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FACIL:50-261 H.B. Robinson Plant, Unit 2, Carolina Power & Light C 05000261
AUTH.NAME AUTHOR AFFILIATION
PEEBLES,T.A. Region 2 (Post 820201)
RECIP.NAME RECIPIENT AFFILIATION
EURY,L.W. Carolina Power & Light Co.

SUBJECT: Forwards exam rept 50-261/91-300 on 910722-25,exam questions,answer key & facility comments.Determines that exam team not assigned adequate work space & procedure AOP-16 exceeded RCS makeup capability.

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September 5, 1991

Carolina Power and Light Company
ATTN: Mr. L. W. Eury
Executive Vice President
Power Supply
P. O. Box 1551
Raleigh, NC 27602

Gentlemen:

SUBJECT: H. B. ROBINSON STEAM ELECTRIC PLANT EXAMINATION REPORT - 50-261/91-300

On July 22-25 1991, the NRC administered examinations to employees of your company who had applied for licenses to operate your H. B. Robinson Steam Electric Plant. At the conclusion of the examination, the examination questions and preliminary findings were discussed with those members of your staff identified in the enclosed report.

A copy of the written examination questions and answer key are included in this report as Enclosure 2. Facility comments regarding the written examination are included in this report as Enclosure 3. An NRC resolution to facility Comments report is included in Enclosure 4. A Simulator Fidelity Report is provided as Enclosure 5.

During the examination, two problems were noted that are of significant concern. First, the examination team was not assigned adequate work space. Secondly, your procedure AOP-16 "Excessive Primary Plant Leakage" required safety injection prior to reactor trip when primary plant leakage exceeded RCS makeup capability. We were assured at the exit that this latter problem would be resolved. We would appreciate your attention to resolving the first issue.

In accordance with 10 CFR 2.790 of the Commission's regulations, a copy of this letter and the enclosures will be placed in the NRC Public Document Room.

Should you have any questions concerning this examination, please contact us.

Sincerely,
(ORIGINAL SIGNED BY T. A. PEEBLES)

Thomas A. Peebles, Chief
Operations Branch
Division of Reactor Safety

Enclosures: (See page 2)

IE 43

Enclosures:
1. Examination Report 50-261/91-300
2. Examinations and Answer Keys (SRO) (Document Control Desk Only)
3. Facility Comments
4. NRC Resolution to Facility Comments
5. Simulation Facility Report

cc w/encls 1 and 4:
C. Dietz, Manager - Robinson Nuclear Project
L. Martin, Manager - Nuclear Training (Corporate)
C. Bethea, Manager - Training (Site)

bcc w/encl 1:
R. Lo, NRR
A. Gibson, DRS
H. Christensen, DRP
L. Garner, Senior Resident Inspector
M. Ernstes, DRS
R. Baldwin, DRS
State of South Carolina

bcc w/encls 1, 2, 3, 4 and 5:
NRC Public Document Room

bcc w/encls 1 and 5:
Operator Licensing Branch, DLPQ:NRR

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09/4/91	09/4/91	09/5/91	09/5/91

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
101 MARIETTA STREET, N.W.
ATLANTA, GEORGIA 30323

ENCLOSURE 1

EXAMINATION REPORT - 50-261/91-300

Facility Licensee: Carolina Power and Light Company
P. O. Box 1551
Raleigh, NC 27602

Facility Name: H. B. Robinson Steam Electric Plant

Facility Docket Nos.: 50-261

Facility License Nos.: DPR-23

Examinations were administered at the H. B. Robinson Steam Electric Plant near Hartsville, South Carolina.

Chief Examiner: Richard S. Baldwin — 9/4/91
Richard S. Baldwin — Date Signed

Approved By: Michael E. Ernstes — 9/4/91
for Lawrence L. Lawyer, Chief — Date Signed
Operator Licensing Section 1
Division of Reactor Safety

SUMMARY

Operating examinations were administered on July 23-25, 1991. The written examination was administered on July 22, 1991. Written examinations and operating tests were administered to six SRO candidates. All six SROs passed the examination.

Weaknesses observed included inadequate crew communications (para 3.1), inconsistent use of annunciator response procedures (para 3.c), inconsistent methods of removing failed pressure instruments from service (para 3.d), a slow analysis involving the lack of safety injection flow as a result of a boron injection tank rupture (para 3.f), and inadequate examination team work space (para 3.j).

REPORT DETAILS

1. Facility Employees Attending Exit:

J. Sheppard, Plant General Manager
E. Shoemaker, Project Engineer - Operations Programs
J. Kloosterman, Manager - Regulatory Compliance
R. Wallace, Manager - Operations Programs
C. Bethea, Manager - Training
S. Allen, Manager - License Training
R. Shane, Sr. Specialist - Operator Training

2. Examiners:

*R. Baldwin, NRC, Region II
M. Morgan, NRC, Region II
I. Kingsley, Sonalysts

*Chief Examiner

3. Exit Meeting:

At the conclusion of the site visit, the examiners met with representatives of the plant staff to discuss the results of the examinations. The examiners made the following observations concerning your training program:

a. Crew communication during the examinations was sometimes inadequate. Important information was sometimes not relayed to operators returning to their assigned survelliance areas after completing activities outside this area. For example, an operator left his surveillance area to attend to bistables. During the operators absence an alarm actuated on the operators control board. The actuation of this alarm was not relayed to this operator by the other team members.

b. Both crews took a significant amount of time (nine and eleven minutes respectively) to discover the Boron Injection Tank had ruptured and that coolant flow had not injected into the core.

c. Some crews did not use Annunciator Response Procedures when required.

d. Inconsistencies were noted with the removal of pressure and flow instruments that followed failures of steamline pressure transmitters.

e. During boron concentration changes both crews did not energize pressurizer heaters or actuate sprays for pressurizer boron mixing.

f. During an event in which an inadvertent boron addition occurred that followed the loss of a feedwater heater; both crews showed a lack of understanding of plant parameter changes, which resulted in delaying the diagnosis of the inadvertent boron addition.

g. Three of the four SRO Upgrades received written examination grades in the low 80s. This may indicate weaknesses in SRO upgrade training.

h. AOP-16, "Excessive Primary Plant Leakage", step 3.1.4 requires Safety Injection prior to reactor plant trip when leakage exceeds RCS makeup capability. The concern with Safety Injection prior to plant trip was discussed with plant management. Mr. J. Sheppard committed to resolve this procedural problem by September 15, 1991.

i. Reference Material that was sent for examination development did not include the simulator malfunction/cause and effect manual and it did not include the lesson plans used for the initial operator training. It is important that all requested materials used in initial training be sent to preclude unnecessary schedule changes.

j. The examination team was not assigned adequate work space. Particular attention needs to be directed to assuring the availability of reasonable facilities prior to the next examination.

The licensee did not identify as proprietary any material provided to or reviewed by the examiners.

ENCLOSURE 2

MASTER

Nuclear Regulatory Commission
Operator Licensing
Examination

This document is removed from
Official Use Only category on
date of examination.

U. S. NUCLEAR REGULATORY COMMISSION
SITE SPECIFIC EXAMINATION
SENIOR OPERATOR LICENSE
REGION 2

CANDIDATE'S NAME: _____

FACILITY: H. B. Robinson 2

REACTOR TYPE: PWR-WEC3

DATE ADMINISTERED: 91/07/22

INSTRUCTIONS TO CANDIDATE:

Use the answer sheets provided to document your answers. Staple this cover sheet on top of the answer sheets. Points for each question are indicated in parentheses after the question. The passing grade requires a final grade of at least 80%. Examination papers will be picked up four (4) hours after the examination starts.

TEST VALUE	CANDIDATE'S SCORE	%
95.00 ~~100.00~~		___ % TOTALS
	FINAL GRADE	

All work done on this examination is my own. I have neither given nor received aid.

_____
Candidate's Signature

A N S W E R S H E E T

Multiple Choice (Circle or X your choice)

If you change your answer, write your selection in the blank.

MULTIPLE CHOICE

001 a b c d ___
002 a b c d ___
003 a b c d ___
004 a b c d ___
005 a b c d ___
006 a b c d ___
007 a b c d ___

008 MATCHING

a ___
b ___
c ___
d ___

MULTIPLE CHOICE

009 a b c d ___
010 a b c d ___
011 a b c d ___
012 a b c d ___
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039 a b c d ___
040 a b c d ___

A N S W E R S H E E T

Multiple Choice (Circle or X your choice)

If you change your answer, write your selection in the blank.

041 a b c d ___

042 a b c d ___

043 a b c d ___

044 a b c d ___

045 a b c d ___

046 a b c d ___

047 a b c d ___

048 a b c d ___

049 a b c d ___

050 a b c d ___

051 MATCHING

a ___

b ___

c ___

d ___

MULTIPLE CHOICE

052 a b c d ___

053 a b c d ___

054 a b c d ___

055 a b c d ___

056 a b c d ___

057 a b c d ___

058 a b c d ___

059 a b c d ___

060 MATCHING

a ___

b ___

c ___

MULTIPLE CHOICE

061 a b c d ___

062 a b c d ___

063 a b c d ___

064 a b c d ___

065 a b c d ___

066 a b c d ___

067 MATCHING

a ___

b ___

c ___

d ___

MULTIPLE CHOICE

068 a b c d ___

069 a b c d ___

070 a b c d ___

071 a b c d ___

072 a b c d ___

A N S W E R S H E E T

Multiple Choice (Circle or X your choice)

If you change your answer, write your selection in the blank.

073	a	b	c	d	___
074	a	b	c	d	___
075	a	b	c	d	___
076	a	b	c	d	___
077	a	b	c	d	___
078	a	b	c	d	___
079	a	b	c	d	___
080	a	b	c	d	___
081	a	b	c	d	___
082	a	b	c	d	___
083	a	b	c	d	___
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085	a	b	c	d	___
086	a	b	c	d	___
087	a	b	c	d	___
088	a	b	c	d	___
089	a	b	c	d	___
090	a	b	c	d	___

A N S W E R S H E E T

091 SHORT ANSWER

092 SHORT ANSWER

093 SHORT ANSWER

094 SHORT ANSWER

095 SHORT ANSWER

(********** END OF EXAMINATION **********)

NRC RULES AND GUIDELINES FOR LICENSE EXAMINATIONS

During the administration of this examination the following rules apply:

1. Cheating on the examination means an automatic denial of your application and could result in more severe penalties.

2. After the examination has been completed, you must sign the statement on the cover sheet indicating that the work is your own and you have not received or given assistance in completing the examination. This must be done after you complete the examination.

3. Restroom trips are to be limited and only one applicant at a time may leave. You must avoid all contacts with anyone outside the examination room to avoid even the appearance or possibility of cheating.

4. Use black ink or dark pencil ONLY to facilitate legible reproductions.

5. Print your name in the blank provided in the upper right-hand corner of the examination cover sheet and each answer sheet.

6. Mark your answers on the answer sheet provided. USE ONLY THE PAPER PROVIDED AND DO NOT WRITE ON THE BACK SIDE OF THE PAGE.

7. Before you turn in your examination, consecutively number each answer sheet, including any additional pages inserted when writing your answers on the examination question page.

8. Use abbreviations only if they are commonly used in facility literature. Avoid using symbols such as < or > signs to avoid a simple transposition error resulting in an incorrect answer. Write it out.

9. The point value for each question is indicated in parentheses after the question.

10. Show all calculations, methods, or assumptions used to obtain an answer to any short answer questions.

11. Partial credit may be given except on multiple choice questions. Therefore, ANSWER ALL PARTS OF THE QUESTION AND DO NOT LEAVE ANY ANSWER BLANK.

12. Proportional grading will be applied. Any additional wrong information that is provided may count against you. For example, if a question is worth one point and asks for four responses, each of which is worth 0.25 points, and you give five responses, each of your responses will be worth 0.20 points. If one of your five responses is incorrect, 0.20 will be deducted and your total credit for that question will be 0.80 instead of 1.00 even though you got the four correct answers.

13. If the intent of a question is unclear, ask questions of the examiner only.

14. When turning in your examination, assemble the completed examination with examination questions, examination aids and answer sheets. In addition, turn in all scrap paper.

15. Ensure all information you wish to have evaluated as part of your answer is on your answer sheet. Scrap paper will be disposed of immediately following the examination.

16. To pass the examination, you must achieve a grade of 80% or greater.

17. There is a time limit of four (4) hours for completion of the examination.

18. When you are done and have turned in your examination, leave the examination area (EXAMINER WILL DEFINE THE AREA). If you are found in this area while the examination is still in progress, your license may be denied or revoked.

QUESTION: 001 (1.00)

Which one of the following statements, concerning CLEARANCES, is correct?

a. Clearance Certificates must ALWAYS be used when giving Station Clearances.

b. Clearance Certificates may be used when giving Line Clearances.

c. Station and Line Clearances should NOT be logged in the Control Operator's log.

d. Line Clearances are issued when it is possible for the person taking the clearance to personally check all feeds.

QUESTION: 002 (1.00)

Which one of the following statements is correct concerning the Technical Specifications for inoperability of reactor trip breakers?

a. ONE reactor trip breaker may be inoperable for up to 24 hours.

b. ONE reactor trip bypass breaker may be racked in and closed for up to 12 hours if the associated trip breaker is found to be inoperable.

c. ONE train of automatic trip logic may be inoperable for up to EIGHT (8) hours.

d. ONE reactor trip bypass breaker may be inoperable for up to 12 hours.

QUESTION: 003 (1.00)

The basis for HBR Technical Specification 3.1.1.1.a, "Reactor Coolant Pump Operation at LESS THAN TWO % Power", states that the specification contains requirements designed to limit the consequences of what postulated accident at low or subcritical power conditions?

a. Loss of flow.

b. Steam line break event.

c. Uncontrolled bank withdrawal.

d. Uncontrolled dilution.

QUESTION: 004 (1.00)

During a normal reactor startup, with reactor power at 20%, the reactor operator reports that the rods will not respond to outward motion demands.

Considering the above conditions, the operator apparently failed to:

a. initiate the "at power" permissive P-10.

b. defeat the power range low power rod stop.

c. initiate the rod bottom bistable bypass.

d. defeat the intermediate range rod stop.

QUESTION: 005 (1.00)

Which one of the following actions is correct if a high radiation level alarm is initiated by the radiation monitor (RMS-14C) mounted in the stack during a gas decay tank release?

a. RCV-014 will close automatically and must be reset locally when the alarm condition clears before it can be reopened.

b. RCV-014 will close automatically and will reopen automatically when the alarm condition clears.

c. PCV-1040 will close automatically and must be reset locally before it can be reopened.

d. PCV-1040 will close automatically and will reopen automatically when the alarm condition clears.

QUESTION: 006 (1.00)

Which range of Reactor Vessel Level Instrumentation is designed to measure vessel level with reactor coolant pumps running?

a. Upper Range.

b. Full Range.

c. Static Head.

d. Dynamic Head.

QUESTION: 007 (1.00)

According to AOP-001, "Malfunction of the Reactor Control System", what immediate action(s) must be taken if more than ONE rod is out of alignment with its bank, or otherwise inoperable?

a. Trip the reactor & emergency borate per AOP-002, "Emergency Boration".

b. Emergency borate per AOP-002, "Emergency Boration", and immediately place the plant in Hot Shutdown.

c. Transfer to manual rod control and stabilize the plant.

d. Initiate a normal reactor shutdown.

QUESTION: 008 (2.00)

Table 1 of procedure AOP-003, "Malfunction of Reactor Make-up Control", lists indications of instrument failures for various VCT level instruments.

Match each failure mode listed in Column A to its correct symptom in Column B. (NOTE: The item in Column B may be used once, more than once, or not at all, and only a single answer may occupy one answer space.)

Column A	Column B
_____a. LT-115 failed low.	1. If no action is taken, then LI-115 will decrease but emergency make-up will not actuate automatically.
_____b. LT-112 failed low.	2. LCV-115A aligns to the VCT.
_____c. LT-115 failed high.	3. No automatic make-up.
_____d. LT-112 failed high.	4. If no action is taken, then LI-112 will increase causing LCV-115A to modulate to HUT
	5. Charging Pump suction will automatically shift to the RWST.

QUESTION: 009 (1.00)

Technical Specification (TS) 3.8.1(e) requires at least ONE RHR loop to be operable during refueling operations.

What is the technical specification basis for this requirement?

a. To be able to maintain Tave less than or equal to 150 degrees F.

b. To be able to minimize the effect of a postulated boron dilution event.

c. To ensure that the core remains subcritical even if all control rods were withdrawn during a postulated inadvertent rod withdrawal accident.

d. To prevent the partial uncovering of a fuel assembly during refueling.

QUESTION: 010 (1.00)

Immediately following a loss of offsite and onsite power (station blackout), the STA reports the status of Critical Safety Fuctions as:

Subcriticality - Green
Core Cooling - Orange (go to FRP-C.2)
Heat Sink - Red (go to FRP-H.1)
Integrity - Green
Containment - Green
Inventory - Yellow (go to FRP-I.2)

Which one of the following is the first procedure to be used in response to the transient.

a. "Loss of All AC Power", EPP-1

b. "Response to Degraded Core Cooling", FRP-C.2

c. "Response to Loss of Secondary Heat Sink", FRP-H.1

d. "Response to Voids in Reactor Vessel", FRP-I.2

QUESTION: 011 (1.00)

Which one of the following reactor trips is based upon protecting the reactor from exceeding the linear power density rating (KW/ft) of the fuel rods?

a. Over Temperature delta T.

b. Over Power delta T.

c. Low pressurizer pressure.

d. Power range high flux.

QUESTION: 012 (1.00)

Which one of the following malfunctions could cause one of the Over Temperature Delta T trip bistables to trip?

a. Controlling turbine impulse pressure channel failing low.

b. Power range N43 lower detector failing low.

c. Reactor coolant flow detector failing low.

d. Controlling pressurizer level channel failing low.

QUESTION: 013 (1.00)

Unit 2 is operating at 60% with Bank D rods at 180 steps, turbine is in manual when a failure of the "B" inverter occurs, deenergizing instrument bus #3. No trip or runback occured. You have noted that the rods cannot be withdrawn in manual.

Which ONE of the following is preventing rod motion?

a. High Overpower Delta-T Rod Stop

b. High Intermediate Range Flux Rod Stop

c. High Overtemperature Delta-T Rod Stop

d. High Power Ranre Flux Rod Stop

QUESTION: 014 (1.00)

Which one of the following correctly describes main feedwater system response to a valid SG B high level trip signal while at 75% power?

a. All SG main and bypass feedwater control valves will shut; MFPs will not trip

b. All SG main and bypass feedwater control valves will shut; MFPs will trip

c. Only SG-B main and bypass feedwater control valves will shut; MFPs will not trip

d. Only SG-B main and bypass feedwater control valves will shut; MFPs will trip

QUESTION: 015 (1.00)

The plant is operating at steady-state 60% power. An IMMEDIATE manual reactor trip is required if:

a. RCP A seal differential pressure equals 220 psid and is increasing.

b. RCP B frame vibration equals 3 mils.

c. RCP C upper motor bearing temperature equals 200 degrees F and is increasing.

d. RCP A shaft vibration equals 17 mils.

QUESTION: 016 (1.00)

The basis for depressurizing all intact steam generators to 160 psig in step 9 of FRP-C.1, "Response to Inadequate Core Cooling," is to:

a. ensure core exit thermocouple temperatures are reduced to less than 700 degrees F.

b. ensure core exit thermocouple temperatures are reduced to less than 1200 degrees F.

c. reduce RCS pressure to aid in recovery of reactor water level.

d. enhance natural circulation cooling of the reactor core.

QUESTION: 017 (1.00)

Which one of the actions from the list below are major action categories of FRP-S.1, "Response to Nuclear Power Generation/ATWS"?

1. Emergency borate.
2. Check for and eliminate sources of positive reactivity.
3. Verify subcriticality.
4. Establish Safety Injection flow to RCS.

a. 1, 2, 3

b. 1, 2, 4

c. 1, 3, 4

d. 2, 3, 4

QUESTION: 018 (1.00)

The basis for ensuring control of steam generator levels during Natural Circulation is:

a. to prevent an excessive cooldown rate.

b. to provide a stable heat sink for decay heat removal.

c. to prevent unnecessary positive or negative reactivity insertions caused by varying cooldown rate.

d. to provide continuous flow to the steam generator to ensure steam generator tube integrity.

QUESTION: 019 (1.00)

PATH 2 has the operator check the "ruptured steam generator pressure greater than 200 psig". Subsequent steps direct the operator to dump steam from the intact S/G(s) as rapidly as possible in order to establish adequate subcooling margin. The basis for checking ruptured S/G pressure greater than 200 psig is to ensure ... (Choose ONE)

a. the subsequent cooldown will not result in an ORANGE condition on the Integrity Critical Safety Function Status Tree.

b. that RCS pressure will be less than the ruptured S/G pressure after the cooldown to stop primary to secondary leakage.

c. that the operator blocks the High Steam Flow/Low Steamline Pressure SI signal when RCS average coolant temperature is below 543 degrees F.

d. an optimal RCS temperature is established which could preclude a return to criticality during the subsequent rapid RCS cooldown.

QUESTION: 020 (1.00)

Which one of the following states the TWO procedures that can lead to FRP-H.1, "Loss of Secondary Heat Sink"?

a. PATH 1 and PATH 2

b. CSFST for heat sink and PATH 1

c. PATH 2 and CSFST for heat sink

d. PATH 2 and EPP-11

QUESTION: 021 (1.00)

Which one of the following is the basis for terminating safety injection flow during the performance of PATH 2?

a. To minimize the cooldown affects caused by the tube rupture.

b. To establish normal charging and letdown for RCS chemistry control.

c. To prevent filling the pressurizer, thus lifting the pressurizer PORVs.

d. To prevent overfilling the ruptured steam generator.

QUESTION: 022 (1.00)

Technical Specifications state that with the Quadrant Power Tilt Ratio greater than 1.02 but less than 1.09, the operator must, within two hours, reduce QPTR to within its limits or reduce thermal power. The two hour time allowance for operation with a tilt condition greater than 1.02 but less than 1.09 is provided to allow time for:

a. corrective action in the event of xenon redistribution following power changes.

b. identification and correction of a dropped or misaligned rod.

c. boron concentration changes to restore the QPTR to less than 1.02.

d. identification and correction of a failed excore-detector.

QUESTION: 023 (1.00)

Which one of the following will cause the "A" steam generator (S/G) main feedwater regulating valve to initially go to the OPEN position? Assume no operator action taken. (Each of the following is on the "A" S/G)

a. S/G narrow range level transmitter fails HIGH.

b. S/G feedwater flow transmitter fails HIGH.

c. S/G steam flow transmitter fails HIGH.

d. S/G pressure transmitter fails LOW.

QUESTION: 024 (1.00)

Manning requirements for REFUELING operations (during fuel movement would include:

a. Shift Supervisor (SRO), Refueling SCO (SRO), one Control Room Operator (RO) and Reactivity Monitor/ 1/M Plotter.

b. Shift Supervisor (SRO), Refueling SCO (SRO), STA and Reactivity Monitor/ 1/M Plotter.

c. Refueling SCO (SRO), STA, Fire Protection Technical Aide and Reactivity Monitor/ 1/M Plotter.

d. Shift Supervisor (SRO), one additional SRO, two Control Room Operators (RO) and STA.

QUESTION: 025 (1.00)

Which one of the following protective relays will actuate the 86P lock out on the Main Generator?

a. Negative Sequence

b. Loss of Field

c. Generator Ground

d. Unit Differential

QUESTION: 026 (1.00)

Which one of the following system loads can NOT be DIRECTLY supplied by the Dedicated Shutdown 480 V AC electrical bus?

a. A CCW Pump

b. D SWP (Service Water Pump)

c. MCC-5

d. 5KVA UPS (uninterrupted power supply)

QUESTION: 027 (1.00)

Which one of the following sets of loads is started on Blackout sequence loading?

a. Service water booster pumps

b. RHR pumps A & B

c. HVH Units 1 & 2 ONLY

d. Safety Injection pumps A, B & C

QUESTION: 028 (1.00)

Which one of the following loads is shed automatically upon SI initiation in order to ensure the EDG does NOT exceed the 2 hour over load rating of 2750 KW?

a. "A" and "B" Rod Drive MG Sets

b. MCC-9/10 Feeder Breakers

c. Radwaste Evaporator heat trace

d. Battery Charger "C"

QUESTION: 029 (1.00)

Which one of the following statement is correct about the A/B and A1/B1 Battery Chargers?

a. A1/B1 Battery chargers have unfiltered output and can be run without the batteries in the circuit.

b. A/B Battery chargers have filtered output and can be run without the batteries in the circuit.

c. A1/B1 Battery chargers have filtered output and must be run with the batteries in the circuit.

d. A/B Battery chargers have unfiltered output and must be run with the batteries in the circuit.

QUESTION: 030 (1.00)

Which one of the following will occur during the loss of DC Bus "A" with offsite power available?

a. Turbine does not trip.

b. Both Pressurizer PORV's - PCV 456 & 455C are lost.

c. "B" EDG will start but does not load.

d. "A" EDG starts, the field flashes but 480 V AC Bus E-1 remains de-energized because the output breaker will not close.

QUESTION: 031 (1.00)

Which one of the following Plant personnel is the Minimum level of plant supervision to authorize extension of the whole body dose limit of 1250 mrem/quarter to a whole body dose limit of 2000 mrem/quarter?

a. Plant General Manager

b. Manager E & RC

c. RC Supervisor

d. Shift Supervisor

QUESTION: 032 (1.00)

In an Emergency situation where it is necessary to perform life saving actions, which one of the following is the maximum allowable EXTREMITY dose?

a. 25 rem

b. 75 rem

c. 100 rem

d. 200 rem

QUESTION: 033 (1.00)

Which one of the following is the maximum radiation exposure a Visitor shall be limited to if the Visitor has NOT successfully completed General Employee Training?

a. 50 mrem

b. 100 mrem

c. 150 mrem

d. 200 mrem

QUESTION: 034 (1.00)

Which one of the following groups represents the minimum level of plant management who can authorize keys and who can authorize approval for entry into a Special Hazards Area?

a. Shift Supervisor, RC Supervisor

b. RC Technician, RC Supervisor

c. RC Supervisor, Manager E & RC

d. Manager E & RC, Plant General Manager

QUESTION: 035 (1.00)

Due to a loss of Feedwater pumps, the Steam Generators go below the low-low level setpoint and no reactor trip occurs. The SRO carries out the actions of FRP-S.1, "Response to Nuclear Power Generation/ATWS", and reactor power is < 5% with a negative startup rate. At the completion of this procedure a Red Path exists on Heat Sink. Which procedure should the SRO go to next?

a. Re-enter PATH 1 at Entry point A

b. Enter PATH 1 at the step in effect

c. Enter FRP-H.1, "Loss of Secondary Heat Sink"

d. Enter EEP-4, "Reactor Trip Response"

QUESTION: 036 (1.00)

Which one of the following plant personnel approves the Temporary Modification Declaration of Operability associated with installation of jumpers?

a. Plant General Manager

b. Shift Supervisor

c. Manager of Operations

d. Manager of Operations Coordination

QUESTION: 037 (1.00)

Which one of the following is the required action that must be performed by the Shift Foreman in the control room in the event of a fire?

a. Operate fire systems in accordance with technical specifications and operating procedures.

b. ensure that the motor driven fire pump is running.

c. determine plant operation condition based on actual or potential core damage.

d. ensure a fire watch is assigned when required.

QUESTION: 038 (1.00)

Which one of the following is the method used for the independent second check verification of a throttled valve?

a. Observe valve position indicators.

b. Verify the presence of a stem lock or tamper seal.

c. Observe another operator initially position the valve to the throttled position.

d. Check the valve, counting the number of turns, then restore the valve to the throttle position by opening the same number of turns used to close the valve.

QUESTION: 039 (1.00)

Which one of the following is correct regarding locking devices for safety-related/plant reliability-related locked valves?

a. The lock and chain should prevent any movement of the valve operator.

b. The lock and chain should limit movement of the valve operator to less than one-half revolution.

c. The lock and chain should limit movement of the valve operator to less than one revolution.

d. The lock and chain does not have to physically prevent any valve operator movement. It is designed as a visual deterrent only.

QUESTION: 040 (1.00)

Which one of the following is the method used for verifying a manual valve position when an ALARA concern exists?

a. hands-on operation in the shut direction only.

b. observing the initial positioning of the valve by another operator.

c. referring to the last completed lineup on that valve.

d. visual observation of the stem position or local valve position indication.

QUESTION: 041 (1.00)

The primary and alternate clearance holders are NOT available to cancel a clearance. Which one of the following constitutes sufficient authorization to cancel the clearance?

a. The work Group Supervisor after physically verifying the work is complete and restored along with written concurrence of the Plant General Manager.

b. Any Shift Foreman after physically verifying the work is complete and restored along with written concurrence of the Plant General Manager.

c. The "On-Duty" Shift Foreman after physically verifying the work is complete and equipment is restored.

d. The Operations Coordinator after verifying the work is complete and restored by either inspection or direct report from an operator.

QUESTION: 042 (1.00)

Which one of the following should have the Shift Foreman as clearance holder?

a. Station Clearance.

b. Line Clearance.

c. A clearance needed to protect personnel or equipment.

d. A clearance needed to perform work on a defective plant component that is classified as vital equipment.

QUESTION: 043 (1.00)

Which one of the following is an application of a caution tag?

a. Establish hydrostatic test boundaries.

b. To isolate a component for routine preventive maintenance.

c. To isolate a component to preclude personnel injury or equipment damage.

d. Indicates possible radiation hazard points of system breaches during maintenance evolutions performed under clearances.

QUESTION: 044 (1.00)

Who must authorize entry into a radiography restricted area via the control point?

a. Shift Supervisor

b. Radiographer

c. Radiation Control Supervisor

d. Radiation Control Technician

QUESTION: 045 (1.00)

Who can authorize and administer a "Locked High Radiation Area Master Key" transfer from one Radiation Control Technician to another?

a. Operations Coordinator.

b. Shift Foreman.

c. Any on-duty control operator.

d. The radiation control Technician currently possessing the key.

QUESTION: 046 (1.00)

In accordance with Technical Specifications:

The Minimum number of Fire Brigade Members is _____ AND the Maximum amount of time the minimum number can be less than designated is _____?

a. 3 people, 1 hour

b. 4 people, 2 hours

c. 5 people, 2 hours

d. 6 people, 1 hour

QUESTION: 047 (1.00)

Fire protection Pre-plans are written and staged in the Control Room to coordinate and direct fire-fighting efforts in areas that affect:

a. containment barrier integrity

b. continuity of off-site power supply

c. radioactive materials storage

d. ability of the plant to achieve cold shutdown

QUESTION: 048 (1.00)

Which one of the following represents the approximate Hydrogen concentration in the containment following a LOCA assuming the Hydrogen Recombiner panel temperatures are as follows:

Reaction Chamber gas temperature = 1325 def. F

Heater outlet gas temperature = 965 deg. F

a. 2%

b. 3%

c. 4%

d. 5%

QUESTION: 049 (1.00)

Which one of the following is provided by the Main Steam header pressure transmitters?

a. supplies AMSAC-ATWS mitigation system.

b. supplies signals for steam dump control.

c. supplies high steam flow setpoint.

d. used for pressure compensation of the steam flow channels.

QUESTION: 050 (1.00)

Which one of the following represents how the Steam Dump system operates during a 48% loss of load from 53% reactor power?

a. 3 condenser dump valves modulate open due to Tave-Tref deviation of 12.1 deg. F.

b. All 5 condenser dump valves trip open due to Tave-Tref deviation of 16.6 deg. F.

c. All 5 condenser dump valves trip open with 1 of the 3 PORVs due to a Tave-Tref deviation of 32.5 deg. F.

d. All 5 condenser dump valves and all PORVs trip open due to a Tave-Tref deviation of 24.3 deg. F.

QUESTION: 051 (2.00)

Match the Process Radiation Monitors (PRMs) listed in Column A with the Description/Actions listed in Column B.

(NOTE: The items in column B may be used once, more than once, or not at all, and only a single answer may occupy one answer space.)

COLUMN A	COLUMN B
a. Fuel Handling Building Basement Exhaust Gas Monitor (R-20)	1. Setpoint basis is based on 10% MPC at the Protected area for Gaseous
b. Containment Radioactive Gas monitor (R-12)	2. Provides Backup monitoring to plant vent monitor (R-14C)
c. Plant Vent Gas Monitor (R-14C)	3. Scintillation type detector
d. Steam Generator Blowdown Monitor (R-19A,B,C)	4. Alarms Only
	5. Closes RCV-014, Waste Gas Release valve when Alarm setpoint is exceeded

QUESTION: 052 (1.00)

The Plant vent stack low range Nobel Gas Radiation Monitor (RC-14C) level setpoint is exceeded then decreases below the setpoint.

Which one of the following actions describes the required actions for NORMAL system operation?

a. Sample flow will automatically realign.

b. Sample flow must be realigned at the local skid.

c. Sample flow will automatically realign after the reset push button is depressed.

d. Sample flow will automatically realign once detector power is reset and the reset push button is depressed.

QUESTION: 053 (1.00)

Which one of the following represents the Maximum delta T by procedure between the Auxiliary Spray Temperature and the Pressurizer Temperature?

a. 280 deg. F

b. 300 deg. F

c. 320 deg. F

d. 340 deg. F

QUESTION: 054 (1.00)

Which one of the following series of valves in accordance with AOP-002, "Emergency Boration", represents the preferred order of suction sources for the Charging pumps during Emergency Boration?

1. MOV-350

2. FCV-113A and FCV-113B

3. FCV-113A and FCV-114B

4. LCV-115B or CVC-358 and close LCV-115C

a. 1, 2, 3, 4

b. 3, 2, 4, 1

c. 2, 4, 3, 1

d. 4, 3, 2, 1

QUESTION: 055 (1.00)

Which one of the following is correct concerning the Intermediate Range Nuclear Instrumentation?

a. When one of the two Intermediate Range channels is below the P-6 setpoint, P-6 automatically reinstates the Source Range High Flux trip.

b. When one of the two Intermediate Range channels is above 20% full power automatic and manual rod withdrawal is blocked.

c. Must be blocked when three of the four Power Range channels are greater than 10 % full power.

d. Will be reinstated when two of the four Power Range channels are below P-10.

QUESTION: 056 (1.00)

Which one of the following represents the Technical Specification requirement for minimum Channel operability for Source Range Instruments when core geometry is being changed?

a. One Source Range channel with continual visual indication in the Control Room.

b. One Source Range channel with continual visual indication in the Control Room with its audible indication available in the containment.

c. Two Source Range Channels, each with continuous visual indication in the Control Room.

d. Two Source Range Channels, each with continuous visual indication in the Control Room and one with audible indication available in the containment.

QUESTION: 057 (1.00)

If during power operation, NI-41 control or instrument power fuses were removed and a runback did NOT occur, which one of the following would have been the most likely cause preventing this runback?

a. Turbine in Auto (IMP out).

b. Time delay relay for runback signal has not been reset.

c. Rod stop (103%) bypass switch for affected power range instrument in bypass position.

d. Comparator channel defeat switch in "Defeat" position for the affected power range insturment.

QUESTION: 058 (1.00)

In accordance with OP-403, "Feed Water System", Precaution and Limitations, which one of the following in NOT a Precaution and Limitation concerning the Local Handwheel control of a Steam Generator Feed water regulating valve?

a. Two Feed Reg. valves may be placed in local-handwheel control provided adequate communication is maintained between the Feed Reg. valve stations and the control room.

b. No Feed Reg. valve may be placed in local-handwheel control for more than eight hours.

c. A licensed operator must be stationed at the Feed Reg. valve for the entire time that the valve is in local-handwheel control.

d. The associated feed water header section valve for the Feed Reg. valve is local-handwheel control must be operable for the duration of the evolution.

QUESTION: 059 (1.00)

Which one of the following correctly describes the Main Feed Water system response to a Safety Injection signal?

a. Feed Water header section valves remain open, All S/G main and bypass valves will shut MFP's will not trip.

b. Feed Water header section valves shut, All S/G main and bypass valves will shut, MFP's will trip.

c. Feed Water header section valves shut, All S/G main and bypass valves will shut, MFP's will not trip.

d. Feed Water header section valves remain open, All S/G main and bypass valves will shut, MFP's will trip.

QUESTION: 060 (1.50)

Match the Auxiliary Feed Water Flow Control valve listed in Column A with that description/Power Supply listed in Column B.

(NOTE: The items in Column B may be used once, more than once or not at all, and only a single answer may occupy one answer space.)

Column A	Column B
a. FCV-1424 (A AFW MDAFWP)	1. Fails open, powered from an Instrument Bus.
b. FCV-1425 (B AFW MDAFWP)	2. Fails closed, powered from an Instrument Bus.
c. FCV-6416 (Steam Driven AFWP)	3. Fails as is, powered from an Instrument Bus.
	4. Fails open, powered from a Lighting Panel.
	5. Fails closed, powered from a Lighting Panel.

QUESTION: 061 (1.00)

Which one of the following correctly describes the AFW automatic start signal that is defeated when the AFW pump auto-start defeat switch is in the "DEFEAT" position?

a. AMSAC

b. Both MFW pump breakers open

c. Safety Injection signal

d. Blackout Sequence

QUESTION: 062 (1.00)

Which one of the following is the system design requirement for the Containment during a design basis accident?

a. 2 spray pumps, 1 fan cooler unit

b. 2 spray pumps, 2 fan cooler units

c. No spray pumps, 2 fan cooler units

d. No spray pumps, 4 fan cooler units

QUESTION: 063 (1.00)

In accordance with EPP-7, "SI Termination", which one of the following must be reset first when resetting a Phase A Isolation?

a. Containment Isolation Phase A

b. Containment Isolation Phase B

c. Feed Water Isolation

d. Safety Injection

QUESTION: 064 (1.00)

Which one of the following is correct concerning the Component Cooling Water System during a condition when Spray, Blackout and Safety Injection signals have occurred?

a. Neither B or C CCW pumps will be started automatically but can be started manually from the control board.

b. Neither B or C CCW pumps will be started automatically and can not be started manually from the control board.

c. Pump B will auto start 30 seconds after the Diesel Generator output breaker closes, Pump C will not auto start.

d. Pump C will auto start 30 seconds after the Diesel Generator output breaker closes, Pump B will not auto start.

QUESTION: 065 (1.00)

Which one of the following is the reason for gagging open the CCW vent valve RCV-906?

a. to ensure a radiation monitor pathway to detect in leakage to CCW.

b. allows continuous recirculation for chemistry control.

c. to ensure continuous venting to prevent gas binding the CCW pumps.

d. to prevent CCW system overpressurization.

QUESTION: 066 (1.00) deleted KAH 7/22/11

Which one of the following is the basis for limiting the throttling of CCW Heat Exchanger outlet valves (SW-739 and SW-740)?

a. Ensure proper cooling water flow to the dedicated shutdown Diesel Generator.

b. Pre-Flux Rod Stop

QUESTION: 067 (2.00)

Match the Fuel Handling System Interlock listed in Column A with the description listed in Column B.

(NOTE: The items in Column B may be used once, more than once, or not at all, and only a single answer may occupy one answer space.)

Column A	Column B
a. Gripper Tube interlock	1. Tube must be "full up" to energize the bridge or trolley drive.
b. Bridge-trolley-hoist interlock	2. Limits mast travel path to avoid vessel guide stud.
c. Bridge-trolley position interlock	3. Prevents operation of gripper until weight is less than 950 lbs.
d. Hoist-gripper interlock	4. Stops hoist movement in up direction when weight exceeds ~2700 lbs.
	5. Gripper must be engaged or disengaged to operate hoist.
	6. Allows drive of only one unit at a time.

QUESTION: 068 (1.00)

Which one of the following containment isolation lines is provided with Manual seal water injection?

a. Letdown line

b. Pressurizer relief tank makeup line

c. Reactor Coolant drain tank pump discharge line

d. Reactor Coolant pump seal water supply line

QUESTION: 069 (1.00)

Which one of the following signals send a close signal to all Containment isolation valves and a start signal to the HVH Units 1, 2, 3, and 4?

a. Phase A signal

b. Phase B signal

c. Safety Injection signal

d. R-11 or R-12 high alarm signal

QUESTION: 070 (1.00)

A design basis LOCA has occurred at HBR-2. The following data has been obtained:

Time following the LOCA - 10 days
Hydrogen Concentration (Hydrogen Monitor Reading) - 5.8%
Containment pressure - 0.2 psig

Which one of the following is the correct pressure that the containment should be raised in order to vent the containment using the preferred path? (OP-922 is provided for reference)

a. 1.5 psig

b. 1.9 psig

c. 2.0 psig

d. 2.5 psig

QUESTION: 071 (1.00)

Which one of the following leak rates is the basis for limiting the Specific Activity of the secondary coolant system to less than or equal to 0.10 micro Ci/gm dose equivalent Iodine 131?

a. 0.1 gpm

b. 0.5 gpm

c. 1.0 gpm

d. 1.5 gpm

QUESTION: 072 (1.00)

Which one of the following is the leg and the reason for directing 80% of the feed water to that leg of the S/G?

a. Cold leg, increases the steam quality in the hot leg and reduces the steam quality in the cold leg.

b. Cold leg, reduces the steam quality in the hot leg and increases the steam quality in the cold leg.

c. Hot leg, increases the steam quality in the hot leg and reduces the steam quality in the cold leg.

d. Hot leg, reduces the steam quality in the hot leg and increases the steam quality in the cold leg.

QUESTION: 073 (1.00)

Which one of the following is the correct maximum operational delta Pressure (RCS to Secondary)?

a. 1000 psid

b. 1500 psid

c. 2000 psid

d. 2250 psid

QUESTION: 074 (1.00)

Which one of the following is the correct water level that should be maintained in the steam generators prior to placing the plant on line?

a. 30% water level

b. 52% water level

c. 30%-39% water level

d. 40%-50% water level

QUESTION: 075 (1.00)

During refueling operations the spent fuel pool temperature reaches 150 deg. F, which one of the following is the correct operator action per Technical Specifications? (Assume a full core off load has taken place)

a. increase CCW flow through the SFP heat exchanger.

b. add water to the spent fuel pool pit from the RWST using the refueling water purification pump.

c. transfer fuel assemblies back to the containment.

d. start an additional spent fuel pit pump.

QUESTION: 076 (1.00)

In accordance with AOP-001, "Malfunction of the Reactor Control System", which one of the following immediate operator actions must be taken if 2 rods have dropped?

a. Initiate an orderly shutdown to Hot Shutdown.

b. Transfer Rod control to manual and stabilize plant conditions, recover one rod at a time per AOP-001.

c. Trip the reactor and emergency borate in accordance with EPP-4, "Reactor Trip Response".

d. Emergency borate in accordance with AOP-002, "Emergency Boration", and immediately place the plant in Hot Shutdown.

QUESTION: 077 (1.00)

Procedure AOP-002, "Emergency Boration", contains a NOTE stating that one of the Emergency Boration pathways should not be used if the plant is to be maintained at power provided that none of the other flow paths are available.

Which one of the following is the correct Emergency Boration path this note applies?

a. MOV-350

b. FCV-113A and FCV-113B

c. LCV-115B or CVC-358 and close LCV-115C

d. FCV-113A and FCV-114B

QUESTION: 078 (1.00)

Which one of the following is an immediate operator action per AOP-003, "Malfunction of the Reactor Make-up Control", if the level of the VCT is LOW?

a. Verify LCV-115A is open and LCV-115B is closed.

b. Verify MOV-350 is closed.

c. Secure Boric Acid transfer pump if running.

d. Verify charging and letdown flow are normal.

QUESTION: 079 (1.00)

In accordance with AOP-013, "Fuel Handling Accident, Fuel assembly stuck in the RV or transfer basket", which one of the following plant personnel should be called as part of the immediate operator actions?

a. Plant General Manager

b. E & R/RC Manager

c. Shift Supervisor

d. Refueling Senior Reactor Operator

QUESTION: 080 (1.00)

In accordance with AOP-016, "Excessive Primary Plant Leakage", which one of the following is the proper operator action, if leakage exceeds RCS makeup capability and the RCS temperature is greater than 350 deg. F?

a. Manually trip the reactor, initiate Safety Injection and follow Path 1.

b. Implement AOP-020, "Loss of Residual Heat Removal".

c. Initiate Safety Injection and follow Path 1.

d. Start additional charging pumps, trip the reactor and follow Path 1.

QUESTION: 081 (1.00)

Which one of the following is the correct procedural path an operator should take if the plant is at 100% full power when loss of all AC occurs, the Emergency Diesel Generators fail to start and the Reactor did NOT trip?

a. Directly implement EPP-1.

b. Implement Path 1 and EPP-1 concurrently.

c. Directly implement FRP-S.1 since the reactor trip has NOT been verified.

d. Enter Path 1 which will direct implementation of FRP-S.1.

QUESTION: 082 (1.00)

EPP-5, "Natural Circulation Cooldown" is in progress at step 5, CRDM cooling fans are NOT running and can not be started on the Emergency bus.

Which one of the following describes how the inability to start the CRDM fans will affect the cooldown and depressurization?

a. A transition to EPP-006, "Natural Circulation Cooldown with Steam Void in the Vessel", will be required because the cooldown will cause the formation of a steam void in the vessel head.

b. There is no effect - the lack of CRDM fans running can be offset by increasing the steaming rate of the secondary plant.

c. Greater subcooling must be maintained and this will result in a longer upper head cool off time period.

d. Less subcooling must be maintained and the total upper head cooldown rate will be greater.

QUESTION: 083 (1.00)

While at full power operation, a loss of seal water injection has occurred which caused RCP "A" to have an excessive high bearing temperature. It has been determined that RCP "A" must be tripped.

Which one of the following is the correct action that must be performed first?

a. Trip the reactor.

b. Simultaneously trip RCP "A" and the reactor.

c. Reduce power below P-8 then trip RCP "A" then trip the reactor.

d. Verify the seal injection valve to RCP "A" is open, then trip the reactor.

QUESTION: 084 (1.00)

In accordance with EPP-6, "Natural Circulation Cooldown with Steam Void in Vessel", which one of the following methods is used to enhance upper head cooling if pressurizer level is greater than 90%?

a. energize pressurizer heaters.

b. open one pressurizer PORV.

c. open the Auxiliary spray valve.

d. isolate Letdown System.

QUESTION: 085 (1.00)

Which one of the following is NOT a Major Action Category of EPP-11, "Faulted Steam Generator Isolation"?

a. Check Main Steam line isolation

b. Identify and isolate faulted S/G's

c. Check for S/G tube rupture

d. Depressurize RCS to minimize RCS Leakage

QUESTION: 086 (1.00)

In accordance with AOP-24, "Loss of Instrument Buss", when a Manual/Auto control station is re-energized on the control board, the operator can switch the control station to "Auto" when: (Choose one)

a. The "auto" light is energized

b. The "manual" light is energized

c. The "auto" light is blinking

d. The "manual" light is blinking

QUESTION: 087 (1.00)

In accordance with AOP-17, "Loss of Instrument Air", subsequent actions to the feed and condensate system, which one of the following plant conditions would require the operator to trip the reactor?

a. MSIVs going closed

b. S/G levels can not be maintained

c. Pressurizer level not maintained within normal limits.

d. Heater drain pump trips on Heater Drain tank low level.

QUESTION: 088 (1.00)

In accordance with FRP-P.1, "Response to Imminent Pressurizer Thermal Shock", which one of the following is the correct cooldown criteria in determining if an RCS temperature soak is required?

a. 75 degrees F in any 60 minute period

b. 85 degrees F in any 60 minute period

c. 95 degrees F in any 60 minute period

d. 105 degrees F in any 60 minute period

QUESTION: 089 (1.00)

A fire has occurred on site which requires implementation of DSP-2, "Hot Shutdown using the Dedicated/Alternate Shutdown System", when performing this procedure with the minimum complement of 3 operators, which one of the following positions should the Shift Foreman assume?

a. Turbine Building Operator

b. Electrical Operator

c. Auxiliary Operator

d. Fire Protection Technical Aide

QUESTION: 090 (1.00)

Which one of the following plant management personnel should be directing (ordering) the steps of DSP-003, "Hot Shutdown from the Control Room with a Fire in the Charging Pump Room?

a. Plant General Manager

b. Operations Supervisor

c. Shift Foreman

d. Senior Control Operator

QUESTION: 091 (1.00)

Briefly explain, what will happen if the Auto/Manual selector switch on the side of the Bailey Positioner at the Feed Water Regulation Valves is selected to the manual position?

QUESTION: 092 (2.00)

LIST ALL the Immediate Operator Actions in accordance with AOP-014, "Loss of Component Cooling Water", if the CCW Surge tank level is LOST?

QUESTION: 093 (1.50)

In accordance with EPP-1, "Loss of All AC Power", there is a caution that states:

> "If an SI signal exists or is actuated during this procedure, it should be reset to permit manual loading of equipment on an Emergency Bus."

What are the three reasons for doing this?

QUESTION: 094 (1.00)

Procedure EPP-9, "Transfer to Cold Leg Recirculation", has a Caution that states:

> "Steps 1 through 11 should be performed without delay. Function Restoration Procedures should not be implemented prior to completion of this procedure."

What is the basis for this Caution?

QUESTION: 095 (1.00)

What action is necessary if at any time an operator determines that he is in an incorrect Path EPP?

(********** END OF EXAMINATION **********)

ANSWER: 001 (1.00)

a.

REFERENCE:

HBR OMM-005, page 10.
3.7/4.1

194001K102 ..(KA's)

ANSWER: 002 (1.00)

b.

REFERENCE:

HBR T.S. 3.10.4, page 3.10-8.
2.9/3.8
001000G006 ..(KA's)

ANSWER: 003 (1.00)

c.

REFERENCE:

HBR T.S. Basis, page 3.1-2.
2.7/3.8
003000G006 ..(KA's)

ANSWER: 004 (1.00)

d.

REFERENCE:

HBR S.D. 010, page 10.
3.7/3.9

015000K402 ..(KA's)

ANSWER: 005 (1.00)

a.

REFERENCE:

HBR SD-024, page 18.
3.6/3.8
071000A302 ..(KA's)

ANSWER: 006 (1.00)

d.

REFERENCE:

HBR SD-501, page 6.
3.5/3.7

002000K107 ..(KA's)

ANSWER: 007 (1.00)

d.

REFERENCE:

HBR AOP-001, page 20
3.5/4.0
000005A203 ..(KA's)

ANSWER: 008 (2.00)

a. 4
b. 2
c. 3
d. 1

REFERENCE:

HBR AOP-003, page 8
3.4/3.3
000022A108 ..(KA's)

ANSWER: 009 (1.00)

b.

REFERENCE:

HBR T.S. 3.8.1(e) basis, page 3.8-4.
2.6/3.8

000025G004 ..(KA's)

ANSWER: 010 (1.00)

a.

REFERENCE:

EPP-1 Caution prior to step 1, EOP-TP-5.1 #4
KA: 000055G011 (4.1/4.1)

000055G011 ..(KA's)

ANSWER: 011 (1.00)

b.

REFERENCE:

SD-011 3.1.5.6; T/S p. 2.3-5; ESF-TP-6.1 #1
KA: 012000K502 (3.1/3.3)

012000K502 ..(KA's)

ANSWER: 012 (1.00)

b

REFERENCE:

SD-011 p.17 LO RPS-TP-4.1 #3
KA: 012000K611 (2.9/2.9)

012000K611 ..(KA's)

ANSWER: 013 (1.00)

d.

REFERENCE:

AOP-024, DC-TP-2.1 #4, RDCNT-TP-3.1 #5
KA: 001000K407
3.7/3.8
001000K407 ..(KA's)

ANSWER: 014 (1.00)

d. (1.0)

REFERENCE:

SD-027 p.13, FW-TP-2.1 #3
KA: 059000K419 (3.2/3.4)
059000K419 ..(KA's)

ANSWER: 015 (1.00)

c.

REFERENCE:

AOP-018, Rev. 1, p. 4
LO - Not Available
3.4/3.5
000015A208 ..(KA's)

ANSWER: 016 (1.00)

c.

REFERENCE:

EOP-LP-16, p. 7
EOP-LP-16, LO A.3
4.0/4.4
000074K311 ..(KA's)

ANSWER: 017 (1.00)

a.

REFERENCE:

EOP-LP-15, p. 3
EOP-LP-15, LO A.2
4.4/4.7
000029K312 ..(KA's)

ANSWER: 018 (1.00)

b.

REFERENCE:

EOP-LP-6, p. 7
EOP-LP-6, LO A.4
4.1/4.2
000015K307 ..(KA's)

ANSWER: 019 (1.00)

a.

REFERENCE:

EOP-LP-4, p. 16
EOP-LP-4, LO A.3.
4.2/4.5
000038K306 ..(KA's)

ANSWER: 020 (1.00)

b.

REFERENCE:

EOP-LP-17, p. 13
EOP-LP-17, LO A.1.

000054G011 ..(KA's)

ANSWER: 021 (1.00)

d.

REFERENCE:

EOP-LP-4, p.25
EOP-LP-4, LO A.3.
000038K309 ..(KA's)

ANSWER: 022 (1.00)

b.

REFERENCE:

Technical Specification 3.10.3 and Basis
NI-TP-5.1, LO 5.
2.6/3.7

015020G006 ..(KA's)

ANSWER: 023 (1.00)

c.

REFERENCE:

SD-027, REV. 9, p. 18 - 20
SGLCS-TP-2.1, LO 1.
3.4/3.6
035010A203 ..(KA's)

ANSWER: 024 (1.00)

a.

REFERENCE:

AOP-LP-01, p. 7
AOP-LP-01, LO A.3.
3.4
194001A103 ..(KA's)

ANSWER: 025 (1.00)

c.

REFERENCE:

SD-016, p. 27,
[2.6/3.2]

062000K401 ..(KA's)

ANSWER: 026 (1.00)

d.

REFERENCE:

AC-HO-1 p. 3 of 9 Session 3

[3.3/3.4]

062000K201 ..(KA's)

ANSWER: 027 (1.00)

a

REFERENCE:

AC-HO-1 Session 4, p. 4 of 11
L.O. # 2

[3.8/3.9]

000056A247 ..(KA's)

ANSWER: 028 (1.00)

c

REFERENCE:

AC-LP-4 p. 6 of 19
AC-HO-1 P 5 of 11

[2.9/3.3]
064000A206 ..(KA's)

ANSWER: 029 (1.00)

d

REFERENCE:

DC-HO-1 p. 5 of 30
LO #6

[2.9/3.5]

063000K103 ..(KA's)

ANSWER: 030 (1.00)

c.

REFERENCE:

DC-HO-1 p. 3,4,5 Session 2
LO #1

[3.5/3.9]

000058A203 ..(KA's)

ANSWER: 031 (1.00)

c

REFERENCE:

PROC-LP-2 p. 4 of 14, LO A1

[/3.4]

194001K103 ..(KA's)

ANSWER: 032 (1.00)

d

REFERENCE:

PROC-LP-2, p. 5 of 14, LO A1

[/3.4]

194001K103 ..(KA's)

ANSWER: 033 (1.00)

b

REFERENCE:

PROC-LP-2 p. 7 of 14, LO A1

[/3.4]

194001K103 ..(KA's)

ANSWER: 034 (1.00)

d

REFERENCE:

PROC-LP-5 p. 13 of 21, LO A6

[/3.4]

194001K103 ..(KA's)

ANSWER: 035 (1.00)

b

REFERENCE:

EOPs

[4.4/4.6]

000056K304 ..(KA's)

ANSWER: 036 (1.00)

c

REFERENCE:

MOD-018, Attach. 6.3 p 1 of 1

[3.6/3.7]
194001K107 ..(KA's)

ANSWER: 037 (1.00)

b

REFERENCE:

AOP-LP-9 p. 10 of 15 , LO #2

[/4.2]

194001K116 ..(KA's)

ANSWER: 038 (1.00)

c

REFERENCE:

OMM-001 5.7.2

[/3.7]

194001K101 ..(KA's)

ANSWER: 039 (1.00)

c

REFERENCE:

OMM-009, 5.1.2

[/3.7]

194001K101 ..(KA's)

ANSWER: 040 (1.00)

d

REFERENCE:

OMM-001, 5.7.2

[/3.5]

194001K104 ..(KA's)

ANSWER: 041 (1.00)

a

REFERENCE:

OMM-005, 5.2.4

[/4.1]

194001K102 ..(KA's)

ANSWER: 042 (1.00)

c

REFERENCE:

OMM-005, 5.2.8, 4.1.3, 4.1.4

[/4.1]

194001K102 ..(KA's)

ANSWER: 043 (1.00)

a

REFERENCE:

OMM-18, 5.1.2

[/4.1]

194001K102 ..(KA's)

ANSWER: 044 (1.00)

b

REFERENCE:

Health Physics Procedure (HPP) 009, 10.14
PROC-LP-2 II.F.2

[/3.4]

194001K103 ..(KA's)

ANSWER: 045 (1.00)

b

REFERENCE:

Administrative Procedures -031, 3.5
PROC-LP-5 II.F.5

[/3.4]

194001K103 ..(KA's)

ANSWER: 046 (1.00)

c

REFERENCE:

T/S 6.2.3, g. h.
OMM-002, 3.4.2

[/4.2]

194001K116 ..(KA's)

ANSWER: 047 (1.00)

d

REFERENCE:

OMM-002, 5.8

[/4.2]

194001K116 ..(KA's)

ANSWER: 048 (1.00)

b

REFERENCE:

CSS-LP-8 p. 9
LO #4

[3.4/3.8]

028000A101 ..(KA's)

ANSWER: 049 (1.00)

b

REFERENCE:

MS-LP-1 p. 22
LO A4

[3.3/3.3]

039000K102 ..(KA's)

ANSWER: 050 (1.00)

b

REFERENCE:

MS-LP-2 p. 11 of 21
LO A2
[2.8/3.1]

041020K411 ..(KA's)

ANSWER: 051 (2.00)

a. 4
b. 2
c. 5
d. 3

REFERENCE:

RM-LP-2, LO A2, A3

[4.0/4.3]

073000K401 ..(KA's)

ANSWER: 052 (1.00)

a

REFERENCE:

RM-LP-3, LO A3

[3.1/3.5]

000061A204 ..(KA's)

ANSWER: 053 (1.00)

c

REFERENCE:

CVC-LP-3 p. 12 of 20

[3.6/3.9]

004000K511 ..(KA's)

ANSWER: 054 (1.00)

c

REFERENCE:

CVC-LP-4 p. 11 of 22 LO A5

[3.9/3.7]

004010A403 ..(KA's)

ANSWER: 055 (1.00)

b

REFERENCE:

NI-LP-4 p. 10 of 19

[3.8/3.9]

015000A403 ..(KA's)

ANSWER: 056 (1.00)

d

REFERENCE:

NI-LP-3 p. 12 of 28 LO A2

[3.3/3.8]

015000G005 ..(KA's)

ANSWER: 057 (1.00)

b

REFERENCE:

NI-LP-5 p. 27 of 40 LO A5

[3.1/3.2]

015000K604 ..(KA's)

ANSWER: 058 (1.00)

a

REFERENCE:

FW-LP-1 p. 9 of 14 LO A3, OP-403 p. 8 of 33

[3.0/2.9]

059000A408 ..(KA's)

ANSWER: 059 (1.00)

b

REFERENCE:

OP-403 p. 6 of 33

[3.1/3.2]

059000K416 ..(KA's)

ANSWER: 060 (1.50)

a. 2
b. 2
c. 4

REFERENCE:

FW-LP-3 p. 10 of 32 LO A4

[3.2/3.3]

061000K201 ..(KA's)

ANSWER: 061 (1.00)

b

REFERENCE:

FW-LP-3 p. 21 of 32, LO A4

[4.5/4.6]

061000K402 ..(KA's)

ANSWER: 062 (1.00)

d

REFERENCE:

ESF-LP-4 p. 12 of 22, LO A7

[2.5/3.8]

026000G006 ..(KA's)

ANSWER: 063 (1.00)

d

REFERENCE:

ESF-LP-5, EPP-7

[3.9/4.3]

013000K401 ..(KA's)

ANSWER: 064 (1.00)

b

REFERENCE:

CCW-LP-1, p. 14 of 23, LO A3

[3.1/3.3]

008000K401 ..(KA's)

ANSWER: 065 (1.00)

d

REFERENCE:

CCW-LP-1, p. 9 of 23 LO A3

[3.2/3.5]

008000A202 ..(KA's)

ANSWER: 066 (1.00)

~~b~~ deleted KS 7/22/91

REFERENCE:

SWP-LP-2 p. 7, 8 of 29 LO A3
OP-903 p. 7 of 81

[3.4/3.3]

076000K101 ..(KA's)

ANSWER: 067 (2.00)

a. 1
b. 6
c. 2
d. 5

REFERENCE:

FH-LP-2 LO A2

[2.5/3.3]

034000K402 ..(KA's)

ANSWER: 068 (1.00)

d

REFERENCE:

CSS-LP-4 p. 5 of 19, LO A4

[3.9/4.4]

000069A202 ..(KA's)

ANSWER: 069 (1.00)

c

REFERENCE:

CSS-LP-5 p. 15 of 26, LO A3

[3.8/4.0]

029000A301 ..(KA's)

ANSWER: 070 (1.00)

a

REFERENCE:

CSS-LP-7 p. 16 of 25, LO A6
OP-922 Need to place graph 7.6 and 7.17 with procedure to the examination.

[2.9/3.0]

029000G013 ..(KA's)

ANSWER: 071 (1.00)

c

REFERENCE:

S/G-LP-1 p. 14 of 21, LO A4

[2.7/3.7]

035010G006 ..(KA's)

ANSWER: 072 (1.00)

d

REFERENCE:

S/G-LP-1, LO A2

[4.2/4.5]

035010K101 ..(KA's)

ANSWER: 073 (1.00)

b

REFERENCE:

S/G-LP-1 LO A4, p. 14 of 21

[3.5/3.8]
035010A102 ..(KA's)

ANSWER: 074 (1.00)

d

REFERENCE:

SGLCS-LP-3 p. 12 of 20

[2.8/3.1]

035010K503 ..(KA's)

ANSWER: 075 (1.00)

c

REFERENCE:

SFPCS-LP-1 p. 13 of 19
OP-910, TS 3.8.3
[2.4/3.2]

033000G005 ..(KA's)

ANSWER: 076 (1.00)

a

REFERENCE:

AOP-001 p. 15 of 31

[3.9/3.8]

000003G010 ..(KA's)

ANSWER: 077 (1.00)

a

REFERENCE:

AOP-002 p. 4 0f 7

[4.2/4.4]

000024K302 ..(KA's)

ANSWER: 078 (1.00)

d

REFERENCE:

AOP-003

[3.5/3.4]

000022G010 ..(KA's)

ANSWER: 079 (1.00)

d

REFERENCE:

AOP-013 p. 7 of 9

[3.7/3.8]
000036G010 ..(KA's)

ANSWER: 080 (1.00)

c

REFERENCE:

AOP-016 p. 6 of 9

[4.3/4.5]
000011G001 ..(KA's)

ANSWER: 081 (1.00)

a

REFERENCE:

EOP-LP-05, p. 5 of 20, LO A2
THIS question is similar to #11 Need to see which one to keep.

[4.1/4.1]

000055GO11 ..(KA's)

ANSWER: 082 (1.00)

c

REFERENCE:

EOP-LP-9 p. 7 of 17, LO A4
EPP-5 p. 6
Facility exam bank similar question 5.24

[3.9/4.2]

000038K103 ..(KA's)

ANSWER: 083 (1.00)

a

REFERENCE:

AOP-018 p. 10 of 15
(Similar to facility exam question 5-28)

[3.7/4.0]

000015K303 ..(KA's)

ANSWER: 084 (1.00)

a

REFERENCE:

EPP-6, p. 17 of 24
EOP-LP-10 p. 10 of 17, LO A4

[4.0/4.6]

000074A206 ..(KA's)

ANSWER: 085 (1.00)

d

REFERENCE:

EOP-LP-11 p. 3 of 10, LO A2
EPP-11
[3.8/4.2]

000038G012 ..(KA's)

ANSWER: 086 (1.00)

b

REFERENCE:

AOP-24, p. 6 of 7
Same as facility 5.26, TRB-90-14
[3.5/3.5]

000057A106 ..(KA's)

ANSWER: 087 (1.00)

b

REFERENCE:

AOP-17
Similar to Facility question 5.40, TRB-90-14

[3.7/3.9]

000065K308 ..(KA's)

ANSWER: 088 (1.00)

d

REFERENCE:

EOP-LP-18, p. 9 of 11, LO A3

[4.2/4.5]

000009K321 ..(KA's)

ANSWER: 089 (1.00)

b

REFERENCE:

DSP-002 p. 3 of 38

[2.5/3.3]

000067K302 ..(KA's)

ANSWER: 090 (1.00)

c

REFERENCE:

[3.1/3.4]

000067G007 ..(KA's)

ANSWER: 091 (1.00)

(If selected to manual) the valve will fail closed (1.0)
k
k
k
k
k
k
k
k
k
k
k
k
k
k
k
k
k
k
k
k
k
k

REFERENCE:

SD-027 p. 13 of 34

[2.5/2.7]

059000K408 ..(KA's)

ANSWER: 092 (2.00)

Trip the Reactor (0.25) and the Reactor Coolant pumps (0.25) and Follow path 1 (0.25).
Defeat the CCW pump auto start feature (by positioning the pump switches individually to off then releasing)(0.25)
Dispatch an operator to rack out "A" CCW pump Breaker (0.25) and remove Control Power Fuses for B & C CCW pump breaker (0.25).
Isolate charging and letdown flow (0.25) but maintain seal injection to the RCPs (0.25)

1
1
1
1
1
1
1
1
1
1
1
1
1
1
1
1
1
1
1

REFERENCE:

AOP-014 p. 5 of 10

[3.6/3.5]

000026G010 ..(KA's)

ANSWER: 093 (1.50)

Prevent auto loading of the emergency bus (0.5)
Ensure any loading is done in a controlled manner (0.5)
Ensure reliability of the bus (0.5)

1
1
1
1
1
1
1
1
1
1
1
1
1
1
1
1
1
1
1

REFERENCE:

EOP-LP-5 p. 7 of 20, LO A5
EPP-1

[4.3/4.6]

000055K302 ..(KA's)

ANSWER: 094 (1.00)

Limited amount of time to accomplish RHR switchover (0.75) and the RWST emptying. (0.25)
1
1
1
1
1
1
1
1
1
1
1
1
1
1
1
1
1
1

REFERENCE:

EPP-9 p. 3 of 18
EOP-LP-19A, p. 3 of 15

[4.4/4.6]

000011K312 ..(KA's)

ANSWER: 095 (1.00)

Re-enter at the top of Path 1 (1.0) (and re-diagnose)
1
1
1
1
1
1
1
1
1
1
1
1
1
1
1
1
1
1
1
1

REFERENCE:

EOP-LP-1 p. 18 of 23

[/3.9]

194001A102 ..(KA's)

(********** END OF EXAMINATION **********)

MASTER

SENIOR REACTOR OPERATOR

A N S W E R K E Y

MULTIPLE CHOICE

001 a
002 b
003 c
004 d
005 a
006 d
007 d

008 MATCHING

a 4
b 2
c 3
d 1

MULTIPLE CHOICE

009 b
010 a
011 b
012 b
013 d
014 d
015 c
016 c
017 a
018 b
019 a
020 b
021 d
022 b
023 c
024 a
025 c deleted 7/29/91
026 d
027 a
028 c
029 d
030 c
031 c
032 d
033 b
034 d
035 b
036 c
037 b
038 c
039 c
040 d

A N S W E R K E Y

041 a

042 c

043 a

044 b

045 b

046 c

047 d

048 b

049 b

050 b

051 MATCHING

a 4

b 2

c 5

d 3

MULTIPLE CHOICE

052 a

053 c

054 c

055 b

056 d

057 b

058 a

059 b

060 MATCHING

a 2

b 2

c 4

MULTIPLE CHOICE

061 b

062 d

063 d

064 b

065 d

~~066 b~~ deleted 7/22/94

067 MATCHING

a 1

b 6

c 2

d 5

MULTIPLE CHOICE

068 d

069 c

070 a

071 c

072 d

A N S W E R K E Y

073 b

074 d

075 c

076 a

077 a

078 d

079 d

080 c

081 a

082 c

083 a

084 a

085 d

086 b

087 b

088 d

089 b

090 c

A N S W E R K E Y

091 SHORT ANSWER

(If selected to manual) the valve will fail closed (1.0)

092 SHORT ANSWER

Trip the reactor (0.25) and the Reactor coolant pumps (0.25) and follow path 1 (0.25)

Defeat the CCW pump auto start feature (by positioning the pump switches individually to off then releasing) (0.25)

Dispatch an operator to rack out A CCW pump breaker (0.25) and remove control power fuses for B & C CCW pump breaker (0.25)

Isolate charging and letdown flow (0.25) but maintain seal injection to the RCPs (0.25)

093 SHORT ANSWER

Prevent auto loading of the emergency bus (0.5)

Ensure any loading is done in a controlled manner (0.5)

Ensure reliability of the bus (0.5)

094 SHORT ANSWER

Limited amount of time to accomplish RHR switchover (0.75) and the RWST emptying. (0.25)

095 SHORT ANSWER

Re-enter at the top of Path 1 (1.00)

(********** END OF EXAMINATION **********)

CAROLINA POWER AND LIGHT COMPANY

H. B. ROBINSON SEG PLANT

PLANT OPERATING MANUAL

VOLUME 3

PART 2

OPERATING PROCEDURE

OP-922

POST ACCIDENT CONTAINMENT HYDROGEN REDUCTION/VENTING SYSTEM

REVISION 6

Effective Date 8/4/89

RECOMMENDED BY: W T Gainey Jr. 7-31-89

Unit 2 - Operating Supervisor — Date

APPROVED BY: M Ellington for 7/31/89

Manager - Operations — Date

CONTROLLED
RECIPIENT
ID _____

LIST OF EFFECTIVE PAGES

EFFECTIVE PAGES	REVISION
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4 through 53	6

TABLE OF CONTENTS

1.0 PURPOSE

The purpose of this procedure is to provide instructions for alignment and operation of the Post Accident Containment Venting and Hydrogen Recombiner System.

2.0 REFERENCES

2.1 Technical Specification 3.3.5

2.2 FSAR Section 6.2.5

2.3 Rockwell International Thermal Hydrogen Recombiner System Technical Manual

2.4 HBR2-6490, Vapor Containment Testing, Pressure Sensing and Post Accident Sampling System Flow Diagram

2.5 HBR2-6933, Post Accident Containment Venting System Flow Diagram

2.6 SD-039, Post Accident Containment Venting

2.7 SD-048, H_2 Recombiner System

3.0 PREREQUISITES

3.1 Plant Electrical Distribution is in service per OP-603.

3.2 Bottled Nitrogen available to Post Accident Containment Venting System.

4.0 PRECAUTIONS AND LIMITATIONS

4.1 The Reactor shall not be made critical unless the valves of the Post Accident Containment Venting System are operable.

4.2 The Nitrogen supply to the Post Accident Containment Venting System consists of two Nitrogen Cylinders. Both cylinders are normally isolated and during an emergency one cylinder will be placed in service.

4.3 When in service, the Nitrogen cylinder pressure should be checked at PI-775A at least once every eight hours. If cylinder pressure decreases to 1000 psig it should be isolated and the reserve cylinder placed in service. The used cylinder should be replaced with a full cylinder.

4.4 Upon delivery of the Hydrogen Recombiner, the Space Heater should be placed in service as quickly as possible not to exceed 48 hours after transit and the Space Heater should remain energized at all times that the recombiner is not in operation.

4.5 If the recombiner is disconnected from the process lines or the ventilation ducts, the inlet and outlet ventilation ducts and inlet and outlet flanged process lines must be covered to prevent air circulation.

4.6 The Power Supply Lockout on both CV Vent Panels must be locked out at all times when the system is not in operation. An operator must be present at the CV Vent Panels continuously when the system is in operation.

4.0 PRECAUTIONS AND LIMITATIONS (Continued)

4.7 Recombiner operation is not required until Containment H_2 Concentration reaches 3.5%, however, the recombiner should be anchored and connected to temporary hoses and power supply as soon as possible following the LOCA. This allows maximum time for action necessary to ensure recombiner availability.

4.8 The recombiner is designed to process 90 SCFM of gas containing up to 5% H_2.

4.9 The recommended minimum recombiner flowrate is 5.0 inches H_2O.

4.10 Portions of the recombiner develop high temperatures, therefore caution should be used to prevent burns.

4.11 Do not operate the recombiner blowers if they are dead headed.

4.12 The blind flanges on the recombiner supply and return ducts should be kept closed at all times except during recombiner use.

4.13 The recombiner should be placed in operation whenever Containment H_2 Concentration exceeds 0.5%.

4.14 The recombiner should not be operated if Containment exceeds either 23 psig or 230°F.

4.15 A copy of the Rockwell International Thermal Hydrogen Recombiner System Technical Manual should be kept at the H_2 Recombiner whenever it is operating.

4.0 PRECAUTIONS AND LIMITATIONS (Continued)

4.16 A preventive maintenance inspection should be made upon receipt of the H_2 Recombiner prior to startup to ensure the components are ready for long term operation (e.g. control cabinet components, lubricate motor and fan, etc.).

4.17 The following valves which are required for PACV and H_2 recombiner operation are not equipped with environmentally qualified limit switches:

V12-14	V12-15
V12-18	V12-19
V12-24A	V12-24B
V12-25	

As a result, position indication for these valves may not be available in a post-LOCA environment. Should it be necessary to proceed with this procedure with one or more position indication failures, functional parameters such as CV pressure, H_2 recombiner flow, etc., should be used to verify valve positions. Valves which must be verified closed can be failed to the close position by isolating motive N_2 (except V12-25).

5.0 STARTUP INITIALS

5.1 Placing the Hydrogen Recombiner in Service

5.1.1 Initial Conditions

5.1.1.1 This revision is the latest revision available and has been verified against the Revision Status List.

_____ (Print) _____ _____
Name Signature Date

5.1.1.2 The Post Accident Containment Venting and Hydrogen Recombiner System is aligned per ATTACHMENT 9.1. _____

5.1.1.3 The recombiner power supply cables have been installed. _____

5.1.1.4 The recombiner supply and return lines are connected. _____

5.1.1.5 The recombiner HVAC duct is connected. _____

5.1.1.6 The recombiner "Space Heater ON" light is illuminated. _____

5.1.1.7 On LP-25:
Circuit breaker 28 is CLOSED. _____
Circuit breaker 36 is CLOSED. _____

5.1.1.8 On MCC #1, Breaker 3B is CLOSED. _____

5.1.1.9 Safety Switch mounted on the East wall of the New Fuel Storage is CLOSED (requires key from Shift Foreman). _____

5.1.1.10 Containment pressure is 10 psig or less as indicated on RTGB. _____

5.1.1.11 Containment temperature is 150°F or less as indicated on RTGB. _____

5.1.1.12 A supply of Nitrogen cylinders available for Nitrogen operated valves. _____

5.1.1.13 The Nitrogen System is in service per OP-907. _____

5.1.1.14 The CV Vent Panels Power Supply Lockouts are turned on with an operator standing by (requires key from Shift Foreman). _____

5.0 STARTUP (Continued) INITIALS

NOTE

The Containment H_2 Concentration can be determined by chemical analysis of samples collected per Section 8.0 if the Containment Hydrogen Monitor is inoperable.

5.1.1.15 The Containment Hydrogen Concentration is greater than 3.5% as determined by the Containment Hydrogen Monitor located on the CV Monitor in the Control Room or from analysis of Containment samples collected per Section 8.0.

H_2 Concentration _____% (From Samples)

H_2 Concentration _____% (H_2 Monitor) Greater than 3.5% _____

NOTE

If Hydrogen Concentration is in excess of 4%, it will be necessary to dilute the flow to the recombiner with Nitrogen.

5.1.1.16 Calculate the approximate Nitrogen dilution required using the following formulas:

$$SCFM - \frac{SCFM \times 0.04}{\% H_2} = N_2 \text{ flow rate @ STP}$$

Where: 1. SCFM is the flow rate at the inlet nozzle as calculated below:

$$SCFM = 177.4 \left(\frac{P_{in} \times M_4}{T_t} \right)^{1/2}$$

P_{in} is absolute pressure at the flow meter throat in psia (determined from installed instrumentation)

M_4 is read from FI-1 in inches

T_t is flow meter throat temperature

2. % H_2 is the decimal equivalent of percent H_2

3. N_2 flow rate @ STP is in SCFM

N_2 dilution flow required = _____SCFM @ STP

5.0 STARTUP (Continued) INITIALS

5.1.2 Instructions for Placing the Hydrogen Recombiner in Service

5.1.2.1 Verify that all controls, settings, and valves are as follows:

Temperature Controls

NOTE

TIC-4 is a controller, TISH-3 and TISH-6 are for indication only. The temperature setpoint for TIC-4 is dialed in under the controller. Temperature indication for TISH-3 and TISH-6 are read out on the meter at ±50°F from the dial setting. To determine actual temperature, the variance (between ±50°F) is added/subtracted from the dial setting.

TIC-4 (Reaction Chamber Gas Temperature) Set at 1350°F. _____
TISH-3 (Heater Outlet Gas Temperature) Set at 1400°F. _____
TISH-6 (Gas Return Wall Temperature) Set at 300°F. _____

Circuit Breakers

NOTE

Located in bottom cabinet.

CB1 (Enclosed Blower/Motor) CLOSED _____
CB2 (Heat Exchanger Fan Motor) CLOSED _____
CB3 (Heaters) CLOSED _____
CB4 (Instrument Control Power) CLOSED _____
CB5 (Primary Power) CLOSED _____
Have I&C disable PS-1721 by jumpering across Terminals 27 and 28 in PACV Panel "A". _____
Have I&C disable PS-1743 by jumpering across Terminals 14 and 15 in PACV Panel "B". _____

5.0 STARTUP (Continued) INITIALS

Start Switch

NOTE

HS-1 is a momentary switch and will return to center after operation.

HS-1 (Start-Stop Switch) STOP _____

Timer

KS-1 (Low Temperature Start Cutoff) Set at 120 minutes _____

Motor Starter

NOTE

Located in bottom cabinet.

JS-1 (Enclosed Blower/Motor) AUTO _____

JS-2 (Heat Exchanger Fan Motor) AUTO _____

5.1.2.2 Place the Bottled Nitrogen in service by opening the isolation valve from one of the cylinders and OPEN PAV-39 and verify N_2 pressure regulator set at 65 psig as observed on PI-775B.

Cylinder OPEN _____

PAV-39 OPEN _____

Regulator at 65 psig _____

NOTE

With PS-1721 disabled, cycle V12-14 first to relieve any pressure within the interspace.

NOTE

With PS-1721 disabled, the 2 psig pressure interlock with V12-10 and V12-11 is also disabled. Therefore these valves should not be cycled while the jumpered is installed.

5.0 STARTUP (Continued) INITIALS

NOTE

With PS-1743 disabled, cycle V12-18 first to relieve any pressure within interspace.

5.1.2.3 Perform the following:

1. UNLOCK and OPEN PAV-31, V12-14 N_2 Isolation. OPEN _____
2. UNLOCK and OPEN PAV-32, V12-14 N_2 Isolation. OPEN _____
3. OPEN V12-14, Containment Air Exhaust "A". OPEN _____
4. OPEN V12-15, PACV "A" Inlet Isolation. OPEN _____
5. OPEN V12-61, Containment Gas Supply to H_2 Recombiner. OPEN _____
6. OPEN V12-63, Containment Gas Return from H_2 Recombiner. OPEN _____
7. UNLOCK and OPEN PAV-33, V12-18 N_2 Isolation. OPEN _____
8. UNLOCK and OPEN PAV-34, V12-18 N_2 Isolation. OPEN _____
9. OPEN V12-18, Containment Air Exhaust "B". OPEN _____
10. OPEN V12-19, PACV "B" Inlet Isolation. OPEN _____

NOTE

The Recombiner Heater will be energized, the Containment Gas Blower will start, and the Heat Exchanger Fan will start when HS-1 is placed to START. Containment gas will begin circulating from Containment through the Recombiner and returned to Containment.

5.1.2.4 Place Keylock switch, HS-1, to START (requires key from Shift Foreman). _____

NOTE

Startup time requires approximately one and one half hours. After the temperature of the gas in the reaction chamber reaches 1350°F, the recombiner system operates automatically, with the heater power gradually changing to maintain the same preset reaction chamber temperature.

5.0 STARTUP (Continued) INITIALS

5.1.2.5 Verify Recombiner Flow rate is at least 5.0 Inches H_2O. _____

NOTE

Nitrogen dilution should be cut in when TIC-4 reaches 900°F. Hydrogen recombination begins at 1100°F, and by placing Nitrogen dilution in service at 900°F Hydrogen combustion is prevented when temperature reaches 1100°F.

5.1.2.6 Monitor Recombiner heat-up at TIC-4 and when 900°F is reached perform the following, IF Nitrogen dilution is required. _____

1. THROTTLE OPEN NS-26, Nitrogen Supply Valve, until FI-1077 reads required Nitrogen dilution flow as calculated in Initial Condition 5.1.1.16. _____

5.1.2.7 Monitor Recombiner heat-up at TIC-4 until the temperature reaches 1350°F and stabilizes. _____

NOTE

When temperature indication stabilizes, the Hydrogen concentration of the Recombiner influent should be observed periodically to determine the need for Nitrogen dilution. Quicker and more efficient recombination will occur if Nitrogen is periodically reduced in proportion to Hydrogen concentration reduction over the length of time the H_2 Recombiner is operating.

5.1.2.8 Periodically observe and record temperatures and flow rate indications, and calculate influent Hydrogen content on ATTACHMENT 9.2. _____

5.0 STARTUP (Continued) INITIALS

5.1.2.9 Adjust NS-26 as necessary to maintain the required Nitrogen dilution flow rate. _____

	Initials	Name (Print)	Date
Performed By:	_____	_____	_____
	_____	_____	_____
	_____	_____	_____

Approved By: _____ _____
Unit 2 - Shift Foreman Date

5.0 STARTUP (Continued) INITIALS

5.2 Placing the PACV System in Service

5.2.1 Initial Conditions

5.2.1.1 This revision is the latest revision available and has been verified against the Revision Status List.

_____ (Print) _____ _____
Name Signature Date

NOTE

The PACV System should only be used if the H_2 Recombiner System is unavailable for Containment Hydrogen Reduction. The PACV System is used for pressurizing the Containment to a pressure such that venting for one hour per day will maintain Containment Hydrogen Concentration at or below 3%. The Containment should be repressurized as necessary to maintain the calculated exhaust flow.

5.2.1.2 The Post Accident Containment Venting and Hydrogen Recombiner System is aligned per ATTACHMENT 9.1. _____

5.2.1.3 Containment pressure is 3 psig or less as indicated on RTGB. _____

5.2.1.4 At least two Containment Air Circulating Fans are operating. _____

5.2.1.5 A supply of Nitrogen cylinders available for Nitrogen operated valves. _____

5.2.1.6 Obtain keys for the CV Vent Panels from Shift Foreman. _____

5.2.1.7 At least one of the following operable for pressurizing the CV:

1. Station Air System components required to pressurize the CV, which includes Station Air Compressor and piping and valves to the CV. _____

5.0 STARTUP (Continued) INITIALS

2. Instrument Air System components required to pressurize the CV, which includes an Instrument Air Compressor and piping and valves to the CV (an Instrument Air Prefilter and Dryer should be used if available, however, they can be bypassed). _____

NOTE

The Containment H_2 Concentration can be determined by chemical analysis of samples collected per Section 8.0 if the Containment Hydrogen Monitor is inoperable.

5.2.1.8 Determine H_2 generation rate from Curve Book, Curve 7.16, Total Hydrogen Generation Rate From All Sources, and the H_2 Concentration is greater than 3% from Containment Hydrogen Monitor located on CV Monitor in the Control Room or from analysis of Containment samples collected per Section 8.0.

Time Following LOCA _____ Days
H_2 Generation Rate _____ SCFM (Curve 7.16)
H_2 Concentration _____ % (From Samples)
H_2 Concentration _____ % (H_2 Monitor) Greater than 3% _____

5.2.1.9 Estimate the required exhaust flow:

$$Qe = 2400 \frac{G}{C}$$

Where: Qe is exhaust flow in SCFM
G is H_2 generation rate
C is H_2 concentration

Required exhaust = _____ SCFM

5.0 STARTUP (Continued) INITIALS

NOTE

The Containment Air Exhaust line (PACV"B") should be used in preference to the Pressure Relief line (PACV"A").

5.2.1.10 Determine the required Containment pressure from Curve Book, Curve 7.6, System Resistance Curve to obtain required exhaust flow.

Required pressure for PACV"B" = _____ psig (Curve 7.6)

Required pressure for PACV"A" = _____ psig (Curve 7.6) _____

5.2.1.11 Select the vent path to be used and proceed to the applicable section.

PACV "B" _____, proceed to Section 5.2.2

PACV "A" _____, proceed to Section 5.2.3 _____

5.2.2 Instructions for Placing PACV "B" in Service

5.2.2.1 Have I&C diable PS-1743 by jumpering across Terminals 14 and 15 in PACV Panel "B". Jumper Installed _____

5.2.2.2 Place the Bottled Nitrogen in service by opening the isolation valve from one of the cylinders and OPEN PAV-39 and verify N_2 pressure regulator set at 65 psig as observed on PI-775B.

Cylinder OPEN _____

PAV-39 OPEN _____

Regulator at 65 psig _____

NOTE

With PS-1743 disabled, cycle V12-18 first to relieve any pressure within interspace.

5.2.2.3 Turn on the Power Supply Lockout for "B" CV Vent Panel. ON _____

1. UNLOCK and OPEN PAV-33, V12-18 N_2 Isol. OPEN _____
2. UNLOCK and OPEN PAV-34, V12-18 N_2 Isol. OPEN _____
3. OPEN V12-18, Containment H_2 Exhaust "B" Isol. OPEN _____

5.0 STARTUP (Continued) INITIALS

4. OPEN V12-19, H_2 Purge PACV "B" Inlet Isol. OPEN _____

5. Record Containment pressure from PI-772B. _____psig

5.2.2.4 If present Containment pressure (5.2.2.3.5) is equal to or greater than required Containment pressure (5.2.1.10) for PACV "B", proceed to Step 5.2.2.8 and N/A Steps 5.2.2.5, 5.2.2.6, and 5.2.2.7. _____

5.2.2.5 Calculate the time required to raise the Containment pressure to the required pressure (5.2.1.10) as follows:

$$t = \frac{(P_r - P_c)\ (1{,}950{,}000)}{(Q_c)\ 14.7}$$

Where: t is the time in minutes to raise Containment pressure from P_c to P_r.
P_r is the required containment pressure.
P_c is the present containment pressure.
Q_c is the compressor flow rate (nominal value is 200 SCFM for either Instrument Air Compressor and 400 SCFM for the Station Air Compressor).

NOTE

The Station Air Compressor should be used in preference to an Instrument Air Compressor when pressurizing the Containment.

1. Select the Air System to be used:
Station Air _____
Instrument Air _____ _____

NOTE

The calculated time for pressurizing the Containment is not corrected for heating the air after it enters the Containment, therefore, the actual time may be as much as 15% less than calculated.

5.0 STARTUP (Continued) INITIALS

2. Calculated pressurization time (t) is _____ minutes.
3. To pressurize Containment with Station Air System proceed to 5.2.2.6 and N/A 5.2.2.7. _____
4. To pressurize Containment with Instrument Air System proceed to 5.2.2.7 and N/A 5.2.2.6. _____

5.2.2.6 Pressurize Containment as follows:

1. Isolate all Station Air Lines which are not required by closing the appropriate valves. _____
2. Verify the Power Supply Lockout for "B" CV Vent Panel is ON. _____
3. Verify the following valves positions:
   - V12-24B, Station Air Supply CLOSED _____
   - V12-25, Station Air Supply to CV. OPEN _____
4. Isolate Penetration Pressurization System line between SA-43 and SA-44 by closing PP-22A. PP-22A CLOSED _____
5. UNLOCK and OPEN SA-42, Station Air to CV. OPEN _____
6. UNLOCK and OPEN SA-43, Station Air to CV. OPEN _____
7. UNLOCK and OPEN SA-44, Station Air to CV. OPEN _____
8. UNLOCK and OPEN PAV-37, V12-24B N_2 Isol. OPEN _____
9. UNLOCK and OPEN PAV-38, V12-24B N_2 Isol. OPEN _____
10. START Station Air Compressor. STARTED _____
11. OPEN V12-24B, Station Air Supply. OPEN _____
12. Monitor PI-772B until required Containment pressure (5.2.1.10) is reached. PI-772B _____psig

5.0 STARTUP (Continued) INITIALS VERIFIED BY

13. CLOSE V12-24B, Station Air Supply.
CLOSED _____ _____

14. If not needed for service at this time, then STOP the Station Air Compressor.
STOPPED _____

15. CLOSE and LOCK SA-44, Station Air to CV.
LOCKED CLOSED _____ _____

16. CLOSE and LOCK SA-43, Station Air to CV.
LOCKED CLOSED _____ _____

17. CLOSE and LOCK SA-42, Station Air to CV.
LOCKED CLOSED _____ _____

18. CLOSE and LOCK PAV-37, V12-24B N_2 Isol.
LOCKED CLOSED _____ _____

19. CLOSE and LOCK PAV-38, V12-24B N_2 Isol.
LOCKED CLOSED _____ _____

20 OPEN PP-22A, Penetration Pressurization System Isol.
PP-22A OPEN _____ _____

21. Proceed to Step 5.2.2.8. _____

5.2.2.7 Pressurize Containment as follows:

1. Isolate all Instrument Air Lines which are not required by closing the appropriate valves. _____
2. Turn on the Power Supply Lockout for "A" CV Vent Panel.
ON _____
3. Verify the following valves positions:
   - V12-24A, Instrument Air Supply.
CLOSED _____
   - PCV-1716, Instrument Air Isol. to CV.
OPEN _____

5.0 STARTUP (Continued) INITIALS VERIFIED BY

4. UNLOCK and OPEN PAV-35, V12-24A N_2 Isol.
   OPEN _____
5. UNLOCK and OPEN PAV-36, V12-24A N_2 Isol.
   OPEN _____
6. START an Instrument Air Compressor.
   A or B _____
   (Circle One)
7. OPEN V12-24A, Instrument Air Supply.
   OPEN _____
8. Monitor PI-772B until required Containment pressure (5.2.1.10) is reached.
   PI-772B _____psig
9. CLOSE V12-24A, Instrument Air Supply.
   CLOSED _____ _____
10. If not needed for service at this time, then STOP the Instrument Air Compressor started above.
    STOPPED _____
11. CLOSE and LOCK PAV-35, V12-24A N_2 Isol.
    LOCKED CLOSED _____ _____
12. CLOSE and LOCK PAV-36, V12-24A N_2 Isol.
    LOCKED CLOSED _____ _____
13. Turn off the Power Supply Lockout for "A" CV Vent Panel.
    OFF _____

5.0 STARTUP (Continued) INITIALS

5.2.2.8 Vent Containment as follows:

NOTE

This section describes the procedure for venting of the CV to maintain Hydrogen concentration at or below 3% with a minimum venting time of one hour per day. It is desirable to delay venting as long as possible to allow airborne radioactivity to decay. Note from Curve 7.17, that pressurizing the Containment reduces the Hydrogen concentration allowing a 28 day delay before venting is required during the worst case LOCA.

1. H_2 concentration from Hydrogen Monitor located on the CV Monitor in the Control Room. _____% H_2
2. Verify the following valve positions:
   - V12-18, Containment H_2 Exhaust "B" Isol. OPEN _____
   - V12-19, H_2 Purge PACV "B" Inlet Isol. OPEN _____
3. Record "B" CV Vent Panel CV Exh. Flow Integrator reading. _____SCF
4. Calculate the Integrator reading for one hour of venting time as follows:

   SCF = SCFM x 60 minutes

   Where: SCFM is the required exhaust flow from 5.2.1.9

   SCF is the Integrator reading after 1 hour.

   Calculated Int. reading = _____SCF
5. Reset Integrator to zero. _____
6. OPEN V12-20, H_2 Purge PCV "B" Inlet Isol. OPEN _____

5.0 STARTUP (Continued) INITIALS

****

CAUTION

WHEN V12-21, H_2 PURGE PCV "B" OUTLET ISOL., IS OPENED, THE CONTAINMENT WILL BEGIN VENTING TO ATMOSPHERE. WHEN VENTING BEGINS, THE PLANT VENT RADIATION MONITOR MUST BE CHECKED TO PREVENT EXCEEDING RELEASE LIMITS.

****

7. To commence venting, OPEN V12-21 to a position that does not exceed the Plant Vent Radiation Monitor release limits, OR until the required exhaust flow is attained, whichever is more restrictive, and record the flow rate. _____CFM
8. Verify TI-774B indicating less than 155°F. _____
9. Monitor the Plant Vent Radiation Monitor and FI-770B during venting to ensure limits are not exceeded. _____
10. Regulate the exhaust flow rate during venting with Valve V12-21. _____
11. When the Integrator reaches total SCF as calculated above, CLOSE V12-19. _____
12. Verify FI-770B indicates zero flow. _____
13. Record the Integrator reading. _____SCF
14. When venting is complete, refer to Section 7.2 for Shutdown. _____

	Initials	Name (Print)	Date
Performed By:	_____	_____	_____
	_____	_____	_____
	_____	_____	_____
Approved By:	_____	Unit 2 - Shift Foreman	_____ Date

5.0 STARTUP (Continued) INITIALS

5.2.3 Instruction for Placing PACV "A" in Service

5.2.3.1 Have I&C disable PS-1721 by jumpering across Terminals 27 and 28 in PACV Panel "A". Jumper Installed _____

5.2.3.2 Place the Bottled Nitrogen in service by opening the isolation valve from one of the cylinders and OPEN PAV-39 and verify N_2 pressure regulator set at 65 psig as observed on PI-775B.

Cylinder OPEN _____
PAV-39 OPEN _____
Regulator at 65 psig _____

NOTE

With PS-1721 disabled, cycle V12-14 first to relieve any pressure within the interspace.

NOTE

With PS-1721 disabled, the 2 psig pressure interlock with V12-10 and V12-11 is also disabled. Therefore these valves should not be cycled while the jumpered is installed.

5.2.3.3 Verify V12-10, Containment Pressure Relief Valve is CLOSED.
CLOSED _____

5.2.3.4 Turn on the Power Supply Lockout for "A" CV Vent Panel. ON _____

1. UNLOCK and OPEN PAV-31, V12-14 N_2 Isol. OPEN _____
2. UNLOCK and OPEN PAV-32, V12-14 N_2 Isol. OPEN _____
3. ~~OPEN~~ V12-14, Containment Air Exhaust "A". OPEN _____
4. OPEN V12-15, PACV "A" Inlet Isol. OPEN _____
5. Record Containment pressure from PI-772A. _____psig

5.2.3.5 If present Containment pressure (5.2.3.4.5) is equal to or greater than required Containment pressure (5.2.1.10) for PACV "A", proceed to Step 5.2.3.9 and N/A Steps 5.2.3.6, 5.2.3.7, and 5.2.3.8. _____

5.0 STARTUP (Continued) INITIALS

5.2.3.6 Calculate the time required to raise the Containment pressure to the required pressure (5.2.1.10) as follows:

$$t = \frac{(P_r - P_c)\ (1{,}950{,}000)}{(Q_c)\ 14.7}$$

Where: t is the time in minutes to raise Containment pressure from P_c to P_r.

P_r is the required containment pressure.

P_c is the present containment pressure.

Q_c is the compressor flow rate (nominal value is 200 SCFM for either Instrument Air Compressor and 400 SCFM for the Station Air Compressor).

NOTE

The Station Air Compressor should be used in preference to an Instrument Air Compressor when pressurizing the Containment.

1. Select the Air System to be used:
   Station Air _____
   Instrument Air _____ _____

NOTE

The calculated time for pressurizing the Containment is not corrected for heating the air after it enters the Containment, therefore, the actual time may be as much as 15% less than calculated.

2. Calculated pressurization time (t) is _____ minutes.
3. To pressurize Containment with Station Air System proceed to 5.2.3.7 and N/A 5.2.3.8. _____
4. To pressurize Containment with Instrument Air System proceed to 5.2.3.8 and N/A 5.2.3.7. _____

5.0 STARTUP (Continued) INITIALS VERIFIED BY

5.2.3.7 Pressurize Containment as follows:

1. Isolate all Station Air Lines which are not required by closing the appropriate valves. _____
2. Turn on the Power Supply Lockout for "B" CV Vent Panel. ON _____
3. Verify the following valves positions:
   - V12-24B, Station Air Supply CLOSED _____
   - V12-25, Station Air Supply to CV. OPEN _____
4. Isolate Penetration Pressurization System line between SA-43 and SA-44 by closing PP-22A. PP-22A CLOSED _____
5. UNLOCK and OPEN SA-42, Station Air to CV. OPEN _____
6. UNLOCK and OPEN SA-43, Station Air to CV. OPEN _____
7. UNLOCK and OPEN SA-44, Station Air to CV. OPEN _____
8. UNLOCK and OPEN PAV-37, V12-24B N_2 Isol. OPEN _____
9. UNLOCK and OPEN PAV-38, V12-24B N_2 Isol. OPEN _____
10. START Station Air Compressor. STARTED _____
11. OPEN V12-24B, Station Air Supply. OPEN _____
12. Monitor PI-772A until required Containment pressure (5.2.1.10) is reached. PI-772A _____psig
13. CLOSE V12-24B, Station Air Supply. CLOSED _____ _____
14. If not needed for service at this time, then STOP the Station Air Compressor. STOPPED _____

5.0 STARTUP (Continued) INITIALS VERIFIED BY

15. CLOSE and LOCK SA-44, Station Air to CV.
LOCKED CLOSED _____ _____

16. CLOSE and LOCK SA-43, Station Air to CV.
LOCKED CLOSED _____ _____

17. CLOSE and LOCK SA-42, Station Air to CV.
LOCKED CLOSED _____ _____

18. CLOSE and LOCK PAV-37, V12-24B N_2 Isol.
LOCKED CLOSED _____ _____

19. CLOSE and LOCK PAV-38, V12-24B N_2 Isol.
LOCKED CLOSED _____ _____

20 OPEN PP-22A, Penetration Pressurization System Isol. PP-22A OPEN _____ _____

21. Turn off the Power Supply Lockout for "B" CV Vent Panel. OFF _____

22. Proceed to Step 5.2.3.9. _____

5.2.3.8 Pressurize Containment as follows:

1. Isolate all Instrument Air Lines which are not required by closing the appropriate valves. _____

2. Verify the Power Supply Lockout for "A" CV Vent Panel is ON. _____

3. Verify the following valves positions:
   - V12-24A, Instrument Air Supply.
     CLOSED _____
   - PCV-1716, Instrument Air Isol. to CV.
     OPEN _____

4. UNLOCK and OPEN PAV-35, V12-24A N_2 Isol.
OPEN _____

5. UNLOCK and OPEN PAV-36, V12-24A N_2 Isol.
OPEN _____

5.0 STARTUP (Continued) INITIALS VERIFIED BY

6. START an Instrument Air Compressor.
   A or B _____
   (Circle One)
7. OPEN V12-24A, Instrument Air Supply.
   OPEN _____
8. Monitor PI-772A until required Containment pressure (5.2.1.10) is reached.
   PI-772A _____psig
9. CLOSE V12-24A, Instrument Air Supply.
   CLOSED _____ _____
10. If not needed for service at this time, then STOP the Instrument Air Compressor started above.
    STOPPED _____
11. CLOSE and LOCK PAV-35, V12-24A N_2 Isol.
    LOCKED CLOSED _____ _____
12. CLOSE and LOCK PAV-36, V12-24A N_2 Isol.
    LOCKED CLOSED _____ _____

5.2.3.9 Vent Containment as follows:

NOTE

This section describes the procedure for venting of the CV to maintain Hydrogen concentration at or below 3% with a minimum venting time of one hour per day. It is desirable to delay venting as long as possible to allow airborne radioactivity to decay. Note from Curve 7.17, that pressurizing the Containment reduces the Hydrogen concentration allowing a 28 day delay before venting is required during the worst case LOCA.

1. H_2 concentration from Hydrogen Monitor located on the CV Monitor in the Control Room. _____% H_2

5.0 STARTUP (Continued) INITIALS

2. Verify the following valve positions:
   - V12-14, Containment Air Exhaust "A". OPEN _____
   - V12-15, PACV "A" Inlet Isol. OPEN _____
   - V12-10, Containment Pressure Relief Valve. CLOSED _____
3. Record "A" CV Vent Panel CV Exh. Flow Integrator reading. _____SCF
4. Calculate the Integrator reading for one hour of venting time as follows:

   SCF = SCFM x 60 minutes

   Where: SCFM is the required exhaust flow from 5.2.1.9

   SCF is the Integrator reading after 1 hour.

   Calculated Int. reading = _____SCF
5. Reset Integrator to zero. _____
6. OPEN V12-16, H_2 Purge PCV "A" Inlet Isol. OPEN _____

****

CAUTION

WHEN V12-17, H_2 PURGE PCV "A" OUTLET ISOL., IS OPENED, THE CONTAINMENT WILL BEGIN VENTING TO ATMOSPHERE. WHEN VENTING BEGINS, THE PLANT VENT RADIATION MONITOR MUST BE CHECKED TO PREVENT EXCEEDING RELEASE LIMITS.

****

7. To commence venting, OPEN V12-17 to a position that does not exceed the Plant Vent Radiation Monitor release limits, OR until the required exhaust flow is attained, whichever is more restrictive, and record the flow rate. _____CFM
8. Verify TI-774A indicating less than 155°F. _____

5.0 STARTUP (Continued) INITIALS

9. Monitor the Plant Vent Radiation Monitor and FI-770A during venting to ensure limits are not exceeded. _____
10. Regulate the exhaust flow rate during venting with Valve V12-17. _____
11. When the Integrator reaches total SCF as calculated in Step 4, CLOSE V12-15. _____
12. Verify FI-770A indicates zero flow. _____
13. Record the Integrator reading. _____SCF
14. When venting is complete, refer to Section 7.2 for Shutdown. _____

	Initials	Name (Print)	Date
Performed By:	_____	_____	_____
	_____	_____	_____
	_____	_____	_____

Approved By: _____
Unit 2 - Shift Foreman Date

6.0 NORMAL OPERATION

None Applicable

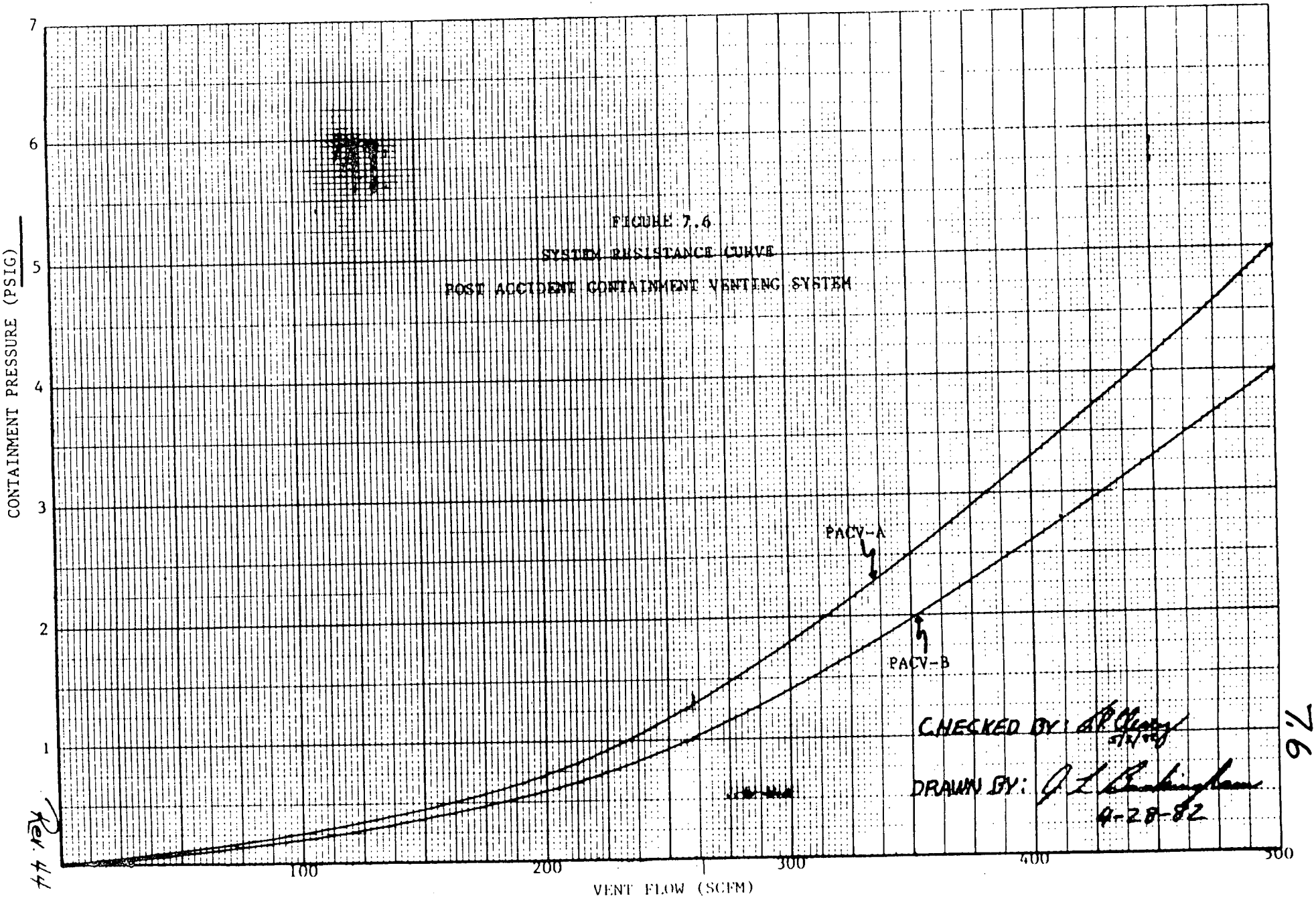
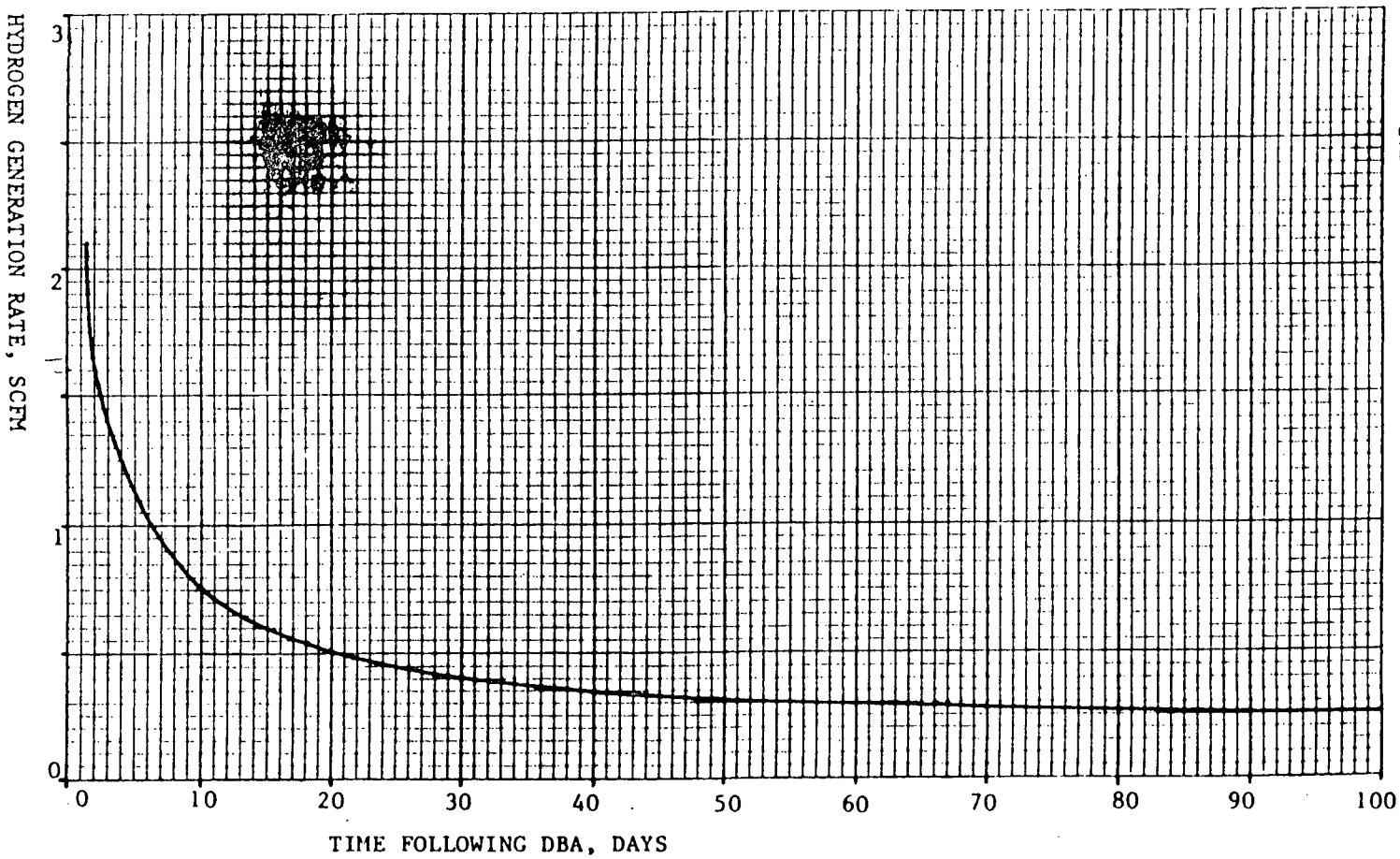


FIGURE 7.6
SYSTEM RESISTANCE CURVE
POST ACCIDENT CONTAINMENT VENTING SYSTEM
CONTAINMENT PRESSURE (PSIG)
VENT FLOW (SCFM)
PACV-A
PACV-B
7
6
5
4
3
2
1
100
200
300
400
500
CHECKED BY: A P Cleary 5/12/82
DRAWN BY: C L Cunningham 4-28-82

Curve 7.16



Drawn By: James M. Wilson 10-19-84

Checked By: Gary M. Shaw 10/19/84

830 Day Full Power TID Core
DBA Conditions
Hydrogen Sources:

- Zirconium-Water Reaction
- Aluminum Corrosion
- Core Solution Radiolysis
- Sump Solution Radiolysis

CURVE 7.16 TOTAL HYDROGEN GENERATION RATE FROM ALL SOURCES.

Curve 7.16

9.0 ATTACHMENTS

9.1 Post Accident Containment Venting and Hydrogen Recombiner Checklist

9.2 Post LOCA Hydrogen Recombination Record

POST ACCIDENT CONTAINMENT VENTING AND HYDROGEN RECOMBINER CHECKLIST

This revision is the latest revision available and has been verified against the Revision Status List.

_____ (Print) _____ _____
Name Signature Date

Date Completed: _____

	Initials	Name (Print)	Date
Performed By:	_____	_____	_____
	_____	_____	_____
	_____	_____	_____

Approved By: _____ _____
Unit 2 - Shift Foreman Date

VALVE NUMBER	VALVE DESCRIPTION	REQUIRED POSITION	INITIALS	TAG ATTACHED	VERIFIED BY
V12-14	Containment H_2 Exhaust "A" (inside CV)	CLOSED			
V12-24A	Instrument Air Supply (inside CV)	CLOSED			
V12-24B	Station Air Supply (inside CV)	CLOSED			
V12-18	Containment H_2 Exhaust "B" (inside CV)	CLOSED			
V12-15	H_2 Purge PCV "A" Inlet Isolation	CLOSED			
V12-19	H_2 Purge PCV "B" Inlet Isolation	CLOSED			
V12-22A	H_2 Purge Condensate Drain	CLOSED			
V12-22B	H_2 Purge Condensate Drain	CLOSED			
V12-23A	H_2 Purge PI-772A Isolation	OPEN			N/A
	H_2 Purge PI-772A Vent	CLOSED			

POST ACCIDENT CONTAINMENT VENTING AND HYDROGEN RECOMBINER CHECKLIST

VALVE NUMBER	VALVE DESCRIPTION	REQUIRED POSITION	INITIALS	TAG ATTACHED	VERIFIED BY
V12-16	H_2 Purge PCV "A" Inlet Isolation	CLOSED			
PCV-773A	H_2 Purge Pressure Control Valve	OPERABLE			
V12-31A	PCV-773A Pressure Sensing Isolation	OPEN			N/A
V12-17	H_2 Purge PCV "A" Outlet Isolation	CLOSED			
V12-27	FT-770A Isolation	CLOSED			
V12-28	FT-770A Isolation	CLOSED			
V12-23B	H_2 Purge PI-772B Isolation	OPEN			N/A
	H_2 Purge PI-772B Vent	CLOSED			
V12-20	H_2 Purge PCV "B" Inlet Isolation	CLOSED			
PCV-773B	H_2 Purge Pressure Control Valve	OPERABLE			
V12-31B	PCV-773B Pressure Sensing Isolation	OPEN			N/A
V12-21	H_2 Purge PCV "B" Outlet Isolation	CLOSED			
V12-29	FT-770B Isolation	CLOSED			
V12-30	FT-770B Isolation	CLOSED			
V12-25	Station Air to Containment (outside CV)	OPEN			
V12-33	PI-771 Pressure Sensing Line Drain	CLOSED CAP INSTALLED			
V12-32	PI-771 Isolation	CLOSED			
	PI-771 Vent	CLOSED			

POST ACCIDENT CONTAINMENT VENTING AND HYDROGEN RECOMBINER CHECKLIST

VALVE NUMBER	VALVE DESCRIPTION	REQUIRED POSITION	INITIALS	TAG ATTACHED	VERIFIED BY
V12-43	PI-771 Pressure Sensing Line Drain	CLOSED CAP INSTALLED			
PAV-31	V12-14 N_2 Isolation	LOCKED CLOSED			
PAV-31A	Vent	CLOSED			
PAV-32	V12-14 N_2 Isolation	LOCKED CLOSED			
PAV-33	V12-18 N_2 Isolation	LOCKED CLOSED			
PAV-33A	Vent	CLOSED			
PAV-34	V12-18 N_2 Isolation	LOCKED CLOSED			
PAV-35	V12-24A N_2 Isolation	LOCKED CLOSED			
PAV-35A	Vent	CLOSED			
PAV-36	V12-24A N_2 Isolation	LOCKED CLOSED			
PAV-37	V12-24B N_2 Isolation	LOCKED CLOSED			
PAV-37A	Vent	CLOSED			
PAV-38	V12-24B N_2 Isolation	LOCKED CLOSED			
PRV-776A	N_2 Bottle Regulator	OPERABLE			
PAV-39	N_2 Bottle Isolation	CLOSED			
PAV-40	PI-775A Isolation	OPEN			N/A
	PI-775A Vent	CLOSED			
PRV-776B	N_2 Regulator	OPERABLE			
PAV-42	PI-775B Isolation	OPEN			N/A
	PI-775B Vent	CLOSED			
	Filter Unit "B" Inlet Damper (BIT Room)	OPEN			
	Filter Unit "B" Outlet Damper (BIT) Room	OPEN			

POST ACCIDENT CONTAINMENT VENTING AND HYDROGEN RECOMBINER CHECKLIST

VALVE NUMBER	VALVE DESCRIPTION	REQUIRED POSITION	INITIALS	TAG ATTACHED	VERIFIED BY
V12-61	Containment Gas Supply to H_2 Recombiner	CLOSED			
V12-63	Containment Gas Return From H_2 Recombiner	CLOSED			
V12-65	Containment Gas Supply to H_2 Recombiner Drain (Demineralizer Room)	CLOSED CAP INSTALLED			
V12-66	Containment Gas Return from H_2 Recombiner Drain (Pipe Alley)	CLOSED CAP INSTALLED			
VCT-13	CV Test Pressure Source Isolation	LOCKED CLOSED			
VCT-15	Highpoint Containment Isolation	OPEN			
VCT-16	Midpoint Containment Isolation	OPEN			
VCT-17	Lowpoint Containment Isolation	OPEN			
VCT-18	Highpoint CV Sample Line Isolation	CLOSED			
VCT-19	Midpoint CV Sample Line Isolation	CLOSED			
VCT-20	Lowpoint CV Sample Line Isolation	CLOSED			
VCT-21	Midpoint CV Pressure Sensing Line Drain	CLOSED CAP INSTALLED			
VCT-22	Highpoint CV Pressure Sensing Line Drain	CLOSED CAP INSTALLED			
VCT-23	Lowpoint CV Pressure Sensing Line Drain	CLOSED CAP INSTALLED			
VCT-24	Highpoint CV PT-950A Isolation	OPEN			

POST ACCIDENT CONTAINMENT VENTING AND HYDROGEN RECOMBINER CHECKLIST

VALVE NUMBER	VALVE DESCRIPTION	REQUIRED POSITION	INITIALS	TAG ATTACHED	VERIFIED BY
VCT-25	Highpoint CV PT-950B Isolation	OPEN			
VCT-26	Highpoint CV PT-951 Isolation	OPEN			
VCT-27	Midpoint CV PT-952 Isolation	OPEN			
VCT-28	Midpoint CV PT-953 Isolation	OPEN			
VCT-29	Lowpoint CV PT-954 Isolation	OPEN			
VCT-30	Lowpoint CV PT-955 Isolation	OPEN			
VCT-31	Highpoint CV PT-956 Isolation	OPEN			
		CAP INSTALLED			
	PT-956 Instrument Isolation	OPEN			
VCT-32	Midpoint CV PT-957 Isolation	OPEN			
		CAP INSTALLED			
	PT-957 Instrument Isolation	OPEN			
VCT-33	Pressure Source Connection Line Drain	CLOSED			
		CAP INSTALLED			
PAS-1	Highpoint Suction Isolation	CLOSED			
PAS-2	Highpoint Return Isolation	CLOSED			
PAS-3	Midpoint Suction Isolation	CLOSED			

POST ACCIDENT CONTAINMENT VENTING AND HYDROGEN RECOMBINER CHECKLIST

VALVE NUMBER	VALVE DESCRIPTION	REQUIRED POSITION	INITIALS	TAG ATTACHED	VERIFIED BY
PAS-4	Midpoint Return Isolation	CLOSED			
PAS-5	Lowpoint Suction Isolation	CLOSED			
PAS-6	Lowpoint Return Isolation	CLOSED			
PAS-7	N_2 Inlet to PAS Condensate Trap	CLOSED			
PAS-8	PI-963 Isolation	OPEN			N/A
PAS-9	Condensate Trap Drain	CLOSED CAP INSTALLED			
PAS-10	Sample Bomb A - Line Inlet	OPEN			N/A
PAS-11	Sample Bomb A - Inlet Isolation	OPEN			N/A
PAS-12	Sample Bomb A - Outlet Isolation	OPEN			N/A
PAS-13	Sample Bomb A - Line Outlet	OPEN			N/A
PAS-14	Sample Bomb B - Line Inlet	CLOSED			
PAS-15	Sample Bomb B - Inlet Isolation	CLOSED			
PAS-16	Sample Bomb B - Outlet Isolation	CLOSED			
PAS-17	Sample Bomb B - Line Outlet	CLOSED			
PAS-18	CV PAS System Vacuum Pump Suction	CLOSED			
PAS-19	Gas Analyzer Sample to CV PAS System	CLOSED			

Date/Time _____

POST-LOCA HYDROGEN RECOMBINATION RECORD

Date and time of LOCA: _____

Date and time of recording: _____

Estimated hydrogen concentration from previous observation _____% H_2

H_2 Recombiner Annunciator panel dark? _____

OBSERVED VALUE OR SET POINT	NOMINAL VALUE	CONTROL INDICATOR
TISH-3	_____	1400°F
TIC-4	_____	1350°F
TISH-6	_____	300°F
CB1 thru CB5	_____	Closed
HS-1	_____	Start
KS-1	_____	2 Hours
JS-1	_____	Auto
JS-2	_____	Auto
FI-1	_____	5 in H_2O

Containment H_2 Concentration _____%H_2

Containment Temperature _____°F

Containment Pressure _____psia

Containment Spray On _____yes _____no

Calculated approximation of hydrogen content of influent; _____%H_2

$$\frac{\text{Temp (TIC-4)} - \text{Temp (TISH-3)}}{120} = \%\ H_2$$

Adjust Nitrogen dilution flow as necessary.

Performed By: _____