ENCLOSURE 1

EXAMINATION REPORT

Facility Licensee: Florida Power and Light Company

Facility Name: Turkey Point 3 & 4

Facility Docket Nos. 50-250 and 50-251

Written and oral examinations were administered at Turkey Point near Homestead, Florida.

Chief Examiner: Sandy Lawyer — Date Signed: 7/11/84

Approved by: Bruce A. Wilson, Section Chief — Date Signed: 7/11/84

Summary:

Examinations on April 30 - May 4, 1984

Written and oral examinations were administered to 18 candidates 6 of whom passed.

REPORT DETAILS

1. Persons Examined

SRO Candidates:

Thomas P. Anderson
James J. Ball
Jennifer A. Chase
William G. Haley
Gary E. Hollinger
Winnie R. Jinright, Jr.
Julio C. Balaguero
Richard G. Mende
Daniel J. Tomasewski

RO Candidates:

Michael A. Downs
Jack E. Grant
Gregory D. Keller
David A. Kranz
Thomas McColough
Ronald W. Miller
Milton A. Newton,
Kay A. Lovell

Instructor Certifications

Thomas E. Lightfoot
Kay A. Lovell

Other Facility Employees Contacted:

*C. J. Baker, PTP-Plant Manager-Nuclear
*P. W. Hughes, PTP-Health Physics
*K. L. Jones, PTP-QA
*T. A. Finn, PTP-Oper. Supv-Nuc.
*R. H. Reinhardt, PTP-QC
*R. Gouldy, PTP-Rx Engr.
*P. Roach, PTP-Regulation & Compliance
*D. G. Jackson, PTP-Nuclear Training
*W. C. Miller, PTP-Nuclear Training
*Leo Goebel, PTP-Nuclear Training
*P. J. Baum, PTP-Nuclear Training

*Attended Exit Meeting

2. Examiners:

*L. (Sandy) Lawyer
Art Johnson
John Fehringer
Pete Isaksen
Frank Jagger

*Chief Examiner

3. Examination Review Meeting

At the conclusion of the written examinations, the examiners met with W. C. Miller, Leo Goebel, and P. J. Baum to review the written examination and answer key. The following comments were made by the facility reviewers:

a. SRO Exam

(1) Question 5.09b

Facility Comment: This question asked for the 3 factors that determine how the limiting curves are drawn. The answer stated the following:

TH<Tsat
Subcooling > 0
DNBR> 1.3
Core Exit Quality < 15%

The referenced document was Tech. Specs. A review of Tech Specs failed to reveal this information.

NRC Resolution: The comment was accepted and the question was deleted from the examination.

(2) Question 6.01 a2

Facility Comment: This question asked how axial flux difference f(ΔQ) effected OTΔT and OPΔT. The answer stated that it only effected one of these parameters. f(ΔQ) actually effects OTΔT and OPΔT in the same manner but only if f(ΔQ) exceeds +10 or -14 percent. See Tech. Specs. Page 2.3-2 and 2.3-3. Also, OP 12304.2, Power Range Nuclear Instrumentation Periodic Channel Functional Test on page 7, Steps 8.2.35 and 8.2.38 discuss checking the +10 and -14 percent setpoints to be sure they are within their tolerance limits.

NRC Resolution: The answer key was changed to reflect this comment.

(3) Question 6.06

Facility Comment: The question asked something about the number of low pressure protection features associated with the main feedwater pumps. The accompanying material lists 4.

NRC resolution: The answer key was changed to reflect this comment.

(4) Question 6.12

Facility Comment: The answer states that bus stripping will send a signal to trip the emergency diesel generator breakers. The correct answer should say that main generator lockout will send a signal to trip the emergency diesel generator breakers. See Dwg. 5610-T-L1, Sht. 4A. The bus stripping signal will start the diesels, remove the trip signal generated by main generator lockout, and close the diesel breakers to the buses. See Dwg. 5610-T-L1, Sht. 13.

NRC Resolution: The answer sheet was changed to reflect the referenced information.

(5) Question 7.08

Facility Comment: This question asked for symptoms of a void in the RCS. One of the answers was temperature less than saturation. This is apparently a typographical error. On page 1 of ONOP 1008.10, Response to Void in Reactor Vessel, Step 4.3 states:

> "A rapid RCS cooldown may result in the vessel head temperature being greater than the primary saturation temperature and result in a steam bubble being developed."

NRC Resolution: The typographical error was corrected on the answer sheet.

b. RO Exam

(1) Question 2.01a

Facility Comment: On a downstream steam line break, there is only one safety injection signal that will initiate main steamline isolation. That signal is high steam line flow coincident with low Tavg or low steam generator pressure. See Logic Sheet 5610-T-L1, Sht. 11.

NRC Resolution: The point values were adjusted on the answer sheet to reflect this comment.

(2) Question 2.04a

Faility Comment: The answer stated that after Phase A initiation, RCP seal leakoff is diverted to the PRT by way of a relief valve whose setpoint is 150 psig. While this flow path is possible, it is doubtful that the pressure on the #1 seal leakoff line will get that high. Upon initiation of safety injection and phase A, the charging pumps will trip and seal injection will be RCS flow up through the thermal barrier. Flow through the #1 seal will continue on through the #2 seal where it will leak off to the RCP standpipe and then to the RCDT. As long as this flow path is available, pressure between the #1 seal and the #2 seal should

never reach 150 psig. See Dwg. 5610-T-E-4503, Sht. 1.

NRC Resolution: The comment was accepted as valid. The answer sheet was modified accordingly.

(3) Question 2.04d

Facility Comment: This question asked when you would use the #1 seal bypass line. By our procedure, OP 0202.1 Reactor Startup - Cold Condition to Hot Shutdown Condition, Ste, 8.10.2.2 on Page 17, states:

> "Open #1 seal bypass valve (307) ONLY if #1 seal leakoff temperature or RCP bearing temperature reaches the alarm point."

The same procedure in Step 8.39 on page 25 states:

"When all RCP #1 seal leakoff flows have increased to 1 GPM, or system pressure has increased to 1000 psig, close or verify closed valve 307."

NRC Resolution: The answer sheet was modified to reflect this updated information.

(4) Question 3.04a

Facility Comment: This system has just recently been changed. Now, loss of either 4 KV bus will initiate bus stripping on that bus. See the Undervoltage Mods Training Brief, Page 1.

NRC Resolution: The answer sheet was modified to reflect this updated information.

(5) Question 4.03a

Facility Comment: The test question asked for the "Administrative Radiation Guidelines". At Florida Power & Light Co., when we talk about the NRC radiation requirements we refer to them as "NRC limits". When we talk about the FP&L radiation requirements we refer to them as Administrative "Guidelines". Because the question asked for "Administrative Radiation Guidelines", I would have to assume you meant the FP&L Guidelines. The answer was for the "NRC limits" instead of the "Administrative Guidelines" you asked for. See the Personnel Exposure Control Section of HP Procedure OP 11500 Section 6 begining on Page 22.

NRC resolution: The answer sheet was modified accordingly.

4. Post Examination Grading Review

The Following questions were deleted during review of the graded examinations: 1.01, 103d, 5.04a&b and 7.04.

5. Examination Results Meeting in Atlanta.

a. Subjects Discussed

(1) FP&L presented their current plans for training program improvements in the areas of training management, candidate screening and training materials. Historical perspective was provided by a presentation entitled "Description of Turkey Point Hot License Candidate Training Program." A copy of the handouts used by FP&L during this presentation is attached. Comments on the examinations were presented by FP&L, responded to by the NRC staff, and discussed by the group.

(2) FP&L outlined their current plans for a remedial training program to begin July 2, 1984. The meeting concluded with a discussion of the proper method of examining and returning to licensed duties those SRO candidates who recently failed sections 6 and/or 7 of the written examination.

b. Meeting Attendance

(1) FP&L

K. Harris - Vice-President, Turkey Point Nuclear Plant
W. Miller - Training Supervisor, Nuclear
T. Finn - Operations Supervisor, Nuclear
C. Baker - Plant Manager, Nuclear

(2) Nuclear Regulatory Commission

A. Gibson
B. Wilson
A. Johnson
S. Lawyer
H. Dance
S. Elrod
K. Jenison

ATTACHMENT

DESCRIPTION

OF

TURKEY POINT PLANT

HOT LICENSE

CANDIDATE TRAINING PROGRAM

*HLCTP/860/8010/#

TABLE OF CONTENTS

EXECUTIVE

SUMMARY

EXECUTIVE SUMMARY

This document describes the Turkey Point Plant Hot License Candidate Training Program and the qualifications of the instructors utilized in implementing the program. As NRC requirements increased, the program was modified to meet the needs of the candidates. The present length of the program is eighteen months.

The description of the program lists the major topics or areas of study and gives the duration of each major area in terms of weeks spent on those topics. The program meets or exceeds all the requirements of an approved training program. During the program, the student's progress is closely monitored. If a student is unable to meet the minimum entry requirements or is unable to maintain a satisfactory knowledge level, he or she is dropped from the program. The attrition history of the Group IX Hot License Candidate Program is included in the document to show that the instructors were cognizant of the candidates performances in order to maintain minimum qualification standards.

The instructor qualification portion of this document gives a resume of the instructors utilized during the Group IX Hot License Candidate Program. All the instructors were highly qualified to teach their portions of the program.

The last section of this document shows the success rates of the Turkey Point Training Programs over the last ten years. During that period Turkey Point had a 88.6% successful first attempt pass rate and a 100% successful second attempt pass rate.

It is the conclusion of the Training Department that the Hot License Training Program has been well structured and implemented by competent instructors. It should be noted that Sandy Lawyer, the Lead NRC Examiner for Group IX, commented and then reiterated that no generic weaknesses were found during the Group IX oral evaluations.

DESCRIPTION

OF

TURKEY POINT PLANT

HOT LICENSE

CANDIDATE TRAINING PROGRAM

*HLCTP/860/8010/#

DESCRIPTION OF TURKEY POINT PLANT
HOT LICENSE CANDIDATE TRAINING PROGRAM

The Group IX Hot License Candidate Training Program began on November 1, 1982 and finished on April 27, 1984. The course duration was 18 months. The course curriculum was as follows:

I. Nuclear Power Plant Fundamentals - 14 weeks
   1. Fundamental Mathematics
   2. Reactor Theory
   3. Radiation Control
   4. Fundamentals of Heat Transfer, Thermodynamics and Fluid Flow
   5. Chemistry and Materials Science

II. Plant Systems - 34 weeks
   1. Water Treatment Plant and Intake Area
      a. Classroom Instruction
      b. On-shift observation and evaluations
   2. Secondary Systems
      a. Classroom Instruction
      b. On-shift observation and evaluations
   3. Primary Systems
      a. Classroom Instruction
      b. On-shift observation and evaluations
   4. Additional Associated Topics
      a. Rod Control System
      b. Incore and Excore Instrumentation
      c. Electrical Systems and Emergency Diesels
      d. Reactor Protection, Safeguards, Bus Stripping and Sequencer
      e. Process and Area Radiation Monitors
      f. Reactor Coolant Pumps
      g. Level and Pressure Programs
      h. Transient Analysis
      i. Mitigating Core Damage and Pressurized Thermal Shock
      j. Procedures - Admin., Operations, Off-Normal and Emergency
      k. Technical Specifications
      l. Licensee Event Reports

III. Operating Practice - 15 weeks (minimum)
   1. Control Room Operating Experience
      a. Learn Control Room layout
      b. Manipulate controls under direct supervision of licensed operator
      c. Perform daily periodic checks and tests
      d. Write plant clearances
      e. Participate in refuelings (when possible)
      f. Utilize procedures and Tech Specs

DESCRIPTION OF TURKEY POINT PLANT
HOT LICENSE CANDIDATE TRAINING PROGRAM
(Cont'd)

2. Simulator Training
   a. Reactor Startup training
   b. Prediction of instrument response
   c. Utilization of procedures
   d. Handle minor malfunctions
   e. Reactor Startup Certification
   f. Handling major malfunctions

IV. Pre-NRC License Examination Review - 5 weeks
   1. Review of above listed topics

V. Pre-NRC License Examinations - 1 week
   1. Four section NRC type written exam
   2. NRC type oral evaluation

Determination of an individual's ability to sit for the NRC exam was dependent on his or her successful completion of the course described above.

INSTRUCTOR QUALIFICATIONS

NAME: Paul J. Baum

TITLE: Operations Training Supervisor

TOPICS TAUGHT GROUP IX

Math Refresher
Reactor Theory
Heat Transfer and Fluid Flow
Instruments and Controls
Safety and Emergency Systems
Procedures - Administrative, Normal, Off-Normal
Technical Specifications
Plant Changes/Modifications
Operating Feedback
Startup Certification Program

LICENSES HELD:

Reactor Operator License
OP-5618 - September 3, 1984
Senior Reactor Operator License
SOP-4251-1 - March 25, 1984

EDUCATION:

Formal - Bachelor of Science - Mechanical Engineering
Florida International University
December 1977

Technical - NUS Instructor Workshop - April 1980
Duration: 4 days

Pacific Pump Advanced Centrifugal Pump Seminar - 1980
Duration: 5 days

Florida Power & Light Co. Hot License Training Program Group VII - September 1981

Criterion Referenced Instructor Courses:
1. Advanced Technology - 5 days
2. Resource Systems International - 2 days

FP&L O.D.T., Train the Trainer
Duration: 3 days

FP&L O.D.T., MAP-LS
Duration: 3 days

EXPERIENCE: Ten years in the Nuclear Training Department

Researched and drew Secondary System Training Drawings

EXPERIENCE (Cont'd.)

Non-licensed Operator Instructor

New Employee Orientation

Taught Math and Basic Reactor Theory to Group VII Hot License Class

Assistant Instructor and Subsequently Lead Instructor for Group VIII Hot License Class

Lead Instructor for Group IX Hot License Class and SRO Upgrade Class

Simulator Instructor
1. Group VIII and IX Start Up Certification Training
2. Requal Simulator Training

NAME: Leo Goebel

TITLE: Nuclear Training Instructor

TOPICS TAUGHT:
GROUP IX

Reactor Theory
Instruments and Controls
Safety and Emergency Systems
Procedures - Normal, Off-Normal and Emergency
Technical Specifications
Plant Changes/Modifications
Startup Certification Program

LICENSES HELD:

Reactor Operator License
OP-5209 - April 14, 1980
Senior Reactor Operator License
SOP-4254-1 - May 1, 1984

EDUCATION:

Formal - Associate of Arts Degree
Miami-Dade Community College - July 1980

Technical - Florida Power & Light Co.
Hot License Training Program - April 1980

Criterion Referenced Instructor Courses
1. Advanced Technology - 5 days
2. Mager & Associates - 15 days

EXPERIENCE:

Non-Licensed and Licensed Operator - 8 years

Nuclear Training Department Staff - 2 years
1. Instructor for Group VIII
2. Instructor for Group IX
3. Instructor for SRO Upgrade Class
4. Licensed Requal Instructor
5. Simulator Instructor
   a. Licensed Operator Requal
   b. Start-up Certification Training for Groups VIII and IX

NAME: William C. Miller

TITLE: Training Supervisor

TOPICS TAUGHT: Mitigating Core Damage
GROUP IX Pressurized Thermal Shock

LICENSES HELD: SOP-2334-4
November 29, 1982

EDUCATION:

Formal - Bachelor of Science - Mechanical Engineering
University of Miami, June 1977

Technical - Florida Power & Light Co. Hot License Training Program Group IV, November 1974
Duration: 9 months

Westinghouse Hot License Simulator Certification Program
Zion Simulator - September 1974
Duration: 7 days

Northwestern University - Safety of Light Water Cooled Nuclear Power Plants - September 1977
Duration: 5 days

General Physics
Mitigating Reactor Core Damage
November 1980
Duration: 3 days

Westinghouse
Mitigating Core Damage Course
Diablo Canyon - July 1981
Duration: 5 days

Criterion Referenced Instructor Courses
1. Advanced Technology - 5 days
2. Resource Systems International - 2 days
3. Mager & Associates - 15 days

EXPERIENCE:

Lead Instructor
1. Group V PTP Hot License Candidates Program
2. SRO Upgrade Class - November 1977
3. SRO Upgrade Class - March 1982
4. 1979-80 Requal Program
5. 1980-81 Requal Program

EXPERIENCE (Cont'd.)

Simulator Instructor
1. Licensed Operator Requal
2. Start-up Certification Training for Groups VIII & IX

Training Supervisor since August 1982.

NAME: Robert L. Coleman

TITLE Senior Training Instructor

TOPICS TAUGHT: Secondary Systems
GROUP IX

LICENSES HELD Saxton Training Reactor - 1968
Senior Reactor Operator License (cold)
SOP-1614-8 - February 14, 1984

EDUCATION:

Formal - Two years of college courses

Technical - Westinghouse Operator Training Program

Westinghouse Equipment Design, Penn Center

K.T. Course presented by Kepner Tregoe

Criterion Referenced Instructor Courses
1. Advanced Technology - 5 days
2. Mager & Associates - 15 days

EXPERIENCE: Thirty-seven years operating experience as a licensed and non-licensed operator

Nuclear Watch Engineer - March 1970

Plant Supervisor - Nuclear - April 1973

Assigned to Nuclear Training Department - February 1974

Turbine Operator Training Instructor

First Aid and CPR Instructor

Advanced Fire Training Instructor

Requal Simulator Instructor

Requal Lecture Instructor

NAME: Tom Lightfoct

TITLE: Nuclear Operator Training Instructor

TOPICS TAUGHT GROUP IX Primary Systems

EDUCATION:

Formal - Bachelor of Science - Mechanical Engineering
Florida International University
March 1980

Technical - NUS Instructor Workshop - October 1980
Duration: 4 days

Fire Protection Systems
Contractor License - 1981

Criterion Referenced Instructor Courses
1. Advanced Technology - 5 days

FP&L O.D.T., Train the Trainer
Duration: 3 days

FP&L O.D.T., MAP-LS
Duration: 3 days

FP&L O.D.T., Management Contact Transactional Analysis
Duration: 3 days

EXPERIENCE: Non-Licensed Operator - 3 years

Nuclear Training Department Staff - 3.5 years
1. Developed Nuclear Operatof Training Program
2. Nuclear Operator Training Instructor
3. Fire Brigade Training Instructor
4. Developed Heat Tracing Lesson Material
5. Licensed Requal Instructor - Specific Topics
6. Primary System Instructor for Group IX

NAME: Greg Casto

TITLE: Emergency Planning Coordinator

TOPICS TAUGHT: Emergency Plan and Emergency Plan Procedures
GROUP IX

EDUCATION:

Formal -

39 credit hours toward a Masters in Business Administration from the University of Miami

Bachelor of Science in Biology with concentration in Health Physics from Virginia Polytechnic Institute and State University

Technical -

Harvard School of Medicine
Emergency Preparedness Coordination and Protocol - June 1983
Duration: 1 week

Northwestern University Emergency Preparedness Seminar - September 1983
Duration: 4 days

INPO Emergency Preparedness Training Seminar - October 1983
Duration: 2 days

Battelle Laboratories Emergency Preparedness Workshop - January 1984
Duration: 1 week

EXPERIENCE:

Consulting Health Physics Technician - 4 years
1. Outage Coordinator at PWR's and BWR's
2. Health Physics Senior Technician

FP&L Health Physics Technician for 2 years

Acting Assistant Radiation Waste Specialist assigned to General Office for 7 months

Emergency Planning Coordinator for over 1 year
1. Rewrite Emergency Plan Procedures
2. Organize Emergency Preparedness Exercises
3. Training On-site personnel and Off-site agencies in Emergency Preparedness Functions

ATTRITION HISTORY

OF

GROUP IX

ATTRITION HISTORY OF GROUP IX

1.	Number of bargaining unit members who bid RCO candidate job:	40
2.	Number of bargaining unit members that bid jobs who met minimum requirements:	31
3.	Number of bargaining unit members who passed the independently administered screening exam:	7
4.	Attrition (in percent) due to inability to pass screening exam:	77.4%
5.	Number of bargaining unit members who passed the screening exam that were admitted to program:	6
6.	Number of non-bargaining unit members who bid RCO candidate job:	
	(a) FP&L employees:	21
	(b) Non-FP&L employees:	2
7.	Number of non-bargaining unit members who passed the screening exam:	
	(a) FP&L employees:	14
	(b) Non-FP&L employees:	2
8.	Number of non-bargaining unit members who passed the screening exam that were admitted to program:	5
9.	Number of potential instant SRO candidates admitted to program based on their formal education and experience:	5
10.	Number of individuals failing to complete the program:	
	(a) Left for personal reasons:	1
	(b) Dropped due to academic deficiencies:	3
11.	Attrition (in percent) from the program:	25%

NRC EXAM SUCCESS RATES

OF PREVIOUS

TURKEY POINT

LICENSE CANDIDATE CLASSES

NRC EXAM SUCCESS RATES OF PREVIOUS TURKEY POINT LICENSE CANDIDATE CLASSES

1.	Group IV License Candidates	
a.	Number of candidates	12
b.	Number successful first attempt	10
c.	Number successful second attempt	2
d.	Total successful	12
e.	Date examined:	November 1974
f.	Lead Instructor:	Ken Beatty
2.	SRO Upgrade Class	
a.	Number of candidates	6
b.	Number successful first attempt	6
c.	Number successful second attempt	-
d.	Total successful	6
e.	Date examined:	February 1975
f.	Lead Instructor:	Ken Beatty
3.	Group V License Candidates	
a.	Number of candidates	11
b.	Number successful first attempt	11
c.	Number successful second attempt	-
d.	Total successful:	11
e.	Date examined:	April 1977
f.	Lead Instructor:	Bill Miller
4.	SRO Upgrade Class	
a.	Number of candidates	5
b.	Number successful first attempt	5
c.	Number successful second attempt	-
d.	Total successful	5
e.	Date examined:	November 1977
f.	Lead Instructor:	Bill Miller
5.	Group VI License Candidates	
a.	Number of candidates	5
b.	Number successful first attempt	5
c.	Number successful second attempt	-
d.	Total successful	5
e.	Date examined:	April 1980
f.	Lead Instructor:	Bob Dodson

NRC Exam Success Rates (Cont'd.)

6. Group VII License Candidates

a.	Number of candidates	11
b.	Number successful first attempt	9
c.	Number successful second attempt	2
d.	Total successful	11
e.	Date examined:	August 1981
f.	Lead Instructor:	Bill Miller (first half) John Haerle (second half)

7. SRO Upgrade Class

a.	Number of candidates	10
b.	Number successful first attempt	10
c.	Number successful second attempt	-
d.	Total successful	10
e.	Date examined:	March 1982
f.	Lead Instructor:	Bill Miller

8. Group VIII License Candidates

a.	Number of candidates	10
b.	Number successful first attempt	6
c.	Number successful second attempt	4
d.	Total successful	10
e.	Date examined:	May 1983
f.	Lead Instructor:	John Haerle (first half) Paul Baum (second half)

Total License Candidates during period of November 1974 to May 1983:

a.	Number of candidates	70
b.	Number successful first attempt	62
c.	Number successful second attempt	8
d.	Total successful	70

ENCLOSURE 3

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

FACILITY: _IUBLEY_EDIWI_3&4_____

REACTOR TYPE: _EWB=WEC3_____

DATE ADMINISTERED: _84/09/30_____

EXAMINER: _JACOBS,_E._____

APPLICANT: ~~MASTER COPY~~

INSTRUCTIONS_TO_APPLICANT:

Use separate paper for the answers. Write answers on one side only. Staple question sheet on top of the answer sheets. Points for each question are indicated in parentheses after the question. The passing grade requires at least 70% in each category and a final grade of at least 80%. Examination papers will be picked up six (6) hours after the examination starts.

CATEGORY VALUE	% OF TOTAL	APPLICANT'S SCORE	% OF CATEGORY VALUE	CATEGORY	
~~25.00~~ 22.25	~~25.00~~ 22.25			5.	THEORY OF NUCLEAR POWER PLANT OPERATION, FLUIDS, AND THERMODYNAMICS
25.00	25.00			6.	PLANT SYSTEMS DESIGN, CONTROL, AND INSTRUMENTATION
~~25.00~~ 23.00	~~25.00~~ 23.00			7.	PROCEDURES - NORMAL, ABNORMAL, EMERGENCY AND RADIOLOGICAL CONTROL
25.00	25.00			8.	ADMINISTRATIVE PROCEDURES, CONDITIONS, AND LIMITATIONS
95.25 ~~100.00~~	95.25 ~~100.00~~				TOTALS

FINAL GRADE _____%

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

_____
APPLICANT'S SIGNATURE

QUESTION 5.01 (2.00)

a. During an approach to criticality with an initial count rate of 20 cps, bank C rods are withdrawn to a count rate of 40 cps. What will be the effect on reactor power of adding the same amount of reactivity again? Briefly explain your answer. State any assumptions. (1.0)

b. With an initial power level of 10%, reactivity is added to raise power to 20%. If the same amount of reactivity is added again, what will be the final power? Briefly explain your answer. (1.0)

QUESTION 5.02 (3.00)

For each of the following, choose the situation in which INDIVIDUAL rod worth will be greater. Briefly explain your answer.

a. Tavg equal to 150 F OR 500 F. INTEGRAL WORTH.

b. Early in core life OR late in core life. INTEGRAL WORTH at 185 steps.

c. At 180 steps OR 215 steps on Bank D. DIFFERENTIAL WORTH.

d. For an assembly next to a rodded assembly in which the rod is withdrawn OR inserted. DIFFERENTIAL WORTH. (3.0)

QUESTION 5.03 (1.50)

a. Explain how the INCREASE in reactor power from 10% to 100% effects equilibrium Samarium. (0.5)

b. Explain how the DECREASE in reactor power from 10% to 100cps effects Samarium concentration. (0.5)

c. Assume a reactor trip from 100% power with equilibrium Xenon and Samarium.

Would the reactivity effect of Samarium concentration CHANGES be MORE NEGATIVE or LESS NEGATIVE than the reactivity effect of Xenon concentration CHANGES from immediately after the trip until:

1. 10 hours after the trip.
2. 30 hours after the trip. (0.5)

QUESTION 5.04 (2.00) DELETED

a. How AND why does the Doppler Power Coefficient change as reactor power is increased? (1.0)

b. How do the following affect the Doppler Power Coefficient? (More negative, less negative, or no effect)

1. Accumulation of Xenon and Krypton gases in the fuel to clad gap.

2. Increase in the amount of fuel to clad contact. (1.0)

QUESTION 5.05 (2.00)

a. How (more or less negative) AND why does the Moderator Temperature Coefficient (MTC) change as temperature is increased at a constant boron concentration, in an undermoderated core? (1.0)

b. How AND why does MTC change as boron concentration is increased at a constant temperature, in an undermoderated core? (1.0)

QUESTION 5.06 (2.50)

a. Define Axial Flux Difference. (0.5)

b. How does Axial Flux Difference change as core ages? (0.5)

c. Assume the reactor is operating at 100% full power, all rods out, near end of cycle. Without moving rods, power is lowered to 50% by boratins. How AND why will Axial Flux Difference change? (1.5)

QUESTION 5.07 (2.50)

a. Define the term 'Shutdown Margin'. (0.5)

b. The reactor is at 70% power with rod control in automatic. Power level is increased to 80%. What happens to Shutdown Margin immediately following the power change? Five hours after the transient? Thirty hours after the transient? Explain each answer. (Assume sufficient rod worth to accomodate the change) (1.5)

c. Would your answer to part 'b' (immediately after the power change) be any different if the operator had adjusted boron concentration for the power change? Explain. (0.5)

QUESTION 5.08 (2.00)

How is THERMAL efficiency in the secondary system affected (increase, decrease, or no affect) by an INCREASE in the following. NO EXPLANATION REQUIRED.

a. Steam generator pressure.

b. Condenser PRESSURE.

c. Condensate depression.

d. Number of feed heaters.

e. Turbine power. (2.0)

QUESTION 5.09 (2.00)

a. What 3 parameters are compared on the Reactor Core Safety Limit Curves? (0.75)

~~b. What are the 3 factors that determine how the limiting curves are drawn?~~ DELETED ~~(0.75)~~

c. Sketch and label the axes for the Reactor Core Safety Limit Curve for normal operating pressure. (0.5)

QUESTION 5.10 (2.50)

Answer the following questions (a-e) using the attached Figure 5.1. (Remove the figure and include with answer sheets).

a. Indicate, on the figure, where the onset of nucleate boiling occurs.

b. Indicate, on the figure, where the core operates at 100% unit load.

c. Indicate, on the figure, where the Technical Specifications limit for Departure from Nucleate Boiling Ratio (DNBR) is located.

d. Indicate, on the figure, where Departure from Nucleate Boiling (DNB) occurs.

e. EXPLAIN why even though film boiling is occurring the curve indicates that heat transfer has improved in the area marked 'e'. (2.5)

QUESTION 5.11 (1.00)

A centrifugal pump is equipped with a variable speed motor. The pump is initially producing 50 psi discharge pressure, 180 gpm, and consuming 2 kw of electricity. The speed is increased to raise capacity to 400 gpm. What is the final discharge pressure AND electrical consumption? SHOW CALCULATIONS (1.0)

QUESTION 5.12 (2.00)

a. At what axial location in a PWR core is the critical heat flux at the MINIMUM? (0.5)

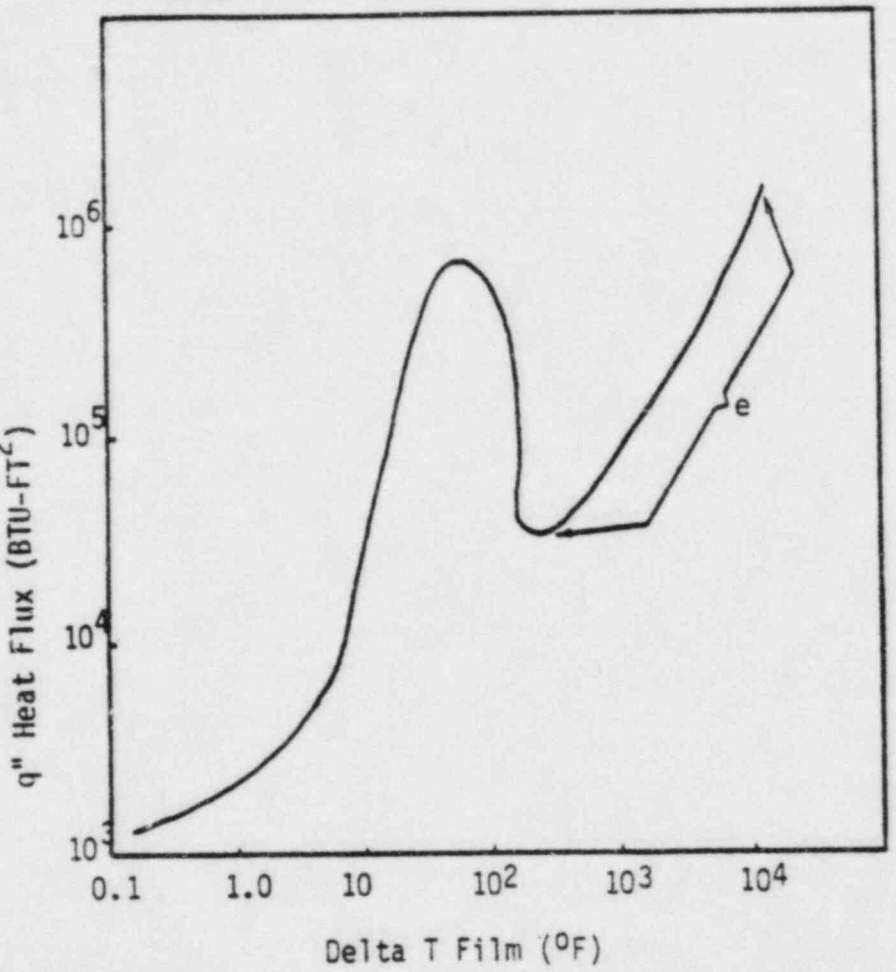
b. How does the minimum critical heat flux change (increase, decrease, or no change) as the following are increased? Consider each separately.

1. Tave
2. Rcs pressure
3. RCS flow
4. Reactor power (1.0)

c. The following parameters associated with a fuel rod in a PWR core reach maximum values at different AXIAL locations in the core. Arrange the following in order (beginning at the top of the core) where the MAXIMUM VALUE is nearest the top of the core.

Ts, clad - clad surface temperature
Ts, fuel - fuel surface temperature
Tb, - bulk reactor coolant temperature
Tc, - fuel centerline temperature (0.5)

Figure 5.1


10^6
10^5
10^4
10^3
q" Heat Flux (BTU-FT^2)
e
0.1
1.0
10
10^2
10^3
10^4
Delta T Film (^{o}F)

QUESTION 6.01 (3.00)

a. Indicate whether the OTdT AND OPdT setpoints will INCREASE, DECREASE, or REMAIN THE SAME if the following operating parameter changes occur. Consider each change independently.

1. Pressurizer pressure is increased 100 psig.
2. Power range N-41 lower detector fails high.
3. Tavg is less than full load Tavg with reactor at 100%. (1.5)

b. Indicate whether the following statements are true for OTdT, OPdt, or both OTdT and OPdT protection instruments.

1. Protects the core from DNB.
2. Protects the core from overpower (kw/ft).
3. Backup for the high neutron flux trip.
4. Circuitry includes dynamic compensation for piping delays to the loop temperature detectors.
5. Requires pressure to be within the high and low pressure reactor trip setpoints to be valid. (1.5)

QUESTION 6.02 (2.50)

Provide a sketch of the power supplies to Nuclear Instrument Cabinet I. Begin at the 480V MCC. Include component numbers where applicable. (2.5)

QUESTION 6.03 (2.00)

a. Explain what is meant when the pressurizer pressure controller is described as a 'proportional plus rate plus reset' controller. (1.2)

b. How AND why is pressurizer level used in the pressurizer pressure control system? (0.8)

QUESTION 6.04 (2.00)

a. What type of detector is used in the following radiation monitoring channels?

1. R 3(4)-11
2. R 3(4)-12 (0.5)

b. Provide a brief sketch of the sample flow path through the R-11 and R-12 monitor system. Include major components. (1.0)

c. How is particulate removed from the sample stream in the R-12 monitor system? (0.5)

QUESTION 6.05 (2.50)

a. Provide a drawing showing the steam supplies to the Auxiliary Feed Pump turbines. (1.0)

b. To which steam supply train is Auxiliary Steam supplied to the Auxiliary Feed Pump turbines? (0.5)

c. State the conditions that will open the Motor Operated Valves to allow steam to the Auxiliary Feed Pump turbines. (1.0)

QUESTION 6.06 (1.50)

a. What are the power supplies to the Steam Generator Main Feed Pumps? Include bus and voltage. (0.5)

b. List 4 means by which the Main Feed Pumps are protected against low suction pressure? (1.0)

QUESTION 6.07 (2.00)

a. What is the purpose of the Containment Purge System? (0.4)

b. What actions occur within the Containment Purge System upon receipt of a high activity signal from R-11 &/or R-12 radiation monitors? (1.0)

c. List 3 of the 4 other signals that will initiate the actions in (b) above. (0.6)

QUESTION 6.08 (2.00)

a. List 6 penetrations (in addition to the VCT outlet) to the 4" charging pump suction line. Do not include instrument sensing lines. (1.0)

b. State the interlocks that must be satisfied to OPEN the CVCS orifice isolation valves. (1.0)

QUESTION 6.09 (2.00)

a. List the 3 design bases for programming the Steam Generator water level. (1.0)

b. What conditions will cause the following to CLOSE automatically?

1. Feedwater Regulating Valves (FWRV).
2. FWRV bypass valves. (1.0)

QUESTION 6.10 (2.00)

Match the Rod Control System failures in Column A to the type of failure in Column B. Consider each failure independently. Place responses on your answer paper. More than one response may be required.

COLUMN A	COLUMN B
1. Pulser failure	a. Logic cabinet non-urgent failure
2. Slave cycler failure	b. Power cabinet non-urgent failure
3. Loose circuit card(s)	c. Logic cabinet urgent failure
4. Regulation failure	d. Power cabinet urgent failure
5. Phase failure	
6. Multiplexing error	
7. -16.5 VDC Power supply failure	
8. -24 VDC Power supply failure	
9. +100 VDC Power supply failure	

(2.0)

QUESTION 6.11 (1.50)

With the Emergency Diesel Generator (EDG) operating on a bus in parallel with the system. Describe how you could verify that the EDG is operating in the LEAD or in the LAG by using the Voltage Adjust Switch. (1.5)

QUESTION 6.12 (2.00)

List 5 of the 8 actions that are performed by the Bus Stripping Relays in the event of a loss of off-site power. NOTE--Do not list breakers separately. (2.0)

QUESTION 7.01 (1.50)

a. Operating Procedure 0202.1 states that the Steam Generator temperature can not be greater than Reactor Coolant System temperature by a maximum amount. State that maximum temperature difference. (0.5)

b. After starting a Reactor Coolant Pump, when will the oil pressure permissive light come on? Be specific. (1.0)

QUESTION 7.02 (2.00)

Fill in the blanks for the following statements taken from Operating Procedure 0202.1. Place answers on your answer paper.

a. The maximum RCS heatup rate is _____F/hr.

b. The maximum pressurizer heatup rate is administratively controlled at _____F/hr.

c. Temperature difference between pressurizer spray water and the water inside the pressurizer is limited to _____F.

d. RCS Oxygen level must be 0.1 ppm or less before RCS temperature can be raised above _____F.

e. If the RHR isolation valves are open, RCS temperature and pressure shall not exceed _____F and _____psig respectively. (2.0)

QUESTION 7.03 (2.00)

a. State the RTndt for each unit. (0.5)

b. What are the minimum and maximum RCS temperatures when the reactor is in the cold shutdown condition with the reactor vessel head bolted down? (0.5)

c. Briefly describe how purification of the RCS is accomplished when the reactor is in the cold shutdown condition. (1.0)

QUESTION 7.04 (2.00) DELETED

Fill in the blanks. Place answers on your answer paper.

a. The approximate load at which the second Steam Generator Main Feed Pump is placed in service is _____MWE.

b. The first procedure hold for 1st stage metal temperature is approximately _____MWE.

c. Steam Generator chemistry must be within specifications prior to exceeding _____% power.

d. The Unit Startup Transformers must be in service prior to exceeding _____% power.

e. If Moderator Temperature Coefficient is greater than 0 dk/k/ F, reactor power must not be increased above _____% power. ~~(2.0)~~

QUESTION 7.05 (3.00)

a. List the Immediate Operator Actions in descending order of preference that must be performed when a reactor trip is called for but the trip breakers have not opened and the RCCA's are not fully inserted. (1.5)

b. State ALL the approvals required for reactor restart under the following conditions.

1. Cause of the reactor trip is known and corrected with no safety considerations.

2. Cause of the reactor trip is unknown. (1.5)

QUESTION 7.06 (2.00)

a. What criteria must be met before a Safety Injection may be deemed spurious and may be reset? (1.0)

b. State the Safety Injection reinitiation criteria following termination of the spurious Safety Injection. (1.0)

QUESTION 7.07 (2.00)

a. Prior to a reactor startup with normal operating temperature and pressure the following RCS leakages exist. For each leak rate below, indicate if you would STARTUP or REMAIN SHUTDOWN.

1. 0.5 GPM from a cracked weld on a narrow range temperature instrument manifold.

2. 1.0 GPM from a manual valve packing gland.

3. 0.4 GPM tube leakage on one Steam generator.

4. Leak from an unknown source of 1.2 GPM. (1.0)

b. For the following combinations of leakage, state if you would be allowed to startup.

Leakage from an unknown source = 0.7 GPM, Steam Generator tube leakage (total) = 0.3 GPM, Pressurizer safety valve leakage = 3.1 GPM, various valve packing leaks = 5.2 GPM. (1.0)

QUESTION 7.08 (1.50)

a. List 3 of the 4 symptoms of the existence of a void in the Reactor Coolant System. (0.75)

b. List 3 of the 5 criteria for the termination of a reactor vessel vent operation. (0.75)

QUESTION 7.09 (2.00)

a. During Emergency Plan activation, what is the order of succession for the Emergency Coordinator? (1.0)

b. What actions (responsibilities) may the Emergency Coordinator NOT delegate? (1.0)

QUESTION 7.10 (2.00)

a. Who (by job title) is designated as Interim Team Leader for the First Aid/Decontamination Team? Radiation Team? (0.5)

b. Who (by job title) is designated as Team Leader for the Recovery and Restoration Team? Fire Team? (0.5)

c. What Emergency Classifications require activation of the Operational Support Center? (0.25)

d. State the location of the following Emergency Facilities.

1. Interim Emergency Operations Facility
2. Technical Support Center
3. Operational Support Center (0.75)

QUESTION 7.11 (2.00)

a. Define (by dose rate) the following areas.

1. Radiation Area.

2. High Radiation Area.

3. Locked High Radiation Area.

4. Contaminated Area. (2.0)

QUESTION 7.12 (3.00)

Match the description or phrase in column B which best depicts or describes the item in column A.

COLUMN A	COLUMN B
a. N-16 Gamma	1. 1/10 value layer = 8" lead.
b. Beta radiation	2. Administrative exposure limit.
c. Cobalt 60	3. Maximum exposure limit.
d. Alpha radiation	4. Major source of radiation in containment at power.
e. 2150 mrem/qtr	5. Short lived isotope.
	6. May dictate the need for eye protection.
	7. Major source of radiation in containment after shutdown.
	8. Should not be a problem unless fuel clad is breached.

(3.0)

QUESTION 8.01 (2.00)

a. How many PORV's must be in service per Technical Specifications while a unit is in cold shutdown condition? (0.5)

b. What is the temperature below which these PORV's must be in service? (0.5)

c. What 2 transients are specifically addressed in the basis for the Technical Specification referenced in 'a' above? (1.0)

QUESTION 8.02 (2.00)

a. State the 3 provisions listed in Technical Specifications that must be adhered to when making temporary changes (OTSC) to Operating Procedures. (1.5)

b. What additional approval is required if the OTSC involves a change in the intent of the procedure? (0.5)

QUESTION 8.03 (2.00)

a. Who (by job title) may authorize clearances to perform maintenance on equipment? Two required. (0.5)

b. True or False
If the requirements of Admin. Procedure 0103.4 are met, granting of a clearance indicates that the equipment has been tested to prove that it is de-energized, grounded, drained, or depressurized. (0.5)

c. List the 4 conditions required prior to authorizing a 'Partial Release' of a clearance. (1.0)

QUESTION 8.04 (2.00)

a. State the minimum number of RO and SRO licenses required by Technical Specifications when one unit is operating at 100% and the other unit is in a refueling mode. (0.6)

b. What is the minimum number of fire brigade members required by Technical Specifications to be onsite at all times? (0.4)

c. What are the Technical Specification restrictions on using shift crew personnel for fire brigade membership? (1.0)

QUESTION 8.05 (2.00)

Under what 4 conditions will an Estimated Critical Condition NOT have to be performed following a reactor trip at EOL? (2.0)

QUESTION 8.06 (2.00)

By Technical Specification when is Containment Integrity defined to exist? Five conditions required. (2.0)

QUESTION 8.07 (2.00)

a. State the primary and alternate methods used for notifying the NRC Operations Center (NRCOC) of a Significant Event. (0.4)

b. State if the following will require 1 hour notification to the NRCOC.

1. Initiation of any nuclear plant shutdown as required by Technical Specifications.

2. Failure of any safety related system to function correctly due to improper settings on automatic protective devices.

3. Discovered inoperablity of primary NRCOC notification method.

4. Declaration of an Unusual Event. (1.6)

QUESTION 8.08 (2.00)

Recent incidents involving the "C" busses at Turkey Point Units 3 & 4 have caused problems.

a. Describe 3 changes that have been made to alleviate these problems. (1.5)

b. What will happen in the event of a "C" bus lockout at greater than 60% power? What will this prevent? (0.5)

QUESTION 8.09 (3.50)

a. The following Reactor Coolant System (RCS) parameters are DNB related. What is the Technical Specification limit for each?

1. RCS Tavg.

2. Pressurizer pressure.

3. Rcs flow. (1.5)

b. What action must be taken if one of the above limits is exceeded? (1.0)

c. By Technical Specification, how often must each of the above parameters be verified to be within its limit? (1.0)

QUESTION 8.10 (2.00)

a. What parameters must you observe to determine the 'Reactor Core' Safety Limit? (0.6)

b. What is the objective of the 'Reactor Core' Safety Limit? (0.4)

c. What is the limit AND objective for the 'Safety Limit' on RCS pressure with fuel installed? (0.6)

d. What are the Plant Supervisor-Nuclear's responsibilities in the event a 'Safety Limit' is violated? (0.4)

QUESTION 8.11 (2.00)

a. Fill in the blanks.

1. Either reactor shall not be started from cold shutdown without ____ diesel generator(s) operable with onsite supply of 40,000 gallons of fuel available.

2. Either reactor shall not be started from cold shutdown without ____ batteries and associated DC systems operable with ____ out of 6 battery chargers operable. (0.75)

b. What conditions must be satisfied for power operations to continue if one diesel generator is out of service? (1.0)

c. For what period of time may one battery be out of service? (0.25)

QUESTION 8.12 (1.50)

a. What is the basis for having at least one RHR pump in operation when Tavg is > 160 F during refueling operations? (0.5)

b. State the Technical Specification and basis for minimum boron concentration during refueling operations. (1.0)

ANSWERS -- TURKEY POINT 3&4 -84/04/30-JAGGAR, F.

MASTER COPY

ANSWER 5.01 (2.00)

a. delta reactivity=Keff2-Keff1/Keff2(Keff1)
assume Keff at 20cps=0.90
Keff at 40cps=0.95
delta reactivity=.05/(0.95*1.00)=526 dk/k needed for criticality
=.05/(0.90*0.95)=585 dk/k added

59 dk/k excess reactivity----reactor is supercritical (1.0)

b. Total power defect changes linearly so the new power level would be 30%. (1.0)

REFERENCE
CP&L Reactor Theory Chap. 12 pp 12-4 thru 12-6

ANSWER 5.02 (3.00)

a. At 500 F[0.25]---at higher temperatures, the diffusion length is greater, allowing neutrons to reach the control rods from further away.[0.5]

b. Late in life[0.25]---reduced boron concentration increases diffusion length (same effect as higher temperature).[0.5]

c. 180 steps[0.25]---there is a higher flux at this lower core height.[0.5]

d. Next to the withdrawn[0.25] rod---the withdrawn rod results in a higher flux, making the rod in question more effective.[0.5] (3.0)

REFERENCE
CP&L Reactor Theory Chap. 13 pp. 13-6 thru 13-12

ANSWERS -- TURKEY POINT 3&4 -84/04/30-JAGGAR, F.

ANSWER 5.03 (1.50)

a. There is no effect on equilibrium Samarium due to power changing because both the production and removal terms for equilibrium are not flux dependent. (0.5)

b. After reactor shutdown, Samarium removal term goes to zero and the pre-shutdown Pm decays to Samarium thereby raising the Samarium concentration. (0.5)

c. 1. Less negative.
2. More negative. (0.5)

REFERENCE
CP&L Reactor Theory Chap. 15 pp. 15-3 thru 15-14

ANSWER 5.04 (2.00) DELETED

a. As power increases, fuel temperature increases, the Doppler Power Coefficient (Pn/Power) becomes less negative because the resonance broadening effect decreases. Will also accept more negative because of resonance broadening ~~(1.0)~~

b. 1. ~~More~~ Less negative.
2. ~~Less~~ More negative. ~~(1.0)~~

REFERENCE
CP&L Reactor Theory Chap. 14 pp. 14-7 thru 14-11

ANSWER 5.05 (2.00)

a. Becomes more negative [0.5]. The density per F change is greater at higher temperature [0.75]. will accept discussion of Leakage change as density changes. (1.0)

b. Becomes less negative [0.5]. The number of boron atoms in the core decreases more per F change then at higher boron concentrations [0.75]. (1.0)

REFERENCE
CP&L Reactor Theory Chap. 14 pp. 14-2 thru 14-6

ANSWERS -- TURKEY POINT 3&4 -84/04/30-JACGAR, F.

ANSWER 5.06 (2.50)

a. AFD is the top normalized excore detector current minus the bottom excore detector currents. (0.5)

b. AFD will move in the less negative direction. (0.5)

c. Dropping power will lower core dT. The negative MTC will add positive reactivity to the top half of the core and negative reactivity to the bottom half. [1.0] Therefore, AFD will swing positive [0.5]. (1.5)

REFERENCE
CP&L Reactor Theory Chap. 13 pp. 13-6 thru 13-7
SD-4 pg. 65

ANSWER 5.07 (2.50)

a. Shutdown Margin is the instantaneous amount of reactivity the reactor is or would be subcritical from its present condition assuming all full length rods are fully inserted except the rod of highest worth is assumed to be fully withdrawn. (0.5)

b. Immediately following the transient, the movement of the control rods exactly compensates for the change in power defect. Therefore no change in shutdown margin. (0.5)

Five hours later Xenon is at a lower value so rods must be inserted to compensate. Therefore shutdown margin decreases since power defect is the same (80% value). (0.5)

Thirty hours later Xenon has increased close to the 80% value. Rods have withdrawn to compensate. Therefore shut down margin has increased. (0.5)

c. If boron concentration was reduced to compensate for power defect and control rods were at the original position the shutdown margin has decreased. (0.5)

REFERENCE
CP&L Reactor Theory Chap. 15; OP 1009.3

ANSWERS -- TURKEY POINT 3&4 -84/04/30-JAGGAR, F.

ANSWER 5.08 (2.00)

a. Increase d. Increase

b. Decrease e. Increase

c. Decrease (2.5)

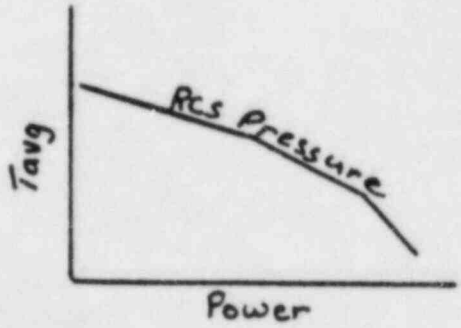
REFERENCE
Thermodynamics- Plant Cycle Chap. 4

ANSWER 5.09 (2.00)

a. Reactor power; Tavg; RCS pressure. (flow) (0.75)

b. Th < Tsat, Subcooling > 0; DNBR >or equal to (1.37) } not graded (0.75)
Core exit quality < (15%). DELETED

c.

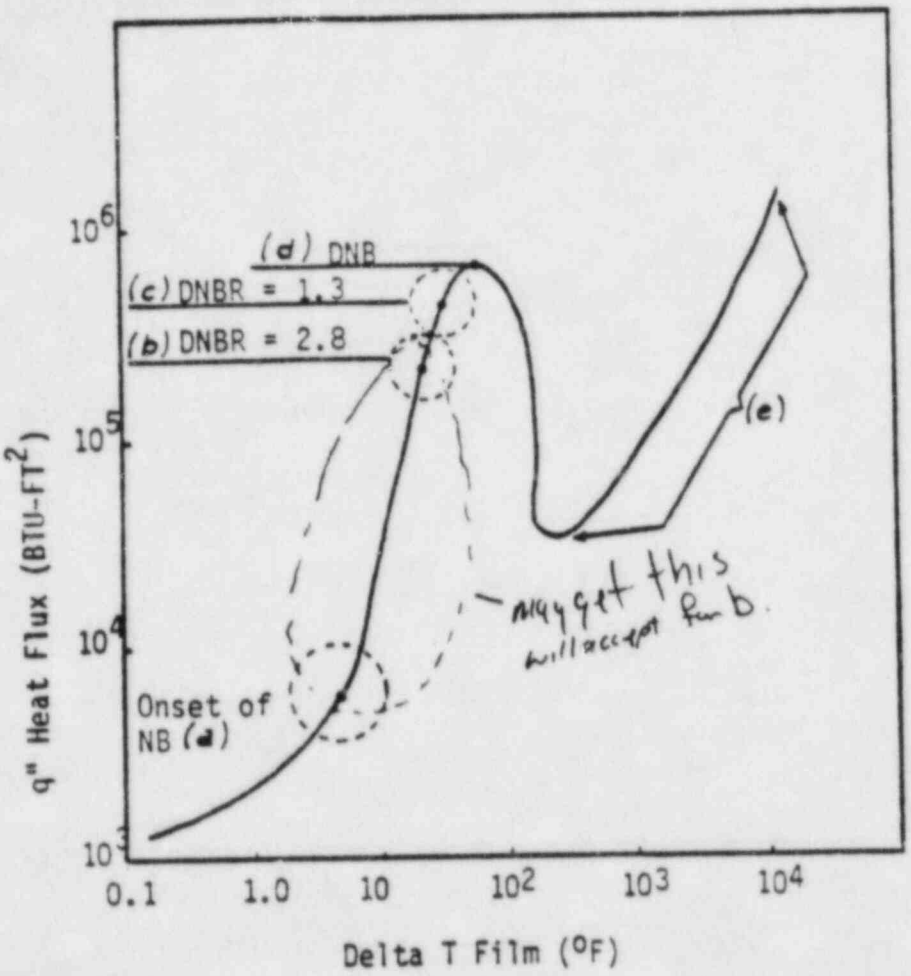


(0.5)

REFERENCE
Turkey Point Technical Specifications pp. 2.1-1; B2.1-2; 2.1-2.

ANSWERS -- TURKEY POINT 3&4 -84/04/30-JAGDAR, F.

ANSWER 5.10 (2.50)



Dashed circles indicate allowable band for full credit. Points "b" and "c" must show some separation.

(2.0)

e. With dT film becoming large enough, radiant heat transfer becomes the effective method of removing heat. (0.5)

REFERENCE
Turkey Point Thermodynamics & Fluid Flow Topics
Nucleate Boiling pp. 196-203

ANSWERS -- TURKEY POINT 3&4 -84/04/30-JAGGAR, F.

ANSWER 5.11 (1.00)

400gpm/180gpm = 2.22 Hp = N×N P = N×N×N

Hp = (2.22)(2.22) * 50 psi = 246.42 psi

P = (2.22)(2.22)(2.22) * 2 kw = 21.88 kw (1.0)

REFERENCE
Thermodynamics and Fluid Flow Topics---Centrifugal Pumps pg. 158

ANSWER 5.12 (2.00)

a. Top of the core (0.5)

b. 1. Decrease
2. Increase
3. Increase
4. Decrease (1.0)

c. Tb, Ts clad, Ts fuel, Tc [0.05 for each correct sequence] (0.5)

REFERENCE
Turkey Point Thermodynamics & Fluid Flow--Nucleate Boiling

ANSWERS -- TURKEY POINT 3&4 -84/04/30-JACOAR, F.

ANSWER 6.01 (3.00)

a.

	OTdT	OPdT
1.	Increase	Same
2.	Decrease	~~Same~~ Decrease
3.	Increase	Same

will accept decrease for q.2

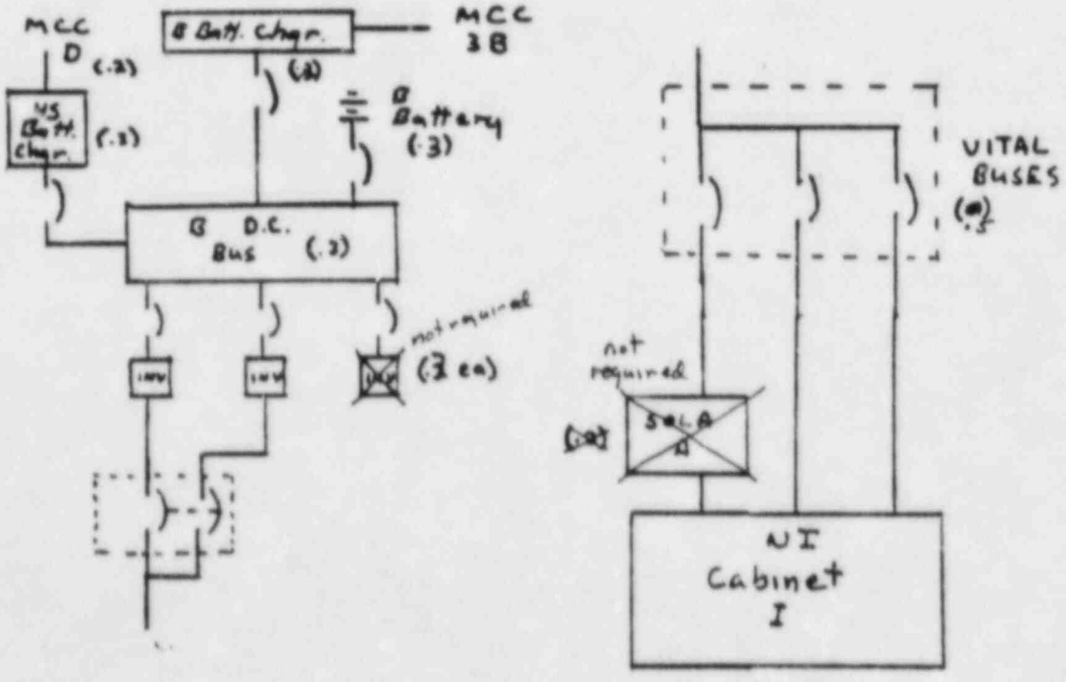
[0.25 each] (1.5)

b. 1. OTdT
2. OPdT
3. OPdT
4. Both
5. OTdT

[0.3 each] (1.5)

REFERENCE
Turkey Point SD-63 pp. 19-23

ANSWER 6.02 (2.50)



(2.5)

REFERENCE
Turkey Point SD-4 pg. 17 & Figure 15

ANSWERS -- TURKEY POINT 3&4 -84/04/30-JAGGAR, F.

ANSWER 6.03 (2.00)

a. The pressure controller output is proportional to the actual deviation from setpoint [0.4] and is modified by the rate at which actual pressure is changing (rate) [0.4] plus the amount of time that pressure has been off set point (reset) [0.4]. (1.2)

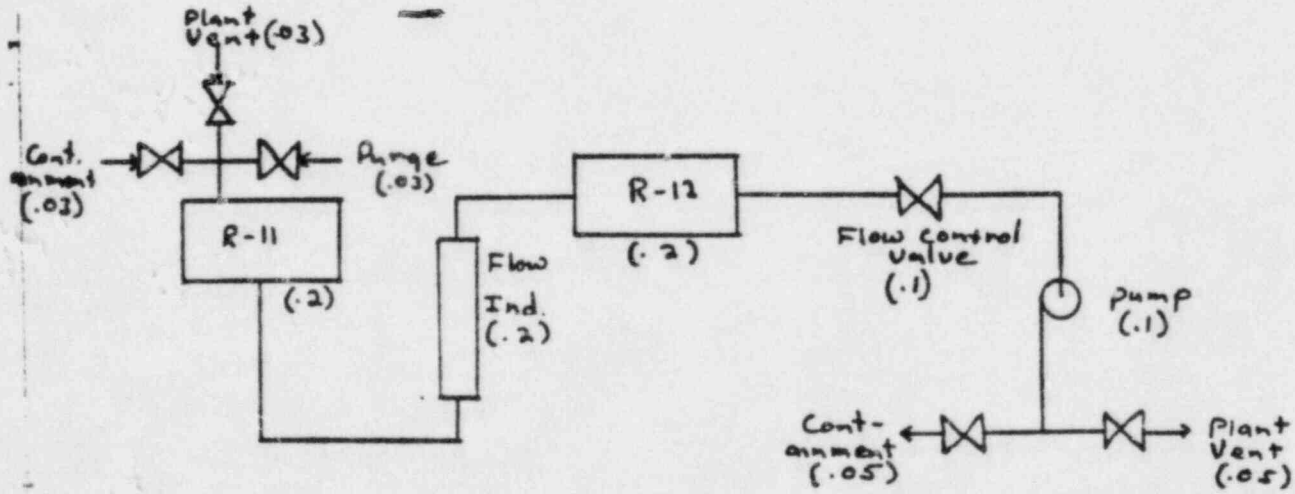
b. A high level alarm also energizes pressurizer heaters [0.4] in anticipation of cooler water causing a pressure reduction [0.4]. (0.8)

REFERENCE
Turkey Point SD-9 pp. 40-44 & Figure 3

ANSWER 6.04 (2.00)

a. R-11 Scintillation counter
R-12 G-M tube (0.5)

b.



(1.0)

c. The sample stream is drawn through filter paper prior to exiting the R-11 moniter. (0.5)

REFERENCE
Turkey Point SD-68 pp. 19,32 & Figure 10

AFP TURBINE STEAM SUPPLY

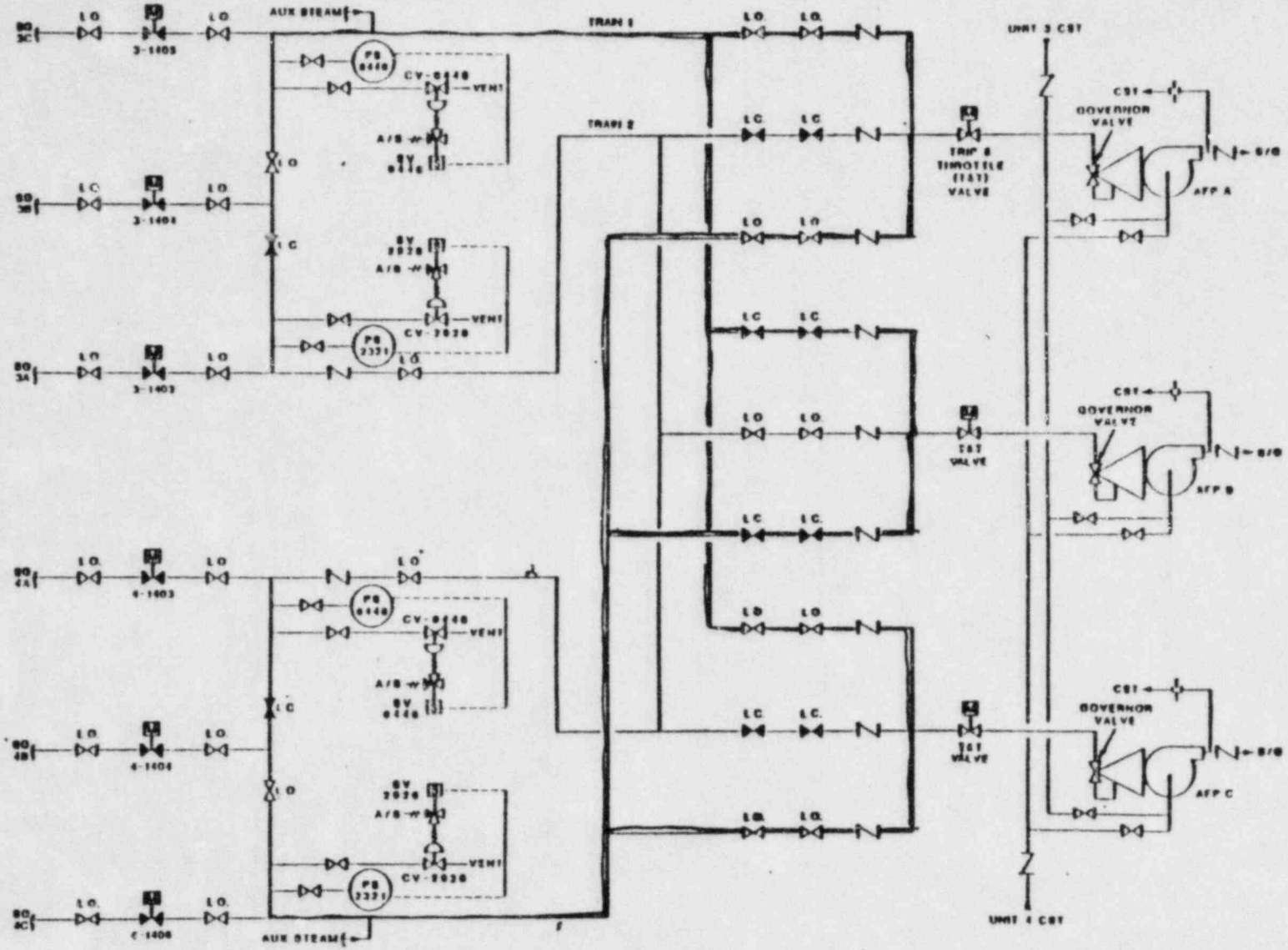


FIGURE 6

ANSWERS -- TURKEY POINT 3&4 -84/04/30-JAGGAR, F.

ANSWER 6.05 (2.50)

a. See attached Figure 6. (1.0)

b. Train 1 (0.5)

c. Safety injection, Loss of voltage on either 4160 bus, LoLo Level in any Steam Generator, Loss of both Main Feed Pumps. (manual) (1.0)

REFERENCE
Turkey Point SD-117 p. 14 & Figure 6

ANSWER 6.06 (1.50)

a. A--4160 A bus
B--4160 C bus (0.5)

b. 1. CV-1400 (Condensate Recirculation Valve) closes at 240 psig.
2. Pressure switches block MFP start if <240 psig.
3. Pressure switches trip MFP when <200 psig.
4. Feedwater heater bypass opens when <220 psig.
~~5. CAF~~ Per Utility, there are no others (CV-201) (1.0)

REFERENCE
Turkey Point SD-112 pp. 10, 14, 16, 26

ANSWERS -- TURKEY POINT 3&4 -84/04/30-JAGGAR, F.

ANSWER 6.07 (2.00)

a. Purges the containment atmosphere of noble gases and radioactivity to allow personnel access during shutdown periods. (0.4)

b. Trips supply and exhaust fans, shuts supply and exhaust valves. (1.0)
(also closes instrument air bleed valves)

c. SI, Phase A isolation, Phase B isolation, manual. (0.6)
[3 required]

REFERENCE
Turkey Point SD-29 p. 6; pp. 12-13

ANSWER 6.08 (2.00)

a. 1. Normal boration flowpath V1138 [0.25]
2. Chemical addition. [0.25]
3. 2 paths for emergency boration. [0.125 ea] MOV-350, V356
4. 2 paths from the RWST. [0.125 ea] V1100, 358 (1.0)

b. 1. Pressurizer level >14%.
2. Letdown isolation valve (LCV-460) must be open.
3. (Proper air pressure and 125 VDC power available) ← these are not interlocks
4. No Phase A isolation signal. (1.0)

REFERENCE
Turkey Point SD-13 p. 19; pp. 30-32

ANSWER 6.09 (2.00)

a. 1. Limit containment pressure in the event of a steam break inside containment.
2. Limit RCS cooldown with resultant positive reactivity addition.
3. Limit the effects of shrink and swell. will accept "maintain constant rxs" (1.0)

b. 1. FWRV--- HiHi level [.2], SI [.2], Reactor trip [.15] with Lo Tavg [.05]
2. Bypass---HiHi level [.2], SI [.2] (1.0)

REFERENCE
Turkey Point SD-11 pp. 23-27

ANSWERS -- TURKEY POINT 3&4 -84/04/30-JAGGAR, F.

ANSWER 6.10 (2.00)

1. ~~a~~ c
2. ~~a~~ c
3. ~~a~~ b,c,d
4. ~~b~~ d
5. ~~b~~ d
6. ~~b~~ d
7. ~~c~~ a
8. ~~d~~ b
9. ~~c~~ a

[0.2 each] -.1 for additional wrong answers (2.0)

REFERENCE
Turkey Point SD-5 pp. 46-47

ANSWER 6.11 (1.50)

If the EDG is operating in the LEAD the ammeter will respond in the opposite direction the Voltage Adjust Switch is moved, in the LAG, the ammeter will respond in the same direction the switch is moved. (1.5)

REFERENCE
Turkey Point NRC Exam Question Bank

ANSWER 6.12 (2.00)

1. Open all breakers on that bus that are feeding equipment.
2. Open all breakers feeding the 4KV busses.
3. Send start signal to the diesels.
4. Send signal to the Emergency Load Sequencer.
5. Block auto start of the turbine generator auxiliary oil pump.
6. Block auto start of CCW pump on low header pressure.
7. Open steam supply valves from the S/G to the Auxiliary Feed Pumps.
8. ~~Trip Diesel Generator breaker if diesel is supplying 4KV bus.~~ Remove main generator trip signal, close diesel bkrs onto bus.

[5 required 0.4 each] (2.0)

REFERENCE
Turkey Point SD-170 pp. 11-12

ANSWERS -- TURKEY POINT 3&4 -84/04/30-JAGGAR, F.

ANSWER 7.01 (1.50)

a. 50 F. (0.5)

b. 350 psig and 2 minutes. (1.0)

REFERENCE
Turkey Point Operating Procedure 0202.1 pp. 2, 19

ANSWER 7.02 (2.00)

a. 100 F/hr.
b. 90 F/hr.
c. 320 F.
d. 250 F
e. 350 F, 450 psig ± 10°, ± 10 psig (2.0)

REFERENCE
Turkey Point Operating Procedure 0202.1 pp. 2-4

ANSWER 7.03 (2.00)

a. Unit 3 -- 44 F
Unit 4 -- 30 F (0.5)

b. 50 F minimum +10°
200 F maximum ∓10° (0.5)

c. Uses RHR pump header pressure through HCV-142, through the mixed bed demineralizer, reactor filter, VCT, and normal charging lineup. [.33] [.33] [.33] (1.0)

REFERENCE
Turkey Point Operating Procedure 0205.2 pp. 3, 17, 19

ANSWERS -- TURKEY POINT 3&4 -84/04/30-JAGGAR, F.

ANSWER 7.04 (2.00)

a. 400 MWE. ±5%

b. 40 MWE. ±5

c. 30%.

d. 50%.

e. 70%.

DELETED

[0.4 each] ~~+2.0~~

REFERENCE
Turkey Point Operating Procedure 0202.2

ANSWER 7.05 (3.00)

a. 1. Use reactor trip pushbutton. will accept turbine trip pushbutton
2. Open reactor trip breakers and/or MG set breakers.
3. Open MG set breakers on the 480 V MCC.
4. Emergency borate
5. Drive rods in manually.
[0.1 for sequence, 0.2 for action] (1.5)

b. 1. Plant Supervisor-Nuclear
STA
Operations Supervisor-Nuclear [0.3 each] (0.9)

2. Operations Superintendent-Nuclear or
Plant Manager-Nuclear or
Site Manager [.15]
Plant Supervisor-Nuclear [.3]
STA [.15]
Operations Supervisor-Nuclear [.15]
(PNSC)
[0.15 each] (0.6)

REFERENCE
Turkey Point Off Normal Operating Procedure 0208.1 pp. 3, 9

ANSWERS -- TURKEY POINT 3&4 -84/04/30-JAGGAR, F.

ANSWER 7.06 (2.00)

a. 1. Normal readings for containment temperature, pressure, radiation, and sump level.
2. Normal readings for Auxiliary Building radiation and ventilation.
3. Normal readings for Steam Generator blowdown and Condenser air ejector. .2
4. RCS pressure > 2000 psig and increasing. [.2]
5. Pressurizer level > 22%. [.2]
6. RCS subcooling > 30 F. [.2]
7. Auxiliary feed at least 375 gpm or narrow range level in at least 1 Steam Generator. [.2] (1.0)

b. 1. RCS pressure < 1723 psig or
2. Pressurizer level < 10% or
3. Subcooling < 30 F. [0.1 for value, 0.23 for parameter] (1.0)

REFERENCE
Turkey Point Emergency Procedure EDP 20000 E-0 pg. 7

ANSWER 7.07 (2.00)

a. 1. Shutdown
2. Startup
3. Shutdown
4. Shutdown [0.25 each] (1.0)

b. You could startup, (as there is no pressure boundary valve leaking at greater than 1.0 GPM). Will accept decision to not s/u if mention that conditions are unsafe. (1.0)

REFERENCE
Turkey Point Technical Specifications pg. 3.1-4, 5

ANSWERS -- TURKEY POINT 3&4 -84/04/30-JAGGAR, F.

ANSWER 7.08 (1.50)

a. 1. Variations in pressurizer pressure and level in response to normal charging and spraying operations. (2 answers)
3. Gases in the Reactor Coolant System.
4. Reactor ~~Coolant System~~ Vessel Head temperature ≥ saturation. [3 required] well accept 1. Core exit TC's high 2. Erratic RCP indications 3. RVLS indications (0.75)

b. 1. Containment Hydrogen > 3% by volume.
2. Reactor Coolant System subcooling < 30 F.
3. Pressurizer level < 20%.
4. Reactor Coolant System pressure decreases by 200 psig.
5. Venting period greater than calculated.
[3 required] (0.75)

REFERENCE
Turkey Point ONOP 01008.10

ANSWER 7.09 (2.00)

a. 1. Plant Supervisor-Nuclear
2. Nuclear Watch Engineer
3. Member of plant staff with an SRO license
4. On shift Reactor Control Operator [.1 ~~for~~ each for order] (1.0)

b. 1. Decision to notify state and local authorities.
2. Recommendation of protective action for the public. (1.0)

REFERENCE
Turkey Point EP 20101 P. 2

ANSWER 7.10 (2.00)

a. A Nuclear Operator trained in first aid and decon procedures.
Health Physics Technician on shift. (0.5)

b. Operations Superintendent-Nuclear
Nuclear Watch Engineer (0.5)

c. Alert, Site Area, General (0.25)

d. 1. FPL offices in Miami
2. ~~EAF~~ Same as 3. below
3. 1st floor of the I&C Building (by Water treatment Plant) (0.75)

ANSWERS -- TURKEY POINT 3&4 -84/04/30-JAGGAR, F.

REFERENCE
Turkey Point EP 20125 pp. 3-5; Emergency Plan pp. 2-36 thru 40

ANSWER 7.11 (2.00)

a. 1. 5 mrem/hr or 100 mrem in 5 days

2. > 100 mrem/hr

3. 1000 mrem/hr

4. ~~10 times the general area decay rate will accept~~ >1000 ~~10,000~~ dpm/100 cm²

[0.5 each] (2.0)

REFERENCE
Turkey Point Health Physics Lesson Notes pp. 24-25

ANSWER 7.12 (3.00)

a. --4

b. --6

c. --7

d. --8

e. --2 [0.6 each] (3.0)

REFERENCE
Turkey Point Health Physics Manual

ANSWERS -- TURKEY POINT 3&4 -84/04/30-JAGGAR, F.

ANSWER 8.01 (2.00)

a. 2 (0.5)

b. 275 F + 10°F (0.5)

c. 1. Start of an idle Reactor Coolant Pump with Steam Generator greater than or equal to 50 F above the Reactor Coolant System cold leg temperature.

2. Start of a HPSI pump and its injection into a water solid RCS. (1.0)

REFERENCE
Turkey Point Technical Specification pp. 3.15-1; B3.15-1

ANSWER 8.02 (2.00)

a. 1. The intent of the original procedure is not altered.
2. The change is approved by two members of the plant management staff, at least one of whom holds an SRO license on the unit.
3. The change is documented, approved by the PNSC and approved by the Plant Manager-Nuclear within 14 days of implementation. (1.5)

b. The OTSC must be reviewed and approved by PNSC ~~(and Plant Manager)~~ prior to implementation. ~~Manager only PNSC~~ (0.5)

REFERENCE
Turkey Point Admin. Procedure 0109.3

ANSWER 8.03 (2.00)

a. 1. Plant Supervisor-Nuclear
2. Nuclear Watch Engineer (0.5)

b. False (0.5)

c. 1. A need exists.
2. Permission of the person holding the clearance must be obtained.
3. Clearance holder and Nuclear Watch Engineer shall be in complete agreement that the partial release will not endanger personnel or equipment.
4. Independent verification shall be performed. (1.0)

ANSWERS -- TURKEY POINT 3&4 -84/04/30-JAGGAR, F.

REFERENCE
Turkey Point Admin. Procedure 0103.4

ANSWER 8.04 (2.00)

a. The operating unit---2 SRO; 3 RO (3) (2)
The refueling unit---2 SRO; 2 RO (* SRO and 3 RO acceptable) (0.6)

b. 5 (0.4)

c. The fire brigade shall not include 2 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. (1.0)

REFERENCE
Turkey Point Technical Specifications pp. 6.2, 6.5 & Table 6.2-1

ANSWER 8.05 (2.00)

1. Criticality is planned within 4 hours from the trip.
2. Boron concentration is less than 300 ppm.
3. Trip was from 40% or greater power.
4. Equilibrium Xenon conditions existed prior to the trip. (2.0)

REFERENCE
Turkey Point Operating Procedure 0202.2 p. 15

ANSWER 8.06 (2.00)

1. The required non-automatic containment isolation valves and blind flanges are closed.
2. The required automatic containment isolation valves are operable or are secured closed.
3. The equipment hatch is properly closed.
4. At least one door in each personnel airlock is properly closed.
5. No uncontrolled containment leakage exists. (2.0)

REFERENCE
Turkey Point Technical Specification ps. 1-2

ANSWERS -- TURKEY POINT 3&4 -84/04/30-JAGGAR, F.

ANSWER 8.07 (2.00)

a. ENS telephone--primary
Other telephone lines or relayed message--alternate (0.4)

b. 1. Yes
2. No
3. Yes
4. Yes (1.6)

REFERENCE
Turkey Point Admin. Procedure 0103.12; Emer. Procedure 20101 P. 6

ANSWER 8.08 (2.00)

a. 1. The normal power supply for each unit's "C" bus is the opposite unit's "C" transformer; 3C 4KV bus is normally fed from 4C transformer and 4C 4KV bus is normally fed from the 3C transformer. (0.5)

2. The "C" bus supply breakers from their associated transformers are maintained in the racked out and locked position. Permission from the NPS must be given to change their position. (0.5)

3. Various protective relays have been removed from the breaker doors. (0.5)

4. Supply from 3C Xfmr now on SW Bus not on NE Bus - separates Unit 1 & 2

b. The result will be a runback on the affected unit on the loss of the feedwater pump from that unit's "C" bus. [0.25] If this causes a "C" bus transformer lockout, it will de-energize the unaffected unit's startup transformer. This will prevent having a unit with a runback or trip being without its startup transformer. [0.25] (0.5)

REFERENCE
Turkey Point NRC-SRO Question Bank

ANSWERS -- TURKEY POINT 3&4 -84/04/30-JAGGAR, F.

ANSWER 8.09 (3.50)

a. 1. Less than or equal to 578.2 F. +/- 2 F
2. Greater than or equal to 2220 psig. +/- 50 psig
3. Greater than or equal to 268,500 gpm. +/- 10,000 gpm (1.5)

b. Restore the parameter to within its limit within 2 hours or reduce thermal power to less than 5% of rated thermal power using normal shutdown procedures. (1.0)

c. Tavg and Pressurizer pressure are verified every 12 hours (+/- 25%). RCS flow is verified after each refueling cycle. (1.0)

REFERENCE
Turkey Point Technical Specifications p. 3.1-7

ANSWER 8.10 (2.00)

a. You need to know the combination of:
1. Thermal power
2. RCS pressure
3. Loop coolant temperature (Tavg),
(and compare them to the limits of Technical Specification).
Figure 2.1-1. will also accept flow. (0.6)

b. To maintain the integrity of the fuel cladding. (0.4)

c. The limit is 2735 psig with the objective of maintaining RCS integrity. (0.6)

d. 1. Shutdown the reactor
2. Notify the NRC
3. Notify company officials
4. ~~CAF for additional~~ No restart w/o NRC permission. (0.4)

REFERENCE
Turkey Point Technical Specifications pp. 2.1-1, 6-14;
10 CFR 50.36 (c)(1)(i)

ANSWERS -- TURKEY POINT 3&4 -84/04/30-JAGGAR, F.

ANSWER 8.11 (2.00)

a. 1. 2
2. 4, 4 [0.25 each] (0.75)

b. 1. The remaining diesel is tested daily and its associated ESF systems are operable.
2. Either Startup Transformer is operable.
[0.50 each] (1.0)

c. 24 hours (+/- 25%) (0.25)

REFERENCE
Turkey Point Technical Specifications pp. 3.7-1, 2

ANSWER 8.12 (1.50)

a. Used to maintain a uniform boron concentration in the RCS. (0.5)
will accept use of RHR as Heat Sink to cool RCS (Decay Heat Removal)

b. 1950 ppm [0.5] maintain the reactor subcritical (by at least 10% dk/k) [0.5] (1.0)
in the cold shutdown condition with all rods inserted.
[0.5]

REFERENCE
Turkey Point Technical Specifiation 3.10; p. B3.10-1