Commonwealth Edison Company
Braidwood Generating Station
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Braceville, IL 60407-9619
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July 30, 1998

ComEd

Mr. Hironori Peterson
U. S. Nuclear Regulatory Commission
Region III
801 Warrenville Road
Lisle, IL 60532-4351

Dear Mr. Peterson:

Enclosed are the examination materials that Braidwood Generating Station is submitting for review, comment, and approval for the Initial License Written Re-examination of Mr. Robert Sherman scheduled for the week of September 14, 1998, at Byron Generating Station.

This submittal includes the Reactor Operator Written Examination.

This examination material has been developed in accordance with Interim Revision 8 of NUREG-1021, "Operator Licensing Examiner Standards". Please note that reference materials are attached to each individual examination question per your request.

Some minor modifications have been made to the Integrated Examination Outline with regards to the written examination in order to improve balance and content. These changes improve the examination quality and compliance with Interim Revision 8 of NUREG-1021, "Operator Licensing Examiner Standards".

Quantitative and qualitative validation of the examination material will occur during the next three weeks. Some modifications or adjustments to the examination material may be required.

Please ensure that these materials are withheld from public disclosure until after the examination is completed.

If you have any questions or concerns regarding this submittal, please contact Scott Deprest at (815) 458-3411 extension 2250 or Paul Hippely at extension 2235.

Sincerely,

Tim J. Tulon
Site Vice President
Braidwood Nuclear Generating Station

List of Enclosures:

Updated RO Written Exam Sample Plan
RO Composite Examination with references attached
Completed ES-401-6 Checklist
Examination Security Agreement (ES-201-3)
Listing of Submitted Sample Plan Changes

cc: w/o Enclosures
Regulatory Assurance
B. Wegner
J. Walker
D. Hoots
C. Cerovac
P. Hippely
T. Benton
L. Holden
Class File

nrc/98047tjt.doc

Facility: Braidwood 1 & 2 Date of Exam: September 14, 1998 Exam Level: RO

Tier	Group	K/A Category Points											Point Total
		K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	
1. Emergency & Abnormal Plant Evolutions	1	2	2	2				4	6				16
	2	3	2	3				6	2			1	17
	3			1				1	1				3
	Tier Totals	5	4	6				11	9			1	36
2. Plant Systems	1	3	2	1	2	2	1	1	2	3	4	2	23
	2	2		2	2	2	1	2	2	3	2	2	20
	3	2		1	1				1	1	1	1	8
	Tier Totals	7	2	4	5	4	2	3	5	7	7	5	51

3. Generic Knowledge and Abilities	Cat 1	Cat 2	Cat 3	Cat 4	13
	5	3	2	3	

Note:
- Attempt to distribute topics among all K/A categories; select at least one topic from every K/A category within each tier.
- Actual point totals must match those specified in the table.
- Select topics from many systems; avoid selecting more than two or three K/A topics from a given system unless they relate to plant-specific priorities.
- Systems/evolutions within each group are identified on the associated outline.
- The shaded areas are not applicable to the category/tier.

PWR RO ɪmination Outline

Facility: Braidwood Exam Date: 9/14/98 Examination Level: RO

Section Title Generic Knowledge and Abilities

RO Group 1

System/Evolution	K/A	RO	KA Statement	Level	Question Topic
Conduct of Operations	2.1.1	3.7	Knowledge of conduct of operations requirements.	B	Evaluation of requirement for "active" license
	2.1.1	3.7	Knowledge of conduct of operations requirements.	B	Direction of NLO personnel
	2.1.2	3.0	Knowledge of operator responsibilities during all modes of plant operation.	B	Operating Daily Orders
	2.1.23	3.9	Ability to perform specific system and integrated plant procedures during all modes of plant operation.	B	Procedure required usage
	2.1.24	2.8	Ability to obtain and interpret station electrical and mechanical drawings.	B	Use of electrical prints
Equipment Control	2.2.13	3.6	Knowledge of tagging and clearance procedures.	B	MOV tagout
	2.2.26	2.5	Knowledge of refueling administrative requirements.	B	RCS level discrepancy during refueling
	2.2.32	3.5	Knowledge of RO duties in the control room during fuel handling such as alarms from fuel handling area, communication with fuel storage facility, systems operated from the control room in support of fueling operations, and supporting instrumentation.	B	RO duties in Control Room during refueling
Radiation Control	2.3.1	2.6	Knowledge of 10 CFR: 20 and related facility radiation control requirements.	B	Radiation exposure determination
	2.3.10	2.9	Ability to perform procedures to reduce excessive levels of radiation and guard against personnel exposure.	R	Fuel Handling Accident Response
Emergency Procedures / Plan	2.4.16	3.0	Knowledge of EOP implementation hierarchy and coordination with other support procedures.	B	Performance of Status Trees/Function Restoration
	2.4.20	3.3	Knowledge of operational implications of EOP warnings, cautions, and notes.	B	Applicability of EOP Foldout Page
	2.4.31	3.3	Knowledge of annunciators alarms and indications, and use of the response instructions.	B	Identification of inoperable CR annunciators

PWR RO amination Outline

Facility: Braidwood Exam Date: 9/14/98 Examination Level: RO

Section Title Plant Systems

RO Group 1

System/Evolution	K/A	RO	KA Statement	Level	Question Topic
Control Rod Drive System	001 A2.06	3.4	Effects of transient xenon on reactivity	B	Effect of Xenon Transient & compensation
	001 K1.03	3.4	CRDM	B	Application of DC Hold
Reactor Coolant Pump System	003 A1.06	2.9	PZR spray flow	B	RCP and Pzr spray operations
	003 K2.01	3.1	RCPS	R	RCP Breaker & interlocks
Chemical and Volume Control System	004 A3.11	3.6	Charging/letdown	R	Charging & letdown flows (including seal injection)
	004 A4.07	3.9	Boration/dilution	B	Calculation of dilution
	004 K6.01	3.1	Spray/heater combination in PZR to assure uniform boron concentration	R	Boron mixing
Engineered Safety Features Actuation System	013 A3.01	3.7*	Input channels and logic	B	CNMT Spray/Phase B
	013 K4.13	3.7	MFW isolation/reset	R	FW Isolation - P14
Nuclear Instrumentation System	015 A2.02	3.1	Faulty or erratic operation of detectors or compensating components	B	SR NIS discriminator failure
	015 K2.01	3.3	NIS channels, components, and interconnections	B	SR NIS - loss of control power
	015 K5.06	3.4	Subcritical multiplications and NIS indications	R	Eval for 1/M - Eightfold increase
In-Core Temperature Monitor System	017 K4.01	3.4	Input to subcooling monitors	R	CETC failure effect on Subcooling Monitor/Iconic Display
Containment Cooling System	2.1.32	3.4	Ability to explain and apply all system limits and precautions.	R	RCFC operations requirements
Main Feedwater System	2.1.7	3.7	Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation.	B	S/G Level program - low power
	059 K1.04	3.4	S/GS water level control system	R	Effect of failure of S/G steam pressure channel

PWR RO amination Outline

Facility: Braidwood Exam Date: 9/14/98 Examination Level: RO

Section Title Plant Systems

RO Group 1

System/Evolution	K/A	RO	KA Statement	Level	Question Topic
Auxiliary / Emergency Feedwater System	061 A3.01	4.1	AFW startup and flows	B	AFW Startup
	061 K5.02	3.2	Decay heat sources and magnitude	B	AFW flow requirements for cooldown
Liquid Radwaste System	068 A4.04	3.8	Automatic isolation	B	RCDT operation - effect of CNMT Isolation
	068 K1.07	2.7	Sources of liquid wastes for LRS	R	CNMT Sump sources of input during normal operation
Waste Gas Disposal System	071 A4.05	2.6*	Gas decay tanks, including valves, indicators, and sample line	R	Waste Gas Decay Tank Operations
Area Radiation Monitoring System	072 A4.03	3.1	Check source for operability demonstration	R	Check Source operation
	072 K3.02	3.1	Fuel handling operations	B	Loss of FHB Overhead Crane rad monitor

PWR RO ımination Outline

Facility: Braidwood Exam Date: 9/14/98 Examination Level: RO

Section Title Plant Systems

RO Group 2

System/Evolution	K/A	RO	KA Statement	Level	Question Topic
Reactor Coolant System	002 A1.11	2.7	Relative level indications in the RWST, the refueling cavity, the PZR and the reactor vessel during preparation for refueling	B	Relationship of levels during refueling operations
	002 A3.01	3.7	Reactor coolant leak detection system	R	RCS leak Detection Systems
	002 K4.09	3.2	Operation of loop isolation valves.	R	Use of Loop Isolation Valves
Emergency Core Cooling System	006 A2.13	3.9	Inadvertent SIS actuation	B	Systems response to SI/Actions
	006 K3.02	4.3	Fuel	B	10CFR50.46 Design Criteria
	006 K6.03	3.6	Safety Injection Pumps	B	Evaluation of flow ECCS pumps
Pressurizer Pressure Control System	010 A1.08	3.2	Spray nozzle DT	B	Spray using Normal and Aux Spray
	010 K5.01	3.5	Determination of condition of fluid in PZR, using steam tables	B	Evaluation of Pzr conditions
Pressurizer Level Control System	011 K1.04	3.8	RPS	B	Pzr Level Reactor Trip
Reactor Protection System	012 A3.07	4.0	Trip breakers	R	Operation of BOTH Bypass Trip Breakers
	012 A4.03	3.6	Channel blocks and bypasses	B	Input that can be bypass & condition
	012 K5.01	3.3*	DNB	R	OTdT inputs & effect of changes
Rod Position Indication System	2.4.31	3.3	Knowledge of annunciators alarms and indications, and use of the response instructions.	R	ROD BOTTOM Alarm operation
Non-Nuclear Instrumentation System	016 K3.02	3.4*	PZR LCS	B	NR RTD Failure effects
Containment Spray System	026 A2.08	3.2	Safe securing of containment spray when it can be done)	B	Sequence for securing CNMT Spray
	026 A4.01	4.5	CSS controls	R	Pump operation interlocks
Spent Fuel Pool Cooling System	033 K1.05	2.7*	RWST	R	RWST Purification Loops

PWR RO ımination Outline

Facility: Braidwood Exam Date: 9/14/98 Examination Level: RO

Section Title Plant Systems

RO Group 2

System/Evolution	K/A	RO	KA Statement	Level	Question Topic
D.C. Electrical Distribution	2.1.30	3.9	Ability to locate and operate components, including local controls.	B	DC bus battery charger
Emergency Diesel Generators	064 A3.07	3.6*	Load sequencing	B	Sequencing of ESF pumps - SI & SI w LOP
Fire Protection System	086 K4.06	3.0	CO2	B	Effect of loss of DC - CO2 actuation

PWR RO ımination Outline

Facility: Braidwood Exam Date: 9/14/98 Examination Level: RO

Section Title Plant Systems

RO Group 3

System/Evolution	K/A	RO	KA Statement	Level	Question Topic
Residual Heat Removal System	005 K1.12	3.1	Safeguard pumps	B	Recirc interties to SI Pumps & CV Pumps
	005 K4.10	3.1	Control of RHR heat exchanger outlet flow	R	Failure of Hx Outlet Valve
Pressurizer Relief Tank/Quench Tank System	2.4.50	3.3	Ability to verify system alarm setpoints and operate controls identified in the alarm response manual.	R	PRT conditions causing alarm/response
Component Cooling Water System	008 A2.05	3.3*	Effect of loss of instrument and control air on the position of the CCW valves that are air operated	R	Determination of effect of valve positioning
Containment Iodine Removal System	027 A4.03	3.3*	CIRS fans	R	Charcoal Filters response to deluge
Steam Dump System and Turbine Bypass Control	041 A3.02	3.3	RCS pressure, RCS temperature, and reactor power	B	Steam Dump input malfunction
Main Turbine Generator System	045 K1.20	3.4	Protection system	R	Turbine Control response to Failed Impulse Channel
Instrument Air System	078 K3.02	3.4	Systems having pneumatic valves and controls	B	Evaluation of eqpt affected for slow loss

PWR RO amination Outline

Facility: Braidwood Exam Date: 9/14/98 Examination Level: RO

Section Title Emergency and Abnormal Plant Evolutions

RO Group 1

System/Evolution	K/A	RO	KA Statement	Level	Question Topic
Reactor Coolant Pump Malfunctions	015 AA2.10	3.7	When to secure RCPs on loss of cooling or seal injection	B	Eval loss of cooling fl
	015 AK2.07	2.9	RCP seals	B	Eval of RCP seal failure
Emergency Boration	024 AA2.05	3.3	Amount of boron to add to achieve required SDM	B	Time/amount E-boration for condition
Loss of Component Cooling Water	026 AA1.05	3.1	The CCWS surge tank, including level control and level alarms, and radiation alarm	B	Evaluation of CCW leak
Pressurizer Pressure Control Malfunction	027 AA1.01	4.0	PZR heaters, sprays, and PORVs	B	Pressure controller step change
	027 AA2.15	3.7	Actions to be taken if PZR pressure instrument fails high	B	Non-Controlling channel failure
Steam Line Rupture	040 AA1.01	4.6	Manual and automatic ESFAS initiation	B	Steamline isolation
	040 AK1.06	3.7	High-energy steam line break considerations	B	Eval of Leak
Loss of Condenser Vacuum	051 AA2.02	3.9	Conditions requiring reactor and/or turbine trip	B	Eval of conditions
Station Blackout	055 EK3.02	4.3	Actions contained in EOP for loss of offsite and onsite power	B	Identification of RCP seal LOCA/cooldown
Loss of Vital AC Instrument Bus	057 AA2.19	4.0	The plant automatic actions that will occur on the loss of a vital ac electrical instrument bus	B	Eqpt affected on bus loss
Control Room Evacuation	068 AA1.21	3.9	Transfer of controls from control room to shutdown panel or local control	B	Operations required for transfer
Inadequate Core Cooling	074 EK1.03	4.5	Processes for removing decay heat from the core	B	Major action categories
High Reactor Coolant Activity	076 AA2.02	2.8	Corrective actions required for high fission product activity in RCS	B	Actions for reducing activity
Pressurized Thermal Shock	E08 EK2.2	3.6	Facility's heat removal systems, including primary coolant, emergency coolant, the decay heat removal systems, and relations between the proper operation of these systems to the operation of the facility.	B	Identification of heat removal process

PWR RC amination Outline

Facility: Braidwood Exam Date: 9/14/98 Examination Level: RO

Section Title Emergency and Abnormal Plant Evolutions

RO Group 1

System/Evolution	K/A	RO	KA Statement	Level	Question Topic
Natural Circulation Operations	E09 EK3.1	3.3	Facility operating characteristics during transient conditions, including coolant chemistry and the effects of temperature, pressure, and reactivity changes and operating limitations and reasons for these operating characteristics.	B	Natural Circ conditions and limits

PWR RO amination Outline

Facility: Braidwood Exam Date: 9/14/98 Examination Level: RO

Section Title Emergency and Abnormal Plant Evolutions

RO Group 2

System/Evolution	K/A	RO	KA Statement	Level	Question Topic
Continuous Rod Withdrawal	001 AA2.05	4.4	Uncontrolled rod withdrawal, from available indications	B	Evaluate conditions - unwarranted rod withdrawal
Dropped Control Rod	003 AK3.10	3.2?	RIL and PDIL	B	P/A vs. Group Step Counters
Reactor Trip	007 EA1.03	4.2	RCS pressure and temperature	B	Stabilized RCS temperature with failure of Steam Dumps
	007 EK2.03	3.5	Reactor trip status panel	R	Reactor Trip requirements
Pressurizer Vapor Space Accident	008 AK1.01	3.2	Thermodynamics and flow characteristics of open or leaking valves	R	Tail-Pipe conditions
Small Break LOCA	009 EA1.10	3.8*	Safety parameter display system	B	Calculation of subcooled margin on Iconics
Large Break LOCA	011 EA1.03	4.0	Securing of RCPs	B	RCP trip criteria evaluation
Loss of Reactor Coolant Makeup	022 AA1.08	3.4	VCT level	B	VCT level transmitter malfunction
Loss of Residual Heat Removal System	025 AK1.01	3.9	Loss of RHRS during all modes of operation	B	Calc of time to saturation/core boiling
	025 AK3.01	3.1	Shift to alternate flowpath	B	Alternate RCS cooling
Anticipated Transient Without Scram	2.4.48	3.5	Ability to interpret control room indications to verify the status and operation of system, and understand how operator actions and directives affect plant and system conditions.	B	AMS conditions
Loss of Source Range Nuclear Instrumentation	032 AK1.01	2.5	Effects of voltage changes on performance	B	Evaluation of SR NIS voltage failure
Loss of Intermediate Range Nuclear Instrumentation	033 AA2.04	3.2	Satisfactory overlap between source-range, intermediate-range and power-range instrumentation	B	Eval of failed IR channel on SU
Steam Generator Tube Leak	037 AA1.02	3.1*	Condensate exhaust system	R	Monitors for S/G Tube leakage
Steam Generator Tube Rupture	038 EK3.06	4.2	Actions contained in EOP for RCS water inventory balanc[illegible]G tube rupture, and plant shutdown proced[illegible]es	B	Loss of subcooling

PWR RO amination Outline

Facility: Braidwood Exam Date: 9/14/98 Examination Level: RO

Section Title Emergency and Abnormal Plant Evolutions

RO Group 2

System/Evolution	K/A	RO	KA Statement	Level	Question Topic
Loss of Secondary Heat Sink	E05 EK2.1	3.7	Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.	B	Interlocks affecting reestablishment of feed
Loss of Emergency Coolant Recirculation	E11 EA1.1	3.9	Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.	B	Reason for rapid S/G depressurization

PWR RC amination Outline

Facility: Braidwood Exam Date: 9/14/98 Examination Level: RO

Section Title Emergency and Abnormal Plant Evolutions

RO Group 3

System/Evolution	K/A	RO	KA Statement	Level	Question Topic
Pressurizer Level Control Malfunction	028 AK3.05	3.7	Actions contained in EOP for PZR level malfunction	B	Failed level channel low.
Loss of Off-Site Power	056 AA1.21	3.3*	Reset of the ESF load sequencers	B	Reset of sequencer
	056 AA2.46	4.2	That the ED/Gs have started automatically and that the bus tie breakers are closed	B	Eval of electric bus status

U.S. Nuclear Regulatory Commission
Site-Specific
Written Examination

Applicant Information	
Name:	Region: III
Date:	Facility/Unit: Braidwood 1 & 2
License Level: RO	Reactor Type: W
Start Time:	Finish Time:

Instructions

Use the answer sheets provided to document your answers. Staple this cover sheet on top of the answer sheets. The passing grade requires a final grade of at least 80.00 percent. Examination papers will be collected four hours after the examination starts.

Applicant Certification

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

_____
Applicant's Signature

Results	
Examination Value	_____ Points
Applicant's Score	_____ Points
Applicant's Grade	_____ Percent

Reactor Operator Examination

1 . An operator sits for the NRC License Operator Examination (Initial), successfully passes the Examination and is granted an NRC Senior Operator License or Reactor Operator license this month. What are the requirements for having the license on ACTIVE STATUS?

a. The individual must meet the time on shift requirements of SEVEN 8-hour shifts before the license is in ACTIVE STATUS.

b. The license is considered in ACTIVE STATUS for the current quarter ONLY.

c. The individual must meet the time on shift requirements of SEVEN 8-hour shifts to have a license in ACTIVE STATUS for the next quarter.

d. The license is considered in ACTIVE STATUS for the current and next quarter.

2 . The following conditions on Unit 1:

- Reactor power 45%
- 1A and 1C Feedwater pumps are operating
- FW PUMP TURB BRNG OIL LEVEL HIGH LOW annunciator (1-16-D3) alarms and the SER monitor indicates a low level.
- An EA is dispatched and confirms a low level exists.

In performing actions to correct the condition (per BwOP TO-08 "Filling a Turbine Feed Pump Oil Reservoir"), what is the normal relationship between the US, the NSO and the EA?

a. The US will direct the EA's activities, but will inform the NSO before the job commences.

b. The US will direct the EA's activities, and need NOT inform the NSO unless unit controls are affected.

c. The NSO will direct the EA's activities, but will inform the US before the job commences.

d. The NSO will direct the EA's activities, and need NOT inform the US unless unit load is affected.

3 . How is a procedure change, which significantly changes normal processes, procedurally conveyed to licensed members of the operating crew?

a. The SM places the applicable information in the Daily Order Book, and issues an additional memo to all crew personnel that is initialed.

b. The SM is informed by memo of the addition to the Daily Order Book, and makes an announcement of the addition during the shift briefing.

c. The SOS places the applicable information in the Daily Order Book, and the individual operator is responsible for reviewing the Daily Order.

d. The US places the applicable information in the Daily Order Book, and makes an announcement of the addition during the shift briefing.

4 . An example of a licensed operator evolution that can be performed WITHOUT either referring to an operations procedure or having a procedure in-hand is ...

a. Adjusting rod position following a boration.

b. Starting the 1A Heater Drain Pump.

c. Placing excess letdown in service.

d. Latching and rolling up the main turbine.

5 . Assuming an auto-close signal is continuously present in the circuit for the 1A SI pump, which contact will be maintained open in order to prevent the starting relay (SR) from attempting repeated breaker closures onto a faulted bus?

(E 1-4030-SI01 is provided for use.)

a. LC SW

b. 52/b

c. Y

d. LS

6 . An operator is preparing an OOS that designates 1CC685, RCP Thermal Barrier CC Return CNMT Isolation valve, as an isolation point.

What is the acceptability of using this isolation point?

The OOS is...

a. acceptable only if the MOV is tagged at its control switch, power supply and valve handwheel.
b. acceptable only if the MOV is tagged at its control switch, power supply and a blocking device is placed on the valve.
c. NOT acceptable because the MOV fails to meet isolation requirements.
d. NOT acceptable because the valve fails open on a loss of power.

7 . The following conditions exist for Unit 1:

- Unit shutdown and cooldown initiated 120 hours ago
- Lowering of RCS level to the reactor vessel flange is underway
- RCS temperature - 95°
- RCS level Control Room indicators: 1LI-RY046 - 401' 0"
  1LI-RY049 - 402' 1"
- RH loop 1A in operation with "normal" indications

What is the appropriate action for these conditions?

a. The lowering of RCS level can continue.
b. The level change must be stopped until the cause for the level discrepancy is determined.
c. When temperature correction is applied to the highest Control Room level indication, the running RHR pump must be stopped to prevent cavitation.
d. When temperature correction is applied to the lowest Control Room level indication, the available SI Pump aligned for hot leg injection must be started.

8 . What is a responsibility of the NSO during refueling operations?

a. Checking source range counts while a fuel assembly is being placed in the core.
b. Ensuring water level in spent fuel pool is at least 23' above the fuel.
c. Maintaining a 1/M plot while reloading fuel during a core shuffle.
d. Monitoring the manipulator crane position by updating the Control Room tag board.

9 . An operator has the following exposure history this year until today:

Deep Dose Equivalent (DDE)	-	210 mrem
Committed Effective Dose Equivalent (CEDE)	-	45 mrem
Shallow Dose Equivalent (SDE)	-	33 mrem
Committed Dose Equivalent (CDE)	-	28 mrem

Today the operator was required to make two entries into containment:

Entry 1: Gamma dose - 52 mrem; Neutron dose - 24 mrem
Entry 2: Gamma dose - 124 mrem

How much radiation exposure is available to the operator if he has to make additional entries?

His available margin based on the routine Administrative Exposure Control Levels is...

a. 100 mrem for that day; 2484 mrem for the year.
b. 100 mrem for that day; 2545 mrem for the year.
c. 124 mrem for that day; 2569 mrem for the year.
d. 124 mrem for that day; 2614 mrem for the year.

10 . The following conditions exist on Unit 1:

- Refueling operations in progress
- A HIGH alarm received on radiation monitor 1RE-AR012, Containment Fuel Handling Incident

When should the NSO initiate action and what action should he/she take from the control room?

Indication of a fuel handling accident is considered when a...

a. report is received from personnel in containment. The operator starts the containment charcoal filter fans.
b. report is received from personnel in containment. The operator actuates Unit 1 CNMT evacuation alarm.
c. corroborating rise is indicated on monitor 1RE-AR011. The operator starts the containment charcoal filter fans.
d. corroborating rise is indicated on monitor 1RE-AR011. The operator actuates Unit 1 CNMT evacuation alarm.

11 . The following conditions exist on Unit 1:

- A reactor trip has occurred and both reactor trip breakers are verified open
- The turbine has tripped
- BwEP-0 "Reactor Trip OR Safety Injection" has been entered.
- BUS 141 ALIVE light is NOT lit with bus voltage at ZERO volts
- BUS 142 ALIVE light is lit with bus voltage at 4149 volts.

Which of the following describes the actions the operators are required to take?

a. Continue with next step of BwEP-0.
b. Turn on the synchroscope and manually close ACB 1412, SAT 142-1 feed breaker.
c. Manually start 1A D/G and verify ACB 1413, D/G output breaker, closes.
d. Initiate actions of BwOA ELEC-3 and continue with next step of BwEP-0.

12. From the list of procedures identified below, which has(have) "Transfer to Cold Leg Recirculation" on the Operator Action Summary Page?

(NOTE: The following procedures are in the E-1 or CA-1 series:
BwEP-1 "Loss Of Reactor Or Secondary Coolant"
BwEP ES-1.1 "SI Termination"
BwEP ES-1.2 "Post-LOCA Cooldown And Depressurization"
BwEP ES-1.3 "Transfer To Cold Leg Recirculation"
BwEP ES-1.4 "Transfer To Hot Leg Recirculation"
BwCA-1.1 "Loss Of Emergency Coolant Recirculation"
BwCA-1.2 "LOCA Outside Containment")

a. BwEP-1, BwEP ES-1.1 through ES-1.4, and BwCA-1.1 through BwCA-1.2 procedures.
b. BwEP-1, BwEP ES-1.1 and ES-1.2 procedures ONLY.
c. BwEP-1 and BwEP ES-1.2 procedures ONLY.
d. BwEP-1 procedure ONLY.

13 . The following conditions exist on Unit 1:

- Reactor trip breakers status - OPEN
- RCS Tave - 557°F
- Pzr pressure - 2235 psig

Annunciator RCFC VIBRATION HI (1-3-C5) has been in alarm for the past 1 ½ shifts due to a faulty vibration probe. While maintenance troubleshoots the vibration probe on RCFC 1C which of the following actions is appropriate for this alarm window?

a. The alarm should be acknowledged for each actuation and the SER monitored for valid alarm inputs.

b. The alarm should be acknowledged for each actuation and operators stationed locally at each RCFC to monitor vibration.

c. The alarm should have been silenced without acknowledgement after obtaining Unit Operating Engineer's permission and the SER monitored for valid alarm inputs.

d. The alarm should have been silenced without acknowledgement with US permission and operators stationed locally at each RCFC to monitor vibration.

14 . A feed pump trip occurred resulting in a rapid power reduction on Unit 1. Power was reduced from 100% steady-state conditions using a combination of rods and boration.

The following conditions exist for Unit 1 following stabilization:

- Reactor Power - 60%
- Delta-I target value - +2.0
- Control Bank D position - 160 steps withdrawn
- Tave - 572°F
- Delta-I - -10.5%
- Core Age - MOL

What actions will be required to maintain the current power level and maintain Delta-I within its normal operating band over the next FIVE hours?

a. Boration and control rod withdrawal, followed by dilution.

b. Boration and control rod insertion, followed by dilution.

c. Dilution and control rod withdrawal, followed by boration

d. Dilution and control rod insertion, followed by boration.

15 . A problem with the rod control system requires checking several rod bank circuits. The affected power cabinet repairs are to be made by supplying power from the DC hold supply cabinet.

What is the capacity of the DC Hold Supply Cabinet under these circumstances?

a. ONE control rod bank group can be placed on DC HOLD, and these rods will drop ONLY if the controls are taken to OFF at the DC Hold cabinet.

b. ONE control rod bank group and ONE shutdown bank group can be placed on DC HOLD, and these rods will drop ONLY if the controls are taken to OFF at the DC Hold cabinet.

c. ONE control rod bank group can be placed on DC HOLD, and these rods will automatically drop.

d. ONE control rod bank group and ONE shutdown bank group can be placed on DC HOLD, and these rods will automatically drop.

16 . The following conditions exist for Unit 1:

- Mode 5
- RCS is draining to Pzr level of 40%
- IM calibrations have been completed for LT-RY048, Refuel Cavity level, in preparation for further draining

What is the relationship between Pzr level instrument LT-459, Pzr level instrument LT-462 and LI-RY048?

At approximately 40% level indicated on LI-462, level on...

a. LI-459 and LI-RY048 will be offscale high.

b. LI-RY048 will be just onscale and LI-459 will be offscale low.

c. LI-459 will read higher than 40% and LI-RY048 will just be onscale.

d. LI-RY048 will be offscale high and LI-459 will read lower than 40%

17 . The following conditions exist for Unit 1:

- Reactor power - 100%
- RCS activity is elevated, but below Technical Specification (CTS) levels
- Pzr pressure - 2225 psig
- Pzr level - 44%
- PORV 1RY456 - dual indication
- Leak rate - 6 gpm

In an attempt to isolate the leakage past the PORV, the Block Valve 1RY8000B was taken to close. The valve failed to close and the operator placed 1RY456 in the CLOSE position. When conditions stabilize:

- Reactor power - 100%
- Pzr pressure - 2228 psig
- Pzr level - 44%

How would the operator be able to tell if the PORV has closed?

a. Position lights for PCV-456 showing CLOSE indication ONLY.
b. PORV downstream temperature indication 1TI-463 dropping.
c. Level change in RCDT.
d. Lower readings for containment radiation monitors RE-001 1A/0012A.

18 . The following conditions exist on Unit 1:

- RCS Loop C is isolated for maintenance
- RCS Loop A had been isolated for maintenance
- RCS Loop A Hot Leg Stop Isolation Valve (LSIV) was opened at 1001
- RCS Loop A Bypass Stop Valve was opened at 1005 with relief line flow of 115 gpm verified
- RCS Loop A Cold Leg LSIV is closed
- RCS temperature - 110°F
- RCS Hot Leg Loop temperatures - 108°F (A); 119°F (B); 110°F (C); 125°F (D)
- RCS Cold Leg Loop temperatures - 103°F (A); 108°F (B); 90°F (C); 115°F (D)
- S/G levels (Narrow Range) - 20% (A); 30% (B); 15% (C); 32% (D)

What will occur when the operator takes the control switch for MOV-RC8002A (RCS Loop A Cold Leg LSIV) to OPEN at 1509?

The valve...

a. will travel fully open with NO automatic actuations.
b. will travel fully open, and the AFW pumps get a start signal.
c. remains closed because the temperature difference interlock remains active.
d. remains closed because the timer interlock is still active.

19 . The following Unit 1 conditions exist:

- RCS temperature (Average CETC) - 140°F
- RCS pressure - 365 psig
- A bubble has just been drawn in the Pressurizer
- All loops are filled and vented
- Preparations are in progress to start the first RCP for continuous run

What is the effect of selecting the 1C RCP to start?

a. Both Pzr Sprays will function normally for Pzr pressure control.
b. Manual cycling of the Pzr heaters will be required for Pzr pressure control.
c. PORV RY456 will open on high pressure from high pressure bistable PB456E.
d. Normal Pzr spray will deliver minimal spray flow for Pzr pressure control.

20 . The following conditions exist on Unit 1:

- Reactor power 26%
- Pzr pressure - 2235 psig
- Pzr level - 35%

RCP 1A breaker trips due to sensed undervoltage from bus 157. What is expected as a result of the trip of the RCP?

a. The reactor will trip due to the open RCP breaker.
b. The reactor will trip due to RCS loop low flow condition.
c. The reactor will be manually tripped by the operator.
d. A normal plant shutdown will be initiated.

21 . The following conditions exist on Unit 1:

- Reactor power - 100%
- PZR pressure - 2235 psig
- PZR level - 44% stable
- CV121 - In MANUAL
- CVCS letdown - Isolated due to leak in Letdown Hx
- CVCS Excess Letdown - In service with maximum flow of 20 gpm
- RCP seal injection - 1A CV pump aligned to all RCPs
- RCP seal leakoff flow - 3 gpm (1A); 3.5 gpm (1B); 3 gpm (1C); 2.5 gpm (1D)

What flow is indicated on Charging Header Flow indicator, FI-121?

a. 5 gpm
b. 25 gpm
c. 32 gpm
d. 65 gpm

22 . The following conditions exist on Unit 2:

- Unit is in MODE 5
- Unit burnup is 5700 EFPH in Cycle 7
- SDM - 1.3% DeltaK/K
- RCS pressure - 400 psig
- RCS average temperature - 195°F
- RCS boron concentration - 1006 ppm
- Differential boron worth - -10.75 pcm/ppm
- PZR level - 32.3%
- SR NIS countrate - 10 cps , BOTH channels stable background levels
- An inadvertent dilution at 70 gpm begins at 1300 hours

Assuming NO operator action is taken and PZR level remains constant over the time period, when would the HIGH FLUX AT SHUTDOWN alarm actuate?

a. Never, because BDPS will actuate prior to actuation.
b. 1430 hours.
c. 1505 hours.
d. 1734 hours.

23 . The following conditions exist on Unit 1:

- Reactor power was 95% prior to the event
- A turbine runback resulted in rod insertion with control rods in AUTOMATIC
- Annunciator ROD BANK LO-2 INSERTION LIMIT (1-10-A6) is lit

The operators initiated an emergency boration per BwOA PRI-2 "Emergency Boration" and have verified control rods are now withdrawing. Why does the operator energize the Pzr Backup Heaters?

This action...

a. ensures Pzr boron concentration equalization with RCS by increasing normal spray flow.
b. counteracts RCS cooldown due the boration by the additional heat from the backup heaters.
c. prevents loss of Pzr level by increasing the volume of fluid maintained in the Pzr.
d. guarantees adequate subcooling margin is maintained by raising the saturation temperature of the Pzr.

24 . The following conditions exist on Unit 1:

- A LOCA has occurred
- Actions of 1BwEP ES-1.3, 'Transfer To Cold Leg Recirculation, have been completed.
- During alignment, 1CV8804A, RH HX to CENT CHG Pumps Isolation Valve, failed to open and could NOT be manually opened.

What is the status of the ECCS system?

a. The RHR discharge headers are cross-tied with only RHR Pump 1B running and supplying suction to the SI pumps and Centrifugal Charging pumps from the B train connection.

b. The RHR discharge headers are cross-tied with both RHR pumps running and supplying suction to the SI pumps only from the B train connection. The Centrifugal Charging pumps are stopped.

c. RHR Pump 1B is discharging through the B Train cold leg injection headers and supplying suction to the SI Pumps. RHR Pump 1A and the Centrifugal Charging pumps are stopped.

d. RHR Pump 1B is discharging through the B Train cold leg injection headers and supplying suction to the SI pumps and Centrifugal Charging pumps. RHR Pump 1A is discharging through the A Train cold leg injection headers.

25 . The following conditions exist on Unit 1:

- Unit is in MODE 4 during cooldown per 1BwGP 100-5 following unit shutdown 38 hours ago
- RCS temperature - 340°F
- RCS pressure - 345 psig
- PZR level - 33%
- RHR pump 1A is operating in Shutdown Cooling mode
- RH-618 A Hx Bypass Flow Control Valve is in MAN at 3000 gpm
- RH-606 A HX Flow Control Valve controller demand is at 20%
- CV-128 RHR Ltdn Flow Contr Valve demand is at 100%
- PCV-131 is in AUTOMATIC set to maintain 350 psig

A signal failure from the controller causes RH-606 to go fully closed. What is the system response to this failure WITHOUT operator action?

a. PCV-131 will throttle open due to lower RH discharge pressure.
b. RCS pressure will increase due to RCS heatup.
c. Pressurizer level will decrease due to increased letdown flow.
d. RH-610 will throttle open due to lower RH flow.

26 . The following conditions exist on Unit 1:

- A plant heatup is underway
- MODE 3 has just been entered
- RCS pressure 450 psig

SI Accumulator 1C was drained below required level during the outage for repair work. System configuration has NOT allowed refilling the Accumulator until now. The SI Accumulator line is being flushed in accordance with BwOP SI-14 "SI Accumulator Fill Line Flush" (Valve lineup includes: 1SI-8964, SI Test Lines to Radwaste Isolation Valve, and SI-8888, SI Pps to Accumulator Fill Valve, are open. 1SI 8821A, SI Pump to Cold Leg Isolation Valve, and 1SI 8802A, SI to Hot Leg 1A & 1D Isol valve are closed). SI pump 1A running. During the flushing, an inadvertent SI signal is generated.

What is the status of the ECCS based on the current alignment WITHOUT operator action?

a. 1B SI pump ONLY is running with injection flow to the RCS cold legs and to the Accumulator 1C fill line flush.
b. 1A SI pump ONLY is running with flow directed to the Accumulator fill line flush ONLY.
c. BOTH SI pumps are running with injection flow to the RCS cold legs and to the Accumulator 1C fill line flush.
d. BOTH SI pumps are running with flow directed to the Accumulator 1C fill line flush ONLY.

27 . To meet the 10CFR50.46 criteria, the ECCS System is designed such that under accident conditions it will maintain...

a. total hydrogen production from zirconium-water reaction below maximum value of 5%.
b. maximum fuel temperature at the inside surface of the cladding less than 2000°F.
c. the core at least 5% shutdown to prevent an inadvertent return to criticality.
d. fuel clad oxidation less than 17% of total clad thickness anywhere within the core.

28 . The following conditions exist on Unit 1:

- A LOCA has occurred
- Transfer to Cold Leg recirculation is required
- RCS pressure is approximately 50 psig

What is the approximate total SI pump flow indicated on the main control board and how will this value change following transfer of BOTH trains of ECCS to cold leg recirculation?

	Total Flow	Flow Change
a.	650 gpm	Decrease
b.	800 gpm	Increase
c.	1050 gpm	Decrease
d.	1300 gpm	Increase

29 . During shift turnover for Unit 1, the NSO notes the following parameters:

RCS Tave - 566.5°F
Pzr pressure - 2235 psig
Pzr level - 38.3%
PRT pressure - 4 psig
PRT level - 74%
PRT temperature - 98°F

One hour later when annunciator 1-12-A7, PRT LEVEL HIGH LOW alarmed, the NSO notes the following parameters:

RCS Tave - 566.2°F
Pzr pressure - 2233 psig
Pzr level - 38%
PRT pressure - 5.9 psig
PRT level - 81%
PRT temperature - 96°F

What condition resulted in the change in parameters?

a. PRT PW Supply Inside Cnmt Isol Valve RY-8030 opened.
b. PRT to GW Comp Isol Valve RY-469 failed closed.
c. CVCS letdown relief valve CV-8117 lifted.
d. PORV RY-455A opened and reclosed.

30 . Unit 1 is operating at 100% power in MOL conditions. All systems are functioning normally with rod control in manual.

What is the effect on plant operations if instrument air supplied to the CVCS letdown Hx component cooling water outlet valve, CV-130 is lost?

TCV-130 goes fully...

a. shut and reactor power decreases due to boration in the CVCS demineralizers.
b. shut and the CVCS demineralizers are automatically bypassed on temperature signal.
c. open and reactor power increases due to deboration in the CVCS demineralizers.
d. open and the CVCS demineralizers are automatically bypassed on temperature signal.

31 . What are the parameters and values used by the operator to ensure the temperature difference between the PZR and the spray fluid are within the specified limit(s) in the PRESSURE AND TEMPERATURE LIMIT REPORT when initiating PZR spray?

a. For normal spray, the difference between RCS hot leg loop temperature and PZR vapor space temperature limit is 50°F, and for aux spray, the difference between Regenerative Hx charging inlet temperature and PZR vapor space limit is 320°F.

b. For normal spray, the difference between RCS cold leg loop temperature and PZR vapor space temperature limit is 50°F, and for aux spray, the difference between Regenerative Hx charging outlet temperature and PZR vapor space limit is 320°F.

c. For normal spray, the difference between RCS hot leg loop temperature and PZR vapor space temperature limit is 320°F, and for aux spray, the difference between Regenerative Hx charging inlet temperature and PZR vapor space limit is 320°F.

d. For normal spray, the difference between RCS cold leg loop temperature and PZR vapor space temperature limit is 320°F, and for aux spray, the difference between Regenerative Hx charging outlet temperature and PZR vapor space limit is 320°F.

32 . The following conditions exist on Unit 1:

- A load reject from 100% power has occurred
- Reactor power - 80%
- Pzr level - 56%
- Pzr vapor temperature - 655°F
- Pzr liquid temperature - 653°F
- RCS Tave - 578°F

What is the current status of the Pressurizer based on given conditions?

a. Backup and proportional heaters are fully on.

b. Proportional heaters are modulated on.

c. Pzr spray valves have modulated open.

d. Pzr spray valves and Pzr PORVs are open.

33 . The following conditions exist on Unit 1 with all controls in normal lineup:

- Reactor power - 30% stable
- RCS Tave - 564.5°F
- Pzr pressure - 2230 psig
- Pzr level - 36%

The pressurizer level controller 1LK-459 output fails low. What automatic actions result assuming NO operator action taken?

a. The reactor will trip on high pressurizer level ONLY.
b. Letdown will isolate on low pressurizer level and then the reactor will trip on high pressurizer level.
c. The reactor will trip on high pressurizer pressure ONLY.
d. Letdown will isolate on low pressurizer level and then the reactor will trip on RCS low pressure.

34 . The following conditions exist on Unit 1:

- Mode 3 NOT NOP with reactor trip breakers (RTA and RTB) closed
- Testing of reactor trip bypass breakers underway
- Reactor bypass breaker B (BYB) is racked in and closed
- An operator begins to perform test with reactor bypass breaker A (BYA).

What occurs as the operator operates the breaker BYA?

When reactor bypass breaker BYA is...

a. locally closed, ONLY breaker BYB will trip.
b. racked in to the CONNECT position, ONLY breaker BYB will trip.
c. locally closed, all reactor trip and bypass breakers will trip.
d. is racked in to the CONNECT position, all reactor trip and bypass breakers will trip

35 . The following conditions exist on Unit 2:

- Unit shutdown is in progress
- Reactor power - 20%
- RCS Tave - 562°F
- Pzr pressure - 2235 psig
- Pzr level - 32%
- First stage turbine pressure channel PT-506 fails high

What affect does this failure have on operations as unit shutdown is continued, if NO action is taken for the failure?

a. At 10% power, the reactor will trip if the Source Range Block RESET pushbuttons are depressed.
b. At 9% power, the reactor will trip if an RCP trips.
c. At 7% power, the reactor will trip if the TURBINE TRIP pushbuttons are depressed.
d. At 5% power, the reactor will be manually tripped as during a normal shutdown by BwGP 100-5.

36 . The following conditions exist on Unit 1:

- Power range NIS reading - 100%
- Tcold - 553°F
- Thot - 608°F
- RCS total flow - 372,000 gpm
- Pzr pressure - 2215 psig
- Pzr level - 69%

How does the setpoint for Over Temperature Delta-T (OTdT) change when a listed parameter is changed? (Consider each change individually)

The setpoint...

a. increases if Power range NIS output rises to 102%.
b. increases if total reactor flow decreases to 370,000 gpm.
c. decreases if pressurizer pressure increases to 2235 psig.
d. decreases if the Thot rises to 612°F.

37 . The following conditions exist on Unit 1:

- Mode 3 with unit cooldown in progress
- RCS temperature - 520°F
- Pzr pressure - 1750 psig
- Pzr level - 33%
- MSIVs open

What would directly happen if the operator were to take CONTAINMENT SPRAY & PHASE B ISOL switches for both trains to the ACTUATE position?

a. NO ESF actuations would occur.
b. Containment Phase B isolation and Containment Ventilation isolation ONLY would be actuated.
c. Containment Phase B isolation and Containment Ventilation isolation, and Containment Spray ONLY would be actuated.
d. Containment Phase B isolation and Containment Ventilation isolation, Containment Spray, and Main Steamline isolation would be actuated.

38 . The following conditions exist on Unit 2:

- RCS temperature - 340°F
- RCS pressure - 900 psig
- All MSIVs for the S/Gs are closed
- The MSIV Bypass valves are open
- The FW-035s, Feedwater Tempering Isolation Valves, are open
- The FW-034s, Feedwater Tempering Flow Control Valves, are closed (opened periodically for level control)
- Feedwater pump 2C is reset and latched on turning gear
- The Start Up Feedwater pump is running

The level in the S/G 2B rises to 90%. How is the plant affected?

a. No actuation occurs because of the position of the MSIVs.
b. The 2C Feedwater pump and Start Up Feedwater pump trip.
c. The 2C Feedwater pump trips and FW-035 valves close.
d. The 2C Feedwater pump and Start Up Feedwater pump trip, the FW-035 valves close, and the MSIV Bypass valves close.

39 . During a reactor startup, when does the ROD AT BOTTOM alarm become active for each control bank?

The alarm will actuate for a dropped rod for...

a. any Control Bank whenever Control Bank A DRPI output is above 9 steps.
b. each Control Bank whenever that Control Bank demand position is above 3 steps.
c. each Control Bank whenever that Control Bank DRPI output is above 9 steps.
d. Control Banks A, B and C whenever their Control Bank demand position is above 9 steps, and for Control Bank D whenever Control Bank D demand position is above 3 steps.

40 . How would the failure of the pulse height discriminator to a low value affect the indication of the affected Source Range channel?

The output would...

a. decrease due to electronic filtering which narrows the pulse height window.
b. decrease due to failure in counting the higher amplitude neutron generated pulses.
c. increase due to counting of the gamma generated pulses ONLY.
d. increase due to counting of the gamma generated pulses and decay alpha generated pulses.

41 . The following conditions exist on Unit 1:

- RCS at NOT NOP
- Reactor trip breakers - closed
- Source Range readings:
  N31 - 18 cps
  N32 - 22 cps

What indication would the operator observe if Control Power was lost to the N31 Drawer?

The N31 meter would read...

a. downscale, the associated drawer bistable lamps NOT lit, and reactor trip breakers closed.
b. downscale, the associated drawer bistable lamps lit, and reactor trip breakers open.
c. 18 cps, the associated drawer bistable lamps NOT lit, and reactor trip breakers closed.
d. 18 cps, the associated drawer bistable lamps lit, and reactor trip breakers open.

42 . The following conditions exist on Unit 1:

- A reactor startup is about to be performed
- All shutdown banks are fully withdrawn
- All control banks are fully inserted
- An ECC records the following:
  Predicted Critical Position (ECP) - 130 steps on CBD
  Max rod position - 231 steps on CBD
  Min rod position - 58 steps on CBD

The following parameters were recorded during the rod withdrawal:

ROD HEIGTH	N31 cps	N32 cps
0 on CBA	25	23
178 on CBA	34	31
178 on CBB	58	62
178 on CBC	116	106
80 on CBD	200	182
92 on CBD	237	225

When was the first time the operator was required to determine the Predicted Critical Position?

a. At 50 steps on CBA, with N32 as the designated Source Range detector.
b. At 113 steps on CBC, with N31 as the designated Source Range Detector.
c. At 80 steps on CBD, with N31 as the designated Source Range detector.
d. At 92 steps on CBD, with N32 as the designated Source Range detector.

43 . The following conditions exist on Unit 1:

- Reactor power - 50%
- RCS Tave - 570°F (A); 569°F (B); 569°F (C); 570°F (D)
- RCS Thot - 585°F (A); 584°F (B); 583°F (C); 585°F (D)
- RCS Tcold - 555°F (A) 554°F (B); 555°F (C); 555°F (D)
- Pzr pressure - 2235 psig
- Pzr level - 43 %

If loop B Thot output channel fails LOW, what is the response of Pzr level ?

Pressurizer level will...

a. increases to 60%.
b. remains the same.
c. decreases to 25%.
d. decreases to the letdown isolation setpoint.

44 . With Unit 1 at 100% power and with normal operating parameters, how would the failure of the HOTTEST Core Exit Thermocouple affect the reading of subcooling margin on the SPDS Iconics (CETC/SMM display) for each of the two situations below:

Situation 1 - The CETC output fails high slowly
Situation 2 - The CETC output fails low slowly

a. Situation 1: Subcooling margin will decrease to saturation then rise in superheat, and return to normal when CETC output reaches 2300°F.
Situation 2: Subcooling margin will increase, then stabilizes when the CETC output is smaller than TEN other TCs.

b. Situation 1: Subcooling margin will decrease to saturation then rise in superheat, and return to normal when CETC output reaches 1200°F.
Situation 2: Subcooling margin will remain constant.

c. Situation 1: Subcooling margin will increase to saturation then rise in superheat, and return to normal when CETC output reaches 1200°F.
Situation 2: Subcooling margin will decrease, then stabilizes when the CETC output is smaller than TEN other TCs.

d. Situation 1: Subcooling margin will increase to saturation then rise in superheat, and return to normal when TC output reaches 2300°F.
Situation 2: Subcooling margin will remain constant.

45 . The following conditions exist on Unit 2:

- RCS Temperature - 342°F
- Pzr pressure - 375 psig
- 2A, 2B, and 2D RCFCs are operating in high speed
- Unit 2 RCFC Dry Bulb temperatures are recorded as follows:.
  - 2A RCFC - 119°F
  - 2B RCFC - 118°F
  - 2C RCFC - 127°F
  - 2D RCFC - 121°F

Which of the following identifies the equipment status and actions for the above conditions?

What are the MINIMUM requirements for operation for the Reactor Containment Fan Coolers (RCFCs)?

a. An additional RCFC must be started because the average of ALL the RCFC temperatures exceeds the limit.
b. An additional RCFC must be started because ONE of the operating RCFCs temperatures is above the limit.
c. NO action is necessary because ALL temperatures are within their appropriate limit.
d. NO action is necessary because the average temperature of ALL operating RCFCs is below the limit.

46 . The following conditions exist on Unit 1:

- A LOCA has occurred
- Transition has been made to BwEP ES-1.3 "Transfer To Cold Leg Recirculation"
- Containment Spray actuated due to high containment pressure
- All systems and components operating as expected

What conditions allow for termination of Containment Spray?

a. ONE pump is stopped when containment pressure is less than 15 psig. The other pump is stopped when RWST LO-3 level is reached.

b. ONE pump is stopped when containment pressure is less than 20 psig. The other pump is stopped after it has operated for a period of at least TWO hours

c. BOTH pumps are stopped when containment pressure is less than 15 psig and have operated for a period of at least TWO hours.

d. BOTH pumps are stopped when containment pressure is less than 20 psig and RWST LO-3 level is reached.

47 . The following conditions exist on Unit 1:

- LOCA is in progress
- Containment pressure - 15 psig
- Containment Spray actuated due to high containment pressure
- Containment Spray signal has been reset
- The actions of BwEP ES-1.3 "Transfer To Cold Leg Recirculation" have been completed
- Offsite power is then lost and the D/G output breakers have just closed onto ESF buses

How are the Containment Spray Pumps re-started?

a. The pumps will auto start 15 seconds following closure of the D/G output breakers.

b. The pumps will auto start 40 seconds following closure of the D/G output breakers.

c. If the operator immediately places the CS & PHASE B ISOL switches for both trains to ACTUATE, the pumps will auto start 15 seconds following closure of the D/G output breakers.

d. If the operator immediately places the PP 1_ TEST switches for both pumps in TEST, the pumps will auto start 40 seconds following closure of the D/G output breakers.

48 . Annunciator 0-33-C3, FILTER 1VP05FA TEMPERATURE HIGH, alarms in the Control Room while 1VP02CA CNMT Charcoal Filter Fan is operating. The alarm condition is verified locally.

Which of the following describes the actions taken and/or the system response for the Containment Ventilation System?

a. The deluge valve FP244A will automatically open and the fan will automatically stop.
b. The control room operator will open the deluge valve FP244A and the local operator will then stop the fan.
c. The local operator will open the deluge valve FP244A and the fan will automatically stop.
d. The local operator will open the deluge valve FP244A and the control room operator will then stop the fan.

49 . The following conditions exist:

- Unit 1 - 20% power with load increase in progress
- Unit 2 - MODE 5 following refueling outage
- Unit 2 Spent Fuel Pool Cooling Loop is in service.
- Spent Fuel Pool Pump 1FC01P is OOS.

Which of the following is allowed under this situation?

Alignment and operation of...

a. both Unit 1 RWST purification and Unit 2 RWST purification with flow through the Unit 2 Spent Fuel Pool Demineralizer and Unit 2 Spent Fuel Pool Filter.
b. Spent Fuel Pool purification and Unit 1 RWST purification with flow through the Unit 1 Spent Fuel Pool Demineralizer and Unit 1 Spent Fuel Pool Filter.
c. Unit 2 RWST purification with flow through the Unit 1 Spent Fuel Pool Filter ONLY.
d. Unit 2 RWST purification with flow through the Unit 2 Spent Fuel Pool Demineralizer and Unit 2 Spent Fuel Pool Filter.

50 . The following conditions exist on Unit 1:

- Reactor power was 65% when the turbine tripped
- An ATWS occurred
- The reactor tripped 15 seconds later when B reactor trip breaker was locally opened
- Reactor trip breaker A is failed closed
- RCS Tave - 559°F
- Pzr pressure - 2255 psig
- Steamline header pressure - 1100 psig
- No controls other than control rods and boration controls have been operated

What is the status of the Steam Dump valves?

Steam Dumps are...

a. modulated open due to steam header pressure.
b. modulated open due to Tave above no-load Tave.
c. closed because Tave is NOT greater than 3°F above Tref.
d. closed because the dumps are NOT armed.

51 . The following conditions exist on Unit 1:

- Reactor power 28%
- All systems normal
- Turbine EHC Panel settings:
  Turbine REFERENCE DEMAND - 580 MW
  Turbine REFERENCE - 330 MW
- The GO pushbutton is LIT

What would be the DEHC System response to a slow failure to ZERO for the turbine impulse pressure channel that feeds into the DEHC?

Turbine load will...

a. decrease until the difference between REFERENCE and impulse pressure exceeds 30%, the operator would then be alerted to select MANUAL control.
b. decrease until the difference between REFERENCE DEMAND and impulse pressure exceeds 30%, then load will stabilize in MANUAL control.
c. increase until the difference between REFERENCE and impulse pressure exceeds 30%, then load will stabilize in MANUAL control.
d. increase until the difference between REFERENCE DEMAND and impulse pressure exceeds 30%, the operator would then be alerted to select MANUAL control.

52 . The following conditions exist on Unit 1:

- Reactor power 35%
- All systems normal

What failure would cause a decrease in feedwater flow to all S/Gs?

a. ONE condenser steam dump ONLY fails open.
b. Main steamline pressure PT-507 fails low.
c. ONE HD pump flow control valve ONLY fails open.
d. Main feedwater header pressure PT-508 fails low.

53 . The following conditions exist on Unit 1:

- Reactor power 100%
- All systems normal
- FT-512 selected for steam flow input into SGWLC for S/G 1A

What is the initial effect of the pressure transmitter associated with FT-512 failing low?

a. S/G 1A level will decrease and feed pump speed will decrease.
b. S/G 1A level will decrease ONLY.
c. S/G 1A level will increase and feed pump speed will increase.
d. S/G1A level will increase ONLY.

54 . The following conditions exist on Unit 1:

- The reactor tripped from 40% power
- The trip was caused by RCS loop 1C low flow condition due to undervoltage for RCP 1C bus
- Power Range NIS channel N42 failed at 100% on the trip
- ESF bus 141 undervoltage occurred
- 1A D/G automatically started and ACB 1413 is closed
- S/G levels lowest readings were - 19% (A); 25% (B); 22% (C); 20% (D)

What is the status of the Auxiliary Feedwater (AF) Pumps on Unit 1 for these conditions at ONE minute following the trip?

a. Both AF pumps are running.
b. ONLY the 1A AF pump is running
c. ONLY the 1B AF pump is running.
d. Neither AF Pump is running

55 . W hich of the following describes the designed MINIMUM AFW pump and S/G configuration necessary to remove all of the reactor decay heat load following a reactor trip from 102% power?

a. The 1A AF pump supplying 500 gpm to at least ONE S/G with S/G blowdown manually isolated.

b. The 1B AF pump supplying 740 gpm to at least ONE S/G with S/G blowdown in service

c. The 1A and 1B AF pump supplying 500 gpm total flow to at least TWO S/Gs with S/G blowdown in service.

d. The 1A and 1B AF pump supplying 740 gpm total flow to at least TWO S/Gs with S/G blowdown manually isolated.

56 . The following conditions exist on Unit 1:

- Reactor power - 100%

Investigation has located a ground on the 125 VDC Normal supply to the 1A D/G from DC 111. What action is required to transfer DC Control Power to the reserve source?

The Reserve power breaker from...

a. DC 111 will be closed after opening the Normal power breaker and the Reserve power breaker at the D/G control panel.

b. DC 111 will be closed after swapping the no-blow link at the Normal and Reserve power fuse blocks at the D/G control panel.

c. DC 112 will be closed after opening the Normal power breaker and the Reserve power breaker at the D/G control panel.

d. DC 112 will be closed after swapping the no-blow link at the Normal and Reserve power fuse blocks at the D/G control panel.

57 . Unit 1 was being synchronized to the grid when the following occurred:

- Trip of 345 KV breakers resulted in deenergizing the SATs

- A steamline break occurred that resulted in containment pressure reaching 20 psig 20 seconds after the D/Gs output breakers have closed

When would the 1A SX pump re-start?

a. Always following start of the 1A CS Pump.
b. Between the start of the 1A CV pump and the 1A RH pump on the SDRA contacts (UV).
c. Between the start of 1A CC Pump and the 1A AF Pump on the SARA contacts (SI).
d. Coincident with the starting of the 1A and 1C RCFCs.

58 . The following conditions exist on Unit 1:

- Unit is in MODE 3
- A cooldown had just been initiated
- Steam Dump Bypass Interlock control switches have just been taken to BYPASS
- No other operator actions have been performed
- The Steam Dump valves fail open and the following parameters are observed:
- RCS temperature - 537°F (A); 539°F (B); 538°F (C); 538°F (D)
- Pzr pressure - 1820 psig
- Pzr level - 10%
- S/G pressure - 850 psig (A); 740 psig (B); 800 psig (C); 715 psig (D)
- S/G flow - 1.0 Mlb/hr (A); 1.5 Mlb/hr (B); 1.1 Mlb/hr (C); 1.6 Mlb/hr (D)
- The level in the RCDT has risen to the alarm setpoint (80%) for REACTOR COOLANT DRAIN TANK UNIT 1 LEVEL HI-LO

Assuming all systems are functioning correctly, what is the status of the RCDT system?

a. BOTH RCDT pumps are running and flow is directed to the Holdup Tanks.
b. BOTH RCDT pumps are running and flow is recirculated back to the RCDT.
c. ONE RCDT pump is running and flow is directed to the Holdup Tanks.
d. NEITHER RCDT pump is running and NO flow exists for the system.

59 . During at-power operations with systems in their normal alignment, what is a normal source of water to the Containment Floor Sump?

a. Output from the reactor cavity sump.
b. Leakoff from the #2 RCP seals.
c. Leakoff from the reactor vessel flange.
d. Valve packing leakage from the CVCS letdown isolation valves.

60 . When aligned for normal operation (BwOP GW-1), how does the Waste Gas System respond to high pressure sensed at the in-service Gas Decay Tank?

An alarm is generated that...

a. alerts the operator to place an alternate Gas Decay Tank in service.
b. indicates auto swap of in-service Gas Decay Tank to selected backup Gas Decay Tank, and alerts the operator to align another standby Gas Decay Tank.
c. indicates auto swap of in-service Gas Decay Tank to selected standby Gas Decay Tank and auto swap of standby Gas Decay Tank to new standby Gas Decay Tank.
d. shuts down the Waste Gas Compressors and isolates the in-service Gas Decay Tank.

61 . Area Radiation Monitor for Fuel Bldg Fuel Handling Incident (0RE-AR055) is being manually Check Source tested. What is the response when the monitor's CHECK SOURCE (C/S) pushbutton is depressed at the RM-23 panel?

a. The alarm and automatic action output will be blocked, and the RM-23 amber INTLK LED will be lit.
b. The alarm and automatic action output will be blocked, and the RM-23 green AVAIL LED will be lit.
c. The alarm will be actuate when value is reached, and the RM-23 amber INTLK LED will be lit.
d. The alarm will be actuate when value is reached, and the RM-23 red HIGH LED will be lit.

62 . The following conditions exist on Unit 2:

- Refueling operations are in progress

While using the Fuel Handling Building Crane to move new fuel into the Spent Fuel Pool, the radiation monitor 0RE-AR039, Fuel Handling Building Crane Monitor, goes into alarm. What action is affected?

a. Traverse of the Fuel Handing Building Crane bridge and trolley.
b. Both lowering and raising the Fuel Handing Building Crane hoist.
c. Traverse of the Fuel Handing Building Crane trolley and raising the hoist.
d. Raising the Fuel Handing Building Crane hoist.

63 . The following conditions exist on Unit 1:

- A unit startup is in progress with reactor power raised above 18%.
- Turbine is at 1800 rpm ready to be synchronized to grid.
- Motor driven feedwater pump is supplying the S/Gs with Feed Reg Bypass valves in AUTO.
- Steam Dump demand in AUTO at 12%.
- Instrument air header pressure begins to slowly drop due to a leak

If the leak CANNOT be isolated and instrument air pressure continues to drop, which of the following would occur?
(Assume NO operator action taken.)

a. AF recirculation flow to the CST would be lost due to AF recirc failing closed.
b. Pressurizer level would increase due to 1CV121 failing open.
c. The main turbine would auto runback due to Diaphragm Interface Valve (DIV) opening.
d. RCS temperature would drop to 550°F due to steam dumps failing open.

64 . With the fire protection systems in their normal alignment, what is the affect of a loss of DC power?

Loss of DC control power to the...

a. halon control cabinet will cause halon release in the 0A Control Room HVAC Room.
b. battery control panel will cause automatic start of the diesel driven fire pump.
c. fire detection system will cause start of the motor driven fire pump.
d. carbon dioxide system will cause the master discharge valve to fail open pressurizing the CO2 header.

65 . The following conditions exist on Unit 1:

- Reactor power is 30%.
- Rod control is in Automatic
- Tref - 564°F
- Tave values - 564°F (A); 565°F (B); 565°F (C); 564°F (D)
- Power Range NI - 31% (N41); 29% (N42), 30% (N43); 30% (N44)
- Control bank D is at 156 steps.

Which condition would result in continuous rod withdrawal?

a. Turbine first stage pressure PT-505 fails upscale.
b. Power Range channel N41 fails upscale.
c. Loop A Tcold fails downscale.
d. Tref signal fails downscale.

66 . A Control Bank D rod was dropped from 156 steps. The P-A converter was NOT zeroed when directed by the procedure.

Select the effect of NOT performing this action?

a. While performing the procedure, the C-11 Rod Stop will be received prior to realigning the rod.
b. While performing the procedure, the Rod Insertion Limit Alarm will be received at a lower rod position than required.
c. After the procedure is complete, Bank C control rods will begin insertion at a lower value of Control Bank D.
d. After the procedure is complete, Bank C control rods will begin insertion at a higher value of Control Bank D.

67 . On Unit 1, a loss of all circulating water pumps has resulted in a reactor trip. All control systems respond as expected. Significant decay heat causes RCS temperature to increase following the trip.

At what RCS temperature should temperature stabilize?

Temperature should stabilize at the saturation temperature for...

a. 1030 psig.
b. 1092 psig.
c. 1115 psig.
d. 1175 psig.

68 . If Unit 2 is operating at full load, which group of conditions will result in an automatic reactor trip either directly or indirectly?

a. RCP bus frequency(Hz):56.9 (Bus 156) 57.1(Bus 157) 56.9 (Bus 158) 57.2 (Bus 159)
b. Power range (%): 107 (N41) 108 (N42) 108 (N43) 109 (N44)
c. PZR pressure (psig): 2375 (PT-455) 2380 (PT-456) 2385 (PT-457) 2380 (PT-458)
d. S/G C NR level (%): 35 (LT-537) 38 (LT-538) 38 (LT-539) 37 (LT-558)

69 . With the RCS at normal operating pressure and temperature, what is the condition of the steam entering the PRT at normal conditions, if a PORV opens? (Assume an ideal thermodynamic process).

a. Superheated steam at 239°F.
b. Superheated steam at 222°F.
c. Saturated steam-water mixture at 239°F.
d. Saturated steam-water mixture at 222°F.

70 . What are the parameters used to calculate Subcooling Margin in the SPDS Iconics if only the 1C RCP and 1D RCP are running?

a. RCS wide range pressure from loop C hot leg and core exit thermocouple temperatures.
b. Pressurizer pressure and core exit thermocouple temperatures.
c. RCS wide range pressure from loop A and loop C hot leg, and RCS loop A and loop C hot leg temperatures.
d. Pressurizer pressure and RCS loop A hot leg temperature.

71 . The following conditions exist during performance of BwEP-0.

- Train A ECCS pumps failed to start.
- RCS pressure is 1350 psig.
- Containment pressure of 7 psig.
- Bus 142 has an overcurrent trip on the normal feeder breaker.
- SI actuated due to High Containment Pressure.
- The highest critical safety function is Yellow on Heat Sink.
- All other equipment and components operated as expected.

Based on the RCP Trip Criteria, the RCPs should...

a. NOT be stopped because NO SI pumps or Charging Pumps are running.
b. NOT be stopped because RCS pressure is above the trip setpoint.
c. be stopped because SI flow is established to the RCS.
d. be stopped because CC flowpath to the RCP motor oil coolers is isolated.

72 . On a loss of seal injection to the RCPs, what criteria is used to determine if the RCPs should be tripped?

a. High temperatures on the RCP seal or bearing outlet temperatures.
b. Time elapsed since loss of seal injection.
c. RCP Thermal Bearing Cooling Water low flow alarms.
d. #1 seal leakoff flow rate decreases to zero.

73 . Unit 1 is operating at 100% power when the following alarm is received:

- RCP SEAL LEAKOFF FLOW LOW (1-7-C3)

The NSO investigates and reports the following additional information:

- RCP 1A seal injection flow is 10.7 gpm
- #1 Seal Leakoff Flow on 1A RCP is 0.4 gpm
- RCP 1A Seal Water Outlet Temperature is 140°F and STABLE
- RCP 1A Bearing Outlet Temperature is 145°F and STABLE

Based on the above information, which of the following events has occurred?

a. RCP 1A #1 Seal has failed closed
b. RCP 1A #1 Seal has failed open.
c. RCP 1A #2 Seal has failed closed.
d. RCP 1A #2 Seal has failed open.

74 . Given the following:

- The plant is at 90% power with ALL controls in AUTO.
- VCT level transmitter, LT-112, fails HIGH causing a letdown diversion.

What will occur if NO operator action is taken?

VCT level decreases...

a. until Auto makeup starts and maintains VCT level.
b. with NO auto makeup capability and charging suction shifts to RWST.
c. faster than auto makeup input and charging suction shifts to RWST.
d. until charging pumps lose suction and start to cavitate.

75 . Given the following after a reactor trip:

- THREE rods remain withdrawn.
- Due to equipment malfunctions boration is only available from the RWST.
- Charging flow rate 132 gpm.
- RCS boron concentration was 1050 prior to the trip.
- 120 gpm letdown in service.

Of the listed times, which would be minimum acceptable time that boration from the RWST would have to occur?

a. 1 Hour
b. 2 Hours
c. 3 Hours
d. 4 Hours

76 . The following conditions exist on Unit 1:

- The plant was shutdown 8½ days ago to repair a steam generator tube leak.
- Reactor vessel level is at 397' 1" with Thot at 212°F.
- A loss of RHR pumps due to cavitation has occurred

Which of the following is the smallest amount of flow that meets the minimum makeup flow required to maintain current RCS level?

a. 80 gpm
b. 72 gpm
c. 59 gpm
d. 45 gpm

77 . The following conditions exist on Unit 2:

- MODE 5 operation during normal cooldown
- RCS temperature - 195° F
- RCS pressure - 325 psig
- Train A RH in service, train B RHR tagged out for repairs

What is the preferred method of core cooling if a loss of RH cooling occurs?

Alternate RCS cooling using...

a. bleed and feed using reactor head vents.
b. the S/Gs.
c. normal charging and RHR letdown.
d. SI Pump cold leg injection

78 . The following conditions exist on Unit 1:

- The reactor is shutdown.
- RHR is in shutdown cooling.
- RCS temperature is 300°F.
- RCS pressure is 160 psig.
- CCW surge tank level is decreasing

What leak locations will produce these indications?

a. RHR Heat Exchanger
b. Thermal Bearing Heat Exchanger
c. Letdown Heat Exchanger
d. Seal Water Heat Exchanger

79 . The following conditions exist on Unit 2:

- Reactor power is 100%
- Pressurizer pressure control is in automatic.

What is the immediate response of the pressure control system if the Master Pressure Controller setpoint is inadvertently changed to 2330 psig (step change)?

a. PORV RY455A opens and spray valves open.
b. PORV RY455A opens, spray valves open, and all heaters energize.
c. Spray valves open and proportional heaters go to minimum.
d. Spray valves close and proportional heaters go to maximum.

80 . The following conditions exist on Unit 1:

- Reactor power is 100%
- All systems are in automatic
- Channel I Pressurizer Pressure Channel (PT-455) was declared inoperable and taken out of service with the appropriate bistables placed in the tripped condition.
- Controlling pressurizer pressure channel (PT-457) fails high

Assuming NO operator action, what is the plant response to the channel failure?

a. Both PORVs and both spray valves open resulting in a reactor trip from low pressurizer pressure followed by SI actuation.
b. The reactor will trip immediately on high pressure, and safety injection will actuate on low pressure due to spray valve operation.
c. Pressurizer proportional heaters will de-energize and spray valves will open resulting in an OTdT runback prior to tripping, and safety injection will actuate due to low pressurizer pressure.
d. Both PORVs and both spray valves remain closed while pressurizer heaters de-energize.

81 . The plant is operating at 100% power with all control systems in AUTO. The following parameters are noted:

- Letdown Hx outlet flow (FI-132) - 75 gpm
- Charging Header flow (FI-121) - 87 gpm
- Total seal injection flow (FI-142 -FI -45) - 33 gpm

What is the effect on total seal injection flow initially if controlling Pzr level channel LT-459 fails LOW?

Total seal injection flow will...

a. decrease to 0 gpm.
b. decrease to approximately 20 gpm.
c. remain approximately 33 gpm.
d. increase to greater than 40 gpm.

82 . The following conditions exist on Unit 1:

- At t= 0 sec, Turbine load was decreased below 352 MW (30% power)
- At t=240 sec, The running main feedwater pump tripped.
  The reactor did NOT trip due equipment malfunction.
- At t=250 sec, All feedflow indications decrease to 0% flow
- At t=320 sec, All steam generator levels decrease below 15%.

Based on this information, AMS would...

a. initiate at t=320 sec.
b. initiate at t=345 sec.
c. initiate at t=360 sec.
d. NOT initiate because C-20 is cleared.

83 . The following conditions exist on Unit 1:

- Reactor startup in progress
- Intermediate power range indication: 2.5E-5 amp N35 & 2.8E-5 amp N36
- SOURCE RANGE PERMISSIVE P-6 permissive light clear
- SOURCE RANGE TRIP ACTIVE permissive light clear
- Source Range Channel N31 High voltage power supply fails to half its normal value

What indication(s) would be available to alert the operator to this failure?

a. None, until power is lowered below the P-6 setpoint, and then the Source Range N31 indication will indicate lower than expected.

b. None, until power is lowered below the P-6 setpoint, and then the Source Range N31 indication will indicate higher than expected.

c. Annunciator SR HIGH VOLTAGE FAILURE (1-10-B1) will alarm when power exceeds P-10.

d. Annunciator SR HIGH VOL GE FAILURE (1-10-B1) will re-flash when the voltage source fails.

84 . The following conditions exists on Unit 2:

- Plant shutdown is in progress.
- All power range channels indicate 6% reactor power.
- Intermediate range channel N-36 fails HIGH.

What is the plant response to this failure?

a. The reactor will trip on high IR flux, and source range trip will reinstate when N-35 decreases below P-6.

b. The reactor will trip on high IR flux, and source range trip will NOT be reinstated.

c. The reactor will NOT trip immediately, but will trip when the source range trip is reinstated when N-35 decreases below P-6

d. The reactor will NOT trip, and source range trip will NOT be reinstated.

85 . The following conditions exist on Unit 1:

- Reactor power is 75%
- Troubleshooting has commenced due to reduced condenser vacuum with the air ejectors out of service.
- Hogging vacuum pumps are aligned to the main condenser to aid in maintaining vacuum.

What would be an indication of a Steam Generator Tube Leak under these conditions?

a. Increasing radiation level on 1RE-PR027, "SJAE/Gland Steam Exhaust Monitor".
b. Decreasing S/G level for ONE S/G.
c. Increasing feedwater flow to ONE S/G.
d. Decreasing charging header flow to RCS.

86 . BwEP-3 "Steam Generator Tube Rupture" is being performed in response to a tube rupture on 2C S/G. The cooldown has just been completed but the target temperature value selected by the operators was higher than that stipulated in the procedure.

What condition could result because of this error?

a. Loss of RCS subcooling before RCS and ruptured S/G pressures are equalized.
b. Increase in pressure of the ruptured S/G with resultant lifting of the S/G Safety Valve.
c. Increase in pressure of the non-ruptured S/Gs with resultant lifting of their S/G Safety Valves.
d. Filling the Pressurizer solid during the subsequent depressurization.

87 . The following conditions exist on Unit 1:

- The Unit was in MODE 3 at normal operating temperature and pressure prior to the event.
- A faulted steam generator has occurred.
- RCS hot leg temperatures - 547°F (A), 544°F (B), 545°F (C), 547°F (D)
- RCS cold leg temperatures - 545°F (A), 530°F (B), 543°F (C), 545°F (D)
- S/G pressures - 700 psig (A), 635 psig (B), 690 psig (C), 705 psig (D)
- S/G flow - 0.85 MLB/hr (B)
- Containment pressure (Channel) - 8 psig (1), 7.5 psig (2), 7.5 psig (3), 8 psig (4)

Based on these conditions, a main steam line isolation should...

a. have occurred because of the low pressure in at least ONE S/G.
b. have occurred because the steamline high negative rate occurred in S/G 1B.
c. NOT have occurred because Containment pressure is below the setpoint for the CNMT High-2 pressure signal.
d. NOT have occurred because THREE S/Gs have pressures above the isolation setpoint and do NOT indicate high steam flow.

88 . The following conditions exist on Unit 1 following a trip from 100% power:

- Pressurizer level is 0%
- Pressurizer pressure is 1500 psig
- Containment Pressure is 16 psig.
- Tcold is 420°F for all loops.

Where is the location of the leak?

a. On one loop RCS cold leg.
b. On a Main Steam Line inside containment.
c. In a Steam Generator Tube.
d. On a feedwater line between FWRV and Associated FWIV, 1FW009.

89 . In accordance with BwOA SEC-3, "Loss of Condenser Vacuum", which of the following sets of conditions requires the operator to trip the reactor?

a. LOW POWER TRIP BLOCKED P-8 annunciator - LIT
Turbine load - 200 MW
Condenser pressure - 5.2 " HgA

b. LOW POWER TRIP BLOCKED P-8 annunciator - LIT
Turbine load - 300 MW
Condenser pressure - 3.3" HgA

c. LOW POWER TRIP BLOCKED P-8 annunciator - CLEAR
Turbine load - 600 MW
Condenser pressure - 7.2" HgA

d. LOW POWER TRIP BLOCKED P-8 annunciator - CLEAR
Turbine load - 900 MW
Condenser pressure - 7.8" HgA

90 . Select the primary basis for rapidly depressurizing the steam generators during a Loss of All AC.

a. To provide maximum core cooling until power can be restored.
b. To minimize RCS inventory loss from RCP seals.
c. To enhance restoration of S/G level from the diesel dr ven AF pump.
d. To increase subcooling of the RCS.

91 . How would the sequencer operate if a Safety Injection (SI) actuation occurs while the sequencer is sequencing loads in response to an ESF bus undervoltage condition?

a. There will be no change in operation; the undervoltage sequence overrides the SI sequence.

b. The undervoltage sequencing stops, the sequencer immediately resets and SI loads NOT already running will sequentially start.

c. The undervoltage sequencing stops, all started loads are shed, and SI loads will sequentially start.

d. The undervoltage sequencing completes its cycle, then resets to SI mode, and SI loads NOT already running will sequentially start.

92 . The following conditions exist on Unit 1:

- Bus 141 is powered from its normal source
- D/G 1A surveillance is being performed with the D/G paralleled to the bus

What would occur if a failure of the undervoltage relay results in a sensed undervoltage condition on Bus 141?

a. SAT feeder breaker ACB 1412 and D/G feeder breaker ACB 1413 remain closed. The Safe Shutdown loads will NOT sequence and CANNOT be manually started from the control room.

b. SAT feeder breaker ACB 1412 and D/G feeder breaker ACB 1413 will open. After a 10-second delay, ACB 1413 will close and the Safe Shutdown loads will sequence.

c. SAT feeder breaker ACB 1412 will open but D/G feeder breaker ACB 1413 will remain closed. The Safe Shutdown loads will sequence normally.

d. SAT feeder breaker ACB 1412 will open but D/G feeder breaker ACB 1413 will remain closed. The Safe Shutdown loads will NOT sequence and CANNOT be manually started from the control room.

93 . On Unit 1 power is lost to 120 VAC Instrument Bus 111

How are the ESF and Safe Shutdown loads affected?

a. "A" Train ESF loads will NOT load on an SI signal, but Safe Shutdown loads will load on a U/V signal.
"B" Train loads are NOT affected.

b. A" Train ESF loads will load on an SI signal, but Safe Shutdown loads will NOT load on a U/V signal.
"B" Train loads are NOT affected.

c. "A" Train ESF loads will NOT load on an SI signal, and Safe Shutdown loads will NOT load on a U/V signal.
"B" Train loads are NOT affected.

d. "A" Train AND "B" Train ESF loads will NOT load on an SI signal, but Safe Shutdown loads will load on a U/V signal.

94 . Select the method used for transferring controls to the remote shutdown panels PI.04/05J.

a. Placing applicable transfer switches in LOCAL on RSP.
b. Opening the isolation switches in the Auxiliary Electric Room.
c. Deenergizing normal control power to individual controls.
d. Taking local controls out of the PULL-TO-LOCK position.

95 . When inadequate core cooling exists, which of the following sets of actions states the proper sequence of the major action categories to be performed in accordance with BwFR-C.1, "RESPONSE TO INADEQUATE CORE COOLING", for removing decay heat from the core?

a. Reinitiation of safety injection; RCP restart; rapid secondary depressurization.
b. Reinitiation of safety injection; rapid secondary depressurization; RCP restart.
c. RCP restart; reinitiation of safety injection; rapid secondary depressurization.
d. RCP restart; rapid secondary depressurization; reinitiation of safety injection.

96 . High coolant activity has been detected and chemistry has determined that it is due to corrosion product activation.

Identify the effect of placing the cation demineralizer in service.

The cation demineralizer...

a. will remove lithium so it should NOT be used in this condition.
b. will cause the activity level to decrease as soon as it is placed in service.
c. is NOT effective in removing corrosion product activity.
d. is less effective than the mixed bed demineralizer so it is placed in service ONLY if decontamination factor is less than 10.

97 . The following conditions exist on Unit 1:

- Reactor power was 8% prior to the event below.
- A failure in the feedwater control system caused ONE S/G level to exceed P-14.
- The main turbine tripped.
- S/G levels have returned to their normal level range
- The Startup FW Pump is running

What are all the conditions that would have to be met to feed the S/Gs using the FW034's Feedwater Tempering Flow Control valves?

a. The FW Isolation Aux Relays would have to be reset and FW035 Feedwater Tempering Isol valves opened.

b. The reactor trip breakers would have to be cycled, the FW Isolation Aux Relays would have to be reset and FW035 Feedwater Tempering Isol valves opened.

c. The FW Isolation Main Relays and Aux Relays would have to be reset and FW035 Feedwater Tempering Isol valves opened.

d. The reactor trip breakers would have to be cycled and FW Isolation Main Relays and Aux Relays reset and FW035 Feedwater Tempering Isol valves opened.

98 . The following conditions exist on Unit 1:

- A leak developed on the RCS loop C flow instrument piping.
- Coincident with the RCS leak, on the reactor trip a S/G PORV failed open and was later isolated.
- FR-P.1 was entered to due to an ORANGE PATH condition.
- SI actuated and has been reset.
- All RCPs are stopped.
- Conditions required to support an RCP start are met.

What is the basis for operation of a RCP?

Under the current conditions starting the RCP will...

a. cause excessive thermal stresses in the stagnant loops.

b. cause a pressure surge that will aggravate the PTS condition.

c. provide mixing of the ECCS injection flow thereby decreasing the likelihood of PTS.

d. increase the RCS cooldown rate thereby increase the likelihood of PTS.

99 . Why is it important to run the CRDM vent fans when performing a natural circulation cooldown?

a. Aids the operator in maintaining subcooling in the reactor vessel head.
b. Aids in natural circulation flow through the RCS head region.
c. Minimizes stresses on the reactor vessel head due to uneven cooldown.
d. Aids in natural circulation flow through the RCS.

100 . Why are the S/Gs depressurized to less than 670 psig according to BwCA-1.1, "Loss of Emergency Coolant Recirculation"?

a. To allow maximum AFW flow to the S/Gs.
b. To ensure adequate subcooling for restart of the RCPs.
c. To set up conditions for controlled injection to the RCS from the accumulators.
d. To decrease RCS temperature and pressure which reduces break flow in a LOCA condition.

GENERIC FUNDAMENTALS EXAMINATION
EQUATIONS AND CONVERSIONS HANDOUT SHEET

EQUATIONS

$\dot{Q} = \dot{m}C_p\Delta T$

$\dot{Q} = \dot{m}\Delta h$

$\dot{Q} = UA\Delta T$

$\dot{Q} \propto \dot{m}^3_{\text{Nat Circ}}$

$\Delta T \propto \dot{m}^2_{\text{Nat Circ}}$

$K_{eff} = 1/(1 - \rho)$

$\rho = (K_{eff} - 1)/K_{eff}$

$SUR = 26.06/\tau$

$$\tau = \frac{\bar{\beta} - \rho}{\lambda_{eff}\,\rho}$$

$$\rho = \frac{\ell^*}{\tau} + \frac{\bar{\beta}}{1 + \lambda_{eff}\tau}$$

$\ell^* = 1 \times 10^{-4}$ seconds

$\lambda_{eff} = 0.1$ seconds^{-1}

$P = P_o 10^{SUR(t)}$

$P = P_o e^{(t/\tau)}$

$A = A_o e^{-\lambda t}$

$CR_{S/D} = S/(1 - K_{eff})$

$CR_1(1 - K_{eff1}) = CR_2(1 - K_{eff2})$

$1/M = CR_1/CR_X$

$DRW \propto \phi^2_{tip}/\phi^2_{avg}$

$F = PA$

$\dot{m} = \rho A\bar{v}$

$\dot{W}_{Pump} = \dot{m}\Delta P v$

$E = IR$

Eff. = Net Work Out/Energy In

$$v(P_2 - P_1) + \frac{(\bar{v}_2^2 - \bar{v}_1^2)}{2g_c} + \frac{g(z_2 - z_1)}{g_c} = 0$$

$g_c = 32.2$ lbm-ft/lbf-sec^2

CONVERSIONS

1 Mw = 3.41×10^6 Btu/hr

1 hp = 2.54×10^3 Btu/hr

1 Btu = 778 ft-lbf

°C = (5/9)(°F - 32)

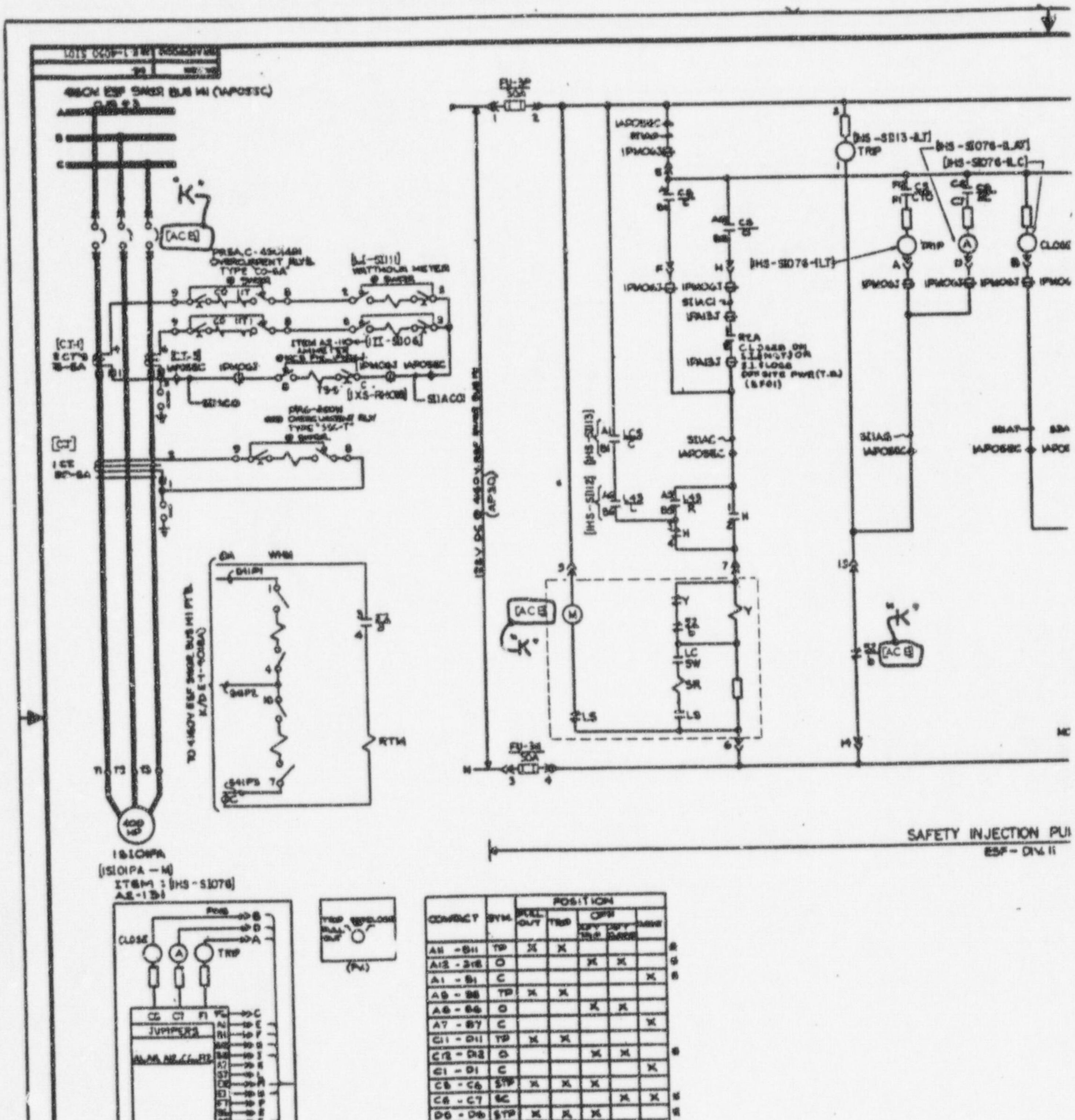
°F = (9/5)(°C) + 32

1 Curie = 3.7×10^{10} dps

1 kg = 2.21 lbm

1 gal_{water} = 8.35 lbm

1 ft^3_{water} = 7.48 gal

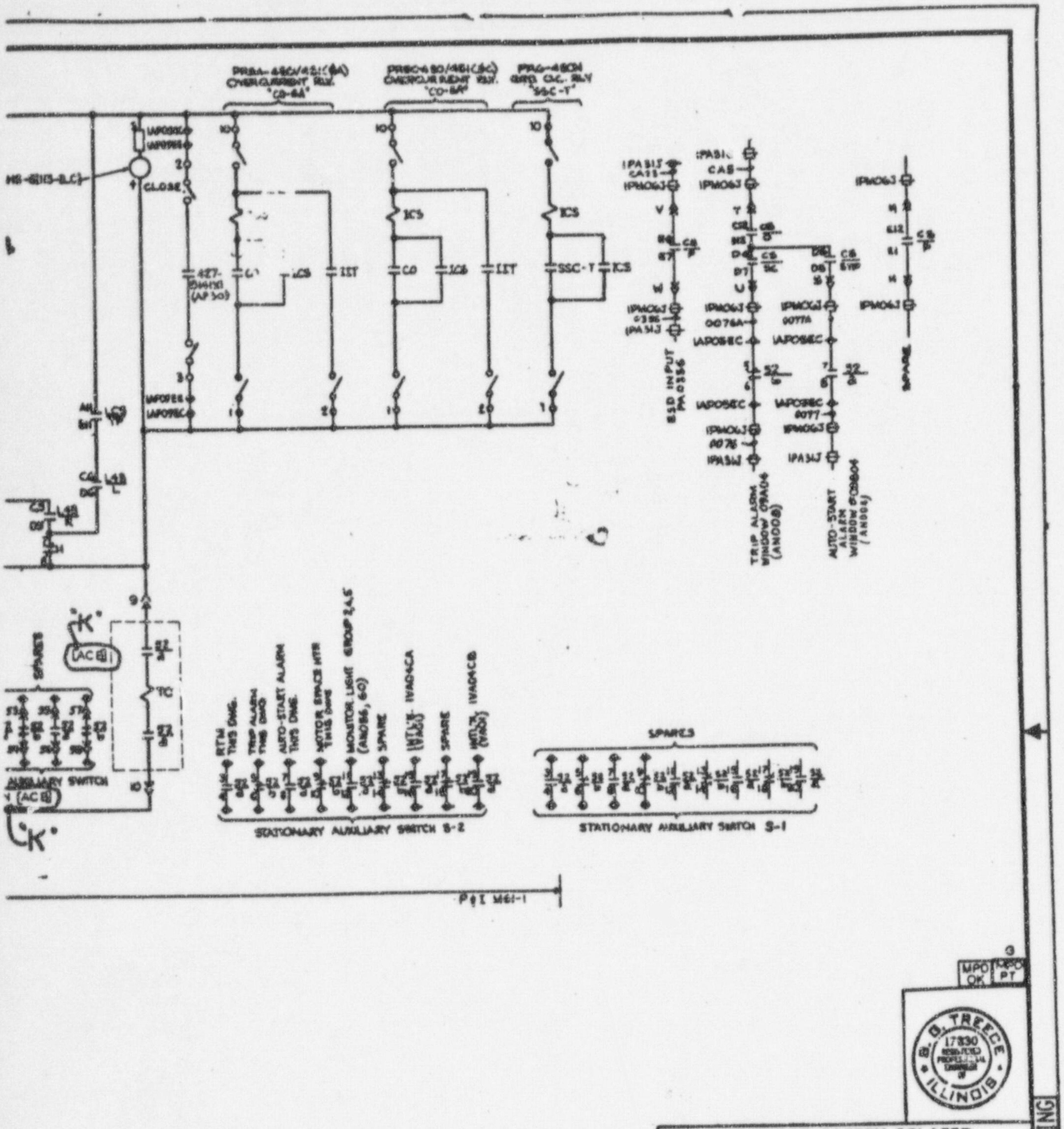


CONTACT	SYM.	POSITION: PULL OUT	TRIP	OFF: AFTER TRIP	OFF: AFTER CLOSE	CLOSE	
A11 - B11	TP	X	X				●
A12 - B12	O			X	X		●
A1 - B1	C					X	●
A5 - B5	TP	X	X				
A6 - B6	O			X	X		
A7 - B7	C					X	
C11 - D11	TP	X	X				
C12 - D12	O			X	X		●
C1 - D1	C					X	
C5 - C6	STP	X	X	X			
C6 - C7	SC				X	X	●
D5 - D6	STP	X	X	X			●
D6 - D7	SC				X	X	●
E12 - E1	P	X					
F12 - F1	CTO		X	X	X	X	●
E6 - E7	P	X					●
F6 - F7	CTO		X	X	X	X	

WESTINGHOUSE TYPE W-2 CONTROL SWITCH, 3 POSITIONS, SPRING RETURN TO CENTER. BASIC SWITCH [illegible], PISTOL GRIP FIXED HANDLE.

X - DENOTES CONTACT CLOSED
● - DENOTES SWITCH CONTACT USED

CONTROL SWITCH DEVELOPMENT "CS"
[illegible]



B. G. TREECE 17330 REGISTERED PROFESSIONAL ENGINEER OF ILLINOIS

NUCLEAR SAFETY RELATED
EQUIPMENT IS SHOWN ON THIS DRAWING

REF. W.E.CO. DWG.271C620 SHT.26

SCHEMATIC DIAGRAM
SAFETY INJECTION PUMP 1A -
1SI01PA

[illegible]/BRAIDWOOD STATION —UNIT1
COMMONWEALTH EDISON CO.
CHICAGO, ILLINOIS

SCALE NONE

SARGENT & LUNDY
CHICAGO

DRAWING NO.
BRAIDWOOD 20E-1-4030 SI01

4687

CRITICAL CONTROL ROOM DRAWING

REFERENCE DWGS.	
DWG. NO.	DESCRIPTION
E-4084 SERIES	INT/EXT W/D MCB ENG. SAFETY FEATURES 1PM06J
E-4122 SERIES	INT/EXT W/D ESF SEQUENCING AND ACTUATION CAB-TRAIN A 1PA13J
E-4156 SERIES	INT/EXT W/D ANNUNCIATOR INPUT CAB. (ESF II) 1PA31J
E-4611 SERIES	INT/EXT W/D 4160V ESF SWGR BUS 141 1AP05E
E-4030 SERIES	S/D NOTES, LEGENDS, REFERENCE DRAWINGS
E-4641 SERIES	INT/EXT W/D 480V MCC 131X1 (1AP21E)
E-4645 SERIES	INT/EXT W/D 480V MCC 131X3 (1AP22E)

DRAWING RELEASE RECORD			
REV.	DATE	DESCRIPTION	ENGR. APPROVAL
K	[illegible]	ADDED "CRITICAL CONT. RM. DWG." TAG DWG. FOR RSE-ONLY PROJ.#8538-91	[illegible]
K	12-29-86	ADD COMPONENT TAGS RELEASED FOR EL. INSTALL. [illegible]	[illegible]

BRS-9184(K)

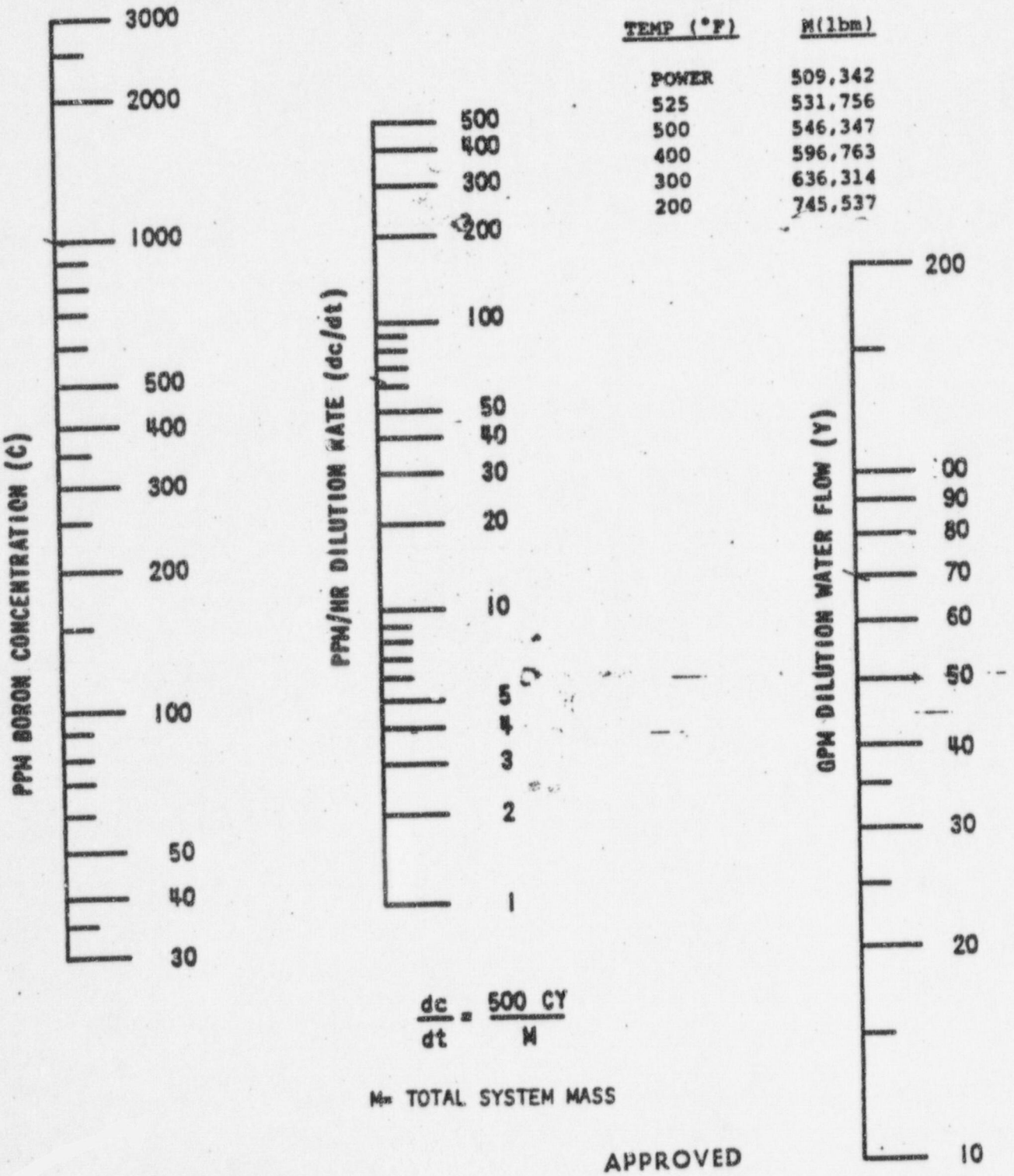
BRS-6744(K)

07

MC

MULTIPLE USE

BORON DILUTION RATE NOMOGRAPH



TEMP (°F)	M(lbm)
POWER	509,342
525	531,756
500	546,347
400	596,763
300	636,314
200	745,537

$$\frac{dc}{dt} = \frac{500\ CY}{M}$$

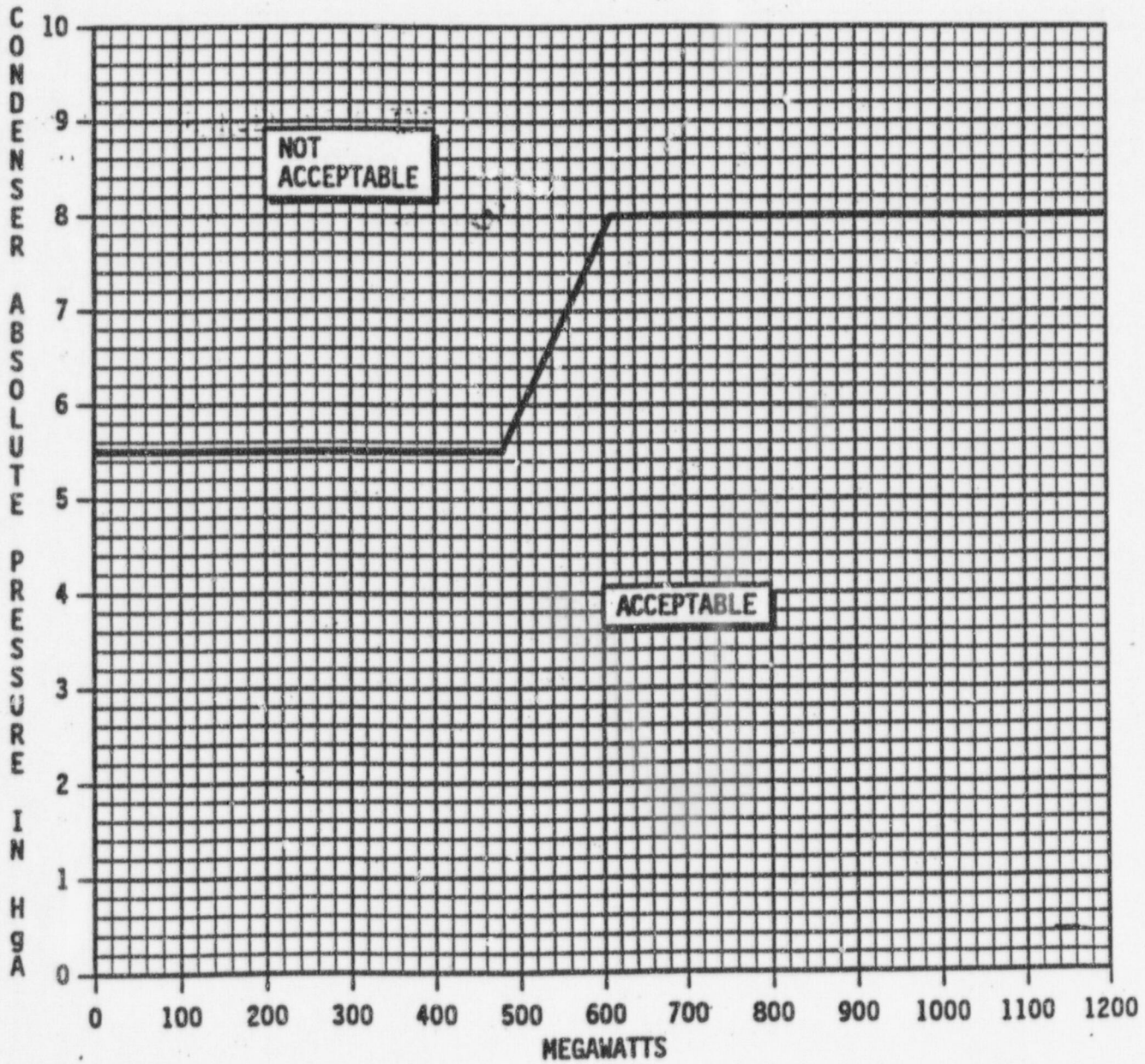
M= TOTAL SYSTEM MASS

APPROVED

NOV 27 1987

BRAIDWOOD REVIEW

7984P(080587)18
A



APPROVED

APR 21 1994

BRAIDWOOD ON-SITE REVIEW

FIGURE 1BwOA SEC-3-1
TURBINE LOAD -vs- CONDENSER PRESSURE

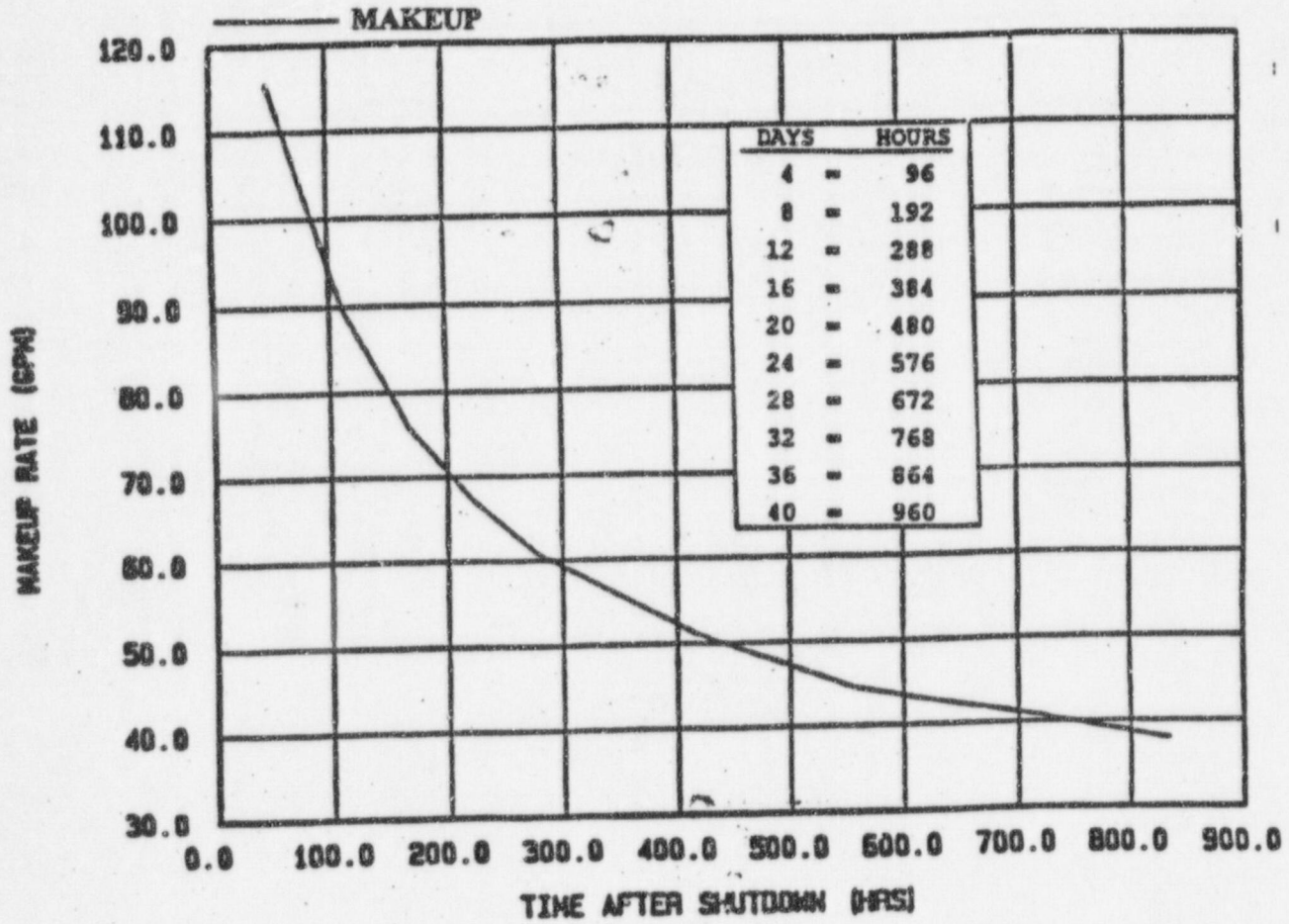


FIGURE 1BwOA PRI 10-3

Minimum Makeup Flow Required to Match Boiloff

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
5	VERIFY ALL CONTROL RODS FULLY INSERTED: • All rod bottom lights - LIT	Perform the following: a. IF two or more rods are NOT fully inserted, THEN emergency borate 1200 GAL (3600 GAL FROM RWST) for each rod NOT fully inserted per 1BwOA PRI-2, EMERGENCY BORATION. *b. Within 1 HOUR calculate Shutdown Margin per 1BwOS 1.1.1.1.e-1, SHUTDOWN MARGIN VERIFICATION DURING SHUTDOWN (1BwOSR 3.1.1.1).

APPROVED
JUN 10 1998
BRAIDWOOD
ON SITE REVIEW

Reactor Operator Answer Key

1 .d
2 .c
3 .c
4 .a
5 .c
6 .a
7 .b
8 .a
9 .b
10 .d
11 .d
12 .b
13 .c
14 .a
15 .c
16 .c
17 .b
18 .a
19 .d
20 .c
21 .c
22 .c
23 .a
24 .d
25 .b
26 .c
27 .d
28 .d
29 .a
30 .c
31 .d
32 .c
33 .b
34 .c
35 .d
36 .d
37 .c
38 .c
39 .c
40 .d
41 .d
42 .c
43 .b
44 .a
45 .d
46 .c
47 .c
48 .c
49 .d
50 .b

Reactor Operator Answer Key

51 .c
52 .b
53 .a
54 .b
55 .a
56 .b
57 .c
58 .d
59 .a
60 .b
61 .b
62 .d
63 .b
64 .d
65 .a
66 .a
67 .c
68 .a
69 .d
70 .a
71 .a
72 .a
73 .d
74 .d
75 .b
76 .b
77 .b
78 .d
79 .d
80 .b
81 .d
82 .b
83 .a
84 .b
85 .a
86 .a
87 .a
88 .b
89 .b
90 .b
91 .b
92 .d
93 .c
94 .a
95 .b
96 .b
97 .a
98 .c
99 .a
100 .c

Question Evaluation of requirement for "active" license

An operator sits for the NRC License Operator Examination (Initial), successfully passes the Examination and is granted an NRC Senior Operator License or Reactor Operator license this month. What are the requirements for having the license on ACTIVE STATUS?

a. The individual must meet the time on shift requirements of SEVEN 8-hour shifts before the license is in ACTIVE STATUS.

b. The license is considered in ACTIVE STATUS for the current quarter ONLY.

c. The individual must meet the time on shift requirements of SEVEN 8-hour shifts to have a license in ACTIVE STATUS for the next quarter.

d. The license is considered in ACTIVE STATUS for the current and next quarter.

Answer d **Exam Level** B **Cognitive Level** Memory **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 2.1.1 **RO Value:** 3.7 **SRO Value:** 3.8 **Section:** PWG **RO Group:** 1 **SRO Group:** 1

System/Evolution

KA

Knowledge of conduct of operations requirements.

Explanation of Answer

Reference Title/Facility Reference Number **Revisio L. O.**

Braidwood Ops Memo #2-97 issued 5/1/97 rev. 0

Bwd Tsk List **Task P1-AM-TK-180**

Material Required for Examination

Question Source: New **Question Modification Method:**

Question Source Comments:

Comment Type **Comment**

Question Direction of NLO personnel

The following conditions on Unit 1:

- Reactor power 45%
- 1A and 1C Feedwater pumps are operating
- FW PUMP TURB BRNG OIL LEVEL HIGH LOW annunciator (1-16-D3) alarms and the SER monitor indicates a low level.
- An EA is dispatched and confirms a low level exists.

In performing actions to correct the condition (per BWOP TO-08 "Filling a Turbine Feed Pump Oil Reservoir"), what is the normal relationship between the US, the NSO and the EA?

a. The US will direct the EA's activities, but will inform the NSO before the job commences.

b. The US will direct the EA's activities, and need NOT inform the NSO unless unit controls are affected.

c. The NSO will direct the EA's activities, but will inform the US before the job commences.

d. The NSO will direct the EA's activities, and need NOT inform the US unless unit load is affected.

Answer C **Exam Level** B **Cognitive Level** Comprehension **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 2.1.1 **RO Value:** 3.7 **SRO Value:** 3.8 **Section:** PWG **RO Group:** 1 **SRO Group:** 1

System/Evolution

KA

Knowledge of conduct of operations requirements.

Explanation of Answer

Reference Title/Facility Reference Number

aidwood Task List

Revisio L. O.

Task P1B-AM-TK-130

Material Required for Examination

Question Source: New

Question Modification Method:

Question Source Comments:

Comment Type Comment

Question Operating Daily Orders

How is a procedure change, which significantly changes normal processes, procedurally conveyed to Licensed members of the operating crew?

a. The SM places the applicable information in the Daily Order Book, and issues an additional memo to all crew personnel that is initialed.

b. The SM is informed by memo of the addition to the Daily Order Book, and makes an announcement of the addition during the shift briefing.

c. The SOS places the applicable information in the Daily Order Book, and the individual operator is responsible for reviewing the Daily Order.

d. The US places the applicable information in the Daily Order Book, and makes an announcement of the addition during the shift briefing.

Answer C **Exam Level** B **Cognitive Level** Memory **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 2.1.2 **RO Value:** 3.0 **SRO Value:** 4.0 **Section:** PWG **RO Group:** 1 **SRO Group:** 1

System/Evolution

KA

Knowledge of operator responsibilities during all modes of plant operation.

Explanation of Answer

Reference Title/Facility Reference Number	Section	Page	Revisio	L. O.
BwAP 350-2 rev. 6	C.7.b.4)	14		
Intro to Main Control Room Ops Lesson Plan				6
Braidwood Task List				Task P1-AM-TK-025

Material Required for Examination

Question Source: New **Question Modification Method:**

Question Source Comments:

Comment Type Comment

Question Procedure required usage

An example of a licensed operator evolution that can be performed WITHOUT either referring to an operations procedure or having a procedure in-hand is ...

a. Adjusting rod position following a boration.

b. Starting the 1A Heater Drain Pump.

c. Placing excess letdown in service.

d. Latching and rolling up the main turbine.

Answer a **Exam Level** B **Cognitive Level** Memory **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 2.1.23 **RO Value:** 3.9 **SRO Value:** 4.0 **Section:** PWG **RO Group:** 1 **SRO Group:** 1

System/Evolution

KA

Ability to perform specific system and integrated plant procedures during all modes of plant operation.

Explanation of Answer

Reference Title/Facility Reference Number		Section	Page	Revisio	L. O.
Use Of Procedures For Operating Department	BwAP 340-1	C.1.f.3)	pg 4,5	rev.12	
Braidwood Task List				Task P1-AM-TK-022	

Material Required for Examination

Question Source: New **Question Modification Method:**

Question Source Comments:

Comment Type **Comment**

Question Use of electrical prints

Assuming an auto-close signal is continuously present in the circuit for the 1A SI pump, which contact will be maintained open in order to prevent the starting relay (SR) from attempting repeated breaker closures onto a faulted bus?

(E 1-4030-SI01 is provided for use.)

a. LC SW

b. 52/b

c. Y

d. LS

Answer C **Exam Level** B **Cognitive Level** Comprehension **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 2.1.24 **RO Value:** 2.8 **SRO Value:** 3.1 **Section:** PWG **RO Group:** 1 **SRO Group:** 1

System/Evolution

KA

Ability to obtain and interpret station electrical and mechanical drawings.

Explanation of Answer "Y" is an antipump relay that when prevented from energizing interrupts the circuit that energizes the START relay in tne AUTO mstart circuit

Reference Title/Facility Reference Number	Section/Page	Revisio	L. O.
Schematic Diagram Safety Injection Pump 1A 20E-1-4030SI01			
Print Reading Lesson Plan Chap 3	pg 23	rev. 5	2c, 3

Material Required for Examination

Question Source: Facility Exam Bank **Question Modification Method:** Editorially Modified

Question Source Comments: Braidwood requal bank

Comment Type **Comment**

Question MOV tagout

An operator is preparing an OOS that designates 1CC685, RCP Thermal Barrier CC Return CNMT Isolation valve, as an isolation point.

What is the acceptability of using this isolation point?

The OOS is...

a. acceptable only if the MOV is tagged at its control switch, power supply and valve handwheel.

b. acceptable only if the MOV is tagged at its control switch, power supply and a blocking device is placed on the valve.

c. NOT acceptable because the MOV fails to meet isolation requirements.

d. NOT acceptable because the valve fails open on a loss of power.

Answer a **Exam Level** B **Cognitive Level** Comprehension **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 2.2.13 **RO Value:** 3.6 **SRO Value:** 3.8 **Section:** PWG **RO Group:** 1 **SRO Group:** 1

System/Evolution

KA

Knowledge of tagging and clearance procedures.

Explanation of Answer Valve is MOV and requirements include tagging control switch, electrical power supply and local handwheel if accessible.

Reference Title/Facility Reference Number	Section/Page	Revisio	L. O.
BwAP 330-1 Out of Service Process	D.4.a pg 12		
	D.4.c.1) pg 14		

Braidwood Task List — Task P1-AM-TK-010

Material Required for Examination

Question Source: New **Question Modification Method:**

Question Source Comments:

Comment Type Comment

Question RCS level discrepancy during refueling

The following conditions exist for Unit 1:

- Unit shutdown and cooldown initiated 120 hours ago
- Lowering of RCS level to the reactor vessel flange is underway
- RCS temperature - 95°
- RCS level Control Room indicators: 1LI-RY046 - 401' 0"
  1LI-RY049 - 402' 1"
- RH loop 1A in operation with "normal" indications

What is the appropriate action for these conditions?

a. The lowering of RCS level can continue.

b. The level change must be stopped until the cause for the level discrepancy is determined.

c. When temperature correction is applied to the highest Control Room level indication, the running RHR pump must be stopped to prevent cavitation.

d. When temperature correction is applied to the lowest Control Room level indication, the available SI Pump aligned for hot leg injection must be started.

Answer b **Exam Level** B **Cognitive Level** Comprehension **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 2.2.26 **RO Value:** 2.5 **SRO Value:** 3.7 **Section:** PWG **RO Group:** 1 **SRO Group** 1

System/Evolution

KA

Knowledge of refueling administrative requirements.

Explanation of Answer With any level discrepancy, the reason for the discrepancy must be determined before further draining can continue.

Reference Title/Facility Reference Number	Section/Page	Revisio	L. O.
BwOP RC-4 Reactor Coolant System Drain	D.1	12E1	
BwGP 100-6 Refueling Outage lesson plan		12	2

Material Required for Examination

Question Source: Facility Exam Bank **Question Modification Method:** Significantly Modified

Question Source Comments: Zion exam bank

Comment Type	Comment
NRC	Significant Industry Event -

Question RO duties in Control Room during refueling

What is a responsibility of the NSO during refueling operations?

a. Checking source range counts while a fuel assembly is being placed in the core.

b. Ensuring water level in spent fuel pool is at least 23' above the fuel.

c. Maintaining a 1/M plot while reloading fuel during a core shuffle.

d. Monitoring the manipulator crane position by updating the Control Room tag board.

Answer a **Exam Level** B **Cognitive Level** Memory **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 2.2.32 **RO Value:** 3.5 **SRO Value:** 3.3 **Section:** PWG **RO Group:** 1 **SRO Group:** 1

System/Evolution

KA

Knowledge of RO duties in the control room during fuel handling such as alarms from fuel handling area, communication with fuel storage facility, systems operated from the control room in support of fueling operations, and supporting instrumentation.

Explanation of Answer

Reference Title/Facility Reference Number	Section/Page	Revisio	L. O
BwAP 2000-38 Reactivity Management	F.2.h.5) pg 11	2E2	
Braidwood Task List			Task P1-QG-TK-051

Material Required for Examination

Question Source: New **Question Modification Method:**

Question Source Comments:

Comment Type Comment

Question Radiation exposure determination

An operator has the following exposure history this year until today:

Deep Dose Equivalent (DDE)	-	210 mrem
Committed Effective Dose Equivalent (CEDE)	-	45 mrem
Shallow Dose Equivalent (SDE)	-	33 mrem
Committed Dose Equivalent (CDE)	-	28 mrem

Today the operator was required to make two entries into containment:

Entry 1: Gamma dose - 52 mrem; Neutron dose - 24 mrem
Entry 2: Gamma dose - 124 mrem

How much radiation exposure is available to the operator if he has to make additional entries?

His available margin based on the routine Administrative Exposure Control Levels is...

a. 100 mrem for that day; 2484 mrem for the year.

b. 100 mrem for that day; 2545 mrem for the year.

c. 124 mrem for that day; 2569 mrem for the year.

d. 124 mrem for that day; 2614 mrem for the year.

Answer b **Exam Level** B **Cognitive Level** Comprehension **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 2.3.1 **RO Value:** 2.6 **SRO Value:** 3.0 **Section:** PWG **RO Group:** 1 **SRO Group:** 1

System/Evolution

A

Knowledge of 10 CFR: 20 and related facility radiation control requirements.

Explanation of Answer Limits are 300 mrem routine DDE/Day and 3000 mrem routine cumulative TEDE/year. C. Neutron rad not counted for daily & yearly; A. All counted for yearly; d. previous DDE+CEDE only counted for year.

Reference Title/Facility Reference Number	Section/Page	Revisio	L. O.
Selected BwRPs Lesson Plan		Rev. 00	2,3,4

Material Required for Examination

Question Source: New **Question Modification Method:**

Question Source Comments:

Comment Type **Comment**

Question Fuel Handling Accident Response

The following conditions exist on Unit 1:

- Refueling operations in progress
- A HIGH alarm received on radiation monitor 1RE-AR012, Containment Fuel Handling Incident

When should the NSO initiate action and what action should he/she take from the control room?

Indication of a fuel handling accident is considered when a...

a. report is received from personnel in containment. The operator starts the containment charcoal filter fans.

b. report is received from personnel in containment. The operator actuates Unit 1 CNMT evacuation alarm.

c. corroborating rise is indicated on monitor 1RE-AR011. The operator starts the containment charcoal filter fans.

d. corroborating rise is indicated on monitor 1RE-AR011. The operator actuates Unit 1 CNMT evacuation alarm.

Answer d **Exam Level** R **Cognitive Level** Comprehension **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 2.3.10 **RO Value:** 2.9 **SRO Value:** 3.3 **Section:** PWG **RO Group:** 1 **SRO Group:** 1

System/Evolution

KA

Ability to perform procedures to reduce excessive levels of radiation and guard against personnel exposure.

Explanation of Answer

Reference Title/Facility Reference Number	Section/Page	Revisio	L. O.
BwOA REF-1 Lesson Plan		Rev. 0	2,3,4

Material Required for Examination

Question Source: New **Question Modification Method:**

Question Source Comments:

Comment Type Comment

Question Performance of Status Trees/Function Restoration

The following conditions exist on Unit 1:

- A reactor trip has occurred and both reactor trip breakers are verified open
- The turbine has tripped
- BwEP-0 "Reactor Trip OR Safety Injection" has been entered.
- BUS 141 ALIVE light is NOT lit with bus voltage at ZERO volts
- BUS 142 ALIVE light is lit with bus voltage at 4149 volts.

Which of the following describes the actions the operators are required to take?

a. Continue with next step of BwEP-0.

b. Turn on the synchroscope and manually close ACB 1412, SAT 142-1 feed breaker.

c. Manually start 1A D/G and verify ACB 1413, D/G output breaker, closes.

d. Initiate actions of BwOA ELEC-3 and continue with next step of BwEP-0.

Answer d **Exam Level** B **Cognitive Level** Memory **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 2.4.16 **RO Value:** 3.0 **SRO Value:** 4.0 **Section:** PWG **RO Group:** 1 **SRO Group:** 1

System/Evolution

KA

Knowledge of EOP implementation hierarchy and coordination with other support procedures.

Explanation of Answer

Reference Title/Facility Reference Number	Section/Page	Revisio	L. O.
Reactor Trip or Safety Injection BwEP-0	Step 3.b. RNO		
wEP-0 Rx Trip or SI Lesson Plan		rev.11	1,3

Material Required for Examination

Question Source: New **Question Modification Method:**

Question Source Comments:

Comment Type **Comment**

Question Applicability of EOP Foldout Page

From the list of procedures identified below, which has(have) "Transfer to Cold Leg Recirculation" on the Operator Action Summary Page?

(NOTE: The following procedures are in the E-1or CA-1 series:
BwEP-1 "Loss Of Reactor Or Secondary Coolant"
BwEP ES-1.1 "SI Termination"
BwEP ES-1.2 "Post-LOCA Cooldown And Depressurization"
BwEP ES-1.3 "Transfer To Cold Leg Recirculation"
BwEP ES-1.4 "Transfer To Hot Leg Recirculation"
BwCA-1.1 "Loss Of Emergency Coolant Recirculation"
BwCA-1.2 "LOCA Outside Containment")

a. BwEP-1, BwEP ES-1.1 through ES-1.4, and BwCA-1.1 through BwCA-1.2 procedures.

b. BwEP-1, BwEP ES-1.1 and ES-1.2 procedures ONLY.

c. BwEP-1 and BwEP ES-1.2 procedures ONLY.

d. BwEP-1 procedure ONLY.

Answer b **Exam Level** B **Cognitive Level** Comprehension **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 2.4.20 **RO Value:** 3.3 **SRO Value:** 4.0 **Section:** PWG **RO Group:** 1 **SRO Group:** 1

System/Evolution

KA

Knowledge of operational implications of EOP warnings, cautions, and notes.

Explanation of Answer

Reference Title/Facility Reference Number	Section/Page	Revisio	L. O.
EP-1 Loss of Reactor or Secondary Coolant Lesson Plan		rev.11	1,10

Material Required for Examination

Question Source: New **Question Modification Method:**

Question Source Comments:

Comment Type **Comment**

Question Identification of inoperable CR annunciators

The following conditions exist on Unit 1:

- Reactor trip breakers status - OPEN
- RCS Tave - 557°F
- Pzr pressure - 2235 psig

Annunciator RCFC VIBRATION HI (1-3-C5) has been in alarm for the past 1 ½ shifts due to a faulty vibration probe. While maintenance troubleshoots the vibration probe on RCFC 1C which of the following actions is appropriate for this alarm window?

a. The alarm should be acknowledged for each actuation and the SER monitored for valid alarm inputs.

b. The alarm should be acknowledged for each actuation and operators stationed locally at each RCFC to monitor vibration.

c. The alarm should have been silenced without acknowledgement after obtaining Unit Operating Engineer's permission and the SER monitored for valid alarm inputs.

d. The alarm should have been silenced without acknowledgement with US permission and operators stationed locally at each RCFC to monitor vibration.

Answer C **Exam Level** B **Cognitive Level** Comprehension **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 2.4.31 **RO Value:** 3.3 **SRO Value:** 3.4 **Section:** PWG **RO Group:** 1 **SRO Group:** 1

System/Evolution

KA

Knowledge of annunciators alarms and indications, and use of the response instructions.

Explanation of Answer

Reference Title/Facility Reference Number	Section/Page	Revisio	L. O.
RCFC VIBRATION HI /BwAR 1-3-C5	E.	1	51
HANDLING OF MAIN CONTROL BOARD and RADWASTE PANEL ANNUNCIATOR ALARMS/ BwAP 380-2	C.3 C.4		
Braidwood Task List			Task P1-AM-TK-033

Material Required for Examination

Question Source: New **Question Modification Method:**

Question Source Comments:

Comment Type **Comment**

Question Effect of Xenon Transient & compensation

A feed pump trip occurred resulting in a rapid power reduction on Unit 1. Power was reduced from 100% steady-state conditions using a combination of rods and boration.

The following conditions exist for Unit 1 following stabilization:

- Reactor Power - 60%
- Delta-I target value - +2.0
- Control Bank D position - 160 steps withdrawn
- Tave - 572°F
- Delta-I - -10.5%
- Core Age - MOL

What actions will be required to maintain the current power level and maintain Delta-I within its normal operating band over the next FIVE hours?

a. Boration and control rod withdrawal, followed by dilution.

b. Boration and control rod insertion, followed by dilution.

c. Dilution and control rod withdrawal, followed by boration

d. Dilution and control rod insertion, followed by boration.

Answer a **Exam Level** B **Cognitive Level** Application **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 001 A2.06 **RO Value:** 3.4 **SRO Value:** 3.7 **Section:** SYS **RO Group:** 1 **SRO Group:** 1

System/Evolution Control Rod Drive System

KA Ability to (a) predict the impacts of the following on the Control Rod Drive System and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operation:
Effects of transient xenon on reactivity

Explanation of Answer With delt-I near the negative limit of the band, boration would be initiated to to allow rod withdrawal and hence shifting of power poduction toward positive delta-I (power shift toward top of core). Later as Xenon (neutron poison) builds in, dilution will be initiated to maintain power level

Reference Title/Facility Reference Number	Section/Page	Revisio	L. O.
DELTA I CONSIDERATIONS BwGP 100-8	F.3,5,6	3,4-7	
BwGP 100-8 Lesson Plan		rev 4	1

Material Required for Examination

Question Source: New **Question Modification Method:**

Question Source Comments:

Comment Type **Comment**

Question Application of DC Hold

A problem with the rod control system requires checking several rod bank circuits. The affected power cabinet repairs are to be made by supplying power from the DC hold supply cabinet.

What is the capacity of the DC Hold Supply Cabinet under these circumstances?

a. ONE control rod bank group can be placed on DC HOLD, and these rods will drop ONLY if the controls are taken to OFF at the DC Hold cabinet.

b. ONE control rod bank group and ONE shutdown bank group can be placed on DC HOLD, and these rods will drop ONLY if the controls are taken to OFF at the DC Hold cabinet.

c. ONE control rod bank group can be placed on DC HOLD, and these rods will automatically drop.

d. ONE control rod bank group and ONE shutdown bank group can be placed on DC HOLD, and these rods will automatically drop.

Answer C **Exam Level** B **Cognitive Level** Memory **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 001 K1.03 **RO Value:** 3.4 **SRO Value:** 3.6 **Section:** SYS **RO Group:** 1 **SRO Group:** 1

System/Evolution Control Rod Drive System

KA Knowledge of the physical connections and/or cause-effect relationships between Control Rod Drive System and the following: CRDM

Explanation of Answer Only one GROUP of control rods can be placed on HOLD at a time in order to ensure the rods are held without falling. Opening the reactor trip breakers interrupts power to the power cabinet and DC Hold cabinet , so that power to the CRDM is interrupted when the breakers open

Reference Title/Facility Reference Number	Section/Page	Revisio	L. O.
Rod Control System Chap 28	A.5.e pg 40	12	1,9

Material Required for Examination

Question Source: New **Question Modification Method:**

Question Source Comments:

Comment Type **Comment**

Question Relationship of levels during refueling operations

The following conditions exist for Unit 1:

- Mode 5
- RCS is draining to Pzr level of 40%
- IM calibrations have been completed for LT-RY048, Refuel Cavity level, in preparation for further draining

What is the relationship between Pzr level instrument LT-459, Pzr level instrument LT-462 and LI-RY048?

At approximately 40% level indicated on LI-462, level on...

a. LI-459 and LI-RY048 will be offscale high.

b. LI-RY048 will be just onscale and LI-459 will be offscale low.

c. LI-459 will read higher than 40% and LI-RY048 will just be onscale.

d. LI-RY048 will be offscale high and LI-459 will read lower than 40%

Answer c **Exam Level** B **Cognitive Level** Comprehension **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 002 A1.11 **RO Value:** 2.7 **SRO Value:** 3.2 **Section:** SYS **RO Group:** 2 **SRO Group:** 2

System/Evolution Reactor Coolant System

KA Ability to predict and/or monitor changes in parameters associated with operating the Reactor Coolant System controls including: Relative level indications in the RWST, the refueling cavity, the PZR and the reactor vessel during preparation for refueling

Explanation of Answer LI-462 is the cold calibrated Pzr level instrument and will read lower (but more accurately) than the hot calibrated level instruments (LI-459/460/461) at lower RCS temperatures. The refueling cavity level instrument just comes onscale at 40% Pzr level.

Reference Title/Facility Reference Number	Section/Page	Revisio	L. O.
REACTOR COOLANT SYSTEM DRAIN			
BWOP RC-4	D.2 pg 4	rev. 12E1	
BwOP RC-4A5			
BwCB ½ fig 31			
BwGP 100-6 Refuel Outage lesson plan		rev. 12	1,2

Material Required for Examination

Question Source: New **Question Modification Method:**

Question Source Comments:

Comment Type Comment

Question RCS leak Detection Systems

The following conditions exist for Unit 1:

- Reactor power - 100%
- RCS activity is elevated, but below Technical Specification (CTS) levels
- Pzr pressure - 2225 psig
- Pzr level - 44%
- PORV 1RY456 - dual indication
- Leak rate - 6 gpm

In an attempt to isolate the leakage past the PORV, the Block Valve 1RY8000B was taken to close. The valve failed to close and the operator placed 1RY456 in the CLOSE position. When conditions stabilize:

- Reactor power - 100%
- Pzr pressure - 2228 psig
- Pzr level - 44%

How would the operator be able to tell if the PORV has closed?

a. Position lights for PCV-456 showing CLOSE indication ONLY.

b. PORV downstream temperature indication 1TI-463 dropping.

c. Level change in RCDT.

d. Lower readings for containment radiation monitors RE-0011A/0012A.

Answer b **Exam Level** R **Cognitive Level** Comprehension **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 002 A3.01 **RO Value:** 3.7 **SRO Value:** 3.9 **Section:** SYS **RO Group:** 2 **SRO Group:** 2

System/Evolution Reactor Coolant System

KA Ability to monitor automatic operations of the Reactor Coolant System including: Reactor coolant leak detection system

Explanation of Answer

Reference Title/Facility Reference Number	Section/Page	Revisio	L. O.
1BwAR 12-C-6		rev51E2	
Braidwood Task List			task P1-OA-TK-058

Material Required for Examination

Question Source: New **Question Modification Method:**

Question Source Comments:

Comment Type **Comment**

Question Use of Loop Isolation Valves

The following conditions exist on Unit 1:

- RCS Loop C is isolated for maintenance
- RCS Loop A had been isolated for maintenance
- RCS Loop A Hot Leg Stop Isolation Valve (LSIV) was opened at 1001
- RCS Loop A Bypass Stop Valve was opened at 1005 with relief line flow of 115 gpm verified
- RCS Loop A Cold Leg LSIV is closed
- RCS temperature - 110°F
- RCS Hot Leg Loop temperatures - 108°F (A); 119°F (B); 110°F (C); 125°F (D)
- RCS Cold Leg Loop temperatures - 103°F (A); 108°F (B); 90°F (C); 115°F (D)
- S/G levels (Narrow Range) - 20% (A); 30% (B); 15% (C); 32% (D)

What will occur when the operator takes the control switch for MOV-RC8002A (RCS Loop A Cold Leg LSIV) to OPEN at 1509?

The valve...

a. will travel fully open with NO automatic actuations.

b. will travel fully open, and the AFW pumps get a start signal.

c. remains closed because the temperature difference interlock remains active.

d. remains closed because the timer interlock is still active.

Answer a **Exam Level** R **Cognitive Level** Comprehension **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 002 K4.09 **RO Value:** 3.2 **SRO Value:** 3.2 **Section:** SYS **RO Group:** 2 **SRO Group:** 2

System/Evolution Reactor Coolant System

KA Knowledge of Reactor Coolant System design feature(s) and or interlock(s) which provide for the following: Operation of loop isolation valves.

Explanation of Answer

Reference Title/Facility Reference Number	Section/Page	Revisio	L. O.
Simplified RCS/RC-1	valve interlocks/1	3	
Reactor Coolant system lesson plan Chapter 12		8	9

Material Required for Examination

Question Source: Facility Exam Bank **Question Modification Method:** Significantly Modified

Question Source Comments: Question 30/35 on Braidwood 1996 NRC exam is about LSIV interlocks. Premise and answers significantly different. Question asked about interlock for opening HL LSIV.

Comment Type **Comment**

Question RCP and Pzr spray operations

The following Unit 1 conditions exist:

- RCS temperature (Average CETC) - 140°F
- RCS pressure - 365 psig
- A bubble has just been drawn in the Pressurizer
- All loops are filled and vented
- Preparations are in progress to start the first RCP for continuous run

What is the effect of selecting the 1C RCP to start?

a. Both Pzr Sprays will function normally for Pzr pressure control.

b. Manual cycling of the Pzr heaters will be required for Pzr pressure control.

c. PORV RY456 will open on high pressure from high pressure bistable PB456E.

d. Normal Pzr spray will deliver minimal spray flow for Pzr pressure control.

Answer d **Exam Level** B **Cognitive Level** Memory **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 003 A1.06 **RO Value:** 2.9 **SRO Value:** 3.1 **Section:** SYS **RO Group:** 1 **SRO Group:** 1

System/Evolution Reactor Coolant Pump System

KA Ability to predict and/or monitor changes in parameters associated with operating the Reactor Coolant Pump System controls PZR spray flow

Explanation of Answer

Reference Title/Facility Reference Number	Section/Page	Revisio	L. O.
BwGP 100-1 Plant Heat up	f. 57 pg 20	rev 11	
BwGP 100-1 Plant Heat up sson plan		12	1,2,3

Material Required for Examination

Question Source: New **Question Modification Method:**

Question Source Comments:

Comment Type **Comment**

Question RCP Breaker & interlocks

The following conditions exist on Unit 1:

- Reactor power 26%
- Pzr pressure - 2235 psig
- Pzr level - 35%

RCP 1A breaker trips due to sensed undervoltage from bus 157. What is expected as a result of the trip of the RCP?

a. The reactor will trip due to the open RCP breaker.

b. The reactor will trip due to RCS loop low flow condition.

c. The reactor will be manually tripped by the operator.

d. A normal plant shutdown will be initiated.

Answer C **Exam Level** R **Cognitive Level** Comprehension **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 003 K2.01 **RO Value:** 3.1 **SRO Value:** 3.1 **Section:** SYS **RO Group:** 1 **SRO Group:** 1

System/Evolution Reactor Coolant Pump System

KA Knowledge of electrical power supplies to the following: RCPS

Explanation of Answer No AUTO trip is expected due to power < P-8. Administrative direction for a RCP trip in these condiitons is a manual trip will be initiated.

Reference Title/Facility Reference Number	Section/Page	Revisio	L. O.
Chp 13, Reactor Coolant Pump lesson plan	C. 4.a 2)/ pg 16	9	8
AC Electrical Distribution lesson plan chp 4		8	10b
Ops Memo/ special Op Order			

Material Required for Examination

Question Source: New **Question Modification Method:**

Question Source Comments:

Comment Type **Comment**

Question Charging & letdown flows (including seal injection)

The following conditions exist on Unit 1:

- Reactor power - 100%
- PZR pressure - 2235 psig
- PZR level - 44% stable
- CV121 - In MANUAL
- CVCS letdown - Isolated due to leak in Letdown Hx
- CVCS Excess Letdown - In service with maximum flow of 20 gpm
- RCP seal injection - 1A CV pump aligned to all RCPs
- RCP seal leakoff flow - 3 gpm (1A); 3.5 gpm (1B); 3 gpm (1C); 2.5 gpm (1D)

What flow is indicated on Charging Header Flow indicator, FI-121?

a. 5 gpm

b. 25 gpm

c. 32 gpm

d. 65 gpm

Answer C **Exam Level** R **Cognitive Level** Application **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 004 A3.11 **RO Value:** 3.6 **SRO Value:** 3.4 **Section:** SYS **RO Group:** 1 **SRO Group:** 1

System/Evolution Chemical and Volume Control System

KA Ability to monitor automatic operations of the Chemical and Volume Control System including: Charging/letdown

Explanation of Answer FI-121 indicates total charging flow (chg header + RCP seal flow, less Chg pump recirc (60 gpm)). Flow balance - Letdown: 20 + 12 = 32 & Chg: 0 + 20 + 12 = 32.

Reference Title/Facility Reference Number	Section/Page	Revisio	L. O.
CVCS/ Schematic	CV-1		
Chp 15a Chemical VolumeControl System lesson plan		10	4,5,9,15

Materia: Required for Examination

Question Source: New

Question Modification Method:

Question Source Comments:

Comment Type **Comment**

Question Calculation of dilution

The following conditions exist on Unit 2:

- Unit is in MODE 5
- Unit burnup is 5700 EFPH in Cycle 7
- SDM - 1.3% DeltaK/K
- RCS pressure - 400 psig
- RCS average temperature - 195°F
- RCS boron concentration - 1006 ppm
- Differential boron worth - -10.75 pcm/ppm
- PZR level - 32.3%
- SR NIS countrate - 10 cps , BOTH channels stable background levels
- An inadvertent dilution at 70 gpm begins at 1300 hours

Assuming NO operator action is taken and PZR level remains constant over the time period, when would the HIGH FLUX AT SHUTDOWN alarm actuate?

a. Never, because BDPS will actuate prior to actuation.

b. 1430 hours.

c. 1505 hours.

d. 1734 hours.

Answer C **Exam Level** B **Cognitive Level** Application **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 004 A4.07 **RO Value:** 3.9 **SRO Value:** 3.7 **Section:** SYS **RO Group:** 1 **SRO Group:** 1

System/Evolution Chemical and Volume Control System

KA Ability to manually operate and/or monitor in the control room: Boration/dilution

Explanation of Answer Dilution rate dc/dt = (500)(C)(Y)/M where M is the RCS mass at the given temperature (200°F). M = 745,537 lbm; C = 1006 ppm (given); Y=70 gpm (given). The dil rate = 47.2 ppm/hr. HIGH FLUX AT SHUTDOWN alarms at 5 x background = 50 cps. With K1= 0.987 dK/K (p1=-0.01317), calculate K2 = 0.9974 DKr/K (p2=-0.00261). Delta-P = 1056 pcm. 1056/-10.75=-98.2 ppm change required. Therefore the time required for the 98.2 ppm dilution is 98.2/47.2 = 2 hours 5 min. Difference in time based on use of Nomograph for RCS at normal pressure & temperature conditions. 'd' would only occur if count rate doubled in any 10 minute period. Assuming count rate increase is linear, for given dilution rate counts would change by 3 every 10 minutes.

Reference Title/Facility Reference Number	Section/Page	Revisio	L. O.
Reactor Makeup Control system lesson plan		8	4,7,11
Source Range Nuclear instrumentation Lesson plan		6	6,10,11
Braidwood Curve Book			
Boron dilution rate nomograph			

Material Required for Examination Braidwood CURVE BOOK Figure 12.

Question Source: New **Question Modification Method:**

Question Source Comments:

Comment Type **Comment**

Topic Question Boron mixing

The following conditions exist on Unit 1:

- Reactor power was 95% prior to the event
- A turbine runback resulted in rod insertion with control rods in AUTOMATIC
- Annunciator ROD BANK LO-2 INSERTION LIMIT (1-10-A6) is lit

The operators initiated an emergency boration per BwOA PRI-2 "Emergency Boration" and have verified control rods are now withdrawing. Why does the operator energize the Pzr Backup Heaters?

This action...

a. ensures Pzr boron concentration equalization with RCS by increasing normal spray flow.

b. counteracts RCS cooldown due the boration by the additional heat from the backup heaters.

c. prevents loss of Pzr level by increasing the volume of fluid maintained in the Pzr.

d. guarantees adequate subcooling margin is maintained by raising the saturation temperature of the Pzr.

Answer a **Exam Level** R **Cognitive Level** Comprehension **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 004 K6.01 **RO Value:** 3.1 **SRO Value:** 3.3 **Section:** SYS **RO Group:** 1 **SRO Group:** 1

System/Evolution Title: Chemical and Volume Control System

KA Statement: Knowledge of the of the effect of a loss or malfunction on the following will have on the Chemical and Volume Control System:

Spray/heater combination in PZR to assure uniform boron concentration

Explanation of Answer

Reference Title/Facility Reference Number	Section/Page	Revisio	L. O.
BwOA Pri-2 Emergency Boration lesson plan		6	6
Reactor Makeup control system lesson plan		8	12

Material Required for Examination **Number(s)** n

Question Source: New **Question Modification Method:**

Question Source Comments:

Comment Type **Comment**

Question Recirc interties to SI Pumps & CV Pumps

The following conditions exist on Unit 1:

- A LOCA has occurred
- Actions of 1BwEP ES-1.3, 'Transfer To Cold Leg Recirculation, have been completed.
- During alignment, 1CV8804A, RH HX to CENT CHG Pumps Isolation Valve, failed to open and could NOT be manually opened.

What is the status of the ECCS system?

a. The RHR discharge headers are cross-tied with only RHR Pump 1B running and supplying suction to the SI pumps and Centrifugal Charging pumps from the B train connection.

b. The RHR discharge headers are cross-tied with both RHR pumps running and supplying suction to the SI pumps only from the B train connection. The Centrifugal Charging pumps are stopped.

c. RHR Pump 1B is discharging through the B Train cold leg injection headers and supplying suction to the SI Pumps. RHR Pump 1A and the Centrifugal Charging pumps are stopped.

d. RHR Pump 1B is discharging through the B Train cold leg injection headers and supplying suction to the SI pumps and Centrifugal Charging pumps. RHR Pump 1A is discharging through the A Train cold leg injection headers.

Answer d **Exam Level** B **Cognitive Level** Comprehension **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 005 K1.12 **RO Value:** 3.1 **SRO Value:** 3.4 **Section:** SYS **RO Group:** 3 **SRO Group:** 3

System/Evolution . Residual Heat Removal System

KA Knowledge of the physical connections and/or cause-effect relationships between Residual Heat Removal System and the following: Safeguard pumps

Explanation of Answer CL recirc lineup has any ONE running RHR pump aligned to provide suction path to all other ECCS pumps (SI & CENT CHG). The discharge headers between RH trains are required to be separate so that the ONE running RH pump does not operate in runout condition.

Reference Title/Facility Reference Number	Section/Page	Revisio	L. C.
Emergency Operating Procedures			
Loss of Reactor or secondary coolant/			
BwEP 1, BwEP ES 1.1-1.4		11	10
Chp 58 Emergency Core Cooling system			
Lesson plan		10	5,7,8,14

Material Required for Examination

Question Source: New **Question Modification Method:**

Question Source Comments:

Comment Type **Comment**

Question Failure of Hx Outlet Valve

The following conditions exist on Unit 1.

- Unit is in MODE 4 during cooldown per 1BwGP 100-5 following unit shutdown 38 hours ago
- RCS temperature - 340°F
- RCS pressure - 345 psig
- PZR level - 33%
- RHR pump 1A is operating in Shutdown Cooling mode
- RH-618 A Hx Bypass Flow Control Valve is in MAN at 3000 gpm
- RH-606 A HX Flow Control Valve controller demand is at 20%
- CV-128 RHR Ltdn Flow Contr Valve demand is at 100%
- PCV-131 is in AUTOMATIC set to maintain 350 psig

A signal failure from the controller causes RH-606 to go fully closed. What is the system response to this failure without operator action?

a. PCV-131 will throttle open due to lower RH discharge pressure.

b. RCS pressure will increase due to RCS heatup.

c. Pressurizer level will decrease due to increased letdown flow.

d. RH-610 will throttle open due to lower RH flow.

Answer b **Exam Level** R **Cognitive Level** Application **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 005 K4.10 **RO Value:** 3.1 **SRO Value:** 3.1 **Section:** SYS **RO Group:** 3 **SRO Group:** 3

System/Evolution Residual Heat Removal System

KA Knowledge of Residual Heat Removal System design feature(s) and or interlock(s) which provide for the following: Control of RHR heat exchanger outlet flow

Explanation of Answer RCS pressure will rise as fluid temperature increases due to loss of cooling flow through HX. IF flow decreases system pressure downstream may decrease this will cause PCV-131 to throttle close in an attempt to raise pressure

Reference Title/Facility Reference Number	Section/Page	Revisio	L. O.
RHR Cooldown/ RH-1 Schematic	RH-1	1	
Chp 18Residual Heat Removal system		7	3,4,5,9

Material Required for Examination

Question Source: New **Question Modification Method:**

Question Source Comments:

Comment Type Comment

Question Systems response to SI/Actions

The following conditions exist on Unit 1:

- A plant heatup is underway
- MODE 3 has just been entered
- RCS pressure 450 psig

SI Accumulator 1C was drained below required level during the outage for repair work. System configuration has NOT allowed refilling the Accumulator until now. The SI Accumulator line is being flushed in accordance with BWOP SI-14 "SI Accumulator Fill Line Flush" (Valve lineup includes: 1SI-8964, SI Test Lines to Radwaste Isolation Valve, and SI-8888, SI Pps to Accumulator Fill Valve, are open. 1SI 8821A, SI Pump to Cold Leg Isolation Valve, and 1SI 8802A, SI to Hot Leg 1A & 1D Isol valve are closed). SI pump 1A running. During the flushing, an inadvertent SI signal is generated.

What is the status of the ECCS based on the current alignment without operator action?

a. 1B SI pump ONLY is running with injection flow to the RCS cold legs and to the Accumulator 1C fill line flush.

b. 1A SI pump ONLY is running with flow directed to the Accumulator fill line flush ONLY.

c. BOTH SI pumps are running with injection flow to the RCS cold legs and to the Accumulator 1C fill line flush.

d. BOTH SI pumps are running with flow directed to the Accumulator 1C fill line flush ONLY.

Answer C **Exam Level** B **Cognitive Level** Comprehension **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 006 A2.13 **RO Value:** 3.9 **SRO Value:** 4.2 **Section:** SYS **RO Group:** 2 **SRO Group:** 2

System/Evolution Emergency Core Cooling System

KA Ability to (a) predict the impacts of the following on the Emergency Core Cooling System and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operation:
Inadvertent SIS actuation

Explanation of Answer SI pumps are operable; SI8821A remains closed; SI8888 and SI8964 remain open.

Reference Title/Facility Reference Number	Section/Page	Revisio	L. O.
Plant Heatup BwGP 100-1	F.49 pg 30	11	
SI Accumulator Fill Line Flush BwOP SI-14		6	
Chp 58 Emergency Core Cooling system Lesson plan		10	6,9

Material Required for Examination

Question Source: New **Question Modification Method:**

Question Source Comments:

Comment Type Comment

Question 10CFR50.46 Design Criteria

To meet the 10CFR50.46 criteria, the ECCS System is designed such that under accident conditions it will maintain...

a. total hydrogen production from zirconium-water reaction below maximum value of 5%.

b. maximum fuel temperature at the inside surface of the cladding less than 2000°F.

c. the core at least 5% shutdown to prevent an inadvertent return to criticality.

d. fuel clad oxidation less than 17% of total clad thickness anywhere within the core.

Answer d **Exam Level** B **Cognitive Level** Memory **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 006 K3.02 **RO Value:** 4.3 **SRO Value:** 4.4 **Section:** SYS **RO Group:** 2 **SRO Group:** 2

System/Evolution Emergency Core Cooling System

KA Knowledge of the effect that a loss or malfunction of the Emergency Core Cooling System will have on the following: Fuel

Explanation of Answer Third selection addresses design criteria for reactivity control per CTS.

Reference Title/Facility Reference Number	Section/Page	Revisio	L. O.
	10CFR50/ 47		
Chp 58 Emergency Core Cooling system Lesson plan		10	2

Material Required for Examination

Question Source: Facility Exam Bank **Question Modification Method:** Editorially Modified

Question Source Comments:

Comment Type **Comment**

Question Evaluation of flow ECCS pumps

The following conditions exist on Unit 1:

- A LOCA has occurred
- Transfer to Cold Leg recirculation is required
- RCS pressure is approximately 50 psig

What is the approximate total SI pump flow indicated on the main control board and how will this value change following transfer of BOTH trains of ECCS to cold leg recirculation?

	Total Flow	Flow Change
a.	650 gpm	Decrease
b.	800 gpm	Increase
c.	1050 gpm	Decrease
d.	1300 gpm	Increase

Answer d **Exam Level** B **Cognitive Level** Comprehension **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 006 K6.03 **RO Value:** 3.6 **SRO Value:** 3.9 **Section:** SYS **RO Group:** 2 **SRO Group:** 2

System/Evolution Emergency Core Cooling System

KA Knowledge of the of the effect of a loss or malfunction on the following will have on the Emergency Core Cooling System: Safety Injection Pumps

Explanation of Answer SI pump design values provid e for 650 gpm flow per pump @ 1300 psig and 1300 gpm @ 600 psig (or less). The flow from the pumps increases since the RH pumps are now providing a suction pressure of approximately 250 psig to the pumps instead of the lower pressure (30 psig or less) provided by the head associated with RWST level.

Reference Title/Facility Referen :e Number	Section/Page	Revisio	L. O.
Chp 58, Emergency Cor Cooling System Lesson plan		10	3, 8a

Material Required for Examination

Question Source: New **Question Modification Method:**

Question Source Comments:

Comment Type **Comment**

Question PRT conditions causing alarm/response

During shift turnover for Unit 1, the NSO notes the following parameters:

RCS Tave - 566.5°F
Pzr pressure - 2235 psig
Pzr level - 38.3%
PRT pressure - 4 psig
PRT level - 74%
PRT temperature - 98°F

One hour later when annunciator 1-12-A7, PRT LEVEL HIGH LOW alarmed, the NSO notes the following parameters:

RCS Tave - 566.2°F
Pzr pressure - 2233 psig
Pzr level - 38%
PRT pressure - 5.9 psig
PRT level - 81%
PRT temperature - 96°F.

What condition resulted in the change in parameters?

a. PRT PW Supply Inside Cnmt Isol Valve RY-8030 opened.
b. PRT to GW Comp Isol Valve RY-469 failed closed.
c. CVCS letdown relief valve CV-8117 lifted.
d. PORV RY-455A opened and reclosed.

Answer a **Exam Level** R **Cognitive Level** Comprehension **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 2.4.50 **RO Value:** 3.3 **SRO Value:** 3.3 **Section:** SYS **RO Group:** 3 **SRO Group:** 3

System/Evolution Pressurizer Relief Tank/Quench Tank System

KA Ability to verify system alarm setpoints and operate controls identified in the alarm response manual.

Explanation of Answer The only input provided that would give a level increase and a temperatue decrease is the makeup from PW.

Reference Title/Facility Reference Number	Section/Page	Revisio	L. O.
Pressurizer Relief Tank Filling and Venting BwOP RY-3		3	
PRT Level High low/ BwAR 1-12-A7		51E1	
Chp 14 Pressurizer lesson plan		9	13,14

Material Required for Examination

Question Source: New **Question Modification Method:** Editorially Modified

Question Source Comments: Ginna 9/90 NRC Exam

Comment Type **Comment**

Topic

Question Determination of effect of valve positioning

Unit 1 is operating at 100% power in MOL conditions. All systems are functioning normally with rod control in manual.

What is the effect on plant operations if instrument air supplied to the CVCS letdown Hx component cooling water outlet valve, CV-130 is lost?

TCV-130 goes fully...

a. shut and reactor power decreases due to boration in the CVCS demineralizers.

b. shut and the CVCS demineralizers are automatically bypassed on temperature signal.

c. open and reactor power increases due to deboration in the CVCS demineralizers.

d. open and the CVCS demineralizers are automatically bypassed on temperature signal.

Answer C **Exam Level** R **Cognitive Level** Comprehension **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 008 A2.05 **RO Value:** 3.3 **SRO Value:** 3.5 **Section:** SYS **RO Group:** 3 **SRO Group:** 3

System/Evolution Component Cooling Water System

KA Ability to (a) predict the impacts of the following on the Component Cooling Water System and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operation:
Effect of loss of instrument and control air on the position of the CCW valves that are air operated

Explanation of Answer The CVCS letdown flow is overcooled and will give up boron to the resins in the CVCS demins (until a new equilibrium value of boron reached in demins).

Reference Title/Facility Reference Number	Section/Page	Revisio	L. O.
ss of Instrument Air/ 1BwOA Sec-4	Table A Component clg	2	
Ch15a CVCS lesson plan		10	10,14
Service Air/ Instrument Air Lesson plan	review quest 14	8	9

Material Required for Examination

Question Source: New

Question Modification Method:

Number(s) n

Question Source Comments:

Comment Type **Comment**

Question Spray using Normal and Aux Spray

What are the parameters and values used by the operator to ensure the temperature difference between the PZR and the spray fluid are within the specified limit(s) in the PRESSURE AND TEMPERATURE LIMIT REPORT when initiating PZR spray?

a. For normal spray, the difference between RCS hot leg loop temperature and PZR vapor space temperature limit is 50°F, and for aux spray, the difference between Regenerative Hx charging inlet temperature and PZR vapor space limit is 320°F.

b. For normal spray, the difference between RCS cold leg loop temperature and PZR vapor space temperature limit is 50°F, and for aux spray, the difference between Regenerative Hx charging outlet temperature and PZR vapor space limit is 320°F.

c. For normal spray, the difference between RCS hot leg loop temperature and PZR vapor space temperature limit is 320°F, and for aux spray, the difference between Regenerative Hx charging inlet temperature and PZR vapor space limit is 320°F.

d. For normal spray, the difference between RCS cold leg loop temperature and PZR vapor space temperature limit is 320°F, and for aux spray, the difference between Regenerative Hx charging outlet temperature and PZR vapor space limit is 320°F.

Answer d **Exam Level** B **Cognitive Level** Memory **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 010 A1.08 **RO Value:** 3.2 **SRO Value:** 3.3 **Section:** SYS **RO Group:** 2 **SRO Group:** 2

System/Evolution Pressurizer Pressure Control System

KA Ability to predict and/or monitor changes in parameters associated with operating the Pressurizer Pressure Control System controls including:
Spray nozzle DT

Explanation of Answer

erence Title/Facility Reference Number	Section/Page	Revisio	L. O.
Pressurizer Temperature Limit Surv/ 1BwOS 4.9.2-1			
Pressurizer Spray Water Temperature Differential Limit surv/ 1BwOS 4.9.2-2			
1BwGP 100-1 Plant heat up lesson plan		12	1,2,3
Chp 14 Pressurizer lesson plan		9	7,8

Material Required for Examination

Question Source: New **Question Modification Method:** Significantly Modified

Question Source Comments: Kewaunee 2/94 NRC Exam

Comment Type **Comment**

Question Evaluation of Pzr conditions

The following conditions exist on Unit 1:

- A load reject from 100% power has occurred
- Reactor power - 80%
- Pzr level - 56%
- Pzr vapor temperature - 655°F
- Pzr liquid temperature - 653°F
- RCS Tave - 578°F

What is the current status of the Pressurizer based on given conditions?

a. Backup and proportional heaters are fully on.

b. Proportional heaters are modulated on.

c. Pzr spray valves have modulated open.

d. Pzr spray valves and Pzr PORVs are open.

Answer C **Exam Level** B **Cognitive Level** Comprehension **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 010 K5.01 **RO Value:** 3.5 **SRO Value:** 4.0 **Section:** SYS **RO Group:** 2 **SRO Group:** 2

System/Evolution Pressurizer Pressure Control System

KA Knowledge of the operational implications of the following concepts as they apply to the Pressurizer Pressure Control System: Determination of condition of fluid in PZR, using steam tables

Explanation of Answer At 655°F, saturation pressure is 2272 psig. At this pressure, with current PZR level deviation <5% of program level(53%), the sprays are the only component "on".

Reference Title/Facility Reference Number	Section/Page	Revisio	L. O.
Pzr Pressure Control/ RY-2	Pzr Pressure Setpoints		
Chp 14 Pressurizer lesson plan		9	5,6,7
Steam tables	Saturation table		

Material Required for Examination Steam Tables

Question Source: Facility Exam Bank **Question Modification Method:** Concept Used

Question Source Comments: Braidwood 1997 NRC exam

Comment Type **Comment**

Question Pzr Level Reactor Trip

The following conditions exist on Unit 1 with all controls in normal lineup:

- Reactor power - 30% stable
- RCS Tave - 564.5°F
- Pzr pressure - 2230 psig
- Pzr level - 36%

The pressurizer level controller 1LK-459 output fails low. What automatic actions result assuming NO operator action taken?

a. The reactor will trip on high pressurizer level ONLY.

b. Letdown will isolate on low pressurizer level and then the reactor will trip on high pressurizer level.

c. The reactor will trip on high pressurizer pressure ONLY.

d. Letdown will isolate on low pressurizer level and then the reactor will trip on RCS low pressure.

Answer b **Exam Level** B **Cognitive Level** Comprehension **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 011 K1.04 **RO Value:** 3.8 **SRO Value:** 3.9 **Section:** SYS **RO Group:** 2 **SRO Group:** 2

System/Evolution Pressurizer Level Control System

KA Knowledge of the physical connections and/or cause-effect relationships between Pressurizer Level Control System and the RPS

Explanation of Answer NOTE that this failure is like the failure of the controlling level channel high in that charging flow falls to minimum. At 17% level, letdown isolates charging continues at minimum (52 gpm) and Pzr level rises to high level trip setpoint.).

Reference Title/Facility Reference Number	Section/Page	Revisio	L. O.
Pzr Level Control schematic	RY-3 Pzr level setpts	2	
Chp14 Pressurizer lesson plan		9	21

Material Required for Examination

Question Source: Facility Exam Bank **Question Modification Method:** Significantly Modified

Question Source Comments:

Comment Type **Comment**

Question Operation of BOTH Bypass Trip Breakers

The following conditions exist on Unit 1:

- Mode 3 NOT NOP with reactor trip breakers (RTA and RTB) closed
- Testing of reactor trip bypass breakers underway
- Reactor bypass breaker B (BYB) is racked in and closed
- An operator begins to perform test with reactor bypass breaker A (BYA).

What occurs as the operator operates the breaker BYA?

When reactor bypass breaker BYA is...

a. locally closed, ONLY breaker BYB will trip.

b. racked in to the CONNECT position, ONLY breaker BYB will trip.

c. locally closed, all reactor trip and bypass breakers will trip.

d. is racked in to the CONNECT position, all reactor trip and bypass breakers will trip

Answer C **Exam Level** R **Cognitive Level** Memory **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 012 A3.07 **RO Value:** 4.0 **SRO Value:** 4.0 **Section:** SYS **RO Group:** 2 **SRO Group:** 2

System/Evolution Reactor Protection System

KA Ability to monitor automatic operations of the Reactor Protection System including: Trip breakers

Explanation of Answer Closure of the second BYB results in SPSS generating a GENERAL WARNING on both trains which would open all trip and bypass breakers.

Reference Title/Facility Reference Number	Section/Page	Revisio	L. O.
SF setpoints Schematic	EF-2 Rx Trip Byp brkr trips	5	
ch 60a SSPS lesson plan		3	6,9

Material Required for Examination

Question Source: Facility Exam Bank **Question Modification Method:** Editorially Modified

Question Source Comments:

Comment Type **Comment**

Question Input that can be bypass & condition

The following conditions exist on Unit 2:

- Unit shutdown is in progress
- Reactor power - 20%
- RCS Tave - 562°F
- Pzr pressure - 2235 psig
- Pzr level - 32%
- First stage turbine pressure channel PT-506 fails high

What affect does this failure have on operations as unit shutdown is continued, if NO action is taken for the failure?

a. At 10% power, the reactor will trip if the Source Range Block RESET pushbuttons are depressed.

b. At 9% power, the reactor will trip if an RCP trips.

c. At 7% power, the reactor will trip if the TURBINE TRIP pushbuttons are depressed.

d. At 5% power, the reactor will be manually tripped as during a normal shutdown by BwGP 100-5.

Answer d **Exam Level** B **Cognitive Level** Comprehension **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 012 A4.03 **RO Value:** 3.6 **SRO Value:** 3.6 **Section:** SYS **RO Group:** 2 **SRO Group:** 2

System/Evolution Reactor Protection System

KA Ability to manually operate and/or monitor in the control room:
Channel blocks and bypasses

Explanation of Answer PT-506 failure results in P13 interlock NOT clearing when turbine power falls below 10%. This also feeds into P7 "AT POWER TRIPS" interlock also remains active. Trips affected: 1) 2 loop loss of flow, 2) Pzr low press, 3) Pzr high level, 4) RCP brkr open, 5) RCP UV, 6) RCP UF. At 10% power, the SR NIS should still be auto blocked by P-10 (active). The turbine is normally tripped from ~65 Mwe at 5% power per BwGP.

Reference Title/Facility Reference Number	Section/Page	Revisio	L. O.
Power Descension /1BwGP 100-4	note step F.27	16	
ESF Setpoints/Schematic	EF-1/ Permissive Rx Trip	4	
Ch60b/ Reactor Protection system		6	4

Material Required for Examination

Question Source: New **Question Modification Method:**

Question Source Comments:

Comment Type Comment

Topic Question OTdT inputs & effect of changes

The following conditions exist on Unit 1:

- Power range NIS reading - 100%
- Tcold - 553°F
- Thot - 608°F
- RCS total flow - 372,000 gpm
- Pzr pressure - 2215 psig
- Pzr level - 69%

How does the setpoint for Over Temperature Delta-T (OTdT) change when a listed parameter is changed? (Consider each change individually)

The setpoint...

a. increases if Power range NIS output rises to 102%.

b. increases if total reactor flow decreases to 370,000 gpm.

c. decreases if pressurizer pressure increases to 2235 psig.

d. decreases if the Thot rises to 612°F.

Answer d **Exam Level** R **Cognitive Level** Comprehension **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 012 K5.01 **RO Value:** 3.3 **SRO Value:** 3.8 **Section:** SYS **RO Group:** 2 **SRO Group:** 2

Title:
System/Evolution Reactor Protection System
Statement:
KA Knowledge of the operational implications of the following concepts as they apply to the Reactor Protection System: DNB

Explanation of Answer a - NIS input is only for exceeding +/- delta-I; b - Flow affects when DNB occurs, but is NOT an input to OTdT; c - Pressurize rise increases OTdT. Thot input to dT power for OTdT determination **Number(s)** n

Reference Title/Facility Reference Number	Section/Page	Revisio	L. O.
ESF Setpoints/ EF-2	OTDT	5	
CH 60b/ RPS lesson plan		6	3,4

Material Required for Examination

Question Source: New

Question Modification Method:

Question Source Comments:

Comment Type Comment

Question CNMT Spray/Phase B

The following conditions exist on Unit 1:

- Mode 3 with unit cooldown in progress
- RCS temperature - 520°F
- Pzr pressure - 1750 psig
- Pzr level - 33%
- MSIVs open

What would directly happen if the operator were to take CONTAINMENT SPRAY & PHASE B ISOL switches for both trains to the ACTUATE position?

a. NO ESF actuations would occur.

b. Containment Phase B isolation and Containment Ventilation isolation ONLY would be actuated.

c. Containment Phase B isolation and Containment Ventilation isolation, and Containment Spray ONLY would be actuated.

d. Containment Phase B isolation and Containment Ventilation isolation, Containment Spray, and Main Steamline isolation would be actuated.

Answer C **Exam Level** B **Cognitive Level** Comprehension **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 013 A3.01 **RO Value:** 3.7 **SRO Value:** 3.9 **Section:** SYS **RO Group:** 1 **SRO Group:** 1

System/Evolution Engineered Safety Features Actuation System

KA Ability to monitor automatic operations of the Engineered Safety Features Actuation System including: Input channels and logic

Explanation of Answer Phase B, CS actuation and CNMT vent directly actuated. Main Steam Isolation comes in auto on a rate CNMT Hi-2 pressure (or manual MSLI) only.

Reference Title/Facility Reference Number	Section/Page	Revisio	L. O.
ESF Setpoints/ EF-2	**CS/Phase B sig**	5	
CS/ MCB indications/ CS-1, CS-2	CS Actuation sig	3	
Chp 61 ESF lesson plan		5	7,8

Material Required for Examination

Question Source: New

Question Modification Method:

Question Source Comments:

Comment Type **Comment**

Question FW Isolation - P14

The following conditions exist on Unit 2:

- RCS temperature - 340°F
- RCS pressure - 900 psig
- All MSIVs for the S/Gs are closed
- The MSIV Bypass valves are open
- The FW-035s, Feedwater Tempering Isolation Valves, are open
- The FW-034s, Feedwater Tempering Flow Control Valves, are closed (opened periodically for level control)
- Feedwater pump 2C is reset and latched on turning gear
- The Start Up Feedwater pump is running

The level in the S/G 2B rises to 80%. How is the plant affected?

a. No actuation occurs because of the position of the MSIVs.

b. The 2C Feedwater pump and Start Up Feedwater pump trip.

c. The 2C Feedwater pump trips and FW-035 valves close.

d. The 2C Feedwater pump and Start Up Feedwater pump trip, the FW-035 valves close, and the MSIV Bypass valves close.

Answer C **Exam Level** R **Cognitive Level** Comprehension **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 013 K4.13 **RO Value:** 3.7 **SRO Value:** 3.9 **Section:** SYS **RO Group:** 1 **SRO Group:** 1

System/Evolution Engineered Safety Features Actuation System

KA Knowledge of Engineered Safety Features Actuation System design feature(s) and or interlock(s) which provide for the following: MFW isolation/reset

Explanation of Answer Having Loop Isolation Stops closed does not defeat P-14.

Reference Title/Facility Reference Number	Section/Page	Revisio	L. O.
Feedwater simple/ FW-1	FWI signals	4	
SGWLC/ FW-2	S/U Flowpaths	0	
Chp61 ESF lesson plan		5	7

Material Required for Examination

Question Source: New **Question Modification Method:**

Question Source Comments:

Comment Type **Comment**

Question ROD BOTTOM Alarm operation

During a reactor startup, when does the ROD AT BOTTOM alarm become active for each control bank?

The alarm will actuate for a dropped rod for...

a. any Control Bank whenever Control Bank A DRPI output is above 9 steps.

b. each Control Bank whenever that Control Bank demand position is above 3 steps.

c. each Control Bank whenever that Control Bank DRPI output is above 9 steps.

d. Control Banks A, B and C whenever their Control Bank demand position is above 9 steps, and for Control Bank D whenever Control Bank D demand position is above 3 steps.

Answer C **Exam Level** R **Cognitive Level** Memory **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 2.4.31 **RO Value:** 3.3 **SRO Value:** 3.4 **Section:** SYS **RO Group:** 2 **SRO Group:** 1

System/Evolution Rod Position Indication System

KA

Knowledge of annunciators alarms and indications, and use of the response instructions.

Explanation of Answer Note that the ROD BOTTOM comes direfctly from the DRPI unit with a setpoint of 9 steps; the alarm actuates when rod position is detected at 3 steps (or less).

Reference Title/Facility Reference Number	Section/Page	Revisio	L. O.
ROD at Bottom/ 1BwAR 1-10-E6		2	
Chp 29 rod Position Indication sys			
Lesson plan		9	4,5

Material Required for Examination

Question Source: New **Question Modification Method:** Significantly Modified

Question Source Comments: Millstone 3 11/90 NRC Exam

Comment Type **Comment**

Question SR NIS discriminator failure

How would the failure of the pulse height discriminator to a low value affect the indication of the affected Source Range channel?

The output would...

a. decrease due to electronic filtering which narrows the pulse height window.

b. decrease due to failure in counting the higher amplitude neutron generated pulses.

c. increase due to counting of the gamma generated pulses ONLY.

d. increase due to counting of the gamma generated pulses and decay alpha generated pulses.

Answer d **Exam Level** B **Cognitive Level** Memory **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 015 A2.02 **RO Value:** 3.1 **SRO Value:** 3.5 **Section:** SYS **RO Group:** 1 **SRO Group:** 1

System/Evolution Nuclear Instrumentation System

KA Ability to (a) predict the impacts of the following on the Nuclear Instrumentation System and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operation:
Faulty or erratic operation of detectors or compensating components

Explanation of Answer Pulse height discriminator used to set window to detect those pulses with energy level high enough to be from event associated with neutron detection. Gamma and other interactions such as the alpha decay of fission product daughters is of lower heigth (energy) and disciminator normally electronically removes.

Reference Title/Facility Reference Number	Section/Page	Revision	L. O.
Source Range Detector schematic	NI-4	4	
Chp 31 Source Range Nuclear Inst		6	3

Material Required for Examination

Question Source: New

Question Modification Method:

Question Source Comments:

Comment Type **Comment**

Question SR NIS - loss of control power

The following conditions exist on Unit 1:

- RCS at NOT NOP
- Reactor trip breakers - closed
- Source Range readings:
  N31 - 18 cps
  N32 - 22 cps

What indication would the operator observe if Control Power was lost to the N31 Drawer?

The N31 meter would read...

a. downscale, the associated drawer bistable lamps NOT lit, and reactor trip breakers closed.

b. downscale, the associated drawer bistable lamps lit, and reactor trip breakers open.

c. 18 cps, the associated drawer bistable lamps NOT lit, and reactor trip breakers closed.

d. 18 cps, the associated drawer bistable lamps lit, and reactor trip breakers open.

Answer d **Exam Level** B **Cognitive Level** Comprehension **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 015 K2.01 **RO Value:** 3.3 **SRO Value:** 3.7 **Section:** SYS **RO Group:** 1 **SRO Group:** 1

System/Evolution Nuclear Instrumentation System

KA Knowledge of electrical power supplies to the following:
NIS channels, components, and interconnections

Explanation of Answer Control power loss affects bistables which trip but NOT drawer instrument indication which is from Instrument Power source.

Reference Title/Facility Reference Number	Section/Page	Revision	L. O.
Source Range Detector Schematic	NI-4 loss of Control power	4	
Ch 31 Source Range Nuclear Inst		6	8.b

Material Required for Examination

Question Source: New

Question Modification Method:

Question Source Comments:

Comment Type **Comment**

Question Eval for 1/M - Eightfold increase

The following conditions exist on Unit 1:

- A reactor startup is about to be performed
- All shutdown banks are fully withdrawn
- All control banks are fully inserted
- An ECC records the following:
  Predicted Critical Position (ECP) - 130 steps on CBD
  Max rod position - 231 steps on CBD
  Min rod position - 58 steps on CBD

The following parameters were recorded during the rod withdrawal:

ROD HEIGTH	N31 cps	N32 cps
0 on CBA	25	23
178 on CBA	34	31
178 on CBB	58	62
178 on CBC	116	106
80 on CBD	200	182
92 on CBD	237	225

When was the first time the operator was required to determine the Predicted Critical Position?

a. At 50 steps on CBA, with N32 as the designated Source Range detector.

b. At 113 steps on CBC, with N31 as the designated Source Range Detector.

c. At 80 steps on CBD, with N31 as the designated Source Range detector.

d. At 92 steps on CBD, with N32 as the designated Source Range detector.

Answer C **Exam Level** R **Cognitive Level** Comprehension **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 015 K5.06 **RO Value:** 3.4 **SRO Value:** 3.7 **Section:** SYS **RO Group:** 1 **SRO Group:** 1

System/Evolution Nuclear Instrumentation System

KA Knowledge of the operational implications of the following concepts as they apply to the Nuclear Instrumentation System: Subcritical multiplications and NIS indications

Explanation of Answer During reactor SU, hold point for ICRR determination is performed for each Control Bank at 50 steps and 113 steps withdrawn. The actual detemination of Predicted Critical Position is required at the eight-fold count increase holdpoint.

Reference Title/Facility Reference Number	Section/Page	Revision	L. O.
1BwGP 100-2 Reactor Startup	1BwGP 100-2A1	12	
1BwGP 100-2A1 Lesson plan		13	2

Material Required for Examination

Question Source: New **Question Modification Method:**

Question Source Comments:

Question NR RTD Failure effects

The following conditions exist on Unit 1:

- Reactor power - 50%
- RCS Tave - 570°F (A); 569°F (B); 569°F (C); 570°F (D)
- RCS Thot - 585°F (A); 584°F (B); 583°F (C); 585°F (D)
- RCS Tcold - 555°F (A) 554°F (B); 555°F (C); 555°F (D)
- Pzr pressure - 2235 psig
- Pzr level - 43 %

If loop B Thot output channel fails LOW, what is the response of Pzr level ?

Pressurizer level will...

a. increases to 60%.

b. remains the same.

c. decreases to 25%.

d. decreases to the letdown isolation setpoint.

Answer b **Exam Level** B **Cognitive Level** Comprehension **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 016 K3.02 **RO Value:** 3.4 **SRO Value:** 3.5 **Section:** SYS **RO Group:** 2 **SRO Group:** 2

System/Evolution Non-Nuclear Instrumentation System

KA Knowledge of the effect that a loss or malfunction of the Non-Nuclear Instrumentation System will have on the following: PZR LCS

Explanation of Answer Thot fails to 510°F. With loop Tcold of 537°F, loop Tave is now 524°F. Auctioneered HIGH Tave is used for Pzr level program.

Reference Title/Facility Reference Number	Section/Page	Revision	L. O.
PZR Level Control Schematic	RY-3	2	
1BwOA Inst-2 lesson plan		15	1
chp 12 RCS lesson plan		8	13

Material Required for Examination

Question Source: Facility Exam Bank **Question Modification Method:** Concept Used

Question Source Comments: Zion 2/92 NRC Exam (along with several others). Change includes failure of Thot loop, failure low and conditions instead of dual condition.

Comment Type **Comment**

Question CETC failure effect on Subcooling Monitor/Iconic Display

With Unit 1 at 100% power and with normal operating parameters, how would the failure of the HOTTEST Core Exit Thermocouple affect the reading of subcooling margin on the SPDS Iconics (CETC/SMM display) for each of the two situations below:

Situation 1 - The CETC output fails high slowly
Situation 2 - The CETC output fails low slowly

a. Situation 1: Subcooling margin will decrease to saturation then rise in superheat, and return to normal when CETC output reaches 2300°F.
Situation 2: Subcooling margin will increase, then stabilizes when the CETC output is smaller than TEN other TCs.

b. Situation 1: Subcooling margin will decrease to saturation then rise in superheat, and return to normal when CETC output reaches 1200°F.
Situation 2: Subcooling margin will remain constant.

c. Situation 1: Subcooling margin will increase to saturation then rise in superheat, and return to normal when CETC output reaches 1200°F.
Situation 2: Subcooling margin will decrease, then stabilizes when the CETC output is smaller than TEN other TCs.

d. Situation 1: Subcooling margin will Increase to saturation then rise in superheat, and return to normal when TC output reaches 2300°F.
Situation 2: Subcooling margin will remain constant.

Answer a **Exam Level** R **Cognitive Level** Comprehension **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 017 K4.01 **RO Value:** 3.4 **SRO Value:** 3.7 **Section:** SYS **RO Group:** 1 **SRO Group:** 1

System/Evolution In-Core Temperature Monitor System

KA Knowledge of In-Core Temperature Monitor System design feature(s) and or interlock(s) which provide for the following: Input to subcooling monitors

Explanation of Answer Fail high - Since it is initially tha highest, its input will remain active in average until high setpoint reached at 2300°F. Fail low - subcooling margin will slightly increase as temperature falls and input to average remains valid. When it reaches the 11th highest value, the subcooling margin will stabilize and reamin constant (assuming other 10 inputs do not change).

Reference Title/Facility Reference Number	Section/Page	Revision	L. O.
Chapter 34b Inadequate Core Cooling Detection		7	5,6

Material Required for Examination

Question Source: Facility Exam Bank **Question Modification Method:** Significantly Modified

Question Source Comments: Braidwood 1997 NRC Exam. Difference in all answer choices - similar premise in theory, but different wording.

Comment Type Comment

Question RCFC operations requirements

The following conditions exist on Unit 2:

- RCS Temperature - 342°F
- Pzr pressure - 375 psig
- 2A, 2B, and 2D RCFCs are operating in high speed
- Unit 2 RCFC Dry Bulb temperatures are recorded as follows:.
  - 2A RCFC - 119°F
  - 2B RCFC - 118°F
  - 2C RCFC - 127°F
  - 2D RCFC - 121°F

Which of the following identifies the equipment status and actions for the above conditions?

What are the MINIMUM requirements for operation for the Reactor Containment Fan Coolers (RCFCs)?

a. An additional RCFC must be started because the average of ALL the RCFC temperatures exceeds the limit.

b. An additional RCFC must be started because ONE of the operating RCFCs temperatures is above the limit.

c. NO action is necessary because ALL temperatures are within their appropriate limit.

d. NO action is necessary because the average temperature of ALL operating RCFCs is below the limit.

Answer d **Exam Level** R **Cognitive Level** Comprehension **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 2.1.32 **RO Value:** 3.4 **SRO Value:** 3.8 **Section:** SYS **RO Group:** 1 **SRO Group:** 1

System/Evolution Containment Cooling System

KA

Ability to explain and apply all system limits and precautions.

Explanation of Answer Limits on CNMT temperature determined by average of temperatures for OPERATING RCFC outlet temps.

Reference Title/Facility Reference Number	Section/Page	Revision	L. O.
RCFC Start up 1BwOP VP-5			
U2 Mode 1,2,3 shiftly daily Op surv			
2BwOS-0.1-1,2,3			
chp 42 Containment Vent system lesson plan		4	6, 10a

Material Required for Examination

Question Source: New **Question Modification Method:**

Question Source Comments:

Comment Type **Comment**

Topic

Question Sequence for securing CNMT Spray

The following conditions exist on Unit 1:

- A LOCA has occurred
- Transition has been made to BwEP ES-1.3 "Transfer To Cold Leg Recirculation"
- Containment Spray actuated due to high containment pressure
- All systems and components operating as expected

What conditions allow for termination of Containment Spray?

a. ONE pump is stopped when containment pressure is less than 15 psig. The other pump is stopped when RWST LO-3 level is reached.

b. ONE pump is stopped when containment pressure is less than 20 psig. The other pump is stopped after it has operated for a period of at least TWO hours

c. BOTH pumps are stopped when containment pressure is less than 15 psig and have operated for a period of at least TWO hours.

d. BOTH pumps are stopped when containment pressure is less than 20 psig and RWST LO-3 level is reached.

Answer C **Exam Level** B **Cognitive Level** Comprehension **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 026 A2.08 **RO Value:** 3.2 **SRO Value:** 3.7 **Section:** SYS **RO Group:** 2 **SRO Group:** 1

System/Evolution Containment Spray System

KA Ability to (a) predict the impacts of the following on the Containment Spray System and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operation:
Safe securing of containment spray when it can be done)

Explanation of Answer Title:

Reference Title/Facility Reference Number	Section/Page	Revision	L. O.
Containment Spray Schematic	CS-1/ CS term	3	
Loss of Reactor or Sec Coolant/1BwEP-1		1B WOG-1B	
Ch 59 Containment Spray sys Lesson plan		6	14

Material Required for Examination

Question Source: New **Question Modification Method:**

Question Source Comments:

Comment Type **Comment**

Question Pump operation interlocks

The following conditions exist on Unit 1:

- LOCA is in progress
- Containment pressure - 15 psig
- Containment Spray actuated due to high containment pressure
- Containment Spray signal has been reset
- The actions of BwEP ES-1.3 "Transfer To Cold Leg Recirculation" have been completed
- Offsite power is then lost and the D/G output breakers have just closed onto ESF buses

How are the Containment Spray Pumps re-started?

a. The pumps will auto start 15 seconds following closure of the D/G output breakers.

b. The pumps will auto start 40 seconds following closure of the D/G output breakers.

c. If the operator immediately places the CS & PHASE B ISOL switches for both trains to ACTUATE, the pumps will auto start 15 seconds following closure of the D/G output breakers.

d. If the operator immediately places the PP 1_ TEST switches for both pumps in TEST, the pumps will auto start 40 seconds following closure of the D/G output breakers.

Answer C **Exam Level** R **Cognitive Level** Comprehension **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 026 A4.01 **RO Value:** 4.5 **SRO Value:** 4.3 **Section:** SYS **RO Group:** 2 **SRO Group:** 1

System/Evolution Containment Spray System

KA Ability to manually operate and/or monitor in the control room: CSS controls

Explanation of Answer If the AUTO actuation input signal is absent and actuation input has been reset, manaul actuation is required to get equiptment restarted following a LOSP.

Reference Title/Facility Reference Number	Section/Page	Revision	L. O.
-Chp 59 Containment spray sys lesson plan		6	8,9

Material Required for Examination

Question Source: New **Question Modification Method:**

Question Source Comments:

Comment Type Comment

Question Charcoal Filters response to deluge

Annunciator 0-33-C3, FILTER 1VP05FA TEMPERATURE HIGH, alarms in the Control Room while 1VP02CA CNMT Charcoal Filter Fan is operating. The alarm condition is verified locally.

Which of the following describes the actions taken and/or the system response for the Containment Ventilation System?

a. The deluge valve FP244A will automatically open and the fan will automatically stop.

b. The control room operator will open the deluge valve FP244A and the local operator will then stop the fan.

c. The local operator will open the deluge valve FP244A and the fan will automatically stop.

d. The local operator will open the deluge valve FP244A and the control room operator will then stop the fan.

Answer C **Exam Level** R **Cognitive Level** Memory **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 027 A4.03 **RO Value:** 3.3 **SRO Value:** 3.2 **Section:** SYS **RO Group:** 3 **SRO Group:** 2

System/Evolution Containment Iodine Removal System

KA Ability to manually operate and/or monitor in the control room: CIRS fans

Explanation of Answer Operation of fp components associated with charcoal filter is local. But fan trips when deluge system activated.

Reference Title/Facility Reference Number	Section/Page	Revision	L. O.
Filter 1VP05FA Temperature High			
/1BwaR 1VP01j-1-A1		1	
chp 42 Containment vent 7 purge		4	8

Material Required for Examination

Question Source: New **Question Modification Method:**

Question Source Comments:

Comment Type Comment

Question RWST Purification Loops

The following conditions exist:

- Unit 1 - 20% power with load increase in progress
- Unit 2 - MODE 5 following refueling outage
- Unit 2 Spent Fuel Pool Cooling Loop is in service.
- Spent Fuel Pool Pump 1FC01P is OOS.

Which of the following is allowed under this situation?

Alignment and operation of...

a. both Unit 1 RWST purification and Unit 2 RWST purification with flow through the Unit 2 Spent Fuel Pool Demineralizer and Unit 2 Spent Fuel Pool Filter.

b. Spent Fuel Pool purification and Unit 1 RWST purification with flow through the Unit 1 Spent Fuel Pool Demineralizer and Unit 1 Spent Fuel Pool Filter.

c. Unit 2 RWST purification with flow through the Unit 1 Spent Fuel Pool Filter ONLY.

d. Unit 2 RWST purification with flow through the Unit 2 Spent Fuel Pool Demineralizer and Unit 2 Spent Fuel Pool Filter.

Answer d **Exam Level** R **Cognitive Level** Memory **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 033 K1.05 **RO Value:** 2.7 **SRO Value:** 2.8 **Section:** SYS **RO Group:** 2 **SRO Group:** 2

System/Evolution Spent Fuel Pool Cooling System

KA Knowledge of the physical connections and/or cause-effect relationships between Spent Fuel Pool Cooling System and the RWST

Explanation of Answer The lineup allows Unit 2 only to be used for Unit 2 RWST cleanup. Only one unit RWST can be aligned at time due to common input path via Refueling Water Purification Pumps. With the cooling loop inservice only, the Unit's RWST may be aligned through the same Unit's, demin and filter train. Simultaneous use of Demin/filter for the same Unit's SFP and RWST is NOT allowed due to concerns of draining RWST.

Reference Title/Facility Reference Number	Section/Page	Revision	L. O.
S/U purification sys to purify or Reciculate the RWST/ BwOP FC-7		7	
Fuel Pool Cooling Schematic	FC-1	3	
Chp 51 Spent Fuel Pool Cooling And Cleanup		5	3

Material Required for Examination

Question Source: New **Question Modification Method:**

Question Source Comments:

Comment Type **Comment**

Question Steam Dump input malfunction

The following conditions exist on Unit 1:

- Reactor power was 65% when the turbine tripped
- An ATWS occurred
- The reactor tripped 15 seconds later when B reactor trip breaker was locally opened
- Reactor trip breaker A is failed closed
- RCS Tave - 559°F
- Pzr pressure - 2255 psig
- Steamline header pressure - 1100 psig
- No controls other than control rods and boration controls have been operated

What is the status of the Steam Dump valves?

Steam Dumps are...

a. modulated open due to steam header pressure.

b. modulated open due to Tave above no-load Tave.

c. closed because Tave is NOT greater than 3°F above Tref.

d. closed because the dumps are NOT armed.

Answer b **Exam Level** B **Cognitive Level** Comprehension **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 041 A3.02 **RO Value:** 3.3 **SRO Value:** 3.4 **Section:** SYS **RO Group:** 3 **SRO Group:** 3

System/Evolution Steam Dump System and Turbine Bypass Control

KA Ability to monitor automatic operations of the Steam Dump System and Turbine Bypass Control including: RCS pressure, RCS temperature, and reactor power

Explanation of Answer The "A" reactro trip breaker provides the arming signal for dumps on normal reactor trip. Since "A" RTB is still closed, the steam dumps respond to event like load rejection, with C-7 load rejection (10% load decrease in 2 minutes sensed on PT-506) arming the dumps. Since the "B" RTP was opened, the steam dump controller does operate on the plant trip controller (No load Tave compared to Auct Hi Tave).

Reference Title/Facility Reference Number	Section/Page	Revisin	L. O.
Steam Dumps/ Schematic	MS-4	4	
Chp 24 Steam Dumps Lesson Plan		7	3,4

Material Required for Examination

Question Source: New **Question Modification Method:**

Question Source Comments:

Comment Type Comment

Question Turbine Control response to Failed Impulse Channel

The following conditions exist on Unit 1:

- Reactor power 28%
- All systems normal
- Turbine EHC Panel settings:
  Turbine REFERENCE DEMAND - 580 MW
  Turbine REFERENCE - 330 MW
- The GO pushbutton is LIT

What would be the DEHC System response to a slow failure to ZERO for the turbine impulse pressure channel that feeds into the DEHC?

Turbine load will...

a. decrease until the difference between REFERENCE and impulse pressure exceeds 30%, the operator would then be alerted to select MANUAL control.

b. decrease until the difference between REFERENCE DEMAND and impulse pressure exceeds 30%, then load will stabilize in MANUAL control.

c. increase until the difference between REFERENCE and impulse pressure exceeds 30%, then load will stabilize in MANUAL control.

d. increase until the difference between REFERENCE DEMAND and impulse pressure exceeds 30%, the operator would then be alerted to select MANUAL control.

Answer C **Exam Level** R **Cognitive Level** Comprehension **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 045 K1.20 **RO Value:** 3.4 **SRO Value:** 3.6 **Section:** SYS **RO Group:** 3 **SRO Group:** 3

System/Evolution Main Turbine Generator System

KA Knowledge of the physical connections and/or cause effect relationships between Main Turbine Generator System and the Protection system

Explanation of Answer When the difference between actual load and turbine impulse pressure (IMP IN) channel exceeds, circuit AUTO transfer impulse feedback to IMP OUT

Reference Title/Facility Reference Number	Section/Page	Revision	L. O.
TV/GV Control/ schematic	EHC-3/ Impulse	1	
Chp 37a Main turbine Control And Protection		5	52

Material Required for Examination

Question Source: New

Question Modification Method:

Question Source Comments:

Comment Type **Comment**

Question S/G Level program - low power

The following conditions exist on Unit 1:

- Reactor power 35%
- All systems normal

What failure would cause a decrease in feedwater flow to all S/Gs?

a. ONE condenser steam dump ONLY fails open.

b. Main steamline pressure PT-507 fails low.

c. ONE HD pump flow control valve ONLY fails open.

d. Main feedwater header pressure PT-508 fails low.

Answer b **Exam Level** B **Cognitive Level** Comprehension **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 2.1.7 **RO Value:** 3.7 **SRO Value:** 4.4 **Section:** SYS **RO Group:** 1 **SRO Group:** 1

System/Evolution Main Feedwater System

KA

Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation.

Explanation of Answer PT-507 fails low causes feed pump speed to decrease which reduces FW pressure. This would initially result in a decrease of flow to all S/Gs.

Reference Title/Facility Reference Number	Section/Page	Revision	L. O.
Fw EH controls/schematic	EHC-6/ DP	1	
Chp 27 SGWLC		6	16

Material Required for Examination

Question Source: New

Question Modification Method:

Question Source Comments:

Comment Type Comment

Question Effect of failure of S/G steam pressure channel

The following conditions exist on Unit 1:

- Reactor power 100%
- All systems normal
- FT-512 selected for steam flow input into SGWLC for S/G 1A

What is the initial effect of the pressure transmitter associated with FT-512 failing low?

a. S/G 1A level will decrease and feed pump speed will decrease.

b. S/G 1A level will decrease ONLY.

c. S/G 1A level will increase and feed pump speed will increase.

d. S/G1A level will increase ONLY.

Answer a **Exam Level** R **Cognitive Level** Comprehension **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 059 K1.04 **RO Value:** 3.4 **SRO Value:** 3.4 **Section:** SYS **RO Group:** 1 **SRO Group:** 1

System/Evolution Main Feedwater System

KA Knowledge of the physical connections and/or cause-effect relationships between Main Feedwater System and the following: S/GS water level control system

Explanation of Answer Steam flow is output to summator for FW control system program Delta-P. Delta-P program will decrease causing feed pump speed and FW header pressure to decrease.

Reference Title/Facility Reference Number	Section/Page	Revision	L. O.
FW EH controls/ schematic	EHC-6/DP	1	
SGWLC schematic	FW-2/ 512 loop	0	
Chp 27 SGWLC lesson plan		6,	16

Material Required for Examination

Question Source: New

Question Modification Method:

Question Source Comments:

Comment Type **Comment**

Question AFW Startup

The following conditions exist on Unit 1:

- The reactor tripped from 40% power
- The trip was caused by RCS loop 1C low flow condition due to undervoltage for RCP 1C bus
- Power Range NIS channel N42 failed at 100% on the trip
- ESF bus 141 undervoltage occurred
- 1A D/G automatically started and ACB 1413 is closed
- S/G levels lowest readings were - 19% (A); 25% (B); 22% (C); 20% (D)

What is the status of the Auxiliary Feedwater (AF) Pumps on Unit 1 for these conditions at ONE minute following the trip?

a. Both AF pumps are running.

b. ONLY the 1A AF pump is running

c. ONLY the 1B AF pump is running.

d. Neither AF Pump is running

Answer b **Exam Level** B **Cognitive Level** Comprehension **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 061 A3.01 **RO Value:** 4.1 **SRO Value:** 4.2 **Section:** SYS **RO Group:** 1 **SRO Group:** 1

System/Evolution Auxiliary / Emergency Feedwater System

KA Ability to monitor automatic operations of the Auxiliary / Emergency Feedwater System including: AFW startup and flows

Explanation of Answer SG levels are above AF actuation setpoints and the motor driven AF pump starts on the detected undervoltage.

Reference Title/Facility Reference Number	Section/Page	Revision	L. O.
Aux Feedwater System		2	5
Chp 26 AFW sys lesson plan		9	3,5
Chp 9 EDG lesson plan		7	7

Material Required for Examination

Question Source: New **Question Modification Method:**

Question Source Comments:

Comment Type Comment

Question AFW flow requirements for cooldown

W hich of the following describes the designed MINIMUM AFW pump and S/G configuration necessary to remove all of the reactor decay heat load following a reactor trip from 102% power?

a. The 1A AF pump supplying 500 gpm to at least ONE S/G with S/G blowdown manually isolated.

b. The 1B AF pump supplying 740 gpm to at least ONE S/G with S/G blowdown in service

c. The 1A and 1B AF pump supplying 500 gpm total flow to at least TWO S/Gs with S/G blowdown in service.

d. The 1A and 1B AF pump supplying 740 gpm total flow to at least TWO S/Gs with S/G blowdown manually isolated.

Answer a **Exam Level** B **Cognitive Level** Memory **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 061 K5.02 **RO Value:** 3.2 **SRO Value:** 3.6 **Section:** SYS **RO Group:** 1 **SRO Group:** 1

System/Evolution Auxiliary / Emergency Feedwater System

KA Knowledge of the operational implications of the following concepts as they apply to the Auxiliary / Emergency Feedwater System: Decay heat sources and magnitude

Explanation of Answer

Reference Title/Facility Reference Number	Section/Page	Revision	L. O.
AFW system lessson plan ch26		9	1,11

Material Required for Examination

Question Source: New **Question Modification Method:** Significantly Modified

Question Source Comments: Comanche Peak 11/93 NRC Exam

Comment Type **Comment**

The following conditions exist on Unit 1:

- Reactor power - 100%

Investigation has located a ground on the 125 VDC Normal supply to the 1A D/G from DC 111. What action is required to transfer DC Control Power to the reserve source?

The Reserve power breaker from...

a. DC 111 will be closed after opening the Normal power breaker and the Reserve power breaker at the D/G control panel.

b. DC 111 will be closed after swapping the no-blow link at the Normal and Reserve power fuse blocks at the D/G control panel.

c. DC 112 will be closed after opening the Normal power breaker and the Reserve power breaker at the D/G control panel.

d. DC 112 will be closed after swapping the no-blow link at the Normal and Reserve power fuse blocks at the D/G control panel.

Answer b **Exam Level** B **Cognitive Level** Memory **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 2.1.30 **RO Value:** 3.9 **SRO Value:** 3.4 **Section:** SYS **RO Group:** 2 **SRO Group:** 1

System/Evolution D.C. Electrical Distribution

KA

Ability to locate and operate components, including local controls.

Explanation of Answer

Reference Title/Facility Reference Number	Section/Page	Revision	L. O.
125 VDC system/schematic	DC-1	0	
DC Control power transfer from Normal to reserve source/ BwOP-DC-6A1		51	
Chp 8a 125 VDC lesson plan		6	4,6

Material Required for Examination

Question Source: New **Question Modification Method:**

Question Source Comments:

Comment Type **Comment**

Question Sequencing of ESF pumps - SI & SI w LOP

Unit 1 was being synchronized to the grid when the following occurred:

- Trip of 345 KV breakers resulted in deenergizing the SATs

- A steamline break occurred that resulted in containment pressure reaching 20 psig 20 seconds after the D/Gs output breakers have closed

When would the 1A SX pump re-start?

a. Always following start of the 1A CS Pump.

b. Between the start of the 1A CV pump and the 1A RH pump on the SDRA contacts (UV).

c. Between the start of 1A CC Pump and the 1A AF Pump on the SARA contacts (SI).

d. Coincident with the starting of the 1A and 1C RCFCs.

Answer C **Exam Level** B **Cognitive Level** Memory **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 064 A3.07 **RO Value:** 3.6 **SRO Value:** 3.7 **Section:** SYS **RO Group:** 2 **SRO Group:** 2

System/Evolution Emergency Diesel Generators

KA Ability to monitor automatic operations of the Emergency Diesel Generators including: Load sequencing

Explanation of Answer The SX pump would be started in this case by the SI signal which is overrides the UV condition. The SX pump starts in following sequence: CV (0 sec); SI ((5 sec); RH (10sec); CS (15-18 secs, if actuation signal present); CC pumps (20 sec); SX pumps (25 sec); AF 1A pump (35 sec); CS pump (40 sec, if acutaion signal now present but not present at 18 sec)

Reference Title/Facility Reference Number	Section/Page	Revision	L. O.
D/G Relaying/ schematic	DG-2/ sequencing order	1	
Chp 9 EDGs and Aux sys lesson plan		7	7
Chp 20 Essential Service Water sys Lesson plan		7	8

Material Required for Examination

Question Source: New **Question Modification Method:**

Question Source Comments:

Comment Type	Comment

Question RCDT operation - effect of CNMT Isolation

The following conditions exist on Unit 1:

- Unit is in MODE 3
- A cooldown had just been initiated
- Steam Dump Bypass Interlock control switches have just been taken to BYPASS
- No other operator actions have been performed
- The Steam Dump valves fail open and the following parameters are observed:
- RCS temperature - 537°F (A); 539°F (B); 538°F (C); 538°F (D)
- Pzr pressure - 1820 psig
- Pzr level - 10%
- S/G pressure - 850 psig (A); 740 psig (B); 800 psig (C); 715 psig (D)
- S/G flow - 1.0 Mlb/hr (A); 1.5 Mlb/hr (B); 1.1 Mlb/hr (C); 1.6 Mlb/hr (D)
- The level in the RCDT has risen to the alarm setpoint (80%) for REACTOR COOLANT DRAIN TANK UNIT 1 LEVEL HI-LO

Assuming all systems are functioning correctly, what is the status of the RCDT system?

a. BOTH RCDT pumps are running and flow is directed to the Holdup Tanks.

b. BOTH RCDT pumps are running and flow is recirculated back to the RCDT.

c. ONE RCDT pump is running and flow is directed to the Holdup Tanks.

d. NEITHER RCDT pump is running and NO flow exists for the system.

Answer d **Exam Level** B **Cognitive Level** Comprehension **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 068 A4.04 **RO Value:** 3.8 **SRO Value:** 3.7 **Section:** SYS **RO Group:** 1 **SRO Group:** 1

System/Evolution Liquid Radwaste System

KA Ability to manually operate and/or monitor in the control room: Automatic isolation

Explanation of Answer Conditions for steam flow & low RCS temp. actuate SI. The coincident CNMT Phase A Isolation signal isolates RCDT valves out. Closure of valve RE9170 cuses pumps to stop.

Reference Title/Facility Reference Number	Section/Page	Revision	L. O.
PRT and RCDT/schematic	RY-4	2	
Chp 48a Liquid Rad Waste lesson plan		6	11
Ch61 ESF lesson plan		5	7

Material Required for Examination

Question Source: New **Question Modification Method:**

Question Source Comments:

Comment Type **Comment**

Question CNMT Sump sources of input during normal operations

During at-power operations with systems in their normal alignment, what is a normal source of water to the Containment Floor Sump?

a. Output from the reactor cavity sump.

b. Leakoff from the #2 RCP seals.

c. Leakoff from the reactor vessel flange.

d. Valve packing leakage from the CVCS letdown isolation valves.

Answer a **Exam Level** R **Cognitive Level** Memory **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 068 K1.07 **RO Value:** 2.7 **SRO Value:** 2.9 **Section:** SYS **RO Group:** 1 **SRO Group:** 1

System/Evolution Liquid Radwaste System

KA Knowledge of the physical connections and/or cause-effect relationships between Liquid Radwaste System and the following: Sources of liquid wastes for LRS

Explanation of Answer Rx cavity sump output to CNMT Floor sump, #2 seals directed to RCDT, RV flange to RCDT , valve leakoffs directed to PRT

Reference Title/Facility Reference Number	Section/Page	Revision	L. O.
Chp 46a Liquid Radwaste System		6	12

Material Required for Examination

Question Source: New **Question Modification Method:**

Question Source Comments:

Comment Type **Comment**

Question Waste Gas Decay Tank Operations

When aligned for normal operation (BWOP GW-1), how does the Waste Gas System respond to high pressure sensed at the in-service Gas Decay Tank?

An alarm is generated that...

a. alerts the operator to place an alternate Gas Decay Tank in service.

b. indicates auto swap of in-service Gas Decay Tank to selected backup Gas Decay Tank, and alerts the operator to align another standby Gas Decay Tank.

c. indicates auto swap of in-service Gas Decay Tank to selected standby Gas Decay Tank and auto swap of standby Gas Decay Tank to new standby Gas Decay Tank.

d. shuts down the Waste Gas Compressors and isolates the in-service Gas Decay Tank.

Answer b **Exam Level** R **Cognitive Level** Memory **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 071 A4.05 **RO Value:** 2.6 **SRO Value:** 2.6 **Section:** SYS **RO Group:** 1 **SRO Group:** 1

System/Evolution Waste Gas Disposal System

KA Ability to manually operate and/or monitor in the control room:
Gas decay tanks, including valves, indicators, and sample line

Explanation of Answer Indicates auto swap to standby WGD Tank at 95 psig.

Reference Title/Facility Reference Number	Section/Page	Revision	L. O.
Gas waste sys S/U & Operation/			
BwOP GW-6		5	
GDT sel sw reposition req'd/ 0GW02J-A1		51	
Chgp 46 Gas Radwaste sys lesson plan		6	6

Material Required for Examination

Question Source: New **Question Modification Method:**

Question Source Comments:

Comment Type **Comment**

Question Check Source operation

Area Radiation Monitor for Fuel Bldg Fuel Handling Incident (0RE-AR055) is being manually Check Source tested. What is the response when the monitor's CHECK SOURCE (C/S) pushbutton is depressed at the RM-23 panel?

a. The alarm and automatic action output will be blocked, and the RM-23 amber INTLK LED will be lit.

b. The alarm and automatic action output will be blocked, and the RM-23 green AVAIL LED will be lit.

c. The alarm will be actuate when value is reached, and the RM-23 amber INTLK LED will be lit.

d. The alarm will be actuate when value is reached, and the RM-23 red HIGH LED will be lit.

Answer b **Exam Level** R **Cognitive Level** Memory **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 072 A4.03 **RO Value:** 3.1 **SRO Value:** 3.1 **Section:** SYS **RO Group:** 1 **SRO Group:** 1

System/Evolution Area Radiation Monitoring System

KA Ability to manually operate and/or monitor in the control room:
Check source for operability demonstration

Explanation of Answer Depressing the C/S blocks the alarm and auto function of the minitor but the AVAIL litght remains lit.

Reference Title/Facility Reference Number	Section/Page	Revision	L. O.
Control Function Channel Check Source Energized/BwOP AR/PR-11A26	B.1	1	
Rad Monitor Sys lesson plan chp 49		7	3, 8

Material Required for Examination

Question Source: New **Question Modification Method:**

Question Source Comments:

Comment Type **Comment**

Question Loss of FHB Overhead Crane rad monitor

The following conditions exist on Unit 2:

- Refueling operations are in progress

While using the Fuel Handling Building Crane to move new fuel into the Spent Fuel Pool, the radiation monitor 0RE-AR039, Fuel Handling Building Crane Monitor, goes into alarm. What action is affected?

a. Traverse of the Fuel Handing Building Crane bridge and trolley.

b. Both lowering and raising the Fuel Handing Building Crane hoist.

c. Traverse of the Fuel Handing Building Crane trolley and raising the hoist.

d. Raising the Fuel Handing Building Crane hoist.

Answer d **Exam Level** B **Cognitive Level** Comprehension **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 072 K3.02 **RO Value:** 3.1 **SRO Value:** 3.5 **Section:** SYS **RO Group:** 1 **SRO Group:** 1

System/Evolution Area Radiation Monitoring System

KA Knowledge of the effect that a loss or malfunction of the Area Radiation Monitoring System will have on the following: Fuel handling operations

Explanation of Answer Rad monitor prevents raising hoist.

Reference Title/Facility Reference Number	Section/Page	Revision	L. O.
Chp 49, Radiation Monitors lesson plan		7	4.a.3)

Material Required for Examination

Question Source: New

Question Modification Method:

Question Source Comments:

Comment Type **Comment**

Question Evaluation of eqpt affected for slow loss

The following conditions exist on Unit 1:

- A unit startup is in progress with reactor power raised above 18%.
- Turbine is at 1800 rpm ready to be synchronized to grid.
- Motor driven feedwater pump is supplying the S/Gs with Feed Reg Bypass valves in AUTO.
- Steam Dump demand in AUTO at 12%.
- Instrument air header pressure begins to slowly drop due to a leak

If the leak CANNOT be isolated and instrument air pressure continues to drop, which of the following would occur?
(Assume NO operator action taken.)

a. AF recirculation flow to the CST would be lost due to AF recirc failing closed.

b. Pressurizer level would increase due to 1CV121 failing open.

c. The main turbine would auto runback due to Diaphragm Interface Valve (DIV) opening.

d. RCS temperature would drop to 550°F due to steam dumps failing open.

Answer b **Exam Level** B **Cognitive Level** Comprehension **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 078 K3.02 **RO Value:** 3.4 **SRO Value:** 3.6 **Section:** SYS **RO Group:** 3 **SRO Group:** 3

System/Evolution Instrument Air System

KA Knowledge of the effect that a loss or malfunction of the Instrument Air System will have on the following: Systems having pneumatic valves and controls

Explanation of Answer Charging flow goes to maximum due to 1CV121 failing open, and letdown isol 1CV459 & 1CV460 fail closed. 'a' is incorrect because both 1A & 1B AF pump recirc valves fail open . 'c' main turbine not directly affected. 'd' not occur because steam dumps fail closed.

eference Title/Facility Reference Number	Section/Page	Revision	L. O.
Loss of Instrument Air Lesson Plan			
1BwOA SEC-4	Table A	52	
Chp 53 IA/SA lesson plan		8	9

Material Required for Examination

Question Source: New

Question Modification Method:

Question Source Comments:

Comment Type **Comment**

Question Effect of loss of DC - CO2 actuation

With the fire protection systems in their normal alignment, what is the affect of a loss of DC power?

Loss of DC control power to the...

a. halon control cabinet will cause halon release in the 0A Control Room HVAC Room.

b. battery control panel will cause automatic start of the diesel driven fire pump.

c. fire detection system will cause start of the motor driven fire pump.

d. carbon dioxide system will cause the master discharge valve to fail open pressurizing the CO2 header.

Answer d **Exam Level** B **Cognitive Level** Comprehension **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 086 K4.06 **RO Value:** 3.0 **SRO Value:** 3.3 **Section:** SYS **RO Group:** 2 **SRO Group:** 2

System/Evolution Fire Protection System

KA Knowledge of Fire Protection System design feature(s) and or interlock(s) which provide for the following: CO2

Explanation of Answer EMPCs uses DC control power. On loss of power, the master EMPC valves fail open which in turn cause the master discharge/selector valve to open, charging the affected header.

Reference Title/Facility Reference Number	Section/Page	Revision	L. O.
Chp 57, Fire Protection System lesson plan		5	8

Material Required for Examination

Question Source: New **Question Modification Method:**

Question Source Comments:

Comment Type **Comment**

Question Evaluate conditions - unwarranted rod withdrawal

The following conditions exist on Unit 1:

- Reactor power is 30%.
- Rod control is in Automatic
- Tref - 564°F
- Tave values - 564°F (A); 565°F (B); 565°F (C); 564°F (D)
- Power Range NI - 31% (N41); 29% (N42), 30% (N43); 30% (N44)
- Control bank D is at 156 steps.

Which condition would result in continuous rod withdrawal?

a. Turbine first stage pressure PT-505 fails upscale.

b. Power Range channel N41 fails upscale.

c. Loop A Tcold fails downscale.

d. Tref signal fails downscale.

Answer a **Exam Level** B **Cognitive Level** Comprehension **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 001 AA2.05 **RO Value:** 4.4 **SRO Value:** 4.6 **Section:** EPE **RO Group:** 2 **SRO Group:** 1

System/Evolution Continuous Rod Withdrawal

KA Ability to determine and interpret the following as they apply to Continuous Rod Withdrawal: Uncontrolled rod withdrawal, from available indications

Explanation of Answer Input to rod control Tref, auctioneered HIGH Tave & Auctioneered high PRNIs: PT-505 provides input signal for development of Tref. If it fails high Tref goes to maximum value (581°F) and results in rods being withdrawn to match Tave to Tref. PR failure high compares the rate of change of reactor power to the rate of change of turbine power. Initially high rate of change during failure but rapidly the rate of change falls to zero and so rods may initially begin to insert but quickly stop motion with no more rate of change. Auctioneered high Tave is used and Tcold failing low will remove this input (if prevoiusly auctioneered high). Tref failing low will cause rods to move inward to match Tave to Tref.

Reference Title/Facility Reference Number	Section/Page	Revision	L. O.
Rod control Unit/ Schematic	RD-2	2	
Chp 28 Rod control sys Lesson Plan		12	20
Uncontrolled Rod Motion/1BwOA ROD –1 Lesson plan		6	3

Material Required for Examination

Question Source: New **Question Modification Method:**

Question Source Comments:

Comment Type Comment

Question P/A vs. Group Step Counters

A Control Bank D rod was dropped from 156 steps. The P-A converter was NOT zeroed when directed by the procedure.

Select the effect of NOT performing this action?

a. While performing the procedure, the C-11 Rod Stop will be received prior to realigning the rod.

b. While performing the procedure, the Rod Insertion Limit Alarm will be received at a lower rod position than required.

c. After the procedure is complete, Bank C control rods will begin insertion at a lower value of Control Bank D.

d. After the procedure is complete, Bank C control rods will begin insertion at a higher value of Control Bank D.

Answer a **Exam Level** B **Cognitive Level** Application **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 003 AK3.10 **RO Value:** 3.2 **SRO Value:** 4.2 **Section:** EPE **RO Group:** 2 **SRO Group:** 1

System/Evolution Dropped Control Rod

KA Knowledge of the reasons for the following responses as they apply to Dropped Control Rod: RIL and PDIL

Explanation of Answer The bank overlap units are bypassed when rods are moved with individual bank selector positions. The P to A converter provides step information to rod position indication including the C-11 circuit. As the individual rod was withdrawn to approximately 67 steps the C11 circuit would sense that bank D was at 223 steps and block outward motion.

Reference Title/Facility Reference Number	Section/Page	Revision	L. O.
RD Data logging/ rod stops schematic	RD-5/RD-1		
	P/A & C-11 rod stop	0/0	
,ıp 28 Rod Control sys lesson plan		12	1g, 1C

Material Required for Examination

Question Source: New **Question Modification Method:** Editorially Modified

Question Source Comments: D.C. Cook 6/13/1995

Comment Type **Comment**

Question Stabilized RCS temperature with failure of Steam Dumps

On Unit 1, a loss of all circulating water pumps has resulted in a reactor trip. All control systems respond as expected. Significant decay heat causes RCS temperature to increase following the trip.

At what RCS temperature should temperature stabilize?

Temperature should stabilize at the saturation temperature for...

a. 1030 psig.

b. 1092 psig.

c. 1115 psig.

d. 1175 psig.

Answer C **Exam Level** B **Cognitive Level** Application **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 007 EA1.03 **RO Value:** 4.2 **SRO Value:** 4.1 **Section:** EPE **RO Group:** 2 **SRO Group:** 2

System/Evolution Reactor Trip

KA Ability to operate and / or monitor the following as they apply to Reactor Trip:
RCS pressure and temperature

Explanation of Answer The condenser would NOT be available for steam dumps (either on trip controller or load rejection controller).
Th S/G pressure would stabilize based on the seocndary PORV opening setpoint normally set at 1115 psig.
The Main Steam safety valve setting is 1175 psig.

Reference Title/Facility Reference Number	Section/Page	Revision	L. O.
Steam dumps/schematic	MS-4/ C-9	4	
Chp 24 Steam dumps lesson plan		7	4
Chp 23 Main steam lesson plan		8	3

Material Required for Examination

Question Source: New **Question Modification Method:**

Question Source Comments:

Comment Type Comment

Topic

Question Reactor Trip requirements

If Unit 2 is operating at full load, which group of conditions will result in an automatic reactor trip either directly or indirectly?

a. RCP bus frequency(Hz):56.9 (Bus 156) 57.1(Bus 157) 56.9 (Bus 158) 57.2 (Bus 159)

b. Power range (%): 107 (N41) 108 (N42) 108 (N43) 109 (N44)

c. PZR pressure (psig): 2375 (PT-455) 2380 (PT-456) 2385 (PT-457) 2380 (PT-458)

d. S/G C NR level (%): 35 (LT-537) 38 (LT-538) 38 (LT-539) 37 (LT-558)

Answer a **Exam Level** R **Cognitive Level** Memory **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 007 EK2.03 **RO Value:** 3.5 **SRO Value:** 3.6 **Section:** EPE **RO Group:** 2 **SRO Group:** 2

System/Evolution Reactor Trip

KA Knowledge of the interrelations between Reactor Trip and the following:
Reactor trip status panel

Explanation of Answer Trp condition RCP UF - 2/4 RCP buses < 57.0 Hz. Other trip setpoints: Rx power - 2/4 >109%; Pzr pressure **Title:** 2/4 > 2385 psig

Reference Title/Facility Reference Number	Section/Page	Revision	L. O.
ESF Setpoints/ schematic	EF-1/Rx trip	4	
2BwEP-0 Reactor Trip or SI lesson plan		3	6
Chp 60b RPS lesson plan		6	4

Material Required for Examination

Question Source: New **Question Modification Method:** Significantly Modified

Question Source Comments: Comanche Peak 11/94

Comment Type	Comment

Question Tail-Pipe conditions

With the RCS at normal operating pressure and temperature, what is the condition of the steam entering the PRT at normal conditions, if a PORV opens? (Assume an ideal thermodynamic process).

a. Superheated steam at 239°F.

b. Superheated steam at 222°F.

c. Saturated steam-water mixture at 239°F.

d. Saturated steam-water mixture at 222°F.

Answer d **Exam Level** R **Cognitive Level** Application **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 008 AK1.01 **RO Value:** 3.2 **SRO Value:** 3.7 **Section:** EPE **RO Group:** 2 **SRO Group:** 2

System/Evolution Pressurizer Vapor Space Accident

KA Knowledge of the operational implications of the following concepts as they apply to Pressurizer Vapor Space Accident: Thermodynamics and flow characteristics of open or leaking valves

Explanation of Answer Nominal PRT pressure 3 psig; Hg = 1154 BTU/lb. Saturation temperature 221.9°F. At NOP Pzr pressure 2235 psig with Hg = 1117.7 BTU/lb. Therefore PRT conditions are within saturation parameters.

Reference Title/Facility Reference Number	Section/Page	Revision	L. O.
Steam Tables			
Chp 14, Pressurizer lesson plan		9	25e

Material Required for Examination Steam Tables

Question Source: New **Question Modification Method:** Significantly Modified

Question Source Comments: South Texas 9/95

Comment Type Comment

Question Calculation of subcooled margin on Iconics

What are the parameters used to calculate Subcooling Margin in the SPDS Iconics if only the 1C RCP and 1D RCP are running?

a. RCS wide range pressure from loop C hot leg and core exit thermocouple temperatures.

b. Pressurizer pressure and core exit thermocouple temperatures.

c. RCS wide range pressure from loop A and loop C hot leg, and RCS loop A and loop C hot leg temperatures.

d. Pressurizer pressure and RCS loop A hot leg temperature.

Answer a **Exam Level** B **Cognitive Level** Comprehension **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 009 EA1.10 **RO Value:** 3.8 **SRO Value:** 3.9 **Section:** EPE **RO Group:** 2 **SRO Group:** 2

System/Evolution Small Break LOCA

KA Ability to operate and / or monitor the following as they apply to Small Break LOCA:
Safety parameter display system

Explanation of Answer

Reference Title/Facility Reference Number	Section/Page	Revision	L. O.
SPDS Display schematic	CX-1/subcooling	1	
Ch34b Inadequate Core Cooling Lesson plan		7	6

Material Required for Examination

Question Source: New

Question Modification Method:

Question Source Comments:

Comment Type Comment

Question RCP trip criteria evaluation

The following conditions exist during performance of BwEP-0.

- Train A ECCS pumps failed to start.
- RCS pressure is 1350 psig.
- Containment pressure of 7 psig.
- Bus 142 has an overcurrent trip on the normal feeder breaker.
- SI actuated due to High Containment Pressure.
- The highest critical safety function is Yellow on Heat Sink.
- All other equipment and components operated as expected.

Based on the RCP Trip Criteria, the RCPs should...

a. NOT be stopped because NO SI pumps or Charging Pumps are running.

b. NOT be stopped because RCS pressure is above the trip setpoint.

c. be stopped because SI flow is established to the RCS.

d. be stopped because CC flowpath to the RCP motor oil coolers is isolated.

Answer a **Exam Level** B **Cognitive Level** Application **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 011 EA1.03 **RO Value:** 4.0 **SRO Value:** 4.0 **Section:** EPE **RO Group:** 2 **SRO Group:** 1

System/Evolution Large Break LOCA

KA Ability to operate and / or monitor the following as they apply to Large Break LOCA:
Securing of RCPs

Explanation of Answer The trip criteria is < 1425 psig, with NO cooldown in progress, and HHSI flow > 50 gpm or SI flow > 100 gpm.

Reference Title/Facility Reference Number	Section/Page	Revision	L. O.
LAS for 1BwEP-0	Trip RCPs	1C	
1BwEP-0 lesson plan	RCP trip criteria	11	2,5

Material Required for Examination

Question Source: New **Question Modification Method:** Significantly Modified

Question Source Comments: Watts Bar 3/3/1995

Comment Type Comment

Question Eval loss of cooling flow

On a loss of seal injection to the RCPs, what criteria is used to determine if the RCPs should be tripped?

a. High temperatures on the RCP seal or bearing outlet temperatures.

b. Time elapsed since loss of seal injection.

c. RCP Thermal Bearing Cooling Water low flow alarms.

d. #1 seal leakoff flow rate decreases to zero.

Answer a **Exam Level** B **Cognitive Level** Memory **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 015 AA2.10 **RO Value:** 3.7 **SRO Value:** 3.7 **Section:** EPE **RO Group:** 1 **SRO Group:** 1

System/Evolution Reactor Coolant Pump Malfunctions

KA Ability to determine and interpret the following as they apply to Reactor Coolant Pump Malfunctions: When to secure RCPs on loss of cooling or seal injection

Explanation of Answer Seal & bearing temperatures are monitored for trip setpoint.

Reference Title/Facility Reference Number	Section/Page	Revision	L. O.
Loss of seal cooling 1BwOA RCP-2		54	
Losss of Seal Cooling lesson plan		6	4

Material Required for Examination

Question Source: New **Question Modification Method:**

Question Source Comments:

Comment Type **Comment**

Question Eval of RCP seal failure

Unit 1 is operating at 100% power when the following alarm is received:

- RCP SEAL LEAKOFF FLOW LOW (1-7-C3)

The NSO investigates and reports the following additional information:

- RCP 1A seal injection flow is 10.7 gpm
- #1 Seal Leakoff Flow on 1A RCP is 0.4 gpm
- RCP 1A Seal Water Outlet Temperature is 140°F and STABLE
- RCP 1A Bearing Outlet Temperature is 145°F and STABLE

Based on the above information, which of the following events has occurred?

a. RCP 1A #1 Seal has failed closed

b. RCP 1A #1 Seal has failed open.

c. RCP 1A #2 Seal has failed closed.

d. RCP 1A #2 Seal has failed open.

Answer d **Exam Level** B **Cognitive Level** Comprehension **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 015 AK2.07 **RO Value:** 2.9 **SRO Value:** 2.9 **Section:** EPE **RO Group:** 1 **SRO Group:** 1

System/Evolution Reactor Coolant Pump Malfunctions

KA Knowledge of the interrelations between Reactor Coolant Pump Malfunctions and the following: RCP seals

Explanation of Answer

Reference Title/Facility Reference Number	Section/Page	Revision	L. O.
RCP seal Failure/ 1BwOA RCP-1		55B	
1BwOA RCP-1 lesson plan		7	5

Material Required for Examination

Question Source: Facility Exam Bank **Question Modification Method:** Editorially Modified

Question Source Comments: Braidwood bank

Comment Type **Comment**

Question VCT level transmitter malfunction

Given the following:

- The plant is at 90% power with ALL controls in AUTO.
- VCT level transmitter, LT-112, fails HIGH causing a letdown diversion.

What will occur if NO operator action is taken?

VCT level decreases...

a. until Auto makeup starts and maintains VCT level.

b. with NO auto makeup capability and charging suction shifts to RWST.

c. faster than auto makeup input and charging suction shifts to RWST.

d. until charging pumps lose suction and start to cavitate.

Answer d **Exam Level** B **Cognitive Level** Application **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 022 AA1.08 **RO Value:** 3.4 **SRO Value:** 3.3 **Section:** EPE **RO Group:** 2 **SRO Group:** 2

System/Evolution Loss of Reactor Coolant Makeup

KA Ability to operate and / or monitor the following as they apply to Loss of Reactor Coolant Makeup: VCT level

Explanation of Answer LT 112 provides for AUTO makeup to the VCT. If NO operator action taken, then level will continue to fall until NPSH is lost to the CENT CHG pump(s). Transfer will NOT occur to RWST since both channels are required for swap. An alarm will be generated from LT-185 at 20% level.

Reference Title/Facility Reference Number	Section/Page	Revision	L. O.
CVCS notes/schematic	CV-2/ LT 112 table	3	
Chp 15a CVCS lesson plan		10	11,14

Material Required for Examination

Question Source: New

Question Modification Method:

Question Source Comments:

Comment Type **Comment**

Question Time/amount E-boration for condition

Given the following after a reactor trip:

- THREE rods remain withdrawn.
- Due to equipment malfunctions boration is only available from the RWST.
- Charging flow rate 132 gpm.
- RCS boron concentration was 1050 prior to the trip.
- 120 gpm letdown in service.

Of the listed times, which would be minimum acceptable time that boration from the RWST would have to occur?

a. 1 Hour

b. 2 Hours

c. 3 Hours

d. 4 Hours

Answer b **Exam Level** B **Cognitive Level** Application **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 024 AA2.05 **RO Value:** 3.3 **SRO Value:** 3.9 **Section:** EPE **RO Group:** 1 **SRO Group:** 1

System/Evolution Emergency Boration

KA Ability to determine and interpret the following as they apply to Emergency Boration:
Amount of boron to add to achieve required SDM

Explanation of Answer 1BwEP ES-0.1 requires 3600 gallons boration from RWST for each rod not fully inserted, therefore requiring 10,800 gallons. If net change over is 120 gpm, then required time is 10,800/120 = 90 minutes. Other answers based on counting 2 rods and/or borating from CV-8104 @ 57 gpm with total of 1200 gallons.

Reference Title/Facility Reference Number	Section/Page	Revision	L. O.
1BwOA Pri-2 emergency Boration		55B	
1BwOA Pri-2 lesson plan		1	4,6
1BwEP-0 lesson plan		11	3

Material Required for Examination 1BwEP ES-0.1, page 6 (step 5)

Question Source: New **Question Modification Method:**

Question Source Comments:

Comment Type **Comment**

Question Calc of time to saturation/core boiling

The following conditions exist on Unit 1:

- The plant was shutdown 8½ days ago to repair a steam generator tube leak.
- Reactor vessel level is at 397' 1" with Thot at 212°F.
- A loss of RHR pumps due to cavitation has occurred

Which of the following is the smallest amount of flow that meets the minimum makeup flow required to maintain current RCS level?

a. 80 gpm

b. 72 gpm

c. 59 gpm

d. 45 gpm

Answer b **Exam Level** B **Cognitive Level** Comprehension **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 025 AK1.01 **RO Value:** 3.9 **SRO Value:** 4.3 **Section:** EPE **RO Group:** 2 **SRO Group:** 2

System/Evolution Loss of Residual Heat Removal System

KA Knowledge of the operational implications of the following concepts as they apply to Loss of Residual Heat Removal System: Loss of RHRS during all modes of operation

Explanation of Answer 81/2 days is 204 afters shutdown. The curve shows minimum flow at approximately 70 gpm.

Reference Title/Facility Reference Number	Section/Page	Revision	L. O.
Loss of RH cooling/1BwOA Pri-10		56	
1BwOA Pri-10 Lesson plan			4

Material Required for Examination Figure 1BwOA PRI 10-1

Question Source: New **Question Modification Method:**

Question Source Comments:

Comment Type Comment

Question Alternate RCS cooling

The following conditions exist on Unit 2:

- MODE 5 operation during normal cooldown
- RCS temperature - 195° F
- RCS pressure - 325 psig
- Train A RH in service, train B RHR tagged out for repairs

What is the preferred method of core cooling if a loss of RH cooling occurs?

Alternate RCS cooling using...

a. bleed and feed using reactor head vents.

b. the S/Gs.

c. normal charging and RHR letdown.

d. SI Pump cold leg injection

Answer b **Exam Level** B **Cognitive Level** Comprehension **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 025 AK3.01 **RO Value:** 3.1 **SRO Value:** 3.4 **Section:** EPE **RO Group:** 2 **SRO Group:** 2

System/Evolution Loss of Residual Heat Removal System

KA Knowledge of the reasons for the following responses as they apply to Loss of Residual Heat Removal System: Shift to alternate flowpath

Explanation of Answer Steaming Intact/non-isolated SGs is the preferred alternate decay heat removal method if the RCS is intact.

Reference Title/Facility Reference Number	Section/Page	Revision	L. O.
s of RHR Cooling/1BwOA Pri-10	Table A	56	
.BwOAPri-10 Lesson Plan			4

Material Required for Examination

Question Source: New **Question Modification Method:**

Question Source Comments:

Comment Type **Comment**

Question Evaluation of CCW leak

The following conditions exist on Unit 1:

- The reactor is shutdown.
- RHR is in shutdown cooling.
- RCS temperature is 300°F.
- RCS pressure is 160 psig.
- CCW surge tank level is decreasing

What leak locations will produce these indications?

a. RHR Heat Exchanger

b. Thermal Bearing Heat Exchanger

c. Letdown Heat Exchanger

d. Seal Water Heat Exchanger

Answer d **Exam Level** B **Cognitive Level** Comprehension **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 026 AA1.05 **RO Value:** 3.1 **SRO Value:** 3.1 **Section:** EPE **RO Group:** 1 **SRO Group:** 1

System/Evolution Loss of Component Cooling Water

KA Ability to operate and / or monitor the following as they apply to Loss of Component Cooling Water:
The CCWS surge tank, including level control and level alarms, and radiation alarm

Explanation of Answer The seal water HX would be the only location where the CC pressure would be lower than the process fluid pressure. RHR HX approx. 165 psig; L/D Hx pressure should be approximately 160 psig; & Thermal barrier pressure should be about 160 psig.

Reference Title/Facility Reference Number	Section/Page	Revision	L. O.
CCW malfs/ 1BwOA Pri-6	Att B	56	
BwOA Pri-6 lesson plan	Att B	6	3

Material Required for Examination

Question Source: Facility Exam Bank **Question Modification Method:** Significantly Modified

Question Source Comments: Zion 7/13/92

Comment Type **Comment**

Question Pressure controller step change

The following conditions exist on Unit 2:

- Reactor power is 100%
- Pressurizer pressure control is in automatic.

What is the immediate response of the pressure control system if the Master Pressure Controller setpoint is inadvertently changed to 2330 psig (step change)?

a. PORV RY455A open, and spray valves open.

b. PORV RY455A opens, spray valves open, and all heaters energize.

c. Spray valves open and proportional heaters go to minimum.

d. Spray valves close and proportional heaters go to maximum.

Answer d **Exam Level** B **Cognitive Level** Application **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 027 AA1.01 **RO Value:** 4.0 **SRO Value:** 3.9 **Section:** EPE **RO Group:** 1 **SRO Group:** 2

System/Evolution Pressurizer Pressure Control Malfunction

KA Ability to operate and / or monitor the following as they apply to Pressurizer Pressure Control Malfunction: PZR heaters, sprays, and PORVs

Explanation of Answer Setting the pot setting higher reduces the output from the controller and raises the demanded pressure setpoint. This reduction results in spray valve closure & heaters turning fully on.

Reference Title/Facility Reference Number	Section/Page	Revisio	L. O.
Pzr Pressure Control/ schematic	RY-2/PK-455A in Auto	3	
Chp 14 Pressurizer lesson plan		9	30

Material Required for Examination

Question Source: New **Question Modification Method:** Significantly Modified

Question Source Comments: Calvert Cliffs 11/97

Comment Type **Comment**

Question Non-Controlling channel failure

The following conditions exist on Unit 1:

- Reactor power is 100%
- All systems are in automatic
- Channel I Pressurizer Pressure Channel (PT-455) was declared inoperable and taken out of service with the appropriate bistables placed in the tripped condition.
- Controlling pressurizer pressure channel (PT-457) fails high

Assuming NO operator action, what is the plant response to the channel failure?

a. Both PORVs and both spray valves open resulting in a reactor trip from low pressurizer pressure followed by SI actuation.

b. The reactor will trip immediately on high pressure, and safety injection will actuate on low pressure due to spray valve operation.

c. Pressurizer proportional heaters will de-energize and spray valves will open resulting in an OTdT runback prior to tripping, and safety injection will actuate due to low pressurizer pressure.

d. Both PORVs and both spray valves remain closed while pressurizer heaters de-energize.

Answer b **Exam Level** B **Cognitive Level** Application **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 027 AA2.15 **RO Value:** 3.7 **SRO Value:** 4.0 **Section:** EPE **RO Group:** 1 **SRO Group:** 2

System/Evolution Pressurizer Pressure Control Malfunction

KA Ability to determine and interpret the following as they apply to Pressurizer Pressure Control Malfunction: Actions to be taken if PZR pressure instrument fails high

Explanation of Answer TWO PZR pressure channels will have HIGH PZR PRESSURE bistables actauted resulting in the reactor trip. The sparys wil have modulated fully open resulting in actual pressure decreasing (PORV 1RY455A would have also opened on the failure of PT-457, but would close when the PZR pressure fell to 2185 psig PT-458 will actaute the low pressure interlock closing the PORV) until SI occurs at 1829 psig.

Reference Title/Facility Reference Number	Section/Page	Revision	L. O.
Pzr Pressure Control/ schematic	RY-2/ PZR press	3	
Chp 14 Pressurizer lesson plan		9	30

Material Required for Examination

Question Source: New

Question Modification Method: Significantly Modified

Question Source Comments: BV 8/91

Comment Type Comment

Question Failed level channel low.

The plant is operating at 100% power with all control systems in AUTO. The following parameters are noted:

- Letdown Hx outlet flow (FI-132) - 75 gpm
- Charging Header flow (FI-121) - 87 gpm
- Total seal injection flow (FI-142 -FI -45) - 33 gpm

What is the effect on total seal injection flow initially if controlling Pzr level channel LT-459 fails LOW?

Total seal injection flow will...

a. decrease to 0 gpm.

b. decrease to approximately 20 gpm.

c. remain approximately 33 gpm.

d. increase to greater than 40 gpm.

Answer d **Exam Level** B **Cognitive Level** Comprehension **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 028 AK3.05 **RO Value:** 3.7 **SRO Value:** 4.1 **Section:** EPE **RO Group:** 3 **SRO Group:** 3

System/Evolution Pressurizer Level Control Malfunction

KA Knowledge of the reasons for the following responses as they apply to Pressurizer Level Control Malfunction: Actions contained in EOP for PZR level malfunction

Explanation of Answer The failure of the level instrument low increases charging flow and charging dicharge header pressure. Since seal injection flow is normally increased by throttling close on CV182 to increase backpressure, the result is the same and seal injection flow will increase.

Reference Title/Facility Reference Number	Section/Page	Revision	L. O.
CVCS notes/schematic	CV-2/cvcs ratings	2	
1BwOA Inst 2 Att C lesson plan		9	1

Material Required for Examination

Question Source: Facility Exam Bank **Question Modification Method:** Significantly Modified

Question Source Comments: Braidwood 1996 NRC exam. Modified premise from failed controller to failed level channel. Changed location of correct answer based on different response (increasing flow instead of decreasing flow).

Comment Type **Comment**

Question AMS conditions

The following conditions exist on Unit 1:

- At t= 0 sec, Turbine load was decreased below 352 MW (30% power)
- At t=240 sec, The running main feedwater pump tripped.
  The reactor did NOT trip due equipment malfunction.
- At t=250 sec, All feedflow indications decrease to 0% flow
- At t=320 sec, All steam generator levels decrease below 15%.

Based on this information, AMS would...

a. initiate at t=320 sec.

b. initiate at t=345 sec.

c. initiate at t=360 sec.

d. NOT initiate because C-20 is cleared.

Answer b **Exam Level** B **Cognitive Level** Application **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 2.4.48 **RO Value:** 3.5 **SRO Value:** 3.8 **Section:** EPE **RO Group:** 2 **SRO Group:** 1

System/Evolution Anticipated Transient Without Scram

KA

Ability to interpret control room indications to verify the status and operation of system, and understand how operator actions and directives affect plant and system conditions.

Explanation of Answer AMS remains armed for 6 minutes(360 sec) following decrease below 30%(C-20). The actuation siganl is generated after 3/4 SGs level have fallen 3% below the LO-2 (reactor trip) setpoints of 18% for a period of 25 seconds. C-20 would clear @ t=360sec. AMS actuation occurs at 320 + 25 = 345 sec.

Reference Title/Facility Reference Number	Section/Page	Revision	L. O.
AS/ schematic	PN-3/ logic 1 schem	2	
hp 60b		6	7

Material Required for Examination

Question Source: New **Question Modification Method:**

Question Source Comments:

Comment Type **Comment**

Question Evaluation of SR NIS voltage failure

The following conditions exist on Unit 1:

- Reactor startup in progress
- Intermediate power range indication: 2.5E-5 amp N35 & 2.8E-5 amp N36
- SOURCE RANGE PERMISSIVE P-6 permissive light clear
- SOURCE RANGE TRIP ACTIVE permissive light clear
- Source Range Channel N31 High voltage power supply fails to half its normal value

What indication(s) would be available to alert the operator to this failure?

a. None, until power is lowered below the P-6 setpoint, and then the Source Range N31 indication will indicate lower than expected.

b. None, until power is lowered below the P-6 setpoint, and then the Source Range N31 indication will indicate higher than expected.

c. Annunciator SR HIGH VOLTAGE FAILURE (1-10-B1) will alarm when power exceeds P-10.

d. Annunciator SR HIGH VOLTAGE FAILURE (1-10-B1) will re-flash when the voltage source fails.

Answer a **Exam Level** B **Cognitive Level** Comprehension **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 032 AK1.01 **RO Value:** 2.5 **SRO Value:** 3.1 **Section:** EPE **RO Group:** 2 **SRO Group:** 2

System/Evolution Loss of Source Range Nuclear Instrumentation

KA Knowledge of the operational implications of the following concepts as they apply to Loss of Source Range Nuclear Instrumentation: Effects of voltage changes on performance

Explanation of Answer Based on Gas filled detector curve (Region III), the number of events collected would drop (counts drop). Alarm and voltage input to SR detector is blocked until both IR NIS fall below the P-6 setpoint.

ference Title/Facility Reference Number	Section/Page	Revision	L. O.
ↄR High Volt Failure/ 1BwAR 1-10-B1	setpts/notes	1	
Source Range detector/schematic	NI-4	4	
Chp 31 source range nuclear inst			
Lesson plan		6	2,3,11,12

- **Material Required for Examination**

Question Source: New **Question Modification Method:**

Question Source Comments:

Comment Type Comment

Question Eval of failed IR channel on SU

The following conditions exists on Unit 2:

- Plant shutdown is in progress.
- All power range channels indicate 6% reactor power.
- Intermediate range channel N-36 fails HIGH.

What is the plant response to this failure?

a. The reactor will trip on high IR flux, and source range trip will reinstate when N-35 decreases below P-6.

b. The reactor will trip on high IR flux, and source range trip will NOT be reinstated.

c. The reactor will NOT trip immediately, but will trip when the source range trip is reinstated when N-35 decreases below P-6

d. The reactor will NOT trip, and source range trip will NOT be reinstated.

Answer b **Exam Level** B **Cognitive Level** Application **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 033 AA2.04 **RO Value:** 3.2 **SRO Value:** 3.6 **Section:** EPE **RO Group:** 2 **SRO Group:** 2

System/Evolution Loss of Intermediate Range Nuclear Instrumentation

KA Ability to determine and interpret the following as they apply to Loss of Intermediate Range Nuclear Instrumentation: Satisfactory overlap between source-range, intermediate-range and power-range instrumentation

Explanation of Answer Since reactor power is < P-10 setpoint (10% power), the IR trip setpoint at 25% EICAwill be exceeded resulting in reactor trip. SR will NOT be reinstated automatically because only one IR channel will fall below P-6 and Two are required to remove P-6.

Reference Title/Facility Reference Number	Section/Page	Revision	L. O.
Intermediate Range/ schematic	NI-3	4	
033 Intermediate range nuclear inst Lesson plan		6	4,8,9,10

Material Required for Examination

Question Source: New **Question Modification Method:** Significantly Modified

Question Source Comments: Watts Bar 8/94

Comment Type Comment

Question Monitors for S/G Tube leakage

The following conditions exist on Unit 1:

- Reactor power is 75%
- Troubleshooting has commenced due to reduced condenser vacuum with the air ejectors out of service.
- Hogging vacuum pumps are aligned to the main condenser to aid in maintaining vacuum.

What would be an indication of a Steam Generator Tube Leak under these conditions?

a. Increasing radiation level on 1RE-PR027, "SJAE/Gland Steam Exhaust Monitor".

b. Decreasing S/G level for ONE S/G.

c. Increasing feedwater flow to ONE S/G.

d. Decreasing charging header flow to RCS.

Answer a **Exam Level** R **Cognitive Level** Comprehension **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 037 AA1.02 **RO Value:** 3.1 **SRO Value:** 2.9 **Section:** EPE **RO Group:** 2 **SRO Group:** 2

System/Evolution Steam Generator Tube Leak

KA Ability to operate and / or monitor the following as they apply to Steam Generator Tube Leak: Condensate exhaust system

Explanation of Answer The Hogger discharge is aligned through the Off Gas header which is monitored by 1RE-PR027.

Reference Title/Facility Reference Number	Section/Page	Revisio	L. O.
SGTR lesson plan/ BW0A Sec 8		6	4
Ch 49 rad monitors lesson plan		7	14

Material Required for Examination

Question Source: New **Question Modification Method:**

Question Source Comments:

Comment Type Comment

Question Loss of subcooling

BwEP-3 "Steam Generator Tube Rupture" is being performed in response to a tube rupture on 2C S/G. The cooldown has just been completed but the target temperature value selected by the operators was higher than that stipulated in the procedure.

What condition could result because of this error?

a. Loss of RCS subcooling before RCS and ruptured S/G pressures are equalized.

b. Increase in pressure of the ruptured S/G with resultant lifting of the S/G Safety Valve.

c. Increase in pressure of the non-ruptured S/Gs with resultant lifting of their S/G Safety Valves.

d. Filling the Pressurizer solid during the subsequent depressurization.

Answer a **Exam Level** B **Cognitive Level** Application **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 038 EK3.06 **RO Value:** 4.2 **SRO Value:** 4.5 **Section:** EPE **RO Group:** 2 **SRO Group:** 2

System/Evolution Steam Generator Tube Rupture

KA Knowledge of the reasons for the following responses as they apply to Steam Generator Tube Rupture: Actions contained in EOP for RCS water inventory balance, S/G tube rupture, and plant shutdown procedures

Explanation of Answer

Reference Title/Facility Reference Number	Section/Page	Revision	L. O.
SGTR lesson plan 1BwEP-3		12	1
ERG basis			

Material Required for Examination

Question Source: New **Question Modification Method:** Editorially Modified

Question Source Comments: Salem 6/94

Comment Type **Comment**

Question Steamline isolation

The following conditions exist on Unit 1:

- The Unit was in MODE 3 at normal operating temperature and pressure prior to the event.
- A faulted steam generator has occurred.
- RCS hot leg temperatures - 547°F (A), 544°F (B), 545°F (C), 547°F (D)
- RCS cold leg temperatures - 545°F (A), 530°F (B), 543°F (C), 545°F (D)
- S/G pressures - 700 psig (A), 635 psig (B), 690 psig (C), 705 psig (D)
- S/G flow - 0.85 MLB/hr (B)
- Containment pressure (Channel) - 8 psig (1), 7.5 psig (2), 7.5 psig (3), 8 psig (4)

Based on these conditions, a main steam line isolation should...

a. have occurred because of the low pressure in at least ONE S/G.

b. have occurred because the steamline high negative rate occurred in S/G 1B.

c. NOT have occurred because Containment pressure is below the setpoint for the CNMT High-2 pressure signal.

d. NOT have occurred because THREE S/Gs have pressures above the isolation setpoint and do NOT indicate high steam flow.

Answer a **Exam Level** B **Cognitive Level** Application **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 040 AA1.01 **RO Value:** 4.6 **SRO Value:** 4.6 **Section:** EPE **RO Group:** 1 **SRO Group:** 1

System/Evolution Steam Line Rupture

KA Ability to operate and / or monitor the following as they apply to Steam Line Rupture:
Manual and automatic ESFAS initiation

Explanation of Answer The steamline isolation signal is generated by the low pressure sensed on 2/3 pressure transmitters in any one SG. CNMT pressure is below the MSLI setpoint of 8.2 psig and steamline negative rate is blocked since initial condition has PZR pressure > P-11.

Reference Title/Facility Reference Number	Section/Page	Revision	L. O.
ESF Setpoints/schematic	EF-2/ Stmline isol	5	
Ch 23 Main steam Sys lesson plan		8	5,13,15,16
Ch 61 ESF lesson plan		5	7

Material Required for Examination

Question Source: New **Question Modification Method:**

Question Source Comments:

Comment Type Comment

Question Eval of Leak

The following conditions exist on Unit 1 following a trip from 100% power:

- Pressurizer level is 0%
- Pressurizer pressure is 1500 psig
- Containment Pressure is 16 psig.
- Tcold is 420°F for all loops.

Where is the location of the leak?

a. On one loop RCS cold leg.

b. On a Main Steam Line inside containment.

c. In a Steam Generator Tube.

d. On a feedwater line between FWRV and Associated FWIV, 1FW009.

Answer b **Exam Level** B **Cognitive Level** Comprehension **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 040 AK1.06 **RO Value:** 3.7 **SRO Value:** 3.8 **Section:** EPE **RO Group:** 1 **SRO Group:** 1

System/Evolution Steam Line Rupture

KA Knowledge of the operational implications of the following concepts as they apply to Steam Line Rupture: High-energy steam line break considerations

Explanation of Answer Secondary LOCA not indicated since Tcold is the same in all loops and RCS tcold is not consistent wth given CNMT pressure for steam/feed break. SGTR not indicated since CNMT pressure is elevated. LOCA condiiton indcated by consistent Tcold, and CNMT pressure increase.

Reference Title/Facility Reference Number	Section/Page	Revisio	L. O.
1BwEP-0 Reactor Trip or SI lesson plan		3	6,7
1BwEP2 Faulted S?g isolation lesson plan		7	2,4

Material Required for Examination

Question Source: New **Question Modification Method:** Editorially Modified

Question Source Comments: St. Lucie 10/13/97

- **Comment Type** **Comment**

Question Eval of conditions

In accordance with BwOA SEC-3, "Loss of Condenser Vacuum", which of the following sets of conditions requires the operator to trip the reactor?

a. LOW POWER TRIP BLOCKED P-8 annunciator - LIT
Turbine load - 200 MW
Condenser pressure - 5.2 " HgA

b. LOW POWER TRIP BLOCKED P-8 annunciator - LIT
Turbine load - 300 MW
Condenser pressure - 6.3" HgA

c. LOW POWER TRIP BLOCKED P-8 annunciator - CLEAR
Turbine load - 600 MW
Condenser pressure - 7.2" HgA

d. LOW POWER TRIP BLOCKED P-8 annunciator - CLEAR
Turbine load - 900 MW
Condenser pressure - 7.8" HgA

Answer b **Exam Level** B **Cognitive Level** Application **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 051 AA2.02 **RO Value:** 3.9 **SRO Value:** 4.1 **Section:** EPE **RO Group:** 1 **SRO Group:** 1

System/Evolution Loss of Condenser Vacuum

KA Ability to determine and interpret the following as they apply to Loss of Condenser Vacuum:
Conditions requiring reactor and/or turbine trip

Explanation of Answer P-8 permissive active below 30% power (annunciator lit). At 480 MW and below, the minimum acceptable condenser pressure is 5.5 in HgA. At 600 MW minimum acceptable pressure is 7. 8 in HgA. At 610 MW and greater, minimum acceptable pressure is 8.0 in HG

Reference Title/Facility Reference Number	Section/Page	Revision	L. O.
BwOA Ses –3 loss of condenser vac lesson plan		6	5

Material Required for Examination Figure 1BwOA SEC 3-1

Question Source: New **Question Modification Method:**

Question Source Comments:

Comment Type **Comment**

Question Identification of RCP seal LOCA/cooldown

Select the primary basis for rapidly depressurizing the steam generators during a Loss of All AC.

a. To provide maximum core cooling until power can be restored.

b. To minimize RCS inventory loss from RCP seals.

c. To enhance restoration of S/G level from the diesel driven AF pump.

d. To increase subcooling of the RCS.

Answer b **Exam Level** B **Cognitive Level** Memory **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 055 EK3.02 **RO Value:** 4.3 **SRO Value:** 4.6 **Section:** EPE **RO Group:** 1 **SRO Group:** 1

System/Evolution Station Blackout

KA Knowledge of the reasons for the following responses as they apply to Station Blackout:
Actions contained in EOP for loss of offsite and onsite power

Explanation of Answer The rapid cooling allows depressuring the RCS reducing the leak rate via the RCP seals

Reference Title/Facility Reference Number	Section/Page	Revision	L. O.
Loss of All AC Power/ 1BwCA 0.0	Caution 2	1B Wog 1B	
1BwCA 0.0 lesson plan		4	

Material Required for Examination

Question Source: New **Question Modification Method:**

Question Source Comments:

Comment Type **Comment**

Question Reset of sequencer

How would the sequencer operate if a Safety Injection (SI) actuation occurs while the sequencer is sequencing loads in response to an ESF bus undervoltage condition?

a. There will be no change in operation; the undervoltage sequence overrides the SI sequence.

b. The undervoltage sequencing stops, the sequencer immediately resets and SI loads NOT already running will sequentially start.

c. The undervoltage sequencing stops, all started loads are shed, and SI loads will sequentially start.

d. The undervoltage sequencing completes its cycle, then resets to SI mode, and SI loads NOT already running will sequentially start.

Answer b **Exam Level** B **Cognitive Level** Comprehension **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 056 AA1.21 **RO Value:** 3.3 **SRO Value:** 3.3 **Section:** EPE **RO Group:** 3 **SRO Group:** 3

System/Evolution Loss of Off-Site Power

KA Ability to operate and / or monitor the following as they apply to Loss of Off-Site Power:
Reset of the ESF load sequencers

Explanation of Answer The UV sequence is stopped and the SARA sequencing is initiated from step 1.

Reference Title/Facility Reference Number	Section/Page	Revision	L. O.
D/G Relaying schematic	DG-2/ SARA & SDRA	1	
Ch 9 EDG and Aux sys lesson plan		7	7
Ch 4 AC Electrical distribution lesson plan		8	10,16
Ch 61 ESF lesson plan		5	7,8

Material Required for Examination

Question Source: New **Question Modification Method:** Significantly Modified

Question Source Comments: Vogtle - 5/91

Comment Type Comment

Question Eval of electric bus status

The following conditions exist on Unit 1:

- Bus 141 is powered from its normal source
- D/G 1A surveillance is being performed with the D/G paralleled to the bus

What would occur if a failure of the undervoltage relay results in a sensed undervoltage condition on Bus 141?

a. SAT feeder breaker ACB 1412 and D/G feeder breaker ACB 1413 remain closed. The Safe Shutdown loads will NOT sequence and CANNOT be manually started from the control room.

b. SAT feeder breaker ACB 1412 and D/G feeder breaker ACB 1413 will open. After a 10-second delay, ACB 1413 will close and the Safe Shutdown loads will sequence.

c. SAT feeder breaker ACB 1412 will open but D/G feeder breaker ACB 1413 will remain closed. The Safe Shutdown loads will sequence normally.

d. SAT feeder breaker ACB 1412 will open but D/G feeder breaker ACB 1413 will remain closed. The Safe Shutdown loads will NOT sequence and CANNOT be manually started from the control room.

Answer d **Exam Level** B **Cognitive Level** Comprehension **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 056 AA2.46 **RO Value:** 4.2 **SRO Value:** 4.4 **Section:** EPE **RO Group:** 3 **SRO Group:** 3

System/Evolution Loss of Off-Site Power

A Ability to determine and interpret the following as they apply to Loss of Off-Site Power:
That the ED/Gs have started automatically and that the bus tie breakers are closed

Explanation of Answer On sensed UV, the SAT feeder breaker opens (and alternate feeder breaker would also have opened if closed) and the control switches for the safe shutdown loads will be locked out.

Reference Title/Facility Reference Number	Section/Page	Revision	L. O.
Ch 4 AC Electrical Distribution		8	10,16

Material Required for Examination

Question Source: New **Question Modification Method:**

Question Source Comments:

Comment Type Comment

Question Eqpt affected on bus loss

On Unit 1 power is lost to 120 VAC Instrument Bus 111

How are the ESF and Safe Shutdown loads affected?

a. "A" Train ESF loads will NOT load on an SI signal, but Safe Shutdown loads will load on a U/V signal.

   "B" Train loads are NOT affected.

b. A" Train ESF loads will load on an SI signal, but Safe Shutdown loads will NOT load on a U/V signal.
   "B" Train loads are NOT affected.

c. "A" Train ESF loads will NOT load on an SI signal, and Safe Shutdown loads will NOT load on a U/V signal.
   "B" Train loads are NOT affected.

d. "A" Train AND "B" Train ESF loads will NOT load on an SI signal, but Safe Shutdown loads will load on a U/V signal.

Answer C **Exam Level** B **Cognitive Level** Comprehension **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 057 AA2.19 **RO Value:** 4.0 **SRO Value:** 4.3 **Section:** EPE **RO Group:** 1 **SRO Group:** 1

System/Evolution Loss of Vital AC Instrument Bus

KA Ability to determine and interpret the following as they apply to Loss of Vital AC Instrument Bus:
The plant automatic actions that will occur on the loss of a vital ac electrical instrument bus

Explanation of Answer

Reference Title/Facility Reference Number	Section/Page	Revision	L. O.
9wOA Elec 2 Loss of inst bus	Table A	7	
...n 60a SSPS lesson plan		3	11
1BwOA elec 2 lesson plan		6	3,5
I and C system notes	I & C 1		

Material Required for Examination

Question Source: New **Question Modification Method:**

Question Source Comments:

Comment Type **Comment**

Question Operations required for transfer

Select the method used for transferring controls to the remote shutdown panels PL04/05J.

a. Placing applicable transfer switches in LOCAL on RSP.

b. Opening the isolation switches in the Auxiliary Electric Room.

c. Deenergizing normal control power to individual controls.

d. Taking local controls out of the PULL-TO-LOCK position.

Answer a **Exam Level** B **Cognitive Level** Memory **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 068 AA1.21 **RO Value:** 3.9 **SRO Value:** 4.1 **Section:** EPE **RO Group:** 1 **SRO Group:** 1

System/Evolution Control Room Evacuation

KA Ability to operate and / or monitor the following as they apply to Control Room Evacuation: Transfer of controls from control room to shutdown panel or local control

Explanation of Answer

Reference Title/Facility Reference Number	Section/Page	Revisio	L. O.
RSP PL04/5J/ schematic	PN-1	2	
Control Room Inaccessbility 1BwOA Pri-5 lesson plan	Att. A	57B	
Ch 62 Remote shutdown Panel Lesson plan		3	3,4

Material Required for Examination

Question Source: New **Question Modification Method:**

Question Source Comments:

Comment Type **Comment**

Question Major action categories

When inadequate core cooling exists, which of the following sets of actions state the proper sequence of the major action categories to be performed in accordance with BwFR-C.1, "RESPONSE TO INADEQUATE CORE COOLING", for removing decay heat from the core?

a. Reinitiation of safety injection; RCP restart; rapid secondary depressurization.

b. Reinitiation of safety injection; rapid secondary depressurization; RCP restart.

c. RCP restart; reinitiation of safety injection; rapid secondary depressurization.

d. RCP restart; rapid secondary depressurization; reinitiation of safety injection.

Answer b **Exam Level** B **Cognitive Level** Comprehension **Facility:** Braidwood **ExamDate:** 9/14/98

KA: 074 EK1.03 **RO Value:** 4.5 **SRO Value:** 4.9 **Section:** EPE **RO Group:** 1 **SRO Group:** 1

System/Evolution Inadequate Core Cooling

KA Knowledge of the operational implications of the following concepts as they apply to Inadequate Core Cooling: Processes for removing decay heat from the core

Explanation of Answer

Reference Title/Facility Reference Number	Section/Page	Revisio	L. O.
Function Restoration Procedures BwFR-C.1, C.2, C.3 lesson plan		5	2,3

Material Required for Examination

Question Source: New **Question Modification Method:** Editorially Modified

Question Source Comments: VC Summer 5/94

Comment Type **Comment**

Question Actions for reducing activity

High coolant activity has been detected and chemistry has determined that it is due to corrosion product activation.

Identify the effect of placing the cation demineralizer in service.

The cation demineralizer...

a. will remove lithium so it should NOT be used in this condition.

b. will cause the activity level to decrease as soon as it is placed in service.

c. is NOT effective in removing corrosion product activity.

d. is less effective than the mixed bed demineralizer so it is placed in service ONLY if decontamination factor is less than 10.

Answer b **Exam Level** B **Cognitive Level** Memory **Facility:** Braidwood **ExamDate** 9/14/98

KA: 076 AA2.02 **RO Value:** 2.8 **SRO Value:** 3.4 **Section:** EPE **RO Group:** 1 **SRO Group:** 1

System/Evolution High Reactor Coolant Activity

KA Ability to determine and interpret the following as they apply to High Reactor Coolant Activity: Corrective actions required for high fission product activity in RCS

Explanation of Answer The cation demin is highly effective in removing corrosion products from the coolant.

Reference Title/Facility Reference Number	Section/Page	Revision	L. O.
BwOP CV-8			
1BwOA Pri-4 High coolant Activity lesson plan		1	4,5
ch 15a CVCS lesson plan		10	4

aterial Required for Examination

Question Source: New **Question Modification Method:**

Question Source Comments:

Comment Type Comment

Question Interlocks affecting reestablishment of feed

The following conditions exist on Unit 1:

- Reactor power was 8% prior to the event below.
- A failure in the feedwater control system caused ONE S/G level to exceed P-14.
- The main turbine tripped.
- S/G levels have returned to their normal level range
- The Startup FW Pump is running

What are all the conditions that would have to be met to feed the S/Gs using the FW034's Feedwater Tempering Flow Control valves?

a. The FW Isolation Aux Relays would have to be reset and FW035 Feedwater Tempering Isol valves opened.

b. The reactor trip breakers would have to be cycled, the FW Isolation Aux Relays would have to be reset and FW035 Feedwater Tempering Isol valves opened.

c. The FW Isolation Main Relays and Aux Relays would have to be reset and FW035 Feedwater Tempering Isol valves opened.

d. The reactor trip breakers would have to be cycled and FW Isolation Main Relays and Aux Relays reset and FW035 Feedwater Tempering Isol valves opened.

Answer a **Exam Level** B **Cog tive Level** Application **Facility:** Braidwood **ExamDate:** 9/14/98

KA: E05 EK2.1 **RO Value:** 3.7 **SRO Value:** 3.9 **Section:** EPE **RO Group:** 2 **SRO Group:** 2

System/Evolution Loss of Secondary Heat Sink

KA Knowledge of the interrelations between Loss of Secondary Heat Sink and the following: Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.

Explanation of Answer The P-14 signal, once clear, only mainaitns FWI signal via the FW Isol Aux relays if NO reactro trip signal is present. So reseting the FW Isolation Aux relay allows opeing of FW035s (normal feed path at low power) and throttling of FW034s

Reference Title/Facility Reference Number	Section/Page	Revision	L. O.
ESF setpoints/ schematic	EF-2/ reset FWI	5	
Feedwater Simple/SGWLC	FW-1,2/ reset FWI	0	
Ch 61 ESF lesson plan		6	4,7,8

Material Required for Examination

Question Source: New **Question Modification Method:**

Question Source Comments:

Comment Type **Comment**

Topic

Question Identification of heat removal process

The following conditions exist on Unit 1:

- A leak developed on the RCS loop C flow instrument piping.
- Coincident with the RCS leak, on the reactor trip a S/G PORV failed open and was later isolated.
- FR-P.1 was entered to due to an ORANGE PATH condition.
- SI actuated and has been reset.
- All RCPs are stopped.
- Conditions required to support an RCP start are met.

What is the basis for operation of a RCP?

Under the current conditions starting the RCP will...

a. cause excessive thermal stresses in the stagnant loops.

b. cause a pressure surge that will aggravate the PTS condition.

c. provide mixing of the ECCS injection flow thereby decreasing the likelihood of PTS.

d. increase the RCS cooldown rate thereby increase the likelihood of PTS.

Answer C **Exam Level** B **Cognitive Level** Comprehension **Facility:** Braidwood **ExamDate:** 9/14/98

KA: E08 EK2.2 **RO Value:** 3.6 **SRO Value:** 4.0 **Section:** EPE **RO Group:** 1 **SRO Group:** 1

System/Evolution **Title:** Pressurized Thermal Shock

KA **Statement:** Knowledge of the interrelations between Pressurized Thermal Shock and the following:
Facility's heat removal systems, including primary coolant, emergency coolant, the decay heat removal systems, and relations between the proper operation of these systems to the operation of the facility.

Explanation of Answer

Reference Title/Facility Reference Number	Section/Page	Revisin	L. O.
FRP 1BwFR P.1, 2, lesson plan		4	3,4
Status Trees	ST-I/ Integrity		

Material Required for Examination

Question Source: New **Question Modification Method:**

Question Source Comments:

Comment Type **Comment**

Question Natural Circ conditions and limits

Why is it important to run the CRDM vent fans when performing a natural circulation cooldown?

a. Aids the operator in maintaining subcooling in the reactor vessel head.

b. Aids in natural circulation flow through the RCS head region.

c. Minimizes stresses on the reactor vessel head due to uneven cooldown.

d. Aids in natural circulation flow through the RCS.

Answer a **Exam Level** B **Cognitive Level** Memory **Facility:** Braidwood **ExamDate:** 9/14/98

KA: E09 EK3.1 **RO Value:** 3.3 **SRO Value:** 3.6 **Section:** EPE **RO Group:** 1 **SRO Group:** 1

System/Evolution Natural Circulation Operations

KA Knowledge of the reasons for the following responses as they apply to Natural Circulation Operations:
Facility operating characteristics during transient conditions, including coolant chemistry and the effects of temperature, pressure, and reactivity changes and operating limitations and reasons for these operating characteristics.

Explanation of Answer

Reference Title/Facility Reference Number	Section/Page	Revision	L. O.
1BwEP -0 Reactor Trip or SI Lesson plan		11	3,4,6

Material Required for Examination

Question Source: New **Question Modification Method:**

Question Source Comments:

Comment Type **Comment**

Question Reason for rapid S/G depressurization

Why are the S/Gs depressurized to less than 670 psig according to BwCA-1.1, "Loss of Emergency Coolant Recirculation"?

a. To allow maximum AFW flow to the S/Gs.

b. To ensure adequate subcooling for restart of the RCPs.

c. To set up conditions for controlled injection to the RCS from the accumulators.

d. To decrease RCS temperature and pressure which reduces break flow in a LOCA condition.

Answer C **Exam Level** B **Cognitive Level** Memory **Facility:** Braidwood **ExamDate:** 9/14/98

KA: E11 EA1.1 **RO Value:** 3.9 **SRO Value:** 4.0 **Section:** EPE **RO Group:** 2 **SRO Group:** 2

System/Evolution Loss of Emergency Coolant Recirculation

KA Ability to operate and / or monitor the following as they apply to Loss of Emergency Coolant Recirculation:
Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.

Explanation of Answer The concern is maximizing cooling volumes that supply water to RCS. By cooling RCS, depressurization of RCS can be initiated (while maintaining subcooling) to the point where the SI accumulators inject their volumes into the RCS.

Reference Title/Facility Reference Number	Section/Page	Revision	L. O.
Loss of Emergency Coolant Recirc/ 1BwCA-1.1		1B WOG 1B	
1BwCA 1.1 and 1.2 lesson plan		7	3

Material Required for Examination

Question Source: New **Question Modification Method:** Editorially Modified

Question Source Comments: South Texas 9/92

Comment Type Comment