UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION I
475 ALLENDALE ROAD
KING OF PRUSSIA, PA 19406

DATE: 11-24-03

MESSAGE TO: Dan Orr - These are the items discussed with Scott ... for info + follow-up.

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MESSAGE FROM: Scott Barber & Ted Wingfield
U.S.N.R.C. Region I, King of Prussia, PA

TRANSMITTED BY:

DATE & TIME:

VERIFIED BY:

C-250

May Be Something Here, Surprized That This Was Allowed while operating More Conservative off Line. No Nuclear Safety Loss.

TARP Report 02 25 03
Salem Loss of Station Air Header Pressure
(20133239)

TARP Team:
Pat Walsh - Team Leader
Bill O'Brien – Work Management
John Hawrlak- Engineering
Anthony Carrucci - Maintenance
Alan Crampton - Operations
Jeff DeFebo – QA

DESCRIPTION OF EVENT;

At approximately 1445 on 2/25/2003, during the station air outage three of the temporary air compressors were in service carrying station air load. A drop in station air pressure was noted in the control room. A fourth and fifth temporary compressors were started. At 1613 the #2 station air compressor was placed in-service and was maintained acceptable air pressure. The temporary air compressors were removed from service. The #2 Station air compressor ran for approximately 26 minutes and tripped on high oil temperature. Following the trip of #2 Station air compressor, #3 station air compressor and four temporary air compressors were started and station air header pressure stabilized. It was discovered that #2 SAC tripped because the lube oil temperature control valve 12ST6 was found jacked closed. Lube oil cooler outlet temperature was observed to be 148 Degrees.

After the trip of #2 SAC, the PRT pressure high alarm was received. PRT level was rising and it was noticed that letdown valve 1CV7 was closed which resulted in the lifting of the letdown relief valve 1CV6. 1CV6 lifted for 8 minutes at a rate of 75 GPM leak rate to the PRT.

Both unit #1 & #2 ECACs auto started. Lowest pressures noted were 57 psi on station air, 82 psi on A control air and 77 psi on B control air. The control air header pressures as indicated in unit #2 were observed to deviate as much as 11 PSID between A and B header. No leaks were initially observed in the plant during operator walk downs.

At 1649 letdown was isolated and at 1700 letdown was restored to normal lineup. Additionally, 1WL99, 1WL17, 1WL108 and 1WL13 were found closed and restored to normal position.

At approximately 1830 the oncoming OCC staff walked down the air compressors and discovered a leak in buried station air piping supply to SW area. The leaking header was isolated at approximately 1945.

An RCS leakrate evaluation was initiated at 2100 and completed at 2400 with values consistent with pre-event levels.

EVALUATION OF THE EVENT:

Plant Response

The station air system was degraded from a leak that began at about 1445. Actions by operators maintained air pressure at adequate levels until the #2 SAC tripped on high temperature at 1640. At that time air pressure dropped and both Emergency control air compressors started as designed. The repositioning of 1CV7 and the WL valves occurred when pressure dropped to about 80 psi. All the valves that were discovered out of position were from the same instrument air panel (311). Plant response to the closure of 1CV7 was as expected. VCT level decreased for the 8 minutes letdown was isolated with 1CV6

relieving. There was a corresponding increase in pressurizer level. Feedwater flow remained constant during the period of reduced air pressure. The event was essentially terminated when the #3 SAC was started and compensated for the leak, restoring air pressure. Letdown was promptly restored.

Operator Response

This event occurred during IPTE 03-02 (Total Station Air Compressor Outage). Salem Station's air header was being supplied by three temporary air compressors under IPTE 03-02. At approximately 14:45 both control header pressures dropped 10-14 PSI and another temporary air compressor was started to maintain header pressure. Station air header pressure did not improve and the decision was made to swap back to the installed station air compressors and terminate the IPTE. At 16:13 the #2 SAC was started and header pressure increased 8-10 PSI. Due to the belief that the temporary air skid was the source of the pressure reduction the temporary compressors were removed from service at 16:30 and header pressure was normal until 16:40 when #2 sac tripped due to high temperature (12ST6 was later found to be jacked closed). S1/2.OP.S0.AB-CA-0001 was entered and #3 SAC was started; the emergency air compressors on both units had already auto started. On Unit 1 the 1CV7 failed closed at 16:41, which caused 1CV6 relief valve to lift and discharge to the PRT. Letdown was isolated at 16:49, which reseated the 1CV6. Unit 2 exited S2.OP.AB-CA-0001 at 16:55 and did not experience the valve abnormalities that Unit 1 did. Salem unit 1 terminated S1.OP-AB.CA-0001 at 18:30 upon completion of all actions.

The operating crew took the actions that were briefed iaw the IPTE and entered S1/2.OP-AB.CA-0001 as expected. The Tech Spec entry and exit for Reactor Coolant Leakage on Unit 1 was correct and not reportable. S1.OP-AB.RC-0001 should have been entered which would have directed the crew to perform a leak rate iaw S1.OP-ST.RC-0008. A leak rate was subsequently performed and found to be .07 gpm. All other actions performed were in accordance with procedure and operations standards.

IMPACT STATEMENT:

The reduction in station air pressure caused a significant threat to operability and generation. If air pressure had not been restored both units would have been required to be manually tripped within minutes of the loss of the #2SAC. The TS 3.4.6 .2 limit of 10 gpm was exceeded for 8 minutes

APPARENT CAUSE:

The loss of air pressure was due to a leak in a buried air supply header to the Service Water/ Non-radwaste area.

EXTENT OF CONDITION:

The potential for a leak could extend to all buried air piping on site. Notification 20075759 describes an apparent air leak in the same vicinity of this header. Closed out without action. Evaluated as not economic to repair.

ACTIONS TAKEN:

1. Plant was restored to a normal Station Air lineup with the leaking header isolated.

FOLLOW-UP ACTIONS:

1. Inspect instrument air panel 311 to determine if the panel has abnormal leakage or improperly operating switchover device.
2. Excavate and repair leaking air header.
3. Evaluate all buried station air piping for vulnerability to a similar event.
4. Determine why the cooling water valve for #2 SAC was not open.
5. Re-evaluate trip criteria for 80 psi air pressure in procedure AB-CA-001.

Event Time Line

Time	Action/Result
1300 hrs	A, B, C Temporary Air Compressors Carrying Load
1445 hrs	10 – 14 psi drop in control air and station air compressor header pressure
1500 hrs	Started "D" Temporary Air Compressor to raise header pressure 2 A/B Control Air Header Pressure differs by 10 psi
1613 hrs	Placed #2 Station Air Compressor I/S
1630 hrs	Removed all 4 Temporary Air Compressors from service
1641 hrs	#2 Station Air Compressor Trips (12 ST6 Jacked Closed) Unit 1 and 2 Emergency Air Compressor started Started #3 Station Air Compressor Entered AB-CA-1 CV7 failed closed (CV6 lifted)
1649 hrs	Isolated letdown IAW SD-CVC-1 CV6 Reseated
1655 hrs	Exited AB-CA-1 (U/2)
1700 hrs	Placed letdown I/S
1830 hrs	Exited AB-CA-1 (U/1)
1845 hrs	Identified station air header leak
1945 hrs	Isolated station air header leak

Panel 311 Valves and Changes in Position due to 2/25/03 Loss of Control Air

Valve	Status during Loss of Control Air	SV	Comment
INT-32	No change. Valve remained in closed position.	SV-249	85 psig regulator
INT-25	No change.	SV-423	80 psig regulator

	Valve remained in closed position.		
1CV-7	Valve position changed to closed position.	SV-425	85 psig regulator
1CV-21	No changed. Valve remained in mid position and is normally in mid position.	N/A	E/P provides 3 to 15 psig input to valve positioner. Motive pressure from panel 700-1G. E/P regulator is 20 psig
1SJ-60	No change. Valve remained in closed position.	SV-575	45 psig regulator
1WL-13	Valve position changed to closed position	SV-396	80 psig regulator
1WL-17	Valve position changed to closed position	SV-395	35 psig regulator
1WL-97	Not Known	SV-400	80 psig regulator
1WL-99	Valve position changed to closed position	SV-398	80 psig regulator
1WL-108	Valve position changed to closed position	SV-402	80 psig regulator

References:
205690, 207530
207532, 207537
207529,211289
211310, 229988

2 River Grassing Events Per Letter. More severe than any grassing that I was ever witness to. All actions appear per procedure + training. No Nuclear Safety Issue

TARP Report

03/03/2003

Salem Unit One Load reduction due to River Grass Problems

Notification # 20134025

TARP Team:

Jim Reid/Pat Walsh – TARP Leaders
Ken Cutler/ Paul Templet– Training/Maintenance
Gary Stoltz / George Reed– Q/Ab
Carl Buckley / -Work Management
Steve Mannion / Jim Barnes-Engineering
Bob Swartzwelder-Engineering
Bill Nurnberger/ Bernie Landers-Chemistry

Operations Shift: (At the time of the Event)

J. Sullivan – Operations Superintendent
C. Lynch– Control Room Supervisor
J. Klein– Reactor Operator
B. LashBrook– Plant Operator
B. Bonner – Shift Technical Advisor
M. Fiocco-Primary Operator
T. Schildgen-Field Supervisor

General Description Of Event:

On 03/03/03 at 1649 Salem Unit 1 experienced elevated river grass conditions. 12B CW pump was out of service for scheduled maintenance, and 13B CW pump was removed from service due to indications of a dirty tube sheet. The CW abnormal operating procedure was entered, when conditions on 13A and 12A CW WB degraded. The 13B CW pump was placed back into service however the discharge valve (CW126) failed to open. The field operator reset the thermal overloads on the valve and the valve did not open. He then cycled the breaker and the valve opened. At 1733 a power reduction was commenced due to condenser CW delta-T exceeding 27.5 F. Power was reduced to 70 percent to restore delta-T to specifications with all CW pumps in service with the exception of 12B.

Detailed Description Of Event:

Salem Unit 1 13B CW pump displayed excessive amps; Hi screen D/P Alarms were coming in and clearing for the 13B CW pump, and the condenser delta-T was steadily rising towards 27.5 degrees Fahrenheit. Operations personnel noted reports of grassing conditions. The 13B CW pump was then stopped. Condenser delta-T continued to rise greater than 27.5 degrees Fahrenheit. Condenser backpressure was slowly rising. Operations entered AB.CW-0001 and a load reduction was commenced to 90 % power with two batches of boric acid added at 14.5 GPM. Rods were inserted and Condenser backpressure stabilized at 2.5 inches Hg but the Condenser delta-T increased to greater than 35 degrees F. The down power was continued to 80 % and then to 70 % using AB.Load. Total Boric acid added was 522 gallons IAW the reactivity plan. AFD went low in the band (appx 7.3 % @ 70 % power) but did not exceed the lower limit. The 13B CW pump was placed back into service at approximately 90% power however the discharge valve (CW126) failed to open until the field operator reset the thermal overloads on the valve and cycled the breaker. Inspections

of 13B indicated a combination of reeds, leaves, hydroids, and fish. It was noted during the inspection the fish appeared larger than what's normally observed.

Evaluation of Event:

Evaluation of prior events revealed the following:

Notification 20132979 documented when 21A circulator was cycled out for a bus swap the operator attempted to open the valve to drain the water box. The thermal overloads tripped on the breaker before the valve reached full open. The overloads were reset and the valves opened.

Notification 20127092 documented that while investigating 20126949 it was determined that a leak occurred while the circulator was in service. The outlet waterbox pressure while in service is typically 15 in. hg vacuum. The only time positive pressure is seen is when the outlet valve is closed during startup or shutdown. It was suspect a possible valve shear of the disc pins and closed. It was reported that pump amps went from 240 to 280. This was indicative of blocked flow (waterbox dirty or outlet closed).

Notification 20076679 documented that while attempting to start 21A circulator, found 21CW26 breaker overloads tripping while attempting to close 21CW26. The 12-hour shift took current readings while stroking the valve and found them normal (5-6 amps). Suspect 21CW26 encountered some resistance during stroke causing overloads to trip.

Operator response to this event was in accordance with S1.OP-AB.CW-0001(Q), Circulating Water System Malfunction, and S1.OP-AB.LOAD-0001(Q), Rapid Load Reduction.

On Friday 2/28/2003 the Salem CW Risk Snapshot report recommended cleaning 12A, 12B, 13B, 21B and 22A. The 13A, 12A and 12B water boxes were cleaned over the weekend.

Areas of Non-Compliance:

None

Suspected Causes:

The cause of the event was excessive grass and other debris entering the circ water system and excessive accumulation of grass on the lower debris lip.

Corrective Actions Completed:

1. Initiated notification 20134045 to document the need to troubleshoot possible causes of overload tripping of 13CW126.
2. Evaluated the delta-T requirements against the procedure and did not find any of exceedences for a 24 hour period. (S1.OP-DL.ZZ-0001)

Recommended Actions:

1. Improve the raking of the bottom debris lip areas.
2. Maintain the two dedicated equipment operators for raking during the high potential periods. In addition, during periods where tide changes impact-grassing conditions the operators should be present for raking during normal shift turnover periods.
3. Determine the cause of 13CW126 Outlet Valve failing to open and repeat events of 21CW26 tripping overloads.

4. Have diver inspect the 13A & 13B circulating pump end bells during the next available work windows.
5. Have licensing review the grassing events resulting in down powers for determining if the down power would be included in the NRC PI. Particularly since no equipment failure was noted.
6. Review procedural guidance for removing Circulating Water pumps under high delta Temperature conditions to determine when power should be reduced prior to removing the circulator.
7. Clean water boxes with high delta pressure and evaluate CW system material condition prior to raising power.

Salem Unit 1 Power Reduction Time Line

Date	Time	Event	Who
03/03/03	1530	Raking at ½ hour intervals with it taking appx. 20 minutes to complete. Trash rack cleaning going on all day. Changed out baskets several times.	
03/03/03	1649	Initiated a Stop on the 13 B Circulator IAW S1.OP-SO.CW-0001	
	1655	Entered S1.OP-AB.CW-0001 due to having 2 Circulators O/S	
	1655	13 B breaker opened and procedure listed above entered. Condenser delta-T steadily rose to greater than 30 degrees F along with corresponding rise in back pressure and unit output being reduced. Operations also noted elevated temp on CN pump suction.	
	1716	Started 13B Circulator IAW S1.OP-SO.CW-0001-Outlet valve failed to open after appx. 5 minutes and operators were dispatched to investigate.	
	1733	Commenced a turbine load reduction 1 % per minute to reduce delta-T below 27.5 F IAW S1.OP-AB.LOAD-0001. Current delta-T is 34 F. Note: 10% load reduction commenced.	
	1750	13 B Circulator discharge valve 13CW126 breaker thermal overloads discovered tripped. Reset overloads per CRS permission. Chemistry notified of entry into AB.CHEM-0001 due to high polisher DO of > 25 ppb.	
	1826	Turbine Load reduction on hold @ 70 % IAW S1.OP-AB.Load-0001. Note: Operations noted performed until unit load stabilized at 70 % and CW delta-T at appx. 22 degrees F and lowering. 13B CW discharge valve had to be manually opened and bypass had to be manually closed from the control room. Overloads were found tripped on 13CW126. AB CW and AB load turned over.	

TARP Report

03/29/2003

Salem Unit Two Reactor Trip – Grassing Event

Notification #20137707

TARP Team:

Pat Walsh – TARP Leader
John Konovalchick – Operations
Tom - Reactor Engineering
Ken Cutler – Maintenance
George Reed – Q/A
Todd Anderson -Work Management
Steve Mannon-Engineering
Greg Morrison, Chad Warriner - Engineering
Bill Nurnberger-Chemistry

Operations Shift:

Van Ford – Operations Superintendent
Connor Lynch – Control Room Supervisor
Jim Klein – Reactor Operator
Matt Lutek– Plant Operator
Brian Bonner – Shift Technical Advisor
J. Cook -Primary NEO
S. Lashbrook – Secondary NEO

General Description Of Event:

At approximately 0400 on 3/29/2003 with the unit at 100% power multiple High Screen DP Alarms were received in the control Room. Circ Water operator reported severe grassing conditions. At 0423 differential on several screens rose and caused shear pin failures on two screens. CW pumps were emergency tripped and a power reduction was initiated. After a third shear pin failure and CW pump trip, the crew decided to manually trip the reactor. Post trip response was normal.

Detailed Description Of Event:

On 3/28/ 03 Salem Unit2 was operating at 100% power with river detritus at level 2. At 0111 23B circulator was removed from service for water box cleaning. At approximately 0400 multiple High Screen DP Alarms were received in the Control Room. And the CW operator reported severe grassing conditions. At 0421 21B screen DP increased to >5 ft, the shear pin failed and was emergency tripped. The 22A screen DP increased to >5ft ft, the shear pin failed and was emergency tripped. The crew initiated power reduction (0430) at a rate of 1%/min to 75% power. At 0436 rate was increased to 3%/min. At approximately 0441 the 21A screen was lost due to shear pin failure. The crew manually tripped (0442 from SOE) the reactor and entered EOP-TRIP-1.

Abnormalities noted during after the trip were:

- 22MS167 lost open limit; valve was opened IAW Alarm Response Procedure and indication was regained.
- 23 Heater Drain Tank level was off scale low and pump amps were oscillating.
- 23CN22 and 23CN27 auto closed.
- 21/22CN27 had no indication valves were discovered to be in mid-position and were re-opened.

Unit 1 was experiencing similar symptoms and at 0434 the 11A shear pin failed and a power reduction was initiated that was stopped at 54% when 13B was returned to service.

Evaluation of Event:

Operator actions were reviewed in a simulator run of the event and were judged to be as expected based on procedures and training. No deviations from procedures were noted. Plant response in the simulator closely followed the actual plant response. Operators promptly tripped the reactor when the fourth circulator was taken out of service.

Process computer parameter plots were reviewed and verified that plant response was as expected. Alarm Sequence recorder showed normal response. Plant SOE review showed safety systems actuated as expected in the correct sequence. One minor anomaly was noted: the negative flux rate trip was not activated for channel three. This had no effect on post trip response.

During inspection of the 12B waterbox, it was noted that there was significant amount of trash (plastic etc.) mixed in with the grass which may have contributed to the high screen loading.

23 Heater Drain Tank Low Level Evaluation

The level in the 2C Reheater Drain Tank (2HDE3) was normal prior to the unit's being tripped. Upon tripping, the condensate production drops and the tank level is expected to drop, at which time 23HD15 should go closed, and 23HD17 should open to recirculate flow back to the tank, maintaining level.

The low level in the tank indicates that either 1) 23HD15 did not close properly or 2) 23HD9, the hi-level dump valve, inadvertently opened (a high level is not expected on a plant trip, so the HD9 would not be expected to open. The controls for HD9/15 will need to have troubleshooting performed.

HUMAN PERFORMANCE REVIEW OF EVENT:

Personnel involved took appropriate actions during the event. No human performance errors were identified. However, some enhancements for performance improvement might be made in the following areas:

1. Swapping gates at Circ Water is an activity that is considered "skill of the craft." This task is not found in the skill of the craft list for the NEOs nor is direction for how to perform the task listed anyplace else. (An OS stated that he requested a notification be written to add this task to that list about 6 months ago but did not know the current status.) Although tide charts and a visual inspection of the river are given as the criteria for when to swap gates, interviews show that NEOs have different techniques for knowing when and how to swap the gates. As there are a number of new NEOs who have not had enough exposure to Circ Water challenges during times of river grassing to have gained some of this knowledge, Operations might consider compiling a list of "Best Practices" identifying optimum methods for mitigating the impact of grassing on the traveling screens.
2. There are several minor procedural issues that could be addressed to enhance performance.
   a. In S2.OP-AB.CW-0001(Q) a section addressing a throttle band for condenser hot well level is too fine a tolerance. This causes considerable distraction for the operator who must perform this evolution. A notification is to be written to have this step moved to the Continuous Action portion of the procedure.
   b. A notification will also be generated to enhance the usability of EOP Trip 2, specifically in steps 17 and 19.
3. The selector switch for the Traveling Screen Differential Pressure Indicator has human error factors built in. There are two problems - the operator can only view the indicator for one screen at a time by turning the switch. If problems are being encountered by more than 1 screen at a time, the operator must switch back and forth. Also, all 6 screens are listed on the same switch and the numbers are listed in small font. It would be easy for an operator to move the switch to the wrong screen and take actions that would not be appropriate for the screen selected.
4. The station approved-tagging process does not lend itself to making quick tagging changes. This becomes an issue when fast action is needed, such as replacing broken shear pins in the traveling screens. Operations might consider evaluating an alternative method of tagging Circ Water screens that complies with OSHA guidelines but still allows for quick repairs on the screens.
5. Finally, station management sends a mixed message regarding human performance when it allows a SAP outage to be scheduled at the same time as a power reduction for Turbine Valve testing. Since SAP is the approved tagging and work management tool, scheduling the SAP outage at the same time as a 53% power reduction, especially in light of the challenges faced on Unit 1, could be interpreted as insensitivity to or a lack of understanding of the challenges this creates for Operations.

Areas of Non-Compliance:

None

Suspected Causes:

The cause of the event was heavy grassing conditions that caused screens to be overloaded and subsequently tripped. The loss of four circulators caused the operators to manually trip the reactor in accordance with procedures and training.

Corrective Actions:

Completed:

1. Plant stabilized in mode 3
2. Forced outage response team activated.

Planned:

1. Resolve primary system leakage indications discovered during containment walk downs.
2. Affirm that Circulating Water System is ready to restart unit.
3. Perform troubleshooting of HD9/15 controller.
4. Investigate cause of 23CN22/27 auto closure and 21/22CN27 going to mid position.
5. Evaluate if channel 3 negative flux rate channel response was abnormal.
6. Interview operators for possible procedure enhancements and perform Human Performance review of event.

Recommended Actions:

1. Review procedural response to high grassing situations to determine if additional actions could be taken to avoid emergency CW pump shutdowns and subsequent reactor shutdowns.
2. Review CW system improvement plan and maintenance activities to determine if short term actions can be taken to improve performance during grassing conditions.

Sequence of Events
Unit 2

Time	Event
0111	23B taken OOS for waterbox cleaning
0423	21B emergency trip by operator; shear pin failure
0424(approx)	22A emergency trip by operator; shear pin failure
0430	Load reduction at 1% commenced; target 75%
0436	Load reduction at 3% commenced
0441	21A emergency trip by operator; shear pin failure
0442	Reactor Manual Trip

Pump/Screen Status

23B	23A	22B	22A	21B	21A
OOS Cleaning	I/S Hi dp	I/S	Shear Pin 2	Shear Pin 1	Shear Pin 3

Unit 1

Time	Event
0208	13B OOS for Cleaning
0434	11A Shear Pin Failure, Emergency Trip, delta T >27.5, Commenced power reduction at 1%/min
0509	13B placed in service, stop load reduction at 54%
0537	11A placed in service after shear pin replacement

Pump/Screen Status

11A	11B	12A	12B	13A	13B
Shear Pin	I/S	I/S	I/S	OOS Pump/Valve Maint.	OOS Cleaning

Common CFCU Issues have Nuclear Safety Impact. Should Look At History, Old CRODs (per Det)

TARP Report

Saturday, December 21, 2002

Salem Unit #2 22SW223 Stroke Time Issue

Notification # 20125714

TARP Team:

Dave Pysher– TARP Leader
Gary Meekins- Salem Operations
Carl Caltabiano – Maintenance
Dave Hanley – Maintenance
Doug McCollum – Engineering
Russell Burke – Work Management
Courtney Smyth – Reliability/Technical Support

General Description Of Event:

22CFCU was declared inoperable on Tuesday, December 17, 2002 at 04:10 to perform troubleshooting activities on 22SW223 control loop. This was a follow-up troubleshooting effort to exit CROD 70028270 that was entered on Monday, November 25, 2002, following flow oscillations that could not be resolved within the required action statement period.

During this troubleshooting effort, the 22SW223 valve was inspected and the upper turnbuckle assembly at the actuator was found frozen, and the actuator shaft had rub marks at the actuator housing. The actuator was replaced on Thursday, December 19, 2002, and a new AirCEt was performed on Friday, December 20, 2002. The CFCU was placed in service on Saturday, December 21, 2002, at which time the flow oscillations were still present. It was determined to re-enter the CROD. In restoring the CFCU to service, stroke time testing of the 22SW223 was required. The valve stroked closed outside the acceptance criteria of 9 seconds at 9.65 seconds. The stroke time in the open direction was at the time limit of 17 seconds.

Areas of Non-Compliance:

The 22CFCU is currently in a 7-day LCO that expires at 04:10 on Tuesday, December 24, 2002. The area of non-compliance is the closed stroke time of the valve. The technical specification limit for the valve in the closed direction is equal or less than 9.0 seconds. The valve stroked closed in 9.65 seconds.

Suspected Causes:

As part of the troubleshooting process, the valve actuator was replaced, the auto/manual station was adjusted, and the controller was recalibrated. As part of the replacement of the actuator, the bench set was adjusted on the new actuator. It

is suspected that the set-up of the control loop and the new actuator resulted in the valve stroke being sluggish.

Recommended Corrective Actions:

1. Adjust the volume booster to get the desired valve stroke response. The volume booster has been adjusted by Maintenance, and the valve satisfies the stroke limit in the static condition. Operations completed surveillance testing, and the valve stroked closed in 8.77 seconds and 12.1 seconds in the open direction. The closed direction of 8.77 seconds is within the evaluation range of the procedure, but allows operability of the valve. The opening stroke is in the satisfactory range of the procedure.

Closure Statement:

The 22 CFCU can be declared operable at this time.

TARP Report

Sunday, December 22, 2002

Salem Unit #1 14SW223 Stroke Time Issue

Notification # 20125678

TARP Team:

Bob Deppi– TARP Leader
Frank Soens- Salem Operations
Danny Franklin– Maintenance
Doug McCollum – Engineering

General Description Of Event:

14 CFCU was declared inoperable on Tuesday, December 17, 2002 at 04:00 to perform preventative maintenance activities including work on the following components:

1SWE27	12SW223
S1CBV-1PL7660	1BBDC13
S1SW-1FA3172	14SW58
14SW72	

During performance of final valve setting, controls technicians noted to the operations, lower than expected pressures on the CFCU. Following the valve setting operations placed the CFCU in service and performed post maintenance surveillances. During performance of ST.SW-0010 which requires the 14SW223 be stroked closed in a high speed – low flow mode of operation the stroke time failed. The stroke time on the 14SW223 as required per surveillance was an UNSAT 14 seconds vice the required 7 seconds / 9 seconds for alert. 12 hr. shift performed troubleshooting (obtained pressures) per the bio-fouling procedure. It was noted that in the low speed – high flow (accident) mode of operation all valves and pressures appeared to be normal. Observable parameters for other CFCUs noted as normal, i.e., no indication of grassing or potential common service water failure.

Areas of Non-Compliance:

The 14CFCU is currently in a 7-day LCO that expires at 04:00 on Tuesday, December 24, 2002. The area of non-compliance is the closed stroke time of the valve. The technical specification limit for the valve in the closed direction is equal or less than 7.0 seconds. The valve stroked closed in 14 seconds.

Suspected Causes:

Blockage
- Grassing or other obstruction
- Valve disc separation

Failure of Control
- 14SW223
- 14SW65
- 14SW57

In review of the pressures and noted valve positions (attached) it appears the 14SW65 may be over-throttling and choking flow therefore reducing pressure and flow down stream at the 14SW223 or that the 14SW223 may not be set up correctly. This would explain the lower pressures observed and cause the 14SW223 to be in the observed full open position.

Grassing or a mechanical valve failure would have shown similar flow / pressure conditions in both modes of operation and therefore was given a lower probability as the failure cause.

A review of the previously performed ST.SW-0010 indicated the valve 14SW223 stroked in specification prior to this maintenance window. Discussion with the acting 12hr. superintendent and technicians placed troubleshooting and possible tuning of the control loop for the 14SW65 at 5-6 men and a full 12hr shift duration.

A management update conference call was held at 6:45 pm. An update was provided and suggested actions incorporated into the TARP recommended actions.

Recommended Corrective Actions:

After additional discussion of failure modes of the valves and control loops and review of the 22CFCU CROD TARP recommends following:

1. Convene a Tech Issues to determine most probable failure mode and additional troubleshooting activities for the 14CFCU.
2. Engineering to develop an engineering action plan to do the following:
   a. Place the 14CFCU in the low speed – high flow (accident) mode
   b. Stroke the 1SW223 valve
   c. Adjust the volume booster as required to get the desired valve stroke response (to be performed with direct oversight of Controls superintendent Dave Hanley).
3. Operations to incorporate the engineering action plan into an operations troubleshoot SH.OP-AP.ZZ0008 (Q)
4. When the desired stroke time is obtained operations should administratively control the breakers for the high-speed mode on the 14CFCU.
5. Operations to revise ST.SW-0010 to perform the stroke test of the 14SW223 in the low speed – high flow mode and perform the surveillance.
6. Operations to develop a CROD for the 14CFCU.
7. SORC will review post operability on Monday 12/23/02.
8. STOP WORK on Salem CFCUs that is not required for maintaining operability until a complete review of recent CFCU failures is reviewed Engineering and approved by senior management.

Closure Statement:

The 14 CFCU can be declared operable at this time.

No Direct Safety Concern, but Continued Circ Water Issues Challenge Crew. Actions were Appropriate

TARP Investigation Report

Salem Unit 1 Down Power Due To Circulating Water System Issues

TARP TEAM:

Don Jackson – TARP Team Leader
Mike Gwirtz- Operations
Matt Jermusyk- Chemistry
Warren Evans- Reactor Engineering
Jim Barnes- Reliability
Marc Chastain- Work Management
Jim Kennedy – Maintenance
Dave Hurka – Environmental Licensing
Mike Welker – Engineering
Brian Thomas – Nuclear Licensing

DESCRIPTION OF EVENT:

At 0200 on March 3, 2002, Salem Unit 1 began a power reduction at a rate of 10% per hour to 850 Mwe in preparation for removal of the 13A Circulating Water pump due to high differential pressure on the tube sheet. At 0207, the 12B Circulating Water pump was emergency tripped in accordance with S1.OP-SO.CW-0001 due to a bearing lube oil leak on the upper bearing. At this time 13B Circulating Water pump was out of service. Abnormal procedure S1.OP-AB.CW-0001 was entered due to greater than 1 circulator out of service. At 0228, the 12B Circulator upper bearing oil leak was determined to have introduced oil to the river. In accordance with the event classification guidelines (ECGs), a 15 minute notification was made to the NJDEP, a 2-hour call was made to the National Response Center and a 4-hour report was made the NRC. At 0256, abnormal operating procedure S1.OP-AB.LOAD-0001 was entered to reduce load at 1% per minute to reduce load to 40% power. At 0405, the load reduction was stopped at 50% power in accordance with procedure. At 0410, the load reduction was continued to reduce power below 20% in preparations to take the turbine off line if necessary. The 13A Circulator tube sheet differential pressure continued around 16 psi.

The 13A Circulator amp indication began to fluctuate and the operating shift determined that prudent action was to take the turbine offline. The shear pin broke on the 11B Circulator screen and high amps are indicated on the pump. Reactor Power was reduced to ~8% with heat removal currently being performed through the steam dumps.

EVALUATION OF EVENT:

Actions taken by the Control Room and Operations Management were conservative and in accordance with proper operating standards and procedures. The protracted maintenance activity surrounding the replacement of the 13B Circulating Water Pump has caused a loss of flexibility in maintaining the other water boxes and screens in optimum condition.

IMPACT STATEMENT:

Salem Unit 1 load was taken offline (turbine removed from service) causing a negative impact to capacity factor. Although this action was a conservative reactor safety decision, the fact remains that 13B Circulating Water Pump is 10 days past its expected maintenance window duration.

Oil was discharged from the 12B Circulator to the river causing the need to notify the NJDEP, National Response Center and the NRC.

AREAS OF NON-COMPLIANCE:

Preventive maintenance on the Circulating Water system is allowed to go past due or overdue at the start of the high river grass season.

SUSPECTED CAUSES:

Unplanned extension of 13B Circulating Water Pump Maintenance window has placed the overall system in a less flexible state to handle other issues such as needing to perform normal water box maintenance and responding to emergent equipment failures.

CORRECTIVE ACTIONS PLANNED/TAKEN:

Taken:

1. A TARP was convened to ensure proper actions are taken and to set a short-range plan.
2. Salem Unit 1 was lowered to ~8% power and the turbine was removed from service until the circulating water systems is recovered to a point to support continued operation.
3. Chemistry TARP personnel evaluated the plant maneuver from a Chemistry perspective, and all was reported satisfactory.
4. Reactor Engineering provided an initial reactivity plan for the down power.

5. Due to the release of oil from the 12B Circulator, a 15-minute report to the NJDEP, a 2-hour notification of the National Response Center, and a 4-hour report to the NRC were made.
6. Loss prevention erected a boom in the 12B Circulator bay to maintain the oil within the 12B bay.
7. Clean up of oil around the 12B Circulator.
8. Evaluated the status of all the circulators on Unit 1 and Unit 2 to assess the necessary actions to ensure continued plant operation.

Planned:

1. Restore the 13B Circulating Water Pump to service.
2. Remove and Tag Out 13A Circulating Water Pump for water box cleaning and traveling screen alignment. Restore 13A Circulating Water Pump.
3. Continue clean up of oil around 12B Circulator.
4. Remove and Tag Out the 11B Circulating Water Pump for water box cleaning.
5. Reactor Engineering is developing a reactivity plan for stabilizing Unit 1 at ~8% power.

RECOMMENDED CORRECTIVE ACTIONS:

1. The Salem Unit 1 Turbine will not be placed in service until all the Circulating Pumps and Screens are repaired and all the water boxes are cleaned with the exception of the 12B Circulator as it will require extended maintenance.
2. Conduct an apparent cause analysis of the actions surrounding the extended maintenance window for 13B Circulating Water Pump.
3. Evaluate plans to remove silt from the Circulating Water pump structure by dredging the front of the intakes (the screens are apparently sitting in several feet of silt causing increased wear on the screens). Need to also evaluate/develop a long-range plan for performing silt removal.
4. Based on operators feedback, ECG Attachment 16 for Environmental Events is cumbersome. ECG attachment 16 needs to be evaluated for any changes.

Salem Unit 1 and 2 Circulating Water System Status

Unit 1	
Circulator (Priority for Restoration)	Status
11A	OK
11B (3)	Water Box needs cleaning. Shear Pin & Hub alignment (need notification)
12A (4)	Screen – shaft & sleeve walking (60018981), Pump PM Overdue (30002366), Motor PM Overdue (30001752), Shear Pin & Hub Alignment (need notification)
12B (5)	Spurious Trip (60026381, 60016906), Motor Cooler broke (20092912), Shear Pin & Hub alignment (need notification), Screen Speed Control currently running in manual (20091342)
13A (2)	Water Box needs cleaning. Shear pin & Hub alignment (scheduled to work on 3/1), need to look at spray & fish lips. EMIS tag #20085012
13B (1)	Currently out of service for maintenance. Need motor heater hook up. Alignment/Insertion of the thermocouple in the upper bearing. (30001764)
Unit 2	
Circulator	Status
21A	Shear Pin & Hub alignment (need notification)
21B	Spray mis-aligned
22A	OK
22B	Screen Worn (30019164), PM Overdue for Screen, Motor PM Past Due (30001773), Debris lip on screen (60011937)
23A	Screen Worn (30032670), Shear Pin bushing walking (need notification)
23B	14# differential pressure – water box needs cleaning, Head shaft sleeve walking (need notification), Motor PM Past Due (30001783)

Other:

#3 Bearing lube check valve (60018275)
Screen Wash – bearing lube back/up regulator (U1- 60020507, U2 – 60024942)

Improper Completed On This So A 50.72 Report Did Not Have To Be Made. Pressure Was Involved. No Nuclear Safety Issue

TARP Investigation Report

Damage To Met Tower Power Cable Due To Digging

TARP TEAM:

Don Jackson – TARP Team Leader
Mike Gwirtz- Operations
Jeff Porter- Reliability
Jim Kennedy – Maintenance
Cliff Knaub- Loss Prevention

DESCRIPTION OF EVENT:

At approximately 11:30am on March 28, 2002 power to the Artificial Island Meteorological Data Tower was lost. The loss of power was caused by digging in progress in the vicinity of the Met Tower for a fiber optic cable run. The area had been surveyed by PSEG and Vendor personnel before digging commenced. During the trenching operation, a contractor noticed a spark coming from the digging equipment coincident with the loss of power to the Met Tower. Work was stopped for a short period of time. The spark was assessed to be coming from static electricity or a spark from a stone. Work restarted, until word was passed to the dig site that Met Tower power was lost. An accident investigation was started, and personnel from Maintenance, Loss Prevention, and Project Engineering came to the site. Met data from the tower was not interrupted as a battery back up allows power to be provided to the equipment.

EVALUATION OF EVENT:

It appears that an inadequate survey of the area was performed before the trenching operation was started. Although no personnel were injured, this is considered a significant near miss event. The Met Tower power is provided by the 1H 480 Volt Bus located in the Salem Unit 1 Turbine Building. There is sufficient energy to cause personnel injury or death from this power source. In addition, the loss of power to the Met Tower is problematic in that the battery back up at the tower is only rated for 5 hours.

IMPACT STATEMENT:

This is a significant near miss safety event that could have resulted in death. In addition, the protracted loss of the Meteorological Tower power supply will drain the battery back up power supply and result in an 8 hour report to the Nuclear Regulatory Commission.

AREAS OF NON-COMPLIANCE:

An inadequate survey of the area where the cable was buried occurred.

SUSPECTED CAUSES:

The cause of the inadequate survey will be determined by the event investigation team early next week, as the surveyors could not be contacted.

CORRECTIVE ACTIONS PLANNED/TAKEN:

Taken:

1. A TARP team was convened.
2. Notification 20095181 was written to document the occurrence.
3. An event investigation team was convened and continues to determine the safety aspects of the event.

Planned:

1. Provide temporary power to the met tower via a temporary modification.
2. Repair the 480V feed from the 1H 480V bus to the met tower
3. Complete the event investigation and implement corrective actions