

TITLE RCV-1 failed open OCDWEE-2

RELATED SPRs _____

This SPR has been reviewed by Wash. Engineering Groups and is applicable to
NCS- 3, 4, 9 & *5. The following
is the status and/or resolution of this SPR on other contracts.

REMARKS _____ CHECKING _____ ORIGINAL _____

New operators are being supplied by Rockwell
Infy. Due to ships in Dec. 1974.
R6B.

* NOTE: GPU DECIDED TO CUT THIS VALUE OF OF
LINE @ TMI-1 & USED A UNIT II VALVE.
UNKNOWN WHETHER GPU PLANS TO PUT THIS
Rockwell VALVE IN UNIT II. R6B

NCS-8 Fred H. Faust says no problem ~~on work~~

Clark H. Clark ENTG NOV 1974

Dec 14th at 210 both the spring & the spring block valve failed
to close. ESP/11-21-75

These valves have had problems and the
problems are carried on the Top Generic problem

NCS- list. They are being tracked generically on
another SPR. (See 496 NCS-3)

ARED

TRANSMITTAL SLIP

PLANT STARTUP SERVICE SITE PROBLEM REPORT

**** CLEARED ****

TO: _____ For Information

Central Engineering Files

C. C. Plunkett - Contract Admin.

C. M. Fletcher - Quality Assurance

R. G. Barclay - Task Engineer

W. A. Cobb - Sr. Proj. Manager

FILE: 12M2

CONTRACT NO: 620-00 04

SPR 193

TITLE RCV-2 Failed
in open position

DATE: AUG 28 1974

The attached, cleared SPR is submitted for your information.

TO: _____ J. N. Kaelin - ARKANSAS _____

_____ E. L. Logan - SMUD _____

_____ B. L. Dry - OODNEE _____

_____ L. C. Rogers - MET ED _____

Attached is one copy of Site Problem Report No. 193 which was processed on Contract 620-00 04. Future contracts have been reviewed for the potential of a similar problem. This problem is ~~not~~ considered applicable to other contracts 03, 09, 05.

REMARKS: operation has been OK after replacing stripped yoke
bushing; presently operating with manual motor
until new motor operator arrives... scheduled for
December 24 maintaining Rev 2 open

cc:


EARL H. DAVIS, E.
NUCLEAR SERVICE SUPPORT ENGINEER

RTP
TECHNICAL SUPPORT SUPERVISOR
CLEARED

SITE PROBLEM REPORT

BABCOCK & WILCOX

CUSTOMER Duke Power Company		CONTRACT NO. 620-0004	SPR NO. 193	REV. NO. 0
VENDOR Rockwell P.O. NO.		TASK NO. 28	GROUP NO. 41	SEQ. NO. 01
SITE ENGINEER K. H. Fischer		REQ'D. RESOL. DATE	REQ'D. COMP. DATE	
TITLE RC-1 FAILED IN OPEN POSITION				
DESCRIPTION OF PROBLEM				
SEE ATTACHED				
STATUS ACTION TO DATE INCLUDING PERSONS CONTACTED				
SEE ATTACHED				
FURTHER ACTION RECOMMENDED BY SITE PERSONNEL				
Lynchburg inform site as to when the smaller operators for this valve will be shipped, and how many cycles the spray nozzle is designed for.				
ORIGINATOR SIGNATURE K. H. Fischer		DATE 6/13/74	SIGNATURE <i>R.A. Baker</i>	
RESOLUTION				
RESOLUTION	APPROVED BY		SIGNATURE	DATE
	N.S. SUPPORT ENGINEER		<i>[Signature]</i>	6/14/74
	TASK ENGINEER			
	PROJECT MANAGER		<i>C.A. Cready</i>	8-29-74
COST CATEGORY <input type="checkbox"/> NORM <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> S <input type="checkbox"/> L <input type="checkbox"/> VENDOR CLAIM				
AUTH CHARGE NO.		<input type="checkbox"/> FIELD CHANGE REQ		FC NO.
COMPLETION	SITE COMPLETION REPORT			<input type="checkbox"/> RECOMMENDED STDS. CHANGE
	U.R. Miller's letter to R.B. Reynolds letter dated 7/19/74 states that no damage occurred to spray nozzle. We will change operator when it arrives on site. O-ke repaired existing operator with the speed motor. Valve checked out OK after replacing stripped yoke bushing.			FINAL DISTRIBUTION
	DEVIATIONS <input type="checkbox"/> NONE <input type="checkbox"/> SEE SPR REV. NO.			PROJECT MANAGER
	DATE COMPLETED 8/19/74			S.O.M. CONST. REP.
S.O.M. CONST. REP. APPROVAL <i>[Signature]</i>			QA DOC. FILE	
SIGNED BY <i>R.A. Baker</i>			CENT. ENGR	
DATE 8/19/74			FILE 12N.2	

INSTRUCTIONS FOR PDS-21091 - SITE PROBLEM REPORT

Initiated by NPC 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 (if applicable).
- (2) 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) Task Engineer - Fill in: Resolution; Recommended Std.'s Change*; (if applicable, FC Req. and FC Number); Signature and Date.

*If recommended standard's change, transmit a copy to cognizant Standard Task Engineer to resolve with Standard Plant Manager.

- (5) Field Engineer - Implement resolution; upon completion, fill in: Completion Report; Date Completed and Signature.

NOTE: If necessary to deviate from the approved SPR, note deviation and submit revised SPR to the Site Operations Manager.

- (6) Site Operations Manager - Approve completion; sign.

Initiated by BFW Construction Company

- (1) Originator - (Same as (1) above)
- (2) Construction Co. Site Representative - (Same as (2) above)
- (3) Project Manager - (Same as (3) above)
- (4) Task Engineer - (Same as (4) above)
- (5) Construction Co. Site Representative - (Same as (5) and (6) above)

DESCRIPTION OF PROBLEM:

After the last reactor trip on Unit II on May 30, 1974, it was impossible to keep the normal operating pressure in the pressurizer with all heater banks on.

It appeared that the yoke bushing threads of the motor-operated valve ZRC-1 are stripped because the shaft does not move in and out of the valve, although the motor runs and indicates closed or open position of ZRC-1 in the control room.

STATUS - ACTION TO DATE INCLUDING PERSONS CONTACTED:

To maintain the pressure in the pressurizer ZRC-3 was closed after the Reactor trip.

With ZRC-3 closed a minimum bypass spray flow of 0.75 gpm is not maintained as per EP 1101-01 section 1.2-5.

Stan Holland and Jim Hampton were informed that keeping RC-3 shut violates limits and precautions and that if they continue to operate, RC-3 should not be opened unless absolutely necessary to minimize the number of cycles on the spray nozzle. Duke was also asked to rewire RC-3 so that it could be throttled to maintain some small continuous spray flow. As yet this has not been done, but Duke is checking into it.

At this time, Duke is sampling the pressurizer for Boron every 6 hrs, and opening RC-3 only if the pressurizer boron concentration is not within ± 50 ppm of the RC System Boron Concentration.

Duke has been asked to keep a log of the number of times RC-3 is opened and the spray line temperature just before RC-3 is opened.

Ted Stables has been informed about this problem.
See Oconee I, SPR - 570 for same problem.

RJB/KEF/bh

MODIFICATION REQUEST		DATE: 6/4/74	1
STATION: Oconee	2	APPLICABLE TO: UNIT 1 - YES () NO (X) UNIT 2 - YES (X) NO () UNIT 3 - YES () NO (X)	3
		REV: 10 # 0 - 201 - S	2
		STRUCTURE, SYSTEM OF COMPONENT AFFECTED: Pressurizer Coolant	6
7			
DESCRIPTION OF MODIFICATION: Modify valve 2RC-3 breaker seal in circuit such that the valve can be operated as a throttle valve rather than open-closed type.			
REFERENCES: 1. PO 100A-2 H-5 2. 3.		8	9
		ATTACHMENTS: 1. SAFETY ANALYSIS ATTACHED () YES (X) NO 2. 3.	9
10			
JUSTIFICATION FOR MODIFICATION: With normal pressurizer spray valve 2RC-1 inoperable we need the capability of maintaining a small, continuous spray flow to the pressurizer for the following reasons. 1. Prevent B ¹⁰ concentration buildup in pressurizer. 2. Prevent excessive thermal cycle of the pressurizer spray nozzle. 3. Allow continuation of certain portions of the 75% power test program.			
REQUEST ORIGINATED BY: NAME: S. A. Holland DEPARTMENT: Oconee-Operations ASSIGNMENT: Assistant Operating Engineer		11	12
		PRESENT STATUS (ACTION TO DATE, PERSONS CONTACTED ETC.) None	12
13			
PRIORITY: 1. () REQUIRED PRIOR TO <u>soon as possible</u> , FOR THE FOLLOWING REASONS: 2. (X) REQUIRED FOR PROPER SYSTEM OR UNIT OPERATION. 3. () DESIRABLE FOR PROPER SYSTEM OR UNIT OPERATION.			
AUTHORIZATION FOR REQUEST		14	15
APPROVED: <i>[Signature]</i> DATE: 6/14/74		SAFETY-RELATED MODIFICATION () YES (X) NO Per Policy Definition	15
		This Modification involves an unreviewed safety question or a change in technical specifications () YES (X) NO	16

C. A. CREASY

THE BABCOCK & WILCOX COMPANY
POWER GENERATION GROUP

To | Pressurizer Task Engineer
R.B. Reynolds - Component Management - NPGD-CE - Mt. Vernon
From | Lead Engineer - (Ext. 319)
U.R. Miller - Mechanical Design, NPGD-CE - Mt. Vernon

605 663-5

Cust. | Duke Power Company
File No. or Ref. | 2.5.2
620-0004-59

Subj. | SPR 193 Rev. 1
Date | July 19, 1974

This letter is cover one customer and one subject only.

The subject Site Problem Report described a condition where the spray valve was shut and opened periodically. When the valve was shut, the fluid in the spray line lost heat to the atmosphere and, thus, the fluid temperature decreased. When the valve was opened, the cooler water in the spray line came in contact with the pressurizer spray nozzle. Mechanical Design has conducted a simplified, yet conservative, analysis that shows that the fatigue life of the pressurizer spray nozzle has not been significantly affected by the conditions presented in the subject SPR.

If you have any questions and/or comments, please call.

U.R. Miller
U. R. Miller

C. A. CREASY:

Tab
Attachments

THIS SHOULD RESOLVE
SPR 193-REV. 1. IF THERE
ARE ANY QUESTION, PLEASE
CALL.

R.B. Reynolds

JUSTIFICATION FOR SPE 1973 REV1 CONTRACT 620-0001-57

WHEN THE SPRAY VALVE WAS SHUT, THE FLUID IN THE SPRAY LINE COOLED. WHEN THE SPRAY VALVE WAS OPENED, THE COOLER WATER WAS FORCED THRU THE PRESSURIZER SPRAY NOZZLE. THE FOLLOWING CALCULATIONS INDICATE THAT THE RESULTING THERMAL STRESSES IN THE SPRAY NOZZLE HAD NO APPRECIABLE EFFECT ON THE FATIGUE LIFE OF THE NOZZLE.

ASSUMPTIONS

1. THE INITIAL SPRAY NOZZLE TEMPERATURE IS 650°F
2. THE NOZZLE IS SHOCKED WITH 375°F WATER
3. THE DURATION OF TIME THE COOL WATER IS IN CONTACT WITH THE PRESSURIZER SPRAY NOZZLE IS SMALL.

ANALYSIS

THE EFFECT OF THE COLD WATER IS TO PRODUCE THERMAL SKIN STRESSES IN THE NOZZLE. SINCE THE CARBON STEEL PART OF THE NOZZLE IS PROTECTED BY A THERMAL SLEEVE, IT WILL NOT EXPERIENCE A TEMPERATURE CHANGE. THE SKIN STRESS FOR THE STAINLESS SECTION MAY BE CONSERVATIVELY ESTIMATED BY

$$\sigma_H = \sigma_L = 1.43 E \alpha \Delta T$$

WHERE $E = 26 \times 10^6$ PSI
 $\alpha = 9.96 \times 10^{-6}$ /°F INSTANTANEOUS VALUE AT 400°F
 $\Delta T = 650 - 375 = 275$ °F

BABCOCK & WILCOX

DEPARTMENT 411-CC

DATE 7-19-74 BY CLM

REVISION

$$\therefore \sigma_H = \sigma_L = 1.43(26 \times 9.96)(275) = 101836 \text{ psi}$$

$$S = 102 \text{ ksi}$$

ALTERNATING STRESS = 51 ksi

FROM FIG N-415(B) ALLOWABLE CYCLES = 20,000

$$\text{USAGE FACTOR} = \frac{\text{TOTAL CYCLES}}{\text{ALL. CYCLES}} = \frac{150}{20,000} = 0.0$$

CONCLUSION

THE DESCRIBED CONDITION HAD NO SIGNIFICANT EFFECT ON THE FATIGUE LIFE OF THE SPRAY NOZZLE.

BADCOCK & WILCOX

DEPARTMENT OFFICE

DATE 7-10-74 BY URM

REVISION

PROBLEM REPORT TRANSMITTAL

File 1342

For Action

CONTRACT 620-00 04

SPR 193

TITLE RCV-1 Failed

For Information

in OPEN position

C.A. Creacy
D.G. Burnley

JUN 14 1974

DATE

Date Final Resolution Required by
Nuclear Service Support Engineer

Requested: The smaller operator will be available
by 26, 1974

Direct reply in writing to H.S. Support
Engineer. Please reply immediately
whether answer is final or preliminary.

- C. C. Plunkett-Contract Admin.
- Central Engineering Files
- C.M. Fletcher -NPG Quality Assurance
- B.L. Day
- J. N. Kaelin
- E. L. Logan
- L. C. Rogers

T.D. Stables

Earl W. Davis Jr.
Nuclear Service Support Engineer
Earl W. Davis Jr.

MAN-HOUR LIMITS _____

COST LIMITS _____

CHARGE No. _____

APPROVED: _____
Project Manager

CLEARED

TRANSMITTAL SLIP

PLANT STARTUP SERVICE SITE PROBLEM REPORT

**** CLEARED ****

TO: _____ For Information
Central Engineering Files
C. C. Plunkett - Contract Admin.
C. M. Fletcher - Quality Assurance
R. B. Reynolds - Task Engineer
W. A. Cobb - Sr. Proj. Manager

FILE: 1.M2
CONTRACT NO: 620-00 04
SPR 193 (REV 1)
TITLE 2 RC-1 FAILED
IN OPEN POSITION
DATE: 12/10/74

The attached, cleared SPR is submitted for your information

TO: _____ J. N. Kaelin - ARKANSAS _____ R. E. Kosiba
_____ E. L. Logan - SMUD _____
_____ B. L. Day - OGDNEE _____
_____ L. C. Rogers - MET ED _____
J. L. Hollis - FLORIDA

Attached is one copy of Site Problem Report No. 193 which was processed on Contract 620-00 04. Future contracts have been reviewed for the potential of a similar problem. This problem is / is not considered applicable to other contracts 3, 5, 9.

REMARKS: _____

cc:

G. K. WANDLING

G. K. Wandling
NUCLEAR SERVICE SUPPORT ENGINEER

SITE PROBLEM REPORT

BABCOCK & WILCOX

CUSTOMER Duke Power Company		CONTRACT NO 620-0004	SPR NO. 193	REV. NO. 01
VENDOR Rockwell P.O. NO.		TASK NO. 28	GROUP NO. 41	SEQ. NO. 01
SITE ENGINEER <i>L.J. Decker</i> <i>S.D. White</i>		REQ'D RESOL. DATE	REQ'D. COMP. DATE	
TITLE 2RC - 2 FAILED IN OPEN POSITION				
DESCRIPTION OF PROBLEM See Attached:				
STATUS - ACTION TO DATE INCLUDING PERSONS CONTACTED See Attached:				
FURTHER ACTION RECOMMENDED BY SITE PERSONNEL See attached:				
INITIATOR <i>RB</i>		DATE <i>12/17/74</i>	REF. SIGNATURE <i>RB</i>	DATE <i>4/17/74</i>
RESOLUTION				
APPROVED BY		SIGNATURE		DATE
N.S. SUPPORT ENGINEER		<i>[Signature]</i>		<i>12/17/74</i>
TASK ENGINEER				
PROJECT MANAGER		<i>C.A. Creacy</i>		<i>12-12-74</i>
POST CATEGORY <input type="checkbox"/> NORM <input type="checkbox"/> C <input type="checkbox"/> D <input checked="" type="checkbox"/> L <input type="checkbox"/> VENDOR CLAIM				
AUTH. CHARGE NO.		<input type="checkbox"/> FIELD CHANGE REQ		FC NO <i>155</i>
SITE COMPLETION REPORT <i>FC-281(NSS-3), FC-155(NSS-4), FC-102(NSS-9)</i> <i>will be issued to install ^{needed} speed operator on valve.</i> <i>This clears all parts of this SPR.</i>				<input type="checkbox"/> RECOMMENDED STDS. CHANGE
DEVIATIONS <input checked="" type="checkbox"/> NONE <input type="checkbox"/> SEE SPR REV. NO.				FINAL DISTRIBUTION
DATE COMPLETED <i>12/5/74</i>		SIGNED BY <i>[Signature]</i>		PROJECT MGR
S.O.M. CONSTR. REP. APPROVAL <i>[Signature]</i>		DATE <i>12/4/74</i>		S.O.M./CONSTR. REP.
				CA DOC. FILE
				CENT. ENGR
				FILE 12/74

DESCRIPTION OF PROBLEM:

After ~~the last~~ reactor trip on Unit II on May 30, 1974, it was impossible to keep the normal operating pressure in the pressurizer with all heater banks on.

It appeared that the yoke bushing threads of the motor-operated valve 2RC-1 are stripped because the shaft does not move in and out of the valve, although the motor runs and indicates closed or open position of 2RC-1 in the control room.

STATUS - ACTION TO DATE INCLUDING PERSONS CONTACTED:

To maintain the pressure in the pressurizer, 2RC-3 was closed after the Reactor trip.

With 2RC-3 closed a minimum bypass spray flow of 0.75 gpm is not maintained as per DP 1101-01 section 1.2-5.

Stan Holland and Jim Hampton were informed that keeping RC-3 shut violates limits and precautions and that if they continue to operate, RC-3 should not be opened unless absolutely necessary to minimize the number of cycles on the spray nozzle. Duke was also asked to rewire RC-3 so that it could be throttled to maintain some small continuous spray flow.

Additionally, Mr. V. Miller and Mr. R. Reynolds of Mt. Vernon were contacted in an effort to determine what the effects of frequent cycling of 2RC-3 would be on the pressurizer spray nozzle. Mr. Miller could not provide an absolute number as to the allowable number of cycles, or even what constitutes a cycle; however, he did state that with the pressurizer at normal operating temperature, spray line temperatures as low as 522° F had been analyzed. The results of these analysis indicated that the expected nozzle lifetime was not significantly reduced.

Based on this additional information, Mr. Stan Holland and Duke Power operating personnel were informed that if they were going to cycle 2RC-3 in order to maintain pressurizer boron concentration, then they should cycle the valve at a frequency such that spray line temperature did not decrease to below 522° F. This information was also provided to Duke Power Company in a letter. (Encl. #1)

By June 11, Duke Power Co. had completed electrical modifications to the 2RC-3 operator to allow this valve to be stopped at intermediate positions, thus allowing it to be used as a throttle valve to maintain continuous spray line flow. The valve is now being operated to maintain continuous spray line flow. The data requested by the letter of Enclosure #1 is here included as Enclosure #2. This data is highly suspect, since a brief examination of it will reveal gross discrepancies between time-between cycles, and spray line temperature prior to cycling the valve. These are unexplained at this time.

INSTRUCTIONS FOR PDS-21091 - SITE PROBLEM REPORT

Initiated by NPG 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 (if applicable).
- (2) 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) Task Engineer - Fill in: Resolution; Recommended Std.'s Change*; (if applicable, FC Req. and FC Number); Signature and Date.

*If recommended standard's change, transmit a copy to cognizant Standard Task Engineer to resolve with Standard Plant Manager.
- (5) Field Engineer - Implement resolution; upon completion, fill in: Completion Report; Date Completed and Signature.

NOTE: If necessary to deviate from the approved SPR, note deviation and submit revised SPR to the Site Operations Manager.

- (6) Site Operations Manager - Approve completion; sign.

Initiated by B&W Construction Company

- (1) Originator - (Same as (1) above)
- (2) Construction Co. Site Representative - (Same as (2) above)
- (3) Project Manager - (Same as (3) above)
- (4) Task Engineer - (Same as (4) above)
- (5) Construction Co. Site Representative - (Same as (5) and (6) above)

With 2RC-3 in a throttling position, the following data was obtained from Unit II:

Tave = 579° F
Tc = 553° F
Prs = 2155
T (spray line) = 473.5 °F
Rx. Power = 75%

By comparison, Unit I parameters are shown below:

Tave = 579° F
Tc = 556° F
Prs = 2155
T (spray line) = 482.8
Rx. Power = 99 + %

The above data should be compared with the transient data of enclosure #2 to determine the validity of RC Spray line temperatures as listed. Note: Spray line thermocouples are on the exterior of the pipe and therefore do not measure true fluid temperature.

FURTHER ACTION RECOMMENDED BY SITE PERSONNEL

It is recommended that the data of enclosure 2 be forwarded to Mr. R. Reynolds for analysis of the thermal shocks to which the spray nozzle was subjected. It is further recommended that more definitive information concerning the following be generated for all contracts:

- 1) What temperature differential constitutes a spray nozzle cycle?
- 2) How many cycles are available?
- and 3) Given the same situation repeats itself, what is the best way to operate the system while continuing plant operations?

Babcock & Wilcox

file
Encl. (1)
Power Generation Group

P.O. Box 1260 Lynchburg, Va. 24505

Telephone: (804) 384 5111

June 5, 1974

SCM 2081

Duke Power Company
Goosee Nuclear Station
P. O. Box 1175
Seneca, South Carolina 29678

Subject: Unit II Spray Line Stop Valve (2RC-3)

Attention: Mr. J. Ed Smith

Dear Mr. Smith:

Recent failure of the spray line valve (2RC-1) in an intermediate position has required that the spray line isolation valve (2RC-3) be shut and opened only as necessary to maintain pressurizer boron concentration.

Mr. Stan Holland and Mr. Jim Hampton were informed by B. & W. personnel that operating with 2RC-3 shut violates limits and precautions, DP 1101-01, in that the minimum required spray flow of 0.75 gpm is not maintained. B. & W. has further recommended that if this method of operation is continued, 2RC-3 should not be operated unless absolutely necessary to minimize the number of temperature transients on the spray nozzle.

An additional factor to consider is the severity of the thermal shock suffered by the spray nozzle each time the valve is cycled. Analysis of temperature transients has been previously performed with 522° F as the limiting minimum spray flow temperature. Thus, it is further recommended that if it is anticipated that continuous cycling of RC-3 will be required to prevent excessive boron concentration buildup in the pressurizer, then the valve should be cycled at a frequency such that spray line temperature does not decrease to below 522° F.

While operating the pressurizer in this configuration, it is requested that you log the following data each time 2RC-3 is cycled:

- 1) time at which the valve is opened
- 2) time at which the valve is closed
- 3) temperature in the spray line just prior to opening the valve.

Babcock & Wilcox

SOM Letter # 2081
June 5, 1974
Oconee - Unit II

Based on conversations with Unit II operating personnel and Mr. Stan Holland of Duke Power Company, this data is now being logged. It is additionally recommended that you consider re-wiring the controller for 2 RC-3 such that the valve may be partially opened in order to maintain a small continuous spray flow.

Yours truly,

B. L. Day by R. L. Baker, Jr.

B. L. Day
Site Operations Manager

JJW/ph

cc: H. J. McConnell
W. A. Cobb
R. L. Pittman
Stan Holland (DPC)
Loyd Schmid (DPC)
W. O. Parker (DPC)

2RC-3 Cycling

<u>Date</u>	<u>Start</u>	<u>Stop</u>	<u>Temp.</u>
6/11/74	0029	0030	412
	0128	0130	---
	0201	0202	427
	0258	0259	422
	0407	0408	410
	0500	0501	420
	0607	0608	408
	0700	0701	417
	0857	0858	393
	0922	0923	443
	1025	1025	425
	1046	1046	450
	1245	1248	400
	1416	1419	450
1522	1524	460	
6/11/74	1639	1633	560.9
	1801	1802	566.6
	1901	1903	564.0
	2006	2007	562.9
	2126	2128	565.5
	2305	2307	561.7
	0100	0103	394.7
	0243	0244	428.2
	0317	0318	442.8
	0406	0407	424.8
	0501	0503	419.5
	0624	0625	428.5
	0705	0707	431.8
6/9/74	2203	2204	414.6
	2301	2302	416.4
6/10/74	0101	0102	394
	0204	0205	411
	0303	0304	412
	0402	0403	414
	0505	0506	412
	0606	0607	413
	0701	0702	417
	0805	0806	413
	0925	0926	406
	1103	1104	399
	1206	1207	424
	1304	1305	427
	1401	1402	421
1503	1504	424	

Babcock & Wilcox

Enclosure #2
 SPR 193 - Oconee II
 June 14, 1974
 Page 2 of 3

<u>Date</u>	<u>Start</u>	<u>Stop</u>	<u>Temp.</u>
6/10/74 (cont'd)	1602	1603	417.2
	1703	1704	417
	1759	1800	415.4
	1903	1904	413.0
	2015	2016	405.6
	2046	2047	434.9
	2207	2208	418.8
	2301	2302	412.4

<u>Date</u>	<u>Time Open</u>	<u>Time Shut</u>	<u>Spray Line Temperature</u>	
6/8/74	1237	1238	374.8	
	1333	1334	421.7	
	1433	1434	416.2	
	1534	1535	418.3	
	1623	1624	425.3	
	1807	1808	400.9	
	1902	1903	425.2	
	2002	2003	415.8	
	2124	2125	407.7	
	2202	2203	430.6	
	2300	2301	425.3	
	6/8/74	0014	0015	452.8
6/9/74	0118	0119	414.3	
	0205	0206	425.7	
	0303	0304	418.7	
	0405	0406	421.3	
	0528	0529	407.8	
	0603	0603	437.9	
	0702	0703	423.2	
	0822	0823	408.1	
	0929	0931	413	
	1018	1019	432.9	
6/9/74	1109	1110	424.2	
	1220	1220	430.1	
	1329	1329	561.4	
	1555	1556	412.4	
	1741	1742	397.5	
	1809	1810	438.7	
	1902	1903	420.9	
	2008	2009	413.5	
	2104	2105	416.4	
	6/4/74	0619	0620	371.9
		1030	1031	564.5 after
		1144	1145	560.3
1229		1250	560.4	
1342		1343	561.1	

<u>Date</u>	<u>Time Open</u>	<u>Time Shut</u>	<u>Spray Line Temperature</u>
6/4/74	1430	1431	564.5
	1529	1530	561.3
	1710	1711	566
	1915	1916	566.7
	2041	2041	564.7
	2145	2145	558.5
	2239	2240	553.2
	2348	2349	553.3
	6/5/74	0150	0153
0258		0259	423
0353		0354	429
6/6/74	0322	0323	426
6/7/74	0055	0056	---
	0900	0901	566
	1008	1009	566

JW/bh

Between 5/30 and 6/4 no records were kept on cycling RL-3, but I don't feel that the valve was cycled more than 40 times during this time.

J. M. Baker

SITE PROBLEM REPORT

BABCOCK & WILCOX

CUSTOMER	Duke Power Company	CONTRACT NO	60-0004	SPR NO	93	REV. NO	10
VENDOR	Rockwell Int'l Co.	TASK NO.	28	GROUP NO	41	SEQ. NO.	01
SITE ENGINEER	K. H. Fischer	REQ'D. RESOL. DATE		REQ'D. COMP. DATE			

TITLE: NO-1 FAILED IN OPEN POSITION

DESCRIPTION OF PROBLEM

SEE ATTACHED

Will clear 12/5/74

STATUS - ACTION TO DATE INCLUDING PERSONS CONTACTED

SEE ATTACHED

FURTHER ACTION RECOMMENDED BY SITE PERSONNEL

Lynchburg informs site as to when the smaller operators for this valve will be shipped, and how many cycles the spray nozzle is designed for.

K. H. Fischer *12/13/74* | *R. A. Reynolds* | *12/13/74*

RESOLUTION

RESOLUTION

APPROVED BY	SIGNATURE	DATE
N.S. SUPPORT ENGINEER	<i>[Signature]</i>	<i>12/13/74</i>
TASK ENGINEER		
PROJECT MANAGER		

LOSS CATEGORY: NRR C D G L VENDOR CLAIM

FIELD CHANGE NO. FIELD CHANGE REQ. FC NO.

COMPLETION REPORT

See letter to R.A. Reynolds letter *FC 281* stating that no damage occurred to spray nozzle. Change operator when it arrives on site. Duke advised existing operator with 1/2 speed motor. Valve *OK* after replacing to speed.

RECOMMENDED STDS CHANGE

FINAL DISTRIBUTION

SEE SPR REV. NO. *SEE Rev 1*

SIGNED BY *R.A. Reynolds*

DATE *12/13/74*

CAUTION FILED

INT. ENGR

DESCRIPTION OF PROBLEM:

After the last reactor trip on Unit II on May 30, 1974, it was impossible to keep the normal operating pressure in the pressurizer with all heater banks on.

It appeared that the yoke bushing threads of the motor-operated valve 2RC-1 are stripped because the shaft does not move in and out of the valve, although the motor runs and indicates closed or open position of 2RC-1 in the control room.

STATUS - ACTION & DATE INCLUDING PERSONS CONTACTED:

To maintain the pressure in the pressurizer 2RC-3 was closed after the Reactor trip.

With 2RC-3 closed a minimum bypass spray flow of 0.75 gpm is not maintained as per DP 1101-01 section 1.2-5.

Stan Holland and Jim Hampton were informed that keeping RC-3 shut violates limits and precautions and that if they continue to operate, RC-3 should not be opened unless absolutely necessary to minimize the number of cycles on the spray nozzle. Duke was also asked to rewire RC-3 so that it could be throttled to maintain some small continuous spray flow. As yet this has not been done, but Duke is checking into it.

At this time, Duke is sampling the pressurizer for Boron every 8 hrs, and opening RC-3 only if the pressurizer boron concentration is not within ± 50 ppm of the RC System Boron Concentration.

Duke has been asked to keep a log of the number of times RC-3 is opened and the spray line temperature just before RC-3 is opened.

Ted Stables has been informed about this problem.
See Oconee I, SIP - 570 for same problem.

RJB/KHP/bh

MODIFICATION REQUEST

DATE:

LOCATION:

Office

APPLICABLE TO:

- UNIT 1 - YES () NO (X)
- UNIT 2 - YES (X) NO ()
- UNIT 3 - YES () NO (X)

REV:

STRUCTURE, SYSTEM OF CONTROLS, APPURTENANCES
Reactor Coolant

DESCRIPTION OF MODIFICATION:

Modify valve 2EC-3 breaker seal in circuit such that the valve can be operated as a throttle valve rather than open-closed type.

REFERENCES:

- 1. PO 100A-2 R-5
- 2.
- 3.

ATTACHMENTS:

- 1. SAFETY ANALYSIS ATTACHED () YES (X) NO
- 2.
- 3.

JUSTIFICATION FOR MODIFICATION:

With normal pressurizer spray valve 2EC-1 operable we need the capability of maintaining a small, continuous spray flow to the pressurizer for the following reasons.

- 1. Prevent B¹⁰ concentration buildup in pressurizer.
- 2. Prevent excessive thermal cycle of the pressurizer spray nozzle.
- 3. Allow continuation of certain portions of the 75% power test program.

REQUEST ORIGINATED BY:

NAME: S. A. Holland
DEPARTMENT: Reactor-Operations
ASSIGNMENT: Assistant Operating Engineer

PRESENT STATUS

(ACTION TO DATE, PERSONS CONTACTED, ETC.)
None

PRIORITY:

- 1. () REQUIRED PRIOR TO SUCH AS POSSIBLE FOR THE FOLLOWING REASONS:
- 2. (X) REQUIRED FOR PROPER SYSTEM OR UNIT OPERATION.
- 3. () DESIRED FOR PROPER SYSTEM OR UNIT OPERATION.

APPROVED:

DATE:

SAFETY-CRITICAL MODIFICATION () YES (X) NO

Per Follow-up Form

This Modification Involves: unreviewed

safety critical or a change in technical specifications () YES (X) NO

C. A. CREASY

BABCOCK & WILCOX COMPANY
POWER GENERATION GROUP

JUL 19 1974

To	Pressurizer Task Engineer R.B. Reynolds - Component Management - NPGD-CE -Mt. Vernon	
From	Lead Engineer (Ext. 319) U.R. Miller - Mechanical Design, NPGD-CE - Mt. Vernon	BOS 663-5
Cust.	Duke Power Company	File No. or Ref. 2.5.2 620-0004-59
Subj.	SPR 193 Rev. 1	Date July 19, 1974

This letter to cover one customer and one subject only.

The subject Site Problem Report described a condition where the spray valve was shut and opened periodically. When the valve was shut, the fluid in the spray line lost heat to the atmosphere and, thus, the fluid temperature decreased. When the valve was opened, the cooler water in the spray line came in contact with the pressurizer spray nozzle. Mechanical Design has conducted a simplified, yet conservative, analysis that shows that the fatigue life of the pressurizer spray nozzle has not been significantly affected by the conditions presented in the subject SPR.

If you have any questions and/or comments, please call.

U.R. Miller
U. R. Miller

C. A. CREASY:

Tab

Attachments

THIS SHOULD RESOLVE
SPR 193 R+V.1. IF THERE
ARE ANY QUESTION, PLEASE
CALL.

R.B. Reynolds

JUSTIFICATION FOR SPR 1973 REV1 CONTRACT 620-0004-505

WHEN THE SPRAY VALVE WAS SHUT, THE FLUID IN THE SPRAY LINE COOLED. WHEN THE SPRAY VALVE WAS OPENED, THE COOLER WATER WAS FORCED THRU THE PRESSURIZER SPRAY NOZZLE. THE FOLLOWING CALCULATIONS INDICATE THAT THE RESULTING THERMAL STRESSES IN THE SPRAY NOZZLE HAD NO APPRECIABLE EFFECT ON THE FATIGUE LIFE OF THE NOZZLE.

ASSUMPTIONS

1. THE INITIAL SPRAY NOZZLE TEMPERATURE IS 650°F
2. THE NOZZLE IS SHOCKED WITH 375°F WATER
3. THE DURATION OF TIME THE COOL WATER IS IN CONTACT WITH THE PRESSURIZER SPRAY NOZZLE IS SMALL.

ANALYSIS

THE EFFECT OF THE COLD WATER IS TO PRODUCE THERMAL SKIN STRESSES IN THE NOZZLE. SINCE THE CARBON STEEL PART OF THE NOZZLE IS PROTECTED BY A THERMAL SLEEVE, IT WILL NOT EXPERIENCE A TEMPERATURE CHANGE. THE SKIN STRESS FOR THE STAINLESS SECTION MAY BE CONSERVATIVELY ESTIMATED BY

$$\sigma_H = \sigma_L = 1.43 E \alpha \Delta T$$

WHERE

$$E = 26 \times 10^6 \text{ PSI}$$

$$\alpha = 9.96 \times 10^{-6} / ^\circ\text{F} \text{ INSTANTANEOUS VALUE AT } 400^\circ\text{F}$$

$$\Delta T = 650 - 375 = 275^\circ\text{F}$$

BABCOCK & WILCOX

DEPARTMENT MFM - CE

DATE 7-19-74 BY (LJH)

REVISION

$$\therefore \sigma_h = \sigma_L = 1.43(26 \times 9.96)(275) = 101836 \text{ psi}$$

$$S = 102 \text{ ksi}$$

ALTERNATING STRESS = 51 ksi

FROM FIG N-415(B) ALLOWABLE CYCLES = 20,000

$$\text{USAGE FACTOR} = \frac{\text{TOTAL CYCLES}}{\text{ALL. CYCLES}} = \frac{150}{20,000} = 0.0075$$

CONCLUSION

THE DESCRIBED CONDITION HAD NO SIGNIFICANT EFFECT ON THE FATIGUE LIFE OF THE SPRAY NOZZLE.

BABCOCK & WILCOX
DEPARTMENT SERVICE

DATE 7-19-74 BY URM

REVISION

SI PROBLEM REPORT TRANSMITTAL

To P. F. SHELTON For Action

File 12N2

CONTRACT 620-00 04

SPR 193 (REV 1)

TITLE 2 RC-1 FAILED

To W. A. COBB For Information

IN OPEN POSITION

C. A. CREELY

DATE 7/30/74

Date Final Resolution Required by Nuclear Service Support Engineer

Action Requested: P. F. SHELTON IS REQUESTED TO REVIEW THIS SPR AND PROVIDE NSSE WITH AN ANSWER TO SITE'S QUESTION: "GIVEN THE SAME SITUATION REPEATS ITSELF WHAT IS THE BEST WAY TO OPERATE THE SYSTEM WHILE CONTINUING PLANT OPERATIONS?"

Direct reply in writing to N.S. Support

Engineer. Please reply immediately

whether answer is final or preliminary.

[Signature]
Nuclear Service Support Engineer

cc:

C. C. Plunkett-Contract Admin.
Central Engineering Files

J. N. Kaelin

L. C. ROGERS

B. L. DAY

E. L. LOGAN

-QUALITY ASSURANCE

MAN-HOUR LIMITS _____

COST LIMITS _____

CHARGE No. _____

APPROVED: _____

Project Manager

SIT PROBLEM REPORT TRANSMITTAL

File 1242

CONTRACT 620-00 04

SPR 193 Rev 1

TITLE 2RC-1 FAILED

IN OPEN POSITION

DATE 7/15/74

R.B. REYNOLDS

For Action

To C.A. CREACY

For Information

Date Final Resolution Required by
Nuclear Service Support Engineer

Action Requested: R. B. REYNOLDS IS REQUESTED TO EVALUATE THE
TRANSIENT EFFECTS ON THE SPRAY NOZZLE AND RESPOND
TO NSSE AS REQUESTED BY THIS SPR. (REPLY MEMO
ATTACHED)

Direct reply in writing to N.S. Support
Engineer. Please reply immediately

- cc: ~~D. L. Allison~~
- C. C. Plunkett-Contract Admin.
- ~~Central Engineering Files~~
- ~~H. V. Hoell NDI Quality Assurance~~
- ~~J. J. Kennedy~~
- ~~J. H. Kuehn~~
- ~~H. J. McDonnell~~
- ~~J. D. Phinney~~
- B. L. DAY**

whether answer is final or preliminary.
[Signature]
Nuclear Service Support Engineer

MAN-OUR LIMITS 40 Hrs CC 314
 COST LIMITS _____
 CHARGE No. 620-0004-08-07
 APPROVED: See Attached Page
 Project Manager

SITE PROBLEM REPORT TRANSMITTAL

To R.B. Reynolds For Action

File 12M2
CONTRACT 620-00 04

SPR 193 REV 1

To C.A. Cracy For Information
Pressure Situation

TITLE 2001 TANK

(N) (P) (R) (S) (T) (U) (V) (W) (X) (Y) (Z)

DATE 6/20/74

Date Final Resolution Required by
Nuclear Service Support Engineer

Action Requested: L.B. Reynolds is requested to indicate the correct
me to send report to NSSE as requested by this
SPR. Reply memo attached

I also information is sent to ANSWERED
for water condition.
40

Direct reply in writing to N.S. Support
Engineer. Please reply immediately
whether answer is final or preliminary.

- cc: C. C. Plunkett-Contract Admin.
Central Engineering Files
E. V. DeCarli-NPG Quality Assurance
E. Logan
J. H. Kaelin
J. D. Phinney

J.D. Phinney
Nuclear Service Support Engineer
J. Handling

MANHOUR LIMITS 70 Hrs @ 314
COST LIMITS ---
CHARGE No. 620-0004-08-07
APPROVED: C.A. Cracy
Project Manager

SITE PROBLEM REPORT REPLY MEMO

NSS- /
FILE # 222
8-19-73 1

To: T. D. STABLES
Support Engineer
From: R. B. REYNOLDS
Task Engineer

RECOMMENDED ACTION: NO
~~1. This site problem is definitely not applicable to the following NSS contracts:
Reason: _____~~
~~2. This site problem report is suspected as having effect on the following NSS contracts: NSS- _____~~
~~3. This problem could occur on other contracts but could be prevented simply by informing site personnel and the customer of the potential problem.~~
~~4. This site problem could be prevented on NSS- _____ and subsequent contracts by changing Standard _____
Lo. or Title _____~~

CORRECT

- Final and Complete. Manhours Charged _____
- An estimate only. Complete Charge No.: _____
- Resolution available _____ Date _____ Signature _____
- Field Change Necessary Task Engineer _____

APPLICABILITY TO OTHER NSS CONTRACTS

Check applicable statements.

- 1. This Site Problem is definitely not applicable to the following NSS contracts:
Reason: _____
- 2. This Site Problem Report is suspected as having effect on the following NSS contracts: NSS- _____
- 3. This Problem could occur on other contracts but could be prevented simply by informing site personnel and the customer of the potential problem.
- 4. This Site Problem could be prevented on NSS- _____ and subsequent contracts by changing Standard _____
Lo. or Title _____

Signature _____
Task Engineer

With SPR-3 in a throttling position, the following data was obtained from Unit II:

? Tave = 579° F *WHAT IS Tc & Tave* Tc = RCS COLD LEG TEMP. (REACTOR INLET)

Tc = 558° F

Prss = 2155

T (spray line) = 473.5° F TAVE = AVERAGE OF RCS COLD LEG & HOT LEG TEMP.'s

Rx. Power = 75%

By comparison, Unit I parameters are shown below:

? Tave = 579° F *WHAT IS Tc & Tave*

Tc = 556° F

Prss = 2155

T (spray line) = 482.8

Rx. Power = 99 + %

The above data should be compared with the transient data of enclosure #2 to determine the validity of RC Spray line temperatures as listed. Note: Spray line thermocouples are on the exterior of the pipe and therefore do not measure true fluid temperature. *IS THIS SPRAY LINE MEASUREMENT YES...*

FURTHER ACTION RECOMMENDED BY SITE PERSONNEL

~ 2" MIRROR INSULATION

It is recommended that the data of enclosure 2 be forwarded to Mr. R. Reynolds for analysis of the thermal shocks to which the spray nozzle was subjected. It is further recommended that more definitive information concerning the following be generated for all contracts:

- 1) What temperature differential constitutes a spray nozzle cycle? *100° F*
- 2) How many cycles are available? *∞ if less than 100° F*
- and 3) Given the same situation repeats itself, what is the best way to operate the system while continuing plant operations?

↑ LYNCH. SYSTEMS WILL HAVE TO ANSWER THIS.

2PC-3 Cycling

SPRAY LINE
 TEMP. IN 2/2/2/2/2/2

Date	Start	Stop	Temp.
6/11/74	0029	0030	412
	0128	0130	---
	0201	0202	427
	0258	0259	422
	0407	0408	410
	0500	0501	420
	0607	0608	408
	0700	0701	417
	0857	0858	393
	0922	0923	443
	1025	1025	425
	1046	1046	450
	1245	1248	400
	1416	1419	450
1522	1524	460	
6/11/74	1630	1633	560.9
	1801	1802	566.6
	1901	1903	564.0
	2006	2007	562.9
	2126	2128	565.5
	2305	2307	561.7
	0100	0103	394.7
	0243	0244	428.2
	0317	0318	442.8
	0406	0407	424.8
	0501	0503	439.5
	0624	0625	423.5
	0705	0707	431.9
	6/9/74	2203	2204
2301		2302	416.4
6/10/74	0101	0102	394
	0204	0205	411
	0303	0304	412
	0402	0403	414
	0505	0506	412
	0606	0607	413
	0701	0702	417
	0805	0806	413
	0925	0926	406
	1103	1104	399
	1206	1207	424
	1304	1305	427
	1401	1402	421
	1503	1504	424

1. WHAT IS
 THE TEMPERATURE
 OF THE NOZZLE
 PRIOR TO
 OPENING VALVE
 ~ 648°F
 (SAT. TEMP. FOR 2155 PSIG)

SPRAY NOZZLE ~ 648°F
 THEREFORE, TEMP. OF
 NOZZLE WOULD DECREASE,
 THE AMOUNT DEPENDING
 UPON SPRAY LINE TEMP.
 PRIOR TO OPENING VALVE.

Subcock & Wilcox

Enclosure #2
 SR 193 - Occurrence II
 June 14, 1974
 Page 2 of 3

<u>Date</u>	<u>Start</u>	<u>Stop</u>	<u>Temp.</u>
6/8/74 (cont'd)	1602	1603	417.2
	1703	1704	417
	1759	1800	415.4
	1903	1904	413.0
	2015	2016	405.6
	2046	2047	434.9
	2207	2208	418.8
	6/10/74	2301	2302

<u>Date</u>	<u>Time Open</u>	<u>Time Shut</u>	<u>Spray Line Temperature</u>	
6/8/74	1237	1238	374.8	
	1333	1334	421.7	
	1433	1434	416.2	
	1534	1535	418.3	
	1623	1624	425.3	
	1607	1608	400.9	
	1902	1903	425.2	
	2002	2003	415.8	
	2124	2125	407.7	
	2202	2203	430.6	
	2300	2301	425.3	
	6/8/74 6/9/74	0014	0015	452.8
		0118	0119	414.3
0205		0206	425.7	
0303		0304	418.7	
0405		0406	421.3	
0528		0529	407.8	
0603		0603	437.9	
0702		0703	423.2	
6/9/74	0822	0823	408.1	
	0929	0931	413	
	1018	1019	432.9	
	1109	1110	424.2	
	1220	1220	430.1	
	1329	1329	561.4	
	1555	1556	412.4	
	1741	1742	397.5	
	1809	1810	438.7	
	1902	1903	420.9	
	2008	2009	413.5	
	2104	2105	416.4	
6/4/74	0619	0620	371.9	
	1030	1031	564.5 after	
	1144	1145	560.3	
	1229	1250	560.4	
	1347	1343	561.1	

}?

<u>Date</u>	<u>Time Open</u>	<u>Time Shut</u>	<u>Spray Line Temperature</u>
6/4/74	1430	1431	564.5
	1529	1530	561.3
	1710	1711	566
	1915	1916	566.7
	2041	2041	564.7
	2145	2145	558.5
	2239	2240	558.2
	2348	2349	558.3
	6/5/74	0150	0153
0258		0259	423
0353		0354	429
6/6/74	0322	0323	426
6/7/74	0055	0056	---
	0900	0901	566 } ?
	1008	1009	566 }

JJW/bh

19

Between 5/30 and 6/4 no records were kept on cycling RC-3, but I don't feel that the valve was cycled more than 40 times during this time.

RM Baber

43 Cycles Total

SITE PROBLEM REPORT TRANSMITTAL

To R.B. Reynolds For Action

File 12M2
CONTRACT 620-00 04

SER 193 REV 1

TITLE SRM TALLS

To C.A. Cross For Information

SRM Position

FRONT SHEET

DATE 6/20/74

Date Final Resolution Required by
Nuclear Service Support Engineer

Action Requested: R.B. Reynolds is requested to indicate the amount
of work to be reported to NSSE as requested by this
SRM. Reply memo attached

Direct reply in writing to N.S. Support
Engineer. Please reply immediately
whether answer is final or preliminary.

- cc: C. C. Plunkett-Contract Admin.
- Central Engineering Files
- E. V. DeCarli-NPG Quality Assurance
- E. Logan
- J. N. Kaelin

[Signature]
Nuclear Service Support Engineer

J. D. Phinney

MANOUR LIMITS _____
COST LIMITS _____
CHARGE No. _____
APPROVED: _____
Project Manager