COMANCHE PEAK STEAM ELECTRIC STATION

TRAINING MANUAL

FOR INFORMATION ONLY

SHIFT ADVISOR TRAINING AND QUALIFICATIONS

PROCEDURE NO. TRA-299

REVISION NO. 0

NON-SAFETY-RELATED

SUBMITTED BY: R K Wenstrand ADMINISTRATIVE SUPERINTENDENT DATE: 6/5/84

APPROVED BY: [signature] MANAGER, PLANT OPERATIONS DATE: 6/5/84

1.0 Purpose

This procedure describes the Qualifications and Training Requirements for Shift Advisors.

2.0 Applicability

This procedure is applicable to individuals assigned as Shift Advisors to the Operations Department and becomes effective upon issuance.

3.0 Definitions

3.1 Shift Advisor - That individual who acts as an operations advisor on shift, and recommends appropriate actions (including shutdown) to the Shift Supervisor. The responsibilities of the Shift Advisors are delineated in ODA-102, "Shift Complement, Responsibilities And Authorities".

4.0 Instructions

4.1 Qualifications

At the time of initial fuel loading, Shift Advisors shall have the following qualifications.

4.1.1 Four (4) years of power plant experience.

4.1.2 Two (2) years of Nuclear Power Plant Experience.

4.1.3 One (1) year of experience as an on-shift licensed senior operator at an operating PWR plant.

4.2 Training

Shift Advisor Training is divided into the following areas: General Training, Procedure Training, Specialty Training, and Recurrent Training.

4.2.1 General Training: This area includes subjects which are general in nature and may be a requirement for station access.

4.2.1.1 The Shift Advisor must complete the training requirements for unescorted access into the Protected Area in accordance with TRA-101, "General Employee Training".

4.2.1.2 The Shift Advisor must complete the training requirements for unescorted access into Radiation Controlled Areas in accordance with TRA-102, "Radiation Worker Training".

4.2.1.3 The Shift Advisor may complete the training requirements for the use of respiratory protection equipment in accordance with TRA-103, "Respiratory Protection Training".

4.2.2 Procedure Training: This area includes training in station procedures and programs. The procedure training checklist is contained in Attachment 1.

4.2.3 Specialty Training: This area consists of formal classroom training, informal training obtained by reading applicable material, on-shift training or attending special seminars or meetings as necessary. The curriculum for formal classroom training is described in Attachment 2. Attachment 3 is typical schedule for classroom training.

4.2.4 Recurrent Training

Shift Advisors shall attend the Operator Proficiency Lecture Series as described in paragraph 4.2.2 of CPSES Procedure, TRA-204, "Licensed Operator Requalification Training Program". This lecture series includes the following topics:

4.2.4.1 Administrative Procedures, Conditions, and Limitations, including Technical Specifications.

4.2.4.2 Major Operational Evolutions

4.2.4.3 Facility Design and License Changes

4.2.4.4 Procedures - Normal, Abnormal, Emergency Operating, and Radiological Control

4.2.4.5 Operating History and Problems

4.2.4.6 Related Nuclear Industry Operating Experience

4.2.4.7 Procedure Changes

4.2.4.8 Reportable Occurrences

4.2.5 Exemptions

Exemptions from certain courses may be allowed for appropriately qualified individuals. Exemptions shall be justified, documented and approved by the Operations Supervisor or the Operations Superintendent.

4.3 Examinations And Verification

4.3.1 Examinations may be written or oral as specified by the course description. Some courses may require attendance only for successful completion. Procedure reviews require the reviewers signature and a verification signature by the Operations Superintendent or Operations Supervisor.

4.3.2 An oral review will be conducted with each Shift Advisor to ensure that their responsibilities, duties and training requirements are understood.

4.3.2.1 The review shall be conducted by any three of the following members of plant management, all of whom should be qualified at the SRO level:

4.3.2.1.1 Operations Superintendent

4.3.2.1.2 Operations Supervisor

4.3.2.1.3 Operations Engineer

4.3.2.1.4 Shift Supervisor

4.3.2.1.5 Assistant Shift Supervisor

4.3.2.2 The review shall include the areas listed in Attachment 4.

4.3.2.3 Attachment 4 shall be utilized to document the review.

4.3.3 Shift Advisors should successfully complete written or oral examinations covering the topics listed in section 4.2.4, "Recurrent Training". The examinations are normally administered at the conclusion of each recurrent training cycle.

4.4 Program Evaluation

4.4.1 The Shift Advisor training may be periodically evaluated as part of the Operations Department Training Program in accordance with CPSES Procedure, NOT-110, "Evaluating the Effectiveness of Training".

4.4.2 The Operations Supervisor shall evaluate the effectiveness of training by using individual Shift Advisor performance on shift as the basis. He shall specify the need for re-training or additional training.

4.5 Documentation

Training shall be documented in accordance with CPSES Procedure, NOT-104, "Training Records".

5.0 References

5.1 CPSES Procedure TRA-101, "General Employee Training"

5.2 CPSES Procedure TRA-102, "Radiation Worker Training"

5.3 CPSES Procedure TRA-103, "Respiratory Protection Training"

5.4 CPSES Procedure TRA-204, "Licensed Operator Requalification Training Program"

5.5 CPSES Procedure NOT-104, "Training Records"

5.6 CPSES Procedure NOT-110, "Evaluating the Effectiveness of Training"

5.7 CPSES Procedure ODA-102, "Shift Complement, Responsibilities and Authorities.

6.0 Attachments

6.1 Shift Advisor Procedure Training, Attachment 1

6.2 Shift Advisor Classroom Training, Attachment 2

6.3 Shift Advisor Training Schedule (Typical), Attachment 3

ATTACHMENT 1
PAGE 1 OF 8

SHIFT ADVISOR PROCEDURE TRAINING

PROCEDURE NUMBER	TITLE	SIGNATURE/DATE
STA-204	Temporary Procedures	
STA-205	Temporary Changes to Procedures	
STA-207	Special Orders, Night Orders, and Management Memorandums	
STA-403	Identification of Safety-Related Equipment	
STA-501	Reporting of Operating Information to the NRC	
STA-503	Reporting of Operating Information to Regulatory Agencies other Than NRC	
STA-504	Problem Report	
STA-601	Authority for Equipment Operations	
STA-602	Temporary Modifications and Bypassing of Safety Functions	
STA-605	Clearance and Safety Tagging	
STA-606	Maintenance Action Requests	
STA-610	Secondary Water Chemistry Control	
STA-615	Staff Work Hours	
STA-616	Control Room and Observation Area Access	
STA-702	Surveillance Test Program	
STA-703	ISI Program	
ODA-101	Operations Department Organization and Responsibilities	
ODA-102	Shift Complement, Responsibilities, and Authorities	
ODA-104	Operations Department Document Control	
ODA-107	Reporting of Operational Incidents	
ODA-301	Operating Logs	
ODA-302	Relief of Personnel	
ODA-303	Conduct of Personnel in Control Room	
ODA-401	Disabling of Control Panel Annunciators/Instruments	
EPP-104	Drills and Exercises	
EPP-109	Duties of the Emergency Coordinator	

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SHIFT ADVISOR PROCEDURE TRAINING

PROCEDURE NUMBER	TITLE	SIGNATURE/DATE
EPP-112	Duties of Emergency Response Personnel	
EPP-201	Assessment of Emergency Action Levels and Plan Activation	
EPP-203	Emergency Notification and Communications	
EPP-204	Emergency Facility Activation	
EPP-305	Personnel Dosimetry for Emergency Condition	
FIR-101	Fire Protection Program	
FIR-102	Fire Emergency Plan	
FIR-103	Fire Reporting	
FIR-104	Fire Brigade	
FIR-107	Control of Transient Combustables and Ignition Sources	
FIR-109	Fire Watches	
HPA-101	ALARA Program	
HPA-108	Radiation Incident Identification and Reporting	
HPA-112	Radiation Work Permits	
HPA-115	Control of Contaminated Spills	
RFO-101	Refueling Organization	
RFO-102	Refueling Operation	
RFO-103	Fuel Handling Emergencies	
RFO-301	Handling of New Fuel and Shipping Containers During Fuel Receipt Operations	
RFO-302	Handling of Fuel Assemblies During Refueling Operations	
RFO-303	Handling of Rod Cluster Control Assemblies and Core Components	
OPT-104	Operations Weekly Routine Tests	
OPT-106A	Control Rod Excerise	
OPT-107A	Seismic Monitoring Instrumentation Check	
OPT-108A	Remote Shutdown Instrument Channel Check	

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SHIFT ADVISOR PROCEDURE TRAINING

PROCEDURE NUMBER	TITLE	SIGNATURE/DATE
OPT-109A	PORV and Block Valve Operability Test	
OPT-110A	RCP Controlled Leakage Measurement	
OPT-111A	Accumulator Isolation Valve Breaker Check	
OPT-112A	Accident Monitoring Instrument Channel Check	
OPT-113A	Containment Purge Supply and Exhaust Position Check	
OPT-201A/B	Charging System Operability	
OPT-202A/B	Boration System Operability	
OPT-203A/B	Residual Heat Removal System Operability	
OPT-204A/B	Safety Injection System Operability	
OPT-205A/B	Containment Spray System Operability	
OPT-206A/B	Auxiliary Feedwater System Operability	
OPT-207A/B	Service Water System Operability	
OPT-208A	Component Cooling Water System Operability	
OPT-210A/B	Control Room Emergency Air Cleanup System Operability Test	
OPT-213A/B	ESF Exhaust Air Cleanup System Operability Test	
OPT-214A/B	Diesel Generator Operability	
OPT-215A/B	Preferred AC Source Operability	
OPT-217A	Main Turbine Stop and Control Valve Test	
OPT-218A/B	Containment Isolation Valve Operability (Testable during Operation)	
OPT-219A	Containment Penetration Non-Automatic Isolation Valve Position Verification (IRC)	
OPT-220A	Fire Suppression Water and Sprinkler System Operability Test	
OPT-301	Reactor Shutdown Margin Verification	
OPT-302	Calculating Power Tilt Ratio	
OPT-303	Reactor Coolant System Water Inventory	

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SHIFT ADVISOR PROCEDURE TRAINING

PROCEDURE NUMBER	TITLE	SIGNATURE/DATE
OPT-304	Leak Test of Reactor Coolant System After Opening	
OPT-305	Inspection Following Containment Maintenance	
OPT-306	Containment Sump Inspection	
OPT-307A/B	Residual Heat Removal System Isolation	
OPT-308	Calculating Estimated Critical Condition	
OPT-309	Unit Calorimetric	
OPT-401A	Reactor Coolant System Temperature Verification	
OPT-402A	Shutdown Rod Surveillance	
OPT-403A	Axial Flux Difference	
OPT-406A	Final Actuation Device Test	
OPT-407A	Reactor Coolant System Heatup/Cool-down Limitations Verification	
OPT-408A	Containment Integrity Verification	
OPT-409A	Steam Generator Low Temperature Limitation Verification	
OPT-410A	Turbine Trip Checks - Startup Mode	
OPT-411A	Refueling Water Level Check	
TRA-203	Replacement License Training	
TRA-204	Licensed Operator Requalification Training Program	
TRA-299	Shift Advisor Training and Qualifications	
EOP-0.0	Reactor Trip or Safety Injection	
EOS-0.1	Reactor Trip Recovery	
EOS-0.2	Natural Circulation Cooldown	
EOS-0.3	SI Termination Following Spurious SI	
EOS-0.4	Natural Circulation Cooldown with Steam Void in Vessel Upper Head	
EOP-1.0	Loss of Reactor Coolant (LOCA)	
EOS-1.1	SI Termination Following LOCA	
EOS-1.2	Post-LOCA Cooldown and Depressurization	
EOS-1.3	Transfer to Cold Leg Recirculation Following LOCA	

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SHIFT ADVISOR PROCEDURE TRAINING

PROCEDURE NUMBER	TITLE	SIGNATURE/DATE
EOS-1.4	Transfer to Hot Leg Recirculation	
EOP-2.0	Loss of Secondary Coolant (LOSC)	
EOS-2.1	SI Termination Following LOSC	
EOS-2.2	Transfer to Cold Leg Recirculation Following LOSC	
EOP-3.0	Steam Generator Tube Rupture (SGTR)	
EOS-3.1	SI Termination Following SGTR	
EOS-3.2	SGTR Alternate Cooldown By Backfilling RCS	
EOS-3.3	SGTR with Secondary Depressurization	
ECA-1.0	Anticipated Transient Without Trip (ATWT)	
ECA-2.0	Loss of All AC Power	
ECA-2.1	Loss of All AC Power Recovery Without SI Required	
ECA-2.2	Loss of All AC Power Recovery With SI Required	
ECA-3.0	SGTR Contingencies	
ECA-4	Response to Multiple Steam Generator Depressurization	
ECA-5	Loss of Emergency Coolant Recirculation	
ECA-6	Secondary High Energy Line Rupture with Loss of SI Function	
ECA-7	Combined SGTR and LOCA	
ECA-8	Unisolable SGTR	
ECA-9	SGTR Without Pressurizer Pressure Control	
FRS-0.1	Response to Nuclear Power Generation	
FRS-0.2	Response to Loss of Core Shutdown	
FRC-0.1	Response to Inadequate Core Cooling	
FRC-0.2	Response to Degraded Core Cooling	
FRC-0.3	Response to Potential Loss of Core Cooling	
FRC-0.4	Response to Saturated Core Cooling Conditions	

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SHIFT ADVISOR PROCEDURE TRAINING

PROCEDURE NUMBER	TITLE	SIGNATURE/DATE
FRP-0.1	Response to Imminent Pressurized Thermal Shock Conditions	
FRP-0.2	Response to Anticipated Pressurized Thermal Shock Conditions	
FRH-0.1	Response to Loss of Secondary Heat Sink	
FRH-0.2	Response to Steam Generator Overpressure	
FRH-0.3	Response to Steam Generator High Level	
FRH-0.4	Response to Steam Generator Low Level	
FRH-0.5	Response to Loss of Steam Generator PORV's and Condenser Dump Valves	
FRZ-0.1	Response to Containment High Pressure	
FRZ-0.2	Response to High Containment Sump Level	
FRZ-0.3	Response to High Containment Radiation Level	
FRI-0.1	Response to Pressurizer Flooding	
FRI-0.2	Response to Low System Inventory	
FRI-0.3	Response to Voids in Reactor Vessel	
ABN-101	Reactor Coolant Pump Trip/Malfunctions	
ABN-102	High Reactor Coolant Activity	
ABN-103	Excessive Reactor Coolant Leakage	
ABN-104	Residual Heat Removal System Malfunction	
ABN-105	Chemical and Volume Control System Malfunctions	
ABN-106	High Secondary Activity	
ABN-301	Instrument Air System Malfunction	
ABN-302	Feedwater, Condensate, Heater Drain System Malfunction	
ABN-304	Main Condenser and Circulating Water System Malfunction	
ABN-401	Main Turbine - Generator Malfunctions	
ABN-501	Station Service Water System Malfunction	

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SHIFT ADVISOR PROCEDURE TRAINING

PROCEDURE NUMBER	TITLE	SIGNATURE/DATE
ABN-502	Component Cooling Water System Malfunction	
ABN-601	138/345 KV High Voltage Interruption	
ABN-701	Source Range Instrumentation Malfunction	
ABN-702	Intermediate Range Instrumentation Malfunction	
ABN-703	Power Range Instrumentation Malfunction	
ABN-704	T_c/N-16 Instrumentation Malfunction	
ABN-705	Pressurizer Pressure Instrumentation Malfunction	
ABN-706	Pressurizer Level Instrumentation Malfunction	
ABN-707	Steam Flow Instrumentation Malfunction	
ABN-708	Feedwater Flow Instrumentation Malfunction	
ABN-709	S/G Pressure, Steam Header Pressure, and Turbine 1st Stage Pressure Instrumentation Malfunction	
ABN-710	Steam Generator Level Instrumentation Malfunction	
ABN-711	Loss of Protection and/or Instrument Bus	
ABN-712	Rod Control System Malfunction	
ABN-901	Fire Protection System Malfunctions	
ABN-902	Accidental Release of Radioactive Gas	
ABN-903	Accidental Release of Radioactive Liquid	
ABN-904	Accidental Release of Chlorine Gas	
ABN-905	Loss of Control Room Habitability	
ABN-906	Loss of P2500 Computer	
ABN-907	Acts of Nature	
ABN-908	Fuel Handling Accident	

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SHIFT ADVISOR PROCEDURE TRAINING

PROCEDURE NUMBER	TITLE	SIGNATURE/DATE
IPO-001	Plant Startup from Cold Shutdown to Hot Standby	
IPO-002	Plant Startup from Hot Standby to Minimum Load	
IPO-003	Power Operations	
IPO-004	Plant Shutdown from Minimum Load to Hot Standby	
IPO-005	Plant Shutdown from Hot Standby to Cold Shutdown	
IPO-007	Maintaining Hot Standby	
IPO-008	Plant Shutdown from Hot Standby to Cold Shutdown Outside of Control Room	

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ATTACHMENT 2
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SHIFT ADVISOR CLASSROOM TRAINING

Subject	Approximate Classroom Hours
Turbine/generator EHC	6
Steam Generator	2
Reactor Coolant Pump	2
Steam Generator Water Hammer Interlocks	2
Steam Generator Water Level Control	2
Pressurizer Pressure and Level	4
Steam Dump	2
Excore Instruments	4
Incore Instruments	3
Loose Parts Monitoring	1
N-16 Power/Flow	1
RCS Temperature	1
Upgrade Protection Package	2
Rod Control	5
Rod Position Indication and Rod Insertion Limits	3
Subcooled Margin Monitoring	1
Seismic Monitoring	1
Plant Computer	2
Reactor Protection	5
Control Logic	2
Control System Failure Analysis	5
Abnormal Procedures	5
Emergency Operating Procedures	5
Integrated Plant Operating Procedures	4
Technical Specifications	6
Technical Data Book	2
Industry Transients	3
Accident Analysis	3
Increase Heat Removal	2
Decrease Heat Removal	1
Decrease Flow Rate	2
Reactivity Anomalies	2
Decrease Inventory	2
Increase Inventory	1
Radioactive Release	2
ATWT	3
Forced Flow	2
Natural Circulation	2
ERG	7
ECA	2
FRG	5

ATTACHMENT 2
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SHIFT ADVISOR CLASSROOM TRAINING

Subject	Approximate Classroom Hours
Hydrogen Gas	2
Containment Response	2
Radiological Consideration	2
Instrumentation	3
Review	5
Exam	10

ATTACHMENT 3
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COMANCHE PEAK STEAM ELECTRIC STATION

TRAINING SCHEDULE

WEEK 1 SHIFT ADVISOR TRAINING

DAY	DATE	GROUP	GROUP	GROUP	GROUP	GROUP	GROUP	GROUP	GROUP	NOTES
MONDAY		RCP	Steam Generator	SGWLC	Water Hammer Interlocks	EHC	EHC	EHC	Study	
TUESDAY		Steam Dumps	Steam Dumps	Pzr Press/ Level Control	Pzr Press/ Level Control	Excore	Excore	Study	Study	
WEDNESDAY		Incore	Incore	RCS Temp/ N16 PWR/ Flow/Up-grade Pac	RCS Temp/ N16 PWR/ Flow/Up-grade Pac	RCS Temp/ N16 PWR/ Flow/Up grade Pac	LPMS	Seismic Monitor	Study	
THURSDAY		Rod Control	Rod Control	RPI/RIL	RPI/RIL	RPI/RIL	Subcooled Margin Monitor	Plant Computer		
FRIDAY		Study	Study	Exam	Exam					

ATTACHMENT 3
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COMANCHE PEAK STEAM ELECTRIC STATION

TRAINING SCHEDULE

WEEK 2 SHIFT ADVISOR TRAINING

DAY	DATE	GROUP	GROUP	GROUP	GROUP	GROUP	GROUP	GROUP	GROUP	NOTES
MONDAY		RPS	RPS	RPS	IFA	IFA	IFA	IFA	IFA	
TUESDAY		IPO's	IPO's	EOP's	EOP's	EOP's	EOP's	Study	Study	
WEDNESDAY		ABN's	ABN's	ABN's	ABN's	Technical Data Book	Technical Data Book	Study	Study	
THURSDAY		Tech Specs	Tech Specs	Tech Specs	Tech Specs	Tech Specs	Tech Specs	Study	Study	
FRIDAY		Study	Study	Study	Exam	Exam				

ATTACHMENT 3
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COMANCHE PEAK STEAM ELECTRIC STATION

TRAINING SCHEDULE

WEEK 1 SHIFT ADVISOR TRAINING

DAY	DATE	GROUP	GROUP	GROUP	GROUP	GROUP	GROUP	GROUP	GROUP	NOTES
MONDAY		Intro. to Industry Transients	Intro. to Industry Transients	Intro. to Industry Transients	Accident Analysis	Accident Analysis	Accident Analysis	Study	Study	
TUESDAY		Increase Heat Removal	Increase Heat Removal	Decrease Heat Removal	Decrease Flow Rate	Decrease Flow Rate	Reactivity Anomalies	Reactivity Anomalies	Study	
WEDNESDAY		Decrease Inventory	Decrease Inventory	Increase Inventory	Radioactive Release	Radioactive Release	Relatro ATWT	Study	Study	
THURSDAY		ATWT	ATWT	Forced Flow	Natural Circ	Natural Circ	Study	Study	Study	
FRIDAY		ERG's	ERG's	ERG's	ERG's	ERG's	ERG's	Study	Study	

ATTACHMENT 3
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COMANCHE PEAK STEAM ELECTRIC STATION

TRAINING SCHEDULE

WEEK 4 SHIFT ADVISOR TRAINING

DAY	DATE	GROUP	GROUP	GROUP	GROUP	GROUP	GROUP	GROUP	GROUP	NOTES
MONDAY		HOLIDAY	HOLIDAY	HOLIDAY	HOLIDAY	HOLIDAY	HOLIDAY	HOLIDAY	HOLIDAY	
TUESDAY		FRG's	FCA	FCA	FRG	FRG	FRG	FRG	FRG	
WEDNESDAY		Hydrogen Gas	Hydrogen Gas	Contain- ment Response	Contain- ment Response	Radio- logical Consider- ations	Radio- logical Consider- ations	Study	Study	
THURSDAY		Instru- mentation	Instru- mentation	Instru- mentation	Study	Study	Study	Study	Study	
FRIDAY		Study	Study	Exam	Exam	Exam				

ATTACHMENT 4
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COMANCHE PEAK STEAM ELECTRIC STATION
SHIFT ADVISOR ORAL REVIEW AND CERTIFICATION

SHIFT ADVISOR _____

☐ Qualifications confirmed _____ / _____
Operations Superintendent Date

☐ General Training Complete

☐ General Employee Training ☐ Respiratory Protection Training (Optional)

☐ Radiation Worker Training

_____ / _____
Director, Nuclear Training Date

☐ Specialty Training Complete _____ / _____
Director, Nuclear Training Date

☐ Procedure Training Complete _____ / _____
Operations Supervisor Date

☐ Oral Review

☐ Understands responsibilities and authorities (ODA-102)

☐ Understands initial and recurrent training requirements (TRA-299)

Comments (____ Additional comment pages attached:) _____

_____

_____

_____

Certification of Qualifications and Training Completion

_____ / _____ / _____
Signature Title Date

_____ / _____ / _____
Signature Title Date

_____ / _____ / _____
Signature Title Date

Attachment 5

Shift Advisor Examinations
and Examination Results

EXAM KEY

COURSE NAME

SHIFT ADVISOR TRAINING

EXAM 1

Date

MAY 11, 1984

TOTAL POINTS 39.0

SUBMITTED BY : W. E. Short **DATE :** 5/10/84

APPROVED BY : Phillip A. Tuckett **DATE :** 5-10-84

NOT-105-1 Form C Rev. 0

5	MCD (3)	3	Q.	List at least six precautions or limitations referenced in EOS-1.1 for starting a reactor coolant pump.
6	MCD (.5 each)	3	A.	1. Ensure steam bubble in Pzr 2. Starting duty requirements a. Not more than once per 30 minutes b. Three starts maximum in a 2-hour period 3. Seal injection temp less than 130°F 4. If CCW lost, RCP stopped if bearing temp increases to 200°F 5. No more than 6 starts per day throughout life of RCP motor 6. Only one RCP started at any one time 7. Start RCP after oil lift pump operation for 2 minutes; continue oil lift pump for 50 sec after start 8. Min differential pressure of 200 psid across #1 seal 9. Component cooling to RCP's maintained at or below 105°F 10. Various alarms cleared: VCT pressure HI/LO RCP seal leakoff flow high RCP oil reservoir HI/LO RCP standpipe level HI/LO CCW to RCP alarms (several) 11. RCS Pressure > 325 psig

1*	SG (4)	1	Q.	Describe the path of water flowing through the steam generator. List each component the water encounters and the function or purpose of that components. Include the recirculation water flow.
2	SG	1	A.	Water enters through thermal sleeve near the bottom of the SG. Enters the preheater section, flows to the middle of the tube bundle, through flow slots which direct most of the flow up and a little down. The upward flow is forced to crossflow the tubes by the preheater baffles. Boiling occurs when the water leaves the preheater, mixes with recirculated water from other side of tube bundle and flows through tube bundle passing through drilled holes in tube support plates. Exits tube bundle and flows through 12 pipes containing swirlvane moisture separators which force the heavier water out of the steam and return it to the downcomer. The partially dried steam enters the dryer box which consists of many chevron vanes which force the steam to make a torturous path through the dryer box. The moisture cannot make the sudden direction changes and is separated and returned to the downcomer via J-tubes. The steam leaves out the tope of the SG through flow restrictor venturis. The water separated from the moisture separators flows down the annulus region (downcomer) between the tube bundle wrapper plate and the SG shell and flows under the wrapper, across the tube sheet and then up through the flow distribution baffle and into the tube bundle.

9	SGLC (1.5)	5	Q.	List all inputs to the steam generator level control system, including bypass control and feed pump speed control.
10	SGLC	5	A.	Steam Flow Feed Flow Narrow range level Programmed level Auctioneered nuclear power Steam pressure Feed pressure
5	MF (2)	3	Q.	What conditions must be met (or satisfied) before the water hammer permissive circuits will allow the feed isolation valve (FIV) to open? Which valves open with the FIV? Which valves would be closed?
6	MF	3	A.	Flow greater than 2%. (.25) Feed temperature greater than 200° and ΔT in feed line less than 5°. (.5) S/G level above lo-level setpoint. (.25) S/G pressure above minimum setpoint. (.25) FIBV open. (optional) FBTV opens with FIV. (.25) FIBV and FPBV close when FIV opens. (.5)

25*	MT (3)	13	Q.	List all the different fluid circuits of the turbine hydraulic control system. List what each circuit does.
26	MT	13	A.	a. Startup fluid--sequences the HP and LP stop valves opening sequence during startup; or it operates the test valves for the HP and LP stop valves to open then during startup. b. Aux startup fluid--resets the main trip valve and mechanical trips. c. Trip fluid--holds HP and LP stop valves open. Supplies follow-up pistons with fluid pressure. d. Aux trip fluid--holds the main trip valve open. e. Secondary fluid--supplies a variable fluid pressure to the control valves to vary their position. f. Aux secondary fluid--fluid pressure signal supplied to EH convertor from the MHC; or this pressure determines the position of the EH convertor follow-up pistons.
1	SD (1)	1	Q.	Describe the arrangement and number of valves in the steam dump system.
2	SD	1	A.	4 banks of valves with three dump valves per bank.

9	SD (2)	5	Q.	Describe the P-12 interlock in the steam dump system and the reason for it. Can this interlock be blocked or bypassed? When? Why?
10	SD	5	A.	At 553°F Tavg the P-12 interlock will block the steam dump valves from opening (and shut any open valves). This prevents excessive primary plant cooldown with the steam dump. (1) P-12 may be blocked when Tave is below 553°F to allow normal plant cooldown using only 3 of the 12 steam dump valves. (1)
3	INC (2)	2	Q.	With only using 6 incore detectors, we are able to monitor 58 different core subassemblies. Briefly describe how we are able to do this.
4	INC	2	A.	Each detector can be sent through a 5 path transfer device. In the "normal" position of this 5 path device it is sent to its 10 path transfer device. The output of each 10 path can go to 10 different core locations. 6 detectors x 10 paths per detector implies 60 locations (actually 58).

3	SMM (1.5)	2	Q.	a.	What inputs are used in the subcooling margin monitor?
				b.	The subcooling margin is based on what inputs?
4	SMM	2	A.	a.	Wide range pressure (PT-405) Pressurizer pressure (PT-455) Wide range loop RTD's Selected core exit thermocouples
				b.	Highest thermocouple or RTD Lowest pressure
1	PCOM (2)	1	Q.		What are the two types of Trending functions available on the Plant Computer? Give a brief description of each type.
2	PCOM	1	A.		Analog Trend--allows trending of up to 4 points on 2 MCB mounted strip charts. Printer Block Trend--allows trending of a group or block of points on one of the output devices.

25	ROD (3)	13	Q.	List any rod stops or blocks that affect rod control. Include the number of the block, coincidence, setpoint and whether the block is effective in manual, auto or both.
26	ROD	13	A.	a. C1 - IRN 1 high 20% 1/2, blocked manually b. C2 - PRN 1 high 103% 1/4, 1 channel can be blocked c. C3, OTN16, -3% 2/4, Turbine runback d. C4, OPN16, -3% 2/4, Turbine runback e. C5, lo pwr interlock <15% Tur Pimp f. C11, control D only 228 steps g. F & E in auto only
27	ABN (2)	14	Q.	The plant is at 100% power with all control systems in automatic and normal operating plant parameters. The pressurizer pressure control selector switch is in the PT-455/456 position when PT-455 fails high. (ABN-705A) Describe: 1. Automatic control actions that will occur. 2. Effects on the plant (with no operator action). 3. Operator actions which will mitigate this transient.

28	ABN	14	A.	Both spray valves open, variable control heaters receive minimum power and PORV-455 opens. RCS pressure drops rapidly until 2185 psig. At this pressure, channel 458 will send a "CLOSE" signal to PORV-455. Pressure will continue to drop due to sprays. With no operator action, a reactor trip will occur on OTN-16 or low pressurizer pressure and a low pressure SI will occur at 1810 psig. (1.5) Operator response (2 required) (.5) 1. Select position 456/457 on control selector switch. 2. Take manual control of master pressure controller to shut sprays and PORV-455. 3. Shut PORV-455 block valve. 4. Take manual control of individual spray controllers to shut spray valves. 5. Turn on all pressurizer heaters to restore pressure (once PORV and sprays are shut). 6. Run turbine-generator back to reduce steam flow and reactor power (aids in the prevention of DNB condition).

29	ABN (2)	15	Q.	With the plant at 100% power and control rods in AUTO, one power range channel fails HIGH. Describe the AUTOMATIC plant response to this condition (assuming no operator action) and describe what operator actions should be taken. (ABN-703A)
30	ABN	15	A.	Automatic response (1)

1. Rods step in (rate mismatch)
2. Reactor power drops
3. Tave drops
4. Steam pressure drops
5. Pressurizer pressure drops
6. Pressurizer level drops
7. Turbine control valves open to maintain load
8. Tave - Tref mismatch occurs and offsets rate mismatch which causes rods to stop stepping in. (Rods will not step out due to C-2.)

Operator response (1)

1. Rods to manual
2. Restore Tave - Tref
3. Refer to ABN's
4. Refer to Technical Specifications

7	RPI (3)	4	Q.	a.	Why do we have a rod insertion limit?
				b.	What are the inputs used to calculate the Rod Insertion Limits?
				c.	How do we know when we reach our rod insertion limit?
8	RPI	4	A.	a.	1. Minimize ejected rod worth 2. Minimize radial flux peaking (or $F_{\Delta H}$) 3. Maintain adequate shutdown margin
				b.	RIL = K_1 (Tave) + K_2 (N_{16}) + K_3 (not required). Auctioneered High N_{16} and auctioneered High Tave.
				c.	Low-low insertion limit alarm occurs
47	TAA (3.5)	24	Q.	Concerning the overtemperature N-16 reactor trip circuitry:	
				a.	What is the normal trip setpoint?
				b.	What plant parameters are input to the setpoint calculation?
				c.	What protection is provided by this reactor trip?
48	TAA	24	A.	a.	111% + credits - penalties (1)
				b.	Loop Tc Pzr Pressure Delta Flux (.5)
				c.	Protects against exceeding DNB (1)

103	MCD (1.5)	52	Q.	a.	What is subcooling margin? (0.5)
				b.	Calculate the subcooling margin at 50% power assuming normal plant conditions. (1.0)
104	MCD	52	A.	a.	Subcooling margin is the margin that actual RCS temperature is below saturation temperature for RCS pressure.
				b.	At 50% power Tavg = 572.5°F ΔT = 32°F T_H = 572.5°F + 16°F = 588.5°F T_{sat} for Pzr Pressure of 2235 psig = 653°F 653°F - 588.5 = 64.5°F subcooling margin
5	LPMS (1)	3	Q.		Describe the physical process called the piezoelectric effect and how it results in an output signal from an accelerometer in the LPMS.
6	LPMS	3	A.		The piezoelectric effect refers to the electric potential generated by certain crystals when they are subjected to a mechanical deformation. The amount of signal is directly proportional to the amount of deformation, which can be direct mechanical deformation or stress induced deformation due to acoustical waves. The output of the LPMS detector is generated by acoustical wave effects on the detector crystal.

5	SMS (1)	3	Q.	Define "safe shutdown earthquake" and discuss its relationship to the structural design requirements of category I structures.
6	SMS	3	A.	Safe Shutdown Earthquake is that earthquake which is based upon an evaluation of the maximum earthquake potential for a specific area. It is the earthquake which produces the maximum vibratory ground motion for which certain structures, systems and components are designed to remain functional, i.e. category I structures. The structural design of a category I structure is therefore different at different locations around the country.

TRAINING DEPARTMENT USE	
Reviewed by Director, Nuclear Training or Training Supervisor	
INITIALS	DATE 5/30/84

TRAINING SESSION

NOT-104-3 Form B Rev. 0

TO: Training Supervisor

FROM: L. G. Barnes

SUBJECT: Training Session

TOPIC Shift Advisor Upgrade Training (Week 1)

DATE May 7 - 11, 1984 (Actual Wk 1 training week)

CONDUCTED BY Self-Study

DURATION As needed

I. Attendees

David Campbell

II. Material Covered

1. Main Turbine EHC - Reproduce a list of the following EHC fluid systems, state their functions, and briefly describe how they interface with each other.
   a. Startup Fluid
   b. Auxiliary Startup Fluid
   c. Trip Fluid
   d. Auxiliary trip fluid

2. List the inputs to the Subcooled Margin Monitor.

3. Rod Control System - List all interlocks associated with either manual or automatic rod control.

4. RCS Temperature and N-16 Power - Describe how the OTN-16 trip setpoint is calculated, including all parameter inputs.

Larry G. Barnes / Ops. Supv. 5/30/84

David Campbell 5/30/84

Name, Title Date