EXAMINATION REPORT

Examination Report No. 85-41 OL

Facility Docket No: 50-410

Licensee: Niagara Mohawk Power Corporation
300 Erie Boulevard West
Syracuse, New York 13202

Facility: Nine Mile Point 2

Examination Dates: December 10-19, 1986

Chief Examiner: [signature] for 3/24/86
David Lange, Lead BWR Examiner — date

Reviewed by: [signature] 3/25/86
Robert Keller, Chief — date
Projects Section 1C

Approved by: [signature] 3/26/86
Harry Kister, Chief — date
Projects Branch No. 1

Summary: This examination report contains the results of the Operator Licensing examinations given at the Nine Mile Point 2 Nuclear Station the weeks of December 9 and 16, 1985. Twelve (12) Senior Reactor Operator candidates and twenty (20) Reactor Operator candidates were examined. All RO candidates passed the written and oral examinations; two (2) failed the simulator examination. Of the SRO candidates, two (2) failed the written examination, one (1) failed the simulator examination, and one (1) failed both the written and oral examinations.

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REPORT DETAILS

TYPE OF EXAMS: Initial X Replacement ____ Requalification ____

EXAM RESULTS:

	RO Pass/Fail	SRO Pass/Fail
Written Exam	20/0	7/3
Oral Exam	12/0	11/1
Simulator Exam	10/2	11/1
Overall	18/2	8/4

1. Chief Examiners at Site: David Lange, NRC
   Lynn Kolonauski, NRC

2. Other Examiners:

   Frank Crescenzo, NRC
   Allen Howe, NRC
   Brian Hajek, NRC Consultant
   Gary Sly, PNL
   William Cliff, PNL
   Lee Miller, NRC

1. Summary of generic strengths or deficiencies noted on oral exams:

   Most candidates were well aware of the differences between the simulator and the plant.

   A few of the simulator groups were deficient in communication skills and procedure usage.

2. Summary of generic strengths or deficiencies noted from grading of written exams:

   No generic strengths or deficiencies were noted on the RO exam.

   An overall weakness was noted in Section 5 of the SRO exam; more specific weaknesses included an unfamiliarity with the Safety Parameter Display System (SPDS) and procedural cautions for the Reactor Recirculation System.

3. Comments on availability of, and candidate familiarization with plant reference material in the control room:

   Most candidates were adequately familiar with plant procedures but several of the simulator groups used only a limited number of procedures.

   The RO candidates were weak in locating specific piping and instrumentation diagrams as requested by the examiners. The SRO candidates, however, were very successful in locating and using the P&IDs.

4. Personnel Present at Exit Interview:

   NRC Personnel

   David Lange, BWR Chief Examiner, Region I
   Allen Howe, Reactor Engineer Examiner, Region I
   Frank Crescenzo, Reactor Engineer Examiner, Region I
   Steven Hudson, Senior Resident Inspector
   Lee Miller, Operator Licensing Branch, HDQ.

   Facility Personnel

   R. T. Seifried, Nuclear Training Assistant Superintendent
   M. D. Jones, NMP 2 Operations Superintendent
   G. L. Weimer, Associate Generation Specialist, Nuclear
   K. F. Zollitsch, Nuclear Training Superintendent
   T. J. Perkins, Nuclear Generation Superintendent

5. Summary of NRC Comments made at exit interview:

The examiners noticed that plant accessibility requirements changed daily; this example of inconsistent access control may be indicative of a plant security problem.

Several problems caused delays during the written exam:

1. Numerous incorrect and confusing Tech Spec action statements caused approximately a one-half hour delay when answering and clarifying two questions on Section 8 of the SRO exam.

2. The training material (mainly the NMP Lesson Plans and the Q/A Bank) sent to the examiners for preparing the written exam contained many inaccuracies. As a result, the questions prepared from this material were confusing and required a great deal of clarification. Many of the candidates even asked which answer we were looking for - "the one in the lesson plan or the one in the procedure?"

   During the written exam review, the training department asked the exam author to accept both the "right" and the "wrong" answer, because the wrong answer was identified in the training material and the candidates had been exposed to it. We feel accepting incorrect answers for the sake of the training material is not justified and contrary to the interest of safety.

3. The SRO candidates were told to use the TS handout to answer the questions in Section 8 only. The examiners observed several candidates using the TS handout as a "memory jogger" while working in the other exam sections. This resulted in wasted time while searching through Tech Specs and not using the handout as directed.

4. The Learning Objectives identified in the lesson plans should be revised to better represent the operating procedures and actual job performance. Whenever possible, the written exam questions are referenced to learning objectives. The NMP2 lesson plans, however, did not include an adequate amount of learning objectives suitable for this use.

5. A number of errors were identified in the surveillance testing procedures used during the simulator exams; the NMP training department was notified about the errors.

   The examiners thanked the NMP training department for their cooperation during the exam period. The room provided for the examiners next to the simulator was very useful and appreciated.

6. Summary of facility comments and commitments made at exit interview:

   The licensee agreed to send a copy of the Refueling On-the-Job training schedule for the operators to Region I.

7. Changes made to written exam during examination review:

   The following attachment addresses the NRC resolutions of Niagara Mohawk comments on the NMP 2 examinations given on December 10, 1985.

1. Written Examination and Answer Key (RO)
2. Written Examination and Answer Key (SRO)
3. NRC Resolution of Niagara Mohawk Comments

Attachment 1

U. S. NUCLEAR REGULATORY COMMISSION
REACTOR OPERATOR LICENSE EXAMINATION

FACILITY: NINE MILE POINT 2

REACTOR TYPE: BWR-GE5

DATE ADMINISTERED: 85/12/10

EXAMINER: G.A. SLY

APPLICANT: *MASTER KEY*

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	25.00	______	______	1. PRINCIPLES OF NUCLEAR POWER PLANT OPERATION, THERMODYNAMICS, HEAT TRANSFER AND FLUID FLOW
25.00	25.00	______	______	2. PLANT DESIGN INCLUDING SAFETY AND EMERGENCY SYSTEMS
25.00	25.00	______	______	3. INSTRUMENTS AND CONTROLS
25.00	25.00	______	______	4. PROCEDURES - NORMAL, ABNORMAL, EMERGENCY AND RADIOLOGICAL CONTROL
100.00	100.00	______	______	TOTALS

FINAL GRADE ______________%

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

____
APPLICANT'S SIGNATURE

N

QUESTION 1.01 (2.00)

The reactor is operating at 75% power. Recirculation flow is subsequently increased to provide 100% power. Briefly EXPLAIN the reactivity transient caused by the flow/power increase with emphasis on the following: (Your answer should include the initial effect, what happens during the power change, and the final steady state.)

a. core void content (1.0)

b. core reactivity (1.0)

QUESTION 1.02 (1.00)

Concerning control rod worths during a reactor startup from 100% PEAK XENON versus a startup under XENON-FREE conditions, WHICH statement is correct? (1.0)

a. PERIPHERAL control rod worth will be LOWER during the PEAK XENON startup than during the XENON-FREE startup.

b. CENTRAL control rod worth will be HIGHER during the PEAK XENON startup than during the XENON-FREE startup.

c. BOTH control rod worths will be the SAME regardless of core Xenon conditions.

d. PERIPHERAL control rod worth will be higher during the PEAK XENON startup than during the XENON-FREE startup.

QUESTION 1.03 (1.50)

The Reactor has been scrammed following 100 days of full-power operation. STATE whether the following statements concerning fission poisons are TRUE or FALSE.

Relative not absolute

a. A 25% power reduction from 100% power would have a LARGER Xenon peak than a 25% power reduction from 50% power. (0.5)

b. The Equilibrium Concentration of Samarium IS DEPENDENT on flux level (i.e., stable 100% power or stable 50% power). (0.5)

back to 100%

c. Upon restarting the reactor following a 6-month outage, the Samarium Concentration will DECREASE to its 100% full power concentration. (0.5)

QUESTION 1.04 (1.50)

During a routine startup, control rods are withdrawn, adding a specific amount of reactivity. Consider two (2) cases: 1) that the reactor was slightly subcritical (Keff = 0.995), and 2) that the reactor was greatly subcritical (Keff = 0.95). CHOOSE the word or words that best complete the sentence.

a. The change in the count rate in the slightly subcritical reactor would be (GREATER THAN, LESS THAN, EQUAL TO) the change in the count rate of the greatly subcritical reactor. (0.5)

—RATE—

b. The rise in the count rate in the slightly subcritical reactor would be (FASTER THAN, SLOWER THAN, THE SAME AS) the rise in count rate of the greatly subcritical reactor. (0.5)

c. The time required to reach the equilibrium count rate in the slightly subcritical reactor would be (SHORTER, LONGER, THE SAME AS) in the greatly subcritical reactor. Than Than (0.5)

(***** CATEGORY 01 CONTINUED ON NEXT PAGE *****)

QUESTION 1.05 (2.50)

Nine Mile Pt.-2 Reactor has just experienced a LOCA. An operator wishes to use nuclear instrumentation to determine water level within the core. Your answer should include WHAT nuclear instrumentation would be used, HOW you would use this nuclear instrumentation, WHAT indications you would see and WHY? (2.5)

QUESTION 1.06 (2.50)

During your shift an SRV inadvertently opens from 100% power 1000 psia. By using the Mollier Diagram or Steam Tables,

a. WHAT is the tailpipe temperature assuming atmospheric pressure in the suppression pool? (0.5)

b. If the suppression pool pressure were to increase, WHAT would the tailpipe temperature do (INCREASE, DECREASE, or STAY THE SAME)? (0.5)

c. If the reactor is then depressurized, WILL the tailpipe temperature initially (INCREASE, DECREASE, or STAY THE SAME)? (0.5)

d. At WHAT Rx pressure would the tailpipe temperature be at its maximum value and WHAT temperature is it? (0.5)

e. At WHAT Rx pressure would the tailpipe temperature be at its minimum value? INCLUDE value and assume a saturated system. (0.5)

QUESTION 1.07 (2.50)

STATE, for the following conditions, whether pump ampere would INCREASE, DECREASE, or REMAIN THE SAME:

a. the pump suction valve is slowly throttled closed (0.5)

b. increase in inlet subcooling (0.5)

c. slow closure in the discharge valve of the pump (0.5)

d. rotor lock-up (0.5)

e. rotor failure (break) (0.5)

(***** CATEGORY 01 CONTINUED ON NEXT PAGE *****)

QUESTION 1.08 (1.50)

Increasing recirculation pump speed will cause WHAT change (INCREASE, DECREASE, or REMAIN THE SAME) in each of the following parameters?

a. actual bundle power (0.5)

b. critical power (not ratio or margin) (0.5)

c. critical power ratio (0.5)

QUESTION 1.09 (2.00)

A "central" and "peripheral" bundle have been inadvertently placed in each others' location. WILL the misplaced bundles power and flow be (HIGHER THAN, LESS THAN, or THE SAME AS) the same type of bundle in the same area of the core?

a. Central bundle in peripheral location: (1.0)

b. Peripheral bundle in central location: (1.0)

<offacing> fixed

QUESTION 1.10 (2.00)

MATCH the most correct "parameter" listed below to the corresponding "fuel integrity item". (2.0)

Parameter

1. LHGR
2. Bulk boiling
3. Total peaking factor (TPF)
4. Onset of transition boiling (OTB)
5. Critical quality
6. CPR
7. APLHGR
8. Boiling length

Fuel Integrity Item

a. Specified to protect against boiling transition.

b. Specified to limit plastic strain and deformation of cladding to less than 1%.

c. Specified to limit peak fuel cladding temperature during a LOCA to less than 2200 deg F.

d. Specified as the point/time when the liquid film along the rod's surface is evaporated and cladding temperature starts to rise rapidly.

QUESTION 1.11 (2.00)

COMPLETE the following: (Blanks A through D MAY have more than one word). (2.0)

Xe-135 has two (2) methods of production. About 95% of the Xe is produced by _______(A)______ and the remaining 5% of Xe is produced by _______(B)______ . Xe also has two (2) removal methods; at high power levels _______(C)_______ is the major removal method, at low power levels ______(D)_______ becomes the predominant removal method.

QUESTION 1.12 (1.00)

Explain HOW and WHY excess reactivity varies with core age. (1.0)

(***** CATEGORY 01 CONTINUED ON NEXT PAGE *****)

QUESTION 1.13 (3.00)

You are currently operating at 100% power BOL when you loose partial feedwater heating.

a. If the same situation were to occur at EOL, WHAT would be the corresponding reactivity changes (MORE NEGATIVE, LESS NEGATIVE, NO CHANGE) to each of the ~~above~~ coefficients (i.e., delta (T)-mod, delta (% voids), delta (T))? (1.5)
fuel

b. If the STA tells you that feedwater temperature decreased by 10 deg F, voids decreased by 2%, and reactivity returns to zero, WHAT would be the corresponding temperature change to the fuel temperature? (Assume no rod movement, recirculation flow changes.) (1.5)

(***** END OF CATEGORY 01 *****)

QUESTION 2.01 (2.50)

Concerning the Standby Gas Treatment System:

a. ARRANGE the following components in flowpath order from the reactor. (1.0)

1. fan
2. demister
3. electric heater
4. flow element (train)
5. radiation element

b. STATE whether the following signals would (INITIATE, ISOLATE or NOT CHANGE) the SBGT system. (1.5)

1. The receipt of a high temperature alarm in Train "A". Assume Train "A" running and Train "B" had been manually stopped. (Answer for each train.)

2. High radiation alarm at the front face of the turbine.

3. High radiation alarm in the HPCS pump room.

4. Water level equal to 105 inches.

5. Drywell pressure equal to 1.65 psig.

QUESTION 2.02 (2.50)

a. WHAT are the differences in modes of operation for the RHS Loops A and B? (0.5)

b. WHAT is the reason for the interlock between the (1.0)

1. shutdown cooling suction valve and the test return valve?

2. pressure control valve bypass valve (MOV-23A) and Rx pressure?

c. If a LPCI auto initiation function (high drywell) was overridden to realign the system in shutdown cooling mode and another LPCI signal (triple low level) was to come in, WOULD the RHS Loop realign from the shutdown cooling mode to the LPCI mode? EXPLAIN. (1.0)

QUESTION 2.03 (2.50)

a. The LPCS system design has features to protect piping from overpressure. To manually open the LPCS inboard and outboard isolation valves, the correct sequence is....... (CHOOSE one). (Assume CS pumps are OFF initially and both valves are closed.) (1.0)

1. valve differential pressure < ~~700~~ psig , outboard opens then inboard opens

2. valve differential pressure < 700 psig, inboard opens then outboard opens

3. valve differential pressure > 700 psig, outboard opens then inboard opens

4. valve differential pressure > 700 psig, inboard opens then outboard opens

b. DESCRIBE the operation of the core spray sparger break detection system. INCLUDE in your answer WHERE pressure is physically sensed, and WHAT delta pressures are sensed. (1.5)

QUESTION 2.04 (1.00)

The Reactor Recirculation Pump seal cartridge assemblies consist of two (2) sets of sealing surfaces and breakdown bushing assemblies. Failure of the No. 2 seal assembly at rated conditions would result in... (CHOOSE one.) (1.0)

a. an increase in No. 2 seal cavity pressure from approximately 500 psig to approximately 1000 psig

b. a decrease in No. 2 seal cavity pressure from approximately 500 psig to approximately 0 psig

c. an increase in No. 1 seal cavity pressure from approximately 500 psig to approximately 1000 psig

d. a decrease in No. 1 seal cavity pressure from approximately 500 psig to approximately 0 psig

QUESTION 2.05 (2.00)

There are two (2) Check Valves located in the discharge line immediately upstream and downstream of the RCIC primary containment line penetration. STATE the two (2) purposes of these Check Valve. (2.0)

QUESTION 2.06 (2.00)

ANSWER TRUE or FALSE for the following:

a. The CRD Water Header pressure is normally maintained at 260 psig above reactor pressure. (0.5)

b. The standby CRD pump auto starts when the running pump trips. If operating pump trips will other CRD pump auto starts? (0.5)

c. CRDM Accumulators are charged with air from the service and instrument air system. (0.5)

d. Speed Control of the CRDM is accomplished by throttling valves in the hydraulic control units. (0.5)

QUESTION 2.07 (2.50)

STATE the following operating temperatures for the Reactor Water Cleanup System:

a. RWCU pump suction temperature (0.5)

b. NRHX outlet temperature (0.5)

c. Filter-demineralizer high temperature alarm (0.5)

d. Filter-demineralizer inlet system isolation temperature (0.5)

e. Return to feedwater temperature. (0.5)

QUESTION 2.08 (2.50)

a. WHAT conditions will cause the Div. III (CSH) diesel generator to shutdown during a LOCA condition? (3 required) (1.5)

b. Besides the fuel oil storage and transfer system, WHAT are the other five (5) auxiliary systems necessary for reliable and safe operation? (1.0)

QUESTION 2.09 (1.50)

Concerning combustible gas production following a Loss of Cooling Accident (LOCA):

a. STATE two (2) sources of hydrogen production. (1.0)

b. STATE the single source of oxygen production. (0.5)

QUESTION 2.10 (2.00)

LIST the four (4) signals which will cause an automatic Recirculation pump downshift from fast to slow speed. (2.0)

QUESTION 2.11 (2.00)

Concerning the four (4) vacuum relief lines between the drywell and the suppression chamber.

a. In WHICH direction is the flow designed to go? (0.5)

b. WHAT condition(s) do the vacuum relief lines limit or protect against? (1.5)

QUESTION 2.12 (2.00)

LIST the four (4), non-electrical, trips associated with a reactor feed pump (2.0)

(***** END OF CATEGORY 02 *****)

QUESTION 3.01 (3.00)

WHAT are the four (4) anticipatory scrams, HOW is each sensed, and HOW is each one bypassed? (3.0)

QUESTION 3.02 (2.00)

The reactor is at 100% power with the generator synced to the grid. Electrohydraulic Control (EHC) load set is 105%. By using the attached EHC diagram, EXPLAIN WHAT would happen (control valve, bypass valve) in the following circumstances:

a. load limit potentiometer reduced to 95%. (0.5)

b. maximum combined flow limit potentiometer reduced to 95%. (0.5)

c. "A" pressure regulatory (~~setpoint~~ X MTR) fails low. (0.5)

d. failure of two (2) bypass valves full open. (0.5)

QUESTION 3.03 (2.00)

ANSWER the following questions based upon the situation described below.

The RRCS is fully operational. The RRCS receives a reactor water low level (+105 inches) signal in both complementary logics of an RRCS channel and remains in for 120 seconds. It takes 100 seconds from the initial reactor water low level signal before the APRM level is downscale.

a. WHICH of the four (4) logics integrated into RRCS are actuated at T = 0 seconds? (0.5)

b. WHICH logics are actuated at T = 25 seconds? (0.5)

c. WHICH logics are actuated at T = 98 seconds? (0.5)

d. HOW LONG from T = 0 seconds is it before the RRCS can be reset? (0.5)

QUESTION 3.04 (2.50)

An automatic RCIC initiation has occurred. Subsequently, RCIC injection was automatically terminated due to high reactor water level.

a. WHAT component in the RCIC system functioned to terminate the injection? (0.5)

b. Assuming no operator action, HOW will RCIC respond to a subsequent decreasing water level? (below high water isolation setpoint) (0.5)

c. If an RCIC "Turbine Test" had been in progress when the initial automatic initiation signal had been received, HOW would the system have responded? (0.5)

d. If, following the initiation, the RCIC turbine had tripped on overspeed, COULD it be reset from the Control Room? (0.5)

e. If the RCIC system were lined-up in standby, WHAT would be the functional result of depressing and releasing the manual isolation button? (0.5)

QUESTION 3.05 (2.00)

For each of the following situations, STATE whether the ADS valves will OPEN, CLOSE, or REMAIN IN THE SAME position.

	Initial Condition	Action/Event	
a.	ADS logic initiated with all ADS valves open.	Turn off all operating ECCS pumps.	(0.5)
b.	All ADS logic signals initiated 105 sec. timer timing out. signal out	Push Channel A High DW PRESS SEAL-IN, push button then timer times out. out	(0.5)
c.	ADS valves closed ~~on B Main Steamline~~; All initiation signals are in, 105 timer just timed out.	Failure of the N2 supply system downstream of storage tank (TK4).	(0.5)
d.	SRV keylock control switch (PNL601) for ADS valve in off position.	All initiation signal come in and timer times out.	(0.5)

(***** CATEGORY 03 CONTINUED ON NEXT PAGE *****)

QUESTION 3.06 (3.00)

EXPLAIN WHAT affect the following failures would have on reactor level. WHY? (Assume 3-element control and Channel A controlling.)

a. 'C' steam line flow signal fails low. (0.75)

b. Channel 'A' reactor level detector signal fails low. (0.75)

c. Lose of RFP lube oil to the 'A' pump servo motor. FW.C.V. (0.75)

d. Inadvertent activation of the setpoint setdown circuitry. (0.75)

QUESTION 3.07 (1.00)

Concerning the four (4) rod display:

a. A control rod is selected for motion and a double X (XX) appears in the rod position window of the four (4) display panel. WHAT does this mean? (0.5)

b. WHAT if a rod were selected and a position window on the four (4) rod display panel, NOT corresponding to the selected selected rod, indicated blank? (0.5)

QUESTION 3.08 (3.00)

Concerning the Intermediate Range Monitors (IRM):

a. If an IRM is reading 7 on Range 9 and the operator down-ranges to range 7, WHAT will the channel reading be? (0.5)

b. WHAT would be the corresponding APRM power level and WHAT trips, if any, will occur? (1.0)

c. Briefly DESCRIBE HOW the IRM system discriminates for gamma signals. Include in your answer the difference between this method and that used for the SRMs. (1.5)

QUESTION 3.09 (3.00)

The Instrument and Service Air systems receive air from a common set of three (3) air compressors.

a. The control switches must be in the auto after stop (green flag) position during normal operations. If the standby compressor started, WHAT would be the consequences of matching the flag to the running status? (0.5)

b. If the air header pressure continued to drop after the standby compressor started, and the Service Air System isolated, WHAT action is required to restore Service Air? (0.5)

c. If Instrument Air were to be completely lost, in WHAT position would each of the following valves fail? (2.0)

1. scram inlet valves

2. reactor water cleanup filter/demin inlet and outlet valves

3. cooling tower level control valve

4. condenser 4-inch make-up valve (LV-103, Normal make-up)

QUESTION 3.10 (2.00)

WHAT five (5) conditions will cause the Loop Flow Controllers to automatically transfer from Automatic to Manual, when operating in Master Manual control? (2.0)

(***** CATEGORY 03 CONTINUED ON NEXT PAGE *****)

QUESTION 3.11 (1.50)

Given the following data for APRM Channel C:

LPRM Level:	A	B	C	D
Number of LPRMs assigned:	6	5	5	5
Number of LPRMs bypassed:	3	4	0	0

a. If APRM Channel C selector switch on the local (back) panel was placed to the COUNT position, WHAT would be the expected meter reading? (SHOW calculations.) (0.5)

b. Based on the above data, is APRM Channel C operable: ANSWER YES or NO and EXPLAIN WHY. (1.0)

(***** END OF CATEGORY 03 *****)

QUESTION 4.01 (2.50)

During a plant startup and heatup, several actions must be taken as a function of RPV pressure. For EACH of the following actions, GIVE the approximate pressures by which, or above which, the action must be taken according to N2-IOP-101A, Plant Startup.

a. The ADS must be verified operable prior to reactor pressure exceeding ____________________. (0.5)

b. Condenser vacuum must be established prior to opening a bypass valve with the vacuum being maintained by the SJAEs. The EHC will open a bypass valve at approximately __________. (0.5)

c. Start a motor driven feedpump when reactor pressure reaches about ______________. (0.5)

d. Transfer the Mode switch to Run after (among verification of other parameters) the steamline pressure has been verified to be greater than ______________. (0.5)

e. RCIC must be determined operable prior to exceeding a reactor pressure of ______________. (0.5)

QUESTION 4.02 (3.00)

ANSWER the following questions concerning the main generator and load changes. USE the attached Power Factor Chart.

a. WHAT would be the operating load (MWe, KVA) limit with a lagging power factor 0.9 and H2 pressure at 30 psig? (0.5)

b. You are operating at a 0.95 lagging power factor with 75 psig H2 and the load dispatcher orders you to drop your power factor to a 0.9 lagging power factor but maintain maximum MWe output. In general, HOW would you change your operating condition? Include in your answer initial conditions (MWe,KVA), a brief discussion of the power change, and the final conditions (MWe, KVA). (2.5)

QUESTION 4.03 (3.00)

According to the start-up procedure:

a. HOW is the SRM/IRM 1/2 decade overlap supposed to be verified? (1.0)

b. If reactor power is 13% and the mode switch is in start-up, SHOULD the reactor have scrammed? WHY? (0.5)

c. HOW is the reactor determined critical (3 conditions)? (1.5)

QUESTION 4.04 (1.00)

During the "steam condensing mode" of RHS, EXPLAIN HOW reactor cooldown rate is controlled. (1.0)

QUESTION 4.05 (1.00)

WHAT reactor conditions and characteristics [four (4) required] influence the point of criticality and the rate at which it is approached during a reactor startup? (1.0)

QUESTION 4.06 (1.50)

A precaution in OP-92, Neutron Monitoring, states that "BWR cores typically operate with neutron flux noise. Care should be taken when operating in this area."

a. WHAT problem can this "noise" create? (0.5)

b. In WHAT specific operating condition is this applicable? (0.5)

c. WHAT actions are required if this condition exists? (0.5)

QUESTION 4.07 (2.00)

For the CRD System:

a. PROVIDE the four (4) indications of a sucessful coupling check. (1.0)

b. WHAT immediate operator actions are required on loss of all CRD flow? (1.0)

QUESTION 4.08 (2.00)

ANSWER TRUE or FALSE to the following questions on the Rod Worth Minimizer (RWM) System.

a. If an insert block is present, then three (3) control rod insert errors HAVE occurred and ALL three (3) rods are positioned two (2) even notches past their pull sheet minimum limits. (0.5)

b. When changing Rx power into the RWM operable range, the Rod Group Window WILL display the highest group which has less than three (3) insert errors and at least one (1) rod withdrawn past its minimum limit. (0.5)

c. The select error lamp WILL illuminate whenever the selected rod is not responsible for the current rod block. (0.5)

d. If Rx power is changed such that the RWM system becomes operational with greater than the maximum amount of insert and withdrawal errors present, NO NORMAL rod movement is possible, unless the group contains a control rod causing an insert/withdrawal error. (0.5)

QUESTION 4.09 (3.00)

ANSWER the following questions concerning radiation and radiological control: For a 20-year-old employee with an accumulated occupational dose of 8 rem.

a. WHAT would be the employees maximun federal limit for the quarter? (1.0)

b. COULD this employee be eligible for a life saving action and not violate any federal limits. EXPLAIN (1.0)

c. If the above individual were assigned to assist in the charging of the CRD accumulator (predicted to take 3-hrs) WOULD he/she violate any administrative limits? Radiation Protection stated that a 25 mrem/hr dose exists in the area. (Answer YES or NO, and PROVIDE limit.) (1.0)

QUESTION 4.10 (2.50)

According to Procedure N2-EOP-RL,

a. WHAT precautions must be taken PRIOR TO placing an ECCS system in manual? (1.5)

b. WHAT precautions must be taken WHILE an ECCS system is in manual? (1.0)

QUESTION 4.11 (2.50)

You have been operating at 60% power when one (1) recirculation loop trips. You have been requested to restart the idle loop.

a. According to the Recirculation Procedure, WHAT are the thermal limits that apply to the restart of an idle loop? (1.5)

b. If the idle loop cannot be restarted, COULD you continue to operate with only one (1) recirculation loop for an extended period of time, (i.e., greater than 8 hours)? EXPLAIN. (1.0)

(***** CATEGORY 04 CONTINUED ON NEXT PAGE *****)

QUESTION 4.12 (1.00)

LIST the Entry Conditions for Reactor Pressure Vessel (RPV) Water Level Control. (1.0)

(***** END OF CATEGORY 04 *****)
(************* END OF EXAMINATION ***************)

EQUATION SHEET

Where $\dot{m}_1 = \dot{m}_2$

$(\text{density})_1(\text{velocity})_1(\text{area})_1 = (\text{density})_2(\text{velocity})_2(\text{area})_2$

$KE = \frac{mv^2}{2}$ $PE = mgh$ $PE_1+KE_1+P_1V_1 = PE_2+KE_2+P_2V_2$ where V = specific volume, P = Pressure

---

$Q = \dot{m}c_p(T_{out}-T_{in})$ $Q = UA\ (T_{ave}-T_{stm})$ $Q = \dot{m}(h_1-h_2)$

$P = P_o10^{(SUR)(t)}$ $P = P_oe^{t/T}$ $SUR = \frac{26.06}{T}$ $T = \frac{(B-p)t}{p}$

$\text{delta } K = (K_{eff}-1)$ $CR_1(1-K_{eff1}) = CR_2(1-K_{eff2})$ $CR = S/(1-K_{eff})$

$M = \frac{(1-K_{eff1})}{(1-K_{eff2})}$ $SDM = \frac{(1-K_{eff}) \times 100\%}{K_{eff}}$

$\text{decay constant} = \frac{\ln(2)}{t_{1/2}} = \frac{0.693}{t_{1/2}}$ $A_1 = A_oe^{-(\text{decay constant})x(t)}$

Water Parameters

1 gallon = 8.345 lbs
1 gallon = 3.78 liters

1 ft^3 = 7.48 gallons

Density = 62.4 lbm/ft^3
Density = 1 gm/cm^3

Heat of Vaporization = 970 Btu/lbm
Heat of Fusion = 144 Btu/lbm
1 Atm = 14.7 psia = 29.9 in Hg

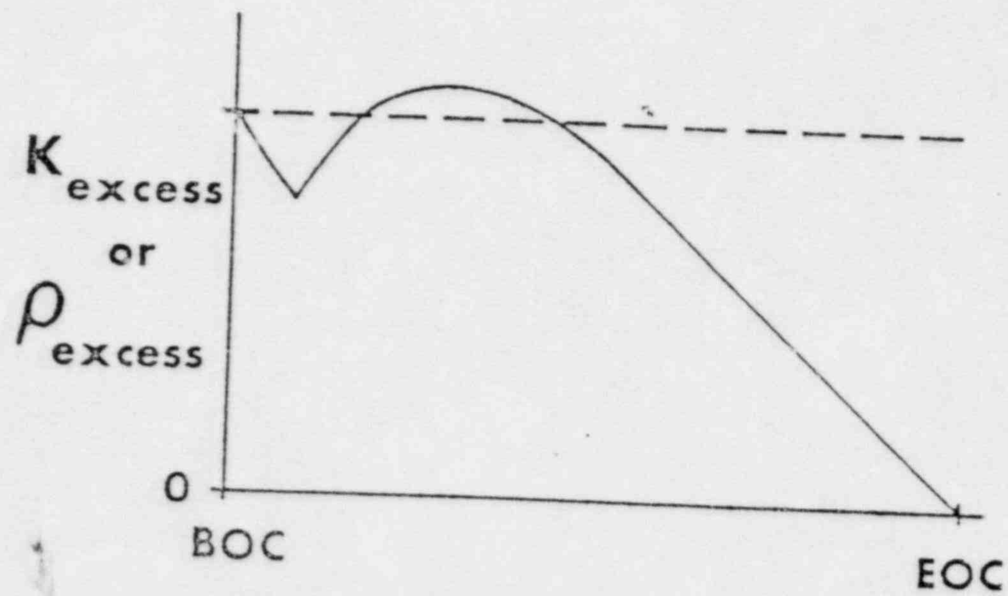
Miscellaneous Conversions

1 Curie = 3.7×10^{10} dps
1 kg = 2.21 lbs

1 hp = 2.54×10^3 Btu/hr

1 MW = 3.41×10^6 Btu/hr
1 Btu = 778 ft-lbf

Degrees F = (1.8 x Degrees C) + 32
1 inch = 2.54 centimeters
g = 32.174 $ft\text{-}lbm/lbf\text{-}sec^2$



K excess
or
ρ excess
0
BOC
EOC

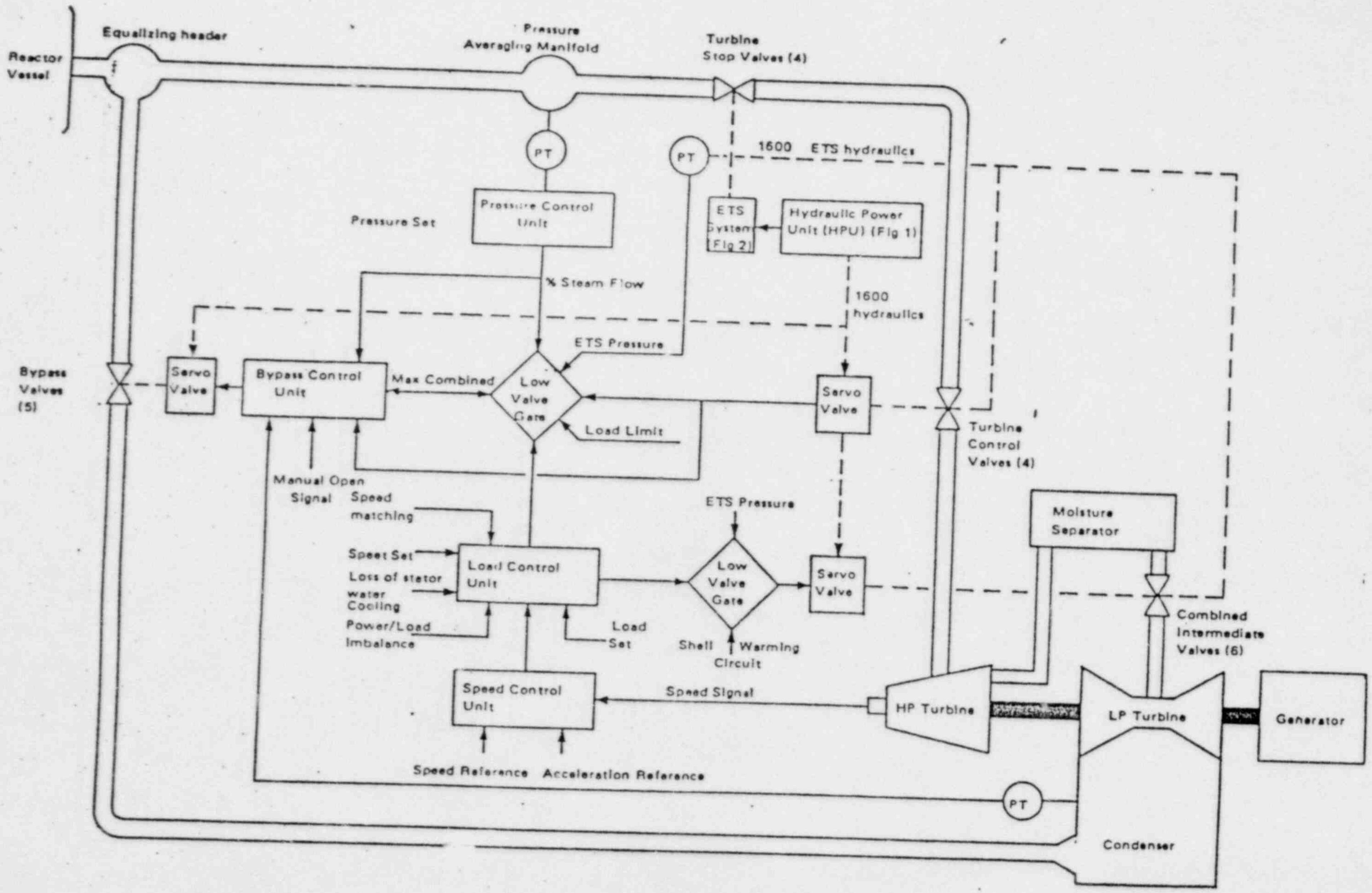


Figure 3	Rev. 0

Title:

TURBINE CONTROL UNIT

2. NMP-2 Exam Bank Question, p. 33, Cat. 1/5.

ANSWER 1.07 (2.50)

a. decrease

b. increase

c. decrease

d. increase

e. decrease

(+0.5 pts for each)

REFERENCE

1. NMP-2 Student Learning Objectives for Fluid Statics, Dynamics, and Delivery No. 7, 10, 12, 14, pp. 15 to 17.

ANSWER 1.08 (1.50)

a. actual bundle power increases (+0.5)

b. critical power increases (+0.5)

c. critical power ratio decreases (+0.5)

REFERENCE

1. NMP-2 Student Learning Objective for BWR Thermodynamics and Thermal Hydraulic Limits, No. 7, p. 9.

2. General Electric Thermodynamics, Heat Transfer, and Fluid Flow, MTC, March 1983, pp. 9-81, 9-86, 9-92.

Since orfices are fixed: only 2Ø flow would effect flow
∴ Central - lower flow due to higher power.
Periferal - higher flow due to lower power

ANSWER 1.09 (2.00)

a. Central bundle in peripheral location:

power higher than (+0.5)

flow ~~higher~~ lower than (+0.5) If responds "increase" reverse due to 2Ø

b. Peripheral bundle in a central location:

power lower than (+0.5) " "

flow ~~Lower~~ higher than (+0.5) "decrease" " "

REFERENCE

1. Thermodynamics Lesson Plan, BWR Thermodynamics and Thermal Hydraulic Limits, p. 13 of 20.

2. NMP-2 Examination Bank, Category 1.5, p. 73.

ANSWER 1.10 (2.00)

a. 6. CPR - protect against transition boiling

b. 1. LHGR - maintain cladding than 1% plastic strain.

c. 7. APLHGR - maintain peak cladding surface temperature to less than 2200 deg F following a LOCA

d. 4. OTB

(+0.5 pts. for each response)

REFERENCE

1. NMP-2 Introduction to Thermodynamics and Thermal Hydraulic Limits, Figure 4, p. 6, Student Learning Objective Nos. 1, 2, 5.

ANSWER 1.11 (2.00)

A. I-135 decay (+0.5)

B. Direct fission yield (+0.5)

C. Burnout (+0.5)

D. Xe-135 decay (+0.5)

REFERENCE

1. NMP-2 Operations Technology, Module I, Part 16, pp. I-16-1 to I-16-3, Student Learning Objective No. 1

ANSWER 1.12 (1.00)

Initially the excess reactivity of the core will decrease due to a buildup of fission product poisons (+0.25). Once fission product poisons reach an equilibrium value, the excess reactivity will increase as burnable poison burnout exceeds fuel burnup (+0.25). This increase continues to a maximum value where fuel burnup begins to exceed poison burnout (+0.25). The value then decreases until refueling due to fuel burnup (+0.25).

REFERENCE

1. NMP-2 Operations Technology, Module I, Part 7, p. 7-7, Student Learning Objective No. 3. Provide K-excess Graph.

2. NMP Examination Bank Question Category 1, 5, p. 39.

ANSWER 1.13 (3.00)

a. delta(ro) = alpha(x) [delta(x)]

delta(ro)D = more negative (+0.5)

delta(ro)V = less negative (+0.5)

delta(ro)M = less negative (+0.5)

b. alpha(d)(delta(T)fuel) = alpha(m)(delta(T)mod) + alpha(v)delta(%V)
(0.25 pts for equation)

alpha(m) = -1.0 x 10E-5 delta K/K/deg-F (0.25)

alpha(d) = -1.0 x 10E-5 delta K/K/deg-F (0.25)

alpha(v) = -1.0 x 10E-3 delta K/K/%V (0.25)

1.0
delta(T)fuel=[(-1 x 10E-4(-10))+(-1 x 10E-3(-2))]/(-1.2 x 10E-5)

delta(T)fuel = -250 deg F or 250 deg F increase in fuel temp. (0.5)
-300

REFERENCE

1. NMP-2 Operations Technology Module I, Part 13, pp. 13-5, 13-6, Student Learning Objectives No. 2.c, 3.

2. NMP-2 Operations Technology Module I, Part 12, pp. 12-5, 12-7, Figures 12-6, 12-7, Student Learning Objectives No. 2.b, 3.a, 3.b.

ANSWER 2.01 (2.50)

a. 2, 3, 1, 4, 5
(demister, electric heater, fan, flow element, radiation element) (+0.2 for each)

b. 1. ~~initiate~~ no change Train "B", ~~isolate~~ no change Train "A" (+0.5) (need high-high)
2. no change (+0.25)
3. no change (+0.25)
4. initiate (+0.25)
5. initiate (+0.25)

REFERENCE
1. NMP-2 Operations Technology, Module V, Part 6, SBGT, pp. 2-7, Student Learning Objective Nos. 2, 3, 5, 6.
N2-IOP-61B, pg. 7.

ANSWER 2.02 (2.50)

Motor operated valves to loop 'B' only

a. RHR'B' - head spray (+0.25)
- containment flooding (+0.25) (+0.5 TOTAL)

} design change - NOT "modes" exactly

b. 1. Prevent inadvertent draining of the vessel (+0.5)

2. Prevent exceeding RHS design pressure (+0.5) (+1.0 TOTAL)

NO - suction valves do not realign (No auto open on Sup Pool Cooling)

c. ~~Yes~~ (+0.25), because the second LPCI initiation signal will realign the system by reopening the LPCI injection valve. (+0.75) (+1.0 TOTAL)

REFERENCE
1. NMP-2 Operations Technology, Module IV, Part 5, RHS, pp. 5, 9, 10, Student Learning Objective Nos. 1, 5, 6.

ANSWER 2.03 (2.50)

a. "1" (+1.0)

b. Differential pressure is sensed between the core spray injection line (+0.25) and the RHS A LPCI injection ~~nozzle~~ line (+0.25) A break in the CS piping outside the shroud (+0.25) but inside the vessel (+0.25) would cause the dp to increase to the pressure drop across the steam separators (+0.5, +1.5 Total)

or Jet Pump / Core

REFERENCE

1. NMP-2 Operations Technology, Module IV, CSL, pp 7, 8

ANSWER 2.04 (1.00)

b. (+1.0)

REFERENCE

1. NMP-2 Operations Technology, Module III, Recirc., p. 3, Fig. 6

ANSWER 2.05 (2.00)

Prevent back flow (+0.5)

Check Valve - Assure a non-isolatable or non-servicable flow path for RCIC (~~+1.0~~ +0.5) and provides for the inside and outside primary containment isolation valve. (+1.0)

did solicit CV vs. any other valve, will not get isolations

REFERENCE

1. NMP-2 Operations Technology, Module IV, RCIC, p. 3, Fig. 1

ANSWER 2.06 (2.00)

a. TRUE (+0.5)

b. TRUE (+0.5)

c. FALSE (+0.5)

d. TRUE (+0.5)

REFERENCE

1. NMP-2 Operations Technology, Control Rod Hydraulics Rev. 1, p. 10 of 14, Student Learning Objective No.

ANSWER 2.07 (2.50)

a. 533 deg F +/- 5 deg F — 1000 psia — 545°F ± 5°F steam table (Now changes "e")

b. ~120 deg F ~~(no tolerance)~~ O.P. 37 says "about 120°F"

c. 130 deg F (no tolerance)

d. 140 deg F (no tolerance)

e. 437 deg F +/- 5 deg F — gives you about 444°F

NOTE: Since students were taught that there is a 100 deg F difference between (a) and (e) above, accept a 100 deg F difference for full credit for (e).

(+0.5 for each value)

REFERENCE

1. NP-2-OP-37, Reactor Water Cleanup.

2. NMP-2 Exam Bank

ANSWER 2.08 (2.50)

a. 1. Engine (or generator) overspeed (+0.5)
   2. Generator differintial lockout (+0.5)
   3. Manual stop (+0.5)

b. 1. Fuel oil supply
   2. Jacket water cooling / SW
   3. Starting air
   4. Lubrication
   5. Combustion air (+0.2 each, +1.0 Total)

Acc'd to OP 100.1 pg 7:
1. Station Electrical 115 kV switchyard
2. Sby and Emerg AC dist
3. HPCS 125 Vdc dist
4. DG Bldg ventilation
5. Service Water

REFERENCE

1. NMP-2 Operation Technology, CSH Diesel Generator, Rev. 1, p. 3, 13 of 16.

taught "OpTechs for Info only - you run the plant w/ OPs"

ANSWER 2.09 (1.50)

a. radiolytic decomposition of water, zirc-water reaction (+1.0)

b. radiolytic decomposition of water (+0.5)

Add:
1. oxidation of zinc w/in contain
2. O_2 of steel from RPV
Ref: from MCO text

REFERENCE
1. N2-IOP-62 Hydrogen Recombiner.

ANSWER 2.10 (2.00)

– List 4 of 5 Below –

a. Steam line to pump suction temp. difference is < 7 deg

b. Total feed flow < 30%

c. (EOC-RPT) TSV or TCV closure with power > 30% of rated

d. Reactor water < level 3 (59")
(+0.5 for each, +2.0 TOTAL)

e. Rx pressure > 1050 psi via ATWS circuitry
Ref: RRCS Chapter

REFERENCE
1. NMP-2 Operations Technology, Recirculation System, Rev. 1, pg. 12

ANSWER 2.11 (2.00)

a. Suppression pool to drywell (+0.5)

b. limits negative pressure differential (+0.5) to prevent drawing water up the downcomer from the suppression pool to the drywell. (+1.0)
or protect the floor

REFERENCE
1. NMP-2 Operations Technology, Primary Containment, Rev. 1 pg. 6

SRO – see Q6.13!

ANSWER 2.12 (2.00)

1. RPV high level
2. Low suction w/TD
3. low-low suction
4. low lube oil pressure
(+0.5 for each, +2.0 TOTAL)

REFERENCE

1. NMP-2 Operations Technology, Feedwater Sys., p. 6

ANSWERS -- NINE MILE POINT 2 -85/12/10-G.A. SLY

ANSWER 3.01 (3.00)

a. TCS, TCV, MSIV closure, plus the SDV high water level scrams. (+1.0 TOTAL)

b. TSV - valve position (>5% closed)
TCV-EST fluid pressure (<530 psig)
MSIV closure-valve position (>6% closed)
SDV-level switches (or transmitters) (25 gal) = 46.5"

(+1.0 TOTAL)

c. TSV - bypasses when <30% of rated (1st stage shell pressure)
TCV - same as above
MSIV closure - bypasses with the MSS out of run
SDV scram - MSS in S/D or Refuel with the bypass switches in B/P (4 total)

(+1.0 TOTAL) -0.25 for extra

REFERENCE

1. NMP-2 Operations Technology, Reactor Protection System, Rev. 1, Table 1.

2. NMP-2 Technical Specification Bases, RPS LSS.

ANSWER 3.02 (2.00)

a. control valves close 5% (+0.25), open one bypass valve (+0.25) (or similar answer on diagram). (+0.5 Total)

b. control valves close 5% (+0.25), reactor scram probable due to increasing pressure since bypass valves will not be open (+0.25). (+0.5 Total)

c. ~~will develop a pressure error of 800 psid. This will be a demand for maximum opening of all valves. However, due to the action of the maximum combined flow limiter, control valves will go to 105%, demand and bypass valves to 10%.~~ (+0.5) 100% 25%

'B' controls C.V. closes then reopens to 100% as 'B' take over. Bypass does not respond.

d. control valves close to 90% (+0.25) to maintain Rx pressure at 920 psig (+0.25). (+0.5 Total)

REFERENCE

1. NMP-2 Operations Technology, EHC, Rev. 1, pp. 2, 5 to 9 of 14, Student Learning Objective Nos. 5, 6, 8, including EHC Figure 3.

ANSWER 3.03 (2.00)

a. alternate rod insertion (+0.5)

b. none (+0.5)

c. standby liquid control (+0.5)

d. ~~80 seconds~~ (+0.5)
11.6 min. OR 11 min 35 sec. f SLC

REFERENCE

1. NMP-2 Operations Technology, Module VI, Part 8, pp. 2, 4, 7, Student Learning Objective No. 4.

ANSWER 3.04 (2.50)

called "steam admission valve"

a. closure of the turbine stop valve (MOV-120) (+0.5)

b. open the turbine stop valve and reinject (+0.5)

c. align in RCIC mode and inject (+0.5)

d. no -mechanical- (locally) (+0.5) -OR- yes electrical can

e. no change to system logic (+0.5)

REFERENCE

1. NMP-2 Operations Technology, Module IV, Part 6, RCIC, pp. 4, 9, 10, Student Learning Objective Nos. 1, 3a, 3b, 5, 6.

ANSWER 3.05 (2.00)

a. valves close (+0.5)

b. valves open (+0.5) ~~remain the same~~ valves open due to C.B. Closed if stated removed.

c. valves open (+0.5)

d. valves open (+0.5)

REFERENCE

1. NMP-2 Operations Technology, Module IV, Part 3, ADS, pp. 10, 12, 13, 16, Student Learning Objective Nos. 3, 4, 5, 6, 7a.

ANSWER 3.06 (3.00)

a. decrease (+0.25) due to steam/feed mismatch requiring less water (+0.5) (+0.75 Total)

b. increase (+0.25) due to level mismatch requesting more water (+0.5) (+0.75 Total)

c. no change (+0.25), servo would lock up valve as is (+0.5) (+0.75 Total)

d. decrease (+0.25), due to reduction in operator setpoint of one-half input value (+0.5) (+0.75 Total)

REFERENCE

1. NMP-2 Operations Technology, Module IX, Part 6, pp. 4, 5, Student Learning Objective Nos. 4, 7.

ANSWER 3.07 (1.00)

a. bad position indication into the RPIS (+0.5)

b. peripheral rod selected (+0.5)

REFERENCE

1. NMP-2 Operation Technology, Module VI, Part 6, RMCS, p. 6.

ANSWER 3.08 (3.00)

a. off-scale high, (40) (+0.5)

b. 2.8% power (93.1 MWt) (-0.1 min)
rod withdrawal block trip
upscale alarm trip
upscale trip (1/2 scram)
(+0.25 for each, +1.0 TOTAL)

if refer to APRM ⇒ downscale (0.40)
rod block (0.35)

c. The IRM system uses the method of Cambelling to elimimate the gamma signal(+0.5) where as the SRM system uses a pulse height discriminator.(+0.5) The Cambelling method, roughly, squares the signal and then chops the gamma out.(+0.5)

REFERENCE

1. NMP-2 Operations Technology, Module VI, Part 2, IRM, pp. 3, 4, 6, 8, 10, Student Learning Objective No. 3

ANSWER 3.09 (3.00)

a. The compressor would not shut down and if it did shut down, it would not automatically restart. (+0.5)

b. The isolation valve (AOV-171) must be locally reopened. This is done by placing a local switch to open. (It will spring return to normal. If the air header pressure is greater than 85 psig, the valve will open.) (+0.5)

Not req'd.

c. 1. open (+0.5)

2. shut (+0.5)

3. shut (+0.5)

4. open (+0.5) (+2.0 TOTAL)

REFERENCE

1. NMP2 IOP-19, pp. 7-10.

ANSWER 3.10 (2.00)

1. Any initiation of high to low recirc pump speed transfer.
2. High Drywell pressure (1.69 psig)
3. Loss of feedpump with concurrent vessel low water level (Runback)
4. Excessive rate of change of the Flux Controller output
5. Deviation of 1% between the Loop Controller input and manual output signal (tracking failure)
(~~+0.2~~ 0.4 for each, +2.0 TOTAL)

~~HO~~ Ref: 2.10 for pump trip!

REFERENCE
1. NMP-2 Lesson Plan for RRFCS, ~~pp~~ p. ~~23-24~~ 12 of 26.

ANSWER 3.11 (1.50)

a. ~~60%~~ 70% (+0.5), 5% (volts) for each LPRM not bypassed (+0.5)

(+1.0 Total)

b. No (+0.5). There are fewer than two (2) operable inputs on Level B (+0.5). (+1.0 Total)

REFERENCE
1. NMP-2 Operations Technology, Module VI, Part 4, APRM, p 5, Student Learning Objective Nos. 3, 4.

ANSWERS -- NINE MILE POINT 2 -85/12/10-G.A. SLY

ANSWER 4.01 (2.50)

a. 100 psig
b. 150 psig
c. 200 psig below the condensate booster pump discharge pressure.
d. ~~765~~ 756 psig
e. 150 psig (+0.5 for each, +2.5 TOTAL)

REFERENCE
1. NMP-2, N2-IOP-101a, Sections E. 2.24, 2.26, 2.30, and 3.5

ANSWER 4.02 (3.00)

a. From the Power Factor Chart or Precautions
0.813 MWe (+0.25) and 400 KVAR (+0.25) 0.5

b. Initial State
1,280 MWe (~~+0.25~~) and 420 KVAR (+0.25)

Reduce generator load by recirc. or control rods to 1.21 MWe (+0.5). Then raise reactive load (VARs) by adjusting the AC voltage regulator (+0.5). To be done in this order as not to exceed operational limits (+0.5)

Final State
1,216 MWe (~~+0.25~~) and 600 KVAR (+0.25)

Asks "Why" NOT asked for by question

REFERENCE
1. NMP-2 N2-IOP-68, Main Gen., p.5 and Figure 3 Provide Power Factor Chart

ANSWER 4.03 (3.00)

a. By visually observing that all IRMs are above downscale before any SRM count rate is above 10E+5 cps with the SRMs fully inserted.(+1.0)

b. No (+0.25), setpoint is 15% power (+0.25) (+0.5 TOTAL)

c. 1. Neutron count rate increasing at a logarithmic rate (+0.5)

2. No control movement (+0.5)

3. A stable positive period. (+0.5)
(+1.5 TOTAL)

REFERENCE

1. N2-IOP-101A, Plant Startup, pp. 8, 13.

ANSWER 4.04 (1.00)

Reactor cooldown rate is controlled by the RHS heat exchanger level (+0.5). If the level is reduced, more heat exchanger tubes are exposed, and the condensing of reactor steam increases (+0.25). If the level in the Hx is increased, the condensing rate decreases (+0.25) (i.e., cooldown rate decreases). (+1.0 TOTAL)

REFERENCE

1. N2-OP-31, Residual Heat Removal, H.4, Steam Condensing Mode.

ANSWER 4.05 (1.00)

Any four (4) of the following: (+0.25 each, max. +1.0)

1. Xenon concentration
2. Moderator temperature
3. Control Rod position (axial)
4. Order of Rod Withdrawal
~~5. Core Exposure~~ delete from key

REFERENCE

1. N2-OP-101A, Plant Startup, Precautions, pp. 2, 3.

ANSWER 4.06 (1.50)

a. High neutron flux alarm and/or scram (+0.5)

b. At or near 100% rod line, minimum recirc. flow (+0.5)

c. Insert control rods per Reactor Analyst or increase recirculation flow (+0.5)

REFERENCE

1. N2-OP, Neutron Monitoring, Precautions and Off-Normal Procedures.

ANSWER 4.07 (2.00)

a. A coupling check is the application of a continuous withdraw signal with the control rod full out to check coupling mechanisms by observing the following:

1. red rod "full-out" light remains on (+0.25)

2. rod overtravel annunciator does not come in (+0.25)

3. drive water flow decreases to "stall flow" (+0.25)

4. rod remains at position 48. (+0.25)

(+1.0 TOTAL)

b. 1. Reduce Recirc Flow to minimum (+0.25)

2. Scram the Plant (+0.25)

3. Follow Procedures (+0.25)

4. Notify SSS (+0.25)

(+1.0 TOTAL)

REFERENCE

1. N2-IOP-30, CRD, pp. 21, 22, 30.

2. NMP-2 Exam Bank Cat. 4, CRD, No. 9 (Part A).

ANSWER 4.08 (2.00)

a. ~~TRUE~~ (+0.5) → ? False

b. ~~FALSE~~ (+0.5) True

c. TRUE (+0.5)

d. ~~TRUE~~ (+0.5) False

REFERENCE

1. NMP-2, Operation Technology, Module VI, Part 6, RMCS, pp. 9, 11, Student Learning Objective No. 5.

2. N2-IOP-95A, pp. 2, 4.

ANSWER 4.09 (3.00)

a. 2 rem. (+0.5) due to 5(N-18) limit (+0.5)
b. No (+0.5), exceeds 5(N-18) limit (+0.5) - or - yes, once in a lifetime
c. No (+0.5), administrative limits state you can receive 100 mrem per week. (+0.5)

REFERENCE

1. NMP-2, S-RP-1, Access and Radiological Control, pp. 1, 12, 17
2. NMP-2, EPP-15, Health Physics Procedure, p. 3.

ANSWER 4.10 (2.50)

a. Do not secure or place an ECCS in MANUAL mode unless, by at least two indepencent indications (+0.5),

   1. misoperation in AUTOMATIC mode is confirmed (+0.5) or

   2. adequate core cooling is assured. (+0.5) (+1.5 TOTAL)

b. If an ECCS is placed in MANUAL mode, it will not initiate automatically. Make frequent checks of the initiating or controlling parameter (+0.5). When manual operation is no longer required, restore the system to AUTOMATIC/STANDBY mode if possible (+0.5). (+1.0 TOTAL)

REFERENCE

1. NMP-2, N2-EOP-RL, RPV Water Level Control, p. 3.

ANSWERS -- NINE MILE POINT 2 -85/12/10-G.A. SLY

ANSWER 4.11 (2.50)

a. 1. Steam dome space to bottom drain less than or equal to 145 deg F (+0.5)

2. Idle loop to operating loop less than or equal to 50 deg F (+0.5)

3. Idle loop to ~~operating loop~~ bottom drain less than or equal to 50~~% of rated flow~~ deg. F (+0.5) (+1.5 TOTAL)

b. No (+0.5), required to shutdown (+0.25) due to ECCS performance criteria (i.e., flow imbalance, etc.) (+0.25) (+1.0 TOTAL) ie. single loop analyses haven't been done yet.

REFERENCE

1. Tech. Spec. 3/4.4.1.4, pp. 3/4 4-4 and B.3/4 4-1.

ANSWER 4.12 (1.00)

1. RPV water level less than 159.3 in.

2. RPV pressure greater than 1037 psig

3. Drywell pressure greater than 1.68 psig

4. A condition that requires an MSIV isolation

5. A condition that requires an Rx scram, AND Rx power is above 4% or cannot be determined.

(+0.2 each, max. +1.0)

REFERENCE

1. NMP-2, N2-EOP-RL, RPV Water Level Control, p. 1, Student Learning Objective No. 2.

QUESTION	VALUE	REFERENCE
01.01	2.00	SLY0000004
01.02	1.00	SLY0000005
01.03	1.50	SLY0000006
01.04	1.50	SLY0000007
01.05	2.50	SLY0000009
01.06	2.50	SLY0000010
01.07	2.50	SLY0000011
01.08	1.50	SLY0000012
01.09	2.00	SLY0000013
01.10	2.00	SLY0000014
01.11	2.00	SLY0000001
01.12	1.00	SLY0000002
01.13	3.00	SLY0000003

	25.00	
02.01	2.50	SLY0000054
02.02	2.50	SLY0000055
02.03	2.50	SLY0000057
02.04	1.00	SLY0000058
02.05	2.00	SLY0000059
02.06	2.00	SLY0000061
02.07	2.50	SLY0000062
02.08	2.50	SLY0000063
02.09	1.50	SLY0000064
02.10	2.00	SLY0000113
02.11	2.00	SLY0000114
02.12	2.00	SLY0000115

	25.00	
03.01	3.00	SLY0000039
03.02	2.00	SLY0000040
03.03	2.00	SLY0000041
03.04	2.50	SLY0000042
03.05	2.00	SLY0000043
03.06	3.00	SLY0000044
03.07	1.00	SLY0000045
03.08	3.00	SLY0000047
03.09	2.00	SLY0000048
03.10	2.00	SLY0000049
03.11	1.50	SLY0000050

	25.00	
04.01	2.50	SLY0000056
04.02	3.00	SLY0000065
04.03	3.00	SLY0000066
04.04	1.00	SLY0000067
04.05	1.00	SLY0000069

QUESTION	VALUE	REFERENCE
04.06	1.50	SLY0000070
04.07	2.00	SLY0000071
04.08	2.00	SLY0000072
04.09	3.00	SLY0000073
04.10	2.50	SLY0000101
04.11	2.50	SLY0000102
04.12	1.00	SLY0000104
	25.00	
	100.00	

Attachment 2

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

FACILITY: NINE MILE POINT 2

REACTOR TYPE: BWR-GE5

DATE ADMINISTERED: 85/12/10

EXAMINER: G.A. SLY

APPLICANT: *MASTER KEY*

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	25.00	________	________	5. THEORY OF NUCLEAR POWER PLANT OPERATION, FLUIDS, AND THERMODYNAMICS
25.00	25.00	________	________	6. PLANT SYSTEMS DESIGN, CONTROL, AND INSTRUMENTATION
25.00	25.00	________	________	7. PROCEDURES - NORMAL, ABNORMAL, EMERGENCY AND RADIOLOGICAL CONTROL
25.00	25.00	________	________	8. ADMINISTRATIVE PROCEDURES, CONDITIONS, AND LIMITATIONS
100.00	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)

ANSWER if the following Sm-149 statements are TRUE or FALSE? ~~(2.0)~~

a. It is REMOVED from an operating reactor by burnout and radioactive decay. (0.5)

b. WHEN a reactor is restarted after a temporary shutdown, Sm-149 concentration increases for several days. (0.5)

c. It has LESS effect on reactor operation than Xe-135 due to its smaller fission yield and smaller microscopic neutron cross section. (0.5)

d. The equilibrium concentration of Sm-149 at 50% FP is about TWO-THIRDS that of the equilibrium concentration at 100% FP. (0.5)

QUESTION 5.02 (2.00)

STATE whether the following situations would (INCREASE, DECREASE or NOT CHANGE) control rod worth.

a. Restart 10 hr following a scram from 100% power condition (peripheral rod only) (0.5)

b. Second rod in a rod group following the withdrawal of the first rod in that group. (0.5)

c. Change from a cruciform shaped rod to a cylindrical rod of the same volume. (0.5)

d. Localized voiding of region not previously voided. (0.5)

QUESTION 5.03 (2.00)

The reactor is critical at 10E+6 cps. A stable period of 60 seconds is achieved. If rods are inserted continuously until the period drops to infinity and then the rod insertion is immediately stopped WILL the reactor be (critical, supercritical, or subcritical) in the time following the rod stoppage? EXPLAIN (2.0)

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

QUESTION 5.04 (2.50)

You are the SRO in charge of the initial fuel loading process. As part of your duties, Operations has asked you to verify the STAs prediction to criticality as fuel is being loaded.

a. From the following information, PREDICT the point of criticality after the 6th fuel bundle. (1.0)

Count Rate, (cps)	1/M Value
S, CRo = 100	1.00
F1, CR1 = 100	1.00
F2, CR2 = 102	0.97
F3, CR3 = 105	0.95
F4, CR4 = 110	0.91
F5, CR5 = 113	0.87
F6, CR6 = 125	0.80
F7, CR7 = 149	0.67
F8, CR8 = 200	0.50
F9, CR9 = 500	0.20

b. HOW MANY fuel bundles may be loaded following the 6th fuel fuel bundle, prior to being required by ANS/ANSI Standards to make another criticality calculation? (ANS/ANSI Standards state that "...the maximum fuel load increment is the greater of one fuel assembly, or one-half the additional bundles which are predicted to produce criticality.") (1.0)

c. DO the initial six (6) fuel bundles of the 1/M plot indicate that fuel is being loaded (IDEALLY, AWAY FROM the detector or TOWARDS the detector)? (0.5)

QUESTION 5.05 (2.50)

Given a large vented tank 30 ft in diameter and 60-ft high with a centrifugal pump taking a suction from its base. The pump is located at a vertical elevation corresponding to the bottom of the tank and it requires 5 ft of net positive suction head (NPSH) to prevent cavitation. The tank is entirely full of water and is maintained at 60 deg F by heaters. The tank is designed such that it could withstand 15 psi differential pressure in either direction. Assume the vent becomes totally clogged while the pump is in operation. ANSWER the following questions.

a. WHAT is the lowest pressure that the tank will drop to as the pump continues to remove water from the tank? (0.5)

b. WILL the pump loose NPSH and begin to cavitate prior to reaching a level of 5 ft in the tank? EXPLAIN. (State any assumptions.) (1.0)

c. COULD the pump continue to pump water at a level below 5 ft without cavitation if the vent were open? EXPLAIN. (Assume no vortexing.) (1.0)

QUESTION 5.06 (2.00)

Given the following two (2) conditions and using the supplied information, DETERMINE which condition is operating MORE CLOSELY to its MCPR limit. (Show all work and state any assumptions.) K-f graph is provided. (2.0)

Condition 1	Condition 2
Rx dome pressure = 950 psig	Rx dome pressure = 980 psig
Core flow = 54.25 Mlb/hr	Core flow = 81 Mlb/hr
Rx power = 1660 MW	Rx power = 2490 MW
P-1 MCPR = 1.57	P-1 MCPR = 1.37

QUESTION 5.07 (2.00)

Water enters the regenerative heat exchanger from the reactor at 538 deg F and exits to the NRHX at 233 btu/lbm.

a. If water exists the demineralizers at 120 deg F, WHAT is the temperature of the water returning to the reactor? Show all work and state all assumptions. (1.25)

b. If a (10%) leak developed downstream of the demineralizer, WHAT would be the temperature of the water returning to the reactor? (0.75)

QUESTION 5.08 (2.00)

While Nine Mile Pt-2 is operating at 90%, extraction steam to the highest pressure feedwater heater is removed. An engineer observed that the turbine load increased by 20 MW electric and concluded that this action has improved (increased) the plant's thermodynamic efficiency (not heat rate).

IS this conclusion correct? EXPLAIN your answer fully. (INCLUDE WHAT caused electrical output to increase.) (2.0)

QUESTION 5.09 (3.00)

You are currently operating at 100% power BOL when you lose partial feedwater heating:

a. If the STA tells you that feedwater temperature decreased by 10 deg F, voids decreased by 2%, WHAT would be the corresponding temperature change to the fuel temperature. (Assume no rod movement, recirculation flow changes and the reactor reactivity returns to zero.) (1.5)

b. If the same situation were to occur at EOL WHAT would be the corresponding reactivity changes (MORE NEGATIVE, LESS NEGATIVE, NO CHANGE) to each of the above coefficients (i.e. delta (T)mod, delta (%voids), delta (T) fuel)? (1.5)

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

QUESTION 5.10 (3.00)

As the reactor is taken from COLD SHUTDOWN to RATED OPERATING CONDITIONS, HOW are the following affected and WHY?

a. The MAGNITUDE of the MODERATOR TEMPERATURE COEFFICIENT. (1.0)

b. DIFFERENTIAL CONTROL ROD WORTH. (1.0)

c. The MAGNITUDE of the FUEL TEMPERATURE COEFFICIENT (Doppler). (1.0)

QUESTION 5.11 (2.00)

Three (3) minutes following a scram from 100% power, reactor power is 75 on IRM Range 4 and decreasing. WHAT will the indicated power be one (1) minute later? SHOW calculation and EXPLAIN any assumptions made. (2.0)

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

QUESTION 6.01 (3.00)

EXPLAIN WHAT affect the following failures would have on reactor level. WHY? (Assume 3-element control and Channel A controlling.) ~~(3.0)~~

a. 'C' steam line flow signal fails low. (+0.75)

b. Channel 'A' reactor level detector signal fails low. (+0.75)

c. Loss of RFP lube oil to the 'A' pump servo motor. To FCV. (0.75)

d. Inadvertent activation of the setpoint setdown circuitry. (+0.75)

QUESTION 6.02 (2.50)

Concerning the Safety Parameter Display System:

a. WHAT are the available level one (1) display(s)? (0.5)

b. WHAT are the available safety function blocks and WHAT parameters are used to determine the safety function status? (2.0)

QUESTION 6.03 (2.00)

The reactor is at 100% power with the generator synced to the grid. Electrohydraulic Control (EHC) load set is 105%. By using the attached EHC diagram, EXPLAIN WHAT would happen (control valve, bypass valve) in the following circumstances:

a. load limit potentiometer reduced to 95%. (0.5)

b. maximum combined flow limit potentiometer reduced to 95%. (0.5)

c. "A" pressure regulatory detector (~~setpoint~~) fails low. (0.5)

d. failure of two (2) bypass valves full open. (0.5)

QUESTION 6.04 (1.00)

WHAT two (2) [redacted] conditions will cause the RSCS to apply a rod block to a control rod? (1.0)

QUESTION 6.05 (2.00)

ANSWER the following questions concerning the Standby Liquid Control (SLS) System:

a. The minimum concentration needed to shutdown the reactor from rated conditions is ________________ ppm in a minimum of ____________________ minutes. (0.5)

b. WHAT is the purpose(s) of the interface between the Instrument Air Systems with the SLS system. (1.0)

c. The auto start feature is interrupted by either a loss of offsite power or a LOCA. (TRUE or FALSE.) (0.5)

QUESTION 6.06 (2.00)

Concerning the CRD Hydraulic System:

a. The reactor operator is going to increase drive pressure to the HCU. WOULD you as the acting SRO direct him to OPEN or CLOSE the drive water pressure control valve? (0.5)

b. EXPLAIN HOW your action in part has changed the following flow rates (INCREASE, DECREASE, NO CHANGE). (1.5)

1. scram valve charging flow
2. CRD total system flow
3. cooling flow

QUESTION 6.07 (2.00)

ANSWER the following questions based upon the situation described below.

The RRCS is fully operational. The RRCS receives a reactor water low level (105 inches) signal in both complementary logics of a RRCS channel and remains in for 200 seconds. It takes 100 seconds from the initial reactor water low level signal before the APRM level is downscale.

a. Which of the four logics integrated into RRCS are actuated at T = 0 seconds? (0.5)

b. Which logics are actuated at T = 25 seconds? (0.5)

c. Which logics are actuated at T = 98 seconds? (0.5)

d. How long from T = 0 seconds is it before the RRCS can be reset? (0.5)

QUESTION 6.08 (1.50)

The Generator Gas Control System provides the main generator with hydrogen to cool the rotor windings and internal components. For this system, three (3) parameters of information (purity, pressure, and temperature) are available in the Control Room concerning generator hydrogen.

a. HOW DOES each effect generator cooling capability if deviated from normal 100% power operations? (Assume purity and pressure to decrease and temperature to increase.) (0.75)

b. You are in the process of purging the main generator with carbon dioxide. STATE HOW the following failure would effect this operation (AUTO ISOLATE or NO EFFECT) (0.75)

1. pipe failure at the exit of the electric vaporizer heater

2. low level in Storage Tank (TK1)

3. low generator gas pressure (<2 psig)

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

QUESTION 6.09 (2.50)

Both the SRM and IRM compensate their detector signals with a unique type of discrimination process.

a. Briefly DESCRIBE HOW each system, SRM/IRM, accomplish this task. (1.5)

b. WHY is there a difference between the two (2) discrimination processes? (1.0)

QUESTION 6.10 (2.00)

An automatic HPCS initiation has occurred. Subsequently HPCS injection was automatically terminated due to high reactor water level.

a. WHAT component in the HPCS system functioned to terminate the injection? (0.5)

b. Assuming no operator action, HOW WILL HPCS respond to a subsequent decreasing water level? (0.5)

c. WHAT would be the response to decreasing water level if HPCS injection has been terminated mannually by closing the injection valve? (0.5)

d. If the HPCS system had switched sources from the CST to the supression pool due to low CST level and the CST level had subsequently recovered, WILL the system automatically switch back to the CST suction? (0.5)

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

QUESTION 6.11 (2.50)

a. WHAT are the differences in modes of operation (System Cooling Line-ups) for the RHS Loops A and B?

b. WHAT is the reason for the interlock between the

1. shutdown cooling suction valve and the test return valve?

2. pressure control valve bypass valve (MOV-23A) and Rx pressure?

c. If a LPCI auto initiation function (high drywell) were overridden to realign the RHS system to the shutdown cooling mode and another LPCI signal (low level) were to come in, WOULD the RHS loop realign from the shutdown cooling mode to the LPCI mode? EXPLAIN. (1.0)

QUESTION 6.12 (1.00)

The plant is operating at 100% power. APRM channels A and C have failed high. You call the I&C Technician to investigate. A Plant Auxiliary Operator wants to shift RPS B power supply to its alternate power source for training. Would you let him? EXPLAIN WHY or WHY not. Direct your answer toward system(s) responses instead of administrative requirements. (1.0)

QUESTION 6.13 (1.00)

WHAT condition(s) do the vacuum relief lines between the drywell and suppression chamber limit/protect against? (1.0)

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

QUESTION 7.01 (2.00)

WHY are each of the following Reactor [illegible]rculation System precautions necessary (i.e., what do [illegible] prevent or ensure when observed)?

a. An idle recirculation loop shall n[illegible] be started unless the temperature differential between [illegible] reactor pressure vessel steam space coolant and the [illegible]tom head drain line coolant is less than or equal to [illegible] deg F, and (0.5)

b. When both loops have been idle, u[illegible] the temperature differential between the reactor c[illegible]nt within the idle loop to be started up and the cool[illegible] in the reactor pressure vessel is less than or eq[illegible] to 50 deg F, or (0.5)

c. When only one loop has been idle, [illegible]ss the temperature differential between the reactor c[illegible]nt within the idle and operating recirculation loops [illegible] less than or equal to 50 deg F and the operating loop f[illegible]rate is less than or equal to 50% of rated loop flow. (0.5)

d. TRUE or FALSE: The operator is al[illegible]d two (2) recirculation motor starts from ambient t[illegible]erature with a required 45-minute delay between [illegible] start. (0.5)

QUESTION 7.02 (2.00)

Assume a loss of Station Air has occur[illegible]

a. WHAT three (3) automatic actions sh[illegible]d be verified as having occurred if STATION AIR HEA[illegible] pressure is observed to be at 82 psig? (Setpoint requi[illegible]) (1.5)

b. Under WHAT circumstances do the Imm[illegible]te Operator Actions for a Loss of Station and/or Contr[illegible] [illegible]r require the reactor to be manually scrammed? (0.5)

PROCEDURES - NORMAL, ABNORMAL, EMERGENCY AND RADIOLOGICAL CONTROL

QUESTION 7.03 (2.00)

Concerning Radiation Work Permits (RWP):

a. WHEN would an extended RWP be issued verses a standard RWP? (0.5)

b. WHAT is the maximum length of issuance of an extended RWP? (0.5)

c. You are to assign a work force to recharge the CRD accumulators. Radiation protection has said that a 25 mrem/hr dose exists in the area. Maintenance states that the job should take

1. 4 hours with one employee, or
2. 3 hours with two employees

WHICH work force would you choose for the work and WHY? (1.0)

QUESTION 7.04 (1.50)

Answer the following question concerning radiation and radiological control: for a 20-year-old employee with an accumulated occupational dose of 8 rem.

a. WHAT would be the employees maximum federal limit for the quarter? (0.5)

b. COULD this employee be eligible for a life saving action and not violate any federal limits? EXPLAIN. (1.0)

QUESTION 7.05 (2.50)

According to the Site Emergency Plan, the Emergency Director has certain responsibilities and/or authorities that may NOT be delegated to a subordinate during emergency conditions. List these five (5) responsibilities/authorities. (2.5)

QUESTION 7.06 (2.00)

Following a required initiation of the Standby Liqu[illegible]ntrol System you are directed by the level/power control [illegible]dure to:

a. "Lower RPV water level by terminating and preven[illegible] injection except from CRD and Boron injection sy[illegible]ms until either: ...". WHAT is the purpose for lowering [illegible] water level at this time? (1.0)

b. You are also directed to inject boron prior to [illegible] suppression pool temperature reaching 110 deg F. WHAT is th[illegible] eason for boron injection prior to reaching this temperat[illegible] limit? (1.0)

QUESTION 7.07 (1.50)

While attempting to line up shutdown cooling mode o[illegible]HR, your reactor operator informs you that the suction [illegible] from the recirculation line is frozen in the closed [illegible]tion. According to the Alternate Shutdown Cooling Procedu[illegible] (N2-EOP-C5), in general, WHAT would be the alternat[illegible] removal flow path for performing the shutdown cool[illegible] ncti[illegible] (1.5)

QUESTION 7.08 (2.50)

Concerning the blowdown and recirculation/hot shutd[illegible] modes of the Reactor Water Cleanup (RWCU) System:

a. The operator is cautioned to place the RWCU sys[illegible] into blowdown mode prior to starting the CRD pumps. [illegible]T is the reason for this caution? (0.5)

b. When operating in the blowdown mode WHY shouldn[illegible] divert all the RWCU flow to Liquid Rad Waste or Main Condenser? (1.0)

c. WHEN and WHY would the hot shutdown mode of the [illegible] system most likely be used? (1.0)

QUESTION 7.09 (3.00)

USE the attached figures from N2-EOP-SPL to ANSWER the following questions:

a. DETERMINE the minimum suppression pool level given a RPV pressure of 700 psig and suppression pool temperature of 160 deg F? (1.0)

b. WHAT is the basis for the Heat Capacity Level Limit curve and WHICH area is the safe area of operation? (Above or below the line.) (1.0)

c. EXPLAIN WHAT would happen if drywell spray were initiated above the Drywell Spray Initiation Pressure Limit? (1.0)

QUESTION 7.10 (2.00)

Procedure N2-EOP-SPT (Suppression Pool Temperature Control) directs the operator to "runback recirc. and manually scram" if an SRV has been stuck open and cannot be closed.

a. WHY is recirc. runback prior to reactor scram? (0.5)

b. Following the reactor scram you are required to depressurize the reactor, if the suppression pool temperature cannot be maintained within the Heat Capacity Temperature Limit. You are also cautioned not to "depressurize the RPV below 60 psig unless motor driven pumps sufficient to maintain RPV water level are running and available." WHAT is the basis for the caution and WHAT system/components does it specifically address? (1.5)

QUESTION 7.11 (2.00)

ANSWER the following question concerning the main generator and load changes. USE the attached Power Factor Chart

You are operating at a 0.95 lagging power factor with 75 psig H2 and the load dispatcher orders you to drop your power factor to a 0.9 lagging power factor but maintain maximum MWe output. In general, HOW would you change your operating condition? (INCLUDE in your answer the initial conditions (MWe, KVA), a brief discussion of the power change, and the final conditions (MWe, KVA). (2.0)

QUESTION 7.12 (2.00)

According to N2-IOP-21, Main Turbine, there are several precautions and time limitations associated with turbine startup to assure proper operation, warmup, and to preclude damage from excessive vibration

a. WHY should shell warming begin as soon as possible after steam seals are established, and WHAT might result if shell warming is excessively delayed? (1.0)

b. WHAT might occur if first stage pressure exceeds 90 psig during shell warming? (1.0)

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

QUESTION 8.01 (2.00)

CONSIDER the following situations.

a. According to Technical Specifications IS IT PERMISSIBLE to go from startup to run if IRMs A, B, and C are inoperable? EXPLAIN. (1.0)

b. If the same IRMs were found inoperable while in run, WOULD you violate any Technical Specifications by:

1. Staying in Run? EXPLAIN. (0.5)

2. Placing the mode switch in Startup? EXPLAIN. (0.5)

QUESTION 8.02 (3.00)

The Division 1 Diesel is operating and is 30 minutes into a surveillance test when the air starting system fails. The maintenance repair team estimates a 2-day minimum repair time. (USE the attached Tech. Spec. to explain your answers.)

a. IS the Diesel Generator inoperable according to Tech. Spec.? EXPLAIN. (1.0)

b. ARE all the Division 1 ECCS systems inoperable because of the Diesel Generator problem? EXPLAIN. (1.0)

c. If at the same time the Division 2 ~~core~~ spray pump is out of service, WHAT added implications does this have on your Tech. Spec. position? (1.0)

QUESTION 8.03 (2.00)

The reactor operator is performing a surveillance of the Standby Liquid Control System and due to system modifications a procedural step becomes impossible to perform.

a. Under this condition CAN a temporary change be issued? (0.5)

b. WHAT three (3) "key points" must be adhered to when issuing a temporary change? (1.5)

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

QUESTION 8.04 (3.00)

LIST the Nine Mile Pt. 2 Tech. Spec. Safety Limits required in Operational Condition 1. (Setpoints required.) (3.0)

QUESTION 8.05 (2.50)

A weekly surveillance, normally performed on Friday, was performed on the following days due to manpower limitations over the Thanksgiving Holiday.

Friday - November 22
Wednesday - November 27 (5 days from last surv.)
Thursday - December 5 (8 days from last surv.)
Friday - December 13 (8 days from last surv.)

a. HAVE the surveillance requirements been exceeded for this set of dates (YES/NO)? EXPLAIN your answer. (1.5)

b. WHEN is the maximum allowable date that the next surveillance can legally be performed? (INCLUDE HOW you determined this date.) (1.0)

QUESTION 8.06 (2.50)

With the reactor plant in mode 1, it is determined that four (4) gallons per minute are being collected by the Drywell floor drain system. Also, the Drywell equipment drain system indicates 22 gallons per minute (steady) collection rate.

a. WHAT are the maximum allowable plant leakage limits? (1.5)

b. STATE the actions required by Tech. Spec. for the above condition (if any). (1.0)

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

QUESTION 8.07 (2.50)

Concerning shift complement and shift turnovers:

a. HOW MANY SRO, RO, STA are required in operation condition 1? (1.5)

b. You come on shift and find that one (1) RO has not reported for duty. CAN your crew accept shift responsibilities in this condition? WHY or WHY NOT? (0.75)

QUESTION 8.08 (1.50)

Concerning the APRM setpoints for power distribution limits:

a. CALCULATE the scram trip setpoint(s) if the reactor is operating at 3000 MW TH with most limiting LHGR mode operating at 10 KW/ft. ASSUME an LHGR limit of 13.4 KW/ft. (0.75)

b. DOES this result require any APRM adjustment? WHY or WHY NOT? (0.75)

QUESTION 8.09 (1.50)

Technical Specification 3.7.1.1 requires two plant service water pumps per loop to be operable and provides explicit action requirements if one service water pump per loop is inoperable. If both of the service water pumps per loop were to become inoperable, no specific action statement would apply. 4 pumps out

a. WHAT would be your required action? 0.75 (1.0)

b. HOW SHOULD an operator interpret tech specs in this instance and in other similar instances not directly provided for in the action statements to insure the intent of the specifications are met? 0.75 (1.5)

QUESTION 8.10 (2.00)

Using the attached Technical Specifications, DETERMINE the maximum time that the reactor may continue operation given the following malfunctions. Reference the sections of tech specs used in determining your answer.

MODE 1

a. It is discovered that valve FO48A (RHR "A" Heat Exchanger Bypass) is failed open and cannot be closed. (1.0)

b. Susequent to the malfunction in (a) above, it is found that RHR pump B is inoperable. (1.0)

QUESTION 8.11 (2.50)

The RCIC outboard isolation valve (2ICS-MOV121) motor controller has failed in the deenergied position and the valve won't shut. Maintenance is currently attending to the problem. By using the attached Technical Specifications:

a. STATE which Tech. Specs. apply to this problem. (0.5)

b. STATE whether RCIC is OPERABLE or INOPERABLE and GIVE ANY necessary action statement(s) required. (2.0)

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

ANSWERS -- NINE MILE POINT 2 -85/12/10-G.A. SLY

ANSWER 5.01 (2.00)

a. FALSE (+0.5)
b. FALSE (+0.5)
c. TRUE (+0.5)
d. FALSE (+0.5)

REFERENCE
1. NMP-2 Operations Technology, Module 1, Part 15, pp. I-15-1, I-15-2, Student Learning Objectives No. 2, 3.

ANSWER 5.02 (2.00)

a. increase (+0.5)

b. decrease (+0.5)

c. decrease (+0.5)

d. ~~increase~~ decrease (+0.5)

REFERENCE
1. NMP-2 Operations Technology, Module 1, Part 14, pp. I-14-9, I-14-10, Student Learning Objective No. 4.
~~Redu~~ G.E. Reactor Theory Fig 5-13a

ANSWER 5.03 (2.00)

Supercritical (+0.5). When the period reaches infinity, the reactor is exactly critical on prompt neutrons. (+0.5) After the rod insertion stops the delayed neutron precursors which were formed in previous generations and at a higher power level tend to pull power back up (+0.5). Therefore, the reactor is still supercritical due to the latent effect of delayed neutrons (+0.5). (+2.0 Total)

REFERENCE
1. NMP-2 Operations Technology, Module 1, Part 11, pp. I-11-6.

ANSWER 5.04 (2.50)

a. See Figure 8-11 in Reference material
criticality predicted at pin 16
(+0.5 for plot and +0.5 for usage)

b. next reading = 1/2(16 - 6) + 6 = after the 11th fuel bundle
therefore 5 more fuel bundles may be loaded (1.0)
<no double jepordy>

c. away from the detector (0.5)

REFERENCE

1. NMP-2 Operations Technology, Module 1, Part 8, pp. I-8-10 and I-8-13, Figure 8-11, Student Learning Objective No. 4.

ANSWER 5.05 (2.50)

a. The lowest pressure that the tank could drop to would be the saturation pressure for 60 deg F which is 0.256 psia. (+0.5)
5 ft head or 2.17 psia OR 4.41 ft H_2O + vapor pressure = 5 ft H_2O total

b. Assuming head loss due to flow [redacted] negligible, the answer is no. Cavitation would not begin until the level drops below 5 ft in the tank. (+1.0)

c. Yes. (0.5) The added pressure of 14[redacted] psia at the pump suction would allow all of the water to be removed. (+0.5)

REFERENCE

1. NMP-2, SLO for Fluid Statics, Dynamics and Delivery, No. 10, pp. 15, 16.

ANSWER 5.06 (2.00)

Assuming 100% core flow is 108.5 Mlb/hr (+0.25), min MCPR (limit) = 1.24 (+0.5)

Check calc.

For Condition 1:
% core flow = 54.25/108.5 = 50%
from Figure 3.2.3-1 Kf = 1.175 (+0.25)
therefore the MPCR(limit) = 1.24(1.175) = 1.457
delta(MCPR) = 1.57 - 1.457 = ~~1.13~~ (.113)

For Condition 2:
% core flow = 80/108.5 = 74.6%

Figure 3.2.3-1 Kf = ~~1.005~~ 1.05 (+0.25)
therefore the MCPR(limit) = 1.24(1.005) = 1.25
delta (MCPR) = 1.37 - 1.25 = ~~1.20~~ (.068)
Condition 2 is closer to limits (+0.5)
(0.25 for math)

REFERENCE

1. NMP-2 Student Learning Objective for BWR Thermodynamics and Thermal Hydraulic Limits, No. 7, p. 9.

2. General Electric Thermodynamics, Heat Transfer, and Fluid Flow, MTC, March 1983, pp. 9-96 to 9-99.

3. NMP-2 Tech. Specifications 3/4.2.3, Minimum Critical Power Ratio. Figure 3.2.3-1 and Table B2.1.2-2.

5. THEORY OF NUCLEAR POWER PLANT OPERATION, FLUIDS, AND THERMODYNAMICS

ANSWERS -- NINE MILE POINT 2 -85/12/10-G.A. SLY

ANSWER 5.07 (2.00)

a. 1. Set up equation
   A. MCp delta(T) = M delta(h)
   B. Cancel M because both are equal, Cp delta(T) = delta (h)
   C. Lookup h(f) for 538 deg F = ~~543~~ Btu/lbm (+0.25)
   (+0.5 pts for equation and logic) 534.25

   T_{h_f} for 233 Btu/lbm = 264 °F

2. Solve for delta (h)
   A. 534(~~543~~-233) Btu/lbm
   B. delta (h) = ~~310~~ 301 Btu/lbm

3. Solve for T(hot) to reactor
   Cp (T(hot) - T(cold)) = delta (h)
   T(hot)h_f = T(cold)h_f + [delta (h) / Cp]
   h_f(hot) = ~~430~~ deg F (+0.5) ⇒ T_{hot} = 394°F

   $h_f(120)$ = 87.97
   388.57 Btu/lbm ⇒ 413°F

b. Solve for T(hot) to reactor
   1. M2 * Cp * (T(hot) - T(cold)) = M1 * delta (h)
   2. M2 = 90% M1
   3. T(hot) = T(cold) + [delta (h) / (0.9 * Cp)]
   4. T(hot) = ~~464~~ deg F (+0.5)
   454 - or 424°F

REFERENCE

1. Thermodynamics Lesson Plan, Heat Transfer and Heat Transfer Equipment, p. 13 of 13.

2. NMP-2 Examination Bank Category 1,5, pp. 67, 68, Student Learning Objective No. 3.

ANSWER 5.08 (2.00)

No (+0.25) thermo efficiency is a comparison of Energy In to Energy Out (+0.5). The increase in output results from no steam being diverted to the high pressure feedwater heater (+0.5). Because the feedwater is now cooler, more energy from the reactor is required to bring the water up to saturation temperature (+0.5) thus thermo efficiency is down (+0.25). (+2.0 Total) definition of efficiency can be [illegible]

REFERENCE

1. NMP-2 Power Plant Cycles, pp. 5-7, Student Learning Objective No. 4

2. General Electric Thermodynamics, Heat Transfer, and Fluid Flow, MTC, March 1983, pp. 6-38, 6-66

ANSWERS -- NINE MILE POINT 2 -85/12/10-G.A. SLY

ANSWER 5.09 (3.00)

alpha(d)(delta(T))fuel = alpha(m)(delta(T))mod + alpha(v)delta(%V)
(0.25pts for equation)

alpha(m) = -1 x 10E-4 delta K/K/deg-F (0.25)

alpha(d) = -1.2 x 10E-5 delta K/K/deg-F (0.25)

alpha(v) = -1.0 x 10E-3 delta K/K/%V (0.25)

delta(T) =[(-1 x 10E-4)(-10) + (-1 x 10E-3)(-2)] / (-1.2 x 10E-5) ~~(+5)~~
delta(T)fuel = -250 deg F or 250 deg F increase in fuel temperature (+0.5 pts) 300°F if 1.0x10⁻⁵ used

b. delta(ro) = alpha(x) * delta(X)
delta(ro)dop = more negative (+0.5)
delta(ro)void = less negative (+0.5)
delta(ro)mod = less negative (+0.5)

REFERENCE

1. NMP-2, Operations Technology, Module I, Part 12, pp. 12.5, 12.7, Fig. 12-6, 12-7. Student Learning Objectives No. 2.c, 3

2. NMP-2, Operations Technology, Module I, Part 13, pp. 13.5, 13.6. Student Learning Objectives No. 2.c, 3

ANSWER 5.10 (3.00)

a. INCREASES [+0.25]. Because the change in density of water per degree F change in temperature increases with increasing temperature [+0.75]. (+1.0 TOTAL)

b. INCREASES [+0.25]. Because neutron leakage from the fuel cell to the volume around the control rod increases exposing the rod to a higher thermal neutron flux [+0.75]. (+1.0 TOTAL)

c. DECREASES [+0.25]. Because the amount of resonance broadening per degree F change fuel temperature decreases OR at higher fuel temperatures most of the broadening takes place at the higher energies where fewer and fewer neutrons exist [+0.75] (Either reason correct for full credit.) (1.0)

REFERENCE

1. NMP2, Operations Technology, Module I, Part 12,13,14 pp. I-12-3, I-12-4, I-12,5, I-13-2, I-13-3, I-14-6, I-14-7, Student Learning Objective No. 12-2, 13-2, 14-4a.

ANSWER 5.11 (2.00)

Using P = Po e ** (t/T) (+0.5)
= 75 e ** (-60/80) (+0.25)
= 35 on Range 4 (+0.25)

On a down power transient, with large negative reactivity insertions, ~~(+0.5)~~ the stable decay period is determined by the longest lived half-life. (+0.5) For this example it is assumed to be -80 sec. (+0.5)

REFERENCE

1. NMP2, Operations Technology, Module I, Part 10, p. I-10.2. Student Learning Objective No. 3.

ANSWER 6.01 (3.00)

a. decrease (+0.25) due to steam/feed mismatch requiring less water (+0.5) (+0.75 Total)

b. increase (+0.25) due to level mismatch requesting more water (+0.5) (+0.75 Total)

c. no change (+0.25), servo would lock up valve as is (+0.5) (+0.75 Total)

d. decrease (+0.25), due to reduction in operator setpoint of one-half input value (+0.5) (+0.75 Total)
185" or setpoint setdown level setpoint

REFERENCE

1. NMP-2 Operations Technology, Module IX, Part 6, pp. 4, 5 Student Learning Ojbective Nos. 4, 7.
2. NMP-2, IOP-7, pp. 3.

ANSWER 6.02 (2.50)

a. Safety function status display (+0.5) or APRM flux, core flow, Rx pressure, RPV level, Drywell level (0.1 each)

b. 1. reactivity control - APRM status

   2. core cooling - RPV level

   3. coolant system integrity - RPV pressure or drywell pressure.

   4. containment integrity - drywell pressure, drywell oxygen concentration, or suppression pool temperature (0.25 each display, +0.25 for each status parameter)

REFERENCE

1. NMP-2 Operations Technology, Module VI, Part 12, SPDS, pp 2, 3, 4 of 8, Student Learning Objective Nos. 2, 1.

ANSWER 6.03 (2.00)

a. control valves close 5% (+0.25), open one bypass valve (+0.25) (or similar answer on diagram).

b. Control valves close 5%, (0.25) (reactor scram probable due to increasing pressure since) bypass valves will not be open (+0.25).

c. (will develop a pressure error of 800 psid) This will be a demand for maximum opening of all valves. However, due to the action of the maximum combined flow limiter, control valves will go to ~~105%~~ 100 demand and bypass valves to ~~10%~~ 15% Throttle

detector bias → this will depend on max combined flow set.

d. control valves close to 90% (+0.25) to maintain ~~Rx~~ pressure at ~~920~~ 950 psig (+0.25).

REFERENCE

1. NMP-2 Operations Technology, EHC, Rev. 1, pp. 2, 5 to 9 of 14, Student Learning Objective Nos. 5, 6, 8, including EHC Figure 3.

ANSWER 6.04 (1.00)

a. If substitute position data has already been entered from the RSCS operators panel, that rod has been moved one notch, and good position data is still missing, then a rod motion insert and withdraw block will occur. (+0.5)

b. From 75% rod density to the LPSP, only notch rod movement is allowed between 00 and 12. (+0.5)

REFERENCE

1. NMP2, Operation Technology, Module VI, Part 6, p. 11, SLO 5.a. N2-IOP-95B and 96

add comments. 1. a rod not in sequence selected
2. Rod at insert bank limit
3. Rod at withdraw bank limit
4. RPIS data fault
5. RSCS inop
any two(2) for full credit.

ANSWER 6.05 (2.00)

a. 660 ppm (+0.25), 50 (+0.25)

b. Instrument Air - air to bubbler level indicator (+0.5)
sparging air for preparation of poison solution (+0.5)

c. FALSE (+0.5)

REFERENCE

1. NMP-2 Operations Technology, Module VI, Part 9, pp. 2, 5, 8, 9, Student Learning Objective Nos. 2, 3, 4,5.

ANSWER 6.06 (2.00)

a. close (+0.5)

b. 1. no change (+0.5)
2. no change (+0.5)
3. ~~decrease~~ (+0.5)
no change

REFERENCE

1. NMP-2 Operations Technology, Module III, Part 5, pp. 4,5,6; Student Learning Objective No. 4.

ANSWER 6.07 (2.00)

a. Alternate Rod Insertion, Recirculation Pump Trip
b. None
c. Standby Liquid Control → RWCU ISOLATION (+0.0)
d. ~~30 seconds~~ 11 min 38 sec. 30 sec. ARI 10 min + 98 sec for SLC
(+0.5 for each, +2.0 TOTAL)

REFERENCE

1. NMP-2, Operations Technology, Module VI, Part 8, pp. 2,4,7 Student Learning Objectives No. 4

ANSWER 6.08 (1.50)

a. 1. Purity - as purity decreases, cooling capability decreases (+0.25)

2. Pressure - as pressure decreases, cooling capability decreases (+0.25)

3. Temperature - as temperature increases, cooling capability decreases (+0.25)

b. 1. auto isolate on low level on tank Terminate purge due to single purge line (+0.25), (generator isolates)

2. auto isolate ~~no effect~~ (Tank 1 isolates) (+0.25), (TK2 ~~still~~ not 8 supplies)

3. no effect (+0.25), (dump valve not opened or used during purge)

REFERENCE

1. NMP-2 Operations Technology, Module VIII, Part 6, pp. 4, 6, 8, 10, Student Learning Objective Nos. 2, 4, 5.

N2-[illegible] Step G.1.2

ANSWER 6.09 (2.50)

a. Pulse height - neutron pulse larger than gamma pulse (+0.25), pulse height discriminator (+0.25) chops gamma and only passes neutron pulses (+0.25)

Cambelling - neutron pulse is larger than gamma pulses (+0.25); Cambelling (+0.25) squares the two signals then (chops) gamma and passes only neutrons (+0.25). γ becomes insignificant

(+1.5 Total)

b. Due to the low number of events and greater sensitivity (+0.25), the SRM deals with individual counts (pulses) (+0.25) where the IRM deals with time averaged signals (+0.5). (+1.0 Total)

REFERENCE

1. NMP-2 Operations Technology, Module VI, Part 1, SRM, pp. 7, 8, Student Learning Objective No. 3.

2. NMP-2 Operations Technology, Module VI, Part 2, IRM, pp. 3, 4, Student Learning Objective No. 3.

ANSWER 6.10 (2.00)

a. closure of the HPCS injection valve (MOV-107) (+0.5)

b. ~~auto restart~~ injection valve reopens on the low-low setpoint (+0.5)

c. stay in manual bypass and not reinitiate (+0.5)

d. no (+0.5)

REFERENCE

1. NMP-2 Operations Technology, Module IV, Part 2, HPCS, pp. 1, 2, 5, 6, 7, Student Learning Objective Nos. 2, 4, 7.

ANSWER 6.11 (2.50)

a. RHS 'B' - Head Spray Mode (+0.25)
MOV to Rad. waste (+0.
- Containment Flooding Mode ~~(~~ (+0.25) -OR- (S.W. x-tie)

b. 1. Prevent inadvertent draining of the vessel. (+0.5)
2. Prevent exceeding RHS design pressure (+0.5)

c. ~~Yes~~ No (+0.25), ~~because the second LPCI initiation signal will realign the system by reopening the LPCI injection valve.~~ (+0.75)
The suction valve MOV 1 will be shut in S.D cooling
No auto action with MOV-1 (INJECTION WON'T REOPEN)

REFERENCE

1. NMP-2, Operations Technology, Module IV, Part 5, RHS, pp. 5, 9, 10. Student Learning Objectives No. 1, 5, 6.
N2-IOP-31 pg. [illegible]

ANSWER 6.12 (1.00)

No (+0.25). When transferring RPS power supplies, the RPS is momentarily deenergized because the transfer is break before make. This would result in a scram due to the 1/2 scram already present (+0.25).

REFERENCE

NMP2, N2-IOP-97, RPS, p. 6.

ANSWER 6.13 (1.00)

-or- Limit floor ΔP to <3 psid - (+0.5)

Limits negative pressure differential (+0.5) to prevent drawing water up the downcomer from the suppression pool to the drywell. (+0.5) add floor →

REFERENCE

1. NMP-2 Operations Technology, Primary Containment, Rev. 1, p. 6

T.S. Bases B-3/4-6.4

ANSWERS -- NINE MILE POINT 2 -85/12/10-G.A. SLY

ANSWER 7.01 (2.00)

a. Prevent undue stress on vessel.

b. Prevent undue thermal shock in recirculation pump and nozzles.

c. Prevent undue thermal stress on vessel nozzles and bottom head.

d. False.

REFERENCE
1. Technical Specifications 3/4.4.1.4 and B.3/4.4-1.
2. NMP-2, N2-IOP-29, Recirculation, p. 3.

ANSWER 7.02 (2.00)

a. 1. Lag Second station air compressor on standby has started at 100 psig. (+0.5) (or 90 psig)

2. standby - backup Third station air compressor on standby has started at 90 psig. (+0.5) (or 85 psig)

3. Inst Service air Station air isolation valve (2IAS-AOV171 ~~P50-F401~~) closed at 85 psig. (+0.5) ~~(or 85 psig)~~

alternate answers due to conflicting setpoints in procedure

b. If air header ~~reactor~~ pressure reaches 60 psig / or rapid air loss. (+0.5)

REFERENCE
NMP-2, N2-IOP-19, Instrument Air, pp. 6, 8, 9, 13

ANSWER 7.03 (2.00)

a. routine or repetitive work (+0.5)
b. 1 year (+0.5)
c. group ~~2~~ 1 (+0.5) due to ALARA program (+0.5)

REFERENCE
1. NMP-2, S-RP-2, RWP Procedure, p. 14.
2. NMP-2, S-RP-7, ALARA, pp. 2,3. Reg Guide, 8.29-9, Item 6.

ANSWERS -- NINE MILE POINT 2 -85/12/10-G.A. SLY

ANSWER 7.04 (1.50)

a. 2 re (+0.5) due to 5(N-18)
b. no (+0.5), exceeds 5(N-18) limit (+0.5) - or yes, once in a lifetime

REFERENCE
1. NMP-2, S-RP-1, Access and Radiological Control, pp. 1, 12, 17.
2. NMP-2, EPP-15, Health Physics Procedure, p. 3.

ANSWER 7.05 (2.50)

1. Making decision to notify offsite emergency management agencies

2. Making protective action recommendations as necessary to offsite emergency management agencies

3. Classification of the emergency event

4. Determining the necessity for a site evacuation

5. Authorizing emergency workers to exceed normal radiation exposure limits

(+0.5 each)

REFERENCE
NMP-2, SEP Sec. 5, Organizational Control of Emergencies, pp. 4, 5.

ANSWER 7.06 (2.00)
or natural circulation (+0.5)

a. Concentrate boron (+0.5) enhance void generation (+0.5)

b. Max. temp. at which SLC initiation will result in injection of hot shutdown boron weight before the supp. pool reaches the HCTL in an ATWS, (i.e. assures shutdown prior to emergency depressurization.) (+1.0)

REFERENCE
1. NMP-2, N2-EOP-C7, Level/Power Control, p. 9, Student Learning Objective Nos. 1, 3.

2. NMP-2, N2-EOP-RQ, RPV Reactivity Control, p. 2, 12 of 21

ANSWERS -- NINE MILE POINT 2 -85/12/10-G.A. SLY

Student Learning Objective No. 3.

ANSWER 7.07 (1.50)

Following flooding of vessel (+0.25) the flow path would be:

(Main steam lines) to suppression pool via SRVs (+0.25)

Suppression pool to vessel via core spray (+0.25) or LPCI (+0.25) <or ECCS pumps>

Heat is removed from suppression pool by suppression pool cooling mode of RHR (+0.5)

REFERENCE

NMP-2, N2-EOP-C5, Alternate Shutdown Cooling, p. 1.

ANSWER 7.08 (2.50)

a. The CRD pump will increase water level (+0.25) and there is no outlet flow path established (+0.25)

alt answer: For reactor level control so as not to flood Rx vessel or use Rx drain to maintain level

b. Because cooling flow is lost to the regeneratives heat exchanger (+0.25) increasing the outlet temperature to the NRHX (+0.25), possibly causing isolation of system (+0.5).

Hot shutdown mode? *

c. Hot shutdown with no recirculation pumps operating (+0.5) minimizes thermal stratification of vessel water (+0.5).
or Hot standby, for water quality, or Rx water level control

REFERENCE

NMP2, Operations Technology, RWCU, pp. 5,8 of 12
N2-IOP-37 pg. 4 Caution #1

ANSWER 7.09 (3.00)

a. CAF (+1.0 TOTAL) 191'

b. Above (+0.5) assures sufficient heat capacity available to absorb the energy from RPV blowdown (+0.5)

c. Spray initiation above this limit may, result in a containment depressurization rate that exceeds the relief capacity of the drywell ~~and reactor building~~ vacuum breaker. (+1.0 TOTAL)

REFERENCE

1. NMP-2 N2-EOP-~~PCP~~ CPL, ~~p. 2, 3 and~~ p. 8, ~~10, 16~~ of 18
   Student Learning Objective No. 3

ANSWER 7.10 (2.00)

a. To minimize the transient. (+0.5)

b. RCIC (+0.5) will isolate at 50 psig (+0.5) and you want assurances that you have an injection mode available prior to depressurization. (+0.5)

REFERENCE

1. ~~NMP-2 N2-IOP-84, SRV/ADS, p. 7~~ NMP2, N2-EOP-RQ, Pg. 10 of 21.
2. NMP-2 N2-EOP-SPT, p. 2, 3 and p. 8, 10 of 13
   Student Learning Objective No. 3

ANSWER 7.11 (2.00)

Initial State
~~0.813~~ 1.275 MWe and ~~400~~ 425 KVAR (+0.25)
You should reduce generator load by recirc. or rods to 1.210 MWe (+0.25), then raise reactive load (VAR) by adjusting the AC voltage regulator (+0.25). (+0.5 for order of steps)

Final State
1.210 MWe and 600 KVAR (+0.25)

REFERENCE

1. NMP-2, N2-IOP-68, Main Gen., p. 5 and Figure 3
   Power Factor Chart Provided

ANSWER 7.12 (2.00)

a. This is necessary to prevent uneven heating of the rotor (+0.5). If it is not started, a rotot long condition could result. (+0.5)

b. The setpoint (of the "Turbine Stop and Control Valve Closure Bypassed" annunciator) could be exceeded (+0.5) and a reactor scram would result. (+0.5)

ANSWERS -- NINE MILE POINT 2 -85/12/10-G.A. SLY

REFERENCE

1. NMP-2 N2-IOP-21, Precautions 2, 3.

ANSWERS -- NINE MILE POINT 2 -85/12/10-G.A. SLY

ANSWER 8.01 (2.00)

a. Yes (+0.5), following putting RPS trip System A in the tripped position (+0.5) as per 3.3.1.a. (+1.0 Total)

b. 1. No (+0.25), IRMs are not required in Condition 1 and you may stay there (+0.25) (+0.5 Total)

2. Yes (+0.25), unless you had the RPS trip System A in the tripped position (+0.25). Specification 3.0.5 is not applicable. (+0.5 Total)

REFERENCE
1. Tech. Specs, pp. 3/4 0-1, 3-1 to 3-4.

ANSWER 8.02 (3.00)

a. Yes (+0.5), due to failure of surveillance 4.8.1.1.2.7 air pressure greater than 225 psig (+0.5). (+1.0 Total)
-or- attendant systems are not operable

b. No (+0.5), due to Specification 3.0.3 which states you can be without emergency power source if you have everything else (+0.5). (+1.0 Total) → Also will get answer of T.S. 3.8.1.1. action e

c. You would be in violation of Specification 3.0.3 (+0.5), and must perform the action statement (+0.5). (+1.0 Total)

T.S. 3.8.1.1.b diesel action 7 day or out.
- OR -

REFERENCE
1. Tech. Spec., pp. 3/4 0-1, 8-1 to 8-8.

-or- T.S. 3.5.1.d - LPCI inop action or 72 ... /24
T.S. 3.5.2.a 4 hr suspend core alterations.
-or- T.S. 8.8.1 e 12/24

ANSWER 8.03 (2.00)

a. Yes (+0.5)

b. 1. The intent of the original procedure is not altered. (+0.5)

2. The change is approved by two (2) members of the plant management staff, at least one (1) of whom holds a Senior Reactor Operators License on the unit affected. (+0.5)

3. The change is documented, reviewed, and approved by the General Superintendent Nuclear Generation or designee within 14 days of implementation. (+0.5)

REFERENCE

1. NMP-2 Tech. Spec., Administrative Procedures 6.8.3.

2. NMP-2 Exam Bank.

ANSWER 8.04 (3.00)

1. THERMAL POWER, Low Pressure or Low Flow

Thermal Power shall not exceed 25% of Rated Thermal Power with the reactor vessel steam dome pressure less than 785 psig or core flow less than 10% of rated flow. (+1.0)

2. THERMAL POWER, High Pressure and High Flow

The Minimum Critical Power Ratio (MCPR) shall not be less than 1.06 with the reactor vessel steam dome pressure greater than 785 psig and core flow greater than 10% of rated flow. (+1.0)

3. REACTOR COOLANT SYSTEM PRESSURE

The reactor coolant system pressure, as measured in the reactor vessel steam dome, shall not exceed 1325 psig. (+1.0)

REFERENCE

1. NMP-2 Tech. Spec., pp. 2-1, 2-2.

ANSWER 8.05 (2.50)

a. No (+0.5), allowed to exceed weekly by 25% ~~or one day~~ (+0.25) no restriction doing them early (+0.25). Also did not exceed 3.25 times interval for three (3) consecutive surveillance (+0.5).

b. Next surveillance would be Wednesday, December 19 (+0.5), because you are limited by the three (3) consecutive interval limit (22 days) from November 27 (+0.5).

REFERENCE

1. NMP-2 Tech. Spec., pp. 3/4 0-2.

ANSWER 8.06 (2.50)

a. 1. No known Pressure Boundary Leakage (+0.5)

2. 5 gpm unidentified leakage (+0.5)

3. 25 gpm total leakage averaged over a 24-hour period (+0.5)

b. 4 gpm --- unidentified leakage

22 gpm --- identified leakage

26 gpm total leakage (+0.5)

Reduce the total leakage rate to less than 25 gpm within 4 hours or be in at least hot shutdown in 12 hours and cold shutdown in the following 24 hours. (+0.5)

REFERENCE

1. NMP-2 Tech. Spec., LCO, Reactor Coolant System, Operational Leakage. T.S. 3.4.3.2 b

ANSWER 8.07 (2.50)

a. SRO - 1 (+0.5)
RO - 2 (+0.5)
STA - 1 ~~and 2 Unlicensed operators~~ (+0.5)

b. No (+0.~~25~~ +0.5), the 2 hour exception does not apply during shift changes (+0.5) ~~(+0.75 Total)~~

Yes if onshift operator stays over (+1.0 Total)

REFERENCE

1. NMP-2 Tech. Spec., 3.6, p. 6-1 and Table 6.2.2-1.

ANSWER 8.08 (1.50)

a. T = FRTP/CMFLPD Both items defined in Tech. Spec. Definitions (+0.25)

T = [(300/3323)/10]/13.4 = 0.902/0.746 = 1.2 (+0.25)

S is less than or equal to (0.66 W + 51%) (+0.25)

b. No (+0.25). The Tech. Spec. require an APRM adjustment only if Tau is less than or equal to 1. (+0.5)

REFERENCE

1. NMP-2 Tech. Spec., 3/4 2.2, LCO, Power Distribution Limits, APRM Setpoints, p. 2-5.

2. NMP-2 Exam Bank.

ANSWER 8.09 (1.50)

a. ~~Restore on pump within 72 hours or be in hot shutdown in 12 hours and cold shutdown within 24 hours. Also take ACTION required by Spec 3.5.2 and 3.8.1.2.~~ (~~+1.0~~) 0.75 0.75
Spec. 3.0.4

b. T.S. 3.0.4. delineates the measures to be taken for those circumstances not directly provided for in the action statements and whose occurrence would violate the intent of the specification. (+~~1.50~~ TOTAL)
+0.75

REFERENCE

1. NMP2, T.S. bases 3.0.4., 3.5.2, 3.7.1.1, 3.8.1.2

ANSWER 8.10 (2.00)

a. Restore within 72 hours or be in Hot Shutdown in 12 hrs.

T.S. 3.6.2.3.a (1.0)

b. Be in at least HOT Shutdown in 12 hrs. T.S. 3.6.2.3.b (1.0)

REFERENCE
1. NMP2, T.S. 3.6.2.3

ANSWER 8.11 (2.50)

a. T.S. 3.6.3 ~~and 3.7.4~~ (+0.5)

b. ~~No~~ operable (+0.5) RCIC can provide its intended function, but you have violated Primary Containment Integrity requirements and must (+0.25)

1. demonstrate the inboard isolation valve operable and (+0.25)

2. within 4 hours: (+0.25)

   a. restore the inop valve to operable (+0.25)
   b. isolate line (this makes RCIC inop) (+0.25)

3. or be in Hot S/D in 12 hrs and Cold S/D in 24 hrs. (+0.25)

REFERENCE
1. NMP2 T.S. 3.6.3 and 3.7.4

QUESTION	VALUE	REFERENCE
05.01	2.00	SLY0000017
05.02	2.00	SLY0000021
05.03	2.00	SLY0000022
05.04	2.50	SLY0000023
05.05	2.50	SLY0000024
05.06	2.00	SLY0000025
05.07	2.00	SLY0000026
05.08	2.00	SLY0000027
05.09	3.00	SLY0000078
05.10	3.00	SLY0000106
05.11	2.00	SLY0000111
	25.00	
06.01	3.00	SLY0000028
06.02	2.50	SLY0000029
06.03	2.00	SLY0000030
06.04	1.00	SLY0000031
06.05	2.00	SLY0000032
06.06	2.00	SLY0000033
06.07	2.00	SLY0000034
06.08	1.50	SLY0000035
06.09	2.50	SLY0000036
06.10	2.00	SLY0000037
06.11	2.50	SLY0000051
06.12	1.00	SLY0000090
06.13	1.00	SLY0000116
	25.00	
07.01	2.00	SLY0000091
07.02	2.00	SLY0000092
07.03	2.00	SLY0000093
07.04	1.50	SLY0000094
07.05	2.50	SLY0000095
07.06	2.00	SLY0000098
07.07	1.50	SLY0000099
07.08	2.50	SLY0000100
07.09	3.00	SLY0000109
07.10	2.00	SLY0000110
07.11	2.00	SLY0000120
07.12	2.00	SLY0000121
	25.00	
08.01	2.00	SLY0000080
08.02	3.00	SLY0000082
08.03	2.00	SLY0000083
08.04	3.00	SLY0000084
08.05	2.50	SLY0000086

QUESTION	VALUE	REFERENCE
08.06	2.50	SLY0000087
08.07	2.50	SLY0000088
08.08	1.50	SLY0000089
08.09	1.50	SLY0000107
08.10	2.00	SLY0000108
08.11	2.50	SLY0000112
	25.00	
	100.00	