Babcock & Wilcox

Power Generation Group

P.O. Box 1260, Lynchburg, Va. 24505
Telephone: (804) 384-5111

November 20, 1979

George Frampton, Jr., Deputy Director
NRC/TMI Special Inquiry Group
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

Ref: NTFTM 791023-02

cy: R Haynes

Dear Mr. Frampton:

In response to your letter of October 24, 1979, enclosed are the following documents:

1. Letter to: W.H. Spangler, from S.P. Maingi, dated May 3[illegible], 1979. Continuation of the Electromatic Relief Valve history.

2. Letter to: H. Honig from E.G. Ward, dated April 22, 1979, subject: PORV Discharge Piping. This letter with its attachments discuss the excess dead loads on the Electromatic Relief Valve.

3. Letter to: F.A. Skrzypiec, from J.E. Reid, File No. NSS-6, 8A30.41, subject: Modification of RC-RV2.

4. Field Change Modification 04 2257 00, Contract No. 620-0006 Field Change Title: Electromatic Relief Valve Modification.

5. Site Problem Reports Nos. 58, 109, 107, 148, 183 and 195. SPR 304 does not exist.

6. B&W Nuclear Power Division Administrative Procedure No. NPG-0503 04, Revision 3, dated March 21, 1975, subject: Site Problem reports.

7. B&W Administrative Manual, Policies and Procedures No. NPG-0503-04, Revision 7, Section: Field Servic[illegible], subject: Site Problem reports.

8001170600

8. Letter to: D.W. Montgomery, Project Manager, from J.D. Carlton, Systems Design Section, Customer: Duke Power Co., Pressure Relief Valve Sizing, dated November 23, 1966, File No. 620-0003-12E59.

9. Letter to: J.H. Taylor, Systems Engineering, from J.D. Carlton, Systems Engineering, Customer: Duke Power Co., Pressurizer Transient Requirements, File No. 620-0003-12E59, dated March 3, 1967.

10. Letter to: H.F. Dobel, Section Manager, Systems Engineering, from: W.C. Butt, Fluid Systems, Customer: Duke Power Co., Pressurizer Safety Valves, dated June 22, 1967, File No. 12E59 8P41.2.

11. Letter to: D.W. Montgomery, Project Manager, from J.H. Taylor, Fluid Systems Group, Customer: Duke Power Co., Pressurizer Safety Valve and Spray Valve Requirements, dated February 13, 1968, File No. 620-0003 8P41.2 and 12E59.

12. Letter to: D.W. Montgomery, Project Manager, from H.F. Dobel, Manager, Systems Engineering Section, Customer: Duke Power Co., Pressurizer Safety Valve Evaluation, dated July 3, 1967, File No. 620-0003-12E45, 12E59 and 8P41.2.

13. Letter to: D.W. Montgomery, Project Manager, NPGD, from H.F. Dobel, Manager, Systems Engineering Section, Customer: Duke Power Co., Pressurizer Safety Valve Requirements, dated September 14, 1967, File No. 620-0003-8P41.2 (620-0003-12E59)

The first and third items requested by your October 24 letter are not enclosed, because they were prepared at the request of counsel.

Very truly yours,

J.G. Mullin
Contracts-Legal
Nuclear Power Generation Division

JGM/jck
Attachments
cc: G.L. Edgar, Esq. (w/att.)
M.M. Maney, Esq. (w/att.)

THE BABCOCK & WILCOX COMPANY
POWER GENERATION GROUP

NF
Copy EG WARD per
and ret. to WHS

W.H. SPANGLER
JUN 4 1979
NPGD

BDS 663.5

To	W.H.Spangler	
From	S.P. Maingi 8pm 5/30/79.	
Cust.	MET/GPU	File No. or Ref.
Subj.	RC-RV2 Traceability	Date 5/30/79

This letter to cover one customer and one subject only.

I tried to track the receipt and subsequent installation of Electromagnetic Relief valves at TMI-1 and 2. The facts as revealed to me are as follows:

(1) E.M. Relief valve RC-RV2 (Sr. # BL-08905) received from Dresser Industries on B&W purchase order, on February 18,1970 for TMI-1.

(2) E.M.Relief valve RC-RV2 (Sr. # BN-4233) received from Dresser Industries on B&W purchase order, on March 10, 1972 for TMI-2.

(3) TMI-2 E.M. Relief valve (Sr. # BN-4233) transferred to TMI-1 per Met-Ed's request on 9/26/74.

(4) The transferred Unit #2 E.M. Relief valve (Sr. # BN- 4233) installed on Unit-1 pressurizer on or about 10/26/74.

(5) Unit-1 E.M. Relief valve (Sr. # BL-8905) rebuilt and installed back on Unit-1.

(6) Unit-2 E.M. Relief valve (Sr. # BN-4233) removed from Unit-1 was re-built and tested by Met-Ed. It failed the leakage test at site.

(7) Unit-2 E.M. Relief valve (Sr. # BN-4233) removed from Unit-1 earlier, sent back to Dresser Industries for refurbishment and testing, per material return ticket (MRT) # 10685 on 12/31/75, by United Engineers.

(8) Purchase order # C-0224 issued by Jersey Control Power & Light (United Engineers) to Dresser Industries for refurbishment and testing of E.M. Relief valve (Sr. # BN- 4233) on June 8, 1976.

(9) E.M. Relief valve (Sr. # BN-4233) received back at TMI-site after refurbishment and testing by the Dresser Industries on October 20, 1976.

(10) E.M. Relief valve (Sr. # BN-4233) received back at site on October 20, 1976 and subsequently installed at TMI-2 pressurizer. The supporting documents I could trace are attached herewith in duplicate for your reference and records.

S.P.M./djr

cc: J.J. Phinney

QC SURVEILLANCE REPORT

NO. TMI 75-182

NO. #1

DEPARTMENT: Crouse Mechanical SYSTEM: Reactor Coolant

VIOLATION SURVEILLED: Testing and Reinstallation of RC-RV-2.

DATE(S) OF SURVEILLANCE: 9/29 to 10/2/75

REFERENCE: (DWG. SPECIFICATION, PROCEDURE, WELD MAP, ETC.) W/R 5625 and Addendums 1 & 2, C/M #145.

OBSERVATION: (Continue on additional plain sheets if necessary indicating page and Surveillance Report Numbers)

Work proceeded to the point of having the inlet flange bolts and several outlet flange bolts loosened prior to the arrival of the QC inspector. Removal of the outlet flange bolts was witnessed and the valve was removed to the clean area located on the 346' elevation of the reactor building. The flanges of RC-V-2 (outlet flange being part of mechanical joint to RC-RV-2) and the discharge pipe were covered with graphited gasket material and taped in place to prevent damage to the flanges.

The Unit #1 valve SR # 8905 was bolted to the test stand and preparations for testing were made. The Dresser Representative, T. Cassidy, prefixed the Crouse test procedure with an additional step which required raising pressure to 200 PSIG below the valve seat and causing the valve to lift and then reset. This was done to permit removal of any foreign material from between the seat and disc.

Upon performing the 200 PSIG lift, the valve failed to reseat as expected; so pressure was raised to 400 PSIG at which time the valve reseated. Testing was satisfactorily completed per Crouse maintenance test procedure #145, at a pressure of 2300I±50 PSIG.

RC-RV-2 was returned to the vicinity of the pressurizer upon completion of testing. Removal of the pipe stub from within the inlet socket of the leakoff line elbow was completed and the valve installed. The new lower flange studs procured were too short to obtain the required thread engagement. It was thus necessary to use the original

DIST.

- [X] MOQA
- [X] M-GO-N
- [X] M-GE
- [ ] M-GO-F
- [ ] M-GM
- [X] UNIT SUPT.
- [X] COGNIZ. DEPT. HEAD D.M. Shovlin
- [X] ORIGINAL FILE
- [ ] OTHER
- [ ] RECOMMEND AUDIT

QA SYSTEMS LIST (YES) NO

CONFORMING R. Reading E.T. Lee QC SPEC/ASST. 10/2/75 DATE

NONCONFORMING QC SPEC/ASST. DATE

NCR OR STOP WORK NO.

APPROVED: M Eyett SUPERVISOR - QC 10/8/7 DATE

4012.001A
2/75

OD-265-REV. 9-75

OBSERVATION:

studs which were in satisfactory condition. The valve and flexitallic gasket were installed upon removal of the flange protection material and the inlet mechanical joint was made per section 7.4.10 of 1401-2.1 as referenced by Crouse. The ½" nipple for the leakoff line was installed, and the thread engagement was inspected and found satisfactory. Fit up of the socket joint (nipple to elbow) and tacking of the joint was found satisfactory visually by E. Gee.

The leakoff line was visually and liquid penetrant inspected satisfactorily upon completion of the welding. The valve inlet flange was torqued per section 7.4.10 and the joint history.

Initial inspection of the valve discharge flanges found them unacceptable for reasons of cleanliness. After some preparation, the flanges were found cleaned to the satisfaction of the inspector. The flexitallic gasket was placed in position and the studs and nuts installed after proper lubrication.

The studs were later removed to facilitate performance of addendum 2 which required cold pulling of the discharge piping per the guidance of GAI Representatives. With cold pulling completed (see Figure 1) the outlet flange studs were reinstalled; and torquing was commenced per section 7.4.10 of the Met-Ed procedure after verifying that the 160 ft. lb. value listed on the flange history was in error. The torquing was witnessed to 250 ft. lb. and found satisfactory. The electrical connection of the valve was completed, and operational testing of the valve will follow. The valve was electrically tested and found satisfactory by operations personnel.

In addition, a leak test for the Unit II electromatic relief was witnessed after it was rebuilt to verify the status of the valve upon turnover. The leak rate was observed as six (6) drops per minute.

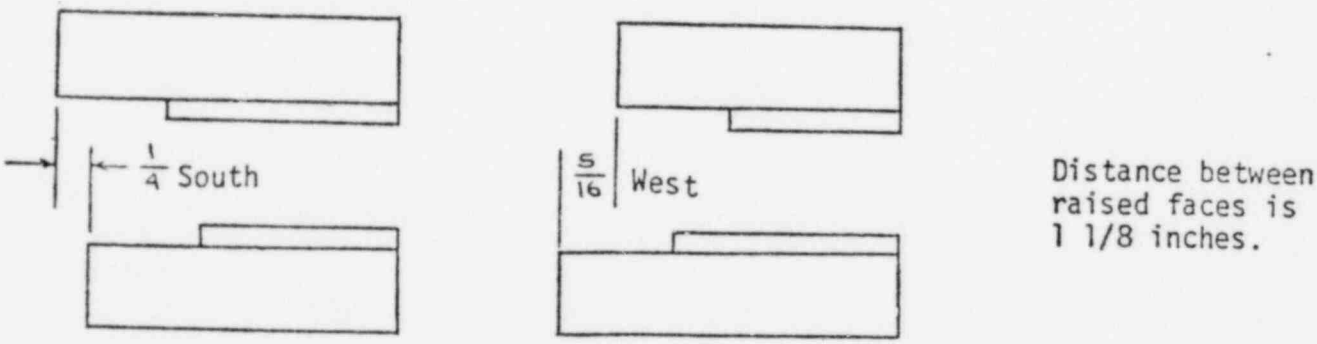


Figure 1

CHECKLIST FOR REMOVAL, OVERHAUL, TESTING
AND REINSTALLATION OF ELECTROMATIC RELIEF
VALVE RC-RV-2

	SAT.	UNSAT.	REMARKS
Removal			
1. Rubber pipe plugs, securely tied to a fixed anchor, installed in pipe openings to and from relief valve.	[illegible]	____	____
2. Record serial number of valve being removed S/N BN4233	[illegible]	____	____
Baseline Verification & Overhaul			
1. All valve replacement parts shall be QC accepted.	[illegible]	____	____
2. Record serial number of valve to be tested S/N 3705	[illegible]	____	____
3. Leakage past seat at normal operating pressure. NOTE: Vendor representative to supply acceptance criteria LEAK RATE 0 DROPS/MIN ACCEPTANCE CRITERIA 3 DROPS/MIN	[illegible]	____	____
4. Actuate solenoid and "pop" valve at 2300 PSIG.	[illegible]	____	____
ACCEPTANCE CRITERIA _____: Clean loud report. LIFT TIME _____ LIFT PRESSURE _____			
5. Allow valve to reseat after popping and perform a second leak test. NOTE: Vendor rep. to supply acceptance criteria LEAK RATE _____ ACCEPTANCE CRITERIA _____	[illegible]	____	____
Reinstallation			
1. Record serial number of valve being installed S/N BL 4505	[illegible]	____	____
2. Gasket surfaces cleaned.	[illegible]	____	____
3. Pipe plugs removed.	[illegible]	____	____
4. Flexitallic gaskets	[illegible]	____	____
Q.C. Accepted a. 2½" P.O. 33499 I-5	[illegible]	____	____
b. 4" P.O. 33499 I-6	[illegible]	____	____

OQA SURVEILLANCE REPORT NO. 74-253

DEPARTMENT: Crouse SYSTEM: RC-RV-2

EVOLUTION SURVEILLED: Removal & Replacement of RC-RV-2

REFERENCE: (DWG., SPECIFICATION, PROCEDURE, WELD MAP, ETC.)

OBSERVATION: RC-RV-2 was removed from the system according to the approved procedure with the exception of the rubber test pipe plugs specified in step 7.4.5. (See NCR 502). Replacement RC-RV-2 from Unit #2 was hydroed and tested on a test stand in the mechanical maintenance shop. These tests proved satisfactory. This valve was then moved into the Reactor Building and placed on the deck near the equipment access door.

Valve RC-RV-2 was moved to the pressurizer area and mounted on RC-V-2. Bolts were then installed and torqued to 200 ft/lbs. in 25 ft/lbs increments. RC-RV-2 was subsequently removed due to the improper installation of valve RC-V-2. Upon proper installation of RC-V-2 on the day shift of 24 Oct. 1974, RC-RV-2 was once again mounted atop RC-V-2. RC-RV-2 inlet flange bolts were then torqued to 355 ft/lbs. in accordance with the W/R procedure. Torque wrench due for cal. 4/16/75. Outlet flange bolts were then torqued to 250 ft/lbs.

Differential on inlet flange perimeters = .007"
Differential on outlet flange perimeters = .015"

Witnessed Bench Test and Set Points "verified" prior to Installation of RC-RV2:
The following personnel were present at the test:

1. Mr. Pruitt, Dresser (Consolidated Safety Valve)
2. Mr. Walter A Japack, The Hartford Steam Boiler - Inspection and Insurance Co. - Code Inspector.
3. Mr. Gil Stambaugh, Met-Ed Maintenance Foreman
4. Mr. R. Neidig, Met-Ed Quality Control Assistant.

Equipment Used for Test:

1. Pressure Vessel for Setting Pressurizer Safety Valves, Max. working pressure of 2500 P.S.I.; Min. working temp. of 50°F; Max. working temp. of 600°F; Hydrostatically tested at 3750 P.S.I. 110°F; July 18, 1974; Wall Thickness by UT: Min. .830. (See Attached She

Dist: Original-File D.M.Shovlin

L.L.Lawyer File 18.10.1

R.M.Klingaman

J.G.Herbein

QA Systems List (Yes) No

Conforming _____ _____
QC Spec/Asst. Date

Nonconforming P.J. Hill E.F. Lee 11/20/74
QC Spec/Asst. Date

NCR ~~Stop Work~~ No. 502

Approved: J.E. Potts 11/20/74
Supervisor - QC Date

GPF 4012.001
4/30/74
Rev. 0
QC Form #29

2. Pressure Source, Nitrogen Bottle to 2250 P.S.I.
3. Used Solenoid with 125 Volt, D.C. Capacity (Solenoid energized at 2300 P.S.I.)
4. Auxiliary Pump (Pump was stopped at the time the valve was lifted - Manufacturers name; Engersol-Rand, 100# Operational Air Pressure, Max. 30, 520 P.S.I.G. Discharge Pressure, Displacement for Stroke .1074 gal., 58 x 6 D.A. HP, Serial No. 21515 - No. COP 7.

Sequence of Test Events:

1. Torqued Flange Bolts to 245 ft/lbs.
2. Filled Pressure Tank Vessel ⅓ full with water.
3. Turned Nitrogen supply on (leading into Pressure Vessel).
4. With the use of the auxiliary pump and thepressure vessel, pressure was boosted at the seat of the valve to 2300 P.S.I. Mr. Pruitt noted there was a leak at the seat (also indicated on the gauge as it dropped slowly).
5. The pressure was built up to its "pop" pressure of 2300 P.S.I. for RC-RV-2.
6. The Solenoid was energized for approximately 2 seconds, which activated the pilot valve which activated the opening of the main valve.
7. After de-energizing the Solenoid, the main valve closed with the pressure dropping to approximately 1500 P.S.I.
8. With the aid of the auxiliary pump the pressure was built up to 2250 P.S.I. or approximately 97% of the manufacturer's specifications required 93% for testing after being popped. Water was on top of the seat once again and the leak appeared negative. The gauge also held at 2250 P.S.I.

NOTE: Mr. R. Pruitt (Dresser - Consolidated Safety Valve) informed G. Kunder and J. Colitz of his recommendation to manually "pop" RC-RV2 after its installation and when the pressure is built-up to a range between 500 to 1000 P.S.I. (Manually) to provide for the expansion of the ring (much like that of a piston ring) under high temperature giving the ring a chance to properly re-seat itself.

10/24/74 1000-1200; 1400-1630:

Noted that RC-RV-2 had been mounted on RC-V2 on the previous shift; however, the mating flanges did not have their bolts torqued, at this point. NOTE: They were torqued according to procedure two days later.

10/26/74 1000-1200 1400-1630:

Noted that RC-RV2 had been completely installed and all bolts appeared to be torqued. (Torquing confirmed by the night QC representative.) However, it was also noted by the QC representative, that the upper seat drain line was loosely screwed into the body of RC-RV2. Mr. Ned Bulmer was immediately notified. The loose threaded drain pipe was later welded to the valve body and accepted by Mr. L. Laime, Q.C. Specialist. The welding initials and date of the welding were etched onto the pipe on 10/27/74 with the joint numbers to be etched at a later date.

Witnessed the installation of leakoff lines to valve RC-RV-2. Leakoff lines were welded into place as per procedure. No discrepancies noted.

Welds were visually inspected and dye-penetrant tested to ensure welds are satisfactory.

QC SURVEILLANCE REPORT

NO. #1

DEPARTMENT: Crouse Mechanical SYSTEM: Reactor Coolant

EVOLUTION SURVEILLED: Testing and Reinstallation of RC-RV-2.

DATE(S) OF SURVEILLANCE: 9/29 to 10/2/7

REFERENCE: (DWG. SPECIFICATION, PROCEDURE, WELD MAP, ETC.) W/R 5625 and Addendums 1 & 2, C/M #145.

OBSERVATION: (Continue on additional plain sheets if necessary indicating page and Surveillance Report Numbers)

Work proceeded to the point of having the inlet flange bolts and several outlet flange bolts loosened prior to the arrival of the QC inspector. Removal of the outlet flange bolts was witnessed and the valve was removed to the clean area located on the 346' elevation of the reactor building. The flanges of RC-V-2 (outlet flange being part of mechanical joint to RC-RV-2) and the discharge pipe were covered with graphited gasket material and taped in place to prevent damage to the flanges.

The Unit #1 valve SR # 8905 was bolted to the test stand and preparations for testing were made. The Dresser Representative, T. Cassidy, prefixed the Crouse test procedure with an additional step which required raising pressure to 200 PSIG below the valve seat and causing the valve to lift and then reset. This was done to permit removal of any foreign material from between the seat and disc.

Upon performing the 200 PSIG lift, the valve failed to reseat as expected; so pressure was raised to 400 PSIG at which time the valve reseated. Testing was satisfactorily completed per Crouse maintenance test procedure #145, at a pressure of 2300I±50 PSIG.

RC-RV-2 was returned to the vicinity of the pressurizer upon completion of testing. Removal of the pipe stub from within the inlet socket of the leakoff line elbow was completed and the valve installed. The new lower flange studs procured were too short to obtain the required thread engagement. It was thus necessary to use the original

DIST.

- [X] MOQA
- [X] M-GO-N
- [X] M-GE
- [ ] M-GO-F
- [ ] M-GM
- [X] UNIT SUPT.
- [X] COGNIZ. DEPT. HEAD D.M. Shovlin
- [X] ORIGINAL FILE
- [ ] OTHER _____
- [ ] RECOMMEND AUDIT

QA SYSTEMS LIST (YES) NO

CONFORMING R. Nuding [signature] QC SPEC/ASST. 10/2/75 DATE

NONCONFORMING _____ QC SPEC/ASST. _____ DATE

NCR OR STOP WORK NO. _____

APPROVED: [signature] SUPERVISOR - QC 10/8 DATE

F 4012.001A
13/75
v. 1

CD-265-REV. 9-75

CHECKLIST FOR REMOVAL, OVERHAUL, TESTING
AND REINSTALLATION OF ELECTROMATIC RELIEF
VALVE RC-RV-2

	SAT.	UNSAT.	REMARKS
Removal			
1. Rubber pipe plugs, securely tied to a fixed anchor, installed in pipe openings to and from relief valve.			
2. Record serial number of valve being removed S/N BN4233			
Setpoint Verification & Overhaul			
1. All valve replacement parts shall be QC accepted.			
2. Record serial number of valve to be tested S/N 8905			
3. Leakage past seat at normal operating pressure. NOTE: Vendor representative to supply acceptance criteria LEAK RATE 0 DROPS/MIN ACCEPTANCE CRITERIA 3 DROPS/MIN			
(1) 4. Actuate solenoid and "pop" valve at 2300 PSIG. ACCEPTANCE CRITERIA _____: Clean loud report. LIFT TIME _____ LIFT PRESSURE _____			
(1) 5. Allow valve to reseat after popping and perform a second leak test. NOTE: Vendor rep. to supply acceptance criteria LEAK RATE _____ ACCEPTANCE CRITERIA _____			
Reinstallation			
1. Record serial number of valve being installed S/N BL 8905			
2. Gasket surfaces cleaned.			
3. Pipe plugs removed.			
4. Flexitallic gaskets			
Q.C. Accepted a. 2½" P.O. 92499 I-5			
b. 4" P.O. 92499 I-6			

OQA SURVEILLANCE REPORT NO. 74-253

DEPARTMENT: Crouse SYSTEM: RC-RV-2

EVOLUTION SURVEILLED: Removal & Replacement of RC-RV-2

REFERENCE: (DWG., SPECIFICATION, PROCEDURE, WELD MAP, ETC.)

OBSERVATION: RC-RV-2 was removed from the system according to the approved procedure with the exception of the rubber test pipe plugs specified in step 7.4.5. (See NCR 502). Replacement RC-RV-2 from Unit #2 was hydroed and tested on a test stand in the mechanical maintenance shop. These tests proved satisfactory. This valve was then moved into the Reactor Building and placed on the deck near the equipment access door.

Valve RC-RV-2 was moved to the pressurizer area and mounted on RC-V-2. Bolts were then installed and torqued to 200 ft/lbs. in 25 ft/lbs increments. RC-RV-2 was subsequently removed due to the improper installation of valve RC-V-2. Upon proper installation of RC-V-2 on the day shift of 24 Oct. 1974, RC-RV-2 was once again mounted atop RC-V-2. RC-RV-2 inlet flange bolts were then torqued to 355 ft/lbs. in accordance with the W/R procedure. Torque wrench due for cal. 4/16/75. Outlet flange bolts were then torqued to 250 ft/lbs.

Differential on inlet flange perimeters = .007"

Differential on outlet flange perimeters = .015"

Witnessed Bench Test and Set Points "verified" prior to Installation of RC-RV2:

The following personnel were present at the test:

1. Mr. Pruitt, Dresser (Consolidated Safety Valve)
2. Mr. Walter A Japack, The Hartford Steam Boiler - Inspection and Insurance Co. - Code Inspector.
3. Mr. Gil Stambaugh, Met-Ed Maintenance Foreman
4. Mr. R. Neidig, Met-Ed Quality Control Assistant.

Equipment Used for Test:

1. Pressure Vessel for Setting Pressurizer Safety Valves, Max. working pressure of 2500 P.S.I.; Min. working temp. of 50°F; Max. working temp. of 600°F; Hydrostatically tested at 3750 P.S.I. 110°F; July 18, 1974; Wall Thickness by UT: Min. .830. (See Attached She

Dist: Original-File D.M.Shovlin | QA Systems List (Yes) No

L.L.Lawver File 18.10.1 | Conforming ______ QC Spec/Asst. ______ Date

R.M.Klingaman ______ | Nonconforming [signature] E F Gee [date] QC Spec/Asst. [signature] Date

J.G.Herbein ______

NCR ~~or Stop Work~~ No. 502

Approved: [signature] 11/22/74 Supervisor - QC Date

GPF 4012.001
4/30/74
Rev. 0
QC Form #29

2. Pressure Source, Nitrogen Bottle to 2250 P.S.I.
3. Used Solenoid with 125 Volt, D.C. Capacity (Solenoid energized at 2300 P.S.I.)
4. Auxiliary Pump (Pump was stopped at the time the valve was lifted - Manufacturers name; Engersol-Rand, 100# Operational Air Pressure, Max. 30, 520 P.S.I.G. Discharge Pressure, Displacement for Stroke .1074 gal., 58 x 6 D.A. HP, Serial No. 21515 - No. COP 7.

Sequence of Test Events:

1. Torqued Flange Bolts to 245 ft/lbs.
2. Filled Pressure Tank Vessel ½ full with water.
3. Turned Nitrogen supply on (leading into Pressure Vessel).
4. With the use of the auxiliary pump and thepressure vessel, pressure was boosted at the seat of the valve to 2300 P.S.I. Mr. Pruitt noted there was a leak at the seat (also indicated on the gauge as it dropped slowly).
5. The pressure was built up to its "pop" pressure of 2300 P.S.I. for RC-RV-2.
6. The Solenoid was energized for approximately 2 seconds, which activated the pilot valve which activated the opening of the main valve.
7. After de-energizing the Solenoid, the main valve closed with the pressure dropping to approximately 1500 P.S.I.
8. With the aid of the auxiliary pump the pressure was built up to 2250 P.S.I. or approximately 97% of the manufacturer's specifications required 93% for testing after being popped. Water was on top of the seat once again and the leak appeared negative. The gauge also held at 2250 P.S.I.

NOTE: Mr. R. Pruitt (Dresser - Consolidated Safety Valve) informed G. Kunder and J. Colitz of his recommendation to manually "pop" RC-RV2 after its installation and when the pressure is built-up to a range between 500 to 1000 P.S.I. (Manually) to provide for the expansion of the ring (much like that of a piston ring) under high temperature giving the ring a chance to properly re-seat itself.

10/24/74 1000-1200; 1400-1630:

Noted that RC-RV-2 had been mounted on RC-V2 on the previous shift; however, the mating flanges did not have their bolts torqued, at this point. NOTE: They were torqued according to procedure two days later.

10/26/74 1000-1200 1400-1630:

Noted that RC-RV2 had been completely installed and all bolts appeared to be torqued. (Torquing confirmed by the night QC representative.) However, it was also noted by the QC representative, that the upper seat drain line was loosely screwed into the body of RC-RV2. Mr. Ned Bulmer was immediately notified. The loose threaded drain pipe was later welded to the valve body and accepted by Mr. L. Laime, Q.C. Specialist. The welding initials and date of the welding were etched onto the pipe on 10/27/74 with the joint numbers to be etched at a later date.

Witnessed the installation of leakoff lines to valve RC-RV-2. Leakoff lines were welded into place as per procedure. No discrepancies noted.

Welds were visually inspected and dye-penetrant tested to ensure welds are satisfactory.

THE BABCOCK & WILCOX COMPANY
POWER GENERATION GROUP

To

HARRY HONIG

From

~~E.G. WARD~~ EGW

BDS 663-5

Cust.

TMI-2

File No. or Ref.

Subj.

PORV DISCHARGE PIPING

Date

APRIL 22, 1979 9:06 AM

This letter to cover one customer and one subject only.

RE: YOUR REQUEST TO B&R ON 4/20/79.

- ON 4/21/79, A JACK KIVEN CALLED TO CONFIRM HE WAS TRANSMITTING A 7 PAGE TELECOPY PROVIDING DESIGN DETAILS AND LOADINGS FOR THE PORV. (THIS DATA IS ATTACHED.)

- THE REV. 20 OF THE WASTE SYSTEM DWG YOU WERE USING IS THE LATEST REVISION.

- A FABRICATION DRAWING OF THE PIPING WILL BE FORWARDED BY MAIL.

- THEY HAVE THE COMPLETE ANALYSIS REPORTS IF WE REQUIRE ANY ADDITIONAL INFORMATION.

EGW/tbc

CC: DOUG LEE

PIPING DESIGN

TASK 20

SH 1/7

1055

Rec'd 11 52 4/21/

Page 1 of 4

1.0 INTRODUCTION

The pressurizer discharge piping system consists of (see figure 1.0.1).

A 4" outlet piping from pressurizer electromatic relief valve RC-R2 which is mounted on the top of the pressurizer and is connected via a 4"Ø discharge piping to 14"Ø discharge header.

Two pressurizer safety valves RC-R1A,B which are connected to the pressurizer via 6 inch loop seals and are mounted on a platform which is integral to the pressurizer. The discharge side of the relief valves are connected to the 14" Ø discharge header via 6"Ø discharge piping.

14"Ø header which connects the relief valves with the WDL-T-3 drain tank.

The analyses were performed to demonstrate the structural integrity of the discharge piping. It is not the intent of this report to show conformance of the loop seal piping to ANSI B31.1 Class I requirements.

The loop seal portion of piping was included only so that its flexability, loadings and overall coupling with the discharge piping could be included in the analysis. The N-1 analysis of the loop seal piping will be performed in separate report.

The following analyses were performed:

1. Thermal analysis of the discharge piping assuming the piping at 70°F, 112°F and 500°F with the pressurizer/loop seal at 650°F and the platform at an average of 600°F (see Appendix A.2 for justification of platform temperature).
2. Spectral seismic analysis of the discharge piping including the pressurizer and secondary shield.
3. Dead weight analysis.
4. A time history analysis for the blow off of relief valves RC-R1A,B was performed.

(105) Pg 29 7 of 49

ORIG. SOURCE: GRANT WARD B-W 4/20/79 1515 TASK NUMBER: 2.0.30
(Name, Date & Time) 204-884-7947

TASK DESCRIPTION:
Provide piping design, pipe stress loads, stress/fab. isos for the electromatic relief RC-R2 inlet and discharge piping for use by B-W in Lab. analysis/Tests. (BW has dwng 2555-2403 Rev 20 - Is it the latest?) DUE BY 4-23 AM

ASSIGNED TO: Stress
J Kiven

DATE & TIME ASSIGNED: 4/20/79 1530
Phone G. Ward with loading information ASAP

DETAILS/STATUS:
LOAD (THERMAL + DEADWEIGHT) IS:
$F_x = 69^{\#}$ $F_y = -300^{\#}$ $F_z = -1032^{\#}$
$M_x = -20102^{\#"}$ $M_y = -371^{\#"}$ $M_z = -1127^{\#"}$

RESOLUTION: PHONE CONVERSATION KIVEN TO WARD 10:30 AM 4/21/79
LOAD INFORMATION REPORTED PER REQUEST.
CONFIRMED THAT DWG 2555-2403 REV 20 IS LATEST,
AGREED THAT FOLLOWING SHEETS OF PRESSURIZER
RELIEF VALVE DISCHARGE PIPE STRESS REPORT WILL BE
TELECOPIED TO LYNCHBURG.
SHTS 1.0.1, 4.1.1, 4.1.2, 4.1.4
FIGURES 1.01, 2.0.1
IG 2.01 — CELL 66 FABRICATION ISO Z-23-1 WILL BE MAILED SPECIAL DELIVERY.

DISCIPLINE SUPERVISOR CONCURRENCE J. KIVEN

COMPLETE RESOLUTION: ✓ YES ___ NO. . .DATE & TIME: 4-21-79 1110

PARTIAL RESOLUTION. ___ YES ✓ NO. . .FORWARDED TO: G. Ward, B&W, 4/21/79 AM
(Name, Date & Time)

ACTION DESIGNEE: J. KEVIN

RESOLUTION ACCEPTED: Allowed 4-21-79 11:45
(Proj. Mgr., Date & Time)

FURTHER ACTION REQUIRED: ___ YES X NO

ASSIGNED TO: ___
(Name, Date & Time)

DISTRIBUTION:
B&R Site (W. R. Cobean), 1 telecopy/ 3 in mail
B&R Site (Proj. Mgr.)
B&R Site File
GPU Mtn. Laker
Project Mgr. Book
THI File (Orig. & Telecopy)

PIPING DESIGN

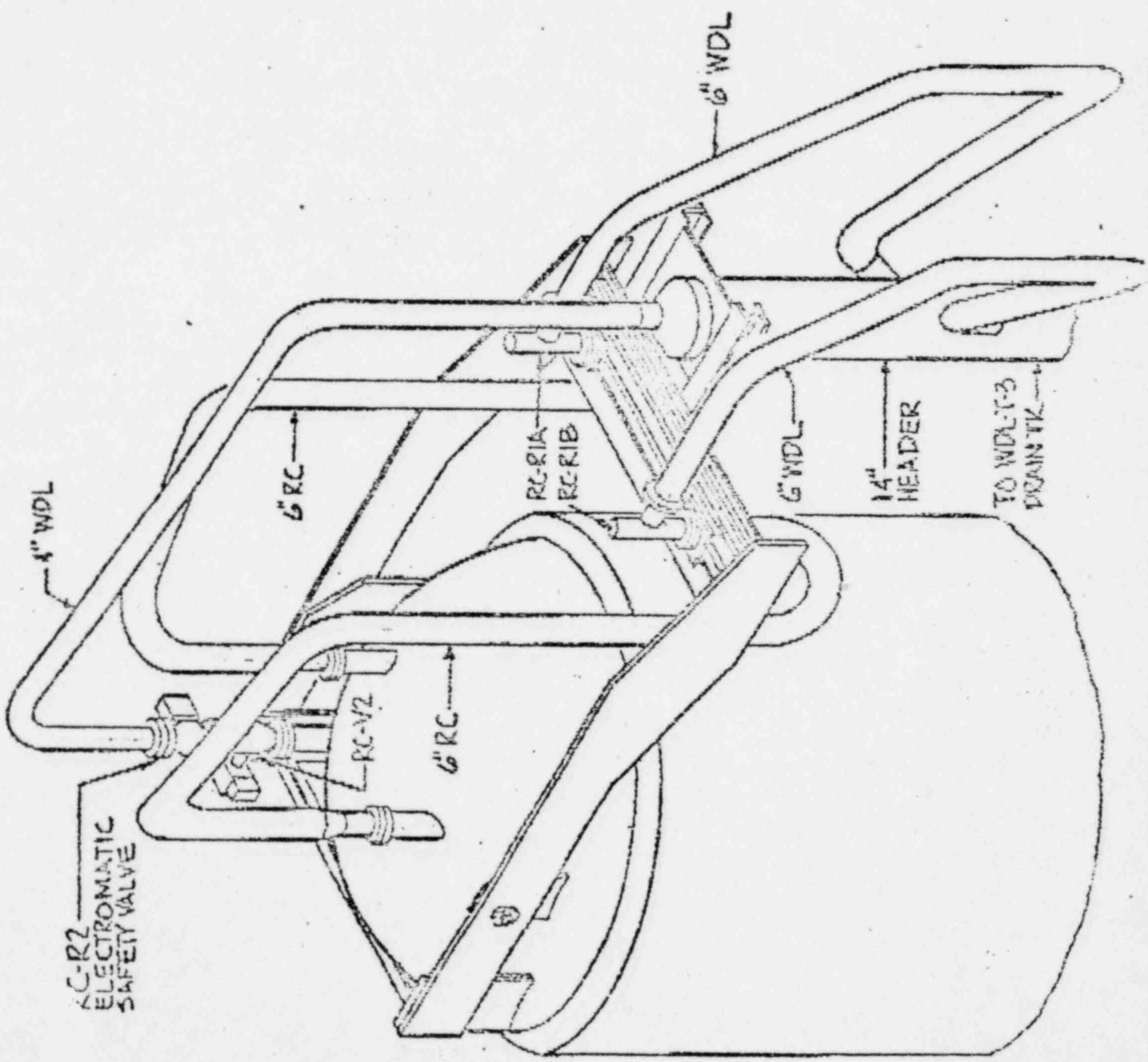
FIGURE 1.0.1

TASK 2030

S.12/7

1055

PA 37/7 4/21/79



BURNS AND ROE, INC.

W.O. No. 2555-09 Date 5-6-76 Book No. — Page No. Sheet [illegible]

Drawing No. — Calc. No. —

By H.W. HSU Checked CHAN, 6/23/76 Approved [illegible]

Title Flange Calculation @ pt. 4 [illegible]

1055
PA 497
4/21/79

3) Thermal and Deadweight Loadings
(Data pt. 4)

	Fx (lb.)	Fy (lb.)	Fz (lb.)	Mx (in-lb)	My (in-lb.)	Mz (in-lb.)
Thermal	70	-217	-1044	-19782	-366	+1107
Deadweight	-1	-83	-12	-321	-5	-20
Total	69	-300	-1032	-20103	-371	-1127

combination of d.w. and thermal loading at worst ambient or operating temperature (platform @ 650°F, pipe @ 70°F)

Overturning Moment

$$M = \sqrt{M_x^2 + M_z^2} = \sqrt{20103^2 + 1127^2} = 20135 \text{ in-lb.}$$

Axial Force

$$F = F_y = 300 \text{ lb.}$$

y = Y
Z = -X
X = +Z

F_x F_y F_z M_x M_y M_z

1044 -217 70 1107 -366 -19782

-12 -83 -1 20 -5 -321

1032 -300 69 1127 -371 -20103

92 -31 -1649

2 -1 -27

94 -31 -1675

BURNS AND ROE, INC.

W.O. No. 2555-09 Date 5-26-76 Book No. — Page No. — 54 4/7

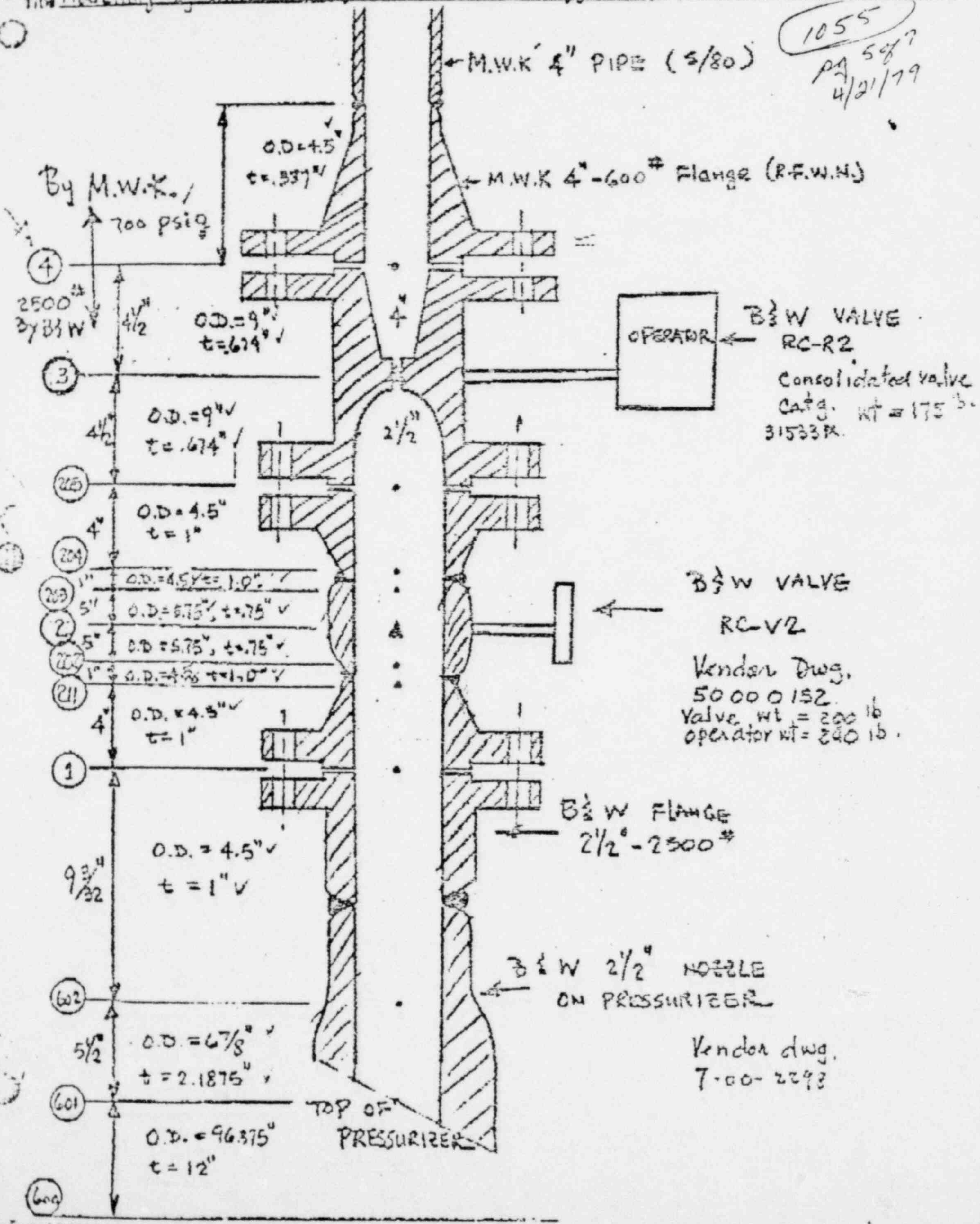
Drawing No. — Calc. No. — Sheet

By Williams Checked CHAN, K.W. 5/28/76 Approved

Title Modelling of valves RC-V2, RC-R2 and the nozzle (2½") TMI-2

1055

PA 5/7 4/21/79



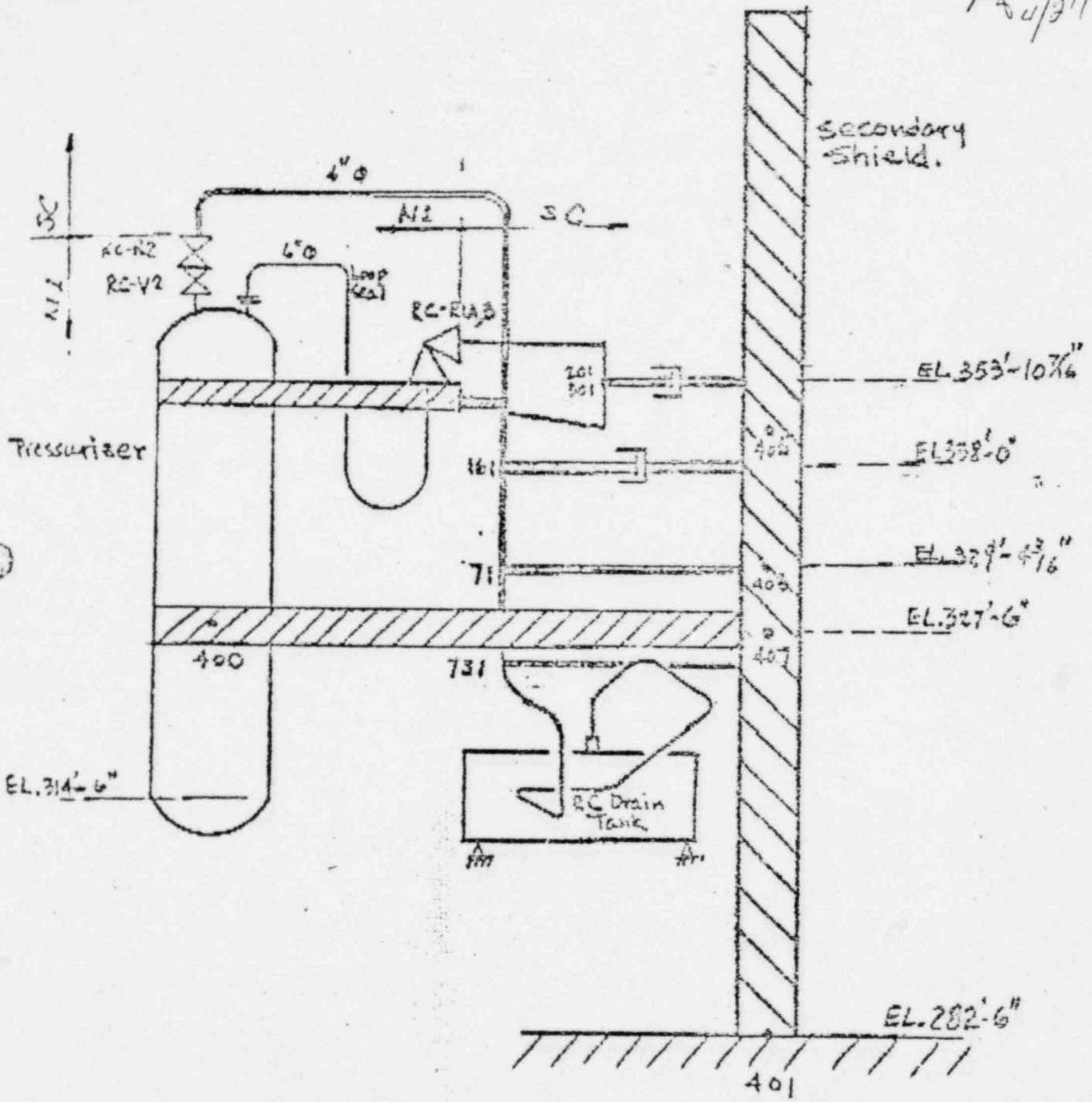
W.O. No. 2555-09 Date 6/21/76 Book No. — Page No. SHT 2

Drawing No. — C.O. No. — Sheet A-1 of A-1

By H. W. Hsu Checked C.H.M. SHORT Approved —

Title Sketch of the Closed Discharge System. TMI-2

1055
P1 6 of 7
4/3/79



TASK 2030

SH 6/7

(TO BE XMITTED ALS BY SPECIAL DELIVERY)

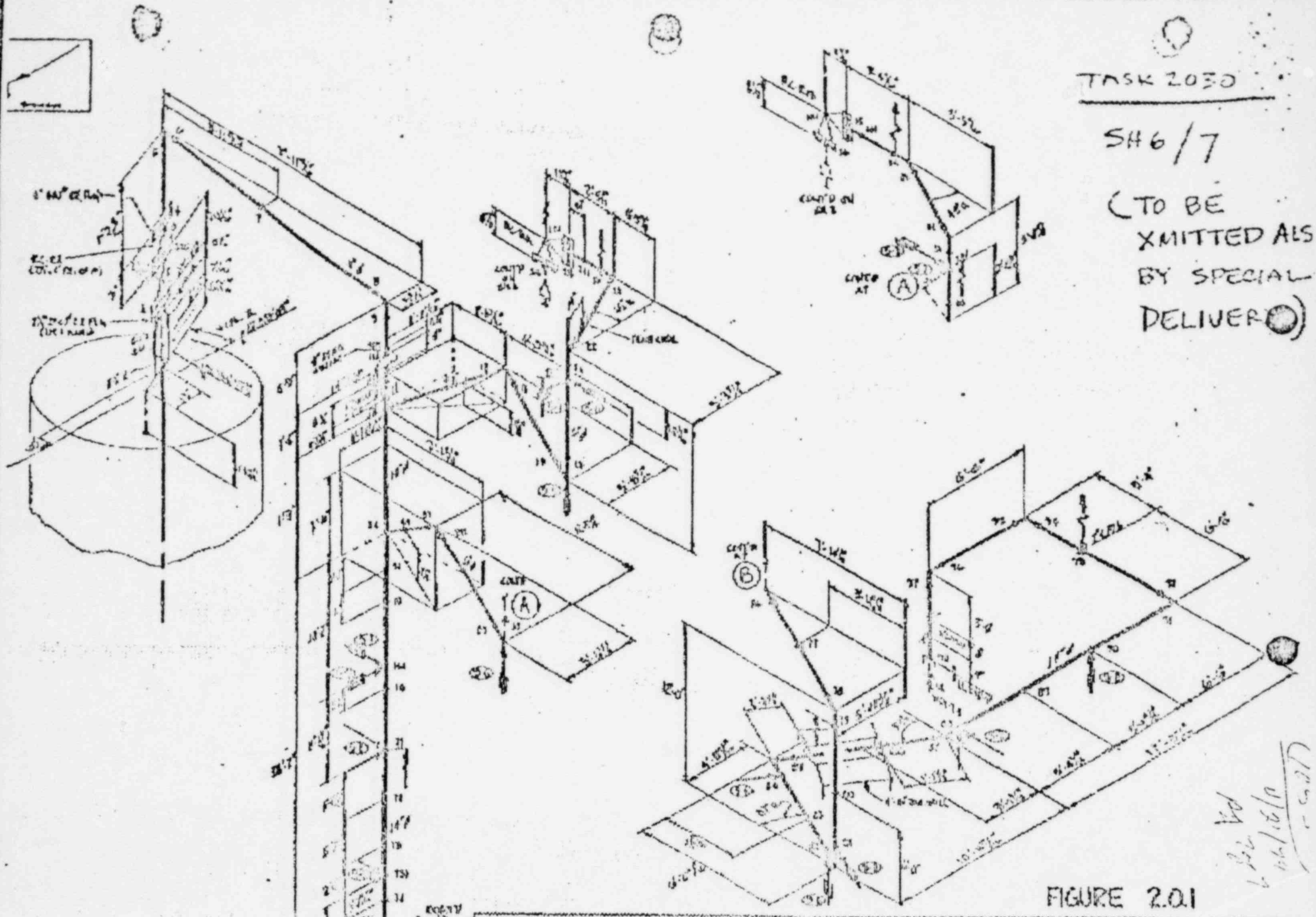


FIGURE 2.01

LONGHAND MEMORANDUM — THE BABCOCK & WILCOX COMPANY

TO
F. A. SKRZYPIEC - B&W CONSTR. Co. - TMI

FROM
J.E. REID - PROJECT AIDE (2555)

LUST
J.C.P.&L.

FILE NO. OR REF.
NSS-6, 8A30.41

DATE
3-2-77

SUBJ.
MODIFICATION OF RC-RV2

ATTACHED IS A COPY OF A WIRE FROM DRESSER STATING THAT THEIR SERVICEMAN WILL COME TO THE SITE THE WEEK OF 3-21-77 FOR MODIFICATION OF THE ELECTROMATIC RELIEF VALVE.

WUI 0099442 1138 03/01•
BABWILCOX LURG
00
2
OCC AUTO RETRY

2
OCC AUTO RETRY
5•
BABWILCOX LURG
BABCOCK & WILCOX 3-1-77 #18
MR DOUG CARMICHAEL
LYNCHBURG VA

REURPHONE. MET ED. 3-MILE ISLAND STA.

OUR SERVPCEMA

BABCOCK & WILCOX 3-1-77 #18
MR DOUG CARMICHAEL
LYNCHBURG VA

REURPHONE. MET ED. 3-MILE ISLAND STA.

OUR SERVICEMAN WILL INSTALL BUSHING IN 31533VX ELECTROMATIC
RELIEF VALVE WEEK OF MARCH 21, 1977.

JACK E COX
DRESSER INDUST VALVE AND INST DIV

PDS-21048-3 (3-75)

FIELD CHANGE AUTHORIZATION 04 2257 00 BABCOCK & WILCOX

CUSTOMER: Jersey Cent. CONTRACT NO. 620-0006 FCA NO. 122 REV. NO. 0

VENDOR: Dresser P.O. NO. 022660LS TASK NO. 28 GROUP NO. 041 SEQ. NO. 006

ORIGINATOR: J. L. Wilsher DATE: ☐ EXPEDITE ☒ NORMAL

F.C. TITLE (MAX. 30 SPACES) Electomatic Relief Valve Mod.

DESCRIPTION OF FIELD CHANGE:

Modify Electromatic Relief Valve, B&W mark no. RC-RV2 per the attached procedure 03 6918 00.

Description: Two bushings are added to lever and one to solenoid bracket. This will ensure freedom of motion of lever pin using corrosion resistant bushings.

REASON FOR CHANGE: ☒ SITE PROBLEM ☐ ENGRG. RQMT ☐ CUSTOMER REQUEST ☐ IMPROVEMENT ☒ OTHER (SPECIFY) Vendor requirement - Equipment Improv.

SPR. DOC. OR LETTER NO/REF SPR-107, NSS-9

TASKS AFFECTED

TASK NO.	TASK ENGINEER	TASK NO.	TASK ENGINEER
28	J. L. Wilsher		

APPROVALS

TITLE	FC AUTHORIZATION APPROVAL	DATE	FC PACKAGE APPROVAL	DATE
TASK ENGINEER	H. Hunig	11-17-76	J. L. Wilsher	11-17-76
INTEGRATOR			L. D. M. Wilsher	11/22/76
ENGRG. UNIT MGR.				11/22/76
NUCLEAR SERV.			R. Pittman	11/22/76
PROJECT MGR.	LR Plotke	11/22/76	LR Plotke	11/22/76

OTHER SUGGESTED APPLICABILITY:

CONTRACTS NSS -3, 4, 5, 6, 7, 8, 9, 11, 12 & 13

STD. PLANT ☐ yes ☐ no

INTEGRATOR DATE

CUSTOMER/CUSTOMER AGENT DISPOSITION OF FIELD CHANGE:

IMPLEMENTED ☑

NOT IMPLEMENTED ☐

REF.

LR Plotke 4/29/77

PROJECT MGR. DATE

AUTH. CHARGE NO.

FILE NUMBER

SHEET 1 of 2

FIELD CHANGE AUTHORIZATION - AFFECTED DOCUMENTATION

CUSTOMER: Jersey Cent. CONTRACT NO. 620-0006 FCA NO. 122 REV. NO. 0

DOCUMENT TITLE	*DOCUMENT NUMBER	DOCUMENT TITLE	*DOCUMENT NUMBER
Dresser Lever Pin Modification	03 6918 00		
Drawing (RC-RV2)	28 41 003 01		

*REVISION LEVEL SAME AS CUSTOMER DELIVERED

PDA 1991-2 (9-73)

App. 00

SITE PROBLEM REPORT

BABCOCK & WILCOX

CUSTOMER Jersey Central	CONTRACT NO 620-0006	SPR NO 58	REV. NO. 0	
VENDOR P&W	P.O. NO. 6M06	TASK NO. 44	GROUP NO 60	SEQ. NO. 01
SITE ENGINEER H. Gerber	REQ'D. RESOL. DATE July 15, 1974	REQ'D. COMP. DATE July 31, 1974		

TITLE

R.V. Closure Head Service Structure Paint Peeling.

DESCRIPTION OF PROBLEM

Service structure paint is peeling & the exposed metal is corroding.

See the attached "Reject" report of inspection #14611 & report of nonconformity #22.

STATUS - ACTION TO DATE INCLUDING PERSONS CONTACTED

None

FURTHER ACTION RECOMMENDED BY SITE PERSONNEL

1. Sand blast & re-paint.

ORIGINATOR SIGNATURE H. Gerber DATE 6/24/74 S.O.M./CONSTR. REP. SIGNATURE R. Ashen 6/25/74

RESOLUTION

RESOLUTION Request via GPU that UE&C have structure restored to original condition by sandblasting and repainting - Letter to R W Heward July 1st, 1974

APPROVED BY	SIGNATURE	DATE
N.S. SUPPORT ENGINEER		
TASK ENGINEER		
PROJECT MANAGER	L R Plitzer	7/1/74

COST CATEGORY ☒ NORM ☐ C ☐ D ☐ G ☐ L ☐ VENDOR CLAIM

AUTH. CHARGE NO. None ☐ FIELD CHANGE REQ — FC NO —

COMPLETION

SITE COMPLETION REPORT

Work completed as directed above.

☐ RECOMMENDED STDS. CHANGE

FINAL DISTRIBUTION

PROJECT MANAGER
S.O.M./CONST REP.
QA DOC. FILE
CENT. ENGR FILE 12.1.2

DEVIATIONS ☒ NONE ☐ SEE SPR REV. NO. ____

DATE COMPLETED 3/10/75 SIGNED BY R. Ashen

S.O.M./CONSTR. REP. APPROVAL H. Gerber DATE 3/10/75

NSS- 6
SPR 58

TITLE RV HEAD SERVICE STRUCTURE PAINT PEELING.

RELATED SPRs

This SPR has been reviewed by Task Engineering Groups and is applicable to NSS- 00. The following is the status and/or resolution of this SPR on other contracts.

REMARKS

THIS SPR IS CONSIDERED NOT GENERIC - HOWEVER, THIS IS ONE OF MANY PAINTING PROBLEMS BEING SUFFERED BY OUR CUSTOMERS. QA (S.H. KLEIN) WAS REQUESTED BY G.K. WANDLING TO REVIEW SUCH PROBLEMS TO DETERMINE WHAT, IF ANYTHING, CAN BE DONE (MEMO: 1/30/75).

9/11/75

NSS-

SITE PROBLEM

REPORT TRANSMITTAL

**** CLEARED ****

TO: CHANGE CONTROL For Distribution

S. M. Klein - Quality Assurance

Central Engineering Files

L.M. LESNIAK - Task Engineer

L.L. PLETKE - Project Manager

FILE: 13-6-109

CONTRACT NO: 620-00 06

SPR 109

TITLE RPS-RTD

RETEST DATA

DATE: 6-24-77

STATUS CODE C

_____ E. L. Logan - FLORIDA _____

_____ L. C. Rogers - MET. ED. _____

_____ F. R. Faist - TOLEDO _____

_____ J. R. Bohart - Intl. Support _____

_____ J. L. Donnell - OFR _____

_____ B. A. Karrasch - Plant Integration _____

Attached is one copy of Site Problem Report No. 109 which was processed on Contract 620-00 06. Future contracts have been reviewed for the potential of a similar problem. This problem ~~is~~/is not considered applicable to other contracts _____.

REMARKS: _____

Dennis Pace

NUCLEAR SERVICE SUPPORT ENGINEER

CLEARED

PDS-21091(8-76)

SITE PROBLEM REPORT

BABCOCK & WILCOX

CUSTOMER	ORIGINATOR	DATE	DOC. ID. CONT. NO.	SPR NO.	REV. NO.
Jersey Central	L. Rogers	10/25/76	13 · 620-0006	109	00

VENDOR	P.A. NO.	PART NO./TASK NO.	GROUP NO.	SEQ. NO.
		23	02	00

TITLE (MAX 30 CHARACTERS)
RPS - RTD Retest Data

PROBLEM CONTACT
W. D. Corbin

PROBLEM IDENTIFICATION

DESCRIPTION OF PROBLEM:

See attached GPU Problem Report #2066

STATUS-ACTION TO DATE, INCLUDING PERSONS CONTACTED:

None

FURTHER ACTION RECOMMENDED BY SITE PERSONNEL:

Provide required retest data

RESOLUTION

RESOLUTION: The R.T.D's were retested, reworked with a design improvement retested with the following results.
(See following Page for results)

PREPARED BY	DATE	APPROVED BY	DATE
Gregory M. Bennetzen	3-9-77		
REVIEWED BY	DATE		
[illegible] for R.R. Evinson	3/9/77	L R Pletke	3/14/77

COST CATEGORY	FIELD CHANGE REQ	F.C.A. NO.	SIGNIF. DEFICIENCY
☑ NORM ☐ OTHER	☐ YES ☑ NO	04-	☐ YES ☒ NO

COMPLETION

SITE COMPLETION REPORT:

[illegible]

DEVIATIONS:
☐ NONE SPR REV NO. ☐

DATE COMPLETED:

COMPLETED BY DATE

SHEET OF

TMI NUCLEAR STATION - GPU STARTUP PROBLEM REPORT 2066

SYSTEM RPS RTD's MTX 151

T.P. NO. N.A. TMI UNIT 2

ORGANIZATION SERIAL NUMBER —

PROBLEM DESCRIPTION:

See PR #2016.

Loop Th RTD's have been sent back for re-testing.

B&W to provide retest data as specified in GPU letter TMI-2/2603.

BY M.A. Nelson

ORGANIZATION GPU SUPT

cc: I.D. Parker
J.A. Trummer

DATE 8/2/76

FOR RESOLUTION BY B&W - L.C. ROGERS DATE SENT 8/2/76

PROPOSED RESOLUTION: The RTD's were retested following a design improvement and the lme response test results are:

S/N	RUN 1	RUN 2	RUN 3	AVE
3670	6.5 SEC	6.3 SEC	6.6 SEC	6.46 SEC
3667	6.2 SEC	6.5 SEC	6.5 SEC	6.4 SEC
3674	5.8 SEC	6.1 SEC	6.0 SEC	5.96 SEC
3672	5.975 SEC	5.75 SEC	5.95 SEC	5.891 SEC

L&R

BY C.E. Brown

DATE 3/21/77

FOR ACTION BY — DATE SENT —

COMPLETED ACTION:

Additional information requested in GPU letter TMI-2/2603 answered by B&W letter Heward from Hard/Fletke dated 5/24/77 (attached).

ACTION COMPLETED SATISFACTORILY - BY

DATE

SYSTEM RPS RTD's MTX 151

T.P. NO. N.A. TMI UNIT 2

ORGANIZATION SERIAL NUMBER —

PROBLEM DESCRIPTION:

See PR #2046.

Loop T, RTD's have been sent back for re-testing.

B&W to provide retest data as specified in GPU letter TMI-2/2603.

BY M.A. Nelson

ORGANIZATION GPU SUPT

DATE 8/21/78

cc: I.D. Porter
T.A. Brunmer

FOR RESOLUTION BY B&W - L.C. ROGERS DATE SENT 8/21/78

PROPOSED RESOLUTION:

BY

DATE

FOR ACTION BY DATE SENT

COMPLETED ACTION: THE RTD'S WERE retested, Recovered with a design improvement retested with the following results

Data from Rosemount indicates the following time response:

S/N	RUN 1	RUN 2	RUN 3	AVE
3670	6.5 SEC	6.3	6.6	6.46 SEC
3667	6.2	6.5	6.5	6.4 SEC
3674	5.8	6.1	6.0	5.96 SEC
2672	5.975 SEC.	5.75 SEC	5.95 SEC.	5.891 SEC

L. McBee

ACTION COMPLETED SATISFACTORILY BY

DATE

Babcock & Wilcox

Bailey Meter Company, U.S.A.

29801 Euclid Avenue, Wickliffe, Ohio 44092
Telephone: (216) 943 5500
Telex: 980621 – Cable: Bailymeter

February 25, 1977

JC-BMBW-77-021

The Babcock & Wilcox Company
P. O. Box 1260
Lynchburg, Virginia 24505

Attention: Mr. D. M. Turner

Customer: Jersey Central Power & Light Company
Three Mile Island Unit No. 2
B&W Order No.: 80812Z
B&W Contract No.: 620-0006
BMCo. Job No.: 1595L

Subject: Rosemount 177HW RTD Time Constant Test

Gentlemen:

The fourth 177HW RTD Serial Number 3672 has successfully passed the time constant test, data as follows:

Run 1	Run 2	Run 3	Avg.
5.975 sec.	5.75 sec.	5.95 sec.	5.891

Please be advised the Bailey Meter Company Q.A. inspection is scheduled for the week of February 28, 1977.

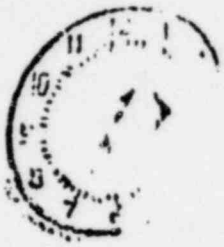
Sincerely,
BAILEY METER COMPANY

G. A. Major, Project Engineer
R. P. Burnett, Sr. Program Manager
Nuclear Programs Office

GAM:plb

LHcc: L. R. Pletke
L. McBee

NC: BJ Shepherd
LH Williams
JAN 27 77



BABWILCOX LURG

BAILYMTR WICK
JAN 27 77
ATTN D M TURNER
RE JCP &L
177HW

DATA FROM ROSEMOUNT INDICATES ~~ARE~~ FOLLOWING TIME RESPONSE

S/N	RUN1	RUN2	RUN 3	AVE
3670	6.5 SEC	6.3	6.6	6.46 SEC
3667	6.2	6.5	6.5	6.4 SEC
3674	5.8	6.1	6.0	~~5.MOY~~ SEC 5.96
(3672)	7.8	7.8	7.8	7.8 SEC

(S/N 3672) PICKED UP MOISTURE DURING TESTS PROCEEDING THE 10 AND WAS
OVEN DRIED OVER THE WEEKEND. I PASSED IR TESTS PER SPEC AND WAS ADJUS
TO TIME CONSTANT WITH RESULTS LISTED

VENDOR INDICATES 60 TO 75 PERCENT PROBABILITY OF PASSING TO HIT
NOGUARANTEE YOUR IMMEDIATE RESPONSE IS REQUESTED

R V BREWSTER
CC: L R PLETKE
L MC BEE
COR. INE 7 IS 5.96

BABWILCOX LURG

BAILYMTR WICK
T

bcc: L. R. Pietke
NSS-6, 12-A, T 1.2
NSS-6, Reading File

Babcock&Wilcox

P.O. Box [illegible] Lynchburg, Va. 24505
Telephone (804) 384-5111

May 24, 1977

Mr. R. W. Heward, P.M.
GPU Service Corporation
Interpace Building
Parsippany, N. J. 07054

Subject: Three Mile Island Nuclear Station, Unit #2
RTD Retest
B&W Reference, NSS-24

Reference: GPU letter TMI-2/2603

Dear Mr. Heward:

The reference letter requested re-testing of the Hot Leg 177HW RTD's to determine or to validate their response time. The RTD's have been reworked and re-tested by Rosemount and have been returned to the site and installed.

Each RTD was tested with its matching well and bridge. The RTD's were tested without the use of "Never-Seez" on the tip of the element. The "Never-Seez" compound has the effect of improving the time constant of a unit under initial test, but may degrade with irradiation such that the time constant would also be degraded.

The RTD's as shipped from the site, did not meet the response time criteria. The tips of the RTD's were modified to provide machined thread contact between RTD and well. The reworked RTD's were re-tested and the measured time constants were acceptable.

The tests were run with the two elements in each RTD connected together, so the data is a composite time constant for the two elements. We had intended that the data be taken for each element, but Rosemount did not do what they were supposed to do.

The procedure for response time testing the RTD's used a high speed thermocouple to mark the start of the transient. This method was verified by B&W in an earlier test program for the TMI-1 RTD's.

Babcock&Wilcox

Mr. R. W. Heward, P.M.
GPU Service Corporation

Subject: RTD Retest -2- May 24, 1977

If you have further questions on this, please advise.

Yours very truly,

E. G. Ward
Senior Project Manager

L. R. Pletke

By:
L. R. Pletke
Project Manager

LRP:EWH

CC: Gooden Gray, New York Sales
R. C. Cutler, GPU
R. J. Toole, GPU
L. C. Rogers, Site

NSS- 9
SPR 107

TITLE ELECTROMATIC RLF VLV MALFUNC.

RELATED SPRs

This SPR has been reviewed by Task Engineering Groups and is applicable to NSS- 00. The following is the status and/or resolution of this SPR on other contracts.

REMARKS

The occurrence on this SPR is possibly generic to other plants. It has been taken care of by Ken Wandling writing an SIP to all sites to maintain an inspection of these moving parts. The writing of this SIP should satisfy the generic concerns of this problem. DONE 7/15/75

RLP
7/16/75

NSS-

SITE PROBLEM

REPORT TRANSMITTAL

**** CLEARED ****

TO: _____ For Information

Central Engineering Files

C. C. Plunkett - Contract Admin.

S. H. Klein - Quality Assurance

R.G Burnley - Task Engineer

CA Creacy - Project Manager

FILE: 12M2

CONTRACT NO: 620-00 09

SPR 107

TITLE Electramatic Relief Valve Mal-Function

DATE: 11-21-75

The attached, cleared SPR is submitted for your information.

TO: _____ E. L. Logan - FLORIDA _____

_____ L. C. Rogers - MET.ED. _____

_____ R. J. Baker - TOLEDO _____

_____ B. L. Day - Intl. Support _____

_____ P. E. Perrone - OFR _____

Attached is one copy of Site Problem Report No. 107 which was processed on Contract 620-00 09. Future contracts have been reviewed for the potential of a similar problem. This problem [redacted] is not considered applicable to other contracts _____.

REMARKS: _____

cc: G. M. Jacks - Plant Integration

This SPR has been reviewed IAW NPG-1707-01

Miles VanDiver

NUCLEAR SERVICE SUPPORT ENGINEER

CLEARED

1091-4 (2-75)

SITE PROBLEM REPORT

BABCOCK & WILCOX

CUSTOMER Oconee III	CONTRACT NO. NSS-09	SPR NO. 107	REV.NO.
VENDOR Dresser P.O. NO. 20158LS	TASK NO. 28	GROUP NO. 41	SEQ.NO. 003
SITE ENGINEER F.G.Grisbaum	REQ'D RESOL DATE	REQ'D COMP. DATE For info only	

TITLE ELECTROMATIC RELEIF VALVE MALFUNCTION

DESCRIPTION OF PROBLEM On Friday, June 13th, Duke reduced power to 12% FP in preparation to cold shutdown for RCP seal replacement. During the transition from turbine to turbine bypass the primary system experienced a pressure transient to 2267 psig. The power relief valve actuated at 2257 psig and failed to close. This caused the Quench Tank rupture disc to rupture. Failure to promptly close the power relief isolation valve caused violations of the fuel compression curve, cooldown rates and RC pumps NPSH curve. Inspection of the power relief valve after shutdown indicated that the pilot valve lever had remained in the ported position preventing the main valve from reseating. Restraint of the lever was caused by corrosion of the lever pin, lever hinge and solenoid bracket.

STATUS - ACTION TO DATE INCLUDING PERSONS CONTACTED
JT Janis, NSD, Lynchburg, KR Ellison, NSD, Lynchburg, advised of problem. Valve has been repaired (6/20/75) and reinstalled. Repair was effected by increasing the clearance for the lever pin in both the solenoid bracket and the lever hinge bearing points. Valve pilot disc and seat were refurbished to achieve tight seating.

FURTHER ACTION RECOMMENDED BY SITE PERSONNEL

Sites be advised to conduct periodic inspection/operation of valve to insure operability. When plant shuts down, perform manual/visual checks for freedom of motions.

INITIATOR SIGNATURE	DATE	SUPERVISOR SIGNATURE	DATE
F.G. Grisbaum	6-27-75	Glad T. Flanagan	6/27/75

RESOLUTION

RESOLUTION See further action.

SITE INSTRUCTION ISSUED ADVISING INSPECTIONS TO PREVENT PROBLEM FROM OCCURRING AT OTHER SITES.

APPROVED BY	SIGNATURE	DATE
N.S. SUPPORT ENGINEER		7/21/75
TASK ENGINEER /N.S. UNIT MANAGER	K C Ellison	11/14/75
PLT.START-UP MGR/SERV. & MAINT. MGR.		
PROJECT MANAGER/ CONTRACT ENGINEER	C. A. Cray	7-22-75

COST CATEGORY ☐ NORM ☐ C ☐ D ☐ G ☐ L ☐ VENDOR CLAIM

AUTH. CHARGE NO. ☐ FIELD CHANGE REQ FC NO:

COMPLETION

SITE COMPLETION REPORT F.C. NO 113 issued 12/1/76 C A Cray

DEVIATIONS ☐ NONE ☐ SEE SPR REV. NO. ____

DATE COMPLETED [illegible] SIGNED BY C. A. Cray

S.O.M./CONST. REP. APPROVAL C. A. Cray DATE 11-14-75

SHEET 1 OF

SITE PROBLEM

REPORT TRANSMITTAL

**** CLEARED ****

TO: Change Control For Distribution
S. M. Klein - Quality Assurance
Central Engineering Files
L.T. SCHLOMER Task Engineer
L.R. PLETKE- Project Manager

FILE: 13-6-148
CONTRACT NO: 620-00 06
SPR 148
TITLE I.C. Cooling Relief Valve Setting
DATE: 11-28-77
STATUS CODE C

	~~E. D. Logan - FLORIDA~~		L.P. KING c.c. 356
	L. C. Rogers - MET. ED.		
	F. R. Faist - TOLEDO		
	J. R. Bohart - Intl. Support		
	J. L. Donnell - OFR		
	B. A. Karrasch - Plant Integration		

Attached is one copy of Site Problem Report No. 148 which was processed on Contract 620-00 06. Future contracts have been reviewed for the potential of a similar problem. This problem ~~is~~/is not considered applicable to other contracts.

REMARKS:

Glenn Z Rice
NUCLEAR SERVICE SUPPORT ENGINEER

CLEARED

PDS-2107-(E-76)

SITE PROBLEM REPORT

BABCOCK & WILCOX

CUSTOMER	ORIGINATOR	DATE	DOC. ID.	CONT. NO.	SPR NO.	REV. NO.
Jersey Central	L. Rogers	10/18/77	13	620-0006	148	0

VENDOR	P.A. NO.	PART NO./TASK NO.	GROUP NO.	SEQ. NO.
B&W	022007	41/043/001,002		

TITLE (MAX 30 CHARACTERS)
Intermediate Cooling Relief Valve Setting

PROBLEM CONTACT
L. L. Losh

PROBLEM IDENTIFICATION

DESCRIPTION OF PROBLEM:

SEE ATTACHED

STATUS-ACTION TO DATE, INCLUDING PERSONS CONTACTED:

Bob Burnley - B&W
Bob Williamson - B&W

FURTHER ACTION RECOMMENDED BY SITE PERSONNEL:

SEE ATTACHED

RESOLUTION

RESOLUTION:
SEE ATTACHED RESOLUTION (SHEET 3 of 3)

PREPARED BY	DATE	APPROVED BY	DATE
Dennis J Rice	10-28-77		
REVIEWED BY	DATE	L R Plethe	10/31/77
L. V. Filippi	10-28-77		
Joseph A Sebastian	10/28/77		

COST CATEGORY	FIELD CHANGE REQ	F.C.A. NO.	SIGNIF. DEFICIENCY
☐ NORM OTHER ☐	☐ YES NO ☒	04-	☐ YES NO ☒

COMPLETION

SITE COMPLETION REPORT:
Burns & Roe Notified of Acceptability of Ordering New Valves for 175°F and Potential Design Deficiencies via SOM-E-079 (Attached).

DEVIATIONS:
☐ NONE SPR REV NO. ☐

DATE COMPLETED: 11-23-77

COMPLETED BY DATE

2 OF 4 1 of 3

DESCRIPTION OF PROBLEM

The present setting for the IC relief valves at the Letdown Cooler is 150 psig. During operation, with both IC pumps (when the running IC pumps is swaped with the idle pump), system pressure is approximately 162 psig, lifting these reliefs. Burns & Roe has requested concurrence in replacing these relief valves with 175 psig valves. However, in the unlikely configuration of no flow and surge tank isolated, the IC coolers could be overpressurized in the event of a letdown cooler tube leak (150 psig design maximum with 150 psig relief valves). The IC coolers are located approximately 23 feet above the letdown coolers. The relief valves at the letdown coolers are sized for 234 gpm saturated water or 32,600 lb/hr saturated steam minimum. The relief valves at the IC coolers are sized for 2 gpm minimum. Please note that the IC system design pressure is 175 psi as per DP 1101-01, Plant Limits & Precautions, but the IC cooler pressure is only 150 psig.

FURTHER ACTION RECOMMENDED BY SITE PERSONNEL

1. Resolve discrepancy in Plant Limits & Precautions
2. Resolve relief valve setting - Potential solutions include:

   a. Accept small risk of overpressurization of IC cooler and increase LD relief to 175 psig as requested.
   b. Increase size of RV's @ IC and increase RV's @ LD cooler to 175 psig as requested.
   c. Alter system configuration to reduce system pressure
   d. Requalify IC's to 175 psig.

Resolution to SPR-148 - NSS-6

The Intermediate Cooling (IC) System as supplied to Jersey Central consisted of various coolers, pumps, valves, etc. and a preliminary design outlay for the system. Burns and Roe (B&R) has built the system using their final design analysis. Recently, various questions have surfaced involving the adequacy of system design and raising the relief valve setting on the letdown cooler shell side.

In regard to the letdown cooler shell side relief, this valve may be reset to 175 psig assuming that the subsystem bounded by the letdown cooler IC inlet and outlet valves are designed for 175 psig. This relief valve must meet the worst case requirements as previously specified by B&W. This relief should not be relied upon to protect the system beyond the boundaries of the letdown cooler inlet and outlet valves. If the assumption is made that this relief will protect other areas of the system, B&W cannot recommend resetting the relief valve.

After performing a preliminary design review of the IC system it has been concluded that there may be a design deficiency in regard to the situation where the IC coolers are placed on a shutoff head which could occur if the IC cooler discharge was inadvertently closed with the inlet valve open. Under this condition, assuming that the surge tank is full and using the highest pressure value from the IC pump curves, the discharge head of the IC pumps will approach 403 ft. of head (174.7 psig). Using the various elevations of the IC System layout, the head at the letdown coolers will be approximately 424 ft. (183.8 psig) and at IC cooler (1C-C1B) - the cooler subject to the highest head - will be approximately 401 ft. (173.8 psig). In other words the pressure at the IC cooler will reach 115.8% of the design pressure of 150 psig. Burns and Roe should verify that this situation which the IC cooler may be subjected to does not violate Section VIII of the ASME Boiler and Pressure Vessel Codes.

If after verifying system adequacy in relation to the ASME Code, it is determined that the pressure at the IC coolers is excessive, action should be taken to lower the pressure. This may be accomplished by lowering the surge tank or possibly interlocking the IC cooler outlet valve to the inlet valve to prevent this situation.

Another possible solution is to increase the capacity of the IC cooler relief so that its flowrate would create adequate head loss in the upstream components to prevent violating the ASME Section VIII Code guidelines on the IC cooler. A relief such as this should have its outlet directed to the surge tank to conserve water and minimize system damage.

This possible deficiency in the IC System which was caused due to the surge tank being installed at an elevation of 354 ft. versus the approximately 333 ft. top on a previous B&R drawing was reported to J. Riddington of Burns and Roe in 1972. It appears that this problem has not been addressed and consideration should be made to address this problem.

DP 1101-01 presently states that the maximum allowable pressure of the IC System is 175 psig. The most limiting component (IC coolers) is designed for 150 psig, therefore, DP 1101-01 should indicate a maximum allowable system working pressure of 150 psig.

Babcock&Wilcox
Power Generation Group
P.O. Box [illegible], Lynchburg, Va. 24505
Telephone: (804) 384-5111

November 17, 1977

GOM-77-079

Mr. R. J. Toole
Test Superintendent
GPU Service Corporation
Post Office Box 480
Middletown, PA 17057

Mr. L. L. Lawyer
Manager, Generation Operations
Metropolitan Edison Company
Post Office Box 542
Reading, PA 19603

Mr. G. P. Miller
Station Superintendent
Metropolitan Edison Company
Post Office Box 480
Middletown, PA 17057

Subject: Intermediate Closed Cooling System

Gentlemen:

Recently, a GPU Problem Report was released requesting B&W concurrence with a Burns & Roe recommendation to raise the settings of the relief valves at the letdown coolers. During the two pump operation, when the running pump is swapped with the idle pump, the pressure at the letdown cooler was found to be approximately 162 psig, thereby lifting the 150 psig relief valve. Since the letdown cooler shell side design pressure is 200 psig, the change from 150 to 175 psig has been approved. It should be noted, however, that the intermediate cooler has a design pressure of 150 psig and, therefore, is the limiting component. If the assumption is made that the relief valve on the letdown cooler will protect other areas of the IC system, B&W cannot recommend resetting the relief valve.

While investigating the IC system for this request, a number of potential problems have been identified. These problems, as listed below, are due to overall system operating pressures which are too high as a result of improper placement of the IC surge tank. In 1972, J. Riddington of Burns & Roe was alerted to the potential problem associated with locating the IC surge tank at the 368 foot elevation rather than the recommended 333 foot elevation.

R. J. Toole
L. L. Lawyer
G. P. Miller

11/17/77

1. Relief valves for CRDM coolers, IC coolers, RC pump seal coolers and the steam generator hot drain coolers are set for 150 psig. Since operation with both IC pumps is required when both letdown coolers are in service, these relief valves will be in jeopardy of relieving continuously when operating in this manner.

2. Placement of the IC System on the pump shutoff head (by closing the IC cooler outlet with the inlet open) could overpressurize IC components by 111% to 123% of design.

Burns & Roe should investigate these potential design deficiencies to ensure adequate protection of the system components as well as proper performance for all anticipated modes of operation.

An additional question on the IC System, unrelated to the previous concerns, has been raised regarding the relieving capability of the relief valve in the letdown cooler. As stated in a letter from E.G. Ward, B&W, to R.J. Dobbs, Burns & Roe, dated March 22, 1972, this valve should have the capability of relieving a saturated water/steam mixture @ 150 psig. The total combined flow to be relieved is 234 gpm saturated water and 32,600 lbs/hr saturated steam.

If you have any further questions, please do not hesitate to contact me.

Very truly yours,

L. C. Rogers
Site Operations Manager

LCR/LLL/bay

cc: L. R. [illegible]
W. H. Spangler
R. P. Williamson
J. G. Herbein
R. M. [illegible]
R. P. [illegible]

POOR ORIGINAL

(File)

SITE PROBLEM REPORT

RESOLUTION TRANSMITTAL

To: Change Control — For Distribution
S. H. Klein — For Information
B. A. Karrasch — For Information
L.C. Rogers — For Action
_____ — All Affected Task Engineers
S.P. Maingi — For Information
_____ — All Affected Engineering Unit Managers

File: 13- 06 - 183
Contract No.: 620-00 06
SPR Number: 183 Rev 0
Title: RC-RV2 FAILED OPEN REACTOR TRIP E
Status Code: R
Date Of Transmittal: 2/20/79

Action Requested: No action is requested from B&W by the Customer. Lee Rogers is requested to please clear this SPR.

Reply and Return This Transmittal to: Mike Dicken x3166

Nuclear Service Support Engineer

CC: J. R. Bohart - International Support
P. E. Perrone - OFR
L. C. Rogers - TMI Site
B. W. Street - Oconee Site
D. A. Lee - TECo Site

SITE PROBLEM REPORT

BABCOCK & WILCOX

CUSTOMER	ORIGINATOR / DATE	DOC. ID. CONT. NO.	SPR NO.	REV. NO.
Jersey Central	L. Roger [illegible] 10/78	13 - 620-0006	183	0
VENDOR	P.A. NO.	PART NO. / TASK NO.	GROUP NO.	SEQ. NO.
Bailey Meter Company		53-001-001		
TITLE (MAX 30 CHARACTERS)		PROBLEM CONTACT		
RC-1/2 Failed Open: Reactor Trip I		S. P. Maine		4/20/78

PROBLEM IDENTIFICATION

DESCRIPTION OF PROBLEM:

SEE ATTACHED

STATUS-ACTION TO DATE, INCLUDING PERSONS CONTACTED:

SEE ATTACHED

FURTHER ACTION RECOMMENDED BY SITE PERSONNEL:

SEE ATTACHED

INFORMATION ONLY

RESOLUTION

RESOLUTION: BURNS & ROE MADE CHANGE TO CLOSE VALVE ON LOSS OF POWER. B&R ISSUED ENGR. CHANGE MEMO TO HAVE CHANGE MADE. NO FURTHER ACTION IS REQUIRED FROM B&W. (FROM BOB CUTLER - GPUSC). LRPLETKE

PREPARED BY	DATE	APPROVED BY	DATE
REVIEWED BY	DATE		

	COST CATEGORY	FIELD CHANGE REQ	F.C.A. NO.	SIGNIF. DEFICIENCY
	☐ NORM OTHER ☐	☐ YES NO ☐	04-	☐ YES NO ☐

COMPLETION

SITE COMPLETION REPORT:

DEVIATIONS: ☐ NONE SPR REV NO. ☐

DATE COMPLETED:

COMPLETED BY DATE

DESCRIPTION OF PROBLEM

On 29 March 1978 at 1437 hours, the TMI-11 reactor tripped on pumps power trip followed by rapid depressurization of the Reactor Coolant System. The reactor coolant low pressure trips annunciated within 73 seconds and the emergency HP injection started in about 2 minutes following the reactor trip.

The cause of the trip was traced to deenergizing of vital power supply 2-1V.

(a) Vital Bus 2-1V feeds the RCP-1A monitoring circuit. Since RCP-2A was already down for clutch repairs, the loss of power to the RCP-1A monitoring circuit registered no pumps operating in "A" loop and hence the signal to trip the reactor.

(b) Vital Bus 2-1V also supplies power to the X bus for non-nuclear instrumentation. Because of loss of X bus to NNI, the electromagnetic relief valve, RC-RV2, received an open command, which initiated a rapid system depressurization.

(c) The electromagnetic relief valve, RC-RV2, does not have valve indication in the Control Room, so the Control Room operator was unware that RC-RV2 had opened; hence, the operator did not take the remedial action of closing the electromagnetic relief valve isolation valve, RC-V2.

(d) There exists an apparent anomaly in the logic for the operation of NaOH tank valves connected to BWST lines that feed the MU pumps suction. Due to this logic, NaOH was fed into the suction lines of MU pumps during the high pressure injection, which ensued after rapid depressurization.

(e) The circumstances which led to the deenergization of vital power supply 2-1V are enumerated in the Met-Ed Reactor Trip Report (copy attached for reference).

STATUS - ACTION TO DATE.

GPU/Met-Ed are sorting the related problems as follows:

(a) The reactor building isolation and cooling surveillance procedure is being revised to the effect that they do not disconnect the alternate source of power to vital buses.

(b) The logic for operating NaOH tank valves during HP injection is being reconsidered. The Reactor Coolant System chemistry was brought back to specifications.

(c) The electromatic fail open logic is being questioned.

Tom Scott of Nuclear Service and Bob Burris of Control Analysis were informed. The apparent consensus was that the electromagnetic relief valve should not fail open but should fail closed. In the safety analysis, no credit was taken for the relieving capability of the electromagnetic valve. The code safety valves exist to take care of the pressure transients.

On request by Ron Toole, GPU Test Superintendent, a logic change was suggested to GPU after consulting Doug Kemp of Engineering. A copy of GPU Problem Report 2718 is attached for reference.

It was also suggested that RC-RV2 open-close signal status lamp be wired to operator console. Burns & Roe is working on this aspect.

FURTHER ACTION RECOMMENDED BY SITE PERSONNEL

As requested by Ron Toole, a formal field change is being issued to modify the fail open logic of RC-RV2, and the desirability of having the key switch in NNI cabinets at location 4-5-14 for testing auto operation of RC-RV2 should be reconsidered.

THREE MILE ISLAND NUCLEAR STATION

GPU STARTUP PROBLEM REPORT

GPU NUMBER 2716

ORGANIZATION SERIAL NUMBER

TMI UNIT 2

SYSTEM: RCS

TP NO. MTX NO. 147

PROBLEM DESCRIPTION: The electromatic relief valve opens on loss of power to its control bystable. Suggest changing this or providing an indication on control Panel that indicates valve has an open signal.

BY: A. Tola

ORGANIZATION: GPU

DATE: 3-30-78

FOR RESOLUTION BY: B&W - Powers DATE SENT: 3-30-78

PROPOSED RESOLUTION:

SEE ATTACHED

BY: Spring

DATE: 4-2-78

FOR ACTION BY: B&R - Brownell DATE SENT: 4-3-78

Pri 1 - to issue ECN to accomplish

ACTION COMPLETED SATISFACTORILY BY:

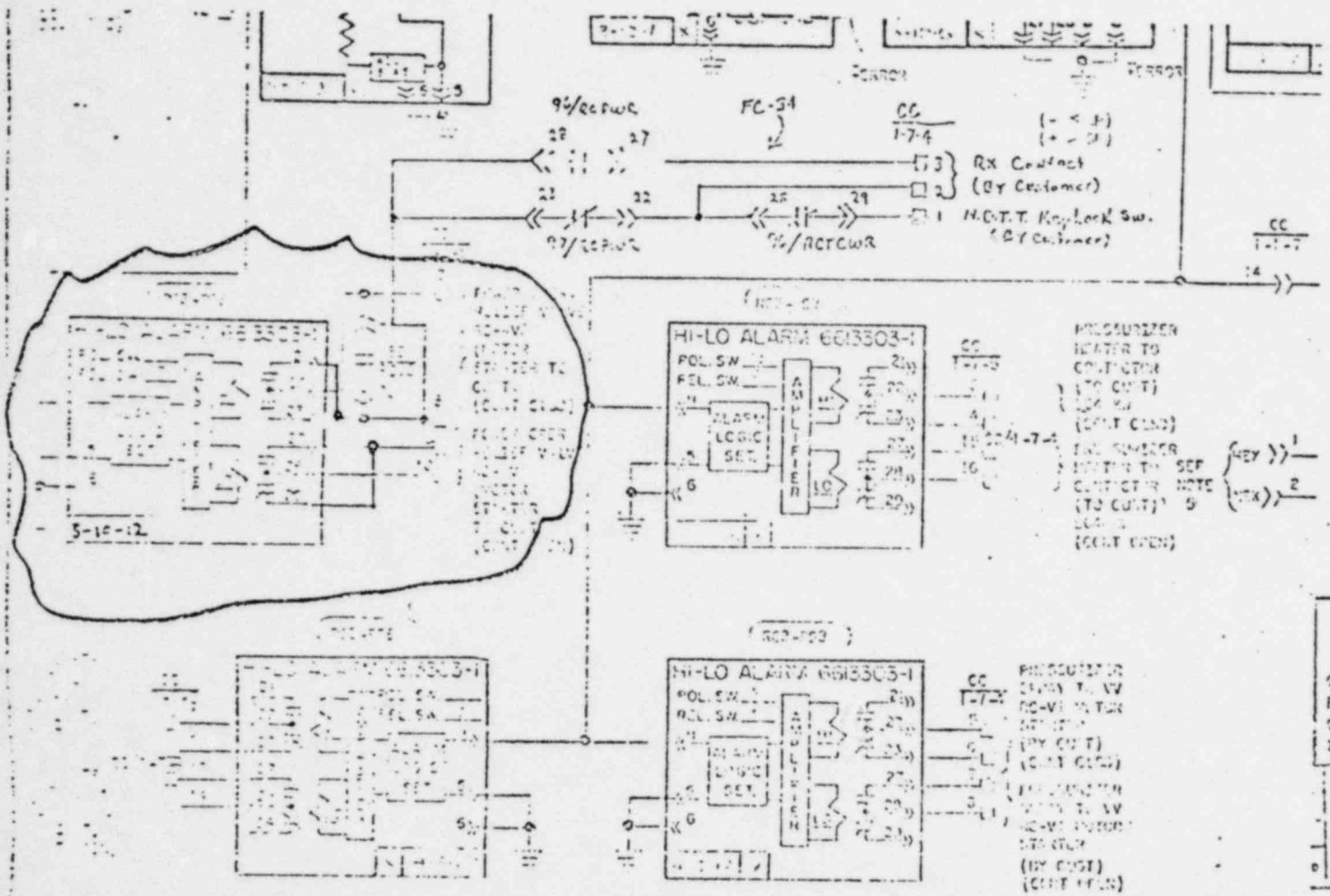
DATE:

PROPOSED RESOLUTION

B&W has reviewed the electromatic relief valve logic and agrees to the concept of having relief valve fail closed on loss of NNI power supply to the Hi-Low Monitor (3-10-12). To achieve this condition, switch S-1 should be in the deenergized mode and the wiring modification be made as indicated in the attached sketch. Per your request, a formal field change will follow.

To provide an indication that the electromatic relief valve has an open signal, a review of the construction schematics indicates that a control room indicating light operated from power to the solenoid can be added without additional cabling. (Refer to B&R drawing #3079, sheet 14.) This light could be actuated by the same auxiliary relay in the power distribution panel that supplies power to the valve solenoid.

1. Change switch S-1 position to deenergized in module 3-10-12
2. Lift lead from pin 23 of module 3-10-12 and connect to pin 21
3. Lift lead from pin 27 of module 3-10-12 and connect to pin 29



REACTOR TRIP REPORT #

1. Time 1937 Date 3-21-78

2. Cause of trip.
Fuse blew on 2-1Y inverter de-energizing RCP monitor. RCP-2A already stopped so RPS saw both pumps stopped in "A" Loop

3. Plant conditions prior to trip

Power Level 4 x 10^{-9} Amps
Reactor Coolant System Pressure 2220 psig
Tave 535 °F
Reactor Coolant System Flow 68% %
Makeup Tank Level 39 inches
Pressurizer Level 95" inches H_2O
BC Boron 1494 ppm.
FPD 0

Control Rod Positions (withdrawn)

Group 1 100 % Group 3 100 % Group 5 100 % Group 7 83 %
Group 2 100 % Group 4 100 % Group 6 83 % Group 8 100 %

ICS Stations in Hand All excepept turbine bypass and SU FW Valves.

4. Evolutions in progress prior to trip.
ISOTHERMAL TEMP coeff determination

5. Corrective actions to prevent reoccurrence.
Fix fuse blowing problem on Inverters

6. Time and date next criticality achieved.

M. L. Bass
Shift Supervisor

Supervisor of Operations

13:48:43:833	3073	COND VAC TRIP VA-P-1A	TRIP
14:37:26:000	3195	RP RED CH PWR/PMPS TRIP	TRIP
14:37:26:005	3196	RP YELLOW CH PWR/PMPS TRIP	TRIP
14:37:26:023	3198	RP BLUE CH PWR/PMPS TRIP	TRIP
14:37:26:039	3175	RP RED CH RC HI PRESS TRIP	HIGH
14:37:26:075	3207	RP RED CH CONT MON PS FAULT	FALT
14:37:26:098	3197	RP GREEN CH PWR/PMPS TRIP	TRIP
14:37:26:119	3191	RP RED CH PWR/BAL/FL TRIP	TRIP
14:37:26:151	3179	RP RED CH RC LOW PRESS TRIP	LOW
14:37:26:175	3183	RP RED CH PRESS-TEMP TRIP	TRIP
14:37:26:178	3203	RP RED CH RC HI TEMP TRIP	HIGH
14:37:26:192	3195	RP RED CH PWR/PMPS TRIP	TRIP
14:37:26:204	3187	RP RED CH OVERPOWER TRIP	TRIP
14:38:39:166	3182	RP BLUE CH RC LOW PRESS TRIP	LOW
14:38:39:709	3181	RP YELLOW CH RC LOW PRESS TRIP	LOW
14:38:46:812	3180	RP GREEN CH RC LOW PRESS TRIP	LOW
14:39:18:333	3166	ES ACT B EMER INJ BT3 CH TRIP	TRIP
14:39:18:335	3163	ES ACT A EMER INJ BT3 CH TRIP	TRIP
14:39:25:589	3162	ES ACT A EMER INJ BT2 CH TRIP	TRIP
14:39:25:591	3165	ES ACT B EMER INJ BT2 CH TRIP	TRIP

GROUP 4
15:34:11
03/29/78

SEQUENCE OF EVENTS REVIEW

14:41:38:854	3164	ES ACT B EMER INJ BT1 CH TRIP	TRIP
14:41:38:884	3161	ES ACT A EMER INJ BT1 CH TRIP	TRIP
14:41:38:905	3179	RP RED CH RC LOW PRESS TRIP	LOW
14:41:39:670	3195	RP RED CH PWR/PMPS TRIP	TRIP

1A 2A 1B 2B

2-IV

14:00:01 03/29/78

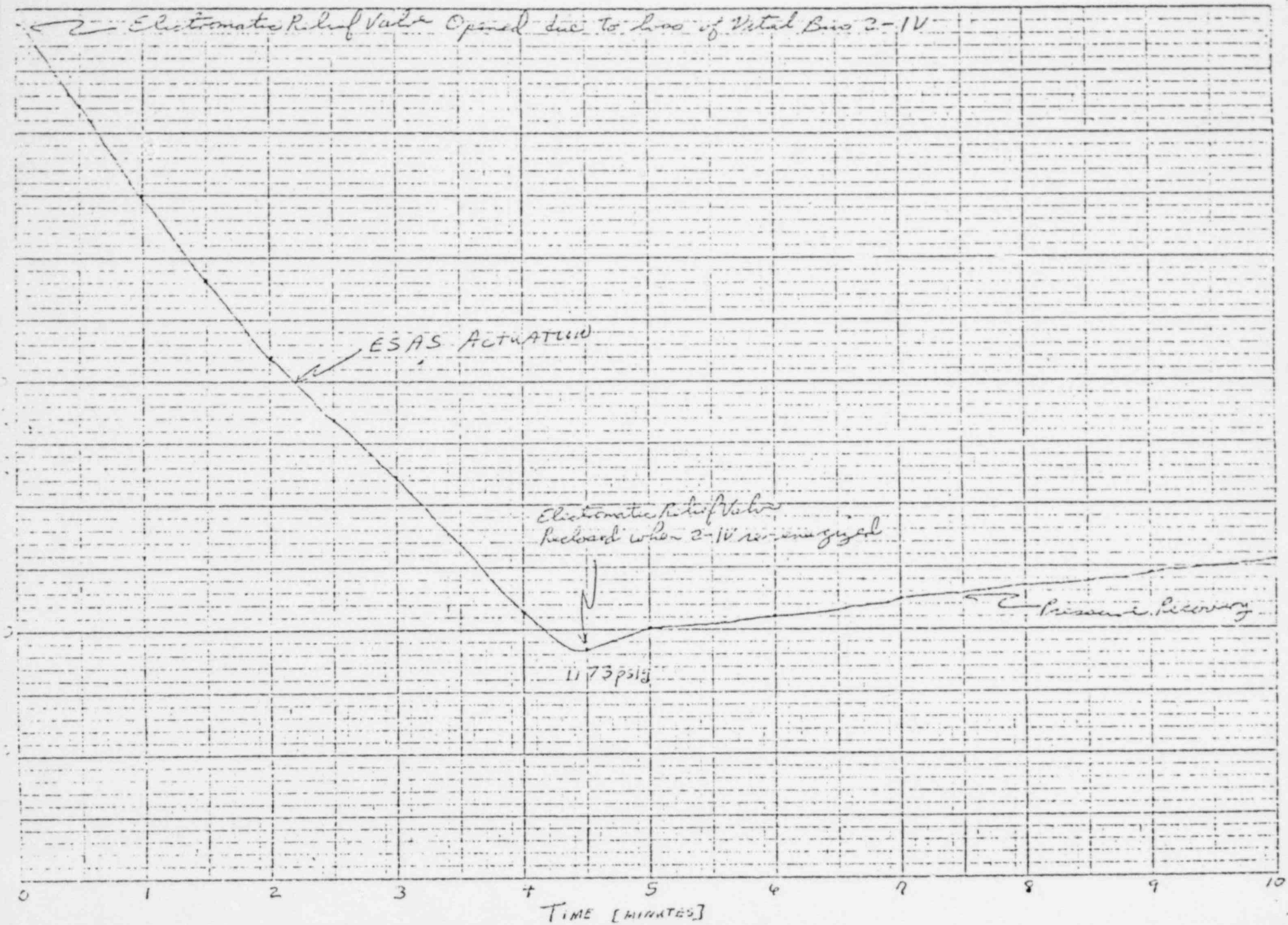
14:55:09	NORM	0035	DR CLR 1B TO COND II FL(KLB/H)	0
14:12:40	CONT	2825	ES ACT A BLDG INSLN MNL TEST GP2	TEST
14:12:48	CONT	2825	ES ACT A BLDG INSLN MNL TEST GP2	NORM
14:26:40	CONT	2825	ES ACT A BLDG INSLN MNL TEST GP2	TEST
14:27:00	CONT	2825	ES ACT A BLDG INSLN MNL TEST GP2	NORM
14:27:16	BAD	0486	SP FDWTR VLV TRAIN B DP (PSI)	-???.?
14:27:40	LOW	0003	SP STM GEN B S-U RANGE LVL (IN)	23.9
14:29:46	NORM	0486	SP FDWTR VLV TRAIN B DP (PSI)	183.2
14:29:57	NORM	0003	SP STM GEN B S-U RANGE LVL (IN)	26.5
14:30:16	BAD	0486	SP FDWTR VLV TRAIN B DP (PSI)	-???.?
15:25:46	FLAG	3576	SP10A-PT4 INSTR CONDITION	GOOD
15:24:48	FLAG	3575	SP10A-PT3 INSTR CONDITION	BAD
15:24:48	FLAG	3577	SP10B-PT3 INSTR CONDITION	BAD
15:26:29	NORM	0486	SP FDWTR VLV TRAIN B DP (PSI)	183.2
15:29:31	BAD	0006	RP AVERAGE LINEAR POWER (PCT)	-???.? ← 14:37
15:29:31	CONT	2871	RP CH A POWER SUPPLY	TRBL
15:29:31	CONT	2875	RP CH A FAN	FAIL
15:29:31	CONT	2883	RP CH A RCP CONT MON PS VOLTS	TRBL
15:29:32	CONT	2923	RC LOOP A PT3 PRESS < 1600 PSI	YES
15:29:32	CONT	2951	BSP A MTR COOLING WTR	TRIP
15:29:32	CONT	3003	RP CH A RCTR BLDG PRESS	HIGH
15:29:32	CONT	3010	CRD REACTOR TRIP CONFIRM	TRIP
15:29:32	CONT	3013	CRD SAFETY RODS NOT WITHDRAWN	YES
15:29:32	CONT	3016	CRD PROG LAMP FAULT	YES
15:29:32	CONT	2878	ES ACT A 2/3 LOGIC BLDG ISLN GP2	ISLN
15:29:32	NORM	0006	RP AVERAGE LINEAR POWER (PCT)	2.2
15:29:33	LOW	0581	RP PWR CH NI5 IMBALANCE(PCT)	-43.40
15:29:34	CONT	2678	PRESS HTR GROUP 5	NORM
15:29:34	LOW	0607	RP CH A POS SUPPLY OUTPUT(VOLTS)	1.92
15:29:34	HIGH	0611	RP CH A NEG SUPPLY OUTPUT(VOLTS)	- 1.55
15:29:34	LOW	0619	RP POWER RANGE HV NI5 (VOLTS)	81.
15:29:35	CONT	2676	PRESS HTR GROUP 3	NORM
15:29:40	LOW	0770	CH BOR WTR TANK LVL 2 (FTH2O)	28.31
15:29:55	LOW	0398	RC LOOP A WIDE RANGE PRESS	3.
15:29:55	HIGH	0402	RC PRESS REL VLV RV2 OUT TEMP	218.6
15:29:58	NORM	0475	SP STARTUP FDWTR FLOW A (IN/H2O)	439.2
15:31:02	CONT	2828	ES ACT A 2/3 LOGIC BLDG ISLN GP2	NORM
15:31:24	CONT	2818	ES ACT A 2/3 LOGIC EMER INJ GP1	ACT
15:31:24	CONT	2819	ES ACT A 2/3 LOGIC EMER INJ GP2	ACT
15:31:24	CONT	2820	ES ACT A 2/3 LOGIC EMER INJ GP3	ACT
15:31:24	CONT	2843	ES ACT B 2/3 LOGIC EMER INJ GP1	ACT
15:31:24	CONT	2844	ES ACT B 2/3 LOGIC EMER INJ GP2	NORM
15:31:24	CONT	2845	ES ACT B 2/3 LOGIC EMER INJ GP3	NORM
15:31:24	CONT	2925	RC LOOP B PT3 PRESS < 1600 PSI	YES
15:31:24	CONT	2934	DHP A MTR STATUS	NORM
15:31:24	CONT	2935	DHP B MTR STATUS	NORM
15:31:24	LOW	0115	DECAY HT REM PMP 1A DISCH PRESS	17.1
15:31:24	LOW	0116	DECAY HT REM PMP 1B DISCH PRESS	30.0
15:31:24	CONT	3163	ES ACT A EMER INJ BT3 CH TRIP	TRIP
15:31:24	CONT	3166	ES ACT B EMER INJ BT3 CH TRIP	TRIP
15:31:24	CONT	3241	DH REMOVAL PMP 1A	ON
15:31:24	CONT	3242	DH REMOVAL PMP 1B	ON
15:31:24	CONT	3247	DECAY HT CL CLG WTR PMP DC-P-1A	ON
15:31:24	CONT	3248	DECAY HT CL CLG WTR PMP DC-P-1B	ON
15:31:25	CONT	2740	D-G ROOM AIR CPRSR DF-P-2C	NORM
15:31:25	HIGH	0403	RC PRESS REL VLV RV1A OUT TEMP	202.4
15:31:25	HIGH	0404	RC PRESS REL VLV RV1B OUT TEMP	202.1
15:31:25	CONT	2935	DHP B MOTOR COOLING WTR	NORM
15:31:31	CONT	2924	RC LOOP A PT4 PRESS < 1600 PSI	YES
15:31:31	CONT	3162	ES ACT A EMER INJ BT2 CH TRIP	TRIP

15:31:39	NORM	0116	DECAY HT REM PMP 1B DISCH PRESS	220.0
15:31:53	CONT	2822	ES ACT A EMER INJ CH2 BYPASSED	NORM
15:31:54	CONT	2034	DHP A MTR STATUS	TRIP
15:31:54	CONT	3241	DH REMOVAL PMP 1A	OFF
15:31:54	CONT	2818	ES ACT A 2/3 LOGIC EMER INJ GP1	NORM
15:31:54	CONT	2819	ES ACT A 2/3 LOGIC EMER INJ GP2	NORM
15:31:54	CONT	2820	ES ACT A 2/3 LOGIC EMER INJ GP3	NORM
15:31:54	CONT	2823	ES ACT A EMER INJ CH3 BYPASSED	NORM
15:31:55	LOW	0099	RC LOOP A WIDE RANGE PRESS	1576.
15:31:55	LOW	0100	RC LOOP B WIDE RANGE PRESS	1539.
15:31:57	CONT	2847	ES ACT B EMER INJ CH2 BYPASSED	NORM
15:31:58	CONT	2843	ES ACT B 2/3 LOGIC EMER INJ GP1	NORM
15:31:58	CONT	2844	ES ACT B 2/3 LOGIC EMER INJ GP2	ACT
15:31:58	CONT	2845	ES ACT B 2/3 LOGIC EMER INJ GP3	ACT
15:31:58	CONT	2848	ES ACT B EMER INJ CH3 BYPASSED	NORM
15:32:21	CONT	2035	DHP B MTR STATUS	TRIP
15:32:22	CONT	3242	DH REMOVAL PMP 1B	OFF
15:33:44	CONT	2871	RP CH A POWER SUPPLY	NORM ← 2-1V ↑
15:33:44	CONT	2875	RP CH A FAN	NORM
15:33:44	CONT	2951	BSP A MTR COOLING WTR	NORM
15:33:45	CONT	3161	ES ACT A EMER INJ BT1 CH TRIP	TRIP
15:33:45	CONT	3164	ES ACT B EMER INJ BT1 CH TRIP	TRIP
15:33:58	BAD	0475	SP STARTUP FDWTR FLOW A (IN/H2O)	-???.?
15:33:59	BAD	0486	SP FDWTR VLV TRAIN B DP (PSI)	-???.?
15:34:03	NORM	0581	RP PWR CH N15 IMBALANCE(PCT)	- .18
15:34:04	NORM	0607	RP CH A POS SUPPLY OUTPUT(VOLTS)	15.02
15:34:04	NORM	0611	RP CH A NEG SUPPLY OUTPUT(VOLTS)	-14.99
→ 15:34:10	HIGH	0770	DH BOR WTR TANK LVL 2 (FT H2O)	54.72
15:38:32	BAD	0569	RP SRCE RANGE N11 LVL (LOG CPS)	-?.???
15:38:42	CONT	2726	RB SUMP PUMP WDL-P-2A	ON
15:38:49	CONT	2821	ES ACT A EMER INJ CH1 BYPASSED	NORM
15:38:50	CONT	2846	ES ACT B EMER INJ CH1 BYPASSED	NORM
15:39:18	CONT	3247	DECAY HT CL CLG WTR PMP DC-P-1A	OFF
15:39:19	CONT	3248	DECAY HT CL CLG WTR PMP DC-P-1B	OFF
15:39:24	LOW	0113	DECAY HT CL CLG PMP 1A DISCH	22.2
15:39:24	LOW	0114	DECAY HT CL CLG PMP 1B DISCH	23.2
15:41:00	CONT	2740	D-G ROOM AIR COMPR DF-P-2C	TRIP
15:41:29	NORM	0486	SP FDWTR VLV TRAIN B DP (PSI)	183.2

15:42:33	CONT	3158	DIESEL GEN DF-X-1A FAULT	NORM
14:51:01	SYSTEM DATE AND TIME SET TO 03/29/78 14:51:00			
14:51:08	FLAG	3575	SP10A-PT3 INSTR CONDITION	GOOD
14:51:08	FLAG	3577	SP10B-PT3 INSTR CONDITION	GOOD
14:51:08	FLAG	3579	RC3A-PT1 INSTR CONDITION	BAD
14:51:08	FLAG	3582	RC3B-PT2 INSTR CONDITION	BAD
14:51:08	FLAG	3583	RC4A-MS INSTR CONDITION	BAD
14:51:08	FLAG	3586	RC4B-MS INSTR CONDITION	BAD
14:51:08	FLAG	3587	RC4B-TE2 INSTR CONDITION	BAD
14:51:08	FLAG	3589	RC14-DPT1 INSTR CONDITION	BAD
14:51:15	CONT	3159	DIESEL GEN DF-X-1B FAULT	NORM
14:51:42	CONT	3158	DIESEL GEN DF-X-1A FAULT	FALT
14:52:24	CONT	3159	DIESEL GEN DF-X-1B FAULT	FALT
14:55:14	CONT	2726	RB SUMP PUMP WDL-P-2A	OFF
14:56:34	BAD	0040	MS&R 1B DR TO 3STGA HD FL(KLB/H)	-???.?

15:00:01 03/29/78

March 29, 1978 Transient T-2



Date of Event 2/29/80

Event Number _____ Time of Event 1437

Was a critique held? ✓ Yes ____ No

Critique Minutes attached? ____ Yes ✓ No

Subject of Event: Blew fuse on 2-1V inverter

1. Description of event and apparent cause:

(Personnel ____ Procedure ____ Equipment ✓ Other ____)

While performing RB Isol & Cooling Surveillance, fuse blew on 2-1V. Alternate source was open per ES procedure. RPS "A" power was de-energized. Pump power monitor lost power. This made RPS A think 1A RCP stopped, 2A RCP was already stopped, 2 pumps one loop off 12PS trip. Also lost power to electromatic relief B/S which opened relief. No indication on console that electro-matic opened. Most primary inst. fed from 2-1V. Had ~~~~ E.S Act - due to Electro-matic opening. All ES equipment started. Injected some BWST and NaOH tank to RCS. Stopped MU-P-1C and closed NaOH valves. Also closed DW-V-5A/B

2. Plant status at time of event:

532°, 4×10^{-9} amps

Hot Zero power physics tests in progress

3. Immediate evaluation/corrective action taken and results:

Brought plant back to Mode 3 status after securing all ES equipment.

4. Is further evaluation/corrective action necessary ✓ Yes _____ No
(Define as necessary)

Perform ECM to remove ES contact on alternate supply to Inverters

5. Temporary corrective action:

Write above ECM

6. Permanent corrective action:

Change ES procedures to reflect not opening alternate supply to Inverters while performing ES surveillance

Evaulators: M.Z. Bera 3/29/28
Supervisor/Foreman Date

Department Head Date

Approved:

Unit 1 Superintendent and/or Unit 1 Superintendent Technical Support Date

Unit 2 Superintendent and/or Unit 2 Superintendent Technical Support Date

Station Superintendent Date

All necessary action completed:

Date

cc: Station Superintendent
Unit 1 Superintendent and/or Unit 1 Superintendent Technical Support
Unit 2 Superintendent and/or Unit 2 Superintendent Technical Support
Supervisor of Operations - Unit 1
Supervisor of Operations - Unit 2
Supervisor of Maintenance
Supervisor of Radiation Protection/Chemistry
File 515
1-TASK System Coordinator
Quality Control

bcc: G. A. Hopper, WO/A
L. R. Pletke
NSS-6, 12-A, T 1.2
NSS-6, Reading File

Babcock & Wilcox

Power Generation Group

P.O. Box 1260, Lynchburg, Va. 24505
Telephone: (804) 384-5111

July 25, 1978

SPR 183
NSS 6
(= Description of Problem item (d))

Mr. L. C. Lanese
GPU Service Corporation
Interpace Building
Parsippany, N. J. 07054

Subject: Three Mile Island Nuclear Station, Unit #2
SYMMET ANALYSIS
B&W Reference, NSS-6

Reference: GPUSC letter, S&L 5092

Gentlemen:

Enclosed is a copy of the SYMMET Analyses performed in response to your letter, S&L 5092. The results were discussed by phone call with you on July 24, 1978.

We still have a concern over the inadvertent actuation of the NaOH valve when HPI pumps are started up in response to low RCS pressure. It is our understanding that the set point for NaOH valve opening is 53' 9" BWST level. This is within the Tech Spec operating range for the BWST. Would you please supply us with the rationale or basis for choosing this set point? We have nothing in writing which describes the changes you have made, or expect to make. We again caution against any further unnecessary injection of NaOH into the RCS.

If you have further questions on the analyses presented herein, please advise.

Yours very truly,

E. G. Ward
Senior Project Manager

L. R. Pletke

By:
L. R. Pletke
Project Manager

LRP:EWH
cc: J. J. Barton
R. C. Cutler
Gooden Gray, New York Sales

SITE PROBLEM

REPORT TRANSMITTAL

*** CLEARED ***

To: Change Control For Distribution

S. H. Klein - Quality Assurance

Central Engineering Files

T.A. Mo[illegible] - Task Engineer (s)

L.R. Rogers - Project Manager

File: 13- 6 - 195

Contract No.: 620-00 [illegible]

SPR: 195 Rev. 2

Title: RC PV-2 Block

Date: 12/12/75

Status Code: C

L. C. Rogers - NET. ED.

J. R. Bohart - Intl. Support

B. A. Karrasch - Plant Integration

P. E. Perrone

A.E. Paulson

Attached is one copy of Site Problem Report No. 195 which was processed on Contract 620-00 [illegible]. This SPR has been reviewed for generic applicability and this problem is/is not considered applicable to other contracts.

REMARKS:

NUCLEAR SERVICE SUPPORT ENGINEER

13 · 620-006

PROBLEM CONTACT
L. A. Porter

DESCRIPTION OF PROBLEM:

HC-RV-2 will not open with plant pressure at 2275 psi or in manual control in the Control Room.

STATUS-ACTION TO DATE, INCLUDING PERSONS CONTACTED:

Contacted L. Pletke, G. Orlicki, S. Maingi

FURTHER ACTION RECOMMENDED BY SITE PERSONNEL:

Replacement of solenoid assembly.

RESOLUTION:

During troubleshooting of the problem, the problem was corrected. See completion report for details (Site include details for completion)

DATE 10/16/90

APPROVED BY L R Pletke

COST CATEGORY ☐ NORM OTHER ☐

FIELD CHANGE REQ ☐ YES NO ☐

F.C.A. NO.

SIGNIFICANT ☐ YES

ACTION REPORT: Visual inspection of the circuit showed a wire physically jumping

DISPOSITIONS: ☐ NONE

COMPLETED BY

PDS-21091(8-76)

SITE PROBLEM REPORT

BABCOCK & WILCOX

PROBLEM IDENTIFICATION

CUSTOMER	ORIGINATOR / DATE	DOC. ID.	CONT. NO.	SPR NO.	REV. NO.
Jersey Central	L. Rogers 7/28/77	13	620-0006	135	0

VENDOR	P.A. NO.	PART NO./TASK NO.	GROUP NO.	SEQ. NO.
Allis Chalmers		42-33-001		

TITLE (MAX 30 CHARACTERS)
RCP Motor - Lube Oil Relief Valve

PROBLEM CONTACT
W. D. Corbin

DESCRIPTION OF PROBLEM:

The TEKTRO pressure control valve for the high pressure lube oil system on the RCP Motor - 1A does not work correctly. The valve has been disassembled and cleaned and still either:

1. will not hold pressure
2. will not relieve

STATUS-ACTION TO DATE, INCLUDING PERSONS CONTACTED:

R. P. Williamson
J. E. Thornhill

FURTHER ACTION RECOMMENDED BY SITE PERSONNEL:

This is a faulty piece of equipment and should be replaced. The model number is VR-3130-31-00 made by TEKTRO. Please deliver a new one to the site for installation.

RESOLUTION

RESOLUTION:

REPLACE CONTROL VALVE.

NEW VALVE HAS ARRIVED ON SITE.

PREPARED BY	DATE	APPROVED BY	DATE
Dennis L. Rice	8/25/77		
REVIEWED BY: R. K. Etter, L. K. Elliott	8/25/77	L R Potts	9/25/77
CSW			

COST CATEGORY	FIELD CHANGE REQ	F.C.A. NO.	SIGNIF. DEFICIENCY
☐ NORM ☐ OTHER	☐ YES ☒ NO	04-	☐ YES ☒ NO

COMPLETION

SITE COMPLETION REPORT:

DEVIATIONS: ☒ NONE SPR REV NO. ☐

DATE COMPLETED: 9-1-77

COMPLETED BY / DATE

L Rogers 9/1/77

ACTIVITY - ACTIONS TO DATE

RC-RV-2 (Electromatic Relief Valve) did not open when the reactor coolant system pressure was raised to 2275 psi; the lift setpoint is 2255 psi. The limit switches on the valve indicated no movement. Indication in the Control Room was that a signal was being sent to the valve for it to open. The auto/manual control switch was then placed in manual, and the limit switches indicated no valve movement. Plant conditions (pressurizer level, reactor coolant system pressure, RTD temperature downstream of RC-RV-2, and makeup tank level and temperature) indicated the valve did not open either time. Measurements taken on the valve control circuit are indicated on the enclosed sketch. The valve operating setpoints were checked and were set correctly.

The measurements taken indicated that the cutout switch was open and did not close when the valve was closed.

Amperage ratings from the technical manual are attached. Solenoid used was 125 volts direct current.

AMPERAGE RATINGS

ALTERNATING CURRENT - 60 CYCLE

VOLTS	INRUSH	HOLDING	SOLENOID FUSE	CONTROL STATION FUSE
110	114	6.5	30	30
120	106	5.9	30	30
220	57	3.2	20	20
240	53	3.0	20	20
440	29	1.6	20	20

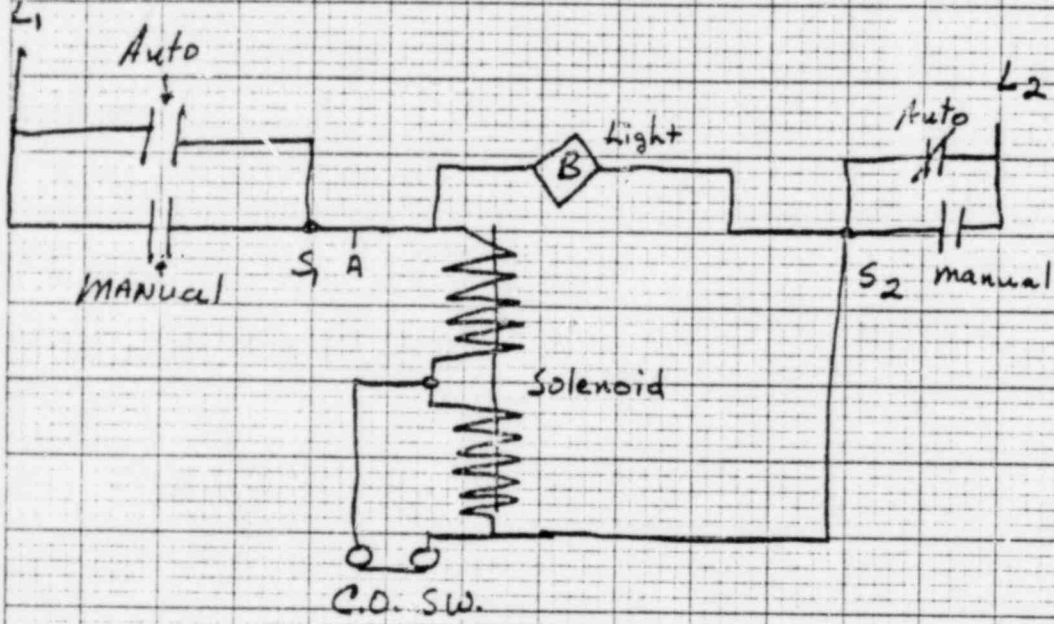
DIRECT CURRENT

VOLTS	INRUSH	HOLDING	SOLENOID FUSE	CONTROL STATION FUSE
110	26.8	.46	5	5
120	25.0	.42	5	5
125	23.6	.40	5	5
230	13.0	.22	5	5
250	12.0	.20	5	5

ALTERNATING CURRENT - 50 CYCLE

VOLTS	INRUSH	HOLDING	SOLENOID FUSE	CONTROL STATION FUSE
110	95	5.34	30	30
120	88.5	4.90	30	30
220	47.5	2.67	20	20
240	44.2	2.46	20	20

Simple Schematic RC-RV-2



Resistance S_1 to S_2, light removed, in auto and pressure less than relief setpoint 312 ohms

Current In manual, at S_1-A, inrush 1.5 Amps
light installed hold 1.0 Amps

BABCOCK & WILCOX
NUCLEAR POWER GENERATION DIVISION
ADMINISTRATIVE PROCEDURE

NUMBER
NPG-0503-04 (Rev 3)

SECTION	SUBJECT
FIELD SERVICE	SITE PROBLEM REPORT

I. APPLICABILITY

COMPLETE REVISION

ENGINEERING DEPARTMENT
NUCLEAR SERVICE DEPARTMENT
PROJECT MANAGEMENT
B&W CONSTRUCTION COMPANY

(For Site Problem Reports originated by Nuclear Fuel Department, see NPG-0411-05 and NPG-0503-10.)

II. PURPOSE

To provide a uniform method for documenting failures and problems associated with B&W-supplied systems, components or equipment after shipment from the vendor or B&W's plant and to provide a timely resolution of site problems on all affected contracts.

III. REFERENCES

FS-IV-2 - Instructions for Recording and Resolving Deviations on NSS Components and Equipment (B&W Construction Co.)
NPG-0411-05 - Handling Site Problems on Irradiated CNFP-Supplied Core Components
NPG-0503-07 - Field Change Authorization
NPG-0503-10 - Procedure for Handling Site Problems on Unirradiated, CNFP-Supplied Core Components
NPG-1202-01 - Vendor Claims Procedure
NPG-1707-01 - Reporting Significant Deficiencies

IV. FORMS PROCESSED

PDS-21048 - Field Change Authorization Form
PDS-21091 - Site Problem Report Form

V. DEFINITIONS

See attached Appendix 1.

VI. GENERAL

See attached Appendix 2 for Cross-Contract Applicability, SPR Documentation and Reporting Significant Deficiencies.

VII. PROCEDURE

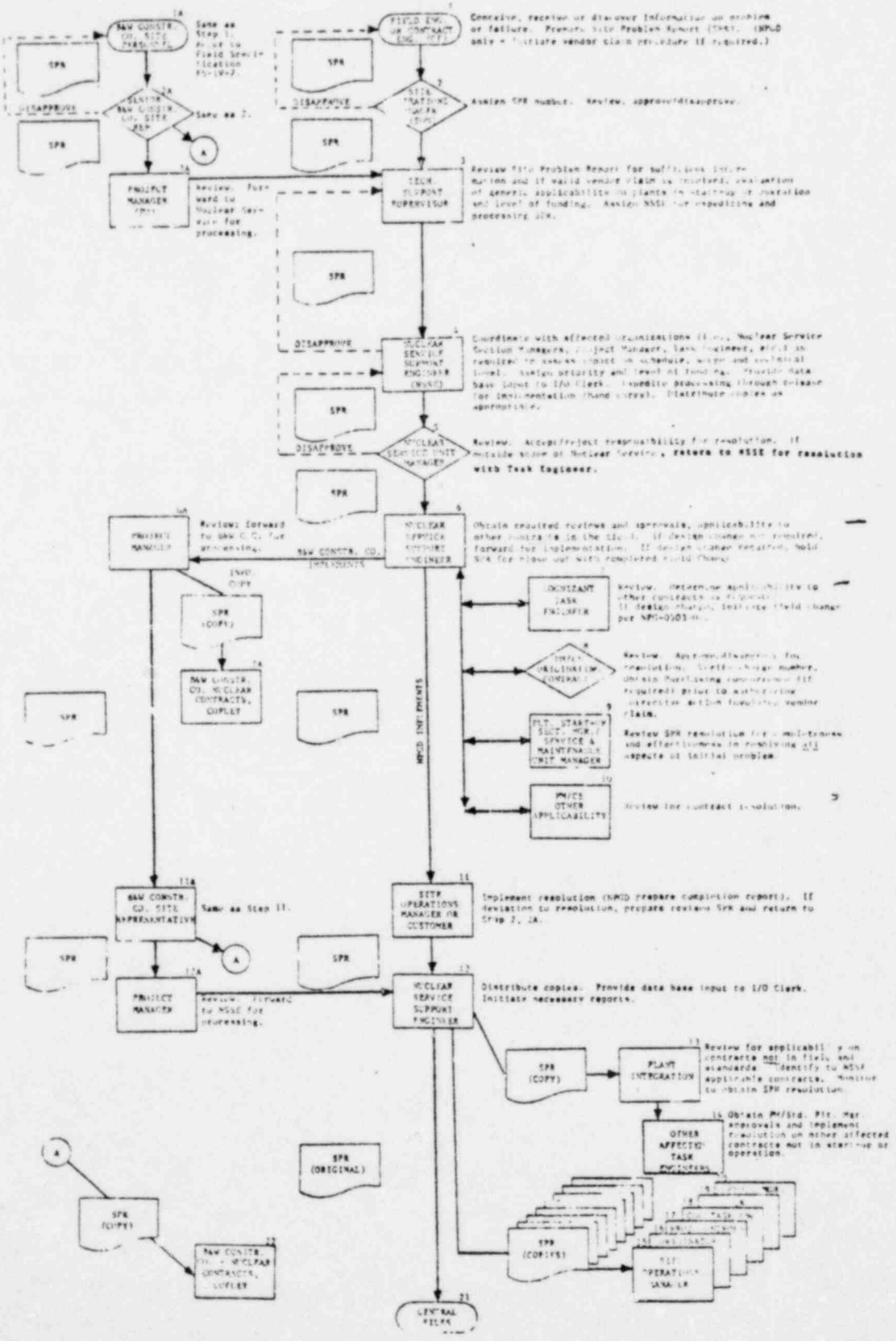
See flowchart immediately following.

- E N D -

REV STATUS OF PAGES																													
	REV	3	3	3	3	3	3	3																					
	PAGE	1	2	3	4	5	6	7																					

FLOWCHART FOR PROCESSING SITE PROBLEM REPORTS

NPG-0503-04



APPENDIX 1

DEFINITIONS

A. Site Problem

An equipment failure, system or component problem associated with B&W-supplied systems, components or equipment after shipment from the vendor or B&W's plant. It includes failure to meet pre-operational, hot functional or power escalation test acceptance criteria, problems arising from BOP design requirements and computer and test equipment software problems.

B. Site Problem Report (SPR) Form PDS-21091

Required for all site problems as defined above. (See Exhibit "A") Site Problem Reports are originated only by B&W personnel at the site. However, they may be initiated as a result of information received from the customer or vendors. Responsibilities for completion of the SPR are shown in Exhibit "B".

C. SPR Master Log Book

A listing by serial number of all SPR's as issued by the site. This book is maintained by the Senior B&W Construction Company Representative until the Site Operations Manager is at the site, at which time the Site Operations Manager assumes responsibility for maintenance of the Log Book.

D. Vendor Claim

A cost claim against a vendor. If resolution of a Site Problem Report involves costs chargeable to a vendor, a Claim Report Worksheet shall be prepared in accordance with NPG-1202-01.

E. Field Change

A change to B&W-supplied components or equipment (including computer software) after shipment from the vendor or B&W plant when either of the following conditions exist:

1. The change affects the form, fit or function requirements of a component or piece of equipment as defined by the B&W Technical Specifications or the B&W Equipment Specifications.

2. The change to B&W-supplied equipment affects an interface between B&W and customer supplied equipment.

APPENDIX 1 (cont'd.)

G. Top Generic Problems

A designation given to certain Site Problems that are of a serious nature and that have a high potential for reoccurrence. A Site Problem may be identified as a top generic problem at any time and from any source; however, the final determination as to applying this term is the responsibility of the Manager, Nuclear Service Support Unit. In addition to an SPR number, a top generic problem is assigned a unique identifying number by Nuclear Service Support Unit and given wide distribution affording the greatest immediate visibility to the problem so that an expeditious resolution might be realized.

H. Field Engineer

A Nuclear Service engineer under the direct cognizance of the Site Operations Manager. He has the responsibility of documenting all problems discovered at the site by means of the Site Problem Report so as to ensure that corrective action taken to resolve a problem is retrievable and available for review for impact on other contracts.

J. Contract Engineer

A Nuclear Service engineer who assumes the Project Manager's role in administering a contract once the contract has been declared commercial and Project Management turns control over to the Operating Plant Services Section of Nuclear Services.

APPENDIX 2

GENERAL

A. Cross-Contract Applicability/Standards Change

1. When requested by Nuclear Service Support Engineer, the cognizant Task Engineer on the original SPR will identify other contracts in the start-up or operational stage which may be affected by the SPR and identify the Task Engineers responsible for each affected contract.

2. The Nuclear Service Support Engineer has the responsibility for requesting, scheduling, expediting and obtaining SPR resolution through affected Task Engineers for other affected contracts that are in the erection, test, start-up or operating phase.

3. Plant Integration has the responsibility for determining applicability of the SPR to standards and to contracts not in the erection, test, start-up or operating phase and for the notification, monitoring and expediting necessary to ensure timely and final SPR resolution on each affected contract/standard by each affected Task Engineer.

4. Affected Task Engineers--as identified in 2 and 3 above--are responsible for taking required action in a timely manner to implement SPR resolution on that equipment and those contracts/standards for which they are assigned task responsibility.

B. Problem Resolution/Documentation

Resolutions to SPR's shall identify all documentation which must be revised and in what manner. The affected Task Engineer shall ensure that required changes are accomplished in accordance with the governing procedure of the document being revised.

C. Reporting Significant Deficiencies

Cognizant individuals involved with each SPR have the responsibility of reporting all deficiencies that have been discovered or reported to them which they suspect or believe to fall within the definition of a significant deficiency as described by NPG-1707-01.

SITE PROBLEM REPORT

BABCOCK & WILCOX

CUSTOMER	CONTRACT NO.	SPR NO.	REV. NO.
VENDOR P.O. NO.	TASK NO.	GROUP NO.	SEQ. NO.
SITE ENGINEER	REQ'D RESOL DATE	REQ'D COMP. DATE	
TITLE			
DESCRIPTION OF PROBLEM			
STATUS - ACTION TO DATE INCLUDING PERSONS CONTACTED			
FURTHER ACTION RECOMMENDED BY SITE PERSONNEL			
[illegible]	DATE	[illegible]	DATE

RESOLUTION

RESOLUTION

APPROVED BY	SIGNATURE	DATE
N.S. SUPPORT ENGINEER		
TASK ENGINEER /N.S. UNIT MANAGER		
PLT. START-UP MGR/SERV. & MAINT. MGR.		
PROJECT MANAGER/ CONTRACT ENGINEER		

COST CATEGORY ☐ NORM ☐ C ☐ D ☐ G ☐ L ☐ VENDOR CLAIM

AUTH. CHARGE NO. ☐ FIELD CHANGE REQ FC NO.

COMPLETION

SITE COMPLETION REPORT

DEVIATIONS ☐ NONE ☐ SEE SPR REV. NO. _____

DATE COMPLETED SIGNED BY

S.O.M./CONST. REP. APPROVAL DATE

SHEET 1 OF

INSTRUCTIONS FOR PDS-21091 - SITE PROBLEM REPORT

Initiated by B&W Construction or NPGD Nuclear Service

(1) Originator - Fill in: Customer; Contract Number; Vendor; Purchase Order Number; Task Number; Group Number; Sequence Number; Name; Title; Description of Problem; Status; Further Action Recommended by Site Personnel; Originator Signature and Date; Vendor Claim (NPGD only - if applicable)

(2) Senior B&W Construction Co. Site Representative or Site Operations Manager - Fill in: SPR Number; Revision Number; Req'd. Resol. Date; Req'd. Comp. Date; Approval Signature; Date.

(3) Nuclear Service Support Engineer - Fill in: Cost Category; Authorized Charge Number.

(4) Nuclear Service Unit Manager and/or Task Engineer - Fill in: Resolution; FC Req. and FC Number; Signature and Date.

(5) Plant Start-up Section Manager or Service and Maintenance Unit Manager - Approve Resolution; Signature; Date.

(6) Project Manager or Contract Engineer - Verify Charge Number; Approve Resolution; Signature and Date.

(7) Senior B&W Construction Co. Site Representative or Field Engineer - Implement resolution; upon completion, fill in: Completion Report; Date Completed and Signature.

(8) Site Operations Manager or Senior B&W Construction Co. Site Representative - Approve completion; sign.

SECTION	SUBJECT
FIELD SERVICE	SITE PROBLEM REPORT (SPR)

COMPLETE REVISION

I. APPLICABILITY

CUSTOMER SERVICE DEPARTMENT
ENGINEERING DEPARTMENT
GENERAL SERVICES DEPARTMENT
PROJECT MANAGEMENT DEPARTMENT
QUALITY ASSURANCE DEPARTMENT

II. PURPOSE

To provide a uniform method for documenting problems associated with B&W Scope of Supply after shipment to the customer and to provide a timely resolution of site problems on all affected contracts.

III. EFFECTIVITY

This procedure is applicable to all Site Problem Report activities initiated after the issue date of this procedure.

IV. REFERENCES

NPG-0412-63 - Format - Technical Documents
NPG-1202-01 - Vendor Claims Procedure
NPG-1707-01 - Processing of Safety Concerns

V. FORMS PROCESSED (See Forms Section Manual)

BWNP-20141 - Problem Cross-Contract Applicability
PDS-21091 - Site Problem Report

VI. DEFINITIONS

A. Site Problem - A problem associated with or affecting B&W Scope of Supply after shipment to the customer. It includes:

1. Failure to pass site receipt, storage or post-installation inspection or to meet acceptance criteria during pre-operation, startup, or periodic testing.

2. Failures, damage or out of specification performance of equipment, components, or systems.

VI. DEFINITIONS (cont'd)

A. (cont'd)

3. Significant plant problems (including BOP) with equipment, software, or systems which affect B&W's scope of supply.

4. Reactor trips, unusual transients, forced plant outages, forced load reductions, or delays in return to power.

5. Operation not in accordance with Operating Instructions, Technical Specifications, or generally accepted operating practices.

B. Site Problem Report (SPR) (PDS-21091) - A report used to process site problems known to NPGD and to document corrective action, if any. The assignment of SPR numbers is the responsibility of the Service Manager (for Operating Plants) or Startup Planning & Support Manager (for plants in startup). Each SPR is sequentially numbered, starting with 1 (one) for each NSS, and has the following format:

13	-	XX		XXXX	-	XX
ID		NSS NO.		SEQUENCE NO.		REV NO.

C. Vendor Claim - A cost claim against a supplier. If a resolution of a Site Problem Report involves costs recoverable from a supplier, a vendor claim shall be prepared in accordance with NPG-1202-01.

D. Field Change - A change to B&W-supplied components or equipment (excluding computer software) to be implemented after shipment from the supplier's plant when any of the following conditions exist:

1. The change affects the interface, function or interchangeability requirements of a component or piece of equipment as defined by B&W Design Requirements Documents.

2. The change to B&W supplied equipment affects an interface between B&W and customer supplied equipment.

3. The change revises the as-shipped design requirements of the component or equipment.

E. Problem Cross-Contract Applicability (PCA)- A form (BWNP-20141) used to identify other contracts and/or the Standard Product Line to which the site problem may be applicable.

VII. GENERAL

A. The Site Problem Report shall be used to process site problems known to NPGD and to document corrective action if any. Where corrective action is required, the corrective action indicated on the SPR shall be limited to restoring the equipment to its specified design or indicating the document (e.g., FCA, Site Instruction, etc.) to resolve problem.

VII. GENERAL (cont'd)

B. All SPR's and markings on attachments to SPR's shall be prepared in blue or black ink or be typed.

All markups shall be in accordance with NPG-0412-63.

If it becomes necessary to make any changes to technical content after one or more approval signatures have been obtained, the originator shall indicate the changes as stated above, and previous approvers shall re-approve by signature and redating to indicate their approval.

C. Revisions to SPR's shall be limited to treating the initial problem and shall be accomplished by:

1. Preparing a new SPR form and increasing revision level by one, or

2. Marking the revision on the existing SPR and increasing the revision level up by one.

In all cases, revisions shall require the same review and approvals as the original SPR.

D. An SPR revision shall supercede the previously issued SPR and incorporate all necessary information from that SPR.

E. Priorities may be assigned to SPR's by the originator using a one through four priority system with one as the highest priority.

What's one and what's four?

F. When either the Service Manager or Startup Planning and Support Manager determinesthat time does not permit the normal processing of the SPR before implementation, he may provide a preliminary resolution of the SPR via a TWX, telecopy or telephone provided the SPR is immediately processed. A copy of the TWX, telecopy, or record of telephone conversation shall be attached to the resolution.

VIII. PROCEDURE

A. For processing of SPR's, see flowchart, Exhibit A.

B. For processing of PCA's, see flowchart, Exhibit B.

C. For preparation, review and approval of SPR's, see Appendix 1 for responsibilities.

- E N D -

APPENDIX 1

RESPONSIBILITY FOR SECTIONS OF SPR FORM

1. PROBLEM IDENTIFICATION

   - Normally prepared and issued by Site Operations Manager/B&WCC Site Representative for plants in startup or by Resident Engineer for operating plants. SPR's may also be initiated by other NPGD personnel aware of a site problem.

2. RESOLUTION

   - Prepared and reviewed by Maintenance Engineering Manager/Plant Performance Manager and Engineering Unit Manager (one prepares and issues, the other reviews). For special products where design responsibility resides in Customer Service Department, substitute Manager, Special Products, for Engineering Unit Manager.

   - Review signature shall signify (1) concurrence with the planned resolution, (2) that corrective action plan has been initiated if further action is required to prevent recurrence, and (3) the problem has been evaluated for cross-contract applicability.

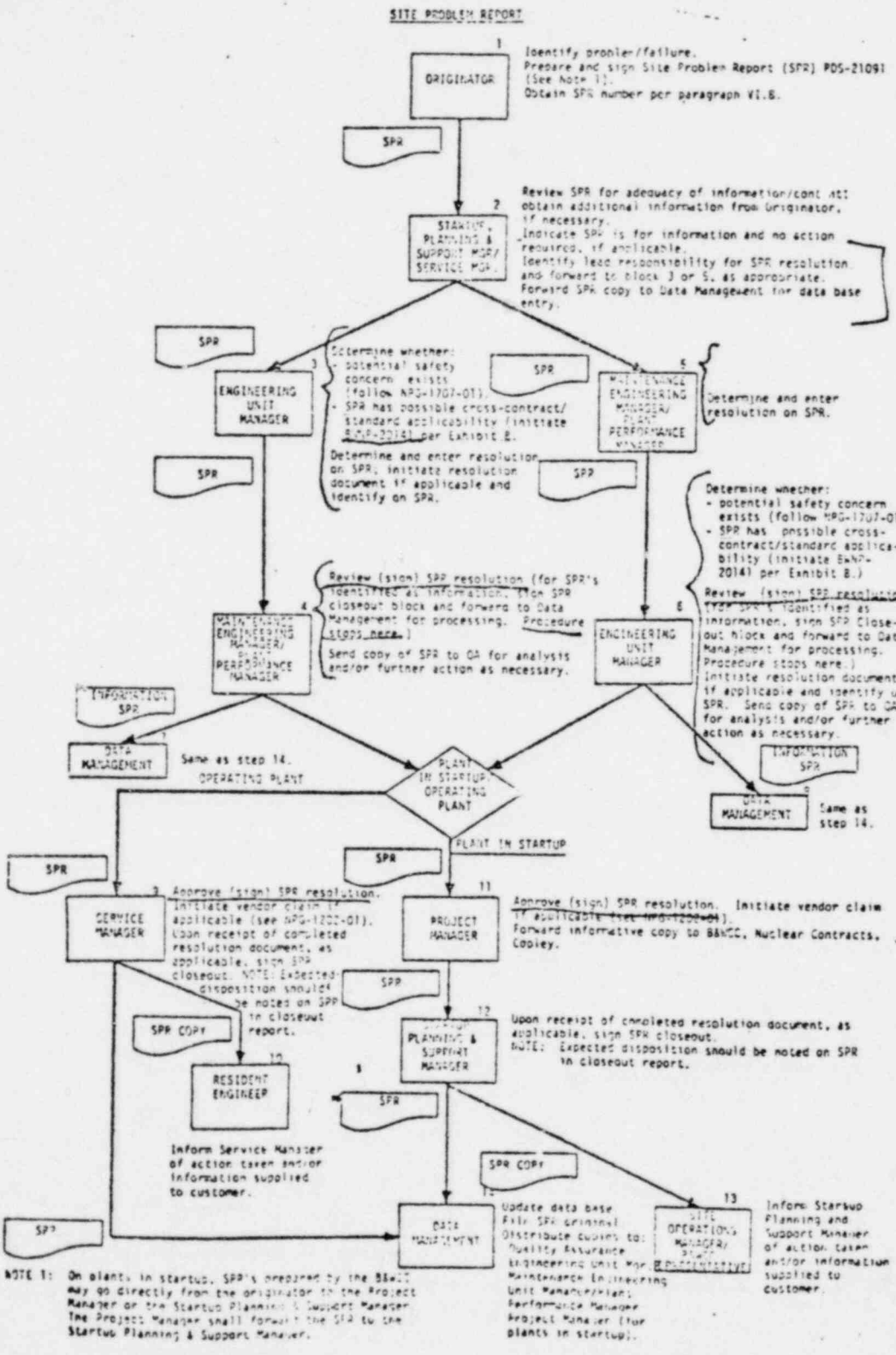
   - Approved, for commercial considerations only, by Project Manager for plants in startup or Service Manager for operating plants.

3. CLOSEOUT

   - Approved by Startup Planning and Support Manager for plants in startup. Approved by Service Manager for operating plants.

   - Approval signifies that SPR Closeout Report reflects disposition and indicates follow-on document has been processed through completion.

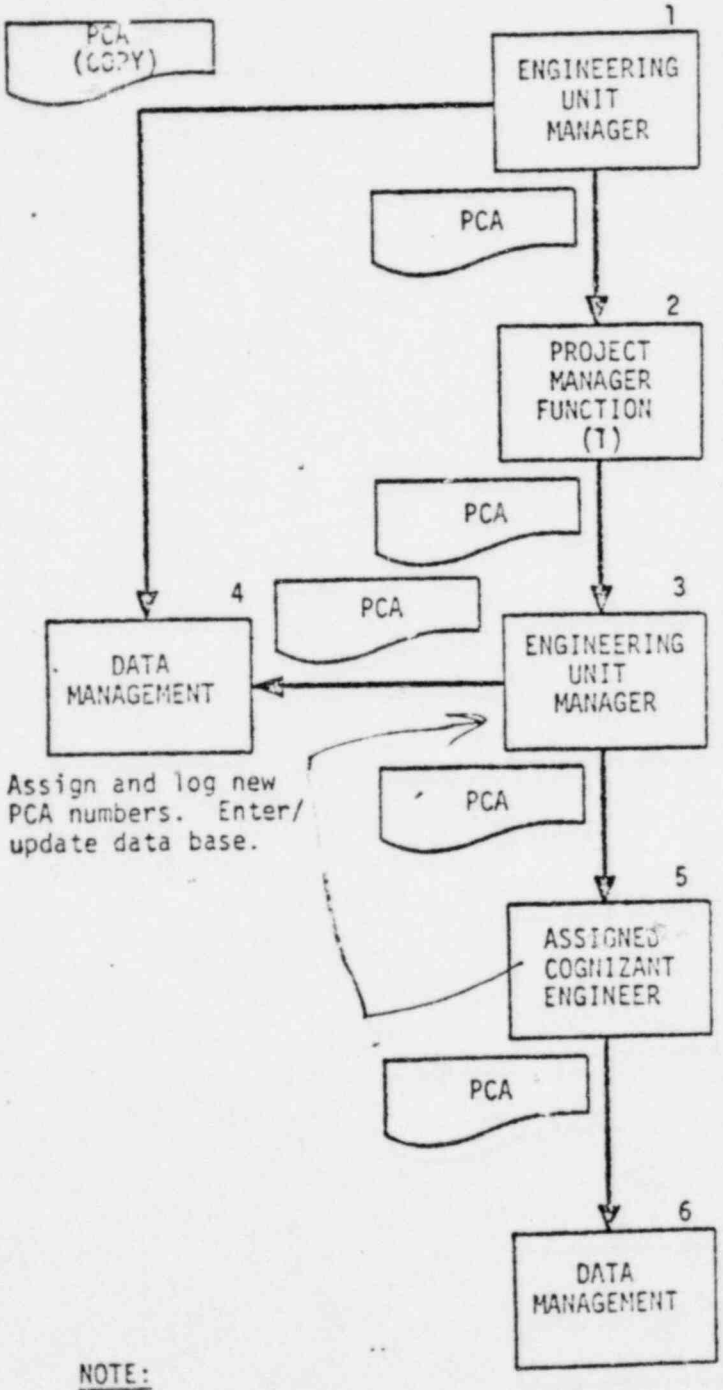
EXHIBIT "A"



What criteria used to decide who gets SPR for Action?

IF IT IS AN ENGINEERING DESIGN PROB. IT GOES TO ENG.
" " A MAINTANENCE PROB. IT GOES TO MAINTENANCE ENG.

PROBLEM CROSS-CONTRACT APPLICABILITY



1 Initiate Problem Cross-Contract Applicability form (PCA) BWNP-20141 and obtain PCA number from Data Management.
Determine and indicate on PCA contract(s)/ standard which may be affected, SPR type per paragraph VI.A., total estimated manhours and affected Project Managers.
In conjunction with Standard Integrator, determine affected tasks.
Distribute PCA to affected Project Managers and Data Management.

2 Resolve comments with originator.
Consult with customer if necessary.
Approve (sign) PCA providing or approving resources to resolve PCA on applicable contract/standard.
If decision is not to process PCA, notify Engineering Unit Manager, indicate on PCA, and forward to Step 6.

3 Assign cognizant engineer and indicate on PCA.
Distribute PCA copy to Data Management and Quality Assurance.
Insure uniformity of resolution to minimize design changes.

5 Determine resolution and prepare/process the appropriate resolution document as applicable.
Identify resolution document number, if applicable, on PCA and sign PCA. If change is not required, enter "NO ACTION REQUIRED" on PCA, and obtain Integrator's concurrence (signature and date).

6 Update data base and file.
Distribute PCA copy to Quality Assurance.
Enter PCA resolutions.

NOTE:

1. Project Manager function is accomplished by the contract PM for plants in design or startup phases, Service Manager for operating plants, or Standard Plant Manager for Standard Plant.

PROBLEM IDENTIFICATION

SITE PROBLEM REPORT	PRIORITY 1 ☐ 2 ☐ 3 ☐ 4 ☐ NONE ☐	BABCOCK & WILCOX
CUSTOMER	ORIGINATOR DATE	DOC ID NSS NO. SPR NO. REV. NO. 13
SUPPLIER	P.O. NO.	PART NO./TASK-GROUP-SEQ. NO.
TITLE (maximum 30 characters)		LEAD MANAGER

DESCRIPTION OF PROBLEM:

STATUS-ACTION TO DATE, INCLUDING PERSONS CONTACTED:

FURTHER ACTION RECOMMENDED BY SITE PERSONNEL:

RESOLUTION

RESOLUTION

ENG | MAINT

☐ INFORMATION ONLY

PCA REQUIRED YES ☐ NO ☐ ENG	POTENTIAL SAFETY CONCERN YES ☐ NO ☐ ENG	RESOLUTION DOC. NO. ENG

PREPARED BY MAINT	DATE ENG
REVIEWED BY ENG	DATE MAINT
APPROVED BY	DATE

CLOSEOUT

SPR CLOSEOUT REPORT:

CLOSED OUT BY: MAINT / ENG DATE

SHEET _____ of _____

BWNP-20141-2 (8-79)

BABCOCK & WILCOX
PROBLEM CROSS-CONTRACT APPLICABILITY

TITLE (30 CHARACTER MAXIMUM)	PCA NO. 41-

SUPPLIER	ORIGINATING CONTRACT	ORIGINATING SPR	ASSIGNED COG. ENG.

DESCRIPTION OF PROBLEM

NSS	SPR TYPE	EST. MHRS	P.M.

ENGINEERING UNIT MANAGER

NAME DATE

PROJECT MANAGER

NAME DATE

RESOLUTION

COGNIZANT ENGINEER

NAME DATE

DISTRIBUTION:
QUALITY ASSURANCE
DATA MANAGEMENT

INTEGRATOR

NAME DATE

SHEET _____ OF _____

THE BABCOCK & WILCOX COMPANY
ATOMIC ENERGY DIVISION

To: D. W. MONTGOMERY - PROJECT MANAGER

From: J. D. CARLTON - SYSTEMS DESIGN SECTION JDC

Cust.: DUKE POWER COMPANY

Subj.: PRESSURIZER RELIEF VALVE SIZING

This letter to cover one customer and one subject

A. H. L.
NOV 23 1966
A. E. D.

File No. or Ref. 620-0003-12E59

Date: NOVEMBER 23, 1966

The bases for pressurizer safety relief valve capacity are:

1) Pressurizer safety valves are sized on the basis that the Reactor Protection System provides first line defense against overpressure.

The high flux trip, the high pressure trip, and the high temperature trip provide overpressure protection for potential reactor system induced transients or accidents. The high pressure trip and the high temperature trip provide overpressure protection for potential steam system induced transients or accidents.

The pressurizer safety valve capacity is based on the larger of the following: (a) Decay heat removal without steam generator or decay heat cooling system, or (b) to prevent overpressure due to overshoot following Reactor Protective System action.

2) Analysis has shown that maximum safety valve capacity requirements result from rod withdrawal accident. The assumptions used for valve capacity are:

(a) Reactor at low power level (below 15% full power). This gives minimum inventory in steam generator - hence minimum cooling effect.

(b) High flux trip at 114% full power.

(c) High pressure trip at 2350 psig.

(d) 0.3 second reactor trip delay time.

(e) 1.5 seconds to 2/3 rod insertion following release.

(f) Decay heat (infinite irradiation) is heat source following reactor trip.

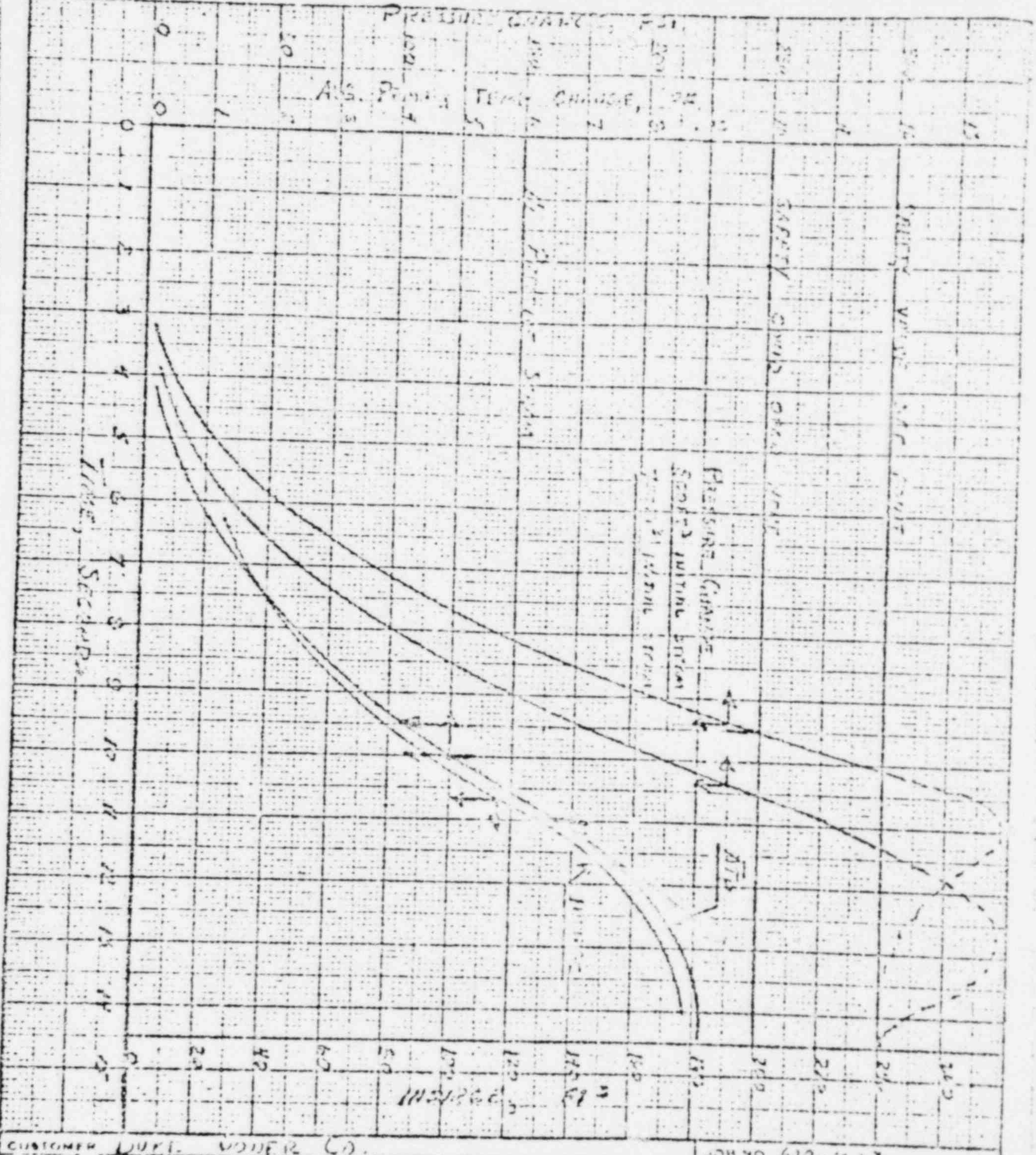
3) Safety valve capacity is sized to relieve steam at a rate corresponding to volumetric insurge of reactor coolant to the pressurizer during this accident. The resulting capacity is 600,000 lb/hr.

JDC:pam

Please do not write below this line

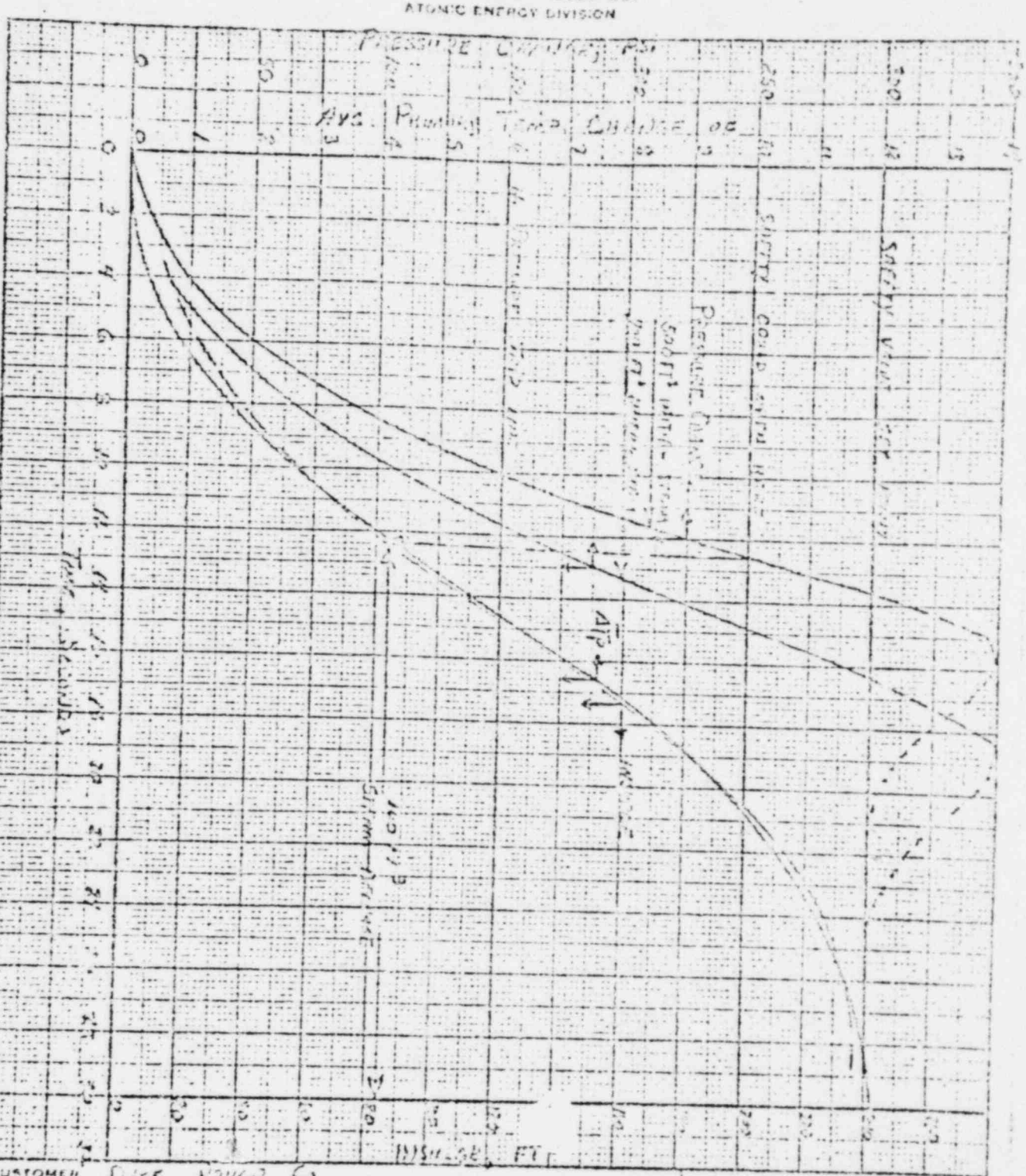
cc: H F Dotel
H H Stevens
A H Lazar
J H Hicks
F R Thomasson
File 620-0003-12E59

THE BABCOCK & WILCOX CO
ATOMIC ENERGY DIVISION



CUSTOMER Duke Power Co.	JOB NO. [illegible]
SUBJECT Pressure & Transients, Pressure Change & [illegible] Vs Time : Rod Withdrawal Accident At ≈ 15% Power	Fig. 1
	BY [illegible]
	DATE [illegible]

THE BABCOCK & WILCOX CO.
ATOMIC ENERGY DIVISION



CUSTOMER DUKE POWER CO	ITEM NO 122-0V3
SUBJECT PRESSURE & TEMPERATURE CHANGE AND INSURGE AS FUNCTION OF TIME DURING TRIP WITHOUT REACTOR CONTROL ACTION	FIG 2
	BY JDG
	DATE 1/18/61

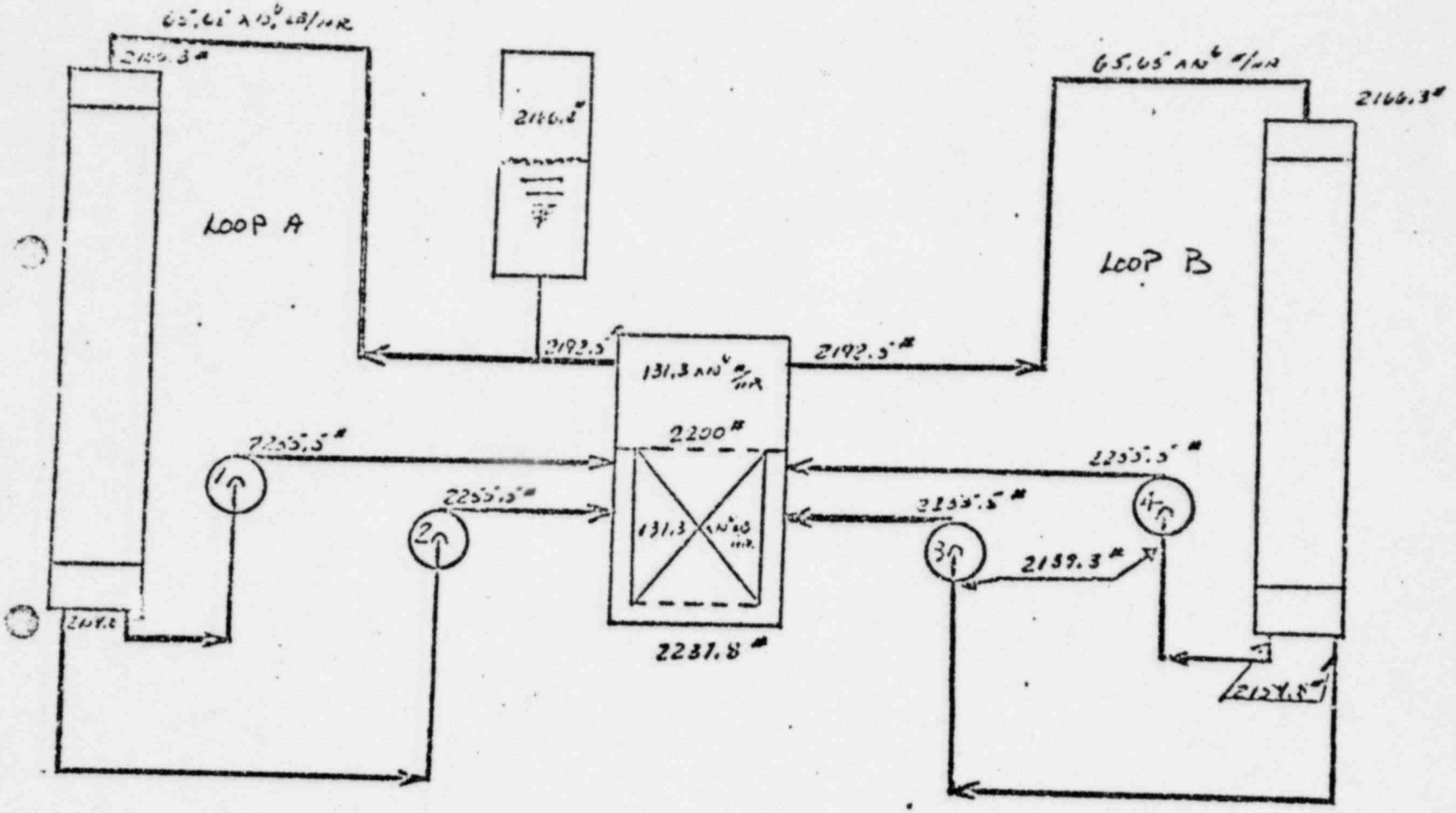


FIGURE 3

REACTOR SYSTEM PRESSURE DISTRIBUTION - ALL PUMPS

To: J. H. TAYLOR - SYSTEMS ENGINEERING	A. H. Taylor A. H. L. 12E59
From: J. D. CARLSON - SYSTEMS ENGINEERING JDC	
Cust. DUKE POWER COMPANY	File No. or Ref. 620-0003-12E59
Subj. PRESSURIZER TRANSIENT REQUIREMENTS	Date MARCH 3, 1967

This letter to cover one and one-half one and one-half only.

Reference: Memo J. H. Taylor to H. H. Stevens, Pressurizer Transient Requirements, 620-0003-12E59 dated 2/9/67.

As requested in the reference letter, the following information relates to pressurizer transient requirements:

1. Capacity of the pressurizer safety valves is set at 680,000 lb/hr. This is based on a rod withdrawal accident at low power level. The criteria is described in my letter to D. W. Montgomery of 11/23/66 (copy attached).

2. Recent discussions with Paul Kurrle relative to capacity of the quench tank have indicated that we lack criteria for sizing this tank.

   Initial considerations for quench tank size were based on assumption of discharge of steam volume above normal water level in pressurizer (700 ft^3).

   We note from Connecticut Yankee Safety Report that they used a volume between normal low load level and the high level trip (this is about 800 ft^3 discharge to quench tank).

   I have examined the available transient data to get an estimate of safety valve discharge quantity. This shows the following:

Transient	Discharge Volume ft^3 of Steam
Rod Withdrawal	230 ft^3
Turbine Trip without Reactor Control Action Reactor Trip on High Pressure	300 ft^3
Power Operated Relief Valve Assumed for "Blackout" Transient	270 ft^3

Figures 1 and 2 show approximate pressure and insurge characteristics during rod withdrawal and turbine trip without reactor control transients.

Please do not write below this line

To estimate the maximum blowdown, it was assumed that the safety valves popped at 2450 psia and reseated at 2400 psia. Also assumed pressurizer water level was 200 ft^3 over normal water level.

Steam discharge was assumed to occur from time safety valve popped until pressurizer insurge stopped.

The steam release due to valve blowdown was estimated by calculating equilibrium pressurizer conditions at 2400 psia and 2500 psia. The estimated steam release is estimated to be 130 ft^3. This is included in the tabulation above.

3. Figures 3 - 6 attached show pressure distribution and flow distribution around the reactor system for:

a) All pumps running.

b) 3 pumps running.

c) One pump each loop running.

d) Two pumps in one loop running.

Note that the pressure valves listed on the figures include gravitational head. The flow distribution values are recent estimates and are based on Bingham curves 23940 (H-Q) and 24074 (Zone Map). Pump reverse flow values are based on locked rotor at zero rpm.

The estimated maximum pressurizer spray rate is 750 GPM. This capacity is estimated for riding through "blackout" transient without power operated pressurizer relief and without high pressure scram.

The pressure differential available for pressurizer spray and the approximate spray rate as related to pump combinations are:

3.1	All pumps on	69.3 psi	750 GPM
3.2	Three pumps on		
a)	Pressurizer in loop A		
	Pump #1 to pressurizer	27.8 psi	475 GPM
	Pump #2 to pressurizer	55.8 psi	673 GPM
	Pump #3 or 4 to pressurizer	47.0 psi	618 GPM
b)	Pressurizer in loop B		
	Pump #1 to pressurizer	34.9 psi	532 GPM
	Pump #2 to pressurizer	62.9 psi	714 GPM
	Pump #3 or 4 to pressurizer	54.1 psi	663 GPM

3.3 Two pumps on - two in one loop

a)	Pressurizer in Loop A		
	Pump 1 or 2 to pressurizer	12.8 psi	322 GPM
	Pump 3 or 4 to pressurizer	35.8 psi	539 GPM
b)	Pressurizer in Loop B		
	Pump 1 or 2 to pressurizer	22.4 psi	426 GPM
	Pump 3 or 4 to pressurizer	45.4 psi	607 GPM

3.4 Two pumps on - one each loop
Pressurizer either loop

Pump #1 or 4 to pressurizer	14.9 psi	348 GPM
Pump #2 or 3 to pressurizer	49.8 psi	636 GPM

For these cases the spray is sufficient for normal ramp load changes (load decreases). As far as I know, criteria for severe load changes have not been established for conditions when there are major equipment malfunctions. I would propose however, that we maintain ability to ride through "blackout" conditions from three pump operation.

It must be noted that the 750 GPM pressurizer spray flow requirement is based on preliminary analysis of the blackout condition from full load. Pressurizer pressure control could be obtained with power operated relief valve(s) set at approximately 2500 psi. Another alternate would be to use a cold spray (from makeup system). This would reduce the spray rate by a factor of 2.5 to 3.

Use of power operated relief on the pressurizer would also reduce spray requirements by a factor of 2.5-3 (to about 250-300 GPM).

If you have further questions, please advise.

JDC:pam

cc: H F Dobel
H M Stevens
B B Cardwell Jr
W E Carson
P Kurrle
J C W Hsu
File

THE BABCOCK & WILCOX COMPANY
BOILER DIVISION

To: S. H. F. DOBEL, SECTION MANAGER, SYSTEMS ENGINEERING

From: W. C. BUTT, FLUID SYSTEMS

Cust.: DUKE POWER COMPANY

Subj.: PRESSURIZER SAFETY VALVES

This letter to cover one customer and one subject only.

12859

File No. 12859
or Ref. BPD1.2

Date: June 22, 1967

REF: a) Memo from J. D. Carlton to D. W. Montgomery dated November 23, 1966; subject, Pressurizer Safety Valve Sizing; File, 12859.

b) Memo from J. D. Carlton to J. H. Taylor dated March 3, 1967; subject, Pressurizer Transient Requirement; File, 12859.

The plant conditions requiring safety valves to prevent reactor coolant system overpressure are:

1) Rod withdrawal accident at low power
2) Turbine trip without reactor control action
3) Decay heat removal without steam generator or decay heat removal system.

The pressurizer safety valve capacity was determined to be 600,000 #/Hr based on the rod withdrawal accident as described in reference (a) and (b).

The proposal indicates that the pressurizer will have two conventional safety valves and one pilot operated valve. The standard justification for using a pilot operated valve is to prevent lift of the conventional safety valve which is more likely to leak following a lift.

Based on the criteria used to establish the safety valve capacity, and for that matter the need for safety valves at all, it can be readily seen that it is extremely unlikely that the safety valves will be required to lift; therefore, it is recommended that the pilot operated valve be eliminated from the valve arrangement.

In any event an evaluation of possible vendors and valve arrangements has been prepared for your comments and/or approval.

WCB:cp

cc: CED File
JHTaylor
AHLaser

W. C. Butt

Please do not write below this line.

DISCUSSION OF QUOTATIONS

In response to our request for quotation submitted to seven vendors, only three submitted bids. These vendors, the valve cost and steam capacity, are tabulated below.

Vendor	Valve Capacity	Unit Cost
CROSBY-ASHTON	288,000 lbs/HR	$6,459.45
	408,000 lbs/HR	7,606.64
DRESSER (CONSOLIDATED)	311,733 lbs/HR	5,300.00
TARGET-ROCK	300,000 lbs/HR	18,000.00
	600,000 lbs/HR	24,000.00

COMMENTS ON CROSBY-ASHTON QUOTE

(1). Hot test will be performed using 200 psig steam with a prorated spring on the valve. This test includes a check of the popping point, blowdown adjustment and performance under back pressure conditions. Our specification requests tests to be performed at 2,500 psig @ 670°F.

(2) Set pressure will be set using 2,500 psig air.

(3) Seat leakage test to be performed at 10 per cent below set pressure using steam. Tightness offered is no audible or visual leakage at 10 per cent below set pressure. Our specification specifies a maximum leakage of 10 cc/HR/in seat diameter at 1½ times design pressure.

(4) No quantity discount is given for either size of valve.

(5) The valves proposed have been certified under Section III, Article 9.

COMMENTS ON DRESSER (CONSOLIDATED) QUOTE

(1) The valve proposed has not been certified to Section III, Article 9. Dresser has not furnished a closed bonnet and bellows type valve for Section III service. The proposed valve will be built using designs developed for Section I and Section VIII valves.

(2) The price quoted is based on a minimum order to twelve valves.

COMMENTS ON TARGET-ROCK QUOTE

(1) The valve proposed by T-R is a pilot operated valve. The flow path through

the valve is the reverse of that found in conventional valves. The steam inlet is in the side of the valve with line pressure tending to hold the valve shut. The discharge may be furnished with the outlet connection on the side or bottom.

(2) T-R has never furnished a valve for ASME Code application. Most valves furnished to date have been for Naval application.

(3) T-R plans to have ASME Section III certification of their valve design this fall. They are presently fabricating a safety valve for the Millstone Station which will have a capacity of 800,000 lbs/HR. Scheduled delivery of this valve is December 1967.

(4) T-R is presently submitting test valves to the National Board of Boiler and Pressure Vessel Inspection for ASME certification.

(5) Quantity discounts of $4,000 per valve are available on the T-R valves. T-R has indicated that they may reduce the price of their valves, but they don't know how much.

(6) Section III, Article 9 requires that this type of valve be equipped with a continuous monitor to detect bellows failure.

SAFETY VALVE ARRANGEMENT

Several possible safety valve arrangements are shown on Figure 1. The cost analysis of each arrangement is given in Table 1.

The factors considered in evaluating each arrangement are as follows:

1) Features incorporated in the arrangement to permit maintenance during operation or while system is pressurized.

2) Ability to continue operation with a defective safety valve. (Leaky seat, cracked bellows)

3) Features that would permit isolation of stuck safety valve following lift to prevent system blowdown.

4) System flexibility for the cost involved.

Arrangement "A"

This arrangement is available with the Target-Rock valve only since it is the only full capacity valve available. Since the Code requires a bellows integrity monitor on the T-R valve, it would be necessary to shut the plant down in the event of a bellows failure; therefore, this arrangement is not considered satisfactory.

Arrangement "B"

The Target-Rock valve is not acceptable for this arrangement for the reason stated above. This arrangement does not have any provisions for valve maintenance with the system pressurized or means for isolating a leaking or stuck valve. In view of the disability to perform maintenance during operation this arrangement is not considered satisfactory.

Arrangement "C"

This arrangement is available with the Target-Rock valve only since it is the only full capacity valve available. This arrangement provides complete flexibility of continued plant operation with one valve on a stand-by status or isolated for maintenance. Should the "on-line" valve lift and stick open or fail to reseat properly, it could be quickly and easily isolated to prevent excessive system blowdown.

Arrangement "D"

This arrangement provides for continued plant operation with one of each pair of valves on a stand-by status or isolated for maintenance. This arrangement would require a rather complicated header arrangement that could increase the cost of the arrangement significantly as compared to arrangement "A" thru "C".

Arrangement "E"

This type of arrangement requires an interlock on the stop valves operators to prevent isolation of more than one safety valve at a time. There are no provisions for determining which valve has stuck following a lift, and consequently, the system could blowdown before the defective valve could be isolated. This arrangement has a complicated header that could increase the cost of arrangement significantly as compared to arrangement "A" thru "C".

Arrangement "F"

This arrangement is a modification of arrangement "C" which replaces the full capacity valve with two half capacity valves. The operational features are the same as arrangement "C". The header arrangement could be easily streamlined without excessive cost.

Based on the factors above, arrangement "F" is the recommended arrangement. The arrangement with stop valves, as shown, is permitted by Section III of Code which reads as follows:

N-910.7 While pressure relieving devices need not be installed directly on the vessels which they serve to protect, no stop valve or similar device shall be placed relative to a protective device required for the protection of any vessel so that it could remove the protection afford to the vessel, except where such stop valves or other devices are shown to be required in the direct interest of system safety or for the purpose of in-service inspection and testing, subject, however, to the requirements of N-910.8.

N-910.8 Any stop valve or similar device on the inlet or discharge side of a protective device provided in conformity with N-910.7 shall be so constructed, positively controlled and interlocked that the requirement of N-910.1 will be complied with under all conditions of operation of the system.

Paragraph N-910.1 simply states that the pressure vessel shall have over-pressure protection.

VENDOR SELECTION

Target-Rock

In view of the high cost of the T-R valve, it is recommended that it receive no further consideration for our present application.

Crosby-Ashton

As stated in the comments on the Crosby quote, they do not offer a hot performance at design conditions that would demonstrate the valve's ability to meet our specifications. This is considered very important, and it is; therefore, recommended that the Crosby valve receive no further consideration for our present application.

Dresser (Consolidated)

Since the field of selection has been narrowed down to one vendor; namely, Dresser and the only outstanding comment is the certification of capacity which is considered a routine procedure with Dresser, it is recommended that procurement and final safety valve header arrangement be based on the Dresser valve.

TABLE 1

VENDOR

Attyt.	T-R	C-A	Dresser
A	$21,000	N.A.*	N.A.*
B	28,000	$14,465	$10,600
C	49,000	N.A.*	N.A.*
D	72,600	44,532	36,800
E	52,200	33,678	26,100
F	63,800	36,732	29,000

*N.A. = Not Available

NOTE: 1) Safety valve costs are based on quantity discounts where possible.

2) Cost of piping not included.

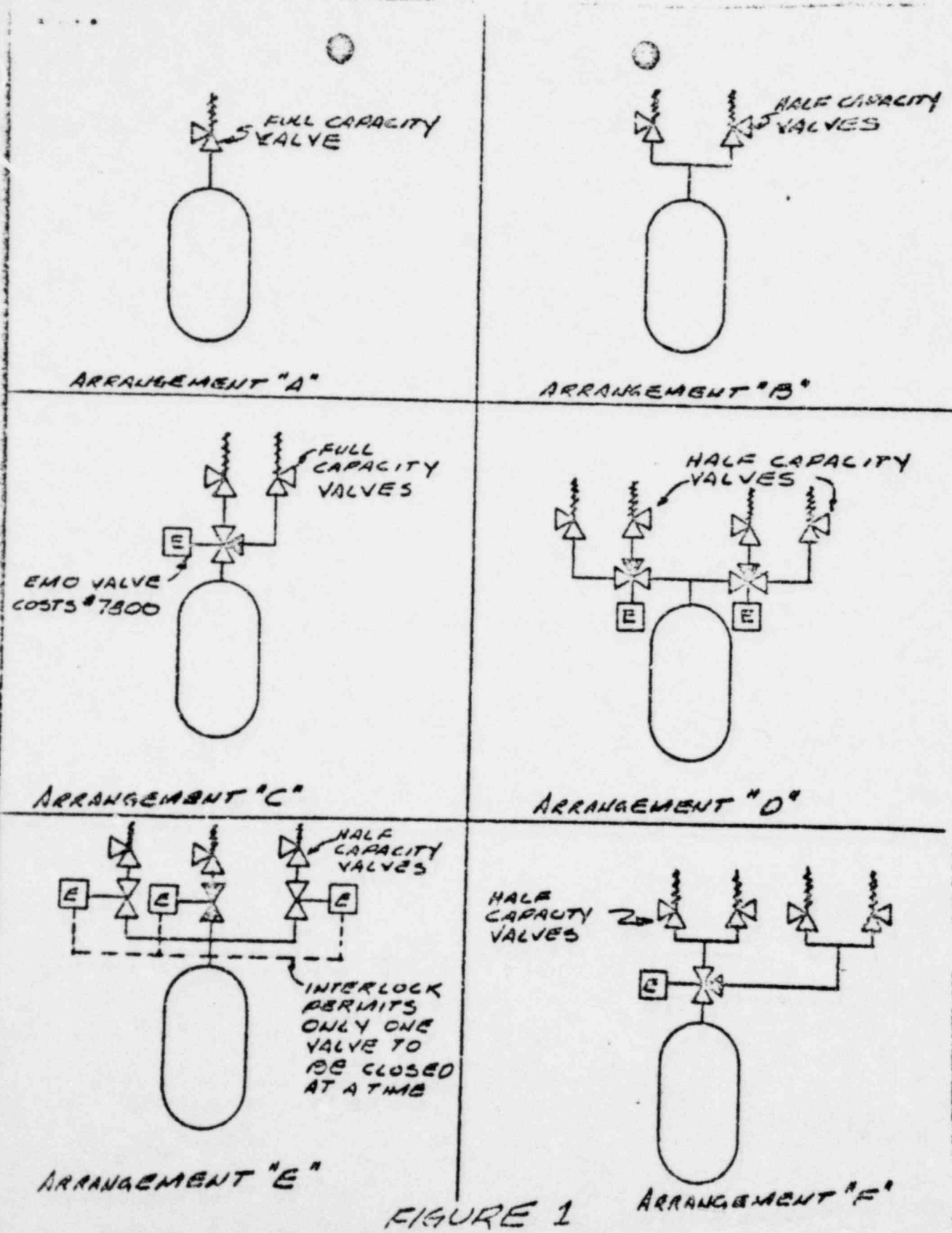

FULL CAPACITY VALVE
ARRANGEMENT "A"
HALF CAPACITY VALVES
ARRANGEMENT "B"
FULL CAPACITY VALVES
E
EMO VALVE COSTS $7800
ARRANGEMENT "C"
HALF CAPACITY VALVES
E
E
ARRANGEMENT "D"
HALF CAPACITY VALVES
E
E
E
INTERLOCK PERMITS ONLY ONE VALVE TO BE CLOSED AT A TIME
ARRANGEMENT "E"
HALF CAPACITY VALVES
E
ARRANGEMENT "F"

FIGURE 1

[illegible] ACTION	
To D. W. MONTGOMERY - PROJECT MANAGER, NTGD	
From J. H. TAYLOR - FLUID SYSTEMS GROUP, NTGD	
Cust. DUKE POWER COMPANY	File No. 620-0003-851.2 or Ref. and 12359
Subj. PRESSURIZER SAFETY VALVE AND SPRAY VALVE REQUIREMENTS	Date FEB. 13, 1968

This letter to cover one customer and one subject only.

Ref.: Letter from H. F. Dobal to D. W. Montgomery, dated September 14, 1967, Subject: Pressurizer Safety Valve Requirements.

During recent weeks additional investigative work has been completed to determine whether a pilot actuated safety valve could be eliminated. The pros and cons of a pilot actuated safety valve were discussed in some detail in the above referenced letter. The additional investigation of this matter has been completed in preliminary form and it is concluded that a pilot actuated safety valve in combination with a small spray valve should be used in our plants.

Mr. J. D. Carlton has performed these transient studies which have led us to the above conclusion. These studies were based on the following conditions:

a. A transient involving a 15% step down from 100% power.
b. Spray valve opening set point at 2230 psig.
c. Spray valve closing set point at 2195 psig.
d. Pilot actuated safety valve set point at 2300 psig.
e. Pilot actuated valve reseating point at 2250 psig.
f. No pressurizer heater action is considered.
g. The time constant for the pressurizer spray valve is 4 seconds.
h. The time constant for the pilot actuated valve is 1 second.

Several different combinations of spray valve and pilot actuated safety valve capacity were investigated. These ranged from 750 gpm spray and 36,000 lb/hr pilot actuated valve capacity to 95 gpm spray and 110,000 lb/hr pilot actuated valve capacity. In trying to determine what combination of spray valve and safety valve capacities should be selected, the following two criteria were set up.

a. The operator should have approximately one minute or more to take corrective action before a low pressure trip occurs if the spray valve opens or is opened inadvertently at 100% power.

b. The operator should have approximately one minute or more to take action before a low pressure trip occurs if the spray valve opens after a 15% step down from 100% power and jams in the open position. (The one-minute time period for this second criteria begins at the point where the valve should have begun to close.)

Please do not write below this line

Results and Recommendations

Following examination of the data that was collected from the above analysis, it is concluded that the above criteria can be met if the spray valve is limited in size to approximately 190 gpm and a pilot actuated safety valve having a capacity of 100,000 lb/hr is installed. Should this spray valve stick in the open position and the heaters work properly, it would probably take in excess of five minutes to reach the low pressure trip point. By comparison, the 750 gpm spray valve stuck open would cause the low pressure trip to be reached in about 20 seconds.

It is also recommended that a remotely operated shutoff valve be added to the spray line downstream of the spray valve. This would provide the operator the means of securing spray flow if the valve did jam in the open position. Without this valve he would have to shut the plant down in a somewhat uncontrolled fashion. It is believed that the failure of the spray valve in this manner is a realistic accident and should be protected against by the addition of this backup valve.

At least on the Oconee project, to accommodate the additional flow into the quench tank from the pilot actuated valve during a pop of the code valves, the number of sparger nozzles in the quench tank will have to be increased from 48 to 56 to maintain the same back pressure on the existing code valves. The space for these nozzles will necessitate an increase in the straight shell length of the quench tank of one foot. The manway should also be able to accommodate a rupture disc of approximately 21" in diameter in lieu of the previously planned 20" diameter disc.

The respective project engineers are requested to obtain approval of the above changes in the area of the spray valve and the pilot actuated valve on all projects and to note the impact on areas outside our scope of supply, i.e., quench tank capacity, etc.

The above changes are summarized as follows:

1. Reduce the present spray valve capacity from 750 gpm to 190 gpm to enhance plant safety.

2. Add an isolation valve to the line presently containing the pressurizer spray valve to allow the operator to shutoff the flow under conditions of spray valve failure.

3. Set pilot actuated safety valve capacity at 100,000 lb/hr.

JHT:NF

J. H. Taylor

cc: JWMerchent
AHLazar
NSEmbrey
WCButt
HFDobel
GEKulynych
RFRyan
WACobb
RCLuken
HHStevens
JDCarlton
DEHeyburn
JHMacMillan
KSchroeder

THE BABCOCK & WILCOX COMPANY
BOILER DIVISION

To D. W. [illegible] - PROJECT MANAGER

From R. F. DOBEL - MANAGER, [illegible] ENGINEERING SECTION

Cust. DUKE POWER COMPANY

File No. 620-0003-12545, 12559, or Ref. 8141.2

Subj. PRESSURIZER SAFETY VALVE EVALUATION

Date JULY 3, 1967

This letter to cover one customer and one subject only.

Reference: Letter from W. C. Butt to R. F. Dobel, entitled, "Pressurizer Safety Valves," dated June 22, 1967.

The above referenced letter (copy attached) presents an evaluation of the quotations received for the pressurizer safety valves and discusses various alternate valve arrangements. As mentioned in Mr. Butt's letter, according to our proposal to Duke we are obligated to supply one pilot actuated and two spring loaded safety valves per reactor unit. It is recommended that we modify this arrangement. It is recommended that we proceed with valve procurement based upon arrangement "F" using Dresser (Harning, Maxwell, and Moore Division) spring loaded valves. The reasons for these recommendations are presented in the attached letter.

In summary, it is believed that there is not a good justification for using a pilot actuated valve and the increased safety and maintenance flexibility make the three-way valve a desirable additional feature.

It would appear that the contract allowance for safety valves is approximately $27,000 per reactor unit. The suggested arrangement will cost approximately $29,000. Piping cost differentials are unknown.

If it were assumed that only once during the lifetime of the plant, unplanned safety valve maintenance were required, the difference between shutdown to 100 psig without degassing the reactor coolant system and a complete shutdown to atmospheric pressure with degassing required, the difference in downtime (estimated at one additional day) would easily justify the feature of the interposing three-way valve and, consequently, should be worth some money to our customers. Hence, it is believed that we would be justified in requesting a contract extra.

Your concurrence to proceed is needed within the next two weeks to allow Dresser to proceed and deliver on schedule and also to allow firming the nozzle and manifold arrangement on top of the pressurizer.

Mr. D. E. Mayburn is advised by copy of this letter that Contract Engineering intends to adopt this arrangement as a standard for all future work. It is further requested that this approach be accepted and approved for other in-house contracts.

RFD:JHT:HP
Attachment
cc: DEMayburn
Contract Department (4)
JHTaylor
AHLazar
WCButt
RJCuffia
WEEsbrey

Please do not write below this line

THE BABCOCK & WILCOX COMPANY
BOILER DIVISION

To	D. W. MONTGOMERY - PROJECT MANAGEMENT, NPGD	
From	H. F. DOBEL - MANAGER SYSTEMS ENGINEERING SECTION, NPGD	
Cust.	DUKE POWER COMPANY	File No. 620-0003-0[illegible].2 or Ref. [illegible]
Subj.	PRESSURIZER SAFETY VALVE REQUIREMENTS	Date SEPT. 14, 1967

This letter to cover one customer and one subject only.

Ref.: (1) Letter from J. D. Carlton to D. W. Montgomery, dated November 23, 1966, Subject: "Pressurizer Relief Valve Sizing."

(2) Letter from J. D. Carlton to J. H. Taylor, dated March 3, 1967, Subject: "Pressurizer Transient Requirements."

(3) Letter from W. C. Butt to H. F. Dobel, dated June 22, 1967, Subject: "Pressurizer Safety Valves."

(4) Letter from H. F. Dobel to D. W. Montgomery, dated July 3, 1967, Subject: "Pressurizer Safety Valve Evaluation."

Reference (4) above recommended that we install four half capacity safety valves with an interposing three-way valve between each pair of safety valves on Duke and all subsequent pressurizers. It also recommended that we not install a pilot actuated safety valve. Subsequent to the preparation of that recommendation, we have issued a letter of intent to Dresser Industries (Marwell, Manning, & Moore Division) to allow them to proceed with the development of a half capacity 300,000 lb/hr safety valve.

Additional review of the safety valve requirements has been completed within the past two months and the purpose of this memorandum is to summarize the conclusions resulting from this review.

On August 17, 1967, Messrs. Carlton, Cobb, Merchent, Butt, Stevens, and Taylor met to discuss the background of sizing the pressurizer safety valves. The pertinent points in this meeting are summarized as follows:

1. The 600,000 lb/hr capacity is a well founded number, is based on a one group rod withdrawal accident from less than 15% power, includes no effect from the pressurizer spray valves, is based on an initial pressurizer steam volume of 700 ft^3, and is based on the maximum expected positive moderator coefficient. It was pointed out that the most sensitive parameter in the analysis leading to safety valve requirements is the set point for the high pressure reactor trip and in this analysis it was assumed to be at 2350 psig.

2. A transient involving a step load change from 100% to 90% power is one of the worst and is essentially equal in terms of overpressure protection requirements to the transient experienced following a system blackout while at full power. In either of these transients

Please do not write below this line

the spray flow required to prevent reactor trip without steam relief is 750 gpm. With the ability to achieve this spray flow in four seconds, the pressure does not exceed 2250 psig. As mentioned in Reference (2), the installation of a pilot actuated safety valve can reduce the spray flow requirements to approximately 300 gpm.

During the last week in August, Messrs. Taylor, Butt, and the writer discussed the outcome of the above meeting, reviewed the recommendations presented in References (3) and (4), and held some additional discussions with safety valve vendors. Mr. D. L. Beyturn entered into one of these discussions and offered some comments regarding his experience with safety valves in the conventional utility industry. The key questions involved were:

1. Can the three-way valve be justified in view of two factors?

   a. Code valve leakage is unlikely unless it first lifts and the transients expected to cause valve action are unlikely.

   b. The probability that a safety valve will stick open after it lifts is nil, hence, this justification for the three-way valve does not exist.

2. Is there any solid justification for the pilot actuated safety valve?

It was generally agreed that a three-way valve could not be justified in view of the above factors. In addition, it appeared that the principal reasons for considering a pilot actuated valve are:

1. Its inclusion does permit a reduction in spray flow requirement.

2. It maintains the plant in essentially the same form as presented in the Duke and subsequent proposals.

3. Pilot actuated valves are familiar and desirable appurtenances on a utility plant and, hence, have some marketing appeal.

One additional point which was not brought out in the previously mentioned discussions is that the use of a pilot actuated valve does reduce the rather severe operating time requirements which must otherwise be imposed on the pressurizer spray valve; i.e., from closed to full open position in four seconds.

In view of the above, we are revising our recommendation presented in Reference (4). It is now recommended that we install two half capacity spring loaded code valves and a partial capacity pilot actuated valve with its associated cutout valve. This will permit installation of a smaller spray valve and spray nozzle in the pressurizer.

As an addition to sizing the spray and pilot actuated valves, it is suggested that we consider these two components as being complementary to each other inasmuch as one or the other could conceivably alone handle transient overpressure protection

or the two components could handle this duty together. As a suggested guide line, we believe we should handle all normal or highly probable transients with spray and the less likely transients with the pilot actuated valve. It would be desirable if this same guide line could be applied to the transients expected when less than four pumps are running but due to the small amount of time expected in this operating mode this should not be a strong factor in ultimately deciding how the overpressure protection duty should be split between the spray and pilot actuated valves.

As of this time, we have no clear definition of the spray or safety valve requirements imposed by transients when less than four pumps are running. By copy of this letter, Messrs. Montgomery and/or Stevens are requested:

1. To confirm that all such transients have less stringent overpressure protection requirements than the four pump situation, or

2. To define the overpressure protection requirements for less than four pump operation, or

3. To indicate when this type of information will be available.

Assuming that the approach outlined above incorporating two half capacity code valves and a pilot actuated valve will be acceptable, we intend to proceed to develop specifications for the pilot actuated valve and to delete further consideration of the three-way valve. Your comments would be appreciated on this letter.

HFD:JHT:SF

cc: JWMerchant
AHLazar
WCButt
JHTaylor
GEKulynych
Contract Department (6)
EFRyan
ESHabrey
EMStevens
JDCarlton
BCheytarn - Barberton