07-643-91

OAK RIDGE NATIONAL LABORATORY
OPERATED BY MARTIN MARIETTA ENERGY SYSTEMS, INC.
FOR THE U.S. DEPARTMENT OF ENERGY

POST OFFICE BOX 2009
OAK RIDGE, TENNESSEE 37831

September 13, 1991

Copies for team members please.

Mr. W. R. Jones
Reactor Operations Analysis Branch
Division of Safety Programs
Office for Analysis and Evaluation of
Operational Data, MS-9112
U. S. Nuclear Regulatory Commission
Washington, DC 20555

Dear Mr. Jones:

Preliminary ASP Analysis of Recent Nine Mile Point 2 Event

Enclosed are three copies of our preliminary Accident Sequence Precursor (ASP) analysis on the August 13, 1991, event at Nine Mile Point Unit 2 involving the failure of five non-safety related uninterruptible power supplies. Please note that this analysis is based on preliminary data and descriptions regarding the event and is subject to revision. Obviously, the report from the Incident Investigation Team (IIT) was not available as input for the analysis.

Based on the analysis at this time, it does appear that this event will be selected as an ASP event for 1991. Please let me know if we can be of further assistance in this matter.

Sincerely yours,

G. T. Mays, Director
Nuclear Operations Analysis Center

GTM:ap

cc/enc: J. W. Cletcher
D. A. Copinger
B. W. Dolan
J. E. Jones Jr.
F. M. Manning, NRC-AEOD
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cc: C. E. Pugh
G. F. Thompson, NRC-AEOD

PRELIMINARY

ACCIDENT SEQUENCE PRECURSOR PROGRAM EVENT ANALYSIS

Preliminary

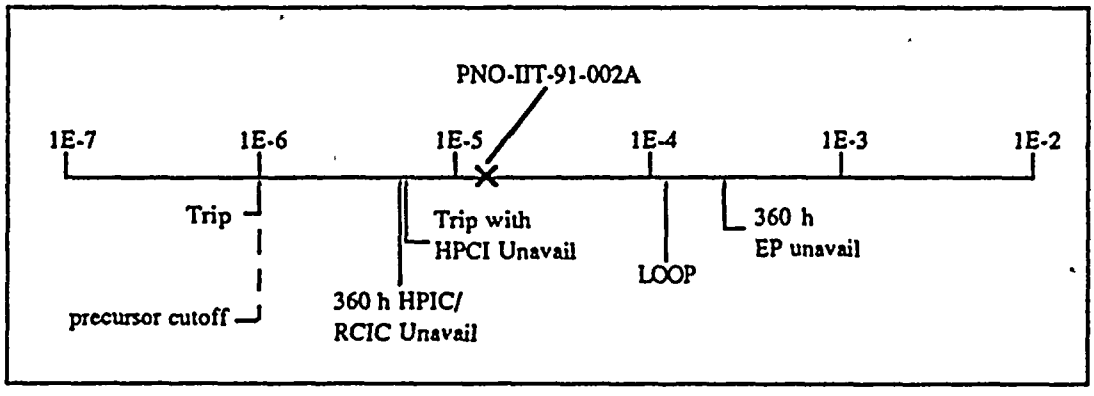
This analysis was based on information which is preliminary in nature and subject to revision

Event No.: PNO-IIT-91-002A
Event Description: Loss of five non-safety uninterruptible power supplies.
Date of Event: August 13, 1991
Plant: Nine Mile Point 2

Summary

A main transformer fault occurred, resulting in turbogenerator trip and reactor scram. At the same time, five uninterruptible power supplies deenergized, removing power from some nonsafety-related instrumentation and equipment. Equipment affected included rod position indicators, control room annunciators, lighting, and communications systems. One train of the low-pressure coolant injection system was unavailable, having previously been removed from service for maintenance.

Plant operators verified successful scram by alternate means and started the reactor core isolation cooling system for reactor vessel level control. Reactor pressure was reduced and a condensate booster pump was aligned to provide makeup. Approximately one-half hour after the scram, power was restored to the uninterruptible power supply buses from an alternate supply and the plant proceeded with a normal shutdown. Based on the preliminary information provided, the conditional probability of subsequent core damage associated with the event is estimated to be 1.4×10^{-5}. The relative significance of this event compared to other postulated events at Nine Mile Point 2 is shown below:



Event Description

Nine Mile Point 2 was operating at 100% power when one phase of the main transformer faulted. The main generator and turbine tripped, and the reactor scrammed. Simultaneously, five uninterruptible power supplies (UPS) tripped and did not transfer to their alternate power supplies. These failures were apparently caused by fault-induced perturbations in the UPS AC power supplies, in conjuction with degraded battery power supplies to logic cards controlling the units. The UPS units affected, all considered not to be safety-related, are listed below in Table 1:

Table 1. Failed Uninterruptible Power Supplies

Supply	Load Description
2VBB-UPS1A	Radwaste Computer Nonsafety-related control room instrumentation & controls
2VBB-UPS1B	Nonsafety-related radiation monitoring Nonsafety-related control room instrumentation & controls
2VBB-UPS1C	Non-essential lighting
2VBB-UPS1D	Non-essential lighting
2VBB-UPS1G	Computer-related loads

Specific loads affected included control room annunciators, balance-of-plant instrumentation, control room recorders, feedwater regulating valves, drywell coolers, the rod position indicating system, control rod drive (CRD) hydraulic system indicators, radio and paging communications systems, plant monitoring computers, and some lighting.

Following a scram, operators normally refer to the rod position indicating system (RPIS) to verify that the control rods have all inserted properly. With the RPIS unavailable, the operators verified the scram by observing:

1. Scram pilot lights deenergized (Indicating scram circuits deenergized, which allows scram valves to operate).

2. Scram discharge volume full (Indicating that control rods have inserted, displacing water from the CRD over-piston area to the scram discharge volume).

3. Flux on source range monitor scale and decreasing.

Subsequent to the loss of load and reactor scram, two safety relief valves operated to relieve steam

from the reactor to the suppression pool. In addition, turbine steam bypass valves opened to relieve to the main condenser.

The reactor core isolation cooling (RCIC) system was placed in service to provide vessel makeup. Its automatic control system experienced flow oscillations and operators placed RCIC in manual control to assure stable flow to the reactor. Residual heat removal (RHR) pump "A" was then placed in service in suppression pool cooling mode. Reactor pressure was rapidly reduced and a condensate booster pump was aligned to supply condensate to the the reactor.

Approximately one-half hour after the scram, the deenergized UPS buses were repowered from the standby "maintenance" bus and a normal plant cooldown ensued. Residual heat removal pump "B" was subsequently placed in service for decay heat removal.

Event-Related Plant Information

The Nine Mile Point 2 Final Safety Analysis Report indicates that ten UPS power supplies are utilized at the plant. UPS power supplies 2VBB-UPS1A, 1B, 1C, 1D, and 1G are all 75-kVA, 120/208-V, 3-phase, nonsafety-related units. Loads supplied by these units are indicated in table 1, above. Nonsafety-related supply 2VBB-UPS1H, a 5-kVA, single-phase, 120V unit, supplies the gaseous effluent radiation monitor in the plant stack. Reactor Protection System (RPS) supplies 2VBB-UPS3A and 3B are 10 kVA, 120-V, single-phase units. These units feed all RPS logic trip channel loads and MSIV control solenoids and are considered nonsafety-related as their loads "fail safe" (deenergize to operate).

Two UPS supplies are considered to be safety-related: 2VBA*UPS2A and 2B. These units are 25-kVA, 120-V, single phase systems which supply ECCS instrumentation and control loads.

ASP Modeling Assumptions and Approach

The ASP models describe sequences in which successes of combinations of the following systems will prevent severe core damage:

- systems required for reactor shutdown (CRD - scram function)
- power conversion systems (for decay heat removal)
- feedwater (for reactor vessel makeup)
- safety/relief valves
- emergency power
- high pressure core spray
- low pressure core spray
- reactor core isolation cooling
- control rod drive hydraulic system

- low pressure coolant injection / residual heat removal system
- RHR service water system

With the exception of the feedwater system, portions of the control rod drive hydraulic system, and the power conversion system, all systems listed are supplied and controlled from safety-related power sources. Loss of the nonsafety UPS supplies should not have affected their availability.

Since the precise impacts of the UPS failures on nonsafety-related equipment were difficult to determine based on available information, the event was conservatively modeled as a scram with the control rod drive hydraulic system, the feedwater system, the power conversion system, and one train of LPCI all unavailable.

Preliminary information indicates that one train of the low-pressure coolant injection (LPCI) was unavailable. As RHR/LPCI pumps "A" and "B" were utilized during the event, it was inferred that "C" pump was unavailable. The "A" and "B" trains of RHR have heat exchangers which are cooled by service water.

System nonrecovery probabilities (given that an initial failure has occurred) are incorporated into the ASP models. These probabilities were examined in light of the additional stress which may have been experienced by the plant operations staff during the event. The values, in the range of 1.0 for actions which could not reasonably be performed in the time available to 0.04 for actions which are simple and which can be performed in the control room, were judged to be still appropriate based on the preliminary information available concerning the event.

Operators were forced to rely on backup sources of information to verify scram and rod insertion. The reduction in information available to operators may have increased the probability of human errors, such as inappropriate initiation of ATWS mitigation. These concerns were not addressed in the preliminary analysis.

Analysis Results

The conditional probability of core damage is estimated to be 1.4×10^{-5}. The dominant sequence involved failure of the power conversion and feedwater systems, and failure of residual heat removal/suppression pool cooling.

The potential impact of inappropriate ATWS mitigation actions may be explored in the final version of this analysis, when additional information is available.

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INTERNAL CORRESPONDENCE

NIAGARA MOHAWK

07-640-91

FROM M.J. Colomb

DISTRICT Nine Mile Point

DATE September 6, 1991

FILE CODE

TO M.J. McCormick

SUBJECT RCIC OSCILLATIONS

This is an assessment of the RCIC flow oscillation problem based on review of surveillance data and interviews with the supervisors, operators and engineers involved.

On June 27, 1991, a surveillance was performed on the RCIC system (N2-OSP-ICS-Q002). During the performance of the test, fluctuations were seen in the RCIC system flow with the controller in auto, after the initial "cold start", during set up to record IST data. The magnitude of the flow change (oscillation) was approximately 30 gpm. When flow to the Condensate Storage Tank was changed by adjusting Test Return Valve (ISC*FV108), the oscillation magnitude reduced to less than 20 gpm (i.e., magnitude was affected by FV108 position). The Control Room (Station Shift Supervisor) assessment was that RCIC operability was not affected (i.e., RCIC could perform its intended function). Eric Townsend (Operations Supervisor) was aware of the problem (he observed at least a portion of the test) and had no operability concerns. A Work Request was written by a GE engineer to "tune" the controller.

During the event of August 13, 1991, RCIC oscillations of a much greater magnitude (100 gpm) were observed. The controller was placed in manual and parameters stabilized.

In order to better assess the control function of the RCIC system in the future, the following changes are being made to the surveillance test:

1) In addition to the present requirement to make flow set point changes, pump discharge pressure changes will be made by adjustment of ICS*FV108 (i.e., assess operation at 1100 psig, 1000 psig, 800 psig, 600 psig, 400 psig and 200 psig).

2) Criteria will be added to assess stability.

In addition, during startup from the present outage, RCIC will be run at three different reactor pressures (150 psig, 500 psig, 1000 psig).

Additional actions:

1) J.A. Fitzpatrick will be notified of the problem (BWR-4 with RCIC and HPCI).

2) An event description is being prepared for Nuclear Network.

3) A letter is being issued to SSSs/ASSSs to emphasize the importance of documenting any surveillance anomalies in the tests and SSS log, and elevating issues when appropriate.

MJC/da

To: J. Conway Date: Sept.2, 1991
From: J.Ting
Subject: RCIC flow and speed hunting problem status report

Brief Description:

WR No. 189944 and 184909 identified RCIC turbine speed and flow hunting problems during the RCIC quarterly surveillance.

Discussions:

Discussions have been made with following personnel: Thad Sitnik, Dan Hadley, John Alberts (I/C Dept.) and Albert Hwu (GE), Dave Flood (System Engineering). Listed below were what we have done:

1. As found flow control loop EGM settings taken:

EGM Settings on	Per N2-IMP-ICS-010	As Found
Amps Gain Pot	7	7
Hi trim (volts)	4	4
Lo trim (volts)	6.5	6.5
Stability pot	7	7
Speed setpoint	5	NA
Idle (volts)	-.892	-1.96 at RGSC TP 1 and 2
P601 Flow controller Gain	.33	.30
" " " Dial	.20 measured	.20 measured
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2. flow transmitter 2ICS*FT101 has been vented with its own line pressure, crud and air bubble were found.
3. Flow controller 2ICS*FC101 has been bench checked and was found OK.
4. Flow indicator 2ICS*FI101 has been checked and was found OK.
5. EGM CONTROL BOX static data was taken per N2-IMP-ICS-010 without any adjustment or setting change. After thoroughly review and revealed that:
   1). The procedure requires further changes.
   2). The as found Null Voltage readings indicated that the EGM control loop was out of calibration and Hi/Low trim needs to be adjusted.

Preliminary Conclusion:

Air in flow sensing line.

Recommended Actions:

1. Review procedure N2-IMP-ICS-010 and implement required changes.(Hi/Low Trim adjustment requires further discussion and confirmation with GE San Jose). Action required date: Sept. 3, 1991

2. Perform N2-IMP-ICS-010 and take static base line data on Sept.3, 1991 night shift.

3. Perform troubleshooting (if required) during performance of N2-OSP-ICS-R002 at reactor pressure 150 psig (perform tune-up procedure N2-IMP-ICS-010 if required).

3A. Taking oil sample for water content during RCIC ~~test~~ 150 run. (N2-CSP-17V) WR# 184910

4. At reactor rated pressure, perform RCIC tune-up per N2-IMP-ICS-010 and pump & valve operability verification per N2-OSP-ICS-Q002.

5. Generate a new procedure for periodic (18 month) system checkout and calibration per GE SIL No. 351 Rev.2 Category 2. (This is for tracking and because N2-IMP-ICS-010 is a once every 5 year procedure).

Required date: As soon as applicable.

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Recommended Actions:

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2. Perform N2-IMP-ICS-010 and take static base line data on Sept.3, 1991 night shift.

3. Perform troubleshooting (if required) during performance of N2-OSP-ICS-R002 at reactor pressure 150 psig (perform tune-up procedure N2-IMP-ICS-010 if required).

3A. Taking oil sample for water content during RCIC test run.

4. At reactor rated pressure, perform RCIC tune-up per N2-IMP-ICS-010 and pump & valve operability verification per N2-OSP-ICS-Q002.

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NRR

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Required date: As soon as applicable.

25) Missed required Tech Spec Surveillance
- DER 2-91-Q-709 & letter from Gary Whitaker
- Tech Spec 3/4.6.4, Suppression Chamber/Drywell Vacuum Breaker, require that...operability shall be demonstrated within 2 hours after any discharge of steam to the suppression chamber from the safety/relief valves, by cycling each vacuum breaker through at least one complete cycle of full travel". The actuation of two safety/relief valves wasn't discovered until approximately four hours after they actually lifted so this Tech. spec. was not met within the required time limit.

26) Missed required Tech Spec Action (RPS Inop due to EOP Jumpers)
- DER 2-91-Q-74B & Section from J. Helker's report "Assessment of Operator Response"
- Defeating of RPS interlocks is authorized by the EOPs for this particular scenario in order to provide the ability to reset the scram and perform multiple scrams. This Tech Spec action request specifies placing at leat one RPS trip system in a tripped condition within one hour. Using N2-EOP-6 Attachment 14 operators had defeated all RPS interlocks (except for manual) as directed by the EOPs for a period of approximately one and one half hours. The basis for the procedures and safety evaluations recognize the potential for this condition, thus, the action taken by the operators and direction by two procedures was appropriate.

27) DIV II H_2/O_2 Sample Pump Trip (2CMS*P2B)
- WR 190966 & 196053
  WR 190966 (910824) is closed. Work Item Description: During Plant Transient on 910813 Div. II Pump (2CMS-P2B) tripped for no obvious reason. Div. I CMS and all other Div. II CMS SOVs were found in their normal positions. Determine cause of pump trip and correct if required. Cause of failures: None found, possibly spurious.
- Following completion of the WR I&C traced the wires through the electricl downings and determined that pump *P2B was wired to the correct power panel.
- Subsequently NMP2 Operations tripped pump *P2B by opening its power panel breaker.
- WR 196053 (910829) is still open. Work Item Description: check the breaker for pump *P2B.

28) RCIC Flow Oscillations
- WR 184909 and 189944
- WR 184909 (910814) is still open. Work Item Description: After several minutes of operation during the RCIC Quarterly Surveillance the RCIC Flow Controller in auto began to hunt at approximately plus or minus 50 GPM about its set point of 600 GPM.

Need Control Loop Setting Verification per attached and troubleshoot as necessary.

- WR 189944(910627) is still.open. Work Item Description: RCIC Turbine Speed Exhibits hunting during surveillance test; perform applicable procedure steps (N2-IMP-ICS-@001) to tune up the RCIC Control System.

29) Drywell Temp indicator discrepancy CMS*TRX130
- WR189947
- WR 189947 (910819) is still open. Work Item Description: Pen showing elevation 307 temperature on the Drywell temperature recorder did not move during temperature transient in the Drywell.

30) Fire panels affected by transient
- Letter from A. Andersen dated August 15, 1991.
- 18 of 20 fire panels at Unit 2 maintained normal power supply. Two fire panels transferred to internal battery backup. There was no interruptions or decreases of fire protection/detection/suppression at the local fire panels.

31) Group 9 Isolation
- System Engineering Evaluation.
- Upon loss of UPS1A, automatic isolation of Group 9 valves was lost. Also, loss of UPS1B resulted in loss of 2GTS-RE105, causing the radiation monitor trip contacts to close. This closed contact feeds a second time delay relay in the isolation logic. When power was restored to UPS1A, the Group 9 isolation logic was restored, causing the relay fed from the radiation monitor to time out, which resulted in the Group 9 isolation.

32) WCS isolation
- Operations Evaluation of Operating Procedure.
- Root Cause under investigation by Operations Department.

33) Verification that EOP Actions Restored to Normal
- Attachment 14 (Alternate Control Rod Insertions) to N2-EOP-6 which installed the RPS Jumpers has a hand written double verification of their removal.
- The ADS inhibit switch is a Control Room front panel switch on panel P601 which has been verified to be back in its normal (unhibited) position.
- A Procedure Change Evaluation (PCE) request will be written suggesting that all EOP-6 attachments have double verification steps after all restoration steps.

INTERNAL CORRESPONDENCE

NIAGARA MOHAWK

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DATE September 6, 1991 FILE CODE

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In order to better assess the control function of the RCIC system in the future, the following changes are being made to the surveillance test:

1) In addition to the present requirement to make flow set point changes, pump discharge pressure changes will be made by adjustment of ICS*FV108 (i.e., assess operation at 1100 psig, 1000 psig, 800 psig, 600 psig, 400 psig and 200 psig).

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From: J.Ting
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Brief Description:

WR No. 189944 and 184909 identified RCIC turbine speed and flow hunting problems during the RCIC quarterly surveillance.

Discussions:

Discussions have been made with following personnel: Thad Sitnik, Dan Hadley, John Alberts (I/C Dept.) and Albert Hwu (GE), Dave Flood (System Engineering). Listed below were what we have done:

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Preliminary Conclusion:

Air in flow sensing line.

Recommended Actions:

1. Review procedure N2-IMP-ICS-010 and implement required changes.(Hi/Low Trim adjustment requires further discussion and confirmation with GE San Jose). Action required date: Sept. 3, 1991

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Preliminary Conclusion:

Air in flow sensing line.

Recommended Actions:

1. Review procedure N2-IMP-ICS-010 and implement required changes.(Hi/Low Trim adjustment requires further discussion and confirmation with GE San Jose). Action required date: Sept. 3, 1991

2. Perform N2-IMP-ICS-010 and take static base line data on Sept.3, 1991 night shift.

3. Perform troubleshooting (if required) during performance of N2-OSP-ICS-R002 at reactor pressure 150 psig (perform tune-up procedure N2-IMP-ICS-010 if required).

3A. Taking oil sample for water content during RCIC test run.

4. At reactor rated pressure, perform RCIC tune-up per N2-IMP-ICS-010 and pump & valve operability verification per N2-OSP-ICS-Q002.

5. Generate a new procedure for periodic (18 month) system checkout and calibration per GE SIL No. 351 Rev.2 Category 2. (This is for tracking and because N2-IMP-ICS-010 is a once every 5 year procedure).

Required date: As soon as applicable.

2. Perform N2-IMP-ICS-010 and take static base line data on Sept.3, 1991 night shift.

3. Perform troubleshooting (if required) during performance of N2-OSP-ICS-R002 at reactor pressure 150 psig (perform tune-up procedure N2-IMP-ICS-010 if required).

3A. Taking oil sample for water content during RCIC ~~test~~ 150 run. (N2-CSP-17V) WR#184910

4. At reactor rated pressure, perform RCIC tune-up per N2-IMP-ICS-010 and pump & valve operability verification per N2-OSP-ICS-Q002.

5. Generate a new procedure for periodic (18 month) system checkout and calibration per GE SIL No. 351 Rev.2 Category 2. (This is for tracking and because N2-IMP-ICS-010 is a once every 5 year procedure).

Required date: As soon as applicable.

NRR

To: J. Conway
From: J.Ting
Date: Sept.2, 1991
Subject: RCIC flow and speed hunting problem status report

Brief Description:

WR No. 189944 and 184909 identified RCIC turbine speed and flow hunting problems during the RCIC quarterly surveillance.

Discussions:

Discussions have been made with following personnel: Thad Sitnik, Dan Hadley, John Alberts (I/C Dept.) and Albert Hwu (GE), Dave Flood (System Engineering). Listed below were what we have done:

1. As found flow control loop EGM settings taken:

EGM Settings on	Per N2-IMP-ICS-010	As Found
Amps Gain Pot	7	7
Hi trim (volts)	4	4
Lo trim (volts)	6.5	6.5
Stability pot	7	7
Speed setpoint	5	NA
Idle (volts)	-.892	-1.96 at RGSC TP 1 and 2
P601 Flow controller Gain	.33	.30
" " " Dial	.20 measured	.20 measured
" " " Reset	30	30

2. flow transmitter 2ICS*FT101 has been vented with its own line pressure, crud and air bubble were found.
3. Flow controller 2ICS*FC101 has been bench checked and was found OK.
4. Flow indicator 2ICS*FI101 has been checked and was found OK.
5. EGM CONTROL BOX static data was taken per N2-IMP-ICS-010 without any adjustment or setting change. After thoroughly review and revealed that:
   1). The procedure requires further changes.
   2). The as found Null Voltage readings indicated that the EGM control loop was out of calibration and Hi/Low trim needs to be adjusted.

Preliminary Conclusion:

Air in flow sensing line.

Recommended Actions:

1. Review procedure N2-IMP-ICS-010 and implement required changes.(Hi/Low Trim adjustment requires further discussion and confirmation with GE San Jose). Action required date: Sept. 3, 1991.

2. Perform N2-IMP-ICS-010 and take static base line data on Sept.3, 1991 night shift.

3. Perform troubleshooting (if required) during performance of N2-OSP-ICS-R002 at reactor pressure 150 psig (perform tune-up procedure N2-IMP-ICS-010 if required).

3A. Taking oil sample for water content during RCIC ~~test~~ 150 run. (N2-CSP-17V) WR# 184910

4. At reactor rated pressure, perform RCIC tune-up per N2-IMP-ICS-010 and pump & valve operability verification per N2-OSP-ICS-Q002.

5. Generate a new procedure for periodic (18 month) system checkout and calibration per GE SIL No. 351 Rev.2 Category 2. (This is for tracking and because N2-IMP-ICS-010 is a once every 5 year procedure).

Required date: As soon as applicable.

25) Missed required Tech Spec Surveillance
- DER 2-91-Q-709 & letter from Gary Whitaker
- Tech Spec 3/4.6.4, Suppression Chamber/Drywell Vacuum Breaker, require that...operability shall be demonstrated within 2 hours after any discharge of steam to the suppression chamber from the safety/relief valves, by cycling each vacuum breaker through at least one complete cycle of full travel". The actuation of two safety/relief valves wasn't discovered until approximately four hours after they actually lifted so this Tech. spec. was not met within the required time limit.

26) Missed required Tech Spec Action (RPS Inop due to EOP Jumpers)
- DER 2-91-Q-74B & Section from J. Helker's report "Assessment of Operator Response"
- Defeating of RPS interlocks is authorized by the EOPs for this particular scenario in order to provide the ability to reset the scram and perform multiple scrams. This Tech Spec action request specifies placing at leat one RPS trip system in a tripped condition within one hour. Using N2-EOP-6 Attachment 14 operators had defeated all RPS interlocks (except for manual) as directed by the EOPs for a period of approximately one and one half hours. The basis for the procedures and safety evaluations recognize the potential for this condition, thus, the action taken by the operators and direction by two procedures was appropriate.

27) DIV II H_2/O_2 Sample Pump Trip (2CMS*P2B)
- WR 190966 & 196053
  WR 190966 (910824) is closed. Work Item Description: During Plant Transient on 910813 Div. II Pump (2CMS-P2B) tripped for no obvious reason. Div. I CMS and all other Div. II CMS SOVs were found in their normal positions. Determine cause of pump trip and correct if required. Cause of failures: None found, possibly spurious.
- Following completion of the WR I&C traced the wires through the electricl downings and determined that pump *P2B was wired to the correct power panel.
- Subsequently NMP2 Operations tripped pump *P2B by opening its power panel breaker.
- WR 196053 (910829) is still open. Work Item Description: check the breaker for pump *P2B.

28) RCIC Flow Oscillations
- WR 184909 and 189944
- WR 184909 (910814) is still open. Work Item Description: After several minutes of operation during the RCIC Quarterly Surveillance the RCIC Flow Controller in auto began to hunt at approximately plus or minus 50 GPM about its set point of 600 GPM.

Need Control Loop Setting Verification per attached and troubleshoot as necessary.

- WR 189944(910627) is still open. Work Item Description: RCIC Turbine Speed Exhibits hunting during surveillance test; perform applicable procedure steps (N2-IMP-ICS-@001) to tune up the RCIC Control System.

29) Drywell Temp indicator discrepancy CMS*TRX130
- WR189947
- WR 189947 (910819) is still open. Work Item Description: Pen showing elevation 307 temperature on the Drywell temperature recorder did not move during temperature transient in the Drywell.

30) Fire panels affected by transient
- Letter from A. Andersen dated August 15, 1991.
- 18 of 20 fire panels at Unit 2 maintained normal power supply. Two fire panels transferred to internal battery backup. There was no interruptions or decreases of fire protection/detection/suppression at the local fire panels.

31) Group 9 Isolation
- System Engineering Evaluation.
- Upon loss of UPS1A, automatic isolation of Group 9 valves was lost. Also, loss of UPS1B resulted in loss of 2GTS-RE105, causing the radiation monitor trip contacts to close. This closed contact feeds a second time delay relay in the isolation logic. When power was restored to UPS1A, the Group 9 isolation logic was restored, causing the relay fed from the radiation monitor to time out, which resulted in the Group 9 isolation.

32) WCS isolation
- Operations Evaluation of Operating Procedure.
- Root Cause under investigation by Operations Department.

33) Verification that EOP Actions Restored to Normal
- Attachment 14 (Alternate Control Rod Insertions) to N2-EOP-6 which installed the RPS Jumpers has a hand written double verification of their removal.
- The ADS inhibit switch is a Control Room front panel switch on panel P601 which has been verified to be back in its normal (unhibited) position.
- A Procedure Change Evaluation (PCE) request will be written suggesting that all EOP-6 attachments have double verification steps after all restoration steps.

NIAGARA
HAWK

2. Perform N2-IMP [illegible] line [illegible] on [illegible] 3, 19[illegible] [illegible]

[illegible] trouble [illegible] during [illegible] of N2-OSP-ICS-R [illegible] [illegible] and [illegible].

3. Taking [illegible] during RCIC test run.

4. At [illegible] [illegible] for [illegible] [illegible].

5. Generate [illegible] periodic (18 month) [illegible] N2-IMP [illegible] procedure.

[illegible]

NRR

To: J. Conway [illegible] Sep. [illegible], 1991
From: J. Ting
Subject: RCIC [illegible]

[illegible] Description

[illegible] turbine speed and flow [illegible] during [illegible] quarterly surveillance.

[illegible]

Discussions [illegible] personnel: [illegible] (I&C Dept. [illegible]) and Albert Hu [illegible] Engineering). [illegible]

1. As found [illegible] CCM settings taken:

[illegible] Found

[illegible]

[illegible] After thoroughly [illegible]

[illegible] indicated that the [illegible] and [illegible]

[illegible]

[illegible]

Recommendation [illegible]

1. Review [illegible] required [illegible] further [illegible]

25) Missed required
- o DNR
- o

Need Control Loop Setting Verification per attached and troubleshoot as necessary.

- o WR 139941 (910627) is still open. Work Item Description: RCIC Turbine Speed [illegible] hunting [illegible] surveillance test, [illegible] (N2-IMP-TCS-0001) [illegible]

[illegible] Drywell Temp. [illegible] CMS[illegible]

- o WR 59947 [illegible]
- o WR 18594 [illegible] Work Item Description: [illegible] on the Drywell [illegible] have during [illegible] temperature [illegible]

[illegible]

- o [illegible]
- o [illegible] power [illegible] transferred to internal battery [illegible] interruptions or degradation of fire [illegible] the local fire [illegible]

[illegible]

- o [illegible]
- o [illegible] valves [illegible]

[illegible]

- o [illegible]
- o [illegible]

[illegible] Normal [illegible]

- o [illegible] to N2- [illegible] dampers [illegible] verification [illegible]
- o [illegible] Control Room front panel [illegible] need to be back [illegible] position.
- o [illegible] will be [illegible] have double [illegible]

RCIC Controller Oscillations 07-641-91

Sequence of events

6-27-91

1. Operation performing ICS Q002
2. Operators note flow oscillations on ICS flow controller
3. SSS informed, SSS recalls oscillation just outside the green band. Green band spans 20 gpm on controller. Estimation of flow oscillation magnitud ≈ 30 gpm
4. Operator adjust FV 108 to attain required pump rpm and flow rate. When FV 108 is throttled open, oscillations stop.
5. SSS concludes that oscillations due to FV108. See SSS note attached.
6. E. Townsend Asst Supv Ops observes ICS instruments and notes minute parameter changes. Concludes that they are due to system dynamics.
7. J.T. Howe, GE advisory observes oscillati Note: Operator is able to start and stop oscillations by adjusting FV 108.
8. SSS and GE discuss operability issue No operability concern because oscillat due to adjustment of FV108. SSS and GE discuss need for loop calibration to correct unsmooth flow control. WR to be written

9. Problem arises during surveillance with inability to trip ICS turbine from control room.
10. JT Huu arrives in the control room, informs SSS that governor/controller is okay but EGM output needs adjustment. WR 189944 written See attached SSS note.
11. Work request reaches Work control, Ron Murray. Ron remembers being hand delivered the WR by JT Huu. JT Huu does not remember this.
12. Ron Murray remembers JT Huu discussing the WR and if it was an operability issue. JT Huu said no it was not. He also said that he discussed it with the SSS.
13. Ron Murray says he called the control room to discuss the WR as an operability concern. He does not remember who he spoke to but does remember being told about slight oscillation and only a need to fine tune.
14. With operability not an issue, the WR was placed in the cycle to be worked during the next ICS outage or prior to the next scheduled surveillance run - 9-11-91

15. Since there was no urgency issue concerning operability, the request to work in less than 7 days was not pursued.

☐ 6/27/91

☐ 8:52Am reported I+C Fixed problem with TIP MACHine Index Flag problem RX ENGINEERING to RUN TIP'S IN preps OF RESP-4.
• RAP 9 Completed (TIP Intercalibration) (9:25Am)

☐ KADIR working ON LiBr Chiller Fill / Vent / Startup

☐ 9:15Am SIGNED to restore CEP-AOU 20 to NORMAL AFTER MECHANICAL WORK

9:17Am PTP N2-RESP-4
LPRM CALIBRATIONS

☐ ICS NOT controlling SMOOTH FLOW NEED I+C to Due LOOP CAL WR to be written NO
APPEARS to be Hydralic ops with ICS-FV108 throttling to MAINTAIN 4250. RPM AND 600 GPM.
CONTROLLER HAS STEADED OUT AND BACK IN AUTO.

6/27/91

- ☐ Cleared T/M 91-025 /032 ON SUP*A/F Left IS WR ON V10F (168700) (10:47 AM)

- ☐ 11:08 AM EGS-W001 Completed DIV I ON Weekly Schedule DIV II/III ON Monthly

- ☐ LOG-W001 BK/VOLTAGE done due 1912 6/27/91

- ☐ RCIC TURBINE TRIP won't work ON P601 EBL 91-390
  Also Governor/controller is okay the EGM output (that changes Electrical to Hydraulic change) is Needing Adjustment. the Governor VLV will Follow EGM output (WR 189944)

- ☐ Adjusted Rods to Raise Rod Line

Al,

I don't remember much detail. alot of FOG.

I walked in the control room. & Remember Jerry Burns + Pat Brennan telling me of some oscillations. & looked at the system + recall very minute parameter changes that appeared to be normal system dynamics. Jerry or Pat told me of having to throttle open FV108.

I don't remember which SRO was there. Newman? Willis? I think I mentioned that DEET was the start up engineer.

I think it was me who suggested getting Albert there to look at some GTARS traces. Nothing was to be gained by looking at the P603 meters.

I don't remember if Albert was in the Control Room before & left or not.

What I saw was RCIC in auto running as req'd for the OSP walkdown. GETARS traces weren't available then.

I might have mentioned calling Dave Flood too, Him not sure.

I do not remember questioning operability.

I hope this helps but June 27th seems long ago.

Eric

ATTACHMENT 2

EQUIPMENT STATUS LOG SHEET *** PAGE 1 OF 2 *** INDEX NO: 91-390

1
DATE....: 6/27/91
TIME....: 1040
BIP NO..: 35
SYSTEM..: ICS
DIVISION: _____

2
COMPONENT (EP) NO: RCIC TURBINE TRIP Button
INFO ONLY.....: (YES or (NO)): _____
3.0.4 APPLICABLE.....: (YES) or NO): _____
S/U or MODE RESTRAINT: (YES) or NO): _____
SPECIAL REPORT REQ'D.: (YES or (NO)): _____
DER WRITTEN TO TRACK..: (YES or NO): _____
MWe/MWth REDUCTION...: Zero

3
DESCRIPTION: MANUAL TRIP TURBINE Button ON PLDS would not FUNCTION.

4
APPLICABLE TECH SPECS: 3.7.4 MODES: 1,2,3
LCO ACTION: restore w/I 14 days with HPCS operable or HSD w/I 12 HOURS
6/27/91 1140 HPCS OPERABLE DWJ

5
REDUNDANT COMPONENT(S) OPERABLE? (Y/N): _____
OPPOSITE DIVISION COMPONENT(S) OPERABLE? (Y/N): _____

6
RELATED ESL ENTRIES:

ESL NUMBER	AFFECTED COMP/SYS	DATE CLEARED

7
IS SYS/COMP OPERABLE? (INIT/DATE) (Y/(N)): DWJ/6/27/91 (Y/N): ___/___
(Y/N): ___/___ (Y/N): ___/___ (Y/N): ___/___ (Y/N): ___/___
ACTIONS REQUIRED TO RESTORE OPERABILITY: Clear WR's

ESL ENTRY ORIGINATED BY: DW Jerman

PAGE 1 OF 2

ATTACHMENT 2
(Continued)

EQUIPMENT STATUS LOG SHEET *** PAGE 2 OF 2 *** INDEX NO: 91-590

9 MARKUPS

	NUMBER	DATE/TIME IN ESL	DATE CLEARED
(B or R):			
(B or R):			
(B or R):			
(B or R):			
(B or R):			
(B or R):			
(B or R):			
(B or R):			
(B or R):			
(B or R):			
(B or R):			
(B or R):			
(B or R):			
(B or R):			
(B or R):			
HOLD-OUT:			
HOLD-OUT:			
HOLD-OUT:			
HOLD-OUT:			

10 WORK REQUESTS

NUMBER	COMP	DATE/TIME IN ESL	DAT. CLEARED
192985	MOU150	6/27/91 1140	6-28-91

MISCELLANEOUS

TEMP MOD:			
TEMP MOD:			
TEMP MOD:			
TEMP MOD:			
PROB REP:			
PROB REP:			
NCR.....:			
NCR.....:			
NCR.....:			
NCR.....:			
OTHER...:			
OTHER...:			
OTHER...:			

SURVEILLANCES/PMTs

DESCRIPTION	COMP	DATE/TIME IN ESL	DATE CLEARED
V2-EPM-GEN-500	Relay ESI-K7	6/27-91 2120	6-28-91

11 REMARKS:

12 OPERABILITY RESTORED/ESL ENTRY CLEARED BY:

SSS/ASSS SIGNATURE: _____ DATE: 6-28-91

PAGE 2 OF 2