.
5. General Pump Data

a. Pump		b. Prime-mover	
Name		Name	
Mfg.		Mfg.	
Model		Model	
S/N		S/N	
Type		Type	

*The component, whether pump or valve, is considered to be an assembly composed of the body, internals, prime-mover (or actuator) and functional accessories.

a. Pump (continued)

Size ______

Weitnt ______

Mounting Method ______

Required B.H.P. ______

Paremeter	Design	Operating
Press		
Temp		
Flow		
Head		

Required NPSH at maximum flow ______

Available NPSH ______

Operating Speed ______

Critical Speed ______

b. Prime-mover (continued)

Size ______

Weight ______

Mounting Method ______

H.P. ______

Power requirements: (include normal, maximum and minimum)

Electrical ______

If MOTOR list:

Duty cycle ______

Stall current ______

Class of insulation ______

List functional accessories:* ______

List control signal inputs: ______

*Functional accessories are those sub-components not supplied by the manufacturer that are required to make the pump assembly operational, (e.g., coupling, lubricating oil system, etc.)

6. General Valve Data.

a. Valve			b. Actuator (if not an integral unit)	
Name	MS-V-22C		Name	MS-AO-22C
Mfg.	Rockwell		Mfg.	Sheffer
Model	1612JMMNTY		Model	SA-A022
S/N	101		S/N	661141
Type	Globe		Type	PNEUMATIC/AIR OR HYDRAULIC/SPRING LOADED TO CLOSE
Size	26 inch		Size	5 INCH AIR 20 INCH HYDRAULIC CYLINDER
Weight	16900# (Total)		Weight	—
Mounting Method	In-line, pipe		Mounting Method	Bolted yoke & bonnet
Required Torque	N/A		Torque	

Parameter	Design	Operating
Press psig	1536/1250	1040
Temp ^{o}F	100/575	550
Flow Lb/Hr	3.76×10^6	3.72×10^6

Max ΔP across valve 1010

Closing time @ max ΔP 3 to 5 sec.

Opening time @ max ΔP 20 SEC

Power requirements for functional accessories, (if any)

Power requirements: (include normal, maximum and minimum)

Electrical

Other: [X] Pneumatic [ ] Hydraulic

125 psig

List control signal inputs: Reactor protection system automatically actuates valve when reactor water level low, or high radiation or low condenser vacuum, or high drywell temp., or high drywell flow, or low steam pressure at turbine inlet.

List functional accessories:* SOLENOID VALVES & LIMIT SWITCHES

III. FUNCTION

1. Briefly describe components normal and safety functions:

Normal function is to permit steam to flow to turbine. The safety function is to effect containment isolation.

2. The components normal state is: [ ] Operating [X] Standby

3. Safety function:

a. [ ] Emergency reactor shutdown
b. [ ] Containment heat removal
c. [X] Containment isolation
d. [ ] Reactor heat removal
e. [ ] Reactor core cooling
f. [X] Prevent significant release of radioactive material to environment
g. [X] Does the component function to mitigate the consequences of one or more of the following events? [X] Yes [ ] No
If "Yes", identify.

[X] LOCA [ ] HELB [X] MSLB

[ ] Other

4. Safety requirements:

[ ] Intermittent Operation
[X] During postulated event
[X] Continuous Operation
[X] Following postuealted event

If component operation is required following an event, give approximate length of time component must remain operational.

4320 hours (e.g., hours, days, etc.)

---

*Functional accessories are those sub-components not supplied by the manufacturer that are required to make the valve assembly operational, (e.g., limit switches).

5. For VALVES:

does the component [ ] Fail open [X] Fail closed [ ] Fail as is

Is this the fail-safe position? [X] Yes [ ] No

Is the valve used for throttling purposes? [ ] Yes [X] No

Is the valve part of the reactor coolant pressure boundary? [X] Yes [ ] No

Does the valve have a specific limit for leakage? [X] Yes [ ] No

If "Yes" give limit: Operational Limit = 11.5 $\frac{SFT^3}{HR}$

IV. QUALIFICATION

1. Reference by specific number those applicable sections of the design codes and standards applicable to the component:

ASME Section III-NB; GE Spec. 21A9257 REV 4; GE SPEC 22A2887AB REV 9

2. Reference those qualification standards, used as a guide to qualify the component:

IEEE 344-1971 (Reevaluated to IEEE 344-1975) NUREG 0588 CAT II

3. Identify those parts of the above qualification standards deleted or modified in the qualification program.

SEE ATTACHMENT

Deleted:	Modified:
None	None

4. Have acceptance criterias been established and documented in the test plan(s) for the component? [X] Yes [ ] No

5. What is the expected failure mode that would keep the pump or valve assembly from performing its safety function?

Stem binding; seat leakage; YOKE ROD OVERSTRESS

6. Are the margins* identified in the qualification documentation? [ ] Yes [X] No

*Margin is the difference between design basis parameters and the test parameters used for equipment qualification.

If component is a PUMP, complete IV.7.

If component is a VALVE, complete IV.8.

7. Pump operability has been demonstrated by: [ ] Analysis
[ ] Test [ ] Combination

Identify PUMP tests performed:

a. [ ] Shell hydrostatic (ASME Section III)

b. [ ] Bearing temperature evaluations

c. [ ] Seismic loading

d. [ ] Vibration levels

e. [ ] Exploratory vibration

(Fundamental Freq.______)

f. [ ] Seal leakage & hydro press

g. [ ] Aging: [ ] Thermal
[ ] Mechanical

h. [ ] Flow performance
Are curves provided [ ] Yes
[ ] No

i. [ ] Pipe reaction end loads (nozzle loads)

j. [ ] Others ______________

k. [ ] Extreme environment:

[ ] Humidity ______________

[ ] Chemical ______________

[ ] Radiation ______________

8. Valve operability has been demonstrated by: [ ] Analysis
[ ] Test [ ] Combination

VALVE OPERABILITY NOT PRESENTLY DEMONSTRATED

Identify VALVE tests performed:

a. [X] Shell hydrostatic (ASME Section III)

b. [ ] Cold cyclic List times:
Open ________
Closed ________

c. [X] Seismic loading

d. [ ] Hot cyclic List times:
Open ________
Closed ________

e. [ ] Exploratory vibration

(Fundamental Freq.______)

f. [ ] Main seat leakage

g. [ ] Aging: [ ] Thermal
[ ] Mechanical

h. [ ] Back seat leakage

i. [X] Pipe reaction end loading

j. [ ] Disc hydrostatic

k. [X] Extreme environment:

[X] Humidity

[ ] Chemical

[ ] Radiation

l. [ ] Flow interruption capability

m. [X] Flow characteristics

Are curves provided?

[X] Yes [ ] No

n. [X] Others CLOSING STROKE VS TIME

9. As a result of any of the tests (or analysis), were any deviations from design requirements identified? [ ] Yes [ ] No If "Yes", briefly describe any changes made in tests (or analysis) or to the component to correct the deviation.

See attachment

10. Was the test component precisely identical (as to model, size, etc.) to the in-plant component? [ ] Yes [X] No If "No", is installed component [ ] oversized or [ ] undersized?
A SIMILARITY ANALYSIS IS BEING PERFORMED BY GE TO SHOW APPLICABILITY TO A SIMILAR 24 INCH VALVE THAT WAS TESTED.

11. If type test was used to qualify the component, does the type test meet the requirements of IEEE 323-1974, Section 5.? [ ] Yes [ ] No

12. Is component orientation sensitive? [X] Yes [ ] No [ ] Unknown If "Yes", does installed orientation coincide with test orientation? [ ] Yes [ ] No See attachment; ANALYZED ORIENTATION IS SAME AS INSTALLED ORIENTATION

13. Is the component mounted in the same manner in-plant as it was during testing (i.e., welded, same number and size bolts, etc.)? [X] Yes [ ] No [ ] Unknown See attachment
ANALYSIS ONLY

14. Were the qualification tests performed in sequence and on only one component? [ ] Yes [ ] No

If "Yes" identify sequence, (e.g., radiation, seismic, cyclic, thermal, etc.): ______

Not applicable

15. If "aging"* was performed, identify the significant aging mechanisms: ______

Not applicable

16. Identify loads imposed (assumed) on the component for the qualification tests (analysis) performed:

a. [X] Plants (shutdown loads)
b. [ ] Extreme environment
c. [X] Seismic load
d. [X] Others hydrodynamic loads

17. Have component design specifications been reviewed in-house to assure they envelope all expected operating, transient, and accident conditions? [ ] Yes [ ] No In process of review.

18. Does the component utilize any unique or special materials? (Examples are special gaskets or packing, limitations on nonferrous materials, or special coatings or surfaces.) [X] Yes [ ] No

If "Yes", identify: VITON DE-60-C SEALS

19. Does component require any special maintenance procedures or practices, (including shorter periods between maintenance)? [X] Yes [ ] No

If "Yes", identify: ASME Section XI tests: Check stroke time quarterly and perform leak rate test biennially; PLANT MAINTENANCE PROCEDURES INCL. SEAL REPLACEMENT

20. Is the qualified life for the component less than 40 years? [ ] Yes [ ] No If "Yes", what is the qualified life? ______

See attachment

*As outlined in Section 4.4.1 of IEEE-627 1980.

21. Information Concerning Qualification Documents for the Component

Report Number	Report Title	Date	Company/Organization Preparing Report	Company/Organization Reviewing Report
QID's 361964, 315011			Supply System EQ Files	

EQUIPMENT QUALIFICATION DOCUMENT LIST

COMPONENT: SOLENOID PILOT VALVE QID NO. 315011

MANUFACTURER: ASCO MANUFACTURER MODEL NO: —

CONTRACT(S): 02B22, 215

DOCUMENTATION:

1.0 SEISMIC

REF. NO.	COMPANY	REPORT TITLE	REPORT NO.	REPORT DATE	REV.	B&R TRANS. #	PUBLICATION NO.
1.1	WPPSS	Memo: Replace of Asco Valves	GE-02-315-81-023	12-31-81	-	—	—
1.2	WPPSS	Memo: " "	GE-02-MSR-82-001	6-14-82	-	—	—
1.3	ISOMEDIX	"Qual of Sol. Op. Valves..."	AQS-21678	7/79	A	see file 315001	
1.4							
1.5							
1.6							

2.0 ENVIRONMENTAL

REF. NO.	COMPANY	REPORT TITLE	REPORT NO.	REPORT DATE	REV.	B&R TRANS. #	PUBLICATION NO.
2.1							
2.2							
2.3							
2.4							
2.5							
2.6							

EQUIPMENT QUALIFICATION DOCUMENT LIST

COMPONENT: Valve, 26" Main Steam Isolation

QID NO. 2101964

MANUFACTURER: Rockwell (R340)

MANUFACTURER MODEL NO: 1612JMMNTY

CONTRACT(S): 2

DOCUMENTATION:

1.0 SEISMIC

REF. NO.	COMPANY	REPORT TITLE	REPORT NO.	REPORT DATE	REV.	B&R TRANS. #	PUBLICATION NO.
1.1	Rockwell / G.E.	Design Report for Class 1 Nuclear Valve	RAL-2006	5/24/73	1	---	VPF 3090-220-2
1.2	Rockwell / G.E.	General Calculations for 26" Figure 1612 JMMNTY	RAL-1002	8/14/73	2	---	VPF 3090-222-3
1.3	NUTECH /	Seismic & Hydrodynamic Loads Requalification Certification	Spec.# 21A9257	5-26-81	1	--	---
1.4	G.E.	NSSS New Loads Design Adequacy Evaluation Summary Report	2.8.11	9-25-81	--	--	-----
1.5							
1.6							

2.0 ENVIRONMENTAL

2.1

2.2

2.3

2.4

2.5

2.6

Attachment to Item 20.

The prediction of a "qualified life" through accelerated aging is generally not feasible at the present state of the art. An aging analysis has been performed for electrical equipment located in potentially harsh environmental areas. The results of these studies are contained in a report to the NRC titled, "WNP-2 Environmental Equipment Qualification Report for Safety-Related Equipment, September 1982". Attached are the summary sheets for the electrical components associated with the selected equipment located in potential harsh environments.

Results of the aging analysis will be used to define recommended maintenance/replacement interval for inclusion in the WNP-2 maintenance and surveillance procedures.

WPPSS QID315011

WASHINGTON PUBLIC POWER SUPPLY SYSTEM

EQUIPMENT QUALIFICATION REPORT

OWNER: WPPSS
FACILITY: WNP 2
SPEC: 2808-02

MPL: B22-F022
FPD: 732E150V

PAGE NO. 183
REVISION: 2
DATE: September 1982

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENT REF.		QUALIFICATION METHOD	OUTSTANDING ITEMS
	PARAMETER	FSAR	QUALIFICATION	FSAR	QUAL.		
SYSTEM Main Steam TAG NUMBER MS-SPV (See Note 1)	OPERATING TIME	24 hours		1			Note 2
	TEMPERATURE (F)	135 normal 150 max abnormal Accident - profile 1, 2		2			
MANUFACTURER Asco	PRESSURE (PSIA)	16.7 abnormal Accident - profile 1, 2		2			
MODEL NUMBER HTX-8320A20 COMPONENT Solenoid Pilot Valve	RELATIVE HUMITY (%)	55 normal 90 max abnormal 100 accident		2			
FUNCTION/SERVICE Operate Inboard Main Steam Isolation Valves	CHEMICAL SPRAY	Demineralized water		2			
	RADIATION (RAD)	2.74×10^7		2			
	AGING	40 years		2			
LOCATION: BLDG C ELEVATION 513 COLUMN 5^0, 15^0, 345^0, 355^0	ACCURACY						

FLOOD LEVEL ELEV:
ABOVE FLOOD LEVEL?
YES NO

Prepared by: W. [illegible]

Reviewed by: [illegible]

DOCUMENTATION REFERENCES

1. WNP-2 CIE Equipment List dated 9/1/82.
2. FSAR Para 3.11

NOTES

1. MS-SPV -22A2, -22A3; MS-SPV -22B2, -22B3; MS-SPV -22C2, -22C3; MS-SPV -22D2, -22D3
2. To be replaced with NP8320A173E, see letter GE-02-JLS-81-023.

WPPSS QID #200002

WASHINGTON PUBLIC POWER SUPPLY SYSTEM

EQUIPMENT QUALIFICATION REPORT

OWNER: WPPSS
FACILITY: WNP 2
SPEC: 2808-02 B22

MPL: B22-F022,A,B,C,D
PFD:

PAGE NO. 167
REVISION: 2
DATE: September 1982

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENT REF.		QUALIFICATION METHOD	OUTSTANDING ITEMS
	PARAMETER	FSAR	QUALIFICATION	FSAR	QUAL.		
SYSTEM Main Steam TAG NUMBER MS-LMS-(see note 2)	OPERATING TIME	24 hours	Note 1	1	3		
	TEMPERATURE (F)	135 normal 150 abnormal accident--profile 1		2			
MANUFACTURER Namco	PRESSURE (PSIA)	14.7 normal 16.7 abnormal accident--profile 1		2			
MODEL NUMBER EA700-86010 COMPONENT Limit Switch	RELATIVE HUMITY (%)	55 normal 90 abnormal accident--profile 2		2			
FUNCTION/SERVICE	CHEMICAL SPRAY	N/A		2			
	RADIATION (RAD)	7.7×10^7		2			
	AGING	40 years		2			
LOCATION: BLDG C ELEVATION 513 COLUMN 5,15,345,355°AZ	ACCURACY	N/A					

FLOOD LEVEL ELEV:
ABOVE FLOOD LEVEL? YES X NO

Prepared by: [signature] 9/1/82 Reviewed by: Raymond [signature] 9/1/82

DOCUMENTATION REFERENCES

1. WNP-2 CIE Equipment List, 9/82
2. FSAR Paragraph 3.11
3. WPPSS Letter GE-02-JLS-81-021

NOTES

1. These limit switches are being replaced by Namco Limit Switch EA180, which is qualified to IEEE 323-74 and 344-75 (Ref. 3).
2. MS-LMS-22A1, -22A2, -22A3, -22B1, -22B2, -22B3; MS-LMS-22C1, -22C2, -22C3, -22D1, -22D2, -22D3

VALVE CRD-V-127/5043
P&ID M528 Zone C-4

PUMP AND VALVE OPERABILITY ASSURANCE REVIEW

I. PLANT INFORMATION

1. Name: WNP-2 Unit No.: ____ 2. Docket No.: 50-397
3. Utility: Washington Public Power Supply System
4. NSSS: General Electric [ ] PWR [X] BWR
5. A/E: Burns and Roe

II. GENERAL COMPONENT* INFORMATION

1. Supplier: [X] NSSS [ ] BOP
2. Location: a. Building/Room Reactor Building K2/3.7
   b. Elevation 522
   c. System Control Rod Drive
3. Component number on in-house drawings: CRD-V-127/5043
4. If component is a [ ] Pump complete II.5.
   If component is a [X] Valve complete II.6.
5. General Pump Data

a. Pump		b. Prime-mover	
Name		Name	
Mfg.		Mfg.	
Model		Model	
S/N		S/N	
Type		Type	

*The component, whether pump or valve, is considered to be an assembly composed of the body, internals, prime-mover (or actuator) and functional accessories.

a. Pump (continued)			b. Prime-mover (continued)
Size ______			Size ______
Weight ______			Weight ______
Mounting Method ______			Mounting Method ______
Required B.H.P. ______			H.P. ______
Parameter	Design	Operating	Power requirements: (include normal, maximum and minimum)
Press	______	______	Electrical ______
Temp	______	______	______
Flow	______	______	______
Head	______	______	______
			______

Required NPSH at maximum flow ______	If MOTOR list:
	Duty cycle ______
Available NPSH ______	Stall current ______
Operating Speed ______	Class of insulation ______
Critical Speed ______	______

List functional accessories:* ______

______

______

List control signal inputs: ______

______

______

*Functional accessories are those sub-components not supplied by the manufacturer that are required to make the pump assembly operational, (e.g., coupling, lubricating oil system, etc.)

6. General Valve Data.

a. Valve

Name CRD-V-127/5043

Mfg. Robert Shaw Controls

Model 83470-B2

S/N 1049

Type Globe Valve

Size 1 inch

Weight

Mounting Method Rack Mounted

Required Torque N/A

Parameter		Design	Operating
Press	psig	1750	1112
Temp	^{o}F	150	100/40
Flow			

MaxΔP across valve 1112 psid

Closing time @ maxΔP

Opening time @ maxΔP

Power requirements for functional accessories, (if any)

b. Actuator (if not an integral unit)

Name

Mfg.

Model

S/N

Type Pneumatic

Size

Weight

Mounting Method Yoke-Mounted to Valve

Torque N/A

Power requirements: (include normal, maximum and minimum)

Electrical None

Other: [X] Pneumatic [ ] Hydraulic

125 PSIG instrument air

List control signal inputs: Scram signal

List functional accessories: ______________________

____

III. FUNCTION

1. Briefly describe components normal and safety functions: The valve (normally closed) opens on scram signal to allow water volume equalization during control rod movement.

2. The components normal state is: [ ] Operating [X] Standby

3. Safety function:

a. [X] Emergency reactor shutdown

b. [ ] Containment heat removal

c. [ ] Containment isolation

d. [ ] Reactor heat removal

e. [ ] Reactor core cooling

f. [ ] Prevent significant release of radioactive material to environment

g. [X] Does the component function to mitigate the consequences of one or more of the following events? [X] Yes [ ] No
If "Yes", identify.

[X] LOCA [X] HELB [ ] MSLB

[X] Other ANY SCRAM INITIATION SIGNAL

4. Safety requirements:

[ ] Intermittent Operation [X] During postulated event

[ ] Continuous Operation [ ] Following postualted event

If component operation is required following an event, give approximate length of time component must remain operational.

4320 hours (e.g., hours, days, etc.)

*Functional accessories are those sub-components not supplied by the manufacturer that are required to make the valve assembly operational, (e.g., limit switches).

5. For VALVES:

does the component [X] Fail open [ ] Fail closed [ ] Fail as is

Is this the fail-safe position [X] Yes [ ] No

Is the valve used for throttling purposes? [ ] Yes [X] No

Is the valve part of the reactor coolant pressure boundary?
ONLY DURING A SCRAM CONDITION [X] Yes [ ] No

Does the valve have a specific limit for leakage? [ ] Yes [ ] No

If "Yes" give limit: ____________________

IV. QUALIFICATION

1. Reference by specific number those applicable sections of the design codes and standards applicable to the component: __________

ASME Section III-NC; GE SPEC 77466AB

GE Spec 21A8799 Rev. 1

2. Reference those qualification standards, used as a guide to qualify the component: __________

IEEE 344-1971 (Reevaluated to IEEE-344-1975)

3. Identify those parts of the above qualification standards deleted or modified in the qualification program.

Deleted:	Modified:
None	None

4. Have acceptance criterias been established and documented in the test plan(s) for the component? [X] Yes [ ] No

5. What is the expected failure mode that would keep the pump or valve assembly from performing its safety function? NONE

6. Are the margins* identified in the qualification documentation?
[X] Yes [ ] No

*Margin is the difference between design basis parameters and the test parameters used for equipment qualification.

If component is a PUMP, complete IV.7.

If component is a VALVE, complete IV.8.

7. Pump operability has been demonstrated by: [ ] Analysis
[ ] Test [ ] Combination

Identify PUMP tests performed:

a. [ ] Shell hydrostatic (ASME Section III)

b. [ ] Bearing temperature evaluations

c. [ ] Seismic loading

d. [ ] Vibration levels

e. [ ] Exploratory vibration (Fundamental Freq.______)

f. [ ] Seal leakage & hydro press

g. [ ] Aging: [ ] Thermal
[ ] Mechanical

h. [ ] Flow performance
Are curves provided [ ] Yes
[ ] No

i. [ ] Pipe reaction end loads (nozzle loads)

j. [ ] Others ______________________

k. [ ] Extreme environment:
[ ] Humidity
[ ] Chemical
[ ] Radiation

8. Valve operability has been demonstrated by: [ ] Analysis
[ ] Test [X] Combination

Identify VALVE tests performed:

a. [X] Shell hydrostatic

b. [X] Cold cyclic List times:
Open ________
Closed ________

c. [X] Seismic loading

d. [ ] Hot cyclic List times:
Open ________
Closed ________

e. [X] Exploratory vibration (Tested as part of rack vibration test).
(Fundamental Freq.______)

f. [X] Main seat leakage

g. [ ] Aging: [ ] Thermal
[ ] Mechanical

h. [ ] Back seat leakage

i. [ ] Pipe reaction end loading

j. [ ] Disc hydrostatic

k. [X] Extreme environment:

[X] Humidity & TEMPERATURE

[ ] Chemical

[ ] Radiation

l. [ ] Flow interruption capability

m. [X] Flow characteristics

Are curves provided?

[ ] Yes [X] No

n. [X] Others Fragility test hydrodynamic loads

9. As a result of any of the tests (or analysis), were any deviations from design requirements identified? [ ] Yes [X] No If "Yes", briefly describe any changes made in tests (or analysis) or to the component to correct the deviation.

10. Was the test component precisely identical (as to model, size, etc.) to the in-plant component? [X] Yes [ ] No If "No", is installed component [ ] oversized or [ ] undersized?

11. If type test was used to qualify the component, does the type test meet the requirements of IEEE 323-1974, Section 5.? [ ] Yes [X] No

12. Is component orientation sensitive? [ ] Yes [X] No [ ] Unknown If "Yes", does installed orientation coincide with test orientation? [ ] Yes [ ] No

13. Is the component mounted in the same manner in-plant as it was during testing (i.e., welded, same number and size bolts, etc.)? [X] Yes [ ] No [ ] Unknown In-plant installation has stiffer mounting attachments for the hydraulic control unit

14. Were the qualification tests performed in sequence and on only one component? [ ] Yes [X] No Tests performed on composite unit.

If "Yes" identify sequence, (e.g., radiation, seismic, cyclic, thermal, etc.): ______

Limited to seismic and fragility tests only.

15. If "aging"* was performed, identify the significant aging mechanisms: ______

None

16. Identify loads imposed (assumed) on the component for the qualification tests (analysis) performed:

a. [X] Plants (shutdown loads) b. [ ] Extreme environment

c. [X] Seismic load d. [X] Others Scram loads

hydrodynamic laods

17. Have component design specifications been reviewed in-house to assure they envelope all expected operating, transient, and accident conditions? [X] Yes [ ] No

18. Does the component utilize any unique or special materials? (Examples are special gaskets or packing, limitations on nonferrous materials, or special coatings or surfaces.) [X] Yes [ ] No

If "Yes", identify: TEFLON SEAT & PACKING

19. Does component require any special maintenance procedures or practices, (including shorter periods between maintenance)? [X] Yes [ ] No

If "Yes", identify: Check operability every 7 days per technical specification in lieu of ASME Section XI quarterly stroke test.

20. Is the qualified life for the component less than 40 years? [ ] Yes [ ] No If "Yes", what is the qualified life? ______

NOT APPLICABLE BECAUSE HAS NO ELECTRICAL COMPONENTS

*As outlined in Section 4.4.1 of IEEE-627 1980.

21. Information Concerning Qualification Documents for the Component

Report Number	Report Title	Date	Company/Organization Preparing Report	Company/Organization Reviewing Report
384HA183	Hydraulic Control Unit	7/21/75	General Electric	NUTECH/SUPPLY SYSTEM
383HA853	Seismic Analysis of Hydraulic Unit	2/13/73	General Electric	NUTECH/SUPPLY SYSTEM
QID 167001	Supply System EQ File			
QID 315020	Supply System EQ File			

VALVE HPCS-V-15
P&ID M520 Zone D-7

PUMP AND VALVE OPERABILITY ASSURANCE REVIEW

I. PLANT INFORMATION

1. Name: WNP-2 Unit No.: ____ 2. Docket No.: 50-397
3. Utility: Washington Public Power Supply System
4. NSSS: General Electric [ ] PWR [X] BWR
5. A/E: Burns and Roe

II. GENERAL COMPONENT* INFORMATION

1. Supplier: [X] NSSS [ ] BOP
2. Location: a. Building/Room Reactor Building 13/3.9
   b. Elevation 449
   c. System High Pressure Core Spray
3. Component number on in-house drawings: HPCS-V-15
4. If component is a [ ] Pump complete II.5.
   If component is a [X] Valve complete II.6.
5. General Pump Data

a. Pump		b. Prime-mover	
Name		Name	
Mfg.		Mfg.	
Model		Model	
S/N		S/N	
Type		Type	

*The component, whether pump or valve, is considered to be an assembly composed of the body, internals, prime-mover (or actuator) and functional accessories.

a. Pump (continued) | b. Prime-mover (continued)

Size ______________________

Weight ______________________

Mounting Method ______________________

Required B.H.P. ______________________

Parameter	Design	Operating
Press		
Temp		
Flow		
Head		

Required NPSH at maximum flow ______________________

Available NPSH ______________________

Operating Speed ______________________

Critical Speed ______________________

b. Prime-mover (continued)

Size ______________________

Weight ______________________

Mounting Method ______________________

H.P. ______________________

Power requirements: (include normal, maximum and minimum)

Electrical ______________________

____

____

____

____

If MOTOR list:

Duty cycle ______________________

Stall current ______________________

Class of insulation ______________________

____

List functional accessories:* ______________________

____

____

List control signal inputs: ______________________

____

____

*Functional accessories are those sub-components not supplied by the manufacturer that are required to make the pump assembly operational, (e.g., coupling, lubricating oil system, etc.)

6. General Valve Data

a. Valve		b. Actuator (if not an integral unit)	
Name	HPCS-V-15	Name	HPCS-MO-15
Mfg.	Anchor-Darling	Mfg.	Limitorque
Model	94-13272	Model	SMB-2-60
S/N	F5310-3-1	S/N	191235
Type	Gate	Type	SMB
Size	18 inch	Size	2-60
Weight	1670# (total)	Weight	660 lbs.
Mounting Method	Pipe, in-line	Mounting Method	15 inch, yoke
Required Torque	12 FT-LB RUN ; 60 FT-LB START	Torque	

Parameter	Design	Operating
Press psig	100	50
Temp ^{o}F	212	120
Flow gpm	7175	6350/685'

Max ΔP across valve 90 psid

Closing time @ max ΔP 18 sec

Opening time @ max ΔP 18 sec

Power requirements for functional accessories, (if any)

Power requirements: (include normal, maximum and minimum)

Electrical motor, Electrical Apparatus Company ; 3ϕ; 460 VAC; 3600 RPM FULL LOAD AMPS = 12a.; LOCKED ROTOR AMPS = 103a

Other: [ ] Pneumatic [ ] Hydraulic

List control signal inputs: Remote manual switch, low condensate storage tank level, high suppression pool water level.

List functional accessories:* None

III. FUNCTION

1. Briefly describe components normal and safety functions: The normal function is to provide isolation between primary and secondary HPCS pump suction sources. The safety function is (1) to effect containment isolation and (2) to provide suppression pool supply to HPCS pump suction.

2. The components normal state is: [ ] Operating [X] Standby

3. Safety function:

   a. [ ] Emergency reactor shutdown
   b. [ ] Containment heat removal
   c. [X] Containment isolation
   d. [ ] Reactor heat removal
   e. [X] Reactor core cooling
   f. [ ] Prevent significant release of radioactive material to environment
   g. [X] Does the component function to mitigate the consequences of one or more of the following events? [X] Yes [ ] No
      If "Yes", identify.

      [X] LOCA [ ] HELB [ ] MSLB

      [ ] Other

4. Safety requirements:

   [X] Intermittent Operation [X] During postulated event

   [ ] Continuous Operation [X] Following postualted event

   If component operation is required following an event, give approximate length of time component must remain operational.

   Valve must maintain inegrity for 4320 hours (e.g., hours, days, etc.)
   Operator must be functional for 24 hours.

*Functional accessories are those sub-components not supplied by the manufacturer that are required to make the valve assembly operational, (e.g., limit switches).

5. For VALVES:

does the component [ ] Fail open [ ] Fail closed [X] Fail as is

Is this the fail-safe position [ ] Yes [X] No

Is the valve used for throttling purposes? [ ] Yes [X] No

Is the valve part of the reactor coolant pressure boundary? [ ] Yes [X] No

Does the valve have a specific limit for leakage? [X] Yes [ ] No

If "Yes" give limit: Operational limit: 1200 scc/min

IV. QUALIFICATION

1. Reference by specific number those applicable sections of the design codes and standards applicable to the component:

ASME Section III-NC; GE Spec KL-71-101; GE SPECS 21A8657 - PARA 4.1.2

GE SPECS 21A8660 & 21A8658

2. Reference those qualification standards, used as a guide to qualify the component: NUREG-0588 Cat. II, IEEE 344-1971 (Reevaluated to IEEE 344-1975)

3. Identify those parts of the above qualification standards deleted or modified in the qualification program.

Deleted:	Modified:
See attachment	

4. Have acceptance criterias been established and documented in the test plan(s) for the component? [X] Yes [ ] No

5. What is the expected failure mode that would keep the pump or valve assembly from performing its safety function?

STEM BINDING

6. Are the margins* identified in the qualification documentation? [ ] Yes [ ] No See Attachment

*Margin is the difference between design basis parameters and the test parameters used for equipment qualification.

If component is a PUMP, complete IV.7.

If component is a VALVE, complete IV.8.

7. Pump operability has been demonstrated by: [ ] Analysis
[ ] Test [ ] Combination

Identify PUMP tests performed:

a. [ ] Shell hydrostatic (ASME Section III)

b. [ ] Bearing temperature evaluations

c. [ ] Seismic loading

d. [ ] Vibration levels

e. [ ] Exploratory vibration

(Fundamental Freq.______)

f. [ ] Seal leakage & hydro press

g. [ ] Aging: [ ] Thermal
[ ] Mechanical

h. [ ] Flow performance
Are curves provided [ ] Yes
[ ] No

i. [ ] Pipe reaction end loads (nozzle loads)

j. [ ] Others ______________

k. [ ] Extreme environment:

[ ] Humidity

[ ] Chemical

[ ] Radiation

8. Valve operability has been demonstrated by: [ ] Analysis
[ ] Test [ ] Combination VALVE OPERABILITY HAS NOT BEEN PRESENTLY DEMONSTRATED

Identify VALVE tests performed: SEE ATTACHMENT

a. [X] Shell hydrostatic (ASME Section III)
VALVE ONLY

b. [ ] Cold cyclic List times:
Open ______
Closed ______

c. [ ] Seismic loading

d. [ ] Hot cyclic List times:
Open ______
Closed ______

e. [ ] Exploratory vibration

(Fundamental Freq.______)

f. [X] Main seat leakage
VALVE ONLY

g. [X] Aging: OPERATOR [X] Thermal [ ] Mechanical

h. [ ] Back seat leakage

i. [ ] Pipe reaction and loading

j. [X] Disc hydrostatic VALVE ONLY

k. [ ] Extreme environment:

[ ] Humidity

[ ] Chemical

[ ] Radiation

l. [ ] Flow interruption capability

m. [ ] Flow characteristics

Are curves provided?

[ ] Yes [ ] No

n. [ ] Others ____________

9. As a result of any of the tests (or analysis), were any deviations from design requirements identified? [ ] Yes [ ] No If "Yes", briefly describe any changes made in tests (or analysis) or to the component to correct the deviation.

N/A

10. Was the test component precisely identical (as to model, size, etc.) to the in-plant component? [ ] Yes [X] No. If "No", is installed component [ ] oversized or [X] undersized?
ANSWER PERTAINS TO ACTUATOR ONLY; TEST ARTICLE WAS SMB-3-100 WHICH IS LARGER THAN INSTALLED ACTUATOR

11. If type test was used to qualify the component, does the type test meet the requirements of IEEE 323-1974, Section 5.? [ ] Yes [X] No

12. Is component orientation sensitive? [X] Yes [ ] No [ ] Unknown If "Yes", does installed orientation coincide with test orientation? [ ] Yes [ ] No

Not known at this time.

13. Is the component mounted in the same manner in-plant as it was during testing (i.e., welded, same number and size bolts, etc.)? [ ] Yes [ ] No [ ] Unknown

Not known at this time.

14. Were the qualification tests performed in sequence and on only one component? [X] Yes [ ] No TESTS PERFORMED ON OPERATOR ONLY

If "Yes" identify sequence, (e.g., radiation, seismic, cyclic, thermal, etc.): THERMAL AGING; OPERATIONAL AGING; RADIATION

SEISMIC; ENVIRONMENTAL TEST

15. If "aging"* was performed, identify the significant aging mechanisms: THERMAL & RADIATION ; NO AGING TESTS PERFORMED

ON VALVE

16. Identify loads imposed (assumed) on the component for the qualification tests (analysis) performed:

a. [ ] Plants (shutdown loads) b. [ ] Extreme environment

c. [X] Seismic load d. [X] Others Hydrodynamic Loads

17. Have component design specifications been reviewed in-house to assure they envelope all expected operating, transient, and accident conditions? [ ] Yes [X] No (review in progress.)

18. Does the component utilize any unique or special materials? (Examples are special gaskets or packing, limitations on nonferrous materials, or special coatings or surfaces.) [ ] Yes [X] No

If "Yes", identify:

19. Does component require any special maintenance procedures or practices, (including shorter periods between maintenance)? [X] Yes [ ] No

If "Yes", identify: ASME Section XI tests; Check stroke time quarterly and perform leak rate test biennially.

20. Is the qualified life for the component less than 40 years? [ ] Yes [X] No If "Yes", what is the qualified life?

See attachment

*As outlined in Section 4.4.1 of IEEE-627 1980.

Attachment to Item 20.

The prediction of a "qualified life" through accelerated aging is generally not feasible at the present state of the art. An aging analysis has been performed for electrical equipment located in potentially harsh environmental areas. The results of these studies are contained in a report to the NRC titled, "WNP-2 Environmental Equipment Qualification Report for Safety-Related Equipment, September 1982". Attached are the summary sheets for the electrical components associated with the selected equipment located in potential harsh environments.

Results of the aging analysis will be used to define recommended maintenance/replacement interval for inclusion in the WNP-2 maintenance and surveillance procedures.

ATTACHMENT

The HPCS-V-15 valve supplied under a General Electric contract was qualified to the Interim piping criteria as established per Reference 3).

The Interim Load was compared to the Final Piping Analysis per Reference 4). The review found that the Final Piping Analysis exceeded the loads considered in the Interim Criteria.

The qualification of HPCS-V-15 is, therefore, an "M" - being analyzed. The valve is currently being analyzed to the new loads.

References:
1) QID File 361075
2) Telephone conversation between Joe Braverman (B&R Woodbury) and F. G. Buck (Supply System), 10/19/82
3) Conference Notes 856, Burns and Roe Woodbury
4) Safety Evaluation Report, Docket #50-397, Section 3.10(3)

WPPSS QID #221001

WASHINGTON PUBLIC POWER SUPPLY SYSTEM

EQUIPMENT QUALIFICATION REPORT

OWNER: WPPSS
FACILITY: WNP-2
SPEC: 2808-02E22

MPL: E22-F001
PED: 21A1883

REVISION: 2
DATE: September, 1982

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENT REF.		QUALIFICATION METHOD	OUTSTANDING ITEMS
	PARAMETER	FSAR	QUALIFICATION	FSAR	QUAL.		
SYSTEM High Pressure Core Spray TAG NUMBER HPCS-MO-1	OPERATING TIME	24 hours	16 days	4	2	Simultaneous Test	None
	TEMPERATURE (F)	90 max normal 104 max abnormal Accident Profile 4	See enclosed profile	1	2	Simultaneous Test	None
MANUFACTURER Limitorque	PRESSURE (PSIA)	14.7	See enclosed profile	1	2	Simultaneous Test	None
MODEL NUMBER SHB-000-25/P12B	RELATIVE HUMIDITY (%)	40 normal 90 max abnormal Accident Profile 4	Steam for 24 hours 100% for 15 days	1	2	Simultaneous Test	None
COMPONENT Valve Motor Operator (Reliance Class B) FUNCTION/SERVICE	CHEMICAL SPRAY	N/A	N/A	1	N/A	N/A	None
Operate HPCS Valve 1	RADIATION (RAD)	1.6×10^6	2×10^7	3	2	Sequential Test	None
	AGING	40 years	40 years	1	2,5	Sequential Test and Engineering Analysis	None
LOCATION: BLDG R ELEVATION 435 COLUMN H/4	ACCURACY	N/A	N/A	N/A	N/A	N/A	None

FLOOD LEVEL ELEV:
ABOVE FLOOD LEVEL?
YES X NO

Prepared by: [signature] 9/1/82 Reviewed by: [signature] 9/1/82

DOCUMENTATION REFERENCES

1. FSAR Par. 3.11
2. Limitorque Test Report B0003, with Addendum A, prepared 5/8/76
3. EDS Study 0740-00-422D
4. WNP-2 1E Equipment List, September 1982
5. Calculations in QID 221001

NOTES

Qualified.

WP-1081

WPPSS

WASHINGTON PUBLIC POWER SUPPLY SYSTEM

QID #221001

EQUIPMENT QUALIFICATION REPORT

OWNER: WPPSS
FACILITY: WNP-2
SPEC: 2808-02E22
MPL: E22-F012
PPD: 21A1880

EQUIPMENT DESCRIPTION	ENVIRONMENT	
	PARAMETER	FSAR
SYSTEM High Pressure Core Spray TAG NUMBER HPCS-MO-12,15	OPERATING TIME	24 hours
	TEMPERATURE (F)	90 max normal 104 max abnormal Accident Profile 4
MANUFACTURER Limitorque MODEL NUMBER SMB-2-40/C184Y SMB-2-60/C184Y	PRESSURE (PSIA)	14.7
COMPONENT Valve Motor Operator*	RELATIVE HUMIDITY (%)	40 normal 90 max abnormal Accident Profile 4
FUNCTION/SERVICE Operate HPCS Valve 12	CHEMICAL SPRAY	N/A
	RADIATION (RAD)	1.6×10^6
	AGING	40 years
LOCATION: BLDG R ELEVATION 430, 455 COLUMN M/3.4, L.4/3.6	ACCURACY	N/A
FLOOD LEVEL ELEV: ABOVE FLOOD LEVEL? YES X NO		

Reference:
3. EDS Report 0740-004-441C

WP-1082

*(Reliance Class B)

Prepared By: [signature]
Reviewed By: [signature] 8/20/82

OWNER: WPPSS
FACILITY: WNP-2
SPEC: 2808-02E22
MPL: E22-F010
PPD: 21A1881

EQUIPMENT DESCRIPTION	ENVIRONMENT	
	PARAMETER	FSAR
SYSTEM High Pressure Core Spray TAG NUMBER HPCS-MO-10,11	OPERATING TIME	24 hours
	TEMPERATURE (F)	90 max normal 104 max abnormal Accident Profile 4
MANUFACTURER Limitorque MODEL NUMBER SMB-3	PRESSURE (PSIA)	14.7
COMPONENT Valve Motor Operator*	RELATIVE HUMIDITY (%)	40 normal 90 max abnormal Accident Profile 4
FUNCTION/SERVICE Operate HPCS Valve 10	CHEMICAL SPRAY	N/A
	RADIATION (RAD)	1.4×10^6
	AGING	40 years
LOCATION: BLDG R ELEVATION 452 COLUMN H/3.8	ACCURACY	N/A
FLOOD LEVEL ELEV: ABOVE FLOOD LEVEL? YES X NO		

* (Reliance Class B)

PUMP AND VALVE
OPERABILITY ASSURANCE REVIEW

Valve CVB-V-1G ✓
P&ID M543 Zone B-11

I. PLANT INFORMATION

1. Name: WNP-2 Unit No.: ____ 2. Docket No.: 50-397

3. Utility: Washington Public Power Supply System

4. NSSS: General Electric [ ] PWR [X] BWR

5. A/E: Burns and Roe

II. GENERAL COMPONENT* INFORMATION

1. Supplier: [ ] NSSS [x] BOP

2. Location: a. Building/Room Containment 150^{o} Azimuth/R=35

b. Elevation 441

c. System Primary Containment Cooling

3. Component number on in-house drawings: CVB-V-1G

4. If component is a [ ] Pump complete II.5.

If component is a [X] Valve complete II.6.

5. General Pump Data

a. Pump		b. Prime-mover	
Name		Name	
Mfg.		Mfg.	
Model		Model	
S/N		S/N	
Type		Type	

*The component, whether pump or valve, is considered to be an assembly composed of the body, internals, prime-mover (or actuator) and functional accessories.

6. General Valve Data

a. Valve		b. Actuator (if not an integral unit)	
Name	CVB-V-1G	Name	Not applicable
Mfg.	Anderson-Greenwood	Mfg.	
Model	CVI-L-Type	Model	
S/N	VB 7894	S/N	
Type	DOUBLE DISC CHECK	Type	
Size	24 inch	Size	
Weight	1500# TOTAL	Weight	
Mounting Method	Flange mounted	Mounting Method	
Required Torque	Not applicable	Torque	

Parameter	Design	Operating
Press psig	45	~0
Temp °F	340 internal 275 external	150 max.
Flow	varies with ΔP	

Power requirements: (include normal, maximum and minimum)

Electrical

Max ΔP across valve 6.4 psid

Closing time @ max ΔP not applic.

Opening time @ max ΔP not applic.

Other: [X] Pneumatic [ ] Hydraulic

125 psig

Power requirements for functional accessories, (if any)

List control signal inputs: For testing purposes only, valve may be actuated by remote manual switch to demonstrate operability of internals.

List functional accessories:* ______________________

____

III. FUNCTION

1. Briefly describe components normal and safety functions: Valve has no "normal" function. The safety function is to maintain equilibrium pressure between drywell and wetwell to thus mitigate containment pressure increase during postulated event.

2. The components normal state is: [ ] Operating [X] Standby

3. Safety function:

   a. [ ] Emergency reactor shutdown
   b. [ ] Containment heat removal
   c. [ ] Containment isolation
   d. [ ] Reactor heat removal
   e. [ ] Reactor core cooling
   f. [X] Prevent significant release of radioactive material to environment
   g. [X] Does the component function to mitigate the consequences of one or more of the following events? [X] Yes [ ] No
      If "Yes", identify.

      [X] LOCA [ ] HELB [X] MSLB

      [ ] Other ______________________

4. Safety requirements:

   [X] Intermittent Operation [X] During postulated event

   [ ] Continuous Operation [ ] Following postualted event

   If component operation is required following an event, give approximate length of time component must remain operational.

   4320 hours (e.g., hours, days, etc.)

____

*Functional accessories are those sub-components not supplied by the manufacturer that are required to make the valve assembly operational, (e.g., limit switches).

5. For VALVES:

does the component [ ] Fail open [ ] Fail closed [X] Fail as is
Pneumatic cylinder failure does not cause valve failure.
Is this the fail-safe position [ ] Yes [ ] No

Is the valve used for throttling purposes? [ ] Yes [X] No

Is the valve part of the reactor coolant pressure boundary? [ ] Yes [X] No

Does the valve have a specific limit for leakage? [ ] Yes [ ] No

If "Yes" give limit: Operational limit for aggregate leakage will be identified in approved Tech. Spec.

IV. QUALIFICATION

1. Reference by specific number those applicable sections of the design codes and standards applicable to the component:

   ASME Section III-NC; Burns & Roe Spec. 2808-68

2. Reference those qualification standards, used as a guide to qualify the component:

   IEEE 323-1971 (Reevaluation to IEEE 323-1974)

3. Identify those parts of the above qualification standards deleted or modified in the qualification program.

   Deleted: See attachment

   Modified:

4. Have acceptance criterias been established and documented in the test plan(s) for the component? [ ] Yes [X] No

5. What is the expected failure mode that would keep the pump or valve assembly from performing its safety function?

   Disc deflection greater than allowable

6. Are the margins* identified in the qualification documentation?
   [ ] Yes [ ] No

   See attachment

*Margin is the difference between design basis parameters and the test parameters used for equipment qualification.

If component is a PUMP, complete IV.7.

If component is a VALVE, complete IV.8.

7. Pump operability has been demonstrated by: [ ] Analysis
[ ] Test [ ] Combination

Identify PUMP tests performed:

a. [ ] Shell hydrostatic (ASME Section III)

b. [ ] Bearing temperature evaluations

c. [ ] Seismic loading

d. [ ] Vibration levels

e. [ ] Exploratory vibration

(Fundamental Freq.______)

f. [ ] Seal leakage & hydro press

g. [ ] Aging: [ ] Thermal
[ ] Mechanical

h. [ ] Flow performance
Are curves provided [ ] Yes
[ ] No

i. [ ] Pipe reaction end loads (nozzle loads)

j. [ ] Others ____________________

____

____

____

____

____

k. [ ] Extreme environment:

[ ] Humidity

[ ] Chemical

[ ] Radiation

8. Valve operability has been demonstrated by: [ ] Analysis
[ ] Test [ ] Combination
SEE ATTACHMENT

Identify VALVE tests performed:

a. [X] Shell hydrostatic (ASME Section III)

b. [ ] Cold cyclic List times:
Open ____________
Closed ____________

c. [ ] Seismic loading

d. [ ] Hot cyclic List times:
Open ____________
Closed ____________

e. [ ] Exploratory vibration

(Fundamental Freq.______)

f. [ ] Main seat leakage

g. [ ] Aging: [ ] Thermal
[ ] Mechanical

h. [ ] Back seat leakage

i. [ ] Pipe reaction end loading

j. [ ] Disc hydrostatic

k. [ ] Extreme environment:

[ ] Humidity

[ ] Chemical

[ ] Radiation

l. [ ] Flow interruption capability

m. [ ] Flow characteristics

Are curves provided?

[ ] Yes [ ] No

n. [ ] Others ____________________

____

____

9. As a result of any of the tests (or analysis), were any deviations from design requirements identified? [ ] Yes [ ] No If "Yes", briefly describe any changes made in tests (or analysis) or to the component to correct the deviation.

See attachment

10. Was the test component precisely identical (as to model, size, etc.) to the in-plant component? [ ] Yes [ ] No If "No", is installed component [ ] oversized or [ ] undersized?

See attachment

11. If type test was used to qualify the component, does the type test meet the requirements of IEEE 323-1974, Section 5.? [ ] Yes [X] No

12. Is component orientation sensitive? [X] Yes [ ] No [ ] Unknown If "Yes", does installed orientation coincide with test orientation? [ ] Yes [ ] No

See attachment

13. Is the component mounted in the same manner in-plant as it was during testing (i.e., welded, same number and size bolts, etc.)? [ ] Yes [ ] No [ ] Unknown

See attachment

14. Were the qualification tests performed in sequence and on only one component? [ ] Yes [ ] No See attachment

If "Yes" identify sequence, (e.g., radiation, seismic, cyclic, thermal, etc.): ______

______

15. If "aging"* was performed, identify the significant aging mechanisms: ______

______

______

16. Identify loads imposed (assumed) on the component for the qualification tests (analysis) performed:

a. [ ] Plants (shutdown loads) b. [ ] Extreme environment

c. [ ] Seismic load d. [ ] Others ______ ______

______ ______

17. Have component design specifications been reviewed in-house to assure they envelope all expected operating, transient, and accident conditions? [ ] Yes [X] No Review in progress.

18. Does the component utilize any unique or special materials? (Examples are special gaskets or packing, limitations on nonferrous materials, or special coatings or surfaces.) [ ] Yes [X] No

If "Yes", identify: ______

______

19. Does component require any special maintenance procedures or practices, (including shorter periods between maintenance)? [X] Yes [ ] No

If "Yes", identify: ASME Section XI tests: Exercise valve quarterly; perform leak rate test per Tech. Spec.

20. Is the qualified life for the component less than 40 years? [ ] Yes [ ] No If "Yes", what is the qualified life? ______

See Attachment

*As outlined in Section 4.4.1 of IEEE-627 1980.

21. Information Concerning Qualification Documents for the Component

Report Number	Report Title	Date	Company/Organization Preparing Report	Company/Organization Reviewing Report
QID 361901			Supply System EQ File	
NEDE-22178-P	Mark II Containment Drywell to Wetwell Vacuum Breaker Models	8/82	General Electric	Supply System
Tech. Memo. #1258	SA Fogelson	3/4/82	Burns and Roe	Supply System
N80.6	Mark II Plant Unique Vacuum Breaker Dynamic Load Spec	10/82	Continuum Dynamics	Supply System

ATTACHMENT

A reevaluation of the equipment capability to function during an accident is being performed. The criteria being employed is contained in a report sent to the NRC titled, "WNP-2 Environmental Equipment Qualification Report for Safety-Related Equipment, September 1982". The results of this reevaluation are not available at this time.

PRELIMINARY QUALIFICATION APPROACH FOR WNP-2 VACUUM BREAKERS

Equipment Description

Drywell/wetwell vacuum breakers are provided as part of the primary containment design to prevent any occurrence of an excessive (negative) upward differential pressure loading on the drywell floor or excessive inward pressure loading on the drywell/wetwell walls. At WNP-2 the drywell/wetwall vacuum breakers are located on nine peripheral downcomers at approximately the 492' elevation. The valves were built under ASME Section III Class 2 rules by Anderson Greenwood & Co. (AGCo) of Houston, Texas. The valves are of a dual disc design (i.e., two sealing discs in series) in a single valve body with 150 pound class, 24-inch diameter flanges. The series disc arrangement provides redundant sealing at each valve. Additionally, excess valve capacity has been provided since only seven of the nine valves installed in containment are needed for adequate normalization of pressure during transient events. The valves utilize magnets embedded in the disc flange to attain a set point opening pressure between 0.15 and 0.35 psid. Each valve disc also features both positive opening and closing (externally valve mounted) air actuation cylinders, which may be activated from the plant control room. Limit switches monitor the disc position for remote surveillance by the plant operators. The valve disc shafts are mounted on enclosed and sealed ball bearings. AGCo drawings N04-3800 and N04-3825 (sheets 1 and 2) provide a complete list of parts, materials, and overall dimensions for the valve.

Valve Modification

The potential problem of drywell/wetwell vacuum breaker cycling during a LOCA originally surfaced in the Mark II Owner's Group in early 1980. This issue was dealt with by creating a GE program, Task A.29, to analytically model condensation induced downcomer vent pressure transients during the chugging phase of a LOCA and to develop a plant unique forcing function to apply to the vacuum breakers.

Work on this task was carried out by Continuum Dynamics Inc. (CDI), subcontracted to GE. It culminated with the issuance of a "Mark II Plant Unique Vacuum Breaker Dynamic Load Specification", which concluded that the Mark II Plants with vacuum breakers attached to downcomers should expect actuation of these valves during chugging. The specification also provided a table of impact velocities and number of impacts to be expected.

An additional potential problem with the drywell/wetwell vacuum breakers was identified by GE at the Mark II Owner's Chugging Subcommittee on November 11, 1981. As a result of a large primary system rupture loss-of-coolant-accident, the vacuum breakers could possibly be actuated and overstressed by the overpressurization of the wetwell airspace during the pool swell phase. This was recognized as a problem generic to all the Mark II plants and not limited to those with their drywell/wetwell vacuum breakers located on downcomers. It was, therefore, integrated into the Mark II Owner's Vacuum Breaker Program, GE Task A.29, and the AGCo Test Program initiated on June 4, 1981.

Task A.29 and the AGCo Test Program generated a test validated dynamic model for the AGCo vacuum breaker valves. Results of this work has been reported to the owners and the NRC in the "Mark II Containment Drywell-to-Wetwell Vacuum Breaker Models" Report. The test program also revealed that at a 10 radians/sec disc impact velocity, the WNP-2 vacuum breakers experienced stresses at or near yield in the valve disc (note that all major valve components were strain gauge instrumented). This was unacceptable since predicted peak chugging and pool swell disc impacts were predicted by the CDI dynamic model to be 25 to 35 radians/sec.

The Supply System considered various alternatives to modify the valves to be able to operate under this condition without failure. Supply System scoping calculations revealed that dampers coupled to the valve disc shafts could be used to reduce disc impacts to acceptable levels. As a result, in March of 1982 the Supply System contracted with CDI to size a

damper for our valves utilizing the dynamic model which had been validated via the AGCo Test Program. Many candidate dampers were surveyed and analyzed. The work culminated this past September by selecting a Pacific Scientific pipe snubber, Model PSA-3. The snubber was selected for the ability to damp the disc impact, its all mechanical design (i.e., no fluids), broad temperature insensitivity, corrosion resistance, and vast experience and testing in nuclear power plant applications.

With the snubber damping force input into the CDI dynamic model, peak impacts were reduced to less than 4 radians/sec. This is well below the 10 radian/sec first determined in the AGCo tests. CDI also completed a test on a single snubber to ensure that the manufacturer's functional load response description was correct and properly input into the dynamic model.

It was also recognized that the snubber addition would slow the valve response time during low-level transients such as inadvertent containment spray actuation. As a result, Burns and Roe reanalyzed the containment to determine the maximum time in which the vacuum breakers could be permitted to attain a full open condition. This opening time limit was determined to be on the order of 10 seconds. The damped valve was analyzed using the Burns and Roe spray actuation load definition and found to have a full open response time of 1.8 seconds, well below the ten second limit. Finally, CDI developed peak damping force time histories to be used for mechanical design analysis modification of the valve.

In September of this year, AGCo was contracted to implement the mechanical design modification of the valve, fitting a single PSA-3 snubber (one per valve disc), in accordance with the test validated dynamic model results provided by CDI. The conceptual design modification has been completed by AGCo under CDI and Supply System review and direction. In summary, the valve will be rebuilt with larger shafts (increased to 1.25 inches from 1.0 inch), reinforced disc arms, larger bearings, selective use of high strength ASME Code approved materials, and external brackets to mount the snubber to the valve body. Drawings showing the modification in detail are being prepared by AG&Co.

Qualification Method

The dynamic analysis for the WNP-2 vacuum breaker valves will be completed using the test validated model developed by Continuum Dynamics and AGCo under GE Task A.29 for the Mark II Owner's[1] and will include seismic/hydrodynamic loads.

The analysis in conjunction with a test presently being devised for the WNP-2 vacuum breaker valves modified with Dampers will form the Qualification Method.

The basic thrust of the test plan is to dynamically load the valve disc, via a hydraulic ram and cable attachments, to achieve disc forces equal to the peak pressure loads predicted under LOCA conditions. The vacuum breaker environmental design basis is provided in Tables 1, 2, and 3. The LOCA load definition is provided in the plant unique dynamic load specification.[2] Seismic and Dynamic vibrational loads are provided in Table 4.

The valve response will be instrumented and compared to the dynamic analysis predictions.

Following the dynamic test(s) the valve will undergo complete functional tests and leak rate tests to ensure operability under these conditions. The test will be conducted early in 1983 by AGCo and CDI. Additionally, each snubber Pacific Scientific provides for this application will be tested and certified compatible with the functional inputs used in the dynamic analysis.

To R.E. Snai· . 3/4/82
From S.A. Fogelson

TABLE 2
(Ref. 5)

DRYWELL-WETWELL AND WETWELL-REACTOR BUILDING VACUUM BREAKER

PRINCIPAL DESIGN PARAMETERS

Pressure Suppression Chamber -	Internal Design Pressure	45 psig
	External Design Pressure	2.0 psid
Drywell -	Internal Design Pressure	45 psig
	External Design Pressure	2.0 psid
Drywell Free Volume		202,242 ft.3
Pressure Suppression Chamber Free Volume		144,166 ft.3
Pressure Suppression Pool Water, Volume (min.)		108,387 ft.3
Submergence of Vent Pipe Below Pressure Suppression Pool Surface		11.67 ft.
Calculated Maximum Pressure after Blowdown		
Drywell		37.2 psig
Pressure Suppression Chamber		28 psig
Normal Operating Temperture - Suppression Chamber		95°F
Normal Operating Temperature - Drywell		135°F
Normal Relative Humidity - Drywell		50%
Normal Relative Humidity - Wetwell		100%
Normal Drywell Pressure		0.7 psig
Normal Wetwell Pressure		0.7 psig

TABLE 3
(Ref. 7)
DRYWELL-WETWELL DESIGN CONDITIONS

The 24" (port size) 150# flanged valves will be located in suppression pool of an "over and under" type BWR containment vessel. Valves will relieve pressure differenial between drywell and suppression chamber. Tag numbers for these valves are: CVB-V-1A, CVB-V-1B, CVB-V-1C, CVB-V-1D, CVB-V-1E, CVB-C-1F, CVB-V-1G, CVB-V-1H (VSB-V-1J, CVB-V-1K if necessary).

A. Environmental Conditions

Accident Conditions

Air temperture, °F 275
Relative humidity -All steam
Pressure, psig 25 calculated/45 design
Radiation:

Type	Gamma
Level, Rad/hr	1.3×10^6 (Loss of Coolant & Accident)
Life dosage, Roentgens	2.6×10^7 (integrated over 6 months)

Normal Operating Conditions (100% Power)

Air temperature, °F	60-170
Relative humidity, percent	100%
Pressure, psig	-0.5 to 2
Radiation:	
Level	
Gamma, Rad/hr	0.1
Neutron, Neutrons/cm^2-sec.	2×10^2
Life Dosage	
Gamma	3.5×10^4 (integrated over 40 years)

B. Operating Parameters

a. Operation
Each valve shall be capable of operation safely under the design conditions summarized below:
Normal Operation
1. Drywell - 2 psig, 150°F, and 40 percent relative humidity.
2. Suppression Chamber - 2 psig and 50°F and 100 percent relative humidity.
Transient Operation
1. Drywell - 45 psig and 340°F. (valve internal)
2. Suppression Chamber - 45 psig and 275°F. (valve ambient)

b. Response Time
Each valve disc shall open fully within one (1) second when a maximum differential pressure of 0.5 psi exists between the suppression chamber and the drywell.

c. Leak Rate
The maximum allowable vacuum breaker leakage from the drywell to the suppression chamber side of the valve shall be 10 std. cc of air per inch of valve seat diameter per hour, per disc.

d. Set Pressure
The set pressure for each valve shall be within the range of .150 to .350 psi differential.

e. Operating Cycle
The valve shall provide a service life of 40 years considering 20 operating cycles per year over the life of the valve.

f. Operator
The pneumatic operator and related equipment shall be furnished to conform with a safe working pressure of 150 psig minimum.

TABLE 4
(Ref. 7)
WETWELL-REACTOR BUILDING DESIGN CONDITIONS

Three (3) 24" 150# flanged valves will be located in the Reactor Building. Valves will mechanically relieve pressure differential (Vacuum) between suppression chamber and Reactor Building. The tag numbers for these valves are: CSP-V-7, CSP-V-8, CSP-V-10.

A. Environmental Conditions

Accident Conditions

Valves must be operable under the following conditions:

	Internal	Ambient
First 6 Hours		
Temperature, °F	275(1)	212
Relative humidity, percent	100(1)	100
Pressure, psig	45(1)	+0.25
(1) - First 24 hours		
Next 6 Hours		
Temperature, °F	-	150
Relative humidity, percent	-	100
Pressure, psig	-	-0.1 to 0.25
Next 100 Days		
Temperature, °F	200	150
Relative humidity, percent	100	90
Pressure, psig	-2 to 20	-0.1 to 0.25
Radiation Level, Gamma		
Level, Rad/hr	6.5 x 102	
Life dosage, Rads	1.7 x 105 (integrated over 40 years)	

Normal Operating Conditions (100% Power)

	Internal	Ambient
Design temperature, °F	60 - 170	40 - 104
Pressure, psig	-.5 to 2	-.1 to 0.25
Relative humidity, percent	100%	0 to 100%

Radiation Level

a. Gamma, Rads/hr 0.001
b. Neutron, Neuts/cm^2-sec 1
c. Life dosage, rads 3.5×10^2
(integrated over 40 years)

Operating Parameters

a. Leak Rate
The maximum allowable vacuum breaker leak rate from suppression chamber to Reactor Building shall be 10 std. cc of air per inch of valve seat diameter per hour. (delete)

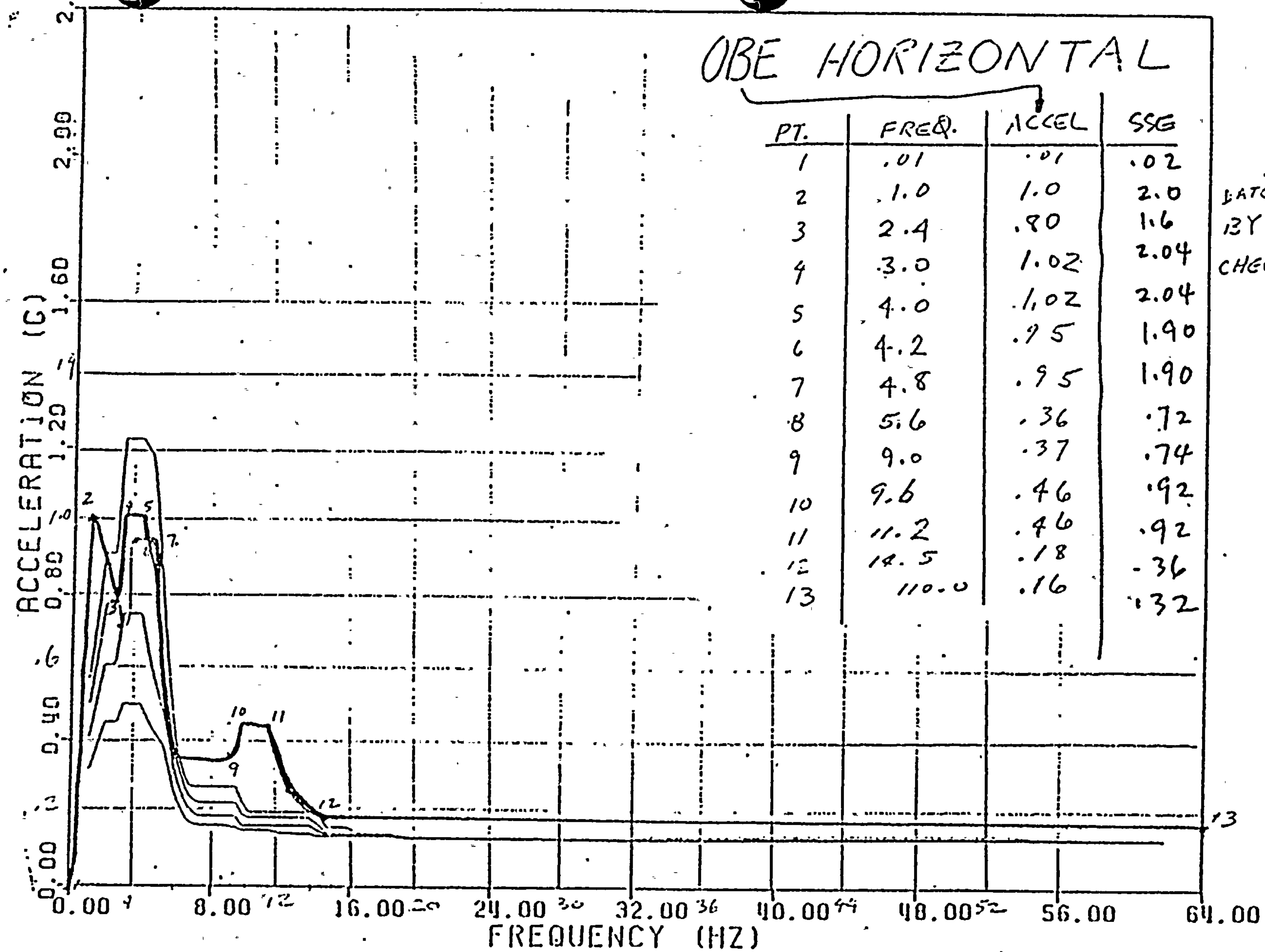
b. Response Time
Each valve shall open fully within one (1) second when a maximum differential pressure of 0.5 psi exists between the Reactor Building and the suppression chamber.

c. Operating Cycles
The valve shall provide a service life of 40 years considering 20 operating cycles per year over the life of the valve.

d. Set Pressure
The set pressure for each valve shall be within the range from .150 to .350 psi differential.

e. Operator
The pneumatic operator and related equipment shall be furnished to conform with a safe working pressure of 150 psig minimum.

TABLE 4.1



OBE HORIZONTAL

PT.	FREQ.	ACCEL	SSE
1	.01	.01	.02
2	1.0	1.0	2.0
3	2.4	.80	1.6
4	3.0	1.02	2.04
5	4.0	1.02	2.04
6	4.2	.95	1.90
7	4.8	.95	1.90
8	5.6	.36	.72
9	9.0	.37	.74
10	9.6	.46	.92
11	11.2	.46	.92
12	14.5	.18	.36
13	110.0	.16	.32

DATE: 8/19/82
BY: BB
CHECKED: [illegible]

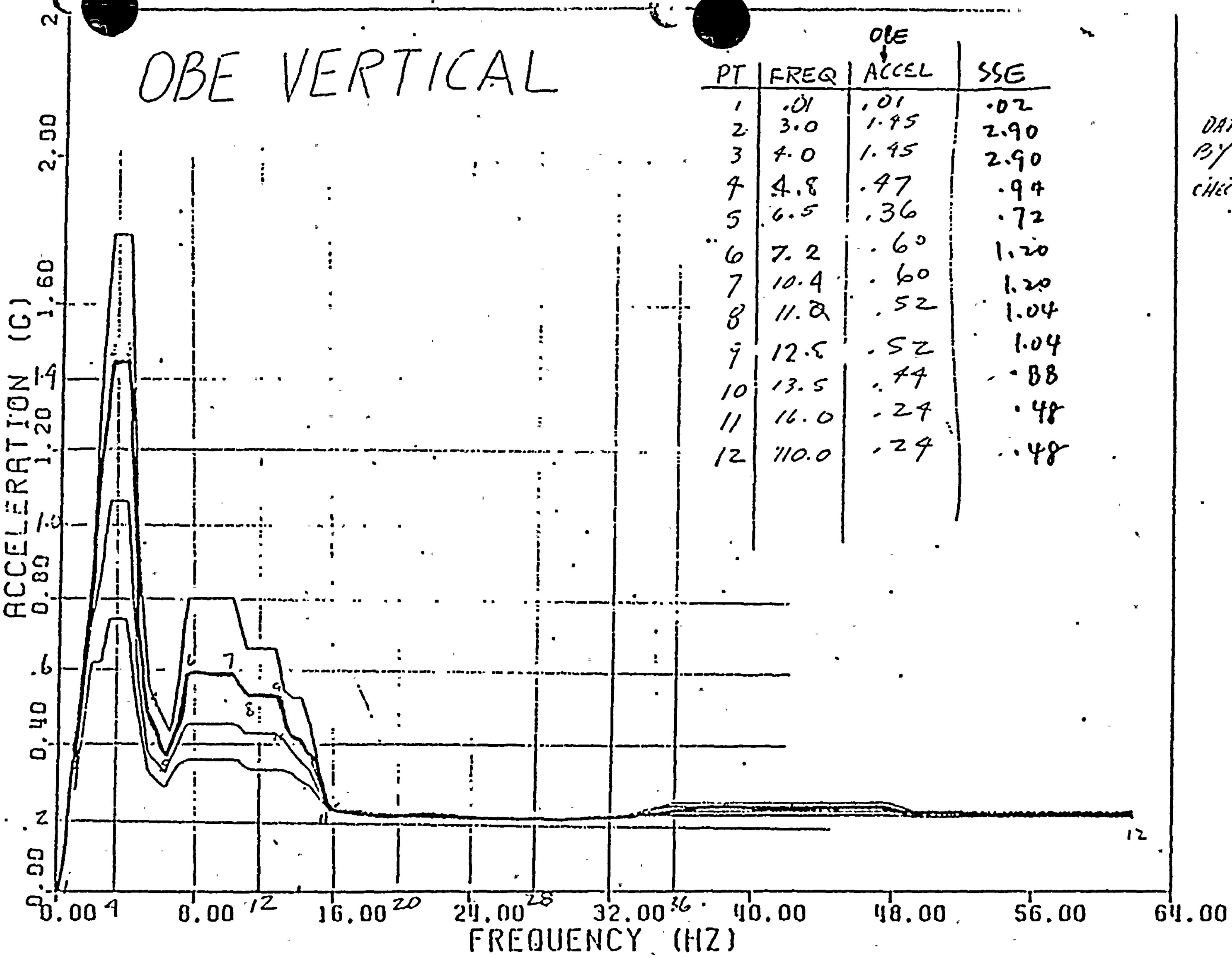
WPPSS REACTOR BLDG. SEISMIC OBE RESPONSE SPECTRA
MASS NO. 137 EL. 414 FT. HORIZ. TRANSLATION
BASEMAT DAMPING= .005, .01, .02, .04

OBE VERTICAL

PT	FREQ	OBE ACCEL	SSE
1	.01	.01	.02
2	3.0	1.45	2.90
3	4.0	1.45	2.90
4	4.8	.47	.94
5	6.5	.36	.72
6	7.2	.60	1.20
7	10.4	.60	1.20
8	11.2	.52	1.04
9	12.5	.52	1.04
10	13.5	.44	.88
11	16.0	.24	.48
12	110.0	.24	.48

DATE: 8/20/82
BY: BB
CHECKED: [illegible]

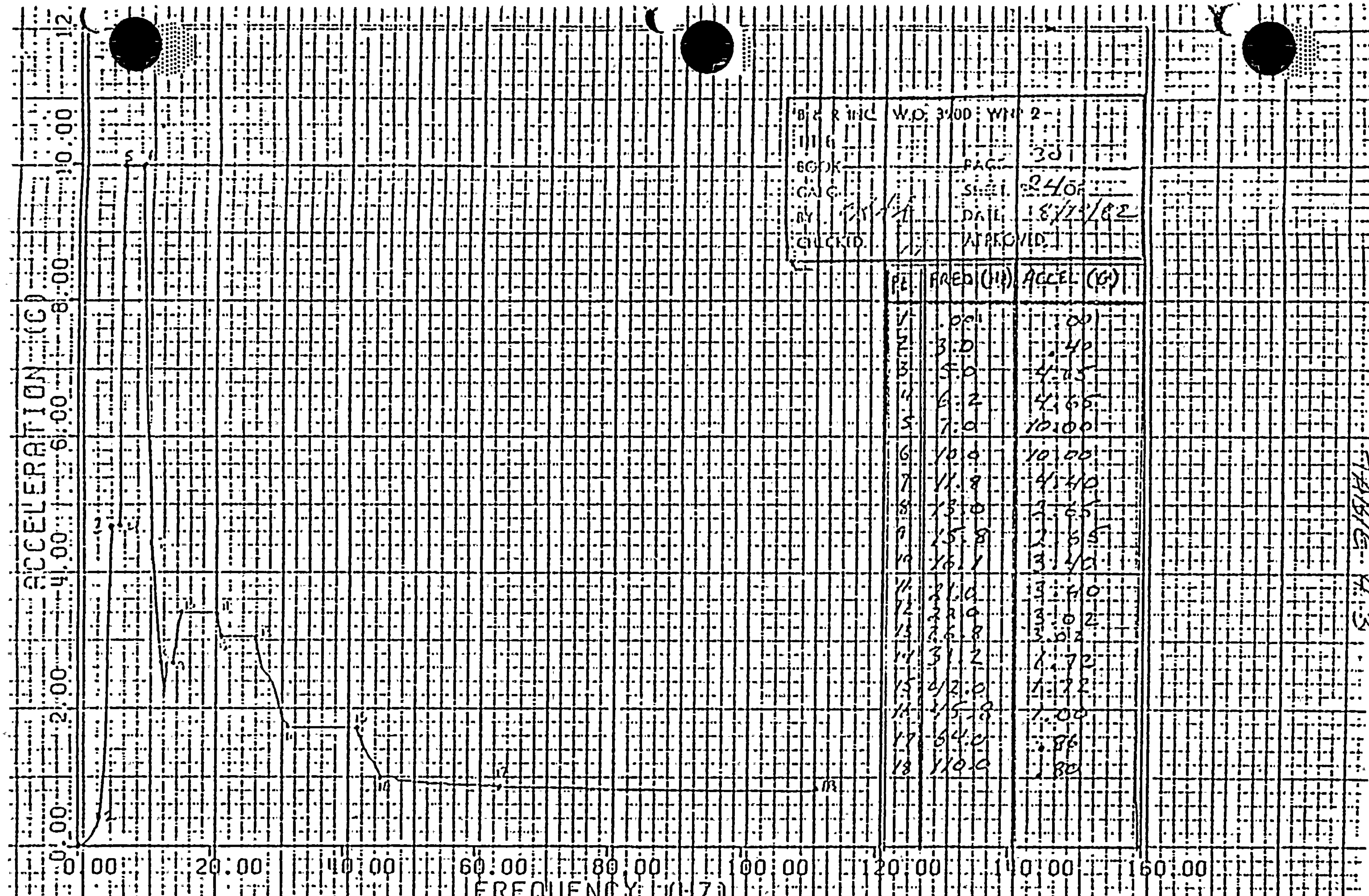
TABLE 4.2



WPPSS REACTOR BLDG. SEISMIC OBE RESPONSE SPECTRA

MASS NO. 198 EL. 500 FT. VERT. TRANSLATION

RPV PEDESTAL DAMPING= .005,.01,.02,.04



B & R INC W.O. 3100 WNP 2
TITLE
BOOK PAGE 30
CALC. SHEET 24 OF
BY DATE 8/23/82
CHECKED APPROVED

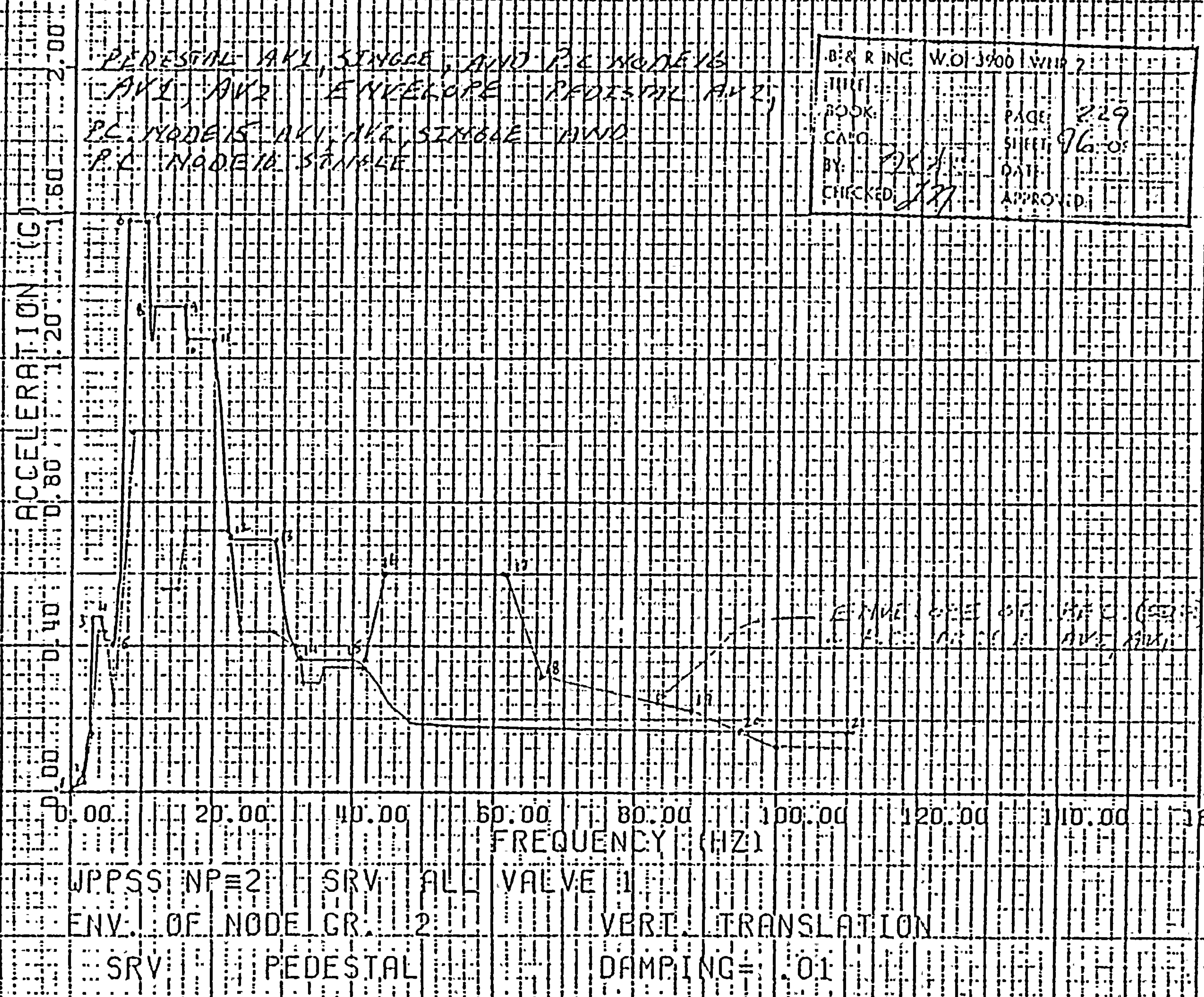
PT	FREQ (HZ)	ACCEL (G)
1	.00	.00
2	3.0	.40
3	5.0	4.75
4	6.2	4.66
5	7.0	10.00
6	10.0	10.00
7	11.8	4.40
8	13.0	3.65
9	15.8	2.65
10	16.1	3.40
11	21.0	3.40
12	22.0	3.02
13	26.8	3.02
14	31.2	1.72
15	42.0	1.72
16	45.8	1.00
17	64.0	.86
18	110.0	.80

WPPSS NP=2 SRV SINGLE VALVE

TANG. TRANSLATION

ENV. OF NODE GR. 1

PRIMARY CONTAINMENT WETWELL NODE 12 DAMPING= 1.01



Pt	FREQ(Hz)	ACCE
1	.001	.0[illegible]
2	1.9	.05
3	3.0	.4[illegible]
4	4.2	.44
5	6.0	.40
6	7.9	1.5[illegible]
7	10.2	1.51
8	11.0	1.3[illegible]
9	15.9	1.35
10	16.1	1.2[illegible]
11	20.0	1.25
12	22.2	.70
13	29.0	.70
14	32.6	.36
15	41.8	.36
16	44.2	.60
17	61.5	.60
18	67.9	
19	87.6	.2
20	95.0	.11
21	110.0	.16

TABLE 4.4

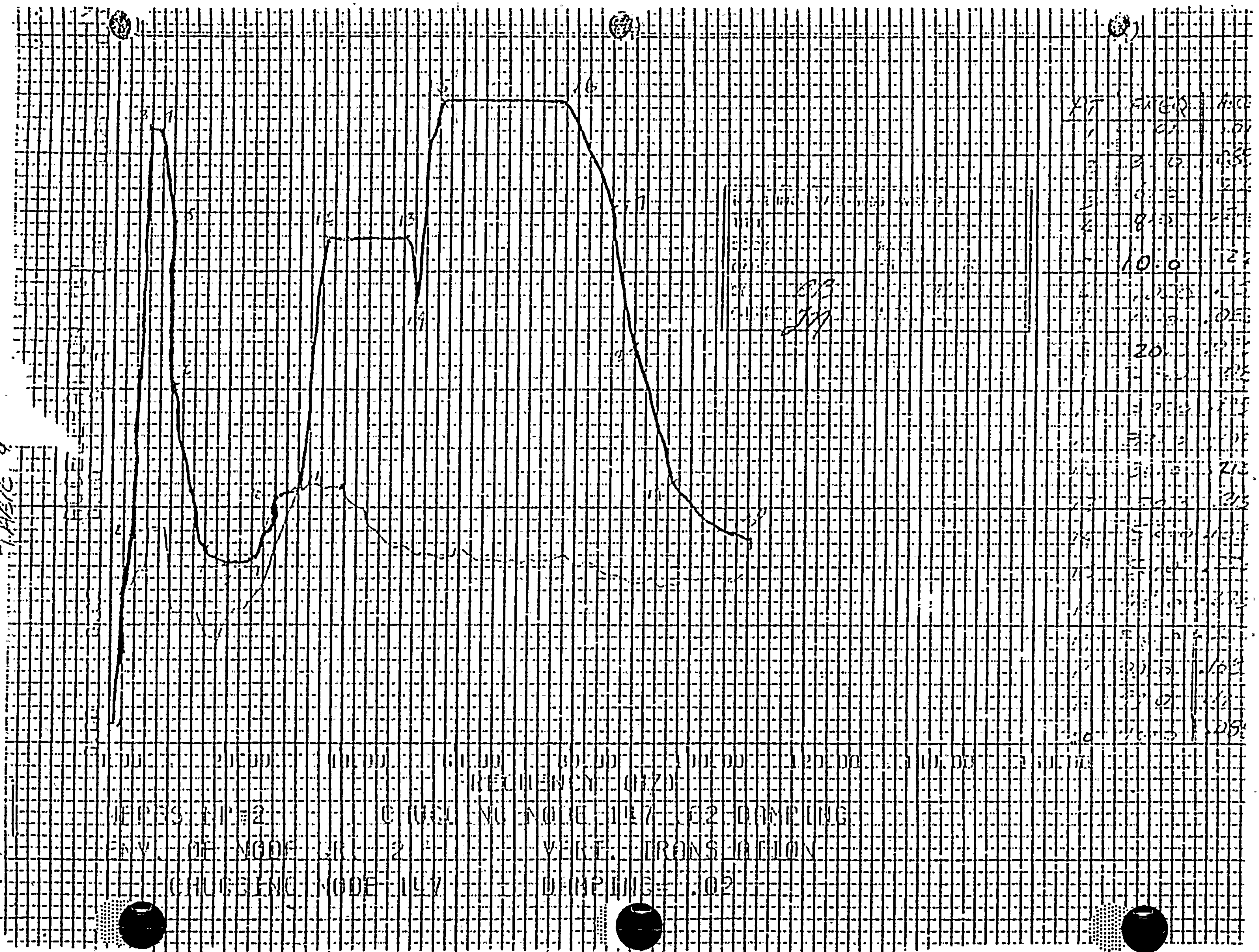
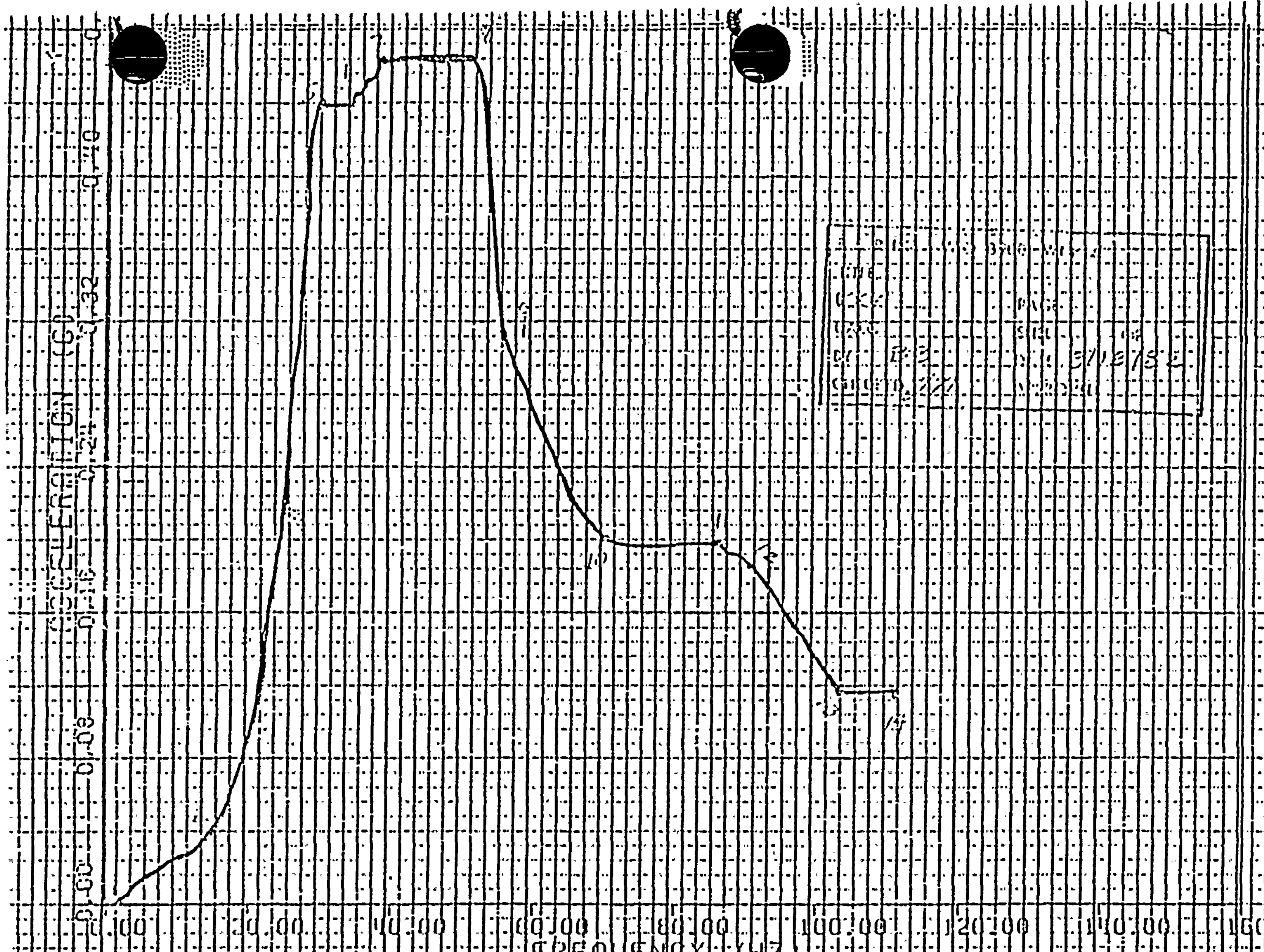


TABLE 4
20.00
40.00
60.00
80.00
100.00
120.00
FREQUENCY (HZ)
DAMPING
VERT. TRANSLATION
CHUGGING MODE 117
DAMPING .02



UPPSS N 1=2 CHUGGING PEDESTAL AND DIAPHRAGM .02 DAMPING
ENV. OF NODE GR. 1 HORIZ. TRANSLATION
CHUGGING PEDESTAL AND DIAPHRAGM DAMPING= .02

PT	FREQ	ACCEL
1	.01	.01
2	17.0	.048
3	23.0	.148
4	25.0	.212
5	30.0	.447
6	32.0	.447
7	38.0	.447
8	55.0	.447
9	56.0	.312
10	78.0	.20
11	86.0	.20
12	91.5	.184
13	104.0	.116
14	110.0	.116

TABLE 4

REFERENCES

1) NEDE-22178-P, "Mark II Containment Drywell-to-Wetwell Vacuum Breaker Models", General Electric Co., August 1982.

2) Teske, M.E., "Mark II Plant-Unique Vacuum Breaker Dynamic Load Specification, Ref. 2", Continuim Dynamics Inc., Report No. 80-6, October 1980.

3) Burns and Roe Technical Memorandum No. 1258, March 4, 1982, S. A. Fogelson.

VALVE LPCS-V-5
P&ID M520 Zone G-11

PUMP AND VALVE
OPERABILITY ASSURANCE REVIEW

PLANT INFORMATION

1. Name: WNP-2 Unit No.: ____ 2. Docket No.: 50-397

3. Utility: Washington Public Power Supply System

4. NSSS: General Electric [ ] PWR [X] BWR

5. A/E: Burns and Roe

II. GENERAL COMPONENT* INFORMATION

1. Supplier: [ ] NSSS [X] BOP

2. Location: a. Building/Room Reactor Building M/4.5

b. Elevation 525

c. System Low Pressure Core Spray

3. Component number on in-house drawings: LPCS-V-5

4. If component is a [ ] Pump complete II.5.

If component is a [ ] Valve complete II.6.

5. General Pump Data

a. Pump

b. Prime-mover

a. Pump		b. Prime-mover	
Name		Name	
Mfg.		Mfg.	
Model		Model	
S/N		S/N	
Type		Type	

*The component, whether pump or valve, is considered to be an assembly composed of the body, internals, prime-mover (or actuator) and functional accessories.

a. Pump (continued)

Size ____________________

Weight ____________________

Mounting Method ____________________

Required B.H.P. ____________________

Parameter	Design	Operating
Press	____	____
Temp	____	____
Flow	____	____
Head	____	____

Required NPSH at maximum flow ____________________

Available NPSH ____________________

Operating Speed ____________________

Critical Speed ____________________

b. Prime-mover (continued)

Size ____________________

Weight ____________________

Mounting Method ____________________

H.P. ____________________

Power requirements: (include normal, maximum and minimum)

Electrical ____________________

____

____

____

____

If MOTOR list:

Duty cycle ____________________

Stall current ____________________

Class of insulation ____________________

____

List functional accessories:* ____________________

____

____

List control signal inputs: ____________________

____

____

---

*Functional accessories are those sub-components not supplied by the manufacturer that are required to make the pump assembly operational, (e.g., coupling, lubricating oil system, etc.)

5. General Valve Data

a. Valve		b. Actuator (if not an integral unit)	
Name	LPCS-V-5	Name	LPCS-MO-5
Mfg.	Velan Engineering	Mfg.	Limitorque
Model	P2-3311-V-15	Model	SMB3-100/254UR3
S/N	None	S/N	204320
Type	Gate	Type	SMB
Size	12 inch	Size	3 inch
Weight	3775#	Weight	1020#
Mounting Method	In-line pipe mounted	Mounting Method	Bolts to valve bonnet
Required Torque		Torque	100 ft/lb start; 20 ft/lb run

Parameter	Design	Operating
Press psig	1250	1015
Temp ^{o}F	575	548
Flow gpm	7800	6350

Max ΔP across valve 750 psid

Closing time @ max ΔP 27 sec

Opening time @ max ΔP 37 sec

Power requirements for functional accessories, (if any) ______

Power requirements: (include normal, maximum and minimum)

Electrical Motor, reliance; 12.8 HP 230/460 VAC; 36.1/18.1 amps; service factor = 1.0; 15 minute duty cycle 3385 rpm

Other: [ ] Pneumatic [ ] Hydraulic

List control signal inputs: ______

List functional accessories:* ______________________________

____

III. FUNCTION

1. Briefly describe components normal and safety functions: The normal function is to isolate the low pressure core spray system from the RPV. The safety function is to allow the LPCS injection flow into the RPV during postulated events and to provide containment isolation.

2. The components normal state is: [ ] Operating [X] Standby

3. Safety function:

a. [ ] Emergency reactor shutdown
b. [ ] Containment heat removal
c. [X] Containment isolation
d. [ ] Reactor heat removal
e. [X] Reactor core cooling
f. [ ] Prevent significant release of radioactive material to environment
g. [X] Does the component function to mitigate the consequences of one or more of the following events? [X] Yes [ ] No
If "Yes", identify.

[X] LOCA [ ] HELB [X] MSLB

[ ] Other ______________________________

4. Safety requirements:

[X] Intermittent Operation [X] During postulated event

[ ] Continuous Operation [X] Following postualted event

If component operation is required following an event, give approximate length of time component must remain operational.

4320 hours for valve to maintain (e.g., hours, days, etc.)
integrity; motor operator to operate for 24 hours.

*Functional accessories are those sub-components not supplied by the manufacturer that are required to make the valve assembly operational, (e.g., limit switches).

5. For VALVES:

does the component [ ] Fail open [ ] Fail closed [X] Fail as is

Is this the fail-safe position [ ] Yes [X] No

Is the valve used for throttling purposes? [ ] Yes [X] No

Is the valve part of the reactor coolant pressure boundary? [X] Yes [ ] No

Does the valve have a specific limit for leakage? [X] Yes [ ] No

If "Yes" give limit: Operational limit = 600 scc/min

IV. QUALIFICATION

1. Reference by specific number those applicable sections of the design codes and standards applicable to the component:

   ASME Section III -NB

   Burns and Roe Spec 2808-41A

2. Reference those qualification standards, used as a guide to qualify the component:

   For Valve: IEEE 344-1971 (Reevaluated to IEEE 344-1975)

   For Actuator: (NUREG-0588 Cat. II)

3. Identify those parts of the above qualification standards deleted or modified in the qualification program.

Deleted:	Modified:
None for valve or operator.	None for valve or operator.

4. Have acceptance criterias been established and documented in the test plan(s) for the component? [X] Yes [ ] No

5. What is the expected failure mode that would keep the pump or valve assembly from performing its safety function?

   STEM BINDING

6. Are the margins* identified in the qualification documentation? [X] Yes [ ] No

*Margin is the difference between design basis parameters and the test parameters used for equipment qualification.

If component is a PUMP, complete IV.7.

If component is a VALVE, complete IV.8.

7. Pump operability has been demonstrated by: [ ] Analysis
[ ] Test [ ] Combination

Identify PUMP tests performed:

a. [ ] Shell hydrostatic (ASME Section III)

b. [ ] Bearing temperature evaluations

c. [ ] Seismic loading

d. [ ] Vibration levels

e. [ ] Exploratory vibration (Fundamental Freq.______)

f. [ ] Seal leakage & hydro press

g. [ ] Aging: [ ] Thermal [ ] Mechanical

h. [ ] Flow performance
Are curves provided [ ] Yes [ ] No

i. [ ] Pipe reaction end loads (nozzle loads)

j. [ ] Others ______________________

k. [ ] Extreme environment:
[ ] Humidity
[ ] Chemical
[ ] Radiation

8. Valve operability has been demonstrated by: [ ] Analysis
[ ] Test [X] Combination

Identify VALVE tests performed:

a. [X] Shell hydrostatic (ASME Section III)
Valve only

b. [ ] Cold cyclic List times:
Open ______
Closed ______

c. [X] Seismic loading
Analysis only

d. [ ] Hot cyclic List times:
Open ______
Closed ______

e. [X] Exploratory vibration
Analysis only
(Fundamental Freq. 43 Hz)
for assembly

f. [ ] Main seat leakage

g. [X] Aging: [X] Thermal [X] Mechanical
OPERATOR ONLY

h. [ ] Back seat leakage

i. [ ] Pipe reaction end loading

j. [ ] Disc hydrostatic

k. [X] Extreme environment:
OPERATOR ONLY
[X] Humidity
[ ] Chemical
[X] Radiation

l. [ ] Flow interruption capability

m. [ ] Flow characteristics
Are curves provided?
[ ] Yes [ ] No

n. [X] Others Fatigue analysis
Hydrodynamic Loads

9. As a result of any of the tests (or analysis), were any deviations from design requirements identified? [ ] Yes [X] No If "Yes", briefly describe any changes made in tests (or analysis) or to the component to correct the deviation.

10. Was the test component precisely identical (as to model, size, etc.) to the in-plant component? [ ] Yes [X] No If "No", is installed component [X] oversized or [ ] undersized?
Operator only, not applicable to valve: environment test performed on smaller operator; seismic test performed on larger operator.

11. If type test was used to qualify the component, does the type test meet the requirements of IEEE 323-1974, Section 5.? [X] Yes [ ] No
Testing & Analysis results satisfy NUREG 0588 CAT.II FOR THE OPERATOR

12. Is component orientation sensitive? [X] Yes [ ] No [ ] Unknown
If "Yes", does installed orientation coincide with test orientation?
[ ] Yes [X] No For operator worst case orientation was tested.

13. Is the component mounted in the same manner in-plant as it was during testing (i.e., welded, same number and size bolts, etc.)?
[X] Yes [ ] No [ ] Unknown For valve, analytical model based on worst case orientation.

14. Were the qualification tests performed in sequence and on only one component? [X] Yes [ ] No Not applicable to valve.

If "Yes" identify sequence, (e.g., radiation, seismic, cyclic, thermal, etc.

THERMAL AGING; VIBRATION AGING; RADIATION; SEISMIC; POST ACCIDENT CONDITIONS

15. If "aging"* was performed, identify the significant aging mechanisms: Thermal and radiation aging for limit switch and motor

fatigue analysis for valve.

16. Identify loads imposed (assumed) on the component for the qualification tests (analysis) performed:

a. [X] Plants (shutdown loads) b. [ ] Extreme environment

c. [X] Seismic load d. [X] Others Hydrodynamic Loads

17. Have component design specifications been reviewed in-house to assure they envelope all expected operating, transient, and accident conditions? [X] Yes [ ] No

18. Does the component utilize any unique or special materials? (Examples are special gaskets or packing, limitations on nonferrous materials, or special coatings or surfaces.) [ ] Yes [X] No

If "Yes", identify:

19. Does component require any special maintenance procedures or practices, (including shorter periods between maintenance)? [X] Yes [ ] No

If "Yes", identify: ASME Section XI tests performed quarterly to check stroke time; leak rate test required biennially.

20. Is the qualified life for the component less than 40 years? [ ] Yes [X] No If "Yes", what is the qualified life?

See attachment.

*As outlined in Section 4.4.1 of IEEE-627 1980.

21. Information Concerning Qualification Documents for the Component

Report Number	Report Title	Date	Company/Organization Preparing Report	Company/Organization Reviewing Report
QID 361715	Supply System EQ File for Valve			
QID 221001	Supply System EQ File for Operator			
82044/29.01F	Seismic & Hydrodynamic Requalification Analysis of 12", 900# MO Gate Valves for the LPCS System	10/13/82	Cygna Energy Services	Supply System
SR-6210	Seismic Analysis, 12" Forged Bolted Bonnet Gate Valve, ASME Class 900 lb. Carbon Steel Nuclear Class 1	5/28/75	Velan Engineering	Cygna Energy Services
To be Procured	Limitorque Dynamic Qualification Report			
80058	Limitorque Valve Actuator Qualification for Nuclear Power Station Services	1/11/80	Limitorque Corporation	Supply System/Cygna Energy Services
600376A	Nuclear Power Station Qualification Type Test Report - Limitorque Valve Actuators for BWR Service	5/13/76	Limitorque Corporation	Supply System/Cygna Energy Services

Attachment to Item 20.

The prediction of a "qualified life" through accelerated aging is generally not feasible at the present state of the art. An aging analysis has been performed for electrical equipment located in potentially harsh environmental areas. The results of these studies are contained in a report to the NRC titled, "WNP-2 Environmental Equipment Qualification Report for Safety-Related Equipment, September 1982". Attached are the summary sheets for the electrical components associated with the selected equipment located in potential harsh environments.

Results of the aging analysis will be used to define recommended maintenance/replacement interval for inclusion in the WNP-2 maintenance and surveillance procedures.

OWNER: WPPSS
FACILITY: WNP-2
SPEC: 2808-41A
MPL:
PPD:

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENT REF.		QUALIFICATION METHOD	OUTSTANDING ITEMS
	PARAMETER	FSAR	QUALIFICATION	FSAR	QUAL.		
SYSTEM Low Pressure Core Spray TAG NUMBER LPCS-MO-5	OPERATING TIME	24 hours	30 days	4	3	Simultaneous Test	None
	TEMPERATURE (F)	90 max. normal 104 max. abnormal Accident Profile 4,11,23,24	See enclosed profile	1	3	Simultaneous Test	None
MANUFACTURER Limitorque	PRESSURE (PSIA)	Normal 14.7 Accident Profile 11,23,24	See enclosed profile	1	3	Simultaneous Test	None
MODEL NUMBER SMB-3-100/254UR3 COMPONENT Motor Operator - Reliance, RH insulation	RELATIVE HUMIDITY (%)	40 max. normal 90 max. abnormal 100 accident	100	1	3	Simultaneous Test	
FUNCTION/SERVICE Operates LPCS injection valve (isolation valve)	CHEMICAL SPRAY	N/A	N/R	N/A	N/A	N/A	None
	RADIATION (RAD)	6.4×10^5	2.04×10^8	5	3	Sequential Test	None
	AGING	40 years	40 years	1	2, 3 5	Sequential Test Engineering Analysis	None
LOCATION: BLDG R ELEVATION 525 COLUMN L8/4.3	ACCURACY	N/A	N/A	N/A	N/A	N/A	None

FLOOD LEVEL ELEV:
ABOVE FLOOD LEVEL?
YES X NO

Prepared by: [signature] 8/13/82

Reviewed by: [signature] 8/28/82

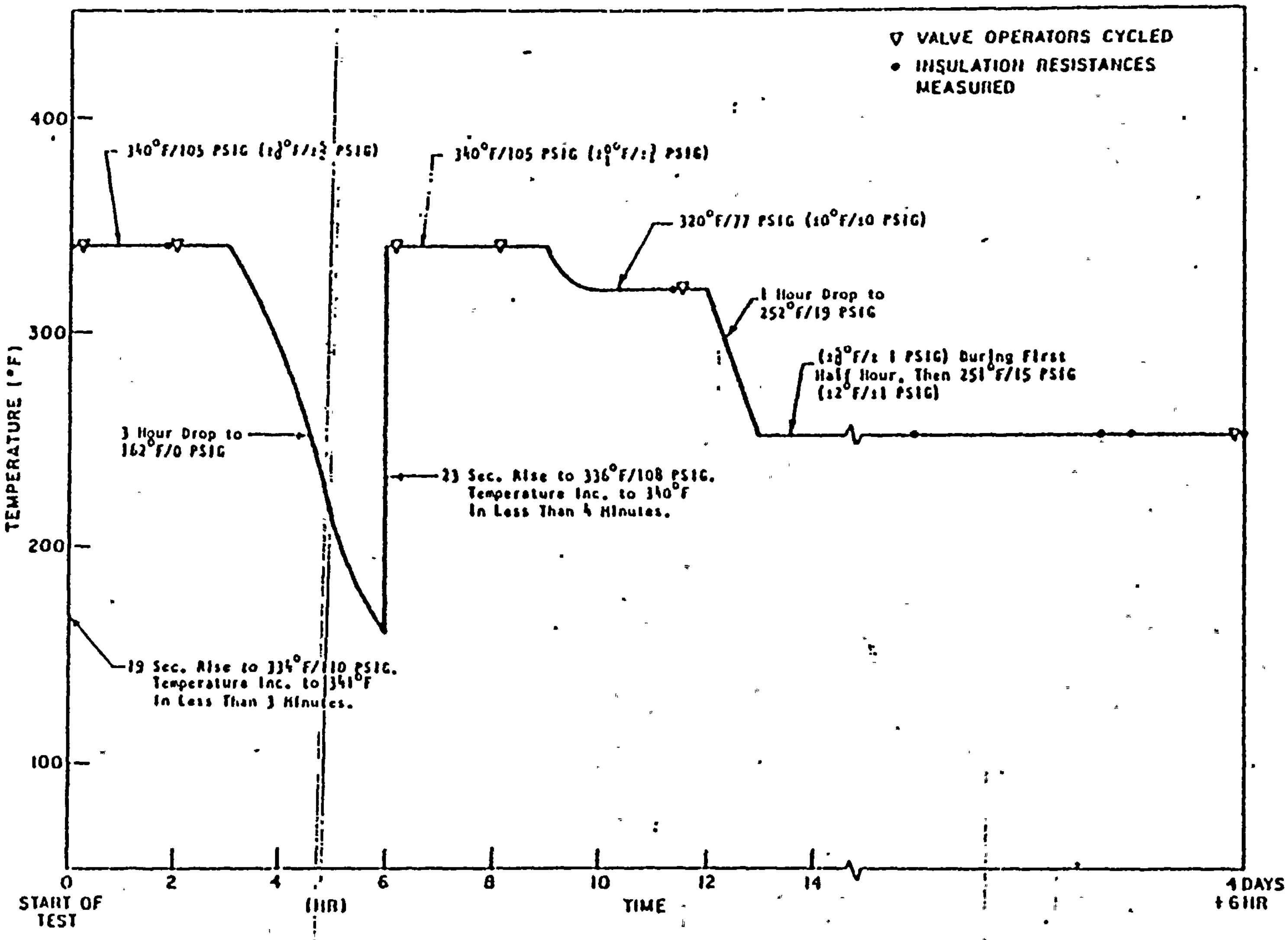
DOCUMENTATION REFERENCES

1. FSAR Par. 3.11
2. Limitorque Report B0058
3. Limitorque Report B600376A
4. WNP-2 Class 1E Equipment List, September, 1982
5. QID #221001

NOTES

Qualified.

WN-1051



F-C3441

Figure 3. Actual Steam Exposure Profile

VALVE MS-RV-1A
P&ID M529 Zone F-10

PUMP AND VALVE OPERABILITY ASSURANCE REVIEW

I. PLANT INFORMATION

1. Name: WNP-2 Unit No.: ____ 2. Docket No.: 50-397
3. Utility: Washington Public Power Supply System
4. NSSS: General Electric [ ] PWR [X] BWR
5. A/E: Burns and Roe

II. GENERAL COMPONENT* INFORMATION

1. Supplier: [X] NSSS [ ] BOP
2. Location: a. Building/Room Reactor Building (Azimuth 24^{o}; R=18)
   b. Elevation 547
   c. System Main Steam
3. Component number on in-house drawings: MS-RV-1A
4. If component is a [ ] Pump complete II.5.
   If component is a [X] Valve complete II.6.
5. General Pump Data

a. Pump		b. Prime-mover	
Name		Name	
Mfg.		Mfg.	
Model		Model	
S/N		S/N	
Type		Type	

*The component, whether pump or valve, is considered to be an assembly composed of the body, internals, prime-mover (or actuator) and functional accessories.

a. Pump (continued)

Size ______

Weight ______

Mounting Method ______

Required B.H.P. ______

Parameter	Design	Operating
Press	____	____
Temp	____	____
Flow	____	____
Head	____	____

Required NPSH at maximum flow ______

Available NPSH ______

Operating Speed ______

Critical Speed ______

b. Prime-mover (continued)

Size ______

Weight ______

Mounting Method ______

H.P. ______

Power requirements: (include normal, maximum and minimum)

Electrical ______

______

______

______

______

If MOTOR list:

Duty cycle ______

Stall current ______

Class of insulation ______

______

List functional accessories:* ______

______

______

List control signal inputs: ______

______

______

*Functional accessories are those sub-components not supplied by the manufacturer that are required to make the pump assembly operational, (e.g., coupling, lubricating oil system, etc.)

6. General Valve Data

a. Valve		b. Actuator (if not an integral unit)	
Name	MS-RV-1A	Name	AO-F013-J
Mfg.	Crosby	Mfg.	Crosby
Model	HB65-BP	Model	Included with Valve
S/N	N63790-00-0047	S/N	Included with Valve
Type	Safety Relief	Type	Direct acting/spring loaded
Size	6 x R x 10	Size	
Weight	2800# incl. actuator	Weight	
Mounting Method	Flanged to Downcomer	Mounting Method	Bolted to valve
Required Torque	NOT APPLICABLE	Torque	NOT APPLICABLE

Parameter	Design	Operating
Press	1250	955
Temp ^{o}F	575	540

Flow lb/hr 883,950 @ 1175 psig including 3% accum.

Max Δ P across valve 1175 psig

Closing time @ max Δ P not applicable

Opening time @ max Δ P 0.2 sec.* 0.3 sec.**

Power requirements for functional accessories, (if any) ________

Power requirements: (include normal, maximum and minimum)

Electrical ________

Other: [ ] Pneumatic [ ] Hydraulic

List control signal inputs. ________

* Opening via air operator.

** Opening via spring.

List functional accessories:* ______________________________

____

III. FUNCTION

1. Briefly describe components normal and safety functions: ______

THE NORMAL FUNCTION IS TO PREVENT OVERPRESSURIZATION OF THE RPV AND MAIN STEAM SYSTEM. THE SAFETY FUNCTION TAKEN IN THE INDUSTRIAL SAFETY SENSE IS IDENTICAL SINCE THIS PARTICULAR UNIT IS NOT PART OF THE AUTOMATIC DEPRESSURIZATION SYSTEM

2. The components normal state is: [ ] Operating [X] Standby

3. Safety function:

a. [X] Emergency reactor shutdown
b. [ ] Containment heat removal
c. [ ] Containment isolation
d. [ ] Reactor heat removal
e. [X] Reactor core cooling
f. [ ] Prevent significant release of radioactive material to environment
g. [X] Does the component function to mitigate the consequences of one or more of the following events? [X] Yes [ ] No
If "Yes", identify.

[X] LOCA [ ] HELS [X] MSLB

[ ] Other ______________________________

4. Safety requirements:

[X] Intermittent Operation [ ] During postulated event

[ ] Continuous Operation [ ] Following postualted event

If component operation is required following an event, give approximate length of time component must remain operational.

24 HOURS (e.g., hours, days, etc.)

______

*Functional accessories are those sub-components not supplied by the manufacturer that are required to make the valve assembly operational, (e.g., limit switches).

5. For VALVES:

does the component [ ] Fail open [X] Fail closed [ ] Fail as is

Is this the fail-safe position? [X] Yes [ ] No

Is the valve used for throttling purposes? [ ] Yes [X] No

Is the valve part of the reactor coolant pressure boundary? [X] Yes [ ] No

Does the valve have a specific limit for leakage? [ ] Yes [X] No

Excessive valve leakage is detected by high temp. indication downstream of valve, on control room annunicators.

IV. QUALIFICATION

1. Reference by specific number those applicable sections of the design codes and standards applicable to the component:

   ASME Section III-NB ; GE SPEC 22A 2887 AB REV 9

   GE Purchase Order #205G5E96

2. Reference those qualification standards, used as a guide to qualify the component:

   IEEE 344-1971 (Reevaluated to IEEE 344-1975)

3. Identify those parts of the above qualification standards deleted or modified in the qualification program.

   Deleted: None

   Modified: None

4. Have acceptance criterias been established and documented in the test plan(s) for the component? [X] Yes [ ] No

5. What is the expected failure mode that would keep the pump or valve assembly from performing its safety function? Operator shaft deflection greater than allowable.

6. Are the margins* identified in the qualification documentation? [X] Yes [ ] No

*Margin is the difference between design basis parameters and the test parameters used for equipment qualification.

If component is a PUMP, complete IV.7.

If component is a VALVE, complete IV.8.

7. Pump operability has been demonstrated by: [ ] Analysis
[ ] Test [ ] Combination

Identify PUMP tests performed:

a. [ ] Shell hydrostatic (ASME Section III)
b. [ ] Bearing temperature evaluations
c. [ ] Seismic loading
d. [ ] Vibration levels
e. [ ] Exploratory vibration (Fundamental Freq.______)
f. [ ] Seal leakage & hydro press
g. [ ] Aging: [ ] Thermal [ ] Mechanical
h. [ ] Flow performance Are curves provided [ ] Yes [ ] No
i. [ ] Pipe reaction end loads (nozzle loads)
j. [ ] Others ________________
k. [ ] Extreme environment:
[ ] Humidity
[ ] Chemical
[ ] Radiation

8. Valve operability has been demonstrated by: [ ] Analysis
[ ] Test [X] Combination

Identify VALVE tests performed:

a. [X] Shell hydrostatic (ASME Section III)
b. [ ] Cold cyclic List times: Open ______ Closed ______
c. [X] Seismic loading
d. [ ] Hot cyclic List times: Open ______ Closed ______
e. [X] Exploratory vibration (Fundamental Freq. 23 hz) valve
15 hz operator
f. [ ] Main seat leakage

g. [ ] Aging: [ ] Thermal
[ ] Mechanical

h. [ ] Back seat leakage

i. [X] Pipe reaction end loading

j. [ ] Disc hydrostatic

k. [ ] Extreme environment:

[ ] Humidity

[ ] Chemical

[ ] Radiation

l. [ ] Flow interruption capability

m. [ ] Flow characteristics

Are curves provided?

[ ] Yes [ ] No

n. [X] Others Stress analysis of Main Steam Piping

9. As a result of any of the tests (or analysis), were any deviations from design requirements identified? [ ] Yes [X] No If "Yes", briefly describe any changes made in tests (or analysis) or to the component to correct the deviation.

10. Was the test component precisely identical (as to model, size, etc.) to the in-plant component? [X] Yes [ ] No If "No", is installed component [ ] oversized or [ ] undersized?

11. If type test was used to qualify the component, does the type test meet the requirements of IEEE 323-1974, Section 5.? [ ] Yes [X] No

12. Is component orientation sensitive? [ ] Yes [X] No [ ] Unknown
If "Yes", does installed orientation coincide with test orientation?
[ ] Yes [ ] No See question 13 below.

13. Is the component mounted in the same manner in-plant as it was during testing (i.e., welded, same number and size bolts, etc.)?
[ ] Yes [ ] No [ ] Unknown

NOT PRESENTLY INSTALLED, BUT DESIGN INSTALLATION IS SAME AS ANALYZED

14. Were the qualification tests performed in sequence and on only one component? [X] Yes [ ] No

If "Yes" identify sequence, (e.g., radiation, seismic, cyclic, thermal, etc.): Design pressure and temperature; seismic and pipe nozzle loading applied coincidentally in checking operability.

15. If "aging"* was performed, identify the significant aging mechanisms: Not applicable

16. Identify loads imposed (assumed) on the component for the qualification tests (analysis) performed:

a. [X] Plants (shutdown loads) b. [ ] Extreme environment

c. [X] Seismic load d. [X] Others Hydrodynamic Loads

17. Have component design specifications been reviewed in-house to assure they envelope all expected operating, transient, and accident conditions? [X] Yes [ ] No

18. Does the component utilize any unique or special materials? (Examples are special gaskets or packing, limitations on nonferrous materials, or special coatings or surfaces.) [ ] Yes [X] No

If "Yes", identify:

19. Does component require any special maintenance procedures or practices, (including shorter periods between maintenance)? [X] Yes [ ] No

If "Yes", identify: ASME Section XI tests; check pressure setting per Section XI intervals, cover all 18 valves every 5 years.

20. Is the qualified life for the component less than 40 years? [ ] Yes [ ] No If "Yes", what is the qualified life?

NOT APPLICABLE, HAS NO ELECTRICAL ELEMENTS

*As outlined in Section 4.4.1 of IEEE-627 1980.

21. Information Concerning Qualification Documents for the Component

Report Number	Report Title	Date	Company/Organization Preparing Report	Company/Organization Reviewing Report
VPF 3379-260-1 (#43445-2)	Seismic Simulation Test Program on a 6R10HB-BP Valve	1/12/77	General Electric & Wyle Labs	SUPPLY SYSTEM
QID 361964	Supply System EQ File			
QID 315011	Supply System EQ File			
QID 297009	Supply System EQ File			

EQUIPMENT QUALIFICATION DOCUMENT LIST

COMPO[illegible] Relief Valve

QID NO. 2970[illegible]

MANUFACTURER: Crosby Valve & Gauge

MANUFACTURER MODEL NO: 6 X R X 10 HB-BP

CONTRACT(S): 02

DOCUMENTATION:

1.0 SEISMIC

REF. NO.	COMPANY	REPORT TITLE	REPORT NO.	REPORT DATE	REV.	B&R TRANS. #	PUBLICATION NO.
1.1	G.E. & Wyle Labs	Seismic Simulation Test Program on a 6R10HB-BP Valve	43445-2	1/12/77	--	---	VPF 3379-260-1
1.2	G.E.	Hanford 2 Main Steam Piping Analysis Results	IN QID # 301961				
1.3							
1.4							
1.5							
1.6							

2.0 ENVIRONMENTAL

REF. NO.	COMPANY	REPORT TITLE	REPORT NO.	REPORT DATE	REV.	B&R TRANS. #	PUBLICATION NO.
2.1							
2.2							
2.3							
2.4							
2.5							
2.6							

PUMP AND VALVE
OPERABILITY ASSURANCE REVIEW

VALVE RCIC-V-19 ✓
P & ID M519

I. PLANT INFORMATION

1. Name: WNP-2 Unit No.: ____ 2. Docket No.: 50-397

3. Utility: Washington Public Power Supply System

4. NSSS: General Electric [ ] PWR [X] BWR

5. A/E: Burns and Roe

II. GENERAL COMPONENT* INFORMATION

1. Supplier: [ ] NSSS [X] BOP

2. Location: a. Building/Room Reactor Building J4/7.7

b. Elevation 467

c. System Reactor Core Isolation Cooling

3. Component number on in-house drawings: RCIC-V-19

4. If component is a [ ] Pump complete II.5.

If component is a [ ] Valve complete II.6.

5. General Pump Data

a. Pump		b. Prime-mover	
Name		Name	
Mfg.		Mfg.	
Model		Model	
S/N		S/N	
Type		Type	

*The component, whether pump or valve, is considered to be an assembly composed of the body, internals, prime-mover (or actuator) and functional accessories.

NOTE: THIS VALVE IS NOT PRESENTLY INSTALLED
THE PREVIOUS DESIGN IS BEING DELETED
AND A NEW VALVE SPECIFIED

a. Pump (continued)

Size ____________________

Weitnt ____________________

Mounting Method ____________________

Required B.H.P. ____________________

Paremeter	Design	Operating
Press	____	________
Temp	____	________
Flow	____	________
Head	____	________

Required NPSH at maximum flow ____________________

Available NPSH ____________________

Operating Speed ____________________

Critical Speed ____________________

b. Prime-mover (continued)

Size ____________________

Weight ____________________

Mounting Method ____________________

H.P. ____________________

Power requirements: (include normal, maximum and minimum)

Electrical ____________________

____

____

____

____

If MOTOR list:

Duty cycle ____________________

Stall current ____________________

Class of insulation ____________________

____

List functional accessories:* ____________________

____

____

List control signal inputs: ____________________

____

____

*Functional accessories are tnose sub-components not supplied by tne manufacturer tnat are required to make the pump assembly operational, (e.g., coupling, lubricating oil system, etc.)

6. General Valve Data

a. Valve		b. Actuator (if not an integral unit)	
Name	RCIC-V-19	Name	
Mfg.	See Attachment	Mfg.	See Attachment
Model		Model	
S/N		S/N	
Type		Type	
Size		Size	
Weight		Weight	
Mounting Method		Mounting Method	
Required Torque		Torque	

Parameter	DESIGN	OPERATING
Press psig	1500	1165
Temp ^{o}F	170	140
Flow gpm	40	40

Max ΔP across valve 1350 psid

Closing time @ max ΔP 5 sec

Opening time @ max ΔP 5 sec

Power requirements for functional accessories, (if any)

Power requirements: (include normal, maximum and minimum)

Electrical

Other: [ ] Pneumatic [ ] Hydraulic

List control signal inputs: Remote manual switch, FIS-2, PS-20, and containment isolation signal

List functional accessories:* ______________________________

____

III. FUNCTION

1. Briefly describe components normal and safety functions: ________

The normal function is to provide RCIC pump minimum recirculation flow

The safety function is to provide containment isolation

____

____

2. The components normal state is: [ ] Operating [X] Standby

3. Safety function:

a. [ ] Emergency reactor shutdown
b. [ ] Containment heat removal
c. [X] Containment isolation
d. [ ] Reactor heat removal
e. [ ] Reactor core cooling
f. [ ] Prevent significant release of radioactive material to environment

g. [ ] Does the component function to mitigate the consequences of one or more of the following events? [X] Yes [ ] No
If "Yes", identify.

[ ] LOCA [X] HELB [X] MSLB

[ ] Other ______________________________

4. Safety requirements:

[X] Intermittent Operation
[X] During postulated event
[ ] Continuous Operation
[X] Following postualted event

If component operation is required following an event, give approximate length of time component must remain operational.

______________________________ (e.g., hours, days, etc.)

____

*Functional accessories are those sub-components not supplied by the manufacturer that are required to make the valve assembly operational, (e.g., limit switches).

5. For VALVES:

does the component [ ] Fail open [ ] Fail closed [X] Fail as is
Is this the fail-safe position [X] Yes [ ] No
Is the valve used for throttling purposes? [ ] Yes [X] No
Is the valve part of the reactor coolant pressure boundary?
[ ] Yes [X] No
Does the valve have a specific limit for leakage? [X] Yes [ ] No
If "Yes" give limit: Operational Limit = 100 SCC/MIN

IV. QUALIFICATION

1. Reference by specific number those applicable sections of the design codes and standards applicable to the component: ____________

ASME III-NC; Burns and Roe Specification 2808-215

2. Reference those qualification standards, used as a guide to qualify the component

3. Identify those parts of the above qualification standards deleted or modified in the qualification program.

Deleted:	Modified:
SEE ATTACHMENT	

4. Have acceptance criterias been established and documented in the test plan(s) for the component? [ ] Yes [ ] No

5. What is the expected failure mode that would keep the pump or valve assembly from performing its safety function? ____________
SEE ATTACHMENT

6. Are the margins* identified in the qualification documentation?
[ ] Yes [ ] No SEE ATTACHMENT

*Margin is the difference between design basis parameters and the test parameters used for equipment qualification.

If component is a PUMP, complete IV.7.

If component is a VALVE, complete IV.8.

7. Pump operability has been demonstrated by: [ ] Analysis
[ ] Test [ ] Combination

Identify PUMP tests performed:

a. [ ] Shell hydrostatic (ASME Section III)

b. [ ] Bearing temperature evaluations

c. [ ] Seismic loading

d. [ ] Vibration levels

e. [ ] Exploratory vibration (Fundamental Freq.______)

f. [ ] Seal leakage & hydro press

g. [ ] Aging: [ ] Thermal [ ] Mechanical

h. [ ] Flow performance Are curves provided [ ] Yes [ ] No

i. [ ] Pipe reaction end loads (nozzle loads)

j. [ ] Others ____________________

k. [ ] Extreme environment:

[ ] Humidity

[ ] Chemical

[ ] Radiation

8. Valve operability has been demonstrated by: [ ] Analysis
[ ] Test [ ] Combination (See Attachment)

Identify VALVE tests performed:

a. [ ] Shell hydrostatic (ASME Section III)

b. [ ] Cold cyclic List times: Open ________ Closed ________

c. [ ] Seismic loading

d. [ ] Hot cyclic List times: Open ________ Closed ________

e. [ ] Exploratory vibration (Fundamental Freq.______)

f. [ ] Main seat leakage

g. [ ] Aging: [ ] Thermal
[ ] Mechanical

h. [ ] Back seat leakage

i. [ ] Pipe reaction end loading

j. [ ] Disc hydrostatic

k. [ ] Extreme environment:

[ ] Humidity

[ ] Chemical

[ ] Radiation

l. [ ] Flow interruption capability

m. [ ] Flow characteristics

Are curves provided?

[ ] Yes [ ] No

n. [ ] Others ______________

____

____

9. As a result of any of the tests (or analysis), were any deviations from design requirements identified? [ ] Yes [ ] No If "Yes", briefly describe any changes made in tests (or analysis) or to the component to correct the deviation.

See Attachment

____

____

____

10. Was the test component precisely identical (as to model, size, etc.) to the in-plant component? [ ] Yes [ ] No If "No", is installed component [ ] oversized or [ ] undersized?

See Attachment

11. If type test was used to qualify the component, does the type test meet the requirements of IEEE 323-1974, Section 5.? [ ] Yes [ ] No

See Attachment

12. Is component orientation sensitive? [ ] Yes [ ] No [ ] Unknown If "Yes", does installed orientation coincide with test orientation? [ ] Yes [ ] No

See Attachment

13. Is the component mounted in the same manner in-plant as it was during testing (i.e., welded, same number and size bolts, etc.)? [ ] Yes [ ] No [ ] Unknown

See Attachment

14. Were the qualification tests performed in sequence and on <u>only</u> one component? [ ] Yes [ ] No

If "Yes" identify sequence, (e.g., radiation, seismic, cyclic, thermal, etc.): ____________________

____

15. If "aging"* was performed, identify the significant aging mechanisms: ____________________

____

____

16. Identify loads imposed (assumed) on the component for the qualification tests (analysis) performed:

a. [ ] Plants (shutdown loads) b. [ ] Extreme environment

c. [ ] Seismic load d. [ ] Others ____________________

____

17. Have component design specifications been reviewed in-house to assure they envelope all expected operating, transient, and accident conditions? [ ] Yes [ ] No

18. Does the component utilize any unique or special materials? (Examples are special gaskets or packing, limitations on nonferrous materials, or special coatings or surfaces.) [ ] Yes [ ] No

If "Yes", identify: ____________________

____

19. Does component require any special maintenance procedures or practices, (including shorter periods between maintenance)? [X] Yes [ ] No

If "Yes", identify: ASME Section XI Tests: Check Stroke Time Quarterly;

Perform leak rate test biennially

20. Is the qualified life for the component less than 40 years? [ ] Yes [ ] No If "Yes", what is the qualified life? __________

*As outlined in Section 4.4.1 of IEEE-627 1980.

21. Information Concerning Qualification Documents for the Component

Report Number	Report Title	Date	Company/Organization Preparing Report	Company/Organization Reviewing Report

PED in action to change out valve

[illegible]

ATTACHMENT

Subject: CHANGE OUT OF RCIC-V-19 PER PED 215-M-5097 AND PED 215-M-4632

RCIC-V-19 valve is being changed due to not meeting the Spec. Requirement that this valve be mandatory seismically tested. To meet this requirement, the vendor has chosen to supply and test a different valve model and operator.

Reference:
1) Letter, WNP2WBG-215-F-81-323
2) PED 215-M-4632
3) PED 215-M-5097
4) PED 215-M-8344
5) Spec. 2808-215

PUMP AND VALVE
OPERABILITY ASSURANCE REVIEW

VALVE CAC-FCV-6A
P & ID M554 ZONE G12

PLANT INFORMATION

1. Name: WNP-2 Unit No.: ___ 2. Docket No.: 50-397

3. Utility: Washington Public Power Supply System

4. NSSS: General Electric [ ] PWR [X] BWR

5. A/E: Burns and Roe

II. GENERAL COMPONENT* INFORMATION

1. Supplier: [ ] NSSS [X] BOP

2. Location: a. Building/Room Reactor Building M6/1614

b. Elevation 572

c. System Containment Atmosphere Control

3. Component number on in-house drawings: CAC-FCV-6A

4. If component is a [ ] Pump complete II.5.

If component is a [X] Valve complete II.6.

5. General Pump Data

a. Pump		b. Prime-mover	
Name		Name	
Mfg.		Mfg.	
Model		Model	
S/N		S/N	
Type		Type	

*The component, whether pump or valve, is considered to be an assembly composed of the body, internals, prime-mover (or actuator) and functional accessories.

a. Pump (continued)

Size ______________________

Weight ______________________

Mounting Method ______________________

Required B.H.P. ______________________

Parameter	Design	Operating
Press	____	______
Temp	____	______
Flow	____	______
Head	____	______

Required NPSH at maximum flow ______________________

Available NPSH ______________________

Operating Speed ______________________

Critical Speed ______________________

b. Prime-mover (continued)

Size ______________________

Weight ______________________

Mounting Method ______________________

H.P. ______________________

Power requirements: (include normal, maximum and minimum)

Electrical ______________________

____

____

____

____

If MOTOR list:

Duty cycle ______________________

Stall current ______________________

Class of insulation ______________________

____

List functional accessories:* ______________________

____

____

List control signal inputs: ______________________

____

____

*Functional accessories are those sub-components not supplied by the manufacturer that are required to make the pump assembly operational, (e.g., coupling, lubricating oil system, etc.)

6. General Valve Data

a. Valve		b. Actuator (if not an integral unit)	
Name	CAC-FCV-6A	Name	CAC-FHO-FCV/6A
Mfg.	CRANE CO.	Mfg.	ITT GENERAL CONTROLS
Model	50	Model	NH91H4070 F 3616
S/N	4743	S/N	76429 R432
Type	GLOBE	Type	ELECTRIC
Size	2 INCH	Size	H91
Weight	COMBINED WEIGHT = 260.5#	Weight	----
Mounting Method	Pipe Mounted	Mounting Method	Vertical Stem Bolted To Valve & Supported Laterally
Required Torque	----	Torque	-----

Parameter			Power requirements: (include normal, maximum and minimum)
Press psig	Design	Operating	Electrical
Temp °F	340	120	30 460 VAC 0.35 Amp 60 Hz
Flow SCFM		120.6 min. 160 Max	4-20 MA Instrument Power
Max ΔP across valve	45 psi		
Closing time @ max ΔP	Not Applicable		Other: [ ] Pneumatic [ ] Hydraulic
Opening time @ max ΔP	Not Applicable		
Power requirements for functional accessories, (if any)			

List control signal inputs: Flow Signals FROM FIC 67A

List functional accessories:* ____________________

____

III. FUNCTION

1. Briefly describe components normal and safety functions: ________

This valve provides a 55% recycle flow of processed air to limit the hydrogen concentration in the air entering the recombiner bed to 2% by volume.

____

____

2. The components normal state is: [X] Operating [ ] Standby

3. Safety function:

a. [ ] Emergency reactor shutdown
b. [ ] Containment heat removal
c. [ ] Containment isolation
d. [ ] Reactor heat removal
e. [ ] Reactor core cooling
f. [X] Prevent significant release of radioactive material to environment
g. [X] Does the component function to mitigate the consequences of one or more of the following events? [X] Yes [ ] No
If "Yes", identify.

[X] LOCA [ ] HELB [ ] MSLB

[ ] Other ____________________

4. Safety requirements:

[ ] Intermittent Operation [ ] During postulated event

[ ] Continuous Operation [X] Following postualted event

If component operation is required following an event, give approximate length of time component must remain operational.

4320 Hours (e.g., hours, days, etc.)

____

*Functional accessories are those sub-components not supplied by the manufacturer that are required to make the valve assembly operational, (e.g., limit switches).

5. For VALVES:

does the component [X] Fail open [ ] Fail closed [ ] Fail as is
Is this the fail-safe position [X] Yes [ ] No
Is the valve used for throttling purposes? [X] Yes [ ] No
Is the valve part of the reactor coolant pressure boundary? [ ] Yes [X] No
Does the valve have a specific limit for leakage? [ ] Yes [X] No
If "Yes" give limit: ____________________

IV. QUALIFICATION

1. Reference by specific number those applicable sections of the design codes and standards applicable to the component: ______

ASME Section III - NC; Burns and Roe Specification 2808-71

2. Reference those qualification standards, used as a guide to qualify the component: ______

IEEE-844-1971 (reevaluated to IEEE-344-1975 NUREG-0588 CAT. II

3. Identify those parts of the above qualification standards deleted or modified in the qualification program.

Deleted: NONE

Modified: NONE

4. Have acceptance criterias been established and documented in the test plan(s) for the component? [X] Yes [ ] No For Skid

5. What is the expected failure mode that would keep the pump or valve assembly from performing its safety function? ______

Stem Binding

6. Are the margins* identified in the qualification documentation?
[X] Yes [ ] No

---

*Margin is the difference between design basis parameters and the test parameters used for equipment qualification.

If component is a PUMP, complete IV.7.

If component is a VALVE, complete IV.8.

7. Pump operability has been demonstrated by: [ ] Analysis
[ ] Test [ ] Combination

Identify PUMP tests performed:

a. [ ] Shell hydrostatic (ASME Section III)

b. [ ] Bearing temperature evaluations

c. [ ] Seismic loading

d. [ ] Vibration levels

e. [ ] Exploratory vibration

(Fundamental Freq.______)

f. [ ] Seal leakage & hydro press

g. [ ] Aging: [ ] Thermal
[ ] Mechanical

h. [ ] Flow performance
Are curves provided [ ] Yes
[ ] No

i. [ ] Pipe reaction end loads (nozzle loads)

j. [ ] Others ________________

k. [ ] Extreme environment:

[ ] Humidity

[ ] Chemical

[ ] Radiation

8. Valve operability has been demonstrated by: [ ] Analysis
[X] Test [ ] Combination
Both Valve & Operator by shaker table test
Identify VALVE tests performed:

a. [X] Shell hydrostatic (ASME Section III)

b. [ ] Cold cyclic List times:
Open ________
Closed ________

c. [X] Seismic loading
Skid

d. [ ] Hot cyclic List times:
Open ________
Closed ________

e. [ ] Exploratory vibration

(Fundamental Freq.______)

f. [ ] Main seat leakage

g. [ ] Aging: [X] Thermal
operator [ ] Mechanical

h. [ ] Back seat leakage

i. [X] Pipe reaction end loading

j. [ ] Disc hydrostatic

k. [ ] Extreme environment:

[ ] Humidity

[ ] Chemical

[ ] Radiation

l. [ ] Flow interruption capability

m. [ ] Flow characteristics

Are curves provided?

[ ] Yes [ ] No

n. [X] Others ______________________

Hydrodynamic Loads

____

9. As a result of any of the tests (or analysis), were any deviations from design requirements identified? [ ] Yes [X] No If "Yes", briefly describe any changes made in tests (or analysis) or to the component to correct the deviation.

____

____

____

10. Was the test component precisely identical (as to model, size, etc.) to the in-plant component? [X] Yes [ ] No If "No", is installed component [ ] oversized or [ ] undersized?

11. If type test was used to qualify the component, does the type test meet the requirements of IEEE 323-1974, Section 5.? [ ] Yes [X] No

12. Is component orientation sensitive? [X] Yes [ ] No [ ] Unknown If "Yes", does installed orientation coincide with test orientation? [X] Yes [ ] No

13. Is the component mounted in the same manner in-plant as it was during testing (i.e., welded, same number and size bolts, etc.)? [X] Yes [ ] No [ ] Unknown

14. Were the qualification tests performed in sequence and on only one component? [ ] Yes [X] No

If "Yes" identify sequence, (e.g.; radiation, seismic, cyclic, thermal, etc.): ______

15. If "aging"* was performed, identify the significant aging mechanisms: ______

Thermal and Radiation

16. Identify loads imposed (assumed) on the component for the qualification tests (analysis) performed:

a. [X] Plants (shutdown loads)
b. [X] Extreme environment
c. [X] Seismic load
d. [X] Others Hydrodynamic Loads

17. Have component design specifications been reviewed in-house to assure they envelope all expected operating, transient, and accident conditions? [X] Yes [ ] No

18. Does the component utilize any unique or special materials? (Examples are special gaskets or packing, limitations on nonferrous materials, or special coatings or surfaces.) [ ] Yes [X] No

If "Yes", identify: ______

19. Does component require any special maintenance procedures or practices, (including shorter periods between maintenance)? [X] Yes [ ] No

If "Yes", identify: ASME Section XI test performed quarterly to check stroke time

20. Is the qualified life for the component less than 40 years? [X] Yes [ ] No If "Yes", what is the qualified life? ______
See attachment

*As outlined in Section 4.4.1 of IEEE-627 1980.

21. <u>Information Concerning Qualification Documents for the Component</u>

Report Number	Report Title	Date	Company/Organization Preparing Report	Company/Organization Reviewing Report
Transmittal #89	Dynamic testing Report for hydrogen recombiner system	2/19/80	Air Products & Chemicals	Supply System
QID's 13305 and 110001	Supply System EQ File			

Attachment to Item 20.

The prediction of a "qualified life" through accelerated aging is generally not feasible at the present state of the art. An aging analysis has been performed for electrical equipment located in potentially harsh environmental areas. The results of these studies are contained in a report to the NRC titled, "WNP-2 Environmental Equipment Qualification Report for Safety-Related Equipment, September 1982". Attached are the summary sheets for the electrical components associated with the selected equipment located in potential harsh environments.

Results of the aging analysis will be used to define recommended maintenance/replacement interval for inclusion in the WNP-2 maintenance and surveillance procedures.

WNP QID #110001, 2, 4

WASHINGTON PUBLIC POWER SUPPLY SYSTEM

EQUIPMENT QUALIFICATION REPORT

OWNER: WPPSS
FACILITY: WNP-2
SPEC: 2808-71, 42A

MPL:
PPD:

REVISION: 2
DATE: September 1982

EQUIPMENT DESCRIPTION	ENVIRONMENT PARAMETER	ENVIRONMENT FSAR	ENVIRONMENT QUALIFICATION	DOCUMENT REF. FSAR	DOCUMENT REF. QUAL.	QUALIFICATION METHOD	OUTSTANDING ITEMS
SYSTEM Containment Atmosphere Control TAG NUMBER CAC-EHO-Note 2	OPERATING TIME	6 months	Equivalent to > 6 months	5	3	Simultaneous Test	Note 1
	TEMPERATURE (F)	90 max. normal 104 max. abnormal Accident profile 4	150	1	3	Simultaneous Test	Note 1
MANUFACTURER ITT-General Controls	PRESSURE (PSIA)	14.7	N/R	1	N/A	N/A	None
MODEL NUMBER NH91 & NH95 COMPONENT Electro-Hydraulic Operator	RELATIVE HUMITY (%)	40 normal 90 max. abnormal Accident profile 4	100	1	3	Simultaneous Test	Note 1
FUNCTION/SERVICE Operate FCV (3 phase)	CHEMICAL SPRAY	N/A	N/A	1	N/A	N/A	None
	RADIATION (RAD)	1.0×10^6	3.9×10^7	2	3	Sequential Test	Note 1
	AGING	40 years	10.6 years	1	3, 4	Sequential Test Engineering Analysis	Note 1
LOCATION: BLDG R ELEVATION (See Note 2) COLUMN (See Note 2)	ACCURACY	N/A	N/A	N/A	N/A	N/A	None

FLOOD LEVEL ELEV:
ABOVE FLOOD LEVEL?
YES NO

Prepared By: Alan Siler 9/1/82 Reviewed By: Raymond Ch 9/1/82

CAC FCV

DOCUMENTATION REFERENCES

1. FSAR Par. 311
2. EDS Study 0740-004-572F
3. HCC Powers #377-80.010 with Appendices A-D.
4. Calculation QID 110001
5. WNP-2 Class 1E Equipment List, dated 9/82

NOTES

1. The vendor is currently retesting these components. The test results will be evaluated when the testing is completed to resolve discrepancies in the original test program.

WPPSS QID #110001, 2, 4

WASHINGTON PUBLIC POWER SUPPLY SYSTEM

EQUIPMENT QUALIFICATION REPORT

OWNER: WPPSS
FACILITY: WNP 2
SPEC: 2808-71, 42
MPL:
PPD:

PAGE NO: 6
REVISION: 2
DATE: September 1982

DOCUMENTATION REFERENCES (Cont'd)	NOTES (Cont'd)
	2.

EPN	Elevation	Column
CAC-EHO-FCV/1A	575	H.2/5.6
EHO-FCV/1B	570	J.6/6.7
EHO-FCV/2A	558	H.2/7.1
EHO-FCV/2B	563	H.5/6.5
EHO-FCV/3A	493	H.8/4.4
EHO-FCV/3B	494	J.0/7.4
EHO-FCV/4A	495	H.2/7.8
EHO-FCV/4B	493	H.0/6.0
EHO-FCV/5A	572	H.6/6.5
EHO-FCV/5B	573	H.5/7.5
EHO-FCV/6A	572	H.6/6.5
EHO-FCV/6B	573	H.5/7.5
EHO-TCV/4A	573	H.5/6.6
EHO-TCV/4B	573	H.5/7.4
EHO-TVV/1A	573	H.5/6.6
EHO-TVV/1B	573	H.5/7.4
EHO-TVV/2A	573	H.5/6.6
EHO-TVV/2B	573	H.5/7.4
EHO-TVV/3A	573	H.5/6.6
EHO-TVV/3B	573	H.5/7.4

Valve SGT-V-4A1
P&ID M544 Zone J5

PUMP AND VALVE OPERABILITY ASSURANCE REVIEW

PLANT INFORMATION

1. Name: WNP-2 Unit No.: ___ 2. Docket No.: 50-397
3. Utility: Washington Public Power Supply System
4. NSSS: General Electric [ ] PWR [X] BWR
5. A/E: Burns and Roe

II. GENERAL COMPONENT* INFORMATION

1. Supplier: [ ] NSSS [X] BOP
2. Location: a. Building/Room Reactor Building H8/7.1 Room R608
   b. Elevation 587
   c. System Standby Gas Treatment
3. Component number on in-house drawings: SGT-V-4A1
4. If component is a [ ] Pump complete II.5.
   If component is a [X] Valve complete II.6.
5. General Pump Data

a. Pump		b. Prime-mover	
Name		Name	
Mfg.		Mfg.	
Model		Model	
S/N		S/N	
Type		Type	

*The component, whether pump or valve, is considered to be an assembly composed of the body, internals, prime-mover (or actuator) and functional accessories.

a. Pump (continued)

Size ______________________________

Weitnt ______________________________

Mounting
Method ______________________________

Required B.H.P. ______________________________

Paremeter	Design	Operating
Press	______	______________
Temp	______	______________
Flow	______	______________
Head	______	______________

Required NPSH at maximum

flow ______________________________

Available NPSH ______________________________

Operating Speed ______________________________

Critical Speed ______________________________

b. Prime-mover (continued)

Size ______________________________

Weight ______________________________

Mounting
Method ______________________________

H.P. ______________________________

Power requirements: (include normal, maximum and minimum)

Electrical ______________________________

____

____

____

____

If MOTOR list:

Duty cycle ______________________________

Stall current ______________________________

Class of insulation ______________________________

____

List functional accessories:* ______________________________

____

____

List control signal inputs: ______________________________

____

____

*Functional accessories are those sub-components not supplied by the manufacturer that are required to make the pump assembly operational, (e.g., coupling, lubricating oil system, etc.)

5. General Valve Data

a. Valve		b. Actuator (if not an integral unit)	
Name	SGT-V-4A1	Name	SGT-MO-4A1
Mfg.	BIF	Mfg.	Limitorque
Model	A206761	Model	SMB-00-10/P56
S/N	N-27232-7	S/N	208100
Type	Butterfly	Type	Electric, SMB
Size	18 inch	Size	00
Weight	445 lbs.	Weight	305 lbs
Mounting Method	Flange mounted	Mounting Method	Bolted to valve yoke
Required Torque	Start 10ft-lb; Run 2ft-lb	Torque	10 ft-lb

Parameter	Design	Operating
Press	150 psi	15 psia
Temp	$212^{o}F$	$70\text{-}120^{o}F$
Flow		4000 scfm

Power requirements: (include normal, maximum and minimum)

Electrical Motor: Reliance, 1.3 HP

1 0; 230VAC; 0.38 amp; 60 Hz 3600 rpm

Max Δ P across valve ______

Closing time @ max Δ P not applicable

Other: [ ] Pneumatic [ ] Hydraulic

Opening time @ max Δ P not applicable

Power requirements for functional accessories, (if any) ______

List control signal inputs: ______

List functional accessories:* Limit switches are provided by manufacturer; electric motor by Reliance Co.

III. FUNCTION

1. Briefly describe components normal and safety functions: This valve is normally closed. It is interlocked with valve SGT-V-5A1 to recycle the output of Standby Gas Treatment System SGT-FU-1A into the building if the charcoal beds release excessive iodine, or if the drywell pressure is high, or if the reactor water level is low.

2. The components normal state is: [ ] Operating [X] Standby

3. Safety function:

   a. [ ] Emergency reactor shutdown
   b. [ ] Containment heat removal
   c. [ ] Containment isolation
   d. [ ] Reactor heat removal
   e. [ ] Reactor core cooling
   f. [X] Prevent significant release of radioactive material to environment

   g. [X] Does the component function to mitigate the consequences of one or more of the following events? [ ] Yes [ ] No If "Yes", identify.

   [X] LOCA [ ] HELB [ ] MSLB

   [ ] Other

4. Safety requirements:

   [ ] Intermittent Operation [ ] During postulated event

   [ ] Continuous Operation [X] Following postualted event

   If component operation is required following an event, give approximate length of time component must remain operational.

   4320 hours (e.g., hours, days, etc.)

*Functional accessories are those sub-components not supplied by the manufacturer that are required to make the valve assembly operational, (e.g., limit switches).

5. For VALVES:

does the component [ ] Fail open [ ] Fail closed [X] Fail as is

Is this the fail-safe position [X] Yes [ ] No

Is the valve used for throttling purposes? [ ] Yes [X] No

Is the valve part of the reactor coolant pressure boundary? [ ] Yes [X] No

Does the valve have a specific limit for leakage? [X] Yes [ ] No

If "Yes" give limit: Bubble tight at 2 psig differential pressure

IV. QUALIFICATION

1. Reference by specific number those applicable sections of the design codes and standards applicable to the component:

   Valve ASME Section III-NC (1971); Burns & Poe Spec 2808-68

2. Reference those qualification standards, used as a guide to qualify the component:

   IEEE 344-1971 (Reevaluation to IEEE 344-1975) NUREG 0588 Cat. II

3. Identify those parts of the above qualification standards deleted or modified in the qualification program.

Deleted:	Modified:
None	None

4. Have acceptance criterias been established and documented in the test plan(s) for the component? [X] Yes [ ] No

   Qualification accomplished by analysis, not testing (for valve)

5. What is the expected failure mode that would keep the pump or valve assembly from performing its safety function?

   Torque or limit switch failure; disc deflection greater than allowable.

6. Are the margins* identified in the qualification documentation? [X] Yes [ ] No

*Margin is the difference between design basis parameters and the test parameters used for equipment qualification.

If component is a PUMP, complete IV.7.

If component is a VALVE, complete IV.8.

7. Pump operability has been demonstrated by: [ ] Analysis
[ ] Test [ ] Combination

Identify PUMP tests performed:

a. [ ] Shell hydrostatic (ASME Section III)

b. [ ] Bearing temperature evaluations

c. [ ] Seismic loading

d. [ ] Vibration levels

e. [ ] Exploratory vibration (Fundamental Freq.______)

f. [ ] Seal leakage & hydro press

g. [ ] Aging: [ ] Thermal [ ] Mechanical

h. [ ] Flow performance
Are curves provided [ ] Yes [ ] No

i. [ ] Pipe reaction end loads (nozzle loads)

j. [ ] Others ____________________

k. [ ] Extreme environment:
[ ] Humidity
[ ] Chemical
[ ] Radiation

8. Valve operability has been demonstrated by: [X] Analysis for valve
[X] Test for Operator [ ] Combination

Identify VALVE tests performed:

a. [X] Shell hydrostatic (ASME Section III)

b. [ ] Cold cyclic List times:
Open ________
Closed ________

c. [X] Seismic loading
OPERATOR TESTED
VALVE ANALYZED

d. [ ] Hot cyclic List times:
Open ________
Closed ________

e. [X] Exploratory vibration
Operator only
(Fundamental Freq. >33 Hz)

f. [ ] Main seat leakage

g. [X] Aging: Operator only [X] Thermal [X] Mechanical

h. [ ] Back seat leakage

i. [ ] Pipe reaction end loading

j. [ ] Disc hydrostatic

k. [X] Extreme environment: Operator only
[X] Humidity
[ ] Chemical
[X] Radiation

l. [ ] Flow interruption capability

m. [ ] Flow characteristics
Are curves provided?
[ ] Yes [X] No

n. [X] Others Static stress & frequency analysis of valve

9. As a result of any of the tests (or analysis), were any deviations from design requirements identified? [ ] Yes [X] No If "Yes", briefly describe any changes made in tests (or analysis) or to the component to correct the deviation.

10. Was the test component precisely identical (as to model, size, etc.) to the in-plant component? [X] Yes [ ] No If "No", is installed component [ ] oversized or [ ] undersized?
Motor Operator was tested; valve was qualified by analysis.

11. If type test was used to qualify the component, does the type test meet the requirements of IEEE 323-1974, Section 5.? [ ] Yes [X] No
TESTING & ANALYSIS RESULTS FOR OPERATOR SATISFY NUREG 0588 CAT II CRITERIA

12. Is component orientation sensitive? [ ] Yes [X] No [ ] Unknown
If "Yes", does installed orientation coincide with test orientation?
[ ] Yes [ ] No Installed orientation consistent with analysis.

13. Is the component mounted in the same manner in-plant as it was during testing (i.e., welded, same number and size bolts, etc.)?
[X] Yes [ ] No [ ] Unknown

Operator only

14. Were the qualification tests performed in sequence and on only one component? [X] Yes [ ] No

If "Yes" identify sequence, (e.g., radiation, seismic, cyclic, thermal, etc.):

Thermal aging Vibration aging Radiation Seismic Post Accident conditions

15. If "aging"* was performed, identify the significant aging mechanisms:

THERMAL & RADIATION AGING FOR LIMIT SWITCH AND MOTOR

16. Identify loads imposed (assumed) on the component for the qualification tests (analysis) performed:

a. [X] Plants (shutdown loads) For valve & operator
b. [X] Extreme environment Operator only
c. [X] Seismic load For valve & operator
d. [ ] Others

17. Have component design specifications been reviewed in-house to assure they envelope all expected operating, transient, and accident conditions? [X] Yes [ ] No

18. Does the component utilize any unique or special materials? (Examples are special gaskets or packing, limitations on nonferrous materials, or special coatings or surfaces.) [ ] Yes [X] No

If "Yes", identify:

19. Does component require any special maintenance procedures or practices, (including shorter periods between maintenance)? [X] Yes [ ] No

If "Yes", identify: Plant Maintenance Procedures

20. Is the qualified life for the component less than 40 years? [ ] Yes [X] No If "Yes", what is the qualified life?

See attachment

*As outlined in Section 4.4.1 of IEEE-627 1980.

21. Information Concerning Qualification Documents for the Component

Report Number	Report Title	Date	Company/Organization Preparing Report	Company/Organization Reviewing Report
QID's 221001 and 361003			Supply System EQ File	

Attachment to Item 20.

The prediction of a "qualified life" through accelerated aging is generally not feasible at the present state of the art. An aging analysis has been performed for electrical equipment located in potentially harsh environmental areas. The results of these studies are contained in a report to the NRC titled, "WNP-2 Environmental Equipment Qualification Report for Safety-Related Equipment, September 1982". Attached are the summary sheets for the electrical components associated with the selected equipment located in potential harsh environments.

Results of the aging analysis will be used to define recommended maintenance/ replacement interval for inclusion in the WNP-2 maintenance and surveillance procedures.

WPPSS

QID #221001

WASHINGTON PUBLIC POWER SUPPLY SYSTEM

EQUIPMENT QUALIFICATION REPORT

OWNER: WPPSS
FACILITY: WNP 2
SPEC: 2808-68

MPL:
PPD:

REVISION: 2
DATE: September, 1982

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENT REF.		QUALIFICATION METHOD	OUTSTANDING ITEMS
	PARAMETER	FSAR	QUALIFICATION	FSAR	QUAL.		
SYSTEM Standby Gas Treatment TAG NUMBER	OPERATING TIME	6 months	Equivalent to>6 months	1	3,5	Sequential Test Engineering Analysis	None
SGT-MO-See Note Below	TEMPERATURE (F)	90 normal 104 abnormal Accident Profile 4	See enclosed profile	2	3	Simultaneous Test	None
MANUFACTURER Limitorque	PRESSURE (PSIA)	14.7	See enclosed profile	2	3	Simultaneous Test	None
MODEL NUMBER SMB-00-10/P56	RELATIVE HUMITY (%)	40 normal 90 abnormal Accident Profile 4	100	2	3	Simultaneous	None
COMPONENT Motor Operator	CHEMICAL SPRAY	N/A	N/A	2	N/A	N/A	None
FUNCTION/SERVICE Various Valve Operators Reliance, Class B Insulation	RADIATION (RAD)	1.1×10^6	2×10^7	6	3	Sequential Test	None
	AGING	40 years	40 years	2	3,5	Sequential Test	None
LOCATION: BLDG R ELEVATION 572 COLUMN See Notes Below	ACCURACY	N/A	N/A	N/A	N/A	N/A	None

FLOOD LEVEL ELEV:
ABOVE FLOOD LEVEL? YES X NO

Prepared by: Raymond O. 8/25/82   Reviewed by: [signature] 8/28/82

DOCUMENTATION REFERENCES

1. WNP-2 Class 1E Equipment List dated September, 1982
2. FSAR Par. 3.11
3. Limitorque Test Report B003
4. Limitorque Test Report B0058
5. QID #221001
6. EDS Report 0740-004-572H

NOTES

Qualified

Tag Number	Location	Tag Number	Location	Tab Number	Location
SGT-MO-1A	H.8/5.2	SGT-MO-4A1	H.4/7.0	SGT-MO-5A1	H.4/7.0
-1B	J.4/5.2	-4A2	J.1/7.0	-5A2	H.9/7.0
-3A1	H.4/7.6	-4B1	H.8/7.0	-5B1	J.1/7.0
-3A2	H.6/7.6	-4B2	J.8/7.0	-5B2	J.6/7.0
-3B1	J.4/7.6				
-3B2	J.6/7.6				

WP-1001

TEMPERATURE PROFILE

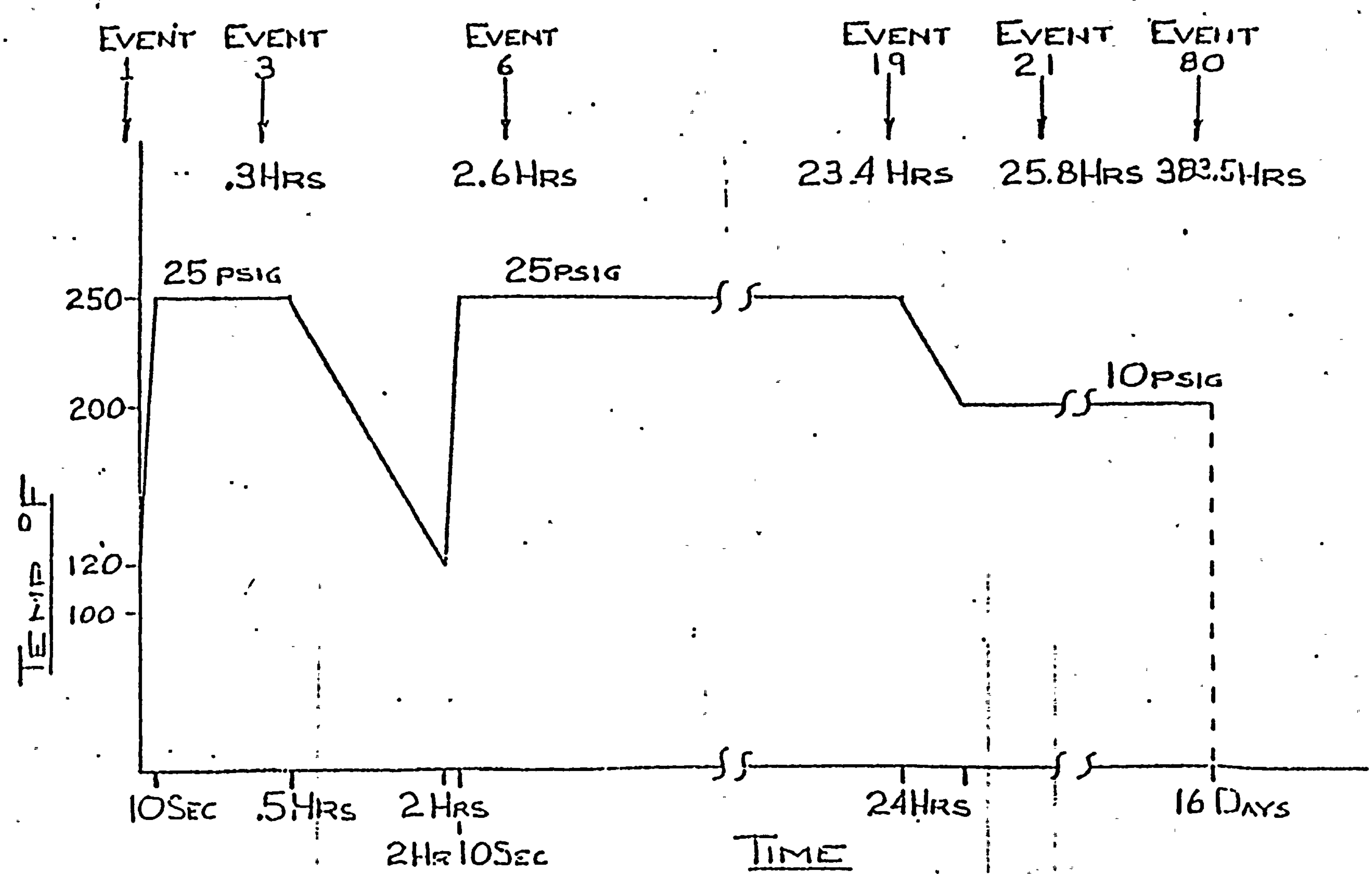


FIGURE 1

PUMP LPCS-P-1
P&ID: M520

PUMP AND VALVE OPERABILITY ASSURANCE REVIEW

I. PLANT INFORMATION

1. Name: WNP-2 Unit No.: ____ 2. Docket No.: 50-397
3. Utility: Washington Public Power Supply System
4. NSSS: General Electric [ ] PWR [X] BWR
5. A/E: Burns and Roe

II. GENERAL COMPONENT* INFORMATION

1. Supplier: [X] NSSS [ ] BOP
2. Location: a. Building/Room Reactor Building K/4.0
   b. Elevation 426
   c. System Low Pressure Core Spray
3. Component number on in-house drawings: LPCS-P-1
4. If component is a [X] Pump complete II.5.
   If component is a [ ] Valve complete II.6.
5. General Pump Data

a. Pump		b. Prime-mover	
Name	LPCS-P-1	Name	LPCS-M-1
Mfg.	Ingersoll-Rand	Mfg.	General Electric
Model	29APKD-5	Model	5K6347XC65A
S/N	0573277	S/N	AJK116029
Type	Vertical Shaft Centrifugal	Type	K, Squirrel Cage Induction Motor

*The component, whether pump or valve, is considered to be an assembly composed of the body, internals, prime-mover (or actuator) and functional accessories.

a. Pump (continued)			b. Prime-mover (continued)	
Size	36" DIA x 284" OVERALL (PUMP 203 5/8)		Size	Frame 6347PZ42
Weight	11700# (DRY)		Weight	10,300#
Mounting Method	Vertical Mount: Flanged to Mounting Ring		Mounting Method	Vertical Mount: Flanged to Pump
Required B.H.P.			H.P.	1500
Paremeter	Design	Operating	Power requirements: (include normal, maximum and minimum)	
Press psig	100 (SUCTION) 500 (DISCH)	150	Electrical	
Temp ^{O}F	212	40 - 212	4000 VAC; 3Ø; 60 Hz	
Flow gpm	6350/7200	6350/7200	FL AMPS = 192	
Head ft	715/560	715/560		

Required NPSH at maximum flow 30 feet

Available NPSH 49.1 feet

Operating Speed 1780 rpm

Critical Speed

If MOTOR list:

Duty cycle Continuous; Service Factor = 1.0

Stall current 1250 amps; 14 seconds @ 80^{O}C

Class of insulation B

List functional accessories:* Asson Piping & Engineering Company Srainger; S/NM5647; Rating 100 psi/212^{O}F; ASME III - NC

List control signal inputs: Remote manual switch plus automatic initiation by reactor protection system

---

*Functional accessories are those sub-components not supplied by the manufacturer that are required to make the pump assembly operational, (e.g., coupling, lubricating oil system, etc.)

Press psig Design 100 (Suction) 500 (Disch) Operating 150

Temp °F Design 212 Operating 40 - 212

Flow gpm Design 6350/7200 Operating 6350/7200

Head ft Design 715/560 Operating 715/560

Required NPSH at maximum flow 30 feet

Available NPSH 49.1 feet

Operating Speed 1780 rpm

Critical Speed ____

List functional accessories:* Asson Piping & Engineering Company Srainger; S/NM5647; Rating 100 psi/212°F; ASME III - NC

List control signal inputs: Remote manual switch plus automatic initiation by reactor protection system

...ounting Ring ____ Weig...

Mountin... Method ____

H.P. 150...

Power require... maximum and mi...

Electrical 4000 VAC; 3Ø; 60 Hz

FL AMPS = 192

If MOTOR list:

Duty cycle Continuous; Service Fa...

Stall current 1250 amps; 14 seconds

Class of insulation B

*Functional accessories are those sub-components not supplied by the manufacturer that are required to make the pump assembly operational, (e.g., coupling, lubricating oil system, etc.)

5. General Valve Data.

a. Valve

Name ______________________

Mfg. ______________________

Model ______________________

S/N ______________________

Type ______________________

Size ______________________

Weight ______________________

Mounting
Method ______________________

Required
Torque ______________________

Parameter		
Press	______	______
Temp	______	______
Flow	______	______

Max P across valve ______________

Closing time @ max P ______________

Opening time @ max P ______________

b. Actuator (if not an integral unit)

Name ______________________

Mfg. ______________________

Model ______________________

S/N ______________________

Type ______________________

Size ______________________

Weight ______________________

Mounting
Method ______________________

Torque ______________________

Power requirements: (include normal, maximum and minimum)

Electrical ______________________

____

____

____

Other: [ ] Pneumatic [ ] Hydraulic

____

Power requirements for functional accessories, (if any) ______________________

____

List control signal inputs: ______________________

____

____

List functional accessories:* ____________________

____

III. FUNCTION

1. Briefly describe components normal and safety functions: This pump has no "normal" function. Its safety function is to supply coolant to the reactor core upon loss of normal reactor coolant to prevent core damage.

2. The components normal state is: [ ] Operating [X] Standby

3. Safety function:

a. [ ] Emergency reactor shutdown
b. [ ] Containment heat removal
c. [ ] Containment isolation
d. [ ] Reactor heat removal
e. [X] Reactor core cooling
f. [ ] Prevent significant release of radioactive material to environment
g. [X] Does the component function to mitigate the consequences of one or more of the following events? [X] Yes [ ] No
If "Yes", identify.

[X] LOCA [ ] HELB [X] MSLB

[ ] Other ____________________

4. Safety requirements:

[ ] Intermittent Operation [X] During postulated event

[ ] Continuous Operation [X] Following postualted event

If component operation is required following an event, give approximate length of time component must remain operational.

4320 hours (e.g., hours, days, etc.)

*Functional accessories are those sub-components not supplied by the manufacturer that are required to make the valve assembly operational, (e.g., limit switches).

5. For VALVES:

does the component [ ] Fail open [ ] Fail closed [ ] Fail as is

Is this the fail-safe position [ ] Yes [ ] No

Is the valve used for throttling purposes? [ ] Yes [ ] No

Is the valve part of the reactor coolant pressure boundary? [ ] Yes [ ] No

Does the valve have a specific limit for leakage? [ ] Yes [ ] No

If "Yes" give limit: ______________________

IV. QUALIFICATION

1. Reference by specific number those applicable sections of the design codes and standards applicable to the component: ASME Section III-NC;

GE specs: 209A4280; 21A9222 21A9222DK; 21A9243; 21A9243DF

2. Reference those qualification standards, used as a guide to qualify the component:

IEEE-344-1971 (Re-evaluated to IEEE-344-1975) NUREG-0588 CAT. II

3. Identify those parts of the above qualification standards deleted or modified in the qualification program.

Deleted:	Modified:
None	None

4. Have acceptance criterias been established and documented in the test plan(s) for the component? [X] Yes [ ] No

5. What is the expected failure mode that would keep the pump or valve assembly from performing its safety function? Pump bearing failure; thrust bearing wearout; lateral shaft deflection in excess of allowable.

6. Are the margins* identified in the qualification documentation? [X] Yes [ ] No

*Margin is the difference between design basis parameters and the test parameters used for equipment qualification.

If component is a PUMP, complete IV.7.

If component is a VALVE, complete IV.8.

7. Pump operability has been demonstrated by: [X] Analysis [ ] Test [X] Combination

Identify PUMP tests performed:

a. [X] Shell hydrostatic (ASME Section III)

b. [ ] Bearing temperature evaluations

c. [X] Seismic loading Analysis only

d. [ ] Vibration levels

e. [X] Exploratory vibration Analysis only (Fundamental Freq.______)

f. [X] Seal leakage & hydro press

g. [X] Aging: [X] Thermal [X] Mechanical (motor only)

h. [X] Flow performance Are curves provided [X] Yes [ ] No

i. [X] Pipe reaction end (Analysis only) loads (nozzle loads)

j. [X] Others Computer aided Dynamic Frequency & Stress Analysis

k. [X] Extreme environment: Motor

[X] Humidity

[ ] Chemical

[X] Radiation

8. Valve operability has been demonstrated by: [ ] Analysis [ ] Test [ ] Combination.

Identify VALVE tests performed:

a. [ ] Shell hydrostatic (ASME Section III)

b. [ ] Cold cyclic List times: Open ______ Closed ______

c. [ ] Seismic loading

d. [ ] Hot cyclic List times: Open ______ Closed ______

e. [ ] Exploratory vibration (Fundamental Freq.______)

f. [ ] Main seat leakage

g. [ ] Aging: [ ] Thermal
[ ] Mechanical

h. [ ] Back seat leakage

i. [ ] Pipe reaction end loading

j. [ ] Disc hydrostatic

k. [ ] Extreme environment:

[ ] Humidity

[ ] Chemical

[ ] Radiation

l. [ ] Flow interruption capability

m. [ ] Flow characteristics

Are curves provided?

[ ] Yes [ ] No

n. [ ] Others ______________

9. As a result of any of the tests (or analysis), were any deviations from design requirements identified? [ ] Yes [X] No If "Yes", briefly describe any changes made in tests (or analysis) or to the component to correct the deviation.

____

____

____

10. Was the test component precisely identical (as to model, size, etc.) to the in-plant component? [ ] Yes [X] No If "No", is installed component [ ] oversized or [ ] undersized?

Tests performed on motorettes of comparable insulation.

11. If type test was used to qualify the component, does the type test meet the requirements of IEEE 323-1974, Section 5.? [ ] Yes [X] No

12. Is component orientation sensitive? [X] Yes [ ] No [ ] Unknown If "Yes", does installed orientation coincide with test orientation? [X] Yes [ ] No

13. Is the component mounted in the same manner in-plant as it was during testing (i.e., welded, same number and size bolts, etc.)? [X] Yes [ ] No [ ] Unknown

Component is mounted consistent with analytical model.

14. Were the qualification tests performed in sequence and on only one component? [ ] Yes [ ] No Not Applicable

If "Yes" identify sequence, (e.g., radiation, seismic, cyclic, thermal, etc.): Thermal Aging, Radiation, Steam-Temp, 100% RH-Temperature

15. If "aging"* was performed, identify the significant aging mechanisms:

Thermal (motor)

Mechanical (motor)

16. Identify loads imposed (assumed) on the component for the qualification tests (analysis) performed:

a. [X] Plants (shutdown loads) b. [X] Extreme environment

c. [X] Seismic load d. [ ] Others

17. Have component design specifications been reviewed in-house to assure they envelope all expected operating, transient, and accident conditions? [X] Yes [ ] No

18. Does the component utilize any unique or special materials? (Examples are special gaskets or packing, limitations on nonferrous materials, or special coatings or surfaces.) [X] Yes [ ] No

If "Yes", identify:

19. Does component require any special maintenance procedures or practices, (including shorter periods between maintenance)? [X] Yes [ ] No

If "Yes", identify: Plant Procedure Manual; ASME Section XI Tests performed quarterly to check discharge pressure, differential pressure, flowrate vibration level & motor lubrication level.

20. Is the qualified life for the component less than 40 years? [ ] Yes [ ] No If "Yes", what is the qualified life?

See Attachment

*As outlined in Section 4.4.1 of IEEE-627 1980.

21. Information Concerning Qualification Documents for the Component

Report Number	Report Title	Date	Company/Organization Preparing Report	Company/Organization Reviewing Report
QID 233011	Supply System EQ File			
QID 213032	Supply System EQ File			
QID 213033	Supply System EQ File			

EQUIPMENT QUA[illegible]TION DOCUMENT LIST

QID NO. 233011

COMPONENT: Pump

MANUFACTURER: Ingersoll-Rand (I075)

MANUFACTURER MODEL NO:

29APKD
29APKD-3
29APKD-5 STAGE

CONTRACT(S): 2

DOCUMENTATION:

1.0 SEISMIC

REF. NO.	COMPANY	REPORT TITLE	REPORT NO.	REPORT DATE	REV.	B&R TRANS. #	PUBLICATION NO.
1.1	Ingersoll-Rand	Design Report of I-R Model 29-APKD-3 (RHR-P-2A, B, C)	------	4/15/73	--	------	VPF 2993-126-1
1.2	Ingersoll-Rand	Design Report for I-R Model 29-APKD-5 (LPCS-P-1)	------	4/25/73	--	------	VPF 2981-88-1
*1.3	General Electric	Dynamic Math Model, Seismic Analysis & Response Spectra	---	Rec'd 4/27/81	-	---	---
*1.4	General Electric	Hanford 2 New Loads Analysis of Floor Mounted Equipment	---	10/3/80	-	---	DRF E12-44
*1.5	General Electric	Hanford 2 New Loads Analysis of Over-loaded Floor Mounted Equipment	---	6/26/81	-	---	DRF E21-41 DRF E12-45
**1.6	General Electric	NSSS New Loads Design Adequacy Evaluation Summary Report	NLDAE	9/25/81	-	---	File No. 2.8.11

*References 1.3, 1.4, 1.5 filed under QID 179002
**Report NLDAE filed under QID 361964

2.0 ENVIRONMENTAL

2.1

2.2

2.3

2.4

2.5

2.6

Attachment to Item 20.

The prediction of a "qualified life" through accelerated aging is generally not feasible at the present state of the art. An aging analysis has been performed for electrical equipment located in potentially harsh environmental areas. The results of these studies are contained in a report to the NRC titled, "WNP-2 Environmental Equipment Qualification Report for Safety-Related Equipment, September 1982". Attached are the summary sheets for the electrical components associated with the selected equipment located in poter harsh environments.

Results of the aging analysis will be used to define recommended maintenance/replacement interval for inclusion in the WNP-2 maintenance and surveillance procedures.

WPPSS

Q10213032

EQUIPMENT QUALIFICATION REPORT

OWNER: WPPSS
FACILITY: WNP 2
SPEC:2808-02E21

MPL: E21-C001 A
PPD:

PAGE NO. 150
REVISION: 2
DATE: 8-25-82

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENT REF.		QUALIFICATION METHOD	OUTSTANDING ITEMS
	PARAMETER	FSAR	QUALIFICATION	FSAR	QUAL.		
SYSTEM Low Pressure Core Spray	OPERATING TIME	24 hours	94,746 hours	5	3,4 7,8	Sequential Engineering Analysis	None
TAG NUMBER LPCS-M-1	TEMPERATURE (F)	90 max normal 104 max abnormal 126 max accident	212	1,6	3,4 7, 8	Simultaneous Engineering Analysis	None
MANUFACTURER General Electric	PRESSURE (PSIA)	14.7	N/R	1	N/A	N/A	None
MODEL NUMBER 5K6347XC65A COMPONENT Motor	RELATIVE HUMITY (%)	40 normal 90 max abnormal 100 max accident	100% & Steam	1	3,4 7,8	Simultaneous Engineering Analysis	None
FUNCTION/SERVICE Drive Pump	CHEMICAL SPRAY	N/A	N/A	1	N/A	N/A	None
	RADIATION (RAD)	1.7×10^6	5.5×10^6	2	3,4 7,8	Sequential Engineering Analysis	None
	AGING	40 years	40 years	1	3, 7,8	Sequential Engineering Analysis	None
LOCATION: BLDG R ELEVATION 429 COLUMN K2/3.8	ACCURACY	N/A	N/A	N/A	N/A	N/A	None

FLOOD LEVEL ELEV:
ABOVE FLOOD LEVEL?
YES NO

Prepared by: [signature] Reviewed by: [signature]

DOCUMENTATION REFERENCES

1. FSAR Par. 3.11
2. EDS Study 0740-004-422C
3. GE #22A4722 (BWR 11-A-05)
4. GE #NEDM-10672, 8/72 (BWR 111-A-05)
5. WNP-2 Class 1E Equipment List
   B&R Calculation 9-46-02
   GE #456IIA898
   Calculations 213032-1, -2, -3, -4

NOTES

1. Qualified.

PUMP HPCS-P-2
P&ID M524

PUMP AND VALVE
OPERABILITY ASSURANCE REVIEW

PLANT INFORMATION

1. Name: WNP-2 Unit No.: ___ 2. Docket No.: 50-397
3. Utility: Washington Public Power Supply System
4. NSSS: General Electric [ ] PWR [X] BWR
5. A/E: Burns and Roe

II. GENERAL COMPONENT* INFORMATION

1. Supplier: [X] NSSS [ ] BOP
2. Location: a. Building/Room Pumphouse A A8/1.9
   b. Elevation 448
   c. System High Pressure Core Spray
3. Component number on in-house drawings: HPCS-P-2
4. If component is a [X] Pump complete II.5.
   If component is a [ ] Valve complete II.6.
5. General Pump Data

a. Pump		b. Prime-mover	
Name	HPCS-P-2	Name	HPCS-M-2
Mfg.	Pacific Pumps	Mfg.	General Electric
Model	6X14M-WY-25T	Model	5K6257XH672A
S/N	48153	S/N	FKJ626453
Type	Vertical Shaft Centrifugal	Type	K; Squirrel Cage Induction

*The component, whether pump or valve, is considered to be an assembly composed of the body, internals, prime-mover (or actuator) and functional accessories.

a. Pump (continued)

Size 6 x 14 M

Weight 2526# (4086# TOTAL WEIGHT FLOODED)

Mounting Method VERTICAL MOUNT; FLANGED TO MOUNTING RING

Required B.H.P.

Paremeter	Design	Operating
Press psig	115	56
Temp °F	32-100	100°F
Flow gpm	1200	1200
Head	130	130

Required Submergence at maximum flow 2 ft @ 1200 gpm

Available NPSH 4 ft

Operating Speed 1750 rpm

Critical Speed 5470 rpm

b. Prime-mover (continued)

Size Frame B364TP16

Weight 600#

Mounting Method Vertical Mount; Flange to Pump

H.P. 60

Power requirements: (include normal, maximum and minimum)

Electrical 460 VAC; 30; 60 Hz

Full Load Amps = 74.5

If MOTOR list:

Duty cycle Continuous; Service Factor = 1.15

Stall current 435 Amps. @ 460 VAC @ 14 Second

Class of insulation B

List functional accessories:* None

List control signal inputs: Remote manual switch interlocked with discharge valve SW-V-2B and HPCS diesel engine pump will start when SW-V-2B is closed and diesel engine starts.

*Functional accessories are those sub-components not supplied by the manufacturer that are required to make the pump assembly operational, (e.g., coupling, lubricating oil system, etc.)

6. General <u>Valve</u> Data

a. Valve			b. Actuator (if not an integral unit)
Name ______			Name ______
Mfg. ______			Mfg. ______
Model ______			Model ______
S/N ______			S/N ______
Type ______			Type ______
Size ______			Size ______
Weignt ______			Weight ______
Mounting Method ______			Mounting Method ______
Required Torque ______			Torque ______
Parameter	______	______	Power requirements: (include normal, maximum and minimum)
Press	______	______	Electrical ______
Temp	______	______	______
Flow	______	______	______
Max P across valve ______			______
Closing time @ max P ______			Other: [ ] Pneumatic [ ] Hydraulic
Opening time @ max P ______			______
Power requirements for functional			______
accessories, (if any) ______			______
______			______

List control signal inputs: ______

______

______

List functional accessories:* ______________________________

____

III. FUNCTION

1. Briefly describe components normal and safety functions: This pump has no "normal" function. The safety function is to provide cooling water to the HPCS diesel heat exchangers and to the atmospheric cooling units for the diesel room and pump room.

2. The components normal state is: [ ] Operating [X] Standby

3. Safety function:

a. [ ] Emergency reactor shutdown
b. [ ] Containment heat removal
c. [ ] Containment isolation
d. [ ] Reactor heat removal
e. [X] Reactor core cooling
f. [ ] Prevent significant release of radioactive material to environment
g. [X] Does the component function to mitigate the consequences of one or more of the following events? [X] Yes [ ] No
If "Yes", identify.

[ ] LOCA [ ] HELB [ ] MSLB

[X] Other Loss of offsite power

4. Safety requirements:

[ ] Intermittent Operation [X] During postulated event

[ ] Continuous Operation [X] Following postualted event

If component operation is required following an event, give approximate length of time component must remain operational.

24 Hours (e.g., hours, days, etc.)

*Functional accessories are those sub-components not supplied by the manufacturer that are required to make the valve assembly operational, (e.g., limit switches).

5. For VALVES:

does the component [ ] Fail open [ ] Fail closed [ ] Fail as is

Is this the fail-safe position [ ] Yes [ ] No

Is the valve used for throttling purposes? [ ] Yes [ ] No

Is the valve part of the reactor coolant pressure boundary? [ ] Yes [ ] No

Does the valve have a specific limit for leakage? [ ] Yes [ ] No

If "Yes" give limit: ______________________

IV. QUALIFICATION

1. Reference by specific number those applicable sections of the design codes and standards applicable to the component: ____________

ASME Section III-ND; GE Specification 21A 1776

2. Reference those qualification standards, used as a guide to qualify the component: IEEE 344-1971 (requalified to IEEE 344-1975);

3. Identify those parts of the above qualification standards deleted or modified in the qualification program.

Deleted:	Modified:
None	None

4. Have acceptance criterias been established and documented in the test plan(s) for the component? [X] Yes [ ] No

5. What is the expected failure mode that would keep the pump or valve assembly from performing its safety function? Thrust bearing wearout; pump shaft bearing failure; shaft lateral deflection greater than allowable.

6. Are the margins* identified in the qualification documentation? [X] Yes [ ] No

*Margin is the difference between design basis parameters and the test parameters used for equipment qualification.

If component is a PUMP, complete IV.7.

If component is a VALVE, complete IV.8.

7. Pump operability has been demonstrated by: [X] Analysis
[ ] Test [ ] Combination

Identify PUMP tests performed:

a. [X] Shell hydrostatic (ASME Section III)

b. [ ] Bearing temperature evaluations

c. [X] Seismic loading Analysis Only

d. [ ] Vibration levels

e. [ ] Exploratory vibration (Fundamental Freq.______)

f. [ ] Seal leakage & hydro press

g. [ ] Aging: [ ] Thermal [ ] Mechanical

h. [X] Flow performance
Are curves provided [X] Yes [ ] No

i. [X] Pipe reaction end (Analysis Only) loads (nozzle loads)

j. [X] Others Computer aided dynamic frequency and stress analysis supplemented by hand calculations.

k. [ ] Extreme environment:

[ ] Humidity

[ ] Chemical

[ ] Radiation

8. Valve operability has been demonstrated by: [ ] Analysis
[ ] Test [ ] Combination

Identify VALVE tests performed:

a. [ ] Shell hydrostatic (ASME Section III)

b. [ ] Cold cyclic List times:
Open ________
Closed ________

c. [ ] Seismic loading

d. [ ] Hot cyclic List times:
Open ________
Closed ________

e. [ ] Exploratory vibration (Fundamental Freq.______)

f. [ ] Main seat leakage

g. [ ] Aging: [ ] Thermal
[ ] Mechanical

h. [ ] Back seat leakage

i. [ ] Pipe reaction end loading

j. [ ] Disc hydrostatic

k. [ ] Extreme environment:

[ ] Humidity

[ ] Chemical

[ ] Radiation

l. [ ] Flow interruption capability

m. [ ] Flow characteristics

Are curves provided?

[ ] Yes [ ] No

n. [ ] Others ______________________

9. As a result of any of the tests (or analysis), were any deviations from design requirements identified? [ ] Yes [ ] No If "Yes", briefly describe any changes made in tests (or analysis) or to the component to correct the deviation.

____

____

____

10. Was the test component precisely identical (as to model, size, etc.) to the in-plant component? [X] Yes [ ] No If "No", is installed component [ ] oversized or [ ] undersized?
QUALIFIED BY ANALYSIS ONLY

11. If type test was used to qualify the component, does the type test meet the requirements of IEEE 323-1974, ~~Section 5.?~~ [ ] Yes [ ] No
TYPE TEST NOT USED

12. Is component orientation sensitive? [ ] Yes [ ] No [ ] Unknown If "Yes", does installed orientation coincide with test orientation? [ ] Yes [ ] No Analytical model conforms to installed orientation

13. Is the component mounted in the same manner in-plant as it was during testing (i.e., welded, same number and size bolts, etc.)? [ ] Yes [ ] No [ ] Unknown Analytical Model conforms to installed orientation.

14. Were the qualification tests performed in sequence and on only one component? [ ] Yes [ ] No

If "Yes" identify sequence, (e.g., radiation, seismic, cyclic, thermal, etc.): ______

15. If "aging"* was performed, identify the significant aging mechanisms:

NO AGING REQUIRED BECAUSE EQUIPMENT LOCATED IN MILD ENVIRONMENT

16. Identify loads imposed (assumed) on the component for the qualification tests (analysis) performed:

a. [X] Plants (shutdown loads)
b. [ ] Extreme environment
c. [X] Seismic load
d. [ ] Others ______

17. Have component design specifications been reviewed in-house to assure they envelope all expected operating, transient, and accident conditions? [X] Yes [ ] No

18. Does the component utilize any unique or special materials? (Examples are special gaskets or packing, limitations on nonferrous materials, or special coatings or surfaces.) [ ] Yes [ ] No

If "Yes", identify: Not Applicable

19. Does component require any special maintenance procedures or practices, (including shorter periods between maintenance)? [X] Yes [ ] No

If "Yes", identify: ASME Section XI Tests performed Quarterly to check discharge pressure, flowrate, vibration levels and Motor lubrication levels

20. Is the qualified life for the component less than 40 years? [ ] Yes [ ] No If "Yes", what is the qualified life? ______

(See attachment)

*As outlined in Section 4.4.1 of IEEE-627 1980.

21. Information Concerning Qualification Documents for the Component

Report Number	Report Title	Date	Company/Organization Preparing Report	Company/Organization Reviewing Report
VPF-3412-59-1	Seismic Analysis	3/16/81	General Electric	Supply System
VPF-3412-2-3	Seismic Analysis	3/16/81	General Electric	Supply System
QID 233009	Supply System EQ File			
QID 213031	Supply System EQ File			
21A1776	Specification, pump, HPCS diesel service water		General Electric	Supply System

Specific equipment aging analysis for electrical and mechanical equipment located in mild environmental areas is not a part of the WNP-2 equipment qualification program. Normal maintenance as recommended by the manufacturer and performed in accordance with the WNP-2 operational maintenance program is considered sufficient.

PUMP LPCS-P-2 ✓
P&ID M520

PUMP AND VALVE OPERABILITY ASSURANCE REVIEW

PLANT INFORMATION

1. Name: WNP-2 Unit No.: ___ 2. Docket No.: 50-397
3. Utility: Washington Public Power Supply System
4. NSSS: General Electric [ ] PWR [X] BWR
5. A/E: Burns and Roe

II. GENERAL COMPONENT* INFORMATION

1. Supplier: [ ] NSSS [X] BOP
2. Location: a. Building/Room REACTOR BUILDING J7/B6
   b. Elevation 424
   c. System LOW PRESSURE CORE SPRAY
3. Component number on in-house drawings: LPCS-P-2
4. If component is a [ ] Pump complete II.5.
   If component is a [ ] Valve complete II.6.
5. General Pump Data

a. Pump		b. Prime-mover	
Name	LPCS-P-2	Name	LPCS-M-2
Mfg.	CRANE CO.	Mfg.	WESTINGHOUSE
Model	3065-1055-6599	Model	TBDP 7504786
S/N	NDC-000-721	S/N	NONE
Type	CENTRIFUGAL, HORIZONTAL	Type	K, SQIRREL CAGE INDUCTION

*The component, whether pump or valve, is considered to be an assembly composed of the body, internals, prime-mover (or actuator) and functional accessories.

a. Pump (continued)

Size CRANE #A05

Weight 150#

Mounting Method HORIZONTAL SHAFT; SKID MOUNTED

Required B.H.P.

Paremeter	Design	Operating
Press psig	150	50
Temp , °F	212	120
Flow gpm	25	25
Head ft.	200	200

Required NPSH at maximum flow 14 ft. @ 64 GPM

Available NPSH 20 Feet

Operating Speed 3500 RPM

Critical Speed Not Available

b. Prime-mover (continued)

Size FRAME 256T

Weight 527#

Mounting Method HORIZONTAL SHAFT; SKID MOUNTED

H.P. 15HP

Power requirements: (include normal, maximum and minimum)

Electrical 460 VAC PH 3 60 Hz

18.5 Amps

If MOTOR list:

Duty cycle Continuous;Service Factor = 1.15

Stall current 91.4 Amps

Class of insulation H

List functional accessories:* None

List control signal inputs: Remote manual switch

*Functional accessories are those sub-components not supplied by the manufacturer that are required to make the pump assembly operational, (e.g., coupling, lubricating oil system, etc.)

6. General Valve Data

a. Valve

Name ____________________

Mfg. ____________________

Model ____________________

S/N ____________________

Type ____________________

Size ____________________

Weight ____________________

Mounting Method ____________________

Required Torque ____________________

Parameter ________ ________

Press ________ ________

Temp ________ ________

Flow ________ ________

Max P across valve ________

Closing time @ max P ________

Opening time @ max P ________

Power requirements for functional accessories, (if any) ________

____

b. Actuator (if not an integral unit)

Name ____________________

Mfg. ____________________

Model ____________________

S/N ____________________

Type ____________________

Size ____________________

Weight ____________________

Mounting Method ____________________

Torque ____________________

Power requirements: (include normal, maximum and minimum).

Electrical ____________________

____

____

____

Other: [ ] Pneumatic [ ] Hydraulic

____

____

____

____

List control signal inputs: ____________________

____

____

List functional accessories:*

Not Required

III. FUNCTION

1. Briefly describe components normal and safety functions:

The safety function is to maintain the LPCS Piping in a Waterfilled Mode, when LPCS is in standby.

2. The components normal state is: [X] Operating [ ] Standby

3. Safety function: (SEE III-1 ABOVE)

a. [ ] Emergency reactor shutdown

b. [ ] Containment heat removal

c. [ ] Containment isolation

d. [ ] Reactor heat removal

e. [ ] Reactor core cooling

f. [ ] Prevent significant release of radioactive material to environment

g. [ ] Does the component function to mitigate the consequences of one or more of the following events? [X] Yes [ ] No
If "Yes", identify.

[ ] LOCA [ ] HELB [ ] MSLB

[X] Other PROVIDES SYSTEM READINESS CAPABILITY TO LPCS SYSTEM

4. Safety requirements:

[ ] Intermittent Operation [ ] During postulated event

[X] Continuous Operation [ ] Following postualted event

If component operation is required following an event, give approximate length of time component must remain operational.

Not Applicable (e.g., hours, days, etc.)

*Functional accessories are those sub-components not supplied by the manufacturer that are required to make the valve assembly operational, (e.g., limit switches).

5. For VALVES:

does the component [ ] Fail open [ ] Fail closed [ ] Fail as is

Is this the fail-safe position [ ] Yes [ ] No

Is the valve used for throttling purposes? [ ] Yes [ ] No

Is the valve part of the reactor coolant pressure boundary? [ ] Yes [ ] No

Does the valve have a specific limit for leakage? [ ] Yes [ ] No

If "Yes" give limit: ______________________

IV. QUALIFICATION

1. Reference by specific number those applicable sections of the design codes and standards applicable to the component: ______

ASME Section III/NC; Burns and Roe SPEC 2808-35 (Section 15A and 1-1B)

2. Reference those qualification standards, used as a guide to qualify the component: IEEE 344-1975 (Reevaluated to 344-1975)

NUREG-0588 Cat. II

3. Identify those parts of the above qualification standards deleted or modified in the qualification program.

Deleted:	Modified:
None	None

4. Have acceptance criterias been established and documented in the test plan(s) for the component? [X] Yes [ ] No Preop Only

5. What is the expected failure mode that would keep the pump or valve assembly from performing its safety function? Motor or pump bearing failure; coupling deflection greater than allowable.

6. Are the margins* identified in the qualification documentation? [X] Yes [ ] No (For Pump)

*Margin is the difference between design basis parameters and the test parameters used for equipment qualification.

If component is a PUMP, complete IV.7.

If component is a VALVE, complete IV.8.

7. Pump operability has been demonstrated by: [X] Analysis [ ] Test [ ] Combination

Identify PUMP tests performed:

a. [ ] Shell hydrostatic (ASME Section III)

b. [ ] Bearing temperature evaluations

c. [X] Seismic loading

d. [ ] Vibration levels

e. [ ] Exploratory vibration

(Fundamental Freq.______)

f. [ ] Seal leakage & hydro press

g. [ ] Aging: [ ] Thermal [ ] Mechanical

h. [ ] Flow performance
Are curves provided [ ] Yes [ ] No

i. [X] Pipe reaction end PUMP ONLY, BY ANALYSIS loads (nozzle loads)

j. [ ] Others Analysis - Dynamic computer frequency and stress analysis with supportive hand calculations

k. [ ] Extreme environment:

[ ] Humidity

[ ] Chemical

[ ] Radiation

8. Valve operability has been demonstrated by: [ ] Analysis [ ] Test [ ] Combination

Identify VALVE tests performed:

a. [ ] Shell hydrostatic (ASME Section III)

b. [ ] Cold cyclic List times:
Open ______
Closed ______

c. [ ] Seismic loading

d. [ ] Hot cyclic List times:
Open ______
Closed ______

e. [ ] Exploratory vibration

(Fundamental Freq.______)

f. [ ] Main seat leakage

g. [ ] Aging: [ ] Thermal
[ ] Mechanical

h. [ ] Back seat leakage

i. [ ] Pipe reaction end loading

j. [ ] Disc hydrostatic

k. [ ] Extreme environment:

[ ] Humidity

[ ] Chemical

[ ] Radiation

l. [ ] Flow interruption capability

m. [ ] Flow characteristics

Are curves provided?

[ ] Yes [ ] No.

n. [ ] Others ______________________

9. As a result of any of the tests (or analysis), were any deviations from design requirements identified? [ ] Yes [X] No If "Yes", briefly describe any changes made in tests (or analysis) or to the component to correct the deviation.

____

10. Was the test component precisely identical (as to model, size, etc.) to the in-plant component? [ ] Yes [X] No If "No", is installed component [ ] oversized or [ ] undersized? (Not Applicable) For Pump Moterettes were tested. The bearings, leadwires and other components were qualified by operating experience and similarity.

11. If type test was used to qualify the component, does the type test meet the requirements of IEEE 323-1974, Section 5.? [ ] Yes [X] No

12. Is component orientation sensitive? [X] Yes [ ] No [ ] Unknown
If "Yes", does installed orientation coincide with test orientation?
[X] Yes [ ] No Installed orientation concides with analytical orientation.

13. Is the component mounted in the same manner in-plant as it was during testing (i.e., welded, same number and size bolts, etc.)?
[X] Yes [ ] No [ ] Unknown
Component is mounted consistent with analytical model.

14. Were the qualification tests performed in sequence and on only one component? [X] Yes Motor [ ] No Not Applicable for Pump

If "Yes" identify sequence, (e.g., radiation, seismic, cyclic, thermal, etc.): Thermal aging, radiation, mechanical stress, moisture, voltage test

15. If "aging"* was performed, identify the significant aging mechanisms: Insulation is aging susceptible

16. Identify loads imposed (assumed) on the component for the qualification tests (analysis) performed:

a. [ ] Plants (shutdown loads) b. [ ] Extreme environment

c. [X] Seismic load d. [ ] Others

17. Have component design specifications been reviewed in-house to assure they envelope all expected operating, transient, and accident conditions? [X] Yes [ ] No

18. Does the component utilize any unique or special materials? (Examples are special gaskets or packing, limitations on nonferrous materials, or special coatings or surfaces.) [ ] Yes [ ] No

If "Yes", identify:

19. Does component require any special maintenance procedures or practices, (including shorter periods between maintenance)? [ ] Yes [ ] No

If "Yes", identify: Technical Specification has requirements

20. Is the qualified life for the component less than 40 years? [ ] Yes [ ] No If "Yes", what is the qualified life?

See Attachment

*As outlined in Section 4.4.1 of IEEE-627 1980.

21. Information Concerning Qualification Documents for the Component

Report Number	Report Title	Date	Company/Organization Preparing Report	Company/Organization Reviewing Report
ME 209	Seismic Analysis	3/19/75	McDonald Engineering	Supply System
QID 233006/ 213016	Qualification File		Supply System	Supply System

Attachment to Item 20.

The prediction of a "qualified life" through accelerated aging is generally not feasible at the present state of the art. An aging analysis has been performed for electrical equipment located in potentially harsh environmental areas. The results of these studies are contained in a report to the NRC titled, "WNP-2 Environmental Equipment Qualification Report for Safety-Related Equipment, September 1982". Attached are the summary sheets for the electrical components associated with the selected equipment located in potential harsh environments.

Results of the aging analysis will be used to define recommended maintenance/replacement interval for inclusion in the WNP-2 maintenance and surveillance procedures.

QID #213016

WASHINGTON PUBLIC [illegible] PLY SYSTEM

EQUIPMENT QUALIFIC[illegible]ON REPORT

OWNER: WPPSS
FACILITY: WNP-2
SPEC: 2808-35A

MPL:
PPD:

PAGE NO: 150A
REVISION: 0
DATE: October 1982

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENT REF.		QUALIFICATION METHOD	OUTSTANDING ITEMS
	PARAMETER	FSAR	QUALIFICATION	FSAR	QUAL.		
SYSTEM Low Pressure Core Spray TAG NUMBER LPCS-M-2	OPERATING TIME	6 months	6 months	1	4	Simultaneous Test and Engineering Analysis	None
	TEMPERATURE (F)	90 Mx Normal 104 Max Abnormal Accident Profile 4,8	410	2	4	Simultaneous Test and Engineering Analysis	None
MANUFACTURER Westinghouse MODEL NUMBER 7504786	PRESSURE (PSIA)	Normal 14.7 Accident Profile 8	Accident Profile 8	2	4	Engineering Analysis	None
COMPONENT	RELATIVE HUMITY (%)	40 Normal 90 Abnormal 100 Accident	100	2	4	Sequential Test	None
FUNCTION/SERVICE 15hp motor for LPCS-P-2	CHEMICAL SPRAY	N/A	N/A	2	N/A	N/A	None
	RADIATION (RAD)	1.9×10^6	2×10^8	3	4	Sequential Test	None
	AGING	40 years	5 years	2	4	Simultaneous Test Engineering Analysis	None
LOCATION: BLDG R ELEVATION 424 COLUMN J.7/3.6	ACCURACY	N/A	N/A	N/A	N/A	N/A	None

FLOOD LEVEL ELEV:
ABOVE FLOOD LEVEL?
YES NO

Prepared by: R L Abbott Reviewed by: J S Sullivan

DOCUMENTATION REFERENCES	NOTES
1. WNP-2 Class 1E Equipment List, dated 9/82 2. FSAR Paragraph 3.11 3. EDS Report #0740-004-422M 4. QID #213017	Qualified

PUMP SW-P-1B
P&ID M524

PUMP AND VALVE OPERABILITY ASSURANCE REVIEW

PLANT INFORMATION

1. Name: WNP-2 Unit No.: ____ 2. Docket No.: 50-397
3. Utility: Washington Public Power Supply System
4. NSSS: General Electric [ ] PWR [X] BWR
5. A/E: Burns and Roe

II. GENERAL COMPONENT* INFORMATION

1. Supplier: [ ] NSSS [X] BOP
2. Location: a. Building/Room Pumphouse B3/12.5
   b. Elevation 444
   c. System Service Water
3. Component number on in-house drawings: SW-P-1B
4. If component is a [X] Pump complete II.5.
   If component is a [ ] Valve complete II.6.
5. General Pump Data

a. Pump		b. Prime-mover	
Name	SW-P-1B	Name	SW-M-1B
Mfg.	B 580	Mfg.	General Electric
Model	28KXH-3	Model	5K6348XC76A
S/N	735-S-0013	S/N	FKJ52203
Type	Vertical Shaft Centrifugal	Type	K, Induction, Square Frame

*The component, whether pump or valve, is considered to be an assembly composed of the body, internals, prime-mover (or actuator) and functional accessories.

a. Pump (continued)

Size	
Weight	14,000# Dry 19,000# Wet
Mounting Method	Flanged to Mounting Ring
Required B.H.P.	1542

Parameter	Design	Operating
Press psi	216	216
Temp ^{o}F	150	32 - 106
Flow gpm	10,500	10,500
Head ft	500	500

Required submergence at maximum flow 3 ft @ 10,500 gpm

Available NPSH 11 ft 9 in

Operating Speed 1185 rpm

Critical Speed

b. Prime-mover (continued)

Size	Frame 6348P42
Weight	15,100#
Mounting Method	Flanged to Pump
H.P.	1750

Power requirements: (include normal, maximum and minimum)

Electrical 4000 VAC: 3Ø: 1185 rpm

60 Hz

Full load amps = 222

If MOTOR list:

Duty cycle Continuous; service factor 1.15

Stall current 177.2 amps per phase

Class of insulation B

List functional accessories:*

List control signal inputs: Remote manual switch, interlocked with valve.
SW-V-2B to require discharge valve to be closed as pump start prerequisite

*Functional accessories are those sub-components not supplied by the manufacturer that are required to make the pump assembly operational, (e.g., coupling, lubricating oil system, etc.)

6. General Valve Data.

a. Valve

Name ______________________

Mfg. ______________________

Model ______________________

S/N ______________________

Type ______________________

Size ______________________

Weight ______________________

Mounting Method ______________________

Required Torque ______________________

Parameter		
Press	______	______
Temp	______	______
Flow	______	______

Max P across valve ______________________

Closing time @ max P ______________________

Opening time @ max P ______________________

Power requirements for functional accessories, (if any) ______________________

____

b. Actuator (if not an integral unit)

Name ______________________

Mfg. ______________________

Model ______________________

S/N ______________________

Type ______________________

Size ______________________

Weight ______________________

Mounting Method ______________________

Torque ______________________

Power requirements: (include normal, maximum and minimum)

Electrical ______________________

____

____

____

Other: [ ] Pneumatic [ ] Hydraulic

____

____

____

____

List control signal inputs: ______________________

____

____

List functional accessories:* ______

______

III. FUNCTION

1. Briefly describe components normal and safety functions: This pump normally supplies cooling water to the residual heat removal system heat exchangers (secondary) to remove decay heat from the RHR system. The safety function is to provide backup cooling water essential for continued operation of critical components.

2. The components normal state is: [ ] Operating [X] Standby

3. Safety function:

a. [ ] Emergency reactor shutdown
b. [X] Containment heat removal
c. [ ] Containment isolation
d. [X] Reactor heat removal
e. [ ] Reactor core cooling
f. [X] Prevent significant release of radioactive material to environment
g. [X] Does the component function to mitigate the consequences of one or more of the following events? [X] Yes [ ] No If "Yes", identify.

[X] LOCA [X] HELB [X] MSLB

[ ] Other BACK-UP COOLING SUPPLY

4. Safety requirements:

[X] Intermittent Operation [X] During postulated event

[ ] Continuous Operation [X] Following postualted event

If component operation is required following an event, give approximate length of time component must remain operational.

4320 hours (e.g., hours, days, etc.)

______

*Functional accessories are those sub-components not supplied by the manufacturer that are required to make the valve assembly operational, (e.g., limit switches).

5. For VALVES:

does the component [ ] Fail open [ ] Fail closed [ ] Fail as is

Is this the fail-safe position [ ] Yes [ ] No

Is the valve used for throttling purposes? [ ] Yes [ ] No

Is the valve part of the reactor coolant pressure boundary? [ ] Yes [ ] No

Does the valve have a specific limit for leakage? [ ] Yes [ ] No

If "Yes" give limit: ____________________

IV. QUALIFICATION

1. Reference by specific number those applicable sections of the design codes and standards applicable to the component:

Burns and Roe Spec 2808-23 Section F23

ASME Section III-ND

2. Reference those qualification standards, used as a guide to qualify the component:

IEEE-344-1971 (reevaluated to IEEE-344-1975)

3. Identify those parts of the above qualification standards deleted or modified in the qualification program.

Deleted:	Modified:
None	None

4. Have acceptance criterias been established and documented in the test plan(s) for the component? [X] Yes [ ] No

5. What is the expected failure mode that would keep the pump or valve assembly from performing its safety function? Shaft bearing failure: thrust bearing wearout; impeller shaft deflection greater than 0.020 inches.

6. Are the margins* identified in the qualification documentation? [X] Yes [ ] No

*Margin is the difference between design basis parameters and the test parameters used for equipment qualification.

If component is a PUMP, complete IV.7.

If component is a VALVE, complete IV.8.

7. Pump operability has been demonstrated by: [X] Analysis [ ] Test [ ] Combination

Identify PUMP tests performed:

a. [X] Shell hydrostatic (ASME Section III)

b. [ ] ~~Bearing temperature~~ evaluations

c. [X] Seismic loading Analysis only

d. [ ] Vibration levels

e. [X] Exploratory vibration (Computer Analysis) (Fundamental Freq.______)

f. [ ] Seal leakage & hydro press

g. [-] Aging: [ ] Thermal [ ] Mechanical NOT APPLICABLE

h. [X] Flow performance Are curves provided [X] Yes [ ] No

i. [X] Pipe reaction end (Analysis only) loads (nozzle loads)

j. [X] Others Computer Aided Dynamic Frequencey & Stress Analysis

k. [ ] Extreme environment:

[ ] Humidity

[ ] Chemical

[ ] Radiation

8. Valve operability has been demonstrated by: [ ] Analysis [ ] Test [ ] Combination

Identify VALVE tests performed:

a. [ ] Shell hydrostatic (ASME Section III)

b. [ ] Cold cyclic List times: Open ______ Closed ______

c. [ ] Seismic loading

d. [ ] Hot cyclic List times: Open ______ Closed ______

e. [ ] Exploratory vibration (Fundamental Freq.______)

f. [ ] Main seat leakage

g. [ ] Aging: [ ] Thermal
[ ] Mechanical

h. [ ] Back seat leakage

i. [ ] Pipe reaction end loading

j. [ ] Disc hydrostatic

k. [ ] Extreme environment:

[ ] Humidity

[ ] Chemical

[ ] Radiation

l. [ ] Flow interruption capability

m. [ ] Flow characteristics

Are curves provided?

[ ] Yes [ ] No

n. [ ] Others ____________________

9. As a result of any of the tests (or analysis), were any deviations from design requirements identified? [ ] Yes [X] No If "Yes", briefly describe any changes made in tests (or analysis) or to the component to correct the deviation.

____

____

____

10. Was the test component precisely identical (as to model, size, etc.) to the in-plant component? [ ] Yes [ ] No If "No", is installed component [ ] oversized or [ ] undersized?

Not tested, not applicable

11. If type test was used to qualify the component, does the type test meet the requirements of IEEE 323-1974, Section 5.? [ ] Yes [ ] No

NOT APPLICABLE

12. Is component orientation sensitive? [X] Yes [ ] No [ ] Unknown If "Yes", does installed orientation coincide with test orientation? [X] Yes [ ] No

13. Is the component mounted in the same manner in-plant as it was during testing (i.e., welded, same number and size bolts, etc.)? [X] Yes [ ] No [ ] Unknown

Analytical model conforms to installed orientation.

14. Were the qualification tests performed in sequence and on only one component? [ ] Yes [ ] No Not applicable

If "Yes" identify sequence, (e.g., radiation, seismic, cyclic, thermal, etc.): Not applicable

15. If "aging"* was performed, identify the significant aging mechanisms: Not applicable

16. Identify loads imposed (assumed) on the component for the qualification tests (analysis) performed:

a. [X] Plants (shutdown loads) b. [ ] Extreme environment

c. [X] Seismic load d. [X] Others Operating Loads

17. Have component design specifications been reviewed in-house to assure they envelope all expected operating, transient, and accident conditions? [X] Yes [ ] No

18. Does the component utilize any unique or special materials? (Examples are special gaskets or packing, limitations on nonferrous materials, or special coatings or surfaces.) [ ] Yes [X] No

If "Yes", identify:

19. Does component require any special maintenance procedures or practices, (including shorter periods between maintenance)? [X] Yes [ ] No

If "Yes", identify: ASME Section XI tests performed quarterly to check discharge pressure, flow rate, vibration level and motor lubrication level.

20. Is the qualified life for the component less than 40 years? [ ] Yes [ ] No If "Yes", what is the qualified life?

See attachemnt (2.0)

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*As outlined in Section 4.4.1 of IEEE-627 1980.

21. Information Concerning Qualification Documents for the Component

Report Number	Report Title	Date	Company/Organization Preparing Report	Company/Organization Reviewing Report
TCF-1002-DES	Design Report for Standby Service Water Pump	9/8/75	Byron Jackson Pump Co.	Supply System
QID 233017	Supply System EQ File			
QID 213034 Job #82044 FIB OL.01/F	Seismic Requalification	7/8/82	Cygna Services	Supply System
B&R Print File 23-00-0014	SEISMIC ANALYSIS	4/3/74	General Electric	Supply System

Attachment to Item 20.

Specific equipment aging analysis for electrical and mechanical equipment located in mild environmental areas is not a part of the WNP-2 equipment qualification program. Normal maintenance as recommended by the manufacturer and performed in accordance with the WNP-2 operational maintenance program is considered sufficient.

EQUIPMENT QUALIFICATION DOCUMENT LIST

COMPONENT: Pump (SW)

QID NO. 2330

MANUFACTURER: Byron-Jackson Pumps (B580)

MANUFACTURER MODEL NO:

28KXH
28 IN KXH-3 STAGE

CONTRACT(S): 23

DOCUMENTATION:

1.0 SEISMIC

REF. NO.	COMPANY	REPORT TITLE	REPORT NO.	REPORT DATE	REV.	B&R TRANS. #	PUBLICATION NO.
1.1	Borg-Warner Corp. (Byron Jackson Div.)	Design Report of Standby Service Water Pump 28KXH 3STAGE VCT	TCF-1002-DES	9/22/75	A	T-23B	23-00-0030
*1.2	General Electric	Seismic Qualification of Standby Service Water Pump Motors	---	11/13/74	-	T-27	23-00-0044
1.3	CYGNA	Requalification of Stantby Service Water Pumps	01..01/F	9-22-82	---	----	------
1.4							
1.5							
1.6							

*Filed under C1E QID 213034

2.0 ENVIRONMENTAL

2.1

2.2

2.3

2.4

2.5

2.6

PUMP SLC-P-1A
P&ID M522 Zone F6

PUMP AND VALVE OPERABILITY ASSURANCE REVIEW

I. PLANT INFORMATION

1. Name: WNP-2 Unit No.: ___ 2. Docket No.: 50-397
3. Utility: Washington Public Power Supply System
4. NSSS: General Electric [ ] PWR [X] BWR
5. A/E: Burns and Roe

II. GENERAL COMPONENT* INFORMATION

1. Supplier: [X] NSSS [ ] BOP
2. Location: a. Building/Room Reactor Building N2/3.7 Room R513
   b. Elevation 548
   c. System Standby Liquid Control
3. Component number on in-house drawings: SLC-P-1A
4. If component is a [ ] Pump complete II.5.
   If component is a [ ] Valve complete II.6.
5. General Pump Data

	a. Pump		b. Prime-mover
Name	SLC-P-1A	Name	SLC-M-1A
Mfg.	Union Pump Company	Mfg.	General Electric
Model	2X3 TD-60	Model	5K324AK2120
S/N	284228	S/N	LG2463202
Type	Positive Displacement Piston Type, Triplex	Type	K, Squirrel Cage Induction

*The component, whether pump or valve, is considered to be an assembly composed of the body, internals, prime-mover (or actuator) and functional accessories.

a. Pump (continued)			b. Prime-mover (continued)	
Size	Skid overall: 40x56x21-5/8 high		Size	324T
Weight	2200# (skid weight)		Weight	409# motor only
Mounting Method	Horizontal Shaft; Skid Mounted; Bolted		Mounting Method	Horizontal Shaft; Skid Mounted; Bolted
Required B.H.P.	33.8		H.P.	40
Paremeter	Design	Operating	Power requirements: (include normal, maximum and minimum)	
Press psi	1400	1220 max	Electrical	
Temp ^{o}F	150	80		
Flow gpm	43	43	460 VAC; 3 phase; 60 Hz; 1750 rpm	
Head	12.9		Full load amps = 53 amp @ 460 VAC	
			Starting Load (Max) = 88.5 KW	

Required NPSH at maximum flow	12.9 psia	If MOTOR list:	
		Duty cycle	continuous; service factor = 1.15
Available NPSH	When tank is empty 13.25 psia	Stall current	290 amps @ 460 VAC
Operating Speed	370 rpm	Class of insulation	B
Critical Speed	not available		

List functional accessories:* Borg Warner strainer model 76790-1; S/N49547; Rating 3600 psi @ 100^{o}F.

List control signal inputs: Keylock remote manual switch.

*Functional accessories are those sub-components not supplied by the manufacturer that are required to make the pump assembly operational, (e.g., coupling, lubricating oil system, etc.)

6. General Valve Data.

a. Valve

Name ______

Mfg. ______

Model ______

S/N ______

Type ______

Size ______

Weight ______

Mounting Method ______

Required Torque ______

Parameter		
Press	______	______
Temp	______	______
Flow	______	______

Max P across valve ______

Closing time @ max P ______

Opening time @ max P ______

Power requirements for functional accessories, (if any) ______

______

b. Actuator (if not an integral unit)

Name ______

Mfg. ______

Model ______

S/N ______

Type ______

Size ______

Weight ______

Mounting Method ______

Torque ______

Power requirements: (include normal, maximum and minimum)

Electrical ______

______

______

______

Other: [ ] Pneumatic [ ] Hydraulic

______

______

______

______

List control signal inputs: ______

______

______

List functional accessories:* ______________________________

____

III. FUNCTION

1. Briefly describe components normal and safety functions: This pump has no "normal" function. The safety function is to inject neutron absorber solution into the reactor primary should it become necessary to go from full power to cold subcritical without use of control rods.

2. The components normal state is: [ ] Operating [X] Standby

3. Safety function:

a. [X] Emergency reactor snutdown

b. [ ] Containment heat removal

c. [ ] Containment isolation

d. [ ] Reactor heat removal

e. [ ] Reactor core cooling

f. [ ] Prevent significant release of radioactive material to environment

g. [X] Does the component function to mitigate the consequences of one or more of the following events? [ ] Yes [X] No
If "Yes", identify.

[ ] LOCA [ ] HELB [ ] MSLB

[ ] Other ______________________________

4. Safety requirements:

[ ] Intermittent Operation [X] During postulated event

[ ] Continuous Operation [ ] Following postualted event

If component operation is required following an event, give approximate length of time component must remain operational.

24 hours (e.g., hours, days, etc.)

*Functional accessories are those sub-components not supplied by the manufacturer that are required to make the valve assembly operational, (e.g., limit switches).

5. For VALVES:

does the component [ ] Fail open [ ] Fail closed [ ] Fail as is

Is this the fail-safe position [ ] Yes [ ] No

Is the valve used for throttling purposes? [ ] Yes [ ] No

Is the valve part of the reactor coolant pressure boundary? [ ] Yes [ ] No

Does the valve have a specific limit for leakage? [ ] Yes [ ] No

If "Yes" give limit: ____________________

IV. QUALIFICATION

1. Reference by specific number those applicable sections of the design codes and standards applicable to the component: ____________

ASME Section III -NC; GE APED Spec #21A9342

2. Reference those qualification standards, used as a guide to qualify the component: IEEE 344-1971 (Reevaluated to IEEE 344-1975);

NUREG 0588 Cat. II

3. Identify those parts of the above qualification standards deleted or modified in the qualification program.

Deleted:	Modified:
N/A	

4. Have acceptance criterias been established and documented in the test plan(s) for the component? [X] Yes [ ] No

5. What is the expected failure mode that would keep the pump or valve assembly from performing its safety function?

NONE, FROM QUALIFICATION VIEWPOINT

6. Are the margins* identified in the qualification documentation? [ ] Yes [X] No See attachment

*Margin is the difference between design basis parameters and the test parameters used for equipment qualification.

If component is a PUMP, complete IV.7.

If component is a VALVE, complete IV.8.

7. Pump operability has been demonstrated by: [ ] Analysis
[ ] Test [ ] Combination See attachment

Identify PUMP tests performed:

a. [X] Shell hydrostatic (ASME Section III)

b. [ ] Bearing temperature evaluations

c. [ ] Seismic loading

d. [ ] Vibration levels

e. [ ] Exploratory vibration (Fundamental Freq.______)

f. [ ] Seal leakage & hydro press

g. [ ] Aging: [ ] Thermal [ ] Mechanical

h. [ ] Flow performance
Are curves provided [ ] Yes [ ] No

i. [ ] Pipe reaction end loads (nozzle loads)

j. [ ] Others ______

k. [ ] Extreme environment:
[ ] Humidity
[ ] Chemical
[ ] Radiation

8. Valve operability has been demonstrated by: [ ] Analysis
[ ] Test [ ] Combination.

Identify VALVE tests performed:

a. [ ] Shell hydrostatic (ASME Section III)

b. [ ] Cold cyclic List times:
Open ______
Closed ______

c. [ ] Seismic loading

d. [ ] Hot cyclic List times:
Open ______
Closed ______

e. [ ] Exploratory vibration (Fundamental Freq.______)

f. [ ] Main seat leakage

g. [ ] Aging: [ ] Thermal
[ ] Mechanical

h. [ ] Back seat leakage

i. [ ] Pipe reaction end loading

j. [ ] Disc hydrostatic

k. [ ] Extreme environment:

[ ] Humidity

[ ] Chemical

[ ] Radiation

l. [ ] Flow interruption capability

m. [ ] Flow characteristics

Are curves provided?

[ ] Yes [ ] No

n. [ ] Others ________________

9. As a result of any of the tests (or analysis), were any deviations from design requirements identified? [ ] Yes [X] No If "Yes", briefly describe any changes made in tests (or analysis) or to the component to correct the deviation.

Pending review

10. Was the test component precisely identical (as to model, size, etc.) to the in-plant component? [ ] Yes [ ] No If "No", is installed component [ ] oversized or [ ] undersized?

See attachment

11. If type test was used to qualify the component, does the type test meet the requirements of IEEE 323-1974, Section 5.? [ ] Yes [X] No

12. Is component orientation sensitive? [X] Yes [ ] No [ ] Unknown If "Yes", does installed orientation coincide with test orientation? [ ] Yes [ ] No

See attachment

13. Is the component mounted in the same manner in-plant as it was during testing (i.e., welded, same number and size bolts, etc.)? [ ] Yes [ ] No [ ] Unknown

See attachment

14. Were the qualification tests performed in sequence and on only one component? [ ] Yes [ ] No

If "Yes" identify sequence, (e.g., radiation, seismic, cyclic, thermal, etc.): ______

See Attachment

15. If "aging"* was performed, identify the significant aging mechanisms: ______

See Attachment

16. Identify loads imposed (assumed) on the component for the qualification tests (analysis) performed:

a. [ ] Plants (shutdown loads) b. [ ] Extreme environment

c. [ ] Seismic load d. [ ] Others ______

SEE ATTACHMENT

17. Have component design specifications been reviewed in-house to assure they envelope all expected operating, transient, and accident conditions? [ ] Yes [X] No

18. Does the component utilize any unique or special materials? (Examples are special gaskets or packing, limitations on nonferrous materials, or special coatings or surfaces.) [ ] Yes [X] No

If "Yes", identify: ______

19. Does component require any special maintenance procedures or practices, (including shorter periods between maintenance)? [X] Yes [ ] No

If "Yes", identify: Plant Maintenance Procedure Manual; ASME Section XI tests performed quarterly to check discharge pressure, flowrate, and pump lubrication level.

20. Is the qualified life for the component less than 40 years? [ ] Yes [ ] No If "Yes", what is the qualified life? SEE ATTACHMENT

*As outlined in Section 4.4.1 of IEEE-627 1980.

21. Information Concerning Qualification Documents for the Component

Report Number	Report Title	Date	Company/Organization Preparing Report	Company/Organization Reviewing Report
QID 233016	Supply System EQ Files			
QID 133030	Supply System EQ Files			

EQUIPMENT QUALIFICATION DOCUMENT LIST

QID NO. 23301[illegible]

COMPONENT: Pump (SLC)

MANUFACTURER: Union Pump (U055)

MANUFACTURER MODEL NO: 2X3 TD-60

CONTRACT(S): 02C41

DOCUMENTATION:

1.0 SEISMIC

REF. NO.	COMPANY	REPORT TITLE	REPORT NO.	REPORT DATE	REV.	B&R TRANS. #	PUBLICATION NO.
1.1	Union Pump Co.	Design Calculations	S.O. DN-2355-Q	7/13/71	-	---	VPF 3159-66-1
* 1.2	General Electric	NSSS New Loads Design Adequacy Evaluation Summary Report	NLDAE	9/25/81	-	---	File No. 2.8.11
1.3	Nutech	Seismic & Hydrodynamic Loads Requalification Certification	---	3-18-81		---	----
1.4							
1.5							
1.6							

*Report NLDAE filed under QID 361964

2.0 ENVIRONMENTAL

2.1

2.2

2.3

2.4

2.5

2.6

Attachment to Item 20.

The prediction of a "qualified life" through accelerated aging is generally not feasible at the present state of the art. An aging analysis has been performed for electrical equipment located in potentially harsh environmental areas. The results of these studies are contained in a report to the NRC titled, "WNP-2 Environmental Equipment Qualification Report for Safety-Related Equipment, September 1982". Attached are the summary sheets for the electrical components associated with the selected equipment located in potential harsh environments.

Results of the aging analysis will be used to define recommended maintenance/replacement interval for inclusion in the WNP-2 maintenance and surveillance procedures.

ATTACHMENT

The letter in Reference 3) asks General Electric to provide the documentation upon which Section 3.3.4 of Reference 1) was based. GE was also asked to address points concerning operability and support bolt loads. This information will complete the qualification documentation on this SRM component.

References: 1) NLDAE (File No. 2.8.11) WPPSS No. 2, NSSS New Loads Design Adequacy Evaluation Summary Report, 9/25/81
2) Letter GEWP-2-82-109, August 9, 1982
3) Letter WPGE-2-82-198, October 1982

WPPSS QID #213030

WASHINGTON PUBLIC POWER SUPPLY SYSTEM

EQUIPMENT QUALIFICATION REPORT

OWNER: WPPSS
FACILITY: WNP 2
SPEC: 2808-02

MPL:
PPD:

REVISION: 2
DATE: September 1982

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENT REF.		QUALIFICATION METHOD	OUTSTANDING ITEMS
	PARAMETER	FSAR	QUALIFICATION	FSAR	QUAL.		
SYSTEM: Standby Liquid Control; TAG NUMBER: SLC-M-1A, B	OPERATING TIME	24 hours		3			Note 1
	TEMPERATURE (F)	90 max. normal 104 max. abnormal Accident profile 4	150	1			Note 1
MANUFACTURER: G.E.	PRESSURE (PSIA)	14.7	R/R	1	N/A	N/A	None
MODEL NUMBER: 5K324AK2120/324T; COMPONENT: Electric Motor	RELATIVE HUMITY (%)	40 normal 90 max. abnormal Accident profile 4	100	1			None
FUNCTION/SERVICE: Drive SLC Pumps	CHEMICAL SPRAY	N/A	N/A	1	N/A	N/A	None
	RADIATION (RAD)	1.1×10^4		2			Note 1
	AGING	40 years	Note 2	N/A			
LOCATION: BLDG R; ELEVATION 548; COLUMN M2/3.7,M2/3.8	ACCURACY	N/A	N/A	N/A	N/A	N/A	None

FLOOD LEVEL ELEV:
ABOVE FLOOD LEVEL? YES X NO

Prepared by: Aron Seila 9/1/82 Reviewed by: A. Nader 9/1/82

DOCUMENTATION REFERENCES

1. FSAR Par. 3.11
2. EDS Report 0740-0040548C
3. WNP-2 Class 1E Equipment List, dated September 1982

NOTES

1. Similar motors have been tested to more severe conditions. A detailed comparison is being made to confirm applicability of the test date.
2. An evaluation is being performed to identify age susceptible parts and is scheduled for completion December 1, 1982.

WP-1001

Valve MS-V-22C
P&ID M-529 Zone F5.

PUMP AND VALVE
OPERABILITY ASSURANCE REVIEW

5

I. PLANT INFORMATION

1. Name: WNP-2 Unit No.: ___ 2. Docket No.: 50-397

3. Utility: Washington Public Power Supply System

4. NSSS: General Electric [ ] PWR [X] BWR

5. A/E: Burns and Roe

II. GENERAL COMPONENT* INFORMATION

1. Supplier: [X] NSSS [ ] BOP

2. Location: a. Building/Room Primary Containment 315^{o} Azimuth, R-32

b. Elevation 506

c. System Main Steam

3. Component number on in-house drawings: MS-V-22C

4. If component is a [ ] Pump complete II.5.

If component is a [X] Valve complete II.6.

5. General Pump Data

a. Pump

b. Prime-mover

Name		Name	
Mfg.		Mfg.	
Model		Model	
S/N		S/N	
Type		Type	

---

*The component, whether pump or valve, is considered to be an assembly composed of the body, internals, prime-mover (or actuator) and functional accessories.

a. Pump (continued)			b. Prime-mover (continued)
Size ______			Size ______
Weight ______			Weight ______
Mounting Method ______			Mounting Method ______
Required B.H.P. ______			H.P. ______
Paremeter	Design	Operating	Power requirements: (include normal, maximum and minimum)
Press	______	______	Electrical ______
Temp	______	______	______
Flow	______	______	______
Head	______	______	______
			______

Required NPSH at maximum	If MOTOR list:
flow ______	Duty cycle ______
Available NPSH ______	Stall current ______
Operating Speed ______	Class of insulation ______
Critical Speed ______	______

List functional accessories:* ______

______

______

List control signal inputs: ______

______

______

*Functional accessories are those sub-components not supplied by the manufacturer that are required to make the pump assembly operational, (e.g., coupling, lubricating oil system, etc.)

5. General Valve Data.

a. Valve		b. Actuator (if not an integral unit)	
Name	MS-V-22C	Name	MS-AO-22C
Mfg.	Rockwell	Mfg.	Sheffer
Model	1612JMMNTY	Model	SA-A022
S/N	101	S/N	661141
Type	Globe	Type	PNEUMATIC/AIR OR HYDRAULIC/SPRING LOADED TO CLOSE
Size	26 inch	Size	5 INCH AIR 20 INCH HYDRAULIC CYLINDER
Weight	16900# (Total)	Weight	—
Mounting Method	In-line, pipe	Mounting Method	Bolted yoke & bonnet
Required Torque	N/A	Torque	

Parameter	Design	Operating
Press psig	1536/1250	1040
Temp ^{o}F	100/575	550
Flow Lb/Hr	3.76×10^{6}	3.72×10^{6}

Max ΔP across valve 1010

Closing time @ max ΔP 3 to 5 sec.

Opening time @ max ΔP 20 SEC

Power requirements for functional accessories, (if any)

Power requirements: (include normal, maximum and minimum)

Electrical

Other: [X] Pneumatic [ ] Hydraulic

125 psig

List control signal inputs: Reactor protection system automatically actuates valve when reactor water level low, or high radiation or low condenser vacuum, or high drywell temp., or high drywell flow, or low steam pressure at turbine inlet.

List functional accessories:* SOLENOID VALVES & LIMIT SWITCHES

III. FUNCTION

1. Briefly describe components normal and safety functions:

Normal function is to permit steam to flow to turbine. The safety function is to effect containment isolation.

2. The components normal state is: [ ] Operating [X] Standby

3. Safety function:

a. [ ] Emergency reactor shutdown

b. [ ] Containment heat removal

c. [X] Containment isolation

d. [ ] Reactor heat removal

e. [ ] Reactor core cooling

f. [X] Prevent significant release of radioactive material to environment

g. [X] Does the component function to mitigate the consequences of one or more of the following events? [X] Yes [ ] No If "Yes", identify.

[X] LOCA [ ] HELB [X] MSLB

[ ] Other ______

4. Safety requirements:

[ ] Intermittent Operation [X] During postulated event

[X] Continuous Operation [X] Following postualted event

If component operation is required following an event, give approximate length of time component must remain operational.

4320 hours (e.g., hours, days, etc.)

*Functional accessories are those sub-components not supplied by the manufacturer that are required to make the valve assembly operational, (e.g., limit switches).

5. For VALVES:

does the component [ ] Fail open [X] Fail closed [ ] Fail as is

Is this the fail-safe position? [X] Yes [ ] No

Is the valve used for throttling purposes? [ ] Yes [X] No

Is the valve part of the reactor coolant pressure boundary?
[X] Yes [ ] No

Does the valve have a specific limit for leakage? [X] Yes [ ] No

If "Yes" give limit: Operational Limit = 11.5 $\frac{SFT^3}{HR}$

IV. QUALIFICATION

1. Reference by specific number those applicable sections of the design codes and standards applicable to the component:

ASME Section III-NB; GE Spec. 21A9257 REV 4; GE SPEC 22A2887AB REV 9

2. Reference those qualification standards, used as a guide to qualify the component:

IEEE 344-1971 (Reevaluated to IEEE 344-1975) NUREG 0588 CAT II

3. Identify those parts of the above qualification standards deleted or modified in the qualification program.
SEE ATTACHMENT

Deleted:	Modified:
None	None

4. Have acceptance criterias been established and documented in the test plan(s) for the component? [X] Yes [ ] No

5. What is the expected failure mode that would keep the pump or valve assembly from performing its safety function?

Stem binding; seat leakage; YOKE ROD OVERSTRESS

6. Are the margins* identified in the qualification documentation?
[ ] Yes [X] No

*Margin is the difference between design basis parameters and the test parameters used for equipment qualification.

If component is a PUMP, complete IV.7.

If component is a VALVE, complete IV.8.

7. Pump operability has been demonstrated by: [ ] Analysis
[ ] Test [ ] Combination

Identify PUMP tests performed:

a. [ ] Shell hydrostatic (ASME Section III)

b. [ ] Bearing temperature evaluations

c. [ ] Seismic loading

d. [ ] Vibration levels

e. [ ] Exploratory vibration

(Fundamental Freq.______)

f. [ ] Seal leakage & hydro press

g. [ ] Aging: [ ] Thermal
[ ] Mechanical

h. [ ] Flow performance
Are curves provided [ ] Yes
[ ] No

i. [ ] Pipe reaction end loads (nozzle loads)

j. [ ] Others ____________

k. [ ] Extreme environment:

[ ] Humidity

[ ] Chemical

[ ] Radiation

8. Valve operability has been demonstrated by: [ ] Analysis
[ ] Test [ ] Combination

VALVE OPERABILITY NOT PRESENTLY DEMONSTRATED

Identify VALVE tests performed:

a. [X] Shell hydrostatic (ASME Section III)

b. [ ] Cold cyclic List times:
Open ________
Closed ________

c. [X] Seismic loading

d. [ ] Hot cyclic List times:
Open ________
Closed ________

e. [ ] Exploratory vibration

(Fundamental Freq.______)

f. [ ] Main seat leakage

g. [ ] Aging: [ ] Thermal
[ ] Mechanical

h. [ ] Back seat leakage

i. [X] Pipe reaction end loading

j. [ ] Disc hydrostatic

k. [X] Extreme environment:

[X] Humidity

[ ] Chemical

[ ] Radiation

l. [ ] Flow interruption capability

m. [X] Flow characteristics

Are curves provided?

[X] Yes [ ] No

n. [X] Others CLOSING STROKE VS TIME

9. As a result of any of the tests (or analysis), were any deviations from design requirements identified? [ ] Yes [ ] No If "Yes", briefly describe any changes made in tests (or analysis) or to the component to correct the deviation.

See attachment

10. Was the test component precisely identical (as to model, size, etc.) to the in-plant component? [ ] Yes [X] No If "No", is installed component [ ] oversized or [ ] undersized?
A SIMILARITY ANALYSIS IS BEING PERFORMED BY GE TO SHOW APPLICABILITY TO A SIMILAR 24 INCH VALVE THAT WAS TESTED.

11. If type test was used to qualify the component, does the type test meet the requirements of IEEE 323-1974, Section 5.? [ ] Yes [ ] No

12. Is component orientation sensitive? [X] Yes [ ] No [ ] Unknown If "Yes", does installed orientation coincide with test orientation? [ ] Yes [ ] No See attachment; ANALYZED ORIENTATION IS SAME AS INSTALLED ORIENTATION

13. Is the component mounted in the same manner in-plant as it was during testing (i.e., welded, same number and size bolts, etc.)? [X] Yes [ ] No [ ] Unknown See attachment
ANALYSIS ONLY

14. Were the qualification tests performed in sequence and on only one component? [ ] Yes [ ] No

If "Yes" identify sequence, (e.g., radiation, seismic, cyclic, thermal, etc.): ______

Not applicable

15. If "aging"* was performed, identify the significant aging mechanisms: ______

Not applicable

16. Identify loads imposed (assumed) on the component for the qualification tests (analysis) performed:

a. [X] Plants (shutdown loads)
b. [ ] Extreme environment
c. [X] Seismic load
d. [X] Others hydrodynamic loads

17. Have component design specifications been reviewed in-house to assure they envelope all expected operating, transient, and accident conditions? [ ] Yes [ ] No In process of review.

18. Does the component utilize any unique or special materials? (Examples are special gaskets or packing, limitations on nonferrous materials, or special coatings or surfaces.) [X] Yes [ ] No

If "Yes", identify: VITON DE-60-C SEALS

19. Does component require any special maintenance procedures or practices, (including shorter periods between maintenance)? [X] Yes [ ] No

If "Yes", identify: ASME Section XI tests: Check stroke time quarterly and perform leak rate test biennially; PLANT MAINTENANCE PROCEDURES INCL. SEAL REPLACEMENT

20. Is the qualified life for the component less than 40 years? [ ] Yes [ ] No If "Yes", what is the qualified life? ______

See attachment

*As outlined in Section 4.4.1 of IEEE-627 1980.

21. Information Concerning Qualification Documents for the Component

Report Number	Report Title	Date	Company/Organization Preparing Report	Company/Organization Reviewing Report
QID's 361964, 315011			Supply System EQ Files	

EQUIPMENT QUALIFICATION DOCUMENT LIST

COMPONENT: SOLENOID PILOT VALVE

QID NO. 315011

MANUFACTURER: ASCO

MANUFACTURER MODEL NO: —

CONTRACT(S): 02822, 213

DOCUMENTATION:

1.0 SEISMIC

REF. NO.	COMPANY	REPORT TITLE	REPORT NO.	REPORT DATE	REV.	B&R TRANS. #	PUBLICATION NO.
1.1	WPPSS	Memo: Replace. of Asco Valves	6E-02-315-81-023	12-31-81	–	–	–
1.2	WPPSS	Memo: " "	6E-02-MSR-82-004	6-14-82	–	–	–
1.3	ISOMEDIX	"Qual of Sol. Op. Valves..."	AQS-21678	7/79	A	} see file 315001	
1.4							
1.5							
1.6							

2.0 ENVIRONMENTAL

REF. NO.							
2.1							
2.2							
2.3							
2.4							
2.5							
2:6							

EQUIPMENT QUALI[FICA]TION DOCUMENT LIST

COMPONENT: Valve, 26" Main Steam Isolation

QID NO. 2[?]1964

MANUFACTURER: Rockwell (R340)

MANUFACTURER MODEL NO: 1612JMMNTY

CONTRACT(S): 2

DOCUMENTATION:

1.0 SEISMIC

REF. NO.	COMPANY	REPORT TITLE	REPORT NO.	REPORT DATE	REV.	B&R TRANS. #	PUBLICATION NO.
1.1	Rockwell / G.E.	Design Report for Class 1 Nuclear Valve	RAL-2006	5/24/73	1	---	VPF 3090-220-2
1.2	Rockwell / G.E.	General Calculations for 26" Figure 1612 JMMNTY	RAL-1002	8/14/73	2	---	VPF 3090-222-3
1.3	NUTECH	Seismic & Hydrodynamic Loads Requalification Certification	Spec.# 21A9257	5-26-81	1	--	---
1.4	G.E.	NSSS New Loads Design Adequacy Evaluation Summary Report	2.8.11	9-25-81	--	--	-----
1.5							
1.6							

2.0 ENVIRONMENTAL

2.1

2.2

2.3

2.4

2.5

2.6

Attachment to Item 20.

The prediction of a "qualified life" through accelerated aging is generally not feasible at the present state of the art. An aging analysis has been performed for electrical equipment located in potentially harsh environmental areas. The results of these studies are contained in a report to the NRC titled, "WNP-2 Environmental Equipment Qualification Report for Safety-Related Equipment, September 1982". Attached are the summary sheets for the electrical components associated with the selected equipment located in potential harsh environments.

Results of the aging analysis will be used to define recommended maintenance/replacement interval for inclusion in the WNP-2 maintenance and surveillance procedures.

WPPSS QID315011

OWNER: WPPSS
FACILITY: WNP 2
SPEC: 2808-02

MPL: B22-F022
PPD: 732E150V

WASHINGTON PUBLIC POWER SUPPLY SYSTEM

EQUIPMENT QUALIFICATION REPORT

PAGE NO. 183
REVISION: 2
DATE: September 1982

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENT REF.		QUALIFICATION METHOD	OUTSTANDING ITEMS
	PARAMETER	FSAR	QUALIFICATION	FSAR	QUAL.		
SYSTEM Main Steam TAG NUMBER MS-SPV (See Note 1)	OPERATING TIME	24 hours		1			Note 2
	TEMPERATURE (F)	135 normal 150 max abnormal Accident - profile 1, 2		2			
MANUFACTURER Asco	PRESSURE (PSIA)	16.7 abnormal Accident - profile 1, 2		2			
MODEL NUMBER HTX-8320A20 COMPONENT Solenoid Pilot Valve	RELATIVE HUMITY (%)	55 normal 90 max abnormal 100 accident		2			
FUNCTION/SERVICE Operate Inboard Main Steam Isolation Valves	CHEMICAL SPRAY	Demineralized water		2			
	RADIATION (RAD)	2.74×10^7		2			
	AGING	40 years		2			
LOCATION: BLDG C ELEVATION 513 COLUMN 5^o, 15^o, 345^o, 355^o	ACCURACY						

FLOOD LEVEL ELEV:
ABOVE FLOOD LEVEL?
YES NO

Prepared by: [signature] Reviewed by: [signature]

DOCUMENTATION REFERENCES

1. WNP-2 CIE Equipment List dated 9/1/82.
2. FSAR Para 3.11

NOTES

1. MS-SPV -22A2, -22A3; MS-SPV -22B2, -22B3; MS-SPV -22C2, -22C3; MS-SPV -22D2, -22D3
2. To be replaced with NP8320A173E, see letter GE-02-JLS-81-023.

WPPSS QID #200002

WASHINGTON PUBLIC POWER SUPPLY SYSTEM

EQUIPMENT QUALIFICATION REPORT

OWNER: WPPSS
FACILITY: WNP-2
SPEC: 2808-02 B22

MPL: B22-F022,A,B,C,D
PPD:

PAGE NO. 167
REVISION: 2
DATE: September 1982

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENT REF.		QUALIFICATION METHOD	OUTSTANDING ITEMS
	PARAMETER	FSAR	QUALIFICATION	FSAR	QUAL.		
SYSTEM Main Steam TAG NUMBER MS-LMS-(see note 2)	OPERATING TIME	24 hours	Note 1	1	3		
	TEMPERATURE (F)	135 normal 150 abnormal accident--profile 1		2			
MANUFACTURER Namco	PRESSURE (PSIA)	14.7 normal 16.7 abnormal accident--profile 1		2			
MODEL NUMBER EA700-86010 COMPONENT Limit Switch	RELATIVE HUMITY (%)	55 normal 90 abnormal accident--profile 2		2			
FUNCTION/SERVICE	CHEMICAL SPRAY	N/A		2			
	RADIATION (RAD)	7.7×10^7		2			
LOCATION: BLDG C ELEVATION 513 COLUMN 5,15,345,355°AZ	AGING	40 years		2			
	ACCURACY	N/A					

FLOOD LEVEL ELEV:
ABOVE FLOOD LEVEL? YES X NO

Prepared by: [signature] 9/1/82 Reviewed by: Raymond [signature] 9/1/82

DOCUMENTATION REFERENCES

1. WNP-2 CIE Equipment List, 9/82
2. FSAR Paragraph 3.11
3. WPPSS Letter GE-02-JLS-81-021

NOTES

1. These limit switches are being replaced by Namco Limit Switch EA180, which is qualified to IEEE 323-74 and 344-75 (Ref. 3).

2. MS-LMS-22A1 MS-LMS-22C1
-22A2 -22C2
-22A3 -22C3
-22B1 -22D1
-22B2 -22D2
-22B3 -22D3

VALVE CRD-V-127/5043
P&ID M528 Zone C-4

PUMP AND VALVE OPERABILITY ASSURANCE REVIEW

I. PLANT INFORMATION

1. Name: WNP-2 Unit No.: ___ 2. Docket No.: 50-397
3. Utility: Washington Public Power Supply System
4. NSSS: General Electric [ ] PWR [X] BWR
5. A/E: Burns and Roe

II. GENERAL COMPONENT* INFORMATION

1. Supplier: [X] NSSS [ ] BOP
2. Location: a. Building/Room Reactor Building K2/3.7
   b. Elevation 522
   c. System Control Rod Drive
3. Component number on in-house drawings: CRD-V-127/5043
4. If component is a [ ] Pump complete II.5.
   If component is a [X] Valve complete II.6.
5. General Pump Data

a. Pump		b. Prime-mover	
Name		Name	
Mfg.		Mfg.	
Model		Model	
S/N		S/N	
Type		Type	

*The component, whether pump or valve, is considered to be an assembly composed of the body, internals, prime-mover (or actuator) and functional accessories.

a. Pump (continued)

Size ____________________

Weight ____________________

Mounting Method ____________________

Required B.H.P. ____________________

Paremeter	Design	Operating
Press	______	______
Temp	______	______
Flow	______	______
Head	______	______

Required NPSH at maximum flow ____________________

Available NPSH ____________________

Operating Speed ____________________

Critical Speed ____________________

b. Prime-mover (continued)

Size ____________________

Weight ____________________

Mounting Method ____________________

H.P. ____________________

Power requirements: (include normal, maximum and minimum)

Electrical ____________________

____

____

____

____

If MOTOR list:

Duty cycle ____________________

Stall current ____________________

Class of insulation ____________________

____

List functional accessories:* ____________________

____

____

List control signal inputs: ____________________

____

____

*Functional accessories are those sub-components not supplied by the manufacturer that are required to make the pump assembly operational, (e.g., coupling, lubricating oil system, etc.)

6. General Valve Data

a. Valve

Name CRD-V-127/5043

Mfg. Robert Shaw Controls

Model 83470-B2

S/N 1049

Type Globe Valve

Size 1 inch

Weight

Mounting Method Rack Mounted

Required Torque N/A

Parameter	Design	Operating
Press psig	1750	1112
Temp ^{o}F	150	100/40
Flow		

MaxΔP across valve 1112 psid

Closing time @ maxΔP

Opening time @ maxΔP

Power requirements for functional accessories, (if any)

b. Actuator (if not an integral unit)

Name

Mfg.

Model

S/N

Type Pneumatic

Size

Weight

Mounting Method Yoke-Mounted to Valve

Torque N/A

Power requirements: (include normal, maximum and minimum)

Electrical None

Other: [X] Pneumatic [ ] Hydraulic

125 PSIG instrument air

List control signal inputs: Scram signal

List functional accessories*: ______________________

____

III. FUNCTION

1. Briefly describe components normal and safety functions: The valve (normally closed) opens on scram signal to allow water volume equalization during control rod movement.

2. The components normal state is: [ ] Operating [X] Standby

3. Safety function:

   a. [X] Emergency reactor shutdown
   b. [ ] Containment heat removal
   c. [ ] Containment isolation
   d. [ ] Reactor heat removal
   e. [ ] Reactor core cooling
   f. [ ] Prevent significant release of radioactive material to environment

   g. [X] Does the component function to mitigate the consequences of one or more of the following events? [X] Yes [ ] No
   If "Yes", identify.

   [X] LOCA [X] HELB [ ] MSLB

   [X] Other ANY SCRAM INITIATION SIGNAL

4. Safety requirements:

   [ ] Intermittent Operation [X] During postulated event

   [ ] Continuous Operation [ ] Following postualted event

   If component operation is required following an event, give approximate length of time component must remain operational.

   4320 hours (e.g., hours, days, etc.)

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*Functional accessories are those sub-components not supplied by the manufacturer that are required to make the valve assembly operational, (e.g., limit switches).

5. For VALVES:

does the component [X] Fail open [ ] Fail closed [ ] Fail as is

Is this the fail-safe position [X] Yes [ ] No

Is the valve used for throttling purposes? [ ] Yes [X] No

Is the valve part of the reactor coolant pressure boundary?
ONLY DURING A SCRAM CONDITION [X] Yes [ ] No

Does the valve have a specific limit for leakage? [ ] Yes [ ] No

If "Yes" give limit: ______

IV. QUALIFICATION

1. Reference by specific number those applicable sections of the design codes and standards applicable to the component:

   ASME Section III-NC; GE SPEC 77466AB

   GE Spec 21A8799 Rev. 1

2. Reference those qualification standards, used as a guide to qualify the component:

   IEEE 344-1971 (Reevaluated to IEEE-344-1975)

3. Identify those parts of the above qualification standards deleted or modified in the qualification program.

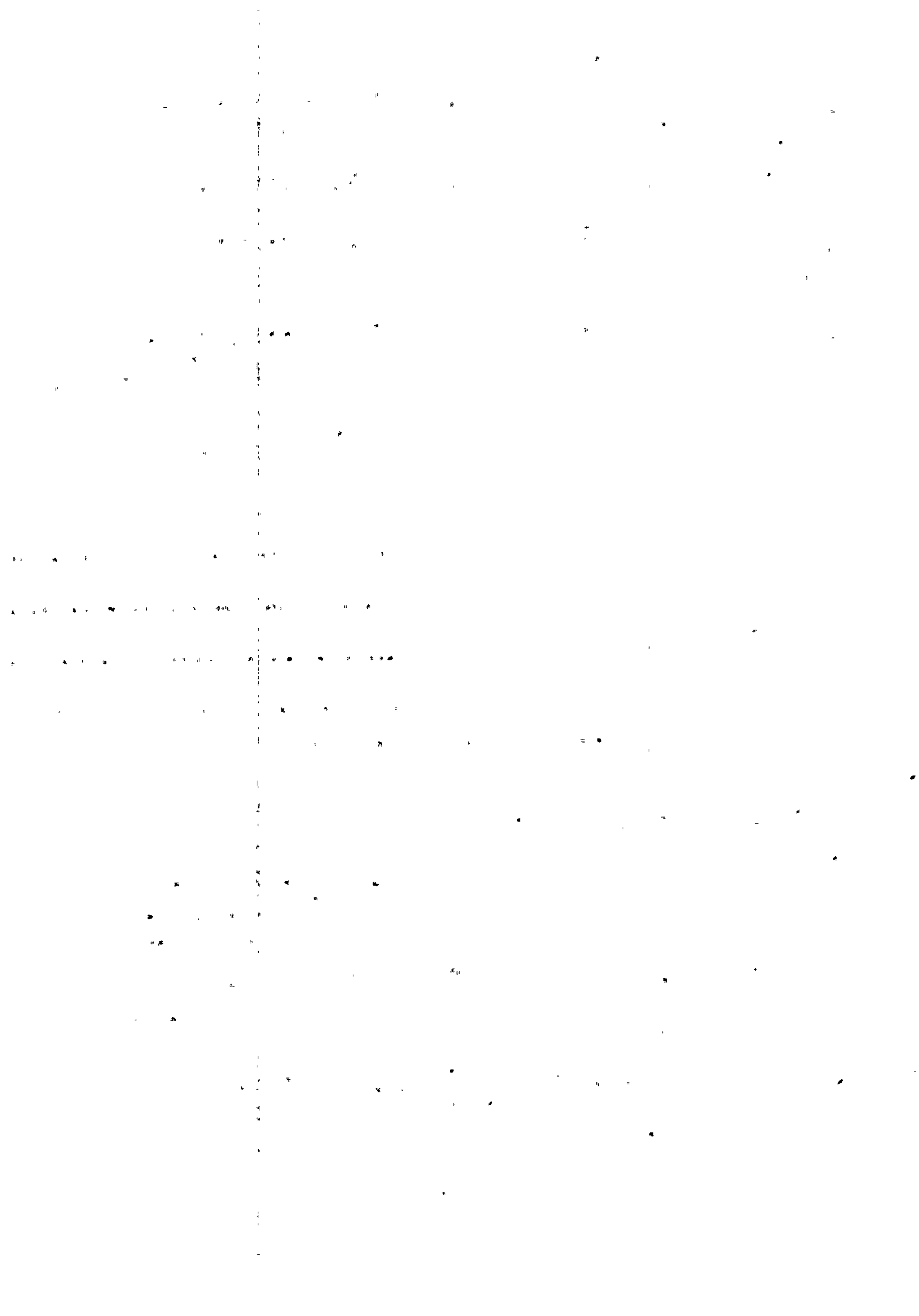
Deleted:	Modified:
None	None

4. Have acceptance criterias been established and documented in the test plan(s) for the component? [X] Yes [ ] No

5. What is the expected failure mode that would keep the pump or valve assembly from performing its safety function? NONE

6. Are the margins* identified in the qualification documentation?
   [X] Yes [ ] No

*Margin is the difference between design basis parameters and the test parameters used for equipment qualification.



If component is a PUMP, complete IV.7.

If component is a VALVE, complete IV.8.

7. Pump operability has been demonstrated by: [ ] Analysis [ ] Test [ ] Combination

Identify PUMP tests performed:

a. [ ] Shell hydrostatic (ASME Section III)

b. [ ] Bearing temperature evaluations

c. [ ] Seismic loading

d. [ ] Vibration levels

e. [ ] Exploratory vibration (Fundamental Freq.______)

f. [ ] Seal leakage & hydro press

g. [ ] Aging: [ ] Thermal [ ] Mechanical

h. [ ] Flow performance
Are curves provided [ ] Yes [ ] No

i. [ ] Pipe reaction end loads (nozzle loads)

j. [ ] Others ______________________

k. [ ] Extreme environment:
[ ] Humidity
[ ] Chemical
[ ] Radiation

8. Valve operability has been demonstrated by: [ ] Analysis [ ] Test [X] Combination.

Identify VALVE tests performed:

a. [X] Shell hydrostatic

b. [X] Cold cyclic List times:
Open ____________
Closed ____________

c. [X] Seismic loading

d. [ ] Hot cyclic List times:
Open ____________
Closed ____________

e. [X] Exploratory vibration (Tested as part of rack vibration test).
(Fundamental Freq.______)

f. [X] Main seat leakage

g. [ ] Aging: [ ] Thermal
[ ] Mechanical

h. [ ] Back seat leakage

i. [ ] Pipe reaction end loading

j. [ ] Disc hydrostatic

k. [X] Extreme environment:

[X] Humidity & TEMPERATURE

[ ] Chemical

[ ] Radiation

l. [ ] Flow interruption capability

m. [X] Flow characteristics

Are curves provided?

[ ] Yes [X] No

n. [X] Others Fragility test
hydrodynamic loads

9. As a result of any of the tests (or analysis), were any deviations from design requirements identified? [ ] Yes [X] No If "Yes", briefly describe any changes made in tests (or analysis) or to the component to correct the deviation.

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10. Was the test component precisely identical (as to model, size, etc.) to the in-plant component? [X] Yes [ ] No If "No", is installed component [ ] oversized or [ ] undersized?

11. If type test was used to qualify the component, does the type test meet the requirements of IEEE 323-1974, Section 5.? [ ] Yes [X] No

12. Is component orientation sensitive? [ ] Yes [X] No [ ] Unknown If "Yes", does installed orientation coincide with test orientation? [ ] Yes [ ] No

13. Is the component mounted in the same manner in-plant as it was during testing (i.e., welded, same number and size bolts, etc.)?
[X] Yes [ ] No [ ] Unknown In-plant installation has stiffer mounting attachments for the hydraulic control unit

14. Were the qualification tests performed in sequence and on only one component? [ ] Yes [X] No Tests performed on composite unit.

If "Yes" identify sequence, (e.g., radiation, seismic, cyclic, thermal, etc.): ______

Limited to seismic and fragility tests only.

15. If "aging"* was performed, identify the significant aging mechanisms: ______

None

16. Identify loads imposed (assumed) on the component for the qualification tests (analysis) performed:

a. [X] Plants (shutdown loads)   b. [ ] Extreme environment

c. [X] Seismic load   d. [X] Others Scram loads

hydrodynamic laods

17. Have component design specifications been reviewed in-house to assure they envelope all expected operating, transient, and accident conditions? [X] Yes [ ] No

18. Does the component utilize any unique or special materials? (Examples are special gaskets or packing, limitations on nonferrous materials, or special coatings or surfaces.) [X] Yes [ ] No

If "Yes", identify: TEFLON SEAT & PACKING

19. Does component require any special maintenance procedures or practices, (including shorter periods between maintenance)? [X] Yes [ ] No

If "Yes", identify: Check operability every 7 days per technical specification in lieu of ASME Section XI quarterly stroke test.

20. Is the qualified life for the component less than 40 years? [ ] Yes [ ] No If "Yes", what is the qualified life? ______

NOT APPLICABLE BECAUSE HAS NO ELECTRICAL COMPONENTS

*As outlined in Section 4.4.1 of IEEE-627 1980.

21. Information Concerning Qualification Documents for the Component

Report Number	Report Title	Date	Company/Organization Preparing Report	Company/Organization Reviewing Report
384HA183	Hydraulic Control Unit	7/21/75	General Electric	NUTECH/SUPPLY SYSTEM
383HA853	Seismic Analysis of Hydraulic Unit	2/13/73	General Electric	NUTECH/SUPPLY SYSTEM
QID 167001	Supply System EQ File			
QID 315020	Supply System EQ File			

VALVE HPCS-V-15
P&ID M520 Zone D-7

PUMP AND VALVE OPERABILITY ASSURANCE REVIEW

I. PLANT INFORMATION

1. Name: WNP-2 Unit No.: ____ 2. Docket No.: 50-397

3. Utility: Washington Public Power Supply System

4. NSSS: General Electric [ ] PWR [X] BWR

5. A/E: Burns and Roe

II. GENERAL COMPONENT* INFORMATION

1. Supplier: [X] NSSS [ ] BOP

2. Location: a. Building/Room Reactor Building L3/3.9

   b. Elevation 449

   c. System High Pressure Core Spray

3. Component number on in-house drawings: HPCS-V-15

4. If component is a [ ] Pump complete II.5.

   If component is a [X] Valve complete II.6.

5. General Pump Data

a. Pump		b. Prime-mover	
Name		Name	
Mfg.		Mfg.	
Model		Model	
S/N		S/N	
Type		Type	

*The component, whether pump or valve, is considered to be an assembly composed of the body, internals, prime-mover (or actuator) and functional accessories.

a. Pump (continued)			b. Prime-mover (continued)
Size ______			Size ______
Weight ______			Weight ______
Mounting Method ______			Mounting Method ______
Required B.H.P. ______			H.P. ______
Paremeter	Design	Operating	Power requirements: (include normal, maximum and minimum)
Press	______	______	Electrical ______
Temp	______	______	______
Flow	______	______	______
Head	______	______	______
			______

Required NPSH at maximum flow ______ | If MOTOR list:

Duty cycle ______

Available NPSH ______

Stall current ______

Operating Speed ______

Class of insulation ______

Critical Speed ______

List functional accessories:* ______

______

______

List control signal inputs: ______

______

______

*Functional accessories are those sub-components not supplied by the manufacturer that are required to make the pump assembly operational, (e.g., coupling, lubricating oil system, etc.)

6.. General Valve Data

a. Valve

Name HPCS-V-15

Mfg. Anchor-Darling

Model 94-13272

S/N F5310-3-1

Type Gate

Size 18 inch

Weight 1670# (total)

Mounting Method Pipe, in-line

Required Torque 12 FT-LB RUN ; 60 FT-LB START

Parameter	Design	Operating
Press psig	100	50
Temp ^{0}F	212	120
Flow gpm	7175	6350/685

Max ΔP across valve 90 psid

Closing time @ max ΔP 18 sec

Opening time @ max ΔP 18 sec

Power requirements for functional accessories, (if any)

b. Actuator (if not an integral unit)

Name HPCS-MO-15

Mfg. Limitorque

Model SMB-2-60

S/N 191235

Type SMB

Size 2-60

Weight 660 lbs.

Mounting Method 15 inch, yoke

Torque

Power requirements: (include normal, maximum and minimum)

Electrical motor, Electrical Apparatus Company; 3ϕ; 460 VAC; 3600 RPM FULL LOAD AMPS = 12a.; LOCKED ROTOR AMPS = ·103a

Other: [ ] Pneumatic [ ] Hydraulic

List control signal inputs: Remote manual switch, low condensate storage tank level, high suppression pool water level.

List functional accessories:* None

III. FUNCTION

1. Briefly describe components normal and safety functions: The normal function is to provide isolation between primary and secondary HPCS pump suction sources. The safety function is (1) to effect containment isolation and (2) to provide suppression pool supply to HPCS pump suction.

2. The components normal state is: [ ] Operating [X] Standby

3. Safety function:

   a. [ ] Emergency reactor shutdown
   b. [ ] Containment heat removal
   c. [X] Containment isolation
   d. [ ] Reactor heat removal
   e. [X] Reactor core cooling
   f. [ ] Prevent significant release of radioactive material to environment
   g. [X] Does the component function to mitigate the consequences of one or more of the following events? [X] Yes [ ] No If "Yes", identify.

      [X] LOCA [ ] HELB [ ] MSLB

      [ ] Other

4. Safety requirements:

   [X] Intermittent Operation [X] During postulated event

   [ ] Continuous Operation [X] Following postualted event

   If component operation is required following an event, give approximate length of time component must remain operational.

   Valve must maintain inegrity for 4320 hours (e.g., hours, days, etc.)
   Operator must be functional for 24 hours.

*Functional accessories are those sub-components not supplied by the manufacturer that are required to make the valve assembly operational, (e.g., limit switches).

5. For VALVES:

does the component [ ] Fail open [ ] Fail closed [X] Fail as is

Is this the fail-safe position [ ] Yes [X] No

Is the valve used for throttling purposes? [ ] Yes [X] No

Is the valve part of the reactor coolant pressure boundary? [ ] Yes [X] No

Does the valve have a specific limit for leakage? [X] Yes [ ] No

If "Yes" give limit: Operational limit: 1200 scc/min

IV. QUALIFICATION

1. Reference by specific number those applicable sections of the design codes and standards applicable to the component:

ASME Section III-NC; GE Spec KL-71-101; GE SPECS 21A8657 PARA 4.1.2

GE SPECS 21A8660 & 21A8658

2. Reference those qualification standards, used as a guide to qualify the component: NUREG-0588 Cat. II, IEEE 344-1971 (Reevaluated to IEEE 344-1975)

3. Identify those parts of the above qualification standards deleted or modified in the qualification program.

Deleted:	Modified:
See attachment	

4. Have acceptance criterias been established and documented in the test plan(s) for the component? [X] Yes [ ] No

5. What is the expected failure mode that would keep the pump or valve assembly from performing its safety function?

STEM BINDING

6. Are the margins* identified in the qualification documentation? [ ] Yes [ ] No See Attachment

*Margin is the difference between design basis parameters and the test parameters used for equipment qualification.

If component is a PUMP, complete IV.7.

If component is a VALVE, complete IV.8.

7. Pump operability has been demonstrated by: [ ] Analysis
[ ] Test [ ] Combination

Identify PUMP tests performed:

a. [ ] Shell hydrostatic (ASME Section III)

b. [ ] Bearing temperature evaluations

c. [ ] Seismic loading

d. [ ] Vibration levels

e. [ ] Exploratory vibration (Fundamental Freq.______)

f. [ ] Seal leakage & hydro press

g. [ ] Aging: [ ] Thermal [ ] Mechanical

h. [ ] Flow performance Are curves provided [ ] Yes [ ] No

i. [ ] Pipe reaction end loads (nozzle loads)

j. [ ] Others ______________________

k. [ ] Extreme environment:
   [ ] Humidity
   [ ] Chemical
   [ ] Radiation

8. Valve operability has been demonstrated by: [ ] Analysis
[ ] Test [ ] Combination VALVE OPERABILITY HAS NOT BEEN PRESENTLY DEMONSTRATED SEE ATTACHMENT

Identify VALVE tests performed:

a. [X] Shell hydrostatic (ASME Section III) VALVE ONLY

b. [ ] Cold cyclic List times: Open ________ Closed ________

c. [ ] Seismic loading

d. [ ] Hot cyclic List times: Open ________ Closed ________

e. [ ] Exploratory vibration (Fundamental Freq.______)

f. [X] Main seat leakage VALVE ONLY

g. [X] Aging: [X] Thermal
OPERATOR [ ] Mechanical

h. [ ] Back seat leakage

i. [ ] Pipe reaction end loading

j. [X] Disc hydrostatic
VALVE ONLY

k. [ ] Extreme environment:

[ ] Humidity

[ ] Chemical

[ ] Radiation

l. [ ] Flow interruption capability

m. [ ] Flow characteristics

Are curves provided?

[ ] Yes [ ] No

n. [ ] Others ______________

9. As a result of any of the tests (or analysis), were any deviations from design requirements identified? [ ] Yes [ ] No If "Yes", briefly describe any changes made in tests (or analysis) or to the component to correct the deviation.

N/A

10. Was the test component precisely identical (as to model, size, etc.) to the in-plant component? [ ] Yes [X] No. If "No", is installed component [ ] oversized or [X] undersized?
ANSWER PERTAINS TO ACTUATOR ONLY; TEST ARTICLE WAS SMB-3-100 WHICH IS LARGER THAN INSTALLED ACTUATOR

11. If type test was used to qualify the component, does the type test meet the requirements of IEEE 323-1974, Section 5.? [ ] Yes [X] No

12. Is component orientation sensitive? [X] Yes [ ] No [ ] Unknown
If "Yes", does installed orientation coincide with test orientation?
[ ] Yes [ ] No

Not known at this time.

13. Is the component mounted in the same manner in-plant as it was during testing (i.e., welded, same number and size bolts, etc.)?
[ ] Yes [ ] No [ ] Unknown

Not known at this time.

14. Were the qualification tests performed in sequence and on only one component? [X] Yes [ ] No TESTS PERFORMED ON OPERATOR ONLY

If "Yes" identify sequence, (e.g., radiation, seismic, cyclic, thermal, etc.): THERMAL AGING; OPERATIONAL AGING; RADIATION SEISMIC; ENVIRONMENTAL TEST

15. If "aging"* was performed, identify the significant aging mechanisms: THERMAL & RADIATION ; NO AGING TESTS PERFORMED ON VALVE

16. Identify loads imposed (assumed) on the component for the qualification tests (analysis) performed:

a. [ ] Plants (shutdown loads) b. [ ] Extreme environment

c. [X] Seismic load d. [X] Others Hydrodynamic Loads

17. Have component design specifications been reviewed in-house to assure they envelope all expected operating, transient, and accident conditions? [ ] Yes [X] No (review in progress.)

18. Does the component utilize any unique or special materials? (Examples are special gaskets or packing, limitations on nonferrous materials, or special coatings or surfaces.) [ ] Yes [X] No

If "Yes", identify:

19. Does component require any special maintenance procedures or practices, (including shorter periods between maintenance)? [X] Yes [ ] No

If "Yes", identify: ASME Section XI tests; Check stroke time quarterly and perform leak rate test biennially.

20. Is the qualified life for the component less than 40 years? [ ] Yes [X] No If "Yes", what is the qualified life?

See attachment

*As outlined in Section 4.4.1 of IEEE-627 1980.

Attachment to Item 20.

The prediction of a "qualified life" through accelerated aging is generally not feasible at the present state of the art. An aging analysis has been performed for electrical equipment located in potentially harsh environmental areas. The results of these studies are contained in a report to the NRC titled, "WNP-2 Environmental Equipment Qualification Report for Safety-Related Equipment, September 1982". Attached are the summary sheets for the electrical components associated with the selected equipment located in potential harsh environments.

Results of the aging analysis will be used to define recommended maintenance/replacement interval for inclusion in the WNP-2 maintenance and surveillance procedures.

ATTACHMENT

The HPCS-V-15 valve supplied under a General Electric contract was qualified to the Interim piping criteria as established per Reference 3).

The Interim Load was compared to the Final Piping Analysis per Reference 4). The review found that the Final Piping Analysis exceeded the loads considered in the Interim Criteria.

The qualification of HPCS-V-15 is, therefore, an "M" - being analyzed. The valve is currently being analyzed to the new loads.

References:
1) QID File 361075
2) Telephone conversation between Joe Braverman (B&R Woodbury) and F. G. Buck (Supply System), 10/19/82
3) Conference Notes 856, Burns and Roe Woodbury
4) Safety Evaluation Report, Docket #50-397, Section 3.10(3)

WPPSS QID #221001

WASHINGTON PUBLIC POWER SUPPLY SYSTEM

EQUIPMENT QUALIFICATION REPORT

OWNER: WPPSS
FACILITY: WNP 2
SPEC: 2808-02E22

MPL: E22-F001
PPD: 21A1883

REVISION: 2
DATE: September, 1982

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENT REF.		QUALIFICATION METHOD	OUTSTANDING ITEMS
	PARAMETER	FSAR	QUALIFICATION	FSAR	QUAL.		
SYSTEM High Pressure Core Spray TAG NUMBER HPCS-MO-1	OPERATING TIME	24 hours	16 days	4	2	Simultaneous Test	None
	TEMPERATURE (F)	90 max normal 104 max abnormal Accident Profile 4	See enclosed profile	1	2	Simultaneous Test	None
MANUFACTURER Limitorque MODEL NUMBER SMB-000-25/P12B	PRESSURE (PSIA)	14.7	See enclosed profile	1	2	Simultaneous Test	None
COMPONENT Valve Motor Operator (Reliance Class B)	RELATIVE HUMIDITY (%)	40 normal 90 max abnormal Accident Profile 4	Steam for 24 hours 100% for 15 days	1	2	Simultaneous Test	None
FUNCTION/SERVICE Operate HPCS Valve 1	CHEMICAL SPRAY	N/A	N/A	1	N/A	N/A	None
	RADIATION (RAD)	1.6×10^6	2×10^7	3	2	Sequential Test	None
	AGING	40 years	40 years	1	2,5	Sequential Test and Engineering Analysis	None
LOCATION: BLDG R ELEVATION 435 COLUMN N/4	ACCURACY	N/A	N/A	N/A	N/A	N/A	None

FLOOD LEVEL ELEV:
ABOVE FLOOD LEVEL?
YES X NO

Prepared by: [signature] 9/1/82 Reviewed by: [signature] 9/1/82

DOCUMENTATION REFERENCES

1. FSAR Par. 3.11
2. Limitorque Test Report B0003, with Addendum A, prepared 5/8/76
3. EDS Study 0740-00-422D
4. WNP-2 1E Equipment List, September 1982
5. Calculations in QID 221001

NOTES

Qualified.

WP-1981

WPPSS

WASHINGTON PUBLIC POWER SUPPLY SYSTEM

QID #221001

EQUIPMENT QUALIFICATION REPORT

OWNER: WPPSS
FACILITY: WNP-2
SPEC: 2808-02E22
MPL: E22-F012
PPO: 21A1880

EQUIPMENT DESCRIPTION	ENVIRONMENT	
	PARAMETER	FSAR
SYSTEM High Pressure Core Spray TAG NUMBER HPCS-MO-12,15	OPERATING TIME	24 hours
	TEMPERATURE (F)	90 max normal 104 max abnormal Accident Profile 4
MANUFACTURER Limitorque	PRESSURE (PSIA)	14.7
MODEL NUMBER SHB-2-40/C184Y SHB-2-60/C184Y	RELATIVE HUMIDITY (%)	40 normal 90 max abnormal Accident Profile 4
COMPONENT Valve Motor Operator* FUNCTION/SERVICE Operate HPCS Valve 12	CHEMICAL SPRAY	N/A
	RADIATION (RAD)	1.6×10^6
	AGING	40 years
LOCATION: BLDG R ELEVATION 430, 455 COLUMN M/3.4, L.4/3.6	ACCURACY	N/A
FLOOD LEVEL ELEV: ABOVE FLOOD LEVEL? YES X NO		

Reference:
3. EDS Report 0740-004-441C

WP-1002

*(Reliance Class B)

Prepared By:
Reviewed By: 8/20/82

OWNER: WPPSS
FACILITY: WNP-2
SPEC: 2808-02E22
MPL: E22-F010
PPO: 21A1881

EQUIPMENT DESCRIPTION	ENVIRONMENT	
	PARAMETER	FSAR
SYSTEM High Pressure Core Spray TAG NUMBER HPCS-MO-10,11	OPERATING TIME	24 hours
	TEMPERATURE (F)	90 max normal 104 max abnormal Accident Profile 4
MANUFACTURER Limitorque	PRESSURE (PSIA)	14.7
MODEL NUMBER SHB-3	RELATIVE HUMIDITY (%)	40 normal 90 max abnormal Accident Profile 4
COMPONENT Valve Motor Operator* FUNCTION/SERVICE Operate HPCS Valve 10	CHEMICAL SPRAY	N/A
	RADIATION (RAD)	1.4×10^6
	AGING	40 years
LOCATION: BLDG R ELEVATION 452 COLUMN H/3.8	ACCURACY	N/A
FLOOD LEVEL ELEV: ABOVE FLOOD LEVEL? YES X NO		

* (Reliance Class B)

PUMP AND VALVE
OPERABILITY ASSURANCE REVIEW

Valve CVB-V-1G
P&ID M543 Zone B-11

PLANT INFORMATION

1. Name: WNP-2 Unit No.: ____ 2. Docket No.: 50-397

3. Utility: Washington Public Power Supply System

4. NSSS: General Electric [ ] PWR [X] BWR

5. A/E: Burns and Roe

II. GENERAL COMPONENT* INFORMATION

1. Supplier: [ ] NSSS [X] BOP

2. Location: a. Building/Room Containment 150° Azimuth/R=35

   b. Elevation 441

   c. System Primary Containment Cooling

3. Component number on in-house drawings: CVB-V-1G

4. If component is a [ ] Pump complete II.5.

   If component is a [X] Valve complete II.6.

5. General Pump Data

a. Pump		b. Prime-mover	
Name		Name	
Mfg.		Mfg.	
Model		Model	
S/N		S/N	
Type		Type	

*The component, whether pump or valve, is considered to be an assembly composed of the body, internals, prime-mover (or actuator) and functional accessories.

6. General Valve Data

a. Valve		b. Actuator (if not an integral unit)	
Name	CVB-V-1G	Name	Not applicable
Mfg.	Anderson-Greenwood	Mfg.	
Model	CVI-L-Type	Model	
S/N	VB 7894	S/N	
Type	DOUBLE DISC CHECK	Type	
Size	24 inch	Size	
Weight	1500# TOTAL	Weight	
Mounting Method	Flange mounted	Mounting Method	
Required Torque	Not applicable	Torque	

Parameter	Design	Operating
Press psig	45	~0
Temp °F	340 internal 275 external	150 max.
Flow	varies with ΔP	

Power requirements: (include normal, maximum and minimum)

Electrical ______

Max ΔP across valve 6.4 psid

Closing time @ max ΔP not applic.

Opening time @ max ΔP not applic.

Other: [X] Pneumatic [ ] Hydraulic

125 psig

Power requirements for functional accessories, (if any) ______

List control signal inputs: For testing purposes only, valve may be actuated by remote manual switch to demonstrate operability of internals.

List functional accessories:* ______________________________

____

III. FUNCTION

1. Briefly describe components normal and safety functions: Valve has no "normal" function. The safety function is to maintain equilibrium pressure between drywell and wetwell to thus mitigate containment pressure increase during postulated event.

2. The components normal state is: [ ] Operating [X] Standby

3. Safety function:

a. [ ] Emergency reactor shutdown
b. [ ] Containment heat removal
c. [ ] Containment isolation
d. [ ] Reactor heat removal
e. [ ] Reactor core cooling
f. [X] Prevent significant release of radioactive material to environment
g. [X] Does the component function to mitigate the consequences of one or more of the following events? [X] Yes [ ] No
If "Yes", identify.

[X] LOCA [ ] HELB [X] MSLB

[ ] Other ______________________________

4. Safety requirements:

[X] Intermittent Operation [X] During postulated event

[ ] Continuous Operation [ ] Following postualted event

If component operation is required following an event, give approximate length of time component must remain operational.

4320 hours (e.g., hours, days, etc.)

____

*Functional accessories are those sub-components not supplied by the manufacturer that are required to make the valve assembly operational, (e.g., limit switches).

5. For VALVES:

does the component [ ] Fail open [ ] Fail closed [X] Fail as is
Pneumatic cylinder failure does not cause valve failure.
Is this the fail-safe position [ ] Yes [ ] No

Is the valve used for throttling purposes? [ ] Yes [X] No

Is the valve part of the reactor coolant pressure boundary? [ ] Yes [X] No

Does the valve have a specific limit for leakage? [ ] Yes [ ] No

If "Yes" give limit: Operational limit for aggregate leakage will be identified in approved Tech. Spec.

IV. QUALIFICATION

1. Reference by specific number those applicable sections of the design codes and standards applicable to the component:

ASME Section III-NC; Burns & Roe Spec. 2808-68

2. Reference those qualification standards, used as a guide to qualify the component:

IEEE 323-1971 (Reevaluation to IEEE 323-1974)

3. Identify those parts of the above qualification standards deleted or modified in the qualification program.

Deleted:	Modified:
See attachment	

4. Have acceptance criterias been established and documented in the test plan(s) for the component? [ ] Yes [X] No

5. What is the expected failure mode that would keep the pump or valve assembly from performing its safety function?

Disc deflection greater than allowable

6. Are the margins* identified in the qualification documentation?
[ ] Yes [ ] No

See attachment

*Margin is the difference between design basis parameters and the test parameters used for equipment qualification.

If component is a PUMP, complete IV.7.

If component is a VALVE, complete IV.8.

7. Pump operability has been demonstrated by: [ ] Analysis
[ ] Test [ ] Combination

Identify PUMP tests performed:

a. [ ] Shell hydrostatic (ASME Section III)

b. [ ] Bearing temperature evaluations

c. [ ] Seismic loading

d. [ ] Vibration levels

e. [ ] Exploratory vibration

(Fundamental Freq.______)

f. [ ] Seal leakage & hydro press

g. [ ] Aging: [ ] Thermal
[ ] Mechanical

h. [ ] Flow performance.
Are curves provided [ ] Yes
[ ] No

i. [ ] Pipe reaction end loads (nozzle loads)

j. [ ] Others ______________________
____
____
____
____
____

k. [ ] Extreme environment:

[ ] Humidity

[ ] Chemical

[ ] Radiation

8. Valve operability has been demonstrated by: [ ] Analysis
[ ] Test [ ] Combination

SEE ATTACHMENT

Identify VALVE tests performed:

a. [X] Shell nydrostatic (ASME Section III)

b. [ ] Cold cyclic List times:
Open ____________
Closed ____________

c. [ ] Seismic loading

d. [ ] Hot cyclic List times:
Open ____________
Closed ____________

e. [ ] Exploratory vibration

(Fundamental Freq.______)

f. [ ] Main seat leakage

g. [ ] Aging: [ ] Thermal
[ ] Mechanical

h. [ ] Back seat leakage

i. [ ] Pipe reaction end loading

j. [ ] Disc hydrostatic

k. [ ] Extreme environment:

[ ] Humidity

[ ] Chemical

[ ] Radiation

l. [ ] Flow interruption capability

m. [ ] Flow characteristics

Are curves provided?

[ ] Yes [ ] No

n. [ ] Others ______________

____

____

9. As a result of any of the tests (or analysis), were any deviations from design requirements identified? [ ] Yes [ ] No If "Yes", briefly describe any changes made in tests (or analysis) or to the component to correct the deviation.

See attachment

10. Was the test component precisely identical (as to model, size, etc.) to the in-plant component? [ ] Yes [ ] No If "No", is installed component [ ] oversized or [ ] undersized?

See attachment

11. If type test was used to qualify the component, does the type test meet the requirements of IEEE 323-1974, Section 5.? [ ] Yes [X] No

12. Is component orientation sensitive? [X] Yes [ ] No [ ] Unknown If "Yes", does installed orientation coincide with test orientation? [ ] Yes [ ] No

See attachment

13. Is the component mounted in the same manner in-plant as it was during testing (i.e., welded, same number and size bolts, etc.)? [ ] Yes [ ] No [ ] Unknown

See attachment

14. Were the qualification tests performed in sequence and on only one component? [ ] Yes [ ] No See attachment

If "Yes" identify sequence, (e.g., radiation, seismic, cyclic, thermal, etc.): ____________________

____

15. If "aging"* was performed, identify the significant aging mechanisms: ____________________

____

____

16. Identify loads imposed (assumed) on the component for the qualification tests (analysis) performed:

a. [ ] Plants (shutdown loads) b. [ ] Extreme environment

c. [ ] Seismic load d. [ ] Others ____________________

____

17. Have component design specifications been reviewed in-house to assure they envelope all expected operating, transient, and accident conditions? [ ] Yes [X] No Review in progress.

18. Does the component utilize any unique or special materials? (Examples are special gaskets or packing, limitations on nonferrous materials, or special coatings or surfaces.) [ ] Yes [X] No

If "Yes", identify: ____________________

____

19. Does component require any special maintenance procedures or practices, (including shorter periods between maintenance)? [X] Yes [ ] No

If "Yes", identify: ASME Section XI tests: Exercise valve quarterly; perform leak rate test per Tech. Spec.

20. Is the qualified life for the component less than 40 years? [ ] Yes [ ] No If "Yes", what is the qualified life? ________

See Attachment

*As outlined in Section 4.4.1 of IEEE-627 1980.

21. Information Concerning Qualification Documents for the Component

Report Number	Report Title	Date	Company/Organization Preparing Report	Company/Organization Reviewing Report
QID 361901			Supply System EQ File	
NEDE-22178-P	Mark II Containment Drywell to Wetwell Vacuum Breaker Models	8/82	General Electric	Supply System
Tech. Memo. #1258	SA Fogelson	3/4/82	Burns and Roe	Supply System
N80.6	Mark II Plant Unique Vacuum Breaker Dynamic Load Spec	10/82	Continuum Dynamics	Supply System

ATTACHMENT

A reevaluation of the equipment capability to function during an accident is being performed. The criteria being employed is contained in a report sent to the NRC titled, "WNP-2 Environmental Equipment Qualification Report for Safety-Related Equipment, September 1982". The results of this reevaluation are not available at this time.

PRELIMINARY QUALIFICATION APPROACH FOR WNP-2 VACUUM BREAKERS

Equipment Description

Drywell/wetwell vacuum breakers are provided as part of the primary containment design to prevent any occurrence of an excessive (negative) upward differential pressure loading on the drywell floor or excessive inward pressure loading on the drywell/wetwell walls. At WNP-2 the drywell/wetwall vacuum breakers are located on nine peripheral downcomers at approximately the 492' elevation. The valves were built under ASME Section III Class 2 rules by Anderson Greenwood & Co. (AGCo) of Houston, Texas. The valves are of a dual disc design (i.e., two sealing discs in series) in a single valve body with 150 pound class, 24-inch diameter flanges. The series disc arrangement provides redundant sealing at each valve. Additionally, excess valve capacity has been provided since only seven of the nine valves installed in containment are needed for adequate normalization of pressure during transient events. The valves utilize magnets embedded in the disc flange to attain a set point opening pressure between 0.15 and 0.35 psid. Each valve disc also features both positive opening and closing (externally valve mounted) air actuation cylinders, which may be activated from the plant control room. Limit switches monitor the disc position for remote surveillance by the plant operators. The valve disc shafts are mounted on enclosed and sealed ball bearings. AGCo drawings N04-3800 and N04-3825 (sheets 1 and 2) provide a complete list of parts, materials, and overall dimensions for the valve.

Valve Modification

The potential problem of drywell/wetwell vacuum breaker cycling during a LOCA originally surfaced in the Mark II Owner's Group in early 1980. This issue was dealt with by creating a GE program, Task A.29, to analytically model condensation induced downcomer vent pressure transients during the chugging phase of a LOCA and to develop a plant unique forcing function to apply to the vacuum breakers.

Work on this task was carried out by Continuum Dynamics Inc. (CDI), subcontracted to GE. It culminated with the issuance of a "Mark II Plant Unique Vacuum Breaker Dynamic Load Specification", which concluded that the Mark II Plants with vacuum breakers attached to downcomers should expect actuation of these valves during chugging. The specification also provided a table of impact velocities and number of impacts to be expected.

An additional potential problem with the drywell/wetwell vacuum breakers was identified by GE at the Mark II Owner's Chugging Subcommittee on November 11, 1981. As a result of a large primary system rupture loss-of-coolant-accident, the vacuum breakers could possibly be actuated and overstressed by the overpressurization of the wetwell airspace during the pool swell phase. This was recognized as a problem generic to all the Mark II plants and not limited to those with their drywell/wetwell vacuum breakers located on downcomers. It was, therefore, integrated into the Mark II Owner's Vacuum Breaker Program, GE Task A.29, and the AGCo Test Program initiated on June 4, 1981.

Task A.29 and the AGCo Test Program generated a test validated dynamic model for the AGCo vacuum breaker valves. Results of this work has been reported to the owners and the NRC in the "Mark II Containment Drywell-to-Wetwell Vacuum Breaker Models" Report. The test program also revealed that at a 10 radians/sec disc impact velocity, the WNP-2 vacuum breakers experienced stresses at or near yield in the valve disc (note that all major valve components were strain gauge instrumented). This was unacceptable since predicted peak chugging and pool swell disc impacts were predicted by the CDI dynamic model to be 25 to 35 radians/sec.

The Supply System considered various alternatives to modify the valves to be able to operate under this condition without failure. Supply System scoping calculations revealed that dampers coupled to the valve disc shafts could be used to reduce disc impacts to acceptable levels. As a result, in March of 1982 the Supply System contracted with CDI to size a

damper for our valves utilizing the dynamic model which had been validated via the AGCo Test Program. Many candidate dampers were surveyed and analyzed. The work culminated this past September by selecting a Pacific Scientific pipe snubber, Model PSA-3. The snubber was selected for the ability to damp the disc impact, its all mechanical design (i.e., no fluids), broad temperature insensitivity, corrosion resistance, and vast experience and testing in nuclear power plant applications.

With the snubber damping force input into the CDI dynamic model, peak impacts were reduced to less than 4 radians/sec. This is well below the 10 radian/sec first determined in the AGCo tests. CDI also completed a test on a single snubber to ensure that the manufacturer's functional load response description was correct and properly input into the dynamic model.

It was also recognized that the snubber addition would slow the valve response time during low-level transients such as inadvertent containment spray actuation. As a result, Burns and Roe reanalyzed the containment to determine the maximum time in which the vacuum breakers could be permitted to attain a full open condition. This opening time limit was determined to be on the order of 10 seconds. The damped valve was analyzed using the Burns and Roe spray actuation load definition and found to have a full open response time of 1.8 seconds, well below the ten second limit. Finally, CDI developed peak damping force time histories to be used for mechanical design analysis modification of the valve.

In September of this year, AGCo was contracted to implement the mechanical design modification of the valve, fitting a single PSA-3 snubber (one per valve disc), in accordance with the test validated dynamic model results provided by CDI. The conceptual design modification has been completed by AGCo under CDI and Supply System review and direction. In summary, the valve will be rebuilt with larger shafts (increased to 1.25 inches from 1.0 inch), reinforced disc arms, larger bearings, selective use of high strength ASME Code approved materials, and external brackets to mount the snubber to the valve body. Drawings showing the modification in detail are being prepared by AG&Co.

Qualification Method

The dynamic analysis for the WNP-2 vacuum breaker valves will be completed using the test validated model developed by Continuum Dynamics and AGCo under GE Task A.29 for the Mark II Owner's[1] and will include seismic/hydrodynamic loads.

The analysis in conjunction with a test presently being devised for the WNP-2 vacuum breaker valves modified with Dampers will form the Qualification Method.

The basic thrust of the test plan is to dynamically load the valve disc, via a hydraulic ram and cable attachments, to achieve disc forces equal to the peak pressure loads predicted under LOCA conditions. The vacuum breaker environmental design basis is provided in Tables 1, 2, and 3. The LOCA load definition is provided in the plant unique dynamic load specification.[2] Seismic and Dynamic vibrational loads are provided in Table 4.

The valve response will be instrumented and compared to the dynamic analysis predictions.

Following the dynamic test(s) the valve will undergo complete functional tests and leak rate tests to ensure operability under these conditions. The test will be conducted early in 1983 by AGCo and CDI. Additionally, each snubber Pacific Scientific provides for this application will be tested and certified compatible with the functional inputs used in the dynamic analysis.

To R.E. Snai · From S.A. Fogelson 3/4/82

TABLE 2
(Ref. 5)

DRYWELL-WETWELL AND WETWELL-REACTOR BUILDING VACUUM BREAKER

PRINCIPAL DESIGN PARAMETERS

Pressure Suppression Chamber -	Internal Design Pressure	45 psig
	External Design Pressure	2.0 psid
Drywell -	Internal Design Pressure	45 psig
	External Design Pressure	2.0 psid
Drywell Free Volume		202,242 ft.3
Pressure Suppression Chamber Free Volume		144,166 ft.3
Pressure Suppression Pool Water, Volume (min.)		108,387 ft.3
Submergence of Vent Pipe Below Pressure Suppression Pool Surface		11.67 ft.
Calculated Maximum Pressure after Blowdown		
Drywell		37.2 psig
Pressure Suppression Chamber		28 psig
Normal Operating Temperture - Suppression Chamber		95°F
Normal Operating Temperature - Drywell		135°F
Normal Relative Humidity - Drywell		50%
Normal Relative Humidity - Wetwell		100%
Normal Drywell Pressure		0.7 psig
Normal Wetwell Pressure		0.7 psig

TABLE 3
(Ref. 7)
DRYWELL-WETWELL DESIGN CONDITIONS

The 24" (port size) 150# flanged valves will be located in suppression pool of an "over and under" type BWR containment vessel. Valves will relieve pressure differenial between drywell and suppression chamber. Tag numbers for these valves are: CVB-V-1A, CVB-V-1B, CVB-V-1C, CVB-V-1D, CVB-V-1E, CVB-C-1F, CVB-V-1G, CVB-V-1H (VSB-V-1J, CVB-V-1K if necessary).

A. Environmental Conditions

Accident Conditions
Air temperture, °F 275
Relative humidity -All steam
Pressure, psig 28 calculated/45 design
Radiation:

Type	Gamma
Level, Rad/hr	1.3×10^6 (Loss of Coolant & Accident)
Life dosage, Roentgens	2.6×10^7 (integrated over 6 months)

Normal Operating Conditions (100% Power)

Air temperature, °F	60-170
Relative humidity, percent	100%
Pressure, psig	-0.5 to 2
Radiation:	
Level	
Gamma, Rad/hr	0.1
Neutron, Neutrons/cm²-sec.	2×10^2
Life Dosage	
Gamma	3.5×10^4 (integrated over 40 years)

B. Operating Parameters

a. Operation
Each valve shall be capable of operation safely under the design conditions summarized below:
Normal Operation
1. Drywell - 2 psig, 150°F, and 40 percent relative humidity.
2. Suppression Chamber - 2 psig and 50°F and 100 percent relative humidity.
Transient Operation
1. Drywell - 45 psig and 340°F. (valve internal)
2. Suppression Chamber - 45 psig and 275°F. (valve ambient)

b. Response Time
Each valve disc shall open fully within one (1) second when a maximum differential pressure of 0.5 psi exists between the suppression chamber and the drywell.

c. Leak Rate
The maximum allowable vacuum breaker leakage from the drywell to the suppression chamber side of the valve shall be 10 std. cc of air per inch of valve seat diameter per hour, per disc.

d. Set Pressure
The set pressure for each valve shall be within the range of .150 to .350 psi differential.

e. Operating Cycle
The valve shall provide a service life of 40 years considering 20 operating cycles per year over the life of the valve.

f. Operator
The pneumatic operator and related equipment shall be furnished to conform with a safe working pressure of 150 psig minimum.

TABLE 4
(Ref. 7)
WETWELL-REACTOR BUILDING DESIGN CONDITIONS

Three (3) 24" 150# flanged valves will be located in the Reactor Building. Valves will mechanically relieve pressure differential (Vacuum) between suppression chamber and Reactor Building. The tag numbers for these valves are: CSP-V-7, CSP-V-8, CSP-V-10.

A. Environmental Conditions

Accident Conditions

Valves must be operable under the following conditions:

	Internal	Ambient
First 6 Hours		
Temperature, °F	275(1)	212
Relative humidity, percent	100(1)	100
Pressure, psig	45(1)	+0.25
(1) - First 24 hours		
Next 6 Hours		
Temperature, °F	-	150
Relative humidity, percent	-	100
Pressure, psig	-	-0.1 to 0.25
Next 100 Days		
Temperature, °F	200	150
Relative humidity, percent	100	90
Pressure, psig	-2 to 20	-0.1 to 0.25
Radiation Level, Gamma		
Level, Rad/hr	6.5 x 102	
Life dosage, Rads	1.7 x 105 (integrated over 40 years)	

Normal Operating Conditions (100% Power)

	Internal	Ambient
Design temperature, °F	60 - 170	40 - 104
Pressure, psig	-.5 to 2	-.1 to 0.25
Relative humidity, percent	100%	0 to 100%
Radiation Level		
a. Gamma, Rads/hr	0.001	
b. Neutron, Neuts/cm^2-sec	1	
c. Life dosage, rads (integrated over 40 years)	3.5×10^2	

Operating Parameters

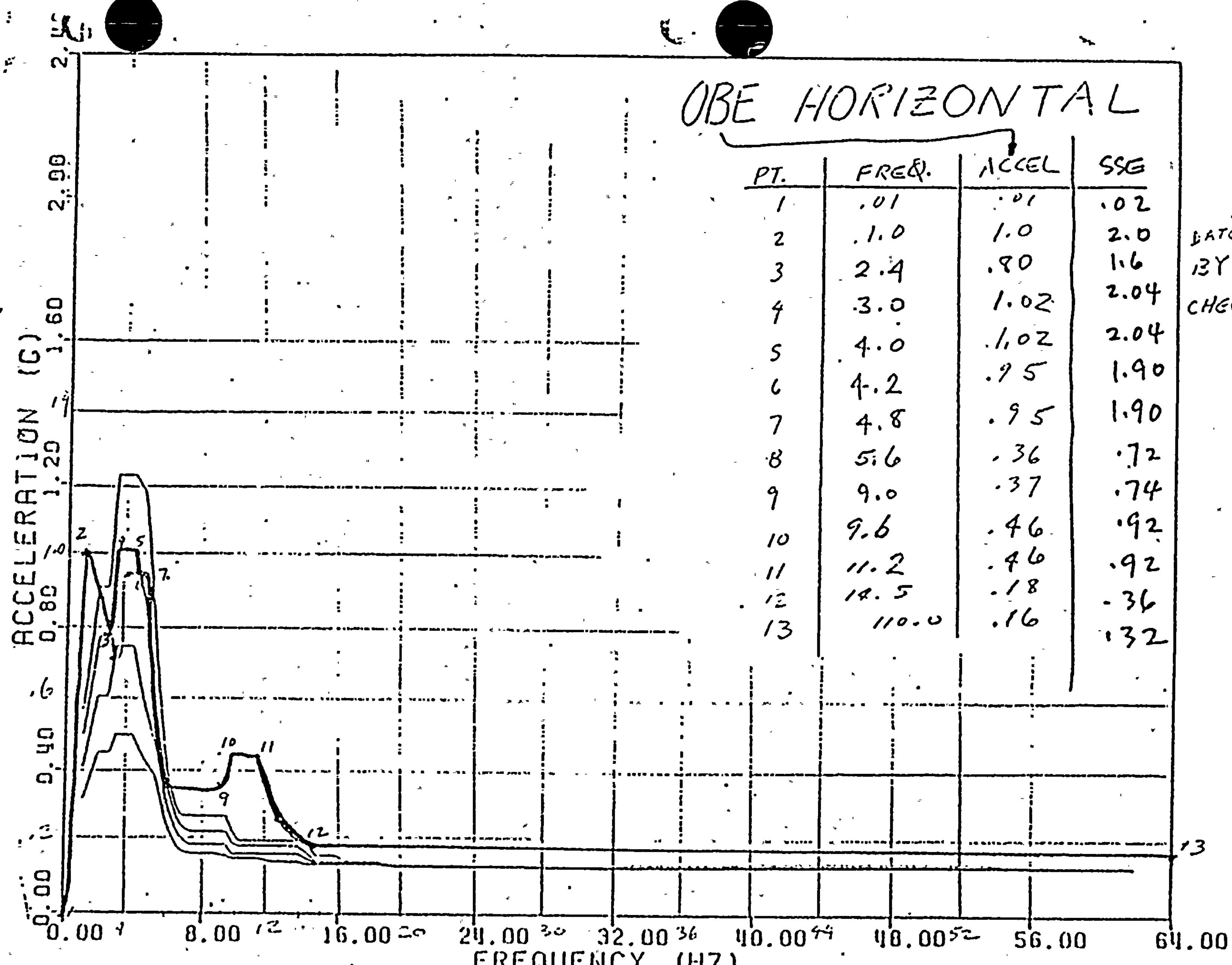
a. Leak Rate
The maximum allowable vacuum breaker leak rate from suppression chamber to Reactor Building shall be 10 std. cc of air per inch of valve seat diameter per hour. (delete)

b. Response Time
Each valve shall open fully within one (1) second when a maximum differential pressure of 0.5 psi exists between the Reactor Building and the suppression chamber.

c. Operating Cycles
The valve shall provide a service life of 40 years considering 20 operating cycles per year over the life of the valve.

d. Set Pressure
The set pressure for each valve shall be within the range from .150 to .350 psi differential.

e. Operator
The pneumatic operator and related equipment shall be furnished to conform with a safe working pressure of 150 psig minimum.



PT.	FREQ.	ACCEL	SSE
1	.01	.01	.02
2	1.0	1.0	2.0
3	2.4	.80	1.6
4	3.0	1.02	2.04
5	4.0	1.02	2.04
6	4.2	.95	1.90
7	4.8	.95	1.90
8	5.6	.36	.72
9	9.0	.37	.74
10	9.6	.46	.92
11	11.2	.46	.92
12	14.5	.18	.36
13	110.0	.16	.32

WPPSS REACTOR BLDG. SEISMIC OBE RESPONSE SPECTRA

MASS NO. 137 EL. 414 FT. HORIZ. TRANSLATION

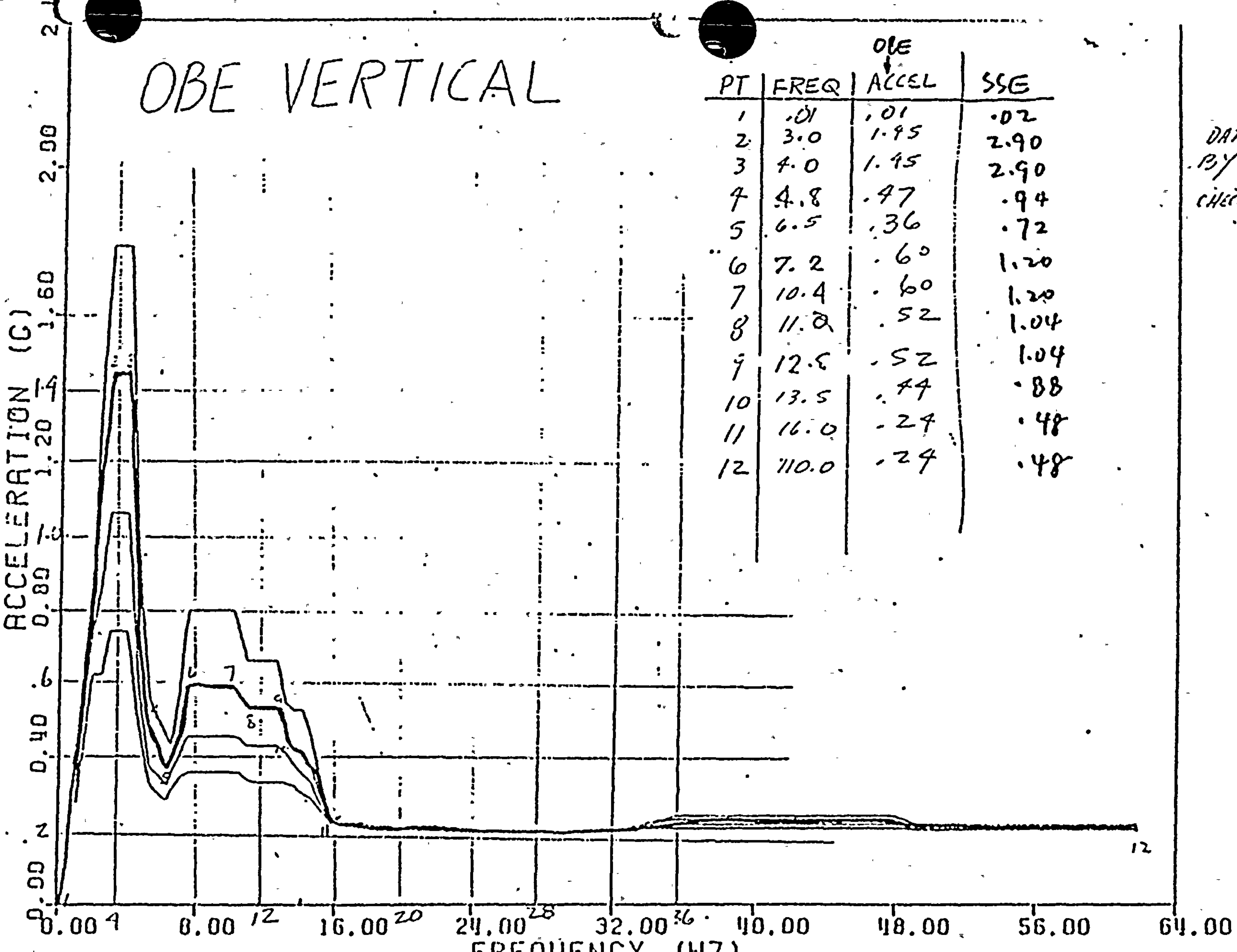
BASEMAT DAMPING= .005, .01, .02, .04

TABLE 4.2

OBE VERTICAL

PT	FREQ	OBE ACCEL	SSE
1	.01	.01	.02
2	3.0	1.45	2.90
3	4.0	1.45	2.90
4	4.8	.47	.94
5	6.5	.36	.72
6	7.2	.60	1.20
7	10.4	.60	1.20
8	11.2	.52	1.04
9	12.5	.52	1.04
10	13.5	.44	.88
11	16.0	.24	.48
12	110.0	.24	.48

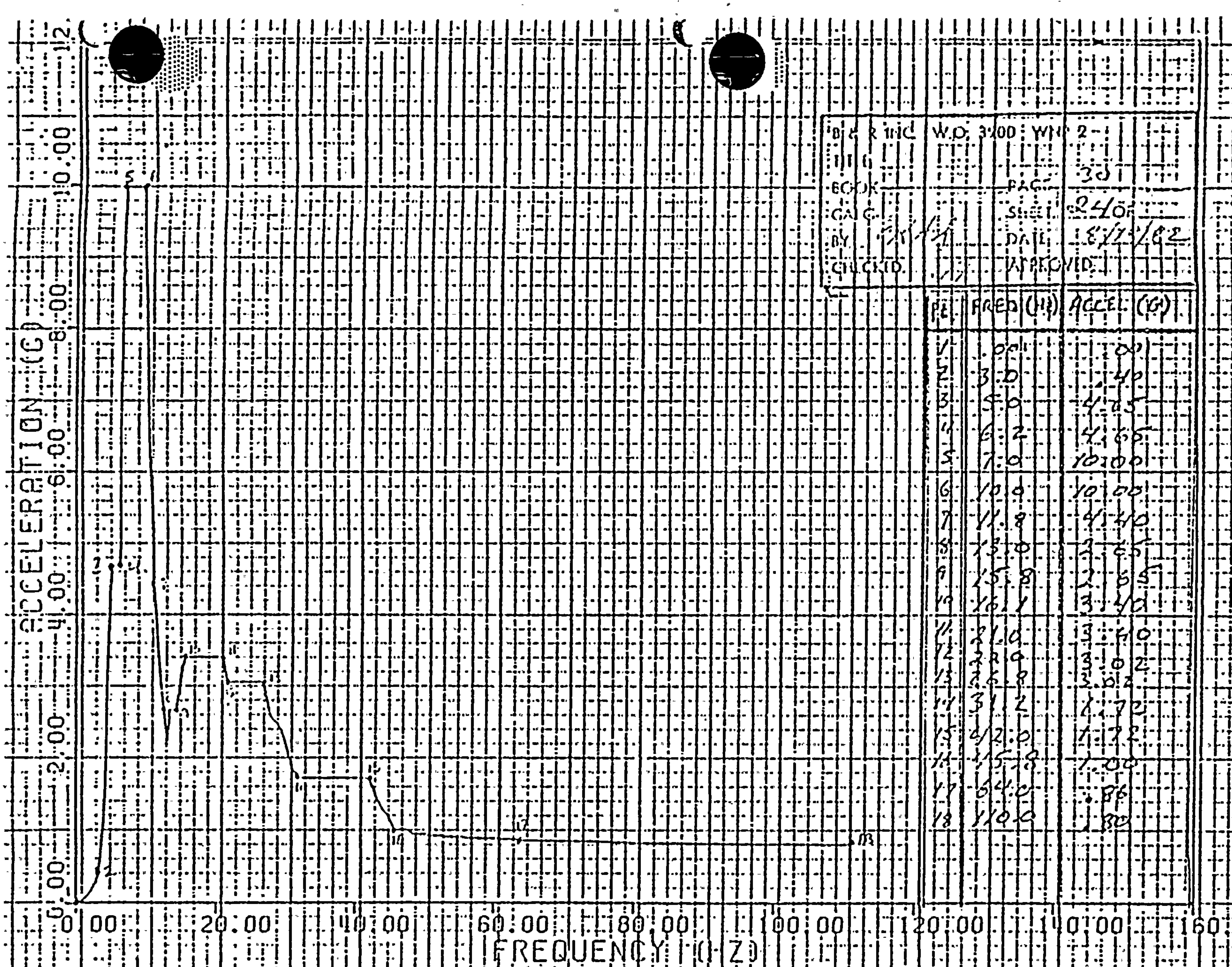
DATE: 8/20/82
BY: BB
CHECKED: [illegible]



WPPSS REACTOR BLDG. SEISMIC OBE RESPONSE SPECTRA

MASS NO. 198 EL. 500 FT. VERT. TRANSLATION

RPV PEDESTAL DAMPING= .005,.01,.02,.04



B & R INC. W.O. 3200 WNP 2
BOOK PAGE 30
CALC. SHEET 24 OF
BY DATE 8/23/82
CHECKED APPROVED

PT.	FREQ (HZ)	ACCEL (G)
1	.01	.00
2	3.0	.40
3	5.0	4.05
4	6.2	4.05
5	7.0	10.00
6	10.0	10.00
7	11.8	4.40
8	13.0	2.65
9	15.8	2.65
10	16.1	3.40
11	21.0	3.40
12	22.0	3.02
13	26.8	3.02
14	31.2	1.72
15	42.0	1.72
16	45.8	1.00
17	64.0	.86
18	110.0	.80

WPPSS NP=2 SRV SINGLE VALVE

ENV. OF NODE GR 1 TANG. TRANSLATION

PRIMARY CONTAINMENT WETWELL NODE 12 DAMPING= 1.01

PEDESTAL AK1, SINGLE, AND R.C. NODE 16
AK1, AK2 ENVELOPE PEDESTAL AK2,
R.C. NODE 15 AK1, AK2, SINGLE AND
R.C. NODE 16 SINGLE

B & R INC.	W.O. 3900	WIR 2
TITLE		
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BY: RKH	DATE	
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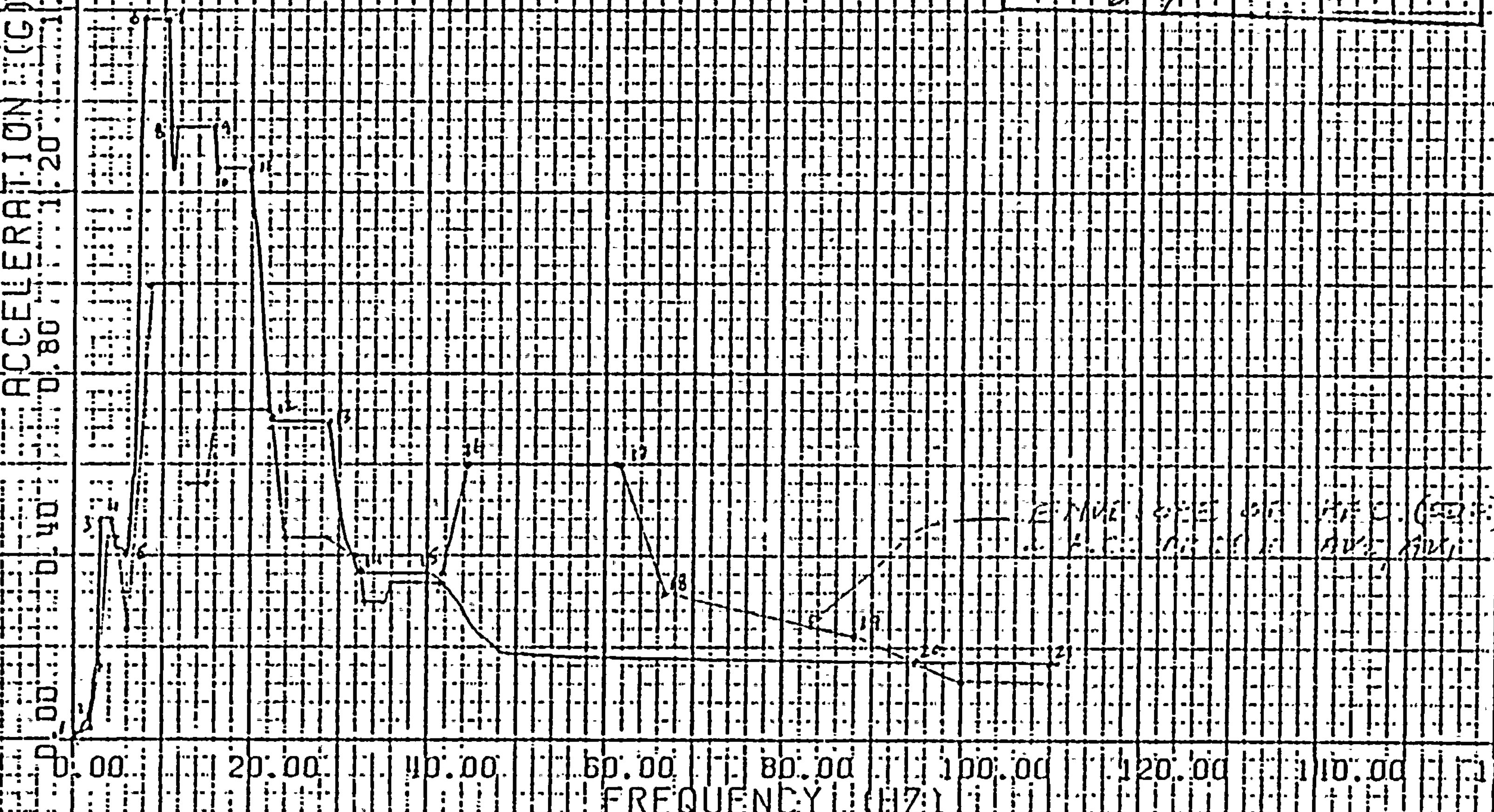
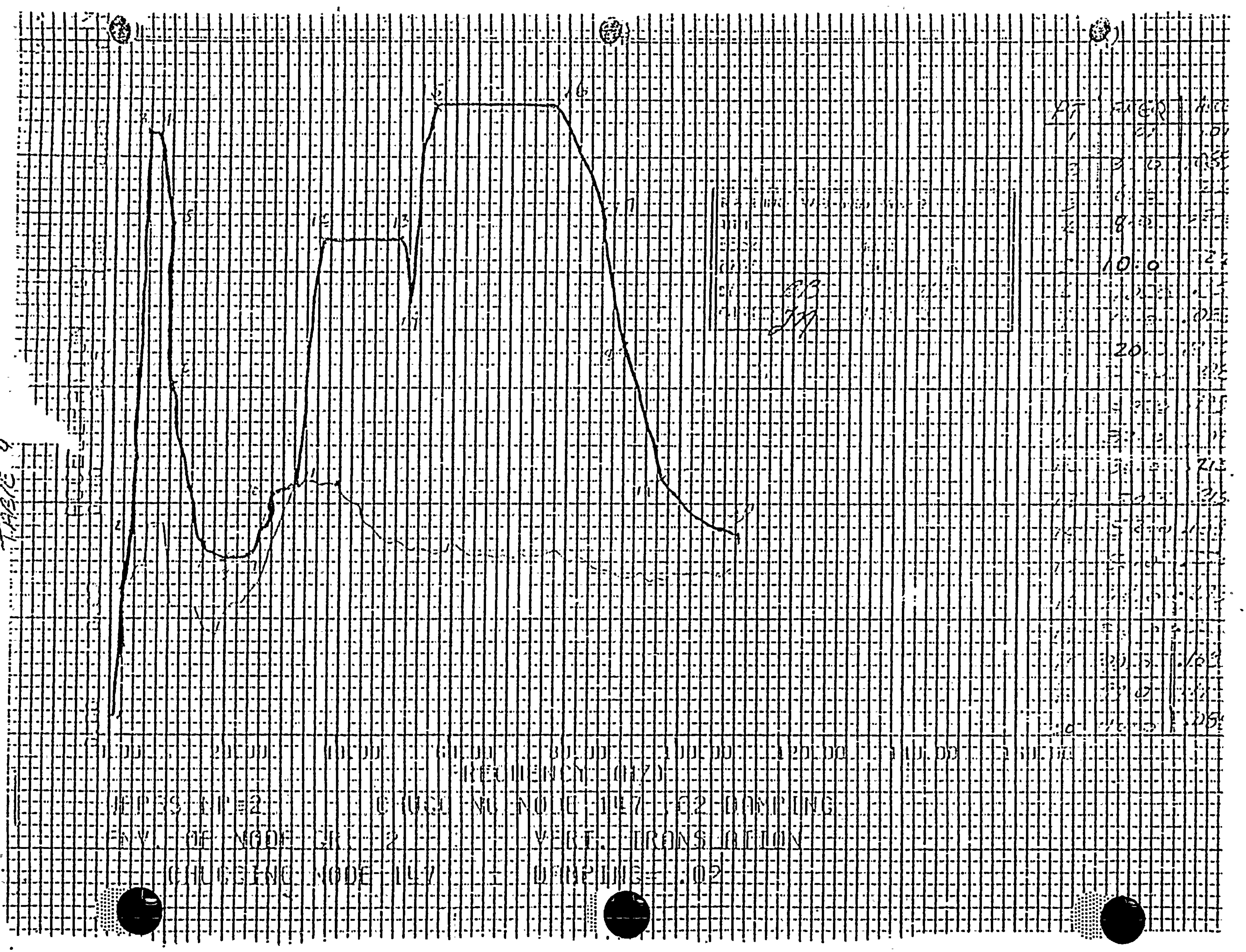


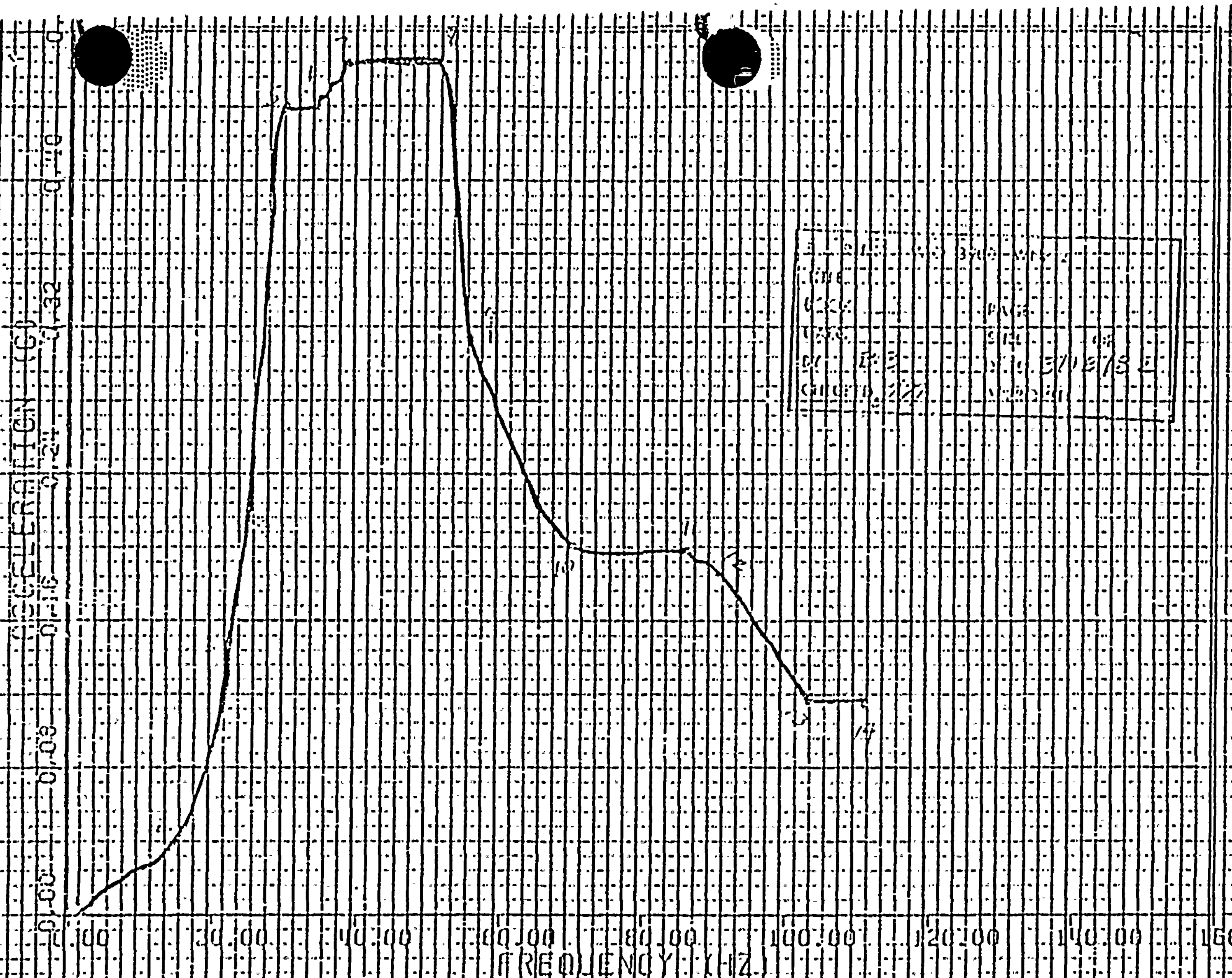
WPPSS NP=2 SRV ALL VALVE 1
ENV. OF NODE GR. 2 VERT. TRANSLATION
SRV PEDESTAL DAMPING= .01

Pt	FREQ(Hz)	ACCEL
1	.001	.00
2	1.9	.05
3	3.0	.44
4	4.2	.44
5	6.0	.40
6	7.9	1.58
7	10.2	1.58
8	11.0	1.35
9	15.0	1.35
10	16.1	1.25
11	20.0	1.25
12	22.2	.70
13	29.0	.70
14	32.6	.36
15	41.8	.36
16	44.2	.60
17	61.5	.60
18	67.0	
19	87.6	.2
20	95.0	.11
21	110.0	.16

TABLE 4.4

TABLE 4





PT	FREQ	ACCEL
1	.0	.01
2	17.0	.048
3	23.0	.148
4	25.0	.212
5	30.0	.44
6	32.0	.47
7	38.0	.464
8	55.0	.464
9	56.0	.312
10	70.0	.20
1	86.0	.20
2	91.5	.184
13	108.0	.116
14	112.0	.116

TABLE 4

JPPSS N1=2 CHUGGING PEDESTAL AND DIAPHRAGM .02 DAMPING
ENV. OF NODE GR. 1 HORIZ. TRANSLATION
CHUGGING PEDESTAL AND DIAPHRAGM DAMPING= .02

REFERENCES

1) NEDE-22178-P, "Mark II Containment Drywell-to-Wetwell Vacuum Breaker Models", General Electric Co., August 1982.

2) Teske, M.E., "Mark II Plant-Unique Vacuum Breaker Dynamic Load Specification, Ref. 2", Continuim Dynamics Inc., Report No. 80-6, October 1980.

3) Burns and Roe Technical Memorandum No. 1258, March 4, 1982, S. A. Fogelson.

VALVE LPCS-V-5
P&ID M520 Zone G-11

PUMP AND VALVE OPERABILITY ASSURANCE REVIEW

I. PLANT INFORMATION

1. Name: WNP-2 Unit No.: ____ 2. Docket No.: 50-397
3. Utility: Washington Public Power Supply System
4. NSSS: General Electric [ ] PWR [X] BWR
5. A/E: Burns and Roe

II. GENERAL COMPONENT* INFORMATION

1. Supplier: [ ] NSSS [X] BOP
2. Location: a. Building/Room Reactor Building M/4.5
   b. Elevation 525
   c. System Low Pressure Core Spray
3. Component number on in-house drawings: LPCS-V-5
4. If component is a [ ] Pump complete II.5.
   If component is a [ ] Valve complete II.6.
5. General Pump Data

a. Pump		b. Prime-mover	
Name		Name	
Mfg.		Mfg.	
Model		Model	
S/N		S/N	
Type		Type	

*The component, whether pump or valve, is considered to be an assembly composed of the body, internals, prime-mover (or actuator) and functional accessories.

a. Pump (continued)			b. Prime-mover (continued)
Size ______			Size ______
Weitnt ______			Weight ______
Mounting Method ______			Mounting Method ______
Required B.H.P. ______			H.P. ______
Parameter	Design	Operating	Power requirements: (include normal, maximum and minimum)
Press	______	______	Electrical ______
Temp	______	______	______
Flow	______	______	______
Head	______	______	______
			______
Required NPSH at maximum			If MOTOR list:
flow ______			Duty cycle ______
Available NPSH ______			Stall current ______
Operating Speed ______			Class of insulation ______
Critical Speed ______			______

List functional accessories:* ______

______

______

List control signal inputs: ______

______

______

*Functional accessories are those sub-components not supplied by the manufacturer that are required to make the pump assembly operational, (e.g., coupling, lubricating oil system, etc.)

5. General Valve Data

a. Valve

Name LPCS-V-5

Mfg. Velan Engineering

Model P2-3311-V-15

S/N None

Type Gate

Size 12 inch

Weight 3775#

Mounting Method In-line pipe mounted

Required Torque

Parameter	Design	Operating
Press psig	1250	1015
Temp ^{o}F	575	548
Flow gpm	7800	6350

Max Δ P across valve 750 psid

Closing time @ max Δ P 27 sec

Opening time @ max Δ P 37 sec

Power requirements for functional accessories, (if any)

b. Actuator (if not an integral unit)

Name LPCS-MO-5

Mfg. Limitorque

Model SMB3-100/254UR3

S/N 204320

Type SMB

Size 3 inch

Weight 1020#

Mounting Method Bolts to valve bonnet

Torque 100 ft/lb start; 20 ft/lb run

Power requirements: (include normal, maximum and minimum)

Electrical Motor, reliance; 12.8 HP 230/460 VAC; 36.1/18.1 amps; service factor = 1.0; 15 minute duty cycle 3385 rpm

Other: [ ] Pneumatic [ ] Hydraulic

List control signal inputs:

List functional accessories:* ____________________

____

III. FUNCTION

1. Briefly describe components normal and safety functions: The normal function is to isolate the low pressure core spray system from the RPV. The safety function is to allow the LPCS injection flow into the RPV during postulated events and to provide containment isolation.

2. The components normal state is: [ ] Operating [X] Standby

3. Safety function:

a. [ ] Emergency reactor shutdown
b. [ ] Containment heat removal
c. [X] Containment isolation
d. [ ] Reactor heat removal
e. [X] Reactor core cooling
f. [ ] Prevent significant release of radioactive material to environment

g. [X] Does the component function to mitigate the consequences of one or more of the following events? [X] Yes [ ] No
If "Yes", identify.

[X] LOCA [ ] HELB [X] MSLB

[ ] Other ____________________

4. Safety requirements:

[X] Intermittent Operation [X] During postulated event

[ ] Continuous Operation [X] Following postualted event

If component operation is required following an event, give approximate length of time component must remain operational.

4320 hours for valve to maintain integrity; motor operator to operate for 24 hours. (e.g., hours, days, etc.)

*Functional accessories are those sub-components not supplied by the manufacturer that are required to make the valve assembly operational, (e.g., limit switches).

5. For VALVES:

does the component [ ] Fail open [ ] Fail closed [X] Fail as is

Is this the fail-safe position [ ] Yes [X] No

Is the valve used for throttling purposes? [ ] Yes [X] No

Is the valve part of the reactor coolant pressure boundary? [X] Yes [ ] No

Does the valve have a specific limit for leakage? [X] Yes [ ] No

If "Yes" give limit: Operational limit = 600 scc/min

IV. QUALIFICATION

1. Reference by specific number those applicable sections of the design codes and standards applicable to the component:

   ASME Section III -NB

   Burns and Roe Spec 2808-41A

2. Reference those qualification standards, used as a guide to qualify the component:

   For Valve: IEEE 344-1971 (Reevaluated to IEEE 344-1975)

   For Actuator: (NUREG-0588 Cat. II)

3. Identify those parts of the above qualification standards deleted or modified in the qualification program.

Deleted:	Modified:
None for valve or operator.	None for valve or operator.

4. Have acceptance criterias been established and documented in the test plan(s) for the component? [X] Yes [ ] No

5. What is the expected failure mode that would keep the pump or valve assembly from performing its safety function?

   STEM BINDING

6. Are the margins* identified in the qualification documentation? [X] Yes [ ] No

*Margin is the difference between design basis parameters and the test parameters used for equipment qualification.

If component is a PUMP, complete IV.7.

If component is a VALVE, complete IV.8.

7. Pump operability has been demonstrated by: [ ] Analysis
[ ] Test [ ] Combination

Identify PUMP tests performed:

a. [ ] Shell hydrostatic (ASME Section III)

b. [ ] Bearing temperature evaluations

c. [ ] Seismic loading

d. [ ] Vibration levels

e. [ ] Exploratory vibration

(Fundamental Freq.______)

f. [ ] Seal leakage & hydro press

g. [ ] Aging: [ ] Thermal
[ ] Mechanical

h. [ ] Flow performance
Are curves provided [ ] Yes
[ ] No

i. [ ] Pipe reaction end loads (nozzle loads)

j. [ ] Others ____________________
____
____
____
____
____

k. [ ] Extreme environment:

[ ] Humidity

[ ] Chemical

[ ] Radiation

8. Valve operability has been demonstrated by: [ ] Analysis
[ ] Test [X] Combination

Identify VALVE tests performed:

a. [X] Shell hydrostatic (ASME Section III)
Valve only

b. [ ] Cold cyclic List times:
Open ________
Closed ________

c. [X] Seismic loading
Analysis only

d. [ ] Hot cyclic List times:
Open ________
Closed ________

e. [X] Exploratory vibration
Analysis only
(Fundamental Freq. 43 Hz)
for assembly

f. [ ] Main seat leakage

g. [X] Aging: OPERATOR ONLY [X] Thermal [X] Mechanical

h. [ ] Back seat leakage

i. [ ] Pipe reaction end loading

j. [ ] Disc hydrostatic

k. [X] Extreme environment: OPERATOR ONLY

[X] Humidity

[ ] Chemical

[X] Radiation

l. [ ] Flow interruption capability

m. [ ] Flow characteristics

Are curves provided?

[ ] Yes [ ] No

n. [X] Others Fatigue analysis

Hydrodynamic Loads

9. As a result of any of the tests (or analysis), were any deviations from design requirements identified? [ ] Yes [X] No If "Yes", briefly describe any changes made in tests (or analysis) or to the component to correct the deviation.

10. Was the test component precisely identical (as to model, size, etc.) to the in-plant component? [ ] Yes [X] No If "No", is installed component [X] oversized or [ ] undersized?
Operator only, not applicable to valve: environment test performed on smaller operator; seismic test performed on larger operator.

11. If type test was used to qualify the component, does the type test meet the requirements of IEEE 323-1974, Section 5.? [X] Yes [ ] No
Testing & Analysis results satisfy NUREG 0588 CAT.II FOR THE OPERATOR

12. Is component orientation sensitive? [X] Yes [ ] No [ ] Unknown
If "Yes", does installed orientation coincide with test orientation?
[ ] Yes [X] No For operator worst case orientation was tested.

13. Is the component mounted in the same manner in-plant as it was during testing (i.e., welded, same number and size bolts, etc.)?
[X] Yes [ ] No [ ] Unknown For valve, analytical model based on worst case orientation.

14. Were the qualification tests performed in sequence and on only one component? [X] Yes [ ] No Not applicable to valve.

If "Yes" identify sequence, (e.g., radiation, seismic, cyclic, thermal, etc.

THERMAL AGING; VIBRATION AGING; RADIATION; SEISMIC; POST ACCIDENT CONDITIONS

15. If "aging"* was performed, identify the significant aging mechanisms: Thermal and radiation aging for limit switch and motor

fatigue analysis for valve.

16. Identify loads imposed (assumed) on the component for the qualification tests (analysis) performed:

a. [X] Plants (shutdown loads) b. [ ] Extreme environment

c. [X] Seismic load d. [X] Others Hydrodynamic Loads

17. Have component design specifications been reviewed in-house to assure they envelope all expected operating, transient, and accident conditions? [X] Yes [ ] No

18. Does the component utilize any unique or special materials? (Examples are special gaskets or packing, limitations on nonferrous materials, or special coatings or surfaces.) [ ] Yes [X] No

If "Yes", identify:

19. Does component require any special maintenance procedures or practices, (including shorter periods between maintenance)? [X] Yes [ ] No

If "Yes", identify: ASME Section XI tests performed quarterly to check stroke time; leak rate test required biennially.

20. Is the qualified life for the component less than 40 years? [ ] Yes [X] No If "Yes", what is the qualified life?

See attachment.

*As outlined in Section 4.4.1 of IEEE-627 1980.

21. Information Concerning Qualification Documents for the Component

Report Number	Report Title	Date	Company/Organization Preparing Report	Company/Organization Reviewing Report
QID 361715	Supply System EQ File for Valve			
QID 221001	Supply System EQ File for Operator			
82044/29.01F	Seismic & Hydrodynamic Requalification Analysis of 12", 900# MO Gate Valves for the LPCS System	10/13/82	Cygna Energy Services	Supply System
SR-6210	Seismic Analysis, 12" Forged Bolted Bonnet Gate Valve, ASME Class 900 lb. Carbon Steel Nuclear Class 1	5/28/75	Velan Engineering	Cygna Energy Services
To be Procured	Limitorque Dynamic Qualification Report			
80058	Limitorque Valve Actuator Qualification for Nuclear Power Station Services	1/11/80	Limitorque Corporation	Supply System/Cygna Energy Services
600376A	Nuclear Power Station Qualification Type Test Report - Limitorque Valve Actuators for BWR Service	5/13/76	Limitorque Corporation	Supply System/Cygna Energy Services

Attachment to Item 20.

The prediction of a "qualified life" through accelerated aging is generally not feasible at the present state of the art. An aging analysis has been performed for electrical equipment located in potentially harsh environmental areas. The results of these studies are contained in a report to the NRC titled, "WNP-2 Environmental Equipment Qualification Report for Safety-Related Equipment, September 1982". Attached are the summary sheets for the electrical components associated with the selected equipment located in potential harsh environments.

Results of the aging analysis will be used to define recommended maintenance/replacement interval for inclusion in the WNP-2 maintenance and surveillance procedures.

WPPSS QID #221001

WASHINGTON PUBLIC POWER SUPPLY SYSTEM

EQUIPMENT QUALIFICATION REPORT

OWNER: WPPSS
FACILITY: WNP-2
SPEC: 2808-41A

MPL:
PPD:

REVISION: 2
DATE: September, 1982

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENT REF.		QUALIFICATION METHOD	OUTSTANDING ITEMS
	PARAMETER	FSAR	QUALIFICATION	FSAR	QUAL.		
SYSTEM Low Pressure Core Spray TAG NUMBER LPCS-MO-5	OPERATING TIME	24 hours	30 days	4	3	Simultaneous Test	None
	TEMPERATURE (F)	90 max. normal 104 max. abnormal Accident Profile 4,11,23,24	See enclosed profile	1	3	Simultaneous Test	None
MANUFACTURER Limitorque	PRESSURE (PSIA)	Normal 14.7 Accident Profile 11,23,24	See enclosed profile	1	3	Simultaneous Test	None
MODEL NUMBER SMB-3-100/254UR3 COMPONENT Motor Operator - Reliance, RH insulation	RELATIVE HUMIDITY (%)	40 max. normal 90 max. abnormal 100 accident	100	1	3	Simultaneous Test	
FUNCTION/SERVICE Operates LPCS injection valve (isolation valve)	CHEMICAL SPRAY	N/A	N/R	N/A	N/A	N/A	None
	RADIATION (RAD)	6.4×10^5	2.04×10^8	5	3	Sequential Test	None
	AGING	40 years	40 years	1	2, 3 5	Sequential Test Engineering Analysis	None
LOCATION: BLDG R ELEVATION 525 COLUMN 1.8/4.3	ACCURACY	N/A	N/A	N/A	N/A	N/A	None

FLOOD LEVEL ELEV:
ABOVE FLOOD LEVEL?
YES X NO

Prepared by: Raymond [signature] 8/13/82

Reviewed by: [signature] 8/28/82

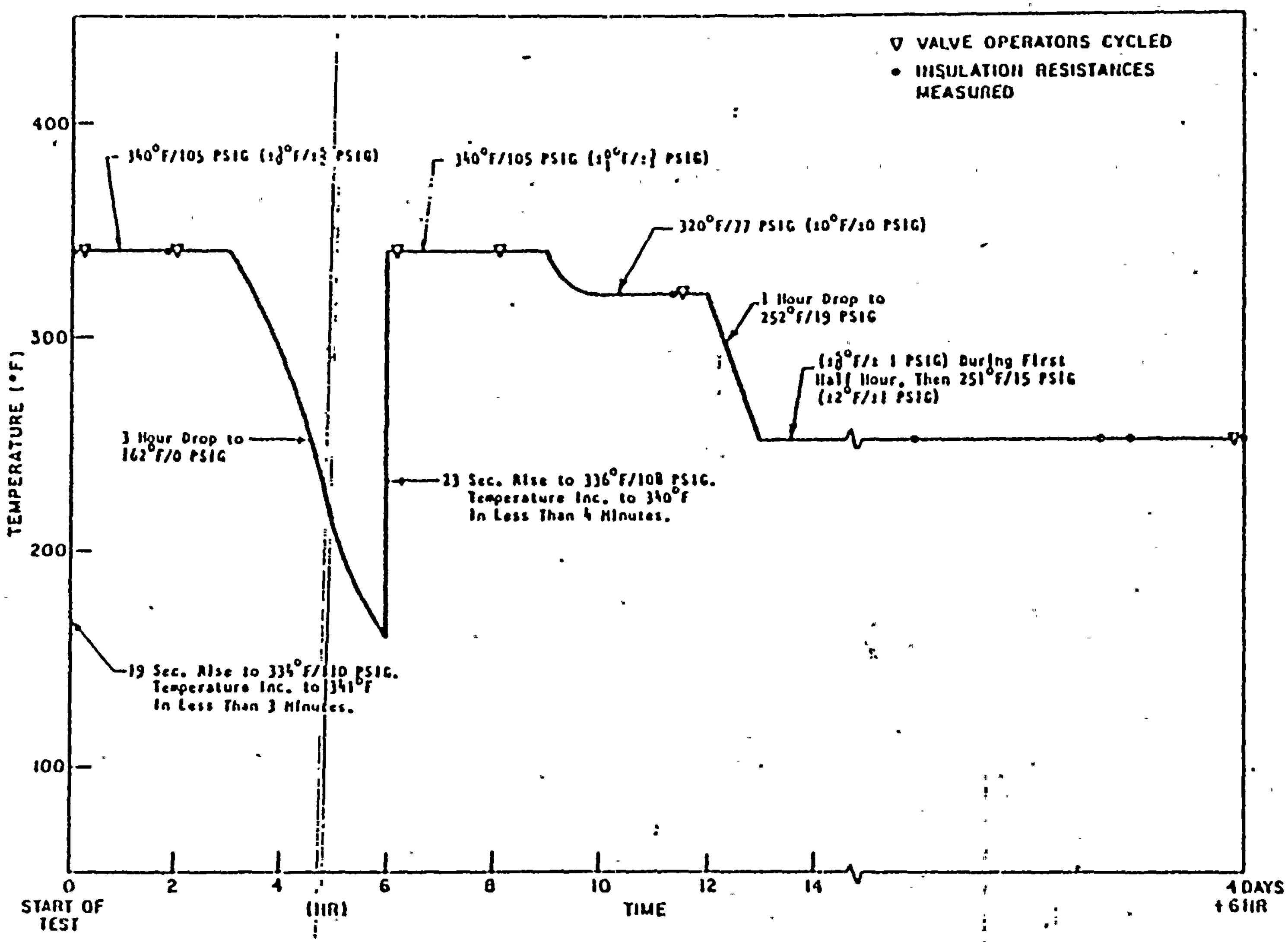
DOCUMENTATION REFERENCES

1. FSAR Par. 3.11
2. Limitorque Report B0058
3. Limitorque Report B600376A
4. WNP-2 Class 1E Equipment List, September, 1982
5. QID #221001

NOTES

Qualified.

WA-1001



F-C3441

Figure 3. Actual Steam Exposure Profile

VALVE MS-RV-1A
P&ID M529 Zone F-10

PUMP AND VALVE
OPERABILITY ASSURANCE REVIEW

I. PLANT INFORMATION

1. Name: WNP-2 Unit No.: ___ 2. Docket No.: 50-397
3. Utility: Washington Public Power Supply System
4. NSSS: General Electric [ ] PWR [X] BWR
5. A/E: Burns and Roe

II. GENERAL COMPONENT* INFORMATION

1. Supplier: [X] NSSS [ ] BOP
2. Location: a. Building/Room Reactor Building (Azimuth 24^{o}; R=18)
   b. Elevation 547
   c. System Main Steam
3. Component number on in-house drawings: MS-RV-1A
4. If component is a [ ] Pump complete II.5.
   If component is a [X] Valve complete II.6.
5. General Pump Data

a. Pump		b. Prime-mover	
Name		Name	
Mfg.		Mfg.	
Model		Model	
S/N		S/N	
Type		Type	

---

*The component, whether pump or valve, is considered to be an assembly composed of the body, internals, prime-mover (or actuator) and functional accessories.

a. Pump (continued)			b. Prime-mover (continued)
Size ______			Size ______
Weight ______			Weight ______
Mounting Method ______			Mounting Method ______
Required B.H.P. ______			H.P. ______
Parameter	Design	Operating	Power requirements: (include normal, maximum and minimum)
Press	______	______	Electrical ______
Temp	______	______	______
Flow	______	______	______
Head	______	______	______
			______
Required NPSH at maximum flow ______			If MOTOR list:
			Duty cycle ______
Available NPSH ______			Stall current ______
Operating Speed ______			Class of insulation ______
Critical Speed ______			______

List functional accessories:* ______

______

______

List control signal inputs: ______

______

______

*Functional accessories are those sub-components not supplied by the manufacturer that are required to make the pump assembly operational, (e.g., coupling, lubricating oil system, etc.)

6. General Valve Data

a. Valve		b. Actuator (if not an integral unit)	
Name	MS-RV-1A	Name	AO-F013-J
Mfg.	Crosby	Mfg.	Crosby
Model	HB65-BP	Model	Included with Valve
S/N	N63790-00-0047	S/N	Included with Valve
Type	Safety Relief	Type	Direct acting/spring loaded
Size	6 x R x 10	Size	
Weight	2800# incl. actuator	Weight	
Mounting Method	Flanged to Downcomer	Mounting Method	Bolted to valve
Required Torque	NOT APPLICABLE	Torque	NOT APPLICABLE

Parameter	Design	Operating
Press	1250	955
Temp ^{o}F	575	540

Flow lb/hr 883,950 @ 1175 psig including 3% accum.

Max Δ P across valve 1175 psig

Closing time @ max Δ P not applicable

Opening time @ max Δ P 0.2 sec.* 0.3 sec.**

Power requirements for functional accessories, (if any) ______

Power requirements: (include normal, maximum and minimum)

Electrical ______

Other: [ ] Pneumatic [ ] Hydraulic

List control signal inputs. ______

* Opening via air operator.

** Opening via spring.

List functional accessories:* ______________________

____

III. FUNCTION

1. Briefly describe components normal and safety functions: ______

THE NORMAL FUNCTION IS TO PREVENT OVERPRESSURIZATION OF THE RPV AND MAIN STEAM SYSTEM. THE SAFETY FUNCTION TAKEN IN THE INDUSTRIAL SAFETY SENSE IS IDENTICAL SINCE THIS PARTICULAR UNIT IS NOT PART OF THE AUTOMATIC DEPRESSURIZATION SYSTEM

2. The components normal state is: [ ] Operating [X] Standby

3. Safety function:

a. [X] Emergency reactor shutdown
b. [ ] Containment heat removal
c. [ ] Containment isolation
d. [ ] Reactor heat removal
e. [X] Reactor core cooling
f. [ ] Prevent significant release of radioactive material to environment
g. [X] Does the component function to mitigate the consequences of one or more of the following events? [X] Yes [ ] No
If "Yes", identify.

[X] LOCA [ ] HELS [X] MSLB

[ ] Other ______________________

4. Safety requirements:

[X] Intermittent Operation [ ] During postulated event

[ ] Continuous Operation [ ] Following postualted event

If component operation is required following an event, give approximate length of time component must remain operational.

24 HOURS (e.g., hours, days, etc.)

______

*Functional accessories are those sub-components not supplied by the manufacturer that are required to make the valve assembly operational, (e.g., limit switches).

5. For VALVES:

does the component [ ] Fail open [X] Fail closed [ ] Fail as is

Is this the fail-safe position? [X] Yes [ ] No

Is the valve used for throttling purposes? [ ] Yes [X] No

Is the valve part of the reactor coolant pressure boundary? [X] Yes [ ] No

Does the valve have a specific limit for leakage? [ ] Yes [X] No

Excessive valve leakage is detected by high temp. indication downstream of valve, on control room annunicators.

IV. QUALIFICATION

1. Reference by specific number those applicable sections of the design codes and standards applicable to the component:

ASME Section III-NB ; GE SPEC 22A2887 AB REV 9

GE Purchase Order #205G5E96

2. Reference those qualification standards, used as a guide to qualify the component:

IEEE 344-1971 (Reevaluated to IEEE 344-1975)

3. Identify those parts of the above qualification standards deleted or modified in the qualification program.

Deleted:	Modified:
None	None

4. Have acceptance criterias been established and documented in the test plan(s) for the component? [X] Yes [ ] No

5. What is the expected failure mode that would keep the pump or valve assembly from performing its safety function? Operator shaft deflection greater than allowable.

6. Are the margins* identified in the qualification documentation? [X] Yes [ ] No

*Margin is the difference between design basis parameters and the test parameters used for equipment qualification.

If component is a PUMP, complete IV.7.

If component is a VALVE, complete IV.8.

7. Pump operability has been demonstrated by: [ ] Analysis
[ ] Test [ ] Combination

Identify PUMP tests performed:

a. [ ] Shell hydrostatic (ASME Section III)

b. [ ] Bearing temperature evaluations

c. [ ] Seismic loading

d. [ ] Vibration levels

e. [ ] Exploratory vibration (Fundamental Freq.______)

f. [ ] Seal leakage & hydro press

g. [ ] Aging: [ ] Thermal [ ] Mechanical

h. [ ] Flow performance
Are curves provided [ ] Yes [ ] No

i. [ ] Pipe reaction end loads (nozzle loads)

j. [ ] Others ________________

k. [ ] Extreme environment:
[ ] Humidity
[ ] Chemical
[ ] Radiation

8. Valve operability has been demonstrated by: [ ] Analysis
[ ] Test [X] Combination

Identify VALVE tests performed:

a. [X] Shell hydrostatic (ASME Section III)

b. [ ] Cold cyclic List times:
Open ________
Closed ________

c. [X] Seismic loading

d. [ ] Hot cyclic List times:
Open ________
Closed ________

e. [X] Exploratory vibration
(Fundamental Freq. 23 hz valve
15 hz operator)

f. [ ] Main seat leakage

g. [ ] Aging: [ ] Thermal
[ ] Mechanical

h. [ ] Back seat leakage

i. [X] Pipe reaction end loading

j. [ ] Disc hydrostatic

k. [ ] Extreme environment:

[ ] Humidity

[ ] Chemical

[ ] Radiation

l. [ ] Flow interruption capability

m. [ ] Flow characteristics

Are curves provided?

[ ] Yes [ ] No

n. [X] Others Stress analysis of Main Steam Piping

9. As a result of any of the tests (or analysis), were any deviations from design requirements identified? [ ] Yes [X] No If "Yes", briefly describe any changes made in tests (or analysis) or to the component to correct the deviation.

10. Was the test component precisely identical (as to model, size, etc.) to the in-plant component? [X] Yes [ ] No If "No", is installed component [ ] oversized or [ ] undersized?

11. If type test was used to qualify the component, does the type test meet the requirements of IEEE 323-1974, Section 5.? [ ] Yes [X] No

12. Is component orientation sensitive? [ ] Yes [X] No [ ] Unknown If "Yes", does installed orientation coincide with test orientation? [ ] Yes [ ] No See question 13 below.

13. Is the component mounted in the same manner in-plant as it was during testing (i.e., welded, same number and size bolts, etc.)?
[ ] Yes [ ] No [ ] Unknown

NOT PRESENTLY INSTALLED, BUT DESIGN INSTALLATION IS SAME AS ANALYZED

14. Were the qualification tests performed in sequence and on only one component? [X] Yes [ ] No

If "Yes" identify sequence, (e.g., radiation, seismic, cyclic, thermal, etc.): Design pressure and temperature: seismic and pipe nozzle loading applied coincidentally in checking operability.

15. If "aging"* was performed, identify the significant aging mechanisms: Not applicable

16. Identify loads imposed (assumed) on the component for the qualification tests (analysis) performed:

a. [X] Plants (shutdown loads) b. [ ] Extreme environment

c. [X] Seismic load d. [X] Others Hydrodynamic Loads

17. Have component design specifications been reviewed in-house to assure they envelope all expected operating, transient, and accident conditions? [X] Yes [ ] No

18. Does the component utilize any unique or special materials? (Examples are special gaskets or packing, limitations on nonferrous materials, or special coatings or surfaces.) [ ] Yes [X] No

If "Yes", identify:

19. Does component require any special maintenance procedures or practices, (including shorter periods between maintenance)? [X] Yes [ ] No

If "Yes", identify: ASME Section XI tests; check pressure setting per Section XI intervals, cover all 18 valves every 5 years.

20. Is the qualified life for the component less than 40 years? [ ] Yes [ ] No If "Yes", what is the qualified life?

NOT APPLICABLE, HAS NO ELECTRICAL ELEMENTS

*As outlined in Section 4.4.1 of IEEE-627 1980.

21. Information Concerning Qualification Documents for the Component

Report Number	Report Title	Date	Company/Organization Preparing Report	Company/Organization Reviewing Report
VPF 3379-260-1 (#43445-2)	Seismic Simulation Test Program on a 6R10HB-BP Valve	1/12/77	General Electric & Wyle Labs	SUPPLY SYSTEM
QID 361964	Supply System EQ File			
QID 315011	Supply System EQ File			
QID 297009	Supply System EQ File			

EQUIPMENT QUALIFICATION DOCUMENT LIST

COMPONENT: Relief Valve — QID NO. 29700

MANUFACTURER: Crosby Valve & Gauge — MANUFACTURER MODEL NO: 6 X R X 10 HB-BP

CONTRACT(S): 02

DOCUMENTATION:

1.0 SEISMIC

REF. NO.	COMPANY	REPORT TITLE	REPORT NO.	REPORT DATE	REV.	B&R TRANS. #	PUBLICATION NO.
1.1	G.E. & Wyle Labs	Seismic Simulation Test Program on a 6R10HB-BP Valve	43445-2	1/12/77	--	---	VPF 3379-260-1
1.2	G.E.	Hanford 2 Main Steam Piping Analysis Results	IN QID # 301960				
1.3							
1.4							
1.5							
1.6							

2.0 ENVIRONMENTAL

2.1

2.2

2.3

2.4

2.5

2.6

PUMP AND VALVE
OPERABILITY ASSURANCE REVIEW

VALVE RCIC-V-19
P & ID M519

PLANT INFORMATION

1. Name: WNP-2 Unit No.: ____ 2. Docket No.: 50-397

3. Utility: Washington Public Power Supply System

4. NSSS: General Electric [ ] PWR [X] BWR

5. A/E: Burns and Roe

II. GENERAL COMPONENT* INFORMATION

1. Supplier: [ ] NSSS [X] BOP

2. Location: a. Building/Room Reactor Building J4/7.7

b. Elevation 467

c. System Reactor Core Isolation Cooling

3. Component number on in-house drawings: RCIC-V-19

4. If component is a [ ] Pump complete II.5.

If component is a [ ] Valve complete II.6.

5. General Pump Data

a. Pump		b. Prime-mover	
Name		Name	
Mfg.		Mfg.	
Model		Model	
S/N		S/N	
Type		Type	

*The component, whether pump or valve, is considered to be an assembly composed of the body, internals, prime-mover (or actuator) and functional accessories.

NOTE: THIS VALVE IS NOT PRESENTLY INSTALLED
THE PREVIOUS DESIGN IS BEING DELETED
AND A NEW VALVE SPECIFIED

a. Pump (continued)			b. Prime-mover (continued)
Size ____			Size ____
Weitnt ____			Weight ____
Mounting Method ____			Mounting Method ____
Required B.H.P. ____			H.P. ____
Parameter	Design	Operating	Power requirements: (include normal, maximum and minimum)
Press	____	____	Electrical ____
Temp	____	____	____
Flow	____	____	____
Head	____	____	____
			____
Required NPSH at maximum flow ____			If MOTOR list: Duty cycle ____
Available NPSH ____			Stall current ____
Operating Speed ____			Class of insulation ____
Critical Speed ____			____

List functional accessories:* ____

____

____

List control signal inputs: ____

____

____

*Functional accessories are those sub-components not supplied by the manufacturer that are required to make the pump assembly operational, (e.g., coupling, lubricating oil system, etc.)

6. General Valve Data

a. Valve

Name RCIC-V-19

Mfg. See Attachment

Model

S/N

Type

Size

Weight

Mounting Method

Required Torque

Parameter	DESIGN	OPERATING
Press psig	1500	1165
Temp ^{o}F	170	140
Flow gpm	40	40

Max ΔP across valve 1350 psid

Closing time @ max ΔP 5 sec

Opening time @ max ΔP 5 sec

Power requirements for functional accessories, (if any)

b. Actuator (if not an integral unit)

Name

Mfg. See Attachment

Model

S/N

Type

Size

Weight

Mounting Method

Torque

Power requirements: (include normal, maximum and minimum)

Electrical

Other: [ ] Pneumatic [ ] Hydraulic

List control signal inputs: Remote manual switch, FIS-2, PS-20, and containment isolation signal

List functional accessories:* ______________________________

____

III. FUNCTION

1. Briefly describe components normal and safety functions: __________

The normal function is to provide RCIC pump minimum recirculation flow

The safety function is to provide containment isolation

____

____

2. The components normal state is: [ ] Operating [X] Standby

3. Safety function:

a. [ ] Emergency reactor shutdown
b. [ ] Containment heat removal
c. [X] Containment isolation
d. [ ] Reactor heat removal
e. [ ] Reactor core cooling
f. [ ] Prevent significant release of radioactive material to environment

g. [ ] Does the component function to mitigate the consequences of one or more of the following events? [X] Yes [ ] No
If "Yes", identify.

[ ] LOCA [X] HELB [X] MSLB

[ ] Other ______________________________

4. Safety requirements:

[X] Intermittent Operation [X] During postulated event

[ ] Continuous Operation [X] Following postualted event

If component operation is required following an event, give approximate length of time component must remain operational.

______________________ (e.g., hours, days, etc.)

---

*Functional accessories are those sub-components not supplied by the manufacturer that are required to make the valve assembly operational, (e.g., limit switches).

5. For VALVES:

does the component [ ] Fail open [ ] Fail closed [X] Fail as is

Is this the fail-safe position [X] Yes [ ] No

Is the valve used for throttling purposes? [ ] Yes [X] No

Is the valve part of the reactor coolant pressure boundary? [ ] Yes [X] No

Does the valve have a specific limit for leakage? [X] Yes [ ] No

If "Yes" give limit: Operational Limit = 100 SCC/MIN

IV. QUALIFICATION

1. Reference by specific number those applicable sections of the design codes and standards applicable to the component:

   ASME III-NC; Burns and Roe Specification 2808-215

2. Reference those qualification standards, used as a guide to qualify the component

3. Identify those parts of the above qualification standards deleted or modified in the qualification program.

   Deleted: SEE ATTACHMENT

   Modified:

4. Have acceptance criterias been established and documented in the test plan(s) for the component? [ ] Yes [ ] No

5. What is the expected failure mode that would keep the pump or valve assembly from performing its safety function?

   SEE ATTACHMENT

6. Are the margins* identified in the qualification documentation? [ ] Yes [ ] No SEE ATTACHMENT

---

*Margin is the difference between design basis parameters and the test parameters used for equipment qualification.

If component is a PUMP, complete IV.7.

If component is a VALVE, complete IV.8.

7. Pump operability has been demonstrated by: [ ] Analysis
[ ] Test [ ] Combination

Identify PUMP tests performed:

a. [ ] Shell hydrostatic (ASME Section III)

b. [ ] Bearing temperature evaluations

c. [ ] Seismic loading

d. [ ] Vibration levels

e. [ ] Exploratory vibration

(Fundamental Freq.______)

f. [ ] Seal leakage & hydro press

g. [ ] Aging: [ ] Thermal
[ ] Mechanical

h. [ ] Flow performance
Are curves provided [ ] Yes
[ ] No

i. [ ] Pipe reaction end loads (nozzle loads)

j. [ ] Others ____________________
____
____
____
____
____

k. [ ] Extreme environment:

[ ] Humidity

[ ] Chemical

[ ] Radiation

8. Valve operability has been demonstrated by: [ ] Analysis
[ ] Test [ ] Combination
(See Attachment)

Identify VALVE tests performed:

a. [ ] Shell hydrostatic (ASME Section III)

b. [ ] Cold cyclic List times:
Open ____________
Closed ____________

c. [ ] Seismic loading

d. [ ] Hot cyclic List times:
Open ____________
Closed ____________

e. [ ] Exploratory vibration

(Fundamental Freq.______)

f. [ ] Main seat leakage

g. [ ] Aging: [ ] Thermal
[ ] Mechanical

n. [ ] Back seat leakage

i. [ ] Pipe reaction end loading

j. [ ] Disc hydrostatic

k. [ ] Extreme environment:

[ ] Humidity

[ ] Chemical

[ ] Radiation

l. [ ] Flow interruption capability

m. [ ] Flow characteristics

Are curves provided?

[ ] Yes [ ] No

n. [ ] Others ______________________

____

____

9. As a result of any of the tests (or analysis), were any deviations from design requirements identified? [ ] Yes [ ] No If "Yes", briefly describe any changes made in tests (or analysis) or to the component to correct the deviation.

See Attachment

____

____

____

10. Was the test component precisely identical (as to model, size, etc.) to the in-plant component? [ ] Yes [ ] No If "No", is installed component [ ] oversized or [ ] undersized?

See Attachment

11. If type test was used to qualify the component, does the type test meet the requirements of IEEE 323-1974, Section 5.? [ ] Yes [ ] No

See Attachment

12. Is component orientation sensitive? [ ] Yes [ ] No [ ] Unknown
If "Yes", does installed orientation coincide with test orientation?
[ ] Yes [ ] No

See Attachment

13. Is the component mounted in the same manner in-plant as it was during testing (i.e., welded, same number and size bolts, etc.)?
[ ] Yes [ ] No [ ] Unknown

See Attachment

14. Were the qualification tests performed in sequence and on only one component? [ ] Yes [ ] No

If "Yes" identify sequence, (e.g., radiation, seismic, cyclic, thermal, etc.): ______

______

15. If "aging"* was performed, identify the significant aging mechanisms: ______

______

______

16. Identify loads imposed (assumed) on the component for the qualification tests (analysis) performed:

a. [ ] Plants (shutdown loads)
b. [ ] Extreme environment
c. [ ] Seismic load
d. [ ] Others ______

______

17. Have component design specifications been reviewed in-house to assure they envelope all expected operating, transient, and accident conditions? [ ] Yes [ ] No

18. Does the component utilize any unique or special materials? (Examples are special gaskets or packing, limitations on nonferrous materials, or special coatings or surfaces.) [ ] Yes [ ] No

If "Yes", identify: ______

______

19. Does component require any special maintenance procedures or practices, (including shorter periods between maintenance)? [X] Yes [ ] No

If "Yes", identify: ASME Section XI Tests: Check Stroke Time Quarterly; Perform leak rate test biennially

20. Is the qualified life for the component less than 40 years? [ ] Yes [ ] No If "Yes", what is the qualified life? ______

______

*As outlined in Section 4.4.1 of IEEE-627 1980.

21. Information Concerning Qualification Documents for the Component

Report Number	Report Title	Date	Company/Organization Preparing Report	Company/Organization Reviewing Report

PED in action to change out valve

ATTACHMENT

Subject: CHANGE OUT OF RCIC-V-19 PER PED 215-M-5097 AND PED 215-M-4632

RCIC-V-19 valve is being changed due to not meeting the Spec. Requirement that this valve be mandatory seismically tested. To meet this requirement, the vendor has chosen to supply and test a different valve model and operator.

Reference:
1) Letter, WNP2WBG-215-F-81-323
2) PED 215-M-4632
3) PED 215-M-5097
4) PED 215-M-8344
5) Spec. 2808-215

PUMP AND VALVE
OPERABILITY ASSURANCE REVIEW

VALVE CAC-FCV-6A
P & ID M554 ZONE G12

I. PLANT INFORMATION

1. Name: WNP-2 Unit No.: ____ 2. Docket No.: 50-397

3. Utility: Washington Public Power Supply System

4. NSSS: General Electric [ ] PWR [X] BWR

5. A/E: Burns and Roe

II. GENERAL COMPONENT* INFORMATION

1. Supplier: [ ] NSSS [X] BOP

2. Location: a. Building/Room Reactor Building M6/1614

   b. Elevation 572

   c. System Containment Atmosphere Control

3. Component number on in-house drawings: CAC-FCV-6A

4. If component is a [ ] Pump complete II.5.

   If component is a [X] Valve complete II.6.

5. General Pump Data

a. Pump		b. Prime-mover	
Name		Name	
Mfg.		Mfg.	
Model		Model	
S/N		S/N	
Type		Type	

---

*The component, whether pump or valve, is considered to be an assembly composed of the body, internals, prime-mover (or actuator) and functional accessories.

a. Pump (continued)

Size ______

Weitnt ______

Mounting Method ______

Required B.H.P. ______

Paremeter	Design	Operating
Press	___	___
Temp	___	___
Flow	___	___
Head	___	___

Required NPSH at maximum flow ______

Available NPSH ______

Operating Speed ______

Critical Speed ______

b. Prime-mover (continued)

Size ______

Weight ______

Mounting Method ______

H.P. ______

Power requirements: (incluoe normal, maximum and minimum)

Electrical ______

______

______

______

______

If MOTOR list:

Duty cycle ______

Stall current ______

Class of insulation ______

______

List functional accessories:* ______

______

______

List control signal inputs: ______

______

______

*Functional accessories are those sub-components not supplied by the manufacturer that are required to make the pump assembly operational, (e.g., coupling, lubricating oil system, etc.)

6. General Valve Data

a. Valve

Name CAC-FCV-6A

Mfg. CRANE CO.

Model 50

S/N 4743

Type GLOBE

Size 2 INCH

Weight COMBINED WEIGHT = 260.5#

Mounting Method Pipe Mounted

Required Torque ----

Parameter	Design	Operating
Press psig		
Temp °F	340	120
Flow SCFM		120.6 min. 160 Max

Max ΔP across valve 45 psi

Closing time @ max ΔP Not Applicable

Opening time @ max ΔP Not Applicable

Power requirements for functional accessories, (if any)

b. Actuator (if not an integral unit)

Name CAC-FHO-FCV/6A

Mfg. ITT GENERAL CONTROLS

Model NH91H4070 F 3616

S/N 76429 R432

Type ELECTRIC

Size H91

Weight ----

Mounting Method Vertical Stem Bolted To Valve & Supported Laterally

Torque -----

Power requirements: (include normal, maximum and minimum)

Electrical

30 460 VAC 0.35 Amp 60 Hz

4-20 MA Instrument Power

Other: [ ] Pneumatic [ ] Hydraulic

List control signal inputs: Flow Signals FROM FIC 67A

List functional accessories:* ______________________________

____

III. FUNCTION

1. Briefly describe components normal and safety functions: ______

This valve provides a 55% recycle flow of processed air to limit the hydrogen concentration in the air entering the recombiner bed to 2% by volume.

____

____

2. The components normal state is: [X] Operating [ ] Standby

3. Safety function:

a. [ ] Emergency reactor shutdown

b. [ ] Containment heat removal

c. [ ] Containment isolation

d. [ ] Reactor heat removal

e. [ ] Reactor core cooling

f. [X] Prevent significant release of radioactive material to environment

g. [X] Does the component function to mitigate the consequences of one or more of the following events? [X] Yes [ ] No
If "Yes", identify.

[X] LOCA [ ] HELB [ ] MSLB

[ ] Other ______________________________

4. Safety requirements:

[ ] Intermittent Operation [ ] During postulated event

[ ] Continuous Operation [X] Following postualted event

If component operation is required following an event, give approximate length of time component must remain operational.

4320 Hours (e.g., hours, days, etc.)

____

*Functional accessories are those sub-components not supplied by the manufacturer that are required to make the valve assembly operational, (e.g., limit switches).

5. For VALVES:

does the component [X] Fail open [ ] Fail closed [ ] Fail as is

Is this the fail-safe position [X] Yes [ ] No

Is the valve used for throttling purposes? [X] Yes [ ] No

Is the valve part of the reactor coolant pressure boundary? [ ] Yes [X] No

Does the valve have a specific limit for leakage? [ ] Yes [X] No

If "Yes" give limit: ______

IV. QUALIFICATION

1. Reference by specific number those applicable sections of the design codes and standards applicable to the component:

   ASME Section III - NC; Burns and Roe Specification 2808-71

2. Reference those qualification standards, used as a guide to qualify the component:

   IEEE-844-1971 (reevaluatied to IEEE-344-1975 NUREG-0588 CAT. II

3. Identify those parts of the above qualification standards deleted or modified in the qualification program.

Deleted:	Modified:
NONE	NONE

4. Have acceptance criterias been established and documented in the test plan(s) for the component? [X] Yes [ ] No For Skid

5. What is the expected failure mode that would keep the pump or valve assembly from performing its safety function?

   Stem Binding

6. Are the margins* identified in the qualification documentation? [X] Yes [ ] No

*Margin is the difference between design basis parameters and the test parameters used for equipment qualification.

If component is a PUMP, complete IV.7.

If component is a VALVE, complete IV.8.

7. Pump operability has been demonstrated by: [ ] Analysis
[ ] Test [ ] Combination

Identify PUMP tests performed:

a. [ ] Shell hydrostatic (ASME Section III)

b. [ ] Bearing temperature evaluations

c. [ ] Seismic loading

d. [ ] Vibration levels

e. [ ] Exploratory vibration

(Fundamental Freq.______)

f. [ ] Seal leakage & hydro press

g. [ ] Aging: [ ] Thermal
[ ] Mechanical

h. [ ] Flow performance
Are curves provided [ ] Yes
[ ] No

i. [ ] Pipe reaction end loads (nozzle loads)

j. [ ] Others ______________________

k. [ ] Extreme environment:

[ ] Humidity

[ ] Chemical

[ ] Radiation

8. Valve operability has been demonstrated by: [ ] Analysis
[X] Test [ ] Combination
Both Valve & Operator by shaker table test

Identify VALVE tests performed:

a. [X] Shell hydrostatic (ASME Section III)

b. [ ] Cold cyclic List times:
Open ______
Closed ______

c. [X] Seismic loading
Skid

d. [ ] Hot cyclic List times:
Open ______
Closed ______

e. [ ] Exploratory vibration

(Fundamental Freq.______)

f. [ ] Main seat leakage

g. [ ] Aging: [X] Thermal
operator [ ] Mechanical

h. [ ] Back seat leakage

i. [X] Pipe reaction end loading

j. [ ] Disc hydrostatic

k. [ ] Extreme environment:

[ ] Humidity

[ ] Chemical

[ ] Radiation

l. [ ] Flow interruption capability

m. [ ] Flow characteristics

Are curves provided?

[ ] Yes [ ] No

n. [X] Others ________

Hydrodynamic Loads

9. As a result of any of the tests (or analysis), were any deviations from design requirements identified? [ ] Yes [X] No If "Yes", briefly describe any changes made in tests (or analysis) or to the component to correct the deviation.

10. Was the test component precisely identical (as to model, size, etc.) to the in-plant component? [X] Yes [ ] No If "No", is installed component [ ] oversized or [ ] undersized?

11. If type test was used to qualify the component, does the type test meet the requirements of IEEE 323-1974, Section 5.? [ ] Yes [X] No

12. Is component orientation sensitive? [X] Yes [ ] No [ ] Unknown
If "Yes", does installed orientation coincide with test orientation?
[X] Yes [ ] No

13. Is the component mounted in the same manner in-plant as it was during testing (i.e., welded, same number and size bolts, etc.)?
[X] Yes [ ] No [ ] Unknown

14. Were the qualification tests performed in sequence and on only one component? [ ] Yes [X] No

If "Yes" identify sequence, (e.g.; radiation, seismic, cyclic, thermal, etc.): ______

15. If "aging"* was performed, identify the significant aging mechanisms:

Thermal and Radiation

16. Identify loads imposed (assumed) on the component for the qualification tests (analysis) performed:

a. [X] Plants (shutdown loads) b. [X] Extreme environment

c. [X] Seismic load d. [X] Others Hydrodynamic Loads

17. Have component design specifications been reviewed in-house to assure they envelope all expected operating, transient, and accident conditions? [X] Yes [ ] No

18. Does the component utilize any unique or special materials? (Examples are special gaskets or packing, limitations on nonferrous materials, or special coatings or surfaces.) [ ] Yes [X] No

If "Yes", identify: ______

19. Does component require any special maintenance procedures or practices, (including shorter periods between maintenance)? [X] Yes [ ] No

If "Yes", identify: ASME Section XI test performed quarterly to check stroke time

20. Is the qualified life for the component less than 40 years? [X] Yes [ ] No If "Yes", what is the qualified life? ______
See attachment

*As outlined in Section 4.4.1 of IEEE-627 1980.

21. Information Concerning Qualification Documents for the Component

Report Number	Report Title	Date	Company/Organization Preparing Report	Company/Organization Reviewing Report
Transmittal #89	Dynamic testing Report for hydrogen recombiner system	2/19/80	Air Products & Chemicals	Supply System
QID's 13305 and 110001	Supply System EQ File			

Attachment to Item 20.

The prediction of a "qualified life" through accelerated aging is generally not feasible at the present state of the art. An aging analysis has been performed for electrical equipment located in potentially harsh environmental areas. The results of these studies are contained in a report to the NRC titled, "WNP-2 Environmental Equipment Qualification Report for Safety-Related Equipment, September 1982". Attached are the summary sheets for the electrical components associated with the selected equipment located in potential harsh environments.

Results of the aging analysis will be used to define recommended maintenance/replacement interval for inclusion in the WNP-2 maintenance and surveillance procedures.

WPPSS QID #110001, 2, 4

WASHINGTON PUBLIC POWER SUPPLY SYSTEM

EQUIPMENT QUALIFICATION REPORT

OWNER: WPPSS
FACILITY: WNP-2
SPEC: 2808-71, 42A

MPL:
PPD:

Page No. 5
REVISION: 2
DATE: September 1982

EQUIPMENT DESCRIPTION	ENVIRONMENT PARAMETER	FSAR	QUALIFICATION	DOCUMENT REF. FSAR	DOCUMENT REF. QUAL.	QUALIFICATION METHOD	OUTSTANDING ITEMS
SYSTEM: Containment Atmosphere Control; TAG NUMBER: CAC-EHO-Note 2	OPERATING TIME	6 months	Equivalent to > 6 months	5	3	Simultaneous Test	Note 1
	TEMPERATURE (F)	90 max. normal 104 max. abnormal Accident profile 4	150	1	3	Simultaneous Test	Note 1
MANUFACTURER: ITT-General Controls	PRESSURE (PSIA)	14.7	N/R	1	N/A	N/A	None
MODEL NUMBER: NH91 & NH95; COMPONENT: Electro-Hydraulic Operator	RELATIVE HUMITY (%)	40 normal 90 max. abnormal Accident profile 4	100	1	3	Simultaneous Test	Note 1
FUNCTION/SERVICE: Operate FCV (3 phase)	CHEMICAL SPRAY	N/A	N/A	1	N/A	N/A	None.
	RADIATION (RAD)	1.0×10^6	3.9×10^7	2	3	Sequential Test	Note 1
	AGING	40 years	10.6 years	1	3, 4	Sequential Test Engineering Analysis	Note 1
LOCATION: BLDG R; ELEVATION (See Note 2); COLUMN (See Note 2)	ACCURACY	N/A	N/A	N/A	N/A	N/A	None

FLOOD LEVEL ELEV:
ABOVE FLOOD LEVEL? YES NO

Prepared By: Aron Siler 9/1/82   Reviewed By: Raymond Che 9/1/82

CAC FCV

DOCUMENTATION REFERENCES

1. FSAR Par. 311
2. EDS Study 0740-004-572F
3. NCC Powers #377-80.010 with Appendices A-D.
4. Calculation QID 110001
5. WNP-2 Class 1E Equipment List, dated 9/82.

NOTES

1. The vendor is currently retesting these components. The test results will be evaluated when the testing is completed to resolve discrepancies in the original test program.

WN-1081

WPPSS QID #110001, 2, 4

WASHINGTON PUBLIC POWER SUPPLY SYSTEM

EQUIPMENT QUALIFICATION REPORT

OWNER: WPPSS
FACILITY: WNP 2
SPEC: 2808-71, 42

MPL:
PPD:

PAGE NO: 6
REVISION: 2
DATE: September 1982

DOCUMENTATION REFERENCES (Cont'd)	NOTES (Cont'd)

2.

EPN	Elevation	Column
CAC-EHO-FCV/1A	575	H.2/5.6
EHO-FCV/1B	570	J.6/6.7
EHO-FCV/2A	558	H.2/7.1
EHO-FCV/2B	563	H.5/6.5
EHO-FCV/3A	493	H.8/4.4
EHO-FCV/3B	494	J.0/7.4
EHO-FCV/4A	495	H.2/7.8
EHO-FCV/4B	493	H.0/6.0
EHO-FCV/5A	572	H.6/6.5
EHO-FCV/5B	573	H.5/7.5
EHO-FCV/6A	572	H.6/6.5
EHO-FCV/6B	573	H.5/7.5
EHO-TCV/4A	573	H.5/6.6
EHO-TCV/4B	573	H.5/7.4
EHO-TVV/1A	573	H.5/6.6
EHO-TVV/1B	573	H.5/7.4
EHO-TVV/2A	573	H.5/6.6
EHO-TVV/2B	573	H.5/7.4
EHO-TVV/3A	573	H.5/6.6
EHO-TVV/3B	573	H.5/7.4

Valve SGT-V-4A1 ✓
P&ID M544 Zone J5

PUMP AND VALVE OPERABILITY ASSURANCE REVIEW

I. PLANT INFORMATION

1. Name: WNP-2 Unit No.: ___ 2. Docket No.: 50-397
3. Utility: Washington Public Power Supply System
4. NSSS: General Electric [ ] PWR [X] BWR
5. A/E: Burns and Roe

II. GENERAL COMPONENT* INFORMATION

1. Supplier: [ ] NSSS [X] BOP
2. Location: a. Building/Room Reactor Building H8/7.1 Room R608
   b. Elevation 587
   c. System Standby Gas Treatment
3. Component number on in-house drawings: SGT-V-4A1
4. If component is a [ ] Pump complete II.5.
   If component is a [X] Valve complete II.6.
5. General Pump Data

a. Pump		b. Prime-mover	
Name		Name	
Mfg.		Mfg.	
Model		Model	
S/N		S/N	
Type		Type	

---

*The component, whether pump or valve, is considered to be an assembly composed of the body, internals, prime-mover (or actuator) and functional accessories.

a. Pump (continued)			b. Prime-mover (continued)
Size ______			Size ______
Weight ______			Weight ______
Mounting Method ______			Mounting Method ______
Required B.H.P. ______			H.P. ______
Parameter	Design	Operating	Power requirements: (include normal, maximum and minimum)
Press	______	______	Electrical ______
Temp	______	______	______
Flow	______	______	______
Head	______	______	______
			______
Required NPSH at maximum flow ______			If MOTOR list: Duty cycle ______
Available NPSH ______			Stall current ______
Operating Speed ______			Class of insulation ______
Critical Speed ______			______

List functional accessories:* ______

______

______

List control signal inputs: ______

______

______

*Functional accessories are those sub-components not supplied by the manufacturer that are required to make the pump assembly operational, (e.g., coupling, lubricating oil system, etc.)

5. General Valve Data

a. Valve		b. Actuator (if not an integral unit)	
Name	SGT-V-4A1	Name	SGT-MO-4A1
Mfg.	BIF	Mfg.	Limitorque
Model	A206761	Model	SMB-00-10/P56
S/N	N-27232-7	S/N	208100
Type	Butterfly	Type	Electric, SMB
Size	18 inch	Size	00
Weight	445 lbs.	Weight	305 lbs
Mounting Method	Flange mounted	Mounting Method	Bolted to valve yoke
Required Torque	Start 10ft-lb; Run 2ft-lb	Torque	10 ft-lb

Parameter	Design	Operating
Press	150 psi	15 psia
Temp	212^{O}F	70-120^{O}F
Flow		4000 scfm

Max Δ P across valve ______

Closing time @ max Δ P not applicable

Opening time @ max Δ P not applicable

Power requirements for functional accessories, (if any) ______

Power requirements: (include normal, maximum and minimum)

Electrical Motor: Reliance, 1.3 HP
1 Ø; 230VAC; 0.38 amp; 60 Hz 3600 rpm

Other: [ ] Pneumatic [ ] Hydraulic

List control signal inputs: ______

List functional accessories:* Limit switches are provided by manufacturer; electric motor by Reliance Co.

III. FUNCTION

1. Briefly describe components normal and safety functions: This valve is normally closed. It is interlocked with valve SGT-V-5A1 to recycle the output of Standby Gas Treatment System SGT-FU-1A into the building if the charcoal beds release excessive iodine, or if the drywell pressure is high, or if the reactor water level is low.

2. The components normal state is: [ ] Operating [X] Standby

3. Safety function:

a. [ ] Emergency reactor shutdown
b. [ ] Containment heat removal
c. [ ] Containment isolation
d. [ ] Reactor heat removal
e. [ ] Reactor core cooling
f. [X] Prevent significant release of radioactive material to environment
g. [X] Does the component function to mitigate the consequences of one or more of the following events? [ ] Yes [ ] No If "Yes", identify.

[X] LOCA [ ] HELB [ ] MSLB

[ ] Other ______

4. Safety requirements:

[ ] Intermittent Operation [ ] During postulated event

[ ] Continuous Operation [X] Following postualted event

If component operation is required following an event, give approximate length of time component must remain operational.

4320 hours (e.g., hours, days, etc.)

*Functional accessories are those sub-components not supplied by the manufacturer that are required to make the valve assembly operational, (e.g., limit switches).

5. For VALVES:

does the component [ ] Fail open [ ] Fail closed [X] Fail as is

Is this the fail-safe position [X] Yes [ ] No

Is the valve used for throttling purposes? [ ] Yes [X] No

Is the valve part of the reactor coolant pressure boundary? [ ] Yes [X] No

Does the valve have a specific limit for leakage? [X] Yes [ ] No

If "Yes" give limit: Bubble tight at 2 psig differential pressure

IV. QUALIFICATION

1. Reference by specific number those applicable sections of the design codes and standards applicable to the component:

Valve ASME Section III-NC (1971); Burns & Roe Spec 2808-68

2. Reference those qualification standards, used as a guide to qualify the component:

IEEE 344-1971 (Reevaluation to IEEE 344-1975) NUREG 0588 Cat. II

3. Identify those parts of the above qualification standards deleted or modified in the qualification program.

Deleted:	Modified:
None	None

4. Have acceptance criterias been established and documented in the test plan(s) for the component? [X] Yes [ ] No

Qualification accomplished by analysis, not testing (FOR VALVE)

5. What is the expected failure mode that would keep the pump or valve assembly from performing its safety function?

Torque or limit switch failure; disc deflection greater than allowable.

6. Are the margins* identified in the qualification documentation? [X] Yes [ ] No

*Margin is the difference between design basis parameters and the test parameters used for equipment qualification.

If component is a PUMP, complete IV.7.

If component is a VALVE, complete IV.8.

7. Pump operability has been demonstrated by: [ ] Analysis [ ] Test [ ] Combination

Identify PUMP tests performed:

a. [ ] Shell hydrostatic (ASME Section III)

b. [ ] Bearing temperature evaluations

c. [ ] Seismic loading

d. [ ] Vibration levels

e. [ ] Exploratory vibration (Fundamental Freq.______)

f. [ ] Seal leakage & hydro press

g. [ ] Aging: [ ] Thermal [ ] Mechanical

h. [ ] Flow performance. Are curves provided [ ] Yes [ ] No

i. [ ] Pipe reaction end loads (nozzle loads)

j. [ ] Others ______

k. [ ] Extreme environment:

[ ] Humidity

[ ] Chemical

[ ] Radiation

8. Valve operability has been demonstrated by: [X] Analysis for valve [X] Test for Operator [ ] Combination

Identify VALVE tests performed:

a. [X] Shell hydrostatic (ASME Section III)

b. [ ] Cold cyclic List times: Open ______ Closed ______

c. [X] Seismic loading OPERATOR TESTED VALVE ANALYZED

d. [ ] Hot cyclic List times: Open ______ Closed ______

e. [X] Exploratory vibration Operator only (Fundamental Freq. >33 Hz)

f. [ ] Main seat leakage

g. [X] Aging: [X] Thermal
Operator [X] Mechanical
only

h. [ ] Back seat leakage

i. [ ] Pipe reaction end loading

j. [ ] Disc hydrostatic

k. [X] Extreme environment:
Operator only
[X] Humidity
[ ] Chemical
[X] Radiation

l. [ ] Flow interruption capability

m. [ ] Flow characteristics
Are curves provided?
[ ] Yes [X] No

n. [X] Others Static stress & frequency analysis of valve

9. As a result of any of the tests (or analysis), were any deviations from design requirements identified? [ ] Yes [X] No If "Yes", briefly describe any changes made in tests (or analysis) or to the component to correct the deviation.

10. Was the test component precisely identical (as to model, size, etc.) to the in-plant component? [X] Yes [ ] No If "No", is installed component [ ] oversized or [ ] undersized?
Motor Operator was tested; valve was qualified by analysis.

11. If type test was used to qualify the component, does the type test meet the requirements of IEEE 323-1974, Section 5.? [ ] Yes [X] No
TESTING & ANALYSIS RESULTS FOR OPERATOR SATISFY NUREG 0588 CAT II CRITERIA

12. Is component orientation sensitive? [ ] Yes [X] No [ ] Unknown
If "Yes", does installed orientation coincide with test orientation?
[ ] Yes [ ] No Installed orientation consistent with analysis.

13. Is the component mounted in the same manner in-plant as it was during testing (i.e., welded, same number and size bolts, etc.)?
[X] Yes [ ] No [ ] Unknown

Operator only

14. Were the qualification tests performed in sequence and on only one component? [X] Yes [ ] No

If "Yes" identify sequence, (e.g., radiation, seismic, cyclic, thermal, etc.): ____

Thermal aging Vibration aging Radiation Seismic Post Accident conditions

15. If "aging"* was performed, identify the significant aging mechanisms:

THERMAL & RADIATION AGING FOR LIMIT SWITCH AND MOTOR

16. Identify loads imposed (assumed) on the component for the qualification tests (analysis) performed:

a. [X] Plants (shutdown loads) For valve & operator

b. [X] Extreme environment Operator only

c. [X] Seismic load For valve & operator

d. [ ] Others ____

17. Have component design specifications been reviewed in-house to assure they envelope all expected operating, transient, and accident conditions? [X] Yes [ ] No

18. Does the component utilize any unique or special materials? (Examples are special gaskets or packing, limitations on nonferrous materials, or special coatings or surfaces.) [ ] Yes [X] No

If "Yes", identify: ____

19. Does component require any special maintenance procedures or practices, (including shorter periods between maintenance)? [X] Yes [ ] No

If "Yes", identify: Plant Maintenance Procedures

20. Is the qualified life for the component less than 40 years? [ ] Yes [X] No If "Yes", what is the qualified life? ____

See attachment

*As outlined in Section 4.4.1 of IEEE-627 1980.

21. Information Concerning Qualification Documents for the Component

Report Number	Report Title	Date	Company/Organization Preparing Report	Company/Organization Reviewing Report
QID's 221001 and 361003			Supply System EQ File	

Attachment to Item 20.

The prediction of a "qualified life" through accelerated aging is generally not feasible at the present state of the art. An aging analysis has been performed for electrical equipment located in potentially harsh environmental areas. The results of these studies are contained in a report to the NRC titled, "WNP-2 Environmental Equipment Qualification Report for Safety-Related Equipment, September 1982". Attached are the summary sheets for the electrical components associated with the selected equipment located in potential harsh environments.

Results of the aging analysis will be used to define recommended maintenance/replacement interval for inclusion in the WNP-2 maintenance and surveillance procedures.

WPPSS QID #221001

WASHINGTON PUBLIC POWER SUPPLY SYSTEM

EQUIPMENT QUALIFICATION REPORT

OWNER: WPPSS
FACILITY: WNP-2
SPEC: 2808-68

MPL:
PPD:

REVISION: 2
DATE: September, 1982

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENT REF.		QUALIFICATION METHOD	OUTSTANDING ITEMS
	PARAMETER	FSAR	QUALIFICATION	FSAR	QUAL.		
SYSTEM Standby Gas Treatment TAG NUMBER	OPERATING TIME	6 months	Equivalent to>6 months	1	3,5	Sequential Test Engineering Analysis	None
SGT-MO-See Note Below	TEMPERATURE (F)	90 normal 104 abnormal Accident Profile 4	See enclosed profile	2	3	Simultaneous Test	None
MANUFACTURER Limitorque	PRESSURE (PSIA)	14.7	See enclosed profile	2	3	Simultaneous Test	None
MODEL NUMBER SMB-00-10/P56 COMPONENT	RELATIVE HUMITY (%)	40 normal 90 abnormal Accident Profile 4	100	2	3	Simultaneous	None
Motor Operator FUNCTION/SERVICE	CHEMICAL SPRAY	N/A	N/A	2	N/A	N/A	None
Various Valve Operators Reliance, Class B Insulation	RADIATION (RAD)	1.1×10^6	2×10^7	6	3	Sequential Test	None
LOCATION: BLDG R ELEVATION 572	AGING	40 years	40 years	2	3,5	Sequential Test	None
COLUMN See Notes Below	ACCURACY	N/A	N/A	N/A	N/A	N/A	None

FLOOD LEVEL ELEV:
ABOVE FLOOD LEVEL?
YES X NO

Prepared by: Raymond Oi 8/27/82 Reviewed by: [signature] 8/28/82

DOCUMENTATION REFERENCES

1. WNP-2 Class 1E Equipment List dated September, 1982
2. FSAR Par. 3.11
3. Limitorque Test Report B003
4. Limitorque Test Report B0058
5. QID #221001
6. EDS Report 0740-004-572N

NOTES

Qualified

Tag Number	Location	Tag Number	Location	Tab Number	Location
SGT-MO-1A	N.8/5.2	SGT-MO-4A1	N.4/7.0	SGT-MO-5A1	N.4/7.0
-1B	J.4/5.2	-4A2	J.1/7.0	-5A2	N.9/7.0
-3A1	N.4/7.6	-4B1	N.8/7.0	-5B1	J.1/7.0
-3A2	N.6/7.6	-4B2	J.8/7.0	-5B2	J.6/7.0
-3B1	J.4/7.6				
-3B2	J.6/7.6				

WP-1001

TEMPERATURE PROFILE

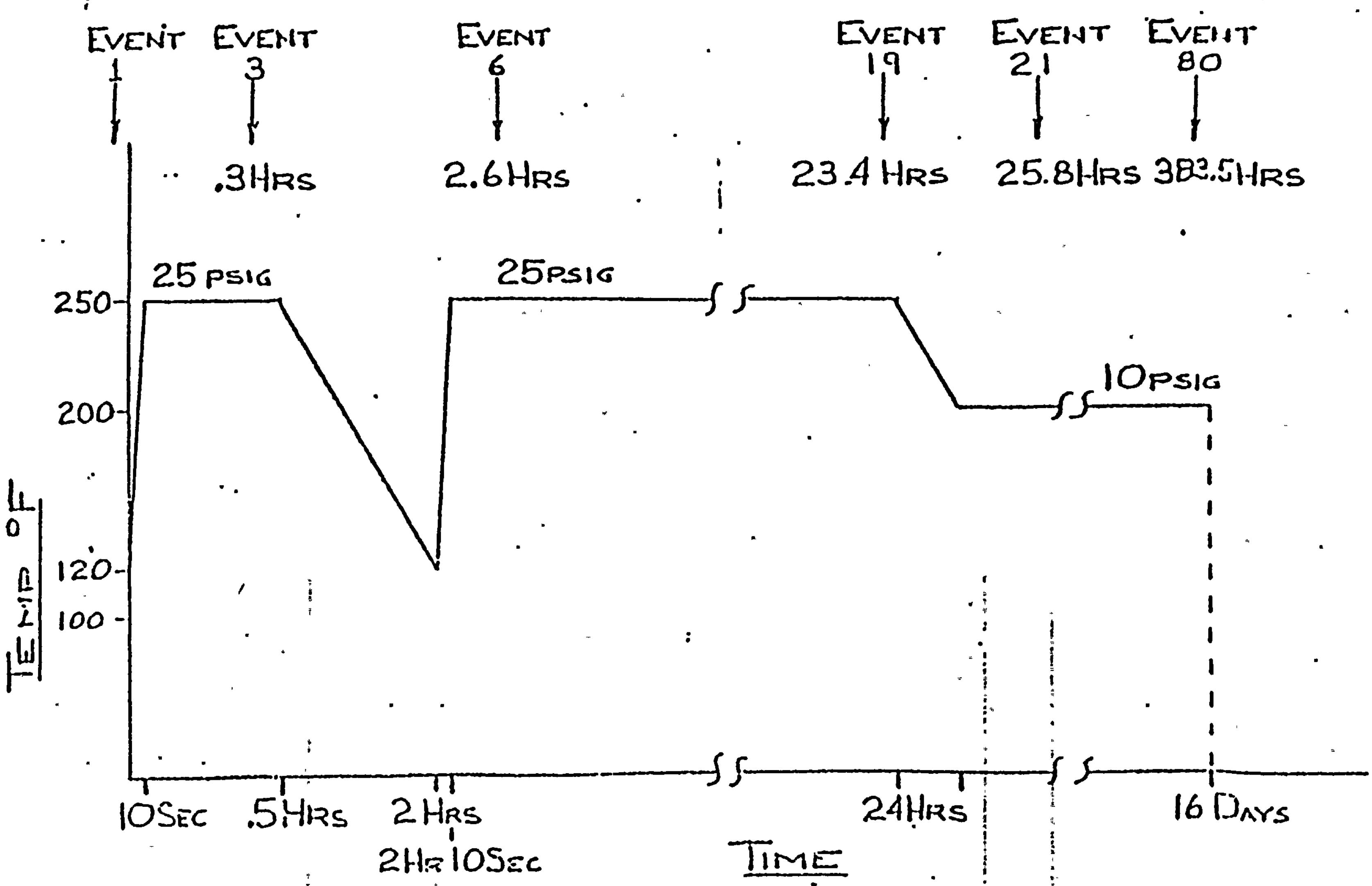


FIGURE 1