U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 50-341/OL-86-01

Docket No. 50-341

Licensee: Detroit Edison Company
6400 N. Dixie Highway
Newport, MI 48166

Facility Name: Enrico Fermi II

Examiners: T M Burdick for
M. Spencer
Chief Examiner — Date 4/29/86

T M Burdick for
J. B. Sherman — Date 4/29/86

Approved By: T M Burdick
T. T. Burdick, Chief
Operating Licensing Station — Date 4/29/86

Examination Summary

Examination administered on March 25-28, 1986 (Report No. 50-341/OL-86-01)
Examinations were administered to six senior operator candidates.
Results: Three senior operator candidates passed the written examination and six senior operator candidates passed the oral/operating examination.

DETAILS

1. Examiners

J. Sherman, INEL
M. Spencer, INEL (Chief Examiner)

2. Examination Review Meeting

At the conclusion of the written examination, the question and answers were given to the facility training staff for review and comment. At the exit meeting the facility supplied the examiners with their comments to the Senior Reactor Operator examination. The facility comments and examiners' resolution to each have been enclosed as Attachment.

After the formal exit meeting, a round table discussion of the facility comments was conducted by the Facility Training Staff and the Examiners.

3. Exit Meeting

On March 27, 1986, an exit meeting was held. The following personnel were present:

S. Latone, Director Nuclear Training
J. Coleman, Supervisor Nuclear Training
G. Preston, Operations Engineer
S. Heard, Operations Coordinator
J. Conen, Engineer
W. Rogers, Resident NRC
D. Hills, Region III NRC
J. Sherman, INEL
T. Bishop, INEL
M. Spencer, INEL

The facility was informed all candidates had passed the simulator and oral portions of the license examination. The only area of general weakness observed by the examiners was the use and control of drawings in the control room and this weakness was discussed at the meeting.

The Chief Examiner discussed the forth coming written exam and simulator exam requirements regarding the use of "K A's" and the additional reference material which will be required to produce the license examination in the future.

Attachment: Facility Examination
Comments and Examiner Resolution

FERMI II FACILITY COMMENTS AND EXAMINER RESOLUTION
EXAM DATE MARCH 25, 1986

The facility divided the comments to the exam into two groups:

1. Those questions felt to be inappropriate to the SRO knowledge level requirements.

2. Questions with additional or alternate answers.

The Group 1. shall be addressed first.

Facility Comment: 5.06

This question is not applicable to BWR Thermodynamic technology. In our thermo course we also talk about PWR's and pressurizer level, but we do not expect the candidate to retain this information.

Examiners' Resolution:

After review of Exam Standards, the facility comment is agreed upon. Question 5.06 was removed and the total point value of Section 5 and the exam changed to 25.5 and 102.75 respectively.

Facility Comment: 5.16

Please see attached graphs from a simulator demonstration of two recirculation pump trip run March 27, 1986. Also see AOP 20.138.01. (20.138.01, Revision 5, Page 1)

Examiners' Resolution:

Review of supplied documents indicated the exam graphs do not model this transient at Fermi. Therefore, Question 5.16 was removed and point value of Section 5 and of exam decreased by 3.0 points, to 22.5 and 99.75 respectively.

Facility Comment: 6.06

We do not "teach" every detail of manufacture of the fuel assembly. When the operators have to assemble the fuel onsite, then they should have to know this level of information.

Examiners' Resolution:

Examiner agrees with comment. Question 6.06 was removed. Point total for Section 6 reduced to 24.25 and the exam reduced to 98.75.

Facility Comment: 7.09 a and b

We do not require memorization of EP-101 Tabs.

Examiners' Resolution:

Operator Licensing Examiner Standards, Section ES-402, Category 7 describes questions applicable to this section. This question asks for general description of the emergency condition with major symptoms given in the question. Question remains in the exam.

Facility Comment: 7.12

We do not require memorization of 10 CFR 50.72. We keep a copy in the Control Room.

Examiners' Resolution:

In Operator Licensing Examiner Standers, Section ES-402, Category 7 describes questions applicable to this section. Also, Fermi Training Lesson Guide, 08-02-01-01, Lesson Objective (LO) No. 14, "List the events that require one hour notification to the NRC in accordance with 10 CFR 50.72." LO No. 15 addresses four hour notifications. Question remains in the exam.

Facility Comment: 7.13

We do not require memorization of EP-102 or EP-104.

Examiners' Resolution:

Operator Licensing Examiner Standards, Section ES-402, Category 7 describes questions applicable to this section. This question asks for general description of the emergency condition with major symptoms given in the question. Question remains in the exam.

Facility Comment: 8.08

The Assistant Operations Engineer and the Training Supervisor maintain records to ensure that no lapse occurs. We administratively enforce a one month periodicity on standing an eight hour watch.

Examiners' Resolution:

Comment noted. Each licensee has an obligation to understand the restrictions mandated upon his/her license. Question remains in exam.

Facility Comment: 8.13

We do not require memorization of Administrative Procedures.

Examiners' Resolution:

Examiner agrees with Facility comment. Question 8.13 was removed. The point value of Section 8 was reduced from 25.0 to 23.5 and the exam total point value becomes 96.75.

Facility Comment: 8.14

This question would be more appropriately directed at the Health Physics Supervisor. Reference 4.10 is Procedure 61.000.03 which is a Health Physics Procedure.

Examiners' Resolution:

Operator Licensing Examiner Standards, Section ES-402, Category 8 describes questions applicable to section the SRO exam. SRO's are responsible for the overall safe operation of the licensed facility and are quizzed upon administrative items. Question remains in exam.

Group 2. Questions with additional or alternate answers.

Facility Comment: 5.07

A and C should both be considered correct. The attached definitions for technical specification for fraction of Limiting Power Density is the justification. (Technical specification, Pages 1-2)

Examiners' Resolution:

Telephone conversation with S. Heard on April 2, 1986, changed the above comment to Question 5.11 and the possible answers to C and D.

Do not agree with Facility comment. The new reference deals with fraction of limiting power density.

The question asked about power density, not fraction of limiting power density. Selection c remains the only correct answer.

Facility Comment: 5.15

Procedure 20.000.07 also lists additional items. (20.000.07, Revision 4, Page 4)

Examiners' Resolution:

Comment accepted. Exam answer key modified to include those items listed as "Indications" on new reference as additional selections for full credit.

Facility Comment: 6.05

This delta-pressure is casually referred to as occurring across the core plate. We feel that since the fuel support casting becomes an integral part of the core plate during construction. The actual component across which the delta-pressure occurs is the orifice built into the fuel support casting. (C.O.K. (common operator knowledge))

Examiners' Resolution:

Comment noted. Question not changed because the facility did not provide acceptable reference material to substantiate a change to the answer.

Facility Comment: 6.08

A seventh detector, recently installed is "Differential Flow." (shown to Examiners at Facility)

Examiners' Resolution:

The comment "(shown to Examiners at Facility)" requires explanation. During M. Spencer's tour of the simulator, the additional instrument was shown to him. The specific reason this was identified is the examiner asked the instructor about LER's associated with RWCU system. Mr. Spencer did not check in the Control Room for this instrument.

The training material sent the examiner made no reference to the said instrument.

Do not agree with Facility comment. The answer key remains unchanged.

Facility Comment: 6.15

Additionally

6. Increase in Room delta temperature.
7. Rate and duration of sump pumpout.

(Leak Det. System Student Handout, Page 3, Revision 3)

Examiners' Resolution:

"Increase in room delta temperature" is presently implied as increase in area temperature. The "rate and duration of sump pumpout" was verified to be correct and the answer key modified.

Facility Comment: 6.18

Additionally

Any RCIC Isolation is a turbine trip. (RCIC Student Handout, Revision 3, Pages 15 and 16)

Examiners' Resolution:

Comment verified to be correct and answer key modified to allow the four (4) automatic "RCIC Isolation signals" as additional answers.

Facility Comment: 7.03

According to the reference procedure, 22.000.17, there are no exemptions. The coolant sample must always be taken. From the coolant sample results, chemistry will then determine if effluent gaseous samples must be taken. An answer which is consistent with the question could be, "If the power change occurs over a period of greater than one hour." (Technical Specifications Table 4.11.2.12-2, Pages 3/4; 11-9 and 11-11, 22.000.27, Revision 2, Pages 1 and 3)

Examiners' Resolution:

Comment verified. Amount key changed to, "IF the power change occurs over a period of greater that one (1) hour."

Reference changed to 22.000.17, Revision 2, Page 2.

Facility Comment: 7.07

Procedure 22.000.03, as well as all other GOP's states that the pressures and power levels are guidelines and that actual plant conditions or requirements may be used to determine if a step must be completed at the specified condition. Unless it was specified that only one action was to be assigned to each condition, the following answers could also be assigned to the 20% power changes:

1. Perform surveillance on Jet Pump Operability
2. Shift to 3 element control

(22.000.03, Revision 5, Pages 2, 30, and 31)

Examiners' Resolution:

Comment verified. Answer key is changed to allow A, C, and/or G as correct for Part 5.

Facility Comment: 7.10

Part d answer should be 2000. (12.000.13, Revision 6, Page 13)

Examiners' Resolution:

Comment verified to be correct. Answer key modified to change Part d from 100 to 2000.

Facility Comment: 7.11

Technical specifications states "two detectors operable, one in the affected quadrant, one in an adjacent quadrant. (Technical specification, Page 3/4 9-3)

Examiners' Resolution:

Comment verified to be correct. Answer key modified to allow, "Two detectors operable, one in the affected quadrant, one in an adjacent quadrant" as a possibility for full credit.

Facility Comment: 8.02

12.000.07 also mandates that the requirements for normal, single temperature change be met. These include:

4. No license commitments are negated
5. A preliminary safety evaluation is performed
6. A technical review is performed
7. Change is approved by OSRO within 14 days

(12.000.07, Revision 15, Pages 23 and 24)

Examiners' Resolution:

Do not agree with Facility comment. The question is quoted verbatim from the reference material and can be further supported by Fermi Technical Specifications, Pages 6-14.

Facility Comment: 8.03

1. These tags are not "controlled." They are issued by individuals and attached to defective tools and non-plant equipment.

Examiners' Resolution:

Comment noted. The exam answer was, "check at facility." Answer to Part 1 was modified to:

Any employee may initiate a safety tag. The supervisor in charge of the equipment responsible for removing the safety tag.

Facility Comment: 8.04

Without reference, you should also accept any reasonable parametric change. Some additional:

8. Jet pump flow decreases
9. MG set Generator volts decreases
10. MG set KW decreases
11. "B" Recirculation pump "runback"
12. APRM's (all) decrease

Examiners' Resolution:

Facility comment noted. Question deals with a specific set of parameters associated with this condition. Can not accept an answer without a reference.

Facility Comment: 8.13

Criticality Monitor or Area Rad Monitor (3/4.3.7, Technical Specifications 3/4 3-47, 48, 49)

During telephone conversation with Facility on April 7, 1986, the below were also possible answers to Question 8.13.

a. K(eff) less than 0.98 (Reference Technical Specification Page 5-6)
b. From procedure 12.000.46, the following steps:

1. 6.5.3.2
2. 6.5.3.3
3. 6.5.3.4
4. 6.5.4.9
5. 6.5.4.11
6. 6.5.7.15

Examiners' Resolution:

After reviewing these additional references, it was determined that question was beyond the scope of SRO knowledge requirements. The question was removed from the exam.

Facility Comment: 8.15

We do not require memorization of all of the footnotes in Technical Specifications EP-201-3 "accident mitigation or first aid/life saving activities" (12.000.13, Revision 6, Page 5, EP 21.000.03, Revision 2, Page 1)

Examiners' Resolution:

Comment verified. Answer key modified to allow the below list of additional possible answers.

a. Accident mitigation
b. Firs aid/life saving activities

Reference also changed to include EP-201-3, Page 1, Revision 2

Facility Comment: 8.16

By saying "shutdown" you have not been sufficiently precise regarding condition.

a. Either < or = 0.2 and < or = 0.1 ppm or
< or = 0.2 and < or = 0.5 are correct.

b. If 0.2 and 0.1 are used the differences are due to the lower expected oxygen levels at operating conditions. (Technical Specification Pages 3/4 4.15, Pages 1-10)

Examiners' Resolution:

Comment verified to be correct. Answer key modified as below for full credit.

A. During power operation = 0.2 ppm (0.5)
During cold shutdown = 0.5 ppm (0.5)

B. During power operation the catalytic effect of higher coolant temperatures requires lower limits in order to reduce chloride stress corrosion. (0.5)

OR

A. During power operation = 0.2 ppm (0.5)
During hot shutdown = 0.1 ppm (0.5)

B. During power operation oxygen level in the coolant are lower than when hot shutdown, thus reducing the possibility of chloride stress corrosion. (0.5)

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

FACILITY: FERMI 2

REACTOR TYPE: BWR-GE4

DATE ADMINISTERED: 86/03/25

EXAMINER: SPENCER, M.

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
22.50 ~~26.50~~	22.25 ~~25.54~~	_____	_____	5. THEORY OF NUCLEAR POWER PLANT OPERATION, FLUIDS, AND THERMODYNAMICS
24.25 ~~25.25~~	25.06 ~~24.74~~	_____	_____	6. PLANT SYSTEMS DESIGN, CONTROL, AND INSTRUMENTATION
~~26.50~~	27.39 ~~25.54~~	_____	_____	7. PROCEDURES - NORMAL, ABNORMAL, EMERGENCY AND RADIOLOGICAL CONTROL
23.50 ~~25.50~~	24.28 ~~24.68~~	_____	_____	8. ADMINISTRATIVE PROCEDURES, CONDITIONS, AND LIMITATIONS
96.75 ~~103.75~~	100.00	_____	_____	TOTALS

FINAL GRADE _____%

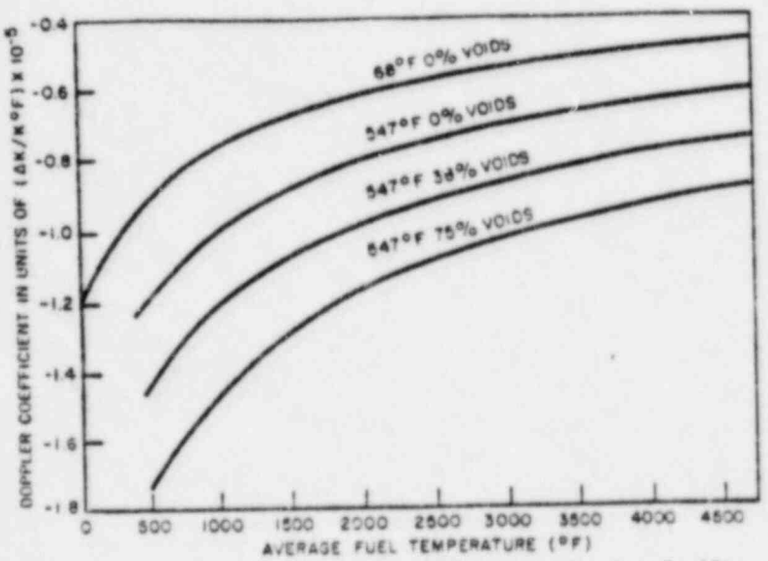
All work done on this examination is my own. I have neither given nor received aid.

_____
APPLICANT'S SIGNATURE

MASTER COPY

QUESTION 5.01 (1.00)

Using the below graph as a reference, BRIEFLY explain why the doppler coefficient becomes more negative for a given temperature and varying void fractions. (1.0)

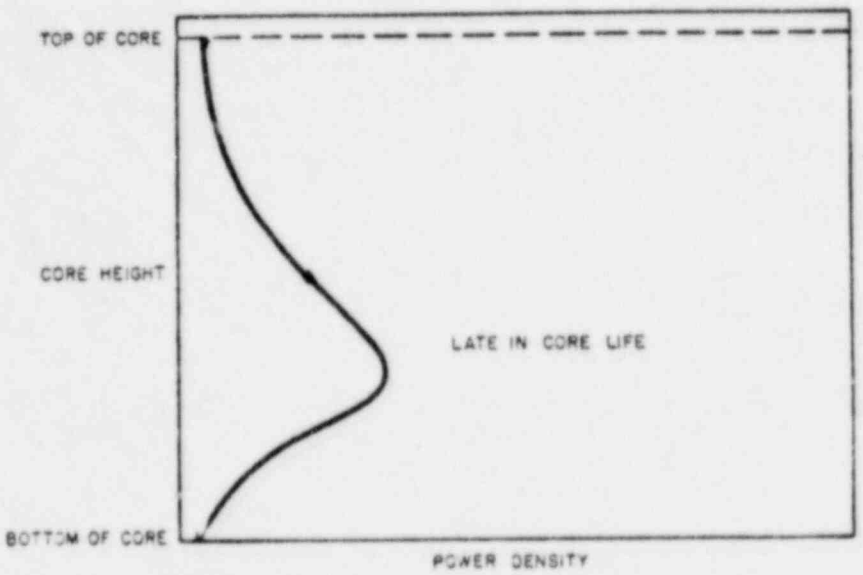


Void and Fuel Temperature Effect on Doppler Coefficient

(***** CATEGORY 05 CONTINUED ON NEXT PAGE *****)

QUESTION 5.02 (1.00)

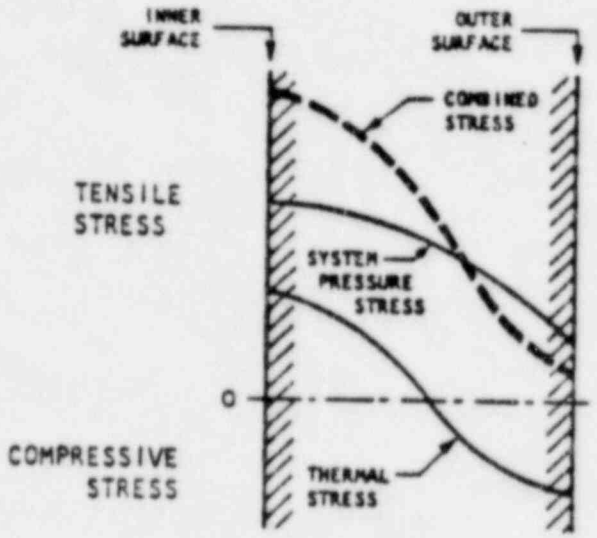
The below figure indicates the power density at the upper portion of the core is ~ 1/3 that of the lower core at EOL. List two (2) reasons for this difference in power density at EOL. (1.0)



(***** CATEGORY 05 CONTINUED ON NEXT PAGE *****)

QUESTION 5.03 (1.00)

The below diagram is of (A) heatup stress or (B) cooldown stress?
[Choose either A or B]



(CROSS-SECTION OF VESSEL WALL)

(***** CATEGORY 05 CONTINUED ON NEXT PAGE *****)

QUESTION 5.04 (1.00)

The convective heat transfer coefficient for boiling water is 300 - 9000. (Btu/hr ftsq F). From the below list choose the values that represent the convective heat transfer coefficient for film boiling.
[Choose either A, B, C, or D] (1.0)

	Btu/hr ftsq F
A.	5000 - 20,000
B.	300 - 9000
C.	50 - 3000
D.	5 - 20

QUESTION 5.05 (1.00)

From the selection of answers in column 1, choose the correct number identifying the horizonal and vertical axis of the curve on the next page of this exam. (1.0)

HORIZONAL = ____

VERTICAL = ____

COLUMN 1
1. delta temperature
2. delta pressure
3. log(T[clad] - T[coolant])
4. mass flow rate
5. log Q
6. change in entropy
7. % void fraction

QUESTION 5.06 (1.00)

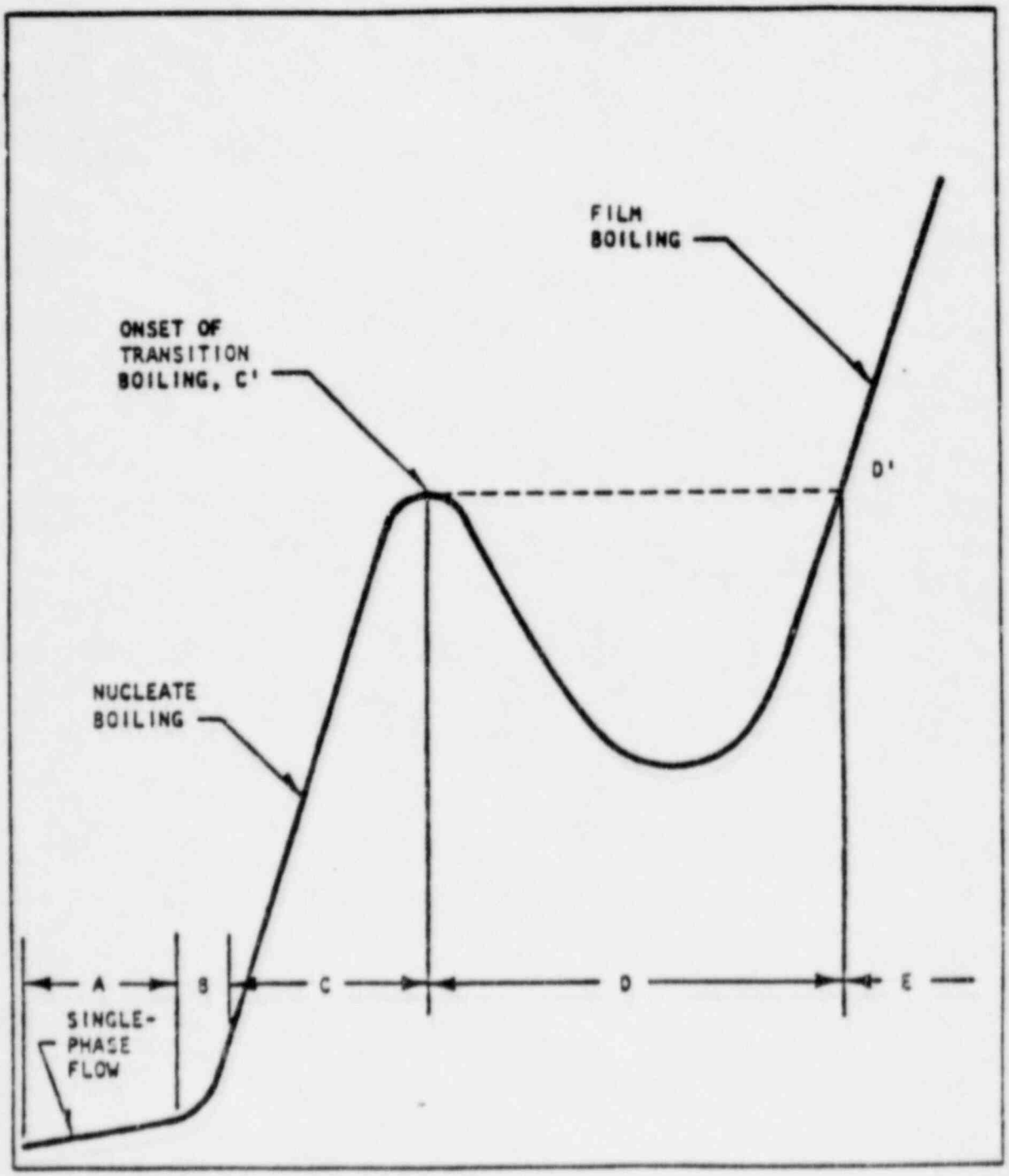
If a pressurized water system is operating at 705 F and 3400 psia, briefly explain what occurs in the system as temperature and pressure are simultaneously increased at a rate of 10 units per minute. Assume no physical restraints on the system. (1.0)

QUESTION 5.07 (1.00)

A representative value for a BWR TOTAL PEAKING FACTOR is 2.43.

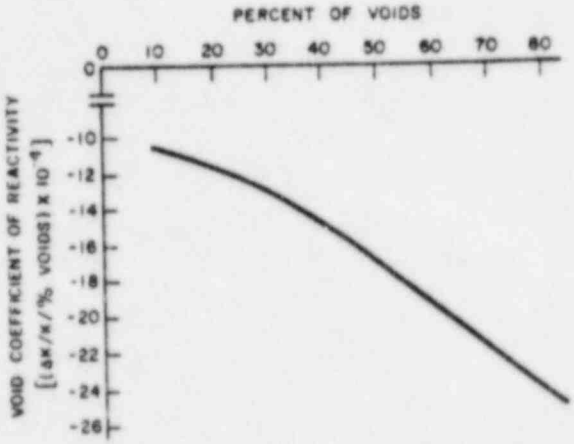
What three parameters are used to determine the total peaking factor? (1.0)

(***** CATEGORY 05 CONTINUED ON NEXT PAGE *****)


FILM
BOILING
ONSET OF
TRANSITION
BOILING, C'
D'
NUCLEATE
BOILING
A
B
C
D
E
SINGLE-
PHASE
FLOW

QUESTION 5.08 (2.00)

The below figure indicates the value of the void coefficient becomes more negative as reactor power increases. BRIEFLY explain why this is true.



Void Coefficient vs. % Voids

(***** CATEGORY 05 CONTINUED ON NEXT PAGE *****)

QUESTION 5.09 (3.00)

Assume the reactor is operating at power when one SRV fully opens.

A. What thermodynamic property of the steam remains nearly constant during the discharge to the suppression pool?

B. What will be the temperature of the steam entering the suppression pool? (State any assumptions you make for full credit!)

QUESTION 5.10 (1.00)

Why does the presence of Pu-239 late in core life cause beta effective to decrease?

QUESTION 5.11 (1.00)

Which of the below best define, "power density"?

a. reactor power in kw divided by the total surface area of the active fuel rods.

b. reactor power in kw divided by uranium loaded in the core.

c. reactor power in kw divided by core volume

d. reactor power in kw divided by the active length of fuel pins in the core.

QUESTION 5.12 (1.50)

List three intrinsic sources available for cold reactor startup. (1.5)

QUESTION 5.13 (1.50)

The effective multiplication for a cold, xenon free reactor with its strongest control rod withdrawn is calculated to be 0.899. What is the reactors shutdown margin? Must include units in answer! (1.5)

(***** CATEGORY 05 CONTINUED ON NEXT PAGE *****)

QUESTION 5.14 (2.00)

State whether the following changes will directly affect AVAILABLE recirculation pump net positive suction head (NPSH):
(Limit answer to: INCREASE, DECREASE, or NO AFFECT)
(Consider each change separately)

a. Feedwater temperature increases (0.5)

b. Reactor pressure decreases (0.5)

c. Reactor water level increases (0.5)

d. Recirculation pump speed decreases (0.5)

QUESTION 5.15 (1.50)

List three (3) symptoms of "core damage". (1.5)

QUESTION 5.16 (3.00) Both M/G Set Field Brks OPEN

During reactor operation at 100% indicated power, ~~the RPT breakers on the recirculation pumps trip open.~~ KMS

Answer the below questions concerning the above transient using the attached transient information. [see next page of exam for transient curves]

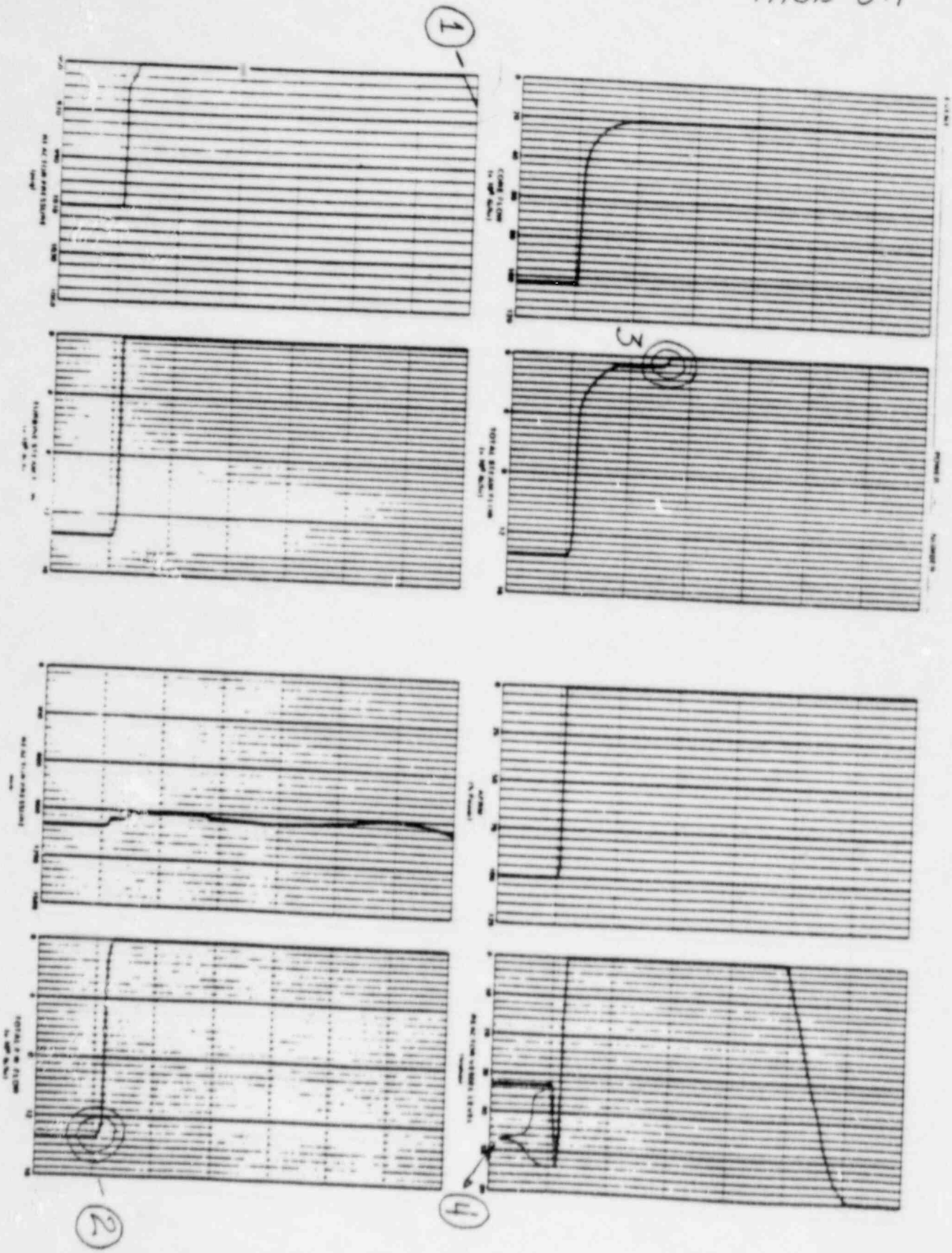
a. Why is pressure increasing at point #1? (0.5)

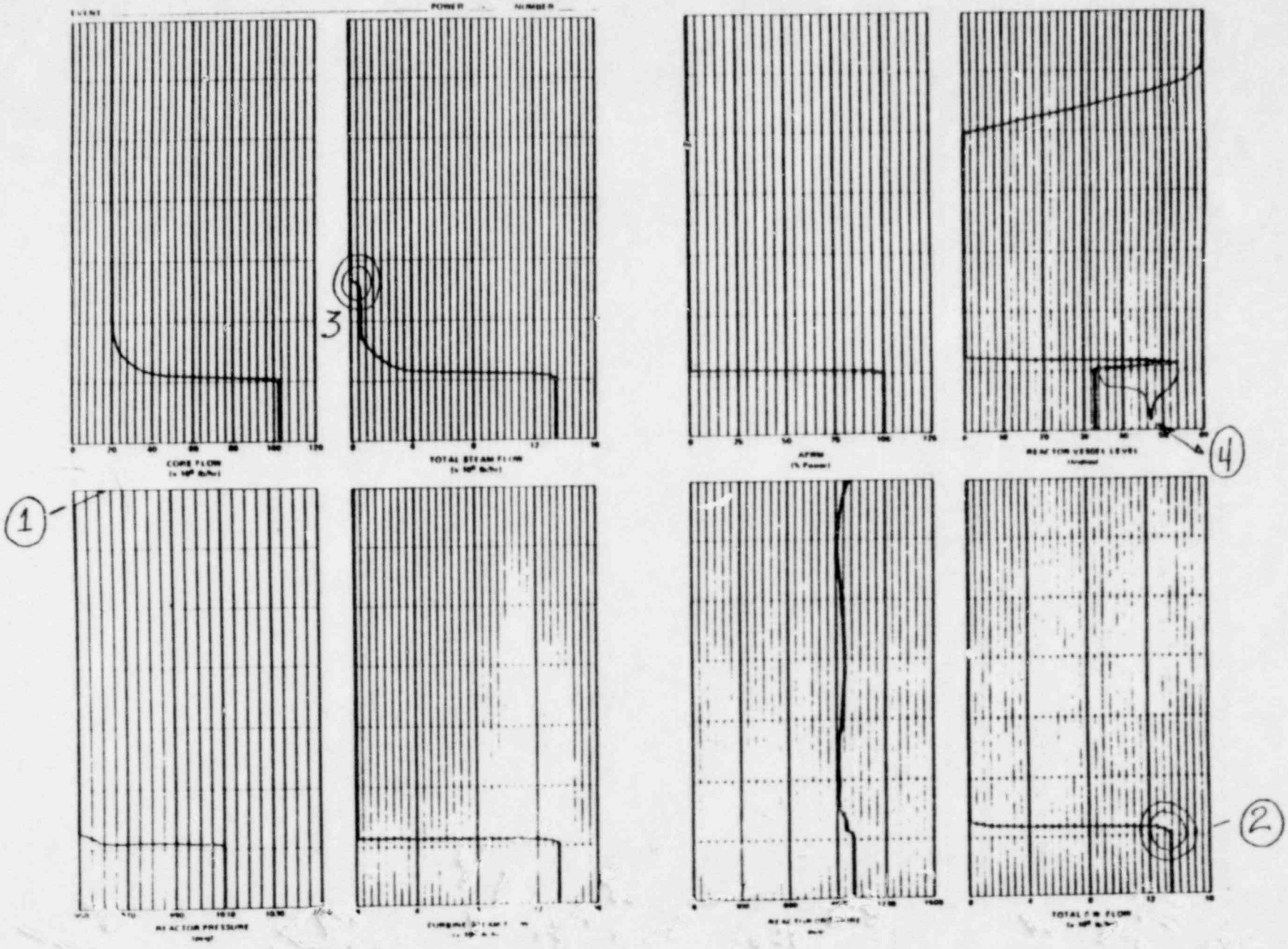
b. Why does total feedwater flow start to decrease at one rate then continue decreasing at a much faster rate at point #2? (1.0)

c. Why does total steam flow decrease to zero at point #3? (0.5)

d. What causes the level increase at point #4? (1.0)

(***** CATEGORY 05 CONTINUED ON NEXT PAGE *****)


1
3
2
4


EVENT
POWER
NUMBER
CORE FLOW
TOTAL STEAM FLOW
APRM
REACTOR VESSEL LEVEL
REACTOR PRESSURE
TOTAL F.W. FLOW
1
2
3
4

QUESTION 5.17 (1.00)

During degraded core conditions, why should the intermediate range monitoring system NOT be used as a vessel level instrument? (1.0)

QUESTION 5.18 (2.00)

Define the following terms;

a. Void fraction

b. steam quality

(***** END OF CATEGORY 05 *****)

QUESTION 6.01 (1.50)

List three (3) systems which receive power from the Reactor Protection System.

(1.0)

QUESTION 6.02 (1.25)

The Level 1 (>or = 7.7") initiates seven(7) automatic functions. List five (5) of the auto functions.

(1.25)

QUESTION 6.03 (1.00)

Which one Group of Primary containment isolation does NOT use " two - out - of - two - once " logic?

(1.0)

QUESTION 6.04 (1.00)

The turbine governor/pressure control system is provided with two non-redundant 130 VDC electrical power supplies.

Indicate the proper selection to correctly complete the statements below.

1. One 130 VDC power supply is required for the bypass valve trip control circuit and is supplied from the positive portion of the balance-of-plant battery. Loss of the power supply (will OR will not) cause a turbine trip.
2. One 130 VDC power supply is required to operate the turbine valve relays, and is supplied from the negative portion of the balance-of-plant battery. Loss of the power supply (will OR will not) cause a turbine trip.

(1.0)

(***** CATEGORY 06 CONTINUED ON NEXT PAGE *****)

QUESTION 6.01 (1.50)

List three (3) systems which receive power from the Reactor Protection System. (1.0)

QUESTION 6.02 (1.25)

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QUESTION 6.03 (1.00)

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The turbine governor/pressure control system is provided with two non-redundant 130 VDC electrical power supplies.

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2. One 130 VDC power supply is required to operate the turbine valve relays, and is supplied from the negative portion of the balance-of-plant battery. Loss of the power supply (will OR will not) cause a turbine trip.

(1.0)

(***** CATEGORY 06 CONTINUED ON NEXT PAGE *****)

QUESTION 6.05 (1.00)

During high power reactor operation the majority of the core delta pressure is taken across which of the below listed core components? (1.0)

a. core plate

b. fuel support casting

c. control rod guide tube

d. the highest powered bundles in the central region

QUESTION 6.06 (1.00)

What mechanically prevents the placement of a high enriched rod in a position designed for a low enriched fuel rod? (1.0)

QUESTION 6.07 (1.00)

The Recirculation loops are identical except for what two (2) differences? (1.0)

QUESTION 6.08 (2.00)

There are six (6) different flow indications associated with the RWCU System in the control room. List four (4) of the six indications. (2.0)

(***** CATEGORY 06 CONTINUED ON NEXT PAGE *****)

QUESTION 6.09 (1.00)

The reactor power input to the Rod Sequence Control System comes from which of the below listed systems? (1.0)

A. The total steam flow signal summed in the feedwater level control system.

B. The sum of the total feedwater flow as compaired to total rated feedwater flow.

C. Main turbine first stage pressure

D. APRM flow bias circuity

QUESTION 6.10 (1.00)

The blue scram lights at the full core display are energized by:
[choose one of the below to complete the above statement] (1.0)

A. limit switch on the ARI valves

B. limit switches on the backup scram valves

C. limit switches on the scram pilot valves indication each valve is not fully CLOSED.

D. limit switches on the inlet and outlet scram valves

QUESTION 6.11 (1.00)

The CRD drive water to reactor differential pressure indication instrument receives the reactor pressure input from:
[select one of the below to complete the above statement] (1.0)

A. pressure above the core plate

B. RWCU inlet pressure tap

C. RECIRC LOOP B suction pressure

D. reactor vessel level reference leg pressure tap

(***** CATEGORY 06 CONTINUED ON NEXT PAGE *****)

QUESTION 6.12 (1.50)

List three (3) of the five (5) loads supplied by Uninterruptible Power Systems. (1.5)

QUESTION 6.13 (2.00)

Answer the below questions concerning the HPCI System.

1. Why is valve F002 the only AC Powered valve in the system? (0.5)

2. How and when is or can the HPCI turbine overspeed trip be reset? Setpoint is required for full credit! (0.5)

3. The steam flow element FE N400 is located between what components? Select answer from below list (0.5)

   a. valve F002 and valve F003

   b. reactor vessel and valve F002

   c. valve F003 and valve F001

   d. valve F0067 and valve F0068

4. The barometric condenser vacuum pump discharges to what system? (0.5)

(***** CATEGORY 06 CONTINUED ON NEXT PAGE *****)

QUESTION 6.14 (2.50)

List in order of flow path starting with the "T" for cooling air from the roof the below listed components of the Standby Gas Treatment System (2.5)

A. HEPA Filter

B. Moisture Seperator

C. Exhaust Fan

D. Air Heater

E. Charcoal Absorber

F. Prefilter

G. HEPA Filter

QUESTION 6.15 (2.00)

There are five (5) methods employed in monitoring various system for leakage by the Leak Detection System.
List four (4) of the methods. (2.0)

QUESTION 6.16 (1.00)

The Main Steam Isolation valve required closing time is three (3) to five (5) seconds. List the two design requirements these operating times are based on.

(1.0)

(***** CATEGORY 06 CONTINUED ON NEXT PAGE *****)

QUESTION 6.17 (2.00)

Identify whether or not the below statements concerning the Reactor Vessel Level Control System signals are TRUE or FALSE.
(2.0)

1. At 30% of full power feedwater flow, the rod worth minimizer interlock is activated. [LPSP]

2. At less than 20% suction flow on a feedwater pump, the recirculation pumps automatically run back to 45% speed.

3. At greater than 35% of full power steam flow, the rod worth minimizer is no longer in the transition zone.

4. Assuming the level mode switch remains in "RUN", 52 seconds after a scram, the Auto Sealin of the SULCV can be reset with the "FEEDWATER LOGIC" switch.

QUESTION 6.18 (1.50)

The RCIC System turbine has four (4) automatic trips. List three (3) of these trips include the setpoints for activation.

(***** END OF CATEGORY 06 *****)

QUESTION 7.01 (1.00)

The technical specification limiting the delta temperature between the reactor pressure vessel steam space coolant and the bottom head drain line coolant protects what components during idle recirculation pump startup? [Select from the list below] (1.0)

1. undue stress on the vessel nozzles

2. recirculation pump and recirculation nozzles

3. undue stress on the vessel

4. undue stress on the vessel orifice plate

QUESTION 7.02 (1.00)

During reactor power operation a 74% rated thermal, the NSO observes a safety relief valve is OPEN. Assuming all attempts to close this valve FAIL, what requirements are now placed on continued reactor operation? (1.0)

QUESTION 7.03 (2.00)

Procedure 22.000.17, "Power Changes During Operation", requires samples whenever thermal power changes exceed 15%. When are these samples not required? (2.0)

QUESTION 7.04 (2.50)

List the entry conditions and setpoints for the "Level / Pressure Control" procedure number 29.000.01. (2.5)

(***** CATEGORY 07 CONTINUED ON NEXT PAGE *****)

QUESTION 7.05 (2.00)

Complete the following chart of operational conditions.

CONDITION	MODE SWITCH POSITION	AVERAGE REACTOR COOLANT TEMP.
Power Operation	Run	Any Temperature
Startup	(A)	(B)
Hot ~~Standby~~ Shutdown	(C)	(D)
Cold Shutdown	(E)	(F)
Refueling	(G)	(H)

QUESTION 7.06 (2.00)

The suppression chamber shall be OPERABLE with the pool water maximum average temperature of 95 F during OPERATIONAL CONDITION 1 or 2. The Technical Specifications lists two (2) exceptions to the above temperature.

List these two (2) exemptions and include the temperature limit associated with each exemption. (2.0)

(***** CATEGORY 07 CONTINUED ON NEXT PAGE *****)

QUESTION 7.07 (1.50)

The Startup From Cold Shutdown To Rated Power (procedure N0.22.000.03) lists several milestones to be performed referenced to system pressure, reactor power, and or system temperature.

Column A below lists various temperatures, pressures, and power levels at which tasks identified in column B are to be performed.

Match the items in column A with the task in column B that is associated with the proper parameter. (1.5)

COLUMN A	COLUMN B
1. reactor temp 200-212 F	A. jet pump operability
2. > / = 75 PSIG	B. start reactor feed pump
3. > / = 110 PSIG	C. transfer from single element to three element level control
4. 350 PSIG	D. close reactor head vents
5. 20 % power	E. place RCIC in standby
	F. place HPCI in standby
	G. start second reactor feed pump

QUESTION 7.08 (1.50)

There are three (3) entry conditions to procedure 29.000.08, Reactivity Control. Each of the entry conditions has two requirements. One of the requirements common to all is, "Receipt of a full scram signal", list the other three (3) entry condition requirements. (1.5)

(***** CATEGORY 07 CONTINUED ON NEXT PAGE *****)

QUESTION 7.09 (2.00)

A. What Emergency Classification is the below listed indications? (1.0)

Annunciator "REACTOR BUILDING DRYWELL FLOOR DRAIN SUMP LEVEL HIGH HIGH" and both drywell floor drain sump pumps running.

OR

Reactor water cleanup system leakage, as indicated by annunicator "RWCU DIFFERENTIAL FLOW HIGH-HIGH" and failure of both RWCU Isolation valves to close

OR

Annunciator "DRYWELL EQUIP DAIN LKGE HIGH" and both drywell equipment drain pumps running

B. What Emergency Condition would the above alarms represent? (1.0)

(***** CATEGORY 07 CONTINUED ON NEXT PAGE *****)

QUESTION 7.10 (1.00)

Radiation exposure control cards are color coded based on quarterly exposure as follows.

1. GREEN - personnel whose quarterly exposure is less than --a-- mREM

2. YELLOW - personnel whose quarterly exposure is --b-- mREM, or greater, but less than --c-- mREM

3. PINK - personnel whose quarterly exposure is greater than --d-- mREM and personnel whoes quarterly exposure limit is 100mREM due to lack of exposure history.

Select a value from column B which correctly completes each of the above statements.

	COLUMN B	
a=	1250	
b=	100	
c=	1000	
d=	2000	
	3000	
	5000	(4 @ 0.25 ea = 1.0)

QUESTION 7.11 (1.00)

Core alterations are being performed in the area of SRM "C". What SRM detectors must be OPERATIONAL in order for core alterations to continue? (1.0)

(***** CATEGORY 07 CONTINUED ON NEXT PAGE *****)

QUESTION 7.12 (2.00)

Identify which of the below listed events require one (1) hour notification to the NRC Operations Center. (2.0)

1. Any serious personnel radioactive contamination requiring extensive onsite decontamination or outside assistance.

2. Exposure of the feet, ankles, hands, or forearms of any individual to 37.5 rems or more of radiation.

3. The release of radioactive material in concentrations which, if averaged of 24 hours, would exceed 500 times the I-131 limit of 1 X 10E-10 micro-curies per millimeter in air.

4. Any serious personnel injury occurring on the site and requiring transport to an offsite medical facility.

QUESTION 7.13 (2.00)

Identify the term or terms each of the below definitions describe. (2.0)

A. Events are in process or have occurred which indicate a potential degradation of the level of safety of the plant. No release of radioactive material requiring off-site response or monitoring are expected unless further degradation of safety systems occurs.

B. Events are in process or have occurred which involve actual or likely major failures of plant functions needed for protection of the public. Any releases are not expected to exceed EPA Protective Action Guideline exposure levels except at or near the site boundary.

QUESTION 7.14 (1.50)

During a refueling floor high radiation event, the reactor building vent exhaust rad monitor upscale trip occurred. List three (3) of the five (5) automatic actions that will occur. (1.5)

(***** CATEGORY 07 CONTINUED ON NEXT PAGE *****)

QUESTION 7.15 (1.50)

Answer the following questions concerning the Halon Fire Suppression Sytem operation. (1.5)

A. What is the time requirement to prevent system activation using the Abort Station?

B. If the Abort Station was used, the system [will OR will not] activate after the station is released. Assume the confirmation signal is still in when the station is released.

C. TRUE or FALSE
Manual-Electric initiation of a Halon System is instantaneous and does not activate an evacuation delay period.

QUESTION 7.16 (2.00)

List two (2) of the three (3) actions to be performed in the control room prior to evacuation per 20.000.19. (2.0)
[The announcement is not an action]

(***** END OF CATEGORY 07 *****)

QUESTION 8.01 (1.50)

List two (2) of the reasons the recirculation pump speed mismatch is administratively limited. (1.5)

QUESTION 8.02 (1.00)

Multiple changes to a procedure may be made during performance of the procedure. List two (2) of the three (3) conditions or requirements (1.0)

QUESTION 8.03 (2.00)

Fermi uses four (4) types of tags for equipment, personnel, and system safety. Listed below are these four (4) types of tags. For each type listed, identify who must approve placement and removal of the tag. (2.0)

1. Safety Tag
2. Information Tag
3. Red tag with white lettering
4. White tag with red lettering

QUESTION 8.04 (2.00)

The reactor is operating at ~ 100% thermal power when "B" Recirc Pump tripped. List four (4) of the seven (7) indications available to the Shift Supervisor of this occurrence.

QUESTION 8.05 (2.00)

List four (4) circumstances requiring the use of a "SPECIFIC " Radiation Work Permit. (2.0)

(***** CATEGORY 08 CONTINUED ON NEXT PAGE *****)

QUESTION 8.06 (2.00)

Other than Operation conditions 1, 2, and 3, list two (2) other conditions requiring Secondary Containment Integrity. (2.0)

QUESTION 8.07 (1.50)

A. List the two (2) personnel that have the authority to postpone Independent Verification Requirements. (1.0)

B. If postoned, when must the verification be completed? (0.5)

QUESTION 8.08 (1.00)

In accordance with 10 CFR 55, " if a licensee has not been actively performing the functions of an operator or senior operator for a period of -----?----- months, or longer, he shall, prior to resuming activities licensed pursuant to this part, demonstrate to the Commission that his knowledge and understanding of facility operation and administration are satisfactory. "

Select from the below list the correct answer to complete the above statement. (1.0)

A. 2

B. 4

C. 6

D. 12

QUESTION 8.09 (1.00)

Which of the Safety Limits, if violated, does not allow two (2) hours to be in at least HOT SHUTDOWN? (1.0)

(***** CATEGORY 08 CONTINUED ON NEXT PAGE *****)

QUESTION 8.10 (1.00)

List two (2) of the methods used to assure "adequate core cooling". (1.0)

QUESTION 8.11 (2.00)

List the conditions required to defeat or shutdown an automatic function of an ECCS. (2.0)

QUESTION 8.12 (1.50)

According to Fermi Technical Specifications, when is the Nuclear Assistant Shift Supervisor NOT required on crew?

QUESTION 8.13 (2.00)

List two (2) of the three (3) additional restrictions placed on the new fuel vault when fuel assemblies are stored there. (2.0)

QUESTION 8.14 (2.00)

The Health Physics Supervisor - Operations or designee can review and revise Radiation Work Permits based on what four (4) criteria? (2.0)

QUESTION 8.15 (1.50)

Under what conditions or circumstances is a Radiation Work Permit NOT required for entry to a "HIGH RADIATION AREA"

(1.5)

(***** CATEGORY 08 CONTINUED ON NEXT PAGE *****)

QUESTION 8.16 (1.50)

The chloride limits associated with reactor coolant are different between operational Condition 1 and shutdown.

A. What are these two (2) limits? (1.0)

B. Why are they different? (0.5)

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(***** END OF CATEGORY 08 *****)
(*************** END OF EXAMINATION ***************)

ANSWERS -- FERMI 2 -86/03/25-SPENCER, M.

ANSWER 5.01 (1.00)

As the percent voids increase the neutron travels farther before slowing down, and thus increases its chance for capture in U-238. Therefore, the magnitude of the doppler coefficient increases.

REFERENCE
FERMI - Reactor Theory Fundamentals, Chapter 8, page 8.21 and fig 8-12

ANSWER 5.02 (1.00)

This effect is the result of fuel depletion [0.5] and fission product poison build-up [0.5]. (1.0)

REFERENCE
FERMI - Reactor Theory Fundamentals, Chapter 13, page 13.11 and Figure .13-16.

ANSWER 5.03 (1.00)

B cooldown stress (1.0)

* REFERENCE
FERMI - Nuclear power Plant Thermal Sciences, Chapter 5, page 5-10 and Figure 5.3

ANSWER 5.04 (1.00)

D

REFERENCE
FERMI - Nuclear Power Plant Thermal Sciences, Chapter 5, page 5-29 (Table 5.2); Chapter 9, page 9-4.

ANSWERS -- FERMI 2 -86/03/25-SPENCER, M.

ANSWER 5.05 (1.00)

HORIZONAL = 3

VERTICAL = 5

(2 @ 0.5 ea)

REFERENCE
FERMI - Nuclear Power Plant Thermal Sciences, Chapter 9, page 9-6.

########## INSERT FIGURE 9.3 INTO EXAM ###########

ANSWER 5.06 D (1.00)

Temperature can only increase to 705.5 F and maintain the water in a liquid state. The critical temperature of water is 705.5 F.

[Candidate must identify change of state or refer to critical temperature for full credit.] (1.0)

REFERENCE
FERMI - Nuclear Power Plant Thermal Sciences, Chapter 3, page 3-13.

ANSWER 5.07 (1.00)

1. Radial peaking factor
2. Local peaking factor
3. Axial peaking factor

*FRFERENCE
FREMI -Nuclear power Plant Thermal Sciences, Chapter 10, page 10-21.

ANSWERS -- FERMI 2 -86/03/25-SPENCER, M.

ANSWER 5.08 (2.00)

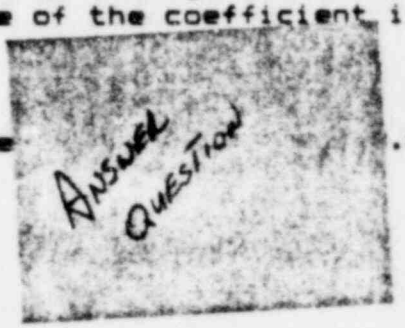
During low power operation, the upper portion of the core is the voided area while the lower portion of the core has the higher thermal flux.[0.5]

Most of the voids occurring outside the region of maximun thermal netron flux causes little effect on neutron multiplication. Therefore, the value of the coefficient is small.[0.5]

During high power operation, the region of void formation has shifted further down the coolant channel to the high thermal neutron flux area.[0.5]

A change in void content in this region now has a large effect on thermal neutron multiplication and the value of the coefficient is large [0.5]. (2.0)

REFERENCE
FERMI - Reactor Theory Fundamentals, Chapte .8.



ANSWER 5.09 (3.00)

A. Enthalpy (1.0)

B. Assume 545 F saturated steam throttled to atmospheric pressure (with constant enthalpy). (1.0)

Final steam temperature (from Mollier Diagram) is 300 F (+/- 10 F) (Other temperatures may be accepted depending upon assumptions) (1.0)

REFERENCE
FERMI- Thermal Sciences, p. 3-17
Mollier Diagram in Steam Tables

ANSWER 5.10 (1.00)

The delayed neutrons from Pu-239 are born at a higher energies the those of U-235[0.5].
Therefore, the slowing down length increased for delayed neutrons over core life, more neutrons leak out, and fewer delayed fast neutons reach thermal energies.[0.5] (1.0)

ANSWERS -- FERMI 2 -86/03/25-SPENCER, M.

REFERENCE
FERMI - Reactor Theory Fundamentals, Chapter 10, page 10.4

ANSWER 5.11 (1.00)

c.

REFERENCE
Nuclear Power Plant Thermal Sciences, Chapter 10, page 10-4

ANSWER 5.12 (1.50)

1. photo neutrons
2. alph - oxygen 18 reaction
3. spontaneous fission of the fuel
4. spontaneous fission of the Cm-242 and 244
5. cosmic neutrons (any 3 @ 0.5 ea) (1.5)

REFERENCE
FERMI - Reactor Theory Fundamentals, Chapter 11, page 11.1

ANSWER 5.13 (1.50)

$$SDM = \frac{1 - K(eff)}{K(eff)}$$ (0.5 pts)

SDM = 1 - 0.899 / 0.899 = 0.112 delta k/ k = 11.2% delta k / k
0.5 (0.25 points for correct math)
(0.50 points for correct units) (1.5)

REFERENCE
FERMI - Reactor Theory Fundamentals, Chapter 11, page 11.13

ANSWERS -- FERMI 2 -86/03/25-SPENCER, M.

ANSWER 5.14 (2.00)

a. DECREASE
b. DECREASE
c. INCREASE
d. INCREASE

(4 @ 0.5 ea.)

REFERENCE
FERMI - Nuclear Power Plant Thermal Sciences, Chapter 17, page 17-20

ANSWER 5.15 (1.50) Comment

1. excessive coolant activity
2. excessive radiaton levels
3. excessive hydrogen generation

(3 @ 0.5 ea)

REFERENCE
FERMI - Mitigating Core Damage, page 39

4. Div I/II off Gas Vent RADN Monitor Upscale
5. Div I/II off gas vent RADN Monitor High-High
6. Div I/II off gas RADN Monitor upscale
7. Div I/II off gas RADN Monitor Hi Timer
8. MN STM Line ch A/B/C/D Radiation Monitor Upscale
9. MN STM Line Radiation upscl/INOP channel trip
10. 2 monitor Holdup pipe RADN Monitor Upscale
11. 2 Monitor Holdup Pipe RADN Monitor Upscal trip

ANSWERS -- FERMI 2 -86/03/25-SPENCER, M.

D

ANSWER 5.16 (3.00)

a. HPCI and RCIC have tripped due to high level allowing pressure to commence to increase (0.5)

b. Feedwater flow initially follows the decrease in steam flow [0.5] then when the RFP's trip on high level the decrease in much faster [0.5] (1.0)

c. Total steam flow decreass to zero due to Group One Isolation at 24.8 inches. (0.5)

d. Vessel leve swells due to voiding in the core [0.5] and reduction in recirculaton and core flow [0.5] (1.0)

REFERENCE
FERMI - BWR Transients BXY - 7

INSERT BXY - 7 INTO EXAM AS NEXT PAGE

++

ANSWER 5.17 (1.00)

It is expected that the actual neutron and gamma levels will be below the range of the detectors. (1.0)

REFERENCE
FERMI - Mitigating Core Damage, page 55, pp 3.3.6.2

ANSWERS -- FERMI 2 -86/03/25-SPENCER, M.

ANSWER 5.18 (2.00)

a. void fraction is the volume fraction of steam in a steam-water mixture

$$\text{void fraction} = \frac{\text{volume of steam}}{\text{volume of steam + volume of water}} \quad (1.0)$$

b. steam quality is the weight fraction of steam in a steam-water mixture.

$$\text{steam quality} = \frac{\text{weight of steam}}{\text{weight of steam + weight of water}} \quad (1.0)$$

REFERENCE
FERMI - Nuclear Power Plant Thermal Sciences, page 9-20.

ANSWERS -- FERMI 2 -86/03/25-SPENCER, M.

ANSWER 6.01 (1.50)

1. Process radiation monitoring system
2. Power range monitoring system
3. Nuclear steam supply shutoff system
4. Reactor Protection System
5. Off-Gas monitoring system (3 @ 0.5 ea = 1.5)

REFERENCE
FERMI - Student Handout, Electrical Overview, page 9, rev. 4

ANSWER 6.02 (1.25)

1. RHR (LPCI Mode)
2. Core Spray
3. Starts Emergency DGS
4. Input ADS Logic
5. Input RHR Containment spray permissive logic
6. Trip of single speed DW cooling fans in AUTO: two speed fans shift to slow
7. Trip Reactor building sump pumps (any 5 @ 0.25 ea =1.25)

REFERENCE
FERMI - PRV Process Instrumentation System, Student Handout, page 26, rev 3

ANSWER 6.03 (1.00)

Group 1 Main Steam Isolation Valves (1.0)

REFERENCE
FERMI - Primary Containment Isolation System, Student Handout, page 5, rev. 4

ANSWERS -- FERMI 2 -86/03/25-SPENCER, M.

ANSWER 6.04 (1.00)

1. WILL NOT

2. WILL (2 @ 0.5 ea = 1.0)

REFERENCE
FERMI - Governor Pressure Control, Student Handout, page 14, rev. 3

ANSWER 6.05 (1.00)

b

REFERENCE
FERMI - Reactor Pressure Vessel and Internals, Student Handout, page 22.

ANSWER 6.06 (1.00)

The shanks on upper end plugs are sized to prevent completing fuel assembly if a high enriched rod is located in a position designed for a lower enriched fuel rod. (1.0)

REFERENCE
FERMI - Core and Fuel, Student Handout, page 8, rev 4

ANSWER 6.07 (1.00)

1. The RHR system can take a suction from loop B

2. The reacor sample lines tap off the loop B (2 @ 0.5 eq = 1.0)

REFERENCE
FERMI - Reactor Recirculatin System, Student Handout, page 4, rev. 4

ANSWERS -- FERMI 2 -86/03/25-SPENCER, M.

ANSWER 6.08 (2.00)

1. Bottom head drain flow
2. RWCU pump combined discharge
3. Return line (after regenerative heat exchangers)
4. Blowdown line
5. Filter demineralizer A effluent
6. Filter demineralizer B effluent

[any four af the above six for full credit] (2.0)

REFERENCE
FERMI - Reactor Water Cleanup System, Student Handout, page 10, rev. 4

ANSWER 6.09 (1.00)

C (1.0)

REFERENCE
FERMI - Rod Sequence Control System, Student Handout, page 3, rev. 4

ANSWER 6.10 (1.00)

D (1.0)

REFERENCE
FERMI - Control Rod Drive Hydraulic System, page 8, rev. 4

ANSWER 6.11 (1.00)

A (1.0)

REFERENCE
FERMI - SK3016-B21-2

ANSWERS -- FERMI 2 -86/03/25-SPENCER, M.

ANSWER 6.12 (1.50)

1. Turbine Governer Control System
2. Feed Water Control System
3. Rod Position Indication System
4. ERIS
5. Testibility Cabinets

(any 3 @ 0.5 ea = 1.5)

REFERENCE
FERMI - Electrical Overview, Student Handout, page 9, rev 4

ANSWER 6.13 (2.00)

1. Its normal position is open and its cntrol switch is keylocked
   ### OR ###
   It is located in a normally inaccessible area (drywell) (0.5)
2. On overspeed, as turbine speed decreases to between 2500 and 3000 RPM, the TRIP DRAIN VALVE resets, thus resetting the turbine and allowing HPCI to reinitiate if necessary. (0.5)
3. b. (0.5)
4. Standby Gas Treatment System (0.5)

REFERENCE
FERMI - High Pressure Coolant Injection System, Student Handout, pages 19, 12, and 7, rev 4
- SK3016-E41 - 1

ANSWERS -- FERMI 2 -86/03/25-SPENCER, M.

ANSWER 6.14 (2.50)

1. B
2. F
3. D
4. A or G
5. E
6. G or A
7. C (7 @ 0.357 ea=2.5)

REFERENCE
FERMI - SK3016-T46 - 1

ANSWER 6.15 (2.00)

COMMENT

1. Excess flow
2. Pressure and temperature change in primary containment
3. Increase in area temperature
4. Radiation
5. Moisture outside piping (any 4 @ 0.5 ea =2.0)
6. RATE & DURATION of sump Pump Out

REFERENCE
FERMI - Leak Detection System, Student Handout, page 4, rev 3

ANSWERS -- FERMI 2 -86/03/25-SPENCER, M.

ANSWER 6.16 (1.00)

1. Short enough to prevent exceeding any release limits during a steam line rupture. (0.5)

2. Long enough so as not to cause reactor pressure to exceed limits following a simultaneous closure of all main steam isolation valves. (0.5)

REFERENCE
FERMI - Main Steam and Bypass System, Student Handout, page 13, rev 4

ANSWER 6.17 (2.00)

1. FALSE [and steam flow] (0.5)

2. FALSE [level 4 also] (0.5)

3. TRUE (0.5)

4. FALSE [automatic reset] (0.5)

REFERENCE
FERMI - Reactor Vessel Level Control System, Student Handout, page 5 and 11

ANSWER 6.18 (1.50)

Comment

1. Mechanical overspeed 5625 RPM

2. High turbine exhaust pressure 25 psig

3. RPV Level 8 greater than or equal to 214 inches

4. Low pump suction 20 inches Hg decreasing

Tolerances on all setpoints is + / - 10%
0.25 pt for trip 0.25 pt for setpoint

(any 3 @ 0.5=1.5)

5 RCIC area high temp ≤ 158°F

6. High Stm flow ≤ 116.3 WATER

7. Rx low pressure ≤ 53 psig

8 Turbin exhaust diaphragm high pressure ≤ 20psig

ANSWERS -- FERMI 2 -86/03/25-SPENCER, M.

REFERENCE
FERMI - Reactor Core Isolation Cooling System, Student Handout, page 25, rev 4

ANSWERS -- FERMI 2 -86/03/25-SPENCER, M.

ANSWER 7.01 (1.00)

3.

REFERENCE
FERMI - Unit 2 T. S. page B 3/4 4-1

ANSWER 7.02 (1.00)

If the SRV cannot be closed in two (2) minutes OR torus temperature increased to (> / =) 95 F the mode switch must be placed to SHUTDOWN (1.0)

REFERENCE
FERMI - AOP 20.000.25, Failed Safety Relief Valve, page 1, rev 4

ANSWER 7.03 (2.00) comment

1. Analysis shows that the dose equivalent I-131 concentration [0.5] in the primary coolant has not icreased more than a factor of 3 [0.5] (1.0)

2. The noble gas monitor [0.5] shows that effluent activity has not increased more than a factor of 3 [0.5]. (1.0)

If power change occurs over a period of greater than one hour

REFERENCE
FERMI - Technical Specifications, page 3/4 11-11

ANSWER 7.04 (2.50)

1. Reactor water level [0.5] less than Level 3 (+172 inches) [0.5] (1.0)

2. Reactor pressure [0.5] greater than 1088 psig [0.5] (1.0)

3. A condition which requires MSIV isolation (setpoint tolerances + or - 10%) (0.5)

REFERENCE
FERMI - 29.000.01, Level Pressure Control, page 1, rev. 2

ANSWERS -- FERMI 2 · 86/03/25-SPENCER, M.

ANSWER 7.05 (2.00)

A = Startup / Hot Standby
B = Any temperature
C = Shutdown
D = 200 F
E = Shutdown
F = < or eq 200 F
G = Shutdown / Refuel
H = < or eq 140 F (8 @ 0.25 ea=2.0)

REFERENCE
FERMI - Unit 2 Technical Specifications, page 1-10.

ANSWER 7.06 (2.00)

105 F [0.5] during testing which adds heat to the suppression chamber [0.5] (1.0)

110 F [0.5] with thermal power less than or equal to 1 % of rated thermal power [0.5] (1 0)

REFERENCE
FERMI - Technical Specifications, page 3/4 6 - 15

ANSWER 7.07 (1.50)

1. = D

2. = E

3. = F

4. = B

5. = G, A, and/or C

REFERENCE
FERMI - Proecdure 22.000.03, rev. 5

ANSWERS -- FERMI 2 -86/03/25-SPENCER, M.

ANSWER 7.08 (1.50)

1. Sustained APRM indication is greater than or equal to 6 % (0.5)

2. More than one control rod does not insert to position 04 or less. (0.5)

3. Reactor power cannot be determined (0.5)

(3 @ 0.5 ea=1.5)

REFERENCE
FERMI - 29.000.08, Reactivity Control

ANSWER 7.09 (2.00)

a. Alert (1.0)

b. Reactor coolant leak rate greater than 50 gpm.
OR
Loss of one Fission Product Barrier [either answer for full credit] (1.0)

REFERENCE
FERMI - EP-101, TAB #9, page 6

ANSWER 7.10 (1.00) COMMENT

a= 1000

b= 1000

c= 2000

d= ~~2000~~ 3000

REFERENCE
FERMI- 12.000.13, Radiation Work Permit, page 13

ANSWERS -- FERMI 2 -86/03/25-SPENCER, M.

ANSWER 7.11 (1.00) COMMENT

SRM C AND SRM D OR SRM B [answer must include two SRM channels] (1.0)

Two detectors operable, one in affected quadrant, one in an adjacent quadrant

REFERENCE
FERMI - Technical Specifications, page 3/4 9-3

ANSWER 7.12 (2.00)

Items 1 and 4 are correct. (4 @ 0.5 ea=2.0)

REFERENCE
FERMI - 10 CFR 50.72

ANSWER 7.13 (2.00)

A. Unusual Event

B. Site Area Emergency

REFERENCE
FERMI - EP-102 and EP-104

ANSWER 7.14 (1.50)

1. Reactor Building Ventilation System trips.
2. Reactor Building Div. I and Div. II Supply and Exhaust Isolation valves close.
3. Primary Containment Purge and Vent valves close.
4. The Standby Gas Treatment System Auto Starts.
5. Control Center HVAC System aligns to the Emergency Recirc Mode.

(any 3 @ 0.5 ea=1.5)

ANSWERS -- FERMI 2 -86/03/25-SPENCER, M.

REFERENCE
FERMI - 20.710.01, Refueling Floor High Radiation, page 1, rev 5

ANSWER 7.15 (1.50)

A. 45 seconds

B. will (information only : after 150 second delay)

C. TRUE (3 @ 0.5 ea = 1.5)

REFERENCE
FERMI - 23.501.03, Halon Fire Suppression System, page 8, rev. 4

ANSWER 7.16 (2.00)

1. Place the reactor mode switch in the SHUTDOWN position.

2. Depress both Manual Scram pushbuttons.

3. Arm and Depress Main Turbine Trip pushbutton. (any 2 @ 1.0 = 2.0)

REFERENCE
FERMI - 200.0019, Shutdown from Outside Control Room, page 1, rev. 7

ANSWERS -- FERMI 2 -86/03/25-SPENCER, M.

ANSWER 8.01 (1.50)

1. Avoid possibility of "fooling" the LPCI loop selection logic.
2. Backflow through the idle or reduced flow jet pumps can cause jet pump vibration.
3. Provides some coastdown flow from the unbroken loop during a line break accident. (any 2 of the above at 0.75 ea)

REFERENCE
FERMI - Reactor Recirculation System, Student Handout, page 10, rev 4

ANSWER 8.02 (1.00)

1. The individual changes do not change the intent of the procedure.
2. Each individual change is signed by two (2) knowledgeable members of plant staff, one of whom is an SRO license holder.
3. Upon completion of the performance of the procedure, the changes will be combined and submitted as a temporary procedure change request. (any 2 @ 0.5 ea = 1.0)

REFERENCE
FERMI - 12.000.07, Plant Operations Manual Procedures, page 18

ANSWER 8.03 (2.00) COMMENT

1. Check at Facility * * * * * * * * * * * * * *
2. Nuclear Shift Supervisor
3. System Supervisor
4. Nuclear Shift Supervisor (4 @ 0.5 ea = 2.0)

REFERENCE
FERMI- 12.000.12, Tagging and Protective Barrier System, page 4

Any employee may initiate a safety tag
The supervisor incharge of the equipment is responsible for removing the safety tag

ANSWERS -- FERMI 2 -86/03/25-SPENCER, M.

ANSWER 8.04 (2.00)

1. Motor trip annunicator (3D119)
2. Recirc system loop A operating (3D151)
3. Core flow decrease
4. Rec Pump spwd indicator, read down scale
5. Recirc drive motor ammeter indicating "0"
6. Recirc drive motor CMC switch trip light ON
7. Generator MWe output decreases (any 4 @ 0.5 ea = 2.0)

REFERENCE
FERMI - AOP - 20.138.01, page 2, rev. 5

ANSWER 8.05 (2.00)

1. Contaminated Area[0.25] - greater the 10,000 dpm/100cm sq. [0.25]
2. Airborne radioactivity areas, requiring the use of respiratory protection equipment and where MPC hours are to be recorded.
3. Netron radiation area exposure
4. High radiation area exposure
5. Unknown conditions in an area to be entered.
6. Maintenance of equipment, controls, or instrumentation which contain radioactive material.
7. Radiography any place wihin the owner controlled area.

(Any 4 @ 0.5 ea.)

REFERENCE
FERMI - 12.000.13, Radiation Work Permit, page 8, rev. 6

ANSWERS -- FERMI 2 -86/03/25-SPENCER, M.

ANSWER 8.06 (2.00)

1. When irradiated fuel is being handled in the secondary containment
2. During Core Alterations
3. During operations having a potential for draining the reactor vessel (any 2 @ 1.0 ea = 2.0)

REFERENCE
FERMI- Technical Specifications, page 3/4 6-51.

ANSWER 8.07 (1.50)

A. Nuclear Shift Supervisor (0.5)
Nuclear Assistant Shift Supervisor (0.5) (1.0)

B. Compltеted prior to entering a condition for which system operability is required (0.5)

REFERENCE
FERMI - 12.000.43, Verification of Correct Performance of Operating Activites, page 5, rev. 2

ANSWER 8.08 (1.00)

B

REFERENCE
FERMI - 10 CFR 55.31.e

ANSWER 8.09 (1.00)

Reactor Vessel Water Level (1.0)

REFERENCE
FERMI - Technical Specifications, page 2-2

ANSWERS -- FERMI 2 -86/03/25-SPENCER, M.

ANSWER 8.10 (1.00)

1. The reactor is shutdowm and the core is covered.
2. The core spray systems are operating and injecting into the reactor vessel at rated flow.
3. An adequate steam cooling flow path has been established with assurance that the core has some water level. (any 2 0.5 ea= 1.0)

REFERENCE
FERMI - OC & P, Operating Reactor Coolant inventory events, page 13

ANSWER 8.11 (2.00)

A. The below must be confirmed by at least two independent indications. (1.5)

1. Misoperation in automatic was initiated (0.5)
2. Adequate core cooling is assured (0.5)

REFERENCE
FERMI- 29.000.02, Cooldown, page 1, rev. 3

ANSWER 8.12 (1.50)

Condition 4 [0.75] or 5 [0.75]

REFERENCE
FERMI - Technical Specifications, page 6-5

ANSWERS -- FERMI 2 -86/03/25-SPENCER, M.

ANSWER 8.13 D (2.00)

1. No more than six (6) rows of fuel assemblies shall remain uncovered during the loading or unloading of fuel assemblies.

2. Fireproof metal covers shall cover all other rows containing fuel assemblies.

3. When loading or unloading of fuel is not in progress, fireproof metal or concrete shield plugs shall cover all rows of fuel assemblies (any 2 @ 1.0 ea = 2.0)

REFERENCE
FERMI - 12.000.46, Refueling Floor Conduct of Operations, page 11, rev. 3

ANSWER 8.14 (2.00)

1. Repeated occurrences of personnel contamination or exposures in excess of administrative limits.

2. A man-rem limit is exceeded.

3. A change in the scope of work.

4. A change in radiological status of a system of area covered by the RWP. (4 @ 0.5 ea = 2.0)

REFERENCE
FERMI - 12.000.13, Radiation Work Permit, page 12, rev. 6

ANSWER 8.15 (1.50) COMMENT

1. Health physics personnel [0.5] or personnel escorted by health physics personnel [0.5] during the performance of the assigned radiation protection duties [0.5]. (1.5)

accident mitigation
first aid and life saving activities (3 of 5 @ 0.5 ea)

REFERENCE
FERMI - Technical Specification, page 6-21.

12.000.13 Rev 6 page 5
EP 21.000.03 Rev 2. page 2

ANSWERS -- FERMI 2 -86/03/25-SPENCER, M.

ANSWER 8.16 (1.50) COMMENT

A. During power operation = 0.2 ppm (0.5)

During shutdown and refueling = 0.5 ppm (0.5)

B. During power operation the catalytic effect of higher coolant temperatures requires lower limits inorder to reduce chloride stress corrosion. (0.5)

REFERENCE
FERMI - Technical Specifications, page B 3/4 4-2.

OR

A During power 0.2 ppm (0.5)
During hot shutdown 0.1 ppm (0.5)

B During power operation the oxygen level in the coolant is lower than when hot SID, thus reducing the possibility of chloride stress corrosion

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QUESTION	VALUE	REFERENCE
05.01	1.00	MJS0000193
05.02	1.00	MJS0000194
05.03	1.00	MJS0000195
05.04	1.00	MJS0000196
05.05	1.00	MJS0000197
05.06	1.00	MJS0000198
05.07	1.00	MJS0000199
05.08	2.00	MJS0000200
05.09	3.00	MJS0000201
05.10	1.00	MJS0000202
05.11	1.00	MJS0000203
05.12	1.50	MJS0000204
05.13	1.50	MJS0000205
05.14	2.00	MJS0000206
05.15	1.50	MJS0000207
05.16	3.00	MJS0000208
05.17	1.00	MJS0000209
05.18	2.00	MJS0000210
	26.50	
06.01	1.50	MJS0000211
06.02	1.25	MJS0000213
06.03	1.00	MJS0000214
06.04	1.00	MJS0000215
06.05	1.00	MJS0000216
06.06	1.00	MJS0000217
06.07	1.00	MJS0000218
06.08	2.00	MJS0000220
06.09	1.00	MJS0000221
06.10	1.00	MJS0000222
06.11	1.00	MJS0000223
06.12	1.50	MJS0000224
06.13	2.00	MJS0000226
06.14	2.50	MJS0000227
06.15	2.00	MJS0000228
06.16	1.00	MJS0000229
06.17	2.00	MJS0000232
06.18	1.50	MJS0000233
	25.25	
07.01	1.00	MJS0000234
07.02	1.00	MJS0000235
07.03	2.00	MJS0000236
07.04	2.50	MJS0000237
07.05	2.00	MJS0000238
07.06	2.00	MJS0000239
07.07	1.50	MJS0000240
07.08	1.50	MJS0000241

QUESTION	VALUE	REFERENCE
07.09	2.00	MJS0000242
07.10	1.00	MJS0000243
07.11	1.00	MJS0000244
07.12	2.00	MJS0000245
07.13	2.00	MJS0000246
07.14	1.50	MJS0000247
07.15	1.50	MJS0000248
07.16	2.00	MJS0000249
	26.50	
08.01	1.50	MJS0000250
08.02	1.00	MJS0000251
08.03	2.00	MJS0000252
08.04	2.00	MJS0000253
08.05	2.00	MJS0000254
08.06	2.00	MJS0000255
08.07	1.50	MJS0000256
08.08	1.00	MJS0000257
08.09	1.00	MJS0000258
08.10	1.00	MJS0000259
08.11	2.00	MJS0000260
08.12	1.50	MJS0000261
08.13	2.00	MJS0000262
08.14	2.00	MJS0000263
08.15	1.50	MJS0000264
08.16	1.50	MJS0000265
	25.50	
	103.75	