DUANE ARNOLD

APRIL 2001

FINAL, AS-GIVEN WRITTEN EXAMINATION

Final Submittal

Facility: DAEC Date of Exam: 4/9/01 Exam Level: RO/SRO

Item Description			Initial a	Initial b*	Initial c*
1. Questions and answers technically accurate and applicable to facility			GRT	JMD	AMS
2. a. NRC K/As referenced for all questions b. Facility learning objectives referenced as available			GRT	JMD	AMS
3. RO/SRO overlap is no more than 75 percent, and SRO questions are appropriate per Section D.2.d of ES-401			GRT	JMD	AMS
~~4. No more than 25 questions are duplicated from [practice exams, quizzes, and] the last two NRC licensing exams; enter the actual number of duplicated questions at right~~	~~NRC~~	~~Other~~	NA	NA	NA
4. ~~[No (Less than 5 percent)~~ Question duplication from the license screening/audit exam ~~(if independently written)]~~ was controlled as indicated below (check the item that applies) and appears appropriate: X the audit exam was systematically and randomly developed; or __ the audit exam was completed before the license exam was started; or X the licensee certifies that there is no duplication; or __ the license exam was prepared by the NRC			GRT	JMD	AMS
5. Bank use meets limits (no more than 50 percent from the bank, at least 10 percent new, and the rest modified); enter the actual question distribution at right	Bank: 19	Modified: 9 / New: 72	GRT	JMD	AMS
6. Between 50 and 60 percent of the questions on the exam (including 10 new questions) are written at the comprehension/analysis level; enter the actual question distribution at right	Memory: 44	C/A: 56	GRT	JMD	AMS
7. References/handouts provided do not give away answers			GRT	JMD	AMS
8. Question content conforms with specific K/A statements in the ~~distribution meets~~ previously approved examination outline; deviations are justified			GRT	JMD	AMS
9. Question psychometric quality and format meet ES, Appendix B, guidelines			GRT	JMD	AMS
10. The exam contains 100, one-point, multiple choice items; the total is correct and agrees with value on cover sheet			GRT	JMD	AMS

	Printed Name / Signature	Date
a. Author	G. R. Thullen / G R Thullen	4/3/01
b. Facility Reviewer(*)	Mike Davis / JMDavis	4/3/01
c. NRC Chief Examiner(*)	Ann Marie Stone / Ann Marie Stone	4/5/01
d. NRC Regional Supervisor(*)	David E. Hills / David E Hills	4/6/01

Note: * The facility reviewer's signature is not applicable for NRC-developed examinations; two independent NRC reviews are required.
See special instructions (Section E.2.c) for Items 1, ~~4,~~ 5, and 6.
~~[ ] The items in brackets do not apply to NRC-prepared examinations.~~

Final Submittal

Facility: QAEC   Date of Exam: 4/9/01   Exam Level: RO/SRO

	Item Description				Initial a	Initial b*	Initial c#
1.	Questions and answers technically accurate and applicable to facility				GRT	JMD	AMS
2.	a. NRC K/As referenced for all questions b. Facility learning objectives referenced as available				GRT	JMD	AMS
3.	RO/SRO overlap is no more than 75 percent, and SRO questions are appropriate per Section D.2.d of ES-401				GRT	JMD	AMS
~~4.~~	~~No more than 25 questions are duplicated from [practice exams, quizzes, and] the last two NRC licensing exams; enter the actual number of duplicated questions at right~~		~~NRC~~	~~Other~~	N/A	N/A	N/A
4.	~~[No (Less than 5 percent)~~ Question duplication from the license screening/audit exam ~~(if independently written)]~~ was controlled as indicated below (check the item that applies) and appears appropriate: GRT X the audit exam was systematically and randomly developed; or __ the audit exam was completed before the license exam was started; or X the licensee certifies that there is no duplication; or __ the license exam was prepared by the NRC				GRT	JMD	AMS
5.	Bank use meets limits (no more than 50 percent from the bank, at least 10 percent new, and the rest modified); enter the actual question distribution at right	Bank: 21	Modified: 9	New: 70	GRT	JMD	AMS
6.	Between 50 and 60 percent of the questions on the exam (including 10 new questions) are written at the comprehension/analysis level; enter the actual question distribution at right	Memory: 48	C/A: 52		GRT	JMD	AMS
7.	References/handouts provided do not give away answers				GRT	JMD	AMS
8.	Question content conforms with specific K/A statements in the ~~distribution meets~~ previously approved examination outline; deviations are justified				GRT	JMD	AMS
9.	Question psychometric quality and format meet ES, Appendix B, guidelines				GRT	JMD	AMS
10.	The exam contains 100, one-point, multiple choice items; the total is correct and agrees with value on cover sheet				GRT	JMD	AMS

	Printed Name / Signature	Date
a. Author	G. R. Thullen / G R Thullen	4/3/01
b. Facility Reviewer(*)	Mike Davis / [signature]	4/3/01
c. NRC Chief Examiner(*)	AnnMarie Stone / AnnMarie Stone	4/5/01
d. NRC Regional Supervisor(*)	David E. Hills / David E. Hills	4/6/01

Note: * The facility reviewer's signature is not applicable for NRC-developed examinations; two independent NRC reviews are required.
\# See special instructions (Section E.2.c) for Items 1, ~~4,~~ 5, and 6.
~~[ ] The items in brackets do not apply to NRC-prepared examinations.~~

Facility: DAEC

Exam Date: 04/09/2001 **Exam Level:** SRO

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	4	3	3				4	6			6	26
	2	2	2	4				2	4			3	17
	Tier Totals	6	5	7				6	10			9	43
2. Plant Systems	1	1	2	2	1	3	3	2	3	2	2	2	23
	2	1	1	2	1	1	0	1	1	1	1	3	13
	3	0	1	0	1	0	0	0	0	1	0	1	4
	Tier Totals	2	4	4	3	4	3	3	4	4	3	6	40

3. Generic Knowledge And Abilities	Cat 1	Cat 2	Cat 3	Cat 4	
	5	4	4	4	17

Note:

1. Attempt to distribute topics among all K/A Categories; select at least one topic from every K/A category within each tier.
2. Actual point totals must match those specified in the table.
3. 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.
4. Systems/evolutions within each group are identified on the associated outline.
5. The shaded areas are not applicable to the category tier.

E/APE #	E/APE Name / Safety Function	K1	K2	K3	A1	A2	G	KA Topic	Imp.	Points
295003	Partial or Complete Loss of A.C. Power / 6		X					AK2.02 - Emergency generators	4.2*	1
295006	SCRAM / 1		X					AK2.02 - Reactor water level control system	3.8	1
295006	SCRAM / 1					X		AA2.06 - Cause of reactor SCRAM	3.8	1
295007	High Reactor Pressure / 3				X			AA1.05 - Reactor/turbine pressure regulating system	3.8	1
295009	Low Reactor Water Level / 2			X				AK3.01 - Recirculation pump run back: Plant-Specific	3.3	1
295010	High Drywell Pressure / 5	X						AK1.03 - Temperature increases	3.4	1
295013	High Suppression Pool Temperature / 5		X					AK2.01 - Suppression pool cooling	3.7	1
295014	Inadvertent Reactivity Addition / 1			X				AK3.01 - Reactor SCRAM	4.1	1
295014	Inadvertent Reactivity Addition / 1				X			AA1.03 - RMCS: Plant-Specific	3.5	1
295015	Incomplete SCRAM / 1						X	2.4.11 - Knowledge of abnormal condition procedures.	3.6	1
295016	Control Room Abandonment / 7						X	2.4.21 - Knowledge of the parameters and logic used to assess the status of safety functions including: 1.Reactivity control 2.Core cooling and heat removal 3.Reactor coolant system integrity 4.Containment conditions 5.Radioactivity release control.	4.3	1
295017	High Off-Site Release Rate / 9				X			AA1.11 - PCIS/NSSSS	4.1	1

ES - 401

Emergency and Abnormal Plant Evolutions - Tier 1 / Group 1

Form ES-401-1

E/APE #	E/APE Name / Safety Function	K1	K2	K3	A1	A2	G	KA Topic	Imp.	Points
295023	Refueling Accidents / 8					X		AA2.01 - Area radiation levels	4.0	1
295024	High Drywell Pressure / 5			X				EK3.04 - †Emergency depressurization	4.1	1
295025	High Reactor Pressure / 3						X	2.4.22 - Knowledge of the bases for prioritizing safety functions during abnormal/emergency operations.	4.0	1
295025	High Reactor Pressure / 3					X		EA2.05 - Decay heat generation	3.6	1
295026	Suppression Pool High Water Temperature / 5					X		EA2.02 - Suppression pool level	3.9	1
295026	Suppression Pool High Water Temperature / 5	X						EK1.01 - Pump NPSH	3.4	1
295030	Low Suppression Pool Water Level / 5	X						EK1.03 - Heat capacity	4.1*	1
295031	Reactor Low Water Level / 2					X		EA2.01 - Reactor water level	4.6*	1
295031	Reactor Low Water Level / 2						X	2.4.8 - Knowledge of how the event-based emergency/abnormal operating procedures are used in conjunction with the symptom-based EOPs.	3.7	1
295037	SCRAM Condition Present and Reactor Power Above APRM Downscale or Unknown / 1					X		EA2.03 - SBLC tank level	4.4*	1
295037	SCRAM Condition Present and Reactor Power Above APRM Downscale or Unknown / 1	X						EK1.02 - Reactor water level effects on reactor power	4.3*	1

ES - 401

Emergency and Abnormal Plant Evolutions - Tier 1 / Group 1

Form ES-401-1

E/APE #	E/APE Name / Safety Function	K1	K2	K3	A1	A2	G	KA Topic	Imp.	Points
295038	High Off-Site Release Rate / 9						X	2.4.48 - Ability to interpret control room indications to verify the status and operation of system, and understand how operator action s and directives affect plant and system conditions.	3.8	1
295038	High Off-Site Release Rate / 9						X	2.4.44 - Knowledge of emergency plan protective action recommendations.	4.0	1
500000	High Containment Hydrogen Concentration / 5				X			EA1.07 - Nitrogen purge system	3.3	1

K/A Category Totals: 4 3 3 4 6 6

Group Point Total: 26

ES - 401

Emergency and Abnormal Plant Evolutions - Tier 1 / Group 2

Form ES-401-1

E/APE #	E/APE Name / Safety Function	K1	K2	K3	A1	A2	G	KA Topic	Imp.	Points
295001	Partial or Complete Loss of Forced Core Flow Circulation / 1					X		AA2.03 - Actual core flow	3.3	1
295002	Loss of Main Condenser Vacuum / 3	X						AK1.03 - Loss of heat sink	3.8	1
295004	Partial or Complete Loss of D.C. Power / 6				X			AA1.03 - A.C. electrical distribution	3.6	1
295005	Main Turbine Generator Trip / 3				X			AA1.07 - A.C. electrical distribution	3.3	1
295008	High Reactor Water Level / 2						X	2.4.50 - Ability to verify system alarm setpoints and operate controls identified in the alarm response manual.	3.3	1
295012	High Drywell Temperature / 5		X					AK2.01 - Drywell ventilation	3.5	1
295018	Partial or Complete Loss of Component Cooling Water / 8			X				AK3.01 - Isolation of non-essential heat loads: Plant-Specific	3.2	1
295019	Partial or Complete Loss of Instrument Air / 8					X		AA2.02 - Status of safety-related instrument air system loads (see AK2.1-AK2.19)	3.7	1
295021	Loss of Shutdown Cooling / 4					X		AA2.07 - Reactor recirculation flow	3.1	1
295022	Loss of CRD Pumps / 1	X						AK1.02 - Reactivity control	3.7	1
295028	High Drywell Temperature / 5			X				EK3.01 - Emergency depressurization	3.9	1

Emergency and Abnormal Plant Evolutions - Tier 1 / Group 2

E/APE #	E/APE Name / Safety Function	K1	K2	K3	A1	A2	G	KA Topic	Imp.	Points
295029	High Suppression Pool Water Level / 5						X	2.1.7 - Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation.	4.4	1
295032	High Secondary Containment Area Temperature / 5		X					EK2.04 - PCIS/NSSSS	3.8	1
295033	High Secondary Containment Area Radiation Levels / 9			X				EK3.03 - Isolating affected systems	3.9	1
295034	Secondary Containment Ventilation High Radiation / 9					X		EA2.01 - Ventilation radiation levels	4.2	1
295035	Secondary Containment High Differential Pressure / 5			X				EK3.01 - Blow-out panel operation: Plant-Specific	3.1	1
295036	Secondary Containment High Sump/Area Water Level / 5						X	2.4.4 - Ability to recognize abnormal indications for system operating parameters which are entry-level conditions for emergency and abnormal operating procedures.	4.3	1

K/A Category Totals: 2 2 4 2 4 3

Group Point Total: 17

Facility: DAEC

ES - 401 **Plant Systems - Tier 2 / Group 1** **Form ES-401-1**

Sys/Ev #	System / Evolution Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	KA Topic	Imp.	Points
202002	Recirculation Flow Control System / 1			X									K3.01 - Core flow	3.5	1
202002	Recirculation Flow Control System / 1							X					A1.01 - Recirculation pump speed: BWR-2, 3, 4, 5, 6	3.2	1
203000	RHR/LPCI: Injection Mode (Plant Specific) / 2											X	2.4.47 - Ability to diagnose and recognize trends in an accurate and timely manner utilizing the appropriate control room reference material.	3.7	1
206000	High Pressure Coolant Injection System / 2										X		A4.06 - Reactor pressure: BWR-2, 3, 4	4.3*	1
209001	Low Pressure Core Spray System / 2		X										K2.02 - Valve power	2.7*	1
211000	Standby Liquid Control System / 1				X								K4.08 - System initiation upon operation of SBLC control switch	4.2*	1
212000	Reactor Protection System / 7											X	2.4.8 - Knowledge of how the event-based emergency/abnormal operating procedures are used in conjunction with the symptom-based EOPs.	3.7	1
215004	Source Range Monitor (SRM) System / 7						X						K6.02 - 24/48 volt D.C. power	3.3	1
215005	Average Power Range Monitor/Local Power Range Monitor System / 7			X									K3.08 - †core thermal calculations	3.4	1

Facility: DAEC

ES - 401 **Plant Systems - Tier 2 / Group 1** **Form ES-401-1**

Sys/Ev #	System / Evolution Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	KA Topic	Imp.	Points
215005	Average Power Range Monitor/Local Power Range Monitor System / 7						X						K6.04 - Trip units	3.2	1
216000	Nuclear Boiler Instrumentation / 7							X					A1.03 - Surveillance testing	3.2*	1
217000	Reactor Core Isolation Cooling System (RCIC) / 2								X				A2.02 - Turbine trips	3.7	1
218000	Automatic Depressurization System / 3									X			A3.07 - Lights and alarms	3.6	1
223001	Primary Containment System and Auxiliaries / 5		X										K2.09 - Drywell cooling fans: Plant-Specific	2.9*	1
223002	Primary Containment Isolation System/Nuclear Steam Supply Shut-Off / 5								X				A2.06 - Containment instrumentation failures	3.2	1
226001	RHR/LPCI: Containment Spray System Mode / 5						X						K6.12 - Containment integrity	3.5	1
239002	Relief/Safety Valves / 3					X							K5.01 - Relief function of SRV operation	3.5	1
241000	Reactor/Turbine Pressure Regulating System / 3	X											K1.11 - RPS	3.8	1
259002	Reactor Water Level Control System / 2					X							K5.03 - Water level measurement	3.2	1
261000	Standby Gas Treatment System / 9									X			A3.02 - Fan start	3.1	1

Facility: DAEC

ES - 401 **Plant Systems - Tier 2 / Group 1** **Form ES-401-1**

Sys/Ev #	System / Evolution Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	KA Topic	Imp.	Points
262001	A.C. Electrical Distribution / 6					X							K5.01 - Principle involved with paralleling two A.C. sources	3.4	1
264000	Emergency Generators (Diesel/Jet) / 6										X		A4.04 - Manual start, loading, and stopping of emergency generator: Plant-Specific	3.7	1
290001	Secondary Containment / 5								X				A2.01 - †Personnel airlock failure	3.7	1

K/A Category Totals: 1 2 2 1 3 3 2 3 2 2 2 **Group Point Total:** 23

Facility: DAEC

ES - 401 **Plant Systems - Tier 2 / Group 2** **Form ES-401-1**

Sys/Ev #	System / Evolution Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	KA Topic	Imp.	Points
204000	Reactor Water Cleanup System / 2											X	2.4.35 - Knowledge of local auxiliary operator tasks during emergency operations including system geography and system implications.	3.5	1
205000	Shutdown Cooling System (RHR Shutdown Cooling Mode) / 4											X	2.4.48 - Ability to interpret control room indications to verify the status and operation of system, and understand how operator action s and directives affect plant and system conditions.	3.8	1
214000	Rod Position Information System / 7			X									K3.01 - RWM: Plant-Specific	3.2	1
215003	Intermediate Range Monitor (IRM) System / 7					X							K5.03 - Changing detector position	3.1	1
230000	RHR/LPCI: Torus/Suppression Pool Spray Mode / 5							X					A1.01 - Suppression chamber pressure	3.9	1
245000	Main Turbine Generator and Auxiliary Systems / 4										X		A4.05 - Generator megawatt output	2.7	1
259001	Reactor Feedwater System / 2		X										K2.01 - Reactor feedwater pump(s): Motor-Driven-Only	3.3	1
262002	Uninterruptable Power Supply (A.C./D.C.) / 6			X									K3.13 - Rx pressure: Plant-Specific	2.9	1
271000	Offgas System / 9				X								K4.07 - Maximizing charcoal bed efficiency	2.7	1

Facility: DAEC

ES - 401 **Plant Systems - Tier 2 / Group 2** **Form ES-401-1**

Sys/Ev #	System / Evolution Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	KA Topic	Imp.	Points
272000	Radiation Monitoring System / 7											X	2.4.3 - Ability to identify post-accident instrumentation.	3.8	1
286000	Fire Protection System / 8	X											K1.09 - Emergency generator rooms: Plant-Specific	3.3	1
290003	Control Room HVAC / 9								X				A2.01 - Initiation/reconfiguration	3.2	1
300000	Instrument Air System (IAS) / 8									X			A3.02 - Air temperature	2.7	1
	K/A Category Totals:	1	1	2	1	1	0	1	1	1	1	3	**Group Point Total:**		13

Facility: DAEC

ES - 401 **Plant Systems - Tier 2 / Group 3** **Form ES-401-1**

Sys/Ev #	System / Evolution Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	KA Topic	Imp.	Points
201003	Control Rod and Drive Mechanism / 1											X	2.4.24 - Knowledge of loss of cooling water procedures.	3.7	1
233000	Fuel Pool Cooling and Clean-up / 9									X			A3.03 - System indicating lights and alarms	2.6	1
239001	Main and Reheat Steam System / 3		X										K2.01 - Main steam isolation valve solenoids	3.3*	1
290002	Reactor Vessel Internals / 5				X								K4.03 - Core orificing	3.3	1
	K/A Category Totals:	0	1	0	1	0	0	0	0	1	0	1	**Group Point Total:**		4

Printed: 04/01/200

BWR SRO Examination Outline

Form ES-401-5

Facility: DAEC

Generic Category	KA	KA Topic	Imp.	Points
Conduct of Operations	2.1.4	Knowledge of shift staffing requirements.	3.4	1
	2.1.1	Knowledge of conduct of operations requirements.	3.8	1
	2.1.12	Ability to apply technical specifications for a system.	4.0	1
	2.1.18	Ability to make accurate, clear and concise logs, records, status boards, and reports.	3.0	1
	2.1.28	Knowledge of the purpose and function of major system components and controls.	3.3	1
			Category Total:	5
Equipment Control	2.2.34	Knowledge of the process for determining the internal and external effects on core reactivity.	3.2*	1
	2.2.6	Knowledge of the process for making changes in procedures as described in the safety analysis report.	3.3	1
	2.2.23	Ability to track limiting conditions for operations.	3.8	1
	2.2.25	Knowledge of bases in technical specifications for limiting conditions for operations and safety limits.	3.7	1
			Category Total:	4
Radiation Control	2.3.10	Ability to perform procedures to reduce excessive levels of radiation and guard against personnel exposure.	3.3	1
	2.3.2	Knowledge of facility ALARA program.	2.9	1
	2.3.4	Knowledge of radiation exposure limits and contamination control, including permissible levels in excess of those authorized.	3.1	1
	2.3.9	Knowledge of the process for performing a containment purge.	3.4	1
			Category Total:	4

BWR SRO Examination Outline

Form ES-401-5

Facility: DAEC

Generic Category	KA	KA Topic	Imp.	Points
Emergency Plan	2.4.11	Knowledge of abnormal condition procedures.	3.6	1
	2.4.25	Knowledge of fire protection procedures.	3.4	1
	2.4.45	Ability to prioritize and interpret the significance of each annunciator or alarm.	3.6	1
	2.4.49	Ability to perform without reference to procedures those actions that require immediate operation of system components and controls.	4.0	1

Category Total: 4

Generic Total: 17

APR 0 4 REC'D

Form ES-401-2

Facility: DAEC

Exam Date: 04/09/2001 **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	3				4	1			1	13
	2	4	4	3				3	2			3	19
	3	0	1	1				0	2			0	4
	Totals Tier	6	7	7				7	5			4	36
2. Plant Systems	1	3	3	2	3	2	3	3	2	2	3	2	28
	2	1	2	3	2	2	1	2	2	1	1	2	19
	3	0	0	0	1	0	0	1	0	2	0	0	4
	Tier Totals	4	5	5	6	4	4	6	4	5	4	4	51

3. Generic Knowledge And Abilities	Cat 1	Cat 2	Cat 3	Cat 4	
	4	3	3	3	13

Note:

1. Attempt to distribute topics among all K/A Categories; select at least one topic from every K/A category within each tier.
2. Actual point totals must match those specified in the table.
3. 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.
4. Systems/evolutions within each group are identified on the associated outline.
5. The shaded areas are not applicable to the category tier.

ES - 401

Emergency and Abnormal Plant Evolutions - Tier 1 / Group 1

Form ES-401-2

E/APE #	E/APE Name / Safety Function	K1	K2	K3	A1	A2	G	KA Topic	Imp.	Points
295005	Main Turbine Generator Trip / 3				X			AA1.07 - A.C. electrical distribution	3.3	1
295006	SCRAM / 1		X					AK2.02 - Reactor water level control system	3.8	1
295007	High Reactor Pressure / 3				X			AA1.05 - Reactor/turbine pressure regulating system	3.7	1
295009	Low Reactor Water Level / 2			X				AK3.01 - Recirculation pump run back: Plant-Specific	3.2	1
295010	High Drywell Pressure / 5	X						AK1.03 - Temperature increases	3.2	1
295014	Inadvertent Reactivity Addition / 1			X				AK3.01 - Reactor SCRAM	4.1*	1
295014	Inadvertent Reactivity Addition / 1				X			AA1.03 - RMCS: Plant-Specific	3.5	1
295015	Incomplete SCRAM / 1						X	2.4.11 - Knowledge of abnormal condition procedures.	3.4	1
295024	High Drywell Pressure / 5			X				EK3.04 - †Emergency depressurization	3.7	1
295025	High Reactor Pressure / 3					X		EA2.05 - Decay heat generation	3.4	1
295031	Reactor Low Water Level / 2		X					EK2.15 - A.C. distribution: Plant-Specific	3.2	1
295037	SCRAM Condition Present and Reactor Power Above APRM Downscale or Unknown / 1	X						EK1.02 - Reactor water level effects on reactor power	4.1*	1
500000	High Containment Hydrogen Concentration / 5				X			EA1.07 - Nitrogen purge system	3.4	1

K/A Category Totals: 2 2 3 4 1 1

Group Point Total: 13

ES - 401

Emergency and Abnormal Plant Evolutions - Tier 1 / Group 2

Form ES-401-2

E/APE #	E/APE Name / Safety Function	K1	K2	K3	A1	A2	G	KA Topic	Imp.	Points
295001	Partial or Complete Loss of Forced Core Flow Circulation / 1	X						AK1.03 - †Thermal limits	3.6	1
295002	Loss of Main Condenser Vacuum / 3	X						AK1.03 - Loss of heat sink	3.6	1
295003	Partial or Complete Loss of A.C. Power / 6		X					AK2.02 - Emergency generators	4.1*	1
295004	Partial or Complete Loss of D.C. Power / 6				X			AA1.03 - A.C. electrical distribution	3.4	1
295008	High Reactor Water Level / 2						X	2.4.50 - Ability to verify system alarm setpoints and operate controls identified in the alarm response manual.	3.3	1
295012	High Drywell Temperature / 5		X					AK2.01 - Drywell ventilation	3.4	1
295013	High Suppression Pool Temperature / 5		X					AK2.01 - Suppression pool cooling	3.6	1
295017	High Off-Site Release Rate / 9				X			AA1.11 - PCIS/NSSSS	3.9	1
295018	Partial or Complete Loss of Component Cooling Water / 8			X				AK3.01 - Isolation of non-essential heat loads: Plant-Specific	2.9	1
295019	Partial or Complete Loss of Instrument Air / 8				X			AA1.04 - Service air isolations valves: Plant-Specific	3.3	1
295022	Loss of CRD Pumps / 1	X						AK1.02 - Reactivity control	3.6	1
295026	Suppression Pool High Water Temperature / 5	X						EK1.01 - Pump NPSH	3.0	1
295028	High Drywell Temperature / 5			X				EK3.01 - Emergency depressurization	3.6	1

ES - 401

Emergency and Abnormal Plant Evolutions - Tier 1 / Group 2

Form ES-401-2

E/APE #	E/APE Name / Safety Function	K1	K2	K3	A1	A2	G	KA Topic	Imp.	Points
295029	High Suppression Pool Water Level / 5						X	2.4.2 - Knowledge of system set points, interlocks and automatic actions associated with EOP entry conditions.	3.9	1
295030	Low Suppression Pool Water Level / 5		X					EK2.07 - Downcomer/ horizontal vent submergence	3.5	1
295033	High Secondary Containment Area Radiation Levels / 9			X				EK3.03 - Isolating affected systems	3.8	1
295034	Secondary Containment Ventilation High Radiation / 9					X		EA2.01 - Ventilation radiation levels	3.8	1
295038	High Off-Site Release Rate / 9						X	2.4.48 - Ability to interpret control room indications to verify the status and operation of system, and understand how operator action s and directives affect plant and system conditions.	3.5	1
600000	Plant Fire On Site / 8					X		AA2.13 - Need for emergency plant shutdown	3.2	1

K/A Category Totals: 4 4 3 3 2 3 **Group Point Total:** 19

ES - 401

Emergency and Abnormal Plant Evolutions - Tier 1 / Group 3

Form ES-401-2

E/APE #	E/APE Name / Safety Function	K1	K2	K3	A1	A2	G	KA Topic	Imp.	Points
295021	Loss of Shutdown Cooling / 4					X		AA2.07 - Reactor recirculation flow	2.9	1
295023	Refueling Accidents / 8					X		AA2.01 - Area radiation levels	3.6	1
295032	High Secondary Containment Area Temperature / 5		X					EK2.04 - PCIS/NSSSS	3.6	1
295035	Secondary Containment High Differential Pressure / 5			X				EK3.01 - Blow-out panel operation: Plant-Specific	2.8	1

K/A Category Totals: 0 1 1 0 2 0

Group Point Total: 4

Facility: DAEC

ES - 401 **Plant Systems - Tier 2 / Group 1** **Form ES-401-2**

Sys/Ev #	System / Evolution Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	KA Topic	Imp.	Points
201001	Control Rod Drive Hydraulic System / 1											X	2.2.27 - Knowledge of the refueling process.	2.6	1
201002	Reactor Manual Control System / 1										X		A4.03 - Rod drift test switch	2.8	1
202002	Recirculation Flow Control System / 1							X					A1.01 - Recirculation pump speed: BWR-2, 3, 4, 5, 6	3.2	1
203000	RHR/LPCI: Injection Mode (Plant Specific) / 2				X								K4.06 - Adequate pump net positive suction head (interlock suction valve open): Plant-Specific	3.5	1
206000	High Pressure Coolant Injection System / 2	X											K1.16 - Containment/Torus pressure: BWR-2, 3, 4	3.5	1
209001	Low Pressure Core Spray System / 2		X										K2.02 - Valve power	2.5*	1
209001	Low Pressure Core Spray System / 2							X					A1.02 - Core spray pressure	3.2	1
211000	Standby Liquid Control System / 1				X								K4.08 - System initiation upon operation of SBLC control switch	4.2*	1
212000	Reactor Protection System / 7				X								K4.05 - Functional testing of the system while maintaining power operation	3.4	1
212000	Reactor Protection System / 7						X						K6.02 - Nuclear instrumentation	3.7	1
215003	Intermediate Range Monitor (IRM) System / 7			X									K3.01 - RPS	3.9	1

Facility: DAEC

ES - 401 **Plant Systems - Tier 2 / Group 1** **Form ES-401-2**

Sys/Ev #	System / Evolution Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	KA Topic	Imp.	Points
215003	Intermediate Range Monitor (IRM) System / 7					X							K5.03 - Changing detector position	3.0	1
215004	Source Range Monitor (SRM) System / 7						X						K6.02 - 24/48 volt D.C. power	3.1	1
215005	Average Power Range Monitor/Local Power Range Monitor System / 7			X									K3.08 - †core thermal calculations	3.0	1
215005	Average Power Range Monitor/Local Power Range Monitor System / 7						X						K6.04 - Trip units	3.1	1
216000	Nuclear Boiler Instrumentation / 7							X					A1.03 - Surveillance testing	2.9*	1
217000	Reactor Core Isolation Cooling System (RCIC) / 2								X				A2.02 - Turbine trips	3.8	1
218000	Automatic Depressurization System / 3	X											K1.04 - Drywell/containment pressure: Plant-Specific	3.9	1
218000	Automatic Depressurization System / 3									X			A3.07 - Lights and alarms	3.7	1
223001	Primary Containment System and Auxiliaries / 5		X										K2.09 - Drywell cooling fans: Plant-Specific	2.7	1
223002	Primary Containment Isolation System/Nuclear Steam Supply Shut-Off / 5								X				A2.06 - Containment instrumentation failures	3.0	1

Facility: DAEC

ES - 401 **Plant Systems - Tier 2 / Group 1** **Form ES-401-2**

Sys/Ev #	System / Evolution Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	KA Topic	Imp.	Points
239002	Relief/Safety Valves / 3										X		A4.06 - Reactor water level	3.9	1
241000	Reactor/Turbine Pressure Regulating System / 3	X											K1.11 - RPS	3.7	1
241000	Reactor/Turbine Pressure Regulating System / 3											X	2.1.10 - Knowledge of conditions and limitations in the facility license.	2.7	1
259001	Reactor Feedwater System / 2		X										K2.01 - Reactor feedwater pump(s): Motor-Driven-Only	3.3	1
259002	Reactor Water Level Control System / 2					X							K5.03 - Water level measurement	3.1	1
261000	Standby Gas Treatment System / 9									X			A3.02 - Fan start	3.2	1
264000	Emergency Generators (Diesel/Jet) / 6										X		A4.04 - Manual start, loading, and stopping of emergency generator: Plant-Specific	3.7	1
	K/A Category Totals:	**3**	**3**	**2**	**3**	**2**	**3**	**3**	**2**	**2**	**3**	**2**	**Group Point Total:**		**28**

Facility: DAEC

ES - 401 **Plant Systems - Tier 2 / Group 2** **Form ES-401-2**

Sys/Ev #	System / Evolution Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	KA Topic	Imp.	Points
201003	Control Rod and Drive Mechanism / 1				X								K4.07 - Maintaining the control rod at a given location	3.2	1
204000	Reactor Water Cleanup System / 2							X					A1.05 - System pressure	2.6	1
205000	Shutdown Cooling System (RHR Shutdown Cooling Mode) / 4		X										K2.02 - Motor operated valves	2.5*	1
214000	Rod Position Information System / 7			X									K3.01 - RWM: Plant-Specific	3.0	1
219000	RHR/LPCI: Torus/Suppression Pool Cooling Mode / 5		X										K2.01 - †Valves	2.5*	1
226001	RHR/LPCI: Containment Spray System Mode / 5					X							K5.06 - Vacuum breaker operation	2.6	1
230000	RHR/LPCI: Torus/Suppression Pool Spray Mode / 5							X					A1.01 - Suppression chamber pressure	3.8	1
239001	Main and Reheat Steam System / 3						X						K6.01 - Electrical power	3.1	1
245000	Main Turbine Generator and Auxiliary Systems / 4										X		A4.05 - Generator megawatt output	2.7	1
262001	A.C. Electrical Distribution / 6					X							K5.01 - Principle involved with paralleling two A.C. sources	3.1	1
262002	Uninterruptable Power Supply (A.C./D.C.) / 6			X									K3.13 - Rx pressure: Plant-Specific	2.7	1

Facility: DAEC

ES - 401 **Plant Systems - Tier 2 / Group 2** **Form ES-401-2**

Sys/Ev #	System / Evolution Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	KA Topic	Imp.	Points
263000	D.C. Electrical Distribution / 6			X									K3.01 - Emergency generators: Plant-Specific	3.4	1
271000	Offgas System / 9				X								K4.07 - Maximizing charcoal bed efficiency	2.6	1
272000	Radiation Monitoring System / 7											X	2.4.3 - Ability to identify post-accident instrumentation.	3.5	1
286000	Fire Protection System / 8											X	2.1.30 - Ability to locate and operate components, including local controls.	3.9	1
290001	Secondary Containment / 5								X				A2.01 - †Personnel airlock failure	3.3	1
290003	Control Room HVAC / 9								X				A2.01 - Initiation/reconfiguration	3.1	1
300000	Instrument Air System (IAS) / 8									X			A3.02 - Air temperature	2.9	1
400000	RWS, ESW, RHRSW, RBCCW, and WW / 8	X											K1.03 - Radiation monitoring systems	2.7	1
	K/A Category Totals:	1	2	3	2	2	1	2	2	1	1	2		**Group Point Total:**	19

Facility: DAEC

ES - 401 **Plant Systems - Tier 2 / Group 3** **Form ES-401-2**

Sys/Ev #	System / Evolution Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	KA Topic	Imp.	Points
215001	Traversing In-Core Probe / 7							X					A1.02 - Detector position: (Not-BWR1)	2.5	1
233000	Fuel Pool Cooling and Clean-up / 9									X			A3.03 - System indicating lights and alarms	2.6	1
234000	Fuel Handling Equipment / 8									X			A3.02 - †Interlock operation	3.1	1
290002	Reactor Vessel Internals / 5				X								K4.03 - Core orificing	3.2	1
	K/A Category Totals:	**0**	**0**	**0**	**1**	**0**	**0**	**1**	**0**	**2**	**0**	**0**	**Group Point Total:**		**4**

Generic Knowledge and Abilities Outline (Tier 3)

Printed: 04/01/200_

BWR RO Examination Outline

Form ES-401-5

Facility: DAEC

Generic Category	KA	KA Topic	Imp.	Points
Conduct of Operations	2.1.18	Ability to make accurate, clear and concise logs, records, status boards, and reports.	2.9	1
	2.1.20	Ability to execute procedure steps.	4.3	1
	2.1.1	Knowledge of conduct of operations requirements.	3.7	1
	2.1.28	Knowledge of the purpose and function of major system components and controls.	3.2	1
			Category Total:	4
Equipment Control	2.2.23	Ability to track limiting conditions for operations.	2.6	1
	2.2.25	Knowledge of bases in technical specifications for limiting conditions for operations and safety limits.	2.5	1
	2.2.2	Ability to manipulate the console controls as required to operate the facility between shutdown and designated power levels.	4.0	1
			Category Total:	3
Radiation Control	2.3.4	Knowledge of radiation exposure limits and contamination control, including permissible levels in excess of those authorized.	2.5	1
	2.3.2	Knowledge of facility ALARA program.	2.5	1
	2.3.9	Knowledge of the process for performing a containment purge.	2.5	1
			Category Total:	3
Emergency Plan	2.4.45	Ability to prioritize and interpret the significance of each annunciator or alarm.	3.3	1
	2.4.19	Knowledge of EOP layout, symbols, and icons.	2.7	1
	2.4.49	Ability to perform without reference to procedures those actions that require immediate operation of system components and controls.	4.0	1
			Category Total:	3
			Generic Total:	13

SRO

ES401 OUTLINE CHANGES

Item:

AA: Tier 3, 2.1 Conduct of Operations changed 2.1.5, 2.1.8, 2.1.9, and 2.1.17 to 2.1.12, 2.1.18, 2.1.27 and 2.1.28
There was a problem with the random selection methodology. 2.1.12, 2.1.18, 2.1.27 and 2.1.28_are K/As that were originally selected on the Primary Random Outline.
(Approved by AMS 1/30/01)

BB: Tier 3, 2.3 Radiation Control added 2.3.4
There was a problem with the random selection methodology. 2.3.4 is a K/A that was originally selected on the Primary Random Outline. **(Approved by AMS 1/30/01)**

CC: Tier 3, 2.4 Emergency Plan deleted 2.4.30
There was a problem with the random selection methodology. 2.4.30 was an SRO level K/A that was added as a replacement for 2.3.4 in Item C above.
(Approved by AMS 1/30/01)

DD: Tier 3, 2.4 Emergency Plan deleted changed 2.4.1 and 2.4.46 to 2.4.45 and 2.4.49
There was a problem with the random selection methodology. 2.4.45 and 2.4.49 are_K/As that were originally selected on the Primary Random Outline.
(Approved by AMS 1/30/01)

EE: Tier 1, Group 1 changed 295015 Gen 2.4.49 to 2.4.11
There was a problem with the random selection methodology. 2.4.11 was randomly selected and inserted from a field that included the K/As that had been restored by direction of Chief Examiner. **(Approved by AMS 1/30/01)**

FF: Tier 2, Group 3 changed 201003 Gen 2.4.21 to 2.1.24
There was a problem with the random selection methodology. 2.1.24 was randomly selected and inserted from a field that included the K/As that had been restored by direction of Chief Examiner. **(Approved by AMS 1/30/01)**

> **FF Rev 1:** Tier 2, Group 3 changed 201003 Gen 2.1.24 to 2.4.24
> This transcription problem was found during preparation for 45 Day submittal. The question was incorrectly written to K/A 2.4.24, then validated and approved before the mistake was identified. The prepared SRO level question does not change Tier or Group totals and is therefore submitted. It is understood that acceptance of this K/A & Question is subject to the discretion of the Chief Examiner.

SRO

ES401 OUTLINE CHANGES

GG: Tier 1 Group 2 295032 EK2.01 changed to EK2.04
A mistake was made in the random selection process. Per the methodology, the first choice for a K/A replacement on the SRO outline was to take the K/A from the RO outline when available. When 295032 was void on the SRO Primary Random outline (see Methodology line items 34 & 36) a replacement was incorrectly taken from the SRO secondary Random outline. This resulted in two different RO level questions on 295032; EK 204 on the RO exam and EK2.01 on the SRO exam.

This results in no change to Tier 1, Group 2 totals.
(Approved by AMS 1/30/01)

HH: Tier 2 Group 2, 271000 K5.11 changed to K4.07
This change merely allows the use of the one RO question (271000 K4.07) on both RO and SRO exams. 271000 (Offgas) was selected twice on the RO outline and the two K/As were very similar; K4.07 (Maximizing charcoal bed efficiency) and K5.11 (Reducing humidity for charcoal beds). K5.11 was deleted and replaced with 262001 (A.C. Electrical) K5.01 per RO line item **E.**

This does result in a change to Tier and Group totals. Add 1 to K4 and subtract 1 from K5 in both Tier 2 Group 2 and Tier totals.**(Approved by AMS 1/30/01)**

I I: Tier 2 Group 1, 262001 K4.02 changed to K5.01
This change merely allows the use of the one RO question (262001 K5.01) on both RO and SRO exams. K4.02 was originally from the SRO Secondary Random outline and was used as a replacement because there were no 262001 K/As on either RO random outlines. Now that there is a 262001 K/A & question on the RO outline, it should be used for both exams.

This does result in a change to Tier and Group totals. Add 1 to K5 and subtract 1 from K4 in both Tier 2 Group 1 and Tier totals. (Note that this restores the balance after the change in item B above.) **(Approved by AMS 1/30/01)**

JJ: Tier 1 Group 2 295035 EK2.03 changed to EK3.01
This change merely allows the use of the one RO question (295035 K3.01) on both RO and SRO exams. An outline development oversight resulted in two different RO level K/As being used on the RO and SRO exams for the same evolution.

This does result in a change to Tier and Group totals. Add 1 to K3 and subtract 1from K2 in both the Tier 1 Group 2 and Tier Totals. This results in a total of 7 K2s and 7 K3s in Tier 1. **(Approved by AMS 2/12/01)**

SRO

ES401 OUTLINE CHANGES

KK (Same as RO-**H**) Tier 1 Group 1 295010 AK1.01 changed to AK 1.03
There was a duplication problem with this K/A. 295010 (High Drywell Pressure) AK1.01 and 295030 (Low Torus Water Level) EK2.07 were both about Drywell to Torus "downcomer submergence". Retained the 295030 K/A. 295010 AK1.03 is about increasing Drywell temperatures.

This results in no change to Tier 1, Group 1 totals.
(Approved by AMS 2/12/01)

LL: (Same as RO-**D**) Tier 3 RO 2.1.27 changed to 2.1.1
2.1.27 questions the candidates "knowledge of system purpose". A systems purpose question is inherently easy and ES401 states that Tier 3 should not become and extension of Tier 2 (Systems). The question substituted is based on a recent plant event. It is documented on the RO&SRO Final Outlines in Tier 2, Group 3 on the page dedicated for Plant Specific Priorities.

This results in no change to Tier 3 totals.
(Approved by AMS 1/30/01 and on 2/1/01)

MM: Tier 3, 2.4.19 changed to 2.4.25
2.4.19 is knowledge of EOP flowchart shapes, symbols, icon, etc. This question is on the RO exam but is too easy for an SRO and made easier by the fact that SROs will be provided EOP flowcharts for their exam. 2.4.25 is knowledge of Fire procedures (i.e.: Fire Plan), a topic which will not be a duplicate and which will clearly be SRO level.

This results in no change to Tier 3 totals.
(Approved by AMS 2/20/01)

NN: Tier 3 Generic 2.1.1 changed to 2.3.9
2.3.9 replacement question is based on a plant event and is a clear upgrade from the RO level question on the same K/A.

This results in no change to Tier 3 totals.
(Approved by AMS 2/23/01)

SRO

ES401 OUTLINE CHANGES

OO: Tier 1 Group 2 295034 2.4.5 changed to EA2.01

This change merely allows the use of the one RO question (295034 EA2.01) on both RO and SRO exams. During outline development, three additional questions in Tier 3 were upgraded to SRO level to bring the total to 10 SRO questions in Tier 3. This resulted in a total of 28 SRO level K/As in the submitted outline. There was a great deal of difficulty matching this evolution (Sec Cont Ventilation High Rad) with K/A 2.4.5 (Knowledge of the organization of the operating procedures for normal, abnormal, and emergency evolutions). Reducing this K/A to RO level still leave 27 SRO level questions.

This does result in a change to Tier and Group totals. Add 1 to A2 and subtract 1 from Generic in both the Tier 1 Group 2 and Tier Totals. This results in a total of 9 A2s and 8 Gs in Tier 1. **(Approved by AMS 2/23/01)**

PP: Tier 1 Group 1, Change 295030 EK2.07 to 295038 2.4.48

This change is due to a handout giving away an answer. It was found while completing the Written Exam Quality Checklist, ES 401-7.

The RO question for 295030 EK2.07 (RO Question # 80) was written as a Cognitive Level 1 Bases question in order to keep an EOP question at the RO level. Due to the random selection process, this K/A also appears on the SRO exam. Three higher order cognitive level SRO questions use the EOP-2 flowchart that will be provided to SRO candidates. The EOP-2 flowchart gives away the answer to this question when it is used on the SRO exam.

295030 EK2.07 is Low Torus Water level as it relates to Downcomer Submergence. One of the three SRO level questions is 295026 EA2.02, Torus High Water Temperature as it relates to Torus Water Level. The SRO question exercises the Heat Capacity Limit which is bounded on the low end by Downcomer Submergence. These two K/As would always be in conflict. The intent of the proposed change is to keep the higher cognitive level questions on the SRO exam and replace the lower order RO level question.

In Tier 1 Group 1 there are 26 questions on 19 evolutions, meaning that 7 evolutions would be selected twice. 295030 is one of those that is selected twice; EK2.07 and EK1.03. So when EK2.07 is replaced, there will still be EK1.03 for this evolution.

The replacement evolution, 295038, is one of those evolutions that was only selected only once on the SRO outline. 295038 EK2.01 measures High Offsite Release Rate as it relates to Radwaste. The addition of 295038 2.4.48 (Question # 86 from the RO exam) provides better balanced coverage to this evolution and does not conflict with other SRO questions. Bottom line: On the SRO Exam, exchange RO Exam questions #86 for #80.

This does result in a change to Tier and Group totals. Add 1 to Generic and subtract 1 from K2 in both the Tier 1 Group 1 and Tier Totals. This results in a total of 6 K2s and 9 Gs in Tier 1. (Chief Examiner unavailable for pre-approval)

SRO

ES401 OUTLINE CHANGES

QQ: Tier 2 Group 1, 215004 (SRM) change Generic 2.4.48 to K6.02
This change merely allows the use of the one RO question (215004 K6.02) on both RO and SRO exams. During outline development, three additional questions in Tier 3 were upgraded to SRO level to bring the total to 10 SRO questions in Tier 3. This resulted in a total of 28 SRO level K/As in the submitted outline. Because one additional Evolution (295016 2.4.21) was written to the SRO level, reducing this K/A to RO level still leaves 27 SRO level questions.

This does result in a change to Tier and Group totals. Add 1 to K6 and subtract 1 from Generic K2 in both Tier 2 Group 1 and Tier Totals. This results in a total of 3 K6s and 6 Gs in Tier 2. (Chief Examiner unavailable for pre-approval)

APR [illegible]

RO

ES401 OUTLINE CHANGES

Item:

<u>**A:** Tier 3, 2.1 Conduct of Operations changed 2.1.8 and 2.1.9 to 2.1.27 and 2.1.28</u>
There was a problem with the random selection methodology. 2.1.27 and 2.1.28 are K/As that were originally selected on the Primary Random Outline.
(Approved by AMS 1/30/01)

<u>**B:** Tier 3, 2.4 Emergency Plan changed 2.4.46 to 2.4.49</u>
There was a problem with the random selection methodology. 2.4.49 is a K/A that was originally selected on the Primary Random Outline. **(Approved by AMS 1/30/01)**

<u>**C:** Tier 1, Group 1 changed 295015 Gen 2.4.49 to 2.4.11</u>
There was a problem with the random selection methodology. 2.4.11 was randomly selected and inserted from a field that included the K/As that had been restored by direction of Chief Examiner. **(Approved by AMS 1/30/01)**

<u>**D:** Tier 3 RO 2.1.27 changed to 2.1.1</u>
2.1.27 questions the candidates "knowledge of system purpose". A systems purpose question is inherently easy and ES401 states that Tier 3 should not become and extension of Tier 2 (Systems). The question substituted is based on a recent plant event. It is documented on the RO&SRO Final Outlines in Tier 2, Group 3 on the page dedicated for Plant Specific Priorities.

This results in no change to Tier 3 totals.
(Approved by AMS 1/30/01 and on 2/1/01)

<u>**E:** Tier 2 Group 2, Changed 271000 K5.11 to 262001 K5.01</u>
262001 is an important system (A.C. Electrical Distribution) and left unnecessarily void by the random selection process.
271000 (Offgas) was selected twice and the two K/As were very similar; K4.07 (Maximizing charcoal bed efficiency) and K5.11 (Reducing humidity for charcoal beds).

This results in no change to Tier 2, Group 2 totals.

(See SRO Items B and C for cascading affects on SRO outline.)
(Approved by AMS 1/30/01)

<u>**F:** Tier 2 Group 2, changed 205000 K2.01 to K2.02</u>
K2.01 is knowledge of Shutdown Cooling power supplies to RHR or RHRSW pumps. This question would have been too easy. K2.02 is knowledge of power supplies to S/D Cooling motor operated valves and makes for a more viable question.

This results in no change to Tier 2, Group 2 totals.
(Approved by AMS 1/30/01)

RO

ES401 OUTLINE CHANGES

<u>**G** Tier 2 Group 1, 202002 2.1.27 changed to 201001 2.2.27</u>
A question of the system purpose (2.1.27) of Recirc speed control (202002) would be too easy. Also the random generation process provided two K/As for 202002 and none for CRD Hydraulics 201001. A Generic CRD K/A on refueling (2.2.27) maintains a Tier total and addresses a topic that was not previously addressed on the outline.

This results in no change to Tier 2, Group 1 totals.
(Approved by AMS 2/1/01)

<u>**H** Tier 1 Group 1 295010 AK1.01 changed to AK 1.03</u>
There was a duplication problem with this K/A. 295010 (High Drywell Pressure) AK1.01 and 295030 (Low Torus Water Level) EK2.07 were both about Drywell to Torus "downcomer submergence". Retained the 295030 K/A. 295010 AK1.03 is about increasing Drywell temperatures.

This results in no change to Tier 1, Group 1 totals.
(Approved by AMS 2/12/01)

<u>**I:** Tier 2 Group 1 215004 K6.01 changed to K 6.02</u>
K6.01 was not applicable to DAEC. K/A asks the effect on SRMs of a loss of RPS. There is none. SRMs are powered from 24 VDC, Instrument AC, and essential lighting. K6.02 asks the effect on SRMs of a loss of 24 VDC.

This results in no change to Tier 1, Group 2 totals.
(Approved by AMS 2/20/01)

<u>Changes after Prep Week</u>

<u>**J:** Tier 1 Group 3 295021 AA1.02 changed to AA2.07</u>
Question written to K/A AA1.02 on RO exam was a system level question for an evolution. Question written to K/A AA2.07 on SRO exam was determined to be RO level. This change allows the use of a common RO level question on both exams.

This results in changes to Tier 1 Group 3 totals. Add 1 to A2 and subtract 1 from A1 in both Tier 1 Group 3 and Tier totals. **(Recommended by AMS 3/19/01)**

SRO

ES401 OUTLINE CHANGES

Item:

<u>**AA:** Tier 3, 2.1 Conduct of Operations changed 2.1.5, 2.1.8, 2.1.9, and 2.1.17 to 2.1.12, 2.1.18, 2.1.27 and 2.1.28</u>
There was a problem with the random selection methodology. 2.1.12, 2.1.18, 2.1.27 and 2.1.28 are K/As that were originally selected on the Primary Random Outline.
(Approved by AMS 1/30/01)

<u>**BB:** Tier 3, 2.3 Radiation Control added 2.3.4</u>
There was a problem with the random selection methodology. 2.3.4 is a K/A that was originally selected on the Primary Random Outline. **(Approved by AMS 1/30/01)**

<u>**CC:** Tier 3, 2.4 Emergency Plan deleted 2.4.30</u>
There was a problem with the random selection methodology. 2.4.30 was an SRO level K/A that was added as a replacement for 2.3.4 in Item C above.
(Approved by AMS 1/30/01)

<u>**DD:** Tier 3, 2.4 Emergency Plan deleted changed 2.4.1 and 2.4.46 to 2.4.45 and 2.4.49</u>
There was a problem with the random selection methodology. 2.4.45 and 2.4.49 are K/As that were originally selected on the Primary Random Outline.
(Approved by AMS 1/30/01)

<u>**EE:** Tier 1, Group 1 changed 295015 Gen 2.4.49 to 2.4.11</u>
There was a problem with the random selection methodology. 2.4.11 was randomly selected and inserted from a field that included the K/As that had been restored by direction of Chief Examiner. **(Approved by AMS 1/30/01)**

<u>**FF:** Tier 2, Group 3 changed 201003 Gen 2.4.21 to 2.1.24</u>
There was a problem with the random selection methodology. 2.1.24 was randomly selected and inserted from a field that included the K/As that had been restored by direction of Chief Examiner. **(Approved by AMS 1/30/01)**

> <u>**FF Rev 1:** Tier 2, Group 3 changed 201003 Gen 2.1.24 to 2.4.24</u>
> This transcription problem was found during preparation for 45 Day submittal. The question was incorrectly written to K/A 2.4.24, then validated and approved before the mistake was identified. The prepared SRO level question does not change Tier or Group totals and is therefore submitted. It is understood that acceptance of this K/A & Question is subject to the discretion of the Chief Examiner. **(Approved by AMS 3/15/01)**

SRO

ES401 OUTLINE CHANGES

<u>**GG:**Tier 1 Group 2 295032 EK2.01 changed to EK2.04</u>
A mistake was made in the random selection process. Per the methodology, the first choice for a K/A replacement on the SRO outline was to take the K/A from the RO outline when available. When 295032 was void on the SRO Primary Random outline (see Methodology line items 34 & 36) a replacement was incorrectly taken from the SRO secondary Random outline. This resulted in two different RO level questions on 295032; EK 204 on the RO exam and EK2.01 on the SRO exam.

This results in no change to Tier 1, Group 2 totals.
(Approved by AMS 1/30/01)

<u>**HH:** Tier 2 Group 2, 271000 K5.11 changed to K4.07</u>
This change merely allows the use of the one RO question (271000 K4.07) on both RO and SRO exams. 271000 (Offgas) was selected twice on the RO outline and the two K/As were very similar; K4.07 (Maximizing charcoal bed efficiency) and K5.11 (Reducing humidity for charcoal beds). K5.11 was deleted and replaced with 262001 (A.C. Electrical) K5.01 per RO line item **E.**

This does result in a change to Tier and Group totals. Add 1 to K4 and subtract 1 from K5 in both Tier 2 Group 2 and Tier totals.**(Approved by AMS 1/30/01)**

<u>**I I:** Tier 2 Group 1, 262001 K4.02 changed to K5.01</u>
This change merely allows the use of the one RO question (262001 K5.01) on both RO and SRO exams. K4.02 was originally from the SRO Secondary Random outline and was used as a replacement because there were no 262001 K/As on either RO random outlines. Now that there is a 262001 K/A & question on the RO outline, it should be used for both exams.

This does result in a change to Tier and Group totals. Add 1 to K5 and subtract 1 from K4 in both Tier 2 Group 1 and Tier totals. (Note that this restores the balance after the change in item B above.) **(Approved by AMS 1/30/01)**

<u>**JJ:** Tier 1 Group 2 295035 EK2.03 changed to EK3.01</u>
This change merely allows the use of the one RO question (295035 K3.01) on both RO and SRO exams. An outline development oversight resulted in two different RO level K/As being used on the RO and SRO exams for the same evolution.

This does result in a change to Tier and Group totals. Add 1 to K3 and subtract 1from K2 in both the Tier 1 Group 2 and Tier Totals. This results in a total of 7 K2s and 7 K3s in Tier 1. **(Approved by AMS 2/12/01)**

SRO

ES401 OUTLINE CHANGES

KK (Same as RO-**H**) Tier 1 Group 1 295010 AK1.01 changed to AK 1.03
There was a duplication problem with this K/A. 295010 (High Drywell Pressure) AK1.01 and 295030 (Low Torus Water Level) EK2.07 were both about Drywell to Torus "downcomer submergence". Retained the 295030 K/A. 295010 AK1.03 is about increasing Drywell temperatures.

This results in no change to Tier 1, Group 1 totals.
(Approved by AMS 2/12/01)

LL: (Same as RO-**D**) Tier 3 RO 2.1.27 changed to 2.1.1
2.1.27 questions the candidates "knowledge of system purpose". A systems purpose question is inherently easy and ES401 states that Tier 3 should not become and extension of Tier 2 (Systems). The question substituted is based on a recent plant event. It is documented on the RO&SRO Final Outlines in Tier 2, Group 3 on the page dedicated for Plant Specific Priorities.

This results in no change to Tier 3 totals.
(Approved by AMS 1/30/01 and on 2/1/01)

MM: Tier 3, 2.4.19 changed to 2.4.25
2.4.19 is knowledge of EOP flowchart shapes, symbols, icon, etc. This question is on the RO exam but is too easy for an SRO and made easier by the fact that SROs will be provided EOP flowcharts for their exam. 2.4.25 is knowledge of Fire procedures (i.e.: Fire Plan), a topic which will not be a duplicate and which will clearly be SRO level.

This results in no change to Tier 3 totals.
(Approved by AMS 2/20/01)

NN: Tier 3 Generic 2.1.1 changed to 2.3.9
2.3.9 replacement question is based on a plant event and is a clear upgrade from the RO level question on the same K/A.

This results in no change to Tier 3 totals.
(Approved by AMS 2/23/01)

SRO

ES401 OUTLINE CHANGES

OO: Tier 1 Group 2 295034 2.4.5 changed to EA2.01
This change merely allows the use of the one RO question (295034 EA2.01) on both RO and SRO exams. During outline development, three additional questions in Tier 3 were upgraded to SRO level to bring the total to 10 SRO questions in Tier 3. This resulted in a total of 28 SRO level K/As in the submitted outline. There was a great deal of difficulty matching this evolution (Sec Cont Ventilation High Rad) with K/A 2.4.5 (Knowledge of the organization of the operating procedures for normal, abnormal, and emergency evolutions). Reducing this K/A to RO level still leave 27 SRO level questions.

This does result in a change to Tier and Group totals. Add 1 to A2 and subtract 1 from Generic in both the Tier 1 Group 2 and Tier Totals. This results in a total of 9 A2s and 8 Gs in Tier 1. **(Approved by AMS 2/23/01)**

PP: Tier 1 Group 1, Change 295030 EK2.07 to 295038 2.4.48
This change is due to a handout giving away an answer. It was found while completing the Written Exam Quality Checklist, ES 401-7.

The RO question for 295030 EK2.07 (RO Question # 80) was written as a Cognitive Level 1 Bases question in order to keep an EOP question at the RO level. Due to the random selection process, this K/A also appears on the SRO exam. Three higher order cognitive level SRO questions use the EOP-2 flowchart that will be provided to SRO candidates. The EOP-2 flowchart gives away the answer to this question when it is used on the SRO exam.

295030 EK2.07 is Low Torus Water level as it relates to Downcomer Submergence. One of the three SRO level questions is 295026 EA2.02, Torus High Water Temperature as it relates to Torus Water Level. The SRO question exercises the Heat Capacity Limit which is bounded on the low end by Downcomer Submergence. These two K/As would always be in conflict. The intent of the proposed change is to keep the higher cognitive level questions on the SRO exam and replace the lower order RO level question.

In Tier 1 Group 1 there are 26 questions on 19 evolutions, meaning that 7 evolutions would be selected twice. 295030 is one of those that is selected twice; EK2.07 and EK1.03. So when EK2.07 is replaced, there will still be EK1.03 for this evolution.

The replacement evolution, 295038, is one of those evolutions that was only selected only once on the SRO outline. 295038 EK2.01 measures High Offsite Release Rate as it relates to Radwaste. The addition of 295038 2.4.48 (Question # 86 from the RO exam) provides better balanced coverage to this evolution and does not conflict with other SRO questions. Bottom line: On the SRO Exam, exchange RO Exam questions #86 for #80.

This does result in a change to Tier and Group totals. Add 1 to Generic and subtract 1 from K2 in both the Tier 1 Group 1 and Tier Totals. This results in a total of 6 K2s and 9 Gs in Tier 1. (Chief Examiner unavailable for pre-approval) **(Approved by AMS 3/15/01)**

SRO

ES401 OUTLINE CHANGES

QQ: Tier 2 Group 1, 215004 (SRM) change Generic 2.4.48 to K6.02
This change merely allows the use of the one RO question (215004 K6.02) on both RO and SRO exams. During outline development, three additional questions in Tier 3 were upgraded to SRO level to bring the total to 10 SRO questions in Tier 3. This resulted in a total of 28 SRO level K/As in the submitted outline. Because one additional Evolution (295016 2.4.21) was written to the SRO level, reducing this K/A to RO level still leaves 27 SRO level questions.

This does result in a change to Tier and Group totals. Add 1 to K6 and subtract 1 from Generic K2 in both Tier 2 Group 1 and Tier Totals. This results in a total of 3 K6s and 6 Gs in Tier 2. (Chief Examiner unavailable for pre-approval) **(Approved by AMS 3/15/01)**

Changes after Prep Week

RR: Tier 1 Group 1 295038 EK2.01 changed to Generic 2.4.44
Question written to EK2.01 was a systems question. Reference documents state that a high rad release from Radwaste (EK2.01) was not possible, making this K/A topic N/A to DAEC. Exam also needed another SRO level question. The selection of 2.4.44 provided balance to the SRO written and operating exams which had not previously addressed EPIP Protective Action Recommendations (2.4.44).

This does result in a change to Tier and Group totals. Add 1 to G and subtract 1 from K2 in both Tier 1 Group 1 and Tier Totals. This results in a total of 10 Gs and 5 K2s in Tier 1. **(Approved by AMS 3/27/01)**

PP: Tier 1 Group 1 295006 Generic 2.1.14 changed to AA2.06
Question written to 2.1.14 was problematic in that it was either too easy or too low in operational validity. Exam also needed a SRO level question. Topic AA2.06 was selected by agreement between Chief Examiner and exam developer.

This does result in a change to Tier and Group totals. Add 1 to A2 and subtract 1 from G in both Tier 1 Group 1 and Tier Totals. This results in a total of 9 Gs and 6 A2s in Tier 1. **(Approved by AMS 3/30/01)**

TEST RECORD
PART 1
PART 2
TOTAL

[redacted]

Verified Correct
4/6/2001 MC

Verified correct
4/23/01 AMS

2001 Initial License Class
NRC EXAM
WRITTEN EXAM
Reactor Operator

SCORE ________%
N/A IF MACHINE GRADED

KEY

SUBJECTIVE SCORE
INSTRUCTOR USE ONLY

50/100%

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

FEED THIS DIRECTION

SUBJECTIVE SCORE INSTRUCTOR USE ONLY

100	90	80	70	60
50	40	30	20	10
9	8	7	6	5
4	3	2	1	0

IMPORTANT

USE NO. 2 PENCIL ONLY

- MAKE DARK MARKS
- ERASE COMPLETELY TO CHANGE
- EXAMPLE: <A> <B> ● <D> <E>

TO USE SUBJECTIVE SCORE FEATURE:

- Mark total possible subjective points
- Only one mark per line on key
- 150 points maximum

EXAMPLE OF STUDENT SCORE:

NAME			
SUBJECT		TEST NO.	
DATE		HOUR	

TEST RECORD	
PART 1	
PART 2	
TOTAL	

PART 2

	(T)	(F)			KEY
	●	●	3	●	●
51	A	B	●	D	E
52	A	B	C	●	E
53	●	B	C	D	E
54	A	●	C	D	E
55	A	B	C	●	E
56	A	B	C	●	E
57	A	●	C	D	E
58	●	B	C	D	E
59	A	B	C	●	E
60	A	B	●	D	E
61	A	B	C	●	E
62	A	B	C	●	E
63	A	B	●	D	E
64	A	B	C	●	E
65	A	B	C	●	E
66	●	B	C	D	E
67	A	B	●	D	E
68	A	●	C	D	E
69	A	B	C	●	E
70	A	B	C	●	E
71	A	●	C	D	E
72	A	B	●	D	E
73	A	B	C	●	E
74	A	B	●	D	E
75	A	●	C	D	E
76	●	B	C	D	E
77	A	●	C	D	E
78	A	●	C	D	E
79	A	B	C	●	E
80	A	B	●	D	E
81	●	B	C	D	E
82	A	B	●	D	E
83	A	B	C	●	E
84	A	●	C	D	E
85	A	●	C	D	E
86	A	B	C	●	E
87	●	B	C	D	E
88	A	B	C	●	E
89	A	B	●	D	E
90	A	B	C	●	E
91	A	B	C	●	E
92	A	●	C	D	E
93	A	B	C	●	E
94	A	B	●	D	E
95	●	B	C	D	E
96	●	B	C	D	E
97	A	B	C	●	E
98	A	B	●	D	E
99	A	B	●	D	E
100	●	B	C	D	E

FEED THIS DIRECTION

50/100%

2001 Initial License Class
NRC EXAM
WRITTEN EXAM
Senior Reactor Operator (SRO)

SCORE ________%
N/A IF MACHINE GRADED

KEY

Verified correct
4/6/2001 MF

Verified Correct
4/23/01 AWS

[redacted]

TEST RECORD	
PART 1	
PART 2	
TOTAL	

SUBJECTIVE SCORE
INSTRUCTOR USE ONLY

50/100%

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

FEED THIS DIRECTION

SUBJECTIVE SCORE INSTRUCTOR USE ONLY				
100	90	80	70	60
50	40	30	20	10
9	8	7	6	5
4	3	2	1	0

IMPORTANT

USE NO. 2 PENCIL ONLY

- MAKE DARK MARKS
- ERASE COMPLETELY TO CHANGE
- EXAMPLE: A B ■ D E

TO USE SUBJECTIVE SCORE FEATURE:

- Mark total possible subjective points
- Only one mark per line on key
- 150 points maximum

EXAMPLE OF STUDENT SCORE:

NAME			
SUBJECT		TEST NO.	
DATE		HOUR	

TEST RECORD	
PART 1	
PART 2	
TOTAL	

PART 2

	(T)	(F)			KEY
	■	■	3	■	■
51	A	B	■	D	E
52	A	B	C	■	E
53	■	B	C	D	E
54	A	■	C	D	E
55	A	B	C	■	E
56	A	B	C	■	E
57	A	■	C	D	E
58	■	B	C	D	E
59	A	B	C	■	E
60	A	B	■	D	E
61	A	B	C	■	E
62	A	B	C	■	E
63	A	B	■	D	E
64	A	B	C	■	E
65	A	B	C	■	E
66	■	B	C	D	E
67	A	B	C	■	E
68	A	■	C	D	E
69	A	B	C	■	E
70	A	B	C	■	E
71	A	■	C	D	E
72	A	B	■	D	E
73	A	B	C	■	E
74	A	B	■	D	E
75	A	■	C	D	E
76	■	B	C	D	E
77	A	■	C	D	E
78	A	■	C	D	E
79	A	B	C	■	E
80	A	B	C	■	E
81	■	B	C	D	E
82	A	■	C	D	E
83	A	B	C	■	E
84	A	B	■	D	E
85	A	■	C	D	E
86	A	B	■	D	E
87	■	B	C	D	E
88	A	B	C	■	E
89	A	■	C	D	E
90	A	B	C	■	E
91	A	B	C	■	E
92	■	B	C	D	E
93	A	B	C	■	E
94	A	■	C	D	E
95	■	B	C	D	E
96	A	B	C	■	E
97	A	B	C	■	E
98	■	B	C	D	E
99	A	B	■	D	E
100	■	B	C	D	E

FEED THIS DIRECTION

50/100%

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

Applicant Information	
Name:	Region: I / II / III / IV
Date:	Facility/Unit: Duane Arnold Energy Center
License Level: RO / SRO	Reactor Type: W / CE / BW / GE
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 five 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

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

Applicant Information	
Name: MASTER	Region: III
Date: April 13, 2001	Facility/Unit: Duane Arnold Energy Center
License Level: RO	Reactor Type: GE
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 five 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	100.0 Points
Applicant's Score	_________ Points
Applicant's Grade	_________ Percent

Duane Arnold Energy Center

Reactor Operator

50007

Topic: 2001 ILC RO Written Exam

Rev. 1

DEVELOPED BY:	George Thullen Instructor	Date
APPROVED BY:	Operations Supervisor (Plant Reviewer)	Date
APPROVED BY:	Mike Davis Training Supervisor-Operations	Date

Available Responses: 100

ANSWER KEY

Number Correct: ___________

SCORE: _________%

Graded By: ___________

Reviewed By: ___________

Student's Name: ____________________________________
Print

Date: ___________

LEAVE EXAM WITH INSTRUCTOR/PROCTOR PRIOR TO LEAVING EXAM ROOM.

EXAM REVIEW SECTION - **PLEASE SIGN IN BLACK INK**

I ACKNOWLEDGE THAT I HAVE PARTICIPATED IN THE REVIEW OF THIS DOCUMENT AND HAVE HAD AN OPPORTUNITY TO ASK QUESTIONS.

____________________________________ ____________________

Student's Signature Date

1 Point

1. While performing the Control Rod Drift Alarm Test, when does the Rod Drift annunciator 1C05A, D-6 activate?

   a. when the rod being tested is selected

   b. when the rod being tested is inserted

   c. when the rod being tested is withdrawn

   d. when the ROD DRIFT ALARM TEST/RESET switch is taken to the TEST position

ANSWER: b

Distracter 1, 2, 3: Per OI-856.1 page 16, the Rod Drift annunciator activates when the control rod
is inserted one notch

REFERENCE: OI-856.1, Reactor Manual Control System, page 16

K/A System: 201002 (Reactor Manual Control System)

K/A Number: A4.03 (Ability to manually operate and/or monitor in the control room: ROD DRIFT TEST SWITCH.)

K/A Value: 2.8/2.8

DAEC Objective: 72.00.00.02

Describe the operation of the following principle Reactor Manual Control System components: ROD DRIFT ALARM CIRCUIT.

Cognitive Level: 1 P

Source: New Question

1 Point

2. The reactor Mode Switch is in REFUEL during refueling operations.

   APRM A is BYPASSED.

   All SRMs and IRMs are operable and NOT BYPASSED.

   Which of the following CORRECTLY describes the response of the Reactor Protection System (RPS) if the mode switch on the 1C36 drawer for A IRM were to be taken to the STANDBY position?

   a. A half scram would result due to an inoperable IRM.

   b. A half scram would result due to an inoperable IRM with companion ARPM downscale.

   c. There would be NO CHANGE to RPS because A IRM remains operable in STANDBY.

   d. There would be NO CHANGE to RPS because the reactor Mode Switch is in REFUEL.

ANSWER: a

Distractor 1: Companion APRM has no affect in refuel.

Distractor 2: Mode switch out of operate makes IRM INOP and results in a ½ scram.

Distractor 3: IRMs only bypassed in RUN.

REFERENCE: SD-878.2

K/A System: 215003 IRM

K/A Number K3.01 (Knowledge of the effect that a loss or malfunction of IRM on RPS.)

K/A Value: 3.95/4.0

DAEC Objective: 79.00.00.06

Cognitive Level: 1 I

Source: NEW

1 Point

3. A plant startup is in progress with reactor power at 65% and both Recirc MGs at 50% speed.
   "A" Recirc MG receives a scoop tube lockup due to a failed instrument.

   What is the highest speed that the "B" Recirc MG would be allowed to be taken to while "A" Recirc MG troubleshooting is on-going?

   a. 50%

   b. 61%

   c. 67.5%

   d. 79.3%

ANSWER: c

Distracter 1, 2, 3: Per Technical Specifications, and P & L # 14, the speed of the faster MG shall not exceed 135% of the slower MG when reactor power is less than 80%.

REFERENCE: OI-264, Reactor Recirculation System

K/A System: 202002 (Recirculation Flow Control System)

K/A Number: A1.01 (Ability to predict and/or monitor changes in parameters associated with operating the Recirculation Flow Control System controls including: RECIRCULATION PUMP SPEED.)

K/A Value: 3.2/3.2

DAEC Objective: 12.01.01.02

Relate the Precautions and Limitations, operating cautions, or procedural notes of OI-264, Reactor Recirculation System, and any applicable ARP, to any component or Recirc System operating status.

Cognitive Level: 3-SPK

Source: Exam Bank

1 Point

4. With the "A" Loop of RHR in Shutdown Cooling, the following annunciators were received:

1C03B, A-5, LPCI HI DRYWELL PRESS

then:

1C03B, A-2, "A" RHR PUMP 1P-229A TRIP
1C03B, A-3, "C" RHR PUMP 1P-229C TRIP
1C03B, D-4, "A/B" RHR HX RHR INLET HI TEMP

Drywell pressure is 3 psig
RHR Hx inlet temperature is 350°F

What was the reason for the RHR pump trips?

a. prevent RHR pump damage due to cavitation caused by a loss of NPSH

b. prevent water hammer to piping when the RHR pumps try to auto start

c. prevent overpressurization of the low pressure Shutdown Cooling piping

d. prevent a thermal shock to the vessel due to injection of cold water from the torus when the RHR pumps auto start

ANSWER: a

Distracter 1: RHR Pump breakers will not close in due to the suction path interlock.

Distracter 2: The Group 4 Isol signal 135 psig does this function.

Distracter 3: RHR Pump breakers will not close in due to the suction path interlock. RHR pump Suction valves do not automatically open

REFERENCE: ARP 1C03B A-2/A-3, 1C05B D-8 Group 4 Isolation

K/A System: 203000 (Residual Heat Removal/Low Pressure Coolant Injection Mode)

K/A Number: K4.06 Knowledge of the RHR/LPCI Injection Mode design feature(s) and/or interlocks which provide for the following: ADEQUATE PUMP NET POSITIVE SUCTION HEAD (INTERLOCK SUCTION VALVE OPEN).

K/A Value: 3.5/3.5

DAEC Objective: 2.03.01.04

Describe the RHR System interlocks, including purpose, setpoints, logic, and when/how they are bypassed, overridden, or reset.

Cognitive Level: 1 I

Source: New Question

1 Point

5. As the following equipment becomes unavailable, the margin to the MCPR Safety limit becomes less during certain transients.

   The initial operator response to three of these conditions is a recalculation and possible adjustment of the Operating Limit MCPR. (Assume that recalculations and/or adjustments can be made within two hours). One condition requires the reduction of reactor power to less than 25% within 4 hours.

   Which condition requires the power reduction to less than 25%?

   a. One Turbine Bypass Valve out of service.

   b. Two Turbine Bypass Valves out of service.

   c. One EHC pressure regulator out of service.

   d. One Recirc Pump Trip (RPT) channel out of service.

ANSWER: c

Note: Margin to MCPR becomes unknown with pressure regulator OOS; P&L requires <25% in 4 hours.

Distracter 1: Requires OLMCPR recalculations and/or adjustments.

Distracter 2: Requires OLMCPR recalculations and/or adjustments.

Distracter 3: Requires OLMCPR recalculations and/or adjustments.

REFERENCE: OI-693.1 P&Ls; COLR; T.S. 3.2

K/A System: 241000 (Reactor Turbine Pressure regulator)

K/A Number: 2.1.10 (Knowledge of the conditions and limitations in the facility license.)

K/A Value: 2.7/3.9

DAEC Objective:51.01.01.02 (Relate the P&Ls, operating cautions, or procedural notes of OI-693.1 and any applicable ARPs to any component or Main Turbine system operating status.)

Cognitive Level: 1-P

Source: New Question

1 Point

6. EOP-2, Primary Containment Control, directs the operator to secure HPCI if torus water level cannot be maintained above 5.8 feet. No instruction concerning securing RCIC is included. Which ONE of the following describes the reason for securing HPCI and not RCIC?

   a. Torus level less than 5.8 feet could result in cavitation of the HPCI pump, but RCIC suction is lower in the torus.

   b. HPCI operation rapidly reduces torus level below the relief valve spargers, where RCIC flow has less significant effect.

   c. The swirling action set up by HPCI suction at low level would cause torus failure, where RCIC low flow causes no problem.

   d. HPCI continued operation could overpressurize the containment, where RCIC steam load is approximately that of decay heat.

ANSWER: d

Distracter 1, 2, 3: The bases for securing HPCI at Torus Water level of 5.8 feet is based on overpressurization of containment as per EOP Bases Document, EOP 2, page 21.

REFERENCE: EOP Bases Document, EOP 2, page 21

K/A System: 206000 (High Pressure Coolant Injection)

K/A Number: K1.16 (Knowledge of the physical connection and/or cause–effect relationships between High Pressure Coolant Injection and the following: CONTAINMENT/TORUS PRESSURE.

K/A Value: 3.5/3.5

DAEC Objective: 95.00.00.18

Evaluate the consequences of exceeding any EOP Curve or Limit on the mitigation of an event.

Cognitive Level: 1 B

Source: Exam Bank

1 Point

7. Which combination of MCCs, if de-energized, would prevent the operation of both of the Core Spray Subsystems Injection Valves from the control room?

   a. 1D41 / 1D42

   b. 1B33 / 1B45

   c. 1B34 / 1B44

   d. 1B35 / 1B43

ANSWER: c

Note: MO-2115 and MO-2117 are powered from 1B34, MO-2135 and MO-2137 are powered from 1B44.

Distracter 1: Both are 250 VDC busses in Rx Bldg. Selected if candidate thinks these loads are DC.

Distracter 2: Both are essential 480VAC busses, but are in the Turbine Bldg. and supply mainly TB essential loads.

Distracter 3: Both are essential 480VAC busses but these busses load shed during a LOOP – LOCA; a bad feature for ECCS pumps.

REFERENCE: OI-151, Core Spray, Attachment 1

K/A System: 209001 (Low Pressure Core Spray)

K/A Number: K2.02 (Knowledge of the electrical power supplies to the following: VALVE POWER.)

K/A Value: 2.5/2.7

DAEC Objective: 4.01.01.10

Given a Core Spray System operating mode and various plant conditions, predict how the Core Spray System will be impacted by the following support system failures: A. C. DISTRIBUTION.

Cognitive Level: 1-F

Source: New Question

1 Point

8. Which of the following Core Spray pressure annunciators/indications describe the operator's indication that a leak has occurred in the Core Spray piping BETWEEN THE REACTOR VESSEL AND CORE SHROUD?

   a. Core Spray Sparger HI Δ P (3.6 psig increasing)

   b. Core Spray Sparger LO Δ P (2.46 psid decreasing)

   c. Core Spray Discharge line low pressure (47.5 psig decreasing)

   d. Core Spray Discharge line high pressure (100 psig increasing)

ANSWER: b

Distracter 1: Common misconception that Δ P goes up. Break detection alarms at 2.46 psid decreasing

Distracter 2: Indicates a leak but not in the described location.

Distracter 3: Possible misconception that described leak pressurized CS discharge header.

REFERENCE: ARP 1C03A; SD-151

K/A System: 209001 (Low Pressure Core Spray)

K/A Number: A1.02 (Ability to predict and/or monitor changes in parameters associated with operating the Low Pressure Core Spray System controls including: CORE SPRAY PRESSURE.)

K/A Value: 3.2/3.4

DAEC Objective: 4.01.01.02Evaluate plant conditions and control room indications to determine if the Core Spray System is operating as expected, and identify any actions that may be necessary to place the Core Spray System in the correct lineup.

Cognitive Level: 1-I

Source: Bank

1 Point

9. During an ATWS transient, the Shift Supervisor has directed the initiation of Standby Liquid Control System (SBLC).

   After placing the SBLC system mode switch to the PUMPS A and B RUN position, you observe the following conditions:

   Both SBLC pumps RED lights ON
   Both SBLC Squib valve ready lights OFF
   SBLC Squib continuity loss annunciator ON
   SBLC System discharge pressure is 980 psig
   SBLC System flow = 55 gpm
   SBLC storage tank level lowering
   Reactor pressure is 950 psig
   RWCU isolated
   Reactor power lowering

   Evaluate these conditions and indicate if the SBLC system has initiated properly and if not, then specify the discrepancy.

   a. The SBLC system has initiated properly.

   b. The SBLC system has NOT initiated properly because system flow would be greater than
      56 gpm.

   c. The SBLC system has NOT initiated properly because the Squib valve continuity loss annunciator would not be activated.

   d. The SBLC system has NOT initiated properly because the system discharge pressure would
      be at least 100 psig greater than reactor pressure.

ANSWER: a
Distracter 1: Per OI-153, SBLC has initiated properly, system flow should be > 52.4 gpm. Actual pump flow during testing is closer to 28 gpm.
Distracter 2: Per OI-153, SBLC has initiated properly, continuity annunciator should be activated.
Distracter 3: Per OI-153, SBLC has initiated properly, system pressure should be greater than reactor pressure, however there is no minimum amount specified.
REFERENCE: OI-153
K/A System: 211000 (Standby Liquid Control System)
K/A Number: K4.08 (Knowledge of Standby Liquid Control System design feature(s) and/or interlocks which provide for the following: SYSTEM INITIATION UPON OPERATION of SBLC SWITCH.)
K/A Value: 4.2/4.2
DAEC Objective: 6.00.00.05 Describe how the Standby Liquid Control System RESPONDS TO AN INITATION signal.
Cognitive Level: 1 I
Source: New Question

10. The plant is less than 75% power as directed by STP 3.3.1.1-19 "Functional Test of TSV Closure Input to RPS and RPT". (Routine turbine testing)

    Per this procedure, both pushbuttons for Turbine Stop Valve 1 and 2, in RPS Channel A1, are simultaneously depressed and then released when the TSVs reach 90% open.

    Which of the following CORRECTLY describes the response of the Reactor Protection System to this test?

    a. The RPS system is DESIGNED for ½ scrams during this type of testing and the action described would result in a ½ scram.

    b. The RPS system is DESIGNED for ½ scrams during this type of testing however, the action described would NOT result in a ½ scram.

    c. The RPS system is NOT DESIGNED for ½ scrams during this type of testing. I&C Technicians must install relay blocks in the appropriate RPS relays at the beginning of this section of the STP.

    d. The RPS system is NOT DESIGNED for ½ scrams during this type of testing. The ½ scram is inhibited when the "A" RPT System Mode Select Switch, C71A-S12A, on 1C15, is placed in TEST at the beginning of this section of the STP.

ANSWER: a

Note: ILC candidates perform this STP as part of their training. It is one of the few times that they do test that result in ½ scrams.

Distracter 1: TSV 1 & 2 testing produces a ½ scram.

Distracter 2: RPS is designed for ½ scrams during testing. This is a functional test performed by operators. It does not require I&C Techs who would be responsible for installing relay blocks.

Distracter 3: RPS is designed for ½ scrams during testing. This may be an obscure test switch but candidate should recognize that the plant is designed to take ½ scrams during testing but not ½ RPT trips.

REFERENCE: STP 3.3.1.1-19 and SD-358

K/A System: 212000 (Reactor Protection System)

K/A Number: K4.05 (Knowledge of the Reactor Protection System design feature(s) and/or interlocks which provide for the following: FUNCTIONAL TESTING OF THE SYSTEM WHILE MAINTAINING POWER OPERATION.)

K/A Value: 3.4/3.6

DAEC Objective: 22.02.01.08Describe the Reactor Protection System interlocks, including purpose, setpoints, logic, and when/how they are bypassed.
Also Task 97.04, Perform TSV closure RPS and RPT Functional.

Cognitive Level: 1 I

Source: New Question

1 Point

11. Assume that the plant is in a normal lineup and that all systems respond as designed.

The following Nuclear Instrumentation conditions exist:

- The plant is at 10% power with the Mode Switch in STARTUP/HOT STANDBY.
- All four SRMs are reading 1x10 E5
- IRM "B" is reading 118 on the 125 scale
- APRM "E" has 9 LPRM inputs

Which of the following CORRECTLY describes the affect of the above conditions on the Reactor Protection System?

a. No scram

b. Full scram

c. Half scram on "A" RPS

d. Half scram on "B" RPS

ANSWER: c

Note: APRM E has too few inputs and would be inop, resulting in a ½ scram on "A" RPS. SRM upscales are not a RPS trip. "B" IRM is below the trip set point of 120/125

Distracter 1: ½ scram on "A" RPS.

Distracter 2: There is no scram signal for the "B" RPS system.

Distracter 3: There is no scram signal for the "B" RPS system..

REFERENCE: SD 358 and 878.1, 2,& 3

K/A System: 212000 (Reactor Protection System)

K/A Number: K6.02 (Knowledge of the effect that a loss or malfunction of the following will have on the Reactor Protection System: NUCLEAR INSTRUMENTATION.)

K/A Value: 3.7/3.9

DAEC Objective: 22.00.00.08

Evaluate plant conditions and control room indications to determine if the Reactor Protection System is operating as expected, and identify any actions that may be necessary to place the Reactor Protection System in the correct lineup.

Cognitive Level: 2 RI

Source: Exam Bank

1 Point

12. OI-324 "Standby Diesel Generator System" warns against prolonged operation of the SBDG at LESS THAN 25% LOAD to prevent "engine souping".

Which of the following is a possible consequence of engine souping?

a. Bearing failure due to oil separation.

b. Injector failure due to incomplete combustion.

c. Exhaust system fire due to combustion product buildup.

d. Engine failure due to water accumulation in the fuel oil.

ANSWER: c

Distracter 1: Plausible but not identified as a consequence.

Distracter 2: Plausible but not identified as a consequence.

Distracter 3: Plausible but not identified as a consequence..

REFERENCE: OI-324 P&L 15

K/A System: 264000 (SBDG)

K/A Number: A4.04 (Ability to manually operate and/or monitor in the control room: MANUAL START, LOADING, AND STOPPING OF SBDG.)

K/A Value: 3.7/3.7

DAEC Objective: 19.01.01.01 (Relate the P&Ls, operating cautions, or procedural notes of OI-324 to any component or SBDG operating status.)

Cognitive Level: 1-D

Source: Bank

1 Point

13. During a normal plant startup and after verifying SRM/IRM overlaps, the operator at 1C05 starts to withdraw the SRMs.

    The operator mistakenly selects the "A" IRM instead of "C" SRM.

    Without any other operator actions, what will be the effect on the startup after the "A" IRM is withdrawn?

    Assume that the plant responded as expected.

    a. The reactor startup and heatup can continue with a 1/2 scram on the "A" RPS channel.

    b. The reactor startup and heatup cannot continue because of an IRM DOWNSCALE rod block.

    c. The reactor startup and heatup can continue with the IRM DOWNSCALE annunciator activated.

    d. The reactor startup and heatup cannot continue because of an IRM INOP 1/2 Scram and rod block.

ANSWER: b

Distracter 1: IRM downscale condition will produce a rod out block and prohibit control rod withdrawal.

Distracter 2: IRM downscale condition will produce a rod out block and prohibit control rod withdrawal.

Distracter 3: The IRM is not inoperative but downscale, there will be no 1/2 scram.

REFERENCE: ARP 1C05A, D-3, IRM DOWNSCALE

K/A System: 215003 (Intermediate Range Monitor)

K/A Number: K5.03 (Knowledge of the operational implications of the following concepts as they apply to Intermediate Range Monitor: CHANGING DETECTOR POSITION.)

K/A Value: 3.0/3.1

Objective: 79.00.00.06

Given an IRM System operating mode and various plant conditions, predict how each supported system will be impacted by failures in the IRM System: REACTOR MANUAL CONTROL

Cognitive Level: 3 PEO

Source: New Question

1 Point

14. PS-4315A, which provides a PRIMARY CONTAINMENT HIGH PRESSURE SIGNAL to the Group 3A logic, has failed AS IS.

Which of the following correctly describes the arrangement of Containment pressure switches in
the Group 3 Isolation logic and correctly describes the response of the Group 3A Isolation logic to an ACTUAL Containment high pressure condition with this one switch failed?

a. There are two pressure switches, one in each logic channel.
The one switch in A logic has failed.
Therefore, the Group 3A Isolation WOULD NOT occur.

b. There are four pressure switches, two in each logic channel.
Both switches in a channel must trip in order for the logic to trip.
Therefore, the Group 3A Isolation WOULD NOT occur.

c. There are four pressure switches, two in each logic channel.
If either switch in a channel trips, the logic will trip.
Therefore, the Group 3A Isolation WOULD occur.

d. There are four pressure switches, four (shared) in each logic channel.
If any two switches in a channel trip, the logic will trip.
Therefore, the Group 3A Isolation WOULD occur.

ANSWER: c

Distracter 1: Group 3 is four switches, one out of two for each logic.

Distracter 2: Group 3 is four switches, one out of two for each logic.

Distracter 3: Group 3 is four switches, one out of two for each logic. The shared switches describe is similar to Group 1 logic.

REFERENCE: ARP 1C05B, C-8

K/A System: 223002 (PCIS/NSSS)

K/A Number: A2.06 (Ability to predict the impacts of the following on PCIS/NSSS; and based on those predictions, use procedures to correct, control or mitigate the consequences of those abnormal conditions or operations; Containment Instrument Failures)

K/A Value: 3.0/3.2
Objective: 42.08.01.07 (List the signals which cause Primary containment and Containment
Atmosphere Monitoring and Control isolations. Describe their purpose setpoint and logic. Describe how they are bypassed and how they are reset.)
Cognitive Level: 2-DR
Source: NEW

1 Point

15. Do the following Source Range Monitor (SRM) system components REMAIN ENERGIZED or do they become DEENERGIZED by a COMPLETE LOSS of 24 VDC System 1?

    1) "A" SRM detector auxiliary trip units
    2) "A" SRM detector drive motor power

a. 1) REMAINS ENERGIZED
   2) REMAINS ENERGIZED

b. 1) DEENERGIZED
   2) REMAINS ENERGIZED

c. 1) REMAINS ENERGIZED
   2) DEENERGIZED

d. 1) DEENERGIZED
   2) DEENERGIZED

ANSWER: b

Distracter 1: Aux trip units are 24VDC.

Distracter 2: Aux trip units are 24VDC.A SRM detector drive motor power is from essential lighting panel 1L80.

Distracter 3: A SRM detector drive motor power is from essential lighting panel 1L80.

REFERENCE: SD 878.1; APO 375

K/A System: 215004 (Source Range Monitor)

K/A Number: K6.02 (Knowledge of the effect that a loss or malfunction of the following will have on the Source Range Monitor System: 24/48 VDC

K/A Value: 3.1/3.3

Objective: 78.06.01.05 Given an SRM system operating mode and various plant conditions, predict how the SRM system will be impacted by failures in the following support systems: c. DC electrical system.

Cognitive Level: 1-F

Source: New Question

1 Point

16. The plant is operating at 95% power.

"E" APRM is bypassed.

An LPRM associated with "E" APRM fails UPSCALE.

Which of the following CORRECTLY describes the affect of this failure on the value of Core Thermal Power (MWTH) on the 3D Monicore official case?

a. LPRMs and APRMs are NOT factors in the heat balance calculation. Therefore, there would be NO CHANGE to the official case MWTH.

b. LPRMs and APRMs are factors in the heat balance calculation. There would be NO CHANGE to the official case MWTH because "E" APRM is bypassed.

c. LPRMs are a factor in the heat balance calculation. Therefore, the official case MWTH would INCREASE.

d. APRMs are a factor in the heat balance calculation even when bypassed. The official case MWTH would INCREASE because the upscale LPRM would cause a higher reading on the "E" APRM.

ANSWER: a

Note: Core Thermal Power is derived from a heat balance and is used to assign the value of reactor power to the APRMs. MWTH will not change.

Distracter 1: No change is correct but NIs are not a factor.

Distracter 2: MWTH will not change. NIs are not a factor.

Distracter 3: MWTH will not change. NIs are not a factor.

REFERENCE: SD 878.3

K/A System: 215005 (Average Power Range Monitor/Local Power Range Monitor)

K/A Number: K3.08 (Knowledge of the effect of a loss or malfunction of the APRM/LPRM will have on the following: CORE THERMAL CALCULATIONS.)

K/A Value: 3.0/3.4

Objective: 81.01.01.15 Given any APRM System operating mode and various plant conditions, predict how any APRM System operation or failure will impact each of the following supported systems: PLANT PROCESS COMPUTER.

Cognitive Level: 2 RI

Source: New Question

1 Point

17. With the plant at 100% power and NO inoperable equipment or LCOs, the following annunciators are received:

1C05A, A-2, "A" RPS AUTO SCRAM

1C05A, A-5, NEUTRON MONITORING SYSTEM TRIP

1C05A, B-2, APRM A, C, OR E UPSCALE TRIP OR INOP

1C05A, D-2, APRM DOWNSCALE

1C05B, A-6, ROD OUT BLOCK

Investigation reveals that the "C" APRM has just become INOPERABLE.

Which of the following describes the appropriate actions per the ARPs?

a. Manually insert a full scram.

b. Place "C" APRM mode switch in STANDBY.

c. Insert a backup manual half scram on the "A" RPS channel.

d. With permission from the OSS, bypass "C" APRM and reset the ½ scram.

ANSWER: d

Distracter 1: Conditions have not degraded to the point that a full scram appropriate. Per Technical Specifications, only two channels are required per trip system. "A" and "E" are still operable. A scram is not required.

Distracter 2: Per Technical Specifications, only two channels are required per trip system. "A" and "E" are still operable. APRM mode switch out of operate would not accomplish anything.

Distracter 3: A backup manual scram is directed per the Scram IPOI-5 but not the ARPs. This action would be useless because A RPS is already tripped.. Per Technical Specifications, only two channels are required per trip system. "A" and "E" are still operable. The trip system is not required to be in the tripped condition.

REFERENCE: Technical Specifications, Section 3.3.1.1; ARP 1C05A (A-2) & (B-2); IPOI-5; OI-878.4

K/A System: 215005 (Average Power Range Monitor/Local Power Range Monitor)

K/A Number: K6.04 (Knowledge of the effect that a loss or malfunction of the following will have on the APRM/LPRM: TRIP UNITS.)

K/A Value: 3.1/3.2

Objective: 81.01.01.09

Describe the function and operation of the following principle LPRM/APRM system components: APRM FLOW-BIASED and NON-FLOW-BIASED TRIP CIRCUITS.

Cognitive Level: 1P

Source: New Question

1 Point

18. Which of the following correctly identifies the Control Room panel(s) where a reactor water level indicator and/or recorder in the range of:

    +8″ to +218″

    can be read?

    a. 1C05 only

    b. 1C05 and 1C03

    c. 1C05 and 1C04

    d. 1C05 and 1C09

ANSWER: a

Distracter 1: +8″ to +218″ is a Yarway on 1C05 only. 1C03 also has a Yarway but it measure fuel zone,
−153-218. It is a possible misconception that the 1C03 RPV level recorder has a range of +8″ to +218″, but it records fuel zone range.

Distracter 2: +8″ to +218″ is considered "wide range" Yarway. The 1C04 level indication has a wide range of 300 inches, +158-+458.

Distracter 3: 1C09 has several Containment Accident recorders, but no RPV level recorders.

REFERENCE: M-115 ; SD 880

K/A System: 216000 (Nuclear Boiler Instrumentation)

K/A Number: A1.03 (Ability to predict and/or monitor changes in parameters associated with operating the Nuclear Boiler Instrumentation controls including: SURVEILLANCE TESTING.)

K/A Value: 2.9/3.2

Objective: 88.00.00.02Describe the operation of the following Non-Nuclear Instrumentation System components including range, control room location, calibration condition, any compensation and any instruments that share the same sensing lines: LEVEL, PRESSURE, TEMPERATURE, FLOW.

Cognitive Level: 1 S

Source: NEW

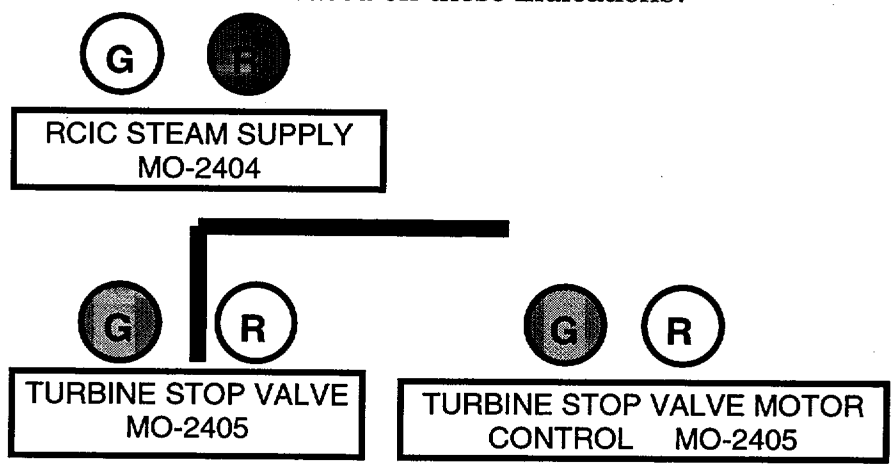
1 Point

19. The following question is related to the three sets of RCIC indicating lights shown below, minus the associated handswitches.

GRAY SHADED means the light is ILLUMINATED (energized).

A loss-of-coolant accident has occurred resulting RPV water level reaching 110 inches before the trend was reversed. A transient has occurred involving the RCIC system. The only operator action taken with RCIC was to cycle the handswitch for MO-2405, RCIC Turbine Stop Valve, to the fully CLOSED position and then to hold it in the OPEN position for three seconds.
MO-2400 and MO-2401, steam supply isolation valves, are open.

What is the status of RCIC based on these indications?



a. A RCIC Auto Isolation trip has occurred.
The RCIC Turbine trip is RESET.

b. A RCIC High RPV Level trip has occurred.
The RCIC Turbine trip is RESET.

c. A RCIC Electrical Overspeed trip has occurred.
The RCIC Turbine trip is NOT RESET.

d. A RCIC Mechanical Overspeed trip has occurred.
The RCIC Turbine trip is NOT RESET.

ANSWER: d
Distracters: a., b, and c. are incorrect because MO-2404 OPEN indicates that a 211" trip has NOT occurred and MO-2405 is indicating that a mechanical overspeed trip has occurred, and the valve motor operator indications indicate that the trip cannot be reset from the control room.
REFERENCE: ARPs 1C04C, A-5 and A-6
K/A System: 217000 (Reactor Core Isolation Cooling System)
K/A Number: A2.02 (Ability to (a) predict the impacts of the following on the Reactor Core Isolation Cooling System (RCIC) and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: TURBINE TRIPS.)
K/A Value: 3.8/3.7

Objective: 3.02.01.05Evaluate plant conditions and control room indications to determine if the RCIC System is operating as expected, and identify any actions necessary to place the RCIC System in the correct lineup. Cognitive Level:2-DR Source: Modified , Exam Bank

20. Following a LOCA, the following conditions exist:

All control rods are fully inserted	
Reactor water level	115"
Reactor pressure	50 psig
Drywell pressure	25 psig
Torus pressure	25 psig
Torus water level	12 ft

"A" and "B" Core Spray pumps are not available.
All other systems worked as designed.
The Shift Supervisor has directed you to continue to depressurize the RPV using the ADS SRVs.

Which of the following is correct concerning the use of the ADS SRVs?

a. The ADS SRVs WILL open and can be used without any restrictions.

b. The ADS SRVs WILL open and can be used until Torus water level reaches 13.5 ft.

c. The ADS SRVs WILL NOT open because the Core Spray pumps are not running.

d. The ADS SRVs WILL NOT open because the RPV to Torus differential pressure is too low.

ANSWER: d

Note: All SRVs need ≈50 psid to actuate.

Distracter 1: Will not open due to low ΔP. Otherwise there would be no restriction.

Distracter 2: Will not open due to low ΔP. Torus Level breakpoint is for vacuum breaker operation, not SRVs

Distracter 3: Selected if candidate is confused about ADS auto initiation, which needs either CS or RHR pumps running. According to stem, RHR would be running. And question is asking for manual ADS operation.

REFERENCE: SD-683

K/A System: 218000 (Automatic Depressurization System)

K/A Number: K1.04 (Knowledge of the physical connections and/or cause-effect relationships between the Automatic Depressurization System and the following: DRYWELL/CONTAINMENT PRESSURE.)

K/A Value: 3.9/4.2

Objective: 8.01.01.02Given an ADS System operating mode and various plant conditions, predict how the ADS System will be impacted by failures in the following support systems: PRIMARY CONTAINMENT SYSTEM.

Cognitive Level: 2 RI

Source: New Question

1 Point

21. An accident has occurred and the ADS LOW WATER LEVEL CONFIRMED annunciator has actuated.

    In which of the following sets of conditions would the actuation of annunciator ADS A/B 2 MIN TIMER(S) INITIATED at 1C03 be expected?

    a. RPV level at +50", RHR pump running with a discharge pressure of 125 psig.

    b. RPV level at +115", RHR pump running with a discharge pressure of 135 psig.

    c. RPV level at +50", Core Spray pump running with a discharge pressure of 115 psig.

    d. RPV level at +115", Core Spray pump running with a discharge pressure of 145 psig.

ANSWER: a

Distracter 1, 2, 3: ADS timers are actuated at 64″ decreasing with a confirmatory level of 170″and either an RHR pump running with discharge pressure > 125 psig or a Core Spray pump running with discharge pressure > 145 psig.

REFERENCE: ARP 1C03A A-5

K/A System: 218000 (Automatic Depressurization System)

K/A Number: A3.07 (Ability to monitor automatic operations of the Automatic Depressurization System including: LIGHTS and ALARMS.)

K/A Value: 3.7/3.6

Objective: 8.03.01.03

Evaluate plant conditions and control room indications to determine if the ADS System or the Low-Low Set System is operating as expected, and identify any actions that may be necessary to place the ADS/LLS Systems in the correct lineup.

Cognitive Level: 1 I

Source: Exam Bank

1 Point

22. Which of the following sets of 480 VAC busses supplies power to the Drywell Cooling Fans?

a. 1B32 / 1B42

b. 1B33 / 1B45

c. 1B34 / 1B44

d. 1B35 / 1B43

ANSWER: d

Distracter 1:Homogeneous distracter, busses supply essential 480vac loads in Rx Bldg. Operator should know that these busses are in the switchgear room and not in Rx Bldg.

Distracter 2:Homogeneous distracter, busses supply essential 480vac loads in Rx Bldg. Operator should know that 1B33&45 are in the Turbine Bldg.

Distracter 3: Homogeneous distracter, busses supply essential 480vac loads in Rx Bldg.

REFERENCE: OI-760

K/A System: 223001 (Primary Containment System and Auxiliaries)

K/A Number: K2.09 (Knowledge of the electrical power supplies to the following: DRYWELL COOLING FANS.)

K/A Value: 2.7/2.9

Objective: 68.01.01.08

Given a Primary Containment Ventilation System operating mode and various plant conditions, predict how the Primary Containment Ventilation System will be impacted by failures in the following support systems: AC ELECTRICAL DISTRIBUTION.

Cognitive Level: 1-F

Source: NEW

1 Point

23. Core alterations are in progress during a refueling outage.

For a given DEFUELED CELL, which of the following is the **LEAST** PREFERRED lineup for the Control Rod and Hydraulic Control Unit?

a. A Blade Guide is in place.
The control rod is fully INSERTED.
One CRD pump is OPERATING.
The Cooling Water valve is OPEN at the HCU.

b. A Blade Guide is NOT in place.
The control rod is fully WITHDRAWN.
One CRD pump is OPERATING.
The Cooling Water valve is OPEN at the HCU.

c. A Blade Guide is NOT in place.
The control rod is fully WITHDRAWN.
One CRD pump is OPERATING.
The Cooling Water valve is CLOSED at the HCU.

d. A Blade Guide is NOT in place.
The control rod is fully WITHDRAWN.
Condensate Service (flushing) water is valved in because both CRD pumps are SECURED.
The Cooling Water valve is OPEN at the HCU.

ANSWER: b

Note: Plant Priority; DAEC will begin a refueling outage shortly after this ILC exam. "Least preferred" sounds subjective, but it clearly defined by the P&L.

Distracter 1: Rod is already in and supported, so it cannot drift in and cause damage.

Distracter 2: This sounds bad because there is no cooling or flushing going on, but it is preferred to setting up to have the rod drift in.

Distracter 3: This is a rarely used lineup but it is proceduralized in OI-255 (CRD) specifically for this situation. Rods cannot be drifted in with Condensate Service water.

REFERENCE: OI-255, P&L 13

K/A System: 201001 (CRD Hydraulic)

K/A Number: 2.2.27 (Knowledge of the refueling process)

K/A Value: 2.6/3.5

Objective: 10.01.01.02 (Relate the applicable CRD precautions and limitations in OI-255 to a give plant, system, or component operating status...)

Cognitive Level: 3-SPK

Source: NEW

1 Point

24. The operating crew has entered EOP 2 on low Torus water level and are required to Emergency Depressurize.

EOP 1 has been entered and a manual scram inserted. IPOI 5 actions have been performed.

The 1C05 operator is controlling feedwater in MANUAL and RPV water level at 190".

What initial feedwater flow rate into the RPV will compensate for the steam flow through the SRVs during the Emergency Depressurization? (Assume 4 ADS SRVs open.)

a. 1.6 Mlbm/hr

b. 2.4 Mlbm/hr

c. 3.2 Mlbm/hr

d. 4.0 Mlbm/hr

ANSWER: c

Distracter 1, 2, 3:Design flow rate of the SRVs is 800,000 lbm/hr at 1125 psid, 4 SRVs are required to ED however reactor pressure should be approximately 940 psig and the flow rate would be slightly less than 3.2 Mlbm/hr. The operator is directed to maintain 170" to 211". Distractors are design flow rates for 2, 3, and 5 SRVs.

REFERENCE: System Description 183.1, Automatic Depressurization System and Low-Low Set System, page 8

K/A System: 239002 (Relief/Safety Valves)

K/A Number: A4.06 (Ability to manually operate and/or monitor in the control room: REACTOR WATER LEVEL.)

K/A Value: 3.9/4.1

Objective: 45.01.01.02

Identify the appropriate procedures that govern the Feed and Condensate System operation, include operator responsibilities during all modes of operation, and any actions required by personnel outside of the control room.

Cognitive Level: 3 SPK

Source: New Question

1 Point

25. The plant is operating at about 55% load when the Stator Cooling Water TCV fails, bypassing the heat exchanger.

As this event progresses, which statement below describes automatic actions the operator should expect to observe?

a. Turbine Load Set will ramp down, causing the bypass valves to open to control pressure.

   If, during this time, NO operator action is taken the reactor will scram on high pressure.

b. The bypass valves receive a direct open signal, causing turbine control valves to close to control pressure.

   If, during this time, NO operator action is taken the reactor will scram on high pressure.

c. Turbine Load Set will ramp down, causing the bypass valves to open to control pressure.

   If, during this time, NO operator action is taken the turbine will trip and the Turbine Stop Valve closure will scram the reactor.

d. The bypass valves receive a direct open signal, causing turbine control valves to close to control pressure.

   If, during this time, NO operator action is taken the turbine will trip and the Turbine Stop Valve closure will scram the reactor.

ANSWER: a

Distractor 1: Load Set runs down to cause a runback.

Distractor 2: The reactor will scram on high pressure because bypass valves are sized too small to accept that much steam flow.

Distractor 3: Load Set runs down to cause a runback. The reactor will scram on high pressure because bypass valves are sized too small to accept that much steam flow.

REFERENCE: ARP 1C08C D-4, revision 7; ARP 1C83A A-4, revision 8

K/A System: 241000 (Reactor/Turbine Pressure Regulating System)

K/A Number: K1.11 (Knowledge of the physical connections and/or cause/effect relationships between Reactor/Turbine Pressure Regulating System and the following RPS.)

K/A Value: 3.7/3.8

Objective: 52.01.01.01

Relate the Precautions and Limitations, operating cautions, warnings or procedural notes of OI-693.2 and any related ARPs to any component or EHC System operating status.

Cognitive Level: 2-RI

Source: Exam Bank

26. A Loss of Drywell cooling has occurred that has resulted in Torus and Drywell pressures of 4 psig.

Which of the following is correct concerning the initiation of Torus Sprays in this situation?

Initiation of Torus Sprays is...

a. NOT ALLOWED by EOP-2. Torus Sprays are used to scrub the air space of radioactive particles in preparation for containment venting and are therefore initiated only after a LOCA.

b. NOT ALLOWED by EOP-2. Torus Sprays are used to condense steam in the Torus' enclosed atmosphere thus reducing its pressure and are therefore initiated only after a LOCA.

c. ALLOWED by EOP-2. Torus Sprays are used for evaporative and convective cooling of the Torus' enclosed atmosphere thus reducing its pressure.

d. ALLOWED by EOP-2. Torus Sprays are used to improve the distribution of water returning from the RHR heat exchangers thus helping reduce Torus Average Water temperature.

ANSWER: c

Distractor #1:Directed by EOP-2 Steps PC/P 3 & 4 no matter what the cause of DW High Pressure.
Scrubbing does help prior to venting, but it is not the basis for this action.

Distractor #2: Directed by EOP-2 Steps PC/P 3 & 4 no matter what the cause of DW High Pressure. Steam condensation is the major reason Torus pressure drops when spraying after a LOCA. Also, Drywell Sprays are allowed on in the allowable region of graph 7, i.e.: post LOCA.

Distractor #3:"Allowed" is correct but the reason given is not the correct basis. If anything, the water will pick up more heat in the air space and Torus water temp will increase not decrease.

REFERENCE: EOP Bases document.

K/A System: 230000 (RHR/LPCI, Torus /Pool Spray mode.)

K/A Number: A1.01 (Ability to predict and/or monitor changes in parameters associated with operating the RHR Torus spray mode controls including: Suppression chamber pressure.)

K/A Value: 3,8/3.9

Objective: 2.01.01.07 (Given an RHR system operating mode and various plant conditions, predict how each supported system will be impacted by the following RHR system operations/failures:
c. Containment Spray initiation.)

Cognitive Level: 1-P&B

Source: NEW

1 Point

27. OI-644 "Condensate and Feedwater Systems" directs that "D" Well Water Pump, 1P-58D, should be removed from service prior to starting which of the following?

    a. "A" Condensate Pump

    b. "B" Condensate Pump

    c. "A" Feedwater Pump

    d. "B" Feedwater Pump

ANSWER: d

Distracter 1, 2, 3:Per OI-644 P&L # 12, the reason is to minimize the voltage transient on 1A2.

REFERENCE: OI-644, Condensate and Feedwater Systems, Precaution and Limitation # 12, page 6

K/A System: 259001 (Reactor Feedwater System)

K/A Number: K2.01 (Knowledge of electrical power supplies to the following: REACTOR FEEDWATER PUMPS.)

K/A Value: 3.3/3.3

Objective: 45.00.00.03

Given a Feed and Condensate System operating mode and various plant conditions, predict how the Feed and Condensate System will be impacted by failures in the following support systems: AC ELECTRICAL DISTRIBUTION.

Cognitive Level: 1 P

Source: New Question

1 Point

28. The “B” SBGT EXHAUST FAN 1V-EF-15B handswitch is in NORM.

In preparation for operating SBGT train “B” in manual, the “B” SBGT MODE SELECT switch is placed in MANUAL.

While the Mode Switch is still in MANUAL, a full GROUP III initiation signal occurs.

Which of the following describes the response of the “B” SBGT system?

a. The “B” SBGT lockout relay will trip.
The “B” SBGT train will function normally.

b. The “B” SBGT lockout relay will NOT trip.
The “B SBGT train Exhaust Fan operation will be inhibited. (Will not auto start).

c. The “B” SBGT lockout relay will trip.
The “B SBGT train Exhaust Fan operation will be inhibited. (Will not auto start).

d. The “B” SBGT lockout relay will trip.
The “B” SBGT train Exhaust Fan will auto start when/if the “A” SBGT train flow decreases to <3300 SCFM.

ANSWER:	c
Distractor 1:	“B” train auto start is inhibited
Distractor 2:	“B” lockout relay will trip
Distractor 3:	“B” train auto start on low flow is inhibited
REFERENCE:	BECH E113 SHT11
K/A System:	261000 (Standby Gas Treatment System)
K/A Number:	A3.02 (Ability to monitor automatic operations of the Standby Gas Treatment System including: FAN START)
K/A Value:	3.2/3.1
Objective:	7.02.01.03
	Evaluate plant conditions and control room indications to determine if the SBGT System is operating as expected, and identify any actions that may be necessary to place the SBGT System in the correct lineup.
Cognitive Level:	1 I
Source:	Exam Bank

1 Point

29. The Narrow Range GEMAC level transmitters (LT-4559, 4560, and 4561) are used in the Reactor Water Level Control system.

1)Are these transmitters calibrated HOT or COLD?
and
2) What type of compensation, if any, do they use?

a. 1) HOT
   2) None

b. 1) HOT
   2) Temperature compensation

c. 1) COLD
   2) None

d. 1) COLD
   2) Electronic pressure compensation

ANSWER: a

Distracter 1: RPV level control Gemacs are not temperature compensated. This describes Wide range Yarways.

Distracter 2: RPV level control Gemacs are calibrated cold. This describes the Floodup Gemacs.

Distracter 3:RPV level control Gemacs are not calibrated cold. and are not pressure compensated. This describes Fuel zone indicators.

REFERENCE: SD-880

K/A System: 259002 (Reactor water level control)

K/A Number: K5.03 (Knowledge of the operational implications of the following concepts as they apply to Reactor water level control system: Water level measurement)

K/A Value: 3.1/3.2

Objective: 88.00.00.02 (Describe the operation of the following non-nuclear instrument system components including range, control room location, calibration condition, any compensation and any instruments that share the same lines: 1 Level)

Cognitive Level: 1-F

Source: NEW

1 Point

30. The 1C05 operator initiates a control rod movement and observed the following indications:

CRD Drive Water flow on 1C05 indicated 4 gpm then dropped to 2 gpm.

Which of the following explains this sequence of flow rates?

a. The 4 gpm is the flow rate required to overcome the friction of the seals during an insertion of the control rod and the 2 gpm is stall flow.

b. The 4 gpm is required to spread the collet fingers so that they will ratchet along the index tube during the control rod insertion and the 2 gpm is the flow rate required for the control rod insertion.

c. The 4 gpm is the required withdrawal flow rate for the control rod and the 2 gpm is required to spread the collet fingers so that they can ratchet along the index tube during the control rod withdrawal.

d. The 4 gpm is insertion flow rate to lift the weight of the index tube and control rod off the collet fingers so that they can be cammed out of the locking notch and the 2 gpm is the flow rate required for the control rod withdrawal.

ANSWER:	d
Distracter 1:	4 gpm is required to insert the control rod and 2 gpm is required to withdraw the control rod. Stall flow is less than 1 gpm.
Distracter 2:	The collet fingers ratchet along the index tube during insertion and are forced out during withdrawal.
Distracter 3:	4 gpm is required to insert the control rod and 2 gpm is required to withdraw the control rod. The collet fingers ratchet along the index tube during insertion and are forced out during withdrawal.
REFERENCE:	System Description 255, CRD Mechanisms and Hydraulic System, page 21
K/A System:	201003 (Control Rod Drive Mechanism)
K/A Number:	K4.07 (Knowledge of the Control Rod Drive Mechanism System design feature(s) and/or interlocks which provide for the following: MAINTAINING THE CONTROL ROD AT A GIVEN POSITION.)
K/A Value:	3.2/3.2
Objective:	10.07.01.05 Describe the construction and operation of the CRD Mechanism including the following components: DRIVE PISTON and INDEX TUBE.
Cognitive Level:	2 DR
Source:	New Question

31. A Group 5 isolation occurred while operating at full power.

The Group 5 signal is corrected after 1 hour.

Which of the below describes what action is required while restoring the RWCU System to service after this 1 hour period and the reason for the action?

a. The RWCU system needs to be re-vented to remove air pockets.

b. The RWCU system flow needs to be adjusted slowly to avoid thermal shock to the heat exchangers.

c. The RWCU system needs to be pressurized because system pressure will have dropped due to RBCCW removing heat from the non-regenerative heat exchangers.

d. The RWCU system filter demineralizers need to be backwashed and precoated because the resin would be damaged by the heat of the water trapped in the demins during the isolation.

ANSWER: c

Distracter 1: CAUTION on page 28 of OI-261, "Venting the RWCU System should only be accomplished when the reactor is below 212°F or if major maintenance was performed and only after informing the Health Physics Department."

Distracter 2: As part of vessel draining operation, CAUTION on page 26, "RWCU flow rate should be raised slowly to avoid thermal shock to the heat exchangers." (NOT draining in this question) and, part of CAUTION on page 29, "During startup and shutdown of RWCU pumps, pump speed should be adjusted promptly to minimize the time in which the low flow trip is in effect."

Distracter 3: The filter/demins need to be backwashed and precoated if the hold pumps do not start, (NOTE on page 28) however, the temperature of the water trapped in the demins would be normal operating temperature.

REFERENCE: OI-261, Reactor Water Cleanup System

K/A System: 204000 (Reactor Water Cleanup System)

K/A Number:A1.05 (Ability to predict and/or monitor changes in parameters associated with operating Reactor Water Cleanup System controls including:
SYSTEM PRESSURE.)

K/A Value: 2.6/2.6

Objective: 11.01.01.06Evaluate plant conditions and control room indications to determine if the Reactor Water Cleanup System is operating as expected and identify any actions that may be necessary to place the Reactor Water Cleanup System in the correct lineup.

Cognitive Level: 3 PEO

Source: New Question

1 Point

32. Reg. Guide 1.97 requires the DAEC to have RADIATION MONITORS installed specifically for
Post Accident Monitoring conditions.

On which of the following Control Room panels is that equipment installed or displayed?

a. 1C09, "Containment Monitoring" panel

b. 1C10, "Process Rad Monitoring" panel (with 1C02 recorders)

c. 1C29, "Instrument XFV and Sampling" panel

d. 1C36, "SRM and IRM" panel (with 1C02 recorders)

ANSWER: a

Note: T.S. Lists only the DW and Torus high range monitors on 1C09. The TRM calls the KAMAN extended range monitors for the Rx Bldg. Turbine Bldg and Offgas stack PAM instruments, but these monitors are in-plant and alarmed at 1C35, which is not an answer option.

Distracter 1: Sounds logical, but there are no accident monitors (1.97) on this Panel.

Distracter 2:Containment Atmosphere Rad Recorders are on this panel, but they are not accident monitors (1.97).

Distracter 3: Main Steam Line and Refuel Exhaust Rad Monitors are on this panel, but they are not accident monitors (1.97).

REFERENCE: SD-877; T.S. 3.3.3.1; TRM T3.3.3

K/A System: 272000 (Radiation Monitoring)

K/A Number: 2.4.3 (Ability to identify Post Accident instruments.)

K/A Value: 3.5/3.8

Objective: 77.00.00.01 (State the purpose of the following: a. PASS, b. Hi-Range containment radiation monitors.

Cognitive Level: 1-S

Source: NEW

33. A reactor startup is in progress.

The Rod Worth Minimizer (RWM) is in OPERATE.

There are four (4) partially withdrawn rods with substitute positions already entered into the RWM.

When rod 30-31 is moved from position 46 to position 48, the FULL OUT light comes ON but the 48 position for this rod on the 4-Rod display goes BLANK. This is accompanied by a ROD DRIFT annunciator.

There is NO OVERTRAVEL OUT Annunciator.

Which of the following CORRECTLY describes the affect, if any, of this Rod Position Information System (RPIS) failure on the Rod Worth Minimizer?

a. There will be NO AFFECT on the RWM.

b. The RWM will enforce a SELECT BLOCK.

c. The RWM will enforce INSERT and WITHDRAW BLOCKS.

d. There will be NO INSERT, WITHDRAW, or SELECT BLOCKS, but the RWM will provide the message INVALID ROD 30-31 POS, MAX SUBS ALREADY MADE.

ANSWER: c

Distracter 1: The RWM will enforce INSERT and WITHDRAW BLOCKS. RWM gets its rod position indications from 00-48 reed switches.

Distracter 2: The RWM will enforce INSERT and WITHDRAW BLOCKS, not select blocks.

Distracter 3: The RWM will enforce INSERT and WITHDRAW BLOCKS. This message is for when 8 positions are substituted, not 4.

REFERENCE: AOP 357, Rev. 23; SD 878.8, Rev. 3; SD 856.1, Rev. 2; OI 856.3, Rev. 7

K/A System: 214000 (Rod Position Information System)

K/A Number: K3.01 (Knowledge of the effect that a loss or malfunction of the Rod Position Information System will have on the following: RWM.)

K/A Value: 3.0/3.2

Objective: 84.00.00.05

Given a Rod Worth Minimizer System operating mode and various plant conditions, predict how the Rod Worth Minimizer System will be impacted by failures in the following support systems: RPIS.

Cognitive Level: 2-RI

Source: NEW

1 Point

34. When placing the "B" Loop of RHR in the Torus Cooling Mode, the OUTBD TORUS CLG/SPRAY valve, MO-1932, and the TORUS COOLING/TEST valve, MO-1934, must be opened.

    The loss of which of the following busses will prevent operation of these RHR system MOVs?

    a. 1B34

    b. 1B44

    c. 1B34A/1B44A

    d. 1B37

ANSWER: b

Note: Both MOVs are powered from 1B44.

Distracter 1: Selected if candidate identifies A loop valves with the same function.

Distracter 2& 3: Selected if candidate thinks these valves are important enough to be powered from the swing bus. 1B37 comes from the swing bus.

REFERENCE: OI-149 RHR

K/A System: 219000 (RHR/LPCI Torus/Suppression Pool Cooling Mode)

K/A Number: K2.01 (Knowledge of electrical power supplies for the following: VALVES)

K/A Value: 2.5/2.9

Objective: 2.01.01.06

Given an RHR System operating mode and various plant conditions, predict how the RHR System will be impacted by operation, or failure of the following support system(s): ESSENTIAL 4160/480 VAC ELECTRICAL POWER SUPPLIES.

Cognitive Level: 1-F

Source: New Question

1 Point

35. During containment spray operation, direction is provided in the EOPs to ensure containment sprays isolate once drywell pressure drops below 2 psig.

Which ONE of the following is a reason for ensuring the containment sprays isolate?

a. Allow operation of the Drywell Cooling fans.

b. Provide an injection path for dilution nitrogen (CAD).

c. Ensure maximum flow is available for LPCI mode of RHR.

d. Preclude operation of the Reactor Bldg.-to-Torus Vacuum Breakers.

ANSWER: d

Distracter 1: Operation of Drywell Cooling fans is not a consideration for securing drywell spray.

Distracter 2: CAD can be injected through the Torus Spray header at the same time as the Drywell Sprays are in service.

Distracter 3: Drywell Spray should never in service if adequate core cooling is not assured.

REFERENCE: EOP Bases Document,

K/A System: 226001 (RHR/LPCI Containment Spray System Mode)

K/A Number: K5.06 (Knowledge of the operational implications of the following concepts as they apply to the RHR/LPCI Containment Spray System Mode: VACUUM BREAKER OPERATION.)

K/A Value: 2.6/2.8

Objective: 2.01.01.08

For any given RHR System operation or failure, describe the impact of that operation or failure on the following systems or components:
PRIMARY CONTAINMENT

Cognitive Level: 1-B

Source: Modified Exam Bank

1 Point

36. MO-1908 is the Inboard Shutdown Cooling Isolation valve.
MO-1909 is the Outboard Shutdown Cooling Isolation valve.

Which of the following correctly identifies the power supplies to these valves?

a. MO-1908 is powered from 250 VDC bus 1D42.
MO-1909 is powered from 480 VAC bus 1B34.

b. MO-1908 is powered from 480 VAC bus 1B34.
MO-1909 is powered from 250 VDC bus 1D42.

c. Both MO-1908 and MO-1909 are powered from 250 VDC bus 1D42.

d. Both MO-1908 and MO-1909 are powered from 480 VAC bus 1B34.

ANSWER: b

Distracter 1: Correct power supplies but assigned to wrong valves.

Distracter 2: Selected if candidate thinks both are DC valves.

Distracter 3: Selected if candidate thinks both are AC valves.

REFERENCE: OI-149

K/A System: 205000 (Shutdown cooling)

K/A Number: K2.02 (Knowledge of electrical power supplies to the following: Motor Operated valves)

K/A Value: 2.5*/2.7*

Objective: 2.01.01.06 (Given the RHR operating mode and various plant conditions, predict how the RHR system will be impacted by operation or failure of the following support systems: a. Essential 4KV/480 VAC electrical power supplies.)

Cognitive Level: 1-F

Source: NEW

1 Point

37. The plant is in a normal full power lineup when a LOSS of 125 VDC Division 1 occurs.

    Which of the following CORRECTLY describes how the LOSS of 125 VDC Division 1 affects the ability of the "A" Standby Diesel Generator (SBDG) to respond to a Loss of Offsite Power initiation signal?

    a. No affect. The A SBDG will respond as designed.

    b. The A SBDG will NOT auto start.

    c. The A SBDG will auto start, but the generator field will NOT flash and the output breaker will NOT auto close onto 1A3.

    d. The A SBDG will auto start and the generator field will flash, but the output breaker will NOT auto close onto 1A3.

ANSWER: b

Distracters 1, 2, &3: Div 1 125 VDC supplies all three SBDG components; start logic, field flash and breaker control.

REFERENCE: SD-324; AOP 302.1

K/A System:	263000 (DC Electrical Distribution)
K/A Number:	K3.01 (Knowledge of the effect that a loss or malfunction of the DC electrical distribution system will have on the following: Emergency Generators)
K/A Value:	3.4/3.8
Objective:	19.02.01.05 (Given the SBDG operating mode and various plant conditions, predict how the SBDG will be impacted by the failure of the following support systems: a. 125VDC.)
Cognitive Level:	3-PEO
Source:	NEW

38. A long term loss of Division 2 Instrument AC bus 1Y21 would present which of the following concerns?

   a. Inboard MSIVs drifting CLOSED due to CV-4371A failing CLOSED.

   b. Rising reactor water level due to "B" Recirc MG Set running back to minimum.

   c. Inability to move control rods due to CRD Flow control valves failing CLOSED.

   d. Increasing reactor power due to a loss of feedwater heating when feedwater heater drain and dump valves fail OPEN.

ANSWER: a

Distracter 1: "B" Recirc MG Set scoop tube will lockup on a loss of 1Y21.

Distracter 2: CRD flow control valves failed closed on a loss of 1Y11.

Distracter 3: Feedwater heater drain and dump fails fail open on a loss of Uninterruptible AC power.

REFERENCE: AOP 317, Loss of 120VAC Inst AC.

K/A System: 239001 (Main and Reheat Steam System)

K/A Number: K6.01 (Knowledge of the effect of a loss or malfunction of the following will have on the Main and Reheat Steam System: ELECTRICAL POWER.)

K/A Value: 3.1/3.3

Objective: 48.01.01.03

Given a Main Steam System operating mode and various plant conditions, predict how the Main Steam System will be impacted by failures in the following support systems: 480 VAC NON-ESSENTIAL MCC 1B22, 480 VAC ESSENTIAL MCC 1B32, RPS. INSTRUMENT AC CONTROL POWER, 125 VDC PANELS 1D13 and 1D23, and 250 VDC PANEL 1D42.

Cognitive Level: 2 RI

Source: New Question

39. (Assume that all times and values provided are exact.)

The System Operation Center requests that the DAEC lower generator output by 60 MWe.

The operator on the Recirc controls records the following readings as he begins the downpower:

Time	Generator Megawatt Output
0120	560 MWe
0121	550 MWe
0122	547 MWe
0123	544 MWe
0124	542 MWe
0125	540 MWe

1) Has the operator exceeded the IPOI-3 "Power Operations" limit for STEP CHANGES in reactor power? (Exceeded or NOT exceeded)
2) Has the operator exceeded the IPOI-3 limit for OVERALL RATE OF POWER CHANGE? (Exceeded or NOT exceeded)

a. 1) Exceeded
2) Exceeded

b. 1) Exceeded
2) NOT exceeded

c. 1) NOT exceeded
2) Exceeded

d. 1) NOT exceeded
2) NOT exceeded

ANSWER: d

Note: First step change was 10 MWe; The limit is 5%, or ≈25Mwe. Overall rate of change was 20 MWe/5 minutes or 4 MWe/Minute; The limit is 1% or 5 MWe/minute. The customary rate of change is 2-3 MWe/Min.
Distracter 1: Selected if candidate thinks Step Change limit is 1% (5 MWe) and Overall rate limit is 2-3 MWe/minute.
Distracter 2: Selected if candidate thinks Step Change limit is 1% (5 MWe).
Distracter 3: Selected if candidate thinks Overall rate limit is 2-3 MWe/minute.

REFERENCE: IPOI 3, Power Operations

K/A System: 245000 (Main Turbine Generator and Auxiliary Systems)

K/A Number: A4.05 (Ability to manually operate and/or monitor in the control room: GENERATOR MEGAWATT OUTPUT.)

K/A Value: 2.7/2.7

Objective: 93.11.01.13 Explain basis for the P&Ls of IPOI-3.

Cognitive Level: 3-SPK

Source: New Question

1 Point

40. A COMPLETE LOSS Uninterruptible AC Power (1Y23) has occurred while at 100% power.

Operators manually scrammed the reactor due to RPV level control problems. RPV level lowered to 140″ and is now at 150″ and rising slowly.

Assume that there are NO EOP-2 entry conditions.

Which of the following EOP-1 Alternate Pressure Control Systems will **NOT** remain available?

a. Main Steam Line Drains

b. Main Turbine Bypass Valves

c. RWCU in Recirculation Mode

d. LOW- LOW Set Safety Relief Valves

ANSWER: b

Note: Uninterruptible AC Power would not be available to power EHC Logic after the turbine trip therefore, turbine bypass valves cannot be used.

Distracter 1: Would remain available. Selected if candidate thinks a Group 1 Isolation would occur.

Distracter 2: Would remain available. Selected if candidate thinks a Group 5 Isolation would occur.

Distracter 3: Would remain available. Selected if candidate thinks LLS logic is powered from UPS.

REFERENCE: AOP 301, Loss of Essential Power, and AOP 357, Loss of Uninterruptible AC Power.

K/A System: 262002 (Uninterruptible Power Supply)

K/A Number: K3.13 (Knowledge of the effect that a loss or malfunction of the Uninterruptible Power Supply will have on the following: REACTOR PRESSURE.)

K/A Value: 2.7/2.9

Objective: 52.01.01.02

Given an EHC System operating mode and various plant conditions, predict how the EHC System will be impacted by failures in the following support systems: UNINTERRUPTIBLE AC CONTROL POWER SYSTEM.

Cognitive Level: 2 RI

Source: Exam Bank

1 Point

41. Which of the following Offgas System design feature(s) function to maximize carbon bed efficiency?

   a. preheating the offgas with steam prior to the recombiner

   b. routing the offgas through the 37 second and 30 minute holdup lines

   c. maintaining the carbon bed vaults at 77°F and reheating the offgas prior to the carbon beds

   d. filtering the offgas prior to the carbon beds and directing the flow upward through the first three beds

ANSWER: c

Distracter 1: Preheating maximizes the operation of the recombiner

Distracter 2: Routing the offgas through the holdup lines allow the short lived isotopes to decay

Distracter 3: Filtering removes particulates and does not effect efficiency. Directing flow upward enhances draining

REFERENCE: System Description 672, Offgas System

K/A System: 271000 (Offgas System)

K/A Number: K4.07 (Knowledge of OFFGAS SYSTEM design feature(s) and/or interlocks which provide for the following: MAXIMIZING CARBON BED EFFICIENCY.)

K/A Value: 2.6/2.7

Objective: 47.01.01.02

Describe the purpose/operation of the following principle Offgas and Recombiner System components and subsystems: OFFGAS MOISTURE SEPARATORS and ELECTRIC REHEATER.

Cognitive Level: 1 F

Source: New Question

1 Point

42. The Electrical grid and site transformers have been restored following a Loss of Offsite Power.

The OSS directs you, as the 1C08 panel operator, to transfer 1A3 from the "A" Standby Diesel Generator (SBDG) to the Startup transformer.

- The BUS 1A3 TRANSFER breaker mode selector switch is placed in MANUAL.
- The handle for the SYNCHRONIZE switch is inserted into 4KV BREAKER 1A302 STARTUP TRANSFORMER TO BUS 1A3 and placed in the ON position.

At this point you observe that the synchroscope is rotating slowly in the COUNTER CLOCKWISE direction.

Which of the following CORRECTLY describes the operational implications of these synchroscope indications while preparing for breaker closure?

a. "A" SBDG speed must be RAISED to achieve proper synchroscope rotation for breaker closure because it is the RUNNING source.

b. "A" SBDG speed must be LOWERED to achieve proper synchroscope rotation for breaker closure because it is the RUNNING source.

c. This is the accepted direction of rotation for breaker closure when an Offsite source is the INCOMING source.

d. The System Operations Center (SOC) must adjust synchroscope rotation for breaker closure because the Offsite source is the INCOMING source.

ANSWER: b

Note: Synchroscope must be moving slowly in the CLOCKWISE direction for breaker closure.

Distracter 1: A SBDG is almost always the incoming source, but not in this situation. If it were incoming, raising would be the correct direction of adjustment.

Distracter 2: Rare situation; Plausible if candidate does not understand synchronization principles.

Distracter 3: Rare situation; Plausible if candidate does not understand synchronization principles.

REFERENCE: OI-304.2

K/A System: 262001 (A.C. Electrical Distribution)

K/A Number: K5.01 (Knowledge of the operational implications of the following concepts as they apply to A.C. Electrical Distribution: Principle involved with paralleling two A.C. sources.)

K/A Value: 3.1/3.4

Objective: Task 15.08 Transfer essential bus from SBDG to Startup transformer.

Cognitive Level: 3-SPK

Source: NEW

1 Point

43. Which of the following operator actions MUST be taken before the Diesel Fire Pump, 1P-49, can be started locally by lifting one of the two MANUAL START CONTACTOR LEVERS?

In order for 1P-49 to be started by lifting a manual start contactor lever, the operator MUST FIRST...

a. override open the electric fuel solenoid.

b. close the breaker to the emergency start batteries.

c. place Control Switch HS-3300A in 1C-116 in the TEST position.

d. place Control Switch HS-3300A in 1C-116 in either the MAN A or MAN B position.

ANSWER: a

Note: When started from the Control Room or 1C-116 the fuel solenoid is energized to open. On a manual start , there is no fuel until the fuel solenoid is overridden. There are 4 distinct ways to start 1P-49; from the Control Room, HS-3300A to MAN A or MAN B and depress START PB, HS-3300A to TEST, and finally by overriding fuel solenoid and manually lifting a start contactor.

Distracter 1: Batteries are always connected to starter and provide DC control power to 1C116.

Distracter 2: This action by itself will start 1P-49 and is not required to be performed first.

Distracter 3: This action electrically energizes the starting contactors when used in conjunction with the START pushbutton, but is not required to be performed first.

REFERENCE: OI-513

K/A System: 286000 (Fire Protection System)

K/A Number: 2.1.30 (Ability to locate and operate components including local controls.)

K/A Value: 3.9/3.4

Objective: NSPEO Task 9.05 (Plant Equipment Operator)

Cognitive Level: 1-P

Source: NEW

1 Point

44. The plant is shutdown with refueling / fuel movement operations in progress.

An NSPEO in the Reactor Bldg. reports that craft workers have set up a welder on the Second Floor and have run their welding cables through the two doors going into the Recirc MG room.

Which of the following is
1) the proper initial response, if any, to this report?
2) the reason for this response?

a. 1) No response is necessary.
   2) These are not Secondary Containment Airlock doors.

b. 1) No response is necessary.
   2) These are Secondary Containment Airlock doors but they are not required to be operable
   during Refueling outages.

c. 1) Initiate action to close at least one of these doors within 4 hours.
   2) These are Secondary Containment Airlock doors that are required to be operable in Modes 1, 2, and 3.

d. 1) Suspend movement of irradiated fuel.
   2) These are Secondary Containment Airlock doors that are required to be operable during
   fuel movement.

ANSWER: d

Note: The DAEC will begin RFO 17 shortly after the 4/9/01 ILC exam. Correct answer can be found in Tech Specs and in Refueling Procedure.

Distracter 1: Possible misconception, but doors are Sec Cont airlock doors.

Distracter 2: Sec Cont airlock doors are sometimes disabled during Refuel outages, but are required during fuel movement.

Distracter 3: This is the proper response in modes 1, 2, or 3; but the plant is in mode 5.

REFERENCE: T. S. 3.6.4.1

K/A System: 290001 (Secondary Containment)

K/A Number:A2.01 (Ability to predict the impact of the following on secondary containment; and based on those predictions, use procedures to correct, control or mitigate the consequences of those abnormal conditions or operations: Personnel airlock failure.)

K/A Value: 3.3/3.7
Objective:98.02.01.02 (Relate the P&Ls, operating cautions or special cautions of RFP 301, ,RFP 402, and RFP 403 to any fuel handling component or evolution status.)
Cognitive Level: 3-SPK
Source: New

1 Point

45. An accident has occurred which resulted in an offsite release.

The Control Building Intake Rad Monitors, RIM6101A/B were at approximately 2 mR/hr and rising at 1 – 2 mR/hr per minute.

At 0933, RIM6101A exceeded 5 mR/hr.
At 0935, RIM6101B exceeded 5 mR/hr.

The Standby Filter Units (SFU) and Control Bldg. HVAC shifted to the following lineup:

	A SFU	B SFU
Intake Valve, AV7301	OPEN	CLOSED
Heater, EC7304	ON	OFF
Discharge valve, AV7318	OPEN	CLOSED
Fan, 1V-SF-30	ON	OFF
Intake Isolation Dampers, 1V-AD-30A & B	CLOSED	
Exhaust Isolation Dampers, 1V-AD-31A & B	CLOSED	

Based only on the indications provided, are the SFUs operating properly? (NO or YES)
If NO, identify what is wrong.
If YES, identify what conditions if any will cause "B" SFU to start.

a. No; the "B" SFU should have automatically started the same as "A" SFU.

b. No; the "B" SFU intake and exhaust dampers, 1V-AD-30B & 1V-AD-31B, should be OPEN.

c. Yes; the "B" SFU will not automatically start until the "A" SFU flow drops to ≤800 scfm.

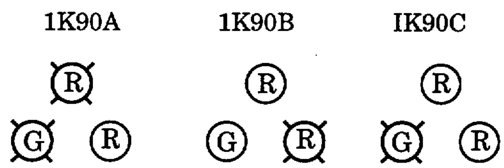
d. Yes; the "B" SFU will not automatically start until the "A" SFU cannot maintain the Control Room at a positive pressure.

ANSWER: c
Note: Initiation takes a lockout >5mr and <800 scfm. The A SFU would have established flow.
Distracter 1:"B" SFU will go into Standby automatically. A SFU has had 2 minutes to establish >800 scfm flow. This logic is different than SBGT.
Distracter 2: "B" SFU lockout should have tripped, closing the dampers.
Distracter 3: The Battery Exhaust fans shift to keep Control Room DP positive.
REFERENCE: SD 730, OI 730
K/A System: 290003 (Control Room HVAC)
K/A Number: A2.01 (Ability to (a) predict the impacts of the following on the Control Room HVAC and, (b) based on those predictions, use procedures to correct, control or mitigate the consequences of those abnormal conditions or operations: INITIATION/RECONFIGURATION.
K/A Value: 3.1/3.2
Objective: 65.01.01.05List the signals which cause a Control Building HVAC System isolation/Standby Filter Unit auto initiation including setpoints and logic. Describe how the Control Building HVAC System responds to a SFU initiation signal.
Cognitive Level: 1 I
Source: Revised, Exam Bank

1 Point

46. Upon entering the control room, you observe the following indications for the Instrument and Service Air Compressors 1K90A, B, and C.
G is GREEN and R is RED.

Instrument Air header pressure is 100 psig.



Which of the following would explain a situation in which these indications would be present?

a. 1K90A is running as the Lag compressor; 1K90B has tripped on Motor Overload.

b. 1K90B is running as the Lead compressor; 1K90C has tripped on Low Oil Pressure.

c. 1K90C is running as the Lead compressor; 1K90A has tripped on High Oil Temperature.

d. 1K90B is running as the Lag compressor; 1K90A has tripped on High 2nd Stage Outlet Temperature.

ANSWER: d
Distracter 1, 2, 3: 1K90A is the Lead compressor and has tripped; 1K90B is the Lag compressor and is running; 1K90C is the Lag-Lag compressor and is not running or tripped.
REFERENCE: System Description 518, Instrument and Service Air System and ARP 1C07B, A-9, AIR COMPRESSOR TRIP
K/A System: 300000 (Instrument Air System)
K/A Number: A3.02 (Ability to monitor automatic operations of the Instrument Air System including: AIR TEMPERATURE.)
K/A Value: 2.9/2.7
Objective: 36.00.00.05 OR 36.00.00.06
Evaluate plant conditions and control room indications to determine if the Instrument and Service Air System is operating as expected, and identify any actions that may be necessary to place the Instrument and Service Air System in the correct lineup. OR
Identify the appropriate procedures that govern the Instrument and Service Air System operation, include operator responsibilities during all modes of operation, and any actions required to be performed by personnel outside the control room.
Cognitive Level: 2-DR
Source: New Question

1 Point

47. A high RPV water level transient has occurred while at power.

    1C05A, D-1 REACTOR VESSEL HI/LO LEVEL RECORDER ALARM annunciated.

    Which of the following CORRECTLY describes the level at which this ANNUNCIATOR is received and a directed action from the ARP?

    a. 195″; take manual control of any or all feedwater regulating valves.

    b. 211″ trip HPCI and RCIC.

    c. 214″; trip the low pressure ECCS pumps.

    d. 258″; close the MSIVs.

ANSWER: a

Note: 1C05A,D-1 annunciator alarms at 195″.
Distracter 1:211″ is the high level trip of Feedwater Pumps, Main Turbine, HPCI and RCIC.

Distracter 2: 214″ is the level at which water is raised in the event of a loss of forced circulation.

Distracter 3: 258″ is the level of the Main Steam lines. Tripping of pumps and Closing MSIVs are actions directed based on plant conditions.

REFERENCE: ARP 1C05A, D-1, REACTOR VESSEL HI/LO LEVEL RECORDER ALARM

K/A System: 295008 (RPV High Level)

K/A Number: 2.4.50 (Ability to verify system alarm setpoints and operate controls identified in ARP.)

K/A Value: 3.3/3.3

Objective: 45.01.01.02

Identify the appropriate procedures that govern the Feed and Condensate System operation, include operator responsibilities during all modes of operation, and any actions required to be performed by personnel outside the control room.

Cognitive Level: 1 P & S

Source: New

1 Point

48. At which of the following positions is the Transversing Incore Probe (TIP) detector when the associated DETECTOR POSITION display is reading <u>0001</u> ?

a. At the CORE TOP position

b. At the CORE BOTTOM position

c. At the INDEXER position

d. At the IN-SHIELD position

ANSWER:	c
Distracter 1:	0001 could be core top, i.e. fully inserted.
Distracter 2:	0001 could be core bottom, i.e. starting into the core.
Distracter 3:	0001 could be in-shield, i.e. fully withdrawn.
REFERENCE:	System Description 878.6 Traversing In-Core Probe System; OI-878.6

K/A System:	215001 (Traversing In-Core Probe)
K/A Number:	A1.02 (Ability to predict and/or monitor changes in parameters associated with operating the Traversing In-Core Probe controls including: DETECTOR POSITION.)
K/A Value:	2.5/2.4
Objective:	83.01.01.07 Evaluate plant conditions and control room indications to determine if the TIP System is operating as expected, and identify any actions necessary to place the TIP System in the correct lineup.

Cognitive Level:	1-F
Source:	New Question

1 Point

49. Which of the following are possible indications to the control operator that the in service Fuel Pool Cooling pump has tripped?

a. Annunciator 1C04B, A-4, FUEL POOL HI/LO LEVEL; lowering Fuel Pool level indicated on LI-3413 at 1C04

b. The Radwaste operator reports an annunciator on Panel 1C136; rising Fuel Pool level indicated on LI-3413 at 1C04

c. SANSOE reports that there is a Low Flow annunciator on Panel 1C136, rising Skimmer Surge Tank level indicated on LI-4312 at 1C04

d. Annunciator 1C04B, D-2, FUEL POOL COOLING PANEL 1C-65/1C-66 TOUBLE; lowering Skimmer Surge Tank level indicated on LI-4312 at 1C04

ANSWER: c

Distracter 1: Normal level in the Fuel Pool is 37 ft. 5 inches with some water going over the weirs. The low level alarms is at 37 ft. 1 inch. Level will lower to the weirs.

Distracter 2: The Radwaste operator will get the alarm but Fuel Pool level will lower slightly to the level of the weirs.

Distracter 3: Skimmer Surge Tank level will increase.

REFERENCE: ARP 1C04B, D-2, FUEL POOL COOLING PANEL 1C-65/1C-66 TOUBLE, OI-435, Fuel Pool Cooling System, M-135, Fuel Pooling Cooling

K/A System: 233000 (Fuel Pool Cooling and Cleanup)

K/A Number: A3.03 (Ability to monitor automatic operations of the Fuel Pool Cooling and Cleanup including: SYSTEM INDICATING LIGHTS AND ALARMS.

K/A Value: 2.6/2.6

Objective: 31.00.00.07

Evaluate plant conditions and control room indications to determine if the Fuel Pool and Fuel Pool Cooling System is operating as expected, and identify any actions necessary to place the Fuel Pool and Fuel Pool Cooling System in the correct lineup.

Cognitive Level: 2-RI

Source: New Question

1 Point

50. What type of CORE ORIFICING, if any, is used at the Duane Arnold Energy Center?

a. Core orificing is NOT used at the DAEC.

b. Core orificing is used at the DAEC.
The SAME size orifice pieces are used throughout the core.

c. Core orificing is used at the DAEC.
The peripheral orifice pieces are SMALLER (tighter) than the ones used on the core interior.

d. Core orificing is used at the DAEC.
The peripheral orifice pieces are LARGER (looser) than the ones used on the core interior.

ANSWER: c

Note: SD states that DEAC has orifices. Generic Fundamentals explains why it is necessary and how it works on a BWR.

Distracter 1, 2, 3:All fuel support pieces have orifice plates. The peripherals are tighter to equalize flow throughout the core. (i.e.: force more flow through the higher powered bundles.)

REFERENCE: System Description 262. Generic Fundamentals Chapter 8, "Thermal Hydraulics"

K/A System: 290002 (Reactor Vessel Internals)

K/A Number: K4.03 (Knowledge of Reactor Vessel Internals design feature(s) and/or interlocks which provide for the following: CORE ORIFICING.)

K/A Value: 3.2/3.3

Objective: 50007.01.09 Define core orificing and explain why it is necessary for a BWR.

Cognitive Level: 2-DR
(The fact that DAEC has core orifices is level 1 F. After that, the reason for the sizing of the orifices is not simple memory; it requires "Understanding".

Source: New Question

1 Point

51. An ATWS has occurred.

The 1C05 operator has started the second CRD pump and is performing RIP 103.2 "Increase CRD Cooling Flow and Pressure".

1) How will CRD cooling flow be increased?
2) How will CRD cooling pressure be increased?

a. 1) By raising the CRD Flow Controller FC-1814 setpoint to maximum in AUTO.
   2) By throttling OPEN MO-1830, DRIVE WATER ΔP CONTROL.

b. 1) By raising the CRD Flow Controller FC-1814 setpoint to maximum in AUTO.
   2) By throttling CLOSED MO-1830, DRIVE WATER ΔP CONTROL.

c. 1) By raising the CRD Flow Controller FC-1814 output to maximum in MANUAL.
   2) By throttling OPEN MO-1830, DRIVE WATER ΔP CONTROL.

d. 1) By raising the CRD Flow Controller FC-1814 output to maximum in MANUAL.
   2) By throttling CLOSED MO-1830, DRIVE WATER ΔP CONTROL.

ANSWER: c

Distracter 1: Controller in AUTO is plausible to free up operator during a busy evolution.

Distracter 2 : Controller in AUTO is plausible to free up operator during a busy evolution. Closing Drive water DP valve is plausible because it raised Drive water pressure to better drive control rods.

Distracter 3: Closing Drive water DP valve is plausible because it raised Drive water pressure to better drive control rods.

REFERENCE: RIP 103.2

K/A System: 295015 (Incomplete scram-Abnormal)
K/A Number: 2.4.11 (Knowledge of Abnormal condition procedures.)
K/A Value: 3.4/3.6
Objective: Task 95.08 Insert control rods by increasing CRD Cooling Flow and Pressure.
Cognitive Level: 1-P
Source: NEW

52. With the plant operating at 25%power, supplying the grid, a generator primary lockout occurs. What changes occur in the plant electrical system and turbine as a result of this event? Assume a normal plant electrical lineup prior to this event.

a. turbine trip; no bus transfer; load shed occurs

b. turbine trip; bus 1A1 and 1A2 closed circuit transfer to the startup transformer; no load shed

c. no turbine trip; bus 1A1 and 1A2 closed circuit transfer to the startup transformer; no load shed

d. turbine trip; bus 1A1 and 1A2 open circuit transfer to the startup transformer; non-essential bus load shed occurs

ANSWER: d

Distracter 1: Generator Primary Lockout Relay is designed to protect the Main Generator, initiate a Turbine trip, and initiate an Open Circuit transfer (SD-304).

Distracter 2: Generator Primary Lockout Relay trip will cause an Open Circuit transfer (ARP 1C08C A-1).

Distracter 3: Generator Primary Lockout Relay trip will trip the Main Turbine (ARP 1C07A A-2).

REFERENCE: ARP 1C08C A-1, SD-304 page 12, 18, 19

K/A System: 295005 (Main Generator Trip)

K/A Number: AA1.07 (Ability to operate and/or monitor the following as they apply to Main Generator Trip: AC ELECTRICAL DISTRIBUTION.)

K/A Value: 3.3/3.3

DAEC Objective: 14.00.00.03

Evaluate plant conditions and control room indications to determine if the Non-essential Electrical Distribution is operating as expected, and identify any actions that may be necessary to place the Non-essential Electrical Distribution System in the correct lineup, include in this evaluation both an open and closed transfer.

Cognitive Level: 1 I

Source: Exam Bank, Question # 758

1 Point

53. GEMAC Feedwater Level Controllers were in normal operation for full power operation when a reactor scram occurred.

Per IPOI-5, "Reactor Scram", the 1C05 operator depressed the pushbutton handswitch for MANUAL LEVEL SETBACK TO 175".

Which of the following CORRECTLY describes the affect of this action on the Feedwater Level Controllers?

a. The Master Controller remains in AUTO and its setpoint goes to 175".

b. The Master Controller shifts to MANUAL and its setpoint goes to 175".

c. The Master Controller is removed from the circuit.
Both "A" and "B" Feed Reg Valves remain in AUTO and their setpoints go to 175".

d. The Master Controller is removed from the circuit.
Both "A" and "B" Feed Reg Valves shift to MANUAL and their setpoints go to 175".

ANSWER: a

Note: The only time this switch is used is during Feedwater Level control following a reactor scram.

Distracter 1: Plausible because of the name of the pushbutton.

Distracter 2: Plausible because operator may want to control feed reg valves independently after a scram. A & B controllers in AUTO put the master in the control circuitry.

Distracter 3: Plausible because of the name of the pushbutton.

REFERENCE: IPOI 5

K/A System: 295006 (Scram)

K/A Number: AK2.02 (Knowledge of the interrelations between SCRAM and the following: REACTOR WATER LEVEL CONTROL)

K/A Value: 3.8/3.8

DAEC Objective: 45.05.01.05 Describe the operation of the FWLC circuitry.

Cognitive Level: 1-I

Source: New

1 Point

54. A loss of coolant accident with concurrent loss of Well Water pumps has occurred while at power. Operators are attempting to restore Well Water and Drywell Cooling.

When the Drywell Average Air temperature cannot be restored and maintained below 280°F, the OSS orders that an Emergency Depressurization be initiated.

One of the reasons for performing Emergency Depressurization at this point is to ensure that Drywell temperatures will remain below structural design limits.

Which of the following is also a basis for this action?

Emergency Depressurization is performed at this point in order to ensure ...

a. that indications from the RPV water level instruments will remain valid after the blowdown.

b. that the blowdown is performed before exceeding the environmental qualification limits of the ADS SRVs.

c. that water hammer will not occur in the Well Water System when Drywell Cooling loop flow is restored.

d. that the energy within the reactor is directed to the torus before exceeding the Torus Heat Capacity Temperature Limit.

ANSWER: b

Distracter 1: Operators must watch out for Sat Curve entry and unstable indications, but this is not a basis.

Distracter 2: Defeats 4 is concerned about DW cooling restoration after elevated temperatures, but this is not a basis for ED.

Distracter 3: ED is performed if the HCL will be exceeded, but HCL is based on RPV pressure and Torus Temp, not DW temp.

REFERENCE: EOP Bases.

K/A System: 295028 (High Drywell Temperature)

K/A Number: K3.01 (Knowledge of the reasons for the following responses as they apply to High Drywell Temperature: Emergency Depressurization)

K/A Value: 3.6/3.9

DAEC Objective: 95.00.00.20

Cognitive Level: 1 B

Source: Industry, Revised

1 Point

55. The Electrohydraulic Control (EHC) System logic diagram provided on the next page.

The EHC system was in the following condition:

- Pressure Setpoint 940 psig
- Load Set Setpoint 600 MWe
- Load Limit 100%
- Max Combined Flow Limiter 125%

A transient occurs that results in a RISE in reactor pressure and a RISE in Main Turbine Throttle pressure to 980 psig

Which of the following CORRECTLY describes the response of the EHC system?

a. The Pressure Set unit will shift control to the "B" pressure regulator.

b. The Load Limit will be controlling and allow a maximum of 100% steam flow to the condenser.

c. The Load Set Limiter will be controlling and will allow the Turbine Control Valves to open until the generator load is 600 MWe.

d. The Max Combined Flow Limiter will be controlling and will allow the Turbine Control Valves to be fully open and with at least one Bypass Valve open.

ANSWER: d

Distracter 1: Both Pressure regulator would adjust their outputs equally an "A" would remain in control.

Distracter 2: Load Limit is set at 100% to limit the Main Generator to 100% of rated electrical load, and adjusts the Control Valves accordingly. This setting does not affect the Bypass Valves positioning.

Distracter 3: The Load set limiter is set at a higher value than pressure set and load limit and would not take control.

REFERENCE: SD-693.2a, Figure 8

K/A System: 295007 (High reactor pressure)

K/A Number: AA1.05 (Ability to operate and/or monitor as they apply to High reactor pressure: REACTOR/TURBINE PRESSURE REGULATING SYSTEM.)

K/A Value: 3.7/3.8

DAEC Objective: 99.16.01.06 Evaluate plant conditions and control room indications to determine if the EHC System is operating as expected, and identify any actions that may be necessary to place the EHC System in the correct lineup.

Cognitive Level: 3 PEO

Source: Exam Bank, Question # 2679

1 Point

56. Reactor power was 100% when the "A" Reactor Feed pump tripped.

    1) Do the Recirculation Pumps INITIALLY runback to 20% or 45%?
    2) Is this automatic runback expected to prevent a RPV low level scram?

a. 1) 20%
   2) YES; The runback will prevent a RPV low level scram.

b. 1) 20%
   2) NO; The runback allows additional time for operator action prior to reaching the low level
   scram setpoint.

c. 1) 45%
   2) YES; The runback will prevent a RPV low level scram.

d. 1) 45%
   2) NO; The runback allows additional time for operator action prior to reaching the low level
   scram setpoint.

ANSWER: d

Note: Based on a Plant event. Follow up investigation confirmed that plant will not avoid a RPV low level scram from 100% power upon loss of a Feed Pump. SD 264 states that purpose is to "allow additional time for operator action prior to reaching the low level scram setpoint". Pump discharge valve closed is a 20% or Feed flow <20 % is a 20% runback.

Distracter 1: 45% Runback not 20%. If recirc did runback all the way to 20% the low level scram might be avoided.

Distracter 2: 45% Runback not 20%. Reason is correct/

Distracter 3: Low level scram is unavoidable.

REFERENCE: System Description 264 Reactor Recirculation System, pages 31 and 32

K/A System: 295009 (Low Reactor Water Level)

K/A: AK3.01 (Knowledge of the reasons for the following responses as they apply to Low Reactor Water Level: RECIRCULATION PUMP RUNBACK)

K/A Value: 3.2/3.3

DAEC Objective: 12.00.00.02 Identify the conditions that allow or cause the following events to occur: RECIRC PUMP SPEED LIMITER IN EFFECT.

Cognitive Level: 1-I & B

Source: New

1 Point

57. HOW MANY Liquid Process Radiation Monitors are installed for the Residual Heat Removal Service Water (RHRSW) and Emergency Service Water (ESW) systems and WHAT POINTS do they monitor?

a. 1 Process Rad Monitor.
It monitors the combined RHRSW/ESW return flow to the Cooling Towers.

b. 2 Process Rad Monitors.
One monitors the combined RHRSW/ESW return flow to the Cooling Towers.
One monitors the combined RHRSW/ESW return flow to the Discharge Canal.

c. 3 Process Rad Monitors.
One monitors RHRSW return flow to the Cooling Towers.
One monitors ESW return flow to the Cooling Towers.
One monitors the combined RHRSW/ESW return flow to the Discharge Canal.

d. 4 Process Rad Monitors.
One monitors RHRSW return flow to the Cooling Towers.
One monitors RHRSW return flow to the Discharge Canal.
One monitors ESW return flow to the Cooling Towers.
One monitors ESW return flow to the Discharge Canal.

ANSWER: b

Distractor 1:MO-1998A&B are almost always open at power sending flow past the cooling tower return and not the discharge canal. The discharge Canal monitor rarely alarms as is easily forgotten. The Cooling tower return is in the HPCI room and is an occasional problem.

Distractor 2: Possible misconception, but there are only two monitors.

Distractor 3:Possible misconception, but there are only two monitors.

REFERENCE: SD 879.1; ARP 1C03AD-8; P&ID M-113 & 142

K/A System: 400000 (Component Cooling Water)

K/A Number:K1.03 (Knowledge of the physical connections and/or cause–effect relationship between CCWS and the following: Radiation Monitoring Systems)

K/A Value: 2.7/3.0

DAEC Objective: 85.00.00.03 (Describe in detail the subsystems of the PRM system, including methods of detection.)

Cognitive Level: 1-S

Source: NEW

1 Point

58. A transient has occurred that resulted in power operations in the Exclusion Zone of the DAEC Stability Power/Flow Map.

The Panel 1C05 operator has been assigned to monitor for core thermal/hydraulic instability.

Assume that A, B, C, & D APRMs remain relatively stable at 52-55% throughout this period.

The Panel 1C05 operator observes these changes to E and F APRMs per the following timeline:

- Time 1:
  Low to High values on E APRM are observed to be 50-57% with the band getting wider. F APRM remains relatively stable at 52-55% at this time.
- Time 2:
  Low to High values on E APRM are observed to be 49-58% with the band getting wider. Low to High values on F APRM are observed to be 50-57% with the band getting wider.
- Time 3:
  Low to High values on E APRM are observed to be 48-59% with the band getting wider. Low to High values on F APRM are observed to be 49-58% with the band getting wider.
- Time 4:
  Low to High values on E APRM are observed to be 47-60% with the band getting wider. Low to High values on F APRM are observed to be 48-59% with the band getting wider.

Per AOP-255.2, "Power/Reactivity Abnormal Change", at which time is a manual reactor scram first required?

a. Time 1

b. Time 2

c. Time 3

d. Time 4

ANSWER: a
Note: Scram required for ANY APRM "undamped oscillations greater than normal".
Normal = 52-55% in this case. A previous definition was >10% swings.
Distracter 1: Selected if candidate thinks >1 APRM with undamped oscillations is necessary.
Distracter 2: Selected if candidate thinks any APRM with oscillations >10% is necessary.
Distracter 3: Selected if candidate thinks >1 APRM with oscillations >10% is necessary
REFERENCE: AOP 255.2 Power/Reactivity Abnormal Change, IPOI-3 Appendix 1
K/A System: 295014 (Inadvertent Reactivity Addition)
K/A Number: AK3.01 (Knowledge of the reasons for the following responses as they apply to Inadvertent Reactivity Addition: reactor scram).
K/A Value: 4.1/4.1
DAEC Objective: 94.03.04.01 Explain when a reactor scram is required per AOP 255.2.
Cognitive Level: 3-SPK
Source: NEW

59. A slightly modified version of the last five pages of a recently used Rod Pull Sheet are provided on the next page of this exam.

Step 39 rods are at position 12.

The OSS directs you to insert the CRAM Rods in response to a loss of feedwater heating transient.

The Rod Worth Minimizer has been bypassed.

Which Control Rod should be inserted FIRST?
And
HOW FAR should it be inserted when it is first moved?

a. Rod 14-15
To position 12

b. Rod 14-15
To position 00

c. Rod 22-15
To position 10

d. Rod 22-15
To position 00

ANSWER: d

Note; Loss of feedwater heating is listed in AOP 255.2 as a possible cause of Power / reactivity abnormal change and is one of the few known events in which the CRAM group is useful.

Distracter 1: Selected if candidate thinks Cram Groups are inserted from 5 to 1. Selected if candidate thinks rod is only inserted to the insert limit listed on the pull sheet.

Distracter 2: Selected if candidate thinks Cram Groups are inserted from 5 to 1.

Distracter 3: Selected if candidate thinks rod is only inserted to the insert limit listed on the pull sheet.

REFERENCE: IPOI-4 Section 6.0 Fast Power Reduction; AOP 255.2 "Power / reactivity abnormal change"

K/A System: 295014 (Inadvertent Reactivity Addition)

K/A Number: AA1.03 (Ability to operate and monitor the following as they apply to Inadvertent Reactivity Addition: RMCS.)

K/A Value: 3.5/3.5

DAEC Objective: 94.03.02.01 Explain the difference between the Cram Group and the Cram Method with regards to control rod insertion and where guidance on how to use the Cram Group/Method is located.

Cognitive Level: 3-SPR

Source: NEW

60. A Loss of Coolant Accident has occurred and Operators are performing EOP-2, "Primary Containment Control"?

The OSS receives the report that the Drywell and Torus pressure are both at 25 psig and rising steadily at 2 psig/minute. He directs the 1C03 operator to Emergency Depressurize (ED).

Which of the following states the basis for Emergency Depressurizing in this situation?

ED is performed...

a. to ensure the Torus design temperature is not exceeded.

b. to ensure the continued operability of RPV level instrumentation.

c. because the pressure suppression function of the Torus has been lost.

d. because the Primary Containment Pressure limit has been exceeded.

ANSWER: c

Distracter 1: This is one of the bases for ED due to Torus Water Temp and RPV Pressure ; Heat Capacity Limit

Distracter 2: RPV level indications are challenged by high DW pressure and temp, but this is not the basis.

Distracter 3: PCPL is 53 psig. At 2psig/min, that will be in 14 minutes. The operator action for this challenge is to vent the containment.

REFERENCE: EOP Bases Document, Rev. 5, EOP 2, page 65 of 69

K/A System: 295024 (High Drywell Pressure)

K/A Number: EK3.04 (Knowledge of the reasons for the following responses as they apply to High Drywell Pressure: EMERGENCY DEPRESSURIZATION.)

K/A Value: 3.7/4.1

DAEC Objective: 95.00.00.15 Explain the bases for each of the EOP Curves and Limits.

Cognitive Level: 1B

Source: Modified Exam Bank,

1 Point

61. Operators have scrammed the reactor due to a partial loss of the Well Water system while at power. Drywell pressure is 2.5 psig and rising slowly as operators attempt to mitigate this transient.

Which of the following is **NOT** a viable mitigation strategy for lowering Drywell pressure?

a. Begin a plant cooldown.

b. Vent the Containment and begin de-inerting.

c. Bypass the Reactor Bldg. Main Intake cooling coils.

d. Initiate the Containment Atmosphere Dilution (CAD) system.

ANSWER: d

Note: CAD initiation is directed only in EOPs and SAGs for hydrogen control. There is no cooling benefit from CAD.

Distracter 1: Directed by ARP.

Distracter 2: Directed by ARP.

Distracter 3: Directed by ARP.

REFERENCE: ARP 1C05B B-1(Primary Containment HI-LO Pressure; 1.5 psig alarm)

K/A System: 295010 (High Drywell Pressure-Abnormal)

K/A Number: AK1.03 (Knowledge of the operational implications of the following concepts as they apply to HIGH DRYWELL PRESSURE; Temperature increases.)

K/A Value: 3.2/3.4

DAEC Objective: 99.03 (Respond to Primary Containment HI-LO Pressure)

Cognitive Level: 1-P

Source: NEW

1 Point

62. The plant was operating at full power for two months in the middle of core life when a turbine control problem resulted in a Reactor Vessel High Pressure trip.

The Low-Low Set (LLS) SRVs responded as designed and opened soon after the trip.

The operating crew is attempting to stabilize RPV pressure TWO MINUTES after the start of the transient. As the 1C03 operator, you have the following information:

- The Turbine Bypass Valves are closed.
- The Main Steam Line (MSL) Drains are open.
- The green, red, and amber lights are illuminated for both LLS SRVs.
- Reactor pressure is 980 psig and lowering at a rate of 10 PSIG / MINUTE.

Which of the following statements is CORRECT concerning these indications and heat energy still being produced by the reactor?

a. RPV pressure is being controlled by LLS and MSL Drains.
The heat energy still being produced by the reactor is NORMAL decay heat.

b. RPV pressure is being controlled by MSL drains because the LLS SRVs are not open.
The heat energy still being produced by the reactor is NORMAL decay heat.

c. RPV pressure is being controlled by LLS and MSL Drains.
The heat energy still being produced by the reactor is HIGHER THAN NORMAL decay heat due to the power history before the reactor was shutdown.

d. RPV pressure is being controlled by LLS and MSL Drains.
The heat energy still being produced by the reactor is MUCH HIGHER THAN NORMAL and indicates that the reactor is not shutdown.

ANSWER: d

Note: Reactor decay heat 1 second after shutdown is 6.2%. Each SRV has ≈ 8% power steam flow capacity, so with two LLS SRVs open, pressure should be lowering much faster than 10 psig/min.

Distracter 1: Decay heat rate is not normal.
Distracter 2: Decay heat rate is not normal and the LLS valves are open.
Distracter 3: Decay heat rate would never be 16% with the reactor shutdown.
REFERENCE: SD 183.1; ARP 1C03A D-5; 1C05B C-4
K/A System: 295025 (High Reactor Pressure)
K/A Number: EA2.05 (Ability to determine and/or interpret the following as they apply to High Reactor Pressure: DECAY HEAT GENERATION.)
K/A Value: 3.4/3.6
DAEC Objective: 8.03.01.03 (Evaluate plant conditions and control room indications to determine if the ADS system or the LLS system is operating as expected and identify any actions that may be necessary to place the ADS/LLS systems in the correct lineup.)
Cognitive Level: 3-SPK
Source: NEW

63. An ATWS has occurred and the crew is intentionally lowering RPV level to reduce reactor power.

The MSIVs remain open and there is no challenge to Primary Containment.

At +130″, reactor power drops to less than 5%, but the OSS directs the 1C05 operator to continue lowering RPV level to less than +87″.

Which of the following is the EOP basis for the continued lowering of RPV level?

This action is intended to ...

a. minimize dilution of the boron being injected.

b. eliminate boron carryover down the steam lines.

c. reduce the severity of thermal hydraulic instabilities.

d. provide a margin for error in keeping reactor power less than 5%.

ANSWER: c.

Note: +87″ is 2 ft. below lowest feedwater sparger nozzle. This places the spargers in the steam space which effectively heats the relatively cold feedwater. Less subcooling reduces instabilities.

Distractor #1: Not the stated purpose, but less water tend to concentrate the boron being injected.

Distractor #2: Not the stated purpose, but carryover certainly would be eliminated that far from the steam lines

Distractor #3: Not the stated purpose but it would provide a margin for error. This is a possible misconception. 43″ is a lot of margin.

REFERENCE: EOP Program Manual, ATWS section, Rev. 4
K/A SYSTEM: 295037 (SCRAM Condition Present and Reactor Power Above APRM Downscale or Unknown.)
K/A NUMBER: EK1.02 (Knowledge of the operational implications of the following concepts as they apply to: SCRAM Condition Present and Reactor Power Above APRM Downscale or Unknown: REACTOR WATER LEVEL EFFECTS ON REACTOR POWER)
K/A VALUE: 4.1/4.3
DAEC Objective: 95.55.01.01
Explain how the mitigation strategies used in ATWS accomplish the purpose of ATWS.
Cognitive Level: 1-B
Source: New

64. A design basis LOCA occurred several hours ago, emergency system failures coupled with electrical transients resulted in hydrogen generation due to RPV water level being below the top of active fuel for too long. The Shift Supervisor has asked you to check plant parameters to determine if Containment Atmosphere Dilution (CAD) can be initiated.

Which of the following **WOULD NOT** be a consideration for initiating the Containment Atmosphere Dilution system?

a. Current primary containment pressure

b. The ability to vent the primary containment

c. The status of the containment spray subsystems in use

d. The ability to start the containment purge fan, 1V-EF-17

ANSWER:	d
Distracter 1:	CAD Loop Control Valves (MO-4320A/B) will auto close if drywell pressure exceeds 30 psig.
Distracter 2:	SEP 303.3. steps dictate which CAD spray header to inject with dependent on if you are venting containment from the Drywell or Torus. SEP 303.4 lists 3 reasons venting may be necessary during Cad injection.
Distracter 3:	Procedural requirement to ensure that CAD system injection does not use a spray header that is being used by Containment Spray.
REFERENCE:	SD-573, Containment Auxiliaries, Pages 27 and 28, SEP-303.3 CAD Initiation for H2 Control in SAG;. SEP 303.4 CAD Initiation for EOP H2 Control
K/A System:	500000 (High Containment Hydrogen Concentration)
K/A Number:	EA1.07 (Ability to operate and/or monitor the following as they apply High Containment Hydrogen Concentration: NITROGEN PURGE SYSTEM)
K/A Value:	3.4/3.3
DAEC Objective:	42.01.01.09 Given a Primary Containment and Containment Atmosphere Monitoring and Control Systems operating mode and various plant conditions, predict how the Primary Containment and Containment Atmosphere Monitoring and Control Systems and each of the supported systems will be impacted by the following operations, conditions, or failures: CAD initiation.
Cognitive Level:	2-RI
Source:	Exam Bank

65. The plant was operating at 100% power, when an electrical transient occurred. The following is a partial list of current plant conditions:

- "A" Circ Water pump is tripped.
- PCIS group 3 DIV 1 isolated.
- "A" SFU auto initiated.
- "A" Recirc scoop tube locked up.

Given the above information, which of the following statements is CORRECT?

a. Manually lock the "B" recirc scoop tube.

b. If necessary, vent the primary containment IAW EOP defeat 9.

c. If necessary, open CV 1611 the "B" Reactor feed pump recirc valve to maintain RPV level.

d. Monitor condenser backpressure and insert a manual scam if it cannot be maintained <7.5" Hg A.

ANSWER:	d
Distracter 1:	Reduce "B" Recirc Speed Control to minimum to reduce feedwater flow requirements and maintain condenser backpressure <5"HgA per AOP-317 Immediate Action 1.
Distracter 2:	Not entered EOPs at this time therefore EOP defeats are not used, and AOP-317 Immediate Action 2 provides steps to vent containment.
Distracter 3:	This step is used for a Loss of Uninterruptible AC power, it is not applicable for this mode of power failure.
REFERENCE:	AOP 317

K/A System:	295002 (Loss of Main Condenser Vacuum)
K/A Number:	AK1.03 (Knowledge of the operational implications of the following concepts as they apply to Loss of Main Condenser Vacuum: LOSS OF HEAT SINK)
K/A Value:	3.6/3.8

DAEC Objective: 32.05.02.07

Predict how each supported systems will be impacted by a loss of the Cooling Towers or a degradation or loss of the Circulating Water System.

Cognitive Level: 3 PEO

Source: Exam Bank

1 Point

66. The SBDG is operating in parallel with the Startup Transformer for surveillance testing, carrying a load of 2500 KW.

A lightning strike trips OPEN the Startup and Standby transformer incoming breakers (J, K, and M).

Select the answer which correctly describes the initial response of the SBDG to this event.

a. SBDG speed will increase and the engine may trip on overspeed.

b. The SBDG output breaker will stay closed but the bus will load shed.

c. The SBDG will trip, restart on bus undervoltage and the SBDG output breaker will close back in.

d. The SBDG output breaker will trip, the bus will load shed and the SBDG output breaker will close back in.

ANSWER: a

Distracter 1: The breaker may trip when the DG trips on overspeed.

Distracter 2: The output breaker does not close back in following trip.

Distracter 3: The SBDG does not restart when tripped on overspeed.

REFERENCE: SD 324, revision 1

K/A System: 295003 (Partial or Complete Loss of A. C. Power)

K/A Number: AK2.02 (Knowledge of the interrelations Partial or Complete Loss of A. C. Power and the following: EMERGENCY GENERATORS)

K/A Value: 4.1/4.2

DAEC Objective: 19.00.00.03

Evaluate plant conditions and control room indications to determine if the SBDG is operating as expected and identify any actions that may be necessary to place the SBDG in the correct lineup.

Cognitive Level: 3 PEO

Source: Exam Bank

1 Point

67. The following conditions exist during Core Alterations:

- The Mode Switch is in REFUEL.
- The Refueling Bridge is OVER THE CORE.
- The only hoist or platform in service is the main refueling grapple.
- The main refueling grapple is NOT FULL UP but it is UNLOADED.
- The control rods in the cells with fuel are fully inserted.
- Control rods in defueled cells have been tagged out and have had jumpers installed to make them indicate full in.
- There are no control rods selected.

Is it possible to select and fully withdraw a control rod in this configuration?
Also identify the CORRECT reason rod withdrawal IS or IS NOT possible.

a. IS possible.
One control rod may be withdrawn in REFUEL with no restrictions on the main refueling grapple.

b. IS possible.
One control rod may be withdrawn in REFUEL as long as the main refueling grapple is unloaded.

c. IS NOT possible.
A rod block will already be in effect in this configuration because the main refueling grapple is not full up.

d. IS NOT possible.
A rod block will occur as soon as a control rod is selected no matter what the status of the main refueling grapple.

ANSWER: c
Distracter 1& 2: Not possible because the main refueling grapple must be FULL UP and unloaded.
Distracter 3: Not possible is correct but for the wrong reason. If the main refueling grapple is FULL UP and unloaded a rod block will not occur in this scenario.
REFERENCE: SD-281; ARP 1C05B A-6
K/A System: 234000 (Fuel Handling Equipment)
K/A Number: A3.02 (Ability to monitor automatic operation of Fuel Handling Equipment including : interlock operation.)
K/A Value: 3.1/3.7
DAEC Objective: 98.03.01.05 (For each of the following components, explain how it is operated or controlled, state any interlocks that could interrupt its use and how they are bypassed; b. Main hoist grapple)
Cognitive Level: 3-SPK
Source: NEW

68. A fire in the 1D1 battery room has resulted in the COMPLETE LOSS OF ALL 125 VDC. The auxiliary operator is in the switchyard and the second assistant is in the turbine building.

The Main Turbine/Generator is still in operation.

From the list of options below, select the CORRECT sequence for securing the Main Turbine/Generator?

1. Trip the H and I breakers

2. Transfer 1A1 and 1A2 to the Startup Transformer

3. Trip the generator field breaker

a. 1, 3, 2

b. 2, 1, 3

c. 2, 3, 1

d. 3, 1, 2

ANSWER: b

Distractor 1: Per AOP-302.1 page 3 sequence. Tripping H&I open first will cause an Open Circuit transfer of Non-Ess Busses.

Distracter 2: Per AOP-302.1 page 3 sequence. Tripping the Generator Field Breaker open first will cause the Generator Backup Lockout Relay to energize, and an Open Circuit transfer of the Non-Ess Busses.

Distracter 3: Per AOP-302.1 page 3 sequence. Tripping the Generator Field Breaker open first will cause the Generator Backup Lockout Relay to energize, challenge to the Turbine overspeed protection.

REFERENCE: AOP 302.1 LOSS OF 125 VDC DIV 1 (page 3 of 34)

K/A System: 295004 (Partial or Complete Loss of D. C. Power)

K/A Number: AA1.03 (Ability to operate and/or monitor the following as they apply to Partial or Complete Loss of D. C. Power: A. C. ELECTRICAL DISTRIBUTION.)

K/A Value: 3.4/3.6

DAEC Objective: 94.06.01.02

Describe how a loss of one or both divisions of 125 VDC affects plant systems and status during all modes of operation.

Cognitive Level: 2-RI

Source: Exam Bank

1 Point

69. The Primary Containment Ventilation system and plant status are as follows:

- The reactor is shutdown.
- All Recirculation fan handswitches are in AUTO.
- The Mode Switch for "A" Loop of Drywell Cooling is in the AUTO position.
- Fans 1A, 2A, 3A, 4A, 5A, 6A, 7A, & 7B are running in HIGH speed.
- The Mode Switch for "B" Loop of Drywell Cooling is in the STANDBY position.
- Fans 1B, 2B, 3B, 4B, 5B & 6B are OFF.
- Drywell pressure is 1.6 psig.
- Well Water outlet temperatures from "B" Loop Coolers are all approximately 110°F.
- Air outlet temperature from the 1A & 1B Coolers is 140°F.

Select the statement that is correct concerning the status of the Primary Containment Ventilation system.

a. The system is operating as expected for these conditions.

b. All Drywell Cooling Fans should be running in HIGH speed due to the elevated Drywell pressure.

c. All Drywell Cooling Fans should be running in HIGH speed due to the elevated "B" Loop Coolers Well Water outlet temperatures.

d. All Drywell Cooling Fans should be running in HIGH speed due to the elevated 1A & 1B Coolers Air outlet temperature.

ANSWER: d

Note: Per ARP 1C25A[B} A-4 & OI-760 P&L#4, All fans switch to High speed and isol valves open at 120°F cooler water out or 135°F air temp out.

Distractor 1: B Loop fans should be running due to Loop overtemperature of >135°F. Plausible because temperature is less than 150°F EOP entry setpoint.

Distractor 2: Drywell pressure is elevated but it is below the 2# setpoint that would shift all fans to slow speed. Fans do not auto start on DW pressure.

Distractor 3: This is a very high temperature for Well Water but still below the 120°F Loop Overtemperature Auto initiation.

REFERENCE: 1C25A[B], A-4, Drywell Cooling Loop "A"["B"] Over Temp, OI-760 P&L #4.
K/A System: 295012 (High Drywell Temperature)
K/A Number: AK2.01 (Knowledge of the interrelations between High Drywell Temperature and the following: DRYWELL VENTILATION.)
K/A Value: 3.4/3.5
DAEC Objective: 68.00.00.05 Evaluate plant conditions and control room indications to determine if the Primary Containment Ventilation System is operating as expected, and identify any actions that may be necessary to place the Primary Containment Ventilation System in the correct lineup.
Cognitive Level: 1-I
Source: Revised, Exam Bank

1 Point

70. The plant is at full power.

One loop of RHR is in the Torus Cooling mode with full RHR and RHRSW flow.

At this point a Safety Relief Valve (SRV) fails FULL OPEN.

The other loop of RHR is quickly placed in Torus Cooling and flows maximized.

Which of the following CORRECTLY describes the expected response of Torus water temperature if the SRV CAN NOT be closed?

a. Torus water temperature will still be LOWERING with only one loop of Torus Cooling on and
LOWER EVEN FASTER when the second loop of Torus Cooling is placed in service.

b. Torus water temperature will STABILIZE with only one loop of Torus Cooling on and
BEGIN TO LOWER when the second loop of Torus Cooling is placed in service.

c. Torus water temperature will RISE with only one loop of Torus Cooling on and
BEGIN TO LOWER when the second loop of Torus Cooling is placed in service.

d. Torus water temperature will RISE with only one loop of Torus Cooling on and
CONTINUE TO RISE when the second loop of Torus Cooling is placed in service.

ANSWER: d

Note: An operator should know that the RHR system Torus Cooling mode is not designed to keep up with a stuck open SRV. This is the most limiting Torus cooling event with Max Temperature reaching 194°F.

Distractor 1: Temp goes up and continues to go up.

Distractor 2: Temp goes up and continues to go up.

Distractor 3: Temp goes up and continues to go up.

REFERENCE: UFSAR 6.2.1.3.3.3

K/A System: 295013 (High Suppression Pool Temperature)

K/A Number: AK2.01 (Knowledge of the interrelations between High Suppression Pool Temperature and the following: SUPPRESSION POOL COOLING.)

K/A Value: 3.6/3.7

DAEC Objective: 2.01.01.08 (State the purpose of the RHR system)

Cognitive Level: 1-B

Source: NEW (Modeled after 1998 Clinton ILC exam)

1 Point

71. Which of the following annunciators or sets of annunciators would be consistent with the Containment Isolation Monitoring System (CIMS) indications provide on the next page?

a. 1C05A, A-1; REACTOR LO-LO-LO LEVEL TRIP

b. 1C05B, C-2; MAIN STEAM LINE HI HI RAD / INOP TRIP

c. 1C05A, B-8 and 1C05B, B-7; PCIS CHANNEL A&B MAIN STEAM LINE HI FLOW

d. 1C05A, C-8 and 1C05B, C-7; PCIS CHANNEL A&B MAIN STEAM LINE LOW PRESSURE

ANSWER: b

Note: A steam line break without isolation is the most limiting event for an offsite release. MSL high rad was originally a full Group 1 isolation. Currently, this signal closes only the Recirc sample valves , the MSL drain valves and trips the mechanical vacuum pump.

Distracter 1, 2, 3:All of these signals cause a full Group 1 isolation and would also result in the amber and green lights for the "MSIVS".

REFERENCE: ARP 1C05B, C-2 and A-8
K/A SYSTEM: 295017 (High Off Site Release Rate)
K/A Number: A1.11 (Ability to operate and/or monitor the following as they apply to High Off Site Release Rate: PCIS/NSSSS)
K/A Value: 3.9/4.1
DAEC Objective: 48.01.01.01 (Describe how the Main Steam System responds to a Group 1 isolation signal.)
Cognitive Level: 3 SPK
Source: NEW

1 Point

72. Of the nine (9) PCIS group isolations listed below, HOW MANY can be initiated by HIGH AREA TEMPERATURES within the Secondary Containment?

- Group 1 Main Steam Isolations
- Group 2 Radwaste Isolation valves
- Group 3 Containment Atmosphere Isolations
- Group 4 RHR Shutdown Cooling Isolations
- Group 5 RWCU Isolations
- Group 6A/B RCIC/HPCI Isolations
- Group 7 RBCCW and Well Water Containment Cooling
- Group 8 RCIC and HPCI Condensate returns
- Group 9 RCIC and HPCI Vacuum Breaker line

a. 1 PCIS group

b. 2 PCIS groups

c. 3 PCIS groups

d. 4 PCIS groups

ANSWER: c

Distracter 1, 2, & 3: Only Groups 1 (MSIVs), Group 4 (RWCU) and 6A/B (RCIC & HPCI) can be initiated by area temperatures.

REFERENCE: SD 959.1

K/A System: 295032 (High Secondary Containment Temperature)

K/A Number: EK2.04 (Knowledge of the interrelations between High Secondary Containment Temperature and the following: PCIS/NSSS)

K/A Value: 3.6/3.8

DAEC Objective: 42.08.01.07 (List the signals which cause Primary containment and Containment
Atmosphere Monitoring and Control isolations.)

Cognitive Level: 1-I

Source: NEW

73. The reactor is at 100% power with the Well Water System in the following lineup:

- The A and B Well Water Pumps are running.
- The Well Water Logic Control Switch, SW1, is in the PUMPS position.

Predict how the Well Water System would respond if the B Well Water Pump tripped off and identify the reason for the system response.

a. The Control Building Chillers bypass valve opens to shift the chiller heat load to ESW.

b. The Domestic Water Storage Tank supply valve closes to ensure all flow is into the essential loads.

c. The selected Condenser Air Cooling Coil isolates to remove the heat input from the Condenser Bay.

d. The Main Plant Intake Coils isolate to maximize cooling to the Drywell. (The Intake Coil bypass valve opens on interlock.)

ANSWER:	d
Distractor a:	ESW is manually started to supply cooling to the Control Building Chillers per AOP 408, Immediate Actions, Step 2.
Distractor b:	Domestic Water is manually isolated per AOP 408, Follow-up Actions, Step 6.
Distractor d:	The selected cooler remains in service per AOP 408 Automatic Actions.
REFERENCE:	AOP 408, Automatic Actions

K/A SYSTEM:	295018 (Partial or Complete Loss of Component Cooling Water)
K/A Number:	AK3.01 (Knowledge of the reasons for the following responses as they apply to Partial or Complete Loss of Component Cooling Water: ISOLATION OF NON-ESSENTIAL HEAT LOADS.)
K/A Value:	2.9/3.2

DAEC Objective: 26.01.01.14

List the signals which cause a Well Water System isolation including purpose, setpoints, and logic. Predict how the Well Water System responds to an isolation signal.

Cognitive Level: 2-RI

Source: Modified, Exam Bank

1 Point

74. See the simplified schematic of the Instrument and Service Air System on the next page.

A LOSS OF INSTRUMENT AND SERVICE AIR transient is in progress.

The air header pressure at PS-3024 has lowered to 78 psig.

Which air header isolation valve(s) will be CLOSED ?

- CV-3032, Service Air Header Isolation
- CV-3034, Balance of Plant Instrument Air Header Isolation
- CV-3035, Balance of Plant Instrument Air Header Isolation
- CV-3039, Reactor Bldg. Instrument Air Header Isolation

a. CV-3032 only

b. CV-3032 and CV-3034 only

c. CV-3032, CV-3034, and CV-3035 only

d. CV-3032, CV-3034, CV-3035, and CV-3039

ANSWER: c

Note: The Service air header (CV-3032) isolates at 82 psig.
Instrument air header CV-3034 & CV-3035 isolate at 80 psig.
Reactor Bldg Inst air header isolates at 3inches wg.

Distracter 1: The Service air header (CV-3032) isolates at 82 psig.

Distracter 2: 85 psig is the pressure at which the air dryers auto bypass. The Service air header (CV-3032) isolates at 82 psig.

Distracter 3:

REFERENCE: M-130 Sheet 7, and AOP 518

K/A System: 295019 (Partial or Complete Loss of Instrument Air)

K/A Number: AA1.04 (Ability to operate and/or monitor the following as they apply to Partial or Complete Loss of Instrument Air: SERVICE AIR ISOLATION VALVES.)

K/A Value: 3.3/3.2

DAEC Objective: 36.00.00.04

Describe how the Instrument and Service Air System responds to an isolation signal.

Cognitive Level: 3-SPK

Source: New Question

75. An ATWS has occurred coupled with a loss of both CRD pumps. EOP ATWS-RPV Control has been entered. Emergency Depressurization may be required in approximately 15 to 20 minutes due to low reactor water level.

Which of the following EOP ATWS operator actions will be adversely affected by the Emergency Depressurization?

a. Inject boron into the RPV with SBLC per OI-153

b. Toggle Individual scram test switches per RIP 103. 1

c. Reset ARI. Defeat interlock if necessary per Defeat 12

d. Increase CRD cooling flow and pressure per RIP 103.2

ANSWER: b

Distractor 1: Lowering reactor pressure should not affect the ability to inject SBLC into the vessel.

Distractor 2: Defeat 12 is not affected by lowering reactor pressure, but bypasses a reactor high pressure signal of 1140 psig. The ARI solenoids will reset.

Distractor 3: If the CRD pumps can be restarted, lowering reactor pressure should not hinder this rod insertion procedure.

REFERENCE: EOP ATWS, EOP DEFEAT 12, RIP-103.1

K/A System: 295022 (Loss of CRD Pumps)

K/A Number: AK1.02 (Knowledge of the operational implications of the following concepts as they apply to Loss of CRD Pumps: REACTIVITY CONTROL).

K/A Value: 3.6/3.7

DAEC Objective: 10.01.01.09 Predict the effects that a losss of CRD Hydraulic System would have upon the following supported systems: Reactor Recirculation System, GEMAC Reference Leg Backfill System.

101.14 Respond to a complete loss of CRD Water flow.

Cognitive Level: 2-RI

Source: INPO Exam Bank

76. A refueling outage is in progress.

- The A Standby Diesel Generator (SBDG) is tagged out for overhaul.
- All 4KV electrical busses are being supplied by the Startup transformer.
- The distribution system is in a normal lineup with all 480 VAC busses energized.

Operators make a mistake while shifting Shutdown cooling loops that causes RPV level to lower uncontrollably; RPV level is at 60 inches and still lowering.

Which of the following CORRECTLY describes the affect that this transient will have on the electrical distribution system?

a. All 4KV busses will remain energized by the Startup transformer.
All 480 VAC busses will remain energized.

b. All 4KV busses will remain energized by the Startup transformer.
All 480 VAC busses will remain energized except 1B33, 1B35, 1B43, & 1B45 which load shed.

c. Busses 1A1, 1A2, & 1A3 will remain energized by the Startup transformer.
Bus 1A4 will be energized by the B SBDG.
All 480 VAC busses will remain energized.

d. Busses 1A1, 1A2, & 1A3 will remain energized by the Startup transformer.
Bus 1A4 will be energized by the B SBDG.
All 480 VAC busses will remain energized except 1B33, 1B35, 1B43, & 1B45 which load shed.

ANSWER: a

Note: A LOCA signal alone does not cause busses to transfer or to load shed. This requires a combined LOOP/LOCA signal. The B SBDG will start on 3xLOW but does not pick up its bus like on a LOOP/LOCA.

Distractor 1: Selected if candidate thinks a load shed occurs on a LOCA signal only.

Distractor 2: Selected if candidate thinks that the SBDG picks up its bus.

Distractor 3: Selected if candidate thinks a load shed occurs on a LOCA signal only and that the SBDG picks up its bus.

REFERENCE: SD 304
K/A System: 295031 (Reactor low water level- Emergency)
K/A Number: EK2.15 (Knowledge of the interrelations between Reactor low water level and the following: A.C. Distribution
K/A Value: 3.2/3.2
DAEC Objective: 15.00.00.03 Evaluate plant conditions and control room indications to determine if the Electrical distribution system is operating as expected.
Cognitive Level: 2-RI
Source: New

1 Point

77. An accident has occurred.

Current plant conditions are as follows:

All control rods are inserted.

Reactor water level	130″ and stable
Reactor pressure	55 psig and stable
Drywell pressure:	4 psig and slowly lowering
Drywell temperature:	145°F and stable
Torus pressure:	3 psig and slowly lowering
Torus water temperature:	190°F and stable
Torus water level	10.4 ft. and stable

Torus and Drywell Sprays are in operation.
Torus Cooling is maximized.
"A" and "B" Core Spray pumps are injecting into the RPV.

Assuming all systems function as expected, which of the following represents a potential concern?

a. Structural damage to the SRV tailpipes.

b. Low pressure ECCS pumps could lose NPSH and cavitate.

c. Introduction of air into the containment with the potential for deflagration conditions.

d. Failure of the Torus to Drywell vacuum breakers to function, causing drywell spray operation to be prohibited.

ANSWER: b
Distractor 1: A consideration on very high Torus level, >13.8 ft.
Distractor 2: Drop in drywell pressure will isolate containment spray valves.
Distractor 3: Torus level of 13.5 ft is the level of concern for Torus to Drywell vacuum breakers.
REFERENCE: EOP Curves and Limits, NPSH Curves
K/A System: 295026 (Suppression Pool High Water Temperature)
K/A Number: EK1.01 (Knowledge of the operational implications of the following concepts as they apply to Suppression Pool High Water Temperature: PUMP NPSH)
K/A Value: 3.0/3.4
DAEC Objective: 95.00.00.17
Evaluate plant status and control room indications to determine the applicability and effect of any EOP Curve or Limit.
Cognitive Level: 3 SPK
Source: New Question

1 Point

78. Which of the following conditions would require entry into EOP-2 "Primary Containment Control"?

a. Drywell Pressure at 1.8 psig

b. Torus Water Level at 10.6 ft.

c. Drywell Hydrogen Concentration at 0.5 %

d. Air inlet temperature to the coolers in the CRD area of the Drywell at 155°F

ANSWER:	b
Distractor 1:	Hi DW pressure alarm is 1.5# and initiates much activity. EOP entry would be 2#.
Distractor 2:	EOP entry would be 4.0% not 0.4 %. Common point of confusion.
Distractor 3:	EOP entry would be 150°F but based on Average DW Temp not a local temp.
REFERENCE:	EOP-2
K/A System:	295029 (High Suppression Pool Water Level)
K/A Number:	2.4.2 (Knowledge of system setpoints, interlocks, and automatic actions associated with EOP ENTRY CONDITIONS.)
K/A Value:	3.9/4.1
DAEC Objective:	95.00.00.08 Explain when EOPs are entered
Cognitive Level:	1 F
Source:	Exam Bank

1 Point

79. A Recirc Pump has tripped while at full power. The crew has stabilized the plant at approximately 60% power and is performing the necessary ARPs.

Consider only the change in core flow described in this scenario for a given bundle in the center of the core.

Which of the following statements is CORRECT concerning the value of CRITICAL POWER?

a. Critical Power will be HIGHER because the actual bundle power is lower with the reduced Recirc flow.

b. Critical Power will be HIGHER because transition boiling will begin at a lower power with the reduced Recirc flow.

c. Critical Power will be LOWER because the actual bundle power is lower with the reduced Recirc flow.

d. Critical Power will be LOWER because transition boiling will begin at a lower power with the reduced Recirc flow.

ANSWER: d

Note: When flow goes down, the power required to produce boiling transition (Critical Power) goes down. CPR = Critical power / Actual bundle power.

Distracter 1: CPR might be higher but not CP.

Distracter 2: CPR might be higher but not CP.

Distracter 3: CP is lower but it is because flow is lower. CP defines a bundle power but it is not dependent on bundle power.

REFERENCE: BWR Fundamentals Thermodynamics.

K/A System: 295001 (LOSS OF FORCED CIRCULATION)

K/A Number: AK1.03 (Knowledge of the operational implications of the following concepts as they apply to partial or complete loss of forced circulation; THERMAL LIMITS)

K/A Value: 3.6/4.1

DAEC Objective:

Cognitive Level: 2-RI& RW

Source: New

1 Point

80. A transient occurs which causes EOP-2 entry on low Torus water level.

When Torus level reaches 7.1 ft., the OSS directs that Emergency Depressurization be performed.

What is the basis for Emergency Depressurization at this level?

7.1 ft. is the level at which ...

a. it is still allowed to open SRVs.

b. HPCI exhaust becomes uncovered.

c. the Drywell downcomers are uncovered.

d. the Heat Capacity Temperature Limit is exceeded.

ANSWER: c

Distracter 1: EOP 2 directs ED if Torus Water Level cannot be maintained above 7.1 feet, which is the level of downcomer vent openings.

Distracter 2: EOP 2 directs ED if Torus Water Level cannot be maintained above 7.1 feet, which is the level of downcomer vent openings.

Distracter 3: EOP 2 directs ED if Torus Water Level cannot be maintained above 7.1 feet, which is the level of downcomer vent openings.

REFERENCE: EOP Bases Document, EOP 2, page 19 of 69

K/A System: 295030 (Low Suppression Pool Water Level)

K/A Number: EK2.07 (Knowledge of the interrelations between Low Suppression Pool Water Level and the following: DOWNCOMER/HORIZONTAL VENT SUBMERGENCE)

K/A Value: 3.5/3.8

DAEC Objective: 95.59.03.01

For any given step, Caution, or Continuous Recheck Statement in EOP 2, explain the bases for the statement.

Cognitive Level: 1 B

Source: New Question

81. The plant was operating in Mode 1, with all systems operable, when a transient occurred that resulted in the following conditions:

- An electrical ATWS has occurred.
- Reactor power 20% (slowly lowering)
- Reactor water level 150" (being intentionally lowered)
- Reactor pressure 880 psig (stable with MSIVs open)

Annunciator REACTOR BLDG ARM HI RAD, 1C04B A-6, has started to alarm.

Assume that each of the systems listed below could be the source of a leak that is causing that alarm.

1) Both CRD pumps are running.
2) RCIC is running on minimum flow.
3) HPCI is running in CST-CST mode.
4) The RWCU system is in normal operation with two demineralizers.

The OSS briefed the crew that EOP 3 was entered and that the crew must isolate systems "not required to be operated by EOPs".

Which system must be KEPT IN OPERATION even if it is the source of the leak?

a. CRD

b. RCIC

c. HPCI

d. RWCU

ANSWER: a
Note: EOP-3 says to isolate all systems discharging into area except: 1-Required for EOPs and 2-needed to suppress a fire. EOP-3 does not include "needed to shutdown reactor" but EOP-3 bases does.
Distracter 1:.RCIC is not needed for level control if level is being intentionally lowered and feedwater is available.
Distracter 2: HPCI not needed for RPV pressure control.
Distracter 3: RWCU would be needed for high coolant activity, but should be isolated if SBLC is being used and is not needed for EOP pressure control.
REFERENCE: EOP Bases Document, EOP 3, page 15 of 22
K/A System: 295033 (High Secondary Containment Area Radiation Levels)
K/A Number: EK3.03 (Knowledge of the reasons for the following responses as they apply to High Secondary Containment Area Radiation Levels: ISOLATING AFFECTED SYSTEMS.)
K/A Value: 3.8/3.96
DAEC Objective: 95.68.08.01For any given step, Caution, or Continuous Recheck Statement in EOP 3, explain the bases for the statement.
Cognitive Level: 3-SPK
Source: New Question

1 Point

82. A Group 3 isolation has just occurred due to HIGH RADIATION LEVELS in the Reactor Building Vent Shaft.

At which of the following locations can operators determine the actual radiation levels in the Vent Shaft?

The meter face on the Reactor Bldg. Vent Shaft Rad Monitors can be read...

a. in the Control Room backpanel area at 1C36 (SRM and IRM panel).

b. in the Control Room backpanel area at 1C23 (Main Plant HVAC panel).

c. in the Reactor Bldg., on the North side mezzanine above the CRD Repair Room.

d. in the Reactor Bldg., on the South side mezzanine above the Transversing Incore Probe (TIP) Room.

ANSWER: c

Distracter 1: Selected if candidate confuses RB Vent Shaft Rad Monitors with the Refuel Floor Exhaust Rad Monitors.

Distracter 2: Common misconception. Rad levels cannot be read in the control room but they can be read locally as directed by the ARP. This condition alarms at 1C23 in the backpanel, but there are no monitors there.

Distracter 3: Main Steam line temperatures are read at both in plant location answer options, but the RB Vent shaft can only be read above CRD Repair Room.

REFERENCE: ARP 1C23A&B

K/A System: 295034 (Secondary Containment Ventilation High Radiation)

K/A Number: EA2.01 (Ability to determine and/or interpret as they apply to Secondary Containment Ventilation High Radiation: VENTILATION RADIATION LEVELS)

K/A Value: 3.8/4.2

DAEC Objective: 67.01.01.07 (Identify the appropriate procedures that govern RB HVAC operation , including operator responsibilities in all modes of operation, and any actions required by personnel outside the control room.)

Cognitive Level: 1 S

Source: NEW

1 Point

83. Evaluate the operational implications of a FIRE in the following areas during normal full power operation.

Which one **WOULD NOT** require operators to reduce Recirc Flow to 24Mlb/hr. and manually scram the reactor?

a. Fire in the EHC pump skid area.

b. Fire in the Hydrogen Seal Oil skid area.

c. Fire in the Turbine Lube Oil pump area.

d. Fire in the "B" Standby Diesel Generator Room.

ANSWER: d

Note: The SBDG is by far the most Reactor safety significant equipment. But there is another SBDG and an electrical distribution system to back it up. There is only one turbine and it cannot operate without the other 3 systems. If a candidate rules out the SBDG, the other answer options are all viable.

Distracter 1, 2, & 3: SCRAM required per AOP 913, Fire, Follow-up actions #1.

REFERENCE: AOP 913, Fire

K/A System: 600000 (Plant Fire on Site)

K/A Number: AA2.13 (Ability to determine and interpret the following as they apply to Plant Fire on Site: NEED FOR EMERGENCY REACTOR SHUTDOWN.)

K/A Value: 3.2/3.8

DAEC Objective: 94.25.03.01

State when AOP 913 directs the following during a fire: REACTOR SCRAM.

Cognitive Level: 3-SPK

Source: NEW

1 Point

84. The "B" RHR Loop was placed in Shutdown Cooling 12 hours ago after a normal shutdown. Current conditions are as follows:

- RPV water level is stable at 200".
- Both Recirc pumps have been secured.
- The "B" Recirc Pump Discharge Bypass valve is open to keep that loop warm.
- "B" Recirc Loop suction temperature is 180°F and stable.
- The RPV wall temperature is 180°F and stable.
- "B" RHR pump is running.
- "B" RHRSW pump is running.
- Many outage activities, including Control Room panel modifications, are in progress.

While in this condition, the Drywell Health Physics Technician calls the control room to report that wisps of steam have started coming from the Drywell sump area and that it is starting to get very humid in the Drywell.

Control Room operators begin to investigate this report.

Which of the following malfunctions would be consistent with this report and current plant conditions?

Control Room Operators find that...

a. MO-4602, "B" Recirc Pump Suction valve, somehow got closed.

b. MO-1905, "B" RHR Inboard Inject Isolation valve, somehow got closed.

c. MO-1947, "B" RHR HX Service Water Outlet valve, somehow got closed.

d. MO-1908, Inboard Shutdown Cooling Isolation valve, somehow got closed.

ANSWER: b

Note: Question is based on industry experience in which the SDC discharge valve went closed without operators knowing about it. Recirc pumps secured with RPV level <214 inches means no natural circulation. Coolant temperatures are not reliable indication of coolant temperature without forced circulation. Such a report from the DW is listed as a probable indicator in AOP 149. Stem conditions indicate that there is **no reactor recirculation flow**, either forced or natural.

Distracter 1: The Discharge Valve is normally tagged closed to prevent SDC flow from bypassing the core. Alternately, the Suction valve can have been tagged closed in its place for the same reason. Therefore closing this valve would have no affect of recirculation flow.

Distracter 2: This constitutes a loss of SDC , but not of reactor recirculation flow. If this were the cause, Recirc Pump suction temps and vessel wall temps would be rising due to hotter and hotter forced circulation water.

Distracter 3: This constitutes a loss of SDC but would also trip the running RHR pump.

REFERENCE:AOP-149; OI-149; IG 94-01; SEN 171; ARP 1C03B (A-8)

K/A System: 295021 (Loss of Shutdown Cooling)

K/A Number: AA2.07 (Ability to determine and/or interpret the following as they apply to Loss of Shutdown Cooling: Reactor recirculation flow.)

K/A Value: 2.9/3.1

DAEC Objective: 94.01.01.04 Evaluate plant conditions and control room indications and determine if entry into AOP-149 is warranted. (Loss of S/D Cooling)

Cognitive Level: 2-RI Source:NEW

1 Point

85. During some fuel handling operations, a spent fuel bundle is dropped onto the reactor core and is damaged.

Annunciators 1C04B A-6, REACTOR BLDG ARM HI RAD and 1C03A A-1, FUEL POOL EXHAUST RIS-4131A/B HI-HI RAD, are alarming and the ANSOE reports the following readings:

Fuel Pool Exhaust, RIS-4131A:	15 mr/hr
Fuel Pool Exhaust, RIS-4131B:	2 mr/hr
North Refuel Floor, RI-9163:	110 mr/hr
South Refuel Floor, RI-9164:	115 mr/hr
Spent Fuel Pool Area, RI-9178:	118 mr/hr
New Fuel Vault Area, RI-9153:	90 mr/hr

Which one of the following is indicated by these readings, and what automatic actions are expected?

a. RIS 4131B has failed. RIS 4131A should have started both trains of SBGT and isolated reactor building ventilation as part of a full Group III Isolation.

b. RIS 4131B has failed. RIS 4131A should have started the "A" train of SBGT and isolated reactor building ventilation as part of a Div 1 Group III Isolation.

c. RIS-4131B is slower to respond to the event because it is downstream of RIS 4131A. When it does respond, both trains of SBGT will auto start and reactor building ventilation will isolate as part of a full Group III Isolation.

d. RIS-4131B is slower to respond to the event as a design feature to minimize spurious actuations. When it does respond, both trains of SBGT will auto start and reactor building ventilation will isolate as part of a full Group III Isolation.

ANSWER:	b
Distractor 1:	Only one monitor will cause half an isolation/auto start.
Distractor 2:	The two detectors are not separated.
Distractor 3:	The two detectors do not have different design response times.
REFERENCE:	ARP 1C03A A-1, revision 4
K/A System:	295023 (Refueling Accidents)
K/A Number:	AA2.01 (Ability to determine and/or interpret the following as they apply to Refueling Accidents: AREA RADIATION LEVELS.)
K/A Value:	3.6/4.0
DAEC Objective:	86.00.00.03Evaluate plant conditions and control room indications to determine if the ARM System is operating as expected, and identify any actions that may be necessary to place the ARM System in the correct lineup.
Cognitive Level:	2-RI
Source:	Exam Bank

1 Point

86. A radiological release accident has occurred while operating at power. The accident was severe enough to cause a Group 3 isolation due to Reactor Building Vent Shaft high radiation levels.

While responding to this event, operators identify that annunciator 1C35A, C-3 REACTOR BLDG KAMAN 3, 4, 5, 6, 7 & 8 HI RAD OR TROUBLE has activated. (A.K.A.: KAMAN red alarm)

The Standby Gas Treatment (SBGT) trains are both operating as designed and the Reactor Bldg. to outside ΔP is approximately 0.35 inches of water as read at 1C23.

Which of the following malfunctions would account for the indications described above?

a. The SBGT overpressure relief damper has failed open.

b. The MAIN PLANT EXHAUST FANS (EF-1, 2, &3) have failed to trip as designed on a Group 3 Isolation signal.

c. The REFUELING POOL EXH FAN (EF-10) has failed to trip as designed on a Group 3 Isolation signal.

d. The RX BLDG EXH FAN (EF11A& B) INLET ISOL DAMPERS (1V-AD-13A & B) have failed to completely isolate as designed on a group 3 Isolation signal.

ANSWER: d

Distractor 1:This damper lifts on a positive pressure when venting the containment. It relieves to the Rx Bldg. 2nd floor, which is still inside containment.

Distractor 2: Common misconception. EF 1, 2, & 3 do not trip on a Group 3. Their exhaust from the plant is the sample point for KAMAN 3-8. High rads there indicate that the reactor Bldg Vent shaft did not isolate from the main plant exhaust plenum (at 1V-AD-13A&B) and that EF-1, 2, &3 are also assisting SBGT at keeping the Rx Bldg negative. That is the reason the ARP directs shutdown of EF1, 2, &3.

Distractor 3:This fan draws air from the refuel floor and discharges into the Rx Bldg Vent Shaft. If 1V-AD 13A&B had isolated as designed, this exhaust would never get to the KAMAN 3-8 monitors.

REFERENCE: SD733; ARP 1C05B C-8; ARP 1C35A, C-3

K/A System: 295038 (High Offsite Release Rate.)
K/A Number: 2.4.48 (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.)
K/A Value: 3.5/3.8
DAEC Objective: 95.71.04.02 (For any step, caution, or continuous recheck statement in EOP-4, explain the basis for the statement.)
Cognitive Level: 3-SPK
Source: NEW

87. The Steam Tunnel and Reactor Building are equipped with blowout panels that relieve internal pressure when pressure exceeds 7"Hg.

What are the design bases for these blowout panels?

1) Steam Tunnel
2) Reactor Building

a. 1) Prevent structural failure of the Steam Tunnel due to a steam leak in the Steam Tunnel.
   2) Prevent structural failure of the Reactor Bldg. due to a design basis Tornado.

b. 1) Prevent structural failure of the Reactor Bldg. due to a steam leak in the Steam Tunnel.
   2) Prevent structural failure of the Reactor Bldg. due to a design basis Tornado.

c. 1) Prevent structural failure of the Steam Tunnel due to a steam leak in the Steam Tunnel.
   2) Prevent structural failure of the Reactor Bldg. due to a steam leak in the Reactor Bldg.

d. 1) Prevent structural failure of the Reactor Bldg. due to a steam leak in the Steam Tunnel.
   2) Prevent structural failure of the Reactor Bldg. due to a steam leak in the Reactor Bldg.

ANSWER: a

Distracter 1, 2, 3: Per UFSAR Chapter 3.3; The Reactor Building blowout panels protect the Reactor Building during the design tornado. Per UFSAR Chapter 3.6, Steam Tunnel blowout panels protect the Steam Tunnel not the Reactor Building.

REFERENCE: System Description 170.1, Secondary Containment, pages 5 and 6

K/A System: 295035 (Secondary Containment High Differential Pressure)

K/A Number: EK3.01 (Knowledge of the reasons for the following responses as they apply to Secondary Containment High Differential Pressure: BLOW-OUT PANEL OPERATION.)

K/A Value: 2.8/3.1

DAEC Objective: 50007.04.03

State the internal pressure limit for the Steam Tunnel and Refuel Floor Structure and explain how excessive pressure is managed.

Cognitive Level: 1 B

Source: New Question

1 Point

88. **See the partially completed page of IPOI-2 "Startup" on the next page of this exam.**

A startup is in progress after a short duration maintenance outage.

A Drywell entry was NOT performed.

The next step of the startup is to withdraw control rods to establish one Turbine Bypass Valve 20%-90% open.

Assume that the attached page is the Working Copy of IPOI-2.

Which of the following CORRECTLY describes the placekeeping /logkeeping on the attached page?

a. All steps have been properly documented per plant procedures?

b. IPOI-2 steps may NOT be marked N/A (Not Applicable).

c. The correction in step (b)1 was NOT performed properly.

d. IPOI-2 steps may NOT be signed off using a check mark.

ANSWER: d

Note: Placekeeping with grease pencils on Operating Instructions and during Simulator training is a common practice. This question verifies that candidates recognize the stricter requirements for documenting IPOI steps. This requirement is in both references.

Distracter 1: The completed IPOI procedure steps are a permanent record and must therefore be initialed or signed per IPOI-2 and ACP-101.01.

Distracter 2: Steps may be marked N/A per ODI-022 and ACP 101.01

Distracter 3: Correction was performed perfectly per current rev of ODI 022. A recent concern has been that ALL corrections must be initialed, dated and timed. So as of the date of question development, the date and time are excessive, but not improper. If ODI-022 is revised, this answer option will still be in compliance.

REFERENCE: ODI-022, ACP-101.01

K/A System: GENERIC

K/A Number: 2.1.18 (Ability to make accurate, clear and concise logs, records, status boards, and reports.)

K/A Value: 2.9/3.0

Objective: 96.05 Conduct plant operations in accordance with Administrative Procedures

Cognitive Level: 3-SPK

Source: New Question

1 Point

89. The plant has experienced a complete loss of River Water Supply.

A Nuclear Station Operating Engineer (NSOE) has been dispatched from the Work Control Center to the Pump House to establish makeup to the RHRSW/ESW pits from GSW.

Which of the following is CORRECT concerning Procedure Usage Level for this operation?

a. This is a Skill of the Craft activity that does NOT require procedure usage.

b. This is a routine activity that requires Information Use.

c. This is an Abnormal Operating Procedure that requires Reference Use.

d. This is a Supplemental Emergency Procedure that requires Continuous Use.

ANSWER: c

Distracter 1: This procedure has the operator open 3 Control Valves and throttle open a dilution flow throttle valve. A very simple procedure that could be considered skill of the craft but is not listed as one in ACP 1410.1.
Distracter 2: This is a practically a routine activity. This AOP is derived from the procedure for chlorination of the RHRSW/ESW pits. The AOP simply starts the dilution flow and omits the Chlorine injection steps. There is one additional step in the AOP, throttling open the dilution flow throttle valve.
Distracter 3: Supplemental Emergency Procedure sounds plausible but the procedure is in the AOP. There are no sign-off in the SEPs which are necessary for "Continuous Use" procedures.
REFERENCE: ACP 101.01; ACP 1410.1; OI-515; AOP-410
K/A System: GENERIC
K/A Number: 2.1.20 (Ability to execute procedure steps.)
K/A Value: 4.3/4.2
Objective: 96.05.02.21 (Explain the guidance for Operations Procedure Use and Adherance contained in ACP 1410.1.)
Cognitive Level:3-SPK Source: NEW

1 Point

90. See the attached RPV instrumentation schematic of 1C56 on the next page.

Given:

- PI-4553 provides indication only.
- PS-4549 provides a protective function.

Are there any prerequisite conditions for venting PI-4553 based on its instrument line connections ? (NO Conditions or SOME Conditions)

If there are SOME prerequisite conditions for venting PI-4553 based on its instrument line connections, are they:

MORE Restrictive,

LESS Restrictive,

or the SAME Restrictions

when compared to PS-4549?

a. PI-4553 can be vented with NO restrictions.

b. SOME prerequisite conditions.
MORE Restrictive than PS-4549.

c. SOME prerequisite conditions.
LESS Restrictive than PS-4549.

d. SOME prerequisite conditions.
The SAME Restrictions as PS-4549.

ANSWER: D
REFERENCE: ACP 1410.1 Conduct of Ops, Section 3.9 (8)-(11); SD 880
Note: Question is based on a plant event. PS-4549 provides high pressure scram signal. However, the point of the question is that both instruments share a common instrument leg with instruments that have protective functions and thus require an approved procedure. Distracter 1, 2, & 3: Both require OSS/OSM concurrence and an approved procedure because they are on the same sensing line.

K/A System: 2.1
K/A Number: 2.1.1 (Knowledge of Conduct of Operations requirements.)
K/A Value: 3.7/3.8
Objective: Industry Events

Cognitive Level: 3-SPK

Source: Revised, Exam Bank

1 Point

91. Which of the following CORRECTLY describes the purpose of the End of Core Life Recirc Pump Trip (EOC-RPT) logic?

The purpose of the EOC RPT trip is to...

a. rapidly shutdown the reactor in the event of an ATWS.

b. rapidly shutdown the reactor when MAPRAT is the greatest.

c. mitigate the core-wide pressurization transient caused by a Group 1 isolation.

d. reduce the severity of the thermal transient caused by a turbine trip without bypass.

ANSWER:	d
Distracter 1:	This shutdown would be the ATWS-ARI trip
Distracter 2:	The thermal limit of concern is MCPR.
Distracter 3:	The MSIV closure pressure transient would be mitigated by SRVs.
REFERENCE:	SD 264
K/A System:	GENERIC
K/A Number:	2.1.28 (Knowledge of the purpose and function of major system components and controls.)
K/A Value:	3.2/3.3
Objective:	12.00.00.03c
	Describe the operation of the following principle Recirc System components: RPT BREAKERS.
Cognitive Level:	1 B
Source:	Exam Bank

1 Point

92. A reactor startup is in progress. Conditions just prior to the startup and currently are listed below:

Beginning of Startup	Currently
• SRM A at 9 cps	SRM A at 85 cps
• SRM B at 11 cps	SRM B at 100 cps
• SRM C at 8 cps	SRM C at 90 cps
• SRM D at 10 cps	SRM D at 95 cps
• Moderator temperature was 148°F	Moderator temperature was 149°F

The reactor is NOT critical and you still have one rod left to pull to complete the A12 sequence. In order to pull this control rod to continue the startup, what must you do per IPOI-2 concerning the method of control rod withdrawal?

a. Change from continuous withdrawal to group notch withdrawal.

b. Change from continuous withdrawal to single rod notch withdrawal.

c. Change from single rod notch withdrawal to group notch withdrawal.

d. Change from single rod notch withdrawal to continuous rod withdrawal.

ANSWER: b

Distracter 1: From continuous withdrawal to group notch withdrawal is directed after 75% density has been reached if SRM count rate has not increased by a factor of ten.

Distracter 2: From single notch withdrawal to group notch withdrawal is directed after 75% density has been reached if SRM count rate has increased by a factor of ten.

Distracter 3: From Single notch withdrawal to continuous withdrawal is never directed.

REFERENCE: IPOI 2

K/A System: GENERIC

K/A Number: 2.2.2 (Ability to manipulate the console controls as required to operate the facility between shutdown and designated power levels.)

K/A Value: 4.0/3.5

Objective: 93.00.00.04

Contrast the different methods of control rod withdrawal that are used during a reactor startup.

Cognitive Level: 3-SPK

Source: Exam Bank

1 Point

93. The plant is operating at full power. The A Core Spray pump breaker has been racked out and tagged out for an oil change on the pump motor. After the hold card was cleared, the operators performed the following sequence of actions:

The NSPEO racked up the breaker.

The NSPEO verified that the contact GAP for the auxiliary switch was acceptable.

The NSPEO placed the RAISE-LOWER switch in the neutral position and properly stored the elevating motor.

The Control Room operators verified the A Core Spray pump indicating lights; green and white ON and red OFF.

The Control Room operators successfully start the A Core Spray pump.

The Control Room operators then stop the A Core Spray pump.

Assume that the OSS is standing by with the Work Request in his hand and ready to declare the A Core Spray pump operable. At which point in this sequence can the Limiting Condition for Operation (LCO) be exited?

The LCO can be exited as soon as ...

a. the breaker has been racked up.

b. the contact GAP has been verified acceptable.

c. the Control Room operators have verified the A Core Spray pump indicating lights at 1C03.

d. the Control Room operators have successfully started and stopped the A Core Spray pump.

ANSWER: d

Distracter 1, 2, & 3:The breaker requires testing to prove its operability. It must be closed in , not just racked in .

REFERENCE: ACP 1410.2, OI-304.2

K/A System: GENERIC

K/A Number: 2.2.23 (Ability to track limiting conditions of operation.)

K/A Value: 2.6/3.8

Objective: 15.01.01.01

Cognitive Level: 3-SPK

Source: NEW

1 Point

94. Which of the following system conditions would allow the "A" RHRSW Subsystem to be considered operable with no LCOs?

  a. The "A" RHRSW pump is tagged out for breaker work.

  b. Breaker 1D1315 for 4160V Bus 1A3 switchgear control, has tripped.

  c. The "A" RHRSW strainer backwash valve is stuck closed, but strainer dp is normal while the system is operating.

  d. The "A" RHRSW pump operates, but it's maximum flow is 2000 gpm with MO-2046 RHRSW heat exchanger outlet valve full open. "C" RHRSW pump operates normally.

ANSWER:	c
Distracter 1:	TS requires both pumps to be operable for the loop to be operable.
Distracter 2:	This breaker will prevent operation of either RHRSW pump.
Distracter 3:	TS bases states that the required flow per pump be 2040 gpm, and both pumps operating to remove the required heat, (3.7.1 background section).
REFERENCE:	OI 416, P&L; TS bases B.3.7.1; AOP 302.1 page 12

K/A System: GENERIC

K/A Number: 2.2.25 (Knowledge of bases in technical specifications for limiting conditions of operations and safety limits.)

K/A Value: 2.5/3.7

Objective: 1.03.02.01Evaluate system status in regard to the LCO applicability and determine system or component operability.

Cognitive Level: 3-SPK

Source: Exam Bank

1 Point

95. Which of the following is **NOT** an example of SOURCE TERM REDUCTION as defined by ACP 1411.1, "The ALARA Emphasis Program"?

a. The Scram Discharge Volume was wrapped with lead blankets.

b. The area around the CRD Discharge Filter was decontaminated.

c. The floor drain of the CRD Repair Room was flushed to remove a hot spot.

d. The stellite rollers on the control rods were replaced to reduce cobalt in the reactor coolant
system.

ANSWER: a

Note: STR= "Systematic application of principles used to remove and/or avoid the buildup of radioactive material in a system which contribute significantly to occupational exposure." Correct answer may be an example of shielding or ALARA but not of STR.

STR is listed with time, distance, and shielding as ALARA principles. It is operationally valid for candidate to understand its definition.

Distracter 1, 2, & 3:ACP 1411.1 uses these activities as examples of STR.

REFERENCE: ACP 1411.1, The ALARA Emphasis Program; OI-878.6 TIP

K/A System: GENERIC

K/A Number: 2.3.2 (Knowledge of facility ALARA program.)

K/A Value: 2.5/2.9

Objective: GET Objective

Cognitive Level: 1 D

Source: NEW

1 Point

96. An individual radiation worker has exposure history as follows:

Date of Birth:	8/29/63
Lifetime Exposure:	23 R
Exposure this year:	0.8 R
Exposure this quarter:	0.2 R

Today is May 18th. The individual is assigned a job that will take several days. During this job the worker will be in a dose rate of 200 mr/hr.

Which one of the following is the LONGEST TIME the worker can participate in the job before reaching a DAEC administrative exposure limit that requires supervisory or other special permission to continue?

a. 6 hours

b. 9 hours

c. 10 hours

d. 18.5 hours

ANSWER:	a
Note:	DAEC Annual administrative limit is 2 REM without permission to exceed the limit however, with permission the limit is 4.5 REM.
Distracter 1:	9 Hours to annual limit of 2 REM using the .2 REM quarterly exposure. Possible miscalculation
Distracter 2:	10 hours to reach age limit.
Distracter 3:	18.5 hours to reach yearly limit of 4.5 REM
REFERENCE:	ACP 1411.17, Occupational Dose Limits and Upgrades.

K/A System:	GENERIC
K/A Number:	2.3.4 (Knowledge of radiation exposure limits and contamination control, including permissible levels in excess of those authorized.)
K/A Value:	2.5/3.1
Objective:	GET Objective

Cognitive Level:	3 SPK
Source:	Exam Bank

1 Point

97. The 1C03 operator is performing an Air Purge (De-inerting) the Primary Containment.

Which of the following radiation monitoring systems monitor the atmosphere that is exhausted through the Drywell/Torus vent valves?

a. Reactor Building Vent KAMAN monitors (KAMAN 3 through 8)

b. Offgas Vent Pipe Rad Monitors (RM-4116A & B) only

c. Offgas Stack KAMAN monitors (KAMAN 9 & 10) only

d. Offgas Vent Pipe Rad Monitors (RM-4116A & B)
and
Offgas Stack KAMAN monitors (KAMAN 9 & 10)

ANSWER: d

Note: This question measures knowledge of how many Radiation Monitors are involved during Containment purge, which comes from ventilation and goes past all 4 monitors. The Vent pipe monitors can send a Group 3 isolation signal.

Distracter 1: Possible misconception because it is not obvious that SBGT in the reactor Bldg. exhausts out the Offgas Stack.

Distracter 2: Possible misconception because it is not obvious that the KAMAN monitors are downstream of the Offgas flow to the offgas stack.

Distracter 3: Common misconception that Vent pipe rad monitors are part of the Offgas system.

REFERENCE: P&ID M-141and M-176

K/A System: GENERIC

K/A Number: 2.3.9 (Knowledge of the process for performing a containment purge.)

K/A Value: 2.5/3.4

Objective: 85.00.00.03 Describe in detail the subsystem of the PRM system, including methods of detection.

Objective: 87.00.00.05 State the effluent types monitored by the KAMAN system.

Cognitive Level: 1-S

Source: New Question

1 Point

98. Four EOP flowchart symbols are provided on the following page.

    Which one is the EOP symbol for an ACTION STATEMENT?

a. A

b. B

c. C

d. D

ANSWER: c

Note: Blanked out segment is from ALC.

Distracter 1: Continuous Recheck Flag.

Distracter 2: Decision Point symbol.

Distracter 3: Hold Point (Wait Until) symbol. .

REFERENCE: EOP Bases, EOP Flowchart Use and Logic

K/A System: GENERIC

K/A Number: 2.4.19 (Knowledge of EOP layout, symbols, and icons.

K/A Value: 2.7/3.7

Objective: 95.00.00.01Interpret the meaning of the color and shape of any EOP flowchart step.

Cognitive Level: 1 F

Source: New Question

1 Point

99. The RHR System was placed in the Shutdown Cooling mode during a normal shutdown. Cooldown has progressed to the point that the head vents have been opened.

Shortly after that, a Group 4 Isolation results in the loss of Shutdown Cooling. The OSS directs you to monitor panel 1C05 while the rest of the operating crew investigates.

Several annunciators are alarming. As you scan the annunciator panels from your station at 1C05, you can see a rapidly flashing annunciator on the EOP ANNUNCIATORS panel, 1C14.

The annunciator window has a WHITE lens but you are too far away to read the wording on the annunciator window.

Could this be a high priority annunciator?

a. No; All high priority annunciators have either a blue or red lens.

b. No; All annunciators on this panel are for EOP Defeats (overrides). The alarming condition must be the result of an operator action taken in response to this event.

c. Yes; The annunciator could be a high area WATER LEVEL EOP-3 entry condition.

d. Yes; The annunciator could be a high area TEMPERATURE EOP-3 entry condition.

ANSWER: c

Note: Group 4 isolations are: Low RPV Level <170", High DW Pressure <2#, and High RPV pressure, >135 psig. With the head vents open, the Group 4 must have been caused by low RPV level.
Distracter 1: Not all EOP entry conditions have colored lenses. On 1C14, area water levels above Max Normal and Max Safe are white lenses.
Distracter 2: 22 of 24 are for EOP defeat annunciation, but this panel also includes, and is the only place for, Area Water Level alarms. Also, there are no applicable EOP defeats to be installed at the onset of Group 4 isolation due to Low RPV level.

Distracter 3: Hi Area Temps is an EOP-3 entry condition, but the Steam Leak Detection annunciator is on panel 1C04B.

REFERENCE: ARP 1C14A & B; 1C04B; EOP-3; ACP1410.1

K/A System: GENERIC

K/A Number: 2.4.45 (Ability to prioritize and interpret the significance of each annunciator or alarm.)

K/A Value: 3.3/3.6

Objective: 1..04.16.02 (Explain the Control Room Operators responsibilities when receiving and acknowledging an annunciator per ACP1410.1.)

Cognitive Level: 3-SPK

Source: New Question

1 Point

100. The plant has experienced an accident that required an entry into EOP 3. One area had exceeded its Max Safe Operating Limit for temperature and another had exceeded its Max Normal Operating Limit for temperature and was still rising.

The OSS, anticipating ED, directed the BOP operator to Rapidly Depressurize the RPV with the Turbine Bypass valves.

The BOP operator went to the 1C07 Panel and performed the following actions without the procedure in hand:

Verified an EHC pump running.
Determined the Main Condenser was available.
Depressed and Held the Bypass Valve Opening Jack Selector "INCREASE" Pushbutton until both Bypass Valves were full open.

Which of the following CORRECTLY describes the operator actions in the above postulated scenario?

a. The operator is allowed to perform this procedure from memory and has performed it correctly.

b. The operator is NOT allowed to perform this procedure from memory.

c. The operator is required to start the second EHC pump before opening the Bypass Valves.

d. The operator is required to depress the test pushbutton for the # 1 Bypass Valve while the Opening Jack "INCREASE pushbutton is held.

ANSWER:	a
Distracter 1,	This is an "Immediate Operator Action" procedure per ACP 1410.1.
Distractor 2,	Only one EHC pump is required.
Distractor 3:	The test pushbutton is not required, but may be used to expedite the evolution to open the #2 BPV not the #1 BPV.
REFERENCE:	ACP 1410.1, Section 3.7(10)
K/A System:	GENERIC
K/A Number:	2.4.49 (Ability to perform without reference to procedures those actions that require immediate operation of system components and controls.)
K/A Value:	4.0/4.0
Objective:	96.05.02.21 and 96.05.02.22 Explain the guidance for Operations Procedure Use and Adherence contained in ACP 1410.1. AND List the activities that an RO should be able to perform from memory as listed in Attachment 3 of ACP 1410.1.
Cognitive Level:	3-SPK
Source:	New Question

DUANE ARNOLD ENERGY CENTER
WRITTEN EXAMINATION
April 2001

REACTOR OPERATOR
HANDOUTS

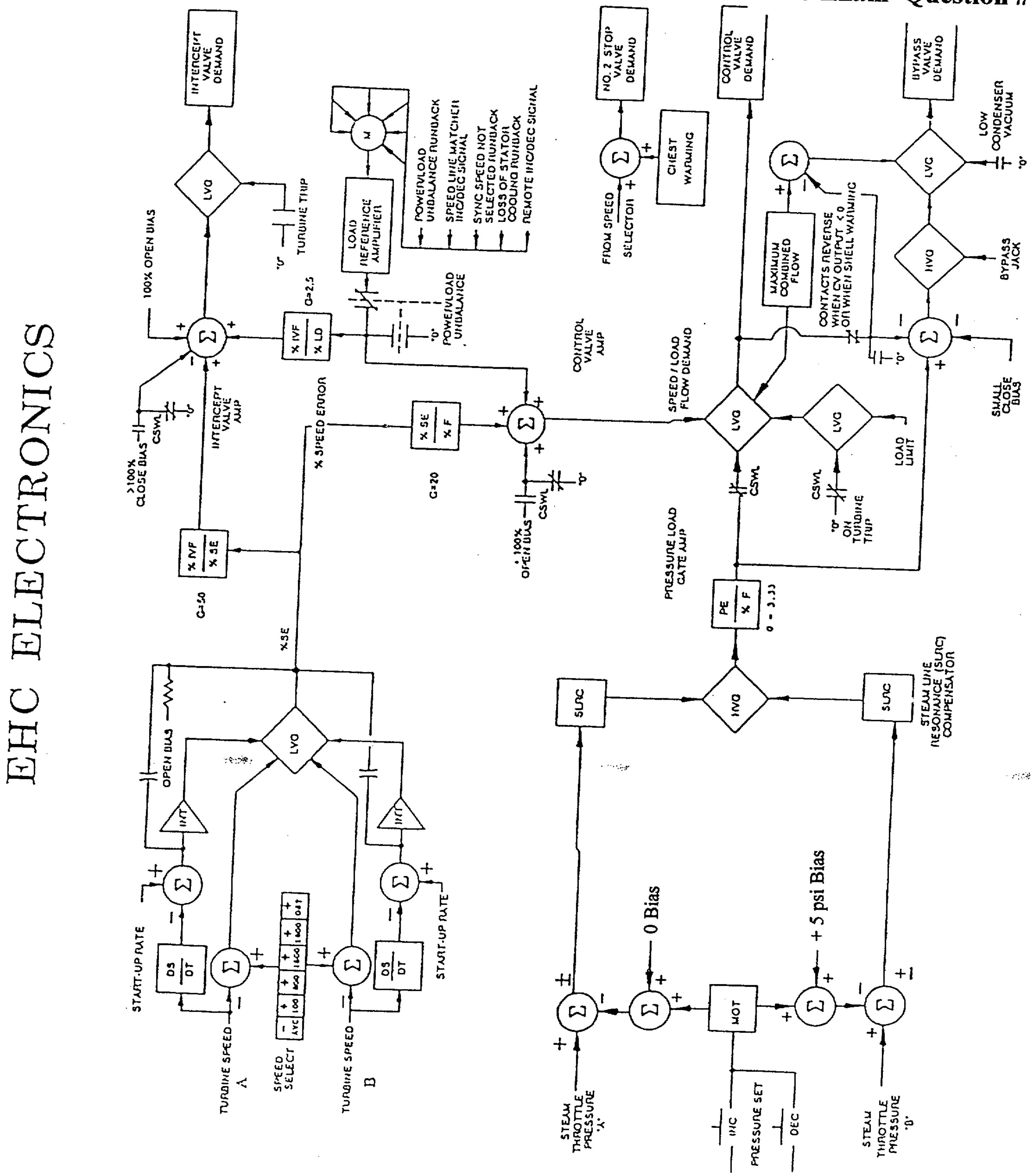


Figure 8. EHC Logic Control System

ILC Exam Question # 59

RSCS GROUP: 11 SUBGROUP: 0 INSERT LIMIT: 12 WITHDRAW LIMIT: 48

		14-31		30-31		30-15		14-15		INITIAL	
STEP	MOVE	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
29	12-14	---	---	---	---	---	---	---	---	---	---
	14-16	---	---	---	---	---	---	---	---	---	---
	16-18	---	---	---	---	---	---	---	---	---	---
	18-20	---	---	---	---	---	---	---	---	---	---
	20-22	---	---	---	---	---	---	---	---	---	---
	22-24	---	---	---	---	---	---	---	---	---	---
	24-26	---	---	---	---	---	---	---	---	---	---
	26-28	---	---	---	---	---	---	---	---	---	---
	28-30	---	---	---	---	---	---	---	---	---	---
	30-32	---	---	---	---	---	---	---	---	---	---
	32-34	---	---	---	---	---	---	---	---	---	---
	34-36	---	---	---	---	---	---	---	---	---	---
	36-38	---	---	---	---	---	---	---	---	---	---
	38-40	---	---	---	---	---	---	---	---	---	---
	40-42	---	---	---	---	---	---	---	---	---	---
	42-44	---	---	---	---	---	---	---	---	---	---
	44-46	---	---	---	---	---	---	---	---	---	---
	46-48	---	---	---	---	---	---	---	---	---	---
	COUPLING	N/A		N/A		N/A		N/A		N/A	

CRAM GROUP 5

APRM GAF's <= 1.00 ? RE/OSS ____________________

RSCS GROUP: 12 SUBGROUP: 0 INSERT LIMIT: 00 WITHDRAW LIMIT: 8

		14-23		30-23		INITIAL	
STEP	MOVE	IN	OUT	IN	OUT	IN	OUT
30	00-02	---	---	---	---	---	---
	02-04	---	---	---	---	---	---
	04-06	---	---	---	---	---	---
	06-08						

ILC Exam Question # 59

RSCS GROUP: 12 SUBGROUP: 1 INSERT LIMIT: 00 WITHDRAW LIMIT: 8

		22-31		22-15		INITIAL	
STEP	MOVE	IN	OUT	IN	OUT	IN	OUT
31	00-02						
	02-04						
	04-06						
	06-08						

RSCS GROUP: 11 SUBGROUP: 1 INSERT LIMIT: 8 WITHDRAW LIMIT: 12

		22-23		INITIAL	
STEP	MOVE	IN	OUT	IN	OUT
32	08-10				
	10-12				

ILC Exam Question # 59

RSCS GROUP: 9   SUBGROUP: 0   INSERT LIMIT: 12   WITHDRAW LIMIT: 48

CRAM
GROUP 4

		6-31		14-39		30-39		38-31		38-15		30-07		14-07		6-15		INITIAL	
STEP	MOVE	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
33	12-14	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	14-16	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	16-18	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	18-20	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	20-22	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	22-24	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	24-26	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	26-28	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	28-30	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	30-32	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	32-34	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	34-36	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	36-38	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	38-40	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	40-42	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	42-44	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	44-46	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	46-48	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	COUPLING	N/A		N/A		N/A		N/A		N/A		N/A		N/A		N/A		N/A	

APRM GAF's <= 1.00 ?   RE/OSS ____________________

RSCS GROUP: 11   SUBGROUP: 1   INSERT LIMIT: 12   WITHDRAW LIMIT: 20

		22-23		INITIAL	
STEP	MOVE	IN	OUT	IN	OUT
34	12-14	---	---	---	---
	14-16	---	---	---	---
	16-18	---	---	---	---
	18-20				

ILC Exam Question # 59

RSCS GROUP: 11 SUBGROUP: 1 INSERT LIMIT: 20 WITHDRAW LIMIT: 48

		22-23		INITIAL	
STEP	MOVE	IN	OUT	IN	OUT
35	20-22	---	---	---	---
	22-24	---	---	---	---
	24-26	---	---	---	---
	26-28	---	---	---	---
	28-30	---	---	---	---
	30-32	---	---	---	---
	32-34	---	---	---	---
	34-36	---	---	---	---
	36-38	---	---	---	---
	38-40	---	---	---	---
	40-42	---	---	---	---
	42-44	---	---	---	---
	44-46	---	---	---	---
	46-48	---	---	---	---
	COUPLNG	N/A		N/A	

CRAM GROUP 3

APRM GAF's <= 1.00 ? RE/OSS ____________________

RSCS GROUP: 12 SUBGROUP: 0 INSERT LIMIT: 8 WITHDRAW LIMIT: 10

		14-23		30-23		INITIAL	
STEP	MOVE	IN	OUT	IN	OUT	IN	OUT
36	08-10						

RSCS GROUP: 12 SUBGROUP: 1 INSERT LIMIT: 8 WITHDRAW LIMIT: 10

		22-31		22-15		INITIAL	
STEP	MOVE	IN	OUT	IN	OUT	IN	OUT
37	08-10						

ILC Exam Question # 59

RSCS GROUP: 12 SUBGROUP: 0 INSERT LIMIT: 10 WITHDRAW LIMIT: 12

		14-23		30-23		INITIAL	
STEP	MOVE	IN	OUT	IN	OUT	IN	OUT
38	10-12						

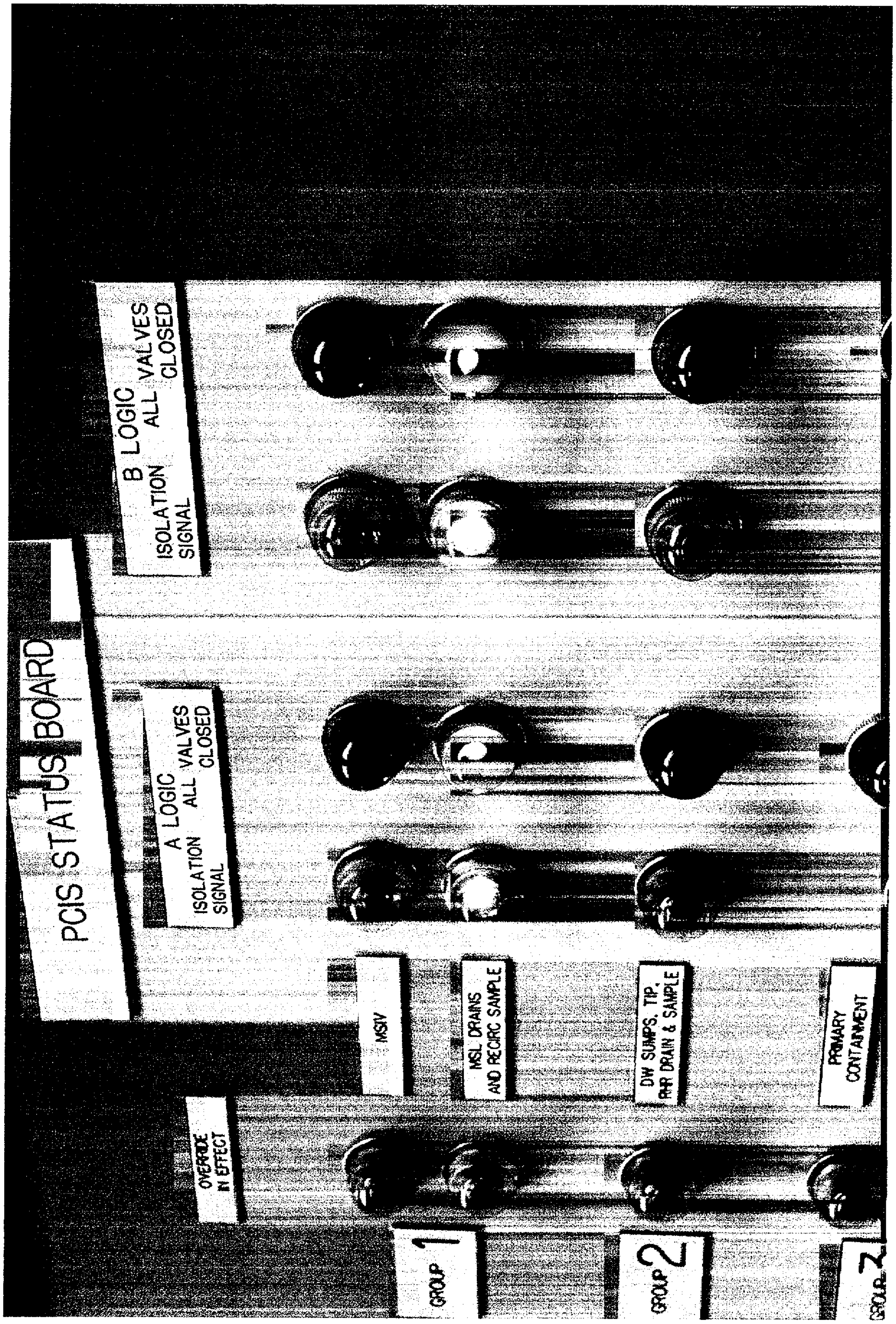
CRAM GROUP 2

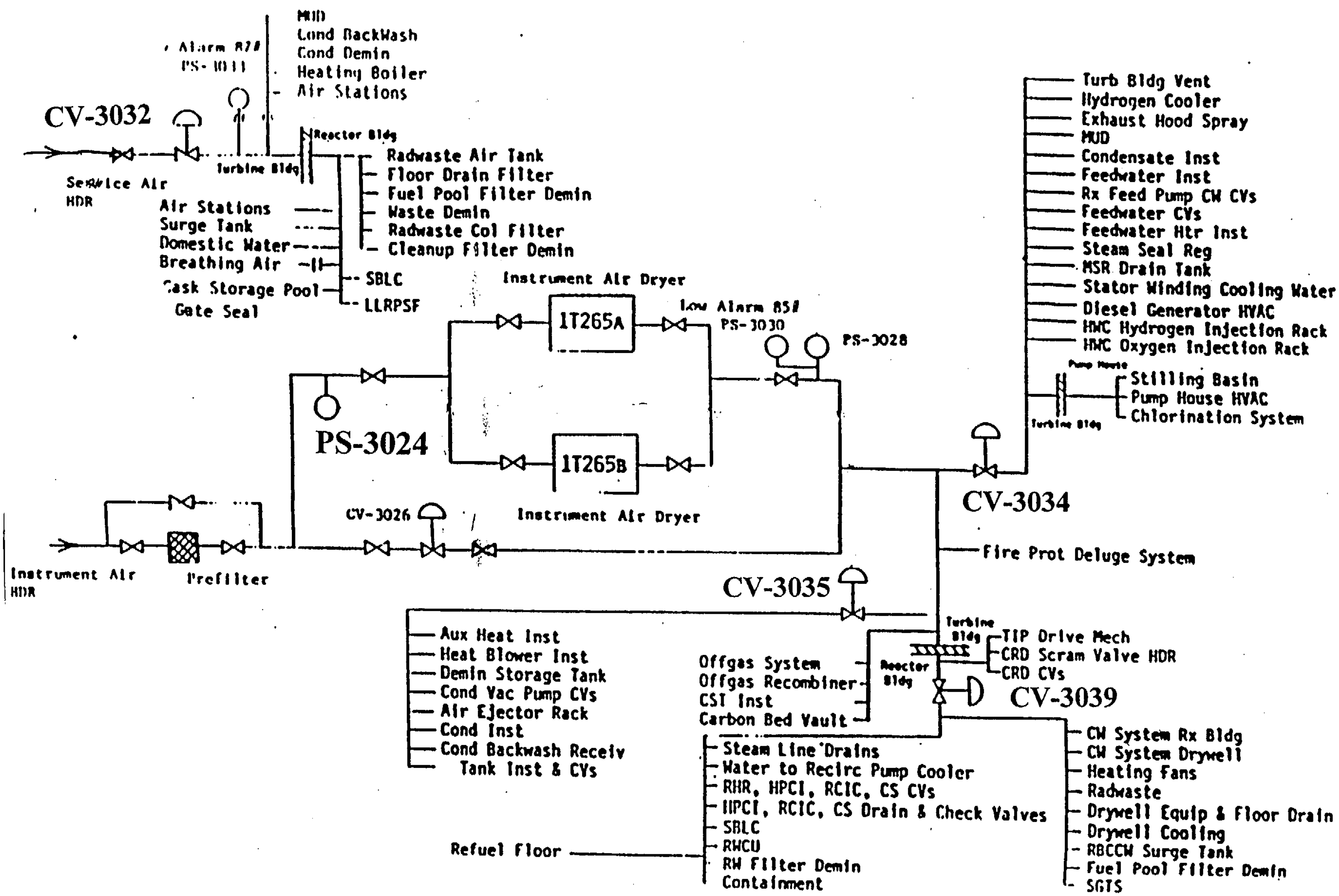
RSCS GROUP: 12 SUBGROUP: 1 INSERT LIMIT: 10 WITHDRAW LIMIT: 12

		22-31		22-15		INITIAL	
STEP	MOVE	IN	OUT	IN	OUT	IN	OUT
39	10-12						

CRAM GROUP 1

ILC EXAM QUESTION #71





ILC Exam Question # 74

3. Notify Mechanical Maintenance to perform the Drywell Airlock Local Leak Rate Test, STP 3.6.1.2-01, within 7 days of the Drywell Airlock being opened.

Drywell Airlock Opened ________/________ N/A
Date Time

(b) Upon completion of the Drywell/Steam Tunnel Inspection verify the following:

1. Drywell/Steam Tunnel inspection completed. 9/14/00 / ~~1400~~ 1600 9/14/00 1620 ✓
Date Time

2. Personnel clear of Drywell/Steam Tunnel. 9/14/00 / 1630 ✓
Date Time

NOTE

Immediate completion of the Drywell Airlock Local Leak Rate Test, STP 3.6.1.2-01, is not required to continue the Startup. The STP must be completed within 7 days of Drywell Airlock entry.

3. Drywell Airlock Local Leak Rate Test, STP 3.6.1.2-01, completed.

________/________ N/A
Date Time

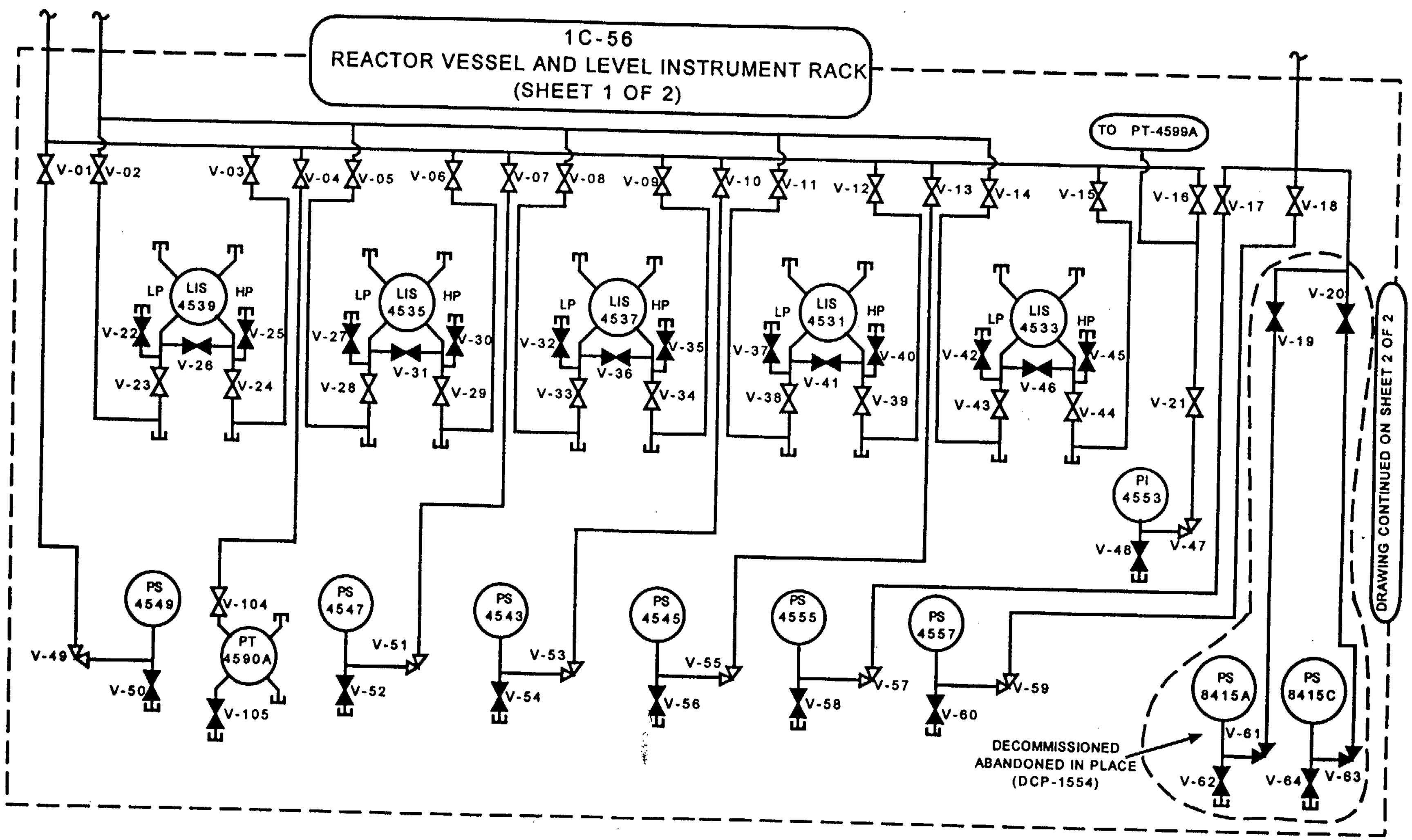
CAUTION

Limit reactor heatup rate to avoid exceeding the condensate pump discharge pressure until the reactor feed pump is started.

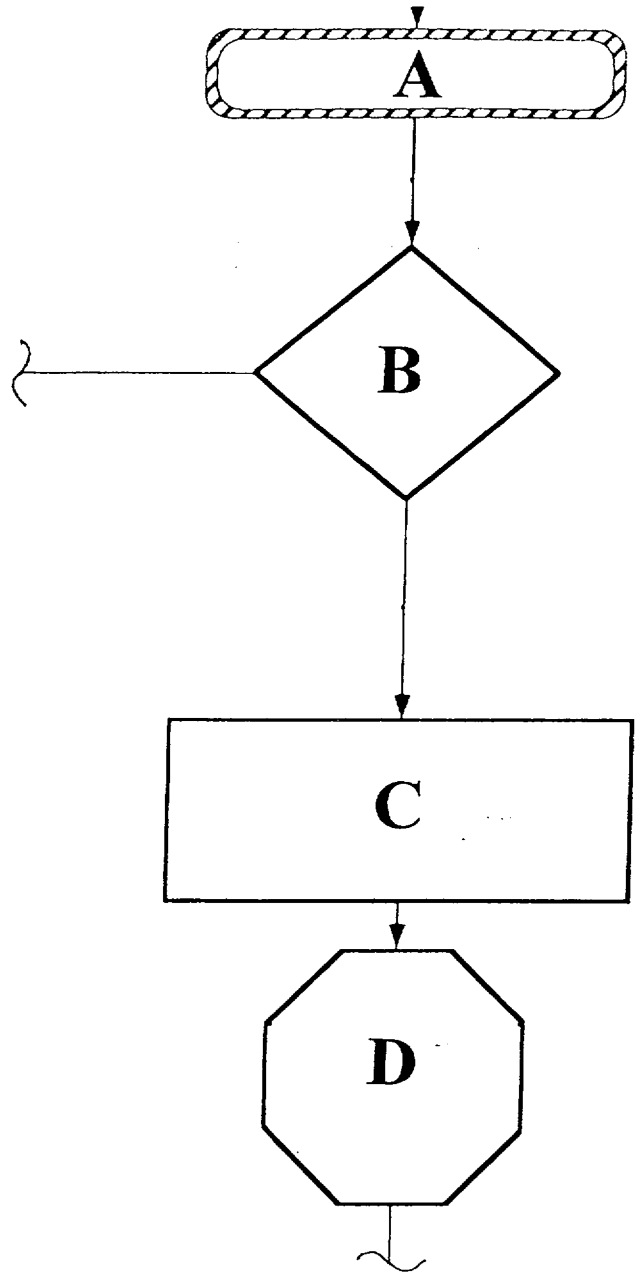
Do not make changes in EHC Pressure Set concurrent with control rod withdrawal.

(9) Continue the heatup/pressurization by withdrawing control rods OR increasing EHC PRESSURE SET ADJUST to maintain #1 BYPASS VALVE POSITION indicated on BPV-1 ZI-9017 between 20% and 90% open, with a Heatup rate of less than 80°F/hr. (T.S. Limit 100°F in any 1 hour period). ________

WORKING COPY



ILC Exam Question # 90


A
B
C
D

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

Applicant Information	
Name: MASTER	Region: III
Date: April 13, 2001	Facility/Unit: Duane Arnold Energy Center
License Level: SRO	Reactor Type: GE
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 five 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	100.0	Points
Applicant's Score	______	Points
Applicant's Grade	______	Percent

Duane Arnold Energy Center

Reactor Operator

50007

Topic: 2001 ILC
SRO Written Exam

Rev. 1

DEVELOPED BY: ______________________________ ____________
George Thullen — Date
Instructor

APPROVED BY: ______________________________ ____________
Operations Supervisor (Plant Reviewer) — Date

APPROVED BY: ______________________________ ____________
Mike Davis — Date
Training Supervisor-Operations

Available Responses: 100

ANSWER KEY

Number Correct: ___________

SCORE: _________%

Graded By: ___________

Reviewed By: ___________

Student's Name: ____________________________________
Print

Date: ___________

LEAVE EXAM WITH INSTRUCTOR/PROCTOR PRIOR TO LEAVING EXAM ROOM.

EXAM REVIEW SECTION - **PLEASE SIGN IN BLACK INK**

I ACKNOWLEDGE THAT I HAVE PARTICIPATED IN THE REVIEW OF THIS DOCUMENT AND HAVE HAD AN OPPORTUNITY TO ASK QUESTIONS.

____________________________________ ____________________

Student's Signature Date

1 Point

1. The Electrical grid and site transformers have been restored following a Loss of Offsite Power.

   The OSS directs you, as the 1C08 panel operator, to transfer 1A3 from the "A" Standby Diesel Generator (SBDG) to the Startup transformer.

   - The BUS 1A3 TRANSFER breaker mode selector switch is placed in MANUAL.
   - The handle for the SYNCHRONIZE switch is inserted into 4KV BREAKER 1A302 STARTUP TRANSFORMER TO BUS 1A3 and placed in the ON position.

   At this point you observe that the synchroscope is rotating slowly in the COUNTER CLOCKWISE direction.

   Which of the following CORRECTLY describes the operational implications of these synchroscope indications while preparing for breaker closure?

   a. "A" SBDG speed must be RAISED to achieve proper synchroscope rotation for breaker closure because it is the RUNNING source.

   b. "A" SBDG speed must be LOWERED to achieve proper synchroscope rotation for breaker closure because it is the RUNNING source.

   c. This is the accepted direction of rotation for breaker closure when an Offsite source is the INCOMING source.

   d. The System Operations Center (SOC) must adjust synchroscope rotation for breaker closure because the Offsite source is the INCOMING source.

ANSWER: b

Note: Synchroscope must be moving slowly in the CLOCKWISE direction for breaker closure.

Distracter 1: A SBDG is almost always the incoming source, but not in this situation. If it were incoming, raising would be the correct direction of adjustment.

Distracter 2: Rare situation; Plausible if candidate does not understand synchronization principles.

Distracter 3: Rare situation; Plausible if candidate does not understand synchronization principles.

REFERENCE: OI-304.2

K/A System: 262001 (A.C. Electrical Distribution)

K/A Number: K5.01 (Knowledge of the operational implications of the following concepts as they apply to A.C. Electrical Distribution: Principle involved with paralleling two A.C. sources.)

K/A Value: 3.1/3.4

Objective: Task 15.08 Transfer essential bus from SBDG to Startup transformer.

Cognitive Level: 3-SPK

Source: NEW

2. Both Reactor Recirculation pumps were running at 70% speed when an internal component failure in the "B" MG SET SPEED CONTROL caused the controller speed demand output signal to instantaneously fail to the MAXIMUM value.

   Which of the following CORRECTLY describes the expected affect of this failure on core flow?

   Core flow will rise until...

   a. the "B" Recirc Scoop Tube Positioner reaches its ELECTRICAL STOP.

   b. the "B" Recirc Scoop Tube Positioner reaches its MECHANICAL STOP.

   c. a "B" Recirc Scoop Tube Positioner LOCK-UP occurs due to high milliamp output signal from the controller.

   d. a "B" Recirc Scoop Tube Positioner LOCK-UP occurs due to high deviation between the controller demand and the Positioner position.

ANSWER: d

Distractor 1: Positioner has an electrical stop , but the deviation lockup should occur much sooner.

Distractor 2: Positioner has an mechanical stop , but the deviation lockup should occur much sooner.

Distractor 3: Milliamp output is something that is checked after a lockup but it does not cause the lockup.

REFERENCE: SD-264; ARP 1C04B, C-2

K/A System: 202002 (Recirculation Flow Control System)

K/A Number K3.01 (Knowledge of the effect that a loss or malfunction of the Recirculation Flow Control System will have on the following: CORE FLOW.)

K/A Value: 3.5/3.5

DAEC Objective: 12.00.00.02 Identify the conditions that allow or causes the following to occur: c. Scoop Tube Lock-up

Cognitive Level: 1-I

Source: NEW

1 Point

3. A plant startup is in progress with reactor power at 65% and both Recirc MGs at 50% speed.
"A" Recirc MG receives a scoop tube lockup due to a failed instrument.

What is the highest speed that the "B" Recirc MG would be allowed to be taken to while "A" Recirc MG troubleshooting is on-going?

a. 50%

b. 61%

c. 67.5%

d. 79.3%

ANSWER: c

Distracter 1, 2, 3: Per Technical Specifications, and P & L # 14, the speed of the faster MG shall not exceed 135% of the slower MG when reactor power is less than 80%.

REFERENCE: OI-264, Reactor Recirculation System

K/A System: 202002 (Recirculation Flow Control System)

K/A Number: A1.01 (Ability to predict and/or monitor changes in parameters associated with operating the Recirculation Flow Control System controls including: RECIRCULATION PUMP SPEED.)

K/A Value: 3.2/3.2

DAEC Objective: 12.01.01.02

Relate the Precautions and Limitations, operating cautions, or procedural notes of OI-264, Reactor Recirculation System, and any applicable ARP, to any component or Recirc System operating status.

Cognitive Level: 3-SPK

Source: Exam Bank

4. The following plant conditions exist after a Loss of Coolant Accident:
   - All control rods are fully inserted.
   - Containment Sprays have failed.
   - Emergency Depressurization has been performed.
   - Average Drywell Air Temperature is 320°F and rising slowly.
   - RPV Flooding is in progress due to loss of RPV water level indications.
   - Torus Average Water temperature is 150°F and rising slowly.
   - The 3 available RHR pumps are injecting into the RPV at 14400 gpm.
   - Torus Water level is 10.0 ft and lowering steadily due to RPV injection.

   The 1C03 operator reports the following trends to you, the OSS:
   - RHR loop flows are lowering slowly.
   - RHR Pump Amps are lowering slowly.
   - RHR Pump discharge pressure is rising slowly.

   Which of the following would account for these indications?

   a. The RPV is full.

   b. The RHR suction strainers are becoming blocked.

   c. The elevated Drywell air temperature is affecting the RHR system indications.

   d. The lowering Torus Level and rising Torus Temperature are affecting RHR Pump NPSH.

ANSWER: a

Distracter 1: Would cause lowering or erratic flow and amps but not rising discharge pressure.

Distracter 2: Drywell air temp is very elevated and has caused the loss of RPV level indications but has no affect on the trends provided.

Distracter 3: Would cause lowering or erratic flow and amps but not rising discharge pressure.

REFERENCE: RPV Flood: SEP 305

K/A System: 203000 (Residual Heat Removal/Low Pressure Coolant Injection)

K/A Number: 2.4.47 (Ability to diagnose and recognize trends in an accurate and timely manner utilizing the appropriate control room reference material.)

K/A Value: SRO 3.7

Objective: SRO 2.06.01.12Evaluate plant conditions and control room indications to determine if the RHR System is needed to be running in any particular mode, is operating as expected and/or is no longer needed and identify any actions that may be necessary to place the RHR System in the correct lineup.

Cognitive Level: 3 SPK

Source: New Question

1 Point

5. The plant is performing a normal cooldown. The following conditions exist:

Reactor pressure	500 psig
Reactor water level	190″
RPV cooldown rate	30°F/hr
HPCI pump discharge pressure	525 psig
HPCI system flow	3100 gpm

HPCI is operating in CST-to-CST using the FIC in AUTO

The Shift Supervisor directs you to increase the cooldown rate to as high as possible but not to exceed 80°F/hr. Which of the following accurately describes how the increase of the cooldown rate would be accomplished?

a. Shift the FIC to MANUAL and raise turbine speed to raise HPCI system flow.

b. Throttle CLOSED CV-2315, Test Bypass Valve, to raise HPCI pump discharge pressure.

c. Control HPCI on the Test Pot and raise turbine speed, to raise HPCI pump discharge pressure, and throttle CV-2315 OPEN to raise system flow.

d. Secure the CST-to-CST lineup and lineup to inject into the RPV. Adjust turbine speed with the FIC until HPCI discharge pressure is 100 psig greater than RPV pressure.

ANSWER: b

Distracter 1: The FIC should be left in AUTO control.

Distracter 2: The FIC should be left in AUTO control and opening CV-2315 lowers discharge pressure.

Distracter 3: It is unnecessary to inject into the RPV to raise discharge pressure.

REFERENCE: Generic Fundamentals, Chapter 2, Pumps page 21

K/A System: 206000 (High Pressure Coolant Injection)

K/A Number: A4.06 (Ability to manually operate and/or monitor in the control room: REACTOR PRESSURE.)

K/A Value: 4.3/4.3

DAEC Objective: 5.02.01.03

Evaluate plant conditions and control room indications to determine if the HPCI System is operating as expected, and identify any actions that may be necessary to place the HPCI System in the correct lineup.

Cognitive Level: 2-RI

Source: New Question

1 Point

6. HPCI is running normally in the CST to CST mode with the following air operated valves in their expected positions:

- CV-2211 HPCI STEAM LINE DRAIN ISOL (Inboard) CLOSED
- CV-2212 HPCI STEAM LINE DRAIN ISOL (Outboard) CLOSED
- CV-2234 CLOSED RADWASTE DISCH ISOL (Inboard) CLOSED
- CV-2235 CLOSED RADWASTE DISCH ISOL (Outboard) CLOSED
- CV-2315 TEST BYPASS THROTTLED OPEN

Which of the following would describe the operating status of these valves and the HPCI System IN THE NEXT 10 MINUTES if a COMPLETE LOSS of Instrument and Service Air were to occur?
(Do not assume any HPCI initiations, trips or isolations resulting from the loss of Air transient.)

a. There would be NO CHANGE to these valve positions and HPCI would continue to operate in the CST-CST mode.

b. The inboard drains, CV-2211 and CV-2234, would be failed OPEN and HPCI would continue to operate in the CST-CST mode.

c. The outboard drains, CV-2212 and CV-2235, would be failed OPEN and HPCI would continue to operate in the CST-CST mode.

d. CV-2315 TEST BYPASS would be failed CLOSED resulting in a shutdown of CST to CST flow and opening of the Minimum Flow valve.

ANSWER: a
Note: Implicit in this question is whether or not the OSS will have HPCI available for RPV pressure control after the reactor scram.
Distracter 1,& 2: Inboard or outboard logics do not matter and these valves do not have accumulators, so they all fail closed.
Distracter 3: Test Bypass does fail closed, but not in the next 10 minutes because of an accumulator that is designed to keep the valve open for 8 hours.
REFERENCE: SD-152
K/A System: 295019 (Partial or complete loss of Instrument Air)
K/A Number: A2.02 (Ability to determine and/or interpret the following as they apply to Partial or complete loss of Instrument Air: Status of safety related instrument air loads.)
K/A Value: 3.6/3.7
DAEC Objective: RO 5.01.01.02 Given HPCI operating mode and various plant conditions, predict how HPCI will be impacted by the following support system failures: l. Inst. and Service Air systems
SRO 5.17.06.01 Explain which systems have associated accumulators and describe the extended operation time allowed by accumulators.
Cognitive Level: 2-RI
Source: NEW

1 Point

7. Which combination of MCCs, if de-energized, would prevent the operation of both of the Core Spray Subsystems Injection Valves from the control room?

   a. 1D41 / 1D42

   b. 1B33 / 1B45

   c. 1B34 / 1B44

   d. 1B35 / 1B43

ANSWER: c

Note: MO-2115 and MO-2117 are powered from 1B34, MO-2135 and MO-2137 are powered from 1B44.

Distracter 1: Both are 250 VDC busses in Rx Bldg. Selected if candidate thinks these loads are DC.

Distracter 2: Both are essential 480VAC busses, but are in the Turbine Bldg. and supply mainly TB essential loads.

Distracter 3: Both are essential 480VAC busses but these busses load shed during a LOOP – LOCA; a bad feature for ECCS pumps.

REFERENCE: OI-151, Core Spray, Attachment 1

K/A System: 209001 (Low Pressure Core Spray)

K/A Number: K2.02 (Knowledge of the electrical power supplies to the following: VALVE POWER.)

K/A Value: 2.5/2.7

DAEC Objective: 4.01.01.10

Given a Core Spray System operating mode and various plant conditions, predict how the Core Spray System will be impacted by the following support system failures: A. C. DISTRIBUTION.

Cognitive Level: 1-F

Source: New Question

1 Point

8. The "B" RHR Loop was placed in Shutdown Cooling 12 hours ago after a normal shutdown.

Current conditions are as follows:

- RPV water level is stable at 200".
- Both Recirc pumps have been secured.
- The "B" Recirc Pump Discharge Bypass valve is open to keep that loop warm.
- "B" Recirc Loop suction temperature is 180°F and stable.
- The RPV wall temperature is 180°F and stable.
- "B" RHR pump is running.
- "B" RHRSW pump is running.
- Many outage activities, including Control Room panel modifications, are in progress.

While in this condition, the Drywell Health Physics Technician calls the control room to report that wisps of steam have started coming from the Drywell sump area and that it is starting to get very humid in the Drywell.

Control Room operators begin to investigate this report.

Which of the following malfunctions would be consistent with this report and current plant conditions?

Control Room Operators find that...

a. MO-4602, "B" Recirc Pump Suction valve, somehow got closed.

b. MO-1905, "B" RHR Inboard Inject Isolation valve, somehow got closed.

c. MO-1947, "B" RHR HX Service Water Outlet valve, somehow got closed.

d. MO-1908, Inboard Shutdown Cooling Isolation valve, somehow got closed.

ANSWER: b

Note: Question is based on industry experience in which the SDC discharge valve went closed without operators knowing about it. Recirc pumps secured with RPV level <214 inches means no natural circulation. Coolant temperatures are not reliable indication of coolant temperature without forced circulation. Such a report from the DW is listed as a probable indicator in AOP 149. Stem conditions indicate that there is **no reactor recirculation flow**, either forced or natural.

Distracter 1: The Discharge Valve is normally tagged closed to prevent SDC flow from bypassing the core. Alternately, the Suction valve can have been tagged closed in its place for the same reason. Therefore closing this valve would have no affect of recirculation flow.

Distracter 2: This constitutes a loss of SDC , but not of reactor recirculation flow. If this were the cause, Recirc Pump suction temps and vessel wall temps would be rising due to hotter and hotter forced circulation water.

Distracter 3: This constitutes a loss of SDC but would also trip the running RHR pump.

REFERENCE:AOP-149; OI-149; IG 94-01; SEN 171; ARP 1C03B (A-8)

K/A System: 295021 (Loss of Shutdown Cooling)

K/A Number: AA2.07 (Ability to determine and/or interpret the following as they apply to Loss of Shutdown Cooling: Reactor recirculation flow.)

K/A Value: 2.9/3.1

DAEC Objective: 94.01.01.04 Evaluate plant conditions and control room indications and determine if entry into AOP-149 is warranted. (Loss of S/D Cooling)

Cognitive Level: 2-RI Source:NEW

1 Point

9. During an ATWS transient, the Shift Supervisor has directed the initiation of Standby Liquid Control System (SBLC).

After placing the SBLC system mode switch to the PUMPS A and B RUN position, you observe the following conditions:

Both SBLC pumps RED lights ON
Both SBLC Squib valve ready lights OFF
SBLC Squib continuity loss annunciator ON
SBLC System discharge pressure is 980 psig
SBLC System flow = 55 gpm
SBLC storage tank level lowering
Reactor pressure is 950 psig
RWCU isolated
Reactor power lowering

Evaluate these conditions and indicate if the SBLC system has initiated properly and if not, then specify the discrepancy.

a. The SBLC system has initiated properly.

b. The SBLC system has NOT initiated properly because system flow would be greater than
56 gpm.

c. The SBLC system has NOT initiated properly because the Squib valve continuity loss annunciator would not be activated.

d. The SBLC system has NOT initiated properly because the system discharge pressure would
be at least 100 psig greater than reactor pressure.

ANSWER: a
Distracter 1: Per OI-153, SBLC has initiated properly, system flow should be > 52.4 gpm. Actual pump flow during testing is closer to 28 gpm.
Distracter 2: Per OI-153, SBLC has initiated properly, continuity annunciator should be activated.
Distracter 3: Per OI-153, SBLC has initiated properly, system pressure should be greater than reactor pressure, however there is no minimum amount specified.
REFERENCE: OI-153
K/A System: 211000 (Standby Liquid Control System)
K/A Number: K4.08 (Knowledge of Standby Liquid Control System design feature(s) and/or interlocks which provide for the following: SYSTEM INITIATION UPON OPERATION of SBLC SWITCH.)
K/A Value: 4.2/4.2
DAEC Objective: 6.00.00.05 Describe how the Standby Liquid Control System RESPONDS TO AN INITATION signal.
Cognitive Level: 1 I
Source: New Question

1 Point

10. A small line break LOCA has occurred while at power.

The following plant conditions exist:

HPCI and RCIC will NOT function.
Feedwater is maintaining RPV level slightly greater than +15"
RPV pressure is at 800 psig
Drywell and Torus Sprays have been initiated and are effective
Torus water level has reached 13.5 ft. even with the maximum amount of water being drained to Radwaste from RHR.

Which of the following statements CORRECTLY explains the required actions?

a. Continue feedwater injection to assure adequate core cooling and continue Drywell Sprays to maintain Drywell temperature < 280°F.

b. Continue feedwater injection to assure adequate core cooling and terminate Drywell Sprays because Drywell vacuum relief CANNOT be assured.

c. Terminate feedwater injection to maintain Torus level below 13.5 ft. and continue Drywell Sprays to maintain Drywell temperature < 280°F.

d. Terminate feedwater injection to maintain Torus level below 13.5 ft. and terminate Drywell Sprays because Drywell vacuum relief CANNOT be assured.

ANSWER: b

Note: **EOP-2 is provided with Entry Conditions blanked out.**

Distracter 1 & 2: Drywell Sprays are required to be secured at 13.5 ft.

Distracter 3: Feedwater is needed to assure adequate core cooling and should not be secured.

REFERENCE: EOP 2

K/A System: 295029 (High Suppression Pool Water Level)

K/A Number: 2.1.7 (Ability to evaluate plant performance and make operational judgments based on operating characteristics/reactor behavior and instrument interpretation.)

K/A Value: SRO 4.4

Objective: SRO 6.58.01.05 Evaluate plant conditions and control room indications and determine the actions directed by EOP 2.

Cognitive Level: 3 SPR
Source: Exam Bank

1 Point

11. "A" RPS bus was deenergized while being transferred to the Alternate power supply.

During this transfer, a Loss of Coolant Accident occurred which caused entry into EOP-1 on a High Drywell pressure signal.

Restoration of the "A" RPS bus will be necessary for the performance of which one of the following EOP-1 actions?

"A" RPS power will be necessary to ...

a. verify that all control rods have fully inserted.

b. verify that the Group 3A isolation has gone to completion.

c. override CV-4371A, Defeat 11 Containment N2 Supply Isolation Defeat.

d. maintain the MSIVs open with Defeat 17, Hi Condenser Backpressure Isolation Defeat.

ANSWER: b

Note: The Group 3A valves listed in AOP-358 lose open/closed indication and cannot be verified.

Distracter 1: Loss of RPS makes the rods insert. RPIS indications are not affected by loss of RPS because they are powered from Uninterruptible AC.

Distracter 2: CV-4371A control and override power is from Div 2 instrument AC.

Distracter 3: A ½ Group 1 would be in affect, but B RPS remains energized as do the DC solenoids on the MSIVs, which will stay open with Defeat 17 if Condenser Backpressure rises.

REFERENCE: EOP-1; AOP-358

K/A System: 212000 (Reactor Protection System)

K/A Number: 2.4.8 (Knowledge of how the event-based emergency/abnormal operating procedures are used in conjunction with the symptom based EOPs.)

K/A Value: SRO 3.7

Objective: SRO 5.11.01.01 Explain how the automatic actions from a loss of RPS effect plant and system status.

Cognitive Level: 2-RI
Source: New Question

1 Point

12. OI-324 "Standby Diesel Generator System" warns against prolonged operation of the SBDG at LESS THAN 25% LOAD to prevent "engine souping".

    Which of the following is a possible consequence of engine souping?

    a. Bearing failure due to oil separation.

    b. Injector failure due to incomplete combustion.

    c. Exhaust system fire due to combustion product buildup.

    d. Engine failure due to water accumulation in the fuel oil.

ANSWER: c

Distracter 1: Plausible but not identified as a consequence.

Distracter 2: Plausible but not identified as a consequence.

Distracter 3: Plausible but not identified as a consequence..

REFERENCE: OI-324 P&L 15

K/A System: 264000 (SBDG)

K/A Number: A4.04 (Ability to manually operate and/or monitor in the control room: MANUAL START, LOADING, AND STOPPING OF SBDG.)

K/A Value: 3.7/3.7

DAEC Objective: 19.01.01.01 (Relate the P&Ls, operating cautions, or procedural notes of OI-324 to any component or SBDG operating status.)

Cognitive Level: 1-D

Source: Bank

1 Point

13. During a normal plant startup and after verifying SRM/IRM overlaps, the operator at 1C05 starts to withdraw the SRMs.

The operator mistakenly selects the "A" IRM instead of "C" SRM.

Without any other operator actions, what will be the effect on the startup after the "A" IRM is withdrawn?

Assume that the plant responded as expected.

a. The reactor startup and heatup can continue with a 1/2 scram on the "A" RPS channel.

b. The reactor startup and heatup cannot continue because of an IRM DOWNSCALE rod block.

c. The reactor startup and heatup can continue with the IRM DOWNSCALE annunciator activated.

d. The reactor startup and heatup cannot continue because of an IRM INOP 1/2 Scram and rod block.

ANSWER:	b
Distracter 1:	IRM downscale condition will produce a rod out block and prohibit control rod withdrawal.
Distracter 2:	IRM downscale condition will produce a rod out block and prohibit control rod withdrawal.
Distracter 3:	The IRM is not inoperative but downscale, there will be no 1/2 scram.
REFERENCE:	ARP 1C05A, D-3, IRM DOWNSCALE
K/A System:	215003 (Intermediate Range Monitor)
K/A Number:	K5.03 (Knowledge of the operational implications of the following concepts as they apply to Intermediate Range Monitor: CHANGING DETECTOR POSITION.)
K/A Value:	3.0/3.1
Objective:	79.00.00.06 Given an IRM System operating mode and various plant conditions, predict how each supported system will be impacted by failures in the IRM System: REACTOR MANUAL CONTROL
Cognitive Level:	3 PEO
Source:	New Question

1 Point

14. PS-4315A, which provides a PRIMARY CONTAINMENT HIGH PRESSURE SIGNAL to the Group 3A logic, has failed AS IS.

Which of the following correctly describes the arrangement of Containment pressure switches in
the Group 3 Isolation logic and correctly describes the response of the Group 3A Isolation logic to an ACTUAL Containment high pressure condition with this one switch failed?

a. There are two pressure switches, one in each logic channel.
The one switch in A logic has failed.
Therefore, the Group 3A Isolation WOULD NOT occur.

b. There are four pressure switches, two in each logic channel.
Both switches in a channel must trip in order for the logic to trip.
Therefore, the Group 3A Isolation WOULD NOT occur.

c. There are four pressure switches, two in each logic channel.
If either switch in a channel trips, the logic will trip.
Therefore, the Group 3A Isolation WOULD occur.

d. There are four pressure switches, four (shared) in each logic channel.
If any two switches in a channel trip, the logic will trip.
Therefore, the Group 3A Isolation WOULD occur.

ANSWER: c

Distracter 1: Group 3 is four switches, one out of two for each logic.

Distracter 2: Group 3 is four switches, one out of two for each logic.

Distracter 3: Group 3 is four switches, one out of two for each logic. The shared switches describe is similar to Group 1 logic.

REFERENCE: ARP 1C05B, C-8

K/A System: 223002 (PCIS/NSSS)

K/A Number: A2.06 (Ability to predict the impacts of the following on PCIS/NSSS; and based on those predictions, use procedures to correct, control or mitigate the consequences of those abnormal conditions or operations; Containment Instrument Failures)

K/A Value: 3.0/3.2
Objective: 42.08.01.07 (List the signals which cause Primary containment and Containment
Atmosphere Monitoring and Control isolations. Describe their purpose setpoint and logic. Describe how they are bypassed and how they are reset.)
Cognitive Level: 2-DR
Source: NEW

1 Point

15. Do the following Source Range Monitor (SRM) system components REMAIN ENERGIZED or do they become DEENERGIZED by a COMPLETE LOSS of 24 VDC System 1?

1) "A" SRM detector auxiliary trip units
2) "A" SRM detector drive motor power

a. 1) REMAINS ENERGIZED
   2) REMAINS ENERGIZED

b. 1) DEENERGIZED
   2) REMAINS ENERGIZED

c. 1) REMAINS ENERGIZED
   2) DEENERGIZED

d. 1) DEENERGIZED
   2) DEENERGIZED

ANSWER: b

Distracter 1: Aux trip units are 24VDC.

Distracter 2: Aux trip units are 24VDC.A SRM detector drive motor power is from essential lighting panel 1L80.

Distracter 3: A SRM detector drive motor power is from essential lighting panel 1L80.

REFERENCE: SD 878.1; APO 375

K/A System: 215004 (Source Range Monitor)

K/A Number: K6.02 (Knowledge of the effect that a loss or malfunction of the following will have on the Source Range Monitor System: 24/48 VDC

K/A Value: 3.1/3.3

Objective: 78.06.01.05 Given an SRM system operating mode and various plant conditions, predict how the SRM system will be impacted by failures in the following support systems: c. DC electrical system.

Cognitive Level: 1-F

Source: New Question

1 Point

16. The plant is operating at 95% power.

"E" APRM is bypassed.

An LPRM associated with "E" APRM fails UPSCALE.

Which of the following CORRECTLY describes the affect of this failure on the value of Core Thermal Power (MWTH) on the 3D Monicore official case?

a. LPRMs and APRMs are NOT factors in the heat balance calculation. Therefore, there would be NO CHANGE to the official case MWTH.

b. LPRMs and APRMs are factors in the heat balance calculation. There would be NO CHANGE to the official case MWTH because "E" APRM is bypassed.

c. LPRMs are a factor in the heat balance calculation. Therefore, the official case MWTH would INCREASE.

d. APRMs are a factor in the heat balance calculation even when bypassed. The official case MWTH would INCREASE because the upscale LPRM would cause a higher reading on the "E" APRM.

ANSWER: a

Note: Core Thermal Power is derived from a heat balance and is used to assign the value of reactor power to the APRMs. MWTH will not change.

Distracter 1: No change is correct but NIs are not a factor.

Distracter 2: MWTH will not change. NIs are not a factor.

Distracter 3: MWTH will not change. NIs are not a factor.

REFERENCE: SD 878.3

K/A System: 215005 (Average Power Range Monitor/Local Power Range Monitor)

K/A Number: K3.08 (Knowledge of the effect of a loss or malfunction of the APRM/LPRM will have on the following: CORE THERMAL CALCULATIONS.)

K/A Value: 3.0/3.4

Objective: 81.01.01.15 Given any APRM System operating mode and various plant conditions, predict how any APRM System operation or failure will impact each of the following supported systems: PLANT PROCESS COMPUTER.

Cognitive Level: 2 RI

Source: New Question

1 Point

17. With the plant at 100% power and NO inoperable equipment or LCOs, the following annunciators are received:

    1C05A, A-2, "A" RPS AUTO SCRAM

    1C05A, A-5, NEUTRON MONITORING SYSTEM TRIP

    1C05A, B-2, APRM A, C, OR E UPSCALE TRIP OR INOP

    1C05A, D-2, APRM DOWNSCALE

    1C05B, A-6, ROD OUT BLOCK

    Investigation reveals that the "C" APRM has just become INOPERABLE.

    Which of the following describes the appropriate actions per the ARPs?

    a. Manually insert a full scram.

    b. Place "C" APRM mode switch in STANDBY.

    c. Insert a backup manual half scram on the "A" RPS channel.

    d. With permission from the OSS, bypass "C" APRM and reset the ½ scram.

ANSWER: d

Distracter 1: Conditions have not degraded to the point that a full scram appropriate. Per Technical Specifications, only two channels are required per trip system. "A" and "E" are still operable. A scram is not required.

Distracter 2: Per Technical Specifications, only two channels are required per trip system. "A" and "E" are still operable. APRM mode switch out of operate would not accomplish anything.

Distracter 3: A backup manual scram is directed per the Scram IPOI-5 but not the ARPs. This action would be useless because A RPS is already tripped.. Per Technical Specifications, only two channels are required per trip system. "A" and "E" are still operable. The trip system is not required to be in the tripped condition.

REFERENCE: Technical Specifications, Section 3.3.1.1; ARP 1C05A (A-2) & (B-2); IPOI-5; OI-878.4

K/A System: 215005 (Average Power Range Monitor/Local Power Range Monitor)

K/A Number: K6.04 (Knowledge of the effect that a loss or malfunction of the following will have on the APRM/LPRM: TRIP UNITS.)

K/A Value: 3.1/3.2

Objective: 81.01.01.09

Describe the function and operation of the following principle LPRM/APRM system components: APRM FLOW-BIASED and NON-FLOW-BIASED TRIP CIRCUITS.

Cognitive Level: 1P

Source: New Question

18. Which of the following correctly identifies the Control Room panel(s) where a reactor water level indicator and/or recorder in the range of:

+8″ to +218″

can be read?

a. 1C05 only

b. 1C05 and 1C03

c. 1C05 and 1C04

d. 1C05 and 1C09

ANSWER: a
Distracter 1: +8″ to +218″ is a Yarway on 1C05 only. 1C03 also has a Yarway but it measure fuel zone,
−153-218. It is a possible misconception that the 1C03 RPV level recorder has a range of +8″ to +218″, but it records fuel zone range.
Distracter 2: +8″ to +218″ is considered "wide range" Yarway. The 1C04 level indication has a wide range of 300 inches, +158-+458.
Distracter 3: 1C09 has several Containment Accident recorders, but no RPV level recorders.
REFERENCE: M-115 ; SD 880
K/A System: 216000 (Nuclear Boiler Instrumentation)
K/A Number: A1.03 (Ability to predict and/or monitor changes in parameters associated with operating the Nuclear Boiler Instrumentation controls including: SURVEILLANCE TESTING.)
K/A Value: 2.9/3.2
Objective: 88.00.00.02Describe the operation of the following Non-Nuclear Instrumentation System components including range, control room location, calibration condition, any compensation and any instruments that share the same sensing lines: LEVEL, PRESSURE, TEMPERATURE, FLOW.
Cognitive Level: 1 S
Source: NEW

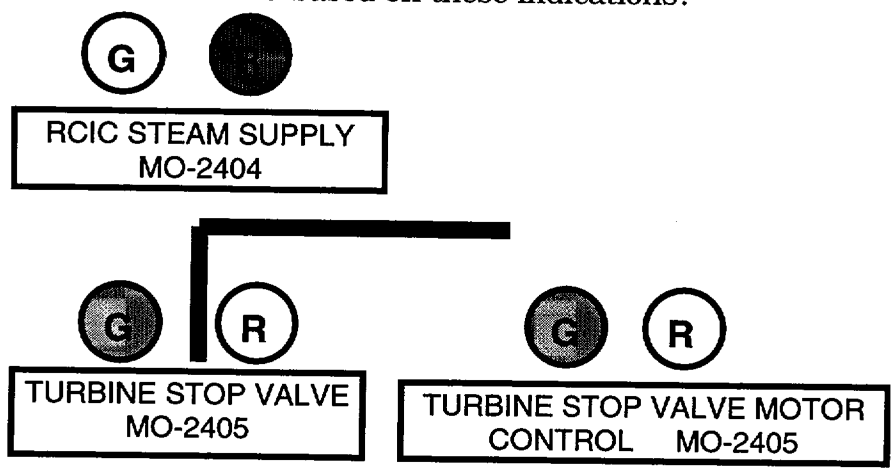
1 Point

19. The following question is related to the three sets of RCIC indicating lights shown below, minus the associated handswitches.

GRAY SHADED means the light is ILLUMINATED (energized).

A loss-of-coolant accident has occurred resulting RPV water level reaching 110 inches before the trend was reversed. A transient has occurred involving the RCIC system. The only operator action taken with RCIC was to cycle the handswitch for MO-2405, RCIC Turbine Stop Valve, to the fully CLOSED position and then to hold it in the OPEN position for three seconds.
MO-2400 and MO-2401, steam supply isolation valves, are open.

What is the status of RCIC based on these indications?



a. A RCIC Auto Isolation trip has occurred.
The RCIC Turbine trip is RESET.

b. A RCIC High RPV Level trip has occurred.
The RCIC Turbine trip is RESET.

c. A RCIC Electrical Overspeed trip has occurred.
The RCIC Turbine trip is NOT RESET.

d. A RCIC Mechanical Overspeed trip has occurred.
The RCIC Turbine trip is NOT RESET.

ANSWER: d
Distracters: a., b, and c. are incorrect because MO-2404 OPEN indicates that a 211" trip has NOT occurred and MO-2405 is indicating that a mechanical overspeed trip has occurred, and the valve motor operator indications indicate that the trip cannot be reset from the control room.
REFERENCE: ARPs 1C04C, A-5 and A-6
K/A System: 217000 (Reactor Core Isolation Cooling System)
K/A Number: A2.02 (Ability to (a) predict the impacts of the following on the Reactor Core Isolation Cooling System (RCIC) and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: TURBINE TRIPS.)
K/A Value: 3.8/3.7

Objective: 3.02.01.05Evaluate plant conditions and control room indications to determine if the RCIC System is operating as expected, and identify any actions necessary to place the RCIC System in the correct lineup. Cognitive Level:2-DR Source: Modified , Exam Bank

1 Point

20. Assume that the plant systems were in the normal lineup for the power level specified in each answer option.

Which of the following events would result in the OSS directing BOTH:

The Immediate Actions of IPOI-5 "Reactor Scram"
and
the IPOI-5 Follow-up Actions to mitigate thermal stratification?

a. MSIV closure at 15% power.

b. Loss of both RPS busses at 100% power.

c. A Main Generator lockout at 25% power.

d. RPV low water level trip due to a controller failure at 50% power.

ANSWER: c

Note: Correct answer trips the main turbine but is not a direct reactor scram when <30%. Above 22.5% (BPV capacity) this transient will also cause pressure control problems which will result in a scram. It also results in an open circuit transfer of the non essential busses resulting in a loss of Condensate, Feed, Circ Water, and Recirc Pumps.

Distracter 1: Plausible because this transient causes a pressure transient on the RPV. If the pressure reached 1140 psig, the recirc Pumps would trip. At this low power, the reactor would scram at MSIVs <90% open and the pressure transient would be minimal

Distracter 2: Plausible because RPS powers isolation logics which could affect Recirc Pumps.

Distracter 3: Plausible because low RPV level transients affect the Recirc Pumps and low water level could be causing stratification.

REFERENCE: IPOI 5

K/A System: 295006 (Reactor Scram)

K/A Number: AA2.06 .Ability to determine and/or interpret the following as they apply to a SCRAM: Cause of reactor scram.

K/A Value: SRO 3.8

Objective: SRO 4.22.01 Direct operator performance of IPOI-5 actions to mitigate thermal stratification.

Cognitive Level: 3-SPK
Source: New Question

1 Point

21. An accident has occurred and the ADS LOW WATER LEVEL CONFIRMED annunciator has actuated.

    In which of the following sets of conditions would the actuation of annunciator ADS A/B 2 MIN TIMER(S) INITIATED at 1C03 be expected?

    a. RPV level at +50", RHR pump running with a discharge pressure of 125 psig.

    b. RPV level at +115", RHR pump running with a discharge pressure of 135 psig.

    c. RPV level at +50", Core Spray pump running with a discharge pressure of 115 psig.

    d. RPV level at +115", Core Spray pump running with a discharge pressure of 145 psig.

ANSWER: a

Distracter 1, 2, 3:ADS timers are actuated at 64″ decreasing with a confirmatory level of 170″and either an RHR pump running with discharge pressure > 125 psig or a Core Spray pump running with discharge pressure > 145 psig.

REFERENCE: ARP 1C03A A-5

K/A System: 218000 (Automatic Depressurization System)

K/A Number: A3.07 (Ability to monitor automatic operations of the Automatic Depressurization System including: LIGHTS and ALARMS.)

K/A Value: 3.7/3.6

Objective: 8.03.01.03

Evaluate plant conditions and control room indications to determine if the ADS System or the Low-Low Set System is operating as expected, and identify any actions that may be necessary to place the ADS/LLS Systems in the correct lineup.

Cognitive Level: 1 I

Source: Exam Bank

1 Point

22. Which of the following sets of 480 VAC busses supplies power to the Drywell Cooling Fans?

a. 1B32 / 1B42

b. 1B33 / 1B45

c. 1B34 / 1B44

d. 1B35 / 1B43

ANSWER: d

Distracter 1:Homogeneous distracter, busses supply essential 480vac loads in Rx Bldg. Operator should know that these busses are in the switchgear room and not in Rx Bldg.

Distracter 2:Homogeneous distracter, busses supply essential 480vac loads in Rx Bldg. Operator should know that 1B33&45 are in the Turbine Bldg.

Distracter 3: Homogeneous distracter, busses supply essential 480vac loads in Rx Bldg.

REFERENCE: OI-760

K/A System: 223001 (Primary Containment System and Auxiliaries)

K/A Number: K2.09 (Knowledge of the electrical power supplies to the following: DRYWELL COOLING FANS.)

K/A Value: 2.7/2.9

Objective: 68.01.01.08

Given a Primary Containment Ventilation System operating mode and various plant conditions, predict how the Primary Containment Ventilation System will be impacted by failures in the following support systems: AC ELECTRICAL DISTRIBUTION.

Cognitive Level: 1-F

Source: NEW

1 Point

23. Following a reactor scram and Group 1 isolation, reactor pressure is noted to be 1070 psig and increasing. PSV-4405 is manually opened to reduce pressure. The operator observes the amber light above HS-4405 at 1C03 come ON.

Which of the following describes the immediate response of the Low-Low Set valves PSV-4401 and PSV-4407?

a. Both PSV-4401 and PSV-4407 will open.

b. Both PSV-4401 and PSV-4407 will remain closed.

c. PSV-4401 will open and PSV-4407 will remain closed.

d. PSV-4401 will remain closed and PSV-4407 will open.

ANSWER: a

Distracter 1, 2, 3:Low-Low Set is armed with a High Pressure scram signal (1055 psig) and one relief valve open (25 psig tail pipe pressure) and then both PSV-4401 and PSV-4407 open.

REFERENCE: 1C03A, D-5

K/A System: 239002 (Relief/Safety Valves)

K/A Number: K5.01 (Knowledge of the operational implications of the following concepts as they apply to Relief/Safety Valves: RELIEF FUNCTION of SRV OPERATION.)

K/A Value: 3.4/3.5

Objective: 8.00.00.03 AND 8.03.01.04

State the purpose(s) of the Low-Low Set System. AND List the signals which cause a Low-Low Set auto initiation including setpoints and logic. Describe how they are bypassed and how they are reset.

Cognitive Level: 1 I

Source: Exam Bank

1 Point

24. The operating crew was forced to rapidly abandon the Control Room and activate the Remote Shutdown Panel.

One operator reports to you, the OSS, that he depressed both manual scram pushbuttons and saw that the 8 white SCRAM GROUP indicating lights were OFF as he hurriedly abandoned the Control Room.

Which of the following is CORRECT concerning VERIFICATION of the scram in accordance with AOP-915, " Shutdown Outside Control Room"?

a. Further verification is NOT necessary if the manual scram pushbuttons were used to scram the reactor.

b. Further verification is NOT necessary if the 8 white SCRAM GROUP indicating lights were
confirmed OFF.

c. Further verification is necessary and performed by confirming that the scram air header pressure is 0 psig.

d. Further verification is necessary and performed by confirming that all 89 pairs of scram inlet and outlet valves are open.

ANSWER: d

REFERENCE: AOP 915 "Shutdown Outside the Control Room"

Distracter 1&2: Very good signs that reactor scrammed but verification is still required by AOP 915, Step 10 Tab 3

Distracter 3: All rods should be in if this indicates 0 psig, but it is not the parameter checked.

K/A System: 295016 (Control Room Abandonment)

K/A Number: Generic 2.4.21 Knowledge of the parameters and logic used to assess the status of safety functions including: 1 Reactivity Control

K/A Value: SRO 4.3

Objective: 5.30.01 Direct performance of the verification of reactor scram

Cognitive Level: 1-P

Source: New Question

1 Point

25. The plant is operating at about 55% load when the Stator Cooling Water TCV fails, bypassing the heat exchanger.

As this event progresses, which statement below describes automatic actions the operator should expect to observe?

a. Turbine Load Set will ramp down, causing the bypass valves to open to control pressure.

   If, during this time, NO operator action is taken the reactor will scram on high pressure.

b. The bypass valves receive a direct open signal, causing turbine control valves to close to control pressure.

   If, during this time, NO operator action is taken the reactor will scram on high pressure.

c. Turbine Load Set will ramp down, causing the bypass valves to open to control pressure.

   If, during this time, NO operator action is taken the turbine will trip and the Turbine Stop Valve closure will scram the reactor.

d. The bypass valves receive a direct open signal, causing turbine control valves to close to control pressure.

   If, during this time, NO operator action is taken the turbine will trip and the Turbine Stop Valve closure will scram the reactor.

ANSWER: a

Distractor 1: Load Set runs down to cause a runback.

Distractor 2: The reactor will scram on high pressure because bypass valves are sized too small to accept that much steam flow.

Distractor 3: Load Set runs down to cause a runback. The reactor will scram on high pressure because bypass valves are sized too small to accept that much steam flow.

REFERENCE: ARP 1C08C D-4, revision 7; ARP 1C83A A-4, revision 8

K/A System: 241000 (Reactor/Turbine Pressure Regulating System)

K/A Number: K1.11 (Knowledge of the physical connections and/or cause/effect relationships between Reactor/Turbine Pressure Regulating System and the following RPS.)

K/A Value: 3.7/3.8

Objective: 52.01.01.01

Relate the Precautions and Limitations, operating cautions, warnings or procedural notes of OI-693.2 and any related ARPs to any component or EHC System operating status.

Cognitive Level: 2-RI

Source: Exam Bank

26. A Loss of Drywell cooling has occurred that has resulted in Torus and Drywell pressures of 4 psig.

Which of the following is correct concerning the initiation of Torus Sprays in this situation?

Initiation of Torus Sprays is...

a. NOT ALLOWED by EOP-2. Torus Sprays are used to scrub the air space of radioactive particles in preparation for containment venting and are therefore initiated only after a LOCA.

b. NOT ALLOWED by EOP-2. Torus Sprays are used to condense steam in the Torus' enclosed atmosphere thus reducing its pressure and are therefore initiated only after a LOCA.

c. ALLOWED by EOP-2. Torus Sprays are used for evaporative and convective cooling of the Torus' enclosed atmosphere thus reducing its pressure.

d. ALLOWED by EOP-2. Torus Sprays are used to improve the distribution of water returning from the RHR heat exchangers thus helping reduce Torus Average Water temperature.

ANSWER: c

Distractor #1:Directed by EOP-2 Steps PC/P 3 & 4 no matter what the cause of DW High Pressure.
Scrubbing does help prior to venting, but it is not the basis for this action.

Distractor #2: Directed by EOP-2 Steps PC/P 3 & 4 no matter what the cause of DW High Pressure. Steam condensation is the major reason Torus pressure drops when spraying after a LOCA. Also, Drywell Sprays are allowed on in the allowable region of graph 7, i.e.: post LOCA.

Distractor #3:"Allowed" is correct but the reason given is not the correct basis. If anything, the water will pick up more heat in the air space and Torus water temp will increase not decrease.

REFERENCE: EOP Bases document.

K/A System: 230000 (RHR/LPCI, Torus /Pool Spray mode.)

K/A Number: A1.01 (Ability to predict and/or monitor changes in parameters associated with operating the RHR Torus spray mode controls including: Suppression chamber pressure.)

K/A Value: 3,8/3.9

Objective: 2.01.01.07 (Given an RHR system operating mode and various plant conditions, predict how each supported system will be impacted by the following RHR system operations/failures:
c. Containment Spray initiation.)

Cognitive Level: 1-P&B

Source: NEW

1 Point

27. OI-644 "Condensate and Feedwater Systems" directs that "D" Well Water Pump, 1P-58D, should be removed from service prior to starting which of the following?

    a. "A" Condensate Pump

    b. "B" Condensate Pump

    c. "A" Feedwater Pump

    d. "B" Feedwater Pump

ANSWER: d

Distracter 1, 2, 3:Per OI-644 P&L # 12, the reason is to minimize the voltage transient on 1A2.

REFERENCE: OI-644, Condensate and Feedwater Systems, Precaution and Limitation # 12, page 6

K/A System: 259001 (Reactor Feedwater System)

K/A Number: K2.01 (Knowledge of electrical power supplies to the following: REACTOR FEEDWATER PUMPS.)

K/A Value: 3.3/3.3

Objective: 45.00.00.03

Given a Feed and Condensate System operating mode and various plant conditions, predict how the Feed and Condensate System will be impacted by failures in the following support systems: AC ELECTRICAL DISTRIBUTION.

Cognitive Level: 1 P

Source: New Question

1 Point

28. The "B" SBGT EXHAUST FAN 1V-EF-15B handswitch is in NORM.

In preparation for operating SBGT train "B" in manual, the "B" SBGT MODE SELECT switch is placed in MANUAL.

While the Mode Switch is still in MANUAL, a full GROUP III initiation signal occurs.

Which of the following describes the response of the "B" SBGT system?

a. The "B" SBGT lockout relay will trip.
   The "B" SBGT train will function normally.

b. The "B" SBGT lockout relay will NOT trip.
   The "B SBGT train Exhaust Fan operation will be inhibited. (Will not auto start).

c. The "B" SBGT lockout relay will trip.
   The "B SBGT train Exhaust Fan operation will be inhibited. (Will not auto start).

d. The "B" SBGT lockout relay will trip.
   The "B" SBGT train Exhaust Fan will auto start when/if the "A" SBGT train flow decreases to <3300 SCFM.

ANSWER:	c
Distractor 1:	"B" train auto start is inhibited
Distractor 2:	"B" lockout relay will trip
Distractor 3:	"B" train auto start on low flow is inhibited
REFERENCE:	BECH E113 SHT11
K/A System:	261000 (Standby Gas Treatment System)
K/A Number:	A3.02 (Ability to monitor automatic operations of the Standby Gas Treatment System including: FAN START)
K/A Value:	3.2/3.1
Objective:	7.02.01.03
	Evaluate plant conditions and control room indications to determine if the SBGT System is operating as expected, and identify any actions that may be necessary to place the SBGT System in the correct lineup.
Cognitive Level:	1 I
Source:	Exam Bank

1 Point

29. The Narrow Range GEMAC level transmitters (LT-4559, 4560, and 4561) are used in the Reactor Water Level Control system.

1)Are these transmitters calibrated HOT or COLD?
and
2) What type of compensation, if any, do they use?

a. 1) HOT
   2) None

b. 1) HOT
   2) Temperature compensation

c. 1) COLD
   2) None

d. 1) COLD
   2) Electronic pressure compensation

ANSWER: a

Distracter 1: RPV level control Gemacs are not temperature compensated. This describes Wide range Yarways.

Distracter 2: RPV level control Gemacs are calibrated cold. This describes the Floodup Gemacs.

Distracter 3:RPV level control Gemacs are not calibrated cold. and are not pressure compensated. This describes Fuel zone indicators.

REFERENCE: SD-880

K/A System: 259002 (Reactor water level control)

K/A Number: K5.03 (Knowledge of the operational implications of the following concepts as they apply to Reactor water level control system: Water level measurement)

K/A Value: 3.1/3.2

Objective: 88.00.00.02 (Describe the operation of the following non-nuclear instrument system components including range, control room location, calibration condition, any compensation and any instruments that share the same lines: 1 Level)

Cognitive Level: 1-F

Source: NEW

1 Point

30. The reactor plant is in a coast down condition with all control rods fully withdrawn.

1C05A, E-6 CRD DRIVE MECHANISM HI TEMP annunciator alarms.

An operator reports that the temperature reading for CRDM 22-23 at 1C20 is 255°F and slowly rising.

The System Engineer for CRD has been notified.

In accordance with the ARP, which of the following would be the correct operator action(s) for this condition?

a. Exercise the Control Rod in an attempt to cool it.

b. Fully insert the Control Rod and electrically disarm it.

c. Insert the Control Rod to position 46 to remove it from its backseat.

d. Leave the Control Rod at position 48 and continue to monitor its temperature.

ANSWER: c

Distracter 1: Per CAUTION on 1C05A, E-6 page 1 "Do not attempt to cool CRD by exercising the affected Control Rod".

Distracter 2: Full insertion of the control rod and electrically disarming is not in accordance with the ARP.

Distracter 3: The ARP directs insertion to 46 if the control rod is backseated.

REFERENCE: ARP 1C05A, E-6

K/A System: 201003 (Control Rod and Drive Mechanism)

K/A Number: 2.4.24 (Knowledge of loss of cooling water procedures).

K/A Value: SRO 3.7

Objective: SRO 1.21.01 Evaluate the event or accident to determine its cause and develop mitigation strategies.

Cognitive Level: 1 P

Source: New Question

1 Point

31. ATWS EOP has been entered.

The SBLC System has failed.

The NSPEO in the Reactor Building has been directed to perform SEP 304, Boron Injection Using RWCU.

Shortly after commencing injection of the first demineralizer of sodium pentaborate, the NSPEO reports that the ΔP of the demineralizer is 15 psig rising rapidly at a rate of 1 psig/minute.

What action, if any, is directed by SEP 304 to address this situation?

a. None, this is an expected indication.

b. Open the CLEANUP DEMIN BYPASS valve, MO-2723.

c. Lower system flow by lowering the running RWCU pump, 1P-205A/B, speed.

d. Throttle RBCCW flow to the Non-Regenerative Heat Exchanger set, 1E-215A/B.

ANSWER: d

Distracter 1: This is not an expected indication but is an identified possible indication.

Distracter 2: This action is not an action directed by the SEP.

Distracter 3: This action is not an action directed by the SEP.

REFERENCE: SEP 304 Boron Injection Using RWCU.

K/A System: 204000 (Reactor Water Cleanup System)

K/A Number: 2.4.35 (Knowledge of local auxiliary operator tasks during emergency operations including system geography and system implications.)

K/A Value: SRO 3.5

Objective: SRO 6.36.01

Direct operator actions to inject boron into the RPV using SEP 304.

Objective: 11.01.01.03

Identify the appropriate procedures that govern the RWCU System operation, include operator responsibilities during all modes of operation, and any actions required by personnel outside of the control room.

Objective: NSPEO 47.03.01.04

Explain the procedure, including any notes or cautions, for Alternate Boron Injection with RWCU.

Cognitive Level: 3-SPK

Source: New Question

1 Point

32. Reg. Guide 1.97 requires the DAEC to have RADIATION MONITORS installed specifically for
Post Accident Monitoring conditions.

On which of the following Control Room panels is that equipment installed or displayed?

a. 1C09, "Containment Monitoring" panel

b. 1C10, "Process Rad Monitoring" panel (with 1C02 recorders)

c. 1C29, "Instrument XFV and Sampling" panel

d. 1C36, "SRM and IRM" panel (with 1C02 recorders)

ANSWER: a

Note: T.S. Lists only the DW and Torus high range monitors on 1C09. The TRM calls the KAMAN extended range monitors for the Rx Bldg. Turbine Bldg and Offgas stack PAM instruments, but these monitors are in-plant and alarmed at 1C35, which is not an answer option.

Distracter 1: Sounds logical, but there are no accident monitors (1.97) on this Panel.

Distracter 2: Containment Atmosphere Rad Recorders are on this panel, but they are not accident monitors (1.97).

Distracter 3: Main Steam Line and Refuel Exhaust Rad Monitors are on this panel, but they are not accident monitors (1.97).

REFERENCE: SD-877; T.S. 3.3.3.1; TRM T3.3.3

K/A System: 272000 (Radiation Monitoring)

K/A Number: 2.4.3 (Ability to identify Post Accident instruments.)

K/A Value: 3.5/3.8

Objective: 77.00.00.01 (State the purpose of the following: a. PASS, b. Hi-Range containment radiation monitors.

Cognitive Level: 1-S

Source: NEW

1 Point

33. A reactor startup is in progress.

The Rod Worth Minimizer (RWM) is in OPERATE.

There are four (4) partially withdrawn rods with substitute positions already entered into the RWM.

When rod 30-31 is moved from position 46 to position 48, the FULL OUT light comes ON but the 48 position for this rod on the 4-Rod display goes BLANK. This is accompanied by a ROD DRIFT annunciator.

There is NO OVERTRAVEL OUT Annunciator.

Which of the following CORRECTLY describes the affect, if any, of this Rod Position Information System (RPIS) failure on the Rod Worth Minimizer?

a. There will be NO AFFECT on the RWM.

b. The RWM will enforce a SELECT BLOCK.

c. The RWM will enforce INSERT and WITHDRAW BLOCKS.

d. There will be NO INSERT, WITHDRAW, or SELECT BLOCKS, but the RWM will provide the message INVALID ROD 30-31 POS, MAX SUBS ALREADY MADE.

ANSWER: c

Distracter 1: The RWM will enforce INSERT and WITHDRAW BLOCKS. RWM gets its rod position indications from 00-48 reed switches.

Distracter 2: The RWM will enforce INSERT and WITHDRAW BLOCKS, not select blocks.

Distracter 3: The RWM will enforce INSERT and WITHDRAW BLOCKS. This message is for when 8 positions are substituted, not 4.

REFERENCE: AOP 357, Rev. 23; SD 878.8, Rev. 3; SD 856.1, Rev. 2; OI 856.3, Rev. 7

K/A System: 214000 (Rod Position Information System)

K/A Number: K3.01 (Knowledge of the effect that a loss or malfunction of the Rod Position Information System will have on the following: RWM.)

K/A Value: 3.0/3.2

Objective: 84.00.00.05

Given a Rod Worth Minimizer System operating mode and various plant conditions, predict how the Rod Worth Minimizer System will be impacted by failures in the following support systems: RPIS.

Cognitive Level: 2-RI

Source: NEW

1 Point

34. When placing the "B" Loop of RHR in the Torus Cooling Mode, the OUTBD TORUS CLG/SPRAY valve, MO-1932, and the TORUS COOLING/TEST valve, MO-1934, must be opened.

The loss of which of the following busses will prevent operation of these RHR system MOVs?

a. 1B34

b. 1B44

c. 1B34A/1B44A

d. 1B37

ANSWER: b

Note: Both MOVs are powered from 1B44.

Distracter 1: Selected if candidate identifies A loop valves with the same function.

Distracter 2& 3: Selected if candidate thinks these valves are important enough to be powered from the swing bus. 1B37 comes from the swing bus.

REFERENCE: OI-149 RHR

K/A System: 219000 (RHR/LPCI Torus/Suppression Pool Cooling Mode)

K/A Number: K2.01 (Knowledge of electrical power supplies for the following: VALVES)

K/A Value: 2.5/2.9

Objective: 2.01.01.06

Given an RHR System operating mode and various plant conditions, predict how the RHR System will be impacted by operation, or failure of the following support system(s): ESSENTIAL 4160/480 VAC ELECTRICAL POWER SUPPLIES.

Cognitive Level: 1-F

Source: New Question

1 Point

35. A Loss of Coolant Accident has occurred and operators are performing EOP-1 and EOP-2.

- Radiological conditions in the plant indicate fuel damage.
- RPV level is currently being maintained +170" to +211".
- The 1C03 operator has been directed to place the "B" Loop of RHR in Shutdown Cooling per SEP 306, "Initiation of Shutdown Cooling for EOP Use".

The 1C03 operator gets to the step for opening the breaker for MO-1935, MIN FLOW BYPASS, but radiological conditions in the Reactor Building will make this task dangerous.

Does the OSS have the authority to waive this step?
(HAS AUTHORITY or DOES NOT HAVE AUTHORITY)

If HAS AUTHORITY, identify the applicable caution associated with this decision.
If DOES NOT HAVE AUTHORITY, identify who does have the authority.

a. HAS AUTHORITY
There will be a loss of decay heat removal capacity with the MIN FLOW BYPASS open in the Shutdown Cooling mode.

b. HAS AUTHORITY
Shutdown Cooling flow must be established promptly to avoid draining the RPV while the MIN FLOW BYPASS is open.

c. DOES NOT HAVE AUTHORITY
The Operations Manager has the authority to waive this step.

d. DOES NOT HAVE AUTHORITY
The Emergency Coordinator has the authority to waive this step.

ANSWER: b
Distracter 1: OSS does have authority but there is no such caution. Also selected if candidate thinks that the Min Flow stays open in the SDC mode.
Distracter 2&3: OSS does have the authority per SEP 306. Ops Mgr. and Emerg Coord are plausible distracters.
REFERENCE: SEP 306 "Initiation of Shutdown Cooling for EOP Use".
K/A System: 205000 (RHR Shutdown Cooling Mode)
K/A Number: 2.4.48 (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.
K/A Value: SRO 3.8
Objective: SRO 6.46 Direct crew response for performance of RC/P leg of EOP-1.
SRO 6.46.06 Direct operator actions to initiate Shutdown Cooling using only RHR pumps not required to maintain RPV level >170 inches.
Cognitive Level: 3 SPK
Source: New Question

1 Point

36. A rupture of the Torus above the water line has occurred during a LOCA.

- The RHR system has responded as designed.
- RPV water level is 170 inches and rising.
- The Drywell pressure is 3 psig and lowering slowly.
- The Torus pressure is 0.5 psig and lowering slowly.

The 1C03 operator has taken both CONTAINMENT SPRAY ENABLE switches to ENABLE.

If that operator were to attempt to initiate Torus and Drywell Sprays at this point, would the valves open?

a. Torus Spray valves would open.
   Drywell Spray valves would open.

b. Torus Spray valves would NOT open.
   Drywell Spray valves would open.

c. Torus Spray valves would open.
   Drywell Spray valves would NOT open.

d. Torus Spray valves would NOT open.
   Drywell Spray valves would NOT open.

ANSWER: a

Distracter 1:Selected if candidate thinks <2 psig isolates Torus Sprays.

Distracter 2:Selected if candidate thinks <2 psig in torus isolates DW Sprays.

Distracter 3:Selected if candidate thinks <2 psig in Torus isolates both Torus & DW Sprays. <2 psig in DW does.

REFERENCE: EOP 2 bases

K/A System: 226001 (RHR/LPCI Containment Spray System Mode)

K/A Number: K6.12 (Knowledge of the effect that a loss or malfunction of the following will have on the RHR/LPCI Containment Spray System Mode: CONTAINMENT INTEGRITY.)

K/A Value: 3.4/3.5

Objective: 2.03.01.04 Describe the RHR system interlocks, including purpose, setpoints, logics, when and how they are bypassed, overridden or reset.

Cognitive Level: 2-RI

Source: New Question

1 Point

37. The plant is at 100% power and a normal electric plant lineup. "A" and "B" RPS busses are being powered from their respective MG Sets. A switchyard malfunction results in the "J" and "K" Breakers tripping OPEN. Busses 1A3 and 1A4 experience a fast transfer to the Standby Transformer.

After the transient has stabilized, what is the status of the MSIVs?

a. Inboard and Outboard MSIVs are OPEN.

b. Inboard and Outboard MSIVs are CLOSED.

c. Inboard MSIVs are OPEN and Outboard MSIVs are CLOSED.

d. Inboard MSIVs are CLOSED and Outboard MSIVs are OPEN.

ANSWER: a

Distracters 1, 2, & 3: RPS remains energized and no MSIVs are repositioned

REFERENCE: SD 304 and SD 358

K/A System: 239001 (Main and Reheat Steam System)

K/A Number: K2.01 (Knowledge of electrical power supplies to the following: MAIN STEAM ISOLATION VALVE SOLENOIDS.)

K/A Value: 3.2/3.3

Objective: 48.01.01.03

Given a Main Steam System operating mode and various plant conditions, predict how the Main Steam System will be impacted by failures in the following support systems: RPS, and 125 VDC PANELS 1D13 and 1D23.

Cognitive Level: 2 RI

Source: Cooper 1 1999 Exam (INPO Bank)

1 Point

38. The plant is operating at power. A Second Assistant reports there is about 4"of water accumulating on the floor in the SE Corner Room and it appears to be from floor drains backing up.

What is the appropriate course of action?

a. Enter EOP 1 and scram the reactor.

b. Enter Emergency Depressurization Contingency and ED.

c. Begin a reactor shutdown per IPOI 3, 4, or 5 as appropriate.

d. Enter EOP 3 and operate available sump pumps to maintain water level less than 2".

ANSWER: d

Note **EOP-3 is provided with Entry Conditions and Step SC-3 blocked out.**

Distracter 1: EOP 1 is enter if reduction in reactor pressure would effect the leak rate. Does not apply to this scenario.

Distractor 2: ED would be performed if two areas were above Max Safe and if reduction in reactor pressure would effect the leak rate. Does not apply to this scenario.

Distracter 3: A reactor shutdown per the IPOIs would be performed if two areas were above Max Safe. Does not apply to this scenario.

REFERENCE: EOP 3

K/A System: 295036 (Secondary Containment High Sump/Area Water Level)

K/A Number:2.4.4 (Ability to recognize abnormal indications for system operating parameters which are entry level conditions for emergency and abnormal procedures.)

K/A Value: SRO 4.3

Objective: SRO 6.67.01.03

Determine if the EOP 3 entry condition parameter(s) exceed(s) the Table 6 Max Normal or Max Safe limit in one or more areas.

Cognitive Level: 3-SPR
Source: Exam Bank

1 Point

39. (Assume that all times and values provided are exact.)

The System Operation Center requests that the DAEC lower generator output by 60 MWe.

The operator on the Recirc controls records the following readings as he begins the downpower:

Time	Generator Megawatt Output
0120	560 MWe
0121	550 MWe
0122	547 MWe
0123	544 MWe
0124	542 MWe
0125	540 MWe

1) Has the operator exceeded the IPOI-3 "Power Operations" limit for STEP CHANGES in reactor power? (Exceeded or NOT exceeded)
2) Has the operator exceeded the IPOI-3 limit for OVERALL RATE OF POWER CHANGE? (Exceeded or NOT exceeded)

a. 1) Exceeded
   2) Exceeded

b. 1) Exceeded
   2) NOT exceeded

c. 1) NOT exceeded
   2) Exceeded

d. 1) NOT exceeded
   2) NOT exceeded

ANSWER: d

Note: First step change was 10 MWe; The limit is 5%, or ≈25Mwe. Overall rate of change was 20 MWe/5 minutes or 4 MWe/Minute; The limit is 1% or 5 MWe/minute. The customary rate of change is 2-3 MWe/Min.
Distracter 1: Selected if candidate thinks Step Change limit is 1% (5 MWe) and Overall rate limit is 2-3 MWe/minute.
Distracter 2: Selected if candidate thinks Step Change limit is 1% (5 MWe).
Distracter 3: Selected if candidate thinks Overall rate limit is 2-3 MWe/minute.

REFERENCE: IPOI 3, Power Operations

K/A System: 245000 (Main Turbine Generator and Auxiliary Systems)

K/A Number: A4.05 (Ability to manually operate and/or monitor in the control room: GENERATOR MEGAWATT OUTPUT.)

K/A Value: 2.7/2.7

Objective: 93.11.01.13 Explain basis for the P&Ls of IPOI-3.

Cognitive Level: 3-SPK

Source: New Question

1 Point

40. A COMPLETE LOSS Uninterruptible AC Power (1Y23) has occurred while at 100% power.

    Operators manually scrammed the reactor due to RPV level control problems. RPV level lowered to 140″ and is now at 150″ and rising slowly.

    Assume that there are NO EOP-2 entry conditions.

    Which of the following EOP-1 Alternate Pressure Control Systems will **NOT** remain available?

    a. Main Steam Line Drains

    b. Main Turbine Bypass Valves

    c. RWCU in Recirculation Mode

    d. LOW- LOW Set Safety Relief Valves

ANSWER: b

Note: Uninterruptible AC Power would not be available to power EHC Logic after the turbine trip therefore, turbine bypass valves cannot be used.

Distracter 1: Would remain available. Selected if candidate thinks a Group 1 Isolation would occur.

Distracter 2: Would remain available. Selected if candidate thinks a Group 5 Isolation would occur.

Distracter 3: Would remain available. Selected if candidate thinks LLS logic is powered from UPS.

REFERENCE: AOP 301, Loss of Essential Power, and AOP 357, Loss of Uninterruptible AC Power.

K/A System: 262002 (Uninterruptible Power Supply)

K/A Number: K3.13 (Knowledge of the effect that a loss or malfunction of the Uninterruptible Power Supply will have on the following: REACTOR PRESSURE.)

K/A Value: 2.7/2.9

Objective: 52.01.01.02

Given an EHC System operating mode and various plant conditions, predict how the EHC System will be impacted by failures in the following support systems: UNINTERRUPTIBLE AC CONTROL POWER SYSTEM.

Cognitive Level: 2 RI

Source: Exam Bank

1 Point

41. A HIGH STEAM LINE FLOW signal has resulted in a Group 1 Isolation from 100% power. Reports from the Turbine Building confirm that the isolation signal was valid.

The following plant conditions exist:

- Several control rods DID NOT fully insert.
- SBLC has been initiated.
- RPV water level is currently 170"and being intentionally lowered.
- Low-Low Set SRVs are controlling RPV pressure between 1025 and 900 psig.
- The Non Essential busses underwent a closed transfer to the Startup transformer.

Would it be appropriate for the OSS to direct installation of EOP Defeat 15, "MSIV and MSL Drain RX LO-LO-LO Level isolation Defeat"? (APPROPRIATE or NOT APPROPRIATE)

Also, identify the correct reason why it is or is not appropriate.

a. NOT APPROPRIATE; There is indication of a Steam Line break.

b. NOT APPROPRIATE; EOP Defeat 15 is installed only if the MSIVs are still open.

c. APPROPRIATE; The main condenser is available and reopening of the MSIVs/MSL Drains will help stabilize RPV pressure.

d. APPROPRIATE; The main condenser is available and reopening of the MSIVs/MSL Drains will reduce the challenge to Primary Containment.

ANSWER: a

Note: **ATWS EOP is provided.** OSS must prioritize safety functions. EOP bases is clear that MSIV/MSL Drains should not be reopened with indications of a steam leak.

Distracter 1: Selected if candidate is confused about ATWS Step /2 which says ,if all MSIVs are open install Defeat 15. Defeat 15 purpose statement is to "allow opening" MSIVs with a 3XLO level isolation in effect.

Distracter 2: Not appropriate per ATWS EOP bases. The condenser would be available and reopening MSIVs/MSL Drains would help stabilize RPV pressure.

Distracter 3: Not appropriate per ATWS EOP bases. The condenser would be available and reopening of the MSIVs/MSL Drains will reduce the challenge to Primary Containment.

REFERENCE: ATWS EOP
K/A System: 295025 (High Reactor Pressure)
K/A Number: 2.4.22 (Knowledge of the bases for prioritizing safety functions during abnormal/emergency operations.)
K/A Value: SRO 4.0
Objective: SRO 1.21.02 Recognize and prioritize data relevant to the accident or event.
Cognitive Level: 1 B
Source: New Question

1 Point

42. Which of the following Offgas System design feature(s) function to maximize carbon bed efficiency?

a. preheating the offgas with steam prior to the recombiner

b. routing the offgas through the 37 second and 30 minute holdup lines

c. maintaining the carbon bed vaults at 77°F and reheating the offgas prior to the carbon beds

d. filtering the offgas prior to the carbon beds and directing the flow upward through the first three beds

ANSWER:	c
Distracter 1:	Preheating maximizes the operation of the recombiner
Distracter 2:	Routing the offgas through the holdup lines allow the short lived isotopes to decay
Distracter 3:	Filtering removes particulates and does not effect efficiency. Directing flow upward enhances draining
REFERENCE:	System Description 672, Offgas System
K/A System:	271000 (Offgas System)
K/A Number:	K4.07 (Knowledge of OFFGAS SYSTEM design feature(s) and/or interlocks which provide for the following: MAXIMIZING CARBON BED EFFICIENCY.)
K/A Value:	2.6/2.7
Objective:	47.01.01.02
	Describe the purpose/operation of the following principle Offgas and Recombiner System components and subsystems: OFFGAS MOISTURE SEPARATORS and ELECTRIC REHEATER.
Cognitive Level:	1 F
Source:	New Question

1 Point

43. A DELUGE fire suppression system has a normally dry supply header with OPEN spray nozzles.

A PREACTION fire suppression system has a normally dry supply header with FUSIBLE LINKS in the spray nozzles.

1) Which type of fire suppression system is used for the Standby Diesel Generators (SBDG) and
associated Fuel Oil Day Tank rooms?
and
2) Which type of actuation system releases the priming water pressure from the top of the main
valve disc on the Deluge or Preaction system used in the SBDG Rooms?

a. 1) DELUGE
2) An electronic fire sensor opens a solenoid vent valve to release the pressure.

b. 1) DELUGE
2) A mechanical Heat Activated Device (HAD) releases the pressure.

c. 1) PREACTION
2) An electronic fire sensor opens a solenoid vent valve to release the pressure.

d. 1) PREACTION
2) A mechanical Heat Activated Device (HAD) releases the pressure.

ANSWER: d

Distracter 1:Very similar systems but Preaction is used to prevent inadvertent system operation. The Electronic sensor actuators are used on the Turbine Bearing Preaction system, not the SBDG.

Distracter 2:Very similar systems but Preaction is used to prevent inadvertent system operation.

Distracter 3: The Electronic sensor actuators are used on the Turbine Bearing Preaction system, not the SBDG.

REFERENCE: SD 513

K/A System: 286000 (Fire Protection System)

K/A Number: K1.09 (Knowledge of the physical connections and/or cause effect relationships between Fire Protection System and the following: EMERGENCY GENERATOR ROOMS.)

K/A Value: 3.2/3.3

Objective: NSPEO 9.01.01.02

Describe the flowpaths and interrelationships between the Fire Protection System and other plant systems.

Cognitive Level: 1-F

Source: New Question

1 Point

44. The plant is shutdown with refueling / fuel movement operations in progress.

An NSPEO in the Reactor Bldg. reports that craft workers have set up a welder on the Second Floor and have run their welding cables through the two doors going into the Recirc MG room.

Which of the following is
1) the proper initial response, if any, to this report?
2) the reason for this response?

a. 1) No response is necessary.
2) These are not Secondary Containment Airlock doors.

b. 1) No response is necessary.
2) These are Secondary Containment Airlock doors but they are not required to be operable
during Refueling outages.

c. 1) Initiate action to close at least one of these doors within 4 hours.
2) These are Secondary Containment Airlock doors that are required to be operable in Modes 1, 2, and 3.

d. 1) Suspend movement of irradiated fuel.
2) These are Secondary Containment Airlock doors that are required to be operable during
fuel movement.

ANSWER: d

Note: The DAEC will begin RFO 17 shortly after the 4/9/01 ILC exam. Correct answer can be found in Tech Specs and in Refueling Procedure.

Distracter 1: Possible misconception, but doors are Sec Cont airlock doors.

Distracter 2: Sec Cont airlock doors are sometimes disabled during Refuel outages, but are required during fuel movement.

Distracter 3: This is the proper response in modes 1, 2, or 3; but the plant is in mode 5.

REFERENCE: T. S. 3.6.4.1

K/A System: 290001 (Secondary Containment)

K/A Number:A2.01 (Ability to predict the impact of the following on secondary containment; and based on those predictions, use procedures to correct, control or mitigate the consequences of those abnormal conditions or operations: Personnel airlock failure.)

K/A Value: 3.3/3.7
Objective:98.02.01.02 (Relate the P&Ls, operating cautions or special cautions of RFP 301, ,RFP 402, and RFP 403 to any fuel handling component or evolution status.)
Cognitive Level: 3-SPK
Source: New

1 Point

45. An accident has occurred which resulted in an offsite release.

The Control Building Intake Rad Monitors, RIM6101A/B were at approximately 2 mR/hr and rising at 1 – 2 mR/hr per minute.

At 0933, RIM6101A exceeded 5 mR/hr.
At 0935, RIM6101B exceeded 5 mR/hr.

The Standby Filter Units (SFU) and Control Bldg. HVAC shifted to the following lineup:

	A SFU	B SFU
Intake Valve, AV7301	OPEN	CLOSED
Heater, EC7304	ON	OFF
Discharge valve, AV7318	OPEN	CLOSED
Fan, 1V-SF-30	ON	OFF
Intake Isolation Dampers, 1V-AD-30A & B	CLOSED	
Exhaust Isolation Dampers, 1V-AD-31A & B	CLOSED	

Based only on the indications provided, are the SFUs operating properly? (NO or YES)
If NO, identify what is wrong.
If YES, identify what conditions if any will cause "B" SFU to start.

a. No; the "B" SFU should have automatically started the same as "A" SFU.

b. No; the "B" SFU intake and exhaust dampers, 1V-AD-30B & 1V-AD-31B, should be OPEN.

c. Yes; the "B" SFU will not automatically start until the "A" SFU flow drops to ≤800 scfm.

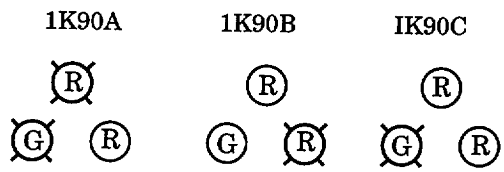
d. Yes; the "B" SFU will not automatically start until the "A" SFU cannot maintain the Control Room at a positive pressure.

ANSWER: c
Note: Initiation takes a lockout >5mr and <800 scfm. The A SFU would have established flow.
Distracter 1:"B" SFU will go into Standby automatically. A SFU has had 2 minutes to establish >800 scfm flow. This logic is different than SBGT.
Distracter 2: "B" SFU lockout should have tripped, closing the dampers.
Distracter 3: The Battery Exhaust fans shift to keep Control Room DP positive.
REFERENCE: SD 730, OI 730
K/A System: 290003 (Control Room HVAC)
K/A Number: A2.01 (Ability to (a) predict the impacts of the following on the Control Room HVAC and, (b) based on those predictions, use procedures to correct, control or mitigate the consequences of those abnormal conditions or operations: INITIATION/RECONFIGURATION.
K/A Value: 3.1/3.2
Objective: 65.01.01.05List the signals which cause a Control Building HVAC System isolation/Standby Filter Unit auto initiation including setpoints and logic. Describe how the Control Building HVAC System responds to a SFU initiation signal.
Cognitive Level: 1 I
Source: Revised, Exam Bank

1 Point

46. Upon entering the control room, you observe the following indications for the Instrument and Service Air Compressors 1K90A, B, and C.
G is GREEN and R is RED.

Instrument Air header pressure is 100 psig.



Which of the following would explain a situation in which these indications would be present?

a. 1K90A is running as the Lag compressor; 1K90B has tripped on Motor Overload.

b. 1K90B is running as the Lead compressor; 1K90C has tripped on Low Oil Pressure.

c. 1K90C is running as the Lead compressor; 1K90A has tripped on High Oil Temperature.

d. 1K90B is running as the Lag compressor; 1K90A has tripped on High 2nd Stage Outlet Temperature.

ANSWER: d

Distracter 1, 2, 3: 1K90A is the Lead compressor and has tripped; 1K90B is the Lag compressor and is running; 1K90C is the Lag-Lag compressor and is not running or tripped.

REFERENCE: System Description 518, Instrument and Service Air System and ARP 1C07B, A-9, AIR COMPRESSOR TRIP

K/A System: 300000 (Instrument Air System)

K/A Number: A3.02 (Ability to monitor automatic operations of the Instrument Air System including: AIR TEMPERATURE.)

K/A Value: 2.9/2.7

Objective: 36.00.00.05 OR 36.00.00.06
Evaluate plant conditions and control room indications to determine if the Instrument and Service Air System is operating as expected, and identify any actions that may be necessary to place the Instrument and Service Air System in the correct lineup. OR
Identify the appropriate procedures that govern the Instrument and Service Air System operation, include operator responsibilities during all modes of operation, and any actions required to be performed by personnel outside the control room.

Cognitive Level: 2-DR

Source: New Question

1 Point

47. A high RPV water level transient has occurred while at power.

1C05A, D-1 REACTOR VESSEL HI/LO LEVEL RECORDER ALARM annunciated.

Which of the following CORRECTLY describes the level at which this ANNUNCIATOR is received and a directed action from the ARP?

a. 195″; take manual control of any or all feedwater regulating valves.

b. 211″ trip HPCI and RCIC.

c. 214″; trip the low pressure ECCS pumps.

d. 258″; close the MSIVs.

ANSWER: a

Note: 1C05A,D-1 annunciator alarms at 195″.
Distracter 1:211″ is the high level trip of Feedwater Pumps, Main Turbine, HPCI and RCIC.

Distracter 2: 214″ is the level at which water is raised in the event of a loss of forced circulation.

Distracter 3: 258″ is the level of the Main Steam lines. Tripping of pumps and Closing MSIVs are actions directed based on plant conditions.

REFERENCE: ARP 1C05A, D-1, REACTOR VESSEL HI/LO LEVEL RECORDER ALARM

K/A System: 295008 (RPV High Level)

K/A Number: 2.4.50 (Ability to verify system alarm setpoints and operate controls identified in ARP.)

K/A Value: 3.3/3.3

Objective: 45.01.01.02

Identify the appropriate procedures that govern the Feed and Condensate System operation, include operator responsibilities during all modes of operation, and any actions required to be performed by personnel outside the control room.

Cognitive Level: 1 P & S

Source: New

1 Point

48. EPIP Form NOTE 5 is provided on the next page. EPIP EAL Tables and Section 3.3 are provided as SRO Exam handouts.

A severe Loss of Coolant accident has occurred.

- The Reactor is shutdown.
- RPV level was offscale low for several minutes before it was recovered.
- Level is currently stable at 0".
- A pair of MSIVs has failed to completely close.

The following radiological conditions exist at the time that the Emergency Action Level is being declared:

- The Turbine Bldg KAMAN monitor reading is 0.5 μCi/cc and is rising steadily.
- The Reactor Bldg. and Offgas Stack KAMAN monitor readings are elevated but not to the alarm level.
- Radiological field survey results are not yet available.
- The Drywell rad monitors are reading 500 R/hr and rising slowly.
- The Torus rad monitors are reading 20 R/hr. and rising slowly.

Which of the following is CORRECT Protective Action Recommendation concerning EVACUATION and SHELTER?

a. Evacuation is not necessary at this time.

b. Evacuate within a 2 mile radius and to 5 miles in the downwind subareas.

c. Evacuate within a 2 mile radius and to 5 miles in the downwind subareas, unless conditions make evacuation dangerous, and shelter downwind subareas from 5 miles to EPZ edge.

d. Evacuate within a 2 mile radius, evacuate from 2 miles to the EPZ edge in the downwind subareas, and shelter as appropriate beyond the EPZ edge.

ANSWER: b

Note: Based on Offsite Rad Conditions alone, a Site Area Emergency should be declared with no evacuation. However, a General Emergency should be declared from Fission Barrier Table.

Distracter 1: Selected if General Emergency is NOT identified.

Distracter 2:Selected if General Emergency is identified but severe core damage is criteria is misapplied. Severe core Damage is specified on Table 2 as >700R/hr. Drywell or >30 R/hr. Torus rad levels. Evacuation statement from Table 2 is a paraphrase of the correct answer option.

Distracter 3: Last possible option from Table 1; Homogeneous distracter

REFERENCE: EPIP 3.3; EPIP Form NOTE 5; EAL Tables

K/A System: 295038 (High Offsite Release Rate)

K/A Number: 2.4.44 Knowledge of Emergency Plan Protective Action Recommendations.

K/A Value: SRO 4.0

Objective: SRO 3.01.02.07 Demonstrate the ability to use EPIP 3.3 to determine Protective Action Recommendations

Cognitive Level: 3-SPR Source: NEW

1 Point

49. Which of the following are possible indications to the control operator that the in service Fuel Pool Cooling pump has tripped?

a. Annunciator 1C04B, A-4, FUEL POOL HI/LO LEVEL; lowering Fuel Pool level indicated on LI-3413 at 1C04

b. The Radwaste operator reports an annunciator on Panel 1C136; rising Fuel Pool level indicated on LI-3413 at 1C04

c. SANSOE reports that there is a Low Flow annunciator on Panel 1C136, rising Skimmer Surge Tank level indicated on LI-4312 at 1C04

d. Annunciator 1C04B, D-2, FUEL POOL COOLING PANEL 1C-65/1C-66 TOUBLE; lowering Skimmer Surge Tank level indicated on LI-4312 at 1C04

ANSWER:	c
Distracter 1:	Normal level in the Fuel Pool is 37 ft. 5 inches with some water going over the weirs. The low level alarms is at 37 ft. 1 inch. Level will lower to the weirs.
Distracter 2:	The Radwaste operator will get the alarm but Fuel Pool level will lower slightly to the level of the weirs.
Distracter 3:	Skimmer Surge Tank level will increase.
REFERENCE:	ARP 1C04B, D-2, FUEL POOL COOLING PANEL 1C-65/1C-66 TOUBLE, OI-435, Fuel Pool Cooling System, M-135, Fuel Pooling Cooling
K/A System:	233000 (Fuel Pool Cooling and Cleanup)
K/A Number:	A3.03 (Ability to monitor automatic operations of the Fuel Pool Cooling and Cleanup including: SYSTEM INDICATING LIGHTS AND ALARMS.
K/A Value:	2.6/2.6
Objective:	31.00.00.07 Evaluate plant conditions and control room indications to determine if the Fuel Pool and Fuel Pool Cooling System is operating as expected, and identify any actions necessary to place the Fuel Pool and Fuel Pool Cooling System in the correct lineup.
Cognitive Level:	2-RI
Source:	New Question

1 Point

50. What type of CORE ORIFICING, if any, is used at the Duane Arnold Energy Center?

a. Core orificing is NOT used at the DAEC.

b. Core orificing is used at the DAEC.
The SAME size orifice pieces are used throughout the core.

c. Core orificing is used at the DAEC.
The peripheral orifice pieces are SMALLER (tighter) than the ones used on the core interior.

d. Core orificing is used at the DAEC.
The peripheral orifice pieces are LARGER (looser) than the ones used on the core interior.

ANSWER: c

Note: SD states that DEAC has orifices. Generic Fundamentals explains why it is necessary and how it works on a BWR.

Distracter 1, 2, 3:All fuel support pieces have orifice plates. The peripherals are tighter to equalize flow throughout the core. (i.e.: force more flow through the higher powered bundles.)

REFERENCE: System Description 262. Generic Fundamentals Chapter 8, "Thermal Hydraulics"

K/A System: 290002 (Reactor Vessel Internals)

K/A Number: K4.03 (Knowledge of Reactor Vessel Internals design feature(s) and/or interlocks which provide for the following: CORE ORIFICING.)

K/A Value: 3.2/3.3

Objective: 50007.01.09 Define core orificing and explain why it is necessary for a BWR.

Cognitive Level: 2-DR
(The fact that DAEC has core orifices is level 1 F. After that, the reason for the sizing of the orifices is not simple memory; it requires "Understanding".

Source: New Question

1 Point

51. An ATWS has occurred.

The 1C05 operator has started the second CRD pump and is performing RIP 103.2 "Increase CRD Cooling Flow and Pressure".

1) How will CRD cooling flow be increased?
2) How will CRD cooling pressure be increased?

a. 1) By raising the CRD Flow Controller FC-1814 setpoint to maximum in AUTO.
   2) By throttling OPEN MO-1830, DRIVE WATER ΔP CONTROL.

b. 1) By raising the CRD Flow Controller FC-1814 setpoint to maximum in AUTO.
   2) By throttling CLOSED MO-1830, DRIVE WATER ΔP CONTROL.

c. 1) By raising the CRD Flow Controller FC-1814 output to maximum in MANUAL.
   2) By throttling OPEN MO-1830, DRIVE WATER ΔP CONTROL.

d. 1) By raising the CRD Flow Controller FC-1814 output to maximum in MANUAL.
   2) By throttling CLOSED MO-1830, DRIVE WATER ΔP CONTROL.

ANSWER: c

Distracter 1: Controller in AUTO is plausible to free up operator during a busy evolution.

Distracter 2 : Controller in AUTO is plausible to free up operator during a busy evolution. Closing Drive water DP valve is plausible because it raised Drive water pressure to better drive control rods.

Distracter 3: Closing Drive water DP valve is plausible because it raised Drive water pressure to better drive control rods.

REFERENCE: RIP 103.2

K/A System: 295015 (Incomplete scram-Abnormal)
K/A Number: 2.4.11 (Knowledge of Abnormal condition procedures.)
K/A Value: 3.4/3.6
Objective: Task 95.08 Insert control rods by increasing CRD Cooling Flow and Pressure.
Cognitive Level: 1-P
Source: NEW

1 Point

52. With the plant operating at 25%power, supplying the grid, a generator primary lockout occurs. What changes occur in the plant electrical system and turbine as a result of this event? Assume a normal plant electrical lineup prior to this event.

    a. turbine trip; no bus transfer; load shed occurs

    b. turbine trip; bus 1A1 and 1A2 closed circuit transfer to the startup transformer; no load shed

    c. no turbine trip; bus 1A1 and 1A2 closed circuit transfer to the startup transformer; no load shed

    d. turbine trip; bus 1A1 and 1A2 open circuit transfer to the startup transformer; non-essential bus load shed occurs

ANSWER: d

Distracter 1: Generator Primary Lockout Relay is designed to protect the Main Generator, initiate a Turbine trip, and initiate an Open Circuit transfer (SD-304).

Distracter 2: Generator Primary Lockout Relay trip will cause an Open Circuit transfer (ARP 1C08C A-1).

Distracter 3: Generator Primary Lockout Relay trip will trip the Main Turbine (ARP 1C07A A-2).

REFERENCE: ARP 1C08C A-1, SD-304 page 12, 18, 19

K/A System: 295005 (Main Generator Trip)

K/A Number: AA1.07 (Ability to operate and/or monitor the following as they apply to Main Generator Trip: AC ELECTRICAL DISTRIBUTION.)

K/A Value: 3.3/3.3

DAEC Objective: 14.00.00.03

Evaluate plant conditions and control room indications to determine if the Non-essential Electrical Distribution is operating as expected, and identify any actions that may be necessary to place the Non-essential Electrical Distribution System in the correct lineup, include in this evaluation both an open and closed transfer.

Cognitive Level: 1 I

Source: Exam Bank, Question # 758

1 Point

53. GEMAC Feedwater Level Controllers were in normal operation for full power operation when a reactor scram occurred.

Per IPOI-5, "Reactor Scram", the 1C05 operator depressed the pushbutton handswitch for MANUAL LEVEL SETBACK TO 175".

Which of the following CORRECTLY describes the affect of this action on the Feedwater Level Controllers?

a. The Master Controller remains in AUTO and its setpoint goes to 175".

b. The Master Controller shifts to MANUAL and its setpoint goes to 175".

c. The Master Controller is removed from the circuit.
Both "A" and "B" Feed Reg Valves remain in AUTO and their setpoints go to 175".

d. The Master Controller is removed from the circuit.
Both "A" and "B" Feed Reg Valves shift to MANUAL and their setpoints go to 175".

ANSWER: a

Note: The only time this switch is used is during Feedwater Level control following a reactor scram.

Distracter 1: Plausible because of the name of the pushbutton.

Distracter 2: Plausible because operator may want to control feed reg valves independently after a scram. A & B controllers in AUTO put the master in the control circuitry.

Distracter 3: Plausible because of the name of the pushbutton.

REFERENCE: IPOI 5

K/A System: 295006 (Scram)

K/A Number: AK2.02 (Knowledge of the interrelations between SCRAM and the following: REACTOR WATER LEVEL CONTROL)

K/A Value: 3.8/3.8

DAEC Objective: 45.05.01.05 Describe the operation of the FWLC circuitry.

Cognitive Level: 1-I

Source: New

1 Point

54. A loss of coolant accident with concurrent loss of Well Water pumps has occurred while at power. Operators are attempting to restore Well Water and Drywell Cooling.

When the Drywell Average Air temperature cannot be restored and maintained below 280°F, the OSS orders that an Emergency Depressurization be initiated.

One of the reasons for performing Emergency Depressurization at this point is to ensure that Drywell temperatures will remain below structural design limits.

Which of the following is also a basis for this action?

Emergency Depressurization is performed at this point in order to ensure ...

a. that indications from the RPV water level instruments will remain valid after the blowdown.

b. that the blowdown is performed before exceeding the environmental qualification limits of the ADS SRVs.

c. that water hammer will not occur in the Well Water System when Drywell Cooling loop flow is restored.

d. that the energy within the reactor is directed to the torus before exceeding the Torus Heat Capacity Temperature Limit.

ANSWER: b

Distracter 1: Operators must watch out for Sat Curve entry and unstable indications, but this is not a basis.

Distracter 2: Defeats 4 is concerned about DW cooling restoration after elevated temperatures, but this is not a basis for ED.

Distracter 3: ED is performed if the HCL will be exceeded, but HCL is based on RPV pressure and Torus Temp, not DW temp.

REFERENCE: EOP Bases.

K/A System: 295028 (High Drywell Temperature)

K/A Number: K3.01 (Knowledge of the reasons for the following responses as they apply to High Drywell Temperature: Emergency Depressurization)

K/A Value: 3.6/3.9

DAEC Objective: 95.00.00.20

Cognitive Level: 1 B

Source: Industry, Revised

1 Point

55. The Electrohydraulic Control (EHC) System logic diagram provided on the next page.

The EHC system was in the following condition:

- Pressure Setpoint 940 psig
- Load Set Setpoint 600 MWe
- Load Limit 100%
- Max Combined Flow Limiter 125%

A transient occurs that results in a RISE in reactor pressure and a RISE in Main Turbine Throttle pressure to 980 psig

Which of the following CORRECTLY describes the response of the EHC system?

a. The Pressure Set unit will shift control to the "B" pressure regulator.

b. The Load Limit will be controlling and allow a maximum of 100% steam flow to the condenser.

c. The Load Set Limiter will be controlling and will allow the Turbine Control Valves to open until the generator load is 600 MWe.

d. The Max Combined Flow Limiter will be controlling and will allow the Turbine Control Valves to be fully open and with at least one Bypass Valve open.

ANSWER: d

Distracter 1: Both Pressure regulator would adjust their outputs equally an "A" would remain in control.

Distracter 2: Load Limit is set at 100% to limit the Main Generator to 100% of rated electrical load, and adjusts the Control Valves accordingly. This setting does not affect the Bypass Valves positioning.

Distracter 3: The Load set limiter is set at a higher value than pressure set and load limit and would not take control.

REFERENCE: SD-693.2a, Figure 8

K/A System: 295007 (High reactor pressure)

K/A Number: AA1.05 (Ability to operate and/or monitor as they apply to High reactor pressure: REACTOR/TURBINE PRESSURE REGULATING SYSTEM.)

K/A Value: 3.7/3.8

DAEC Objective: 99.16.01.06 Evaluate plant conditions and control room indications to determine if the EHC System is operating as expected, and identify any actions that may be necessary to place the EHC System in the correct lineup.

Cognitive Level: 3 PEO

Source: Exam Bank, Question # 2679

1 Point

56. Reactor power was 100% when the "A" Reactor Feed pump tripped.

1) Do the Recirculation Pumps INITIALLY runback to 20% or 45%?
2) Is this automatic runback expected to prevent a RPV low level scram?

a. 1) 20%
2) YES; The runback will prevent a RPV low level scram.

b. 1) 20%
2) NO; The runback allows additional time for operator action prior to reaching the low level
scram setpoint.

c. 1) 45%
2) YES; The runback will prevent a RPV low level scram.

d. 1) 45%
2) NO; The runback allows additional time for operator action prior to reaching the low level
scram setpoint.

ANSWER: d

Note: Based on a Plant event. Follow up investigation confirmed that plant will not avoid a RPV low level scram from 100% power upon loss of a Feed Pump. SD 264 states that purpose is to "allow additional time for operator action prior to reaching the low level scram setpoint". Pump discharge valve closed is a 20% or Feed flow <20 % is a 20% runback.

Distracter 1: 45% Runback not 20%. If recirc did runback all the way to 20% the low level scram might be avoided.

Distracter 2: 45% Runback not 20%. Reason is correct/

Distracter 3: Low level scram is unavoidable.

REFERENCE: System Description 264 Reactor Recirculation System, pages 31 and 32

K/A System: 295009 (Low Reactor Water Level)

K/A: AK3.01 (Knowledge of the reasons for the following responses as they apply to Low Reactor Water Level: RECIRCULATION PUMP RUNBACK)

K/A Value: 3.2/3.3

DAEC Objective: 12.00.00.02 Identify the conditions that allow or cause the following events to occur: RECIRC PUMP SPEED LIMITER IN EFFECT.

Cognitive Level: 1-I & B

Source: New

57. Given the following sets of parameters:

Case 1)	Torus Average Water Temperature, stable at	160°F
	RPV Pressure, stable at	800 psig
	Drywell Pressure, stable at	2 psig
	Torus Water Level, stable at	9.0 ft.
Case 2)	Torus Average Water Temperature, stable at	170°F
	RPV Pressure, stable at	500 psig
	Drywell Pressure, stable at	2 psig
	Torus Water Level, slowly lowering at	7.0 ft.

Is Emergency Depressurization (ED) required in each of these cases?

a. Case 1) ED NOT required
Case 2) ED NOT required

b. Case 1) ED NOT required
Case 2) ED required

c. Case 1) ED required
Case 2) ED NOT required

d. Case 1) ED required
Case 2) ED required

ANSWER: b

Note: This question may appear to be two chances of applying Torus Temp and RPV Pressure to EOP Graph 4; (Both cases are below the curve). It is really measuring the candidates understanding of low Torus level on this limit. The HCL limit graph is invalid below 8 ft. .ED is required not by Graph 4, but by Graph 5.

Distractor 1: Case 2 ED required

Distractor 2: Case 1 Not ED required; Case 2 ED required

Distractor 3: Case 1 Not ED required

REFERENCE: EOP-2 and Bases

K/A System: 295026

K/A Number: EA2.02 Ability to determine and/or interpret the following as they apply to Suppression Pool High Water Temperature: Suppression Pool Level

K/A Value: SRO 3.9

DAEC Objective: SRO 6.62 Direct crew response for performance of the T/T leg of EOP-2

Cognitive Level: 3-SPR

Source: NEW

1 Point

58. A transient has occurred that resulted in power operations in the Exclusion Zone of the DAEC Stability Power/Flow Map.

The Panel 1C05 operator has been assigned to monitor for core thermal/hydraulic instability.

Assume that A, B, C, & D APRMs remain relatively stable at 52-55% throughout this period.

The Panel 1C05 operator observes these changes to E and F APRMs per the following timeline:

- Time 1:
  Low to High values on E APRM are observed to be 50-57% with the band getting wider. F APRM remains relatively stable at 52-55% at this time.
- Time 2:
  Low to High values on E APRM are observed to be 49-58% with the band getting wider. Low to High values on F APRM are observed to be 50-57% with the band getting wider.
- Time 3:
  Low to High values on E APRM are observed to be 48-59% with the band getting wider. Low to High values on F APRM are observed to be 49-58% with the band getting wider.
- Time 4:
  Low to High values on E APRM are observed to be 47-60% with the band getting wider. Low to High values on F APRM are observed to be 48-59% with the band getting wider.

Per AOP-255.2, "Power/Reactivity Abnormal Change", at which time is a manual reactor scram first required?

a. Time 1

b. Time 2

c. Time 3

d. Time 4

ANSWER: a

Note: Scram required for ANY APRM "undamped oscillations greater than normal".
Normal = 52-55% in this case. A previous definition was >10% swings.

Distracter 1: Selected if candidate thinks >1 APRM with undamped oscillations is necessary.

Distracter 2: Selected if candidate thinks any APRM with oscillations >10% is necessary.

Distracter 3: Selected if candidate thinks >1 APRM with oscillations >10% is necessary

REFERENCE: AOP 255.2 Power/Reactivity Abnormal Change, IPOI-3 Appendix 1

K/A System: 295014 (Inadvertent Reactivity Addition)

K/A Number: AK3.01 (Knowledge of the reasons for the following responses as they apply to Inadvertent Reactivity Addition: reactor scram).

K/A Value: 4.1/4.1

DAEC Objective: 94.03.04.01 Explain when a reactor scram is required per AOP 255.2.

Cognitive Level: 3-SPK

Source: NEW

1 Point

59. A slightly modified version of the last five pages of a recently used Rod Pull Sheet are provided on the next page of this exam.

    Step 39 rods are at position 12.

    The OSS directs you to insert the CRAM Rods in response to a loss of feedwater heating transient.

    The Rod Worth Minimizer has been bypassed.

    Which Control Rod should be inserted FIRST?
    And
    HOW FAR should it be inserted when it is first moved?

    a. Rod 14-15
       To position 12

    b. Rod 14-15
       To position 00

    c. Rod 22-15
       To position 10

    d. Rod 22-15
       To position 00

ANSWER: d

Note; Loss of feedwater heating is listed in AOP 255.2 as a possible cause of Power / reactivity abnormal change and is one of the few known events in which the CRAM group is useful.

Distracter 1: Selected if candidate thinks Cram Groups are inserted from 5 to 1. Selected if candidate thinks rod is only inserted to the insert limit listed on the pull sheet.

Distracter 2: Selected if candidate thinks Cram Groups are inserted from 5 to 1.

Distracter 3: Selected if candidate thinks rod is only inserted to the insert limit listed on the pull sheet.

REFERENCE: IPOI-4 Section 6.0 Fast Power Reduction; AOP 255.2 "Power / reactivity abnormal change"

K/A System: 295014 (Inadvertent Reactivity Addition)

K/A Number: AA1.03 (Ability to operate and monitor the following as they apply to Inadvertent Reactivity Addition: RMCS.)

K/A Value: 3.5/3.5

DAEC Objective: 94.03.02.01 Explain the difference between the Cram Group and the Cram Method with regards to control rod insertion and where guidance on how to use the Cram Group/Method is located.

Cognitive Level: 3-SPR

Source: NEW

1 Point

60. A Loss of Coolant Accident has occurred and Operators are performing EOP-2, "Primary Containment Control"?

The OSS receives the report that the Drywell and Torus pressure are both at 25 psig and rising steadily at 2 psig/minute. He directs the 1C03 operator to Emergency Depressurize (ED).

Which of the following states the basis for Emergency Depressurizing in this situation?

ED is performed...

a. to ensure the Torus design temperature is not exceeded.

b. to ensure the continued operability of RPV level instrumentation.

c. because the pressure suppression function of the Torus has been lost.

d. because the Primary Containment Pressure limit has been exceeded.

ANSWER: c

Distracter 1: This is one of the bases for ED due to Torus Water Temp and RPV Pressure ; Heat Capacity Limit

Distracter 2: RPV level indications are challenged by high DW pressure and temp, but this is not the basis.

Distracter 3: PCPL is 53 psig. At 2psig/min, that will be in 14 minutes. The operator action for this challenge is to vent the containment.

REFERENCE: EOP Bases Document, Rev. 5, EOP 2, page 65 of 69

K/A System: 295024 (High Drywell Pressure)

K/A Number: EK3.04 (Knowledge of the reasons for the following responses as they apply to High Drywell Pressure: EMERGENCY DEPRESSURIZATION.)

K/A Value: 3.7/4.1

DAEC Objective: 95.00.00.15 Explain the bases for each of the EOP Curves and Limits.

Cognitive Level: 1B

Source: Modified Exam Bank,

1 Point

61. Operators have scrammed the reactor due to a partial loss of the Well Water system while at power. Drywell pressure is 2.5 psig and rising slowly as operators attempt to mitigate this transient.

Which of the following is **NOT** a viable mitigation strategy for lowering Drywell pressure?

a. Begin a plant cooldown.

b. Vent the Containment and begin de-inerting.

c. Bypass the Reactor Bldg. Main Intake cooling coils.

d. Initiate the Containment Atmosphere Dilution (CAD) system.

ANSWER: d

Note: CAD initiation is directed only in EOPs and SAGs for hydrogen control. There is no cooling benefit from CAD.

Distracter 1: Directed by ARP.

Distracter 2: Directed by ARP.

Distracter 3: Directed by ARP.

REFERENCE: ARP 1C05B B-1(Primary Containment HI-LO Pressure; 1.5 psig alarm)

K/A System: 295010 (High Drywell Pressure-Abnormal)

K/A Number: AK1.03 (Knowledge of the operational implications of the following concepts as they apply to HIGH DRYWELL PRESSURE; Temperature increases.)

K/A Value: 3.2/3.4

DAEC Objective: 99.03 (Respond to Primary Containment HI-LO Pressure)

Cognitive Level: 1-P

Source: NEW

1 Point

62. The plant was operating at full power for two months in the middle of core life when a turbine control problem resulted in a Reactor Vessel High Pressure trip.

The Low-Low Set (LLS) SRVs responded as designed and opened soon after the trip.

The operating crew is attempting to stabilize RPV pressure TWO MINUTES after the start of the transient. As the 1C03 operator, you have the following information:

- The Turbine Bypass Valves are closed.
- The Main Steam Line (MSL) Drains are open.
- The green, red, and amber lights are illuminated for both LLS SRVs.
- Reactor pressure is 980 psig and lowering at a rate of 10 PSIG / MINUTE.

Which of the following statements is CORRECT concerning these indications and heat energy still being produced by the reactor?

a. RPV pressure is being controlled by LLS and MSL Drains.
The heat energy still being produced by the reactor is NORMAL decay heat.

b. RPV pressure is being controlled by MSL drains because the LLS SRVs are not open.
The heat energy still being produced by the reactor is NORMAL decay heat.

c. RPV pressure is being controlled by LLS and MSL Drains.
The heat energy still being produced by the reactor is HIGHER THAN NORMAL decay heat due to the power history before the reactor was shutdown.

d. RPV pressure is being controlled by LLS and MSL Drains.
The heat energy still being produced by the reactor is MUCH HIGHER THAN NORMAL and indicates that the reactor is not shutdown.

ANSWER: d

Note: Reactor decay heat 1 second after shutdown is 6.2%. Each SRV has ≈ 8% power steam flow capacity, so with two LLS SRVs open, pressure should be lowering much faster than 10 psig/min.

Distracter 1: Decay heat rate is not normal.
Distracter 2: Decay heat rate is not normal and the LLS valves are open.
Distracter 3: Decay heat rate would never be 16% with the reactor shutdown.
REFERENCE: SD 183.1; ARP 1C03A D-5; 1C05B C-4
K/A System: 295025 (High Reactor Pressure)
K/A Number: EA2.05 (Ability to determine and/or interpret the following as they apply to High Reactor Pressure: DECAY HEAT GENERATION.)
K/A Value: 3.4/3.6
DAEC Objective: 8.03.01.03 (Evaluate plant conditions and control room indications to determine if the ADS system or the LLS system is operating as expected and identify any actions that may be necessary to place the ADS/LLS systems in the correct lineup.)
Cognitive Level: 3-SPK
Source: NEW

63. An ATWS has occurred and the crew is intentionally lowering RPV level to reduce reactor power.

The MSIVs remain open and there is no challenge to Primary Containment.

At +130″, reactor power drops to less than 5%, but the OSS directs the 1C05 operator to continue lowering RPV level to less than +87″.

Which of the following is the EOP basis for the continued lowering of RPV level?

This action is intended to ...

a. minimize dilution of the boron being injected.

b. eliminate boron carryover down the steam lines.

c. reduce the severity of thermal hydraulic instabilities.

d. provide a margin for error in keeping reactor power less than 5%.

ANSWER: c.

Note: +87″ is 2 ft. below lowest feedwater sparger nozzle. This places the spargers in the steam space which effectively heats the relatively cold feedwater. Less subcooling reduces instabilities.

Distractor #1: Not the stated purpose, but less water tend to concentrate the boron being injected.

Distractor #2: Not the stated purpose, but carryover certainly would be eliminated that far from the steam lines

Distractor #3: Not the stated purpose but it would provide a margin for error. This is a possible misconception. 43″ is a lot of margin.

REFERENCE: EOP Program Manual, ATWS section, Rev. 4
K/A SYSTEM: 295037 (SCRAM Condition Present and Reactor Power Above APRM Downscale or Unknown.)
K/A NUMBER: EK1.02 (Knowledge of the operational implications of the following concepts as they apply to: SCRAM Condition Present and Reactor Power Above APRM Downscale or Unknown: REACTOR WATER LEVEL EFFECTS ON REACTOR POWER)
K/A VALUE: 4.1/4.3
DAEC Objective: 95.55.01.01
Explain how the mitigation strategies used in ATWS accomplish the purpose of ATWS.
Cognitive Level: 1-B
Source: New

64. A design basis LOCA occurred several hours ago, emergency system failures coupled with electrical transients resulted in hydrogen generation due to RPV water level being below the top of active fuel for too long. The Shift Supervisor has asked you to check plant parameters to determine if Containment Atmosphere Dilution (CAD) can be initiated.

Which of the following **WOULD NOT** be a consideration for initiating the Containment Atmosphere Dilution system?

a. Current primary containment pressure

b. The ability to vent the primary containment

c. The status of the containment spray subsystems in use

d. The ability to start the containment purge fan, 1V-EF-17

ANSWER: d

Distracter 1: CAD Loop Control Valves (MO-4320A/B) will auto close if drywell pressure exceeds 30 psig.

Distracter 2: SEP 303.3. steps dictate which CAD spray header to inject with dependent on if you are venting containment from the Drywell or Torus. SEP 303.4 lists 3 reasons venting may be necessary during Cad injection.

Distracter 3: Procedural requirement to ensure that CAD system injection does not use a spray header that is being used by Containment Spray.

REFERENCE: SD-573, Containment Auxiliaries, Pages 27 and 28, SEP-303.3 CAD Initiation for H2 Control in SAG; SEP 303.4 CAD Initiation for EOP H2 Control

K/A System: 500000 (High Containment Hydrogen Concentration)

K/A Number: EA1.07 (Ability to operate and/or monitor the following as they apply High Containment Hydrogen Concentration: NITROGEN PURGE SYSTEM)

K/A Value: 3.4/3.3

DAEC Objective: 42.01.01.09

Given a Primary Containment and Containment Atmosphere Monitoring and Control Systems operating mode and various plant conditions, predict how the Primary Containment and Containment Atmosphere Monitoring and Control Systems and each of the supported systems will be impacted by the following operations, conditions, or failures: CAD initiation.

Cognitive Level: 2-RI

Source: Exam Bank

1 point

65. The plant was operating at 100% power, when an electrical transient occurred. The following is a partial list of current plant conditions:

- "A" Circ Water pump is tripped.
- PCIS group 3 DIV 1 isolated.
- "A" SFU auto initiated.
- "A" Recirc scoop tube locked up.

Given the above information, which of the following statements is CORRECT?

a. Manually lock the "B" recirc scoop tube.

b. If necessary, vent the primary containment IAW EOP defeat 9.

c. If necessary, open CV 1611 the "B" Reactor feed pump recirc valve to maintain RPV level.

d. Monitor condenser backpressure and insert a manual scam if it cannot be maintained <7.5" Hg A.

ANSWER:	d
Distracter 1:	Reduce "B" Recirc Speed Control to minimum to reduce feedwater flow requirements and maintain condenser backpressure <5"HgA per AOP-317 Immediate Action 1.
Distracter 2:	Not entered EOPs at this time therefore EOP defeats are not used, and AOP-317 Immediate Action 2 provides steps to vent containment.
Distracter 3:	This step is used for a Loss of Uninterruptible AC power, it is not applicable for this mode of power failure.
REFERENCE:	AOP 317

K/A System: 295002 (Loss of Main Condenser Vacuum)

K/A Number: AK1.03 (Knowledge of the operational implications of the following concepts as they apply to Loss of Main Condenser Vacuum: LOSS OF HEAT SINK)

K/A Value: 3.6/3.8

DAEC Objective: 32.05.02.07

Predict how each supported systems will be impacted by a loss of the Cooling Towers or a degradation or loss of the Circulating Water System.

Cognitive Level: 3 PEO

Source: Exam Bank

1 Point

66. The SBDG is operating in parallel with the Startup Transformer for surveillance testing, carrying a load of 2500 KW.

    A lightning strike trips OPEN the Startup and Standby transformer incoming breakers (J, K, and M).

    Select the answer which correctly describes the initial response of the SBDG to this event.

    a. SBDG speed will increase and the engine may trip on overspeed.

    b. The SBDG output breaker will stay closed but the bus will load shed.

    c. The SBDG will trip, restart on bus undervoltage and the SBDG output breaker will close back in.

    d. The SBDG output breaker will trip, the bus will load shed and the SBDG output breaker will close back in.

ANSWER:	a
Distracter 1:	The breaker may trip when the DG trips on overspeed.
Distracter 2:	The output breaker does not close back in following trip.
Distracter 3:	The SBDG does not restart when tripped on overspeed.
REFERENCE:	SD 324, revision 1

K/A System:	295003 (Partial or Complete Loss of A. C. Power)
K/A Number:	AK2.02 (Knowledge of the interrelations Partial or Complete Loss of A. C. Power and the following: EMERGENCY GENERATORS)
K/A Value:	4.1/4.2

DAEC Objective: 19.00.00.03

Evaluate plant conditions and control room indications to determine if the SBDG is operating as expected and identify any actions that may be necessary to place the SBDG in the correct lineup.

Cognitive Level: 3 PEO

Source: Exam Bank

1 Point

67. The plant has experienced a LOSS OF COOLANT ACCIDENT with multiple equipment failures.

The 10 minute timer on the non-selected "A" RHR loop has timed out and the 1C03 operator has started injecting into the "A" Recirc loop. RPV level has begun to rise slowly.

Operators have also just gotten word that the in-plant operators have been able to manually open the failed RHR inject valve to the selected "B" Recirc loop and the 1C03 operator observes RHR injection flow into "B" Recirc loop. At this point, indicated RPV levels begins to rise at a faster rate.

The following plant parameters are reported to you, the OSS:

- Drywell Average Air Temperature 265°F (slowly lowering)
- Drywell Pressure 10 psig (slowly lowering)
- RPV Pressure 50 psig (slowly lowering)
- RPV levels:
  - "A" Fuel Zone 85″ (rising)
  - "B" " Fuel Zone 65″ (rising)
  - Wide Range Yarways 40″ (rising)
  - Narrow Range GEMACs Downscale

Based on the above information, which of the following is CORRECT concerning RPV Level?

a. RPV level is 40″ and rising.

b. RPV level is 65″ and rising.

c. RPV level is 85″ and rising.

d. RPV level is indeterminate but rising at this time.

ANSWER: d

Distracter 1& 2:Injection into A and/or B Recirc loops makes the associated Fuel Zone Indicator read artificially high during the injection

Distracter 3: A rapid depressurization has occurred making the Wide Range Yarway unusable.

REFERENCE: EOP-1 Cautions Bases; SD-880

K/A System: 295031 (Reactor Low Water Level)

K/A Number:EA2.01 (Ability to determine or interpret as they apply to Reactor Low Water Level:
Reactor Water Level)

K/A Value: SRO 4.6*

DAEC Objective: SRO Task 1.21 Direct crew response to off normal events/accidents.
SRO Objective 1.21.02.01 Verify the initial conditions using alternate indications.

Cognitive Level: 2-RI

Source: Bank

1 Point

68. A fire in the 1D1 battery room has resulted in the COMPLETE LOSS OF ALL 125 VDC. The auxiliary operator is in the switchyard and the second assistant is in the turbine building.

The Main Turbine/Generator is still in operation.

From the list of options below, select the CORRECT sequence for securing the Main Turbine/Generator?

1. Trip the H and I breakers
2. Transfer 1A1 and 1A2 to the Startup Transformer
3. Trip the generator field breaker

a. 1, 3, 2

b. 2, 1, 3

c. 2, 3, 1

d. 3, 1, 2

ANSWER: b

Distractor 1: Per AOP-302.1 page 3 sequence. Tripping H&I open first will cause an Open Circuit transfer of Non-Ess Busses.

Distracter 2: Per AOP-302.1 page 3 sequence. Tripping the Generator Field Breaker open first will cause the Generator Backup Lockout Relay to energize, and an Open Circuit transfer of the Non-Ess Busses.

Distracter 3: Per AOP-302.1 page 3 sequence. Tripping the Generator Field Breaker open first will cause the Generator Backup Lockout Relay to energize, challenge to the Turbine overspeed protection.

REFERENCE: AOP 302.1 LOSS OF 125 VDC DIV 1 (page 3 of 34)

K/A System: 295004 (Partial or Complete Loss of D. C. Power)

K/A Number: AA1.03 (Ability to operate and/or monitor the following as they apply to Partial or Complete Loss of D. C. Power: A. C. ELECTRICAL DISTRIBUTION.)

K/A Value: 3.4/3.6

DAEC Objective: 94.06.01.02

Describe how a loss of one or both divisions of 125 VDC affects plant systems and status during all modes of operation.

Cognitive Level: 2-RI

Source: Exam Bank

1 Point

69. The Primary Containment Ventilation system and plant status are as follows:

- The reactor is shutdown.
- All Recirculation fan handswitches are in AUTO.
- The Mode Switch for "A" Loop of Drywell Cooling is in the AUTO position.
- Fans 1A, 2A, 3A, 4A, 5A, 6A, 7A, & 7B are running in HIGH speed.
- The Mode Switch for "B" Loop of Drywell Cooling is in the STANDBY position.
- Fans 1B, 2B, 3B, 4B, 5B & 6B are OFF.
- Drywell pressure is 1.6 psig.
- Well Water outlet temperatures from "B" Loop Coolers are all approximately 110°F.
- Air outlet temperature from the 1A & 1B Coolers is 140°F.

Select the statement that is correct concerning the status of the Primary Containment Ventilation system.

a. The system is operating as expected for these conditions.

b. All Drywell Cooling Fans should be running in HIGH speed due to the elevated Drywell pressure.

c. All Drywell Cooling Fans should be running in HIGH speed due to the elevated "B" Loop Coolers Well Water outlet temperatures.

d. All Drywell Cooling Fans should be running in HIGH speed due to the elevated 1A & 1B Coolers Air outlet temperature.

ANSWER: d

Note: Per ARP 1C25A[B} A-4 & OI-760 P&L#4, <u>All</u> fans switch to High speed and isol valves open at 120°F cooler water out or 135°F air temp out.

Distractor 1: B Loop fans should be running due to Loop overtemperature of >135°F. Plausible because temperature is less than 150°F EOP entry setpoint.

Distractor 2: Drywell pressure is elevated but it is below the 2# setpoint that would shift all fans to slow speed. Fans do not auto start on DW pressure.

Distractor 3: This is a very high temperature for Well Water but still below the 120°F Loop Overtemperature Auto initiation.

REFERENCE: 1C25A[B], A-4, Drywell Cooling Loop "A"["B"] Over Temp, OI-760 P&L #4.
K/A System: 295012 (High Drywell Temperature)
K/A Number: AK2.01 (Knowledge of the interrelations between High Drywell Temperature and the following: DRYWELL VENTILATION.)
K/A Value: 3.4/3.5
DAEC Objective: 68.00.00.05 Evaluate plant conditions and control room indications to determine if the Primary Containment Ventilation System is operating as expected, and identify any actions that may be necessary to place the Primary Containment Ventilation System in the correct lineup.
Cognitive Level: 1-I
Source: Revised, Exam Bank

1 Point

70. The plant is at full power.

One loop of RHR is in the Torus Cooling mode with full RHR and RHRSW flow.

At this point a Safety Relief Valve (SRV) fails FULL OPEN.

The other loop of RHR is quickly placed in Torus Cooling and flows maximized.

Which of the following CORRECTLY describes the expected response of Torus water temperature if the SRV CAN NOT be closed?

a. Torus water temperature will still be LOWERING with only one loop of Torus Cooling on and
LOWER EVEN FASTER when the second loop of Torus Cooling is placed in service.

b. Torus water temperature will STABILIZE with only one loop of Torus Cooling on and
BEGIN TO LOWER when the second loop of Torus Cooling is placed in service.

c. Torus water temperature will RISE with only one loop of Torus Cooling on and
BEGIN TO LOWER when the second loop of Torus Cooling is placed in service.

d. Torus water temperature will RISE with only one loop of Torus Cooling on and
CONTINUE TO RISE when the second loop of Torus Cooling is placed in service.

ANSWER: d

Note: An operator should know that the RHR system Torus Cooling mode is not designed to keep up with a stuck open SRV. This is the most limiting Torus cooling event with Max Temperature reaching 194°F.

Distractor 1: Temp goes up and continues to go up.

Distractor 2: Temp goes up and continues to go up.

Distractor 3: Temp goes up and continues to go up.

REFERENCE: UFSAR 6.2.1.3.3.3

K/A System: 295013 (High Suppression Pool Temperature)

K/A Number: AK2.01 (Knowledge of the interrelations between High Suppression Pool Temperature and the following: SUPPRESSION POOL COOLING.)

K/A Value: 3.6/3.7

DAEC Objective: 2.01.01.08 (State the purpose of the RHR system)

Cognitive Level: 1-B

Source: NEW (Modeled after 1998 Clinton ILC exam)

1 Point

71. Which of the following annunciators or sets of annunciators would be consistent with the Containment Isolation Monitoring System (CIMS) indications provide on the next page?

a. 1C05A, A-1; REACTOR LO-LO-LO LEVEL TRIP

b. 1C05B, C-2; MAIN STEAM LINE HI HI RAD / INOP TRIP

c. 1C05A, B-8 and 1C05B, B-7; PCIS CHANNEL A&B MAIN STEAM LINE HI FLOW

d. 1C05A, C-8 and 1C05B, C-7; PCIS CHANNEL A&B MAIN STEAM LINE LOW PRESSURE

ANSWER: b

Note: A steam line break without isolation is the most limiting event for an offsite release. MSL high rad was originally a full Group 1 isolation. Currently, this signal closes only the Recirc sample valves , the MSL drain valves and trips the mechanical vacuum pump.

Distracter 1, 2, 3:All of these signals cause a full Group 1 isolation and would also result in the amber and green lights for the "MSIVS".

REFERENCE: ARP 1C05B, C-2 and A-8
K/A SYSTEM: 295017 (High Off Site Release Rate)
K/A Number: A1.11 (Ability to operate and/or monitor the following as they apply to High Off Site Release Rate: PCIS/NSSSS)
K/A Value: 3.9/4.1
DAEC Objective: 48.01.01.01 (Describe how the Main Steam System responds to a Group 1 isolation signal.)
Cognitive Level: 3 SPK
Source: NEW

1 Point

72. Of the nine (9) PCIS group isolations listed below, HOW MANY can be initiated by HIGH AREA TEMPERATURES within the Secondary Containment?

- Group 1 Main Steam Isolations
- Group 2 Radwaste Isolation valves
- Group 3 Containment Atmosphere Isolations
- Group 4 RHR Shutdown Cooling Isolations
- Group 5 RWCU Isolations
- Group 6A/B RCIC/HPCI Isolations
- Group 7 RBCCW and Well Water Containment Cooling
- Group 8 RCIC and HPCI Condensate returns
- Group 9 RCIC and HPCI Vacuum Breaker line

a. 1 PCIS group

b. 2 PCIS groups

c. 3 PCIS groups

d. 4 PCIS groups

ANSWER: c

Distracter 1, 2, & 3: Only Groups 1 (MSIVs), Group 4 (RWCU) and 6A/B (RCIC & HPCI) can be initiated by area temperatures.

REFERENCE: SD 959.1

K/A System: 295032 (High Secondary Containment Temperature)

K/A Number: EK2.04 (Knowledge of the interrelations between High Secondary Containment Temperature and the following: PCIS/NSSS)

K/A Value: 3.6/3.8

DAEC Objective: 42.08.01.07 (List the signals which cause Primary containment and Containment
Atmosphere Monitoring and Control isolations.)

Cognitive Level: 1-I

Source: NEW

1 Point

73. The reactor is at 100% power with the Well Water System in the following lineup:

- The A and B Well Water Pumps are running.
- The Well Water Logic Control Switch, SW1, is in the PUMPS position.

Predict how the Well Water System would respond if the B Well Water Pump tripped off and identify the reason for the system response.

a. The Control Building Chillers bypass valve opens to shift the chiller heat load to ESW.

b. The Domestic Water Storage Tank supply valve closes to ensure all flow is into the essential loads.

c. The selected Condenser Air Cooling Coil isolates to remove the heat input from the Condenser Bay.

d. The Main Plant Intake Coils isolate to maximize cooling to the Drywell. (The Intake Coil bypass valve opens on interlock.)

ANSWER:	d
Distractor a:	ESW is manually started to supply cooling to the Control Building Chillers per AOP 408, Immediate Actions, Step 2.
Distractor b:	Domestic Water is manually isolated per AOP 408, Follow-up Actions, Step 6.
Distractor d:	The selected cooler remains in service per AOP 408 Automatic Actions.
REFERENCE:	AOP 408, Automatic Actions

K/A SYSTEM:	295018 (Partial or Complete Loss of Component Cooling Water)
K/A Number:	AK3.01 (Knowledge of the reasons for the following responses as they apply to Partial or Complete Loss of Component Cooling Water: ISOLATION OF NON-ESSENTIAL HEAT LOADS.)
K/A Value:	2.9/3.2

DAEC Objective: 26.01.01.14

List the signals which cause a Well Water System isolation including purpose, setpoints, and logic. Predict how the Well Water System responds to an isolation signal.

Cognitive Level: 2-RI

Source: Modified, Exam Bank

74. The reactor has failed to scram from 100% power. The following conditions exist:

- Several control rods are NOT fully inserted. Operators are making every effort to get them inserted.
- The MSIVs are closed and RPV pressure is being controlled by the SRVs.
- The crew has been briefed to prepare for Emergency Depressurization due to degraded containment conditions.
- Standby Liquid Control (SBLC) is being injected with both pumps.

Which one of the following conditions requires tripping of the SBLC pumps ?

a. All APRMs are downscale.

b. The RPV has been Emergency Depressurized.

c. The SBLC Storage Tank level decreases to 0%.

d. All control rods are inserted to at least position 04.

ANSWER: c

Distracter 1: This is a breakpoint for power level control, not shutdown of the SBLC pumps.

Distracter 2: ED changes nothing.

Distracter 3: DAEC Max Subcritical Banked Withdrawal Position is 02.

REFERENCE: OI-153

K/A System: 295037 (Scram condition present and Rx Power above APRM Downscales or unknown)

K/A Number: EA2.03 (Ability to determine and/or interpret the following as they apply to Scram condition present and Rx Power above APRM Downscales or unknown: SBLC Tank Level.

K/A Value: SRO 4.4*

DAEC Objective: SRO Task 6.56 Direct crew response to perform /Q to reduce power/scram during an ATWS.

Cognitive Level: 1-P

Source: Bank

1 Point

75. An ATWS has occurred coupled with a loss of both CRD pumps. EOP ATWS-RPV Control has been entered. Emergency Depressurization may be required in approximately 15 to 20 minutes due to low reactor water level.

Which of the following EOP ATWS operator actions will be adversely affected by the Emergency Depressurization?

a. Inject boron into the RPV with SBLC per OI-153

b. Toggle Individual scram test switches per RIP 103. 1

c. Reset ARI. Defeat interlock if necessary per Defeat 12

d. Increase CRD cooling flow and pressure per RIP 103.2

ANSWER:	b
Distractor 1:	Lowering reactor pressure should not affect the ability to inject SBLC into the vessel.
Distractor 2:	Defeat 12 is not affected by lowering reactor pressure, but bypasses a reactor high pressure signal of 1140 psig. The ARI solenoids will reset.
Distractor 3:	If the CRD pumps can be restarted, lowering reactor pressure should not hinder this rod insertion procedure.
REFERENCE:	EOP ATWS, EOP DEFEAT 12, RIP-103.1

K/A System:	295022 (Loss of CRD Pumps)
K/A Number:	AK1.02 (Knowledge of the operational implications of the following concepts as they apply to Loss of CRD Pumps: REACTIVITY CONTROL).
K/A Value:	3.6/3.7

DAEC Objective:	10.01.01.09 Predict the effects that a losss of CRD Hydraulic System would have upon the following supported systems: Reactor Recirculation System, GEMAC Reference Leg Backfill System.
	101.14 Respond to a complete loss of CRD Water flow.
Cognitive Level:	2-RI
Source:	INPO Exam Bank

1 Point

76. The plant was in normal full power operation on a weekend when a STATION BLACKOUT occurred in conjunction with a loss of high pressure injection systems.

Both Standby Diesel Generators have started but have not reenergized the essential busses due to Bus Lockouts on 1A3 and 1A4.

Electricians have been called out to investigate but they are not yet on site. Operators have performed a visual inspection and verified NO APPARENT DAMAGE to either 1A3 or 1A4.

RPV level has been lowering steadily and, 15 minutes after the plant trip, is at 50 inches.

Which of the following CORRECTLY describes the restrictions on manually resetting the 1A3 and/or 1A4 bus lockouts in order to establish low pressure injection?

a. ONE manual reset of 1A3 or 1A4 lockout may be attempted before Electricians arrive. If that lockout resets, NO attempt may be made to reset the other bus.

b. ONE manual reset of 1A3 or 1A4 lockout may be attempted before Electricians arrive. If that lockout resets, ONE attempt may be made to reset the other bus.

c. ONE manual reset of 1A3 or 1A4 lockout may be attempted but only after consultation with Electricians.
If that lockout resets, and the Electricians agree, ONE attempt may be made to reset the other bus.

d. NO manual reset attempts may be made until Electricians have completed a full inspection of each bus.

ANSWER: a

Note: This is the highest ranking DAEC PRA initiating event for core damage frequency.

Distractor 1: Manual reset of ONLY one bus is allowed if necessary and after sat visual inspection.

Distractor 2: Manual reset of ONLY one bus is allowed if necessary and after sat visual inspection. AOP say to not wait for electricians.

Distractor 3: Manual reset of one bus is allowed if necessary and after sat visual inspection.

REFERENCE: AOP 3.01
K/A System: 295031 (Reactor low water level- Emergency)
K/A Number: Generic 2.4.8 (Knowledge of how event based Emergency/Abnormal operating procedures are used in conjunction with symptom based EOPs.)
K/A Value: SRO 3.7
DAEC Objective: SRO 5.38.02 (Direct operator actions to mitigate the consequences of a Loss of Offsite Power and stabilize plant parameters.)
Cognitive Level: 3-SPK
Source: New

1 Point

77. An accident has occurred.

Current plant conditions are as follows:

All control rods are inserted.

Reactor water level	130″ and stable
Reactor pressure	55 psig and stable
Drywell pressure:	4 psig and slowly lowering
Drywell temperature:	145°F and stable
Torus pressure:	3 psig and slowly lowering
Torus water temperature:	190°F and stable
Torus water level	10.4 ft. and stable

Torus and Drywell Sprays are in operation.
Torus Cooling is maximized.
"A" and "B" Core Spray pumps are injecting into the RPV.

Assuming all systems function as expected, which of the following represents a potential concern?

a. Structural damage to the SRV tailpipes.

b. Low pressure ECCS pumps could lose NPSH and cavitate.

c. Introduction of air into the containment with the potential for deflagration conditions.

d. Failure of the Torus to Drywell vacuum breakers to function, causing drywell spray operation to be prohibited.

ANSWER: b
Distractor 1: A consideration on very high Torus level, >13.8 ft.
Distractor 2: Drop in drywell pressure will isolate containment spray valves.
Distractor 3: Torus level of 13.5 ft is the level of concern for Torus to Drywell vacuum breakers.
REFERENCE: EOP Curves and Limits, NPSH Curves
K/A System: 295026 (Suppression Pool High Water Temperature)
K/A Number: EK1.01 (Knowledge of the operational implications of the following concepts as they apply to Suppression Pool High Water Temperature: PUMP NPSH)
K/A Value: 3.0/3.4
DAEC Objective: 95.00.00.17
Evaluate plant status and control room indications to determine the applicability and effect of any EOP Curve or Limit.
Cognitive Level: 3 SPK
Source: New Question

1 Point

78. A plant startup was in progress when an electrical fault tripped the "B" Recirc pump resulting in annunciator 1C04B (A-1) "B" RECIRC MG DRIVE MOTOR TRIP OR OVERLOAD. Operators have stabilized the plant and you, as the OSS, have directed them to perform the actions for Single Loop Operations.

- The B Recirc pump has been properly secured and its discharge valve reopened after 5 minutes.
- Reactor power was 70% with a load line of 100%.
- The speed of the "A" Recirc pump is currently at 41%.

1) Is it expected that the actual flow in the "B" Recirc Loop be FORWARD or REVERSE in this
plant condition?

2) Will that make the 1C05 TOTAL CORE FLOW indication ACCURATE or NOT ACCURATE for
your decisions as an OSS?

a. 1) FORWARD
2) 1C05 TOTAL CORE FLOW indication will be ACCURATE because the "B" Loop forward flow will be added to the "A" Loop forward flow.

b. 1) FORWARD
2) 1C05 TOTAL CORE FLOW indication will NOT BE ACCURATE because the "B" Loop forward flow will be subtracted from the "A" Loop forward flow.

c. 1) REVERSE
2) 1C05 TOTAL CORE FLOW indication will be ACCURATE because the "B" Loop reverse flow will be subtracted from the "A" Loop forward flow.

d. 1) REVERSE
2) 1C05 TOTAL CORE FLOW indication will NOT BE ACCURATE because the "B" Loop reverse flow will be subtracted from the "A" Loop forward flow.

ANSWER: b

Note: With the trip annunciator in, the field breaker would be open, which causes the flows to be subtracted from each other. Reverse flow does not occur in the idle loop until the operating pump speed is >50%, but it is given at 41%.

Distractor 1:If all flow is forward, these values should be added, not subtracted for an accurate reading.

Distractor 2:Flow would be forward, not reverse. The indication would not be accurate when subtracting a flow that is actually forward.

Distractor 3: Flow would be forward, not reverse.

REFERENCE: SD 264 pg 40&41; ARP 1C04A A-6

K/A System: 295001 (Partial or complete loss of forced circulation)

K/A Number: A2.03 (Ability to determine and/or interpret the following as they apply to Partial or complete loss of forced circulation: Actual Core Flow.)

K/A Value: 3.3/3.3

DAEC Objective: 97.08 Perform Single Loop Operation STP.

Cognitive Level: 2-RI

Source: NEW

1 Point

79. Evaluate the following control room indications and determine the effect of these conditions being established.

All control rods full in	
Reactor pressure	950 psig
Reactor water level	190″
Reactor power	120 cps
Drywell pressure	20 psig
Drywell air temperature	325°F
Torus pressure	17 psig
Torus water temperature	160°F
Torus water level	9.0 ft

a. The Pressure Suppression Pressure Limit has been exceeded and Emergency Depressurization must be performed.

b. The Boron Injection Initiation Temperature Limit has been exceeded and Boron must be injected because the Heat Capacity Limit may be exceeded.

c. The RPV Saturation Temperature has been exceeded and Fuel Zone and GEMAC RPV water level indications must be adjusted by subtracting 23 inches.

d. The Heat Capacity Limit has been exceeded and Emergency Depressurization must be performed if reactor pressure or torus temperature cannot be reduced.

ANSWER: d

Note: **EOP-1, EOP-2, and ATWS flowcharts are provided.**

Distracter 1: PSP is not exceeded until 18 psig at 9 ft. Plausible if drywell pressure is used.

Distracter 2: Boron should be injected above 150°F when power is below 2.2% if ATWS-EOP has been entered. With the reactor shutdown, ATWS EOP should not be entered and Boron should not be injected.

Distracter 3: RPV Sat curve is exceeded above 350°F when above 120 psig RPV pressure.

REFERENCE: EOP Curves and Limits

K/A System: 295030 (Low Suppression Pool Water Level)
K/A Number: EK1.03 (Knowledge of the operational implications of the following concepts as they apply to Low Suppression Pool Water Level: HEAT CAPACITY
K/A Value: 3.8/4.1
DAEC Objective: 95.00.00.17
Evaluate plant status and control room indications to determine the applicability and effect of any EOP Curve or Limit.
Cognitive Level: 3 SPR
Source: New Question

1 Point

80. A radiological release accident has occurred while operating at power. The accident was severe enough to cause a Group 3 isolation due to Reactor Building Vent Shaft high radiation levels.

While responding to this event, operators identify that annunciator 1C35A, C-3 REACTOR BLDG KAMAN 3, 4, 5, 6, 7 & 8 HI RAD OR TROUBLE has activated. (A.K.A.: KAMAN red alarm)

The Standby Gas Treatment (SBGT) trains are both operating as designed and the Reactor Bldg. to outside ΔP is approximately 0.35 inches of water as read at 1C23.

Which of the following malfunctions would account for the indications described above?

a. The SBGT overpressure relief damper has failed open.

b. The MAIN PLANT EXHAUST FANS (EF-1, 2, &3) have failed to trip as designed on a Group 3 Isolation signal.

c. The REFUELING POOL EXH FAN (EF-10) has failed to trip as designed on a Group 3 Isolation signal.

d. The RX BLDG EXH FAN (EF11A& B) INLET ISOL DAMPERS (1V-AD-13A & B) have failed to completely isolate as designed on a group 3 Isolation signal.

ANSWER: d

Distractor 1:This damper lifts on a positive pressure when venting the containment. It relieves to the Rx Bldg. 2nd floor, which is still inside containment.

Distractor 2: Common misconception. EF 1, 2, & 3 do not trip on a Group 3. Their exhaust from the plant is the sample point for KAMAN 3-8. High rads there indicate that the reactor Bldg Vent shaft did not isolate from the main plant exhaust plenum (at 1V-AD-13A&B) and that EF-1, 2, &3 are also assisting SBGT at keeping the Rx Bldg negative. That is the reason the ARP directs shutdown of EF1, 2, &3.

Distractor 3:This fan draws air from the refuel floor and discharges into the Rx Bldg Vent Shaft. If 1V-AD 13A&B had isolated as designed, this exhaust would never get to the KAMAN 3-8 monitors.

REFERENCE: SD733; ARP 1C05B C-8; ARP 1C35A, C-3

K/A System: 295038 (High Offsite Release Rate.)
K/A Number: 2.4.48 (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.)
K/A Value: 3.5/3.8
DAEC Objective: 95.71.04.02 (For any step, caution, or continuous recheck statement in EOP-4, explain the basis for the statement.)
Cognitive Level: 3-SPK
Source: NEW

1 Point

81. The plant was operating in Mode 1, with all systems operable, when a transient occurred that resulted in the following conditions:

- An electrical ATWS has occurred.
- Reactor power 20% (slowly lowering)
- Reactor water level 150" (being intentionally lowered)
- Reactor pressure 880 psig (stable with MSIVs open)

Annunciator REACTOR BLDG ARM HI RAD, 1C04B A-6, has started to alarm.

Assume that each of the systems listed below could be the source of a leak that is causing that alarm.

1) Both CRD pumps are running.

2) RCIC is running on minimum flow.

3) HPCI is running in CST-CST mode.

4) The RWCU system is in normal operation with two demineralizers.

The OSS briefed the crew that EOP 3 was entered and that the crew must isolate systems "not required to be operated by EOPs".

Which system must be KEPT IN OPERATION even if it is the source of the leak?

a. CRD

b. RCIC

c. HPCI

d. RWCU

ANSWER: a

Note: EOP-3 says to isolate all systems discharging into area except: 1-Required for EOPs and 2-needed to suppress a fire. EOP-3 does not include "needed to shutdown reactor" but EOP-3 bases does.

Distracter 1:.RCIC is not needed for level control if level is being intentionally lowered and feedwater is available.

Distracter 2: HPCI not needed for RPV pressure control.

Distracter 3: RWCU would be needed for high coolant activity, but should be isolated if SBLC is being used and is not needed for EOP pressure control.

REFERENCE: EOP Bases Document, EOP 3, page 15 of 22

K/A System: 295033 (High Secondary Containment Area Radiation Levels)

K/A Number: EK3.03 (Knowledge of the reasons for the following responses as they apply to High Secondary Containment Area Radiation Levels: ISOLATING AFFECTED SYSTEMS.)

K/A Value: 3.8/3.96

DAEC Objective: 95.68.08.01For any given step, Caution, or Continuous Recheck Statement in EOP 3, explain the bases for the statement.

Cognitive Level: 3-SPK

Source: New Question

82. The plant is at full power during normal working hours.

While lowering a crate of highly radioactive material from the 5th floor, the sling breaks, causing the contents of the crate to spill out on the ground floor of the Reactor Building.

No one is injured but the Railroad Access ARM is alarming and reading 30 mR/hour.

The OSM takes or directs the following actions:

- Declares a Notification of Unusual Event HU-5, based on OSM judgement.
- Sounds the Evacuation Alarm.
- Makes a Plant Page announcement for all personnel to evacuate the Reactor Building.
- Repeats the Evacuation alarm and Plant Page announcement.

Which of the following is CORRECT concerning the OSM's compliance with the Emergency Plan.

a. All of the OSM's actions have complied with the Emergency Plan.

b. The entire plant must be evacuated when the Evacuation Alarm is used for an EAL declaration.

c. An On-Site Rad Condition classification must be declared, not an HU-5 based on OSM judgement.

d. The Evacuation Alarm is only used for EAL declarations of ALERT or greater, and may not be used for a Notification of Unusual Event.

ANSWER: b

Note: **Emergency Plan Implementing Procedure EAL Tables are provided.**

Distracter 1: Not per EPIP 1.3 In an EAL condition, the entire plant must be evacuated for accountability purposes.

Distracter 2: The only On-site rad condition NUE is AU2 which has entry condition of 1000X normal ARM reading and is therefore not applicable. There is no restriction for using HU5 on rad conditions.

Distracter 3: Evac alarm must be sounded for Alert or greater ,but may also be used for general evacuation or NUEs. Common misconception.

REFERENCE: EPIP 1.3

K/A System: GENERIC

K/A Number: 2.3.10 Ability to perform procedures to reduce excessive levels of radiation and guard against personnel exposure.

K/A Value: SRO 3.3

DAEC Objective: SRO 3.01.03.01 Explain the responsibilities and instructions contained in EPIP 1.3 (Plant assembly and site evacuation)

Cognitive Level: 3-SPK

Source: New

1 Point

83. Postulated scenario:

It is 0400 on a quiet midshift during normal full power operation. The STA's wife calls to tell him that she has gone into labor and that she must get to the hospital.

- At 0405, the STA departs as directed by the Operations Shift Manager (OSM).
- At 0410, the OSM calls the Operations Manager to inform him of the reduction in crew composition.
- At 0420, the OSM reaches a relief for the STA and directs him to come to work.
- At 0615, the STA relief arrives and joins in on the OSS/OSM turnover.
- At 0645, the STA shift turnover briefing is completed.

Which of the following is CORRECT concerning the operating crew's compliance with the shift manning requirements of ACP 1410.1, "Conduct of Operations", in the above postulated scenario?

a. The operating crew has complied fully with the shift manning requirements of ACP 1410.1.

b. The STA may NOT leave until the Plant Manager's permission is obtained.

c. The STA may NOT leave until his relief has arrived on site and has been briefed.

d. The STA position must be manned by a relief within two hours of the STA's departure.

ANSWER: d

Note: This question is based on a plant event and relatively recent change to ACP1410.1. Operations Manager must be notified, the position "manned", and the plant must be stable. These are all conditions satisfied in the postulated scenario except manning the watch in 2 hours. Manning the watch is not defined. It could mean arrival or it could mean completion of turnover briefing. In either case, the STA position was vacant for >2 hours.

Distracter 1: Did not comply because crew composition was reduced for >2 hours.

Distracter 2: Operations Manager required ; not Plant Manager. And it is not required beforehand.

Distracter 3: STA may leave under the stated conditions.

REFERENCE: ACP 1410.1; T.S. 5.2.2

K/A System: Generic

K/A Number: 2.1.4 (Knowledge of shift staffing requirements.)

K/A Value: SRO 3.4

DAEC Objective: SRO 1.01.01.01 Explain the crews responsibilities and authorities, the requirements, instructions and attachments of ACP1410.1 (Conduct of Ops)

Cognitive Level: 3-SPK

Source: NEW

1 Point

84. A reactor startup is in progress per IPOI-2 "Startup".

- Reactor power is 16%.
- Operators are continuing control rod withdrawal.

Assume that the Rod Worth Minimizer (RWM) becomes inoperable at this point. Its mode switch must be taken to BYPASS.

In this situation, is the RWM required to be operable per Technical Specifications? (REQUIRED or NOT REQUIRED)

If REQUIRED, correctly identify the Tech Spec REQUIRED ACTION.
If NOT REQUIRED, correctly identify why it is not required by Tech Specs.

a. REQUIRED
Suspend control rod movement except by scram.

b. REQUIRED
Verify movement of control rods is in compliance with Banked Position Withdrawal Sequence by a second licensed operator or other qualified member of the technical staff.

c. NOT REQUIRED
The RWM is not required by Tech Specs when reactor power is greater than 10%.

d. NOT REQUIRED
The RWM is not required by Tech Specs whenever The (reactor) Mode Switch is RUN.

ANSWER: c

Note: **DAEC Technical Specifications are provided.** The candidate must use a T.S. table to determine applicability, and table notes to identify other specified conditions, thereby demonstrating the ability to apply Tech Specs.
Distracter 1: Common misconception because Plant procedures require a second operator whenever the RWM is bypassed. Required Action is from RWM inop during startup, Condition C.
Distractor 2:Common misconception because plant procedures require a second operator whenever the RWM is bypassed. Required Action is verbatim from RWM inop Condition D which is N/A >10%.
Distracter 3: Not required is correct, but could be required in RUN if <10% power.
REFERENCE: Technical Specifications 3.3.2.1.D, IPOI 4
K/A System: GENERIC
K/A Number: 2.1.12 (Ability to apply Technical Specifications for a system.)
K/A Value: SRO 4.0
Objective: SRO 1.02.03.01 Explain the requirements of Conditions, Required Actions, and Completion Times, when entering planned and unplanned LCOs.
Cognitive Level: 3 SPR
Source: Revised, Exam Bank

1 Point

85. During some fuel handling operations, a spent fuel bundle is dropped onto the reactor core and is damaged.

Annunciators 1C04B A-6, REACTOR BLDG ARM HI RAD and 1C03A A-1, FUEL POOL EXHAUST RIS-4131A/B HI-HI RAD, are alarming and the ANSOE reports the following readings:

Fuel Pool Exhaust, RIS-4131A:	15 mr/hr
Fuel Pool Exhaust, RIS-4131B:	2 mr/hr
North Refuel Floor, RI-9163:	110 mr/hr
South Refuel Floor, RI-9164:	115 mr/hr
Spent Fuel Pool Area, RI-9178:	118 mr/hr
New Fuel Vault Area, RI-9153:	90 mr/hr

Which one of the following is indicated by these readings, and what automatic actions are expected?

a. RIS 4131B has failed. RIS 4131A should have started both trains of SBGT and isolated reactor building ventilation as part of a full Group III Isolation.

b. RIS 4131B has failed. RIS 4131A should have started the "A" train of SBGT and isolated reactor building ventilation as part of a Div 1 Group III Isolation.

c. RIS-4131B is slower to respond to the event because it is downstream of RIS 4131A. When it does respond, both trains of SBGT will auto start and reactor building ventilation will isolate as part of a full Group III Isolation.

d. RIS-4131B is slower to respond to the event as a design feature to minimize spurious actuations. When it does respond, both trains of SBGT will auto start and reactor building ventilation will isolate as part of a full Group III Isolation.

ANSWER: b
Distractor 1: Only one monitor will cause half an isolation/auto start.
Distractor 2: The two detectors are not separated.
Distractor 3: The two detectors do not have different design response times.
REFERENCE: ARP 1C03A A-1, revision 4
K/A System: 295023 (Refueling Accidents)
K/A Number: AA2.01 (Ability to determine and/or interpret the following as they apply to Refueling Accidents: AREA RADIATION LEVELS.)
K/A Value: 3.6/4.0
DAEC Objective: 86.00.00.03Evaluate plant conditions and control room indications to determine if the ARM System is operating as expected, and identify any actions that may be necessary to place the ARM System in the correct lineup.
Cognitive Level: 2-RI
Source: Exam Bank

1 Point

86. New fuel has been loaded during a refueling outage.

Which of the following correctly describes how the new value of Shutdown Margin is determined at the DAEC?

a. The only method used to establish Shutdown Margin is the analytical calculation performed by Reactor Engineers.

b. Both an analytical calculation and confirmatory Surveillance Test Procedure are performed.
This STP identifies the rod positions and other plant conditions at which the SRM counts increase by a factor of 10.

c. Both an analytical calculation and confirmatory Surveillance Test Procedure are performed.
This STP identifies the rod positions and other plant conditions at which the reactor achieves criticality.

d. Both an analytical calculation and confirmatory Surveillance Test Procedure are performed.
This STP identifies the rod positions and other plant conditions at which the reactor achieves 100% power.

ANSWER: c

Note: **Section 3.1.1 will be removed from the Tech Specs provided to SRO Candidates.**
STP 3.1.1-01 is performed every first startup per IPOI-1 to reduce uncertainties in the calculation.

Distracter 1:

Distracter 2: STP is performed but SDM is calculated using Critical data, not SRM counts. Plausible distracter because the factor of 10 increase value is the point at which notch withdrawal must begin.

Distracter 3: STP is performed but SDM is calculated using Critical data, not 100%. Plausible distracter because number of rods remaining partially inserted at full power.

REFERENCE: TS 3.1.1

K/A System: GENERIC

K/A Number: 2.2.34 (Knowledge of the process for determining the internal and external effects on core reactivity.)

K/A Value: SRO 3.2*

Objective: SRO 4.23.01 Direct performance of applicable portions of IPOI-1 (Startup Checklist) attachments and checklists.

Cognitive Level: 1-F

Source: New Question

1 Point

87. The Steam Tunnel and Reactor Building are equipped with blowout panels that relieve internal pressure when pressure exceeds 7"Hg.

What are the design bases for these blowout panels?

1) Steam Tunnel
2) Reactor Building

a. 1) Prevent structural failure of the Steam Tunnel due to a steam leak in the Steam Tunnel.
   2) Prevent structural failure of the Reactor Bldg. due to a design basis Tornado.

b. 1) Prevent structural failure of the Reactor Bldg. due to a steam leak in the Steam Tunnel.
   2) Prevent structural failure of the Reactor Bldg. due to a design basis Tornado.

c. 1) Prevent structural failure of the Steam Tunnel due to a steam leak in the Steam Tunnel.
   2) Prevent structural failure of the Reactor Bldg. due to a steam leak in the Reactor Bldg.

d. 1) Prevent structural failure of the Reactor Bldg. due to a steam leak in the Steam Tunnel.
   2) Prevent structural failure of the Reactor Bldg. due to a steam leak in the Reactor Bldg.

ANSWER: a

Distracter 1, 2, 3: Per UFSAR Chapter 3.3; The Reactor Building blowout panels protect the Reactor Building during the design tornado. Per UFSAR Chapter 3.6, Steam Tunnel blowout panels protect the Steam Tunnel not the Reactor Building.

REFERENCE: System Description 170.1, Secondary Containment, pages 5 and 6

K/A System: 295035 (Secondary Containment High Differential Pressure)

K/A Number: EK3.01 (Knowledge of the reasons for the following responses as they apply to Secondary Containment High Differential Pressure: BLOW-OUT PANEL OPERATION.)

K/A Value: 2.8/3.1

DAEC Objective: 50007.04.03

State the internal pressure limit for the Steam Tunnel and Refuel Floor Structure and explain how excessive pressure is managed.

Cognitive Level: 1 B

Source: New Question

1 Point

88. **See the partially completed page of IPOI-2 "Startup" on the next page of this exam.**

A startup is in progress after a short duration maintenance outage.

A Drywell entry was NOT performed.

The next step of the startup is to withdraw control rods to establish one Turbine Bypass Valve 20%-90% open.

Assume that the attached page is the Working Copy of IPOI-2.

Which of the following CORRECTLY describes the placekeeping /logkeeping on the attached page?

a. All steps have been properly documented per plant procedures?

b. IPOI-2 steps may NOT be marked N/A (Not Applicable).

c. The correction in step (b)1 was NOT performed properly.

d. IPOI-2 steps may NOT be signed off using a check mark.

ANSWER: d

Note: Placekeeping with grease pencils on Operating Instructions and during Simulator training is a common practice. This question verifies that candidates recognize the stricter requirements for documenting IPOI steps. This requirement is in both references.

Distracter 1: The completed IPOI procedure steps are a permanent record and must therefore be initialed or signed per IPOI-2 and ACP-101.01.

Distracter 2: Steps may be marked N/A per ODI-022 and ACP 101.01

Distracter 3: Correction was performed perfectly per current rev of ODI 022. A recent concern has been that ALL corrections must be initialed, dated and timed. So as of the date of question development, the date and time are excessive, but not improper. If ODI-022 is revised, this answer option will still be in compliance.

REFERENCE: ODI-022, ACP-101.01

K/A System: GENERIC

K/A Number: 2.1.18 (Ability to make accurate, clear and concise logs, records, status boards, and reports.)

K/A Value: 2.9/3.0

Objective: 96.05 Conduct plant operations in accordance with Administrative Procedures

Cognitive Level: 3-SPK

Source: New Question

1 Point

89. Which of the following is **NOT** a responsibility of the OSS in regards to processing a Temporary Document Change Form in accordance with ACP 106.1, "Procedure Preparation, Revision, Review, and Approval"?

a. Ensure facility license is not violated.

b. Performing a Safety Evaluation.

c. Ensuring that the intent of the procedure is not changed.

d. Ensure that both the originator and procedure owner have signed within one working day.

ANSWER:	b
Distracter 1:	The OSS shall ensure facility license is not violated.
Distractor 2:	The OSS shall ensure that the intent of the procedure is not changed by the DCF.
Distracter 3:	The OSS shall ensure that both the originator and procedure owner have signed within one working day.
REFERENCE:	ACP 106.1, "Procedure Preparation, Revision, Review, and Approval"
K/A System:	GENERIC
K/A Number:	2.2.6 (Knowledge of the process for making changes in procedures as described in the Safety Analysis Report.)
K/A Value:	2.3/3.3
Objective:	SRO 1.11.02.08
	Explain the OSS's responsibilities regarding ACP 106.1, Procedure Preparation, Revision, Review and Approval.
Cognitive Level:	1 F
Source:	New Question

1 Point

90. See the attached RPV instrumentation schematic of 1C56 on the next page.

Given:

- PI-4553 provides indication only.
- PS-4549 provides a protective function.

Are there any prerequisite conditions for venting PI-4553 based on its instrument line connections ? (NO Conditions or SOME Conditions)

If there are SOME prerequisite conditions for venting PI-4553 based on its instrument line connections, are they:

MORE Restrictive,

LESS Restrictive,

or the SAME Restrictions

when compared to PS-4549?

a. PI-4553 can be vented with NO restrictions.

b. SOME prerequisite conditions.
MORE Restrictive than PS-4549.

c. SOME prerequisite conditions.
LESS Restrictive than PS-4549.

d. SOME prerequisite conditions.
The SAME Restrictions as PS-4549.

ANSWER: D
REFERENCE: ACP 1410.1 Conduct of Ops, Section 3.9 (8)-(11); SD 880
Note: Question is based on a plant event. PS-4549 provides high pressure scram signal. However, the point of the question is that both instruments share a common instrument leg with instruments that have protective functions and thus require an approved procedure. Distracter 1, 2, & 3: Both require OSS/OSM concurrence and an approved procedure because they are on the same sensing line.

K/A System: 2.1
K/A Number: 2.1.1 (Knowledge of Conduct of Operations requirements.)
K/A Value: 3.7/3.8
Objective: Industry Events

Cognitive Level: 3-SPK

Source: Revised, Exam Bank

1 Point

91. Which of the following CORRECTLY describes the purpose of the End of Core Life Recirc Pump Trip (EOC-RPT) logic?

The purpose of the EOC RPT trip is to...

a. rapidly shutdown the reactor in the event of an ATWS.

b. rapidly shutdown the reactor when MAPRAT is the greatest.

c. mitigate the core-wide pressurization transient caused by a Group 1 isolation.

d. reduce the severity of the thermal transient caused by a turbine trip without bypass.

ANSWER:	d
Distracter 1:	This shutdown would be the ATWS-ARI trip
Distracter 2:	The thermal limit of concern is MCPR.
Distracter 3:	The MSIV closure pressure transient would be mitigated by SRVs.
REFERENCE:	SD 264
K/A System:	GENERIC
K/A Number:	2.1.28 (Knowledge of the purpose and function of major system components and controls.)
K/A Value:	3.2/3.3
Objective:	12.00.00.03c Describe the operation of the following principle Recirc System components: RPT BREAKERS.
Cognitive Level:	1 B
Source:	Exam Bank

1 Point

92. The plant is at 95% power. Due to heavy flooding upstream, the river has had excessive amounts of debris.

The Trash Rake has been used several times to clear the Trash Bars.

The "A" RWS pump is running.

The NSPEO reports from the Intake Structure that there is a large tree hung up on the Trash Bars.

About 3 minutes later annunciator 1C06A, A-1 "A" RWS PIT LO LEVEL comes in, followed shortly by annunciator 1C06A, A-2 "B" RWS PIT LO LEVEL.

The NSPEO reports that the Trash Bars are clogging rapidly and the flow of river water into the pits has stopped.

What would be the appropriate initial response under these conditions?

a. Manually scram the reactor.

b. Attempt to start standby pumps in both RWS Subsystems.

c. Line up the sand jets and or use fire hoses to clear the debris.

d. If either "A" or "B" RHRSW/ESW PIT LO LEVEL annunciators come in, scram the reactor.

ANSWER: a

REFERENCE: AOP 410

Distracter 1, 2, & 3: Flow of water into RWS suction pits indicates a complete loss of RWS, which calls for an immediate manual reactor scram.

K/A System: GENERIC

K/A Number: 2.4.11 (Knowledge of abnormal condition procedures.)

K/A Value: SRO 3.6

Objective: SRO 5.15.01 Direct operators to perform the immediate actions of AOP 410 (Loss of RWS)

Note: This event has a 5% risk ranking of initiating events by contribution to total core damage frequency (PRA).

Cognitive Level: 1-P

Source: Bank

1 Point

93. The plant is operating at full power. The A Core Spray pump breaker has been racked out and tagged out for an oil change on the pump motor. After the hold card was cleared, the operators performed the following sequence of actions:

The NSPEO racked up the breaker.

The NSPEO verified that the contact GAP for the auxiliary switch was acceptable.

The NSPEO placed the RAISE-LOWER switch in the neutral position and properly stored the elevating motor.

The Control Room operators verified the A Core Spray pump indicating lights; green and white ON and red OFF.

The Control Room operators successfully start the A Core Spray pump.

The Control Room operators then stop the A Core Spray pump.

Assume that the OSS is standing by with the Work Request in his hand and ready to declare the A Core Spray pump operable. At which point in this sequence can the Limiting Condition for Operation (LCO) be exited?

The LCO can be exited as soon as ...

a. the breaker has been racked up.

b. the contact GAP has been verified acceptable.

c. the Control Room operators have verified the A Core Spray pump indicating lights at 1C03.

d. the Control Room operators have successfully started and stopped the A Core Spray pump.

ANSWER: d

Distracter 1, 2, & 3:The breaker requires testing to prove its operability. It must be closed in , not just racked in .

REFERENCE: ACP 1410.2, OI-304.2

K/A System: GENERIC

K/A Number: 2.2.23 (Ability to track limiting conditions of operation.)

K/A Value: 2.6/3.8

Objective: 15.01.01.01

Cognitive Level: 3-SPK

Source: NEW

94. At the Remote Shutdown Panel 1C388, there are controls for the B Loop RHRSW.

1) Are the RHRSW controls a REQUIRED FUNCTION or NOT a REQUIRED FUNCTION for the operability Remote Shutdown System per Technical Specification 3.3.3.2 ?

2) Identify the correct reason for the answer to Part 1 of this question.

a. 1) REQUIRED FUNCTION
2) RHRSW is required for the CONTAINMENT CONTROL function of the Remote Shutdown System.

b. 1) REQUIRED FUNCTION
2) RHRSW is required for the DECAY HEAT REMOVAL function of the Remote Shutdown
System.

c. 1) NOT a REQUIRED FUNCTION
2) RHRSW is NOT required for the RPV INVENTORY CONTROL function of the Remote Shutdown System.

d. 1) NOT a REQUIRED FUNCTION
2) RHRSW is NOT required for the RPV PRESSURE CONTOL function of the Remote Shutdown System.

ANSWER: b

Distracter 1: There is no containment control function of the RSP.

Distracter 2: RHRSW controls are a required function, if not necessarily for RPV inventory control.

Distracter 3: RHRSW controls are a required function, if not necessarily for RPV pressure control.

REFERENCE: T.S. Bases B3.3.3.2 & Table 3.3.3.2-1

K/A System: GENERIC

K/A Number: 2.2.25 (Knowledge of the bases in Technical Specifications for limiting conditions for operations and safety limits.)

K/A Value: SRO 3.7

Objective: SRO 1.11.01.01 Explain the contents of each section of Technical Specifications and their associated bases.

Cognitive Level: 1B
Source: New Question

95. Which of the following is **NOT** an example of SOURCE TERM REDUCTION as defined by ACP 1411.1, "The ALARA Emphasis Program"?

   a. The Scram Discharge Volume was wrapped with lead blankets.

   b. The area around the CRD Discharge Filter was decontaminated.

   c. The floor drain of the CRD Repair Room was flushed to remove a hot spot.

   d. The stellite rollers on the control rods were replaced to reduce cobalt in the reactor coolant system.

ANSWER: a

Note: STR= "Systematic application of principles used to remove and/or avoid the buildup of radioactive material in a system which contribute significantly to occupational exposure." Correct answer may be an example of shielding or ALARA but not of STR.

STR is listed with time, distance, and shielding as ALARA principles. It is operationally valid for candidate to understand its definition.

Distracter 1, 2, & 3:ACP 1411.1 uses these activities as examples of STR.

REFERENCE: ACP 1411.1, The ALARA Emphasis Program; OI-878.6 TIP

K/A System: GENERIC

K/A Number: 2.3.2 (Knowledge of facility ALARA program.)

K/A Value: 2.5/2.9

Objective: GET Objective

Cognitive Level: 1 D

Source: NEW

1 Point

96. ACP 14.11.17 is "Occupational Dose Limits and Upgrades". It sets the DAEC administrative radiation exposure limits for routine operations and identifies which managers can authorize upgrades to higher limits.

    It also sets a maximum exposure limit for routine operation during any calendar year. No one has been given the authority to upgrade past this limit.

    Which of the following is that exposure limit?

    a. 3.0 rem TEDE

    b. 3.5 rem TEDE

    c. 4.0 rem TEDE

    d. 4.5 rem TEDE

ANSWER: d

Note: SRO titles at DAEC are "Operations Shift Supervisor" and "Operations Shift Manager".

Distracter 1: The limit above which requires First Manager permission.

Distracter 2: Plausible and homogeneous distracter.

Distracter 3: The limit above which requires Department Manager permission.

REFERENCE: ACP 1411.17, Occupational Dose Limits and Upgrades.

K/A System: GENERIC

K/A Number: 2.3.4 (Knowledge of radiation exposure limits and contamination control, including permissible levels in excess of those authorized.)

K/A Value: SRO 3.1

Objective: GET Objective

Cognitive Level: 1-F

Source: New

1 Point

97. The plant is at 30% power and being shutdown for a Drywell entry to find the cause of increased floor drain leakage.

Operators were about to commence an air purge (de-inerting) of the containment when both Offgas Stack Radiation Monitors, RM-4116A&B, became INOPERABLE, as indicated by Annunciator 1C03A, C-4, OFFGAS VENT PIPE RM-4116A/B RAD MONITOR DNSCL/INOP.

KAMAN 9 and 10, Offgas Stack KAMAN monitors, remain operable.

May the other operators begin de-inerting while RM-4116A&B are not operable? (DE-INERTING MAY NOT BEGIN or MAY BEGIN)
If MAY NOT BEGIN, identify the correct reason why not.
If MAY BEGIN, identify the correct compensatory measures that must be taken.

a. DE-INERTING MAY NOT BEGIN
There would be NO Group 3 isolation from the RM-4116A&B inoperability. However, containment venting in this situation would be an unmonitored release.

b. DE-INERTING MAY NOT BEGIN
A Group 3 isolation would be in effect due to RM-4116A&B inoperability. This would not allow containment venting.

c. DE-INERTING MAY BEGIN
A Group 3 isolation would be in effect due to RM-4116A&B inoperability. Operators may override the Group 3 isolation with the keylock switches on 1C04 and begin containment venting.

d. DE-INERTING MAY BEGIN
There would be NO Group 3 isolation from the RM-4116A&B inoperability. Operators may establish administrative control over the containment vent valve controls with continuous monitoring of alternate instrumentation.

ANSWER: d
Note: This question is based on a plant event in which a Work Order was planned incorrectly due to lack of knowledge of this requirement. Tech Spec provided to SRO candidates. Candidate must also know that RM-4116A&B inoperability is not a Group 3 isolation signal. Answer is also available in Tech Specs.
Distracter 1: Allowed by OI-573 P&L 12. Release would still be monitored by Offgas Stack KAMAN.
Distracter 2: Allowed by OI-573 P&L 12. Upscale trips from these rad monitors is a group 3 but not inop.
Distracter 3:Upscale trips from these rad monitors is a Group 3 but not inop. Overrides would not be necessary.
REFERENCE: OI-573; 1C03A, C-4; Tech Spec 3.3.6.1
K/A System: GENERIC
K/A Number: 2.3.9 (Knowledge of the process for performing a containment purge.)
K/A Value: SRO 3.4
Objective: SRO 1.02.03 Declare and instrument, component, or system inoperable ,enter the correct condition. If applicable, determine and direct the performance of the required SRs.

Cognitive Level: 3-SPR & SPK
Source: New Question

1 Point

98. In which of the following documents are the OPERABILITY REQUIREMENTS found for Electric and Diesel Fire pumps (1P-48 & 1P-49)?

OPERABILITY REQUIREMENTS for Electric and Diesel Fire pumps are found in ...

a. the DAEC Fire Plan.

b. the Technical Specification Bases.

c. the DAEC Technical Requirements Manual.

d. Administrative Control Procedure (ACP) 1412.4 "Impairments to Fire Protection Systems".

ANSWER: a

Note : Tech Specs are not good answer option because they are provided with SRO Exam.

Distracter 1: A great deal of information was moved from TS to TS Bases. Bases documents have sections for "Operability Requirements", which provide bases for Op Reqs but not the Op Reqs themselves. Fire system Op Reqs are not included.

Distracter 2: TRM is very similar to Tech Specs and a viable place to find Operability Requirements.

Distracter 3: ACP 1412.4 lists compensatory measures when Fire system equipment is impaired , but not Operability Requirements.

REFERENCE: DAEC Fire Plan

K/A System: GENERIC

K/A Number: 2.4.25 (Knowledge of Fire Protection procedures.)

K/A Value: SRO 3.4

Objective: 2.02.02.05 Demonstrate the ability to read and interpret Att. 3, 4, & 5 and the DAEC Fire Plan operability requirements.

Cognitive Level: 1-F

Source: New

99. The RHR System was placed in the Shutdown Cooling mode during a normal shutdown. Cooldown has progressed to the point that the head vents have been opened.

Shortly after that, a Group 4 Isolation results in the loss of Shutdown Cooling. The OSS directs you to monitor panel 1C05 while the rest of the operating crew investigates.

Several annunciators are alarming. As you scan the annunciator panels from your station at 1C05, you can see a rapidly flashing annunciator on the EOP ANNUNCIATORS panel, 1C14.

The annunciator window has a WHITE lens but you are too far away to read the wording on the annunciator window.

Could this be a high priority annunciator?

a. No; All high priority annunciators have either a blue or red lens.

b. No; All annunciators on this panel are for EOP Defeats (overrides). The alarming condition must be the result of an operator action taken in response to this event.

c. Yes; The annunciator could be a high area WATER LEVEL EOP-3 entry condition.

d. Yes; The annunciator could be a high area TEMPERATURE EOP-3 entry condition.

ANSWER: c

Note: Group 4 isolations are: Low RPV Level <170", High DW Pressure <2#, and High RPV pressure, >135 psig. With the head vents open, the Group 4 must have been caused by low RPV level.
Distracter 1: Not all EOP entry conditions have colored lenses. On 1C14, area water levels above Max Normal and Max Safe are white lenses.
Distracter 2: 22 of 24 are for EOP defeat annunciation, but this panel also includes, and is the only place for, Area Water Level alarms. Also, there are no applicable EOP defeats to be installed at the onset of Group 4 isolation due to Low RPV level.

Distracter 3: Hi Area Temps is an EOP-3 entry condition, but the Steam Leak Detection annunciator is on panel 1C04B.

REFERENCE: ARP 1C14A & B; 1C04B; EOP-3; ACP1410.1

K/A System: GENERIC

K/A Number: 2.4.45 (Ability to prioritize and interpret the significance of each annunciator or alarm.)

K/A Value: 3.3/3.6

Objective: 1..04.16.02 (Explain the Control Room Operators responsibilities when receiving and acknowledging an annunciator per ACP1410.1.)

Cognitive Level: 3-SPK

Source: New Question

1 Point

100. The plant has experienced an accident that required an entry into EOP 3. One area had exceeded its Max Safe Operating Limit for temperature and another had exceeded its Max Normal Operating Limit for temperature and was still rising.

The OSS, anticipating ED, directed the BOP operator to Rapidly Depressurize the RPV with the Turbine Bypass valves.

The BOP operator went to the 1C07 Panel and performed the following actions without the procedure in hand:

Verified an EHC pump running.
Determined the Main Condenser was available.
Depressed and Held the Bypass Valve Opening Jack Selector "INCREASE" Pushbutton until both Bypass Valves were full open.

Which of the following CORRECTLY describes the operator actions in the above postulated scenario?

a. The operator is allowed to perform this procedure from memory and has performed it correctly.

b. The operator is NOT allowed to perform this procedure from memory.

c. The operator is required to start the second EHC pump before opening the Bypass Valves.

d. The operator is required to depress the test pushbutton for the # 1 Bypass Valve while the Opening Jack "INCREASE pushbutton is held.

ANSWER:	a
Distracter 1,	This is an "Immediate Operator Action" procedure per ACP 1410.1.
Distractor 2,	Only one EHC pump is required.
Distractor 3:	The test pushbutton is not required, but may be used to expedite the evolution to open the #2 BPV not the #1 BPV.
REFERENCE:	ACP 1410.1, Section 3.7(10)
K/A System:	GENERIC
K/A Number:	2.4.49 (Ability to perform without reference to procedures those actions that require immediate operation of system components and controls.)
K/A Value:	4.0/4.0
Objective:	96.05.02.21 and 96.05.02.22 Explain the guidance for Operations Procedure Use and Adherence contained in ACP 1410.1. AND List the activities that an RO should be able to perform from memory as listed in Attachment 3 of ACP 1410.1.
Cognitive Level:	3-SPK
Source:	New Question

DUANE ARNOLD ENERGY CENTER
WRITTEN EXAMINATION
April 2001

SENIOR REACTOR OPERATOR
HANDOUTS

1. Technical Specification (not including bases documents)
   The following sections were removed from the Technical Specification:
   3.1.1, 3.1.7, Table 3.3.6.1-1 and 3.6.4.1
2. Emergency Plan Implementation Procedures
3. Emergency Operating Procedures with entry conditions blacked out

EMERGENCY ACTION LEVEL NOTIFICATION FORM

INITIAL ROLL CALL

Benton County ☐
Linn County ☐
Iowa EMD ☐

MESSAGE INITIATED

Time: ________
Date: ________

1. **STATUS**

[A] ACTUAL
[B] DRILL
[C] TERMINATION
[D] UPDATE

2. **FACILITY IN COMMAND & CONTROL**

[A] Control Room
[B] TSC
[C] EOF

3. **ON-SITE ACCIDENT CLASSIFICATION**

[A] UNUSUAL EVENT
[B] ALERT
[C] SITE AREA EMERGENCY
[D] GENERAL EMERGENCY
[E] RECOVERY
[F] CANCELLATION

4. **EAL DECLARATION**

TIME: ________
DATE: ________
EAL#: ________

ACCIDENT TERMINATED

TIME: ________
DATE: ________

5. **RELEASE TO ENVIRONMENT**

[A] NONE (High High KAMAN not in alarm)
[B] POTENTIAL (meets FS1 criteria)
[C] OCCURRING (High High KAMAN alarm)
[D] TERMINATED

6. **TYPE OF RELEASE**

[A] NO RELEASE
[B] RADIOACTIVE GAS (FILTERED)
[C] RADIOACTIVE GAS (UNFILTERED)
[D] RADIOACTIVE LIQUID

7. **PROJECTED DURATION OF RELEASE:**

[A] NOT APPLICABLE
[B] RELEASE DURATION 4 hrs (DEFAULT)
[C] RELEASE DURATION ________ hour(s)

8. **WIND DIRECTION:** FROM ________ DEGREES

9. **WIND SPEED :** ________ MILES/HR

10. **PROTECTIVE ACTION RECOMMENDATIONS**

Unusual Event	Alert	Site Area Emergency
☐ [A] None	☐ [B] None	☐ [C] Activate the Prompt Alert and Notification System AND place dairy animals within the entire EPZ on stored feed and protected water.

General Emergency		
☐ [D] *Default Recommendations from Table 1, Table 2, or dose projections ≥ 1 REM TEDE or 5 REM CDE @ 0-2 miles from site boundary*	☐ [E] *≥ 1 REM TEDE or 5 REM CDE @ 2-5 miles from site boundary*	☐ [F] *≥ 1 REM TEDE or 5 REM CDE @ 5-10 miles from site boundary*
Activate the Prompt Alert and Notification System, Place dairy animals within the entire EPZ on stored feed and protected water. **AND** Evacuate within a 2 mile radius and to 5 miles in the downwind subareas.	Activate the Prompt Alert and Notification System. Place dairy animals within the entire EPZ on stored feed and protected water. **AND** Evacuate within a 2 mile radius and to 5 miles in the downwind subareas, and shelter downwind subareas from 5 miles to EPZ edge.	Activate the Prompt Alert and Notification System. Place dairy animals in the entire EPZ on stored feed and protected water. **AND** Evacuate within a 2 mile radius, evacuate from 2 miles to EPZ edge in downwind subareas, and shelter as appropriate beyond EPZ edge.

11. **ADDITIONAL INFORMATION:**

____

____

APPROVED BY: ______________________ (DATE) ________ (TIME) ________
(OSM, EC, or ER&RD)

12. **MESSAGE TRANSMITTED BY:**

____
(NAME)

____
(FACILITY)

13. **MESSAGE TRANSMITTED:**

CURRENT TIME: ________

CURRENT DATE: ________

FINAL ROLL CALL	Initials
Benton County	____
Linn County	____
Iowa EMD	____

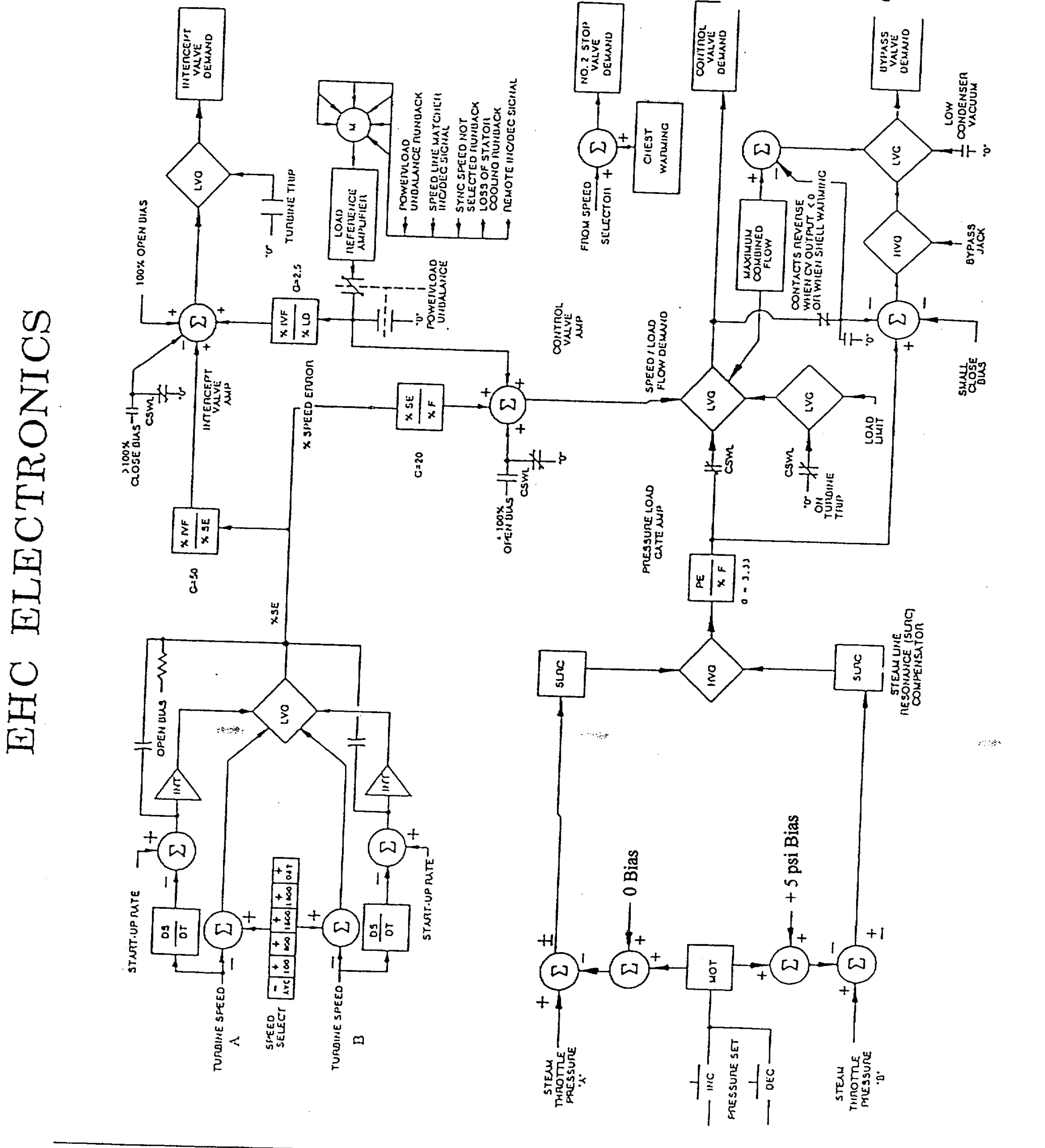


Figure 8. EHC Logic Control System

ILC Exam Question # 59

RSCS GROUP: 11 SUBGROUP: 0 INSERT LIMIT: 12 WITHDRAW LIMIT: 48

STEP	MOVE	14-31 IN	14-31 OUT	30-31 IN	30-31 OUT	30-15 IN	30-15 OUT	14-15 IN	14-15 OUT	INITIAL IN	INITIAL OUT
29	12-14										
	14-16										
	16-18										
	18-20										
	20-22										
	22-24										
	24-26										
	26-28										
	28-30										
	30-32										
	32-34										
	34-36										
	36-38										
	38-40										
	40-42										
	42-44										
	44-46										
	46-48										
	COUPLING	N/A		N/A		N/A		N/A		N/A	

CRAM GROUP 5

APRM GAF's <= 1.00 ? RE/OSS ____________________

RSCS GROUP: 12 SUBGROUP: 0 INSERT LIMIT: 00 WITHDRAW LIMIT: 8

STEP	MOVE	14-23 IN	14-23 OUT	30-23 IN	30-23 OUT	INITIAL IN	INITIAL OUT
30	00-02						
	02-04						
	04-06						
	06-08						

ILC Exam Question # 59

RSCS GROUP: 12 SUBGROUP: 1 INSERT LIMIT: 00 WITHDRAW LIMIT: 8

STEP	MOVE	22-31 IN	22-31 OUT	22-15 IN	22-15 OUT	INITIAL IN	INITIAL OUT
31	00-02	---	---	---	---	---	---
	02-04	---	---	---	---	---	---
	04-06	---	---	---	---	---	---
	06-08						

RSCS GROUP: 11 SUBGROUP: 1 INSERT LIMIT: 8 WITHDRAW LIMIT: 12

STEP	MOVE	22-23 IN	22-23 OUT	INITIAL IN	INITIAL OUT
32	08-10	---	---	---	---
	10-12				

ILC Exam Question # 59

RSCS GROUP: 9 SUBGROUP: 0 INSERT LIMIT: 12 WITHDRAW LIMIT: 48

		6-31		14-39		30-39		38-31		38-15		30-07		14-07		6-15		INITIAL	
STEP	MOVE	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
33	12-14																		
	14-16																		
	16-18																		
	18-20																		
	20-22																		
	22-24																		
	24-26																		
	26-28																		
	28-30																		
	30-32																		
	32-34																		
	34-36																		
	36-38																		
	38-40																		
	40-42																		
	42-44																		
	44-46																		
	46-48																		
	COUPLING	N/A		N/A		N/A		N/A		N/A		N/A		N/A		N/A		N/A	

CRAM GROUP 4

APRM GAF's <= 1.00 ? RE/OSS ____________________

RSCS GROUP: 11 SUBGROUP: 1 INSERT LIMIT: 12 WITHDRAW LIMIT: 20

		22-23		INITIAL	
STEP	MOVE	IN	OUT	IN	OUT
34	12-14				
	14-16				
	16-18				
	18-20				

ILC Exam Question # 59

RSCS GROUP: 11 SUBGROUP: 1 INSERT LIMIT: 20 WITHDRAW LIMIT: 48

		22-23		INITIAL	
STEP	MOVE	IN	OUT	IN	OUT
35	20-22				
	22-24				
	24-26				
	26-28				
	28-30				
	30-32				
	32-34				
	34-36				
	36-38				
	38-40				
	40-42				
	42-44				
	44-46				
	46-48				
	COUPLNG	N/A		N/A	

CRAM
GROUP 3

APRM GAF's <= 1.00 ? RE/OSS ____________________

RSCS GROUP: 12 SUBGROUP: 0 INSERT LIMIT: 8 WITHDRAW LIMIT: 10

		14-23		30-23		INITIAL	
STEP	MOVE	IN	OUT	IN	OUT	IN	OUT
36	08-10						

RSCS GROUP: 12 SUBGROUP: 1 INSERT LIMIT: 8 WITHDRAW LIMIT: 10

		22-31		22-15		INITIAL	
STEP	MOVE	IN	OUT	IN	OUT	IN	OUT
37	08-10						

ILC Exam Question # 59

RSCS GROUP: 12 SUBGROUP: 0 INSERT LIMIT: 10 WITHDRAW LIMIT: 12

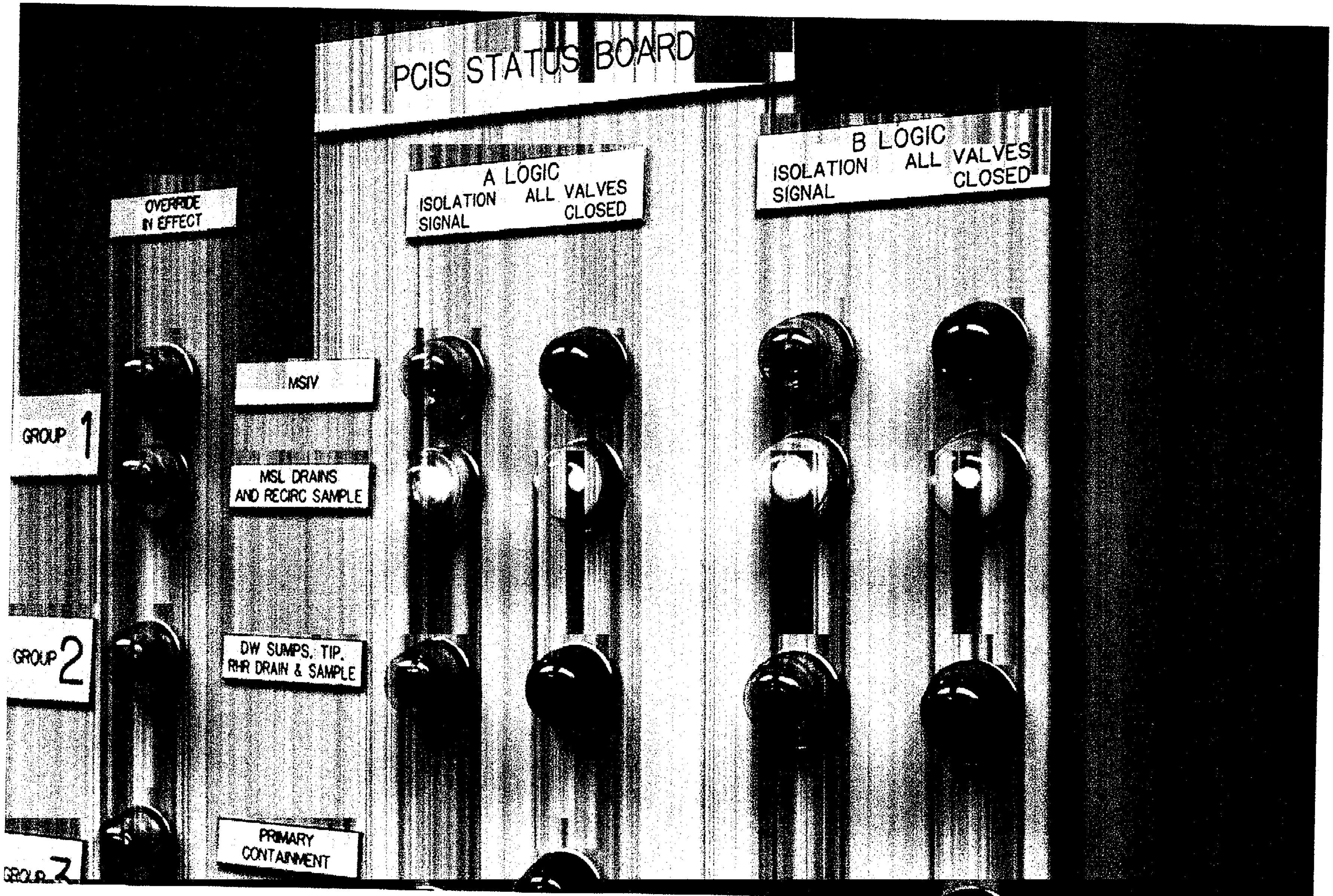
		14-23		30-23		INITIAL	
STEP	MOVE	IN	OUT	IN	OUT	IN	OUT
38	10-12						

CRAM GROUP 2

RSCS GROUP: 12 SUBGROUP: 1 INSERT LIMIT: 10 WITHDRAW LIMIT: 12

		22-31		22-15		INITIAL	
STEP	MOVE	IN	OUT	IN	OUT	IN	OUT
39	10-12						

CRAM GROUP 1



ILC EXAM QUESTION #71

3. Notify Mechanical Maintenance to perform the Drywell Airlock Local Leak Rate Test, STP 3.6.1.2-01, within 7 days of the Drywell Airlock being opened.

Drywell Airlock Opened ______/______ N/A
Date Time

(b) Upon completion of the Drywell/Steam Tunnel Inspection verify the following:

1. Drywell/Steam Tunnel inspection completed. 9/14/00 / ~~1400~~ 1600 9/14/00 1620 ✓
Date Time

2. Personnel clear of Drywell/Steam Tunnel. 9/14/00 / 1630 ✓
Date Time

> **NOTE**
> Immediate completion of the Drywell Airlock Local Leak Rate Test, STP 3.6.1.2-01, is not required to continue the Startup. The STP must be completed within 7 days of Drywell Airlock entry.

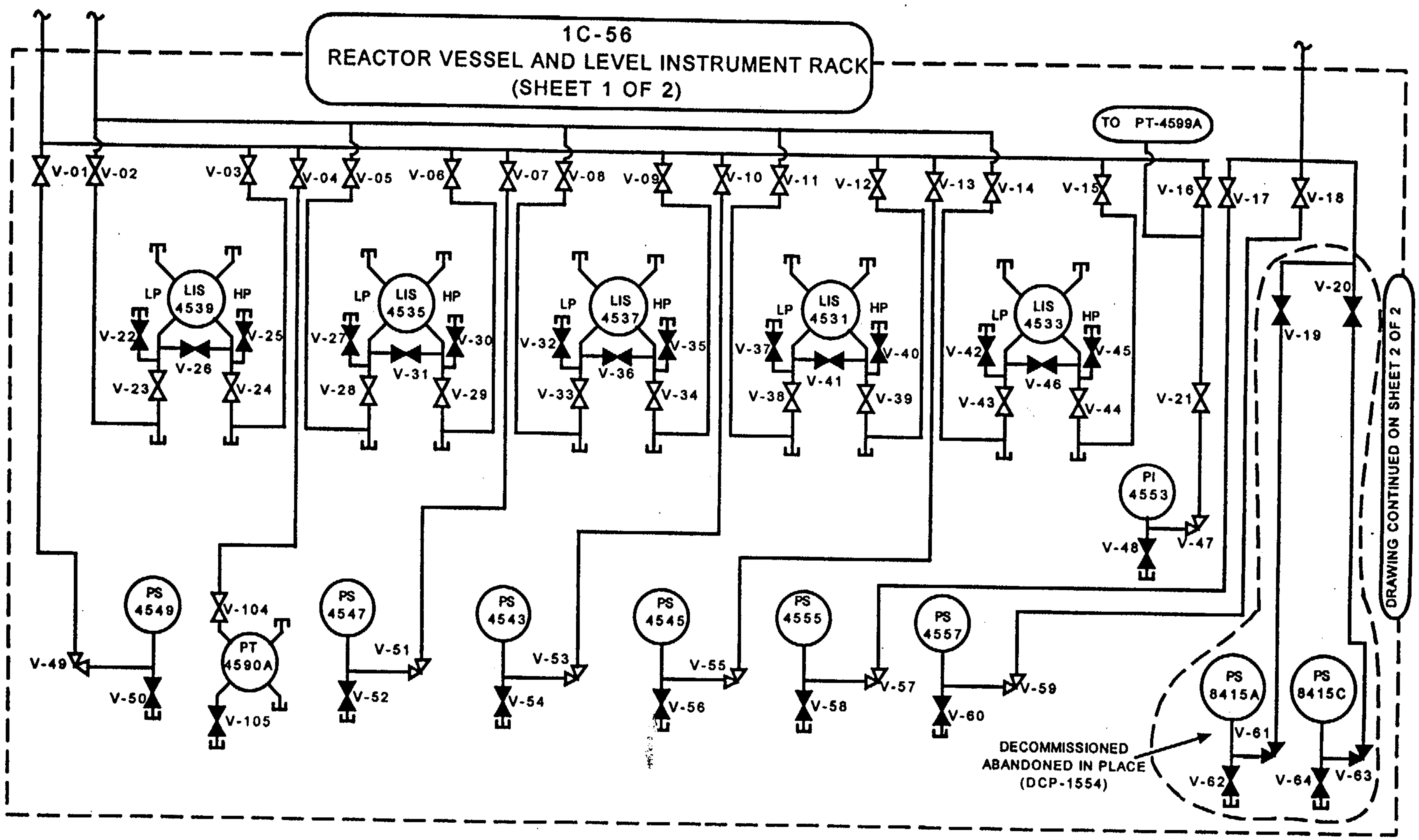
3. Drywell Airlock Local Leak Rate Test, STP 3.6.1.2-01, completed.

______/______ N/A
Date Time

> **CAUTION**
> Limit reactor heatup rate to avoid exceeding the condensate pump discharge pressure until the reactor feed pump is started.
>
> Do not make changes in EHC Pressure Set concurrent with control rod withdrawal.

(9) Continue the heatup/pressurization by withdrawing control rods OR increasing EHC PRESSURE SET ADJUST to maintain #1 BYPASS VALVE POSITION indicated on BPV-1 ZI-9017 between 20% and 90% open, with a Heatup rate of less than 80°F/hr. (T.S. Limit 100°F in any 1 hour period). ______

WORKING COPY



ILC Exam Question # 90

EMERGENCY PLAN IMPLEMENTING PROCEDURE	EPIP 3.3
DOSE ASSESSMENT and PROTECTIVE ACTION	**Rev. 16** Page 1 of 28

EFFECTIVE DATE 11-19-99

Technical Review	
Prepared by: Procedure Writer	Date: 11-11-99
Reviewed by: Independent Reviewer	Date: 11/12/99

Procedure Approval	
I am responsible for the technical content of this procedure.	
Approved by: Manager, Emergency Planning	Date: 11-12-99

1.0 PURPOSE

This procedure provides instructions for directing offsite radiological monitoring activities performed by Alliant Energy, coordinating such activities with those accomplished by the State of Iowa, assessing the offsite radiological impacts of an event at the DAEC, and formulating Protective Action Recommendations.

2.0 DEFINITIONS

* MIDAS - Meteorological Information and Dose Assessment System.

* PAR (Protective Action Recommendation) - Made to the State with regards to evacuation or sheltering of subareas within the Emergency Planning Zone (EPZ).

* PAG (Protective Action Guides) - Established by the Environmental Protection Agency (EPA) Reference 2.

* Special Population - Those individuals who are transit dependent.

* Abnormal Release – When the quantity of radioactive material released to the environment exceeds the HiHi Kaman alarm.

3.0 INSTRUCTIONS

3.1 PROTECTIVE ACTION RECOMMENDATION DECISION MAKING

(1) At the initial Emergency Classification declaration, the on-shift chemist reports to the TSC MIDAS Computer to initiate MIDAS dose projection runs. Projected off-site doses shall be communicated to the Control Room, until the TSC is activated.

(2) Plant conditions and/or dose projections (as available) shall be reviewed to determine:

(a) If the Emergency Action Level (EAL) has changed, reclassification of the event is necessary and/or protective actions are warranted.

(b) If the EPA Protective Action Guides (PAGs) are being exceeded and if protective actions are warranted or need to be revised.

(3) Protective Action Recommendations should be determined in accordance with Attachment 1, "Protective Action Recommendation Decision Making", (forecast weather information should be considered during all Protective Action Decision Making) by:

(a) The Operations Shift Manager/Supervisor if neither the TSC nor the EOF is activated. This person is responsible for ensuring that Protective Action Recommendations are provided to offsite authorities.

(b) The Site Radiation Protection Coordinator once the TSC is activated. This person shall develop these recommendations for approval by the Emergency Coordinator. The Emergency Coordinator or the TSC Supervisor shall ensure that this information is provided to offsite authorities.

(c) The Radiological and EOF Manager, assisted by the Radiological Assessment Coordinator, upon activation of the EOF. These persons shall assume responsibility for development and recommendation of the Protective Actions and, upon approval by the Emergency Response and Recovery Director, provide formal communication of these recommendations to offsite agencies.

(4) If a Site Area Emergency has been declared, recommend the following protective actions as indicated in Table 1 of Attachment 1:

(a) Activate the Prompt Alert and Notification System.

(b) Place dairy animals within the entire EPZ on stored feed and covered water.

(c) If the situation is degrading such that a potential exists for declaration of a General Emergency, evaluate trends and prognosis for change to determine the need for precautionary protective measures for the general public.

(5) If a General Emergency has been declared, recommend the following protective actions as indicated in Table 1, of Attachment 1:

(a) Activate the Prompt Alert and Notification System.

(b) Place dairy animals within the entire EPZ on stored feed and covered water.

(c) Evacuate the population within the 0-2 mile radius and to 5 miles in the downwind subareas.

(6) Field readings should be used to evaluate Protective Action Recommendations. If a significant number of actual dose rates, measured in the field, are greater than those projected to be occurring at the time, consideration should be given to upgrading or expanding the current protective actions, as appropriate.

(7) Formulated Protective Action Recommendations shall be recorded on NOTE-05, "Emergency Action Level Notification Form".

(8) The Emergency Coordinator/Emergency Response and Recovery Director shall approve the Protective Action Recommendations by signing NOTE-05, "Emergency Action Level Notification Form".

(9) The SRPC/Radiological and EOF Manager should release Protective Action Recommendations in the following manner:

(a) Short pre-briefing of impending recommendations and related plant conditions should be given to State EOC Dose Assessment personnel via the microwave phone.

(b) When the EOF is activated this briefing shall be followed by the official recommendations being delivered via the "Administrative Hotline" within 15 minutes of recognizing the criteria.

(c) Fax a copy of the Emergency Action Level Notification Form to Linn County, Benton County and the State EOC. This will serve as a backup of the information received.

(d) Ensure the NRC, NRC Resident, and INPO are notified within 1 hour.

(e) Protective Action Recommendations shall be displayed in the TSC/EOF.

(10) Information regarding emergency classification, plant status, offsite radiological data, Protective Action Recommendations, and response actions underway shall be provided when significant changes occur and on a periodic basis to the ERO, Linn and Benton County EOC's, the State EOC, FEMA, and the NRC.

(11) Original copies of such communications should be retained for filing.

(12) If protective actions actually implemented by local and State officials differ from those recommended by Alliant, the Emergency Coordinator/Emergency Response & Recovery Director should be informed.

(13) The Protective Action Recommendations will be continuously assessed and changed, as appropriate, depending upon the changing conditions.

3.2 INITIAL AND PERIODIC BRIEFINGS

(1) Prior to assuming responsibility for offsite radiological monitoring and dose assessment activities, the Site Radiation Protection Coordinator/Radiological Assessment Coordinator should obtain the following information:

(a) Effluent release information, if a release is in progress, including the release point and release concentration from the KAMAN Effluent Monitoring System.

(b) Meteorological information, including stability class (or ΔT), wind speed and wind direction.

(c) Weather forecast information. This information can be obtained either from the National Weather Service (phone number listed in the ETB.

(d) The results of dose projection calculations.

(e) Containment High Range Radiation Monitor levels.

(f) Protective Action Recommendations which have been made.

(g) On-site radiological information, post-accident sampling activities, and effluent release isotopic mixes, if available .

(h) Status of off-site monitoring activities conducted, if any, and locations of the DAEC Off-site Radiological Monitoring Teams.

(i) Plant status information and prognosis for deteriorating conditions.

(j) The status of activation of the Off-site Radiological and Analytical Laboratory (ORAL).

(k) The status of activation of the Off-site Radiological and Assembly Area (ORAA).

(2) The Site Radiation Protection Coordinator should summarize this information, advise the Emergency Coordinator and the TSC Supervisor of pertinent points discussed, and brief the Radiological Assessment Group.

OR

The Radiological Assessment Coordinator should summarize this information, advise the Radiological and EOF Manager of pertinent points discussed, and brief the Radiological Assessment Group.

a) The Radio Operator/Field Team Director should ensure that the Offsite Radiological Monitoring Teams are apprised of pertinent information regarding plant potential radiological problems expected.

(b) Caution should be exercised in relaying information to teams over the radio, since the radio transmission becomes public information. Only transmit information that is necessary for the field teams to perform their duties safely and information that is made public through news releases.

(3) The Radio Operator should ensure that the Assistant Radio Operator displays meteorological and field team information on the DAEC EPZ maps/status boards. Items such as the following should be considered for display.

OR

The Field Team Director should ensure that the Radiological Data Plotters display the following information on the DAEC EPZ maps/status boards.

a) Wind direction

b) Wind speed

c) Stability class

d) Weather forecast information

e) Plume width and centerline

f) Team locations

g) Survey results at selected locations and an outline of the subarea Protective Actio Recommendations as necessary.

h) Projected TEDE doses or dose rates in the plume path

i) Projected thyroid doses or dose rates in the plume path

(4) Additionally, the Radiological Data Plotter in the EOF should display selected radiological information obtained by the State monitoring teams, as reported by the State Field Team Captain in the EOF.

3.3 OFFSITE RADIOLOGICAL MONITORING TEAMS

(1) Offsite Radiological Monitoring Teams should be initially briefed and dispatched in accordance with EPIP 3.2, "Field Radiological Monitoring."

(2) In preparation for directing the Offsite Radiological Monitoring Teams, the Radio Operator should:

a) Conduct a radio check with the Teams and verify their locations.

b) Advise the Teams of the latest radiological and plant status information, as necessary to perform their duties safely.

c) Inform the Site Radiation Protection Coordinator of readiness to assume control of the Offsite Radiological Monitoring Teams.

(3) Direction and control of the Offsite Radiological Monitoring Teams should be done in accordance with the directions given in EPIP 3.2, "Field Radiological Monitoring"

(4) In preparation for assuming control of the Offsite Radiological Monitoring Teams, the Field Team Director should:

(a) Contact the TSC Radio Operator and inform them of the intent to establish contact with Teams.

(b) Conduct radio check with the Teams and verify their locations.

(c) Advise the Teams of the latest radiological and plant status information, as necessary to perform their duties safely.

(d) Inform the Radiological Assessment Coordinator of readiness to assume control of the Field Radiological Monitoring Teams.

(5) When the EOF has been activated, the Radiological Assessment Coordinator should contact the Site Radiation Protection Coordinator and advise that the EOF is ready to assume control of the Offsite Radiological Monitoring Teams.

(a) The Site Radiation Protection Coordinator should inform the Emergency Coordinator that control of the field radiological monitoring teams and dose assessment has been transferred to the EOF.

(b) The Radiological Assessment Coordinator should then advise the Radiological and EOF Manager that the Radiological Assessment Group is ready to assume responsibility for offsite monitoring and dose assessment activities.

(c) The Field Team Director (in the EOF) should follow up with each Team and the TSC Radio Operator and advise them that all further communications should be conducted with the EOF.

(d) Transfer of responsibility should be recorded in both the TSC and EOF Logs.

3.4 DOSE PROJECTION ACTIVITIES

(1) Until the TSC is activated, the Operations Shift Manager/Supervisor, as the Emergency Coordinator, is responsible for assuring dose projections by the on-duty shift chemist are performed.

a) The results of these projections will normally be summarized for the Site Radiation Protection Coordinator as part of the initial briefing.

(2) Until the EOF is activated, the Site Radiation Protection Coordinator and/or the Operations Shift Manager/Supervisor are responsible for performing dose projections.

(a) The results of these projections will normally be summarized for the Radiological Assessment Coordinator as part of the initial briefing.

(3) Dose projection calculations will be performed by the MIDAS Operator using one of the following methodologies:

(a) MIDAS computer, MIDAS Instruction Manual User's Guide.

(b) MIDAS Backup on the Personal Computer.

(c) MIDAS Laptop Personal Computer.

(4) Dose projections will normally be performed in accordance with the MIDAS instructions in the MIDAS User's Guide. If MIDAS is unavailable, the options below will be reviewed by the Site Radiation Protection Coordinator/Radiological Assessment Coordinator to determine the appropriate back-up methodology.

(a) If real-time data collection in MIDAS is not functional, the TSC MIDAS Operator should coordinate directly with the Back Panel Communicator to determine updated radiological and meteorological parameters applicable to actual or potential release rates.

(b) If there is a loss of MIDAS in the TSC consider using the following:

(1) Transfer of dose assessment to the EOF (if activated)

(2) MIDAS Backup on the Personal Computer

(3) Use of MIDAS Laptop Computer

(c) If real-time data collection in MIDAS is not functional, the EOF MIDAS Operator should coordinate directly with the Site Radiation Protection Coordinator t determine updated radiological and meteorological parameters applicable to actua. or potential release rates.

(d) If there is a loss of MIDAS in the EOF consider the following:

(1) Transfer of dose assessment back to the TSC

(2) Use the MIDAS Backup on the Personal Computer

(3) Use of MIDAS Laptop Computer

(5) Following review of the latest dose projection, the Site Radiation Protection Coordinator should brief the Radio Operator on the magnitude of the projected doses and the need to adjust offsite radiological monitoring activities.

OR

Following review of the latest dose projection, the Radiological Assessment Coordinator should brief the Field Team Director on the magnitude of the projected doses and the need to adjust field radiological monitoring activities.

(6) If Field Team readings are significantly higher than those projected by MIDAS, consider the possibility of an unmonitored release.

3.5 COORDINATION OF DOSE ASSESSMENT WITH THE STATE OF IOWA

(1) Upon activation of the EOF, the Radiological Data Communicator shall verify that the "Rad Data Line" is established and operable or contact the State EOC and request that it be established.

(2) Once established, the Radiological Data Communicator shall maintain communications with the State EOC and the Benton and Linn County EOC's.

(3) Radiological release, dose projections, and meteorological data from the electronic MIDAS print out shall be provided to the State in order for the State to conduct dose assessment and projection activities.

(4) The Radiological Data Communicator shall request the State's dose projection results as they become available, and provide this information to the Radiological Assessment Coordinator.

3.6 DATA RECORDING AND TREND ANALYSIS FROM THE TSC

(1) The Site Radiation Protection Coordinator should initiate and ensure conduct of trend analysis.

(a) Parameters of interest include KAMAN System Effluent Monitor readouts, analyses conducted of effluent stream particulate filters and iodine cartridges, meteorological data, ARM levels and Containment High Range Radiation Monitor levels.

(b) ARM and Containment High Range Radiation Monitor levels are of dual importance due to their direct impact on response activities within the plant and their significance with respect to determining the quantity of radioactive material potentially available for release offsite.

(2) An estimate of fuel failure can be determined by PASAP 7.2 "Fuel Damage Assessment".

(3) An estimate of the potential release rate can be determined by using PASAP 7.4 "Estimation of Potential Release Rate".

(4) The Site Radiation Protection Coordinator should evaluate the trending plot periodically to determine if any significant trends are apparent.

(5) The Emergency Coordinator, the TSC Supervisor, and the Radiological Assessment Team should be periodically advised of the current radiological status, significant trends, and potential implications.

a) The TSC Supervisor should periodically inform representatives of the, State an Federal Government of the current radiological status, significant trends, and potential implications (prior to operation of the EOF).

3.7 DATA RECORDING AND TREND ANALYSIS FROM THE EOF

(1) The Radiological Assessment Coordinator or his designee should trend the following information:

(a) Projected TEDE and Thyroid dose rates at the following locations:

* Site Boundary
* Two Miles
* Five Miles
* Ten Miles
* Greater than ten miles
* Location(s) of peak Whole Body and Thyroid dose rates if other than at one of the above locations.

(b) Containment High Range Radiation Monitors levels for both the Drywell and Torus

(2) An estimate of fuel failure can be determined by using PASAP 7.2 "Fuel Damage Assessment".

(3) An estimate of the potential release rate can be determined using PASAP 7.4 "Estimation of Potential Release Rate".

(4) The Radiological and EOF Manager and the Radiological Assessment Group should be periodically advised of the current radiological status, significant trends, and potential implications.

(a) The Radiological and EOF Manager should periodically inform the EOF staff and representatives of local, State and Federal governments of the current radiological status, significant trends, and potential implications.

(b) The Field Team Director should ensure that the Offsite Radiological Monitoring Teams are provided updated information periodically.

(5) The trending of offsite doses can be utilized as an estimation of integrated dose(s) to the general public throughout the course of the event.

3.8 RE-ENTRY AND FOLLOW-UP ACTIVITIES

(1) Once releases have been terminated, the Radiological and EOF Manager, Radiological Assessment Coordinator and Site Radiation Protection Coordinator should coordinate with local, State and Federal officials to identify the activities required prior to re-entry of the general public into areas that have been evacuated.

(2) As directed by the Emergency Response and Recovery Director, the Radiological and EOF Manager should establish an environmental monitoring program as part of the Recovery Plan to more adequately quantify the impact of these release on the environment.

(a) As a minimum, this program should include sampling and analysis of milk, surface water, vegetation, and soil in the affected area surrounding DAEC.

(b) This program should be structured such that it complements the routine DAEC environmental sampling program and should be conducted in accordance with the Radiological Sampling Procedures (Attachments in EPIP 3.2)

(c) This program should be conducted with the State's environmental program.

4.0 RECORDS

All logs forms and other pertinent information shall be maintained.

5.0 REFERENCES

(1) DAEC Emergency Plan

(2) Manual of Protective Action Guides and Protective Actions for Nuclear Incidents (EPA-400-R-92-001)

(3) DAEC Radiological Engineering Calculation 93-022-H; dated December 17, 1993

(4) EPIP 3.2 "Field Radiological Monitoring"

(5) EPIP 1.2 Notification"

(6) Response Technical Manual (RTM) 1996 Section G.

(7) NOTE-05, "Emergency Action Level Notification Form"

(8) PASAP 7.2, "Fuel Damage Assessment"

(9) PASAP 7.4, "Estimation of Potential Release Rate"

6.0 ATTACHMENTS

(1) Attachment 1 - Protective Action Recommendation Decision Making

(2) Attachment 2 - DAEC Emergency Planning Zone

(3) Attachment 3 -Evacuation Time Estimates

(4) Attachment 4 -Wind Direction and Affected Subareas.

ATTACHMENT 1
PROTECTIVE ACTION RECOMMENDATION DECISION MAKING

1.0 Introduction

This attachment is comprised of two tables intended to assist in the recommendations of appropriate protective actions to the State of Iowa. The Protective Action Recommendations for emergency classification levels and radiological releases impacting areas outside of the site boundary, are in Table 1. The Protective Action Recommendations for Severe Core Damage or loss of control of plant functions are contained in Table 2. All protective actions listed are appropriate for the conditions indicated but do not restrict the decision-maker(s) should it be desirable to recommend other protective actions based on the situation at the time of the emergency.

2.0 Procedure

2.1 When an emergency class has been declared, or dose projections are available for radiological releases, go to Table 1. Table 1 allows for the assessment of appropriate protective actions based on downwind dose projections resulting from an airborne radiological release.

(1) Protective Action Recommendations shall be recorded in your log, the Status Board and NOTE-05, "Emergency Action Level Notification Form".

(2) To determine the subareas affected and the maximum evacuation time (if needed), refer to Attachment 3, "Evacuation Time Estimates."

(3) Continue to work through the table as new classifications change or dose projection information becomes available.

2.2 If the incident is classified as a General Emergency, recommend the minimum protective action as given in Table 2. Table 2 allows for the assessment of a core melt sequence and provides appropriate protective actions based on the conditions indicated (adapted from Section G of the RTM-96).

(1) Enter the table at the top decision block which asks, "Actual or projected severe damage or loss of control of facility".

(2) To determine the sectors affected and the maximum evacuation time (if needed), refer to Attachment 3, "Evacuation Time Estimates."

(3) Continue to work through the table as new information becomes available.

ATTACHMENT 1 (cont.)
PROTECTIVE ACTION DECISION MAKING
TABLE 1

PROTECTIVE ACTION RECOMMENDATIONS

Unusual Event	Alert	Site Area Emergency
☐ [A] None	☐ [B] None	☐ [C] Activate the Prompt Alert and Notification System **AND** Place dairy animals within the entire EPZ on stored feed and covered water.

General Emergency		
Default Recommendations for GENERAL EMERGENCY, core damage or dose projections ≥ 1 REM TEDE or ≥5 REM CDE @ 0-2 miles from site boundary.	*Default Recommendations for GENERAL EMERGENCY with dose projections ≥ 1 REM TEDE or ≥5 REM CDE @ 2-5 miles from site boundary.*	*Default Recommendations for GENERAL EMERGENCY with dose projections ≥ 1 REM TEDE or ≥5 REM CDE @ 5-10 miles from site boundary.*
☐ [D] Activate the Prompt Alert and Notification System, Place dairy animals within the entire EPZ on stored feed and covered water. **AND** Evacuate within a 2 mile radius and to 5 miles in the downwind subareas.	☐ [E] Activate the Prompt Alert and Notification System, Place dairy animals within the entire EPZ on stored feed and covered water. **AND** Evacuate within a 2 mile radius and to 5 miles in the downwind subareas, and shelter downwind subareas from 5 miles to EPZ edge.	☐ [F] Activate the Prompt Alert and Notification System, Place dairy animals in the entire EPZ on stored feed and covered water. **AND** Evacuate within a 2 mile radius, evacuate from 2 miles to EPZ edge in downwind subareas, and shelter as appropriate beyond EPZ edge.

ATTACHMENT 1 (cont.)
PROTECTIVE ACTION DECISION MAKING
TABLE 2 (Page 1 of 2)

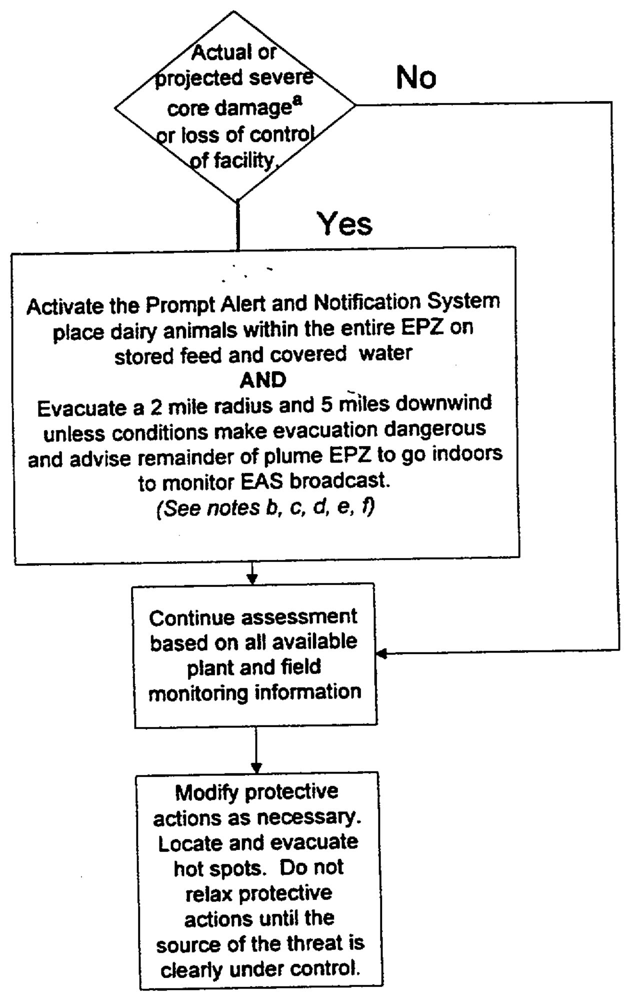
Protective actions in the event of severe core damage or loss of control of facility.

NOTES

[a] severe core damage is indicated by:

(1) Fuel damage assessment (PASAP 7.2) determines at least 5% fuel clad damage
(2) Valid drywell rad monitor reading above 7E + 2R/hr
(3) Valid torus rad monitor reading above 3E + 1R/hr
(4) Coolant activity above 300μCi/gm DOSE EQUIVALENT I-131
(5) RPV Level remains below -25 inches

[b] Distances are approximate - actual distances will be determined by the size of the preplanned sub-areas, which are based on geopolitical boundaries.
[c] If there are very dangerous travel conditions, initially shelter rather than evacuate the population until conditions improve.
[d] Transit-dependent persons should be advised to remain indoors until transportation resources arrive, if possible.
[e] Shelter may be the appropriate action for controlled releases of radioactive material from the containment if there is assurance that the release is short term (puff release) and the area near the plant cannot be evacuated before the plume arrives.
[f] Consider EPA PAGs (Table G-1) in modifying initial protective actions.
(Located on page 2 of 2)



Source: U.S.N.R.C. RTM-96/NUREG/BR-0150

ATTACHMENT 1 (cont.)
PROTECTIVE ACTION DECISION MAKING
TABLE 2 (Page 2 of 2)

Table G-1. Early phase Protective Action Guides (PAGs)

Protective action	PAG (projected dose)	Comments
Evacuation (or sheltering)[a]	1-5 rem[b]	Evacuation (or for some situations, sheltering)[a] should normally be initiated at 1 rem.
Administration of stable iodine	25 rem thyroid	Requires approval of State medical officials.

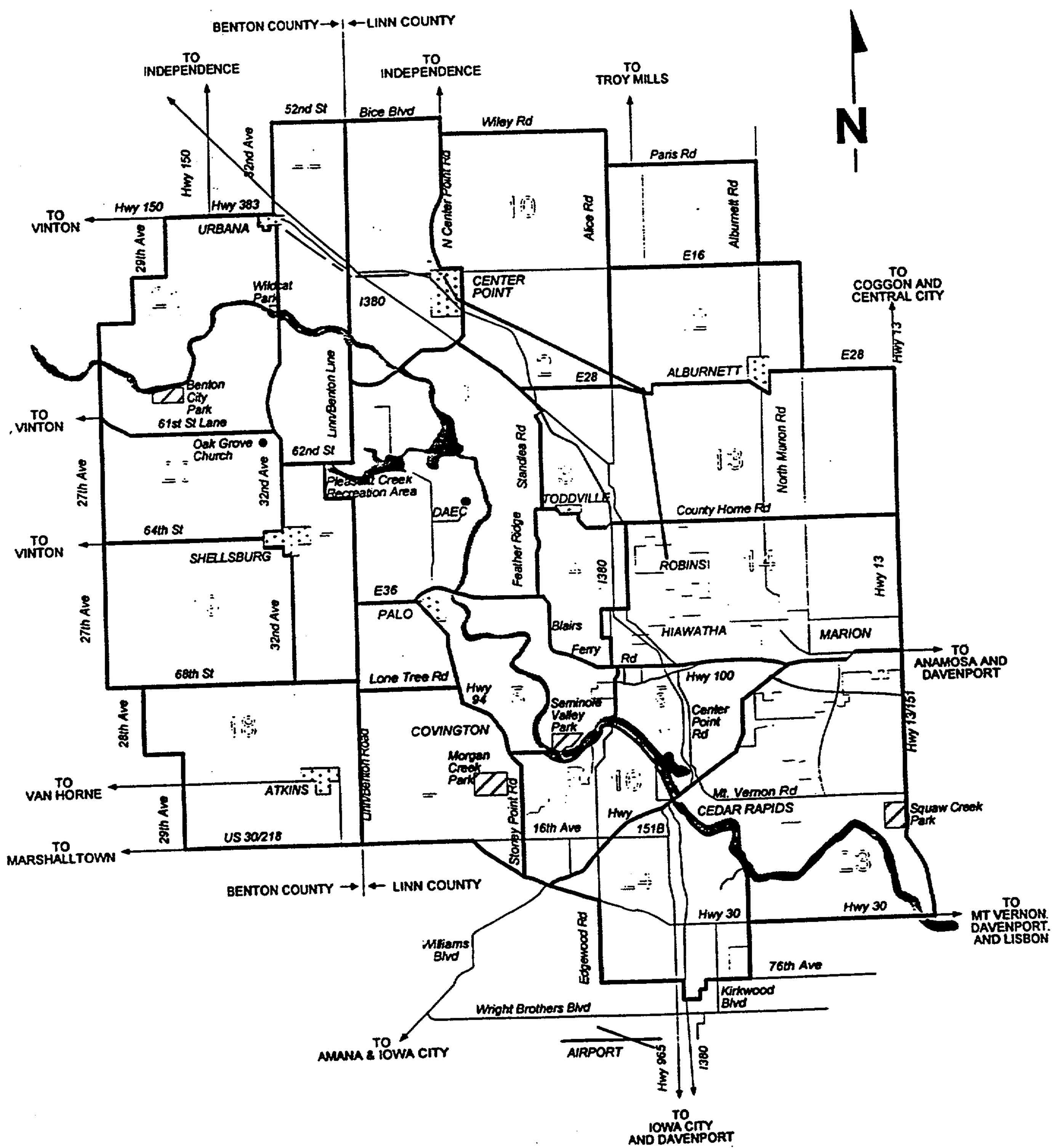
[a] Sheltering may be the preferred protective action when it will provide protection equal to or greater than evacuation, based on consideration of factors such as source term characteristics, and temporal or other site-specific conditions. For further guidance, see EPA 400-92-001, Sect. 2.3.1.

[b] The sum of the effective dose equivalent (EDE) resulting from exposure to external sources and the committed effective dose equivaler (CEDE) incurred from all significant inhalation pathways during the early phase. Committed dose equivalents to the thyroid and to tl skin may be 5 and 50 times larger, respectively.

[c] Committed dose equivalent (CDE) to the thyroid from radioiodine.

Source: Adapted from EPA 400-R-92-001, p. 2-6

ATTACHMENT 2
DAEC EMERGENCY PLANNING ZONE'



ATTACHMENT 3
EVACUATION TIME ESTIMATES

1. Select the appropriate table for the event scenario (Summer or Winter, Midweek or Weekend, Midday or Evening)

2. Select the section of the table corresponding to the extent of the evacuation recommendation (Within 2, 5, or 10 miles, or to the EPZ boundary).

3. Select the wind range for the expected wind direction, and read across for the evacuation time estimate under the expected weather condition for both the general population and special population.

4. Following the tables are evacuation time estimates for two recreational events occurring annually within the DAEC EPZ: the All-Iowa Fair and the Cedar Rapids Freedom Festival.

5. Times in the tables are given in hours and minutes (i.e., 03:35 = 3 hours, 35 minutes).

NOTES:

A. For Summer or Winter Weekend Evening times, use the Summer or Winter Midweek Evening times, respectively.

B. Summer defined as Memorial Day through Labor Day. Winter defined as Labor Day to Memorial Day.

ATTACHMENT 3 (Cont.)

EVACUATION TIME ESTIMATES FOR SUMMER WEEKEND MIDDAY AND SUMMER MIDWEEK EVENING SCENARIOS

(Page 1 of 2)

WIND DIRECTION IN DEGREES FROM	AFFECTED SUBAREAS	GENERALPOPULATION		SPECIAL POPULATION	
		NORMAL	RAIN	NORMAL	RAIN
WITHIN 2 MILES					
Any Direction	1	03:35	03:35	03:35	03:35
WITHIN 5 MILES					
348.76 - 11.25 (N)	1,4,5,6	03:40	03:40	03:40	03:40
11.26 - 33.75 (NNE)	1,5,6,7	03:40	03:40	03:40	03:40
33.76 - 56.25 (NE)	1,5,6,7	03:40	03:40	03:40	03:40
56.26 - 78.75 (ENE)	1,5,6,7	03:40	03:40	03:40	03:40
78.76 - 101.25 (E)	1,7,8	03:45	03:45	03:45	03:45
101.26 - 123.75 (ESE)	1,7,8	03:45	03:45	03:45	03:45
123.76 - 146.25 (SE)	1,7,8	03:45	03:45	03:45	03:45
146.26 - 168.75 (SSE)	1,2,8	03:45	03:45	03:45	03:45
168.76 - 191.25 (S)	1,2,3,8	03:45	03:45	03:45	03:45
191.26 - 213.75 (SSW)	1,2,3	03:35	03:35	03:35	03:35
213.76 - 236.25 (SW)	1,2,3	03:35	03:35	03:35	03:35
236.26 - 258.75 (WSW)	1.2,3,4	03:35	03:35	03:35	03:35
258.76 - 281.25 (W)	1.3,4	03:35	03:35	03:35	03:35
281.26 - 303.75 (WNW)	1,3,4,5	03:40	03:40	03:40	03:40
303.76 - 326.25 (NW)	1,3,4,5	03:40	03:40	03:40	03:40
326.26 - 348.75 (NNW)	1,4,5,6	03:40	03:40	03:40	03:40
Any Direction	1-8	03:45	03:45	03:45	03:45

ATTACHMENT 3 (Cont.)

EVACUATION TIME ESTIMATES FOR SUMMER WEEKEND MIDDAY AND SUMMER MIDWEEK EVENING SCENARIOS

(Page 2 OF 2)

WIND DIRECTION IN DEGREES FROM	AFFECTED SUBAREAS	GENERAL POPULATION		SPECIAL POPULATION	
		NORMAL	RAIN	NORMAL	RAIN
WITHIN 10 MILES					
348.76 - 11.25 (N)	1,4,5,6,15-18	05:40	07:35	12:00	15:05
11.26 - 33.75 (NNE)	1,5,6,7,16-19	05:35	06:35	12:00	15:05
33.76 - 56.25 (NE)	1,5,6,7,17-20	03:35	06:25	03:35	06:25
56.26 - 78.75 (ENE)	1,5,6,7,18-21	03:45	04:00	03:45	04:00
78.76 - 101.25 (E)	1,7,8,18-21	03:45	04:00	03:45	04:00
101.26 - 123.75 (ESE)	1,7,8,19-22	03:45	04:00	03:45	04:00
123.76 - 146.25 (SE)	1,7,8,9,20-22	03:45	04:00	03:45	04:00
146.26 - 168.75 (SSE)	1,2,8,9,10,21,22	03:45	04:00	03:45	04:00
168.76 - 191.25 (S)	1,2,3,8-12,21,22	03:45	04:00	03:45	04:00
191.26 - 213.75 (SSW)	1,2,3,9-13,22	03:45	04:00	03:45	04:00
213.76 - 236.25 (SW)	1,2,3,10 -13	03:40	03:40	03:40	03:40
236.26 - 258.75 (WSW)	1,2,3,4,10-14	05:35	06:45	12:00	15:05
258.76 - 281.25 (W)	1,3,4,12-15	05:40	07:35	12:00	15:05
281.26 - 303.75 (WNW)	1,3,4,5,12-16	05:40	07:35	12:00	15:05
303.76 - 326.25 (NW)	1,3,4,5,13-17	05:40	07:35	12:00	15:05
326.26 - 348.75 (NNW)	1,4,5,6,14-18	05:40	07:35	12:00	15:05
Any Direction	1-22	05:40	07:35	12:00	15:05
TO EPZ BOUNDARY					
348.76 - 11.25 (N)	1,4-6,15-18,23,24	09:10	11:25	12:00	15:05
11.26 - 33.75 (NNE)	1,5-7,16-19,24	05:30	06:15	12:00	15:05
258.76 - 281.25 (W)	1,3,4,12-15,23	08:40	10:40	12:00	15:05
281.26 - 303.75 (WNW)	1,3-5,12-16,23,24	09:05	11:35	12:00	15:05
303.76 - 326.25 (NW)	1,3-5,13-17,23,24	09:05	11:35	12:00	15:05
326.26 - 348.75 (NNW)	1,4-6,14-18,23,24	09:10	11:35	12:00	15:05
Any Direction	1-24	09:10	11:35	12:00	15:05

ATTACHMENT 3 (Cont.)

EVACUATION TIME ESTIMATES FOR SUMMER MIDWEEK MIDDAY SCENARIOUS

(Page 1 of 2)

WIND DIRECTION IN DEGREES FROM	AFFECTED SUBAREAS	GENERAL POPULATION		SPECIAL POPULATION	
		NORMAL	RAIN	NORMAL	RAIN
WITHIN 2 MILES					
Any Direction	1	03:05	03:05	03:05	03:05
WITHIN 5 MILES					
348.76 - 11.25 (N)	1,4,5,6	03:10	03:10	03:10	03:10
11.26 - 33.75 (NNE)	1,5,6,7	03:10	03:10	03:10	03:10
33.76 - 56.25 (NE)	1,5,6,7	03:10	03:10	03:10	03:10
56.26 - 78.75 (ENE)	1,5,6,7	03:10	03:10	03:10	03:10
78.76 - 101.25 (E)	1,7,8	03:15	03:30	03:15	03:30
101.26 - 123.75 (ESE)	1,7,8	03:15	03:30	03:15	03:30
123.76 - 146.25 (SE)	1,7,8	03:15	03:30	03:15	03:30
146.26 - 168.75 (SSE)	1,2,8	03:15	03:30	03:15	03:30
168.76 - 191.25 (S)	1,2,3,8	03:15	03:30	03:15	03:30
191.26 - 213.75 (SSW)	1,2,3	03:05	03:05	03:05	03:05
213.76 - 236.25 (SW)	1,2,3	03:05	03:05	03:05	03:05
236.26 - 258.75 (WSW)	1,2,3,4	03:05	03:05	03:05	03:05
258.76 - 281.25 (W)	1,3,4	03:05	03:05	03:05	03:05
281.26 - 303.75 (WNW)	1,3,4,5	03:10	03:10	03:10	03:10
303.76 - 326.25 (NW)	1,3,4,5	03:10	03:10	03:10	03:10
326.26 - 348.75 (NNW)	1,4,5,6	03:10	03:10	03:10	03:10
Any Direction	1-8	03:15	03:30	03:15	03:30

ATTACHMENT 3 (Cont.)

EVACUATION TIME ESTIMATES FOR SUMMER MIDWEEK MIDDAY SCENARIOUS

(Page 2 of 2)

WIND DIRECTION IN DEGREES FROM	AFFECTED SUBAREAS	GENERAL POPULATION		SPECIAL POPULATION	
		NORMAL	RAIN	NORMAL	RAIN
WITHIN 10 MILES					
348.76 - 11.25 (N)	1,4,5,6,15-18	06:05	07:40	12:00	15:05
11.26 - 33.75 (NNE)	1,5,6,7,16-19	05:45	06:50	12:00	15:05
33.76 - 56.25 (NE)	1,5,6,7,17-20	05:45	06:40	05:45	06:40
56.26 - 78.75 (ENE)	1,5,6,7,18-21	03:15	03:30	03:15	03:30
78.76 - 101.25 (E)	1,7,8,18-21	03:15	03:30	03:15	03:30
101.26 - 123.75 (ESE)	1,7,8,19-22	03:15	03:30	03:15	03:30
123.76 - 146.25 (SE)	1,7,8,9,20-22	03:15	03:30	03:15	03:30
146.26 - 168.75 (SSE)	1,2,8,9,10,21,22	03:15	03:30	03:15	03:30
168.76 - 191.25 (S)	1,2,3,8-12,21,22	03:15	03:30	03:15	03:30
191.26 - 213.75 (SSW)	1,2,3,9-13,22	03:15	03:30	03:15	03:30
213.76 - 236.25 (SW)	1,2,3,10-13	03:10	03:10	03:15	03:30
236.26 - 258.75 (WSW)	1,2,3,4,10-14	05:50	07:05	03:10	03:10
258.76 - 281.25 (W)	1,3,4,12-15	06:05	07:40	12:00	15:05
281.26 - 303.75 (WNW)	1,3,4,5,12-16	06:05	07:40	12:00	15:05
303.76 - 326.25 (NW)	1,3,4,5,13-17	06:05	07:40	12:00	15:05
326.26 - 348.75 (NNW)	1,4,5,6,14-18	06:05	07:40	12:00	15:05
Any Direction	1-22	06:05	07:40	12:00	15:05
TO EPZ BOUNDARY					
348.76 - 11.25 (N)	1,4-6,15-18,23,24	09:40	12:05	12:00	15:05
11.26 - 33.75 (NNE)	1.5-7,16-19,24	05:40	06:40	12:00	15:05
258.76 - 281.25 (W)	1,3,4,12-15,23	09:05	11:05	12:00	15:05
281.26 - 303.75 (WNW)	1,3-5,12-16,23,24	09:40	12:05	12:00	15:05
303.76 - 326.25 (NW)	1,3-5,13-17,23,24	09:40	12:05	12:00	15:05
326.26 - 348.75 (NNW)	1,4-6,14-18,23,24	09:40	12:05	12:00	15:05
Any Direction	1-24	09:45	12:05	12:00	15:05

ATTACHMENT 3 (Cont.)

EVACUATION TIME ESTIMATES FOR WINTER MIDWEEK, MIDDAY SCENARIOS

(Page 1 of 2)

WIND DIRECTION IN DEGREES FROM	AFFECTED SUBAREAS	GENERAL POPULATION			SPECIAL POPULATION		
		NORMAL	RAIN	SNOW	NORMAL	RAIN	SNOW
WITHIN 2 MILES							
Any Direction	1	03:00	03:00	05:05	03:00	03:00	05:05
WITHIN 5 MILES							
348.76 - 11.25 (N)	1,4,5,6	03:10	03:10	05:10	03:40	03:40	06:05
11.26 - 33.75 (NNE)	1,5,6,7	03:10	03:10	05:10	03:40	03:40	06:05
33.76 - 56.25 (NE)	1,5,6,7	03:10	03:10	05:10	03:40	03:40	06:05
56.26 - 78.75 (ENE)	1,5,6,7	03:10	03:10	05:10	03:40	03:40	06:05
78.76 - 101.25 (E)	1,7,8	03:15	03:30	05:30	02:20	02:20	03:10
101.26 - 123.75 (ESE)	1,7,8	03:15	03:30	05:30	02:20	02:20	03:10
123.76 - 146.25 (SE)	1,7,8	03:15	03:30	05:30	02:20	02:20	03:10
146.26 - 168.75 (SSE)	1,2,8	03:15	03:30	05:30	03:40	03:40	05:05
168.76 - 191.25 (S)	1,2,3,8	03:15	03:30	05:30	03:50	03:50	05:15
191.26 - 213.75 (SSW)	1,2,3	03:05	03:05	05:10	03:50	03:50	05:15
213.76 - 236.25 (SW)	1,2,3	03:05	03:05	05:10	03:50	03:50	05:15
236.26 - 258.75 (WSW)	1,2,3,4	03:05	03:05	05:10	03:50	03:50	05:15
258.76 - 281.25 (W)	1,3,4	03:05	03:05	05:10	03:50	03:50	05:15
281.26 - 303.75 (WNW)	1,3,4,5	03:10	03:10	05:10	03:50	03:50	05:15
303.76 - 326.25 (NW)	1,3,4,5	03:10	03:10	05:10	03:50	03:50	05:15
326.26 - 348.75 (NNW)	1,4,5,6	03:10	03:10	05:10	03:40	03:40	05:00
Any Direction	1-8	03:15	03:30	05:30	03:50	03:50	05:15

ATTACHMENT 3 (Cont.)

EVACUATION TIME ESTIMATES FOR WINTER MIDWEEK, MIDDAY SCENARIOS

(Page 2 of 2)

WIND DIRECTION IN DEGREES FROM	AFFECTED SUBAREAS	GENERAL POPULATION			SPECIAL POPULATION		
		NORMAL	RAIN	SNOW	NORMAL	RAIN	SNOW
				WITHIN 10 MILES			
348.76 - 11.25 (N)	1,4,5,6,15-18	06:05	07:35	08:10	12:00	15:05	15:05
11.26 - 33.75 (NNE)	1,5,6,7,16-19	05:45	06:45	07:15	12:00	15:05	15:05
33.76 - 56.25 (NE)	1,5,6,7,17-20	05:45	06:45	07:15	03:40	06:05	06:05
56.26 - 78.75 (ENE)	1,5,6,7,18-21	03:15	03:30	05:30	03:40	06:05	06:05
78.76 - 101.25 (E)	1,7,8,18-21	03:15	03:30	05:30	02:20	03:10	03:10
101.26 - 123.75 (ESE)	1,7,8,19-22	03:15	03:30	05:30	02:20	03:10	03:10
123.76 - 146.25 (SE)	1,7,8,9,20-22	03:15	03:30	05:30	02:20	03:10	0[illegible]
146.26 - 168.75 (SSE)	1,2,8,9,10,21,22	03:15	03:30	05:30	03:40	05:05	05:05
168.76 - 191.25 (S)	1,2,3,8-12,21,22	03:15	03:30	05:30	03:40	05:05	05:05
191.26 - 213.75 (SSW)	1,2,3,9-13,22	03:15	03:30	05:30	03:40	05:05	05:05
213.76 - 236.25 (SW)	1,2,3,10-13	03:10	03:15	05:10	03:40	05:05	05:05
236.26 - 258.75 (WSW)	1,2,3,4,10-14	05:40	06:50	07:20	12:00	15:05	15:05
258.76 - 281.25 (W)	1,3,4,12-15	06:05	07:35	08:10	12:00	15:05	15:05
281.26 - 303.75 (WNW)	1,3,4,5,12-16	06:05	07:35	08:10	12:00	15:05	15:05
303.76 - 326.25 (NW)	1,3,4,5,13-17	06:05	07:35	08:10	12:00	15:05	15:05
326.26 - 348.75 (NNW)	1,4,5,6,14-18	06:05	07:35	08:10	12:00	15:05	15:05
Any Direction	1-22	06:05	07:35	08:10	12:00	15:05	15:05
				TO EPZ BOUNDARY			
348.76 - 11.25 (N)	1,4-6,15-18,23,24	09:05	12:05	12:10	12:00	15:05	15:05
11.26 - 33.75 (NNE)	1,5-7,16-19,24	05:40	06:30	07:10	12:00	15:05	15:05
258.76 - 281.25 (W)	1,3,4,12-15,23	09:00	11:00	11:35	12:00	15:05	15:05
281.26 - 303.75 (WNW)	1,3-5,12-16,23,24	09:10	11:40	12:35	12:00	15:05	15:05
303.76 - 326.25 (NW)	1,3-5,13-17,23,24	09:10	11:40	12:35	12:00	15:05	15:05
326.26 - 348.75 (NNW)	1,4-6,14-18,23,24	09:10	12:05	12:10	12:00	15:05	15:05
Any Direction	1-24	09:10	12:05	12:35	12:00	15:05	1[illegible]

ATTACHMENT 3 (Cont.)

EVACUATION TIME ESTIMATES FOR WINTER, WEEKEND, MIDDAY AND WINTER, MIDWEEK, EVENING SCENARIOS

(Page 1 of 2)

WIND DIRECTION IN DEGREES FROM	AFFECTED SUBAREAS	GENERAL POPULATION			SPECIAL POPULATION		
		NORMAL	RAIN	SNOW	NORMAL	RAIN	SNOW
WITHIN 2 MILES							
Any Direction	1	03:35	03:35	05:00	03:35	03:35	05:00
WITHIN 5 MILES							
348.76 - 11.25 (N)	1,4,5,6	03:40	03:40	05:10	03:40	03:40	05:10
11.26 - 33.75 (NNE)	1,5,6,7	03:40	03:40	05:10	03:40	03:40	05:10
33.76 - 56.25 (NE)	1,5,6,7	03:40	03:40	05:10	03:40	03:40	05:10
56.26 - 78.75 (ENE)	1,5,6,7	03:40	03:40	05:10	03:40	03:40	05:10
78.76 - 101.25 (E)	1,7,8	03:40	03:55	05:10	03:40	03:55	05:10
101.26 - 123.75 (ESE)	1,7,8	03:40	03:55	05:10	03:40	03:55	05:10
123.76 - 146.25 (SE)	1,7,8	03:40	03:55	05:10	03:40	03:55	05:10
146.26 - 168.75 (SSE)	1,2,8	03:40	03:55	05:10	03:40	03:55	05:10
168.76 - 191.25 (S)	1,2,3,8	03:40	03:55	05:10	03:40	03:55	05:10
191.26 - 213.75 (SSW)	1,2,3	03:35	03:35	05:05	03:35	03:35	05:05
213.76 - 236.25 (SW)	1,2,3	03:35	03:35	05:05	03:35	03:35	05:05
236.26 - 258.75 (WSW)	1,2,3,4	03:35	03:35	05:05	03:35	03:35	05:05
258.76 - 281.25 (W)	1,3,4	03:35	03:35	05:05	03:35	03:35	05:05
281.26 - 303.75 (WNW)	1,3,4,5	03:40	03:40	05:05	03:40	03:40	05:05
303.76 - 326.25 (NW)	1,3,4,5	03:40	03:40	05:05	03:40	03:40	05:05
326.26 - 348.75 (NNW)	1,4,5,6	03:40	03:40	05:05	03:40	03:40	05:05
Any Direction	1-8	03:40	03:55	05:10	03:40	03:55	05:10

ATTACHMENT 3 (Cont.)

EVACUATION TIME ESTIMATES FOR WINTER, WEEKEND, MIDDAY AND WINTER, MIDWEEK, EVENING SCENARIOS

(Page 2 of 2)

WIND DIRECTION IN DEGREES FROM	AFFECTED SUBAREAS	GENERAL POPULATION			SPECIAL POPULATION		
		NORMAL	RAIN	SNOW	NORMAL	RAIN	SNOW
WITHIN 10 MILES							
348.76 - 11.25 (N)	1,4,5,6,15-18	05:40	07:20	08:10	12:00	15:05	15:05
11.26 - 33.75 (NNE)	1,5,6,7,16-19	05:10	05:55	07:00	05:10	05:55	07:00
33.76 - 56.25 (NE)	1,5,6,7,17-20	05:30	06:25	07:00	05:30	06:25	07:00
56.26 - 78.75 (ENE)	1,5,6,7,18-21	04:00	04:05	05:10	04:00	04:05	05:10
78.76 - 101.25 (E)	1,7,8,18-21	04:00	04:05	05:10	04:00	04:05	05:10
101.26 - 123.75 (ESE)	1,7,8,19-22	04:00	04:05	05:10	04:00	04:05	05:10
123.76 - 146.25 (SE)	1,7,8,9,20-22	04:00	04:05	05:10	04:00	04:05	05[illegible]
146.26 - 168.75 (SSE)	1,2,8,9,10,21,22	04:00	04:05	05:10	04:00	04:05	05:10
168.76 - 191.25 (S)	1,2,3,8-12,21,22	04:00	04:05	05:10	04:00	04:05	05:10
191.26 - 213.75 (SSW)	1,2,3,9-13,22	03:40	03:40	05:10	03:40	03:40	05:10
213.76 - 236.25 (SW)	1,2,3,10-13	03:40	03:40	05:10	03:40	03:40	05:10
236.26 - 258.75 (WSW)	1,2,3,4,10-14	05:20	06:35	06:55	12:00	15:05	15:05
258.76 - 281.25 (W)	1,3,4,12-15	05:40	07:20	08:15	12:00	15:05	15:05
281.26 - 303.75 (WNW)	1,3,4,5,12-16	05:40	07:20	08:15	12:00	15:05	15:05
303.76 - 326.25 (NW)	1,3,4,5,13-17	05:40	07:20	08:15	12:00	15:05	15:05
326.26 - 348.75 (NNW)	1,4,5,6,14-18	05:40	07:20	08:15	12:00	15:05	15:05
Any Direction	1-22	05:40	07:20	08:15	12:00	15:05	15:05
TO EPZ BOUNDARY							
348.76 - 11.25 (N)	1,4-6,15-18,23,24	08:30	10:45	11:10	12:00	15:05	15:05
11.26 - 33.75 (NNE)	1,5-7,16-19,24	05:30	06:25	06:55	12:00	15:05	15:05
258.76 - 281.25 (W)	1,3,4,12-15,23	08:35	10:35	11:05	12:00	15:05	15:05
281.26 - 303.75 (WNW)	1,3-5,12-16,23,24	08:35	10:45	11:10	12:00	15:05	15:05
303.76 - 326.25 (NW)	1,3-5,13-17,23,24	08:35	10:45	11:10	12:00	15:05	15:05
326.26 - 348.75 (NNW)	1,4-6,14-18,23,24	08:35	10:45	11:10	12:00	15:05	15[illegible]
Any Direction	1-24	08:45	10:50	11:25	12:00	15:05	15:05

ATTACHMENT 3 (Cont.)
EVACUATION TIME ESTIMATES

The evacuation time estimates for the All-Iowa Fair and the Cedar Rapids Freedom Festival consider an evacuation of the general population within the entire DAEC Emergency Planning Zone (Subareas 1-24) while each of these events is in progress.

All-Iowa Fair: 9:10

Cedar Rapids Freedom Festival: 10:15

ATTACHMENT 4

WIND DIRECTION and AFFECTED SUBAREAS

Wind Direction		0-2	2-5	5-10	10-EPZ
N	(348.75-11.25)	**1**	**4,5,6**	**15,16,17,18**	**23,24**
NNE	(11.25-33.75)	**1**	**5,6,7**	**16,17,18,19**	**24**
NE	(33.75-56.25)	**1**	**5,6,7**	**17,18,19,20**	
ENE	(56.25-78.75)	**1**	**5,6,7**	**18,19,20,21**	
E	(78.75-101.25)	**1**	**7,8**	**18,19,20,21**	
ESE	(101.25-123.75)	**1**	**7,8**	**19,20,21,22**	
SE	(123.75-146.25)	**1**	**7,8**	**9,20,21,22**	
SSE	(146.25-168.75)	**1**	**2,8**	**9,10,21,22**	
S	(168.75-191.25)	**1**	**2,3,8**	**9,10,11,12,21,22**	
SSW	(191.25-213.75)	**1**	**2,3**	**9,10,11,12,13,22**	
SW	(213.75-236.25)	**1**	**2,3**	**10,11,12,13**	
WSW	(236.25-258.75)	**1**	**2,3,4**	**10,11,12,13,14**	
W	(258.75-281.25)	**1**	**3,4**	**12,13,14,15**	**23**
WNW	(281.25-303.75)	**1**	**3,4,5**	**12,13,14,15,16**	**23,24**
NW	(303.75-326.25)	**1**	**3,4,5**	**13,14,15,16,17**	**23,24**
NNW	(326.25-348.75)	**1**	**4,5,6**	**14,15,16,17,18**	**23,24**

EMERGENCY ACTION LEVEL NOTIFICATION FORM

INITIAL ROLL CALL

- Benton County ☐
- Linn County ☐
- Iowa EMD ☐

MESSAGE INITIATED

Time: ________

Date: ________

1. **STATUS**
   - [A] ACTUAL
   - [B] DRILL
   - [C] TERMINATION
   - [D] UPDATE

2. **FACILITY IN COMMAND & CONTROL**
   - [A] Control Room
   - [B] TSC
   - [C] EOF

3. **ON-SITE ACCIDENT CLASSIFICATION**
   - [A] UNUSUAL EVENT
   - [B] ALERT
   - [C] SITE AREA EMERGENCY
   - [D] GENERAL EMERGENCY
   - [E] RECOVERY
   - [F] CANCELLATION

4. **EAL DECLARATION**

   TIME: ________

   DATE: ________

   EAL#: ________

ACCIDENT TERMINATED

TIME: ________

DATE: ________

5. **RELEASE TO ENVIRONMENT**
   - [A] NONE (High High KAMAN not in alarm)
   - [B] POTENTIAL (meets FS1 criteria)
   - [C] OCCURRING (High High KAMAN alarm)
   - [D] TERMINATED

6. **TYPE OF RELEASE**
   - [A] NO RELEASE
   - [B] RADIOACTIVE GAS (FILTERED)
   - [C] RADIOACTIVE GAS (UNFILTERED)
   - [D] RADIOACTIVE LIQUID

7. **PROJECTED DURATION OF RELEASE:**
   - [A] NOT APPLICABLE
   - [B] RELEASE DURATION 4 hrs (DEFAULT)
   - [C] RELEASE DURATION ________ hour(s)

8. **WIND DIRECTION:** FROM ________ DEGREES

9. **WIND SPEED :** ______ MILES/HR

10. **PROTECTIVE ACTION RECOMMENDATIONS**

Unusual Event	Alert	Site Area Emergency
☐ [A] None	☐ [B] None	☐ [C] Activate the Prompt Alert and Notification System AND place dairy animals within the entire EPZ on stored feed and protected water.

General Emergency		
☐ [D] *Default Recommendations from Table 1, Table 2, or dose projections ≥ 1 REM TEDE or 5 REM CDE @ 0-2 miles from site boundary*	☐ [E] *≥ 1 REM TEDE or 5 REM CDE @ 2-5 miles from site boundary*	☐ [F] *≥ 1 REM TEDE or 5 REM CDE @ 5-10 miles from site boundary*
Activate the Prompt Alert and Notification System, Place dairy animals within the entire EPZ on stored feed and protected water. AND Evacuate within a 2 mile radius and to 5 miles in the downwind subareas.	Activate the Prompt Alert and Notification System. Place dairy animals within the entire EPZ on stored feed and protected water. AND Evacuate within a 2 mile radius and to 5 miles in the downwind subareas, and shelter downwind subareas from 5 miles to EPZ edge.	Activate the Prompt Alert and Notification System. Place dairy animals in the entire EPZ on stored feed and protected water. AND Evacuate within a 2 mile radius, evacuate from 2 miles to EPZ edge in downwind subareas, and shelter as appropriate beyond EPZ edge.

11. **ADDITIONAL INFORMATION:**

____

____

APPROVED BY: ______________________ (DATE) ________ (TIME) ________

(OSM, EC, or ER&RD)

12. **MESSAGE TRANSMITTED BY:**

    ____

    (NAME)

    ____

    (FACILITY)

13. **MESSAGE TRANSMITTED:**

    CURRENT TIME: ________

    CURRENT DATE: ________

FINAL ROLL CALL	Initials
Benton County	____
Linn County	____
Iowa EMD	____

EMERGENCY ACTION LEVEL NOTIFICATION FORM

INITIAL ROLL CALL

Benton County ☐
Linn County ☐
Iowa EMD ☐

MESSAGE INITIATED

Time: ________
Date: ________

1. **STATUS**

[A] ACTUAL
[B] DRILL
[C] TERMINATION
[D] UPDATE

2. **FACILITY IN COMMAND & CONTROL**

[A] Control Room
[B] TSC
[C] EOF

3. **ON-SITE ACCIDENT CLASSIFICATION**

[A] UNUSUAL EVENT
[B] ALERT
[C] SITE AREA EMERGENCY
[D] GENERAL EMERGENCY
[E] RECOVERY
[F] CANCELLATION

4. **EAL DECLARATION**

TIME: ________
DATE: ________
EAL#: ________

ACCIDENT TERMINATED

TIME: ________
DATE: ________

5. **RELEASE TO ENVIRONMENT**

[A] NONE (High High KAMAN not in alarm)
[B] POTENTIAL (meets FS1 criteria)
[C] OCCURRING (High High KAMAN alarm)
[D] TERMINATED

6. **TYPE OF RELEASE**

[A] NO RELEASE
[B] RADIOACTIVE GAS (FILTERED)
[C] RADIOACTIVE GAS (UNFILTERED)
[D] RADIOACTIVE LIQUID

7. **PROJECTED DURATION OF RELEASE:**

[A] NOT APPLICABLE
[B] RELEASE DURATION 4 hrs (DEFAULT)
[C] RELEASE DURATION ________ hour(s)

8. **WIND DIRECTION:** FROM ________ DEGREES

9. **WIND SPEED :** ______ MILES/HR

10. **PROTECTIVE ACTION RECOMMENDATIONS**

Unusual Event	Alert	Site Area Emergency
☐ [A] None	☐ [B] None	☐ [C] Activate the Prompt Alert and Notification System AND place dairy animals within the entire EPZ on stored feed and protected water.

General Emergency		
☐ [D] *Default Recommendations from Table 1, Table 2, or dose projections ≥ 1 REM TEDE or 5 REM CDE @ 0-2 miles from site boundary*	☐ [E] *≥ 1 REM TEDE or 5 REM CDE @ 2-5 miles from site boundary*	☐ [F] *≥ 1 REM TEDE or 5 REM CDE @ 5-10 miles from site boundary*
Activate the Prompt Alert and Notification System, Place dairy animals within the entire EPZ on stored feed and protected water. AND Evacuate within a 2 mile radius and to 5 miles in the downwind subareas.	Activate the Prompt Alert and Notification System. Place dairy animals within the entire EPZ on stored feed and protected water. AND Evacuate within a 2 mile radius and to 5 miles in the downwind subareas, and shelter downwind subareas from 5 miles to EPZ edge.	Activate the Prompt Alert and Notification System. Place dairy animals in the entire EPZ on stored feed and protected water. AND Evacuate within a 2 mile radius, evacuate from 2 miles to EPZ edge in downwind subareas, and shelter as appropriate beyond EPZ edge.

11. **ADDITIONAL INFORMATION:**

____

____

APPROVED BY: ______________________ (DATE) ________ (TIME) ________
(OSM, EC, or ER&RD)

12. **MESSAGE TRANSMITTED BY:**

____
(NAME)

____
(FACILITY)

13. **MESSAGE TRANSMITTED:**

CURRENT TIME: ________

CURRENT DATE: ________

FINAL ROLL CALL	**Initials**
Benton County	____
Linn County	____
Iowa EMD	____

EOP 1 - RPV CONTROL

[redacted] | [redacted] | [redacted] | [redacted]

1

RC-1 ☐ Refer to EPIP 1.1 for EAL assessment

NOTE

The reactor is shutdown under ALL conditions when:

- o ALL control rods are inserted to at least position 02
  OR
- o It has been determined that the reactor will remain shutdown under ALL conditions without boron

RC-2 ☐
IF a reactor scram has NOT been initiated
THEN initiate a reactor scram
AND
perform immediate actions of IPOI 5

IPOI 5

RC-3 ☐
Initiate ANY of the following which should have initiated but did not:

- o Isolations
- o ECCS initiations
- o SBDG initiation

IF the reactor is NOT shutdown under ALL conditions	THEN exit this procedure and enter ATWS
IF RPV level CANNOT be determined	THEN exit this procedure and enter RPV/F

Irrespective of entry conditions, monitor and control RPV level and pressure CONCURRENTLY

RC/L

2

IF torus pressure CANNOT be maintained below 53 psig OR primary containment water level CANNOT be maintained below 95 ft	THEN terminate RPV injection from sources external to the primary containment NOT required for adequate core cooling
IF the ADS timer has initiated	THEN lockout ADS

Restore and maintain RPV level between +170 in. and +211 in. with one or more Preferred Injection Systems (Table 1A) (1, 2)

IF RPV level CANNOT be restored and maintained above +170 in.

THEN maintain RPV level above +15 in.
AND
if necessary, augment RPV injection with Alternate Injection Systems (Table 2A)

IF RPV water level CANNOT be restored and maintained above +15 in.

RC/L-1 ☐ THEN exit this flowpath and enter ALC

RC/P

RC/P-1 ☐ Override open CV-4371A, Defeat 11

IF emergency depressurization is or has been required	THEN exit this flowpath and enter ED
IF a drywell high pressure ECCS signal exists	THEN prevent injection from Core Spray and RHR pumps NOT required to assure adequate core cooling BEFORE depressurizing below their maximum injection pressures
IF emergency depressurization is anticipated	THEN RAPIDLY depressurize the RPV with the Main Turbine Bypass valves, SEP 307 • OK to exceed cooldown rate limit (2)
IF torus water temperature CANNOT be maintained below the Heat Capacity Limit (Graph 4)	THEN maintain RPV pressure below the curve • OK to exceed cooldown rate limit

3

Is ANY SRV cycling?

Yes — RC/P-2 ☐ — RC/P-3 ☐ Manually open SRVs to terminate SRV cycling

No — RC/P-2 ☐

Stabilize RPV pressure below 1055 psig using main turbine bypass valves and, if necessary, Alternate Pressure Control Systems (Table 7)

- If necessary, bypass main condenser high backpressure isolation, Defeat 17

IF ANY SRVs are being used to stabilize RPV pressure
AND
the continuous nitrogen supply is unavailable

RC/P-4 ☐ THEN place ALL SRV handswitches in AUTO

Cool down the RPV at less than 100 °F/hr with main turbine bypass valves or Alternate Pressure Control Systems (Table 7)

IF ANY SRVs are being used for depressurization
AND
the continuous nitrogen supply is unavailable

RC/P-5 ☐ THEN minimize SRV operation

4

WAIT UNTIL shutdown cooling interlock clears

RC/P-6 ☐

Continue cooldown to cold shutdown conditions with shutdown cooling using only RHR pumps not required to maintain RPV level above +170 in., SEP 306, OI 149

IF shutdown cooling CANNOT be established

THEN maintain RPV pressure below the shutdown cooling RPV pressure interlock using one or more of the systems used for RPV depressurization

RC/P-7 ☐ • Maintain the cooldown rate below 100°F/hr

Table 1A	PREFERRED INJECTION SYSTEMS	
Systems	Notes	Status
CRD	Both pumps if necessary	
Condensate/ Feedwater	Condensate shutoff head is about 500 psig	
RCIC	Preferred suction from the CST If necessary, bypass low RPV pressure isolation interlock, Defeat 1 If necessary, bypass area high temperature isolations, Defeat 18	(3, 4)
HPCI	Preferred suction from the CST If necessary, bypass high torus water level suction transfer interlock, Defeat 2 If necessary, bypass area high temperature isolations Defeat 18	(3)
RHR	Inject through the heat exchangers as soon as possible Shutoff head is about 260 psig	(3)
Core Spray	Shutoff head is about 330 psig	(3)

Table 2A	ALTERNATE INJECTION SYSTEMS			
Systems	Pressure Range (psig)	Capacity (gpm)	Support Procedure	Status
RHR Service Water	0-270	0-2400	AIP 401	
Fire System	0-125	0-2500	AIP 404	
Well Water A & C / B & D	0-125	0-370 / 0-1090	AIP 403	
GSW	0-125	0-4800	AIP 403	
ESW	0-110	0-1200	AIP 402	
Condensate Service Water	0-150	0-100	AIP 405	
SBLC (Test Tank)	0-1400	56	AIP 406	
SBLC (Boron Tank)	0-1400	56	AIP 406	

Table 7	ALTERNATE PRESSURE CONTROL SYSTEMS	
Systems	Notes	Status
SRVs	ONLY if torus water level is above 4.5 ft Alternate SRV sequence if possible: First: PSV-4407 Fourth: PSV-4406 Second: PSV-4402 Fifth: PSV-4400 Third: PSV-4401 Sixth: PSV-4405	
HPCI	Preferred suction from the CST If necessary, bypass high torus water level suction transfer interlock, Defeat 2 May require pressure reduction to 700 psig to stop level fluctuations from causing high level trip	(3)
RCIC	Preferred suction from the CST If necessary, bypass HPCI high torus water level suction transfer interlock, Defeat 2 May require pressure reduction to 700 psig to stop level fluctuations from causing high level trip	(3, 4)
Main steam line drains		
RWCU	SEP 302.1 or SEP 302.2	
Other steam driven equipment	Main turbine, Main turbine seals, SJAEs, Offgas preheaters	

CAUTIONS

(1) The following restrictions apply to RPV water level instruments:

1. If drywell air temperature is above the RPV Saturation Temperature Curve (Graph 1), the following actions are required until the TSC quantifies the potential error due to boiling:
   a. SUBTRACT 23 inches from Fuel Zone and Narrow Range GEMAC instrument indications
   b. Do NOT use Floodup and Wide Range Yarway instruments
2. Floodup and Wide Range instruments may NOT be used below the Minimum Indicated Level for the indicated drywell temperature

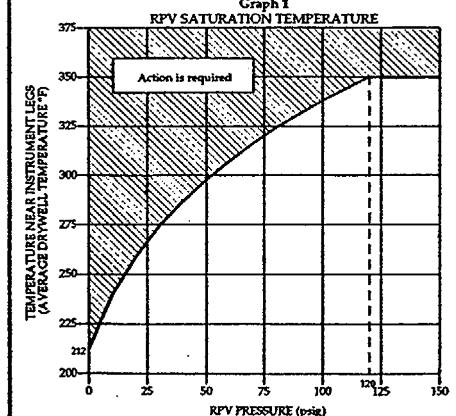
Level Instrument	Temperature Instrument	Drywell Temp (°F)	MIL (in.)
Wide Range Yarway LI 4539 (+8 to +218 in.)	TR-4383A Pen 1 (red)	100-150	+8
		151-200	+12
		201-250	+16
Wide Range Yarway LI 4540 (+8 to +218 in.)	TR-4383B Pen 2 (green)	251-300	+20
		301-350	+25
Floodup Range LI-4541 (+158 to +458 in.)	TR-4383A Pen 1 (red)	100-150	+168
		151-200	+174
		201-250	+181
		251-300	+189
		301-350	+199

(2) Wide Range Yarways (LI-4539 and LI-4540) may NOT be used to determine RPV water level during rapid RPV depressurization below 500 psig.

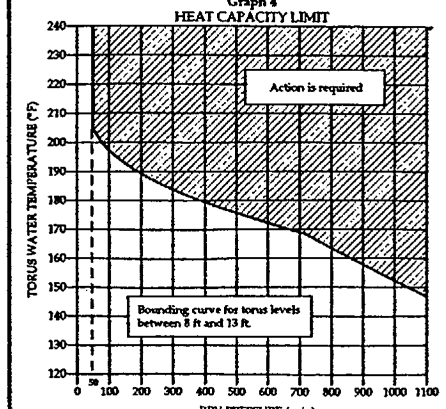
(3) Operation of HPCI, RCIC, Core Spray, or RHR with suctions from the torus and pump flow ABOVE the NPSH or vortex limit may damage equipment.

(4) Elevated torus pressure may trip the RCIC turbine on high exhaust pressure.

Graph 1
RPV SATURATION TEMPERATURE



Graph 4
HEAT CAPACITY LIMIT



FOR INFORMATION ONLY

DUANE ARNOLD ENERGY CENTER
CONTROL
EFFECTIVE DATE: 11-19-99

EOP 2 - PRIMARY CONTAINMENT CONTROL

[redacted]

PC-1 Refer to EPIP 1.1 for EAL assessment

Irrespective of entry conditions, monitor and control ALL primary containment parameters CONCURRENTLY

PC/H

IF H_2 or O_2 monitors are unavailable THEN notify Chemistry to manually sample the drywell and torus for H_2 and O_2, PASAP 2.2

PC/H-1 Monitor H_2 and O_2 concentrations in the drywell and torus
- If necessary, bypass sampling isolation, Defeat 16
- Place standby monitors in analyze mode

PC/H-2 WAIT UNTIL drywell or torus H_2 is greater than 0.6% AND drywell or torus O_2 reaches 4%

PC/H-3 Initiate CAD to maintain O_2 concentrations in the drywell and torus below 4%, SEP 308.4

T/L

T/L-1 Control torus water level between 10.1 ft and 10.4 ft using ONLY those systems NOT required for adequate core cooling

IF torus water level is LOW
THEN raise torus water level with the following:
- Core Spray, OI 151
- HPCI, OI 152

IF torus water level is HIGH
THEN lower torus water level with RHR, OI 149
- If necessary, bypass radwaste isolation, Defeat 13

T/L-2 WAIT UNTIL torus water level CANNOT be maintained between 10.1 ft and 10.4 ft

Is torus level HIGH or LOW?

T/L-3 LOW (Below 10.1 ft)

T/L-4 Maintain torus water level above 7.1 ft

T/L-5 WAIT UNTIL torus water level CANNOT be maintained above 7.1 ft

EOP 1 (1)

T/L-6 Emergency RPV Depressurization is Required

T/L-7 Maintain torus water level above 5.8 ft

T/L-8 WAIT UNTIL torus water level CANNOT be maintained above 5.8 ft

T/L-9 Secure HPCI irrespective of adequate core cooling

T/L-3 HIGH (Above 10.4 ft)

T/L-10 Maintain torus water level below 13.5 ft

T/L-11 WAIT UNTIL torus water level CANNOT be maintained below 13.5 ft

EOP 1 (1)

T/L-12 Terminate drywell sprays

T/L-13 IF adequate core cooling is assured
THEN terminate injection into the primary containment from sources external to the primary containment EXCEPT from systems required to shut down the reactor

T/L-14 WAIT UNTIL torus water level CANNOT be restored and maintained below 13.8 ft

T/L-15 Emergency RPV Depressurization is Required

T/T

T/T-1 Control torus water temperature below 95°F using RHR in torus cooling, OI 149 (3)

T/T-2 WAIT UNTIL torus water temperature CANNOT be maintained below 95°F

T/T-3 Operate ALL available torus cooling using ONLY RHR pumps NOT required for adequate core cooling

T/T-4 BEFORE torus water temperature reaches 110°F

EOP 1 (1)

T/T-5 Maintain torus water temperature below Heat Capacity Limit (Graph 4)

T/T-6 WAIT UNTIL torus water temperature and RPV pressure CANNOT be maintained below the Heat Capacity Limit (Graph 4)

T/T-7 Emergency RPV Depressurization is Required

DW/T

DW/T-1 Control drywell temperature below 150°F using available drywell cooling systems (1)
- If necessary, place HS-6608 in CLOSE to bypass intake coils

DW/T-2 WAIT UNTIL drywell temperature CANNOT be maintained below 150°F

DW/T-3 Maximize drywell cooling
- If necessary, bypass drywell cooling isolation and fan speed interlock, Defeat 4
- If necessary, place HS-6608 in CLOSE to bypass intake coils

IF torus pressure CANNOT be maintained below 53 psig OR primary containment water level CANNOT be maintained below 95 ft	THEN terminate drywell sprays from sources external to the primary containment
IF drywell pressure drops below 2.0 psig	THEN verify containment sprays isolate

DW/T-4 BEFORE drywell temperature reaches 280°F

EOP 1 (1)

DW/T-5 IF torus water level is below 13.5 ft AND drywell temperature and pressure are within the Drywell Spray Initiation Limit (Graph 7) (5)
THEN shut down recirc pumps AND initiate drywell sprays using ONLY pumps NOT required for adequate core cooling (Table 9) AND verify drywell fans shut down

DW/T-6 WAIT UNTIL drywell temperature CANNOT be restored and maintained below 280°F

DW/T-7 Emergency RPV Depressurization is Required

Table 9	SPRAY SOURCES				
Systems		Pressure Range (psig)	Pump Capacity (gpm)	Procedure	Status
RHR		0-260	0-4800	OI 149	
RHR Service Water		0-270	0-2400	AIP 409	
Fire System		0-125	0-2500	AIP 406	
Well Water	A & C B & D	0-125	0-370 0-1050	AIP 403	
GSW		0-125	0-4800	AIP 403	
ESW		0-310	0-1200	AIP 402	
Condensate Service Water		0-150	0-300	AIP 405	

(3)

PC/P

PC/P-1 Control primary containment pressure below 2.0 psig using Containment Atmosphere Control system, OI 573

PC/P-2 WAIT UNTIL primary containment pressure CANNOT be maintained below 2.0 psig

IF torus pressure CANNOT be maintained below 53 psig OR primary containment water level CANNOT be maintained below 95 ft	THEN terminate drywell sprays from sources external to the primary containment
IF torus pressure drops below 2.0 psig	THEN terminate torus sprays
IF drywell pressure drops below 2.0 psig	THEN verify containment sprays isolate

PC/P-3 BEFORE torus pressure reaches 11 psig

PC/P-4 Initiate torus sprays using ONLY pumps NOT required for adequate core cooling (Table 9) (5)

PC/P-5 WAIT UNTIL torus pressure exceeds 11 psig

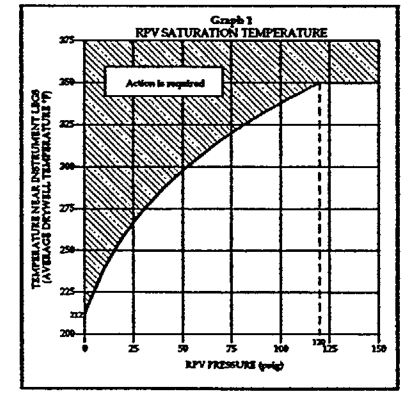
PC/P-6 IF torus water level is below 13.5 ft AND drywell temperature and pressure are within the Drywell Spray Initiation Limit (Graph 7) (5)
THEN shut down recirc pumps AND initiate drywell sprays using ONLY pumps NOT required for adequate core cooling (Table 9) AND verify drywell fans shut down

PC/P-7 WAIT UNTIL torus pressure CANNOT be maintained below the Pressure Suppression Pressure (Graph 5)

PC/P-8 Emergency RPV Depressurization is Required

PC/P-9 BEFORE torus pressure reaches 53 psig

PC/P-10 Vent primary containment to control torus pressure below 53 psig
IF torus water level is below 16 ft
THEN vent the torus, SEP 301.1
IF torus CANNOT be vented OR torus water level is at or above 16 ft
THEN vent the drywell, SEP 301.2
- OK to exceed offsite rad release limits



CAUTIONS

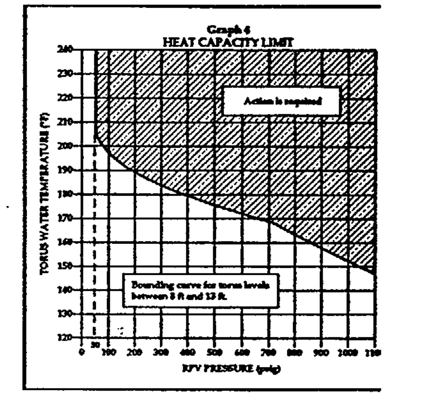
(1) The following restrictions apply to RPV water level instruments:

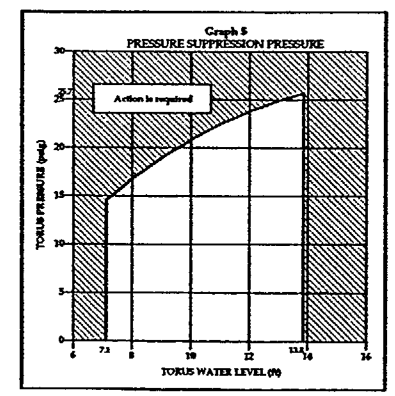
1. If drywell air temperature is above the RPV Saturation Temperature Curve (Graph 1), the following actions are required until the TSC quantifies the potential error due to boiling:
   a. SUBTRACT 23 inches from Fuel Zone and Narrow Range CEMAC instrument indications
   b. Do NOT use Floodup and Wide Range Yarway Instruments
2. Floodup and Wide Range Instruments may NOT be used below the Minimum Indicated Level for the indicated drywell temperature

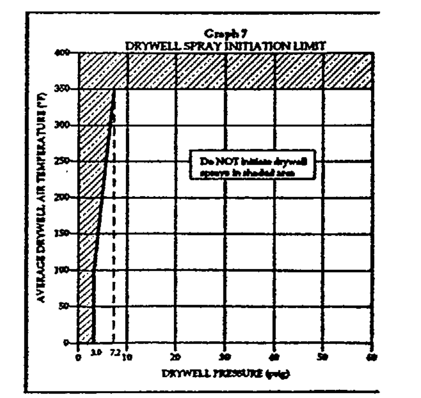
Level Instrument	Temperature Instrument	Drywell Temp (°F)	MIL (in.)
Wide Range Yarway LI 4539 (+8 to +218 in.)	TR-4383A Pen 1 (red)	100-150	+8
		151-200	+12
Wide Range Yarway LI 4540 (+8 to +218 in.)	TR-4383B Pen 2 (green)	201-250	+16
		251-300	+20
		301-350	+25
Floodup Range LI-4541 (+158 to +458 in.)	TR-4383A Pen 1 (red)	100-150	+168
		151-200	+174
		201-250	+181
		251-300	+189
		301-350	+199

(3) Operation of HPCI, RCIC, Core Spray, or RHR with suctions from the torus and pump flow ABOVE the NPSH or vortex limit may damage equipment.

(5) Reducing primary containment pressure will reduce NPSH for pumps taking suction from the torus







FOR INFORMATION ONLY

DUANE ARNOLD ENERGY CENTER	
EOP 2 - PRIMARY CONTAINMENT CONTROL	
REV. 8	EFFECTIVE DATE: 11-19-99

EOP 3 - SECONDARY CONTAINMENT CONTROL

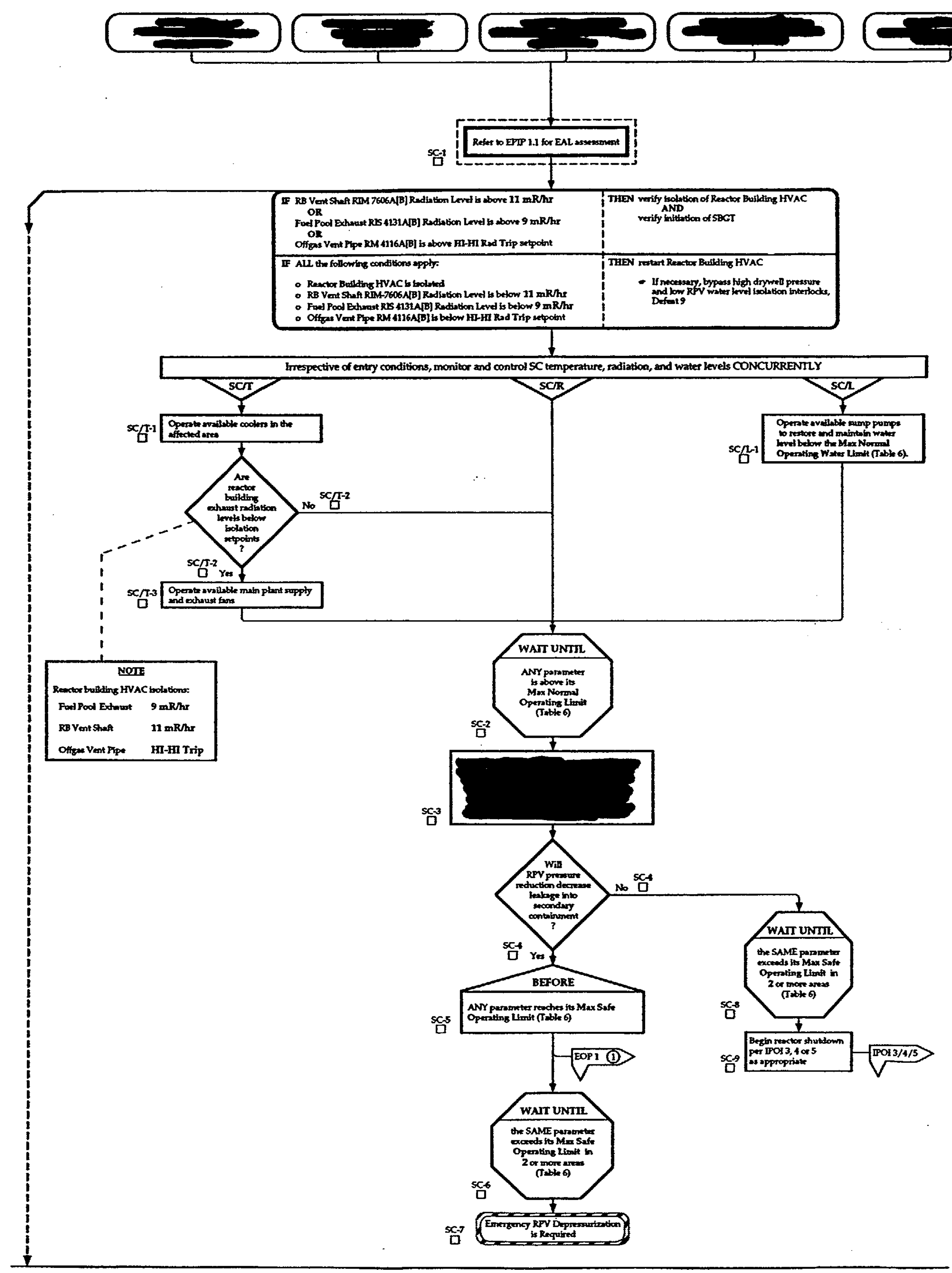


Table 6	SECONDARY CONTAINMENT LIMITS				
	Parameters and Areas		Max Normal Operating Limit	Max Safe Operating Limit	Value/Trend
TEMPERATURE	Area / Location	Indicator	°F	°F	
	A RHR—SE Corner Room Area				
	RHR SE CORNER ROOM AMBIENT	TS 2082A	130	140	
	RHR SE CORNER ROOM DIFFERENTIAL	TDS 2085A	50	N/A	
	B RHR—NW Corner Room Area				
	RHR NW CORNER ROOM AMBIENT	TS 2082B	130	140	
	RHR NW CORNER ROOM DIFFERENTIAL	TDS 2085B	50	N/A	
	HPCI Room Area				
	HPCI EMER COOLER AMBIENT	TS 2261A[B]	175	310	
	HPCI ROOM AMBIENT	TS 2265	175	310	
	HPCI ROOM DIFFERENTIAL	TDS 2260A[B]	50	N/A	
	RCIC Room Area				
	RCIC EMER COOLER AMBIENT	TS 2450A[B]	175	300	
	RCIC ROOM AMBIENT	TS 2453	175	300	
	RCIC ROOM DIFFERENTIAL	TDS 2445A[B]	50	N/A	
	Torus Area				
	TORUS CATWALK NORTH [WEST, SOUTH, EAST] AMBIENT	TS 2526A-D	150	165	
	TORUS AREA (E, W, SW, S CATWALK) DIFFERENTIAL	TDS 2571A-D	50	N/A	
	RB 786' South Area				
	RWCU PUMP ROOM AMBIENT	TS 2742A[B]	130	212	
	RWCU HX ROOM AMBIENT	TS 2742C-F	130	212	
	RB 757' South Area				
	RWCU ABOVE TIP ROOM AMBIENT	TS2742G, H J, K	111.5	150	
	Steam Tunnel Area				
	STEAM TUNNEL AMBIENT	TS 4447	160	300	
	STEAM TUNNEL DIFFERENTIAL	TDS 4451	70	N/A	
RADIATION	Area / Location	Indicator	mR/hr	mR/hr	
	RB 757' South Area				
	RB RAILROAD ACCESS AREA	RI 9167	10	100	
	SOUTH CRD MODULE AREA	RI 9169	10	100	
	TIP ROOM	RI 9176	60	600	
	RB 757' North Area				
	NORTH CRD MODULE	RI 9168	10	100	
	CRD REPAIR ROOM	RI 9170	15	150	
	RB 786' North Area				
	RWCU SPENT RESIN ROOM	RI 9173	100	10^3	
	RWCU PHASE SEP TANK ROOM	RI 9177	20	200	
	RB 786' South Area				
	RWCU PUMP ROOM	RI 9156	10^3	10^4	
	RWCU HX ROOM	RI 9157	10^3	10^4	
	RB 812' North Area				
	MAIN PLANT EXHAUST FAN ROOM	RI 9171	60	600	
	JUNGLE ROOM	RI 9155	60	600	
	Refuel Floor Area				
	NEW FUEL VAULT AREA	RI 9153	10	100	
	NORTH REFUEL FLOOR	RI 9163	10	100	
	SOUTH REFUEL FLOOR	RI 9164	10	100	
	SPENT FUEL POOL AREA	RI 9178	100	10^3	
WATER LEVEL	Area / Location	Indicator	inches	inches	
	HPCI ROOM	LI 3768	2	6	
	RCIC ROOM	LI 3769	3	6	
	"A" RHR & CS SECR	LI 3770	2	10	
	"B" RHR & CS NWCR	LI 3771	2	10	
	TORUS AREA	LI 3772	2	12	

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ATWS - RPV CONTROL

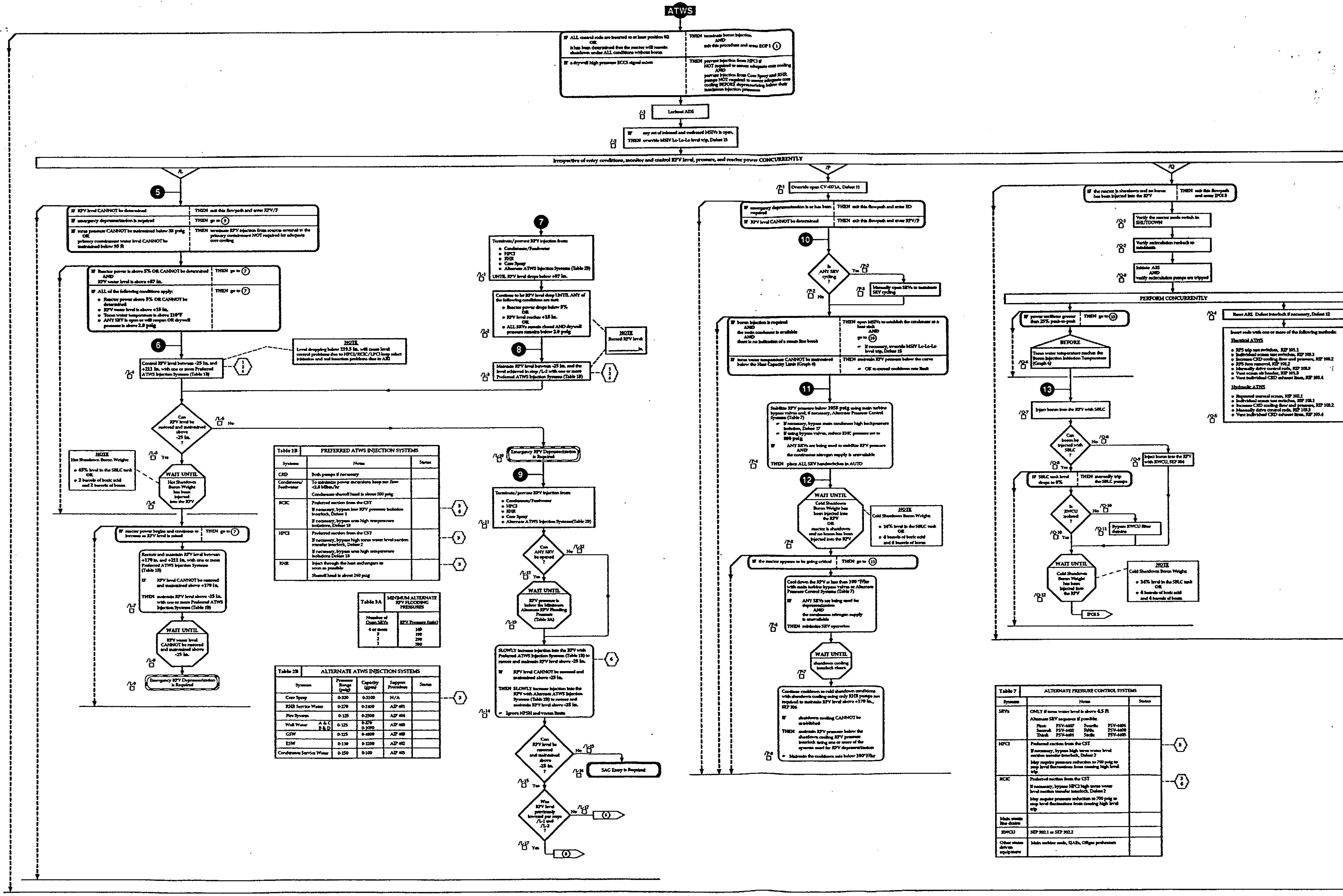


Table 1B	PREFERRED ATWS INJECTION SYSTEMS	
Systems	Notes	Status
CRD	Both pumps if necessary	
Condensate/ Feedwater	To minimize power excursions keep net flow <2.8 Mlbm/hr Condensate shutoff head is about 500 psig	
RCIC	Preferred suction from the CST If necessary, bypass low RPV pressure isolation interlock, Defeat 1 If necessary, bypass area high temperature isolations, Defeat 18	
HPCI	Preferred suction from the CST If necessary, bypass high torus water level suction transfer interlock, Defeat 2 If necessary, bypass area high temperature isolations Defeat 18	
RHR	Inject through the heat exchangers as soon as possible Shutoff head is about 240 psig	

Table 3A	MINIMUM ALTERNATE RPV FLOODING PRESSURES
Number of Open SRVs	RPV Pressure (psig)
4 or more	140
3	190
2	290
1	590

Table 2B	ALTERNATE ATWS INJECTION SYSTEMS				
Systems		Pressure Range (psig)	Capacity (gpm)	Support Procedure	Status
Core Spray		0-330	0-3100	N/A	
RHR Service Water		0-279	0-2400	AIP 401	
Fire System		0-125	0-2500	AIP 404	
Well Water	A & C B & D	0-125	0-379 0-1050	AIP 403	
GSW		0-125	0-4800	AIP 408	
ESW		0-130	0-1200	AIP 402	
Condensate Service Water		0-150	0-100	AIP 405	

Table 7	ALTERNATE PRESSURE CONTROL SYSTEMS	
Systems	Notes	Status
SRVs	ONLY if torus water level is above 4.5 ft Alternate SRV sequence if possible: First: PSV-4407 Fourth: PSV-4406 Second: PSV-4402 Fifth: PSV-4400 Third: PSV-4401 Sixth: PSV-4405	
HPCI	Preferred suction from the CST If necessary, bypass high torus water level suction transfer interlock, Defeat 2 May require pressure reduction to 700 psig to stop level fluctuations from causing high level trip	
RCIC	Preferred suction from the CST If necessary, bypass HPCI high torus water level suction transfer interlock, Defeat 2 May require pressure reduction to 700 psig to stop level fluctuations from causing high level trip	
Main steam line drains		
RWCU	SEP 302.1 or SEP 302.2	
Other steam driven equipment	Main turbine seals, SJAEs, Offgas preheaters	

CAUTIONS

1 The following restrictions apply to RPV water level instruments:

1. If drywell air temperature is above the RPV Saturation Temperature Curve (Graph 1), the following actions are required until the TSC quantifies the potential error due to boiling:
   a. SUBTRACT 23 inches from Fuel Zone and Narrow Range GEMAC instrument indications
   b. Do NOT use Floodup and Wide Range Yarway instruments
2. Floodup and Wide Range instruments may NOT be used below the Minimum Indicated Level for the indicated drywell temperature

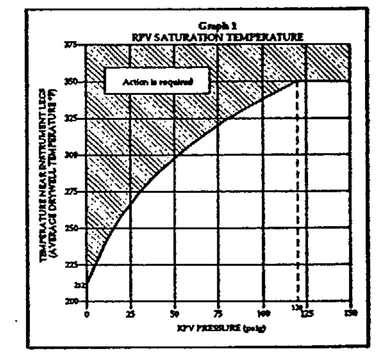
Level Instrument	Temperature Instrument	Drywell Temp (°F)	MIL (in.)
Wide Range Yarway LI 4539 (+8 to +218 in.)	TR-4383A Pen 1 (red)	100-150	+8
		151-200	+12
		201-250	+16
Wide Range Yarway LI 4540 (+8 to +218 in.)	TR-4383B Pen 2 (green)	251-300	+20
		301-350	+25
Floodup Range LI-4541 (+158 to +458 in.)	TR-4383A Pen 1 (red)	100-150	+168
		151-200	+174
		201-250	+181
		251-300	+189
		301-350	+199

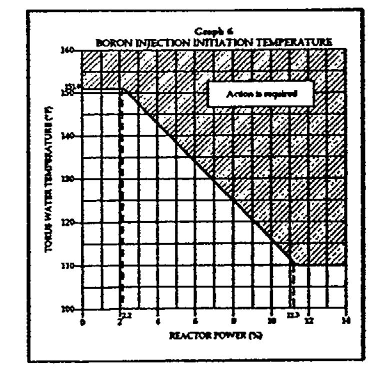
2 Wide Range Yarways (LI-4539 and LI-4540) may NOT be used to determine RPV water level during rapid RPV depressurization below 500 psig.

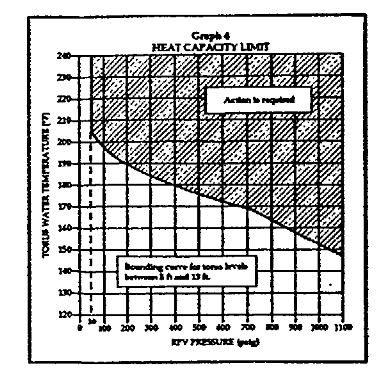
3 Operation of HPCI, RCIC, Core Spray, or RHR with suction from the torus and pump flow ABOVE the NPSH or vortex limit may damage equipment.

4 Elevated torus pressure may trip the RCIC turbine on high exhaust pressure.

6 A rapid increase in injection into the RPV may induce a large power excursion and result in substantial core damage.







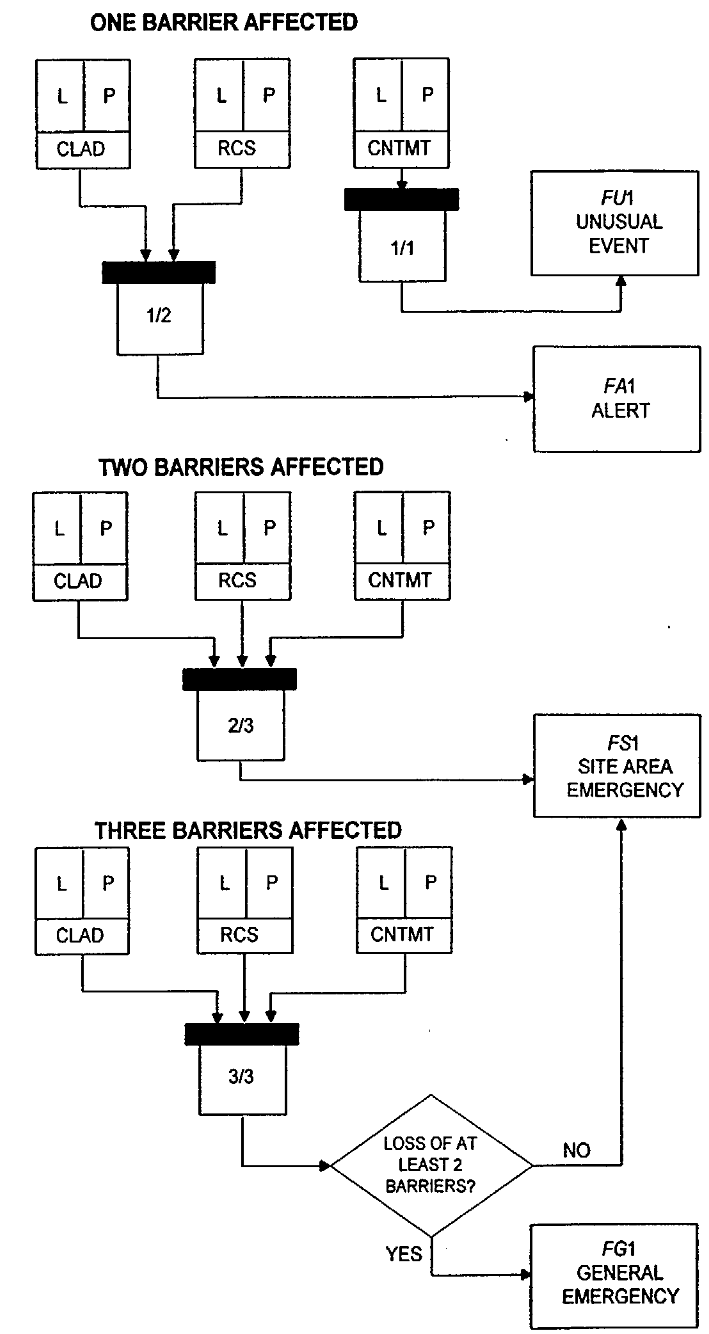
FOR INFORMATION ONLY

EAL T LE
ABNORMAL RAD LEVELS. DIOACTIVE EFFLUENT

EVENT TYPE	UNUSUAL EVENT	ALERT	SITE AREA EMERGENCY	GENERAL EMERGENCY
OFFSITE RAD CONDITIONS	***AU1*** **Any Unplanned Release of Gaseous or Liquid Radioactivity to the Environment That Exceeds Two Times the Offsite Dose Assessment Manual (ODAM) Limit and is Expected to Continue For 60 Minutes or Longer** Valid Reactor Building or Turbine Building ventilation (Kaman) rad monitor reading above 1 E-3 μCi/cc for more than 60 minutes. **OR** Valid Offgas Stack (Kaman) rad monitor reading above 6 E-1 μCi/cc for more than 60 minutes. **OR** Valid LLRPSF (Kaman) rad monitor reading above 9 E-4 μCi/cc for more than 60 minutes. **OR** Valid GSW rad monitor reading above 3E+3 CPS for more than 60 minutes. **OR** Valid RHRSW & ESW rad monitor reading above 8E+2 CPS for more than 60 minutes. **OR** Valid RHRSW & ESW Discharge Canal rad monitor reading above 1E+3 CPS for more than 60 minutes. **OR** Confirmed sample analyses for gaseous or liquid releases indicates concentrations in excess of 2 times ODAM limits for greater than 60 minutes. **OR** Dose assessment determines hourly dose outside the site boundary above 0.1 mrem TEDE. **Op. Modes: ALL**	***AA1*** **Any Unplanned Release of Gaseous or Liquid Radioactivity to the Environment that Exceeds 200X the Offsite Dose Assessment Manual (ODAM) Limit and is Expected to Continue for 15 Minutes or Longer** Valid Reactor Building or Turbine Building ventilation (Kaman) rad monitor reading above 3 E-2 μCi/cc for more than 15 minutes. **OR** Valid Offgas Stack (Kaman) rad monitor reading above 2 E+1 μCi/cc for more than 15 minutes. **OR** Valid LLRPSF (Kaman) rad monitor reading above 9 E-2 μCi/cc for more than 15 minutes. **OR** Valid GSW rad monitor reading above 3E+5 CPS for more than 15 minutes. **OR** Valid RHRSW & ESW rad monitor reading above 8E+4 CPS for more than 15 minutes. **OR** Valid RHRSW & ESW Discharge Canal rad monitor reading above 1E+5 CPS for more than 15 minutes. **OR** Confirmed sample analyses for gaseous or liquid releases indicates concentrations in excess of 200 times ODAM limits for greater than 15 minutes. **OR** Valid field survey reading outside the site boundary >10 mR/hr or >50 mR/hr CDE Thyroid. **OR** Dose assessment determines hourly dose outside the site boundary above 10 mrem TEDE. **Op. Modes: ALL**	***AS1*** **Site Boundary Dose Resulting from an Actual or Imminent Release of Gaseous Radioactivity Exceeds 100 mrem TEDE or 500 mrem CDE Thyroid for the Actual or Projected Duration of the Release** Valid Reactor Building or Turbine Building ventilation (Kaman) rad monitor reading above 6 E-2 μCi/cc for more than 15 minutes. (Dose assessment not available) **OR** Valid Offgas Stack (Kaman) rad monitor reading above 4 E+1 μCi/cc for more than 15 minutes. (Dose assessment not available) **OR** Valid field survey reading outside the site boundary >100 mR/hr or >500 mR/hr CDE Thyroid. **OR** Dose assessment determines integrated accident dose projection outside the site boundary above 100 mrem TEDE or above 500 mrem CDE Thyroid. **Op. Modes: ALL**	***AG1*** **Site Boundary Dose Resulting from an Actual or Imminent Release of Gaseous Radioactivity Exceeds 1000 mrem TEDE or 5000 mrem CDE Thyroid for the Actual or Projected Duration of the Release** Valid Reactor Building or Turbine Building ventilation (Kaman) rad monitor reading above 6 E-1 μCi/cc for more than 15 minutes. (Dose assessment not available) **OR** Valid Offgas Stack (Kaman) rad monitor reading above 4 E+2 μCi/cc for more than 15 minutes. (Dose assessment not available) **OR** Valid field survey reading outside the site boundary >1,000 mR/hr or >5,000mR/hr CDE Thyroid. **OR** Dose assessment determines integrated accident dose projection outside the site boundary above 1,000 mrem TEDE or above 5,000 mrem CDE Thyroid. **Op. Modes: ALL**
ONSITE RAD CONDITIONS	***AU2*** **Unexpected Increase in Plant Radiation** Uncontrolled loss of reactor cavity or fuel pool water level with all spent fuel assemblies remaining water covered as indicated by ANY of the following: • Report to control room • Valid fuel pool level indication (LI-3413) below 36 feet and lowering • Valid WR GEMAC Floodup indication (LI-4541) coming on scale. **OR** Unexpected ARM reading offscale high or above 1000 times normal reading. **Op. Modes: ALL**	***AA2*** **Major Damage to Irradiated Fuel or Loss of Water Level that Has or Will Result in the Uncovering of Irradiated Fuel Outside the Reactor Vessel** Report of ANY of the following: • Valid ARM HI RAD alarm for the Refueling Floor North End, Refueling Floor South End, New Fuel Storage Area, or Spent Fuel Storage Area • Valid Refueling Floor North End, Refueling Floor South End, or New Fuel Storage Area ARM Reading above 10 mR/hr • Valid Spent Fuel Storage Area ARM Reading above 100 mR/hr **OR** Report of visual observation of Irradiated Fuel uncovered **OR** Water level reading below 450" as indicated on LI4541 (floodup) for the Reactor Refueling Cavity that will result in Irradiated Fuel uncovering **OR** Valid Fuel Pool water level indication (LI-3413) below 16 feet. **Op. Modes: ALL** ***AA3*** **Release of Radioactive Material or Increases in Radiation Levels Within the Facility That Impedes Operation of Systems Required to Maintain Safe Operations or to Establish or to Maintain Cold Shutdown** Valid area radiation monitor (RE9162) reading greater than 15 mR/hr in the Control Room. **OR** Valid area radiation monitor (RE9168) reading greater than 500 mR/hr at the Remote Shutdown Panel, 1C388. **Op. Modes: ALL**		

FISSION BARRIER

INDICATORS	FUEL CLAD BARRIER	RCS BARRIER	PRIMARY CONTAINMENT BARRIER
RADIATION / CORE DAMAGE	*Loss* L Fuel damage assessment (PASAP 7.2) determines at least 5% fuel clad damage **OR** Fuel damage is indicated by any of the following: L Valid drywell rad monitor reading above 7E+2 R/hr **OR** L Valid torus rad monitor reading above 3E+1 R/hr **OR** L Coolant activity above 300μCi/gm DOSE EQUIVALENT I-131 *Potential Loss* - None	*Loss* L Valid drywell rad monitor reading above 5 R/hr after reactor shutdown *Potential Loss* - None	*Loss* - None *Potential Loss* P Valid drywell rad monitor reading above 3E+3 R/hr **OR** P Valid torus rad monitor reading above 1E+2 R/hr **OR** P Core damage assessment determines at least 20% fuel clad damage
RPV LEVEL	*Loss* L RPV Level below -25 Inches *Potential Loss* P RPV Level below 15 inches	*Loss* L RPV Level below 15 inches *Potential Loss* - None	*Loss* - None *Potential Loss* P RPV Level below -39 inches
LEAKAGE	None	*Loss* - None *Potential Loss* P RCS Leakage is above 50 GPM **OR** P Unisolable primary system leakage outside the drywell as indicated by area temps or ARMs exceeding the Max Normal Limits per EOP 3, Table 6.	*Loss* L Failure of both isolation valves and a downstream pathway to the environment exists **OR** L Unisolable primary system leakage outside the drywell as indicated by area temps or ARMs exceeding the Max Safe Limits per EOP 3, Table 6, after Containment Isolation. **OR** L Primary containment venting performed per EOPs *Potential Loss* - None
PRIMARY CONTAINMENT ATMOSPHERE	None	*Loss* L Drywell pressure above 2 psig and not caused by a loss of DW Cooling *Potential Loss* - None	*Loss* L Rapid unexplained decrease following initial increase in pressure **OR** L Drywell pressure response not consistent with LOCA conditions *Potential Loss* P Torus pressure reaches 53 psig **OR** P Drywell or torus H_2 CANNOT be determined to be below 6% **AND** Drywell or torus O_2 CANNOT be determined to be below 5%
EC/OSM JUDGMENT	Any condition which in the EC/OSM's judgment indicates loss or potential loss of the fuel clad barrier due to Imminent barrier degradation Degraded fission barrier monitoring capability. L Loss OR P Potential Loss	Any condition which in the EC/OSM's judgment indicates loss or potential loss of the RCS barrier due to Imminent barrier degradation OR Degraded fission barrier monitoring capability. L Loss OR P Potential Loss	Any condition which in the EC/OSM's judgment indicates loss or potential loss of the primary containment barrier barrier due to Imminent barrier degradation **OR** Degraded fission barrier monitoring capability. L Loss OR P Potential Loss



Op. Modes: Run, Startup, Hot S/D

IMMINENT - No turnaround in safety system performance is expected and escalation to General Emergency conditions is expected within 2 hours.

NOTE: *Step 1; for all indicators, move from left to right across table, marking all applicable "L's" and "P's" for each barrier, based on plant indications. Then, step 2, transcribe all "L's" and "P's" marked on Barrier Table to the Logic Diagram (at right). "L's" and "P's" should be marked for each affected barrier (working top to bottom) on the flowchart. Step 3, an "L" or "P" marked for each associated barrier will constitute a Logic I input. When coincidence is met, then the EAL can be declared.*

L = *Loss* (of a fission product barrier) - A severe challenge to a fission product barrier exists such that the barrier is considered incapable of performing its safety function.

P = *Potential Loss* (of a fission product barrier) - A challenge to a fission product barrier exists such that the barrier is considered degraded in its ability to perform its safety function.

EAL TABLE

HAZARDS and OTHER CONDITIONS AFFECTING PLANT SAFETY

EVENT TYPE	UNUSUAL EVENT	ALERT	SITE AREA EMERGENCY	GENERAL EMERGENCY
NATURAL DISASTERS	***HU1*** **Natural and Destructive Phenomena Affecting the Protected Area** Earthquake detected per AOP 901, Earthquake. **OR** Report of tornado touching down within plant protected area or within switchyard. **OR** Assessment by the control room that an event has occurred. **OR** Vehicle crash into plant structures or systems within protected area boundary. **OR** Report of an unanticipated explosion within the protected area boundary resulting in visible damage to structures or equipment. **OR** Turbine failure resulting in casing penetration or damage to turbine or generator seals. **OR** River level above 757 feet. **OR** Any area water level above Max Normal Operating Limit. **OR** River level below 725 feet 6 inches. **Op. Modes: ALL**	***HA1*** **Natural and Destructive Phenomena Affecting the Plant Vital Area** Earthquake peak horizontal acceleration above ± 0.06 Gravity. **OR** Report of tornado striking plant vital area. **OR** Report to control room of damage affecting safe shutdown areas. **OR** Vehicle crash affecting plant vital areas. **OR** Sustained wind speed above 95 MPH. **OR** Missiles affecting safe shutdown areas. **OR** River level above 767 feet. **OR** Water level above Max Safe Operating Limit in 2 or more areas AND Reactor shutdown is required. **OR** River level below 724 feet 6 inches. **Op. Modes: ALL**		
FIRE	***HU2*** **Fire Within Safe Shutdown Areas Not Extinguished Within 15 Minutes of Detection** Fire in buildings or areas contiguous to any of the following areas not extinguished within 15 minutes of control room notification or verification of a control room alarm: • Reactor, turbine, control, admin/security • Intake structure • Pump house **Op. Modes: ALL**	***HA2*** **Fire Affecting the Operability of Plant Safety Systems Required to Establish or Maintain Safe Shutdown** Fire or explosion in any of the following areas: • Reactor, turbine, control, admin/security • Intake structure • Pump house **AND** Affected system parameter indications show degraded performance or plant personnel report visible damage to permanent structures or equipment within the specified area. **Op. Modes: ALL**		
OTHER HAZARDS AND FAILURES	***HU3*** **Release of Toxic or Flammable Gases Deemed Detrimental to Safe Operation of the Plant** Toxic or flammable gas release affecting normal operation. **OR** Report by local, county or State official for potential evacuation of site personnel based on offsite event. **Op. Modes: ALL**	***HA3*** **Release of Toxic or Flammable Gases Within a Facility Structure Which Jeopardizes Operation of Systems Required to Maintain Safe Operations or to Establish or Maintain Cold Shutdown** Toxic or flammable gas making safe shutdown areas uninhabitable or inaccessible. **Op. Modes: ALL**		
SECURITY	***HU4*** **Confirmed Security Event Which Indicates a Potential Degradation in the Level of Safety of the Plant** Suspected sabotage device discovered within plant protected area and outside plant vital area. **OR** Suspected sabotage device discovered in plant switchyard. **Op. Modes: ALL**	***HA4*** **Security Event in a Plant Protected Area** Intrusion into plant protected area by a hostile force. **OR** Sabotage device discovered in the plant protected area. **Op. Modes: ALL**	***HS1*** **Security Event in a Plant Vital Area** Intrusion into plant vital area by a hostile force. **OR** Sabotage device discovered in the plant vital area. **Op. Modes: ALL**	***HG1*** **Security Event Resulting in Loss of Ability to Reach and Maintain Cold Shutdown** Loss of physical control of the Control Room. **OR** Loss of physical control of remote shutdown capability. **Op. Modes: ALL**
CONTROL ROOM EVACUATION	None	***HA5*** **Control Room Evacuation Has Been Initiated** Control room evacuation initiated per AOP 915, Shutdown Outside Control Room. **Op. Modes: ALL**	***HS2*** **Control Room Evacuation Has Been Initiated and Plant Control Cannot Be Established** Control room has been evacuated AND control of plant from Remote Shutdown Panel 1C388 NOT established within 20 minutes. **Op. Modes: ALL**	None
EC/OSM JUDGMENT	***HU5*** **Other Conditions Existing Which in the Judgment of the EC/OSM Warrant Declaration of an Unusual Event** Other conditions exist which in the judgment of the EC/OSM indicate potential degradation of the level of safety of the plant. **Op. Modes: ALL**	***HA6*** **Other Conditions Existing Which in the Judgment of the EC/OSM Warrant Declaration of an Alert** Other conditions exist which in the judgment of the EC/OSM indicate that plant systems may be degraded and that increased monitoring of plant functions is warranted. **Op. Modes: ALL**	***HS3*** **Other Conditions Existing Which in the Judgment of the EC/OSM Warrant Declaration of a Site Area Emergency** Other conditions exist which in the judgment of the EC/OSM indicate actual or likely major failures of plant functions needed for protection of the public. **Op. Modes: ALL**	***HG2*** **Other Conditions Existing Which in the Judgment of the EC/OSM Warrant Declaration of a General Emergency** Other conditions exist which in the judgment of the EC/OSM indicate EITHER: • Actual or imminent substantial core degradation with potential for loss of containment. • Potential for uncontrolled radionuclide releases which can reasonably be expected to exceed EPA PAG plume exposure levels outside the site boundary. **Op. Modes: ALL**

Safe Shutdown Areas

Category	Area
Electrical Power	Switchyard, 1G31 DG and Day Tank Rooms, 1G21 DG and Day Tank Rooms, Battery Rooms, Essential Switchgear Rooms, Cable Spreading Room
Heat Sink/ Coolant Supply	Torus Room, Intake Structure, Pumphouse
Containment	Drywell, Torus
Emergency Systems	NE, NW, SE Corner Rooms, HPCI Room, RCIC Room, RHR Valve Room, North CRD Area, South CRD Area
Other	Control Building, Remote Shutdown Panel 1C388 Area, Panel 1C56 Area, SBGT Room

Water Level Operating Limits

Room Area	Indicator	Max Normal Operating Limit (inches)	Max Safe Operating Limit (inches)
HPCI Room Area	LI 3768	2	6
RCIC Room Area	LI 3769	3	6
A RHR Corner Room SE Area	LI 3770	2	10
B RHR Corner Room NW Area	LI 3771	2	10
Torus Area	LI 3772	2	12

Systems & Equipment of Concern

- Reactivity Control
- Containment (Drywell/Torus)
- RHR/Core Spray/SRV's
- HPCI/RCIC
- RHRSW/River Water/ESW
- Onsite AC Power/EDG's
- Offsite AC Power
- Instrument AC
- DC Power
- Remote Shutdown Capability

EAL TABLE

SYSTEM MALFUNCTION

EVENT TYPE	UNUSUAL EVENT	ALERT	SITE AREA EMERGENCY	GENERAL EMERGENCY
LOSS OF POWER	***SU1*** **Loss of All Offsite Power to Essential Busses for Greater Than 15 Minutes** Loss of Offsite Power Lasting More Than 15 Minutes. **Op. Modes: ALL** ***SU7*** **Unplanned Loss of Required DC Power During Cold Shutdown or Refuel Mode For Greater Than 15 Minutes** Unplanned Loss of Div 1 and Div 2 125 VDC busses based on bus voltage less than 105 VDC indicated. **AND** Failure to restore power to at least one required 125 VDC bus within 15 minutes from time of loss. **Op. Modes: Cold S/D, Refuel**	***SA1*** **Loss of All Offsite Power and Loss of All Onsite AC Power to Essential Busses During Cold Conditions** vhan 15 minutes. **Op. Modes: Cold S/D, Refuel, Defueled** ***SA5*** **AC Power Capability to Essential Busses Reduced to a Single Power Source for Greater Than 15 Minutes Such That Any Additional Single Failure Would Result in Station Blackout** Only one AC power source remains available to supply Bus 1A3 or Bus 1A4 AND if it is lost, a Station Blackout will occur. **Op. Modes: Run, Startup, Hot S/D**	***SS1*** **Loss of All Offsite Power and Loss of All Onsite AC Power to Essential Busses** Loss of Voltage on Buses 1A3 and 1A4 lasting more than 15 minutes. **Op. Modes: Run, Startup, Hot S/D** ***SS3*** **Loss of All Vital DC Power** Unplanned Loss of Div 1 and Div 2 125 VDC busses Lasting More Than 15 Minutes. **Op. Modes: Run, Startup, Hot S/D**	***SG1*** **Prolonged Loss of All Offsite Power and Prolonged Loss of All Onsite AC Power** Loss of Voltage on Buses 1A3 and 1A4 and ANY of the following: • Restoration of power to either Bus 1A3 or 1A4 is NOT likely within 4 hours. • RPV level indeterminate • RPV Level below +15 inches. **Op. Modes: Run, Startup, Hot S/D**
RPS FAILURE	None	***SA2*** **Failure of Reactor Protection System Instrumentation to Complete or Initiate an Automatic Reactor Scram Once a Reactor Protection System Setpoint Has Been Exceeded and Manual Scram Was Successful** Auto Scram Failure **AND** Operator actions to reduce power are SUCCESSFUL as indicated by either: ALL Rods Full-In, **OR** Reactor Shutdown Under All Conditions Without Boron, **OR** Reactor power below the APRM Downscale Alarm on ALL valid APRM instruments **Op. Modes: Run, Startup**	***SS2*** **Failure of Reactor Protection System Instrumentation to Complete or Initiate an Automatic Reactor Scram Once a Reactor Protection System Setpoint Has Been Exceeded and Manual Scram Was NOT Successful** In ATWS EOP **AND** Reactor power above the APRM Downscale Alarm on ANY valid APRM instrument, **OR** Boron Injection Initiation Temperature (BIIT) Curve (EOP Graph 6) exceeded. **Op. Modes: Run, Startup**	***SG2*** **Failure of the Reactor Protection System to Complete an Automatic Scram and Manual Scram was NOT successful and There is Indication of an Extreme Challenge to the Ability to Cool the Core** Entry into ATWS EOP- RPV Control is required **AND** RPV level cannot be maintained above -25 inches. **OR** HCL Curve (EOP Graph 4) exceeded. **Op. Modes: Run, Startup**
INABILITY TO MAINTAIN SHUTDOWN CONDITIONS	***SU2*** **Inability to Reach Required Shutdown Within Technical Specification Limits** Plant NOT brought to required mode within applicable LCO Action Statement Time Limits. **Op. Modes: Run, Startup, Hot S/D**	***SA3*** **Inability to Maintain Plant in Cold Shutdown** Loss of decay heat removal systems required to maintain cold shutdown. **AND** Temperature rise that exceeds 212°F. **OR** Uncontrolled temperature rise approaching 212°F. **Op. Modes: Cold S/D, Refuel**	***SS4*** **Complete Loss of Function Needed to Achieve or Maintain Hot Shutdown** EOP Graph 4 Heat Capacity Limit is exceeded **OR** Reactor CANNOT be brought subcritical. **Op. Modes: Run, Startup, Hot S/D** ***SS5*** **Loss of Water Level in the Reactor Vessel That Has or Will Uncover Fuel in the Reactor Vessel** NO cooling method lined up or available AND RPV Level below 15 inches. **Op. Modes: Cold S/D, Refuel**	See Fission Barrier Table
INSTRUMENTATION / COMMUNICATION	***SU3*** **Unplanned Loss of All Safety System Annunciation or Indication in the Control Room for Greater Than 15 Minutes** Unplanned loss of most annunciators on panels 1C03, 1C04 and 1C05 lasting more than 15 minutes AND compensatory non-alarming indications are available. **Op. Modes: Run, Startup, Hot S/D** ***SU6*** **Unplanned Loss of All Onsite or Offsite Communications Capabilities** Loss of ALL onsite telephone and radio communication methods (PABX, direct-ring, UHF, and radiological survey radio systems). **OR** Loss of ALL electronic communication methods with government agencies (PABX, direct-ring, ENS, microwave and police radio). **Op. Modes: ALL**	***SA4*** **Unplanned Loss of Most or All Safety System Annunciation or Indication in Control Room With Either (1) a Significant Transient in Progress, or (2) Compensatory Non-Alarming Indicators are Unavailable** Unplanned loss of most annunciators on panels 1C03, 1C04 and 1C05 lasting more than 15 minutes and EITHER: • Significant transient in progress. • Loss of compensatory non-alarming indications. **Op. Modes: Run, Startup, Hot S/D**	***SS6*** **Inability to Monitor a Significant Transient in Progress** Significant transient in progress and BOTH of the following: • Loss of annunciators on panels 1C03, 1C04 and 1C05 **AND** • Loss of compensatory non-alarming indications. **Op. Modes: Run, Startup, Hot S/D**	See Fission Barrier Table
COOLANT ACTIVITY	***SU4*** **Fuel Clad Degradation** Valid Pretreat RM-4104 rad monitor reading above 4E+3 mR/hr **OR** Coolant activity above 1.2 μCi/ml DOSE EQUIVALENT I-131 **Op. Modes: Run, Startup, Hot S/D**	See Fission Barrier Table	See Fission Barrier Table	See Fission Barrier Table
COOLANT LEAKAGE	***SU5*** **RCS Leakage** Unidentified or pressure boundary leakage greater than 10 GPM. **OR** Identified leakage greater than 25 GPM. **OR** Main steam line break as determined from annunciators or plant personnel report. **Op. Modes: Run, Startup, Hot S/D**	See Fission Barrier Table	See Fission Barrier Table	See Fission Barrier Table