Rev. 75

Effective Date 5/23/94

OPERATING PROCEDURE

OP-402

FLORIDA POWER CORPORATION

CRYSTAL RIVER UNIT 3

MAKEUP AND PURIFICATION SYSTEM

THIS PROCEDURE ADDRESSES SAFETY RELATED COMPONENTS

THIS PROCEDURE ADDRESSES ENVIRONMENTALLY QUALIFIED (EQ) COMPONENTS

APPROVED BY: Interpretation Contact

(SIGNATURE ON FILE)

DATE: 5/23/94

INTERPRETATION CONTACT: Superviser, Nuclear Operations Administrative Shift

4.4 SYSTEM BLEED

ACTIONS	DETAILS

NOTE: Changes in purification line ups while on Decay Heat can effect vessel level and the operation of the Decay Heat System.

4.4.1 Select "BLEED MODE" selector switch to desired RC Bleed Tank AND Pull Handle Up

- ___ RCBT-3A
- ___ RCBT-3B
- ___ RCBT-3C

Initial/Date

4.4.2 Select MUV-112 Control switch to BLEED

Initial/Date

4.4.3 WHEN MUT decreases to low level alarm, OR desired letdown is completed, THEN select MUV-112 to NORMAL

Initial/Date

4.4.4 Place "BLEED MODE" selector switch in the pushed in position

Initial/Date

4.5 SYSTEM FEED

ACTIONS	DETAILS
NOTE: Changes in purification line ups while on Decay Heat can effect vessel level and the operation of the Decay Heat System.	
4.5.1 Determine required amount of Feed	• Refer to OP-304 Initial/Date
4.5.2 Align Batch Controller	1. ___ Select 'Start/Stop' switch to STOP ___ Depress 'Clear' pushbutton ___ Adjust 'Batch Size' thumbswitch to desired flow ___ Adjust 'Preshutdown' thumbswitch to desired preshutdown setpoint 2. ___ Select 'Start/Stop' switch to START Initial/Date
4.5.3 Select "FEED MODE" selector switch to desired feed Source AND Pull Handle Up	 Initial/Date
4.5.4 IF selected feed source is a BAST, THEN Open discharge valve and start an CAP	• ___ OPEN, CAV-57 • ___ START CAP-1A OR • ___ START CAP-1B Initial/Date
4.5.5 Place both postfilters in service	• Open postfilter isolation valves ___ MUV-90 ___ MUV-91 ___ MUV-97 ___ MUV-96 Initial/Date

[redacted]

4.5 SYSTEM FEED (Cont'd)

ACTIONS
4.5.6 Open Makeup and Purification Feed POV
4.5.7 Adjust flow rate using VALVE LOADING CONTROL on the Batch Controller to desired flow
4.5.8 WHEN MUT level reaches desired level, THEN CLOSE MUV-103
4.5.9 IF CAV-57 was opened, THEN CLOSE CAV-57 AND STOP running CAP
4.5.10 Place the "FEED MODE" selector switch in the pushed in position
4.5.11 Restore postfilter lineup as desired

[redacted]

[redacted]

4.19 MUT VENTING AND GAS ADDITION

	ACTIONS
4.19.1	IF MUT N_2/H_2 addition is desired THEN GO TO Step 4.19.3 OR continue with next step to vent MUT to WGDT
4.19.2	Ensure no other draining or venting operations are in progress in the Waste Gas system
4.19.3	Select WDT 1A OR desired Waste Gas Decay Tank as directed by Chem. Dept.
4.19.4	Perform Valve Alignment for Venting MUT
4.19.5	Vent MUT

[redacted]

4.19.6	WHEN approximately 2 minutes have elapsed, THEN STOP WDP-1A(1B)

	ACTIONS	DETAILS
4.19.7	Remove Waste Gas Decay Tank selected in Step 4.19.3 from service	• Place selector switch in OVERRIDE • Place desired tank in service and ensure Gas Sample Analyzer WDGA-1 lined up to in service Waste Gas Decay Tank Initial/Date
4.19.8	Establish H_2 pressure in MUT if desired, otherwise N/A	1. ___ Refer to Curve 8 of OP-1038 for maximum MUT overpressure 2. ___ OPEN MUV-143, MCB Control switch 3. ___ WHEN MUT is at desired pressure, THEN CLOSE the following: ___ MUV-143 Initial/Date
4.19.9	IF H_2 addition with the manual bypass is desired THEN perform the following OTHERWISE N/A	1. ___ Determine maximum MUT overpressure using Curve 8 of OP-1038 2. ___ Locally open MUV-492, regulator bypass 3. ___ Open MUV-143 on MCB 4. ___ Add desired amount of H_2 while ensuring MUT pressure limit is not exceeded 5. ___ Close MUV-143 on MCB 6. ___ Locally close MUV-492 Initial/Date
4.19.10	IF H_2 overpressure is desired, THEN perform the following, OTHERWISE N/A	1. ___ Determine maximum MUT overpressure using curve 8 of OP-1038 2. ___ Locally open MUV-467 3. ___ OPEN MUV-141 on MCB 4. ___ Add desired amount of H_2 while ensuring MUT pressure limit is not exceeded 5. ___ Close MUV-141 on MCB 6. ___ Locally close MUV-467 Initial/Date

To: DFIELDS
From: GHALNON
Subject: Journal
Date: 08-09-94 Time: 2:00p

To: *JOURNAL

There have been some questions regarding the 72 hour rule. It is still alive and well and takes the DNPO approval to exceed 72 hours. Exceeding 72 hours will be considered if no viable alternative can be found. I instructed Clint to attempt to schedule such that we do not exceed 72 hours for a 7 day period. If in doing this, it will require scheduling a person to work hours that he/she would normally be sleeping (ie the fatigue factor would be high) to attempt an overtime deviation authorization. The point is it is better to keep someone working a set schedule one extra day or a few extra hours than to take someone who would normally be sleeping on that day and ask him/her to work. When attempting to schedule around the 72 hours, all attempts will be made to get the concurrence of the personnel involved. It is not the point to limit the total number of hours, since it will probably wash out as either premium time or overtime anyway. The point is to not ask our personnel to work more than 72 hours in a seven day period because that is where we set the limit on where we are willing to push the human body. Admittingly, some people can handle the 72 hours and more and some get more fatigued. Rather than try and label our personnel as to their physical/mental agility after 72 hours, we set the standard.
****

We will be making a change in the clerk's shifts. Andrew will rotate onto days and Marlene onto mids. This change will be effective this weekend. The reasons behind the schedule change are several but suffice it to say it will provide some cross training opportunities, help put some emphasis on department trends, and help to alleviate some issues that will work out for the best for operations as a whole. Andrew will start learning the schedule which Marlene has built into an excellent tool for our people. Marlene will perform the duties of the mid shift and all that is necessary to maintain department records and plant status. She will also help me perform some detailed trending of key indicators in Ops. I hope everyone can make this transition a smooth one and give both your best support.
****

There is an ongoing discussion on the issue of H2 pressure in the MUT. I have talked to Mark V. and understand the concerns. I discussed this with Bruce and Jerry Campbell and will be working to resolve the questions. It is important, and Bruce has asked, if anyone has a concern, please write it down and send it to me. Even if it is not new, I need to get all perspectives of this issue so we can address the right areas. It appears what has been addressed has not satisfied the concerns to date, so I need to be absolutely clear on the questions.
****

Bob Murray has volunteered to look, in detail, at the deleted computer alarm summary. The purpose is to do away with unnecessary alarms so that the real ones are not diluted beyond recognition. He will need some support in being I asked him to get at least a second opinion before he goes to Barry Baumgardner to get the points deleted. I also asked that I be kept informed, not as an approval, just so I can keep aprised of the progress. Its a good project and I commend those who questioned the need and are taking action to correct it.
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A concerted effort will be undertaken to do away with "operator work-arounds". I need your input. Please send me any and all comments on items you consider as a work-around, both equipment and administrative

GHH

Subject: Summary of actions required to implement the new make-up tank hydrogen cover gas pressure limits (Ref: Calc. I-90-0024) such that a 25cc/kg hydrogen concentration can be maintained in the RCS.

NOTE: There are two separate issues concerning the potential damage to make-up pumps resulting from an increase in make-up cover gas pressure. These concerns are as follows:

1. During normal operations, will raising the make-up tank cover gas pressure to the limit specified in calculation I-90-0024, cause hydrogen gas to come out of solution in the make-up pump suction piping and collect in the high point of the static portions of this piping. The concern is, if a buildup of gas occurs in the BWST piping common to the normally running make-up pump, upon an HPI actuation this gas would be transferred to either pump in the common suction header and potentially cause pump damage (Ref: IN 88-023 including Supplements 1 and 3).

2. At some point during a LOCA will the BWST head pressure be overcome by make-up tank head pressure. This condition could potentially occur as the BWST and make-up tank inventories are depleted to a point eventually allowing make-up tank cover gas to enter the HPI pump suction piping common to the make-up tank (Ref: IN 88-023 Supplement # 2).

Actions required for item 1 above:

a. Per the Nuclear Operations Engineering response to NRC IN 88-23, including Supplements 1 and 3, the potential for hydrogen gas to collect in the static piping of the non-running make-up pump may exist at CR3.

   Per an NPSE walk-down of the make-up pump suction piping, high points do exists in the BWST piping that can trap gas. NPSE will view the high point sections of piping with an infrared scope to determine if any gas is currently present. If this method of gas detection is deemed reliable, it will be used to monitor these high points on a routine bases following the implementation of the new make-up tank cover gas pressure limits. If this method is not considered reliable, than samples will be taken from high point vents. Chemistry and NPSE will develop a method to quantifying the trapped gas. Routine sampling will then be performed until it is determined that a problem exists. If a gas buildup is occurring, routine venting of the high point vents will be required.

   NPSE will perform the infrared analysis on 10/27/92.

Actions required for item 2 above:

a. Complete the review of GC calculations I-90-0024. The Nuclear Operations Technical Advisors are performing a final review of the subject calculation. Per conversation with Bill Stephenson, this review will be completed by October 23, 1992.

b. Following the above review and subsequent acceptance by the NOTA's, a revision to OP-103B (curve #8) is required. Curve #8 is the maximum make-up tank pressure vs indicated water level curve.

c. Calculation I-92-0024 recommends that only one of the two make-up pumps normally lined up to the make-up tank, i.e. MUP-1A or 1B, be operating during a LOCA when the piggyback mode must be established. When this analysis was performed, all three pumps could be operating at this switch over point; however, recent changes to the Engineered Safeguards Actuation procedure (AP-380) now requires that only two of the three pumps are running. Operations should review AP-380 considering the make-up tank pressure concerns for any additional changes required.

d. Calculation I-92-0024 provides the data required to produce a new make-up tank level vs cover gas pressure curve. The curve will represents acceptable normal plant operations that do not endanger make-up (EFI) pump operation in the event of a LOCA. This curve does not address the hydrogen cover gas pressure required to maintain the 25 cc/kg RCS concentration. A calculations currently being performed by Rocky Thompson will determine the actual make-up tank hydrogen cover gas pressure required to reach 25 cc/kg. Dale Mc Collough is working with Rocky on specific plant data needed for this calculation. Based on the results of this calculation, a MAR will be required to raise the make-up tank high pressure alarm set point. Per conversation with Operations, raising this set point is acceptable and should not produce any operating concerns. The new alarm set point will likely be approximately 3 PSIG higher than a conservative value for required cover gas pressure. Because the make-up tank is part of a dynamic system, there may be short periods of time when the operating pressure will exceed the tank pressure vs level curve and times when sufficient hydrogen is not present. At this point in the evaluation phase, we believe this should be acceptable.

An REA will be written to request a MAR to change the high pressure alarm set point; however, the cover gas pressure requirement must first be determined. Also, operations

must by into the proposed set point change. The plan is to write the REA by October 28, 1992.

e. A revision to OP-402 will be required to incorporate the proposed new make-up tank set point and any details required by Operations to incorporate the new higher operating tank pressure.

f. A revision to AR-403 will be required to incorporate the new higher make-up tank set point.

Pat Hummer
10-15-92

INTEROFFICE CORRESPONDENCE

Florida Power corporation

Draft Recommendation

Nuclear Plant Technical Support Office | MAIF NSC | 240-3522 Telephone

Review & Write Comments to Z. Taylor

SUBJECT: Make-Up Tank Hydrogen Overpressure

TO: B.J. Hickle

DATE: September 2, 1994
NPTS 94-0429

On August 5th, 1994, a meeting with Operations, Chemistry, SNES, NOE and NPTS was held to discuss current Make-Up tank overpressure conditions. The purpose of the meeting was to determine what was required to increase overpressure so desired RCS hydrogen concentration could be maintained with minimal Operator burden. The options discussed are provided below. It should be noted that none of these options will recommend changes to OP-103B, Curve #8. Engineering believes this curve is accurate and reasonably conservative to protect the High Pressure Injection pumps from hydrogen gas intrusion in the worst case Large Break LOCA. In addition, corrective action #8 of PR 94-149 is currently is progress to provide technical bases for the BWST swap over point. During this analysis, Make-Up tank overpressure per Curve #8 will be re-evaluated. This action is scheduled to be completed by September 30, 1994.

Background:

There are two conditions which limit the amount of hydrogen overpressure being maintained in the Make-Up tank. These conditions are as follows:

1. The first limiting condition is based on the LOCA analysis. In this analysis, the differential pressure between the Make-Up tank and BWST was evaluated during maximum ECCS flows at various Make-Up tank overpressures. The object was to determine the maximum allowable tank overpressure such that gas from the Make-Up tank would not enter the Make-Up pump suction header. This condition must exist down to the point where ECCS pump suction is transferred from the BWST to the RB sump due to a low BWST level. HPI pump operation after the transfer would require an LPI piggyback line-up. In the piggyback mode, gas intrusion into the Make-Up pump suction header is not a concern due to LPI discharge pressure.

This analysis resulted in a revision to the Make-Up tank level vs. pressure curve, (Curve #8 of OP-103B). The curve is based on the expansion of a known volume of hydrogen for an increasing or decreasing Make-Up tank level. Therefore, for the LOCA analysis it is acceptable to raise the hydrogen overpressure to the curve at any indicated Make-Up tank level.

2) The second limiting condition for hydrogen overpressure is based on Section III.J of 10CFR50 Appendix R and the Appendix R fire study. Section III.J states that operator action cannot occur for eight hours to achieve safe shut down unless emergency lighting is provided for the required action. The study postulates a fire in the Auxiliary building which causes MUV-143 (Make-Up tank hydrogen supply valve) to fail open. In addition, a plant trip is postulated to occur. CR3 cannot take credit for operator action to manually isolate the Make-Up tank hydrogen supply because there is no emergency lighting to the isolation valves (MUV-493 or 494) on the 119 ft Auxiliary Building. Also, the fire may prevent access to these valves. Therefore, the current setpoint of MUV-491 (hydrogen supply regulator) is limited to the eight hour period. Following the trip, make-up to the RCS is required

for inventory control during plant cooldown. With MUV-143 failed open, hydrogen overpressure on the Make-Up tank will remain at the setpoint of MUV-491 while the Make Up tank level decreases. The analysis evaluates Make-Up tank level with respect to bWST level during cooldown while maintaining Make-Up tank overpressure at the regulator setpoint. The regulator setpoint ensures that hydrogen gas will not enter the Make-Up Pump suction header within the eight hour limit. Operator action would be required to isolate hydrogen to the tank after eight hours. In this Appendix R scenario, Curve #8 of OP-103B will be violated. However, because Curve #8 is for LOCA considerations and an Appendix R fire is not assumed to occur concurrent with a LOCA, the violation of Curve #8 is acceptable.

Options to increase hydrogen overpressure:

Option 1: Based on a review of the current MUV-491 setpoint and the analysis performed to establish this setpoint, some of the conservative factors used in the analysis can be relaxed. The current 20 psig setpoint would allow approximately 14.2 hours before operator action would be required to prevent gas intrusion. If the time frame is lowered to the minimum 8 hour period, the setpoint can be increased by approximately 1.2 psig. In addition, the setting of MUV-491 per the Refuel 9 MAR functional test can be revised to allow the regulator setting to be based on indicated tank pressure. The Refuel 9 MAR functional test set the regulator at a conservative 19.5 psig at a Make-Up tank level of 70 inches. However, the actual tank pressure was 17.7 psig. This difference is due to losses in the hydrogen supply line between the tank and the regulator and due to a drastic reduction of gas flow to the tank as pressure approaches setpoint. If both the above changes are made, the new regulator setpoint would be approximately 23 psig. This would provide the ability to increase tank pressure from the Control Room to the curve at approximately 74 inches without manipulating Make-Up tank level. At present, pressure can be increased to the curve at approximately 60 inches but then the Make-Up tank level must be increased to increase pressure to achieve 25 cc/kg.

Although this option is relatively easy to implement and it will improve the ability to add hydrogen to the Make-Up such that the 25 cc/kg RCS hydrogen concentration can be maintained, the overall improvement is marginal.

Option 2: The hydrogen addition regulator setpoint could be raised if a redundant isolation valve was added to the supply line. This valve could be operated from the Control Room providing its power is routed independent of the fire zone which causes MUV-143 to fail open. The addition of a manual valve with emergency lighting could also be added and accessed from outside the fire zone. If the setpoint of MUV-491 is raised to 24 psig, the redundant valve would have to be isolated within approximately one hour. The best location for a redundant valve appears to be on the 119 ft elevation of the Turbine Building. The hydrogen supply line is routed approximately 10 feet above the 119 ft Turbine Building floor.

This option will also improve the ability to add hydrogen to the Make-Up tank and maintain the 25 cc/kg concentration. However, like Option 1, the improvement is marginal. Also, the logistics of installing a new valve in the hydrogen supply line at power could be complex. Temporary hydrogen supplies to both the generator and Make-Up tank would be required.

Option 3: The restoration of MUV-64 with a chain operator would allow the Make-Up tank to be manually isolated in the event of a fire. Because emergency lighting is already available to access MUV-64, the isolation could occur within the eight hour

study assumes a fire on the 119 ft of the Auxiliary Building could cause MUV-143 to fail open. In this scenario, the 95 ft elevation of the Auxiliary Building remains accessible. MUV-64 is on the 95 ft elevation. If the fire exists on the 95 ft Auxiliary Building then MUV-143 would be unaffected.

Based on preliminary NOE analysis, MUV-64 would have to be isolated within approximately 15 minutes of a fire if the following conditions exists: A fire on the 119 ft Auxiliary Building, a Reactor trip, and either the loss of Make-Up tank indications or a high tank pressure alarm occurs due to MUV-143 failing open. The isolation of MUV-64 in the 15 minute period is based on the Make-Up tank being able to supply an average of 140 gpm for 15 minutes even if the tank level is initially 55 inches (low level). Once the pump suction header is aligned to the BWST and MUV-64 is isolated, the gas binding concern no longer exists. Also, the hydrogen regulator setpoint (MUV-491) would no longer be an issue.

The isolation of MUV-64 could be restored to the Control Room and a protected control board switch could be installed. However, the restoration of power and air would be complex and very costly. The valve would have to be protected from spurious closure in the event of a fire.

In addition to installing the chain operator, a MAR would be required to raise the setpoint of MUV-491 to ensure operations can maintain a minimum of 25 cc/kg hydrogen concentration in the RCS without Operator work around. The installation of the chain operator and setpoint change would fall into the category of a minor MAR.

Conclusion:

Based on preliminary evaluations, Engineering prefers installing a chain operator per option three. The chain would be locked to the wall to prevent unauthorized valve operation. This would require a revision to SP-381 (Locked/Sealed Valve Check List procedure). Also, AP-880 (Fire Protection procedure) would have to be revised to incorporate the isolation of MUV-64 in the event the conditions described above occur during a fire.

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