Memorandum

To: Mr. Stephen Barr, USNRC Region I

From: Thomas Wooley TW

Date: 12/9/04

Re: BVPS Unit 1 NRC Exam Outline

Enclosed, for your review and approval is the outline for the FENOC BVPS Unit 1 NRC Exam scheduled to be administered in February 2005. This submittal satisfies the requirements of NUREG-1021, "Operator Licensing Examination Standards for Power Reactors" Rev. 9.

We request that these materials be withheld from public disclosure until after completion of the examination.

If you have any questions or require further information, please call me at (724) 682-5723, or Mr. Chris Hynes at (724) 682-5751.

Facility:	BVPS-1	Date of Examination:	2/28/2005		
Item	Task Description		Initials		
			a	b*	c#
1. WRITTEN	a. Verify that the outline(s) fit(s) the appropriate model per ES-401.		JGA		
	b. Assess whether the outline was systematically and randomly prepared in accordance with Section D.1 of ES-401 and whether all K/A categories are appropriately sampled.		JGA		
	c. Assess whether the outline over-emphasizes any systems, evolutions, or generic topics.		JGA		
	d. Assess whether the justifications for deselected or rejected K/A statements are appropriate.		JGA		
2. SIMULATOR	a. Using Form ES-301-5, verify that the proposed scenario sets cover the required number of normal evolutions, instrument and component failures, technical specifications, and major transients.		JGA		
	b. Assess whether there are enough scenario sets (and spares) to test the projected number and mix of applicants in accordance with the expected crew composition and rotation schedule without compromising exam integrity; and ensure that each applicant can be tested using at least one new or significantly modified scenario, that no scenarios are duplicated from the applicants' audit test(s), and scenarios will not be repeated on subsequent days.		JGA		
	c. To the extent possible, assess whether the outline(s) conform(s) with the qualitative and quantitative criteria specified on Form ES-301-4 and described in Appendix D.		JGA		
3. W / T	a. Verify that systems walk-through outline meets the criteria specified on Form ES-301-2:				
		(1) the outline(s) contain(s) the required number of control room and in-plant tasks, distributed among the safety functions as specified on the form	JGA		
		(2) task repetition from the last two NRC examinations is within the limits specified on the form,	JGA		
		(3)* no tasks are duplicated from the applicants' audit test(s)	JGA		
		(4) the number of alternate path, low-power, emergency and RCA tasks meet the criteria on the form.	JGA		
	b. Verify that the administrative outline meets the criteria specified on Form ES-301-1:				
		(1) the tasks are distributed among the topics as specified on the form	JGA		
		(2) at least one task is new or significantly modified	JGA		
		(3) no more than one task is repeated from the last two NRC licensing examinations	JGA		
	c. Determine if there are enough different outlines to test the projected number and mix of applicants and ensure that no items are duplicated on subsequent days.		JGA		
4. GENERAL	a. Assess whether plant-specific priorities (including PRA and IPE insights) are covered in the appropriate exam section.		JGA		
	b. Assess whether the 10CFR 55.41/43 and 55.45 sampling is appropriate.		JGA		
	c. Ensure that K/A importance ratings (except for plant-specific priorities) are at least 2.5.		JGA		
	d. Check for duplication and overlap among exam sections.		JGA		
	e. Check the entire exam for balance of coverage.		JGA		
	f. Assess whether the exam fits the appropriate job level (RO or SRO).		JGA		

	Printed Name / Signature	Date
a. Author	Joseph G. Arsenault	11/23/2004
b. Facility Reviewer (*)	Christopher P. Hymes / Christopher P. Hymes	12/8/04
c. NRC Chief Examiner (#)	STEPHEN T. BARR / T. Barr	1/13/05
d. NRC Supervisor		

NOTE: # Independent NRC reviewer initial items in Column "c", chief examiner concurrence required.

BVPS Units 1 and 2
2005 NRC Initial License Written Examination
Written Examination Outline Methodology

The written examination outline was developed using a proprietary electronic random outline generator developed by Western Technical Services, Inc.

The software was designed to provide a written examination outline in accordance with the criteria contained in NUREG-1021, Revision 9.

The application was developed using Visual Basic code, relying on a true random function based on the PC system clock. The random generator selects topics in a Microsoft Access Database containing Revision 2 of the PWR K&A catalogue. The selected data is then written to a separate data table. The process for selection of topics is similar to the guidance in ES-401, Attachment 1.

The attached outline report and plant specific suppression profile (not used for BVPS) report are written directly from the data tables created by the software. Electronic copies of the data tables are on file.

The process used to develop the outlines is as follows:

- For Tier 1 and Tier 2 generic items, only the items required to be included in accordance with ES-401, Attachment 2 are included in the generation process.

- The BVPS plant suppression profile lists all suppressed topics, either at the Topic level (System/EPE) or at the statement level. These items were suppressed prior to the electronic generation process. *Items suppressed for the BVPS-1 exam only included system 025 (Ice Condenser) and Generic topics 2.2.3 and 2.2.4 (Multi-Unit) This document intended to serve as plant suppression profile due to the small number of suppressed items.*

- Outline is generated for all topics with KA importance ≥2.5.

- 25 SRO topics are randomly selected from Tier 1 AA2 and required generic items, Tier 2 A2 and required generic items, and Tier 3 generic items (All with ties to 10CFR55.43). 75 RO topics are randomly selected to complete the outline, 100 topics total.

- The exam report generated lists the topic (Question) number in the far right column. RO topics are numbered 1-75, and SRO topics are numbered 76-100. The SRO topics are written in red ink for ease of identification.

- Items that are rejected after the initial generation process are automatically placed on the rejected items page. The software tracks whether items are added manually or by random generation, and a report of outline modification may be generated.

- Disposition of any item randomly selected but not included in the outline is documented and included.

Facility: **BVPS-1** Date of Exam: **2/28/2005**

Tier	Group	RO K/A Category Points												SRO-Only Points		
		K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G*	Total	A2	G*	Total
1. Emergency & Abnormal Plant Evolutions	1	3	0	2	N/A			6	7	N/A		0	18	3	3	6
	2	1	2	2				1	1			2	9	2	2	4
	Tier Totals	4	2	4				7	8			2	27	5	5	10
2. Plant Systems	1	3	1	5	3	2	1	0	4	4	4	1	28	3	2	5
	2	2	1	1	1	0	1	2	0	1	0	1	10	1	2	3
	Tier Totals	5	2	6	4	2	2	2	4	5	4	2	38	4	4	8
3. Generic Knowledge and Abilities Categories		1			2			3			4		10	1	2	3	4	7
		2			3			2			3			2	2	1	2	

Note:

1. Ensure that at least two topics from every applicable K/A category are sampled within each tier of the RO and SRO-only outlines (i.e., except for one category in Tier 3 of the SRO-only outline, the "Tier Totals" in each K/A category shall not be less than two).
2. The point total for each group and tier in the proposed outline must match that specified in the table. The final point total for each group and tier may deviate by ±1 from that specified in the table based on NRC revisions. The final RO exam must total 75 points and the SRO-only exam must total 25 points.
3. Systems/evolutions within each group are identified on the associated outline; systems or evolutions that do not apply at the facility should be deleted and justified; operationally important, site-specific systems that are not included on the outline should be added. Refer to ES-401, Attachment 2, for guidance regarding elimination of inappropriate K/A statements.
4. Select topics from as many systems and evolutions as possible; sample every system or evolution in the group before selecting a second topic for any system or evolution.
5. Absent a plant specific priority, only those KAs having an importance rating (IR) of 2.5 or higher shall be selected. Use the RO and SRO ratings for the RO and SRO-only portions, respectively.
6. Select SRO topics for Tiers 1 and 2 from the shaded systems and K/A categories.
7.* The generic (G) K/As in Tiers 1 and 2 shall be selected from Section 2 of the K/A Catalog, but the topics must be relevant to the applicable evolution or system.
8. On the following pages, enter the K/A numbers, a brief description of each topic, the topics' importance ratings (IR) for the applicable license level, and the point totals (#) for each system and category. Enter the group and tier totals for each category in the table above. Use duplicate pages for RO and SRO-only exams.
9. For Tier 3, select topics from Section 2 of the K/A Catalog, and enter the K/A numbers, descriptions, IRs, and point totals (#) on Form ES-401-3. Limit SRO selections to K/As that are linked to 10CFR55.43

Written Examination Outline
Emergency and Abnormal Plant Evolutions – Tier 1 Group 1

E/APE # / Name Safety Function	G	K1	K2	K3	A1	A2	Number	K/A Topic(s)	Imp.	Q#
025 / Loss of RHR System / 4						X	AA2.02	Ability to determine and interpret the following as they apply to the Loss of Residual Heat Removal System: Leakage of reactor coolant from RHR into closed cooling water system or into reactor building atmosphere	3.8	76
029 / ATWS / 1						X	EA2.01	Ability to determine or interpret the following as they apply to a ATWS: Reactor nuclear instrumentation	4.7	77
038 / Steam Gen. Tube Rupture / 3	X						2.2.25	Equipment Control Knowledge of bases in technical specifications for limiting conditions for operations and safety limits.	3.7	78
058 / Loss of DC Power / 6	X						2.2.25	Equipment Control Knowledge of bases in technical specifications for limiting conditions for operations and safety limits.	3.7	79
062 / Loss of Nuclear Svc Water / 4	X						2.4.31	Emergency Procedures / Plan Knowledge of annunciators alarms and indications, and use of the response instructions	3.4	80
E11 / Loss of Emergency Coolant Recirc / 4						X	EA2.1	Ability to determine and interpret the following as they apply to the (Loss of Emergency Coolant Recirculation) Facility conditions and selection of appropriate procedures during abnormal and emergency operations.	4.2	81
007 / Reactor Trip - Stabilization - Recovery / 1					X		EA1.09	**Ability to operate and monitor the following as they apply to a reactor trip: CVCS**	**3.2**	**39**
008 / Pressurizer Vapor Space Accident / 3						X	AA2.20	**Ability to determine and interpret the following as they apply to the Pressurizer Vapor Space Accident: The effect of an open PORV on code safety, based on observation of plant parameters**	**3.4**	**40**
015 / 17 / RCP Malfunctions / 4		X					AK1.05	**Knowledge of the operational implications of the following concepts as they apply to the Reactor Coolant Pump Malfunctions (Loss of RC Flow): Effects of unbalanced RCS flow on in-core average temperature, core imbalance, and quadrant power tilt**	**2.7**	**41**
022 / Loss of Rx Coolant Makeup / 2						X	AA2.04	**Ability to determine and interpret the following as they apply to the Loss of Reactor Coolant Pump Makeup: How long PZR level can be maintained within limits**	**2.9**	**42**
025 / Loss of RHR System / 4					X		AA1.08	**Ability to operate and / or monitor the following as they apply to the Loss of Residual Heat Removal System: RHR cooler inlet and outlet temperature indicators**	**2.9**	**43**
027 / Pressurizer Pressure Control System Malfunction / 3						X	AA2.02	**Ability to determine and interpret the following as they apply to the Pressurizer Pressure Control Malfunctions: Normal values for RCS pressure**	**3.8**	**44**
029 / ATWS / 1				X			EK3.11	**Knowledge of the reasons for the following responses as the apply to the ATWS: Initiating emergency boration**	**4.2**	**45**

Written Examination Outline
Emergency and Abnormal Plant Evolutions – Tier 1 Group 1

E/APE # / Name Safety Function	G	K1	K2	K3	A1	A2	Number	K/A Topic(s)	Imp.	Q#
038 / Steam Gen. Tube Rupture / 3					X		EA1.16	Ability to operate and monitor the following as they apply to a SGTR: S/G atmospheric relief valve and secondary PORV controllers and indicators	4.4	46
040 / Steam Line Rupture - Excessive Heat Transfer / 4						X	AA2.05	Ability to determine and interpret the following as they apply to the Steam Line Rupture: When ESFAS systems may be secured	4.1	47
054 / Loss of Main Feedwater / 4					X		AA1.04	Ability to operate and / or monitor the following as they apply to the Loss of Main Feedwater (MFW): HPI, under total feedwater loss conditions	4.4	48
055 / Station Blackout / 6		X					EK1.02	Knowledge of the operational implications of the following concepts as they apply to the Station Blackout : Natural circulation cooling	4.1	49
056 / Loss of Off-site Power / 6					X		AA1.10	Ability to operate and / or monitor the following as they apply to the Loss of Offsite Power: Auxiliary/emergency feedwater pump (motor driven)	4.3	50
057 / Loss of Vital AC Inst. Bus / 6						X	AA2.04	Ability to determine and interpret the following as they apply to the Loss of Vital AC Instrument Bus: ESF system panel alarm annunciators and channel status indicators	3.7	51
058 / Loss of DC Power / 6					X		AA1.01	Ability to operate and / or monitor the following as they apply to the Loss of DC Power: Cross-tie of the affected dc bus with the alternate supply	3.4	52
062 / Loss of Nuclear Svc. Water / 4						X	AA2.01	Ability to determine and interpret the following as they apply to the Loss of Nuclear Service Water: Location of a leak in the CCWS	2.9	53
E04 / LOCA Outside Containment / 3						X	EA2.1	Ability to determine and interpret the following as they apply to the (LOCA Outside Containment) Facility conditions and selection of appropriate procedures during abnormal and emergency operations.	3.4	54
E05 / Inadequate Heat Transfer - Loss of Secondary Heat Sink / 4				X			EK3.2	Knowledge of the reasons for the following responses as they apply to the (Loss of Secondary Heat Sink) Normal, abnormal and emergency operating procedures associated with (Loss of Secondary Heat Sink).	3.7	55
E11 / Loss of Emergency Coolant Recirc. / 4		X					EK1.3	Knowledge of the operational implications of the following concepts as they apply to the (Loss of Emergency Coolant Recirculation) Annunciators and conditions indicating signals, and remedial actions associated with the (Loss of Emergency Coolant Recirculation).	3.6	56
K/A Category Point Totals:	0/3	3	0	2	6	7/3	Group Point Total:			18/6

Written Examination Outline
Emergency and Abnormal Plant Evolutions – Tier 1 Group 2

E/APE # / Name Safety Function	G	K1	K2	K3	A1	A2	Number	K/A Topic(s)	Imp.	Q#
037 / Steam Generator Tube Leak / 3	X						2.4.30	Emergency Procedures / Plan Knowledge of which events related to system operations/status should be reported to outside agencies	3.6	82
061 / ARM System Alarms / 7						X	AA2.05	Ability to determine and interpret the following as they apply to the Area Radiation Monitoring (ARM) System Alarms: Need for area evacuation, check against existing limits	4.2	83
E01 & E02 / Rediagnosis and SI Termination / 3						X	EA2.1	Ability to determine and interpret the following as they apply to the (Reactor Trip or Safety Injection Rediagnosis) Facility conditions and selection of appropriate procedures during abnormal and emergency operations	4.0	84
E15 / High Containment Radiation / 9	X						2.4.4	Emergency Procedures / Plan Ability to recognize abnormal indications for system operating parameters which are entry-level conditions for emergency and abnormal operating procedures	4.3	85
001 / Continuous Rod Withdrawal / 1					X		AA1.01	Ability to operate and / or monitor the following as they apply to the Continuous Rod Withdrawal: Bank select switch	3.5	57
003 / Dropped Control Rod / 1			X				AK2.05	Knowledge of the interrelations between the Dropped Control Rod and the following: Control rod drive power supplies and logic circuits	2.5	58
037 / Steam Generator Tube Leak / 3		X					AK1.01	Knowledge of the operational implications of the following concepts as they apply to Steam Generator Tube Leak: Use of steam tables	2.9	59
061 / ARM System Alarms / 7						X	AA2.01	Ability to determine and interpret the following as they apply to the Area Radiation Monitoring (ARM) System Alarms: ARM panel displays	3.5	60
E01 & E02 / Rediagnosis and SI Termination / 3	X						2.4.31	Emergency Procedures / Plan Knowledge of annunciators alarms and indications, and use of the response instructions.	3.3	61
E07 / Inad. Core Cooling / 4				X			EK3.3	Knowledge of the reasons for the following responses as they apply to the (Saturated Core Cooling) Manipulation of controls required to obtain desired operating results during abnormal and emergency situations.	3.8	62
E08 / RCS Overcooling - PTS / 4				X			EK3.3	Knowledge of the reasons for the following responses as they apply to the (Pressurized Thermal Shock) Manipulation of controls required to obtain desired operating results during abnormal and emergency situations.	3.7	63

Written Examination Outline
Emergency and Abnormal Plant Evolutions – Tier 1 Group 2

E/APE # / Name Safety Function	G	K1	K2	K3	A1	A2	Number	K/A Topic(s)	Imp.	Q#
E13 / Steam Generator Over-pressure / 4			X				EK2.1	Knowledge of the interrelations between the (Steam Generator Overpressure) and the following: Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.	3.0	64
E16 / High Containment Radiation / 9	X						2.1.30	Conduct of Operations: Ability to locate and operate components, including local controls.	3.9	65
K/A Category Point Total:	2/2	1	2	2	1	1/2	Group Point Total:			9/4

Written Examination Outline
Emergency and Abnormal Plant Evolutions – Tier 2 Group 1

System #/Name	G	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	Number	K/A Topics	Imp.	Q#
003 Reactor Coolant Pump	X											2.1.33	Conduct of Operations: Ability to recognize indications for system operating parameters which are entry-level conditions for technical specifications.	4.0	86
010 Pressurizer Pressure Control	X											2.2.22	Equipment Control Knowledge of limiting conditions for operations and safety limits	4.1	87
039 Main and Reheat Steam									X			A2.05	Ability to (a) predict the impacts of the following mal functions or operations on the MRSS; and (b) based on predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Increasing steam demand, its relationship to increases in reactor power	3.6	88
078 Instrument Air									X			A2.01	Ability to (a) predict the impacts of the following malfunctions or operations on the IAS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Air dryer and filter malfunctions	2.9	89
103 Containment									X			A2.04	Ability to (a) predict the impacts of the following malfunctions or operations on the containment system; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations Containment evacuation (including recognition of the alarm)	3.6	90
003 Reactor Coolant Pump												K5.02	Knowledge of the operational implications of the following concepts as they apply to the RCPS: Effects of RCP coastdown on RCS parameters	2.8	1
003 Reactor Coolant Pump				X								K3.02	Knowledge of the effect that a loss or malfunction of the RCPS will have on the following: S/G	3.5	2
004 Chemical and Volume Control											X	A4.12	Ability to manually operate and/or monitor in the control room: Boration/dilution batch control	3.8	3
005 Residual Heat Removal											X	A4.04	Ability to manually operate and/or monitor in the control room: Controls and indication for closed cooling water pumps	3.1	4
005 Residual Heat Removal				X								K3.05	Knowledge of the effect that a loss or malfunction of the RHRS will have on the following: ECCS	3.7	5
006 Emergency Core Cooling									X			A2.11	Ability to (a) predict the impacts of the following malfunctions or operations on the ECCS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Rupture of ECCS header	4.0	6
007 Pressurizer Relief/Quench Tank											X	A4.01	Ability to manually operate and/or monitor in the control room: PRT spray supply valve	2.7	7

Written Examination Outline
Emergency and Abnormal Plant Evolutions – Tier 2 Group 1

System #/Name	G	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	Number	K/A Topics	Imp.	Q#
008 Component Cooling Water									X			A2.02	Ability to (a) predict the impacts of the following malfunctions or operations on the CCWS, and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: High/low surge tank level	3.2	8
010 Pressurizer Pressure Control						X						K5.01	Knowledge of the operational implications of the following concepts as the apply to the PZR PCS: Determination of condition of fluid in PZR, using steam tables	3.5	9
012 Reactor Protection							X					K6.06	Knowledge of the effect of a loss or malfunction of the following will have on the RPS: Sensors and detectors	2.7	10
013 Engineered Safety Features Actuation											X	A4.01	Ability to manually operate and/or monitor in the control room: ESFAS-initiated equipment which fails to actuate	4.5	11
022 Containment Cooling					X							K4.01	Knowledge of CCS design feature(s) and/or interlock(s) which provide for the following: Cooling of containment penetrations	2.5	12
022 Containment Cooling		X										K1.02	Knowledge of the physical connections and/or cause-effect relationships between the CCS and the following systems: SEC/remote monitoring systems	3.7	13
026 Containment Spray	X											2.1.23	Conduct of Operations: Ability to perform specific system and integrated plant procedures during all modes of plant operation.	3.9	14
039 Main and Reheat Steam				X								K3.05	Knowledge of the effect that a loss or malfunction of the MRSS will have on the following: RCS	3.6	15
039 Main and Reheat Steam		X										K1.08	Knowledge of the physical connections and/or cause-effect relationships between the MRSS and the following systems: MFW	2.7	16
059 Main Feedwater										X		A3.02	Ability to monitor automatic operation of the MFW, including: Programmed levels of the S/G	2.9	17
059 Main Feedwater					X							K4.16	Knowledge of MFW design feature(s) and/or interlock(s) which provide for the following: Automatic trips for MFW pumps	3.1	18
061 Auxiliary/Emergency Feedwater		X										K1.07	Knowledge of the physical connections and/or cause-effect relationships between the AFW and the following systems: Emergency water source	3.6	19
061 Auxiliary/Emergency Feedwater										X		A3.02	Ability to monitor automatic operation of the AFW, including: RCS cooldown during AFW operations	4.0	20

Written Examination Outline
Emergency and Abnormal Plant Evolutions – Tier 2 Group 1

System #/Name	G	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	Number	K/A Topics	Imp.	Q#
062 AC Electrical Distribution									X			A2.15	Ability to (a) predict the impacts of the following malfunctions or operations on the ac distribution system; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Consequence of paralleling out-of-phase/mismatch in volts	2.8	21
063 DC Electrical Distribution				X								K3.01	Knowledge of the effect that a loss or malfunction of the dc electrical system will have on the following: ED/G	3.7	22
064 Emergency Diesel Generator					X							K4.02	Knowledge of ED/G system design feature(s) and/or inter-lock(s) which provide for the following: Trips for ED/G while operating (normal or emergency)	3.9	23
064 Emergency Diesel Generator										X		A3.05	Ability to monitor automatic operation of the ED/G system, including: Operation of the governor control of frequency and voltage control in parallel operation	2.8	24
073 Process Radiation Monitoring									X			A2.02	Ability to (a) predict the impacts of the following malfunctions or operations on the PRM system; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Detector failure	2.7	25
076 Service Water			X									K2.01	Knowledge of bus power supplies to the following: Service water	2.7	26
078 Instrument Air				X								K3.02	Knowledge of the effect that a loss or malfunction of the IAS will have on the following: Systems having pneumatic valves and controls	3.4	27
103 Containment										X		A3.01	Ability to monitor automatic operation of the containment system, including: Containment isolation	3.9	28
K/A Category Point Totals:	1/2	3	1	5	3	2	1	0	4/3	4	4	Group Point Total:			**28**/5

Written Examination Outline
Emergency and Abnormal Plant Evolutions – Tier 2 Group 2

System #/Name	G	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	Number	K/A Topics	Imp.	Q#
001 Control Rod Drive	X											2.1.32	Conduct of Operations: Ability to explain and apply all system limits and precautions.	3.8	91
045 Main Turbine Generator									X			A2.17	Ability to (a) predict the impacts of the following malfunctions or operation on the MT/G system; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Malfunction of electrohydraulic control	2.9	92
056 Condensate	X											2.4.50	Emergency Procedures / Plan Ability to verify system alarm setpoints and operate controls identified in the alarm response manual.	3.3	93
001 Control Rod Drive			X									K2.01	Knowledge of bus power supplies to the following: One-line diagram of power supply to M/G sets.	3.5	29
002 Reactor Coolant					X							K4.05	Knowledge of RCS design feature(s) and/or interlock(s) which provide for the following: Detection of RCS leakage	3.8	30
011 Pressurizer Level Control				X								K3.01	Knowledge of the effect that a loss or malfunction of the PZR LCS will have on the following: CVCS	3.2	31
028 Hydrogen Recombiner and Purge Control								X				A1.01	Ability to predict and/or monitor changes in parameter (to prevent exceeding design limits) associated with operating the HRPS controls including: Hydrogen concentration	3.4	32
033 Spent Fuel Cooling	X											2.1.27	Conduct of Operations: Knowledge of system purpose and or function.	2.8	33
034 Fuel Handling Equipment							X					K6.02	Knowledge of the effect of a loss or malfunction on the following will have on the Fuel Handling System : Radiation monitoring systems	2.6	34
045 Main Turbine Generator		X										K1.18	Knowledge of the physical connections and/or cause-effect relationships between the MT/G system and the following systems: RPS	3.6	35
068 Liquid Radwaste										X		A3.02	Ability to monitor automatic operation of the Liquid Radwaste System including: Automatic isolation	3.6	36
071 Waste Gas Disposal								X				A1.06	Ability to predict and/or monitor changes in parameters(to prevent exceeding design limits) associated with Waste Gas Disposal System operating the controls including: Ventilation system	2.5	37

Written Examination Outline
Emergency and Abnormal Plant Evolutions – Tier 2 Group 2

System #/Name	G	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	Number	K/A Topics	Imp.	Q#
075 Circulating Water		X										K1.02	Knowledge of the physical connections and/or cause-effect relationships between the circulating water system and the following systems: Liquid radwaste discharge	2.9	38
K/A Category Point Totals:	1/2	2	1	1	1	0	1	2	0/1	1	0	Group Point Total:			**10/3**

Facility:	BVPS-1	Date of Exam:	2/28/2005

Category	K/A #	Topic	RO		SRO-Only	
			IR	Q#	IR	Q#
1. Conduct of Operations	2.1.20	Ability to execute procedure steps.			4.2	94
	2.1.14	Knowledge of system status criteria which require the notification of plant personnel.			3.3	95
	2.1.1	Knowledge of conduct of operations requirements.	3.7	66		
	2.1.25	Ability to obtain and interpret station reference materials such as graphs, monographs, and tables which contain performance data.	2.8	67		
	Subtotal			2		2
2. Equipment Control	2.2.28	Knowledge of new and spent fuel movement procedures.			3.5	96
	2.2.22	Knowledge of limiting conditions for operations and safety limits.			4.1	97
	2.2.12	Knowledge of surveillance procedures.	3.0	68		
	2.2.25	Knowledge of bases in technical specifications for limiting conditions for operations and safety limits.	2.5	69		
	2.2.30	Knowledge of RO duties in the control room during fuel handling such as alarms from fuel handling area, communication with fuel storage facility, systems operated from the control room in support of fueling operations, and supporting instrumentation.	3.5	70		
	Subtotal			3		2
3. Radiation Control	2.3.9	Knowledge of the process for performing a containment purge.			3.4	98
	2.3.10	Ability to perform procedures to reduce excessive levels of radiation and guard against personnel exposure.	2.9	71		
	2.3.11	Ability to control radiation releases.	2.7	72		
	Subtotal			2		1
4. Emergency Procedures / Plan	2.4.35	Knowledge of local auxiliary operator tasks during emergency operations including system geography and system implications.			3.5	99
	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	100
	2.4.29	Knowledge of the emergency plan.	2.6	73		
	2.4.20	Knowledge of operational implications of EOP warnings, cautions, and notes.	3.3	74		
	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.	3.5	75		
	Subtotal			3		2
Tier 3 Point Total				10		7

Tier / Group	Randomly Selected K/A	Reason for Rejection
1 / 1	057 AA2.09	The subject K/A isn't relevant at the subject facility.
1 / 2	001 AA1.04	The subject K/A isn't relevant at the subject facility.
1 / 2	003 AK2.03	The subject K/A isn't relevant at the subject facility.
2 / 1	012 K6.11	The subject K/A isn't relevant at the subject facility.
2 / 2	033 2.4.6	The subject K/A isn't relevant at the subject facility.
2 / 1	059 K4.14	The subject K/A's importance rating isn't equal to or greater than 2.5 for the license level of the proposed examination, and there isn't a site-specific priority that justifies keeping the K/A, if its importance rating is below 2.5.
2 / 1	061 K1.10	The subject K/A isn't relevant at the subject facility.
3	G2.2.9	The subject K/A's importance rating isn't equal to or greater than 2.5 for the license level of the proposed examination, and there isn't a site-specific priority that justifies keeping the K/A, if its importance rating is below 2.5.
1 / 1	027 2.4.49	The subject K/A isn't relevant at the subject facility.
1 / 1	062 2.1.14	It isn't possible to prepare a psychometrically sound question related to the subject K/A.
1 / 2	067 AA2.11	It isn't possible to prepare a psychometrically sound question related to the subject K/A.
1 / 1	062 2.1.23	Random selection of replacement KA was a duplicate topic.
3	G2.4.29	Duplicate of KA already selected.
3	G2.2.17	KA deleted because 3 topics selected for Generic Section 2. Replaced with 2.4.4.

Facility: BVPS-1	Date of Exam: 2/28/05	Scenario Numbers: 1/2 /3/4	Operating Test No.: NRC

QUALITATIVE ATTRIBUTES		Initials		
		a	b*	c#
1.	The initial conditions are realistic, in that some equipment and/or instrumentation may be out of service, but it does not cue the operators into expected events.	JGA		
2.	The scenarios consist mostly of related events.	JGA		
3.	Each event description consists of • the point in the scenario when it is to be initiated • the malfunction(s) that are entered to initiate the event • the symptoms/cues that will be visible to the crew • the expected operator actions (by shift position) • the event termination point (if applicable)			
4.	No more than one non-mechanistic failure (e.g., pipe break) is incorporated into the scenario without a credible preceding incident such as a seismic event.	JGA		
5.	The events are valid with regard to physics and thermodynamics.	JGA		
6.	Sequencing and timing of events is reasonable, and allows the examination team to obtain complete evaluation results commensurate with the scenario objectives.	JGA		
7.	If time compression techniques are used, the scenario summary clearly so indicates. Operators have sufficient time to carry out expected activities without undue time constraints. Cues are given.	N/A	N/A	NA
8.	The simulator modeling is not altered.	JGA		
9.	The scenarios have been validated. Pursuant to 10CFR 55.46(d), any open simulator performance deficiencies or deviations from the referenced plant have been evaluated to ensure that functional fidelity is maintained while running the planned scenarios.			
10.	Every operator will be evaluated using at least one new or significantly modified scenario. All other scenarios have been altered in accordance with Section D.5 of ES-301.	JGA		
11.	All individual operator competencies can be evaluated, as verified using Form ES-301-6 (submit the form along with the simulator scenarios).	JGA		
12.	Each applicant will be significantly involved in the minimum number of transients and events specified on Form ES-301-5 (submit the form with the simulator scenarios).	JGA		
13.	The level of difficulty is appropriate to support licensing decisions for each crew position.	JGA		

TARGET QUANTITATIVE ATTRIBUTES (PER SCENARIO; SEE SECTION D.5.d)		Actual Attributes				-	-	-
		1	*2*	*3*	*4*			
1.	Total malfunctions (5-8)	6	6	6	6	JGA		
2.	Malfunctions after EOP entry (1-2)	2	2	3	1	JGA		
3.	Abnormal events (2-4)	3	3	2	4	JGA		
4.	Major transients (1-2)	1	1	2	1	JGA		
5.	EOPs entered/requiring substantive actions (1-2)	2	2	2	2	JGA		
6.	EOP contingencies requiring substantive actions (0-2)	1	0	0	0	JGA		
7.	Critical tasks (2-3)	2	2	3	2	JGA		

2005 BVPS-1 Initial License Examination
Outline Submittal
PSA Considerations

The scenarios developed for the 2005 BVPS-1 NRC license examination were constructed in consideration of the BVPS-1 Plant Specific Analysis. (PSA)

Each scenario considered one or more of the following 3 factors:

1. Contribution to CDF by sequence type
2. Contribution to CDF by initiator
3. Contribution to CDF by system

Component or instrument failures were chosen based upon the importance of the system to CDF. River Water, Auxiliary Feedwater, and Electrical Distribution failures throughout the scenarios will all increase the likelihood of core damage in accordance with the BVPS-1 PSA. Instrument failures affecting the operation of control systems such as Pressurizer Pressure Control and CVCS are also part of important event sequences.

Major transients were developed based upon either sequence type or initiator. Each of the Major events developed for the BVPS-1 scenarios were selected for their importance either as an initiator (Loss of Feedwater, ATWS), or by sequence type (LOCA, SGTR, MSLB). The events were designed to place the crew in a position to evaluate the performance of operator actions important to the PSA.

For the JPM examination, one new JPM was developed to evaluate important operator actions contributing to CDF:

- Actions for SI Termination (Top 10 action #1)

The remaining JPM's were selected or developed with consideration of the importance of the system or evolution that the task is performed on.

Facility:	BVPS-1				Date of Exam:	2/28/2005			Operating Test No.:	NRC				
APPLICANT	EVENT TYPE	Scenarios											TOTAL	MINIMUM
		1			2			3			4			
		CREW POSITION			CREW POSITION			CREW POSITION			CREW POSITION			
		SRO	ATC	BOP	SRO	ATC	BOP	SRO	ATC	BOP	SRO	ATC	BOP	
SROI-1	RX					1								1	1*
	NOR	1												1	1*
	I/C	2,3,4, 6,7				4,6,8								8	4*
	MAJ	5				7								2	2
	TS	2,3,4												3	2
SROI-2	RX								1					1	1*
	NOR				1									1	1*
	I/C				4,5,6				2,3					5	4*
	MAJ				7				4,6					3	2
	TS				2,3,6									3	2
SROI-3	RX								1					1	1*
	NOR	1												1	1*
	I/C	2,3,4, 6,7							2,3					7	4*
	MAJ	5							4,6					3	2
	TS	2,3,4												3	2
SROU-1	RX													0	1*
	NOR	1			1									2	1*
	I/C	2,3,4, 6,7			4,5,6									8	4*
	MAJ	5			7									2	2
	TS	2,3,4			2,3,6									6	2

Instructions:

1. Circle the applicant level and enter the operating test number and Form ES-D-1 event numbers for each event type; TS are not applicable for RO applicants. ROs must service in both the "at-the-controls (ATC)" and "balance-of-plant (BOP)" positions; Instant SROs must do one scenario, including at least two instrument or component (I/C) malfunctions and one major transient, in the ATC position.

2. Reactivity manipulations may be conducted under normal or *controlled* abnormal conditions (refer to Section D.5.d) but must be significant per Section C.2.a of Appendix D.* Reactivity and normal evolutions may be replaced with additional instrument or component malfunctions on a 1-for-1 basis.

3. Whenever practical, both instrument and component malfunctions should be included; only those that require verifiable actions that provide insight to the applicant's competence count toward the minimum requirement.

Author: T. Wood

NRC Reviewer: A. Barr

Facility:	BVPS-1				Date of Exam:	2/28/2005				Operating Test No.:	NRC			
APPLICANT	EVENT TYPE	Scenarios												
		1			2			3			4			TOTAL	MINIMUM
		CREW POSITION			CREW POSITION			CREW POSITION			CREW POSITION				
		SRO	ATC	BOP	SRO	ATC	BOP	SRO	ATC	BOP	SRO	ATC	BOP		
RO-1	RX		1											1	1*
	NOR						1							1	1*
	I/C		2,3,6				5,9							5	4*
	MAJ		5				7							2	2
	TS														2
RO-2	RX					1								1	1*
	NOR			1										1	1*
	I/C			2,4,7		4,6,8								6	4*
	MAJ			5		7								2	2
	TS														2
RO-3	RX		1											1	1*
	NOR						1							1	1*
	I/C		2,3,6				5,9							5	4*
	MAJ		5				7							2	2
	TS														2
RO-4	RX					1								1	1*
	NOR			1										1	1*
	I/C			2,4,7		4,6,8								6	4*
	MAJ			5		7								2	2
	TS														2
RO-5	RX					1								1	1*
	NOR			1										1	1*
	I/C			2,4,7		4,6,8								6	4*
	MAJ			5		7								2	2
	TS														2

Facility: BVPS-1	Date of Examination:				2/28/2005				Operating Test No.				NRC			
Competencies	APPLICANTS															
	SRO				ATC				BOP							
	SCENARIO				SCENARIO				SCENARIO				SCENARIO			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Interpret/Diagnose Events and Conditions	234 67	234 56	234 6	134 57	236	468	236	34	245 7	259	345 7	156				
Comply With and Use Procedures (1)	123 46	134 56	123 46	1-7	123 6	146 78	123 6	234 67	124 7	157 9	135 7	12				
Operate and Control Boards (2)	NA	NA	NA	NA	123 6	146 8	123	234	124 7	159	135 7	125				
Communicate and Interact	ALL	ALL	ALL	ALL	123 56	146 78	123 6	234 67	124 57	125 79	134 57	125 67				
Demonstrate Supervisory Ability (3)	ALL	ALL	ALL	ALL	NA	NA	NA	NA	NA	NA	NA	NA				
Comply With and Use Tech. Specs. (3)	234	236	23	34	NA	NA	NA	NA	NA	NA	NA	NA				

Notes:
(1) Includes Technical Specification compliance for an RO.
(2) Optional for an SRO-U.
(3) Only applicable to SROs.

Instructions:

Circle the applicants' license type and enter one or more event numbers that will allow the examiners to evaluate every applicable competency for every applicant.

Author: T. Wolfe

NRC Reviewer: J. Bon

Facility: **BVPS-1**		Date of Examination:	2/28/2005
Examination Level	**RO**	Operating Test Number:	NRC

Administrative Topic (see Note)	Type Code*	Describe activity to be performed
Conduct of Operations	N	2.1.25 Ability to obtain and interpret station reference materials such as graphs, monographs, and tables which contain performance data (2.8) JPM: Perform RCS Cooldown Verification
Conduct of Operations	M	2.1.23 Ability to perform specific system and integrated plant procedures during all modes of plant operation (3.9) JPM: Perform an ECP Calculation
Equipment Control	M	2.2.13 Knowledge of Tagging and Clearance Procedures (3.6) JPM: Review a Tagging Request
Radiation Control	N	2.3.2 Knowledge of facility ALARA program (2.5) JPM: Determine Maximum Allowable Stay Time
Emergency Plan		

NOTE: All items (5 total are required for SROs. RO applicants require only 4 items unless they are retaking only the administrative topics, when 5 are required.

*Type Codes & Criteria:

(C)ontrol room

(D)irect from bank (≤ 3 for ROs; ≤ for 4 for SROs & RO retakes)

(N)ew or (M)odified from bank (> 1)

(P)revious 2 exams (≤ 1; randomly selected)

(S)imulator

A1a Given a set of plant conditions and a required RCS cooldown, the applicant will be required to determine the cooldown rate and acceptability within specified limits. This is a new JPM.

A1b Given plant conditions prior to a reactor startup, the applicant will be required to calculate the estimated critical boron concentration. This is a modified bank JPM. A variation of this JPM was performed on the 2001 NRC examination.

A2 Given a tagging request, the applicant will be required to perform a review and identify errors contained within the tagging order. This is a modified bank JPM. A variation of this JPM was performed on the 2001 NRC examination.

A3 Given a task to perform in the RCA, the applicant will be required to select the appropriate RWP, evaluate the RWP and a survey map, and determine maximum stay time in the work area. This is a new JPM.

Facility:	**BVPS-1**	Date of Examination:	2/28/2005
Examination Level	**SRO**	Operating Test Number:	NRC

Administrative Topic (see Note)	Type Code*	Describe activity to be performed
Conduct of Operations	D	2.1.12 Ability to apply Technical Specifications for a system (4.0) JPM: Determine Action Required For Failed AC Sources Surveillance
Conduct of Operations	M	2.1.23 Ability to perform specific system and integrated plant procedures during all modes of plant operation (4.0) JPM: Review an ECP Calculation
Equipment Control	M	2.2.13 Knowledge of Tagging and Clearance Procedures (3.8) JPM: Approve a Tagging Request
Radiation Control	N	2.3.8 Knowledge of the process for performing a planned Gaseous Radioactive release (3.2) JPM: Review a Gaseous Waste Discharge Authorization
Emergency Plan	N	2.4.40 Knowledge of SROs responsibilities in emergency plan implementation (4.0) JPM: Terminate an Emergency Classification

NOTE: All items (5 total are required for SROs. RO applicants require only 4 items unless they are retaking only the administrative topics, when 5 are required.

*Type Codes & Criteria:	(C)ontrol room
	(D)irect from bank (≤ 3 for ROs; ≤ for 4 for SROs & RO retakes)
	(N)ew or (M)odified from bank (> 1)
	(P)revious 2 exams (≤ 1; randomly selected)
	(S)imulator

A1a The applicant will be required to identify procedural errors and determine the required Technical Specification actions for a failed surveillance test. This is a bank JPM. This JPM was performed on the 2002 NRC examination.

A1b Given plant conditions prior to a reactor startup, the applicant will be required to calculate the boron concentration required for reactor startup. This is a modified bank JPM. A variation of this JPM was performed on the 2001 NRC examination.

A2 Given a tagging request, the applicant will be required to perform a review and identify errors contained within the tagging order. This is a modified bank JPM. A variation of this JPM was performed on the 2001 NRC examination.

A3 The applicant will be required to review a gaseous waste discharge release permit containing errors that must be identified and corrected prior to approval. This is a new JPM.

A4 The applicant will be given conditions during performance of Emergency Director duties that allow the termination of an emergency classification. The conditions of this JPM are based on a Unit 2 Unusual Event as documented in LER 2-000-03. This is a new JPM.

Facility:	**BVPS-1**	Date of Examination:	2/28/2005
Exam Level :	RO / SRO(I) ***SRO(U)***	Operating Test No.:	NRC

Control Room Systems (8 for RO; 7 for SRO-I; 2 or 3 for SRO-U)

JPM #	System	JPM Title	Type Code*	Safety Function
S1	001 Rod Control	Raise Reactor Power to 10^{-8} Amps	NSAL	1
S2	***E02*** ***SI Termination***	***Perform SI Termination IAW ES-1.1***	***NSAE***	***3***
S3	***E03*** ***Post LOCA C/D and Depressurization***	***Isolate SI Accumulators During a LOCA***	***NSAE***	***4P***
S4	041 Steam Dump	Initiate Natural Circulation Cooldown	DASE	4S
S5	103 Containment	Manually Actuate CIB	DSAEP	5
S6	***064*** ***EDG***	***Synchronize and Load EDG No. 2***	***DS***	***6***
S7	015 NIS	Remove Power Range Instrument From Service	DS	7
S8	004 CVCS	Perform Manual Makeup to the VCT	DS	2
In-Plant Systems (3 for RO; 3 for SRO-I; 3 or 2 for SRO-U)				
P1	***028*** ***HRPS***	***Locally Startup a Containment Hydrogen Analyzer***	***DER***	***5***
P2	***061*** ***AFW***	***Reset TDAFW Pump Trip Throttle Valve***	***DR***	***4S***
P3	062 AC Distribution	BV-1 Actions to Establish Station Blackout Cross-Tie to Unit 2	DE	6

@ All control room (and in-plant) systems must be different and serve different safety functions; in-plant systems and functions may overlap those tested in the control room.

• Type Codes	Criteria for RO / SRO-I / SRO-U
(A)lternate path	4-6 / 4-6 / 2-3
(C)ontrol room	
(D)irect from bank	≤ 9 / ≤ 8 / ≤ 4
(E)mergency or abnormal in-plant	≥ 1 / ≥ 1 / ≥ 1
(L)ow-Power	≥ 1 / ≥ 1 / ≥ 1
(N)ew or (M)odified from bank including 1(A)	≥ 2 / ≥ 2 / ≥ 1
(P)revious 2 exams	≤ 3 / ≤ 3 / ≤ 2 (randomly selected)
(R)CA	≥ 1 / ≥ 1 / ≥ 1
(S)imulator	

S1 The applicant will raise reactor power using control rods to approach criticality. Source Range High Flux Trips must be blocked, and power indication switched to Intermediate Range channels. The alternate path of this task will be based on continuous rod motion in the OUT direction. The applicant will be required to trip the reactor based on AOP guidance. This is a new JPM.

S2 SI Termination will be performed requiring the applicant to align normal RCS makeup flowpaths and secure ECCS equipment. The alternate path of this task will require the applicant to diagnose the inability to maintain RCS inventory and based on either EOP or Foldout page guidance, realign the BIT and re-establish HHSI flow. This is a new JPM.

S3 The applicant will be placed in the EOP network during a Post-LOCA Cooldown and Depressurization. The task is to isolate SI accumulators so that RCS depressurization may continue. The alternate path of this task is to vent one SI accumulator to containment once it is determined that it cannot be isolated. This is a new JPM.

S4 The applicant will initiate an RCS cooldown IAW ES-0.2 during natural circulation conditions. The alternate path of this task is to initiate cooldown using the Residual Heat Release Valve after diagnosing the failure of condenser steam dump valves. This is a bank JPM.

S5 The applicant will be required to verify Containment Isolation Phase B (CIB) actuation. The alternate path of this task is to manually realign equipment required by CIB after determining that it did not actuate either automatically, or manually. This is a bank JPM. This task was performed on the 2001 NRC examination.

S6 The applicant will synchronize EDG No. 2 to its emergency bus and raise load on the EDG.

S7 The applicant will perform the action to remove a power range NI channel from service.

S8 The applicant will manually establish makeup to the VCT. This is a bank JPM.

P1 The applicant will locally start a containment hydrogen analyzer. This is a bank JPM that will require entry into the Radiation Control Area (RCA).

P2 The applicant will be required to reset the turbine driven auxiliary feedwater pump trip/throttle valve. This is a bank JPM.

P3 The applicant will perform actions to restore emergency AC power using the station blackout cross-tie to Unit 2. This is a bank JPM.

Facility: **BVPS-1** Scenario No.: **1** Op Test No.: **NRC**

Examiners: _____ Candidates: _____ CRS

_____ _____ RO

_____ _____ PO

Initial Conditions: BOL, 100% power.
1CH-P-1C, HHSI/Charging Pump OOS.
PCV-1RC-456 PORV leakage. MOV-1RC-536, Block Valve closed with power maintained.
Flood warnings from heavy rains.
Maintenance investigating 1WR-P-1A, River Water Pump abnormal vibration/noise.

Turnover: Initiate power reduction to 75% for waterbox cleaning.

Critical Tasks: FR-S.1.C, Initiate RCS Boration and/or insert RCCA's

E-2.A, Isolate Faulted SG

Event No.	Malf. No.	Event Type*	Event Description
1		(R) RO (N) PO, US	Power Reduction For Waterbox Cleaning
2	TUR15	(C) ALL (TS) US	Turbine Control Valve Failure (Load Rejection)
3	PRS08E	(I) RO, US (TS) US	Pressurizer Pressure Transmitter Fails High
4	MSS16E	(I) PO, US (TS) US	SG Pressure Transmitter Fails Low
5	TUR01 MSS07A	(M) ALL	Turbine Trip - Steam Dump Failure. Reactor Trip required.
6	CRF12A CRF12B	(C) RO, US	Auto and Manual Reactor Trip Failure
7	MSS12A	(C) PO, US	One SG Atmospheric Dump Valve Fails Partially Open

(N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor

Scenario Event Description

NRC Scenario 1

The crew will assume the shift at 100% power with instructions to reduce load to 75% for waterbox cleaning.

A turbine load rejection will occur due to a turbine valve position limiter failure requiring the crew to stabilize the plant by matching Tave and Tref and resetting condenser steam dump valves.

After Technical Specifications have been addressed and the plant is stable, Pressurizer Pressure Channel PT-445 will fail high slowly requiring the RO to take manual control of Pressurizer heaters, spray valves, and PORV's. The Unit Supervisor will then address applicable Technical Specifications.

When RCS pressure is stable, SG pressure transmitter PT-485 will fail low causing the steam flow signal to its associated main feedwater control valve to fail low. The PO will take manual control of the affected valve to prevent RPS actuation on SG low-low level.

When SG level is under control and Technical Specifications have been addressed, a turbine trip will occur with a steam dump failure requiring a reactor trip.

Upon reactor trip, the reactor trip breakers will not open automatically or manually. The RO must insert rods and initiate emergency boration. The Unit Supervisor will direct crew response in accordance with the ATWS Functional Recovery procedure.

A faulted SG develops due to a stuck open SG atmospheric dump valve requiring transition to E-2 to isolate the faulted SG. The scenario is terminated upon completion of E-2, or upon transition to ES-1.1.

EOP Flow Path: E-0, FR-S.1, E-0, E-2

Facility: **BVPS-1** Scenario No.: **2** Op Test No.: **NRC**

Examiners: _____ Candidates: _____ CRS

_____ _____ RO

_____ _____ PO

Initial Conditions: MOL, 53% power.
1CH-P-1C, HHSI/Charging Pump is OOS.
PCV-1RC-456 PORV leakage. MOV-1RC-536, Block Valve is closed with power maintained.
Flood warnings from heavy rains.
Maintenance investigating 1WR-P-1A, River Water Pump abnormal vibration/noise.

Turnover: Reduce power to take the unit off-line due to circulating water intake clogging.

Critical Tasks: E-0.I, Start Train "B" HHSI/Charging Pump
E-1.C, Stop RCP's

Event No.	Malf. No.	Event Type*	Event Description
1		(R) RO (N) PO, US	Reduce Power
2	FWM16D	(TS) US	SG Level Transmitter Fails High
3	EPS11A	(TS) US	Train "A" (No. 1) EDG Failure
4	X06A087P	(C) RO, US	Letdown Pressure Control Valve Fails Closed In Auto
5	FWM15A	(C) PO, US	SG "A" FRV Controller Fails Closed In Auto
6	RCS02A	(C) RO, US (TS) US	RCS Leak
7	RCS02A	(M) ALL	SBLOCA
8	INH40	(C) RO	Train "B" HHSI/Charging Pump Auto Start Failure
9	SIS10A	(C) PO	AFW Start Failure (Auto SI Failure Train "A")

(N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor

Scenario Event Description

NRC Scenario 2

The crew will assume the shift at 53% power with directions to reduce power to take the unit offline due to circulating water intake clogging.

As power is being reduced, a SG "B" level transmitter will fail high requiring the Unit Supervisor to refer to Technical Specifications.

When the Unit Supervisor has reviewed Technical Specifications, a control power breaker will inadvertently open making the No. 1 Emergency Diesel Generator inoperable. This failure provides the Unit Supervisor with an additional Technical Specification referral and sets up required actions post-trip.

When Technical Specifications have been addressed, the letdown pressure control valve will fail closed requiring the RO to take manual control to restore letdown flow.

When letdown is restored, SG "A" main feedwater control valve will fail closed in automatic, requiring the PO to take manual control to stabilize SG level.

When SG level is stabilized, an RCS leak will develop. When the Unit Supervisor refers to Technical Specifications, the leak will degrade into a SBLOCA requiring a reactor trip and safety injection actuation by the crew.

The Train "B" HHSI/Charging Pump will fail to automatically start and must be started manually. RCP's must be tripped when criteria is met due to the LOCA. ESF Train "A" components must be started manually by the operators.

The scenario may be terminated upon entry to ES-1.2, Post LOCA Cooldown And Depressurization, or when RCS cooldown is initiated.

EOP Flow path: E-0, E-1, ES-1.2

Facility: **BVPS-1** Scenario No.: **3** Op Test No.: **NRC**

Examiners: _____ Candidates: _____ CRS

_____ _____ RO

_____ _____ PO

Initial Conditions: MOL, 25% power.

PCV-1RC-456, PORV 456 Leakage. MOV-1RC-536, Block Valve closed with power maintained

Flood watch remains in effect.

Turnover: Raise power to 100% after a trip due to loss of all circulating water.

Critical Tasks: E-0.F, Initiate Feedwater Flow with MDAFW

E-3.A, Isolate Ruptured SG

E-0.O, Initiate CIA

Event No.	Malf. No.	Event Type*	Event Description
1		(R) RO (N) PO, US	Raise Power
2	AUX10A	(C) RO, US (TS) US	Train "A" River Water Pump Trips. (Backup pump must be manually started.)
3	EPS04E INH53	(C) ALL (TS) US	Loss of 4KV Bus "1AE". No. 1 EDG Fails to Auto Start.
4	FWM01A EPS11A	(M) ALL	MFW Pump "A" Degradation/Trip. Reactor Trip. No. 1 EDG Failure
5	INH33 INH36 INH20 INH21	(C) PO	MDAFW Train "B" Pump Auto Start Failure TDAFW Pump Auto Start Failure
6	RCS03B	(M) ALL	SG "B" SGTR (when AFW is initiated).
7	INH49	(C) PO	CIA Fails To Automatically Actuate

(N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor

Scenario Event Description

NRC Scenario 3

The crew will assume the shift at approximately 25% power with instructions to raise power to 100%.

After initiation of the power increase, the running river water pump will trip. The backup pump will not start automatically and must be started manually by the RO.

When Technical Specifications have been addressed, 4KV Emergency Bus "1AE" will be de-energized and the crew must manually start No. 1 EDG and reinitiate charging flow. The Unit Supervisor will refer to Technical Specifications.

When the plant is stable, the running main feedwater pump will trip requiring a reactor trip. The No. 1 EDG will fail de-energizing 4KV Bus "1AE". The Train "B" MDAFW pump and the TDAFW pump will fail to automatically start requiring manual start by the operator.

When transition is made to ES-0.1 and AFW pumps have been started, a SGTR will develop requiring SI initiation. CIA valves will not automatically close requiring manual closure by the PO while performing Attachment 1-K, Verification of Automatic Actions.

The scenario is terminated when the ruptured SG is isolated in E-3 and the crew has commenced an RCS cooldown.

EOP Flow Path: E-0, ES-0.1, E-0, E-3

Facility: **BVPS-1** Scenario No.: **4** Op Test No.: **NRC**

Examiners: _____ Candidates: _____ CRS

_____ _____ RO

_____ _____ PO

Initial Conditions: MOL, 75% power.
PCV-1RC-456, PORV 456 leakage. MOV-1RC-536, Block Valve closed with power maintained.
River level has receded. Flood watch cancelled on last shift.
1WR-P-1A, River Water Pump OOS.

Turnover: Continue raising power to 100%.

Critical Tasks: E-2.A, Close MSIVs
Terminate ECCS prior to water relief through PORV's

Event No.	Malf. No.	Event Type*	Event Description
1	FWM01B	(C) PO, US	Main Feedwater Pump (FW-P-1B) Trip
2		(R) RO (N) PO, US	Rapid Load Reduction
3	CRF04BV	(C) RO, US (TS) US	Control Rod K-6 Drops (Reactor does not trip.)
4	X07A090P	(C) RO, US (TS) US	Pressurizer Master Pressure Controller Output Fails High
5	FWM14F	(I) PO, US	SG "C" Feedwater Flow Transmitter Fails High
6	FWM07C	(M) ALL	SG "C" Feedwater Reg Valve failure (Unrecoverable). Reactor Trip Required.
7	MSS02B	(C) PO	Main Steam Break Downstream of MSIV's MSIV's Fail To Close Automatically

(N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor

Scenario Event Description

NRC Scenario 4

The crew will assume the shift with instructions to raise power to 100%.

A main feedwater pump will trip requiring the crew to initiate a rapid load reduction. After the load reduction, one control rod will drop requiring action to realign and the Unit Supervisor to refer to Technical Specifications.

After the plant is stabilized, the Pressurizer master pressure controller output will fail high requiring the RO to take action to manually control Pressurizer pressure with backup heaters and spray valves. The Unit Supervisor will refer to Technical Specifications.

When Pressurizer pressure is returned to program, a SG feed flow transmitter failure will require the PO to take manual control of the affected SG main feedwater control valve. When the affected SG level is under control, an unrecoverable main feedwater control valve failure will require a reactor trip.

Upon reactor trip, a steam break will develop downstream of the MSIVs. SI will actuate; however, main steam line isolation will not occur automatically.

The steam line break will be terminated after manual actuation of main steamline isolation by the PO.

The scenario may be terminated when the crew stops HHSI pumps in ES-1.1.

EOP Flow Path: E-0, ES-0.1, E-0, ES-1.1