U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 50-255/OL-89-01

Docket No. 50-255 License No. DPR-20

Licensee: Consumers Power Company
1945 West Parnall Road
Jackson, MI 49201

Facility Name: Palisades

Examination Administered At: Midland Training Center/Palisades

Examination Conducted: Requalification examinations for four Reactor Operators and four Senior Reactor Operators

Chief Examiner: G C Wright /for 5/5/89
J. Lennartz Date

Approved By: G C Wright /for 5/5/89
Thomas M. Burdick, Chief Date
Operating Licensing Section 2

Examination Summary

Examination administered on April 17 through April 21, 1989 (Report No. 50-255/OL-89-01)).
Areas Inspected: Written and operating requalification examinations were administered to four Reactor Operators and four Senior Reactor Operators. Crew performance as well as individual operator performance were evaluated on the dynamic simulator portion of the operating examination.
Results: All eight operators passed the written and operating examinations. In addition, both crews received satisfactory evaluations for their performance on the dynamic simulator portion of the operating examination. The requalification program evaluation criteria contained in NUREG-1021 "Operator Licensing Examiner Standards," ES-601, "Administration of NRC Requalification Program Evaluations," Section C.3.b states that a program evaluation should normally be based on a minimum sample size of at least twelve licensed operators. Therefore, an evaluation of the licensees requalification program will be deferred until inclusion of the next annual requalification examination.

REPORT DETAILS

1. Examiners

*J. Lennartz, NRC
T. Meadows, NRC
P. Isaksen, INWL
F. Jaggar, INEL
I. Kingsley, Sonalysts
*Chief Examiner

2. Examination Development

a. Written Examination

The examination team, which consisted of NRC examiners and facility representatives, was able to develop all phases of the examination entirely from the facilities generated material. However, several wording changes were required of the written examination questions in order to develop an objective and comprehensive type examination which met the requirements of ES-601. In addition, the NRC identified some material that was developed for the operating examination which failed to fully meet the requirements of ES-601. The identified material deficiencies were brought to the attention of the facility representatives on the examination team so that appropriate revisions could be made to the material prior to future examination.

The following are a few examples of the material deficiencies concerning the questions developed for the written examination (Part A and Part B):

- Multiple choice questions contained non-discriminate distractors (i.e., "all of the above;" "a and b above").

- Questions were not limited to one topic (i.e., "explain" or "justify") resulting in open ended questions. This type of question makes it difficult to ensure that there is only one correct answer resulting in inconsistent grading.

- Multi-part questions required the operator to correctly answer first part of the question in order to correctly answer subsequent parts resulting in double jeopardy type questions.

The facility should conduct a complete review of the written examination questions to identify additional questions which contain the identified deficiencies and revise them as necessary to meet the requirements of ES-601 prior to future examinations. This would

result in material that could be used, as written, to develop an objective yet comprehensive type examination which would ensure consistent parallel grading between the facility and the NRC.

b. Dynamic Simulator Scenarios

The following are a few of the observations that were made by the NRC concerning the dynamic simulator scenarios that were developed for use during requalification examinations:

- Scenarios were well developed in that they required the operators to perform some normal evolution (i.e., power increase; heat balance; surveillance) at the beginning of the scenario.

- The facility identified all knowledge and abilities (K/A), contained in NUREG-1122, "Knowledge and Abilities Catalog for Nuclear Power Plants: Pressurized Water Reactors," with an importance rating of greater than or equal to 3.5 as an individual simulator critical task (ISCT). The NRC examiners pointed out that all K/As rated at 3.5 or greater are not necessarily ISCTs. ISCT as defined in ES-601 Section D.1.c(2)(b)1 are "steps to be taken by an individual . . . . that could challenge the safety status of the facility if not performed properly," (i.e., ability to effectively manipulate controls; ability to actuate a reactor trip; prevent violation of technical specifications). In addition, ES-601, Attachment 4 "Facility Generated Reference Material Evaluation," requires that ISCT are compared with the facility job task analysis (JTA) or K/A catalog to insure it has an importance factor of at least 3.0. The facility should review their identified ISCT's and compare them with all the criteria for ISCT's as contained in ES-601.

- Generic actions/steps that are contained in different scenarios were not worded consistently (i.e., "PCS heat removal being met" verification in scenarios 3, 13, and 16 was worded differently in all three scenarios). In order to provide fair and consistent evaluations, the NRC recommends that the facility wording for generic steps/actions be the same.

c. Job Performance Measures

The following are specific examples of the identified deficiencies relating to the job performance measures (JPMs):

- ES-601, Attachment 12, "Job Performance Measure Quality Checklist," requires that JPMs contain restrictions on the sequence of steps. The NRC review identified that the JPMs did not contain step sequencing restrictions. The facility took

prompt corrective action and incorporated this requirement prior to examination administration. However, further review of the step sequencing restriction is required as the NRC identified deficiencies in a few of the JPMs (JPM # RO-007, SRO-001) that were administered. The facility will review the JPMs for this requirement.

- ES-601, Attachment 12, states that "answers to the questions at the end of the JPM are not found directly in the procedure just used." During the review, the NRC identified a few questions in which the answer could be looked up in the procedure used to perform the task. The facility will review the JPM questions and delete/revise any that do not fully meet the requirements of ES-601.

- JPM RO-069, question number two, asks for active signals that input to the reactor regulating units, and gives turbine first stage pressure, T-hot, and T-cold as correct responses. In addition, to the above responses, the Final Safety Analysis Report (FSAR) shows inputs to reactor regulating units from pressurizer pressure and nuclear instrumentation which disagrees with the stated answer in the JPM. The answer as written in the JPM was determined to be technically correct by the facility. The fact that the FSAR is a controlled document and available to the operators to reference, the facility should ensure that the information in the FSAR is accurate and up to date.

3. Examination Administration

The facility was responsible for examination administration while the NRC observed the process.

The following are a few observations that were made by the NRC concerning examination administration:

- The facility did a good job in maintaining examination security during all phases of the examination.

- The facility did a good job in scheduling of examinations and ensuring that all operators knew where to be and what time to be there for their examination.

- The facility used formal checklists to brief the operators prior to the start of each phase of examination with the exception of Part A (static simulator) of the written. The facility will develop a formal checklist to brief the operators for the written examination, Pt. A.

- The dynamic simulator scenarios events were administered on a rigid timed schedule. This resulted in a few of the identified ISCTs having to be deleted from the evaluations as the operators did not have time to complete the ISCT due to another event starting. The NRC recommends that the facility allow time for operator to complete ISCT actions prior to starting another event. If an excessive number of ISCTs were deleted from the examination, this could lead to an invalid examination in that each operator may not perform the required number of ISCTs.

- Not all of the operators had their own set of Administrative Procedures to use during Part A of the written examination (three sets available for four operators), and there was only one set of piping and instrument drawings (PIDs) available. The NRC recommends that a fourth set of Administrative Procedures and at least one more set of PIDs be made available for use to avoid problems (i.e., examination compromise; operator not being able to complete examination in allotted time due to lack of reference materials) that could develop from operators having to share reference materials.

- The simulator operator and facility evaluators coordinated very well during administration of dynamic JPMs to make simulated indications as real as possible.

- The facility did a good job at shuffling the order that each operator would perform the JPMs to the prevent more than one operator from being in a particular area or needing a particular procedure at any one time. This provided for timely completion of this phase of the examination.

- There were no dedicated tools available, when needed, to perform local action steps as contained in the JPMs. The local start of an Auxiliary Feedwater Pump (AFW) procedure, ONP-25.2, Attachment 3, is referenced in JPM RO-012. Step 9 of JPM RO-012 requires the operator to disconnect an air line at PI-0521 and bleed off pressure. When the operator was asked where he would get a wrench to perform this task, he stated at the Auxiliary Operators Station tool box. There was no wrench in that tool box to perform this task. The facility should provide dedicated tools that would be needed to perform local action steps as contained in their off-normal and emergency procedures to ensure all local actions could be accomplished without delay.

- A note in ONP-20, "Diesel Generator Manual Control," before Step 4.3 references lockout relay 186-107 for Diesel Generator (D/G) 1-1. This relay is labeled in the plant as 168-107. The

facility should ensure that plant labeling matches the procedure to preclude an operator from being confused while performing local procedural action steps.

- While performing JPM RO-007, the operators would have to climb on the D/B auxiliary systems piping in order to adjust the governor controls while executing ONP-20 procedural steps. To ensure operator safety and preclude damage to the D/G the facility should provide a dedicated ladder or a permanently installed platform to accomplish this task.

- ONP-20, Step 4.6.1.e directs the operator to simultaneously perform actions, 1, ("slowly lower speed droop control knob to zero") and 2 ("adjust as necessary speed setting knob") to maintain D/G output frequency between 60 to 62 HZ (900 - 930 rpm) during performance of JPM 20-007. Three out of four operators that performed this particular JPM incorrectly performed this step, in that they interpreted it to mean that it had to be done only after the D/G was being loaded. The intent of the step is to lower speed droop to zero prior to loading and simultaneously adjusting the speed setting as necessary to maintain 60 to 62 HZ (900 - 930 rpm) on the D/G. This resulted in two of the four operators unsatisfactorily performing this JPM in that they failed to lower the speed droop to zero even after the D/G was loaded which would cause the D/G to slow down as it was loaded, lowering bus frequency, which could result in losing safety equipment that is supplied from that bus on underfrequency (i.e., service water cooling to the D/G). The facility should provide more training on this particular ONP step, or reword the step to preclude the operators from incorrectly performing this step in an emergency situation.

4. <u>Evaluation of Facility Evaluators</u>

In addition to evaluating the operators performance, the NRC also evaluated the facility evaluators', ability to conduct consistent and objective examinations using ES-601, Attachment 5 as a guideline. Included in this is the ability of the facility evaluators to provide unbiased evaluations of the facility operators.

The following are some examples of the observations made concerning the facility evaluators:

- During the dynamic simulator, facility evaluators failed to follow operators to back panels to observe operator actions, and generally were to far away from operators to monitor communications and/or to ensure procedural compliance.

- There were some instances where the facility evaluator failed to provide appropriate cues to the operator during administration of the JPMs. The NRC examiners provided the needed cue during these instances to ensure the examination was fair and consistent.

- On several occasions during administration of JPMs, the facility evaluators failed to ask followup questions when operators knowledge was in doubt, or were unable to re-phrase questions presented to the operators if the operator was not sure what the question was asking.

- The facility evaluators were generally good at not giving excessive verbal and non-verbal cues.

- The facility evaluators detection skills (ability to pick up on errors) was generally good.

- A facility evaluator gave a satisfactory appraisal on the performance of a JPM to an operator who stated that he could not do a particular step within the JPM because he did not know how. Further questioning of the operator on performance of the particular step, resulted in the operator again stating "I don't know how to do this, I've already spotted you this step." The facility evaluator told the NRC examiner that he was confident that the operator knew how to do the step, and therefore, was giving him a satisfactory mark on this JPM. The facility evaluator was given an unsatisfactory evaluation on this particular JPM by the NRC examiner. The NRC examiner also gave an unsatisfactory appraisal to the operator on the performance of this JPM.

Even though the facility evaluators were considered overall satisfactory, the above mentioned observations point out the need for some type of formal training on how to conduct examinations to the personnel who will be utilized as evaluators during requalification examinations.

5. Simulator Fidelity

The following is the only observed deficiency concerning simulator fidelity:

- The Boric Acid Storage Tank levels never decreased after several minutes of safety injection flow during scenarios 13 and 16.

6. Examination Evaluations

Coevaluation by the NRC examiners and the facility evaluators of the operators performance on the examination was performed. Coevaluations provided the NRC with the necessary information to assess the individual operators performance as well as the facilities qualification program performance.

The overall evaluations on the operating examinations, which consisted of the dynamic simulator examination and the JPM plant walkdowns, were consistent between the NRC examiners and the facility evaluators for all eight operators. In addition, the overall crew performance evaluation during the dynamic simulator examination was consistent between the NRC examiners and the facility evaluators for both crews.

The following are some specific observations made by the NRC examiners during the operational examinations concerning individual/crew evaluations:

- The methodology used by the operators during execution of the immediate action steps of the emergency operating procedures (EOPs) was very good. The Shift Supervisor (SS) allowed the Control Operators (CO) to fully complete the steps prior to the SS entering the procedure and conducting verification of steps which resulted in all immediate action steps consistently being completed as required.

- Communications between crew members during dynamic simulator events is an area for improvement. There were several instances of "open loop" communications between the crew members. The fact that the operators failed to ensure that the crew member they were addressing heard and understood them resulted in required actions either being delayed or performed twice on a few occasions.

- There was one instance (as mentions in Paragraph 4 of this report) in which the NRC examiner gave an operator an unsatisfactory for performance on a JPM while the facility evaluator gave a satisfactory performance mark.

Parallel grading of the written examination by the NRC and the facility resulted in consistent overall evaluations for all eight operators. The following observation was made by the NRC concerning the written examinations:

- Question #1 on Part B, "Limits and Controls," asked the operators to calculate how many gallons of boric acid was required to be added to the SIRW tank to increase the boron concentration to 1900 ppm. Three out of four ROs failed to calculate the correct amount of boric acid needed. The ability of the ROs to correctly perform this calculation is a generic deficiency.

7. <u>Program Evaluation</u>

NUREG 1021, ES-601, Section C.3.b. states that a program evaluation should normally be based on a minimum sample size of at least 12 licensed operators. For this evaluation only eight licensed operators were

administered the requalification examination, and therefore, an evaluation of the licensees requalification program will be deferred until inclusion of the next annual requalification examination.

8. Examiner Concerns

During administration of the operating examinations, the NRC identified one operational concern which is described below.

- The ability of the operators to recognize that all control rods have/have not fully inserted following a reactor trip is an apparent weakness. During the dynamic simulator scenarios, one rod indicated not fully inserted on both scenarios for each of the two crews. The operators are to verify all rods inserted following a reactor trip as part of their immediate actions, and as a second check, verify rod position while performing safety system status checks. During the scenarios, the operating crews failed to identify that one rod had not fully inserted on three out of four occasions. It is imperative that the operators have the ability to correctly identify any rods that are indicating not fully inserted in order to execute any required mitigating actions. The facility should include additional training in this area into the next cycle of their continuing training program.

9. Exit Meeting

An exit meeting was held on April 21, 1989 between the NRC and facility management to discuss all of the observed requalification program and operator strengths, deficiencies, and concerns, including all examples as contained in this report.

NRC representatives in attendance were:

B. Burgess, Chief, Projects Section 2A
E. Swanson, Senior Resident Inspector
J. Lennartz, Examiner
P. Isaksen, Examiner
F. Jaggar, Examiner

Facility representatives in attendance were:

R. Rice, Operations Manager
R. Fenech, Operations Superintendent
D. Rogers, Training Administrator
D. Peterson, Operations Support Coordination
B. Dusterhoft, Operations Support Coordinator
E. Feury, Instructor Supervisor
L. Schmiederknecht, Simulator Instructor Supervisor

The facility management acknowledged the examiners observations discussed in Section 2-8 of this report.

REQUALIFICATION PROGRM EVALUATION REPORT

Facility: Palisades

Examiners: Lennartz, Meadows, Isaksen, Jaggar, Kingsley

Date of Evaluation: April 17-21, 1989

Areas Evaluated: Written x Oral x Simulator x

Examination Results:

	RO Pass/Fail	SRO Pass/Fail	Total Pass/Fail	Evaluation (S, M, or U)
Written Examination	4/0	4/0	8/0	S
Operating Examination				
Oral	4/0	4/0	8/0	S
Simulator	4/0	4/0	8/0	S
Evaluation of facility written examination grading				S

Overall Program Evaluation

Not Evaluated.

NUREG 1021, ES-601, Section C.3.b states that a program evaluation should normally be based on a minimum sample size of at least 12 licensed operators. Contrary to this, only eight licensed operators were administered the requalification examination, and therefore, an overall program evaluation will be deferred until inclusion of the next annual requalification examinations.

Submitted: J. Lennartz, Examiner

Forwarded: T. Burdick, Section Chief

Approved: G. Wright, Branch Chief

MASTER EXAM + KEY
RO; SECTION A.2

NRC

EXAM SECTION A.2 GENERAL INFORMATION

-- EXAM INFORMATION --

EXAM NO.: SECTION A.2

DATE GENERATED: 04/12/89

TOTAL POINTS: ~~9.00~~ 7.5 (QUESTION 4 DELETED)

RESPONSE TIME (min): 41.0

MC QUESTIONS:	0	POINTS:	0.00
TF QUESTIONS:	0	POINTS:	0.00
ES QUESTIONS:	7	POINTS:	9.00

1) PV:1.5 Q#:1076 RT:5.0 LP:G5 CT:OB

Use plant indications to verify each of the three(3) indicated safety injection throttling criteria are met. (1.5 points, .5 each)

ANSWER :
1. PCS is > 25°F subcooled (.5)
2. PZR level is > 20% and under control (.5)
3. At least 1 S/G is available for removing heat (.5)

ref: EOP 9.0, Success Path IC-2

2) PV:1.0 Q#:1077 RT:4.0 LP:G16 CT:OB

The Shift Supervisor has decided to enter EOP 9.0.

Why is it not necessary to trip all 4 PCPs? Include any applicable setpoints.

ANSWER :
EOP 9.0 does not require tripping of all PCPs unless PZR pressure ≤ 1300 psia.

ref: EOP 9.0, section 4.0

3) PV:1.0 Q#:1078 RT:5.0 LP:G37 CT:OB

What is the minimum main steam line pressure, in PSIA, at which the Turbine Bypass Valve would be full open? Show all work. (.25 for value, .75 for application)

ANSWER :
NOTE:To calculate the answer the attached Simulator data sheet is required!

Turbine Bypass Setpoint(point # 10) = .5 (.25) (.5 %) (Point 10 / 100)

Turbine Bypass Setpoint x 200 = 100 (.25) + 800 psia = 900 (.25)

adding 5 to above calculation = 905 psia (.25)

ref:SH-ASJB, FSAR Fig. 7-60

ALSO ACCEPT (.75): 50% SETPOINT (900 psia)

4) ~~PV:1.5 Q#:1079 RT:4.0 LP:G53 CT:OB~~ DELETED

~~Why is containment spray flow not required to meet EOP 9.0 Containment Atmosphere Acceptance Criteria?~~

~~ANSWER :~~
~~Because 3 Containment Air Coolers are in operation. (1.5) (no partial credit)~~

~~ref: EOP 1.0, section 4.0 and EOP 9.0 , RC-3.~~

5) PV:1.0 Q#:1091 RT:6.0 LP:E6 CT:OB

A PZR Safety Valve is leaking into the Quench Tank. One method used to determine that a PZR Safety Valve is leaking is the Quench Tank level, pressure and temperature alarms and indications.

List two other indications that can be used to determine that a Safety Valve is leaking?

ANSWER :
high PZR teltale temperatures downstream of the safety valves (or alarms) (.5 points)
accustic monitors(or alarms) (.5 points)

reference EOP 4.0

5) PV:1.5 Q#:1081 RT:11.0 LP:E3 CT:OB

A. Why did Safety Injection actuate? (.75 points)

B. Why are the left and right "Safety Injection Actuated" lights on panel C-13 not illuminated? (.75 points)

ANSWER :
A. PCS pressure decreased to less than 1605 psia (also accept for full credit that Safety Injection was manually initiated) (.75 points)

B. PCS pressure is currently above 1605 psia (.75 points)

ref: P&ID E-17 sheet 3 & 4

PV:1.50 Q#:1082 RT:6.0 LP:E-14 CT:OB

Calculate the number of gallons of borated water that are currently in the SIRW tank. Show all work. (.5 points for value, 1.0 points for application)

ANSWER :
NOTE: To calculate the answer the attached Simulator Data Sheet is required.

SIRW tank level (Data sheet # 30) = 94.5 (±.5) (.5)

# of gallons = (2797)(SIRW Tk level 94.5) + 18,646 (.5)

# of gallons = 282,962.5 (± 3000) (.5)

ref: SOP-2A, section 2 and 4

MASTER - SRO EXAM & ANSWER KEY PART B - NRC

PERSONAL AND CONFIDENTIAL
EXAMINATION COVER SHEET

Name _____

Social Security Number _____

Company CPCo

Work Location PALISADES

Department OPERATIONS

Course PLOR

Class No. _____

EIS/NUTREC _____

Exam No 1

Approval _____

- -

Date Administered _____ Administrated by _____

Date Graded _____ Graded by _____

Grade _____

- -

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

_____
Signature

- -

I was given the opportunity to review the correct responses to this examination.

_____
Signature

EXAM SRO-NRC-1 GENERAL INFORMATION

-- EXAM INFORMATION --

EXAM NO.: SRO-NRC-1

DATE GENERATED: 04/03/89

TOTAL POINTS: 19.50

RESPONSE TIME (min): 91.0

MC QUESTIONS:	0	POINTS:	0.00
TF QUESTIONS:	0	POINTS:	0.00
ES QUESTIONS:	15	POINTS:	19.50

1) PV:1.0 Q#:1047 RT:6.0 LP:ASFBG35.02, REQUAL CT:OB

The plant daily orders call for SIRW tank boron concentration to be increased during your shift. The following data is known:

"B" BAST boron concentration is 12,700ppm
SIRW tank level is 97%
SIRW tank boron concentration is 1850ppm

The desired final SIRW tank boron concentration is 1900ppm.

Calculate how many gallons of boric acid is required to be added to the SIRW tank in order to reach the desired boron concentration of 1900ppm. SHOW ALL WORK! (.25 points for value, .75 points for application)

ANSWER :

SIRW tank volume = (97x2797) + 18,646 (.25)
= 289,955 (±1000) gallons(.25)

Volume of boric acid addition = $\frac{289,955 \times 50}{12,700 - 1900}$ (.25)

= 1343 (±25)gallons(.25)

reference tech data book figure 8.2 section V, SOP 2A section 4.0g rev14

2) PV:1.0 Q#:1048 RT:6.0 LP:TBAB0K3.01, REQUAL CT:4, 7, OB

Determine the time interval for heat removal, in hours, for the following conditions:

A Rx Trip has occured
T cold is 520°F
2 PCPs are in operation
T-2 level = 85%
T-81 level = 90%
T-939 and T-90 are unavailable
T cold required is 300°F

ANSWER :
11 (±1) hours (1.0)

REFERENCE EOP 2.0 ATTACHMENT 2 REV 1

3) PV:2.0 Q#:1049 RT:8.0 LP:IE8804, ASEA0G9.01, ASFD0A2.03, ASEA0G7.09, REQUAL CT:OB

The PCS is drained to a level of 619 feet. The shutdown cooling system is in operation and maintaining the PCS temperature at 80°F. No draining of the PCS is occurring.

A. What position (wide or narrow range) should LIA-0105 be in? (.5 points)

B. What would LIA-0105 indicate, in % , if it was in the:
-narrow range? (.5 points)
-wide range? (.5 points)

C. What is the setpoint, in %, for the reactor water level low alarm, EK-0748? (.5 points)

ANSWER :
a. narrow range(.5)
b. narrow range--54(±2)%(.5)
wide range----18(±2)%(.5)
c. 16% (.5)

reference ARP 4 window 48 rev 45, SOP 3 section 7.3.3 rev 8, SOP 1 attachment 7 rev 22.

4) PV:1.0 Q#:1050 RT:4.0 LP:ASBD0G7.02, REQUAL CT:2, 4, 6, OB

With the plant at 100% power a failure occurs resulting in the depressurization of one of the high pressure air systems in the safegaurds room.

How does plant operations insure a failure of one High Pressure Air System does <u>not</u> disable both High Pressure Air Systems in the Safeguard Rooms?

<u>ANSWER :</u>
SOP 20 does not allow T-9A, East Engineered Safeguard Room High Pressure Air Supply, and T-9B, West Engineered Safeguard Room High Pressure Air Supply, to be tied together with the reactor critical.

reference SOP 20 section 4.0a rev 3

5) * PV:1.0 Q#:1051 RT:6.0 LP:ASHA0A3.05, REQUAL CT:2, 6, CB, OB

The Engineered Safeguards Room sump pumps are in the AUTO POSITION. A CHR signal has occured. A High Level occurs in the East Safeguards Room sump (sufficient for an auto start signal).

Which of the following describes the condition of the sump pump following the high level in the sump combined with Containment High Radiation.

A. the Sump Pump will auto start since only a SIAS blocks the start signal
B. the Sump Pump will not auto start since the start signal will be blocked by the CHR signal
C. the Sump Pump will auto start since only a CHP blocks the start signal

<u>ANSWER :</u>
b. (1.0)

REFERENCE P&ID E17 SHEET 7 REV 4

6) PV:2.0 Q#:1052 RT:11.0 LP:TBABG10.03, ASLC0K6.04, ASFD0A2.01, REQUAL, TBAK0A2.01 CT:4, 7, CB, OB

A MSLB has occured on "A" S/G inside containment resulting in a reactor trip. The plant was originally at 100% power at EOC.

The following information was obtained while performing EOP 1.0:

- Containment pressure is 40 psia and increasing
- Pressurizer level indicates 15% and decreasing
- PCS temperature is 390°F and decreasing
- Pressurizer pressure is 1000 psia and decreasing
- Containment temperature is 267°F
- Steam Generator pressures: "A" is 200 psia and decreasing
  "B" is 700 psia and decreasing slowly
- No PCPs are in operation due to the loss of CCW

A. List three (3) parameters that may have caused the automatic reactor trip. (0.75)

B. Determine the actual pressurizer level using the hot calibrated PZR level instruments. (0.65)

C. Indicate the expected status (closed, open, or throttled) of the following valves: (0.6)

1. "A" S/G feed reg valve (FRV)
2. "B" S/G FRV
3. "A" S/G FRV bypass
4. "B" S/G FRV bypass
5. "A" S/G MSIV
6. "B" S/G MSIV

ANSWER :

A. Any three of the following: (0.25 each not to exceed .75)
- Containment high pressure
- "A" S/G low pressure
- TM/LP
- High power

B. 11% ± 3% (0.65)

C. 1. Closed (0.1)
2. Open or throttled (0.1)
3. Closed (0.1)
4. Closed (0.1)
5. Closed (0.1)
6. Closed (0.1)

REFERENCE EOP 6.0 ATTACHMENTS 2,3,7 and 8 REV 1 AND ARP 21 REV 39 AND P&IDS M207 SHEET 1A REV 16 AND M205 SHEET 1 REV 45

7) * PV:1.5 Q#:1065 RT:5.0 LP:SEP, N00100-7, REQUAL CT:OB

The Site Emergency plan has been implemented. Emergency team members are preparing to enter containment to fix a manual valve. The planners are estimating that each team member will receive 30R whole body dose and 75R thyroid dose. In accordance with E.I. 2.1:

A. Who authorizes emergency workers to exceed 10CFR20 dose limits for emergency workers? (.75 points)

B. Why should this person NOT approve the above dose for these emergency workers? (.75 points)

ANSWER :
A. Site Emergency Director (SED) (.75)
B. The whole body dose is above the allowable emergency worker dose limit (25R) for non-lifesaving activities (.75)

Reference EI 2.1 Section 4.2 Rev 13

8) * PV:1.0 Q#:1054 RT:4.0 LP:TBAI0K3.02, TBAI0G7.04, REQUAL CT:4, 7, CB, OB

The Plant is critical in HOT STANDBY. While I & C tests the CHP Containment Isolation Signal, CCW to and from the containment is isolated. CCW has been isolated to the PCP for 12 minutes and high temperatures alarms are received on the PCPs bearings, EK-0907,8,9 & 10 and their temperatures are verified to be 190°F. One mechanical degradation that loss of CCW would have on the PCPs is damage to the bearings on the motor.

A. What two immediate actions are required? (.5 points)

B. What is the other mechanical degradation that a loss of CCW will have on the PCPs? (be specific)(.5 points)

ANSWER :
A. Trip reactor (.25)
Trip the primary coolant pumps (0.25)

B. Damage to the seals (.5)

reference ONP6.2 rev 1, technical notebook for EOPs, EOP 4.0

9) PV:1.0 Q#:1067 RT:5.0 LP:ADA00G1.10, REQUAL CT:OB

Plant is at 65% power. At 1600 hours during a review of the shift paperwork, you discover that Diesel Generator 1-2 has exceeded its technical specification interval by 3 days. You declare Diesel Generator 1-2 inoperable.

At what time should the LCO be entered?

ANSWER :
At time of discovery.(1600 hours) (1.0)

Reference: Admin 9.23 Section 6.7

10) * PV:2.0 Q#:1056 RT:6.0 LP:TBABG10.02, TBABG11.01, REQUAL CT:4, 7, CB, OB

The plant was operating at 100% power when a REACTOR TRIP occurred. Listed below are several indications that the Reactor Operator observes while completing EOP 1.0 IMMEDIATE ACTIONS.
Determine the 4 CONTINGENCY ACTIONs that must be taken per EOP 1.0. Include any applicable setpoints. (.5 points for each action)

All PCPs tripped, PCP amps = 0;
Loop Delta T recorder reading 18° F, Subcooled Margin monitor reading 45° F,
S/G Levels at 15% and 18% and TRENDING UPWARD,
T_{AVE} is at 532° F,
S/G pressures are at 880 psia,
P8A running with ≈ 165 gpm flow to each S/Gs.

ANSWER :

1. Verify Core Delta T (Qualified CETs - Tc) < 50° (.5)
2. Verify Qualified CETs at least 25° F Subcooled (.5)
3. Verify difference between Loop T_{hot} and qualified CETs within 15°F. (.5)
4. Loop Thots and Tcolds constant or lowering(.5)

Ref: EOP 1.0 CONTINGENCY ACTIONS 8.a,b,c rev 1

11) PV:1.5 Q#:1066 RT:6.0 LP:RTB00G8.01, REQUAL CT:OB

THE PRIMARY DATALOGGER HAS BEEN DECLARED INOPERABLE DUE TO AN ELECTRICAL MALFUNCTION.

THE LATEST INCA RUN WAS COMPLETED 5 DAYS AGO WITH POWER AT 88% AND THE EXCORES WERE CALIBRATED WITH THE INCORE DATA. APL WAS DETERMINED TO BE 98% POWER AND TARGET AXIAL OFFSET IS +0.010. REACTOR POWER HAS BEEN CONSTANT AT 98% POWER FOR THE LAST FIVE DAYS AND THE Y_I FROM THE TMM HAS BEEN AT +0.007 FOR THE LAST 24 HOURS. QUADRANT POWER TILT IS CONSTANT AT 4%.

A. Why can the Ecores <u>not</u> be used to monitor for Linear Heat Rate? (.5 points)

B. What action is required per Standing Order #54? (.5 points)

C. What method must be used to monitor for Linear Heat Rate? (.5 points)

ANSWER :

A. THE EXCORES CANNOT BE USED TO MONITOR LHR SINCE QUADRANT POWER TILT EXCEEDS 3%. (.5)

B. POWER MUST BE REDUCED TO LESS THAN 85% (.5)

C. MANUAL INCORE READINGS USED TO MONITOR FOR LHR. (.5)

REFERENCE: STANDING ORDER 54, SECTIONS 3.23.1.2 AND 3.23.1.3, REV. 22.

12) * PV:1.5 Q#:1061 RT:6.0 LP:ASHA0G7.09, REQUAL CT:2, 6, 8, OB

For Part A and B, determine the MAXIMUM number of HPSI Pumps that can be operable.

A.PCS temperature at 250°F (.5 points)

B.PCS temperature at 450°F (.5 points)

C.With the PCS temperature at 400°F, what requirement is necessary prior to starting a HPSI pump to demonstrate its operability? (.5 points)

ANSWER :

A.Zero(.5)

B.2(.5)

C.The discharge valve is required to be closed.(.5)

REF SOP3 section 4.0 h rev 8, tech spec section 3.3

4/19/87

NOTES ON EXAM KEY & GRADING

RO QUESTION 13 & SRO QUESTION 13 ANSWER KEY.

ANSWER KEY PART B. ALLOWS FOR ANSWER OF 4.85 (+0, -.2) HRS

NO CREDIT GIVEN FOR CALCULATION OR DETERMINATION OF MAX. ALLOWABLE TEMPERATURE.

ACTUAL CALCULATION WOULD BE:

$$\frac{\text{MAX TEMP} - \text{INITIAL TEMP}}{\text{HEATUP RATE}} = \text{MAX TIME}$$

$$\frac{180^\circ - 95^\circ}{17.5\ ^\circ/\text{HR}} = 4.857 \text{ HOURS}$$

I changed the answer key to allow ± .1 tolerance vice (+0, -.2) based on the fact that the actual calculated value would be wrong based on the key answer.

In addition we are looking to determine if the student can locate the appropriate reference and relate that to an allowable time limit.

Practically we would restart S/D cooling some time before reaching the temperature limit based on actual temperature readings and observed heatup rates.

E A Ferry

NRC:

OK, NRC NOTE CHANGED 4/21/87 TO ACCEPT (± .1) VICE (+0, -.2).

[illegible] (NRC)

13) PV:1.0 Q#:1062 RT:6.0 LP:ASCC0G7.09, REQUAL CT:OB

With the plant shutdown, the shutdown cooling system was removed from service for maintenance. A 2 hour heatup test was performed. The initial PCS temperature was 85°F. The final PCS temperature was 120°F. PCS temperature was then reduced to 95°F.

A. Determine the PCS heatup rate, in °F/Hr, that occurred during the heatup test. (.5 points)

B. What is the maximum time allowed, in hours, from the point that shutdown cooling is removed from service and the point that shutdown cooling shall be returned to service? (.5 points)

ANSWER :
A.17.5(±1)°F/hr(.5)
B.4.85 ~~(+0,-.2)~~ hours(.5)
(±.1) Tm 4/21/89
reference SOP 3 section 7.8.1 and 7.8.2 rev 8

14) PV:1.0 Q#:1064 RT:6.0 LP:IE8805, NPS00K5.02, REQUAL CT:1, 5, OB

Reactor is at equilibrium axial offset
Choose the event which will result in a negative change in ASI. Consider each event separately and without regard to possible other simultaneous events.

a. group 4 control rods are moved from the 90" to the 80" position at MOC.
b. power is decreased from 100% to 70% at MOC.
c. Xenon is "dropping off" in the bottom half of the core at a greater rate than it is "dropping off" in the top half of the core, while at EOC.
d. the reactor operator dilutes 10 ppm boron during a MOC transient.

ANSWER :
b.

reference EM-04-17 attachment 4

15) * PV:1.0 Q#:1072 RT:6.0 LP:ASBAOG8.01, REQUAL CT:OB

The plant is at 33% power. During a performance of a quarterly test to verify the fire suppression system flow switch operability, operations personnel identified a water flow switch in the 1-1 diesel generator room to be inoperable. The inoperable detector was logged in the shift supervisor log book.

A. What administrative action, per tech spec 3.22, shall be taken immediately upon discovery of the inoperable flow switch? (.5 points)

B. What is the time requirement, after the discovery of the inoperable water flow switch, that this action must be initiated? (.5 points)

ANSWER :
A. A fire watch patrol must be initited to inspect the diesel generator room(once per hour)(.5)

B. One hour after discovery (.5)

reference tech spec 3.22.1 action and LER 87-013.

MASTER EXAM + KEY
SRO ; SECTION A.2

NRC

EXAM SECTION A GENERAL INFORMATION

-- EXAM INFORMATION --

EXAM NO.: SECTION A

DATE GENERATED: 04/03/89

TOTAL POINTS: ~~10.00~~ 6.5 PTS (QUESTION #4 DELETED)

RESPONSE TIME (min): 49.0

MC QUESTIONS:	0	POINTS:	0.00
TF QUESTIONS:	0	POINTS:	0.00
ES QUESTIONS:	7	POINTS:	10.00

SCENARIO #E EOP-9.0

SETUP: IC20

SETUP CHECKLIST:

1. Advance recorders prior to start of scenario
2. Place recorders in "fast speed" for those so equipped
3. Ensure all recorder pens inking properly
4. Mark on recorder charts the start and stop points
5. Turn off all chart drives at "freeze point"; leave "Recorder Power ON"
6. Provide an updated PIP Qualified CET reading
7. Complete attached Scenario Data Sheet
8. Calculate answers for appropriate questions on answer key.

MALF:	1,FW16A	(P-8A O.O.S.)
	2,TC04A,,1	(Turb. GV #1 fails closed)
	3,TC04B,,1	(Turb. GV #2 fails closed)
	4,TC04C,,1	(Turb. GV #3 fails closed)
	5,TC04D,,1	(Turb. GV #4 fails closed)
	6,MS06A,,2	(A S/G Safety fails open)
	7,RC21,,2,,3	(RV-1040 PZR Code Safety part open)
	8,MS02A,,3	(A S/G MSIV fails closed)
	9,MS02B,,3	(B S/G MSIV fails closed)

I/O OVRD	1,PIA-0116,,100
	2,TIA-0116,,50
	3,LIA-0331,,92
	4,LIA-0332,,94

TURNOVER:

1. Initial cond: 99% pwr; 10.8GWD (EOL); 97ppmB; Eq Xe

2. First out alarms: "No. 1 Rx Reg Gross Dev.", "No. 2 Rx Reg Gross Dev.", and "FW Heaters High Level", "AWP".

3. RPS initiated a Rx trip on High Pzr. Press.

4. All 4 Governor Valves were drifting shut at time of trip.

5. EOP-1.0 Immediate and Contingency actions were completed at time of trip with the exception of starting an AFW pump. Diagnostic flow chart indicated that EOP-9.0 should be entered.

6. A.O. has reported large amt. of steam coming out of the S/G safeties valve exhaust pipes.

7. Quench Tank temperature, pressure, and level are <u>increasing</u>

8. Approx. 5 minutes has elapsed since time of trip.

INSTRUCTOR SPECIFIC SETUP

SCENARIO #E

1. Bring the simulator out of freeze and let run for 5 - 10 mins.
2. Insert Remote #1 and allow Rx. to trip.
3. Insert Remote #2 at time of Rx. trip.
4. Trip 1 MFW pump immediately
5. Trip 2nd MFW pump at 1650 - 1660 psia on PI-0104
6. Insert Remote #3 immediately after SIAS is received
7. Perform the following prior to freeze:
   a. Display an updated Qualified CET reading
   b. Open MO-2087 (VCT Outlet)
   c. Ensure that P-8C is on and delivering $\geq$ 165 gpm as indicated on C-11
8. Freeze the simulator with PCS press. > 1630 (This is to ensure that SI actuation lights on C-13 are out)

1) PV:1.5 Q#:1076 RT:5.0 LP:G5 CT:OB

Use plant indications to verify each of the three(3) indicated safety injection throttling criteria are met. (1.5 points, .5 each)

ANSWER :
1. PCS is > 25°F subcooled (.5)
2. PZR level is > 20% and under control (.5)
3. At least 1 S/G is available for removing heat (.5)

ref: EOP 9.0, Success Path IC-2

2) PV:1.0 Q#:1077 RT:4.0 LP:G16 CT:OB

The Shift Supervisor has decided to enter EOP 9.0.

Why is it not necessary to trip all 4 PCPs? Include any applicable setpoints.

ANSWER :
EOP 9.0 does not require tripping of all PCPs unless PZR pressure ≤ 1300 psia.

ref: EOP 9.0, section 4.0

3) * PV:1.0 Q#:1078 RT:5.0 LP:G37 CT:OB

What is the minimum main steam line pressure, in PSIA, at which the Turbine Bypass Valve would be full open? Show all work. (.25 for value, .75 for application)

ANSWER :
NOTE:To calculate the answer the attached Simulator data sheet is required!

(in %)
Turbine Bypass Setpoint(point # 10) = .50 (.25) (point #10 / 100)

Turbine Bypass Setpoint x 200 = 100 (.25) + 800 psia = 900 (.25)

adding 5 to above calculation = 905 psia (.25)

ref:SH-ASJB, FSAR Fig. 7-60

ALSO ACCEPT (.75): 50 % SETPOINT (900 PSIA)

4) PV:1.5 Q#:1079 RT:4.0 LP:G53 CT:OB

Why is containment spray flow not required to meet EOP 9.0 Containment Atmosphere Acceptance Criteria?

ANSWER :
Because 3 Containment Air Coolers are in operation. (1.5) (no partial credit)

ref: EOP 1.0, section 4.0 and EOP 9.0 , RC-3.

DELETED

5) * PV:2.0 Q#:1080 RT:14.0 LP:E1 CT:OB

The Shift Supervisor has decided to enter EOP 9.0.

A. What are the Success Paths currently in use for the 9 Safety Functions? (1.8 points)

B. What Safety Function is currently "Jeopardized"? (.2 points)

ANSWER :

A. RC-3 (.2)
MVAE-1 (.2)
IC-2 (.2)
PC-3 (.2)
HR-3 (.2)
CI-1 (.2)
CA-1 OR CA-2 (EITHER ONE ACCEPTABLE FOR FULL CREDIT) (.2)
MVAW-1 (.2)
MVAA-1 (.2)

B. Containment Atmoshere Safety Function (CA-1 or CA-2) (.2)

ref: EOP 9.0, Section 4.0

6) * PV:1.5 Q#:1081 RT:11.0 LP:E3 CT:OB

A. Why did Safety Injection actuate? (.75 points)

B. Why are the left and right "Safety Injection Actuated" lights on panel C-13 not illuminated? (.75 points)

ANSWER :

A. PCS pressure decreased to less than 1605 psia (also accept for full credit that Safety Injection was manually initiated) (.75 points)

B. PCS pressure is currently above 1605 psia (.75 points)

ref: P&ID E-17 sheet 3 & 4

7) PV:1.50 Q#:1082 RT:6.0 LP:E-14 CT:OB

Calculate the number of gallons of borated water that are currently in the SIRW tank. Show all work. (.5 points for value, 1.0 points for application)

ANSWER :
NOTE: To calculate the answer the attached Simulator Data Sheet is required.

SIRW tank level (Data sheet # 30) = 94.5 (+/- .5) (.5)

# of gallons = (2797)(SIRW Tk level 94.5) + 18,646 (.5)

# of gallons = 282,962.5 (± 3000) (.5)

ref: SOP-2A, section 2 and 4

MASTER EXAM KEY
SRO/RO, SECTION A.1

NRC

EXAM SECTION A.1 GENERAL INFORMATION

-- EXAM INFORMATION --

EXAM NO.: SECTION A.1

DATE GENERATED: 04/03/89

TOTAL POINTS: 10.00

RESPONSE TIME (min): 38.0

MC QUESTIONS:	0	POINTS:	0.00
TF QUESTIONS:	0	POINTS:	0.00
ES QUESTIONS:	8	POINTS:	10.00

SCENARIO #F

MISC. EQUIP. FAILURES

SETUP: IC-8

SETUP CHECKLIST:

1. Advance recorders prior to start of scenario
2. Place recorders in "fast speed" for those so equipped
3. Ensure all recorder pens inking properly
4. Mark on recorder charts the start and stop points
5. Turn off all chart drives at "freeze point"; leave "Recorder Power ON"
6. Provide an updated PIP Qualified CET reading
7. Complete attached Scenario Data Sheet
8. Calculate answers for appropriate questions on answer key.

MALF:	1,RC14D,,1	D PCP upper seal fail
	2,RC11,,2	A PCP high lube oil level
	3,RX10A,,3,,0	A S/G level xmtr fail low
	4,TC10,,3,,0	Turb. 1st stage press xmtr fail

I/O OVRD 1,LIA-1400,,50

2,LIA-0136A,,78

TURNOVER INFO:

1. Plant at 41% power, equilibrium Xe, 861 ppm B, 3 GWD
2. First Out Alarm : EK-0952 PRI COOL'T PP P-50D SEAL PRESS OFF NORMAL
3. In addition, an excessive feedwater event has occured.

INSTRUCTOR SPECIFIC SETUP

Scenario #F (Total Run Time = 21 min. 30 sec.)

1. Bring out of freeze, let run for 5 mins.

2. Insert Remote # 1

3. Place P-81A and P-80D handswitches in the OFF position.

4. Ensure that 1/LRC-0101B is selected for this scenario.

5. Place the Process Remote/Local toggle switch for 1/LRC-0101A to the LOCAL position.

6. ~~Match~~ ADJUST the demand signal for Pzr Pressure Controller PRC-0101A so IT READS ~~to~~ 10% HIGHER THAN that of PRC-0101B.

7. Display the "System Status" screen on TMM Channel A.

8. Insert Remote # 2 14 mins. after entering Remote # 1.

9. Insert Remote # 3 2 mins. after entering Remote # 2.

10. Perform the following prior to freeze:
    a. Display an updated Qualified CET reading
    b. Ensure that both Shield Cooling pumps are OFF
    c. Set TIC-0203 (Letdown Temp. Indicating Controller) to MANUAL
    d. Set the REGULATOR meter on C-01 to 10 milliamps out using the Base Adjuster
    e. Match the DEMAND signal of 1/LRC-0101A to that of 1/LRC-0101B
    f. Ensure V-68A and V-70B selected for standby

11. Freeze the simulator at the point where CV-0701 has just closed for the second time due to the high level override for A S/G. (Note: This occurs approx. 30 secs. after entering Remote # 3.)

1) PV:1.50 Q#:1083 RT:4.0 LP:G22 CT:

Determine the Technical Specification Control Rod Insertion limit (in inches withdrawn) for the current plant condition. Use the highest indicated RPCIC nuclear power.

ANSWER :
NOTE: To determine the answer the attached Simulator data sheet is required.

GP 3 AT 102" ; OR, Tom [illegible] 4/19/89 (USNRC, RV)

Insertion limit = GP 4 AT 22" (± 4 inches) (1.5 points)

NOTE: For grader to determine the above answer:
1. Use point # 39 on data sheet (highest indicated RPCIC nuclear power.
2. Use tech data book curve 1.9 and determine T.S. PDIL for the existing power.
3. Insert this value in the blank above.

ref: Tech data book figure 1.9

2) PV:1.0 Q#:1084 RT:4.0 LP:G63 CT:OB

Letdown Temperature Indicating Controller, TIC-0203, is controlling temperature erratically.

Why is TIC-0203 not properly aligned according to plant operating procedures?

ANSWER :
TIC-0203 should be in the AUTO position

ref: SOP-2A section 7.3

3) PV:1.0 Q#:1085 RT:5.0 LP:G64 CT:OB

Maintenance requests a tagout of both isophase bus coolers (water side only) at this time.

Why is this tagout allowed under existing plant conditions?

ANSWER :
Because generator output is less than 14,400 amperes per phase (1.0)

ref SOP 8.0 section 4.0, SECTION 5.0.M
ALSO ACCEPT: NORMAL BUS LOADING MAY BE CARRIED W/O COOLING WATER SO LONG AS SUPPLY AND RETURN AIR TEMP. LIMITS ARE NOT EXCEEDED, BY OPENING AIR INTAKE AND EXHAUST DAMPERS, AND CLOSING RECIRC DAMPER. (MUST HAVE ALL FOR 1.0) NO PARTIAL CREDIT.

4) PV:1.0 Q#:1086 RT:5.0 LP:G67 CT:OB

A. What is the amount of fuel oil in T-10 (Fuel Oil Underground Storage Tank) in %? (.5 points)

TM (USNRC) 4/25/89

B. Per DWO-1, what is the administrative limit for the minimum amount, in gallons, of fuel oil in T-10? (.5 points)

ANSWER :
NOTE: The answer is obtained using the attached simulator data sheet.

A. 50.5 (±2%) (.5)

NOTE: To obtain value use point # 33A from simulator data sheet.

B. 23,000 gallons (.5) (ALSO ACCEPT AS AN ACCEPTABLE RANGE OF ANSWERS: ~~23,760~~ 22620 — 23,760 ~~gallons~~) FROM ATTACHED OA-24.

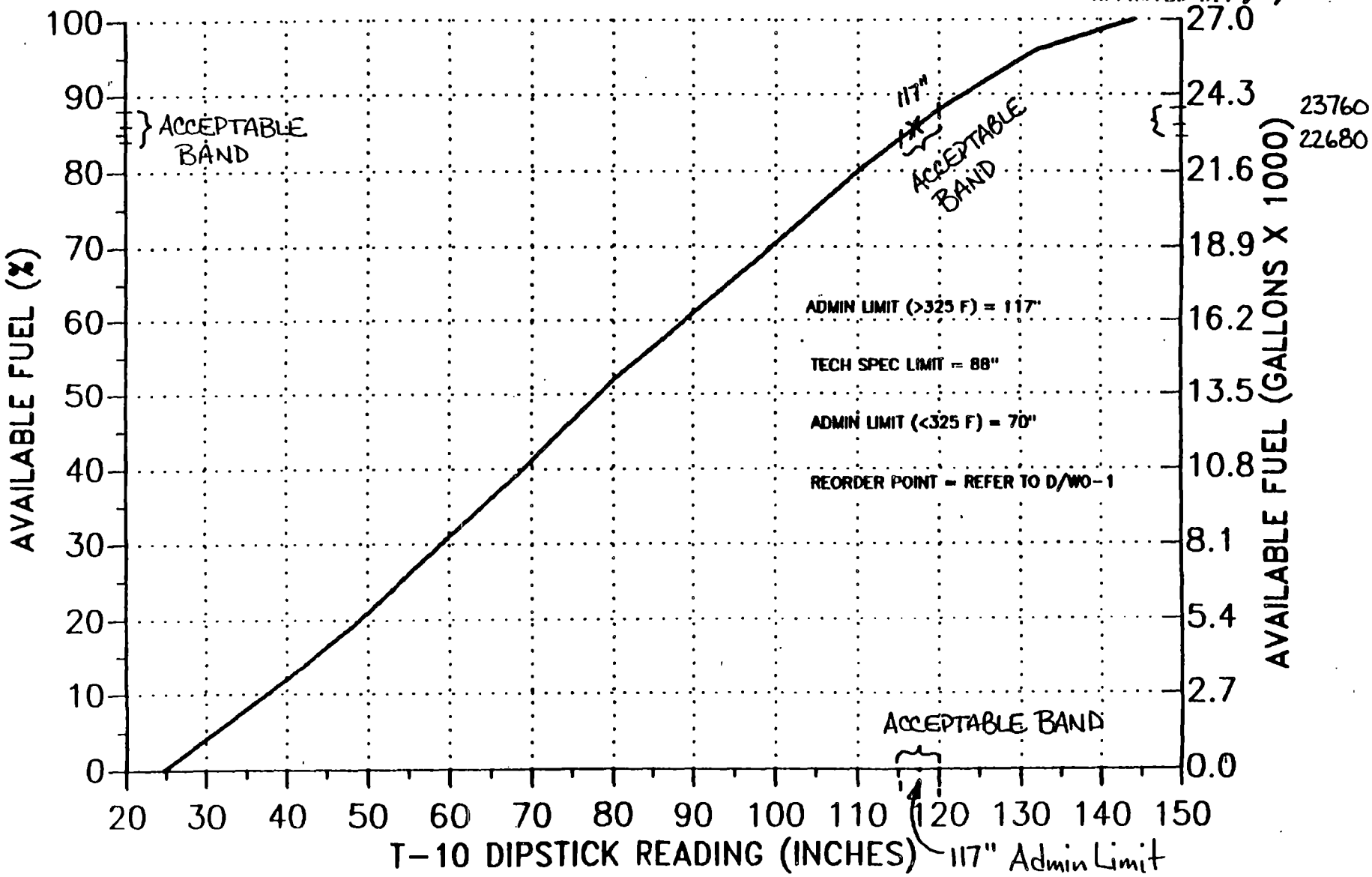
ref: DWO-1 and E-Pal-011b
OA-24

TM (USNRC) 4/25/89

T-10 DIPSTICK vs AVAILABLE FUEL

OA-24

PREPARED BY: 3/28/89
APPROVED BY: 3/28/89
APPROVED BY: 3/28/89



5) * PV:1.50 Q#:1087 RT:6.0 LP:F4 CT:OB

The Shift Supervisor directs you to shift from PZR pressure control channel B to channel A so that I & C can perform testing on channel B.

What effect would this transfer have on PZR pressure? (increase, decrease, or remain the same)

ANSWER :
Cause PZR pressure to decrease (1.5)
ALSO ACCEPT : REMAIN THE SAME. (1.5) TM (USNRC) 7/25/89
ref: SOP 1

6) PV:1.50 Q#:1088 RT:4.0 LP:F7 CT:OB

Why is annunciator window EK-0603 Rack D (Nuclear-delta T power Deviation/Tinlet Off Normal/Calculator Trouble Channel A) in the alarm condition?

ANSWER :
Tcold is less than 525°F(Tcold is in the trip condition) (1.5)

ref: ARP 21

7) * PV:1.50 Q#:1089 RT:5.0 LP:F9 CT:OB

Why is annunciator window EK-0918 (Auto Rod Withdrawal Prohibit) in the alarm condition? Include applicable setpoint.

ANSWER :
Tave - Tref deviation of ≥ 5°F exists (1.5)

ref: ARP 5

8) PV:1.0 Q#:1090 RT:5.0 LP:F13 CT:OB

What two(2) manual operator actions could be taken at this time to stabilize main feedwater flow to A steam generator?

ANSWER :
Take manual control of MFW reg. valve CV-0701 (.5)
Take manual control of "A" MFW pump (.5)

ref: SOP 12, attachment 4.0 and ARP 5 and ONP 10.

46 0782

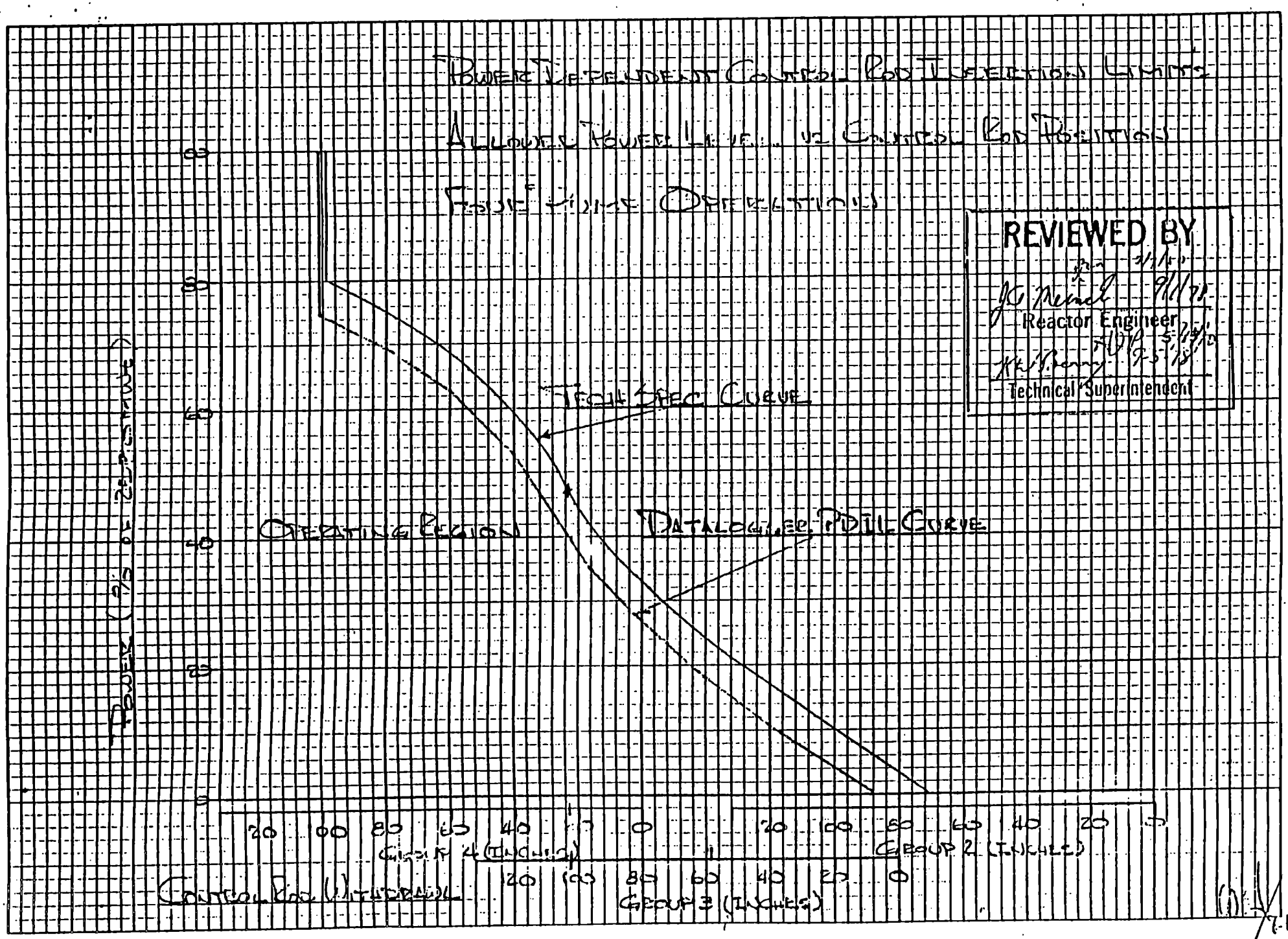


Figure 1.9, Rev 0

MASTER - RO EXAM & ANSWER KEY PART B - NRC

PERSONAL AND CONFIDENTIAL
EXAMINATION COVER SHEET

Name _____

Social Security Number _____

Company CPCo

Work Location PALISADES

Department OPERATIONS

Course PLOR

Class No. _____

EIS/NUTREC _____

Exam No 1

Approval _____

- -

Date Administered _____ Administrated by _____

Date Graded _____ Graded by _____

Grade _____

- -

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

_____
Signature

- -

I was given the opportunity to review the correct responses to this examination.

_____
Signature

PALISADES EXAM BRIEF, RULES, & GUIDANCE FOR EXAMINEES

1. Use black ink or dark pencil ONLY to facilitate legible reproduction.

2. Print your name in the blank provided on the cover sheet of the examination and on each page of the examination.

3. Fill in the date on the cover sheet if necessary.

4. Answer each question on the examination. If additional paper is required, use only paper provided by the examiner.

5. Use abbreviations only if they are commonly used in facility literature.

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

7. Show all calculations, methods or assumptions used to obtain an answer to a mathematical problem, whether asked for in the question or not.

8. Unless solicited, the location of references need not be stated.

9. Partial credit may be given. Therefore, ANSWER ALL PARTS OF THE QUESTION AND DO NOT LEAVE ANY ANSWERS BLANK.

10. If parts of the examination are not clear with respect to their intent, ask questions of the examiner only.

11. You must sign the statement on the cover sheet that indicates the work on the examination is your own and that you have not received or been given any assistance in completing the examination. This must be signed AFTER the examination has been completed.

12. Rest room trips are to be limited and only one examinee at a time may leave. You must avoid all contact with anyone outside the examination room to avoid even the appearance or possibility of examination compromise.

    A. When you are taking the Frozen Simulator exam use the bathroom down the hall from the Simulator.

    B. When you are taking the Classroom exam use the bathroom down the hall from the Cafeteria.

13. Cheating on the examination would result in revocation of your license and could result in more severe penalties.

14. Each section of the examination is designed to take approximately 90 minutes to complete. You will be given two hours to complete each section for a total of four hours.

15. Due to the existence of Frozen Simulator exam questions that will require all examinees to refer to the same indications or controls, particular care must be taken to maintain individual examination security and avoid any possibility of compromise or appearance of cheating.

16. During the Frozen Simulator Exam each question should be referenced to the initial scenario. DO NOT consider a previous question to have any bearing on the question you are presently answering.

17. 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.

18. When you are finished and have turned in your completed examination, leave the examination area.

    A. Following the Frozen Simulator exam go to room 203A.

    B Following the Classroom exam go to the Cafeteria.

    An instructor will come and get you when the second part of the examination is ready to commence.

    When you have completed both portions of the written examination, you should check your schedule. You are free to leave if you have enough time to return prior to the JPM portion of the exam.

EXAM RO-NRC-1 GENERAL INFORMATION

-- EXAM INFORMATION --

EXAM NO.: RO-NRC-1

DATE GENERATED: 04/03/89

TOTAL POINTS: 19.00

RESPONSE TIME (min): 91.0

MC QUESTIONS:	0	POINTS:	0.00
TF QUESTIONS:	0	POINTS:	0.00
ES QUESTIONS:	15	POINTS:	19.00

1) PV:1.0 Q#:1047 RT:6.0 LP:ASFBG35.02, REQUAL CT:OB

The plant daily orders call for SIRW tank boron concentration to be increased during your shift. The following data is known:

"B" BAST boron concentration is 12,700ppm
SIRW tank level is 97%
SIRW tank boron concentration is 1850ppm

The desired final SIRW tank boron concentration is 1900ppm.

Calculate how many gallons of boric acid is required to be added to the SIRW tank in order to reach the desired boron concentration of 1900ppm. SHOW ALL WORK! (.25 points for value, .75 points for application)

ANSWER :

SIRW tank volume = (97x2797) + 18,646 (.25)
= 289,955 (±1000) gallons(.25)

Volume of boric acid addition = $\frac{289,955 \times 50}{12,700 - 1900}$ (.25)

= 1343 (±25)gallons(.25)

reference tech data book figure 8.2 section V, SOP 2A section 4.0g rev14

2) PV:1.0 Q#:1048 RT:6.0 LP:TBAB0K3.01, REQUAL CT:4, 7, OB

Determine the time interval for heat removal, in hours, for the following conditions:

A Rx Trip has occured
T cold is 520°F
2 PCPs are in operation
T-2 level = 85%
T-81 level = 90%
T-939 and T-90 are unavailable
T cold required is 300°F

ANSWER :
11 (±1) hours (1.0)

REFERENCE EOP 2.0 ATTACHMENT 2 REV 1

3) PV:2.0 Q#:1049 RT:8.0 LP:IE8804, ASEA0G9.01, ASFD0A2.03, ASEA0G7.09, REQUAL CT:OB

The PCS is drained to a level of 619 feet. The shutdown cooling system is in operation and maintaining the PCS temperature at 80°F. No draining of the PCS is occurring.

A. What position (wide or narrow range) should LIA-0105 be in? (.5 points)

B. What would LIA-0105 indicate, in % , if it was in the:
-narrow range? (.5 points)
-wide range? (.5 points)

C. What is the setpoint, in %, for the reactor water level low alarm, EK-0748? (.5 points)

ANSWER :
a. narrow range(.5)
b. narrow range--54(±2)%(.5)
wide range----18(±2)%(.5)
c. 16% (.5)

reference ARP 4 window 48 rev 45, SOP 3 section 7.3.3 rev 8, SOP 1 attachment 7 rev 22.

4) PV:1.0 Q#:1050 RT:4.0 LP:ASBD0G7.02, REQUAL CT:2, 4, 6, OB

With the plant at 100% power a failure occurs resulting in the depressurization of one of the high pressure air systems in the safegaurds room.

How does plant operations insure a failure of one High Pressure Air System does <u>not</u> disable both High Pressure Air Systems in the Safeguard Rooms?

<u>ANSWER :</u>
SOP 20 does not allow T-9A, East Engineered Safeguard Room High Pressure Air Supply, and T-9B, West Engineered Safeguard Room High Pressure Air Supply, to be tied together with the reactor critical.

reference SOP 20 section 4.0a rev 3

5) * PV:1.0 Q#:1051 RT:6.0 LP:ASHA0A3.05, REQUAL CT:2, 6, CB, OB

The Engineered Safeguards Room sump pumps are in the AUTO POSITION. A CHR signal has occured. A High Level occurs in the East Safeguards Room sump (sufficient for an auto start signal).

Which of the following describes the condition of the sump pump following the high level in the sump combined with Containment High Radiation.

A. the Sump Pump will auto start since only a SIAS blocks the start signal
B. the Sump Pump will not auto start since the start signal will be blocked by the CHR signal
C. the Sump Pump will auto start since only a CHP blocks the start signal

<u>ANSWER :</u>
b. (1.0)

REFERENCE P&ID E17 SHEET 7 REV 4

6) PV:2.0 Q#:1052 RT:11.0 LP:TBABG10.03, ASLC0K6.04, ASFD0A2.01, REQUAL, TBAK0A2.01 CT:4, 7, CB, OB

A MSLB has occured on "A" S/G inside containment resulting in a reactor trip. The plant was originally at 100% power at EOC.

The following information was obtained while performing EOP 1.0:

- Containment pressure is 40 psia and increasing
- Pressurizer level indicates 15% and decreasing
- PCS temperature is 390°F and decreasing
- Pressurizer pressure is 1000 psia and decreasing
- Containment temperature is 267°F
- Steam Generator pressures: "A" is 200 psia and decreasing
  "B" is 700 psia and decreasing slowly
- No PCPs are in operation due to the loss of CCW

A. List three (3) parameters that may have caused the automatic reactor trip. (0.75)

B. Determine the actual pressurizer level using the hot calibrated PZR level instruments. (0.65)

C. Indicate the expected status (closed, open, or throttled) of the following valves: (0.6)

1. "A" S/G feed reg valve (FRV)
2. "B" S/G FRV
3. "A" S/G FRV bypass
4. "B" S/G FRV bypass
5. "A" S/G MSIV
6. "B" S/G MSIV

ANSWER :

A. Any three of the following: (0.25 each not to exceed .75)
- Containment high pressure
- "A" S/G low pressure
- TM/LP
- High power

B. 11% ± 3% (0.65)

C. 1. Closed (0.1)
2. Open or throttled (0.1)
3. Closed (0.1)
4. Closed (0.1)
5. Closed (0.1)
6. Closed (0.1)

REFERENCE EOP 6.0 ATTACHMENTS 2,3,7 and 8 REV 1 AND ARP 21 REV 39 AND P&IDS M207 SHEET 1A REV 16 AND M205 SHEET 1 REV 45

7) * PV:1.5 Q#:1053 RT:5.0 LP:TBAEG33.01, TBAEG11.01, TBAEG11.02, TBAEG10.02, REQUAL CT:4, 7, CB, OB

The Plant is at 40% Power with all systems in normal configuration for this power level. The CO1 has just requested the Secondary A.O. to start warming the second Main Feed Pump when numerous alarms are received.
The Control Room Operators note the loss of all the lights on the Core Matrix and that the recorders for NI 03, 04, 05, 06, 07, 08, 09 and 10 have failed low.

Which Off Normal condition has occurred? (be specific)

ANSWER :
loss of Y-01 (instrument A.C. Bus)(1.5)

reference ONP 24.5

8) * PV:1.0 Q#:1054 RT:4.0 LP:TBAI0K3.02, TBAI0G7.04, REQUAL CT:4, 7, CB, OB

The Plant is critical in HOT STANDBY. While I & C tests the CHP Containment Isolation Signal, CCW to and from the containment is isolated. CCW has been isolated to the PCP for 12 minutes and high temperatures alarms are received on the PCPs bearings, EK-0907,8,9 & 10 and their temperatures are verified to be 190°F. One mechanical degradation that loss of CCW would have on the PCPs is damage to the bearings on the motor.

A. What two immediate actions are required? (.5 points)

B. What is the other mechanical degradation that a loss of CCW will have on the PCPs? (be specific)(.5 points)

ANSWER :

A. Trip reactor (.25)
Trip the primary coolant pumps (0.25)

B. Damage to the seals (.5)

reference ONP6.2 rev 1, technical notebook for EOPs, EOP 4.0

9) * PV:1 Q#:1055 RT:6.0 LP:TBAB0A2.06, TBABG10.03, REQUAL CT:4, 7, CB, OB

- The plant is at 100% power.
- "A" charging pump is tagged out of service.

The PCS develops a leak which has been initially determined to be 120 gpm. A reactor trip has occurred. EOP 1.0 actions have been completed and all the PCPs have tripped. PZR pressure is at 1275 PSIA.

A. What is the basis for tripping the PCPs when PZR pressure is less than 1300 psia during a LOCA? (.5 points)

B. What is your immediate action if the PCS leak was 50 gpm and PZR level stabilizes at 42%? (.5 points)

ANSWER :
A.In certain LOCAs, inventory loss is increased by running PCPs. (Since diagnosis of break locations is not possible, all PCPs are tripped as a conservative measure). (0.5)

B. Ensure additional charging pumps start(as necessary).(0.5)

reference EOP 1.0 step 7.a rev 1, ONP 23.1 step 3.3 rev 14, EOP 4.0 step 8 rev 1 and SOP 2A attachment 3 rev 14

10) * PV:2.0 Q#:1056 RT:6.0 LP:TBABG10.02, TBABG11.01, REQUAL CT:4, 7, CB, OB

The plant was operating at 100% power when a REACTOR TRIP occurred. Listed below are several indications that the Reactor Operator observes while completing EOP 1.0 IMMEDIATE ACTIONS.
Determine the 4 CONTINGENCY ACTIONs that must be taken per EOP 1.0. Include any applicable setpoints. (.5 points for each action)

All PCPs tripped, PCP amps = 0;
Loop Delta T recorder reading 18° F, Subcooled Margin monitor reading 45° F,
S/G Levels at 15% and 18% and TRENDING UPWARD,
T_{AVE} is at 532° F,
S/G pressures are at 880 psia,
P8A running with ≈ 165 gpm flow to each S/Gs.

ANSWER :
1. Verify Core Delta T (Qualified CETs - Tc) < 50° (.5)
2. Verify Qualified CETs at least 25° F Subcooled (.5)
3. Verify difference between Loop T_{hot} and qualified CETs within 15°F (.5)
4. Loop Thots and Tcolds constant or lowering(.5)

Ref: EOP 1.0 CONTINGENCY ACTIONS 8.a,b,c rev 1

11) * PV:1.0 Q#:1060 RT:6.0 LP:ISAA0G1.09, ADA00G1.01, REQUAL CT:OB

While performing a Technical Specification Surveillance Test, you notice one of the required data points is indicating an unacceptable value. Upon your discovery of this, you circle the unacceptable parameter in red.

What other action is required by Admin Procedure 9.23 upon discovering out of tolerance data?

ANSWER :
The out of tolerance data shall be brought to the SS(SE) attention (1.0)

Reference: Admin 9.23 Section 6.3 rev 6

12) * PV:1.5 Q#:1061 RT:6.0 LP:ASHA0G7.09, REQUAL CT:2, 6, 8, OB

For Part A and B, determine the MAXIMUM number of HPSI Pumps that can be operable.

A.PCS temperature at 250°F (.5 points)

B.PCS temperature at 450°F (.5 points)

C.With the PCS temperature at 400°F, what requirement is necessary prior to starting a HPSI pump to demonstrate its operability? (.5 points)

4/19/87

NOTES ON EXAM KEY & GRADING

RO QUESTION 13 & SRO QUESTION 13 ANSWER KEY.

ANSWER KEY PART B. ALLOWS FOR ANSWER OF 4.85 (+0, -.2) HRS

NO CREDIT GIVEN FOR CALCULATION OR DETERMINATION OF MAX. ALLOWABLE TEMPERATURE.

ACTUAL CALCULATION WOULD BE:

$$\frac{\text{MAX TEMP} - \text{INITIAL TEMP}}{\text{HEATUP RATE}} = \text{MAX TIME}$$

$$\frac{180^\circ - 95^\circ}{17.5\ ^\circ/\text{HR}} = 4.857 \text{ HOURS}$$

I changed the answer key to allow ± .1 tolerance vice (+0, -.2) based on the fact that the actual calculated value would be wrong based on the key answer.

In addition we are looking to determine if the student can locate the appropriate reference and relate that to an allowable time limit.

Practically we would restart S/D cooling some time before reaching the temperature limit based on actual temperature readings and observed heatup rates.

E A Ferry

NRC:

O.K., NRC [illegible] 4/21/87

[illegible] (±.1) vice (+0, -.2).

[illegible]

ANSWER :
A.Zero(.5)

B.2(.5)

C.The discharge valve is required to be closed.(.5)

REF- SOP3 section 4.0 h rev 8, tech spec section 3.3

13) PV:1.0 Q#:1062 RT:6.0 LP:ASCC0G7.09, REQUAL CT:OB

With the plant shutdown, the shutdown cooling system was removed from service for maintenance. A 2 hour heatup test was performed. The initial PCS temperature was 85°F. The final PCS temperature was 120°F. PCS temperature was then reduced to 95°F.

A. Determine the PCS heatup rate, in °F/Hr, that occurred during the heatup test. (.5 points)

B. What is the maximum time allowed, in hours, from the point that shutdown cooling is removed from service and the point that shutdown cooling shall be returned to service? (.5 points)

ANSWER :
A.17.5(±1)°F/hr(.5)
B.4.85(~~+0, -.2~~)hours(.5)
(±.1) 4/21/89
reference SOP 3 section 7.8.1 and 7.8.2 rev 8

14) PV:1.0 Q#:1064 RT:6.0 LP:IE8805, NPS00K5.02, REQUAL CT:1, 5, OB

Reactor is at equilibrium axial offset
Choose the event which will result in a negative change in ASI. Consider each event separately and without regard to possible other simultaneous events.

a. group 4 control rods are moved from the 90" to the 80" position at MOC.
b. power is decreased from 100% to 70% at MOC.
c. Xenon is "dropping off" in the bottom half of the core at a greater rate than it is "dropping off" in the top half of the core, while at EOC.
d. the reactor operator dilutes 10 ppm boron during a MOC transient.

ANSWER :
b.

reference EM-04-17 attachment 4

15) * PV:1.0 Q#:1071 RT:5.0 LP:ASBB0G7.09, REQUAL CT:OB

The plant is at 43% power. Service water temperature indicator, TI-1319, is inoperable. Temperature Recorder TR-5370 is indicating 85°F. SOP 15 section 4.0 identifies 2 alternate methods to determine service water temperature.

A. What administrative action is required if this is a valid temperature? (.5 points)

B. What 2 methods exists, other than temperature recorder TR-5370 or Temperature Indicator Ti-1319, can be used to determine the service water temperature? (.5 points)

ANSWER :

A. Initiate event report(.5)

B. pryometer reading on Service Water pipe (.25)
thermometer reading of intake bay (.25)

reference SOP 15 section 4 rev 4 and LER 86-036.