EXAMINATION REPORT

Examination Report No.: 50-206/OL-90-02

Facility Licensee: Southern California Edison Company
P. O. Box 128
San Clemente, California 92672

Facility Docket No.: 50-206

Facility License No.: DPR-13

Examinations were administered during the week of October 22, 1990, at San Onofre Nuclear Generating Station, near San Clemente, California.

Chief Examiner: T B Sundsmo
Todd B. Sundsmo — 11/26/90
Date Signed

Approved by: William M. Dean
W. M. Dean, Acting Chief
Operations Section — 11/27/90
Date Signed

Summary

Written examinations and operating tests were administered to one Senior Reactor Operator (SRO) and four Reactor Operator (RO) applicants in accordance with Revision 6 of NUREG 1021, "Examiner Standards." All of the applicants passed these examinations.

REPORT DETAILS

1. Personnel

Examiners:

T. B. Sundsmo (Chief Examiner), NRC
L. F. Miller, NRC
P. T. Isaksen, EG&G

Licensee staff for written exam review on October 15-16, 1990:

Howard Bentz, Training Instructor
Gerry Moore, Assistant Plant Superintendent

Licensee staff at exit meeting on October 26, 1990:

Dave Brevig, ONL
Jim Jamerson, ONL Lead Engineer
Dick Mette, SOT
Don Miller, Compliance Engineer
W. S. Morris, ONL Engineer
Charles Seward, Nuclear Training Instructor
Gary Tilton, Shift Superintendent

2. Written Examinations and Facility Review

The written examinations were reviewed at the Region V office on October 15 and 16, 1990 by the two members from the licensee staff identified above. These individuals signed security agreements as required by Examiner Standards. All examinations and related materials were retained in the Region V office to ensure examination security.

The written examinations were administered at the licensee's training facility on October 23, 1990. After the written examinations, the licensee indicated that they would have a comment on one question that was in both the RO and SRO examinations. This comment, and the NRC resolution are in Enclosure 3. No pass/fail decisions were affected by this comment resolution.

After grading and review of the written examinations, it appears that a training weakness exists in the knowledge area of control rod operations. Three multiple choice questions were asked which required the following knowledges to answer:

- Recognition of control rod group failure symptoms,
- How reactor power should be stabilized during a dropped rod recovery, and
- The switch line-up to move a Shutdown Bank of rods.

All five of the applicants incorrectly answered the first two items and three of them missed the third item.

All of the applicants passed the written examination.

3. Operating Examinations

The operating portion of these examinations were administered on October 24 and 25, 1990. These examinations were 100% prescripted in accordance with Revision 6 of the Examiner Standards. Each examination used the following methods:

- walk-through scenarios (facility simulator not available),

- fifteen licensee Job Performance Measures (JPMs); many of these JPMs were modified to obtain out of specification results or require "Response Not Obtained" actions,

- four prescripted questions per JPM using no more that one facility written question per JPM,

- prescribed administrative questions with three to five questions per topic (dependent upon depth of question).

All of the applicants passed the operating examination.

4. Exit Meeting

The examiners met with representatives of the plant staff on October 26, 1990, to discuss results of the examinations. The examiners made the following observations concerning the licensee's training program and plant operations:

a. There appeared to be a larger than average number of conflicts between plant documentation (procedures, system descriptions and lesson plans) and actual plant conditions. Two examples include:

(i) "Reactor Plant No. 2 Annunciator" S01-13-3, recommended action for a dropped control rod (Window 32) states, "monitor the load runback." Similarly, "Control Rod System Malfunction" S01-2.3-1, states that steam dumps may actuate if a turbine runback occurs.

The licensee's staff identified that this turbine runback feature had been disabled and had been removed from the plant's Safety Analysis.

(ii) The system description, "Primary Process Instrumentation Systems" SD-S01-390 (2.2.20), describes the Sub-Cooling Monitoring System as using either T-hot or Core Exit Thermocouples (CETs) through an auctioneered high circuit. The licensee's staff identified that the CETs are not selected to the sub-cooling monitor due to operability concerns.

With the continuing plant modifications that are being made to Unit 1, there is a high potential that the number of conflicts between plant documentation and actual plant conditions will increase.

b. The number of different testing areas covered by the facility's bank of JPMs was lower than expected. The examiners attempted to construct two examinations using facility JPMs without using the same JPM twice. This could not be done; three of the JPMs had to be used twice. Since JPMs used for an initial exam are not limited to facility material, and some overlap between exams is acceptable, the limited JPM coverage did not affect this exam.

c. Several other concerns were identified to the licensee's staff, including the areas of:

- placement of caution and maintenance tags in the Control Room obscuring controller settings from view,

- corrosion on Dedicated Shutdown Diesel fire dampers, and

- an applicant stating that he would operate a manual valve (missing its handwheel) with a pair of pliers during normal operating conditions.

d. The overall preparation of the applicants appeared to be adequate.

e. The support provided by the licensee's staff before and during the examination contributed to a smooth examination process.

QUESTION: 048 (1.0)

Which one of the following statements describes the operation of a Vital Bus transfer between its normal power source and its alternate power source?

a. Power will automatically transfer from normal to alternate (within 50 milliseconds) but must be manually transferred by pushbutton from alternate to normal.

b. Power must be manually transferred by pushbutton from normal to alternate but will automatically transfer from alternate to normal (within 50 milliseconds).

c. Power must be manually transferred by pushbutton from normal to alternate and the Vital bus must be de-energized to allow a return to normal.

d. The Vital bus must be de-energized to allow a transfer to alternate power but can be manually transferred by pushbutton from alternate to normal.

ANSWER: 048 (1.00)

a.

REFERENCE:

LP-1XE205, LO 1.3 & 2.4, 6.8.2 & 6.8.3, pages 9 & 10

SCE COMMENTS:

The students were unable to determine from the wording if the question meant the design features operation of the Vital bus transfer to its alternate power supply or if the operator was initiating the transfer of the Vital bus to its alternate power supply, by de-energizing the normal power supply and the Vital bus for a moment, per SO1-9-13 Inverter and Vital Bus Operations.

SCE REQUESTED RESOLUTION:

Accept both answers a and d

QUESTION: 052 (1.00)

Which one of the following statements describes the operation of a Vital Bus transfer between its normal power source and its alternate power source?

a. Power will automatically transfer from normal to alternate (within 50 milliseconds) but must be manually transferred by pushbutton from alternate to normal.

b. Power must be manually transferred by pushbutton from normal to alternate but will automatically transfer from alternate to normal (within 50 milliseconds).

c. Power must be manually transferred by pushbutton from normal to alternate and the Vital bus must be de-energized to allow a return to normal.

d. The Vital bus must be de-energized to allow a transfer to alternate power but can be manually transferred by pushbutton from alternate to normal.

ANSWER: 052 (1.00)

a.

REFERENCE:

LP-1XE205, LO 1.3 & 2.4, 6.8.2 & 6.8.3, pages 9 & 10

SCE COMMENTS:

The students were unable to determine from the wording if the question meant the design features operation of the Vital bus transfer to its alternate power supply or if the operator was initiating the transfer of the Vital bus to its alternate power supply, by de-energizing the normal power supply and the Vital bus for a moment, per SO1-9-13 Inverter and Vital Bus Operations.

SCE REQUESTED RESOLUTION:

Accept both answers a and d

NRC Resolution of Facility comments for written exams given at SONGS 1 on October 23, 1990.

SRO #48, RO #52

Facility Comment:

The students were unable to determine from the wording if the question meant the design features operation of the Vital bus transfer to its alternate power supply or if the operator was initiating the transfer of the Vital bus to its alternate power supply, by de-energizing the normal power supply and the Vital bus for a moment, per SO1-9-13 Invertor and Vital Bus Operations.

NRC Resolution:

Since a manual transfer by procedure also makes "d" correct and the question did not preclude operator action, the answer key will be modified to accept either "a" or "d" for full credit.

T Bundans 11/1/90

ENCLOSURE (2)

Examinations and Answer Keys (SRO/RO)

As given RO exam
SONGS 1 10/23/90
T D Sandstrom
(includes answer key)

U. S. NUCLEAR REGULATORY COMMISSION
REACTOR OPERATOR LICENSE EXAMINATION
REGION 5

FACILITY: San Onofre 1

REACTOR TYPE: PWR-WEC3

DATE ADMINISTERED: 90/10/23

MASTER COPY

CANDIDATE: ____________

INSTRUCTIONS TO CANDIDATE:

Points for each question are indicated in parentheses after the question. To pass this examination, you must achieve an overall grade of at least 80%. Examination papers will be picked up four ~~and one half~~ (4 ~~1/2~~) hours after the examination starts.

NUMBER QUESTIONS	TOTAL POINTS	CANDIDATE'S POINTS	CANDIDATE'S OVERALL GRADE (%)
100	100.00		

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

____
Candidate's Signature

MASTER COPY

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 <u>only</u> 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 <u>literature</u>. 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 question.

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 (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)

Based on "Assignment And Approval Of Operations Overtime" procedure SO1-14-23, which one of the following situations (excluding shift turnover and meal time) describes the MAXIMUM allowable time that a Licensed Operator can work?

a. 14 hours in any 24 hour period.

b. 24 hours in any 48 hour period.

c. 72 hours in any five day period.

d. 96 hours in any seven day period.

QUESTION: 002 (1.00)

Which one of the following correctly describes the MINIMUM Operations Shift Crew composition for Unit 1 in MODE 4

a. 1 Shift Superintendent (SRO), no Control Room Supervisor, 1 Licensed Operator (RO), 1 Plant Equipment Operator.

b. 1 Shift Superintendent (SRO), no Control Room Supervisor, 2 Licensed Operators (RO), 2 Plant Equipment Operators.

c. 1 Shift Superintendent (SRO), 1 Control Room Supervisor (SRO), 1 Licensed Operator (RO), 2 Plant Equipment Operators.

d. 1 Shift Superintendent (SRO), 1 Control Room Supervisor (SRO), 2 Licensed Operators (RO), 2 Plant Equipment Operators.

QUESTION: 003 (1.00)

As delineated in "Control Of System Alignments" procedure SO123-0-23, each of the following may be used as the SOLE means of verifying position for Independent Verification EXCEPT:

a. Verifying the East SI Pump (G50A) breaker CLOSED by the pump starting and discharge header pressure PI-910A increasing to 150 psig.

b. Checking local valve position closed and locking mechanism LOCKED to verify manual valve SIS-385, SIS Purge to RWST CLOSED.

c. Checking the green open indication on the Control Board to verify the 4 KV output breaker for #1 DG is OPEN.

d. Verifying the Control Room Emergency Air Treatment System Unit Emergency Makeup Fan A-33 starts by locally observing the fan shaft rotation.

QUESTION: 004 (1.00)

A reactor thermal power calibration is to be performed with the reactor in a steady state condition and steam generator blowdown secured. The following parameters are verified:

Pressurizer pressure (PT-430) and level (LT-430) - 2085 psig, 34%
Main Steam pressure (PI-459B) - 800 psig
Feedwater differential pressure (FI-456, 457 & 458) - 280 psid, 275 psid and 280 psid
Feedwater temperature (TR-456) - 375 degrees F

Which one of the following values is the current reactor power as determined by manual calculation per "Reactor Thermal Power Calibration" SO1-12.1-2?
(NOTE: Instruction SO1-12.1-2 is attached for use.)

a. 92%

b. 88%

c. 84%

d. 80%

QUESTION: 005 (1.00)

The plant is at 75% reactor power when a failure of one Heater Drain Pump occurs. The system can be isolated but NOT drained without disassembly of system joints (flanges). What type of Work Authorization would be issued by the Licensed Operator on shift to DRAIN the system?

a. Approval.

b. Pick-Up Item.

c. Permission.

d. Clearance.

QUESTION: 006 (1.00)

Which one of the following indicates the FORM that authorizes a person to initiate work on deactivated/de-energized components and provides the assurance that the status will NOT be changed?

a. Work Authorization Record (WAR).

b. Component Control Form.

c. Clearance Form.

d. Equipment Deficiency Mode Restraints (EDMR).

QUESTION: 007 (1.00)

Which one of the following statements describes a Radiation Workers responsibility as delineated in "ALARA Program" procedure SO123-VII-3.5?

a. The worker must perform his own radiological survey prior to commencing work in a radiation area.

b. The equipment to be worked on must be determined radiation-free prior to disassembly of the components.

c. The worker must wear the required dosimetry for expected conditions in the area where the work occurs.

d. Work tasks must be combined provided the number of people in the work area does not increase by a factor of two.

QUESTION: 008 (1.00)

Which one of the following would be required to be marked as a HOT SPOT in accordance with "Posting" procedure SO123-VII-7.4?

The elbow of a pipe reading:

a. 140 mrem/hr on contact in a room that has been posted as a High Radiation Area of 105 mrem/hr

b. 50 mrem/hr on contact in a room that has been posted as a Radiation Area of 20 mrem/hr.

c. 30 mrem/hr on contact in a room that is NOT posted as a Radiation Area but is within a Red Badge Zone reading 2 mrem/hr.

d. 10 mrem/hr on contact in a room that is NOT posted as a Radiation Area but is within a Red Badge Zone reading 1 mrem/hr.

QUESTION: 009 (1.00)

All of the following are acceptable methods for verifying the revision and any TCNs are current for a user-controlled copy of a procedure EXCEPT:

a. access of SCE Document Verification System.

b. contact CDM by telephone.

c. check against the last procedure copy used.

d. reference the current week Configuration Control Log.

QUESTION: 010 (1.00)

Select the individual below that is normally given the authority to control access to the Control Room during normal full power operation according to "Control Room Access And Conduct", procedure SO123-0-15.

a. Operations Manager.

b. Control Room Supervisor.

c. Security Shift Supervisor.

d. Licensed Operator (RO).

QUESTION: 011 (1.00)

Which one of the following describes an off-normal condition for the RCS Makeup System controls with the reactor at power?

a. The Boric Acid Injection Pump START pushbutton is lit (running) when the system is in standby for AUTO MAKEUP.

b. The Blend to Charging Pump Suction(CV406B) / Blend to VCT(CV406A) control is selected to the "406B" position when the system is aligned for BORATE.

c. The Primary Makeup Water Integrator LED display advances (count up) when the system is operating in DILUTE mode.

d. The Boric Acid Transfer Pumps Discharge Valve CV334 indication is lit RED (open) when the system is aligned for borating the RCS using the Emergency Boration flow path.

QUESTION: 012 (1.00)

According to "Use Of Procedures" procedure SO123-0-20, which one of the following activities must be performed through in-hand use of the associated instruction under normal operating conditions?

a. Starting an RCP motor for post-maintenance testing with the motor uncoupled in accordance with "Reactor Coolant Pump Operation" procedure SO1-4-3, section 6.5.

b. Shifting the selected Holdup Tank in accordance with "Liquid Radioactive Waste Receiving And Storage Operations" procedure SO1-5-14, section 6.2.1.

c. Manually operating the travelling screens in accordance with "Screen Wash System Operations" procedure SO1-7-7, section 6.4.1.

d. Diluting the RCS by 5 ppm in accordance with "Boric Acid System Operations" procedure SO1-4-13, section A 6.5.

QUESTION: 013 (1.00)

When performing SONGS 1 Emergency Operating Procedures, monitoring of Critical Safety Function Status Trees (CSFST) may be discontinued when deemed appropriate by the:

a. Emergency Coordinator (Station Emergency Director).

b. Operations Manager.

c. Shift Superintendent.

d. Control Room Supervisor.

QUESTION: 014 (1.00)

While at full power normal operations SHUTDOWN GROUP II rods are exercised in accordance with "Control Rod Exercise" procedure SO1-12.3-24 section 2.5. Which one of the following statements describes the operator actions required to position the rod control switches to enable exercising these rods?

a. The Overlap Cutout Switch is rotated to Position 2; and the Group Selector Switch is rotated to MANUAL and pushed IN.

b. The Overlap Cutout Switch is rotated to Position 2; and the Group Selector Switch is rotated to MANUAL and pulled OUT.

c. The Overlap Cutout Switch is maintained in Overlap 1 & 2; and the Group Selector Switch is rotated to Position 2 and pushed IN.

d. The Overlap Cutout Switch is maintained in Overlap 1 & 2; and the Group Selector Switch is rotated to Position 2 and pulled OUT.

QUESTION: 015 (1.00)

All of the following are reasons for maintaining rods above the Control Rod Insertion Limits EXCEPT:

a. ensure core subcriticality following a reactor trip.

b. maintain an acceptable core power distribution during operation.

c. provide for a negative moderator temperature coefficient (MTC).

d. limit the reactivity insertion for a control rod ejection.

QUESTION: 016 (1.00)

Which one of the following statements provides the reason for the Precaution regarding the pressure limit between the thermal barrier heat exchanger CCW side and the Primary (RCS) when component cooling water is isolated from the thermal barrier heat exchanger, as detailed in Reactor Coolant Pump Operation" procedure SO1-4-3?

a. Ensure there is NO damage to the Lower Radial Bearing due to expansion.

b. Prevent over-stressing of the thermal barrier heat exchanger coils.

c. Preclude thermal stress induced damage to the Floating Ring Seal.

d. Ensure that the induced RCS pressure rise is limited for solid plant operations.

QUESTION: 017 (1.00)

With the plant operating at full power, which one of the following sets of numbers describes the nominal values for normal RCP operation for seal injection flow, seal injection to RCS flow and No. 1 seal leak off flow for ONE RCP?

(gpm = gallons per minute; gph = gallons per hour)

	Seal Injection	Seal Injection to RCS	Seal Return
a.	10 gpm	10 gpm	2 gph
b.	7 gpm	2 gpm	5 gpm
c.	5 gpm	5 gpm	5 gph
d.	7 gpm	5 gpm	2 gpm

QUESTION: 018 (1.00)

The following plant conditions exist:
MODE 1 full power
All systems are in automatic
A leak has developed on the reference leg of the controlling pressurizer level instrument LT-430 which causes the reference leg to completely drain.

Which one of the following statements describes the affect this leak would have on the CVCS? (Assume NO operator action is taken for systems in automatic.)

a. Charging flow valve FCV-1112 decreases flow lowering actual pressurizer level.

b. Letdown isolation valve LCV-1112 closes raising actual pressurizer level.

c. RWST suction valves MOVs 100B & D open borating the RCS.

d. Charging isolation valve CV-304 closes isolating seal injection flow to the RCPs.

QUESTION: 019 (1.00)

Which one of the following statements describes the action that alters the primary source of letdown from the RCS during a normal plant cooldown when CVCS letdown is changed from its normal (power operation) path to the RHR loop?

a. RHR Inlet Isolation valves MOV-813 & MOV-814 are opened.

b. RHR Flow Control valve HCV-602 is opened.

c. CVCS Excess Letdown Isolation valve CV-287 and Flow Control valve HCV-1117 are opened.

d. CVCS Letdown Isolation valve LCV-1112 is closed.

QUESTION: 020 (1.00)

While performing an RCS makeup, the running South Boric Acid Transfer Pump trips. Which one of the following electrical busses identifies the location to which the operator would go to check the breaker feeding this pump?

a. 4160 V bus 1B.

b. 480 V bus 3.

c. 480 V MCC 1.

d. 125 V DC bus 2.

QUESTION: 021 (1.00)

Which one of the following statements describes the indication available to the Control Room operator to determine that the SIS signal has been generated by the Safeguard Load Sequencing System?

a. Sequencer Load Group amber lights for Groups A-F immediately extinguish.

b. Sequencer Load Group white lights for Group A extinguish per load sequence.

c. Sequencer Load Group white lights for Groups A-F immediately illuminate.

d. Sequencer Load Group amber lights for Groups B-F illuminate per load sequence.

QUESTION: 022 (1.00)

The Safeguard Load Sequencing System contains Input Buffer Cards that receive input from various plant parameters including Pressurizer pressure, 4 KV Bus voltage and DG speed & voltage.

If the input parameter is in its "NORMAL" state (NOT at the trip setpoint) the Input Buffer Card will indicate this by:

a. blue lights that are NOT lit.

b. white lights that are lit.

c. red lights that are lit.

d. amber lights that are NOT lit.

QUESTION: 023 (1.00)

Which one of the following statements describes the method utilized by the Digital Detection Indication of the Rod Position Indication System to determine demanded rod position?

a. The current signal to the Stationary Gripper coil for each rod subgroup is measured for time duration and converted to a digital indication.

b. The contactor providing the current signal to a rod sub group lift coil causes the digital counter to move a step.

c. The LVDT associated with each rod sub group measure rod drive shaft position by induced current signal which is averaged to give the digital counter position.

d. The IN and OUT position contactors for the Control Rod IN-HOLD-OUT switch provides the signal that moves the digital counter.

QUESTION: 024 (1.00)

The following plant conditions exist:
Mode 1 full power
All systems operating in automatic

Which one of the following statements describes the effect of loss of 120 VAC power to N1205 (N41) Power Range drawer? (Assume NO operator action taken)

a. Control Bank 2 would begin to move outward to compensate for lower indicated NIS power.

b. The AUTOMATIC rod withdrawal would be prevented due to an active P-3 signal Rod Drop Rod Stop.

c. Pressurizer program level would lower to 25% due to the auctioneered LOW NIS Power Range input.

d. The Channel Comparator automatically removes the failed channel input from the comparison circuit.

QUESTION: 025 (1.00)

Which one of the following statements identifies the type of detectors utilized in the Excore Nuclear Instrumentation System?

a. Source Range - Campbelling inert-gas counter; Intermediate Range - Uncompensated ion chamber; Power Range - Fission chamber.

b. Source Range - Fission chamber; Intermediate Range - Compensated ion chamber; Power Range - Uncompensated ion chamber.

c. Source Range - Gas-filled spark chamber; Intermediate Range - BF3 Proportional counter; Power Range - Fission chamber.

d. Source Range - BF3 Proportional counter; Intermediate Range - Fission chamber; Power Range - Uncompensated ion chamber.

QUESTION: 026 (1.00)

Which one of the following statements describes the actions required to remove an Intermediate Range Excore Nuclear Instrument System channel from service to prevent a reactor trip?

a. Pullout the Control Power fuses for the chosen channel.

b. Place the Test Mode Switch to the VARIABLE position.

c. Place the Trip/Rod Stop Switch to the BYPASS position.

d. Place the Operation Selector Switch to the CUTOUT position.

QUESTION: 027 (1.00)

Which one of the following statements identifies the features of the Core Exit Thermocouple input to the Subcooling Monitoring System ?

a. A specific eight dedicated Thermocouples that can have their output aligned by a switch to the subcooling monitor.

b. A specific eight dedicated Thermocouples have their output directly sent to the subcooling monitor.

c. Any eight selected Thermocouples have their output directly sent to the subcooling monitor.

d. Any eight selected Thermocouples that can have their output aligned by a switch to the subcooling monitor.

QUESTION: 028 (1.00)

The following plant conditions exist:

MODE 5
RCS drained to below the vessel flange

Which one of the following statements apply to operation of the CRDM Fans (A-8, A-8S and A-8SS) under these conditions ?

a. The fans should NOT be operated for extended periods to prevent cooling the reactor vessel head below NDT.

b. The fans should NOT be operated for extended periods to prevent interference with required Reactor Cavity air flow.

c. The fans should be operated CONTINUALLY to remove CRDM generated heat.

d. The fans should be operated CONTINUALLY to ensure an adequate heat load is maintained on the TPCW system.

QUESTION: 029 (1.00)

Which one of the following describes the method by which hydrazine is added to Containment Spray injection flow?

a. The hydrazine is injected into the discharge header of the Recirculation Pumps by nitrogen overpressure in the Hydrazine Storage Tank when the discharge valves SV-600 and SV-601 open.

b. The hydrazine is injected into the discharge header of the Refueling Water Pumps by the running Hydrazine Pumps when the discharge valves SV-600 and SV-601 open.

c. The hydrazine is siphoned into the suction header of the Refueling Water Pumps by the Hydrazine eductor when the discharge valves SV-600 and SV-601 open.

d. The hydrazine is injected into the suction header of the Recirculation Pumps from the Hydrazine Storage Tank by gravity feed when the discharge valves SV-600 and SV-601 open.

QUESTION: 030 (1.00)

The following plant conditions exist:

Mode 3 after a reactor trip and SI signal from full power
All systems function as designed
SI signal has been reset per SO1.0-12 "SI Termination"

How many Condensate Pumps should be running at this time? (Assume NO other operator actions have been taken other than as directed by procedures.)

a. Zero

b. Two

c. Three

d. Four

QUESTION: 031 (1.00)

The following plant conditions exist:
A reactor trip has occurred from full power
A turbine trip coincident with AFW initiation and trip of BOTH Feed Pumps also occurred
All systems are responding as expected

Which one of the following statements describes the indication available to the operator in the control room to verify that feedwater lines to the Steam Generators have been isolated?

a. The Feedwater Regulating Valves Auto Level Setpoint meters read 100%.

b. The SIS/Aux Trip Reset pushbuttons are backlit red.

c. The Feedwater Block Valves green position indication light illuminates.

d. The FEEDWATER ISOLATION ALERT annunciator alarms.

QUESTION: 032 (1.00)

Which one of the following describes the method by which feedwater is introduced into the Steam Generator?

A feed ring distributes flow:

a. into the lower tube bundle area through inverted J-tubes mounted on bottom of the feed ring.

b. into the lower tube bundle area through holes in the top of the feed ring.

c. around the wrapper plate through inverted J-tubes mounted on top of the feed ring.

d. around the wrapper plate through holes in the bottom of the feed ring.

QUESTION: 033 (1.00)

Which one of the following conditions associated with the Steam Generator Water Level Control System will result in an automatic Turbine Trip/Reactor Trip at full power?

a. Steam Generator HIGH level of 85% in all Steam Generators.

b. Steam Generator LOW-LOW level of 5% in all Steam Generators.

c. Feedwater LOW flow of 2.25 10E4 lbm/hr to all Steam Generators.

d. Steam flow 25% of feedwater full load flow of 4.755 lbm/hr to all Steam Generators.

QUESTION: 034 (1.00)

Which one of the following statements describes actions that occur to restore Auxiliary Feedwater flow after an automatic AFW initiation signal was generated and the Train "B" motor-driven pump G-10W tripped 5 minutes after starting?

a. The Train "A" motor-driven pump G-10S starts and Train "A" turbine-driven pump G-10 starts warmup upon the AFW initiation signal.

b. The Train "A" turbine-driven pump G-10 starts to rated speed upon the AFW initiation signal and the Train "A" motor-driven pump G-10S starts when the Train "B" pump tripped.

c. The Train "A" motor-driven pump G-10S starts and turbine-driven pump G-10 starts to rated speed when the Train "B" pump tripped.

d. The Train "A" motor-driven pump G-10S starts upon the AFW initiation signal and the Train "A" turbine-driven pump G-10 starts warmup when the Train "B" pump tripped.

QUESTION: 035 (1.00)

The following plant conditions exist:

Mode 3 following a reactor trip
Auxiliary Feedwater actuation occurred
Systems responded as designed except that following the trip Vital Bus No. 5 supply breaker opened and all components previously supplied are now de-energized.

Which one of the following indications should be used as positive indication of Auxiliary Feedwater System flow?

a. AFWST level.

b. Steam Generator level.

c. AFW valve alignment verification.

d. Steam Generator to AFW discharge differential pressure .

QUESTION: 036 (1.00)

Which one of the following is an acceptable alternative source of supply to the Auxiliary Feedwater System as delineated in "Auxiliary Feedwater System Operations" procedure SO1-7-3 that uses permanently installed piping?

a. Condensate Storage Tank to the AFW Pump suction.

b. Domestic Water System to AFW Pump discharge.

c. Turbine Plant Cooling Water to the AFWST.

d. Service Water Reservoir to the AFWST.

QUESTION: 037 (1.00)

With the DC Electrical System aligned for normal plant operations at 50% power, which one of the following statements describes the response of the #1 DC Bus to a blown fuse (loss of power) on the in service "A" Battery Charger?

a. The standby Battery Charger automatically picks up the load when the blocking diode voltage setpoint is reached.

b. The standby Battery Charger picks up the load as soon as the AC input breaker automatically closes.

c. The #1 Battery picks up the load as soon as its DC output breaker automatically closes.

d. The #1 Battery picks up the load as soon as the Battery Charger voltage drops below its setpoint.

QUESTION: 038 (1.00)

Which one of the following statements describes the flowpath and purpose for routing of the discharge from the Decon Drain Tank (DDT)?

a. If the water is contaminated with chromates and scum, the water is first directed to the HUT for decay and processing through demins prior to release.

b. If the water contains soaps and oil, the water is first directed to the monitor tank for decay and release.

c. The water is first directed to the Gas Stripper for removal of entrained radioactive gases and volatile liquids.

d. The water is first directed to the Radwaste Ion Exchangers for removal of radioactive ions and suspended solids.

QUESTION: 039 (1.00)

The following plant conditions exist:

Mode 3 at 1900 psig Pressurizer pressure
HP reports that Control Room Area Radiation Monitor R-1231 has failed

Which one of the following statements describes the required operator response to this failure?

a. IMMEDIATELY stop containment purge if in progress.

b. Within one hour initiate corrective action in accordance with Technical Specifications.

c. Don Self-contained Breathing apparatus until the Control Room Emergency Ventilation System has operated for an 2 hours.

d. Return the monitor to service within 4 hours in accordance with Technical Specifications.

QUESTION: 040 (1.00)

Which one of the following statements describes the potential therm~~o~~al-hydraulic effects on the fuel following core uncovery and re-introduction of water to the core during the refill/reflood stage of a design Large-Break LOCA?

a. The fuel and clad temperature are near the interaction temperature of 3500 degrees F and as water is introduced into the core area the fuel pellets begin to melt.

b. Water beads on the very hot cladding surface which limits the heat transfer capability until the cladding surface is cooled by steam convection .

c. Rapid cooling causes the imbrittled metal cladding to split for up to two-thirds of the fuel elements primarily in the inner core regions.

d. The fuel temperature is near the melting point of 2500 degrees F and as water is introduced into the core area the quenching causes the fuel pellet to disintegrate into small chips.

QUESTION: 041 (1.00)

Which one of the following statements describes an interlock feature of west Main Feed Pump SI Suction Valve HV-853B upon an SI actuation signal?

a. If the valve has not opened within 30 seconds of the feed pump start signal, the west feed pump will trip.

b. If the valve has not opened within 1 minute of the SI actuation signal, its corresponding discharge valve HV-851B will re-close.

c. The valve will only get an open signal if the associated west safety injection pump is running.

d. The valve will only get an open signal if the associated condensate suction valve HV-854B closes.

QUESTION: 042 (1.00)

Which one of the following statements describes the design feature associated with the Main Feed pump that allows them to also serve as the SI pump for delivery of borated water to the RCS?

a. Each pump can deliver 10,500 gpm at approximately 1160 psig to the RCS.

b. The pump impeller was manufactured with tight tolerances that allow for rapid temperature changes without damage.

c. Sealing water for the pump is supplied by the safety related CCW system.

d. The recirculation cooling capacity is sufficient to allow for extended operation with the pump suction blocked.

QUESTION: 043 (1.00)

The following plant conditions exists:
A Large-Break LOCA has occurred
All equipment operated as expected
Normal Cold Leg Injection path has been aligned and verified
RWST level has reached 12% and the operator is preparing to align for Cold Leg Recirculation

Which one of the following valves will be operated from the control room in order to complete the alignment for the normal Cold Leg Recirculation flowpath?

a. Seal Injection Manifold Filter Bypass MOV-18.

b. CVCS Charging Flow Control FCV-1112.

c. RWST Outlet MOV-883.

d. Residual Heat Removal Flow Control HCV-602

QUESTION: 044 (1.00)

Which one of the following statements completes the description of conditions required for actuation of the Overpressure Mitigation System?

The PORVS are in AUTO, the OMS controls are in ENABLE and:

a. RHR discharge pressure is GREATER THAN 400 psig.

b. RCS Wide Range pressure is GREATER THAN 400 psig.

c. Pressurizer pressure is GREATER THAN 420 psig.

d. CVCS letdown pressure is GREATER THAN 420 psig.

QUESTION: 045 (1.00)

Which one of the following describes the power supply for the Pressurizer Safety Valve open indication (red position indicating lights) on the North Vertical Board and for the Reactor Plant First Out Annunciator "SAFETY VALVE OPEN"?

a. 120 VAC from the Utility Bus for the valve discharge temperature elements.

b. 120 VAC from two of the Vital Busses to limit switches on the valves.

c. 125 VDC from the DC Switchgear to solenoid poppets in the discharge flowpath.

d. 125 VDC rectified from the 480 VAC MCC that provides motive power for the valves.

QUESTION: 046 (1.00)

Which one of the following statements is consistent with an INDICATION in the Control Room that voids or a steam bubble has formed in the RCS (upper plenum) following a loss of the secondary heat sink?

a. Pressurizer level rapidly increases.

b. Pressurizer vapor space temperature rapidly increases.

c. Reactor coolant pump running amps increase.

d. Core exit thermocouple temperatures rapidly decrease.

QUESTION: 047 (1.00)

Which one of the following describes the indication available to the operator to inform him that one channel PT-430 of Pressurizer Variable Low Pressure (VLPT) is placed in the TRIPPED position as part of approved I&C testing?

a. The VLPT knife switch for channel PC-430 located in rack R-3 will be closed.

b. The VLPT Calculator module for PC-430 located in a rack behind the West Vertical Board will have its LED illuminated.

c. Reactor Plant First Out Annunciator PRESSURIZER VARIABLE LOW PRESSURE REACTOR TRIP will alarm.

d. Reactor Plant Matrix Partial Trip Annunciator PRESSURIZER VAR LO PRESS REACTOR TRIP CHANNEL I will alarm.

QUESTION: 048 (1.00)

Which one of the following statements describes the purpose or basis for the Variable Low Pressure Trip reactor trip?

a. This ensure the reactor is tripped if Safety Injection occurs.

b. It protects the fuel from DNB.

c. This ensures voids are not formed.

d. It prevents exceeding hot channel factors.

QUESTION: 049 (1.00)

While heating up the plant in MODE 4, which one of the following statements describes how Containment Purge Exhaust is isolated in the event of a LOCA?

a. The Purge Exhaust valve POV-10 is maintained closed and its associated manual isolation valve CVS-313 is LOCKED closed.

b. The open Purge Exhaust valve POV-10 receives a closed signal on CIS and the associated manual isolation valve CVS-313 must be manually closed within 15 minutes.

c. The open Purge Exhaust valve POV-10 receives a closed signal and the running Exhaust fan (A-21, 22 or 24) receives a trip signal on CIS.

d. The Purge Exhaust valve POV-10 is maintained closed and all Exhaust fans (A-21, 22 & 24) are TAGGED off.

QUESTION: 050 (1.00)

Which one of the following statements describes the automatic function associated with LC-615 Spent Fuel Pit level controller?

a. It opens the makeup valve CV-327 from the Primary Plant Makeup Water system upon a sensed LOW level.

b. It opens the Radwaste Ion Exchanger divert valve SFP-320 upon a sensed HIGH level.

c. It activates the Spent Fuel Building evacuation alarm upon a sensed LOW level.

d. It actuates the Spent Fuel Pit Hi Level annunciator upon a sensed HIGH level.

QUESTION: 051 (1.00)

Which one of the following statements describes what the normal power system alignment is to energize 4160 VAC Bus 1B while at 10% reactor power?

a. Auxiliary Transformer B supply breaker to the 1B Bus is closed.

b. Auxiliary Transformer C supply breaker to the 1B Bus is closed.

c. Auxiliary Transformer C supply breakers to the 2C Bus and the 2C; and 1B bus tie breaker are closed.

d. Auxiliary Transformer B supply breakers to the 2C Bus and the 2C; and 1B bus tie breaker are closed.

QUESTION: 052 (1.00)

Which one of the following statements describes the operation of a Vital Bus transfer between its normal power source and its alternate power source?

a. Power will automatically transfer from normal to alternate (within 50 milliseconds) but must be manually transferred by pushbutton from alternate to normal.

b. Power must be manually transferred by pushbutton from normal to alternate but will automatically transfer from alternate to normal (within 50 milliseconds).

c. Power must be manually transferred by pushbutton from normal to alternate and the Vital bus must be de-energized to allow a return to normal.

d. The Vital bus must be de-energized to allow a transfer to alternate but power can be manually transferred by pushbutton from alternate to normal.

QUESTION: 053 (1.00)

Which one of the following describes the condition associated with the Starting Air System for the Diesel Generator that will DISABLE the Diesel Generator AUTOMATIC (Sequencer) start circuit?

a. ONE of the two starting air headers pressure LESS THAN 210 psig.

b. BOTH the starting air headers pressure LESS THAN 210 psig.

c. ONE of the two starting air headers pressure LESS THAN 150 psig.

d. BOTH the starting air headers pressure LESS THAN 150 psig.

QUESTION: 054 (1.00)

Which one of the following statements describes the relationship of 125 VDC system and the Diesel Generator system?

a. The Standby Lube Oil pumps have 125 VDC motors.

b. The fuel racks are positioned by a 125 VDC driven pinion.

c. The diesel control power is supplied by 125 VDC system.

d. The generator excitation is maintained after flashing by the 125 VDC system.

QUESTION: 055 (1.00)

Which one of the following describes the location where the radiation reading is indicated for channel R-1259, Post Accident Sample System (PASS) monitor?

a. Control Room meter on the North Vertical Board.

b. Control Room recorder on the RM-23 control panel.

c. Remote meter located in the PASS room.

d. Remote recorder located on the Radwaste Control Panel.

QUESTION: 056 (1.00)

Which one of the following statements describes the effect on the Unit 1 Fire Water System when the Unit 1 - Unit 2/3 cross-tie valve PIV-I closed for repair on Unit 2/3 header?

a. One of the Unit 1 Fire Pumps must be started and kept running in order to maintain Unit 1 header pressure.

b. The automatic start setpoint for the Fire Pumps is reduced since the Service Water pumps are maintaining Unit 1 header pressure.

c. The Unit 2/3 Fire Water Jockey pumps are re-aligned to Unit 1 header in order to maintain pressure in the header.

d. The Unit 1 header pressure high alarm setpoint is increased since the pressure will be higher with Unit 2/3 header isolated.

QUESTION: 057 (1.00)

Which one of the following identifies the "normal" power source for the East RHR pump when the pump is operated for cooldown of the RCS?

a. 4160 VAC bus 2C.

b. 4160 VAC bus 1B.

c. 480 VAC bus #1.

d. 480 VAC MCC #2.

QUESTION: 058 (1.00)

Which one of the following describes the flowpath utilized to prevent RHR pump damage during normal system warm-up prior to placing in service?

a. The CVCS Letdown Divert valve LCV-1100A is adjusted open.

b. Hot Leg Recirculation valve RHR-004 is opened.

c. RHR Outlet Isolation valves MOV-833 and MOV-834 are opened and Flow Control valve HCV-602 is closed.

d. A RHR recirculation line is open downstream of Flow Control valve HCV-602.

QUESTION: 059 (1.00)

Which one of the following describes the interlock between respective Component Cooling Water Heat Exchanger outlet valves MOV-720A & MOV-720B and the controls for the associated North and South Salt Water Cooling Pumps [G-13A & G-13B]?

a. The Salt Water Cooling Pump will AUTO stop if the valve has stroked fully CLOSED.

b. The Salt Water Cooling Pump will NOT start until the valve has stroked fully OPEN.

c. The valve will NOT remain open if the Salt Water Cooling Pump is stopped.

d. The valve will NOT remain closed if the Salt Water Cooling Pump is running.

QUESTION: 060 (1.00)

Which one of the following conditions will cause the DC Thermal Barrier Emergency Cooling pump to AUTO start?

a. Loss of power to a running CCW pump for 10 seconds.

b. CCW low discharge pressure for 15 seconds.

c. Safety Injection Signal [SIS].

d. Loss of voltage on the 1C 4KV bus.

QUESTION: 061 (1.00)

Which one of the following choices completes the following statement about the Hydrogen Recombiners.

In accordance with Operating Instruction SO1-5-11, "Post-Accident Containment Hydrogen Control", the operator will adjust the Recombiner power from the Recombiner control panel located in the _______________ and VERIFY proper operation by monitoring _________________.

a. Main Control Room; Recombiner thermocouple temperature

b. Main Control Room; Containment temperature

c. 2nd Floor Vent Room; Recombiner power wattage

d. 2nd Floor Vent Room; Containment hydrogen concentration

QUESTION: 062 (1.00)

Which one of the following describes an attribute that is characteristic of the valve positioners for the Atmospheric Steam Dump valves?

a. Full control air signal is directed to the valve positioner when the Steam Dump Transfer switch is placed in the "LOCAL" position.

b. Full control air signal is directed to the valve actuator when the Mode Selector switch is placed in the "OFF" position.

c. The "Blow Down" feature ensure full control air signal that dumps air from the valve actuator.

d. The "Blow Open" feature actuates solenoid valves which port air directly to the valve actuator.

QUESTION: 063 (1.00)

Which one of the following statements describes the response of the Control Oil System to a MANUAL turbine trip from full power?

a. The trip block dumps Auto Stop Oil (ASO), moving the trip piston that drains governor oil from each Governor Valve and H.P. oil from each Stop Valve.

b. The governor impeller loses discharge oil pressure which causes the H.P. oil dump valves to dump for each Stop Valve.

c. The governor transformer generates an electrical signal to open the Disk Dump Valves that drains governor oil from each Governor Valve.

d. The Turbine Supervisory System delivers an electrical signal to the solenoid trip device which directs Auto Stop Oil to the closure port for each Governor Valve and Stop Valve .

QUESTION: 064 (1.00)

Which one of the following provides the reason for the CAUTION in SO1-7-1 "Instrument And Service Air System Operation" that warns that the Service Air header should never be valved into the Containment Instrument Air header, except in an emergency?

a. Service Air header pressure is higher than the design pressure for the Containment Instrument Air header and piping failure may occur.

b. Service Air header contains air of a higher moisture content and the water condensing out may adversely impact instrument operation.

c. Containment Instrument Air header is not normally pressurized and interconnecting the headers may lower Service Air header pressure below the isolation setpoint.

d. Containment Instrument Air header enters area where contamination exists and interconnecting the headers may contaminate the Service Air header.

QUESTION: 065 (1.00)

Which one of the following is an indication of a Control Rod Bank or Group failure that would direct the operator to Attachment 3, "Control Rod Bank or Group Failure" of Abnormal Operating Instruction SO1-2.3-1, "Control Rod System Malfunctions" ?

a. The rod drive slave cycler failure rod stop alarm is clear.

b. ONE control bank subgroup step counter indicates 5 steps lower than the remaining subgroup counters.

c. The Hold Mode lights are "Illuminated".

d. Control Rod Shutdown Margin LOW alarm annunciates.

QUESTION: 066 (1.00)

Which one of the following is the MAXIMUM number of steps that a control rod may be misaligned from the indicated bank position on the step counters BEFORE Technical Specification ACTION is required to be entered?

a. 24

b. 29

c. 34

d. 39

QUESTION: 067 (1.00)

Which one of the statements below is the basis or reason for the following note from SO1-2.7-4, "Alternate Shutdown for Fire in the Yard Area" Abnormal Operating Instruction?

NOTE: At and below 350-F RCS temperature, RCP seal flow is optional, but preferred.

a. Seal injection water cannot be cooled sufficiently without CCW cooling flow.

b. RCP pump bearing temperature will NOT affect RCP seal operation.

c. The allowable RCS pressure is insufficient to provide flow past the RCP thermal barrier.

d. RCS leakage past the RCP seals causes minimal degradation of the seal.

QUESTION: 068 (1.00)

Which one of the following statements correctly describes RCP seal leakage control in the event of a #1 seal failure during full power operations with NO operator actions?

a. The Floating Ring seal limits the seal leakage to about 100 gpm for a relatively short period of pump operation.

b. The #1 seal continues to limit the seal leakage to about 2 gpm, even with a failure, for an extensive period of pump operation.

c. The #2 seal limits the seal leakage to about 2 gpm for an extensive period of pump operation.

d. The #3 seal limits the seal leakage to about 100 gpm for a relatively short period of pump operation.

QUESTION: 069 (1.00)

Which one of the following is an IMMEDIATE operator action required by "Emergency Boration", SO1-2.1-12?

a. Ensure at least one charging pump is operating.

b. Increase Letdown flow to 90 gpm.

c. Manually trip the reactor.

d. Terminate RCS Dilution in progress.

QUESTION: 070 (1.00)

Which one of the following would be the approximate percent shutdown increase, if 600 gallons of boric acid have been "Emergency Borated" into the RCS from the Boric Acid Storage Tank (BAST)?

a. 0.5

b. 1.0

c. 2.0

d. 3.0

QUESTION: 071 (1.00)

All of the following are actions required to be taken, according to "Response To Nuclear Power Generation/ATWS" Emergency Operating Instruction SO1-1.1-1, if a reactor trip has NOT been verified EXCEPT:

a. Manually insert the control rods.

b. Manually initiate Safety Injection.

c. Locally open the reactor trip breakers.

d. Locally open DC supply breaker 72-141 to control rods.

QUESTION: 072 (1.00)

Following a large steam line rupture, monitoring of Critical Safety Function Status Trees [Emergency Operating Instruction SO1-1.0-1] indicates a RED path for RCS Integrity.

Which one of the statements below correctly identifies the most limiting component and reason for concern that Pressurized Thermal Shock conditions may result in brittle failure of an existing flaw ?

a. The Pressurizer interior [inside] wall due to increased tensile stress resulting from the large temperature drop.

b. The Pressurizer exterior [outside] wall due to increased tensile stress resulting from lower internal pressure.

c. The Reactor Vessel interior [inside] wall due to the increased tensile stress resulting from the large temperature drop and neutron irradiation.

d. The Reactor Vessel exterior [outside] wall due to the increased tensile stress resulting from the large pressure decrease and neutron irradiation.

QUESTION: 073 (1.00)

Emergency Operating Procedure SO1-1.0-20, "Loss Of Reactor Coolant", instructs the operator in Step 3 to establish and maintain SG levels between 50% and 70%.

Which one of the statements below describes the basis for maintaining the SG level in the event of a SMALL Break LOCA [break diameter - 3/8" to 2.55"] ?

The Steam Generators act as:

a. a heat source to maintain stable RCS conditions when the decay heat production rate falls below the cooling rate provided by the combined subcooled safety injection and break energy removal.

b. an alternate source of water inventory for spillage to the Containment Sump.

c. a condensation pot for the steam in the Steam Generator tubes resulting in the collapsing of the loop seal in the reactor coolant pipe between the RCP suction and the Steam Generator.

d. a heat sink when Steam Generator pressure rises to the safety valve setpoint for heat removal.

QUESTION: 074 (1.00)

Which one of the following actions is an IMMEDIATE action associated with "Shutdown From Outside the Control Room", procedure SO1-2.5-4?

a. Notify plant personnel.

b. Ensure the West AFW pump is running,

c. Obtain a radio transmitter.

d. Verify Saltwater cooling in service.

QUESTION: 075 (1.00)

Which one of the responses below is the basis or reason for the following step in "Shutdown From Outside the Control Room" procedure SO1-2.5-4?

"Throttle Closed MSS-301 and MSS-302, Main Steam 24" Maintenance Block valves as necessary to maintain Tave at 535-F."

a. The main turbine is still rotating.

b. The turbine driven AFW pump has automatically started.

c. The Steam Dumps are discharging to the condenser.

d. The secondary drain traps are unisolated.

QUESTION: 076 (1.00)

During the performance of "Loss Of Condenser Vacuum" procedure SO1-2.4-3, an automatic Unit Trip on low vacuum may be expected to occur at?

a. 26" Hg vacuum decreasing.

b. 22" Hg vacuum decreasing.

c. 5.5" Hg vacuum increasing.

d. 5.5" Hg absolute pressure increasing.

QUESTION: 077 (1.00)

As cautioned by "Steam Generator Tube Rupture", Emergency Operating Instruction SO1-1.0-40, the operator must stop the Feed and SI pumps for which one of the conditions listed below?

a. Ruptured SG level is exceeding 90%.

b. Auxiliary Feedwater Tank level approaches 4 feet.

c. Pressurizer level is nearing 5%.

d. RWST level has lowered to 40%.

QUESTION: 078 (1.00)

Select the flow rate below that correctly completes the following CAUTION from "Loss Of Secondary Coolant", SO1-1.0-30, as it would apply to a single main feedwater line break:

"A minimum feed flow of ___ GPM must be maintained to each intact SG to prevent SG dryout."

a. 25

b. 50

c. 100

d. 150

QUESTION: 079 (1.00)

Initially the following plant conditions exist:

Reactor power is at 50%
Tavg is at 542 degrees F
Pressurizer pressure is at 2085 psig
Pressurizer level and level setpoint are at 30%
All pertinent systems are in AUTOMATIC except Rod Control is in MANUAL

An instrument failure occurs after 5 minutes such that the operator notes that Pressurizer level and its setpoint are increasing to a a new value of 36.5%.

Which one of the failures below would have caused this response assuming there was NO operator action taken ?

a. Pressurizer level channel LT430 failed HIGH.

b. Nuclear Power Range channel N1208 failed HIGH.

c. Pressurizer pressure channel PT431 failed HIGH.

d. Hot Leg RTD to Tave TE401A failed HIGH.

QUESTION: 080 (1.00)

An automatic action of "Main Or Auxiliary Transformers Malfunctions" Section B procedure SO1-2.6-10, states that if a sudden pressure trip has occurred, then the main transformer coolers [pumps] will trip. Which one of the following is the purpose of this action?

a. Continued operation of the oil cooler pumps could result in cavitation due to inadequate suction pressure.

b. Tripping the cooler pumps ensures that the potential for spreading burning oil through any breaks is minimized.

c. Continued operation of the oil cooler pumps could result in lifting relief valves from overcooling and oil thickening.

d. Tripping the cooler pumps will reduce the pressure and assist in restoring normal system pressure conditions.

QUESTION: 081 (1.00)

Which one of the following actions will AUTOMATICALLY occur, if during refueling operations a Containment high activity condition is indicated by a ORMS-R-1212 high alarm, according to "Refueling Accidents" procedure SO1-2.1-16?

a. Containment Evacuation alarm actuates.

b. POV-9 Containment sphere purge - OPENS, and POV-10 Containment sphere exhaust - CLOSES.

c. Fans 1, 2, 3 and 4 - STOP, and PO-13, 14, 15 and 16 - CLOSE.

d. PO-21 diverts Fan A-21 discharge to the vent stack, if sphere purge is in progress.

QUESTION: 082 (1.00)

Which one of the following correctly states the reason or basis for securing the reactor coolant pump (RCP) in the loop with "identified" steam generator tube leakage, Step 16 of "Steam Generator Tube Leakage" procedure SO1-2.1-17?

a. To minimize the heat input from the RCP and limit the thermal expansion of primary coolant into the affected steam generator.

b. To minimize the steaming rate from and the leakage rate into the affected steam generator for radiological release considerations.

c. To maximize flow rates in the unaffected loops allowing for a more rapid cooldown and depressurization for radiological release considerations.

d. To maximize the reverse flow in the affected loop and limit the thermal driving head for primary coolant flow into the affected steam generator.

QUESTION: 083 (1.00)

Which one of the following actions will AUTOMATICALLY occur upon a loss of Vital Bus No. 1, according to "Loss Of Vital or Utility Bus" procedure SO1-2.6-3?

a. All PZR heaters trip OFF due to level control failure.

b. Both PZR spray valves fail OPEN due to the pressure control failure.

c. Both PZR power relief valves fail CLOSED on loss of power.

d. All PZR spray bypass valves fail CLOSED on loss of power.

QUESTION: 084 (1.00)

Which one of the following conditions or symptoms would require entry into the "Response to Inadequate Core Cooling" procedure SO1-1.2-1?

a. RCS subcooling less than 0 degrees-F.

b. Two RCS hot leg RTD's indicate 690 degrees-F.

c. PZR level indication 0% level.

d. RWST level decreased to 20%.

QUESTION: 085 (1.00)

Which one of the following is the reason or basis for transferring to hot leg recirculation during a cooldown approximately 8 hours after a LOCA, in accordance with "Transfer to Hot Leg Recirculation" procedure SO1-1.0-24?

a. Terminate boiling in the core.

b. Entrains additional hydrogen in solution.

c. Enhances boron precipitation.

d. Enhances reflux cooling in the steam generators.

QUESTION: 086 (1.00)

Which one of the following symptoms/conditions would require entry into "High Activity In The Reactor Coolant System" procedure SO1-2.1-15?

a. Sample analysis indicates the RCS specific activity has increased by a factor of 2 above previous level.

b. RCS coolant sample analysis indicates that Co-60 activity has increased by a factor of five.

c. Containment Sphere high radiation alarm (Channel R-1232).

d. Component Cooling high radiation alarm (Channel R-1217).

QUESTION: 087 (1.00)

According to "Control Rod Drive System" SO1-4-35, withdrawal of a dropped rod shall only be made after discussion with Station Core Analysis Engineering and plant management staff AND...

a. if recovery can be completed within 6 hours of the rod drop.

b. concurrence of the on-shift STA.

c. if only 2 rods have dropped.

d. concurrence of the Nuclear Operations Assistant.

QUESTION: 088 (1.00)

During recovery from a dropped control rod, in accordance with "Control Rod Drive System" procedure SO1-4-35, reactor power is held constant while retrieving the dropped rod by which one of the following methods?

a. Insertion of CB-1 or CB-2.

b. RCS dilution.

c. RCS boration.

d. Turbine load adjustment.

QUESTION: 089 (1.00)

Halon gas is suitable for all of the following Class fires, according to "4KV and 480V Rooms Halon Systems Operation" procedure SO1-11-2, EXCEPT?

a. A (trash, wood, paper)

b. B (liquids, grease)

c. C (electrical equipment)

d. D (metals)

QUESTION: 090 (1.00)

Which one of the following is an AUTOMATIC action associated with a SINGLE fire detector actuation in either train for the 480V Room?

a. Yellow lights above the doors will illuminate.

b. Exhaust ventilation actuates.

c. Dampers and doors close.

d. The in-service Halon bank releases, after a 10 second time delay.

QUESTION: 091 (1.00)

Which one of the following is the PREFERRED method for manual initiation of the Halon system for the 4KV or 480V rooms, according to procedure SO1-11-2?

a. Depress the "Execute" pushbutton on the fire annunciator panel for the alarming window.

b. Open the manual Halon discharge bypass valve on the in-service bank.

c. Actuate the manual plunger of the in-service Halon bank.

d. Select the "ON" position for the manual/electric initiation switch on the Halon control panel.

QUESTION: 092 (1.00)

A Reactor trip has occurred, but the Turbine did not trip and a manual trip of the turbine was unsuccessful. Which one of the following actions is required by "Reactor Trip or Safety Injection" procedure SO1-1.0-10?

a. Runback the turbine load limit and trip the Auxiliary Oil Pumps.

b. Runback the turbine load limit and locally trip the turbine from the front standard.

c. Locally trip the turbine from the front standard and close the Main Steam Block Valves.

d. Manually initiate Safety Injection and trip the Auxiliary Oil Pumps.

QUESTION: 093 (1.00)

The following conditions exist:
Mode 5, 20 days following a reactor trip from an extended period of full power operation
The RCS is at mid-loop for maintenance work on Steam Generators
RCS temperature is currently 140 degrees F
RHR cooling has just been lost

If makeup to the RCS was NOT available, which one of the following is the MAXIMUM time before an alternate cooling method would be necessary to prevent boiling from occurring in the core?
(NOTE: Attachment 9 of "Loss of Residual Heat Removal" procedure SO1-2.1-9 is provided.)

a. 8.8 min.

b. 11.3 min.

c. 27.0 min.

d. 30.4 min.

QUESTION: 094 (1.00)

In response to a NIS neutron detector high temperature alarm during Mode 1 operation, the Standby Reactor Cavity Cooling fan has started. The temperature has continued to rise and now indicates 160 degrees-F. Which one of the following is the required action and reason for the action to be taken in accordance with the Abnormal Operating Instructions?

a. Reactor trip due to impaired reliability of the rod control system.

b. Reactor shutdown due to impaired reliability of the rod control system.

c. Reactor trip due to impaired reliability of the NIS instrumentation.

d. Reactor shutdown due to impaired reliability of the NIS instrumentation.

QUESTION: 095 (1.00)

Which one of the following actions should automatically occur upon a loss of DC Bus No. 2, according to "Loss of DC Bus" procedure SO1-2.6.4?

a. Failure of the generator to trip.

b. Transfer of Vital Buses 1,2,3, and 4 to their backup supply.

c. Transfer of Vital Buses 5 and 6 to their backup supply.

d. Initiation of train "B" AFW (West AFW Pump G-10W).

QUESTION: 096 (1.00)

Which one of the following is the operator action for an unexpected ARMS alarm, according to "High Radiation Area Radiation Monitoring System" procedure SO1-2.2-2?

a. Verify appropriate automatic actions have occurred.

b. Have personnel in the affected area don self-contained respiratory equipment.

c. Evacuate personnel from the affected area.

d. Notify HP Technician to verify radiological conditions in the affected area.

QUESTION: 097 (1.00)

Which one of the following actions is required to be performed if the Source Range instrument failed to de-energize during a reactor startup, according to "Abnormal Nuclear Instrumentation Operation" procedure SO1-2.3-2?

a. Stabilize reactor power level until problem is corrected.

b. Shutdown the reactor until problem is corrected.

c. Actuate the P-10 permissive pushbuttons and continue the startup.

d. Place the SR high voltage switch in "off" and continue the startup.

QUESTION: 098 (1.00)

During the performance of "Loss of Reactor Coolant" procedure SO1-1.0-20, a valid RWST lo-lo level alarm is received and direction is given to ensure the SI and Feed Pumps have tripped and MOV 850A, B, and C are closed. To ensure sufficient RWST inventory for successful switchover to the "recirc" mode, which one of the following is the MAXIMUM time allowed before the SI flow (pumps) must be stopped after the receipt of the RWST Lo-Lo alarm?

a. 5 sec.

b. 30 sec.

c. 5 min.

d. 10 min.

QUESTION: 099 (1.00)

Which one of the following conditions would require the use of "adverse containment" values in performance of "Loss of Reactor Coolant" procedure SO1-1.0-20?

a. Containment radiation level of 18,000 R/HR.

b. Containment temperature of 125 degrees F.

c. Containment sump high level alarm.

d. Containment pressure of 6 psig.

QUESTION: 100 (1.00)

Which one of the following is the reason or purpose for throttling AFW to attempt to maintain level in the ruptured steam generator ABOVE 20%, once the ruptured steam generator (SG) has been identified, according to "Steam Generator Tube Rupture" procedure SO1-1.0-40?

a. To ensure sufficient SG level for natural circulation cooldown and depressurization.

b. To assist in establishing conditions necessary for reflux boiling.

c. To filter the RCS coolant prior to becoming steam and leaving the SG.

d. To limit the SG pressure and prevent lifting the SG safety valves.

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

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.

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	a	b	c	d	______
009	a	b	c	d	______
010	a	b	c	d	______
011	a	b	c	d	______
012	a	b	c	d	______
013	a	b	c	d	______
014	a	b	c	d	______
015	a	b	c	d	______
016	a	b	c	d	______
017	a	b	c	d	______
018	a	b	c	d	______
019	a	b	c	d	______
020	a	b	c	d	______
021	a	b	c	d	______
022	a	b	c	d	______
023	a	b	c	d	______
024	a	b	c	d	______
025	a	b	c	d	______

ANSWER SHEET

Multiple Choice (Circle or X your choice)

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

026	a	b	c	d	____
027	a	b	c	d	____
028	a	b	c	d	____
029	a	b	c	d	____
030	a	b	c	d	____
031	a	b	c	d	____
032	a	b	c	d	____
033	a	b	c	d	____
034	a	b	c	d	____
035	a	b	c	d	____
036	a	b	c	d	____
037	a	b	c	d	____
038	a	b	c	d	____
039	a	b	c	d	____
040	a	b	c	d	____
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	____

ANSWER SHEET

Multiple Choice (Circle or X your choice)

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

051	a	b	c	d	______
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	a	b	c	d	______
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	a	b	c	d	______
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	______
073	a	b	c	d	______
074	a	b	c	d	______
075	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.

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	______
084	a	b	c	d	______
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	______
091	a	b	c	d	______
092	a	b	c	d	______
093	a	b	c	d	______
094	a	b	c	d	______
095	a	b	c	d	______
096	a	b	c	d	______
097	a	b	c	d	______
098	a	b	c	d	______
099	a	b	c	d	______
100	a	b	c	d	______

ANSWER SHEET

Multiple Choice (Circle or X your choice)

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

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

SDMS No ____________ (If Applicable)

REFERENCE SO123-VI-1.0.1

TEMPORARY CHANGE NOTICE

Page ___ of 2

FOR CDM USE ONLY:

Issuance Date APR 05 1989 Single Use TCN Cancels On ____________ TCN No 3-3

Copy forwarded to the Nuclear Safety Group **PERFORMED BY:** C-Stockton Date APR 13 1989

TECHNICAL SPECIFICATION VIOLATION IF NOT COMPLETED WITHIN 14 DAYS

Site Document No S01-12.1-2 Revision No 3 Single Use TCN YES ___ NO X

Site Document Title REACTOR THERMAL POWER CALIBRATION

1. **PREPARED BY:** D Paskett (Originator) 89348 (PAX) 23 MAR 89 1230 (Date / Time) CPG1 (Organization)

2. If required TCN Deviation Approval **APPROVED BY:** ____________ CFDM (or designee) (Signature if by telecon print name and SC state) (Date / Time)

3. Check appropriate box [X] Entire Document Attached [ ] Affected Page(s) Attached
   Superseded/Incorporated TCN(s) 3-2 (No. if none so state) (Not applicable for SINGLE USE TCNs)
   Pages Changed 2-7, 10

RECEIVED CDM
APR 13 1989

4. This change cannot wait until the next revision of the Site Document and is required
   A ___ To implement facility design change (PFC NCR TFM etc.)
   Facility design change identifier ____________ (Indicate PFC NCR TFM etc) ____________ (Identifier)

SITE FILE COPY

Implementation of the facility design change has been determined YES [ ] NO [ ] **(If NO, a TCN cannot be approved until the facility design change has been implemented.)**

B [X] Other (e.g. CAR NRC Commitments) Specific Reason Tech Spec Amend # 117, Correction of reversed flow or free

Description of Change(s) (Use Reverse Side if Required) Changed Test Applicability Objective to revised Tech Spec, Restore use of all feed line flows, Precaution 4.6 rewritten, caution added before gain adjustment, Minor format changes (form to Ref. section), Correct Typo.

5. Is the document being TCN'd QA Affecting? YES [X] NO [ ] **(If YES, complete the boxes below.)** **(If NO, see * below.)**
   (This is indicated on the Table of Contents page of the Site Document. If not indicated, treat as QA Affecting.)

A	Does this change affect FSAR or Tech Spec commitments?	YES [ ] NO [X]
B	Does this change affect the nonradiological environment of any offsite area previously undisturbed during site preparation and plant construction?	YES [ ] NO [X]
C	Is the intent of the original document altered?	YES [ ] NO [X]
D	Is the document to be changed an Emergency Operating Instruction?	YES [ ] NO [X]
E	Does this change pose an unreviewed safety question per 10 CFR 50.59, i.e. does it increase the probability of occurrence or the consequences of an accident, create the possibility of a different accident, or reduce the Tech Spec margin of safety?	YES [ ] NO [X]

(If the answer to A, B, C, D or E is YES, a TCN is not authorized.)

6. Are changes being made to numerical data, or is new data being applied, that is being used to perform Technical Specification Surveillance testing? YES [X] NO [ ] **If YES, Form EQ(123) 16 attached. A TCN is NOT authorized until a Technical Division review is obtained.**

7. The entire document was reviewed in conjunction with this TCN and found to be acceptable as written. This constitutes an annual/biennial review disposition of Acceptable As Written-Extend (SO123-VI-1.0.2)
   REVIEWED and APPROVED BY: N/A (CFDM or Designee) APR 05 1989 (Date)

8. ***For SPG Use Only:***

SITE FILE COPY

Is QA/QC Review/Approval Required? YES [X] NO* [ ] Note: Utilize current QAO Procedure Review/Approval Waiver List to respond. *If No, enter N/A on the Quality Assurance Review/Approval line below.

PERFORMED BY: Kathleen R. Clark (SPG) 4/5/89 (Date)

9. **Signatures Required:**

INITIAL APPROVAL

REVIEWED and APPROVED BY:** (at least one (1) SRO for the unit affected)

1) ____________ 4-3-89 ____ (Plant Management Staff Unit 1) (Date) (Time)
2) N/A (Plant Management Staff Units 2&3) (Date) (Time)

Could this TCN affect or does it represent a change to a plant operation in progress? YES*** [ ] NO [X]

Could this TCN affect or does it represent a change to a plant operation in progress? YES*** [ ] NO [ ]

3) ____________ 4/5/89 1228 (SRO Unit 1) (Date) (Time)
4) N/A (SRO Units 2&3) (Date) (Time)

REVIEWED and APPROVED BY:

FINAL APPROVAL

5) ____________ 4/6/89 (Cognizant Functional Division Manager) (Date)
6) ____________ 04/10/89 (Quality Assurance Units 1, 2 and 3) (Date)

* If a document is Not QA Affecting, obtain initial approval from the Cognizant Supervisor(s) on the affected unit(s) (signs Plant Management Staff line(s)) and final approval from the CFDM prior to submittal to CDM. No other signatures are required.

** If QA Affecting, approval shall be by one member of the Plant Management Staff and one SRO Licensed on the unit or units affected. (For TCN approval, members of the Plant Management Staff are defined as the supervisor in charge of the shift, or as designated in writing by the CFDM, exercising responsibility in the specific area and unit(s) addressed by the change.)

*** If YES, the Shift Superintendent shall provide the required SRO approval.

SCE PF(1)231-10 REV 2 07-27/88

TCN 3-3

Reference SO123-VI-1, SO123-VI-1.0.1

PROCEDURE CALCULATION INDEX (PCI)

Entries should be written legibly with a black ballpoint pen.

PROCEDURE NO.: S01-12.1-2 REV. NO.: 3 TCN NO.: 3 (if applicable)

The subject procedure requires Technical Division review as indicated on the associated PF(123) 109 or PF(123) 110 Form.

Author:

1. Enter the subject procedure step(s) number(s) which reflect Technical Specification Surveillance numerical data changes, or that apply new Technical Specification numerical data.

Engineer:

2. Enter the engineering calculation number(s) associated with each procedure step. If a calculation is not required to be performed, specific reasons shall be clearly described for each procedure step number, for example, correction of typographical errors would not warrant calculation performance. Technical Specification Amendments require verification that the information has been correctly transitioned into the subject document (no calculation required.)
3. Sign, date and forward package to Supervising Engineer.
4. Supervising Engineer review and approve providing signature and date. Return package to the SPG - D2P.

Procedure Step/Number(s)	Calculation Number(s) or Reason Calculation Is Not Required
6.1	ALL CALCULATION FORMULA'S AND CONSTANTS ARE CARRIED OVER FROM PREVIOUS REV/TCN. THIS TCN DELETES THE INTERIM CHANGE TO FEED FLOW CALCULATION IMPLEMENTED BECAUSE OF THE LOOP A FEED FLOW ORIFICE BEING INSTALLED BACKWARDS.
	ALL CALCULATIONS FOR K_2 ARE DERIVED FROM S01-SPE-682 "UNIT 1 REACTOR COOLANT SYSTEM HEAT LOSS MEASUREMENT"

Signatures below indicate changes made to Technical Specification surveillance numerical data have been verified as acceptable by the engineering calculation number(s) and/or reasons listed above:

PERFORMED BY: J Ebhart 3/27/89 (Engineer/Date) REVIEWED AND APPROVED BY: R Waldo 3/27/89 (Supervising Engineer/Date)

EG(123) 16 Revision 0 7/1/88 Distribution: Original - CDM Pink/Yellow - SPG

REACTOR THERMAL POWER CALIBRATION

TABLE OF CONTENTS

REACTOR THERMAL POWER CALIBRATION

1.0 OBJECTIVES

1.1 To verify the calibration of the Power Range Nuclear Instrumentation system using Turbine Plant calorimetric data ~~and~~ to meet the requirements of Tech. Specs. Table 4.1.1, ~~item 1~~. TCN

1.2 This calibration will be performed daily ~~while in Mode 1~~ when above 15% of Rated Thermal Power (Tech. Specs. Table 4.1.1 ~~item 1~~).

2.0 REFERENCES

2.1 NRC Commitment

2.1.1 Unit 1 Technical Specifications

2.2 Procedures

2.2.1 S0123-VI-0.9, Documents - Authors' Guide to the Preparation of Site Orders, Procedures and Instructions

2.3 Other

2.3.1 Memorandum to J. L. Reeder from K. L. Johnson dated 12-13-84. Subject: Revised Heat Gain Term.

~~2.3.2~~ ~~E-mail to J. L. Reeder from R. Waldo dated 8-9-88. Subject: RCS Calorimetric Method While A Orifice is in Backwards.~~ TCN

2.3.2 SO(1) 507, "Reactor Thermal Power Calibration"

3.0 PREREQUISITES

3.1 Prior to use of a user-controlled copy of this Site Document to perform work, verify that it is current by checking a controlled copy and any TCNs or by use of the method described in S0123-VI-0.9.

3.2 The reactor is in a steady state condition;

3.2.1 Reactor power shall be stable for a minimum of five minutes prior to obtaining calibration data.

3.2.2 Boration, dilution, and rod motion should be curtailed prior to obtaining calibration data. A limited boration or dilution may be permitted during Xenon transients to hold power steady.

3.2.3 Reactor coolant system temperature and turbine loading shall be maintained constant while the calibration data is being taken.

REACTOR THERMAL POWER CALIBRATION

4.0 PRECAUTIONS

4.1 Occasionally, when the plant is operating near 100% power and a thermal calibration is performed, the indicated power after adjusting the power range instrumentation may exceed 100%. When this occurs, immediately reduce the reactor power level to an indicated 100% and make a suitable log entry. If the required power level reduction exceeds 3%, report the problem to the SRO Operations Supervisor and perform another thermal calibration. If the second calibration provides verification that the reactor had previously been operating above 103% power, report the matter to the Unit 1 Superintendent.

4.2 Due to incore versus excore correlation requirements following refueling (Tech. Spec. 3.10) and continuous power distribution monitoring requirements (Tech. Spec. 3.11) reactor power at times may be restricted to less than full power.

4.3 Should a thermal calibration reveal that reactor power is higher than that allowable by the Technical Specifications, it shall be immediately reduced to or below the Technical Specification limit.

4.4 Utilize the instruments listed below to perform reactor thermal power calculations. Instruments other than those described shall not be used unless authorized by the SRO Operations Supervisor.

4.4.1 Main steam pressure gauge (PI-459B)

4.4.2 Barton differential pressure indicators (FI-456,7,8)

4.4.3 Recorder TR-456, Feedwater Temperature, or if it is unavailable, use TI-1096. If TI-1096 is unavailable the average of the first point heater outlets (TI-41 and TI-42) may be used.

4.5 The Barton differential pressure indicators should be observed for several minutes while taking readings to determine an accurate average.

NOTE: If a steam generator blowdown is in progress, the calculation results will be conservative.

4.6 If **ANY** indicated condition or calculated reactor power seems abnormal or inconsistent with other plant indications (e.g., feedwater flow/temperature, electrical load, reactor power) or it differs from what has been previously observed at similar plant conditions, IMMEDIATELY NOTIFY the SRO Operations Supervisor. Do not adjust the gain on NIS Channels and/or increase power until the apparent difference is resolved.

REACTOR THERMAL POWER CALIBRATION

4.0 PRECAUTIONS (Continued)

4.7 Each channel deviation should be less than 3% during non-equilibrium conditions and less than 1% when at equilibrium power for greater than 48 hours.

5.0 CHECKLIST

5.1 None

TCN

6.0 INSTRUCTIONS

6.1 Determining indications as accurately as possible record the following data on "Reactor Thermal Power Calculation" Form SO(1) 507.

6.1.1 Steam pressure using the main steam pressure gauge at the test bench (PI-459B).

6.1.2 Feedwater Temperature using recorder TR-456, Feedwater Temperature. If it is unavailable, use TI-1096 or average of the two (2) first point heater outlet temperature indicators, TI-41 and TI-42.

6.1.3 Feedwater differential pressure using the ~~highest reading~~ precision Barton differential pressure indicators located adjacent to the turbine test bench. (FI-456, 7, ~~or~~ and 8) ~~(Reference 2.3.2)~~

TCN TCN

NOTES: 1. Reactor power can be determined knowing the feedwater flow and heat rise in the steam generators. Solution of the problem can be expressed by the following equation:

$$Q_{core} = 2.93 \times 10^{-7} \frac{\text{Mwt-hr}}{\text{BTU}} \times (M_A + M_B + M_C) \frac{\text{lbm}}{\text{hr}} \times C_1 \times (h_1 - h_2) - K_2$$

Where:

Q_{core} = Reactor power (Mwt)

$M_A + M_B + M_C$ = Total feedwater flow (lb m/hr)

h_1 = Enthalpy of steam (Quality = 99.75) at main steam pressure ($h_f + .9975\ h_{fg}$)

h_2 = Enthalpy of subcooled liquid at feedwater temperature (h_{f1})

K_2 = Heat gain in reactor system = 4.453 (Ref. 2.3.1)

C_1 = Correction in feedwater flow for density changes.

6.0 INSTRUCTIONS (Continued)

NOTES: 1. (Continued)

Feedwater flow can be determined from differential pressure measurements indicated on each loop. The difference between the feedwater and throttle steam enthalpies is the increase in heat content of feedwater through steam generators.

2. The primary method for calculating thermal power is the Hewlitt-Packard 85 computer. Should the primary method be unavailable, the manual procedure can be utilized.

3. The pressurizer heaters and the steam generator blowdowns are not taken into account in this calculation.

6.2 Calculate reactor thermal power utilizing instruction step 6.2.1 for the Hewlitt-Packard 85 computer or step 6.2.2 for the manual method.

6.2.1 Calculate thermal power for NIS calibration utilizing the Hewlitt-Packard 85 computer.

.1 Use the "THERMAL" program available on the operations tape. Load and/or execute it from the keyboard by the LOAD and RUN keys or by key selection. In either case it is self prompting and will ask for the required data (steam pressure, feedwater temperature and orifice ΔPs).

6.2.2 Calculate thermal power for NIS calibration utilizing the manual procedure. Use attached curves.

.1 Find feedwater flow by entering Curve 3 with the ~~highest~~ indicated differential pressure for each loop, then determine total feedwater flow by the following formula: ~~(Reference 2.3.2)~~ TCN

Feedwater flow = $M_A + M_B + M_C \frac{lbm}{hr}$ ~~3 times the highest flow~~ TCN

.2 Determine feedwater flow temperature correction factor, C_1, by entering Curve 4 with feedwater temperature. (Density Correction Factor)

.3 Determine throttle steam enthalpy (h_1) by entering Curve 1 with throttle steam pressure (psig).

REACTOR THERMAL POWER CALIBRATION

6.0 INSTRUCTIONS (Continued)

6.2.2.4 Determine feedwater enthalpy (h_2) by entering Curve 2 with feedwater temperature (°F).

.5 Determine Δh by using the following formula: $\Delta h = h_1 - h_2$ (Enthalpy change).

.6 Calculate core thermal power (Q) by substituting the determined values into the formula in step 6.1. (Mwt)

.7 Calculate percent power by dividing the calculated Q by 1347 Mwt. (% of Full Power)

6.3 Enter calculated data on SO(1) 507.

NOTE: Should a steam generator blowdown be in progress during the data collection period, note the rate of blowdown on the data sheet SO(1) 507.

6.4 Compare percent power with Power Range NIS indicated percent power.

NOTE: The gain pot setpoints on the percent power meters may be set conservatively such that indicated reactor power is the larger of Calorimetric calculated power or currently indicated percent power on the individual N.I. channels at the discretion of the SRO Operations Supervisor.

CAUTION
=======
If **ANY** indicated condition or calculated reactor power seems abnormal or inconsistent with other plant indications or it differs from what has been previously observed at similar plant conditions, IMMEDIATELY NOTIFY the SRO Operations Supervisor. Do not adjust the gain on NIS Channels and/or increase power until the apparent difference is resolved. TCN

6.5 If calculated power deviates from indicated power;

6.5.1 Accurately adjust the gain pot as necessary on each power range drawer such that indicated power agrees with calculated power.

6.5.2 Verify "Auto Rod Withdrawal Prohibit Reset" pushbutton lamp is lit.

REACTOR THERMAL POWER CALIBRATION

7.0 ACCEPTANCE CRITERIA

7.1 The reactor thermal power in terms of percent power is ≤ that specified in the PRECAUTIONS section of this instruction. TCN

8.0 RECORDS

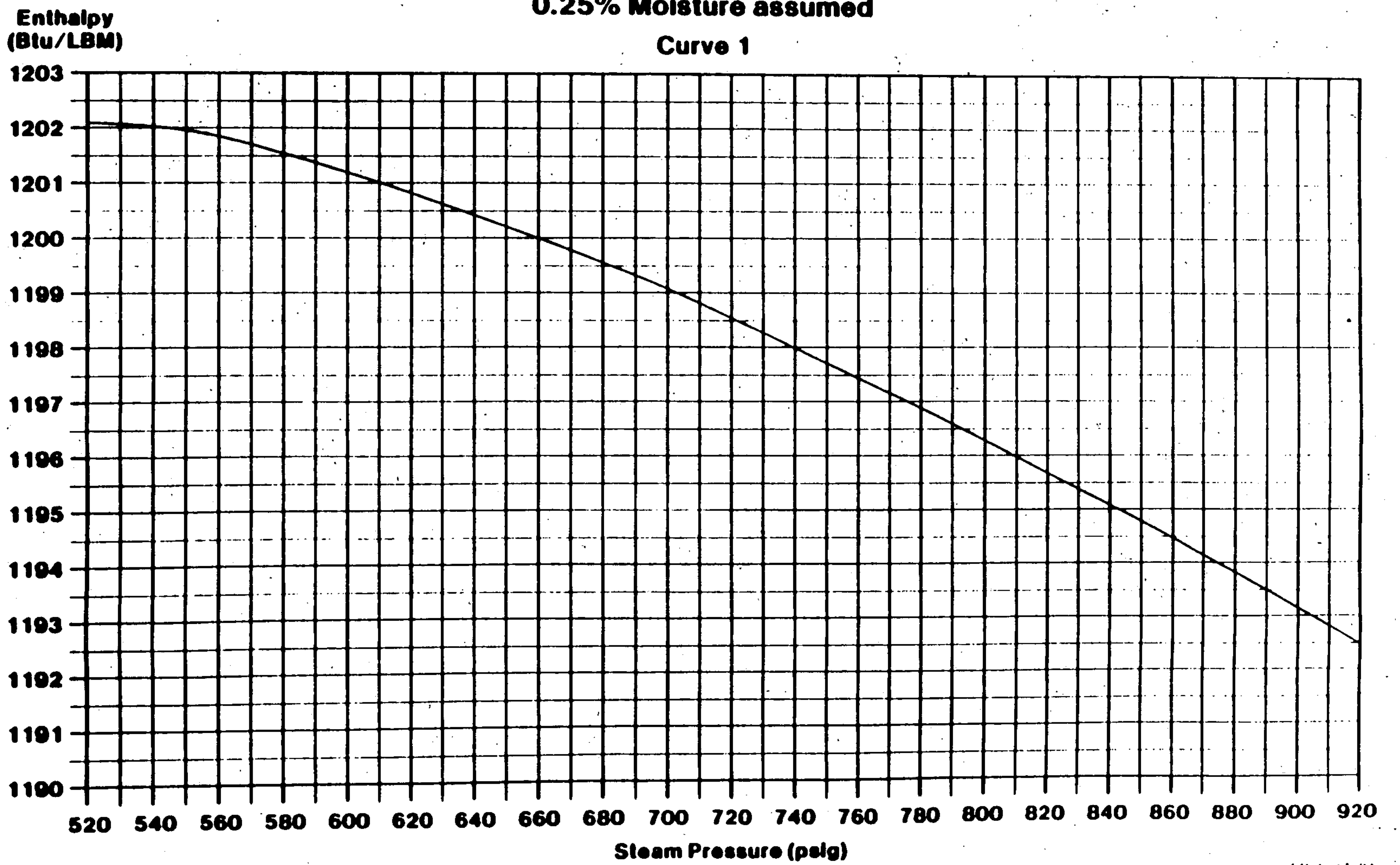
8.1 INITIAL and PROVIDE appropriate code number designating how the test was completed in the spaces provided on SO(1) 37, "Tech Spec/Non-Tech Spec Routine Test Check-Off."

8.2 LOG the completion of this surveillance in the CO's Log.

8.3 PLACE completed SO(1) 507 form in the Completed Surveillance In-basket for disposition per SO1-12.0-2.

San Onofre Unit 1
Main Steam Pressure vs. Enthalpy

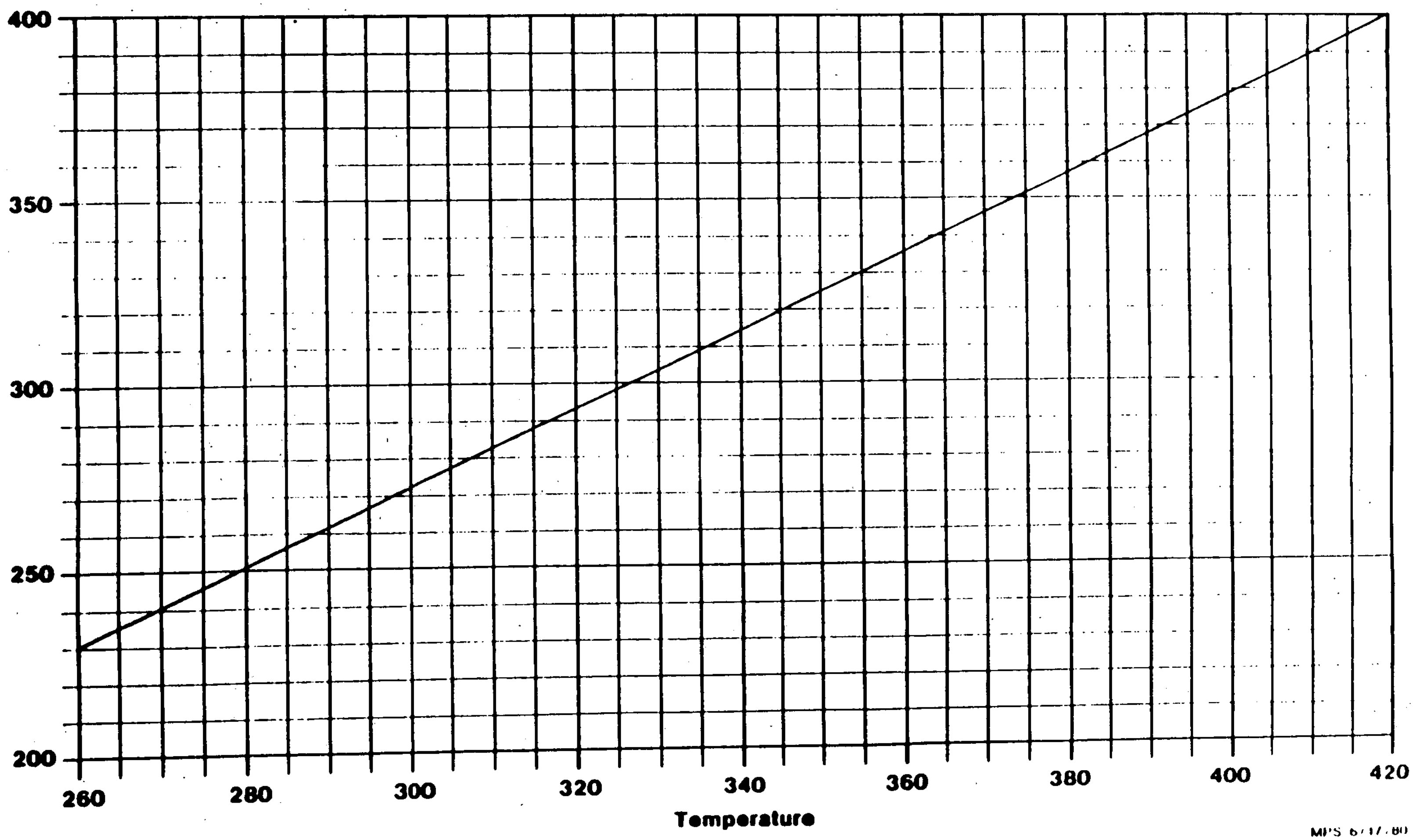
Data Taken from Keenan & Keyes Steam Tables
0.25% Moisture assumed



San Onofre Unit 1
Feedwater Enthalphy vs. Temperature

Data Taken from 1967 ASME Steam Tables
Feedwater pressure assumed to be 1,000 psig

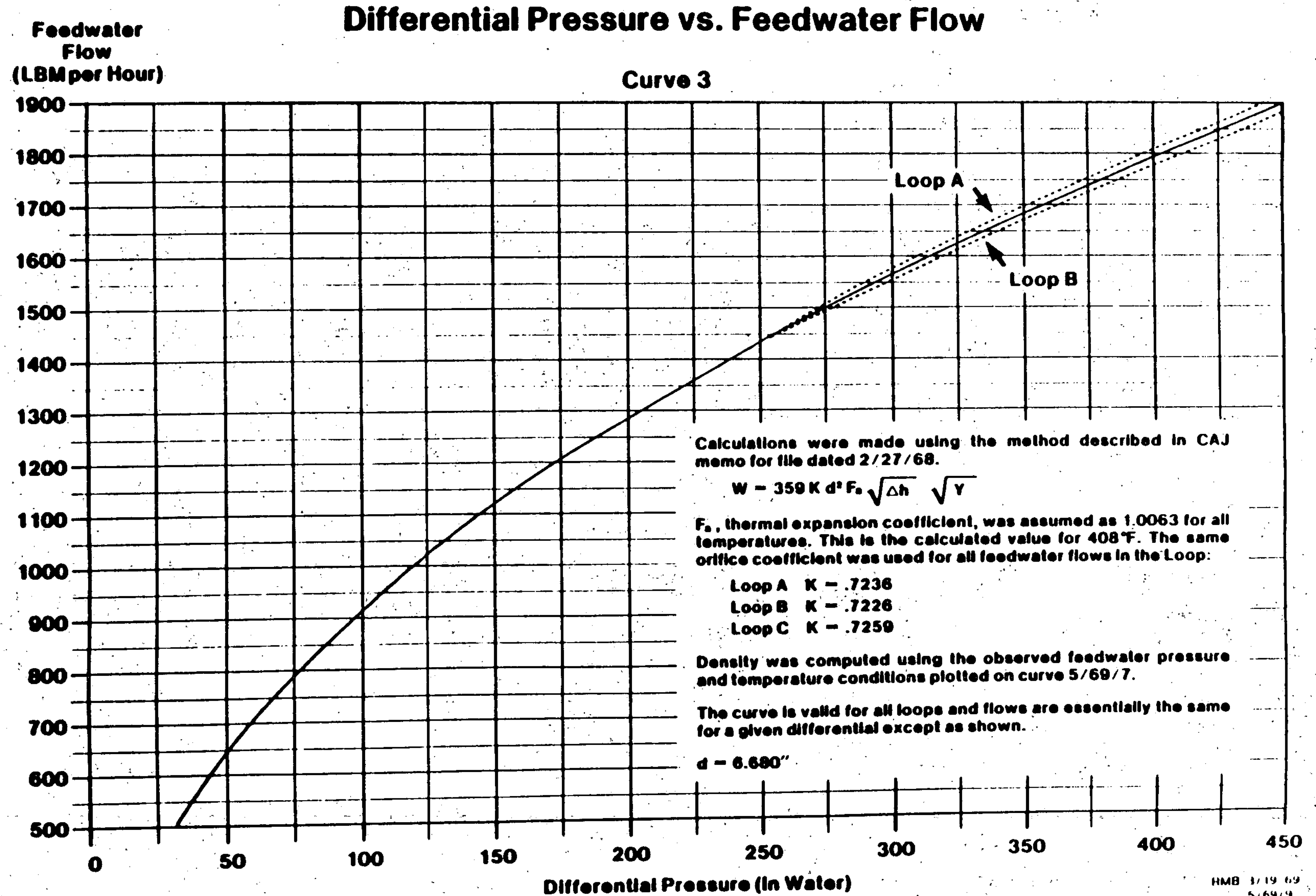
Curve 2



MPS 6/17/80

2355g.aut

San Onofre Unit 1
Differential Pressure vs. Feedwater Flow

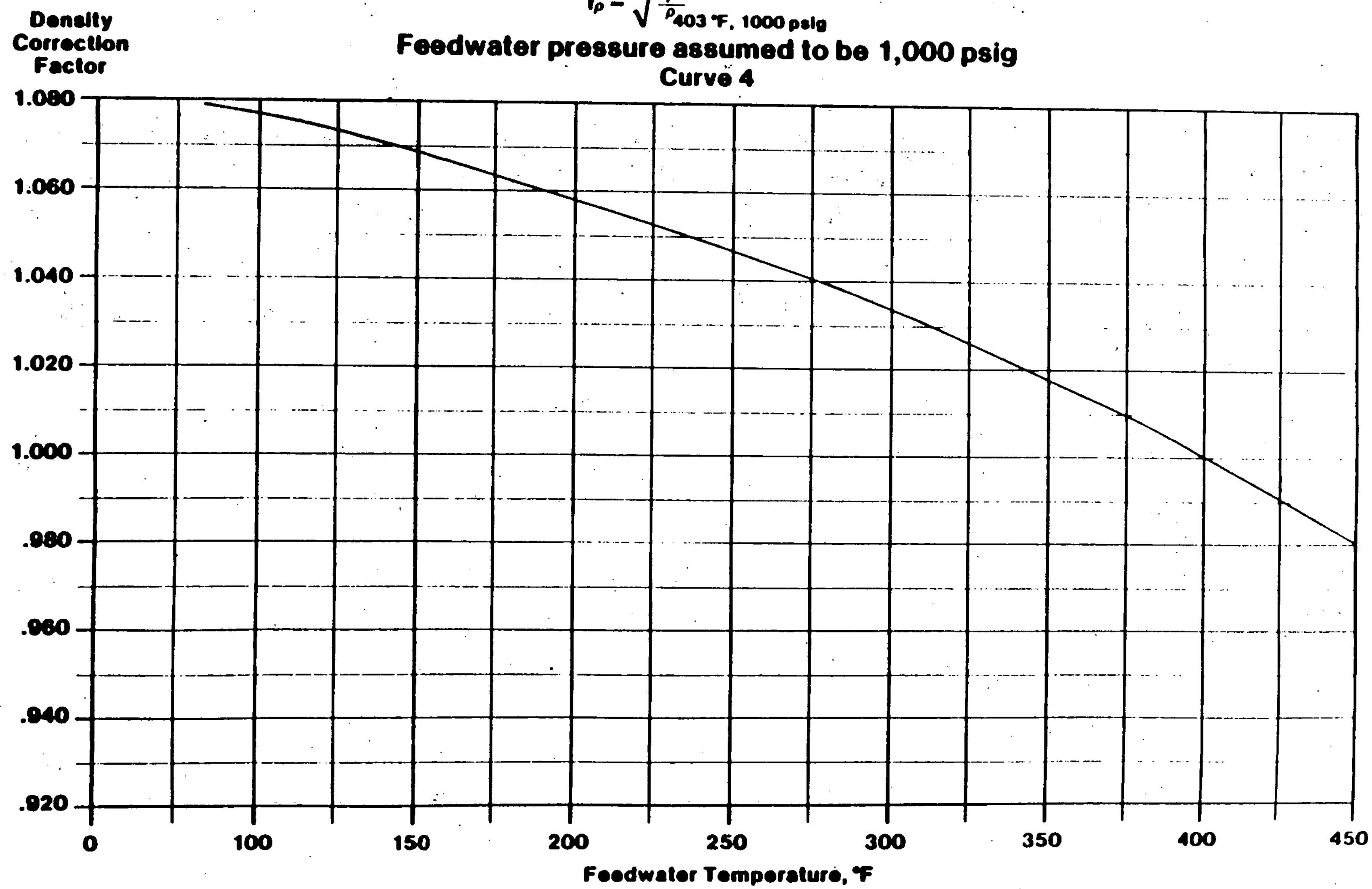


San Onofre Unit 1
Density Correction Factor vs. Feedwater Temperature

$$f_\rho = \sqrt{\frac{\rho}{\rho_{403\,°F,\ 1000\ psig}}}$$

Feedwater pressure assumed to be 1,000 psig

Curve 4



MPS 1/18/80

Time After Trip (Hrs/Days)	Decay Heat (10^6 BTU/hr)	Time to Boil 120-212°F (Mins)	Time to Boil 140-212°F (Mins)	Core Heatup Rate (°F/min)	Makeup Rate (gpm)	Time to Core Uncovery (Mins/Hrs)
4 hrs	51.0	7.2	5.6	12.70	105.0	49 min
8	42.0	8.8	6.9	10.50	86.5	59
12	37.7	9.8	7.7	9.40	77.8	1.10 hrs
20	32.5	11.3	8.8	8.10	67.0	1.28
1 days	30.8	12.0	9.4	7.70	63.5	1.35
3	21.2	17.4	13.6	5.28	44.0	1.95
5	17.0	21.7	17.0	4.24	35.0	2.42
10	12.7	29.0	22.7	3.16	26.2	3.27
15	10.7	34.5	27.0	2.67	22.0	3.88
20	9.5	38.8	30.4	2.37	19.6	4.36
30	8.0	46.1	36.1	1.99	16.5	5.18
40	7.0	52.7	41.2	1.75	14.4	5.93
50	6.2	59.5	46.6	1.55	12.8	6.69
100	4.5	82.0	64.2	1.12	9.3	9.20
200	3.0	123.0	96.5	0.75	6.2	13.80
300	2.3	160.0	125.0	0.57	4.8	18.00

<u>Time to Boil</u> The time it takes for boiling to occur in the core assuming RHR is not restored or no alternate cooling is established.

<u>Core Heatup Rate</u> The rate at which the RCS will heatup from a loss of RHR assuming RHR is not restored or no alternate cooling is established.

<u>Makeup Rate</u> The makeup rate required to prevent core uncovery due to boil off.

<u>Time to Core Uncovery</u> The time it takes to uncover the core assuming no makeup.

****

REFERENCE: SO1-12.1-2

REACTOR THERMAL POWER CALIBRATION

Mode ______________ (1) Date Completed ______________________ Time Completed ____________

☐ Scheduled Test ☐ Load Change ☐ Other ______________________________

Note: Be familiar with SO1-12.1-2, REACTOR POWER CALCULATIONS, prior to taking this data.

DATA

Gross Turbine Load (MWe) __________ Steam Press. (psig) __________ (FI-459B) Feedwater Temp. (°F) __________ (TR-456)

	LOOP A	LOOP B	LOOP C
Feedwater Differential Pressure (in. H_2O)	________ (FI-456)	________ (FI-457)	________ (FI-458)
CALCULATIONS			
Feedwater Flow (1000 lbm/hr) Curve 3	________	________	________
Total Feedwater Flow (1000 lbm/hr)	________		
Density Correction Factor (C_1) Curve 4	________		
Steam Enthalpy (h_1, BTU/lbm) Curve 1	________		
Feedwater Enthalpy (h_2, BTU/lbm) Curve 2	________		
Enthalpy Change (Δh, BTU/lbm)	________		

$$\frac{(\Delta h)\,(\text{Total Feedwater Flow})\,(C_1)}{3413} - 4.453 = \underline{\hspace{4cm}}\ \text{MWt}$$

$$\frac{\text{MWt}}{1347} = \underline{\hspace{4cm}}\ \%\ \text{of Full Power}$$

CHANNEL	AS FOUND	AS LEFT	GAIN CONTROL SETTING
N-1205			
N-1207			
N-1206			
N-1208			

VERIFY "Auto Rod Withdrawal Prohibit Reset" lamp is lit. (Initials) ____________.

Each channel deviation should be less than 3% during non-equilibrium conditions and less than 1% when at equilibrium power for greater than 48 hours. See Precautions in SO1-12.1-2.

Steam Generator Blowdown In Progress – Yes ☐ No ☐ Blowdown - GPM – ____________

PERFORMED BY: (Initials) ______________ OPERATOR **REVIEWED BY:** ______________ SRO OPS. SUPERVISOR

Comments, Deficiencies and Action Taken: ______________________________

____

APPROVED BY: ______________ SHIFT SUPERINTENDENT

ANSWER: 001 (1.00)

b.

REFERENCE:

SO1-14-23, section 4.1.2, page 3.
LP-1AP001, LO 27.1; 5.27.0.C.2., page 26.
K/A [2.5/3.4]
194001A103 ..(KA's)

ANSWER: 002 (1.00)

d.

REFERENCE:

San Onofre - Unit 1 Technical Specification, Table 6.2-1
SO123-0-30 "Shift Manning", Attachment 2, page 10.
LP-1AP001, LO 15.1; 5.15.0.C.2., page 17.
K/A [2.5/3.4]
194001A103 ..(KA's)

ANSWER: 003 (1.00)

c.

REFERENCE:

SO123-0-23, Precaution 4.8, page 4 and section 6.5.3, page 11.
LP-1AP001, LO 37.7; 5.37.0.C.2., page 35.
K/A [3.6/3.7]
194001K101 ..(KA's)

ANSWER: 004 (1.00)

c.

REFERENCE:

SO1-12.1-2
2.93E-7 x (1550 + 1500 + 1500)E3 x 1.010 x (1196.3 - 351) - 4.453
1133.728 MWt = 84.2%
K/A [2.6/3.1]
194001A108 ..(KA's)

ANSWER: 005 (1.00)

c.

REFERENCE:

SO123-0-21 "Equipment Status Control", Attachment 1 Definitions, page 58 (3).
LP-1AP001, LO 3.4.2; 5.3.0.C.2., page 5.
K/A [3.7/4.1]
194001K102 ..(KA's)

ANSWER: 006 (1.00)

a.

REFERENCE:

SO123-0-21 "Equipment Status Control", 6.17.5, page 39.
LP-1AP001, LO 3.4.1; 5.3.0.C.2., page 5.
K/A [3.7/4.1]
194001K102 ..(KA's)

ANSWER: 007 (1.00)

c.

REFERENCE:

SO123-VII-3.5, 6.1.5, pages 5-6

K/A [3.3/3.5]
194001K104 ..(KA's)

ANSWER: 008 (1.00)

c.

REFERENCE:

SO123-VI-7.4, 6.1 & 6.2.1, pages 4 & 7.

K/A [2.8/3.4]
194001K103 ..(KA's)

ANSWER: 009 (1.00)

c.

REFERENCE:

SO123-VI.1.0.1 "Documents - Temporary Change Notices (TCNs) Preparation, Review, Approval, Incorporation And Distribution", section 3.1, page 3.
SO123-0-20 "Use Of Procedures", section 3.1, page 3.
LP-1AP001, LO 3.36.1; 5.36.0.C.2., page 34.
K/A [3.3/3.4]
194001A101 ..(KA's)

ANSWER: 010 (1.00)

b.

REFERENCE:

SO123-0-15 "Control Room Access And Conduct", section 6.1.1, page 3 and Attachment 1.
LP-1AP001, LO 3.5.3; 5.5.0.C.2., page 8.
K/A [3.1/3.4]
194001K105 ..(KA's)

ANSWER: 011 (1.00)

a.

REFERENCE:

LP-1XA204, LO 3.1, 5.2 & 6.2, 5.0 II.B.4, page 8; II.B.7.b, page 11; II.B.7.c, pages 12-13; II.C.2, pages 15-16.
SO1-4-13 "Boric Acid System Operations", section A, pages 5, 6, 8 and 12.
K/A [4.3/4.1]
194001A113 ..(KA's)

ANSWER: 012 (1.00)

a.

REFERENCE:

SO123-0-20 section 6.2.1.1 and 6.2.1.2, page 5.
LP-1AP001, LO 36.1 and 36.7; 5.36.0.C.2., page 34.
K/A [2.5/3.4]
194001A103 ..(KA's)

ANSWER: 013 (1.00)

c.

REFERENCE:

SO1-1.0-1 "Critical Safety Function Status Trees", Purpose statement, page 1.
LP-1EI701, LO 2.2, 6.2.C.5.a, page 13.
K/A [2.8/4.1]
194001A111 ..(KA's)

ANSWER: 014 (1.00)

d.

REFERENCE:

LP-1XI203, LO 3.3 and 3.4, 5.0 II.E.3 & II.E.4, pages 16 & 17.
K/A [3.8/3.8]
001000K402 ..(KA's)

ANSWER: 015 (1.00)

c.

REFERENCE:

LP-1XI203, LO 5.1, 5.0 VI.A.1, page 31.
San Onofre - Unit 1 Technical Specifications, 3.5.2 Objective, page 3.5-6.
K/A [4.3/4.7]
001000K504 ..(KA's)

ANSWER: 016 (1.00)

b.

REFERENCE:

LP-1XA203, LO 1.6.4, 6.2.5.1.1, page 28.
SO1-4-3, Section B: Precaution 4.8, page 11.
K/A [3.3/3.6]
003000G010 ..(KA's)

ANSWER: 017 (1.00)

d.

REFERENCE:

LP-1XA203, LO 1.6.2, 6.1.5.3.4, page 5.
K/A [2.7/3.1]
003000K602 ..(KA's)

ANSWER: 018 (1.00)

a.

REFERENCE:

"Thermal-Hydraulic Principles And Applications To The Pressurized Water Reactor II", WEC-NTS, Chapter 11, EO 10, pages 11-26 through 11-28.
LP-1XI202, LO 3.2 & 3.8, 5.0 V.B.1 & V.B.5.g, pages 31-36.
K/A [3.9/4.2]
004000A202 ..(KA's)

ANSWER: 019 (1.00)

a.

REFERENCE:

SOI-4-9 "Residual Heat Removal System Operation", 6.1.6. NOTE, page 8.
LP-1XB203, LO 5.1, 5.2.B and 5.2.C., pages 2 & 3.
K/A [3.4/3.9]
004010K101 ..(KA's)

ANSWER: 020 (1.00)

c.

REFERENCE:

LP-1XA204, LO 2.4.2, 5.0 II.B.3.c, page 6.
K/A [2.9/3.1]
004000K201 ..(KA's)

ANSWER: 021 (1.00)

a.

REFERENCE:

LP-1XC207, LO 3.6.1, 6.3.1.7.6.3 ,page 13 and 6.5.6.2, page 22.
K/A [4.5/4.7]
013000A403 ..(KA's)

ANSWER: 022 (1.00)

c.

REFERENCE:

LP-1XC207, LO 2.2, 6.3.1.2.5.2 & 6.3.1.4.2, pages 7 & 8.
SD-SO1-590 , 2.3.4.1 & 2.3.4.2, page 15.
K/A [3.7/3.9]
013000A301 ..(KA's)

ANSWER: 023 (1.00)

b.

REFERENCE:

LP-1XI204, LO 1.2, 5.0 II.3.B, page 7.
K/A [3.2/3.6]
014000A102 ..(KA's)

ANSWER: 024 (1.00)

b.

REFERENCE:

LP-1XC204, LO 4.2, 5.0 II.B.3, page 6 & 7.
LP-1XC205, LO 1.2.6, 6.4, pages 20-25.
K/A [3.5/3.9]
015000A201 ..(KA's)

ANSWER: 025 (1.00)

d.

REFERENCE:

LP-1XC205, LO 1.2.1, 1.2.3, 1.2.5; 6.2.3, page 3; 6.3.3, page 12; 6.4.2, page 19.
K/A [2.9/3.2]
015000K601 ..(KA's)

ANSWER: 026 (1.00)

c.

REFERENCE:

LP-1XC205, LO 1.2.4, 6.3..3.6, page 16.
SO1-4-34 ""Reactor Plant Instrumentation Operation, section C Precaution 4.7, page 27.
K/A [3.9/4.2]
015000K406 ..(KA's)

ANSWER: 027 (1.00)

a.

REFERENCE:

LP-1XC201, LO 3.1, 5.0 II.B.2.4, page 6.
K/A [3.4/3.7]
017020K401 ..(KA's)

ANSWER: 028 (1.00)

a.

REFERENCE:

LP-1XB200, LO 5.2, 5.0 II.A.4.f, pages 9 & 10.
SO1-4-25 "Ventilation System Operation", Section A Precaution 4.6, page 3.
K/A [3.2/3.4]
022000G010 ..(KA's)

ANSWER: 029 (1.00)

b.

REFERENCE:

LP-1XA208, LO 3.4, 5.0 C.1.b, page 15.
K/A [3.1/3.6]

026000K402 ..(KA's)

ANSWER: 030 (1.00)

a.

REFERENCE:

LP-1XP204, LO 3.4, 5.0 II.B.1.c, page 8
K/A [2.6/2.8]
056000G001 ..(KA's)

ANSWER: 031 (1.00)

b.

REFERENCE:

LP-1XI206, LO 3.1 & 3.6, 5.0 III.A.5, page 21.
SD-S01-260, section 2.2.6.1, page 13
K/A [3.2/3.3]
059000A306 ..(KA's)

ANSWER: 032 (1.00)

d.

REFERENCE:

LP-1XA201, LO 2.1, 5.0 II.B.1.b.8, page 7.
K/A [3.1/3.3]
059000K103 ..(KA's)

ANSWER: 033 (1.00)

a.

REFERENCE:

LP-1XI206, LO 4.5, 5.0 IV.C.2, page 27 & 28.
K/A [3.3/3.5]
059000K402 ..(KA's)

ANSWER: 034 (1.00)

c.

REFERENCE:

LP-1XP207, LO 1.3.4, 6.7.1, page 29 and 6.7.4, pages 30 & 31.
K/A [3.4/3.8]
061000A204 ..(KA's)

ANSWER: 035 (1.00)

b.

REFERENCE:

LP-1XP207, LO 1.4.1, 6.3.10, pages 19 & 20.
San Onofre - Unit 1 Technical Specifications, 3.5.6 Table 3.5.6-1, page 3.5-21.
K/A [4.2/4.2]
061000A301 ..(KA's)

ANSWER: 036 (1.00)

a.

REFERENCE:

LP-1XP207, LO 1.2.4, 6.2.1.7, page 6.
SO1-7-3 Section B, 6.0, pages 29-34.
K/A [3.9/4.2]
061000K401 ..(KA's)

ANSWER: 037 (1.00)

d.

REFERENCE:

LP-1XE205, LO 1.3 and 5.1; 6.3, 6.5 and 6.14, pages 4, 5 and 21-23.
SO1-9-12, rev. 1 TCN 4-6, section 6.1 & 6.2 pages 5-7 and Attachment 1, page 1.
K/A [2.9/3.5]
063000K103 ..(KA's)

ANSWER: 038 (1.00)

b.

REFERENCE:

LP-1XR204, LO 1.2.1.3 & 1.5.3, 6.2.4.1.1, page 9.
K/A [2.5/2.8]
068000G007 ..(KA's)

ANSWER: 039 (1.00)

b.

REFERENCE:

LP-1XR201, LO 5.1, 5.0 I.E.2, page 3.
San Onofre - Unit 1 Technical Specifications, 3.5.10 Table 3.5.10-1 ACTION 25, page 3.5-33 & 34.
K/A [2.9/3.2]
072000G001 ..(KA's)

ANSWER: 040 (1.00)

b.

REFERENCE:

LP-1TA703, LO 3.2, 5.0 II.G.6.e, pages 39-41.
K/A [4.2/4.5]
002020K301 ..(KA's)

ANSWER: 041 (1.00)

a.

REFERENCE:

LP-1XP205, LO 3.3.3, 5.0 II.B.5, page 8.
LP-1XA207, LO 1.2.4, 6.2.3.3.2, page 13
K/A [3.8/4.1]
006000K409 ..(KA's)

ANSWER: 042 (1.00)

a.

REFERENCE:

LP-1XA207, LO 1.2.5, 6.2.4.4, pages 18-19.
K/A [3.6/3.9]
006000K603 ..(KA's)

ANSWER: 043 (1.00)

c.

REFERENCE:

LP-1XA209, LO 1.1.2.a & 1.5.5, 5.0 III.A.1., pages 16-19.
SO1-1.0-23 "Transfer To Cold Leg Injection And Recirculation".
K/A [3.9/3.8]
006020A402 ..(KA's)

ANSWER: 044 (1.00)

c.

REFERENCE:

LP-1XI202, LO 3.5, 3.6 & 4.1, 5.0 VI.E, page 43.
K/A [2.7/3.1] [3.8/4.1]
010000K601 010000K403 ..(KA's)

ANSWER: 045 (1.00)

b.

REFERENCE:

LP-1XI202, LO 3.7.m & n and 5.1, 5.0 IV.E.6 & 7, page 18.
SO1-13.5 Annunciator Response "Reactor Plant First Out Annunciator" Window 33, Initiating Device (limit switch), page 33.
SD-SO1-280 "Reactor Coolant System", 2.4 Power Supplies (Vital Bus #5 & #1), page 23.
K/A [2.7/2.9]
010000K204 ..(KA's)

ANSWER: 046 (1.00)

a.

REFERENCE:

LP-1TA705, LO 1.1, 5.0 II.C.7.d, page 16.
K/A [3.7/4.0]
011000K510 ..(KA's)

ANSWER: 047 (1.00)

d.

REFERENCE:

LP-1XC204, LO 3.1, 3.2 & 3.3.c, 5.0 II.C.9, page 21 & 22.
SO1-13-6 "Annunciator Response" Reactor Plant First Out Annunciator, window 31, page 35.
SO1-13-7 "Annunciator Response" Reactor Plant Matrix Partial Trip Annunciator, window 31, page 35.
K/A [3.6/3.6]
012000A405 ..(KA's)

ANSWER: 048 (1.00)

b.

REFERENCE:

LP-1XC204, LO 4.2, 5.0 II.C.9.a, page 21.
K/A [3.9/4.3]
012000K402 ..(KA's)

ANSWER: 049 (1.00)

a.

REFERENCE:

LP-1XB200, LO 6.2, 5.0 II.A.6.c.d, page 20.
San Onofre - Unit 1 Technical Specifications, 3.6.2 Table 3.6.2-1, item 21, page 3.6-5.
K/A [3.8/4.0]
029000A301 ..(KA's)

ANSWER: 050 (1.00)

d

REFERENCE:

LP-1XB204, LO 4.1, 5.0 II.B.1.e.2, page 5.
K/A [2.9/3.2]
033000K401 ..(KA's)

ANSWER: 051 (1.00)

c.

REFERENCE:

LP-1XE202, LO 1.2, 6.0 I.C.1, page 3.
K/A [3.7/4.2]
062000K104 ..(KA's)

ANSWER: 052 (1.00)

a. (also accept d) TBS

REFERENCE:

LP-1XE205, LO 1.3 & 2.4, 6.8.2 & 6.8.3, pages 9 & 10.
K/A [3.1/3.5]
062000K410 ..(KA's)

ANSWER: 053 (1.00)

d.

REFERENCE:

LP-1XD201, LO 1.3.3.2, 6.0 II.B.7.b.4, pages 12-13.
K/A [3.4/3.9]
064000K105 ..(KA's)

ANSWER: 054 (1.00)

c.

REFERENCE:

LP-1XD209, LP 6.1, 5.0 V.F.1, page 22.
K/A [3.6/3.9]
064000K104 ..(KA's)

ANSWER: 055 (1.00)

c.

REFERENCE:

LP-1XR201, LO 4.2, 5.0 V.D.6.b, pages 37 & 38.
K/A [3.2/3.5]
073000A101 ..(KA's)

ANSWER: 056 (1.00)

b.

REFERENCE:

LP-1XF202, LO 1.2.1 & 1.2.3, 5.0 III.B.2.d & a.4, pages 15 & 12.
K/A [2.9/3.1]
086000A105 ..(KA's)

ANSWER: 057 (1.00)

c.

REFERENCE:

LP-1XB203, LO 5.1 , 5.0 II.A.2.a, page 5.
K/A [3.0/3.2]
005000K201 ..(KA's)

ANSWER: 058 (1.00)

d.

REFERENCE:

LP-1XB203, LO 2.1 & 2.3, 5.0 II.A.9, page 10
K/A [2.7/3.0]
005000K406 ..(KA's)

ANSWER: 059 (1.00)

d.

REFERENCE:

LP-1XB201, LO 3.3.1, 5.0 III.D.3, page 8 & 9.
K/A [3.1/3.1]
008000K101 ..(KA's)

ANSWER: 060 (1.00)

b.

REFERENCE:

LP-1XB201, LO 3.3.3, 5.0 III.E.3.c, page 10.
K/A [3.1/3.3]
008000K401 ..(KA's)

ANSWER: 061 (1.00)

a.

REFERENCE:

LP-1XR202, LO 2.1.6 & 5.2, 6.3.2.3 & 6.3.2.5.4, pages 11 & 16.
K/A [3.2/3.4]

028000G009 ..(KA's)

ANSWER: 062 (1.00)

d.

REFERENCE:

LP-1XP202, LO 2.5 & 3.3, 5.0 II.C.7 & II.C.10, pages 14-15 & 17-19.
K/A [2.7/2.9]
041020K603 ..(KA's)

ANSWER: 063 (1.00)

a.

REFERENCE:

LP-1XT204, LO 4.3, 5.0 II.C.6.a.3.e.2 & II.C.7.a, pages 26-28.
K/A [3.4/3.6]
045010K423 ..(KA's)

ANSWER: 064 (1.00)

b.

REFERENCE:

LP-1XQ207, LO 5.2.1, 5.0 III.A.1, page 13 & 14.
SO1-7-1 section D., CAUTION 6.3.1, page 24.
K/A [2.8/2.9]
078000G010 ..(KA's)

ANSWER: 065 (1.00)

b

REFERENCE:

SONGS 1 LP 1AI720 rev. 0, P.O. 1.1.
Abnormal Operating Instruction SO1-2.3-1, p 5.
KAI [3.5/3.6]

000005G011 ..(KA's)

ANSWER: 066 (1.00)

c.

REFERENCE:

SONGS 1 LP 1XI203 rev. 1, L.O. 5.1.
San Onofre - Unit 1 Technical Specification 3.5.3.A.
KAI [3.4/4.1]

000005K304 ..(KA's)

ANSWER: 067 (1.00)

d

REFERENCE:

Songs 1 LP 1AI744, p 14, Obj 1.1.5

KAI [3.1/3.2]
000015G007 ..(KA's)

ANSWER: 068 (1.00)

a.

REFERENCE:

SONGS 1 LP 1XA203 rev. 2, L.O. 1.1.3. SO1-2.1-8 p10; SO1-4-3, p5
SONGS 1 System Description SD-SO1-300 rev. 2, p 8.
KAI [2.9/2.9]

000015K207 ..(KA's)

ANSWER: 069 (1.00)

c

REFERENCE:

Songs 1 LP 1AI713, p 8, Obj A.2

KAI [4.2/4.4]
000024K302 ..(KA's)

ANSWER: 070 (1.00)

c

REFERENCE:

Songs 1 LP 1AI713, p 8. Review Ques. 3. Obj A.3.c
Songs 1 SOI-2.1-12, Note following step 4.7
KAI [3.3/3.9]
000024A205 ..(KA's)

ANSWER: 071 (1.00)

b

REFERENCE:

Songs 1 SO1-1.1-1, step 1
Songs 1 LP 1FG701, Obj 1.2.1
KAI [4.5/4.5]
000029G010 ..(KA's)

ANSWER: 072 (1.00)

c.

REFERENCE:

SONGS 1 LP 1TA710 rev. 1, E.O.'s 1.2, 2.1, and 4.2.
Emergency Operating Instruction SO1-1.0-1 rev. 3.
Emergency Operating Instruction SO1-1.0-10 rev. 5, step 24.
Emergency Operating Instruction SO1-1.0-30.1 rev. 3, "Background Document to Loss Of Secondary Coolant".
KAI [4.1/4.4]

000040K101 ..(KA's)

ANSWER: 073 (1.00)

d.

REFERENCE:

Songs 1 LP 1EI711, Obj 1.1.2
Emergency Operating Procedure S01-1.0-20.1 rev. 3,"Background Document For Loss Of Reactor Coolant", section 3.2.3, p 14.
KAI [4.3/4.7]

000009A239 ..(KA's)

ANSWER: 074 (1.00)

c

REFERENCE:

Songs 1 LP 1AI733, Obj 1.1.2
Utility Exam Bank, No 18 of Test No 3.
KAI [4.2/4.5]

000068K318 ..(KA's)

ANSWER: 075 (1.00)

d

REFERENCE:

Songs LP 1AI733, Obj 1.1.3
Utility Exam Bank, No 16 of Test No 3.
KAI [3.9/4.3]

000068K306 ..(KA's)

ANSWER: 076 (1.00)

b.

REFERENCE:

Songs 1 LP 1AI727, p 3, Obj 1.2

KAI [3.9/4.1]
000051A202 ..(KA's)

ANSWER: 077 (1.00)

a

REFERENCE:

SONGS 1 LP 1EI715 rev. 3, L.O. 1.1.3 and 1.2.
Emergency Operating Instruction SO1-1.0-40 rev. 7, CAUTION prior to step 1.
KAI [3.4/3.4]

000038A144 ..(KA's)

ANSWER: 078 (1.00)

a

REFERENCE:

SONGS 1 LP 1EI 706 rev. 1, L.O. 1.1.3.
Emergency Operating Instruction SO1-1.0-30.1 rev. 0, "Background Document For Loss Of Secondary Coolant", page 64.
KAI [4.4/4.6]

000054K304 ..(KA's)

ANSWER: 079 (1.00)

d

REFERENCE:

SONGS 1 LP 1AI723 rev. 0, P.O. 1.1.
SONGS 1 LP 1XA202 rev. 1, L.O. 3.1 and 6.4.
SONGS 1 LP 1XI202 rev. 2, P.O. 2.2, 3.2, and 3.3.
Primary Plant Operating Instruction SO1-4-34 rev.2, "Reactor Plant Instrumentation", section A."Reactor Control And Protection System Operations"
SONGS 1 System Description SD-SO1-390 rev. 1, "Primary Process Instrumentation System", section 2.2.13 through 2.2.17.
SONGS 1 System Description SD-SO1-280 rev. 2, "Reactor Coolant System".
KAI [3.4/3.8]

000028A202 ..(KA's)

ANSWER: 080 (1.00)

b

REFERENCE:

Songs 1 LP 1AI746, Obj 1.1.3
Utility Exam Bank, No 9 of Test No 3.
KAI [4.4/4.7]

000056K302 ..(KA's)

ANSWER: 081 (1.00)

d

REFERENCE:

Songs 1 LP 1XB205, p 17, Obj 4.0
Songs SO1-2.1-16, pp 2,6.
KAI [3.4/3.9]

000036K202 ..(KA's)

ANSWER: 082 (1.00)

b

REFERENCE:

Songs 1 LP 1AI724, Obj 1.1.3

KAI [4.1/4.3]

000037K308 ..(KA's)

ANSWER: 083 (1.00)

a

REFERENCE:

Songs 1 LP 1AI736, pp 13,14. Obj 1.1

KAI [4.0/4.3]

000057A219 ..(KA's)

ANSWER: 084 (1.00)

b

REFERENCE:

Songs LP 1FG702, p 2. Obj 1.1.2
SO1-1.2-1, pp 1,2; SO1-1.0-1 CSFST 2, p 3.
KAI [4.5/4.6]

000074G011 ..(KA's)

ANSWER: 085 (1.00)

a

REFERENCE:

Songs 1 LP 1MD701, Obj 3.1
SO1-1.0-24.1, Background for transfer to Hot Leg recirc., p 2
KAI [3.8/4.2]

000011K313 ..(KA's)

ANSWER: 086 (1.00)

c

REFERENCE:

Songs LP 1AI716, p 2 Obj 1.1.1

KAI [3.2/3.4]

000076A104 ..(KA's)

ANSWER: 087 (1.00)

b

REFERENCE:

Songs LP 1AI720 Obj 1.5
SO1-4-35, rev 1, p 12, Caution following step 6.9.1
KAI [3.4/3.6]
000003G007 ..(KA's)

ANSWER: 088 (1.00)

a

REFERENCE:

Songs LP 1AI720 Obj 1.3
SO1-4-35, p 13, step 6.9.6
KAI [3.8/4.1]
000003K304 ..(KA's)

ANSWER: 089 (1.00)

d

REFERENCE:

Songs LP 1XF202, p 53 Obj 1.2e and 1.4.1
SO1-11-2, rev 3, precaution 4.4.1
KAI [2.9/3.9]
000067K101 ..(KA's)

ANSWER: 090 (1.00)

c.

REFERENCE:

Songs LP 1XF202, p 57 Obj 1.2.3e

KAI [3.5/3.7]
000067A106 ..(KA's)

ANSWER: 091 (1.00)

d

REFERENCE:

Songs LP 1XF202, p 54 Obj 1.5.1

KAI [3.4/3.7]
000067A108 ..(KA's)

ANSWER: 092 (1.00)

b

REFERENCE:

Songs LP 1EI703, p 8 Obj 1.1.4
SO1-1.0-10, rev 8, p 3.
KAI [4.3/4.6]
000007A202 ..(KA's)

ANSWER: 093 (1.00)

d.

REFERENCE:

Songs LP 1AI710, p 4. Obj 1.1.5
SO1-2.1-9, rev 4, p 2
KAI [3.3/3.5]

000025G012 ...(KA's)

ANSWER: 094 (1.00)

d

REFERENCE:

Songs LP 0000111AI721, p 8. Obj 1.1.2
SO1-2.3-2, rev 2, p 14.
KAI [3.3/3.6]
000033A202 ..(KA's)

ANSWER: 095 (1.00)

c

REFERENCE:

Songs LP 1AI737, pp 2,19. Obj 1.1.1, 1.1.4

KAI [3.1/3.3]
000058A103 ..(KA's)

ANSWER: 096 (1.00)

d

REFERENCE:

Songs LP 1AI719, p 18. Obj 1.1.2

K/A [3.4/3.6]
000061K302 ..(KA's)

ANSWER: 097 (1.00)

d

REFERENCE:

Songs SO1-2.3-2, rev 2, p 11; LP 1AI721 Obj 1.2.2; section 6.7.1, page7.

KAI [2.8/2.9]
000032G009 ..(KA's)

ANSWER: 098 (1.00)

b

REFERENCE:

Songs LP 1AI741, p 5. Obj 1.1.2.1

KAI [4.3/4.4]
000011K315 ..(KA's)

ANSWER: 099 (1.00)

d

REFERENCE:

Songs LP 1EI711, Obj 1.1.1.1
SO1-1.0-20, rev 6, p 1.
KAI [3.8/4.1]
000009A211 ..(KA's)

ANSWER: 100 (1.00)

c

REFERENCE:

Songs LP 1EI715, p 8. Obj 1.2.1.2
SO1-1.0-40, rev 7 p 3, step 1b.
KAI [3.6/3.8]
000038G007 ..(KA's)

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

A N S W E R   K E Y

001	b
002	d
003	c
004	c
005	c
006	a
007	c
008	c
009	c
010	b
011	a
012	a
013	c
014	d
015	c
016	b
017	d
018	a
019	a
020	c
021	a
022	c
023	b
024	b
025	d

ANSWER KEY

026	c
027	a
028	a
029	b
030	a
031	b
032	d
033	a
034	c
035	b
036	a
037	d
038	b
039	b
040	b
041	a
042	a
043	c
044	c
045	b
046	a
047	d
048	b
049	a
050	d

ANSWER KEY

051	c
052	a (also accept d) TBS
053	d
054	c
055	c
056	b
057	c
058	d
059	d
060	b
061	a
062	d
063	a
064	b
065	b
066	c
067	d
068	a
069	c
070	c
071	b
072	c
073	d
074	c
075	d

ANSWER KEY

076	b
077	a
078	a
079	d
080	b
081	d
082	b
083	a
084	b
085	a
086	c
087	b
088	a
089	d
090	c
091	d
092	b
093	d
094	d
095	c
096	d
097	d
098	b
099	d
100	c

ANSWER KEY

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

TEST CROSS REFERENCE

QUESTION	VALUE	REFERENCE
001	1.00	8000002
002	1.00	8000003
003	1.00	8000004
004	1.00	8000005
005	1.00	8000006
006	1.00	8000007
007	1.00	8000008
008	1.00	8000009
009	1.00	8000011
010	1.00	8000012
011	1.00	8000013
012	1.00	8000014
013	1.00	8000016
014	1.00	8000017
015	1.00	8000018
016	1.00	8000019
017	1.00	8000020
018	1.00	8000021
019	1.00	8000022
020	1.00	8000023
021	1.00	8000024
022	1.00	8000025
023	1.00	8000027
024	1.00	8000028
025	1.00	8000029
026	1.00	8000030
027	1.00	8000031
028	1.00	8000032
029	1.00	8000033
030	1.00	8000034
031	1.00	8000035
032	1.00	8000036
033	1.00	8000037
034	1.00	8000038
035	1.00	8000039
036	1.00	8000040
037	1.00	8000041
038	1.00	8000043
039	1.00	8000045
040	1.00	8000046
041	1.00	8000047
042	1.00	8000048
043	1.00	8000049
044	1.00	8000050
045	1.00	8000051
046	1.00	8000052
047	1.00	8000053
048	1.00	8000054
049	1.00	8000056
050	1.00	8000057
051	1.00	8000059
052	1.00	8000060
053	1.00	8000062
054	1.00	8000063

QUESTION	VALUE	REFERENCE
055	1.00	8000064
056	1.00	8000065
057	1.00	8000066
058	1.00	8000067
059	1.00	8000069
060	1.00	8000070
061	1.00	8000071
062	1.00	8000072
063	1.00	8000073
064	1.00	8000074
065	1.00	8000075
066	1.00	8000076
067	1.00	8000077
068	1.00	8000078
069	1.00	8000079
070	1.00	8000080
071	1.00	8000082
072	1.00	8000083
073	1.00	8000084
074	1.00	8000085
075	1.00	8000086
076	1.00	8000087
077	1.00	8000088
078	1.00	8000089
079	1.00	8000090
080	1.00	8000091
081	1.00	8000092
082	1.00	8000093
083	1.00	8000095
084	1.00	8000097
085	1.00	8000098
086	1.00	8000099
087	1.00	8000101
088	1.00	8000102
089	1.00	8000103
090	1.00	8000104
091	1.00	8000105
092	1.00	8000106
093	1.00	8000108
094	1.00	8000111
095	1.00	8000112
096	1.00	8000114
097	1.00	8000116
098	1.00	8000118
099	1.00	8000119
100	1.00	8000120

	100.00	

	100.00	

As given SRO exam
SONGS 1, 10/23/90
1855
(includes answer key)

U. S. NUCLEAR REGULATORY COMMISSION
SENIOR REACTOR OPERATOR LICENSE EXAMINATION
REGION 5

FACILITY: San Onofre 1

REACTOR TYPE: PWR-WEC3

DATE ADMINISTERED: 90/10/23

MASTER COPY

CANDIDATE:

INSTRUCTIONS TO CANDIDATE:

Points for each question are indicated in parentheses after the question. To pass this examination, you must achieve an overall grade of at least 80%. Examination papers will be picked up four ~~and one half~~ (4 ~~1/2~~) hours after the examination starts.

NUMBER QUESTIONS	TOTAL POINTS	CANDIDATE'S POINTS	CANDIDATE'S OVERALL GRADE (%)
98	100.00		

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

Candidate's Signature

MASTER COPY

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 <u>only</u> 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 <u>literature</u>. 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 question.

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 (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 conditions is required to be logged in the Shift Superintendent's (SS) Log as delineated in "Narrative Logs" procedure SO123-0-11?

a. A line Clearance is issued from the Energy Control Center for the outgoing Chino 220 KV transmission line.

b. A confirmed leak of 12 gpm exists in the RCS inside Containment and the SS declares an Unusual Event per "Recognition And Classification Of Emergencies" procedure SO1-VIII-I.

c. Chemistry technician calls the Control Room to report that the RWST boron concentration was measured to be 4115 ppm when tested per Technical Specification 4.1.1.B.

d. The Energy Resource Supervisor concurs a return to full power following a successful test of the turbine stop valves per "Turbine Stop Valve Test" procedure SO1-12.3-15 .

QUESTION: 002 (1.00)

Based on "Assignment And Approval Of Operations Overtime" procedure SO1-14-23, which one of the following situations (excluding shift turnover and meal time) describes the MAXIMUM allowable time that a Licensed Operator can work?

a. 14 hours in any 24 hour period.

b. 24 hours in any 48 hour period.

c. 72 hours in any five day period.

d. 96 hours in any seven day period.

QUESTION: 003 (1.00)

Which one of the following correctly describes the MINIMUM Operations Shift Crew composition for Unit 1 in MODE 4

a. 1 Shift Superintendent (SRO), no Control Room Supervisor, 1 Licensed Operator (RO), 1 Plant Equipment Operator.

b. 1 Shift Superintendent (SRO), no Control Room Supervisor, 2 Licensed Operators (RO), 2 Plant Equipment Operators.

c. 1 Shift Superintendent (SRO), 1 Control Room Supervisor (SRO), 1 Licensed Operator (RO), 2 Plant Equipment Operators.

d. 1 Shift Superintendent (SRO), 1 Control Room Supervisor (SRO), 2 Licensed Operators (RO), 2 Plant Equipment Operators.

QUESTION: 004 (1.00)

As delineated in "Control Of System Alignments" procedure SO123-0-23, each of the following may be used as the SOLE means of verifying position for Independent Verification EXCEPT:

a. Verifying the East SI Pump (G50A) breaker CLOSED by the pump starting and discharge header pressure PI-910A increasing to 150 psig.

b. Checking local valve position closed and locking mechanism LOCKED to verify manual valve SIS-385, SIS Purge to RWST CLOSED.

c. Checking the green open indication on the Control Board to verify the 4 KV output breaker for #1 DG is OPEN.

d. Verifying the Control Room Emergency Air Treatment System Unit Emergency Makeup Fan A-33 starts by locally observing the fan shaft rotation.

QUESTION: 005 (1.00)

A reactor thermal power calibration is to be performed with the reactor in a steady state condition and steam generator blowdown secured. The following parameters are verified:

Pressurizer pressure (PT-430) and level (LT-430) - 2085 psig, 34%
Main Steam pressure (PI-459B) - 800 psig
Feedwater differential pressure (FI-456, 457 & 458) - 280 psid, 275 psid and 280 psid
Feedwater temperature (TR-456) - 375 degrees F

Which one of the following values is the current reactor power as determined by manual calculation per "Reactor Thermal Power Calibration" SO1-12.1-2?
(NOTE: Instruction SO1-12.1-2 is attached for use.)

a. 92%

b. 88%

c. 84%

d. 80%

QUESTION: 006 (1.00)

The plant is at 75% reactor power when a failure of one Heater Drain Pump occurs. The system can be isolated but NOT drained without disassembly of system joints (flanges). What type of Work Authorization would be issued by the Licensed Operator on shift to DRAIN the system?

a. Approval.

b. Pick-Up Item.

c. Permission.

d. Clearance.

QUESTION: 007 (1.00)

Which one of the following indicates the FORM that authorizes a person to initiate work on deactivated/de-energized components and provides the assurance that the status will NOT be changed?

a. Work Authorization Record (WAR).

b. Component Control Form.

c. Clearance Form.

d. Equipment Deficiency Mode Restraints (EDMR).

QUESTION: 008 (1.00)

Which one of the following statements describes a Radiation Workers responsibility as delineated in "ALARA Program" procedure SO123-VII-3.5?

a. The worker must perform his own radiological survey prior to commencing work in a radiation area.

b. The equipment to be worked on must be determined radiation-free prior to disassembly of the components.

c. The worker must wear the required dosimetry for expected conditions in the area where the work occurs.

d. Work tasks must be combined provided the number of people in the work area does not increase by a factor of two.

QUESTION: 009 (1.00)

Which one of the following would be required to be marked as a HOT SPOT in accordance with "Posting" procedure SO123-VII-7.4?

The elbow of a pipe reading:

a. 140 mrem/hr on contact in a room that has been posted as a High Radiation Area of 105 mrem/hr

b. 50 mrem/hr on contact in a room that has been posted as a Radiation Area of 20 mrem/hr.

c. 30 mrem/hr on contact in a room that is NOT posted as a Radiation Area but is within a Red Badge Zone reading 2 mrem/hr.

d. 10 mrem/hr on contact in a room that is NOT posted as a Radiation Area but is within a Red Badge Zone reading 1 mrem/hr.

QUESTION: 010 (2.00)

Using the attached "Recognition And Classification of Emergencies" procedure SO1-VIII-1 , MATCH the Event Description provided in Column I to the Emergency Class given in Column II. (NOTE: Each response in Column B may be used more than once or not at all, and only a single answer may occupy one answer space. Place answers on answer sheet.)

Column I Event	Column II Emergency Class
a. In MODE 6, the control room is evacuated but establishment of charging flow is delayed for 37 minutes due to a contaminated injury to an operator who has been transported to the hospital.	1. Unusual Event
	2. Alert
	3. Site Area Emergency
b. After 4 weeks in MODE 5 with the RCS in Mid-loop condition, the only OPERABLE RHR Pump trips and cannot be restarted for 15 minutes.	4. General Emergency
c. In MODE 4, an unidentified individual cuts through the security fence and enters the Protected Area.	
d. In MODE 1 with plant conditions stable at full power, breakers 72-102 and 72-104 to the annunciators trip open and are not reclosed for 10 minutes.	

QUESTION: 011 (1.00)

All of the following are acceptable methods for verifying the revision and any TCNs are current for a user-controlled copy of a procedure EXCEPT:

a. access of SCE Document Verification System.

b. contact CDM by telephone.

c. check against the last procedure copy used.

d. reference the current week Configuration Control Log.

QUESTION: 012 (1.00)

Select the individual below that is normally given the authority to control access to the Control Room during normal full power operation according to "Control Room Access And Conduct", procedure SO123-0-15.

a. Operations Manager.

b. Control Room Supervisor.

c. Security Shift Supervisor.

d. Licensed Operator (RO).

QUESTION: 013 (1.00)

Which one of the following describes an off-normal condition for the RCS Makeup System controls with the reactor at power?

a. The Boric Acid Injection Pump START pushbutton is lit (running) when the system is in standby for AUTO MAKEUP.

b. The Blend to Charging Pump Suction(CV406B) / Blend to VCT(CV406A) control is selected to the "406B" position when the system is aligned for BORATE.

c. The Primary Makeup Water Integrator LED display advances (count up) when the system is operating in DILUTE mode.

d. The Boric Acid Transfer Pumps Discharge Valve CV334 indication is lit RED (open) when the system is aligned for borating the RCS using the Emergency Boration flow path.

QUESTION: 014 (1.00)

According to "Use Of Procedures" procedure SO123-0-20, which one of the following activities must be performed through in-hand use of the associated instruction under normal operating conditions?

a. Starting an RCP motor for post-maintenance testing with the motor uncoupled in accordance with "Reactor Coolant Pump Operation" procedure SO1-4-3, section 6.5.

b. Shifting the selected Holdup Tank in accordance with "Liquid Radioactive Waste Receiving And Storage Operations" procedure SO1-5-14, section 6.2.1.

c. Manually operating the travelling screens in accordance with "Screen Wash System Operations" procedure SO1-7-7, section 6.4.1.

d. Diluting the RCS by 5 ppm in accordance with "Boric Acid System Operations" procedure SO1-4-13, section A 6.5.

QUESTION: 015 (1.00)

Which one of the following describes a requirement that must be met for a planned Containment entry under power operation per "Radiological Evaluation For Containment Entry During Power Operation" procedure SO123-VII-7.8?

a. Neutron dosimetry is NOT required if only entering areas located outside the Secondary Shield Walls.

b. Stack radioactivity samples will be analyzed prior to entry.

c. The Movable Incore Flux Instrumentation is inserted into the core and energized.

d. The Shift Supervisor verifies that there is NO "severe" nitrogen leak in Containment.

QUESTION: 016 (1.00)

When performing SONGS 1 Emergency Operating Procedures, monitoring of Critical Safety Function Status Trees (CSFST) may be discontinued when deemed appropriate by the:

a. Emergency Coordinator (Station Emergency Director).

b. Operations Manager.

c. Shift Superintendent.

d. Control Room Supervisor.

QUESTION: 017 (1.00)

While at full power normal operations SHUTDOWN GROUP II rods are exercised in accordance with "Control Rod Exercise" procedure SO1-12.3-24 section 2.5. Which one of the following statements describes the operator actions required to position the rod control switches to enable exercising these rods?

a. The Overlap Cutout Switch is rotated to Position 2; and the Group Selector Switch is rotated to MANUAL and pushed IN.

b. The Overlap Cutout Switch is rotated to Position 2; and the Group Selector Switch is rotated to MANUAL and pulled OUT.

c. The Overlap Cutout Switch is maintained in Overlap 1 & 2; and the Group Selector Switch is rotated to Position 2 and pushed IN.

d. The Overlap Cutout Switch is maintained in Overlap 1 & 2; and the Group Selector Switch is rotated to Position 2 and pulled OUT.

QUESTION: 018 (1.00)

All of the following are reasons for maintaining rods above the Control Rod Insertion Limits EXCEPT:

a. ensure core subcriticality following a reactor trip.

b. maintain an acceptable core power distribution during operation.

c. provide for a negative moderator temperature coefficient (MTC).

d. limit the reactivity insertion for a control rod ejection.

QUESTION: 019 (1.00)

With the plant operating at full power, which one of the following sets of numbers describes the nominal values for normal RCP operation for seal injection flow, seal injection to RCS flow and No. 1 seal leak off flow for ONE RCP?

(gpm = gallons per minute; gph = gallons per hour)

	Seal Injection	Seal Injection to RCS	Seal Return
a.	10 gpm	10 gpm	2 gph
b.	7 gpm	2 gpm	5 gpm
c.	5 gpm	5 gpm	5 gph
d.	7 gpm	5 gpm	2 gpm

QUESTION: 020 (1.00)

The following plant conditions exist:
MODE 1 full power
All systems are in automatic
A leak has developed on the reference leg of the controlling pressurizer level instrument LT-430 which causes the reference leg to completely drain.

Which one of the following statements describes the affect this leak would have on the CVCS? (Assume NO operator action is taken for systems in automatic.)

a. Charging flow valve FCV-1112 decreases flow lowering actual pressurizer level.

b. Letdown isolation valve LCV-1112 closes raising actual pressurizer level.

c. RWST suction valves MOVs 100B & D open borating the RCS.

d. Charging isolation valve CV-304 closes isolating seal injection flow to the RCPs.

QUESTION: 021 (1.00)

Which one of the following statements describes the action that alters the primary source of letdown from the RCS during a normal plant cooldown when CVCS letdown is changed from its normal (power operation) path to the RHR loop?

a. RHR Inlet Isolation valves MOV-813 & MOV-814 are opened.

b. RHR Flow Control valve HCV-602 is opened.

c. CVCS Excess Letdown Isolation valve CV-287 and Flow Control valve HCV-1117 are opened.

d. CVCS Letdown Isolation valve LCV-1112 is closed.

QUESTION: 022 (1.00)

The Safeguard Load Sequencing System contains Input Buffer Cards that receive input from various plant parameters including Pressurizer pressure, 4 KV Bus voltage and DG speed & voltage.

If the input parameter is in its "NORMAL" state (NOT at the trip setpoint) the Input Buffer Card will indicate this by:

a. blue lights that are NOT lit.

b. white lights that are lit.

c. red lights that are lit.

d. amber lights that are NOT lit.

QUESTION: 023 (1.00)

Which one of the following statements describes a plant condition during which both trains of the Safeguard Load Sequencing System SIS actuation are required per Technical Specifications to be OPERABLE for manual actuation but are NOT required for automatic actuation?

a. Unit is in mode 5 at RCS pressure of 400 psig.

b. Unit is in Mode 4 at RCS pressure of 700 psig.

c. Unit is in Mode 3 at RCS pressure of 2000 psig.

d. Unit is in Mode 1 at 75% power.

QUESTION: 024 (1.00)

The following plant conditions exist:
Mode 1 full power
All systems operating in automatic

Which one of the following statements describes the effect of loss of 120 VAC power to N1205 (N41) Power Range drawer? (Assume NO operator action taken)

a. Control Bank 2 would begin to move outward to compensate for lower indicated NIS power.

b. The AUTOMATIC rod withdrawal would be prevented due to an active P-3 signal Rod Drop Rod Stop.

c. Pressurizer program level would lower to 25% due to the auctioneered LOW NIS Power Range input.

d. The Channel Comparator automatically removes the failed channel input from the comparison circuit.

QUESTION: 025 (1.00)

Which one of the following describes the method by which hydrazine is added to Containment Spray injection flow?

a. The hydrazine is injected into the discharge header of the Recirculation Pumps by nitrogen overpressure in the Hydrazine Storage Tank when the discharge valves SV-600 and SV-601 open.

b. The hydrazine is injected into the discharge header of the Refueling Water Pumps by the running Hydrazine Pumps when the discharge valves SV-600 and SV-601 open.

c. The hydrazine is siphoned into the suction header of the Refueling Water Pumps by the Hydrazine eductor when the discharge valves SV-600 and SV-601 open.

d. The hydrazine is injected into the suction header of the Recirculation Pumps from the Hydrazine Storage Tank by gravity feed when the discharge valves SV-600 and SV-601 open.

QUESTION: 026 (1.00)

The following plant conditions exist:

A reactor trip has occurred from full power
A turbine trip coincident with AFW initiation and trip of BOTH Feed Pumps also occurred
All systems are responding as expected

Which one of the following statements describes the indication available to the operator in the control room to verify that feedwater lines to the Steam Generators have been isolated?

a. The Feedwater Regulating Valves Auto Level Setpoint meters read 100%.

b. The SIS/Aux Trip Reset pushbuttons are backlit red.

c. The Feedwater Block Valves green position indication light illuminates.

d. The FEEDWATER ISOLATION ALERT annunciator alarms.

QUESTION: 027 (1.00)

Which one of the following describes the method by which feedwater is introduced into the Steam Generator?

A feed ring distributes flow:

a. into the lower tube bundle area through inverted J-tubes mounted on bottom of the feed ring.

b. into the lower tube bundle area through holes in the top of the feed ring.

c. around the wrapper plate through inverted J-tubes mounted on top of the feed ring.

d. around the wrapper plate through holes in the bottom of the feed ring.

QUESTION: 028 (1.00)

Which one of the following conditions associated with the Steam Generator Water Level Control System will result in an automatic Turbine Trip/Reactor Trip at full power?

a. Steam Generator HIGH level of 85% in all Steam Generators.

b. Steam Generator LOW-LOW level of 5% in all Steam Generators.

c. Feedwater LOW flow of 2.25 10E4 lbm/hr to all Steam Generators.

d. Steam flow 25% of feedwater full load flow of 4.755 lbm/hr to all Steam Generators.

QUESTION: 029 (1.00)

Which one of the following statements describes actions that occur to restore Auxiliary Feedwater flow after an automatic AFW initiation signal was generated and the Train "B" motor-driven pump G-10W tripped 5 minutes after starting?

a. The Train "A" motor-driven pump G-10S starts and Train "A" turbine-driven pump G-10 starts warmup upon the AFW initiation signal.

b. The Train "A" turbine-driven pump G-10 starts to rated speed upon the AFW initiation signal and the Train "A" motor-driven pump G-10S starts when the Train "B" pump tripped.

c. The Train "A" motor-driven pump G-10S starts and turbine-driven pump G-10 starts to rated speed when the Train "B" pump tripped.

d. The Train "A" motor-driven pump G-10S starts upon the AFW initiation signal and the Train "A" turbine-driven pump G-10 starts warmup when the Train "B" pump tripped.

QUESTION: 030 (1.00)

The following plant conditions exist:

Mode 3 following a reactor trip
Auxiliary Feedwater actuation occurred
Systems responded as designed except that following the trip Vital Bus No. 5 supply breaker opened and all components previously supplied are now de-energized.

Which one of the following indications should be used as positive indication of Auxiliary Feedwater System flow?

a. AFWST level.

b. Steam Generator level.

c. AFW valve alignment verification.

d. Steam Generator to AFW discharge differential pressure .

QUESTION: 031 (1.00)

Which one of the following is an acceptable alternative source of supply to the Auxiliary Feedwater System as delineated in "Auxiliary Feedwater System Operations" procedure SO1-7-3 that uses permanently installed piping?

a. Condensate Storage Tank to the AFW Pump suction.

b. Domestic Water System to AFW Pump discharge.

c. Turbine Plant Cooling Water to the AFWST.

d. Service Water Reservoir to the AFWST.

QUESTION: 032 (1.00)

With the DC Electrical System aligned for normal plant operations at 50% power, which one of the following statements describes the response of the #1 DC Bus to a blown fuse (loss of power) on the in service "A" Battery Charger?

a. The standby Battery Charger automatically picks up the load when the blocking diode voltage setpoint is reached.

b. The standby Battery Charger picks up the load as soon as the AC input breaker automatically closes.

c. The #1 Battery picks up the load as soon as its DC output breaker automatically closes.

d. The #1 Battery picks up the load as soon as the Battery Charger voltage drops below its setpoint.

QUESTION: 033 (1.00)

Which one of the following events AUTOMATICALLY occurs to terminate a liquid radwaste release from the West HUT?

a. The Holdup Tank Pump trips on Liquid Effluent Discharge Filter HIGH differential pressure.

b. The HUT Circulating Pump trips on Holdup Tank LOW level.

c. The Liquid Radwaste Release Isolation Valve CV-111 closes on HIGH radiation signal from R-1218.

d. The Liquid Radwaste Release Isolation Valve CV-110 closes when the running Holdup Tank Pump stops.

QUESTION: 034 (1.00)

Which one of the following events will automatically close SV-99, Release Line Isolation Solenoid Valve, terminating a Gaseous Radwaste release in progress ?

a. Release flow rate for Release Flow Transmitter, FIT-11 exceeds the setpoint.

b. Radiation Stack Gas Monitor, R-1214 exceeds the HIGH alarm setpoint.

c. The running Waste Gas Compressor, K-4 trips on LOW suction pressure.

d. The running Sphere Purge Exhaust Fan, A-22 trips on electrical fault.

QUESTION: 035 (1.00)

The following plant conditions exist:

Mode 3 at 1900 psig Pressurizer pressure
HP reports that Control Room Area Radiation Monitor R-1231 has failed

Which one of the following statements describes the required operator response to this failure?

a. IMMEDIATELY stop containment purge if in progress.

b. Within one hour initiate corrective action in accordance with Technical Specifications.

c. Don Self-contained Breathing apparatus until the Control Room Emergency Ventilation System has operated for an 2 hours.

d. Return the monitor to service within 4 hours in accordance with Technical Specifications.

QUESTION: 036 (1.00)

Which one of the following statements describes the potential thermo-hydraulic effects on the fuel following core uncovery and re-introduction of water to the core during the refill/reflood stage of a design Large-Break LOCA?

a. The fuel and clad temperature are near the interaction temperature of 3500 degrees F and as water is introduced into the core area the fuel pellets begin to melt.

b. Water beads on the very hot cladding surface which limits the heat transfer capability until the cladding surface is cooled by steam convection .

c. Rapid cooling causes the embrittled metal cladding to split for up to two-thirds of the fuel elements primarily in the inner core regions.

d. The fuel temperature is near the melting point of 2500 degrees F and as water is introduced into the core area the quenching causes the fuel pellet to disintegrate into small chips.

QUESTION: 037 (1.00)

Which one of the following statements describes an interlock feature of west Main Feed Pump SI Suction Valve HV-853B upon an SI actuation signal?

a. If the valve has not opened within 30 seconds of the feed pump start signal, the west feed pump will trip.

b. If the valve has not opened within 1 minute of the SI actuation signal, its corresponding discharge valve HV-851B will re-close.

c. The valve will only get an open signal if the associated west safety injection pump is running.

d. The valve will only get an open signal if the associated condensate suction valve HV-854B closes.

QUESTION: 038 (1.00)

Which one of the following statements describes the design feature associated with the Main Feed pump that allows them to also serve as the SI pump for delivery of borated water to the RCS?

a. Each pump can deliver 10,500 gpm at approximately 1160 psig to the RCS.

b. The pump impeller was manufactured with tight tolerances that allow for rapid temperature changes without damage.

c. Sealing water for the pump is supplied by the safety related CCW system.

d. The recirculation cooling capacity is sufficient to allow for extended operation with the pump suction blocked.

QUESTION: 039 (1.00)

The following plant conditions exists:
A Large-Break LOCA has occurred
All equipment operated as expected
Normal Cold Leg Injection path has been aligned and verified
RWST level has reached 12% and the operator is preparing to align for Cold Leg Recirculation

Which one of the following valves will be operated from the control room in order to complete the alignment for the normal Cold Leg Recirculation flowpath?

a. Seal Injection Manifold Filter Bypass MOV-18.

b. CVCS Charging Flow Control FCV-1112.

c. RWST Outlet MOV-883.

d. Residual Heat Removal Flow Control HCV-602

QUESTION: 040 (1.00)

Which one of the following describes the power supply for the Pressurizer Safety Valve open indication (red position indicating lights) on the North Vertical Board and for the Reactor Plant First Out Annunciator "SAFETY VALVE OPEN"?

a. 120 VAC from the Utility Bus for the valve discharge temperature elements.

b. 120 VAC from two of the Vital Busses to limit switches on the valves.

c. 125 VDC from the DC Switchgear to solenoid poppets in the discharge flowpath.

d. 125 VDC rectified from the 480 VAC MCC that provides motive power for the valves.

QUESTION: 041 (1.00)

Which one of the following statements is consistent with an INDICATION in the Control Room that voids or a steam bubble has formed in the RCS (upper plenum) following a loss of the secondary heat sink?

a. Pressurizer level rapidly increases.

b. Pressurizer vapor space temperature rapidly increases.

c. Reactor coolant pump running amps increase.

d. Core exit thermocouple temperatures rapidly decrease.

QUESTION: 042 (1.00)

Which one of the following describes the indication available to the operator to inform him that one channel PT-430 of Pressurizer Variable Low Pressure (VLPT) is placed in the TRIPPED position as part of approved I&C testing?

a. The VLPT knife switch for channel PC-430 located in rack R-3 will be closed.

b. The VLPT Calculator module for PC-430 located in a rack behind the West Vertical Board will have its LED illuminated.

c. Reactor Plant First Out Annunciator PRESSURIZER VARIABLE LOW PRESSURE REACTOR TRIP will alarm.

d. Reactor Plant Matrix Partial Trip Annunciator PRESSURIZER VAR LO PRESS REACTOR TRIP CHANNEL I will alarm.

QUESTION: 043 (1.00)

Which one of the following statements describes the purpose or basis for the Variable Low Pressure Trip reactor trip?

a. This ensure the reactor is tripped if Safety Injection occurs.

b. It protects the fuel from DNB.

c. This ensures voids are not formed.

d. It prevents exceeding hot channel factors.

QUESTION: 044 (1.00)

The following plant conditions exist:
Mode 1 full power
All systems functioning normally in automatic

Which one of the following describes the plant response to Tref module TC-415 failed LOW?

a. Control Rods drive out.

b. Pressurizer level setpoint decreases.

c. Tave/Tref deviation alarm annunciates.

d. Steam dumps trip open.

QUESTION: 045 (1.00)

While heating up the plant in MODE 4, which one of the following statements describes how Containment Purge Exhaust is isolated in the event of a LOCA?

a. The Purge Exhaust valve POV-10 is maintained closed and its associated manual isolation valve CVS-313 is LOCKED closed.

b. The open Purge Exhaust valve POV-10 receives a closed signal on CIS and the associated manual isolation valve CVS-313 must be manually closed within 15 minutes.

c. The open Purge Exhaust valve POV-10 receives a closed signal and the running Exhaust fan (A-21, 22 or 24) receives a trip signal on CIS.

d. The Purge Exhaust valve POV-10 is maintained closed and all Exhaust fans (A-21, 22 & 24) are TAGGED off.

QUESTION: 046 (1.00)

Which one of the following interlocks associated with the Fuel Handling Manipulator Crane is designed to protect the fuel assembly from binding while moving?

a. Hoist Limiting Overload Circuit interlock.

b. Gripper Fingers interlock.

c. Mast Rotation interlock.

d. Bridge Positioner Index interlock.

QUESTION: 047 (1.00)

Which one of the following statements describes what the normal power system alignment is to energize 4160 VAC Bus 1B while at 10% reactor power?

a. Auxiliary Transformer B supply breaker to the 1B Bus is closed.

b. Auxiliary Transformer C supply breaker to the 1B Bus is closed.

c. Auxiliary Transformer C supply breakers to the 2C Bus and the 2C; and 1B bus tie breaker are closed.

d. Auxiliary Transformer B supply breakers to the 2C Bus and the 2C; and 1B bus tie breaker are closed.

QUESTION: 048 (1.00)

Which one of the following statements describes the operation of a Vital Bus transfer between its normal power source and its alternate power source?

a. Power will automatically transfer from normal to alternate (within 50 milliseconds) but must be manually transferred by pushbutton from alternate to normal.

b. Power must be manually transferred by pushbutton from normal to alternate but will automatically transfer from alternate to normal (within 50 milliseconds).

c. Power must be manually transferred by pushbutton from normal to alternate and the Vital bus must be de-energized to allow a return to normal.

d. The Vital bus must be de-energized to allow a transfer to alternate but power can be manually transferred by pushbutton from alternate to normal.

QUESTION: 049 (1.00)

Which one of the following sequences describes the response of the Diesel Generator #2 [DG] and its output breaker to a Sequencer Safety Injection Signal [SIS] when the DG is currently PARALLELED to a 4 KV bus 2C for surveillance testing?

a. The output breaker does NOT receive a trip signal; the DG receives a trip signal to shutdown.

b. The output breaker receives a trip signal; the DG receives a trip signal to shutdown.

c. The output breaker does NOT receive a trip signal; the DG continues to run.

d. The output breaker receives a trip signal; the DG continues to run.

QUESTION: 050 (1.00)

Which one of the following statements describes the relationship of 125 VDC system and the Diesel Generator system?

a. The Standby Lube Oil pumps have 125 VDC motors.

b. The fuel racks are positioned by a 125 VDC driven pinion.

c. The diesel control power is supplied by 125 VDC system.

d. The generator excitation is maintained after flashing by the 125 VDC system.

QUESTION: 051 (1.00)

Which one of the following describes the location where the radiation reading is indicated for channel R-1259, Post Accident Sample System (PASS) monitor?

a. Control Room meter on the North Vertical Board.

b. Control Room recorder on the RM-23 control panel.

c. Remote meter located in the PASS room.

d. Remote recorder located on the Radwaste Control Panel.

QUESTION: 052 (1.00)

Which one of the following statements describes the effect on the Unit 1 Fire Water System when the Unit 1 - Unit 2/3 cross-tie valve PIV-I closed for repair on Unit 2/3 header?

a. One of the Unit 1 Fire Pumps must be started and kept running in order to maintain Unit 1 header pressure.

b. The automatic start setpoint for the Fire Pumps is reduced since the Service Water pumps are maintaining Unit 1 header pressure.

c. The Unit 2/3 Fire Water Jockey pumps are re-aligned to Unit 1 header in order to maintain pressure in the header.

d. The Unit 1 header pressure high alarm setpoint is increased since the pressure will be higher with Unit 2/3 header isolated.

QUESTION: 053 (1.00)

Technical Specifications state that in MODE 5, with all reactor coolant loops filled, at least one Residual Heat Removal (RHR) train shall be OPERABLE and in operation, except that pump may be de-energized for up to one hour provided certain conditions are met. Which one of the following items describes one of these conditions?

a. Core outlet temperature is maintained AT LEAST 40 degrees F below saturation temperature.

b. TWO centrifugal charging pumps are OPERABLE and at least ONE is operating.

c. Pressurizer water level remains LESS THAN 58%.

d. Shutdown Margin CANNOT be decreased by GREATER THAN 5% by dilution.

QUESTION: 054 (1.00)

Which one of the following describes the interlock between respective Component Cooling Water Heat Exchanger outlet valves MOV-720A & MOV-720B and the controls for the associated North and South Salt Water Cooling Pumps [G-13A & G-13B]?

a. The Salt Water Cooling Pump will AUTO stop if the valve has stroked fully CLOSED.

b. The Salt Water Cooling Pump will NOT start until the valve has stroked fully OPEN.

c. The valve will NOT remain open if the Salt Water Cooling Pump is stopped.

d. The valve will NOT remain closed if the Salt Water Cooling Pump is running.

QUESTION: 055 (1.00)

Which one of the following describes an attribute that is characteristic of the valve positioners for the Atmospheric Steam Dump valves?

a. Full control air signal is directed to the valve positioner when the Steam Dump Transfer switch is placed in the "LOCAL" position.

b. Full control air signal is directed to the valve actuator when the Mode Selector switch is placed in the "OFF" position.

c. The "Blow Down" feature ensure full control air signal that dumps air from the valve actuator.

d. The "Blow Open" feature actuates solenoid valves which port air directly to the valve actuator.

QUESTION: 056 (1.00)

Which one of the following provides the reason for the CAUTION in SO1-7-1 "Instrument And Service Air System Operation" that warns that the Service Air header should never be valved into the Containment Instrument Air header, except in an emergency?

a. Service Air header pressure is higher than the design pressure for the Containment Instrument Air header and piping failure may occur.

b. Service Air header contains air of a higher moisture content and the water condensing out may adversely impact instrument operation.

c. Containment Instrument Air header is not normally pressurized and interconnecting the headers may lower Service Air header pressure below the isolation setpoint.

d. Containment Instrument Air header enters area where contamination exists and interconnecting the headers may contaminate the Service Air header.

QUESTION: 057 (1.00)

Which one of the following is an indication of a Control Rod Bank or Group failure that would direct the operator to Attachment 3, "Control Rod Bank or Group Failure" of Abnormal Operating Instruction SO1-2.3-1, "Control Rod System Malfunctions" ?

a. The rod drive slave cycler failure rod stop alarm is clear.

b. ONE control bank subgroup step counter indicates 5 steps lower than the remaining subgroup counters.

c. The Hold Mode lights are "Illuminated".

d. Control Rod Shutdown Margin LOW alarm annunciates.

QUESTION: 058 (1.00)

Which one of the following is the MAXIMUM number of steps that a control rod may be misaligned from the indicated bank position on the step counters BEFORE Technical Specification ACTION is required to be entered?

a. 24

b. 29

c. 34

d. 39

QUESTION: 059 (1.00)

Which one of the statements below is the basis or reason for the following note from SO1-2.7-4, "Alternate Shutdown for Fire in the Yard Area" Abnormal Operating Instruction?

NOTE: At and below 350-F RCS temperature, RCP seal flow is optional, but preferred.

a. Seal injection water cannot be cooled sufficiently without CCW cooling flow.

b. RCP pump bearing temperature will NOT affect RCP seal operation.

c. The allowable RCS pressure is insufficient to provide flow past the RCP thermal barrier.

d. RCS leakage past the RCP seals causes minimal degradation of the seal.

QUESTION: 060 (1.00)

Which one of the following statements correctly describes RCP seal leakage control in the event of a #1 seal failure during full power operations with NO operator actions?

a. The Floating Ring seal limits the seal leakage to about 100 gpm for a relatively short period of pump operation.

b. The #1 seal continues to limit the seal leakage to about 2 gpm, even with a failure, for an extensive period of pump operation.

c. The #2 seal limits the seal leakage to about 2 gpm for an extensive period of pump operation.

d. The #3 seal limits the seal leakage to about 100 gpm for a relatively short period of pump operation.

QUESTION: 061 (1.00)

Which one of the following is an IMMEDIATE operator action required by "Emergency Boration", SO1-2.1-12?

a. Ensure at least one charging pump is operating.

b. Increase Letdown flow to 90 gpm.

c. Manually trip the reactor.

d. Terminate RCS Dilution in progress.

QUESTION: 062 (1.00)

Which one of the following would be the approximate percent shutdown increase, if 600 gallons of boric acid have been "Emergency Borated" into the RCS from the Boric Acid Storage Tank (BAST)?

a. 0.5

b. 1.0

c. 2.0

d. 3.0

QUESTION: 063 (1.00)

Which one of the following is an AUTOMATIC action associated with the Component Cooling Water System Malfunction, Abnormal Operating Instruction SO1-2.1-10?

a. Standby Component Cooling Water Pump starts automatically upon CCW pump discharge pressure reaching 65 psig.

b. Standby Component Cooling Water Pump starts automatically after 10 seconds at LESS THAN 45 psig CCW discharge pressure.

c. RCP Thermal Barrier Emergency Pump starts automatically upon CCW pump discharge pressure reaching 65 psig.

d. RCP Thermal Barrier Emergency Pump starts automatically after 10 seconds at LESS THAN 45 psig CCW discharge pressure.

QUESTION: 064 (1.00)

All of the following are actions required to be taken, according to "Response To Nuclear Power Generation/ATWS" Emergency Operating Instruction SO1-1.1-1, if a reactor trip has NOT been verified EXCEPT:

a. Manually insert the control rods.

b. Manually initiate Safety Injection.

c. Locally open the reactor trip breakers.

d. Locally open DC supply breaker 72-141 to control rods.

QUESTION: 065 (1.00)

Following a large steam line rupture, monitoring of Critical Safety Function Status Trees [Emergency Operating Instruction SO1-1.0-1] indicates a RED path for RCS Integrity.

Which one of the statements below correctly identifies the most limiting component and reason for concern that Pressurized Thermal Shock conditions may result in brittle failure of an existing flaw ?

a. The Pressurizer interior [inside] wall due to increased tensile stress resulting from the large temperature drop.

b. The Pressurizer exterior [outside] wall due to increased tensile stress resulting from lower internal pressure.

c. The Reactor Vessel interior [inside] wall due to the increased tensile stress resulting from the large temperature drop and neutron irradiation.

d. The Reactor Vessel exterior [outside] wall due to the increased tensile stress resulting from the large pressure decrease and neutron irradiation.

QUESTION: 066 (1.00)

Emergency Operating Procedure SO1-1.0-20, "Loss Of Reactor Coolant", instructs the operator in Step 3 to establish and maintain SG levels between 50% and 70%.

Which one of the statements below describes the basis for maintaining the SG level in the event of a SMALL Break LOCA [break diameter - 3/8" to 2.55"] ?

The Steam Generators act as:

a. a heat source to maintain stable RCS conditions when the decay heat production rate falls below the cooling rate provided by the combined subcooled safety injection and break energy removal.

b. an alternate source of water inventory for spillage to the Containment Sump.

c. a condensation pot for the steam in the Steam Generator tubes resulting in the collapsing of the loop seal in the reactor coolant pipe between the RCP suction and the Steam Generator.

d. a heat sink when Steam Generator pressure rises to the safety valve setpoint for heat removal.

QUESTION: 067 (1.00)

Which one of the following actions is an IMMEDIATE action associated with "Shutdown From Outside the Control Room", procedure SO1-2.5-4?

a. Notify plant personnel.

b. Ensure the West AFW pump is running,

c. Obtain a radio transmitter.

d. Verify Saltwater cooling in service.

QUESTION: 068 (1.00)

Which one of the responses below is the basis or reason for the following step in "Shutdown From Outside the Control Room" procedure SO1-2.5-4?

"Throttle Closed MSS-301 and MSS-302, Main Steam 24" Maintenance Block valves as necessary to maintain Tave at 535-F."

a. The main turbine is still rotating.

b. The turbine driven AFW pump has automatically started.

c. The Steam Dumps are discharging to the condenser.

d. The secondary drain traps are unisolated.

QUESTION: 069 (1.00)

During the performance of "Loss Of Condenser Vacuum" procedure SO1-2.4-3, an automatic Unit Trip on low vacuum may be expected to occur at?

a. 26" Hg vacuum decreasing.

b. 22" Hg vacuum decreasing.

c. 5.5" Hg vacuum increasing.

d. 5.5" Hg absolute pressure increasing.

QUESTION: 070 (1.00)

As cautioned by "Steam Generator Tube Rupture", Emergency Operating Instruction SO1-1.0-40, the operator must stop the Feed and SI pumps for which one of the conditions listed below?

a. Ruptured SG level is exceeding 90%.

b. Auxiliary Feedwater Tank level approaches 4 feet.

c. Pressurizer level is nearing 5%.

d. RWST level has lowered to 40%.

QUESTION: 071 (1.00)

Select the flow rate below that correctly completes the following CAUTION from "Loss Of Secondary Coolant", SO1-1.0-30, as it would apply to a single main feedwater line break:

"A minimum feed flow of ___ GPM must be maintained to each intact SG to prevent SG dryout."

a. 25

b. 50

c. 100

d. 150

QUESTION: 072 (1.00)

Initially the following plant conditions exist:

Reactor power is at 50%
Tavg is at 542 degrees F
Pressurizer pressure is at 2085 psig
Pressurizer level and level setpoint are at 30%
All pertinent systems are in AUTOMATIC except Rod Control is in MANUAL

An instrument failure occurs after 5 minutes such that the operator notes that Pressurizer level and its setpoint are increasing to a a new value of 36.5%.

Which one of the failures below would have caused this response assuming there was NO operator action taken ?

a. Pressurizer level channel LT430 failed HIGH.

b. Nuclear Power Range channel N1208 failed HIGH.

c. Pressurizer pressure channel PT431 failed HIGH.

d. Hot Leg RTD to Tave TE401A failed HIGH.

QUESTION: 073 (1.00)

An automatic action of "Main Or Auxiliary Transformers Malfunctions" Section B procedure SO1-2.6-10, states that if a sudden pressure trip has occurred, then the main transformer coolers [pumps] will trip. Which one of the following is the purpose of this action?

a. Continued operation of the oil cooler pumps could result in cavitation due to inadequate suction pressure.

b. Tripping the cooler pumps ensures that the potential for spreading burning oil through any breaks is minimized.

c. Continued operation of the oil cooler pumps could result in lifting relief valves from overcooling and oil thickening.

d. Tripping the cooler pumps will reduce the pressure and assist in restoring normal system pressure conditions.

QUESTION: 074 (1.00)

Which one of the following actions will AUTOMATICALLY occur, if during refueling operations a Containment high activity condition is indicated by a ORMS-R-1212 high alarm, according to "Refueling Accidents" procedure SO1-2.1-16?

a. Containment Evacuation alarm actuates.

b. POV-9 Containment sphere purge - OPENS, and POV-10 Containment sphere exhaust - CLOSES.

c. Fans 1, 2, 3 and 4 - STOP, and PO-13, 14, 15 and 16 - CLOSE.

d. PO-21 diverts Fan A-21 discharge to the vent stack, if sphere purge is in progress.

QUESTION: 075 (1.00)

Which one of the following correctly states the reason or basis for securing the reactor coolant pump (RCP) in the loop with "identified" steam generator tube leakage, Step 16 of "Steam Generator Tube Leakage" procedure SO1-2.1-17?

a. To minimize the heat input from the RCP and limit the thermal expansion of primary coolant into the affected steam generator.

b. To minimize the steaming rate from and the leakage rate into the affected steam generator for radiological release considerations.

c. To maximize flow rates in the unaffected loops allowing for a more rapid cooldown and depressurization for radiological release considerations.

d. To maximize the reverse flow in the affected loop and limit the thermal driving head for primary coolant flow into the affected steam generator.

QUESTION: 076 (1.00)

During a loss of Vital Bus No. 1, the operator is directed to close PCV-1115 A, B and C, (RCP Seal Leakoff Valves) by "Loss of Vital or Utility Bus" procedure SO1-2.6-3. Which one of the following receives the drainage from the 2nd seal after this action has been taken?

a. Pressurizer Relief Tank.

b. Excess Letdown Heat Exchanger.

c. Containment sump via relief valve actuation.

d. Vapor Seal Head Tank.

QUESTION: 077 (1.00)

Which one of the following actions will AUTOMATICALLY occur upon a loss of Vital Bus No. 1, according to "Loss Of Vital or Utility Bus" procedure SO1-2.6-3?

a. All PZR heaters trip OFF due to level control failure.

b. Both PZR spray valves fail OPEN due to the pressure control failure.

c. Both PZR power relief valves fail CLOSED on loss of power.

d. All PZR spray bypass valves fail CLOSED on loss of power.

QUESTION: 078 (1.00)

There has been a reactor trip caused by a loss of offsite power, "Reactor Trip or Safety Injection" SO1-1.0-10 was entered. Then a transition was made to "Loss of All AC Power" SO1-1.0-60, while performing step 11, the 4kV bus 1C becomes energized from a diesel generator. Which one of the following is the appropriate response?

a. Continue to perform SO1-1.0-60 "Loss Of All AC Power" and return to step 2 to restore offsite power.

b. Transition back to SO1-1.0-10, "Reactor trip or Safety Injection" step 4.

c. Transition to SO1-1.0-61, "Loss of All AC Power Recovery".

d. Continue to perform SO1-1.0-60 "Loss Of All AC Power" and concurrently perform SO1-2.6-9, "220kV Switchyard Trouble".

QUESTION: 079 (1.00)

Which one of the following conditions or symptoms would require entry into the "Response to Inadequate Core Cooling" procedure SO1-1.2-1?

a. RCS subcooling less than 0 degrees-F.

b. Two RCS hot leg RTD's indicate 690 degrees-F.

c. PZR level indication 0% level.

d. RWST level decreased to 20%.

QUESTION: 080 (1.00)

Which one of the following is the reason or basis for transferring to hot leg recirculation during a cooldown approximately 8 hours after a LOCA, in accordance with "Transfer to Hot Leg Recirculation" procedure SO1-1.0-24?

a. Terminate boiling in the core.

b. Entrains additional hydrogen in solution.

c. Enhances boron precipitation.

d. Enhances reflux cooling in the steam generators.

QUESTION: 081 (1.00)

Which one of the following symptoms/conditions would require entry into "High Activity In The Reactor Coolant System" procedure SO1-2.1-15?

a. Sample analysis indicates the RCS specific activity has increased by a factor of 2 above previous level.

b. RCS coolant sample analysis indicates that Co-60 activity has increased by a factor of five.

c. Containment Sphere high radiation alarm (Channel R-1232).

d. Component Cooling high radiation alarm (Channel R-1217).

QUESTION: 082 (1.00)

High Activity in the RCS procedure SO1-2.1-15, directs that when in Mode 3 Tave is maintained less than 530 degrees-F and the Steam Dump pressure controller (PC-418) is set less than or equal to 860 psig. Which one of the following is the purpose or reason for the above actions?

a. To increase the solubility of Iodine in the RCS and limit activity released through primary leakage.

b. To prevent the SG safeties from lifting and cause a release in the event of primary to secondary leakage.

c. To concentrate the specific activity in the RCS to enhance the removal of activity by the CVCS.

d. To limit the exposures of HP personnel during RCS sampling operations.

QUESTION: 083 (1.00)

According to "Control Rod Drive System" SO1-4-35, withdrawal of a dropped rod shall only be made after discussion with Station Core Analysis Engineering and plant management staff AND...

a. if recovery can be completed within 6 hours of the rod drop.

b. concurrence of the on-shift STA.

c. if only 2 rods have dropped.

d. concurrence of the Nuclear Operations Assistant.

QUESTION: 084 (1.00)

During recovery from a dropped control rod, in accordance with "Control Rod Drive System" procedure SO1-4-35, reactor power is held constant while retrieving the dropped rod by which one of the following methods?

a. Insertion of CB-1 or CB-2.

b. RCS dilution.

c. RCS boration.

d. Turbine load adjustment.

QUESTION: 085 (1.00)

Halon gas is suitable for all of the following Class fires, according to "4KV and 480V Rooms Halon Systems Operation" procedure SO1-11-2, EXCEPT?

a. A (trash, wood, paper)

b. B (liquids, grease)

c. C (electrical equipment)

d. D (metals)

QUESTION: 086 (1.00)

Which one of the following is an AUTOMATIC action associated with a SINGLE fire detector actuation in either train for the 480V Room?

a. Yellow lights above the doors will illuminate.

b. Exhaust ventilation actuates.

c. Dampers and doors close.

d. The in-service Halon bank releases, after a 10 second time delay.

QUESTION: 087 (1.00)

Which one of the following is the PREFERRED method for manual initiation of the Halon system for the 4KV or 480V rooms, according to procedure SO1-11-2?

a. Depress the "Execute" pushbutton on the fire annunciator panel for the alarming window.

b. Open the manual Halon discharge bypass valve on the in-service bank.

c. Actuate the manual plunger of the in-service Halon bank.

d. Select the "ON" position for the manual/electric initiation switch on the Halon control panel.

QUESTION: 088 (1.00)

A Reactor trip has occurred, but the Turbine did not trip and a manual trip of the turbine was unsuccessful. Which one of the following actions is required by "Reactor Trip or Safety Injection" procedure SO1-1.0-10?

a. Runback the turbine load limit and trip the Auxiliary Oil Pumps.

b. Runback the turbine load limit and locally trip the turbine from the front standard.

c. Locally trip the turbine from the front standard and close the Main Steam Block Valves.

d. Manually initiate Safety Injection and trip the Auxiliary Oil Pumps.

QUESTION: 089 (1.00)

Which one of the following is the purpose or reason for immediately implementing containment closure upon a loss of RHR while in Mode 6, according to "Loss of Residual Heat Removal" procedure SO1-2.1-9?

a. Prevent lowering the spent fuel pool level in case of a loss of primary coolant.

b. To contain potentially contaminated reactor coolant inside the containment sump in case of a loss of primary coolant.

c. Prevent release of potentially contaminated steam to the atmosphere.

d. To control access to the containment during a loss of RHR recovery actions.

QUESTION: 090 (1.00)

The following conditions exist:

Mode 5, 20 days following a reactor trip from an extended period of full power operation
The RCS is at mid-loop for maintenance work on Steam Generators
RCS temperature is currently 140 degrees F
RHR cooling has just been lost

If makeup to the RCS was NOT available, which one of the following is the MAXIMUM time before an alternate cooling method would be necessary to prevent boiling from occurring in the core?
(NOTE: Attachment 9 of "Loss of Residual Heat Removal" procedure SO1-2.1-9 is provided.)

a. 8.8 min.

b. 11.3 min.

c. 27.0 min.

d. 30.4 min.

QUESTION: 091 (2.00)

Following a loss of all AC power[4 KV busses 1C AND 2C deenergized] during power operations, instrument air compressors will be lost and the instrument air system will depressurize. For each valve given in Column I select the effect of the complete loss of instrument air will have on the valve from Column II. [NOTE: Responses from Column II may be used more than once or not at all; Assume NO operator action and NO SI signal present, Place answers on answer sheet.]

Column I Valve	Column II Effect On Valve
__ a. Main Feedwater Flow Control valves.	1. Fails - OPEN
__ b. PZR PORV Block valves.	2. Fails - CLOSED
__ c. Atmospheric Steam Dump valves.	3. Back-Up Nitrogen System maintains valve control
__ d. PZR Spray valves.	4. Not affected since valve is a MOV

QUESTION: 092 (1.00)

The following plant conditions exist:
Mode 5, 3 weeks after plant shutdown
Train "A" RHR operating in Shutdown Cooling Mode
Train "B" RHR aligned and in standby for Shutdown Cooling Mode
Pressurizer level 100% (solid plant), RCS pressure 300 psig, RCS temperature 180 degrees F

Which one of the following procedures provides the guidance in event of a LOCA while operating in this condition?

a. Loss of Reactor Coolant, SO1-1.0-20

b. Loss of Secondary Coolant, SO1-1.0-30

c. Loss of Residual Heat Removal, SO1-2.1-9

d. Response to Inadequate Core Cooling, SO 1-1.2-1

QUESTION: 093 (1.00)

Which one of the following is an indication that DC Bus No. 2 has been lost, according to "Loss of DC Bus" procedure SO1-2.6-4?

a. Reactor trip.

b. DC Control power is de-energized to 4kV Bus 2C.

c. Automatic transfer of Vital Bus No. 2.

d. Loss of control power on 480V Bus 3.

QUESTION: 094 (1.00)

Which one of the following Radiation Monitoring System channels has an "automatic" action associated with an alarm condition, according to "High Activity Operational Radiation Monitoring System" procedure SO1-2.2-1?

a. Containment Sphere channel R-1232.

b. Component Cooling channel R-1217.

c. Reactor Auxiliary Building channel R-1234.

d. Spent Fuel Building channel R-1236.

QUESTION: 095 (1.00)

While performing "Abnormal Pressurizer Pressure" procedure SO1-2.3-3, Spray Valve "PCV-430C" is open and cannot be closed. The required action is to TRIP the reactor AND...

a. Stop all the RCP's.

b. Stop Loop A RCP.

c. Stop Loop B RCP.

d. Stop Loop C RCP.

QUESTION: 096 (1.00)

Which one of the following conditions would require REINITIATION of Safety Injection after SI is reset, while performing "SI Termination" procedure SO1-1.0-12?

a. PZR pressure 1450 psig.

b. PZR level 27%

c. RCS subcooling 32 degrees-F.

d. Containment pressure 2.5 psig.

QUESTION: 097 (1.00)

Which one of the following is the basis or reason why the RCP's are tripped upon safety injection initiation during the performance of "Reactor Trip or Safety Injection" procedure SO1-1.0-10?

a. To minimize the effects of RCS cooldown in the event of a major steamline break for PTS considerations.

b. To limit the rate of RCS depressurization in the event of a large break LOCA and reduce the amount of voiding in the core.

c. To limit the RCS depletion through a small break leading to a more severe core uncovery if RCP's were tripped some time later.

d. To prevent exceeding containment pressure limitations during a large break LOCA event.

QUESTION: 098 (1.00)

Which one of the following conditions would require the reactor to be tripped and safety injection to be initiated while performing "Steam Generator Tube Leakage" procedure SO1-2.1-17?

a. Pzr pressure 1925 psig.

b. PZR level 5%.

c. Primary to secondary leakage is 15 gpm.

d. Primary to secondary leakage is greater than Technical Specification limits.

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

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.

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 a b c d ______

009 a b c d ______

010 match with selected number in the blank

a ______

b ______

c ______

d ______

011 a b c d ______

012 a b c d ______

013 a b c d ______

014 a b c d ______

015 a b c d ______

016 a b c d ______

017 a b c d ______

018 a b c d ______

019 a b c d ______

020 a b c d ______

021 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.

022	a	b	c	d	______
023	a	b	c	d	______
024	a	b	c	d	______
025	a	b	c	d	______
026	a	b	c	d	______
027	a	b	c	d	______
028	a	b	c	d	______
029	a	b	c	d	______
030	a	b	c	d	______
031	a	b	c	d	______
032	a	b	c	d	______
033	a	b	c	d	______
034	a	b	c	d	______
035	a	b	c	d	______
036	a	b	c	d	______
037	a	b	c	d	______
038	a	b	c	d	______
039	a	b	c	d	______
040	a	b	c	d	______
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	______

ANSWER SHEET

Multiple Choice (Circle or X your choice)

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

047	a	b	c	d	______
048	a	b	c	d	______
049	a	b	c	d	______
050	a	b	c	d	______
051	a	b	c	d	______
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	a	b	c	d	______
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	a	b	c	d	______
068	a	b	c	d	______
069	a	b	c	d	______
070	a	b	c	d	______
071	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.

072	a	b	c	d	______
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	______
084	a	b	c	d	______
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	______

091 match with selected number in the blank

a ______

b ______

c ______

d ______

092	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.

093	a	b	c	d	____
094	a	b	c	d	____
095	a	b	c	d	____
096	a	b	c	d	____
097	a	b	c	d	____
098	a	b	c	d	____

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

SDMS No ________ *Applicable

REFERENCE SO123-VI-1.0.1 **TEMPORARY CHANGE NOTICE** Page 1 of 2

FOR CDM USE ONLY:

Issuance Date APR 05 1989 Single Use TCN Cancels On ________ TCN No 3-3

Copy forwarded to the Nuclear Safety Group **PERFORMED BY:** C-Stockton Date APR 13 1989

TECHNICAL SPECIFICATION VIOLATION IF NOT COMPLETED WITHIN 14 DAYS

Site Document No S01-12.1-2 Revision No 3 Single Use TCN YES ☐ NO ☒

Site Document Title REACTOR THERMAL POWER CALIBRATION

1 **PREPARED BY:** D Paskett (ORIGINATOR) 89 3?8 (PAX) 23 MAR 89 1230 (DATE TIME) OPGI (ORGANIZATION)

2 If required TCN Deviation Approval **APPROVED BY:** ________ CFDM (or designee) SIGNATURE IF BY TELECON PRINT NAME AND SO STATE DATE TIME

3 Check appropriate box ☒ Entire Document Attached ☐ Affected Page(s) Attached

Superseded/Incorporated TCN(s) 3-2 (NO IF NONE SO STATE) (Not applicable for SINGLE USE TCNs)

Pages Changed: 2-7, 10

RECEIVED CDM

APR 13 1989

SITE FILE COPY

4 This change cannot wait until the next revision of the Site Document and is required

A ☐ To implement facility design change (PFC NCR TFM etc)

Facility design change identifier ________ (INDICATE PFC NCR TFM ETC) / ________ (IDENTIFIER)

Implementation of the facility design change has been determined YES ☐ NO ☐ **(If NO, a TCN cannot be approved until the facility design change has been implemented.)**

B ☒ Other (e.g. CAR NRC Commitments) Specific Reason Tech Spec Amend # 117, Correction of reversed flow of Sacc

Description of Change(s) (Use Reverse Side if Required) Changed Test Applicability Objective to revised Tech Spec. Restore use of all feed line flows. Precaution 4.6 rewritten, caution added before gain adjustment. Minor format changes (form to Ref. section). Correct Typo.

5 Is the document being TCN'd QA Affecting? YES ☒ NO ☐ **(If YES, complete the boxes below.)** **(If NO, see * below.)**
(This is indicated on the Table of Contents page of the Site Document If not indicated treat as QA Affecting.)

A	Does this change affect FSAR or Tech Spec commitments?	YES ☐ NO ☒
B	Does this change affect the nonradiological environment of any offsite area previously undisturbed during site preparation and plant construction?	YES ☐ NO ☒
C	Is the intent of the original document altered?	YES ☐ NO ☒
D	Is the document to be changed an Emergency Operating Instruction?	YES ☐ NO ☒
E	Does this change pose an unreviewed safety question per 10 CFR 50.59, i.e. does it increase the probability of occurrence or the consequences of an accident create the possibility of a different accident or reduce the Tech Spec margin of safety?	YES ☐ NO ☒
	(If the answer to A, B, C, D or E is YES, a TCN is not authorized.)	

6 Are changes being made to numerical data, or is new data being applied, that is being used to perform Technical Specification Surveillance testing? YES ☒ NO ☐ **If YES, Form EQ(123) 16 attached. A TCN is NOT authorized until a Technical Division review is obtained.**

7 The entire document was reviewed in conjunction with this TCN and found to be acceptable as written. This constitutes an annual/biennial review disposition of Acceptable As Written-Extend (SO123-VI-1.0.2)

REVIEWED and APPROVED BY: N/A (CFDM OR DESIGNEE) APR 05 1989 (DATE)

8 ***For SPG Use Only:*** SITE FILE COPY

Is QA/QC Review/Approval Required? YES ☒ NO* ☐ Note Utilize current QAO Procedure Review/Approval Waiver List to respond ***If No, enter N/A on the Quality Assurance Review/Approval line below.**

PERFORMED BY: Colleen R. Clark (SPG) 4/6/89 (DATE)

9 **Signatures Required:**

REVIEWED and APPROVED BY:** (at least one (1) SRO for the unit affected) ***INITIAL APPROVAL***

1) [signature] (PLANT MANAGEMENT STAFF UNIT 1) 4/3/? 1?? (DATE TIME) 2) N/A (PLANT MANAGEMENT STAFF UNITS 2&3) DATE TIME

Could this TCN affect or does it represent a change to a plant operation in progress? YES*** ☐ NO ☒

Could this TCN affect or does it represent a change to a plant operation in progress? YES*** ☐ NO ☐

3) [signature] (SRO UNIT 1) 4/5/89 1228 (DATE TIME) 4) N/A (SRO UNITS 2&3) DATE TIME

REVIEWED and APPROVED BY: ***FINAL APPROVAL***

5) [signature] (COGNIZANT FUNCTIONAL DIVISION MANAGER) 4/6/89 (DATE) 6) L.W. Sowien (QUALITY ASSURANCE UNITS 1, 2 AND 3) 04/10/89 (DATE)

* If a document is Not QA Affecting obtain initial approval from the Cognizant Supervisor(s) on the affected unit(s) (signs Plant Management Staff line(s)) and final approval from the CFDM prior to submittal to CDM. No other signatures are required.

** If QA Affecting, approval shall be by one member of the Plant Management Staff and one SRO Licensed on the unit or units affected. (For TCN approval members of the Plant Management Staff are defined as the supervisor in charge of the shift, or as designated in writing by the CFDM, exercising responsibility in the specific area and unit(s) addressed by the change.)

*** If YES, the Shift Superintendent shall provide the required SRO approval

SPG

SCE PF(123) 110 REV 2 07-27/88

TCN 3-3

Reference SO123-VI-1, SO123-VI-1.0.1

PROCEDURE CALCULATION INDEX (PCI)

Entries should be written legibly with a black ballpoint pen.

PROCEDURE NO.: S01-12.1-2 REV. NO.: 3 TCN NO.: 3 (if applicable)

The subject procedure requires Technical Division review as indicated on the associated PF(123) 109 or PF(123) 110 Form.

Author:

1. Enter the subject procedure step(s) number(s) which reflect Technical Specification Surveillance numerical data changes, or that apply new Technical Specification numerical data.

Engineer:

2. Enter the engineering calculation number(s) associated with each procedure step. If a calculation is not required to be performed, specific reasons shall be clearly described for each procedure step number, for example, correction of typographical errors would not warrant calculation performance. Technical Specification Amendments require verification that the information has been correctly transitioned into the subject document (no calculation required.)
3. Sign, date and forward package to Supervising Engineer.
4. Supervising Engineer review and approve providing signature and date. Return package to the SPG - D2P.

Procedure Step/Number(s)	Calculation Number(s) or Reason Calculation Is Not Required
6.1	ALL CALCULATION FORMULA'S AND CONSTANTS ARE CARRIED OVER FROM PREVIOUS REV/TCN. THIS TCN DELETES THE INTERIM CHANGE TO FEED FLOW CALCULATION IMPLEMENTED BECAUSE OF THE LOOP A FEED FLOW ORIFICE BEING INSTALLED BACKWARDS.
	ALL CALCULATIONS FOR K_2 ARE DERIVED FROM S01-SPE-682 "UNIT 1 REACTOR COOLANT SYSTEM HEAT LOSS MEASUREMENT"

Signatures below indicate changes made to Technical Specification surveillance numerical data have been verified as acceptable by the engineering calculation number(s) and/or reasons listed above:

PERFORMED BY: JJ Eckhart 3/27/89 (Engineer/Date) REVIEWED AND APPROVED BY: R Waldo 3/27/89 (Supervising Engineer/Date)

Page 1 of 1

EG(123) 16 Revision 0 7/1/88 Distribution: Original - CDM Pink/Yellow - SPG

REACTOR THERMAL POWER CALIBRATION

TABLE OF CONTENTS

QA PROGRAM AFFECTING

REACTOR THERMAL POWER CALIBRATION

1.0 OBJECTIVES

1.1 To verify the calibration of the Power Range Nuclear Instrumentation system using Turbine Plant calorimetric data ~~and~~ to meet the requirements of Tech. Specs. Table 4.1.1, ~~item 1~~. TCN

1.2 This calibration will be performed daily ~~while in Mode 1~~ when above 15% of Rated Thermal Power (Tech. Specs. Table 4.1.1 ~~item 1~~).

2.0 REFERENCES

2.1 NRC Commitment

2.1.1 Unit 1 Technical Specifications

2.2 Procedures

2.2.1 SO123-VI-0.9, Documents - Authors' Guide to the Preparation of Site Orders, Procedures and Instructions

2.3 Other

2.3.1 Memorandum to J. L. Reeder from K. L. Johnson dated 12-13-84. Subject: Revised Heat Gain Term.

~~2.3.2~~ ~~E-mail to J. L. Reeder from R. Waldo dated 8-9-88. Subject: RCS Calorimetric Method While A Orifice is in Backwards.~~ TCN

2.3.2 SO(1) 507, "Reactor Thermal Power Calibration"

3.0 PREREQUISITES

3.1 Prior to use of a user-controlled copy of this Site Document to perform work, verify that it is current by checking a controlled copy and any TCNs or by use of the method described in SO123-VI-0.9.

3.2 The reactor is in a steady state condition;

3.2.1 Reactor power shall be stable for a minimum of five minutes prior to obtaining calibration data.

3.2.2 Boration, dilution, and rod motion should be curtailed prior to obtaining calibration data. A limited boration or dilution may be permitted during Xenon transients to hold power steady.

3.2.3 Reactor coolant system temperature and turbine loading shall be maintained constant while the calibration data is being taken.

REACTOR THERMAL POWER CALIBRATION

4.0 PRECAUTIONS

4.1 Occasionally, when the plant is operating near 100% power and a thermal calibration is performed, the indicated power after adjusting the power range instrumentation may exceed 100%. When this occurs, immediately reduce the reactor power level to an indicated 100% and make a suitable log entry. If the required power level reduction exceeds 3%, report the problem to the SRO Operations Supervisor and perform another thermal calibration. If the second calibration provides verification that the reactor had previously been operating above 103% power, report the matter to the Unit 1 Superintendent.

4.2 Due to incore versus excore correlation requirements following refueling (Tech. Spec. 3.10) and continuous power distribution monitoring requirements (Tech. Spec. 3.11) reactor power at times may be restricted to less than full power. TCN

4.3 Should a thermal calibration reveal that reactor power is higher than that allowable by the Technical Specifications, it shall be immediately reduced to or below the Technical Specification limit.

4.4 Utilize the instruments listed below to perform reactor thermal power calculations. Instruments other than those described shall not be used unless authorized by the SRO Operations Supervisor.

4.4.1 Main steam pressure gauge (PI-459B)

4.4.2 Barton differential pressure indicators (FI-456,7,8)

4.4.3 Recorder TR-456, Feedwater Temperature, or if it is unavailable, use TI-1096. If TI-1096 is unavailable the average of the first point heater outlets (TI-41 and TI-42) may be used.

4.5 The Barton differential pressure indicators should be observed for several minutes while taking readings to determine an accurate average.

NOTE: If a steam generator blowdown is in progress, the calculation results will be conservative.

4.6 If **ANY** indicated condition or calculated reactor power seems abnormal or inconsistent with other plant indications (e.g., feedwater flow/temperature, electrical load, reactor power) or it differs from what has been previously observed at similar plant conditions, IMMEDIATELY NOTIFY the SRO Operations Supervisor. Do not adjust the gain on NIS Channels and/or increase power until the apparent difference is resolved. TCN

REACTOR THERMAL POWER CALIBRATION

4.0 PRECAUTIONS (Continued)

4.7 Each channel deviation should be less than 3% during non-equilibrium conditions and less than 1% when at equilibrium power for greater than 48 hours.

5.0 CHECKLIST

5.1 None

TCN

6.0 INSTRUCTIONS

6.1 Determining indications as accurately as possible record the following data on "Reactor Thermal Power Calculation" Form SO(1) 507.

6.1.1 Steam pressure using the main steam pressure gauge at the test bench (PI-459B).

6.1.2 Feedwater Temperature using recorder TR-456, Feedwater Temperature. If it is unavailable, use TI-1096 or average of the two (2) first point heater outlet temperature indicators, TI-41 and TI-42.

6.1.3 Feedwater differential pressure using the ~~highest reading~~ precision Barton differential pressure indicators located adjacent to the turbine test bench. (FI-456, 7, ~~or~~ and 8) ~~(Reference 2.3.2)~~ TCN TCN

NOTES: 1. Reactor power can be determined knowing the feedwater flow and heat rise in the steam generators. Solution of the problem can be expressed by the following equation:

$$Q_{core} = 2.93 \times 10^{-7} \frac{Mwt\text{-}hr}{BTU} \times (M_A + M_B + M_C) \frac{lbm}{hr} \times C_1 \times (h_1 - h_2) - K_2$$

Where:

Q_{core} = Reactor power (Mwt)

$M_A + M_B + M_C$ = Total feedwater flow (lb m/hr)

h_1 = Enthalpy of steam (Quality = 99.75) at main steam pressure (h_f + .9975 h_{fg})

h_2 = Enthalpy of subcooled liquid at feedwater temperature (h_{f1})

K_2 = Heat gain in reactor system = 4.453 (Ref. 2.3.1)

C_1 = Correction in feedwater flow for density changes.

REACTOR THERMAL POWER CALIBRATION

6.0 INSTRUCTIONS (Continued)

NOTES: 1. (Continued)

Feedwater flow can be determined from differential pressure measurements indicated on each loop. The difference between the feedwater and throttle steam enthalpies is the increase in heat content of feedwater through steam generators.

2. The primary method for calculating thermal power is the Hewlitt-Packard 85 computer. Should the primary method be unavailable, the manual procedure can be utilized.

3. The pressurizer heaters and the steam generator blowdowns are not taken into account in this calculation.

6.2 Calculate reactor thermal power utilizing instruction step 6.2.1 for the Hewlitt-Packard 85 computer or step 6.2.2 for the manual method.

6.2.1 Calculate thermal power for NIS calibration utilizing the Hewlitt-Packard 85 computer.

.1 Use the "THERMAL" program available on the operations tape. Load and/or execute it from the keyboard by the LOAD and RUN keys or by key selection. In either case it is self prompting and will ask for the required data (steam pressure, feedwater temperature and orifice ΔPs).

6.2.2 Calculate thermal power for NIS calibration utilizing the manual procedure. Use attached curves.

.1 Find feedwater flow by entering Curve 3 with the ~~highest~~ indicated differential pressure for each loop, then determine total feedwater flow by the following formula: ~~(Reference 2.3.2)~~ TCN

$$\text{Feedwater flow} = M_A+M_B+M_C \ \frac{\text{lbm}}{\text{hr}} \quad \cancel{\text{3 times the highest flow}}$$ TCN

.2 Determine feedwater flow temperature correction factor, C_1, by entering Curve 4 with feedwater temperature. (Density Correction Factor)

.3 Determine throttle steam enthalpy (h_1) by entering Curve 1 with throttle steam pressure (psig).

REACTOR THERMAL POWER CALIBRATION

6.0 INSTRUCTIONS (Continued)

6.2.2.4 Determine feedwater enthalpy (h_2) by entering Curve 2 with feedwater temperature (°F).

.5 Determine Δh by using the following formula:
$\Delta h = h_1 - h_2$ (Enthalpy change).

.6 Calculate core thermal power (Q) by substituting the determined values into the formula in step 6.1. (Mwt)

.7 Calculate percent power by dividing the calculated Q by 1347 Mwt. (% of Full Power)

6.3 Enter calculated data on SO(1) 507.

NOTE: Should a steam generator blowdown be in progress during the data collection period, note the rate of blowdown on the data sheet SO(1) 507.

6.4 Compare percent power with Power Range NIS indicated percent power.

NOTE: The gain pot setpoints on the percent power meters may be set conservatively such that indicated reactor power is the larger of Calorimetric calculated power or currently indicated percent power on the individual N.I. channels at the discretion of the SRO Operations Supervisor.

CAUTION If **ANY** indicated condition or calculated reactor power seems abnormal or inconsistent with other plant indications or it differs from what has been previously observed at similar plant conditions, IMMEDIATELY NOTIFY the SRO Operations Supervisor. Do not adjust the gain on NIS Channels and/or increase power until the apparent difference is resolved. TCN

6.5 If calculated power deviates from indicated power;

6.5.1 Accurately adjust the gain pot as necessary on each power range drawer such that indicated power agrees with calculated power.

6.5.2 Verify "Auto Rod Withdrawal Prohibit Reset" pushbutton lamp is lit.

REACTOR THERMAL POWER CALIBRATION

7.0 ACCEPTANCE CRITERIA

7.1 The reactor thermal power in terms of percent power is ≤ that specified in the PRECAUTIONS section of this instruction. TCN

8.0 RECORDS

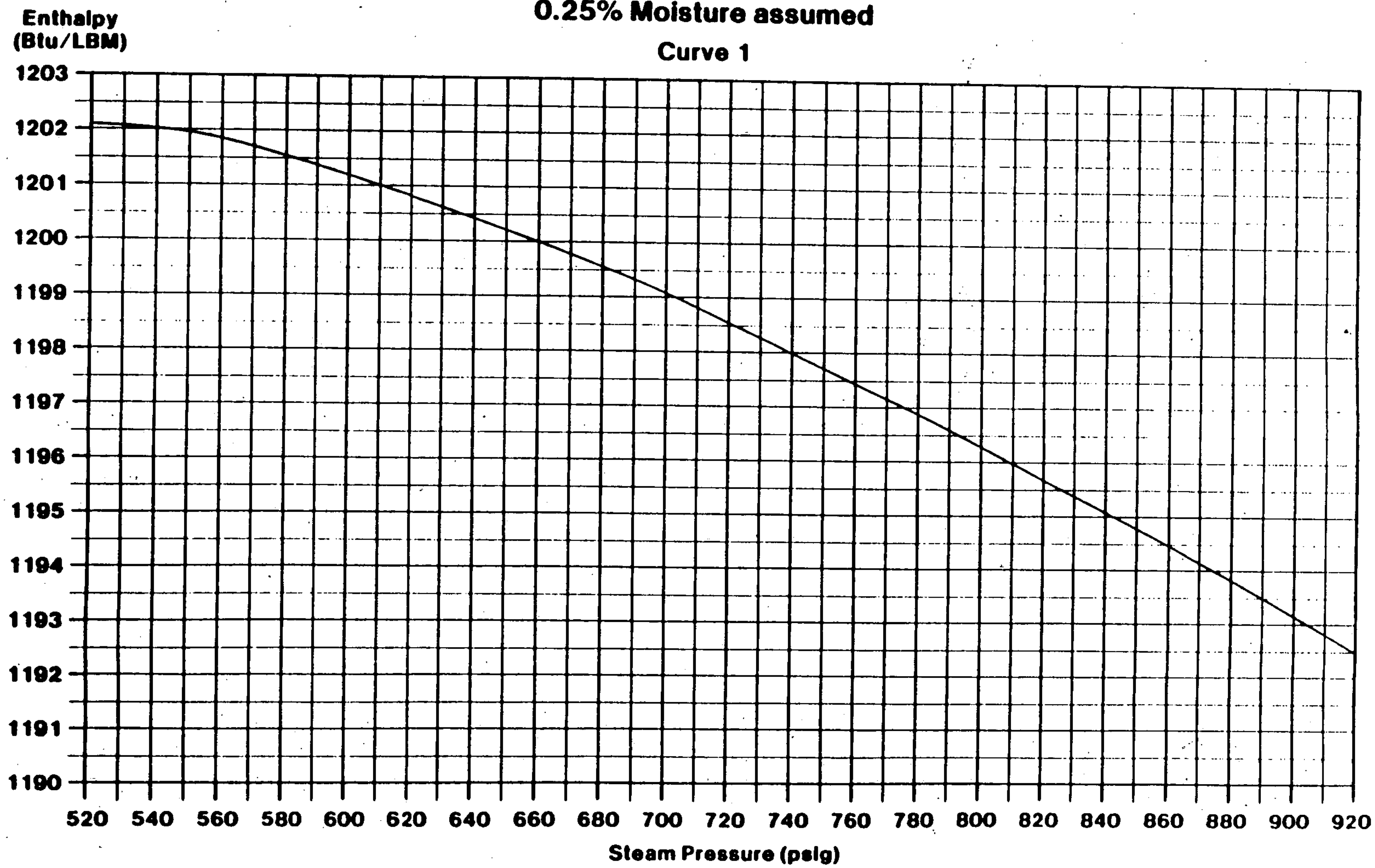
8.1 INITIAL and PROVIDE appropriate code number designating how the test was completed in the spaces provided on SO(1) 37, "Tech Spec/Non-Tech Spec Routine Test Check-Off."

8.2 LOG the completion of this surveillance in the CO's Log.

8.3 PLACE completed SO(1) 507 form in the Completed Surveillance In-basket for disposition per S01-12.0-2.

San Onofre Unit 1
Main Steam Pressure vs. Enthalpy
Data Taken from Keenan & Keyes Steam Tables
0.25% Moisture assumed

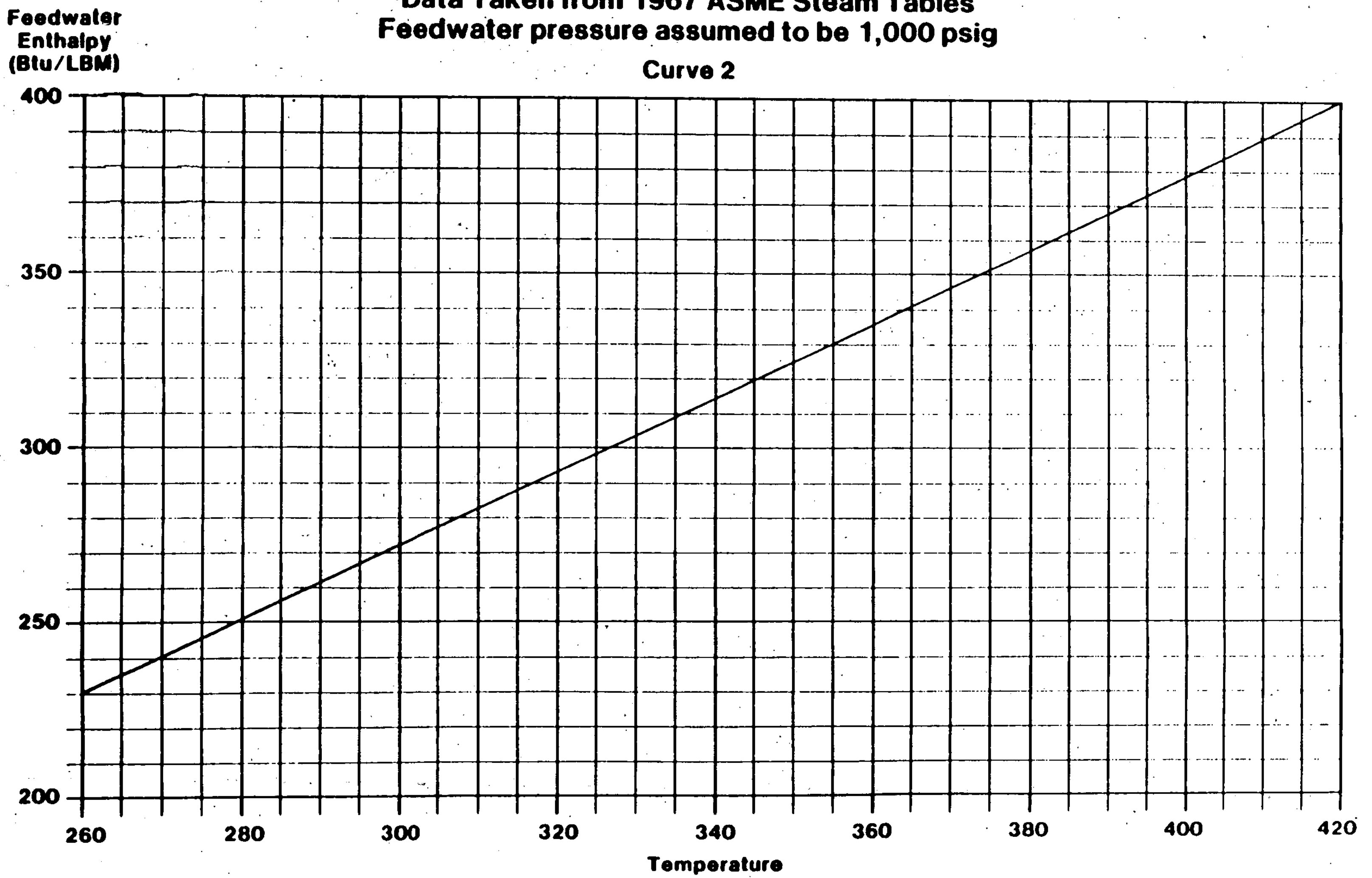
Curve 1



San Onofre Unit 1
Feedwater Enthalpy vs. Temperature

Data Taken from 1967 ASME Steam Tables
Feedwater pressure assumed to be 1,000 psig

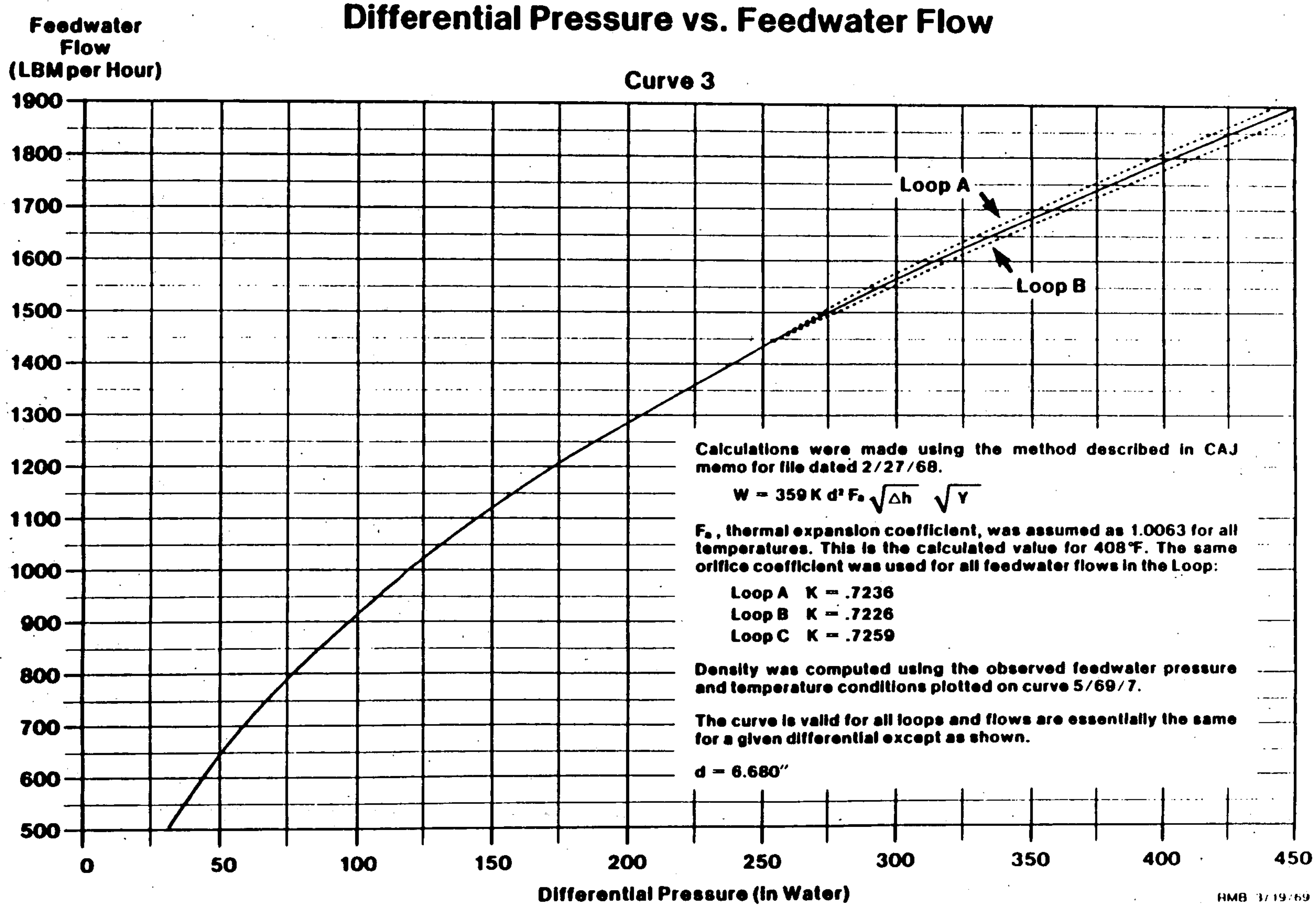
Curve 2



MPS 6/17/80

San Onofre Unit 1
Differential Pressure vs. Feedwater Flow

Curve 3



RMB 3/19/69
5/69/9

San Onofre Unit 1
Density Correction Factor vs. Feedwater Temperature

$$f_\rho = \sqrt{\frac{\rho}{\rho_{403\,°F,\ 1000\ psig}}}$$

Feedwater pressure assumed to be 1,000 psig

Curve 4