

COMANCHE PEAK STEAM ELECTRIC STATION
OPERATIONS DEPARTMENT ADMINISTRATION MANUAL

FOR INFORMATION ONLY

SHIFT COMPLEMENT
RESPONSIBILITIES AND AUTHORITIES

PROCEDURE NO. ODA-102

REVISION NO. 5

SAFETY-RELATED

SUBMITTED BY: *R. B. Seidel* DATE: 5/16/84
OPERATIONS SUPERINTENDENT

APPROVED BY: *R. A. Jones* DATE: 6/5/84
MANAGER, PLANT OPERATIONS

8406150252 840608
PDR ADOCK 05000445
A PDR

CPSES OPERATIONS DEPARTMENT ADMINISTRATION MANUAL	ISSUE DATE JUN 07 1984	PROCEDURE NO. ODA-102
SHIFT COMPLEMENT RESPONSIBILITIES AND AUTHORITIES	REVISION NO. 5	PAGE 2 OF 12

1.0 Purpose

This procedure describes the required Operations Department shift manning for various modes of operation of the station and delineates the responsibilities and authorities of the members of the shift..

2.0 Applicability

This procedure is applicable to all members of the Operations Department shift crews. This procedure becomes effective when issued.

3.0 Definitions

- 3.1 Senior Licensed Operator - An individual having a current USNRC Senior Reactor Operator License on all station units that have a current facility operating license.
- 3.2 Licensed Operator - An individual having a current USNRC Reactor Operator or Senior Reactor Operator License on all station units that have a current facility operating license.
- 3.3 Operating - A reactor unit is considered to be operating when it is in operational Mode 1, 2, 3 or 4 as defined by CPSES Technical Specifications.
- 3.4 Licensed to Operate - A reactor unit is considered to be licensed to operate if it has a current facility operating license and initial fuel loading has begun.
- 3.5 Controls - Apparatus and mechanisms the manipulation of which directly affect the reactivity or power level of the reactor.

4.0 Instructions

4.1 Authority of Licensed Personnel

- 4.1.1 The station will be operated by USNRC licensed personnel in accordance with 10CFR50, 10CFR55 and the Technical Specifications, Section 6.
- 4.1.2 All controls will be manipulated by licensed personnel under the direction of senior licensed personnel. Manipulation of controls by non-licensed personnel is permissible as part of the Replacement Training Program, but must be directly supervised by a licensed individual.

CPSES OPERATIONS DEPARTMENT ADMINISTRATION MANUAL	ISSUE DATE JUN 07 1984	PROCEDURE NO. ODA-102
SHIFT COMPLEMENT RESPONSIBILITIES AND AUTHORITIES	REVISION NO. 5	PAGE 3 OF 12

4.1.3 The Reactor Operator, Assistant Shift Supervisor, Shift Supervisor or any other licensed member of the station staff assigned to manipulate or supervise the manipulation of the controls of a unit or units has the responsibility and authority to place the reactor or reactors in a safe condition when he determines that the safety of the reactor(s) is in jeopardy or when operating parameters exceed any Reactor Protection System or Safeguards System setpoints without automatic protection functions occurring.

4.2 Responsibilities of Shift Crew Personnel

4.2.1 General Responsibilities

In addition to the specific duties of shift crew personnel as delineated in Sections 4.2.2, 4.2.3, 4.2.4 and 4.2.5, all shift crew members have the following responsibilities:

- 4.2.1.1 The responsibility to believe and respond conservatively to instrument indications unless they are proven incorrect.
- 4.2.1.2 The responsibility to adhere to Technical Specifications.
- 4.2.1.3 The responsibility to follow written procedures.
- 4.2.1.4 The responsibility to review routine operating data to assure safe operation.

4.2.2 Shift Supervisor

The Shift Supervisor is responsible to the Operations Supervisor for the operation of the station and the management of operating personnel on an assigned shift consistent with administrative and regulatory requirements. Specific duties of the Shift Supervisor include:

- 4.2.2.1 Supervision of shift operating personnel to ensure that the station and all associated equipment is operated safely, efficiently, reliably and in accordance with Technical Specifications, approved procedures, regulations and licenses.

CPSES OPERATIONS DEPARTMENT ADMINISTRATION MANUAL	ISSUE DATE JUN 07 1984	PROCEDURE NO. ODA-102
SHIFT COMPLEMENT RESPONSIBILITIES AND AUTHORITIES	REVISION NO. 5	PAGE 4 OF 12
<div data-bbox="550 378 1475 1836"> <p>4.2.2.2 The responsibility to determine the circumstances, analyze the cause and determine that operations can proceed safely before a reactor is returned to power following a trip or an unplanned or unexplained power reduction, and to provide direction for the return to power.</p> <p>4.2.2.3 Supervision of the preparation of all routine shift documentation and review of routine operating data.</p> <p>4.2.2.4 Assumption of complete responsibility for the safe operation of the station in the event of an emergency. The Shift Supervisor shall remain in the Control Room during the emergency until properly relieved. The Shift Supervisor shall maintain a broad perspective of operational conditions during the emergency and should not become totally involved in any single operation.</p> <p>4.2.2.5 The responsibility for the initiation of the Emergency Plan in the event of an emergency situation and for serving as Emergency Coordinator until relieved.</p> <p>4.2.2.6 The responsibility for the implementation of applicable portions of the Security Plan.</p> <p>4.2.2.7 Assistance in the review and modification of operating procedures as required.</p> <p>4.2.2.8 The responsibility to follow radiation protection and control procedures and to manage the radiation exposures of assigned personnel to ensure that they are within administrative and regulatory limits.</p> <p>4.2.2.9 The responsibility for ensuring that an adequate number of qualified operations personnel are on duty during an assigned shift, consistent with Section 4.3 of this procedure, and for preparing daily shift crew work schedules.</p> <p>4.2.2.10 Participating in the Requalification Training Program and maintaining a current USNRC Senior Reactor Operator License.</p> </div>		

CPSES OPERATIONS DEPARTMENT ADMINISTRATION MANUAL	ISSUE DATE JUN 07 1984	PROCEDURE NO. ODA-102
SHIFT COMPLEMENT RESPONSIBILITIES AND AUTHORITIES	REVISION NO. 5	PAGE 5 OF 12
<div data-bbox="551 378 1377 570"> <p>4.2.2.11 Other specific duties as assigned by the Operations Supervisor and as delineated in Station Administrative Procedures STA-601 through STA-607 and Operations Department Administrative Procedures ODA-103 through ODA-105 and ODA-301 through ODA-308.</p> </div> <div data-bbox="439 602 964 634"> <p>4.2.3 Assistant Shift Supervisor</p> </div> <div data-bbox="551 666 1471 825"> <p>The Assistant Shift Supervisor is responsible to the Shift Supervisor for assisting in the operation of the station and the management of operating personnel on an assigned shift. Specific duties of the Assistant Shift Supervisor include:</p> </div> <div data-bbox="551 857 1471 1868"> <ul style="list-style-type: none"> 4.2.3.1 Assumption of the duties of the Shift Supervisor in his absence. 4.2.3.2 Supervision of assigned shift operating personnel to ensure that equipment is operated safely, efficiently, reliably and in accordance with Technical Specifications, approved procedures, regulations and licenses. 4.2.3.3 The responsibility to determine the circumstances, analyze the cause and determine that operations can proceed safely before a reactor is returned to power following a trip or an unplanned or unexplained power reduction and to provide direction for the return to power as assigned. 4.2.3.4 Supervision of the preparation of all assigned shift documentation and review of routine operating data. 4.2.3.5 Assistance in the review and modification of operating procedures as required. 4.2.3.6 The responsibility to follow radiation protection and control procedures and to manage the radiation exposures of assigned personnel to ensure that they are within administrative and regulatory limits. 4.2.3.7 The responsibility for assisting in on-shift training of operating personnel. </div>		

<p>CPSES OPERATIONS DEPARTMENT ADMINISTRATION MANUAL</p>	<p>ISSUE DATE JUN 07 1984</p>	<p>PROCEDURE NO. ODA-102</p>
<p>SHIFT COMPLEMENT RESPONSIBILITIES AND AUTHORITIES</p>	<p>REVISION NO. 5</p>	<p>PAGE 6 OF 12</p>
<div data-bbox="522 380 1419 478"> <p>4.2.3.8 Participating in the Requalification Training Program and maintaining a current USNRC Senior Reactor Operator License.</p> </div> <div data-bbox="522 508 1419 702"> <p>4.2.3.9 Other specific duties as assigned by the Shift Supervisor and as delineated in Station Administrative Procedures STA-601, STA-602, STA-605 and STA-607 and Operations Department Administrative Procedures ODA-104, ODA-105 and ODA-301 through ODA-306.</p> </div> <div data-bbox="418 732 786 766"> <p>4.2.4 Reactor Operator</p> </div> <div data-bbox="522 795 1451 923"> <p>The Reactor Operator is responsible to the Shift Supervisor or Assistant Shift Supervisor for operations on an assigned unit or units. Specific duties of the Reactor Operator include:</p> </div> <div data-bbox="522 953 1403 1081"> <p>4.2.4.1 The responsibility for safe, efficient and reliable operation of equipment in accordance with Technical Specifications, approved procedures, regulations and licenses.</p> </div> <div data-bbox="522 1110 1451 1208"> <p>4.2.4.2 Maintaining all logs and records for the unit or units assigned and reviewing routine operating data.</p> </div> <div data-bbox="522 1238 1435 1336"> <p>4.2.4.3 The responsibility for operating equipment from the Control Room and locally and assisting in all phases of operation as assigned.</p> </div> <div data-bbox="522 1366 1419 1464"> <p>4.2.4.4 Continuous monitoring of Control Room indications on an assigned unit and adjustment of parameters as necessary.</p> </div> <div data-bbox="522 1493 1419 1621"> <p>4.2.4.5 Assisting the Shift Supervisor or Assistant Shift Supervisor in directing and coordinating the operating activities of the Auxiliary Operators.</p> </div> <div data-bbox="522 1651 1451 1715"> <p>4.2.4.6 Maintaining necessary communications both within and outside of the plant.</p> </div> <div data-bbox="522 1744 1435 1842"> <p>4.2.4.7 Performing the Auxiliary Operator's duties when necessary or when directed by the Shift Supervisor or Assistant Shift Supervisor.</p> </div>		

<p>CPSES OPERATIONS DEPARTMENT ADMINISTRATION MANUAL</p>	<p>ISSUE DATE JUN 07 1984</p>	<p>PROCEDURE NO. ODA-102</p>
<p>SHIFT COMPLEMENT RESPONSIBILITIES AND AUTHORITIES</p>	<p>REVISION NO. 5</p>	<p>PAGE 7 OF 12</p>
<div data-bbox="529 366 1432 1259"> <p>4.2.4.8 Assisting the Shift Supervisor or Assistant Shift Supervisor in tagging and removal of equipment from service and in returning equipment to service when authorized by the Shift Supervisor or Assistant Shift Supervisor.</p> <p>4.2.4.9 Participating in the Requalification Training Program and maintaining a current USNRC Reactor Operator or Senior Reactor Operator License.</p> <p>4.2.4.10 Assisting in the training of Auxiliary Operators.</p> <p>4.2.4.11 Assisting in the preparation, review and modification of operating procedures and other operating documentation.</p> <p>4.2.4.12 Performing duties required by the Fire Protection Plan and Emergency Plan.</p> <p>4.2.4.13 Assisting with station housekeeping.</p> <p>4.2.4.14 Other specific duties as assigned by the Shift Supervisor or Assistant Shift Supervisor and as delineated in Station Administrative Procedures STA-601, STA-605 and STA-607 and Operations Department Administrative Procedures ODA-104 and ODA-301 through ODA-305.</p> </div> <div data-bbox="428 1289 823 1323"> <p>4.2.5 Auxiliary Operator</p> </div> <div data-bbox="532 1353 1435 1515"> <p>The Auxiliary Operator is responsible to the Shift Supervisor or Assistant Shift Supervisor for the safe and efficient operation of equipment required to support overall station operation. Specific duties of the Auxiliary Operator include:</p> </div> <div data-bbox="532 1544 1448 1923"> <p>4.2.5.1 Proper, safe and efficient care and operation of station auxiliary equipment and systems under the direction of the Shift Supervisor or Assistant Shift Supervisor and the Reactor Operator and in accordance with administrative, regulatory and procedural requirements.</p> <p>4.2.5.2 Periodic inspection of assigned equipment including completing documentation associated with these inspections and adjusting controls as necessary for proper equipment and system operation.</p> </div>		

CPSES OPERATIONS DEPARTMENT ADMINISTRATION MANUAL	ISSUE DATE JUN 07 1984	PROCEDURE NO. ODA-102
SHIFT COMPLEMENT RESPONSIBILITIES AND AUTHORITIES	REVISION NO. 5	PAGE 8 OF 12
<div data-bbox="540 378 1453 1427"> <p>4.2.5.3 Assisting the Shift Supervisor, Assistant Shift Supervisor or Reactor Operator in tagging and removal of equipment from service and in returning equipment to service when authorized.</p> <p>4.2.5.4 Maintaining necessary communications with the Control Room.</p> <p>4.2.5.5 Periodic inspections of controlled access areas including the Containment, Auxiliary Building, Fuel Building and Safeguards Buildings as directed by the Shift Supervisor or Assistant Shift Supervisor.</p> <p>4.2.5.6 Performance of other duties and assistance in all phases of operation as required and directed by the Shift Supervisor or Assistant Shift Supervisor.</p> <p>4.2.5.7 Participation in the Replacement Training Program in order to obtain a USNRC Reactor Operator License.</p> <p>4.2.5.8 Assisting in the preparation, review and modification of operating procedures and other operating documentation.</p> <p>4.2.5.9 Assisting with station housekeeping.</p> <p>4.2.5.10 Other specific duties as delineated in Station Administrative Procedures STA-601 and STA-605 and Operations Department Procedures ODA-104, ODA-301, ODA-302 and ODA-304.</p> </div> <div data-bbox="435 1464 748 1491"> <p>4.2.6 Shift Advisor</p> </div> <div data-bbox="540 1527 1422 1683"> <p>The Shift Advisor functions at the Assistant Shift Supervisor level and is responsible to the Shift Supervisor for evaluating shift operating activities and providing appropriate recommendations concerning safe operation.</p> </div> <div data-bbox="540 1715 1453 1902"> <p>The Shift Advisor is assigned to assist the Shift Supervisor but reports to the Operations Supervisor. He has direct access to plant and corporate management and is responsible for pursuing the resolution of disagreements affecting safe operation through successive management levels.</p> </div> <div data-bbox="540 1936 1325 1964"> <p>Specific responsibilities and authorities include:</p> </div>		

CPSES OPERATIONS DEPARTMENT ADMINISTRATION MANUAL	ISSUE DATE JUN 07 1984	PROCEDURE NO. ODA-102
SHIFT COMPLEMENT RESPONSIBILITIES AND AUTHORITIES	REVISION NO. 5	PAGE 9 OF 12

- 4.2.6.1 Responsible for assisting in the determination of the circumstances, analyzing the cause and determining that operations can proceed safely before recommending a return to power following a trip or an unplanned or unexplained power reduction.
- 4.2.6.2 Assisting in the review and modification of operating procedures.
- 4.2.6.3 Assisting in the preparation and review of shift documentation and operating data.
- 4.2.6.4 Assisting in on-shift training of operating personnel.
- 4.2.6.5 Participating in Shift Advisor training, including recurrent training.
- 4.2.6.6 Other specific duties as assigned by the Shift Supervisor. The duties assigned cannot include those requiring a license.

4.3 Shift Complement

The minimum on-duty shift complement for various modes of single and dual unit operation shall be as shown in Attachment 1 and as follows:

- 4.3.1 A USNRC Senior licensed Shift Supervisor shall be onsite at all times when at least one unit is loaded with fuel. When the Shift Supervisor is absent from the Control Room during routine operations, he shall be relieved by a qualified and USNRC Senior Licensed member of management. This is normally an Assistant Shift Supervisor. The Shift Supervisor's relief shall assume the Control Room command function as well as the complete responsibility and authority as is normally assigned to the position.
- 4.3.2 One USNRC Senior Licensed Operator shall be in the Control Room at all times when in Modes 1, 2, 3 or 4.
- 4.3.3 One USNRC Licensed Operator shall be in the Control Room at all times for each reactor containing fuel.
- 4.3.4 Two USNRC Licensed Operators should be in the Control Room for each reactor while undergoing a startup, scheduled shutdown or reactor trip recovery.

<p>CPSES OPERATIONS DEPARTMENT ADMINISTRATION MANUAL</p>	<p>ISSUE DATE JUN 07 1984</p>	<p>PROCEDURE NO. ODA-102</p>
<p>SHIFT COMPLEMENT RESPONSIBILITIES AND AUTHORITIES</p>	<p>REVISION NO. 5</p>	<p>PAGE 10 OF 12</p>
<p>4.3.5 Two USNRC Senior Licensed Operators shall be onsite at all times with both units loaded with fuel.</p> <p>4.3.6 In addition to the operators specified in 4.3.1, 4.3.2, 4.3.3. and 4.3.5, an additional USNRC Licensed Operator shall be onsite at all times and available to serve as relief operator for the Control Room if either unit is in Mode 1, 2, 3 or 4.</p> <p>4.3.7 Shift crew assignments during periods of core alterations shall include a USNRC Senior Licensed Operator to directly supervise the core alterations. This operator may have fuel handling duties but shall not have other concurrent operational duties.</p> <p>4.3.8 With one unit licensed to operate (mode 5 or 6), each shift crew shall have at least three members including one Shift Supervisor and one USNRC Licensed Operator.</p> <p>4.3.9 With one unit operating (mode 1, 2, 3 or 4), each shift crew shall have at least six members including one Shift Supervisor, one Assistant Shift Supervisor and two USNRC Licensed Operators.</p> <p>4.3.10 With two units licensed to operate (both units in mode 5 or 6), each shift crew shall have at least six members including one Shift Supervisor and two USNRC Licensed Operators.</p> <p>4.3.11 With two units licensed to operate and one or both operating (mode 1, 2, 3 or 4), each shift crew shall have at least eight members, including one Shift Supervisor, one Assistant Shift Supervisor and three USNRC Licensed Operators.</p> <p>4.3.12 In addition to the personnel specified in 4.3.8, 4.3.9, 4.3.10 and 4.3.11 above and with fuel in the reactor, one Radiation Protection Technician and one Chemistry and Environmental Technician shall be on site at all times.</p> <p>4.3.13 With one or both units operating (mode 1, 2, 3 or 4), a Shift Technical Advisor shall be on site.</p> <p>4.3.14 With one or both units operating (modes 1, 2, 3 or 4), a Shift Advisor shall be on site.</p>		

CPSES OPERATIONS DEPARTMENT ADMINISTRATION MANUAL	ISSUE DATE JUN 07 1984	PROCEDURE NO. ODA-102
SHIFT COMPLEMENT RESPONSIBILITIES AND AUTHORITIES	REVISION NO. 5	PAGE 11 OF 12

4.3.15 A site Fire Brigade of at least 5 members shall be maintained onsite at all times. The Fire Brigade shall not include the Shift Supervisor and the 2 other members of the minimum shift crew necessary for safe shutdown of the unit and any personnel required for other essential functions during a fire emergency.

4.3.16 Except for the Shift Supervisor, the Shift Crew composition may be one less than the minimum requirements for a period of time not to exceed 2 hours in order to accommodate unexpected absence of on-duty shift crew members provided immediate action is taken to restore the Shift Crew composition to within the minimum requirements. This provision does not permit any shift crew position to be unmanned upon shift change due to an oncoming shift crewman being late or absent.

5.0 References

5.1 CPSES Final Safety Analysis Report, Section 13.1

5.2 Procedure ODA-101, "Operations Department Organization and Responsibilities"

5.3 USNRC Standard Review Plan, Section 13.1.2

5.4 USNRC Letter, "Interim Criteria for shift Staffing, July 31, 1980

5.5 NUREG-0578, 2.2.1.a

6.0 Attachments

6.1 Minimum Shift Crew Composition, Attachment 1

CPSES OPERATIONS DEPARTMENT ADMINISTRATION MANUAL	ISSUE DATE JUN 07 1984	PROCEDURE NO. ODA-102
SHIFT COMPLEMENT RESPONSIBILITIES AND AUTHORITIES	REVISION NO. 5	PAGE 12 OF 12

ATTACHMENT 1
PAGE 1 OF 1

MINIMUM SHIFT CREW COMPOSITION

MODE	UNIT LICENSED TO OPERATE	
	UNIT 1	UNIT 1 AND 2
ONE OR BOTH UNITS IN MODE 1, 2, 3, OR 4	1 S. S.	1 S. S.
	1 Ass't. S. S.	1 Ass't. S. S.
	2 R. O.	3 R. O.
	2 A. O.	3 A. O.
	1 Shift Advisor	1 Shift Advisor
	1 S. T. A.	1 S. T. A.
	1 R. P. Tech	1 R. P. Tech
	1 C. E. Tech	1 C. E. Tech
TOTAL	10	12
BOTH UNITS IN MODE 5 OR 6	1 S. S.	1 S. S.
	1 R. O.	1 Ass't. S. S.
	1 A. O.	2 R. O.
	1 R. P. Tech	3 A. O.
	1 C. E. Tech	1 R. P. Tech
		1 C. E. Tech
TOTAL	5	9

POSITION (1)	USNRC LICENSE
SHIFT SUPERVISOR - S. S.	SRO
ASSISTANT SHIFT SUPERVISOR - Ass't. S. S.	SRO
REACTOR OPERATOR - R. O.	RO
AUXILIARY OPERATOR - A. O.	NONE
SHIFT TECHNICAL ADVISOR - S. T. A.	NONE
SHIFT ADVISOR	NONE

- (1) Any qualified and USNRC Senior Licensed member or management may be used to satisfy the minimum Shift Supervisor or Assistant Shift Supervisor requirement. Any qualified and USNRC Licensed individual may be used to satisfy the Reactor Operator requirement.

Attachment 4

TRA-299

Shift Advisor Training and Qualifications

EXAM KEY

COURSE NAME

SHIFT ADVISOR TRAINING

WEEK 2

Date

MAY 18, 1984

TOTAL POINTS 32.75

SUBMITTED BY : S. J. Carney DATE : 17 May 84
APPROVED BY : Philip R. Tackett DATE : 5/17/84

1 RPS (1.5) 1 Q. Briefly describe the operation of the Reactor Protection System by tracing the path of components for a reactor trip signal.

2 RPS 1 A. From the sensor to the bistables, to the input cabinets and input relays to the solid state logic cabinets, to the UV coils on the reactor trip breakers.

5* RPS (3) 3 Q. Describe the functions provided by the following permissives/interlocks.

- a. P-4 Reactor Trip
- b. P-7 At Power
- c. P-12 Low-low Tavg
- d. C-9 Condenser interlock
- e. C-5 Low Power interlock
- f. C-8 Turbine Trip

6 RPS 3 A.

	NAME	FUNCTION
P-4	Reactor Trip	1. Trips Main turbine 2. Trips FRV W/Lo Tavg 3. Prevents reactivation of SI after a manual reset
P-7	At Power	Automatically unblocks PZR low press., PZR hi level, all flow trips.
P-12	Low-Low Tavg	Interlocks steam dump below setpoint. Cooldown valves may be bypassed.
C-5	Low power interlock	Stops outward rod motion in auto only.

C-8	Turbine trip	Arming of steam dump after turbine trip-Train "A". Train "B" shifts steam dump valves from output of LOL to the T.T. Controller.
C-9	Condenser interlock	Condenser available for steam dump.

1	ERG (1)	1	Q.	What types of procedures make up the Emergency Response Guidelines?
2	ERG	1	A.	1. Emergency Operating Procedures (EOP) 2. Emergency Operating Sub-Procedures (EOS) 3. Emergency Contingency Actions (ECA) 4. Functional Restoration Guidelines (FRG's) (.25 each)
3	ERG (.5)	2	Q.	What is the purpose of the Functional Restoration Guidelines?
4	ERG	2	A.	The FRG's are procedures designed to maintain the plant in a safe condition without regard to initiating events.

- | | | | | |
|----|--------------|----|----|---|
| 7 | ERG
(.5) | 4 | Q. | <p>If a Critical Safety Function Status Tree contains a "Red" path, do you: (circle correct answer)</p> <p>a. Finish the step you are on and then take actions defined by the CSFST.</p> <p>b. Immediately take actions as determined by the CSFST.</p> <p>c. Complete the procedure you are in and then take actions defined by the CSFST.</p> |
| 8 | ERG | 4 | A. | <p>b. Immediately take actions as determined by the CSFST.</p> |
| 31 | SOP
(1.5) | 16 | Q. | <p>How many RCP's may be started at one time? What are the starting duty limitations on the RCP's?</p> |
| 32 | SOP | 16 | A. | <p>1 RCP at a time. (.25)</p> <p>Maximum of 3 starts in a 2-hour period with at least 30 minutes rest between starts or attempted starts. (.75)</p> <p>A fourth start should first allow a 1-hour rest period. (.5)</p> |

- 5 ABN 3 Q. List three operator actions which
(.75) are performed following
verification of the failure of the
#1 seal in a RCP. (ABN-101A)
- 6 ABN 3 A. Any three for full credit (.25 pts
each)
- 1) Reduce reactor power to less
than 45% within 30 minutes.
 - 2) Within 5 minutes of discovery
and verification of the failed
seal, close the #1 seal
leakoff isolation valve for
the affected RCP.
 - 3) After reaching 45% reactor
power, secure the affected
RCP.
 - 4) Place the Unit in Hot Standby
within one hour after stopping
the affected RCP.
 - 5) Consult CPSES Tech Specs
Section 3/4.4.1 for any
applicable LCO's.
- 7 ABN 4 Q. List 4 conditions that could result
(1) in a gross failed fuel monitor
"alert" alarm. (ABN-102A)
- 8 ABN 4 A. 1) Gross Failed Fuel Monitor
Malfunction
- 2) Depleted resin in Letdown ion
exchanger
 - 3) Crud burst causing activity
 - 4) Actual failed fuel
- (0.25 pts. each)

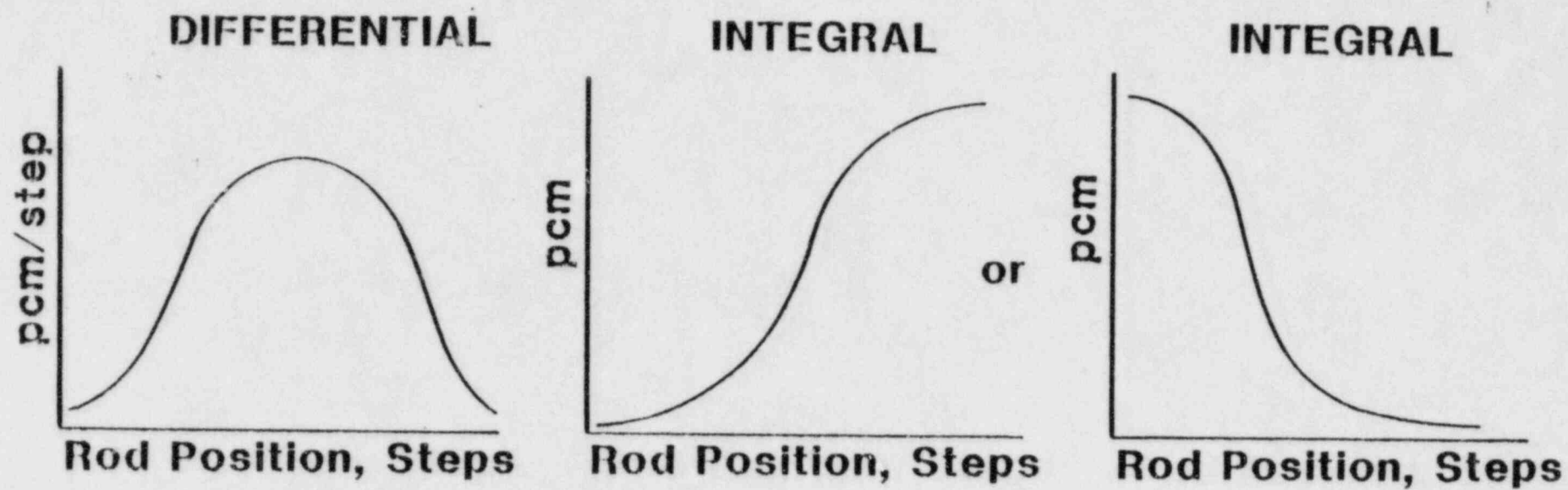
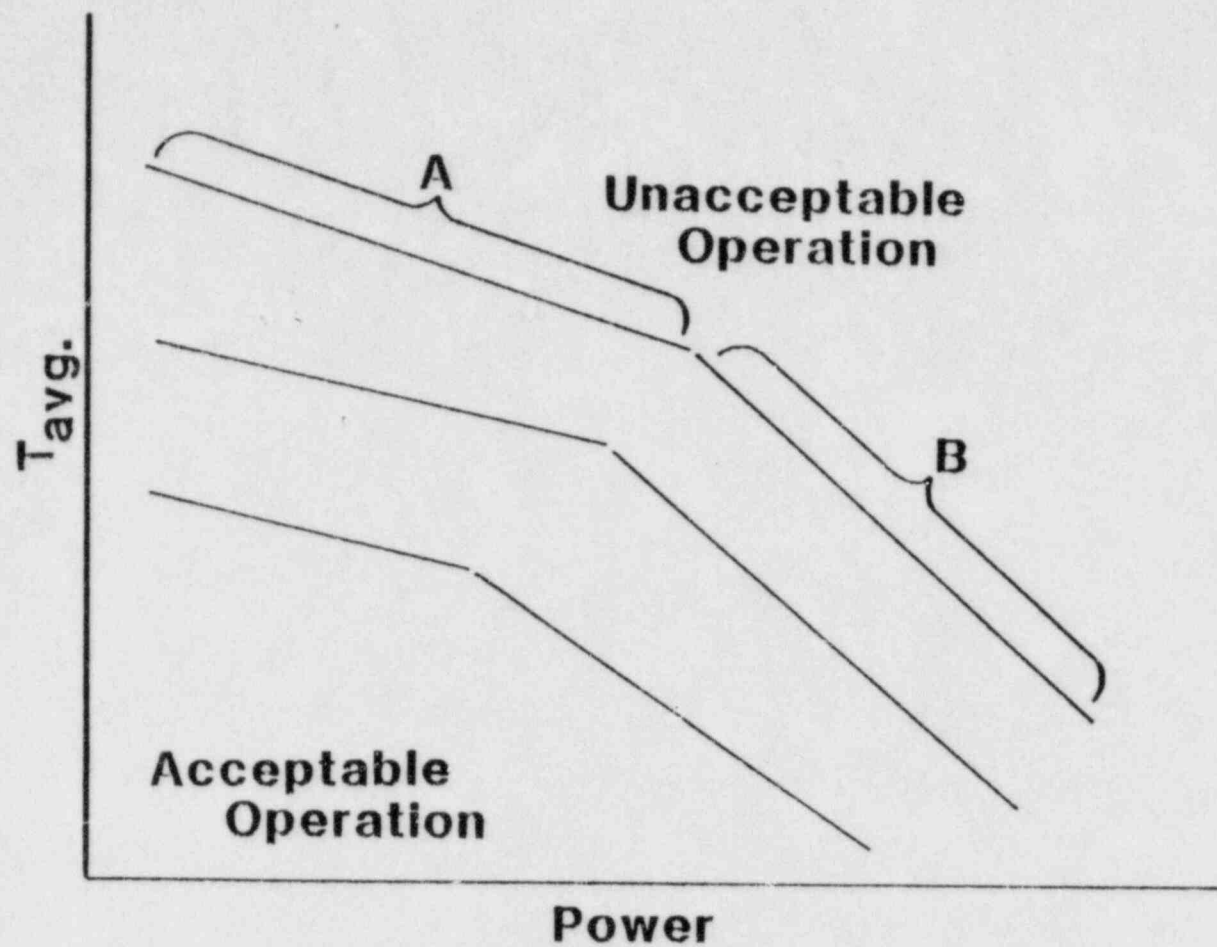


FIGURE TDB-1



**A portion - protection
against saturation
conditions in the
hot leg**

**B portion - protection
against DNB conditions**

FIGURE TDB-2

- | | | | | |
|---|------------|---|----|--|
| 1 | TDB
(1) | 1 | Q. | Draw an integral and differential rod worth curve and explain the reasons for the observed shape. (Label each axis with correct units - actual numerical values are not required.) |
| 2 | TDB | 1 | A. | The reactivity of any absorber at any position within the core is proportional to flux squared - since the axial flux is a cosine shape the axial worth is proportional to $(\cosine)^2$ and since the worth is related to the flux at the tip of the rod the axial differential worth will be $(\cosine)^2$ or as shown above - the integral of this function will be a sigmoid as shown in Fig. TDB-1. |
| 3 | TDB
(1) | 2 | Q. | Draw a family of curves similar to the CPSES safety limit curves and explain the rationale for each portion of the curve. (Label each axis with correct units - actual numerical values are not required.) |
| 4 | TDB | 2 | A. | |

- 5 TAA (4) 3 Q. What conditions must be maintained by operators to ensure that the hot channel factors limits are not exceeded?
- 6 TAA 3 A. 1. Delta Flux limits are observed as prescribed by Axial Flux Difference Target Band. (1)
2. Rod Insertion Limits are observed. (1)
3. Observe proper bank sequencing with overlap. (1)
4. Maintain rods in a bank within ± 12 steps of each other. (1)
- 19 TS (1) 10 Q. Define "shutdown margin."
- 20 TS 10 A. The instantaneous amount of reactivity by which the reactor is subcritical (or would be subcritical) if all rod clusters were inserted except the cluster of highest reactivity worth.
- 57 TS (.5) 29 Q. CIRCLE THE CORRECT ANSWER(S).
Per Technical Specification Bases,
the limits on heat flux hot channel factor, RCS flowrate, and nuclear enthalpy rise hot channel factor ensure that:
1. The design limits on peak local power density and minimum DNBR are not exceeded.
2. A coolable core geometry is maintained.

- 58 TS 29 A. 1. The design limits on peak local power density and minimum DNBR are not exceeded.
4. In the event of a LOCA the peak clad temperature will not exceed the 2200°F ECCS acceptance criteria limit.

73 TS 37 Q. At the Comanche Peak Steam Electric
(1) Station, no credit was taken for
the Source Range and Intermediate
Range Rx Trip in the Final Safety
Analysis Report for a startup
accident event. Explain why.

74 TS 37 A. The Source and Intermediate Range trip circuits can be manually bypassed by operators by utilizing the Level Trip Bypass switches on the front of the instrument drawers. Since the Rx Trips can be physically bypassed, they were not used in the FSAR.

75

TS
(4)

38

Q.

a.

Define the following

1. DNBR (1)
2. Hot Channel Factor (F)
(1)
3. Critical Heat Flux (1)

b. What Rx protection signal is designed specifically to prevent DNB for all combinations of pressure, power, coolant temperature and axial power distribution? (1)

76

TS

38

A.

a.

1. DNBR is defined as the ratio of the heat flux that would cause DNB at a particular core location to the local heat flux at that same core location.

2. Hot Channel Factor (F) is a peak (maximum) to average ratio of something, e.g. for local power density:

$$F = \frac{\text{Peak kw/ft}}{\text{Average kw/ft}}$$

3. Critical Heat Flux is the heat flux (Q) necessary to depart from the nucleate boiling region, or the heat flux needed at DNB.

b. OTN-16 trip.

77 TS 39 Q. According to Technical
(3) Specifications, what requirements
are necessary for a high radiation
area in which the intensity of
radiation is greater than 100
mrem/hr but less than 1000 mrem/hr?

78 TS 39 A. (.5 pts. each)
1. Area shall be barricaded
2. Conspicuously posted as a high
radiation area
3. Entrance controlled by
requiring issuance of RWP
4. Individuals entering shall be
provided with, or accompanied
by one or more of the
following:
(a) A radiation monitoring
device which continuously
indicates dose rate, or
(b) A radiation monitoring
device which continuously
integrates the dose rate
and alarms when a preset
limit is reached, or
(c) A HP individual
(qualified) with a dose
rate monitoring device
who is responsible for
positive control over the
activities in the area.

79 TS 40 Q. What is/are
(3)
a. Axial Flux Difference (1)
b. Quadrant Power Tilt Ratio (1)
c. Subcooling Margin (1)

80 TS 40 A. a. Axial Flux Difference is the
difference in power (expressed
in %) between the upper and
lower halves of the core, e.g.
 $P_{TOP} - P_{BOTTOM} = \Delta \text{Flux}$.
Measured by excore detectors
in each of four quadrants of
the core.

- b. Quadrant Power Tilt Ratio is the ratio of the maximum calibrated upper detector output to the average of the upper detector outputs or the maximum calibrated lower detector output to the average of the lower detector outputs; whichever ratio is greater.
(1)
- c. Subcooling margins is $T_{SAT} - T_{operating}$ or the margin between the hottest fluid temperature in a system and the saturation temperature for the system pressure, e.g. Pzr Temp at saturation = 653°F and T_{Hot} at full power = 620°F.
Subcooling margin = 33°F. (1)

EXAM KEY

COURSE NAME

SHIFT ADVISOR TRAINING

WEEK 4

Date

JUNE 1, 1984

TOTAL POINTS

51.5 44.5

SUBMITTED BY :

DATE :

APPROVED BY :

DATE :

1	CG (1)	1	Q.	What concentration of hydrogen is considered an explosive concentration in air?
2	CG	1	A.	$\geq 4\%$
3	CG (1.5)	2	Q.	List three (3) sources of hydrogen production in containment following a LOCA.
4	CG	2	A.	<ol style="list-style-type: none"> 1. Hydrogen present in the reactor coolant released on depressurization. (.5) 2. Zirconium/water reaction in the core. (.5) 3. Radiolysis of water in the core and containment sump. (.5) 4. Aluminum and zinc corrosion of plant materials. (.5)
37	EPP (.5)	19	Q.	State the purpose for Protection Action Guides.
38	EPP	19	A.	To provide guidelines to the Emergency Coordinator for evaluating post-emergency conditions and for making recommendations to offsite agencies concerning protective measures that could be implemented to insure minimum doses of radiation to the public following offsite releases of radioactive nuclides.

- 39 EPP 20 Q. Define:
- (1)
- a. Plume Exposure Emergency
 Planning Zone
- b. Ingestion Exposure Emergency
 Planning Zone
-
- 40 EPP 20 A. a. The Plume Exposure EPZ is a
 zone 10 miles in radius from
 plant centerline. Used in
 determining protection measure
 to protect public from
 excessive doses received from
 plume passage. (.5)
- b. The Ingestion Exposure EPZ
 extends to a radius 50 miles
 from plant boundaries. Used
 in determining protection
 measures to limit ingestion of
 radioactive nuclides from food
 supplies and to limit public
 exposure from ground level
 contamination. (.5)
-
- 3 RM 2 Q. What type radiation detectors are
 (1) used in Process and Area Monitors?
-
- 4 RM 2 A. Process + Scintillation
 GM Tube
- Area + G-M Tube (Low Range)
 + Ionization Chamber (High
 Range)

7 RM 4 Q. How do we monitor for fission-product activity in the RCS by the Radiation Monitoring System?

8 RM 4 A. Use of failed fuel monitors

9 TAA 5 Q. a. Other ~~than~~ ^{Remove not by objectives} the major LOCA, which events at the CPSES are most limiting with respect to DNBR. (2 pts.)
b. Define DNBR. (1 pt.)
c. What parameters are monitored to ensure that DNBR is maintained greater than a value of 1.30? (2 pts.)

10 TAA 5 A. a. Rod ejection accident; continuous single rod withdrawal accident and RCP locked rotor or shaft break accident. (2)
b.
$$\text{DNBR} = \frac{\text{heat flux to cause DNB at some pt. in the core}}{\text{actual heat flux at that point in core}}$$

c. DNBR > 1.3 Temperature (.5)
Pressure (.5)
Power (.5)
Flow (.5)

27 *

TAA
(5)

14 Q.

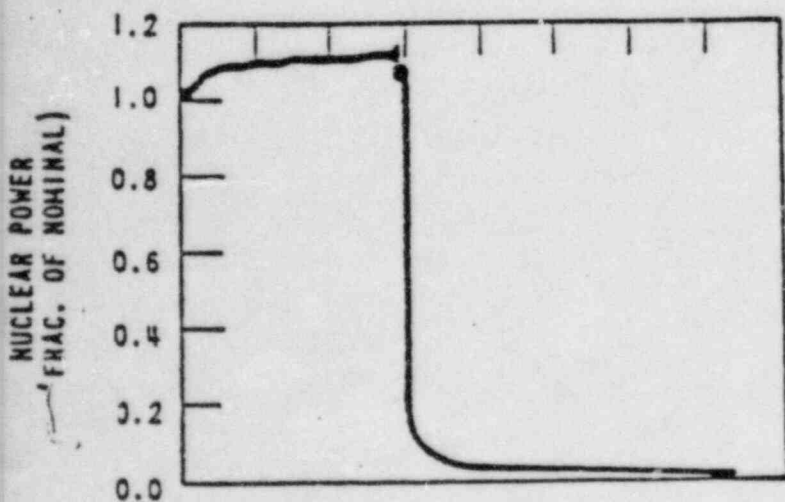
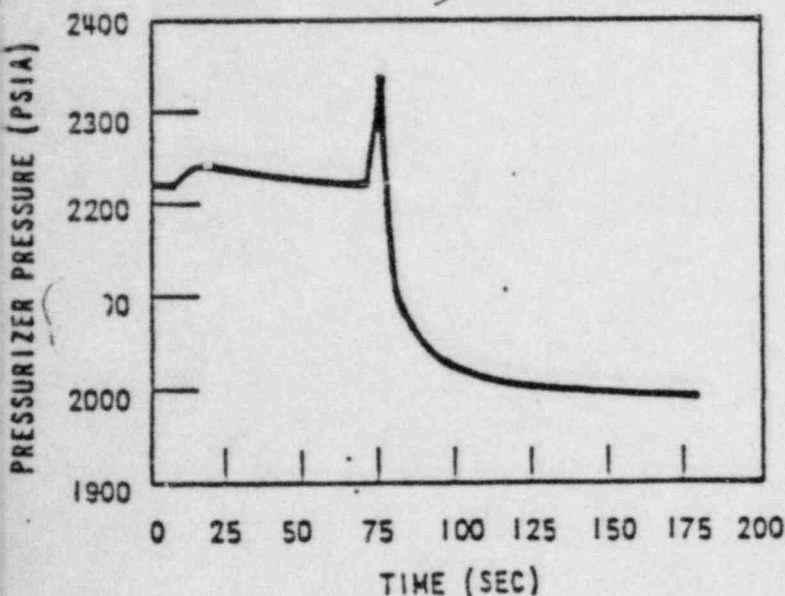
Draw graphs of nuclear power, pressurizer pressure, Tavg, Loop ΔT and DNBR for the ten minute period following an increase in feedwater flow accident.

28

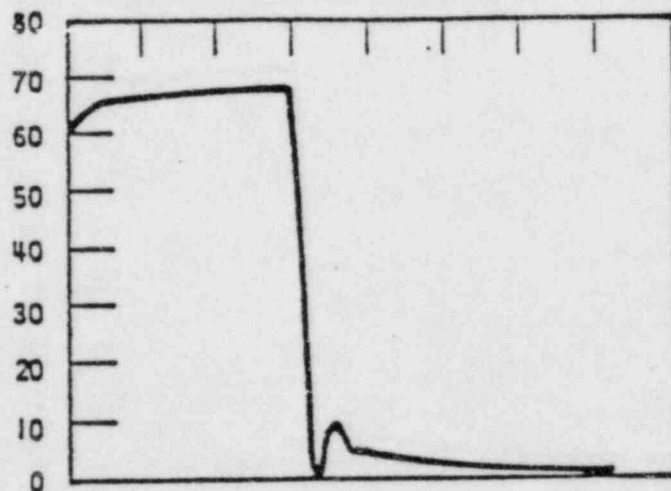
TAA

14 A.

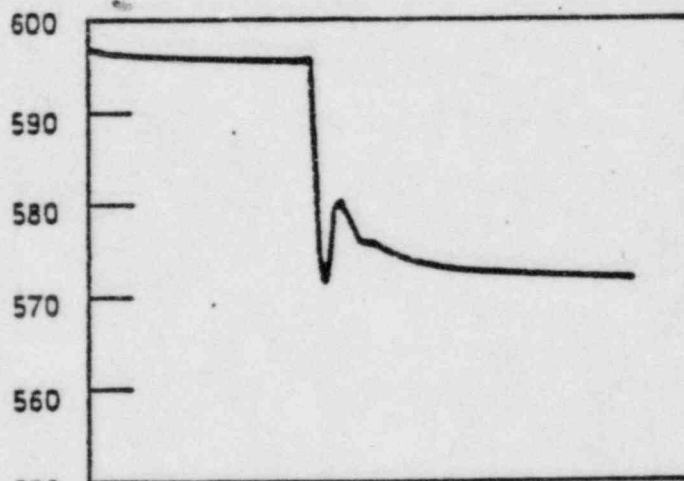
*Remove this
not by objective*



REACTOR COOLANT LOOP
DELTA -T (DEG F)



CORE AVERAGE TEMPERATURE
(DEG F)



DNBR



37

TAA
(3)

19

Q.

The CPSES reactor is operating at 100% power with all control systems in automatic when an inadvertent dilution event occurs. Assuming BOL conditions and the dilution continues indefinitely, explain what will happen to plant conditions over the first 15 minutes. If a reactor protection signal is generated, what will cause it to occur?

38

TAA

19

A.

As dilution begins, positive reactivity will be added to the core, causing reactor power to increase. As reactor power rises above steam demand, T hot and, subsequently, T cold will increase causing Tavg to increase. When Tavg increases to 1.5°F greater than Tref, rods will step inward to maintain Tavg with Tref. Rods will probably move inward intermittently as dilution continues until the rod insertion limit low and low low alarm points are reached and passed. Delta flux will start to be pushed negative which will force operation outside the target band and also cause a penalty f (Δ flux) to the OTN-16 trip setpoint, reducing the setpoint. As OTN-16 trip setpoint is reduced toward the actual N-16 in two of four loops turbine runback/rod stop will occur (3% difference) and quite probably a reactor trip will follow. Dilution will continue until stopped by operator or system action.

69*

TAA
(3)

35

Q.

The CPSES Reactor is operating at 100% power with rods in manual when a 50% load rejection occurs. Assuming no reactor trip and proper steam dump operation, describe the plant conditions once they have stabilized. Include in your discussion the transient effects on power, temperature, pressure and S/G level.

70

TAA

35

A.

Answers will vary based on assumptions for values of αT and Doppler power coefficient. Assume BOL values: $\alpha T - 5\text{pcm}/^\circ\text{F}$; Doppler power coeff - $10\text{ pcm}/\% \text{ power}$

Ideal case: With rods in manual, the steam dumps will accommodate 40% of the load rejection. When load is lost, T_{avg} will increase adding $-\rho$ to the core, causing power to decrease which adds $+\rho$ due to Doppler which balances the reactivity.

With a 5°F deadband on the load rejection controller before actuation, T_{avg} will use from 588°F (full power program) to 593°F to actuate dumps. Meanwhile T_{ref} will be reduced to 572.5°F as a function of turbine steam pressure.

The 5°F increase in T_{avg} will reduce power about 2.5% to 97.5% power. Steam dump pop open actuation will account for 40% of steam demand, so the remaining 10% will be lost due to T_{avg} increase. 10% is -100 pcm which would result in a 20°F increase in T_{avg} .

- a. T_{avg} would approximate 613°F .
- b. Nuclear power would approximate 87.5%.
- c. Steam dumps would be wide open dumping 40% steam demand.

- | | | | | | |
|----|------------|----|----|----|---|
| 39 | TAA
(2) | 20 | Q. | a. | What is a reactivity anomaly? |
| | | | | b. | What action(s) is/are required if a reactivity anomaly were to occur? |

- | | | | | | |
|----|------------|----|----|----|---|
| 39 | TAA
(2) | 20 | Q. | a. | What is a reactivity anomaly? |
| | | | | b. | What action(s) is/are required if a reactivity anomaly were to occur? |

15	TAA (3)	8	Q.	What are the indications for a loss of natural circulation flow?
----	------------	---	----	--

16 TAA 8 A. a. Increasing loop delta T's indicate that natural circulation flow is decreasing. With insufficient flow through the core, core exit temperature will rise. Core exit thermocouples and wide range T hot will be the first indications of insufficient core cooling and their indications will start to increase.

b. Increasing T cold indicates insufficient heat is being removed by the steam generator. If actions are not taken to increase secondary cooling, T hot will also start to increase. This will result in higher secondary steam pressures and lower margin to saturation in the reactor coolant.

17*	TAA (2)	9	Q. Discuss the effects of an inadvertent initiation of ECCS during power operation. Assume the spurious SI signal <u>does not</u> cause a reactor trip/turbine trip. Discuss the effects of this transient on major RCS parameters and overall unit load.
-----	------------	---	---

18 TAA 9 A. If the Reactor Protection System does not produce an immediate trip as a result of the spurious SIS signal, the reactor experiences a negative reactivity excursion due to the injected boron causing a decrease in reactor power.

- a. The power mismatch causes a drop in Tavg and consequent coolant shrinkage in the system results in pressurizer pressure and water level drop.
- b. Load will decrease due to the effect of reduced steam pressure on load after the turbine throttle valve is fully open.
- c. If automatic rod control is used, these effects will be lessened until the rods have moved out of the core. The transient is eventually terminated by the Reactor Protection System low pressure trip or by manual trip.
- d. The time to trip is affected by initial operating conditions including core burnup history which affects initial boron concentration, rate of change of boron concentration and Doppler and moderator coefficients.

91 TAA 46 Q. In performing transient analysis, results of such analysis are compared to criteria specified in 10CFR100. What are the criteria?

92 TAA 46 A. Whole body dose < 25 REM
 Thyroid dose < 300 REM

Both for a two hour stay time at the exclusion area boundary.

95	TAA (1)	48	Q.	For a steam generator tube rupture what principal indication(s) distinguish this event from other RCS inventory loss transients?
96	TAA	48	A.	<p>Steam Jet Air Ejector Rad Monitor Alarms or Condenser Off-Gas Rad Monitor Alarm.</p> <p>Steam Flow/Feed Flow mismatch.</p> <p>Main steam line rad monitor alarms.</p> <p>S/G Blowdown rad monitor alarm.</p> <p>Increased S/G Level on affected S/G.</p>
99	TAA (1)	50	Q.	Upon identifying that an ATWT event has occurred, there are three things an operator must do to mitigate the event irrespective of the type of ATWT. List the three basic actions.
100	TAA	50	A.	<ol style="list-style-type: none"> 1. Try to trip the reactor 2. Try to trip the turbine 3. Insure that a heat sink is available
61	MCD (2)	31	Q.	<ol style="list-style-type: none"> a. What are the RCP trip criteria specified by EOP 0.0 Rx Trip or Safety Injection? b. Why is it recommended to trip RCP's with the above criteria on a small break LOCA?

- 62 MCD 31 A. a. Component Cooling is lost and upper or lower bearing temperature is greater than 200°F.
- OR
- SI is on and RCS pressure \leq 1700 psig.
- b. Westinghouse recommends tripping RCP's because RCP's will tend to pump water out of the system for some break locations. Also, their power supply is not safety related and, therefore, not guaranteed. During a small break LOCA, a loss of the RCP's could cause a more severe condition than analyzed.
-
- 89 MCD (3.0) 45 2. What are the RCS operational leakage limits as specified by Technical Specifications? No action statements required!
-
- 90 MCD 45 A. (.5 each)
- a. No pressure boundary leakage
 - b. Max of 1 gpm unidentified leakage
 - c. 1 gpm S/G primary/secondary leakage total or 500 gpd/S-G
 - d. 10 gpm identified leakage
 - e. 40 gpm controlled leakage at 2235 \pm 20 psig
 - f. 1 gpm from any RCS Pressure Isol. Valve at 2235 \pm 20 psig

37	ERG (1)	19	Q.	In the Emergency Contingency Action procedures related to "Loss of All AC Power" and its recovery, special attention is given to the Reactor Coolant Pump Seals. Why?
38	ERG	19	A.	The RCP Seals are the only normal unisolable RCS leak paths (0.5). They are very sensitive to quick temperature changes and can therefore be damaged due to thermal shock causing a large increase in RCS leakage. (0.5)
67	ERG (1)	34	Q.	State 4 different methods of restoring the primary heat sink or other means of removing heat from the primary as described in FRH-0.1 "Response to Loss of Secondary Heat Sink".
68	ERG	34	A.	<ol style="list-style-type: none"> 1. Establish AFW flow to the steam generators (.25) 2. Establish MFW flow to the steam generators (.25) 3. Feed a steam generator with a condensate pump (.25) 4. Remove heat from the RCS using feed and bleed - SI to RCS and bleed through the PORV's (.25)

- 21 ERG 11 Q. List four (4) actions that must be taken to isolate the ruptured steam generator(s) per EOP-3.0 (SGTR).
 (1)
- 22 ERG 11 A. a. Isolate auxiliary feedwater.
 (.25)
 b. Close main steam isolation valve, bypass valve and drains. (.25)
 c. Verify S/G PORV's closed. (.25)
 d. If appropriate, close steam supply valve from affected steam line to AFW pump
- 9 DG 5 Q. List the automatic start signals for the diesel. Can the diesel be auto started with the mode selector switch in local?
 (2)
- 10 DG 5 A. Undervoltage on the respective safeguards bus.

 Undervoltage on the preferred power source.

 Safety injection.

 When the selector switch on the local diesel control panel is in local, the automatic start signals are blocked.

Shift Advisor Examination Results

SHIFT ADVISOR	EXAM 1	EXAM 2	EXAM 3	COURSE AVERAGE
D. E. Burton	83 ₁	80	73 ²	79
D. R. Campbell	79 ₁	80	69 ²	76
H. C. Crummey	90	90	85 ²	88
L. J. Ryan	87	85	75 ²	82
S. Stevens	88	89	79 ²	85
F. D. Pauli ³				

NOTES: 1. Upgrade Training Completed.
 2. Upgrade Training Scheduled.
 3. Training Not Completed.