

**EXAMINATION OUTLINE SUBMITTAL AND COMMENTS  
FOR THE FERMI INITIAL EXAMINATION - JANUARY 2008**

Joseph H. Plona  
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**DTE Energy**



October 16, 2007  
NRC-07-0054

Mr. Hironori Peterson  
Chief, Operations Branch  
Division of Reactor Safety  
U. S. Nuclear Regulatory Commission  
Region III  
Suite 210  
2443 Warrenville Road  
Lisle, Illinois 60532-4352

Dear Mr. Peterson:

Enclosed please find the proposed examination outline submitted to the NRC in preparation for the upcoming Fermi 2 Initial License Examination scheduled during the week of January 28, 2008:

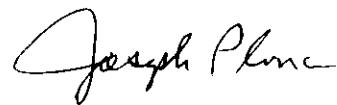
- Examination Outline Quality Checklist (Form ES-201-2)
- Photocopies of Examination Security Agreements (Form ES-201-3)
- RO Administrative Topics Outline(s) (Form ES-301-1)
- SRO Administrative Topics Outline(s) (Form ES-301-1)
- RO Control Room / In-Plant Systems Outline (Form ES-301-2)
- SRO Upgrade Control Room / In-Plant Systems Outline (Form ES-301-2)
- SRO Instant Control Room/In-Plant Systems Outline (Form ES-301-2)
- Transient and Event Checklist (Form ES-301-5)
- Scenario Outlines (Form ES-D-1)
- RO BWR Examination Outline (Form ES-401-1)
- SRO BWR Examination Outline (Form ES-401-1)
- Generic K/A Outline (Form ES-401-3)
- Record of Rejected K/As (Form ES-401-4)

Hironori Peterson  
Chief, Operations Branch  
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The examination outline was developed using the appropriate guidance contained in Revision 9, NUREG 1021, Supplement 1. These materials shall be withheld from public disclosure until after the examinations are complete.

We look forward to working with you and your examination team during the examination development and administration process. If you have any questions or comments regarding the contents of the items listed above, please contact Mr. Timothy P. Horan, General Supervisor, Operations Training at (734) 586-4961.

Sincerely,

A handwritten signature in black ink, appearing to read "Joseph Plume". The signature is fluid and cursive, with a large initial "J" and a long, sweeping underline.

Enclosure

cc: Chief, Reactor Operations Branch  
NRC Resident Office  
Document Control Desk  
Washington D. C.

Facility:		Date of Examination:		
Item	Task Description	Initials		
		a	b*	c*
1. W R I T T E N	a. Verify that the outline(s) fit(s) the appropriate model, in accordance with ES-401.	MB	TPH	MEB
	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.	MB	TPH	MEB
	c. Assess whether the outline over-emphasizes any systems, evolutions, or generic topics.	MB	TPH	MEB
	d. Assess whether the justifications for deselected or rejected K/A statements are appropriate.	MB	TPH	MEB
2. S I M U L A T O R	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.	B	TPH	MEB
	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 that scenarios will not be repeated on subsequent days.	B	TPH	*
	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.	B	TPH	MEB
3. W /	a. Verify that the 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 (2) task repetition from the last two NRC examinations is within the limits specified on the form (3) no tasks are duplicated from the applicants' audit test(s) * (4) the number of new or modified tasks meets or exceeds the minimums specified on the form (5) the number of alternate path, low-power, emergency, and RCA tasks meet the criteria on the form.	B	TPH	*
	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 (2) at least one task is new or significantly modified (3) no more than one task is repeated from the last two NRC licensing examinations	B	TPH	MEB
	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.	B	TPH	MEB
4. G E N E R A L	a. Assess whether plant-specific priorities (including PRA and IPE insights) are covered in the appropriate exam sections.	B	TPH	MEB
	b. Assess whether the 10 CFR 55.41/43 and 55.45 sampling is appropriate.	B	TPH	MEB
	c. Ensure that K/A importance ratings (except for plant-specific priorities) are at least 2.5.	B	TPH	MEB
	d. Check for duplication and overlap among exam sections.	B	TPH	MEB
	e. Check the entire exam for balance of coverage.	B	TPH	MEB
	f. Assess whether the exam fits the appropriate job level (RO or SRO).	B	TPH	MEB
a. Author		Printed Name/Signature		Date
b. Facility Reviewer (*)		Lynn Barker / Lynn H. Barker		10/16/07
c. NRC Chief Examiner (#)		Michael Bielby / Michael Bielby		10/31/07
d. NRC Supervisor		Hiroaki Peterson / Hiroaki Peterson		11/1/07
Note: * Independent NRC reviewer initial items in Column "c"; chief examiner concurrence required. * Not applicable for NRC-prepared examination outlines				

\* Will verify no duplication of audit scenarios during onsite validation

Facility: Fermi 2Date of Examination: 01/28/2008Examination Level: RO ☒ SRO ☐Operating Test Number: 2008-1

Administrative Topic (See Note)	Type Code*	Describe activity to be performed
Conduct of Operations	C,S,R,D	<b>Perform Thermal Limit Verification (MAPRAT) 293009 Core Thermal Limits GENERIC 2.1.7 - Ability to evaluate plant performance and make operational judgments based on operating characteristics / reactor behavior / and instrument interpretation. RO 4.4 / SRO 4.7</b>
Conduct of Operations	C,S,R,M	<b>Complete and Communicate a Nuclear Plant Technical Data Form (Alert) GENERIC 2.4.39 - Knowledge of the RO's responsibilities in emergency plan implementation. RO 3.9 / SRO 3.8</b>
Equipment Control	S,D	<b>Perform 24.202.03, "HPCI System Piping Filled And Valve Position Verification" 206000 High Pressure Coolant Injection System GENERIC 2.2.12 - Knowledge of surveillance procedures. RO 3.7 / SRO 4.1</b>
Radiation Control	C,S,R,D	<b>Determine Dose Limit Will Be Exceeded and Initiate a Dose Extension. GENERIC 2.3.4 - Knowledge of radiation exposure limits and contamination control / including permissible levels in excess of those authorized. RO 3.2 / SRO 3.7</b>
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, (S)imulator, or Class(R)oom
- (D)irect from bank ( $\leq 3$  for ROs;  $\leq 4$  for SROs & RO retakes)
- (N)ew or (M)odified from bank ( $\geq 1$ )
- (P)revious 2 exams ( $\leq 1$ ; randomly selected)

Facility: Fermi 2Date of Examination: 1/28/2008Examination Level: RO ☐ SRO ☒Operating Test Number: 2008-1

Administrative Topic (See Note)	Type Code*	Describe activity to be performed
Conduct of Operations	C,S,R,D	<b>Perform Thermal Limit Verification (MAPRAT) 293009 Core Thermal Limits</b> <b>GENERIC 2.1.7</b> - Ability to evaluate plant performance and make operational judgments based on operating characteristics / reactor behavior / and instrument interpretation. <b>RO 4.4 / SRO 4.7</b>
Conduct of Operations	C,R,S,P	<b>Knowledge of Shift Staffing Requirements</b> <b>GENERIC 2.1.4</b> - Knowledge of individual licensed operator responsibilities related to shift staffing, such as medical requirements, "no-solo" operation, maintenance of active license status, 10CFR55, etc. <b>RO 3.3 / SRO 3.8</b>
Equipment Control	S,D	<b>Perform 24.202.03, "HPCI System Piping Filled And Valve Position Verification"</b> <b>206000 High Pressure Coolant Injection System</b> <b>GENERIC 2.2.12</b> - Knowledge of surveillance procedures. <b>RO 3.7 SRO 4.1</b>
Radiation Control	C,R,S,D	<b>Determine Dose Limit and Complete a Dose Extension</b> <b>GENERIC 2.3.4</b> - Knowledge of radiation exposure limits under normal or emergency conditions. <b>RO 3.2 / SRO 3.7</b>
Emergency Plan	C,S,R,M	<b>Perform On-Site Protective Actions and Classification for Security Event (Alert)</b> <b>GENERIC 2.4.40</b> - Knowledge of the SRO's responsibilities in emergency plan implementation. <b>RO 2.7 SRO 4.5</b>
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: <ul style="list-style-type: none"> <li>(C)ontrol room, (S)imulator, or Class(R)oom</li> <li>(D)irect from bank (<math>\leq 3</math> for ROs; <math>\leq 4</math> for SROs &amp; RO retakes)</li> <li>(N)ew or (M)odified from bank (<math>\geq 1</math>)</li> <li>(P)revious 2 exams (<math>\leq 1</math>; randomly selected)</li> </ul>		

Facility: Fermi 2Date of Examination: 1/28/2008Exam Level: RO ☒ SRO-I ☐ SRO-U ☐Operating Test Number: 2008-1

Control Room Systems® (8 for RO); (7 for SRO-I); (2 or 3 for SRO-U, including 1 ESF)

System / JPM Title	Type Code*	Safety Function
a. Shift Operating CRD Pumps <b>201001 Control Rod Drive Hydraulic System</b> <b>A4.</b> Ability to manually operate and/or monitor in the control room: <b>A4.01</b> CRD pumps <b>RO 3.1 / SRO 3.1</b>	D,S	1
b. Manually Start the RCIC System <b>217000 Reactor Core Isolation Cooling System</b> <b>A4.</b> Ability to manually operate and/or monitor in the control room: <b>A4.04</b> Manually initiated controls <b>RO 3.6 / SRO 3.6</b>	D,S	2
c. Manually Initiate Low Low Set (No Fault) <b>239002 Relief/Safety Valves</b> <b>A4.</b> Ability to manually operate and/or monitor in the control room: <b>A4.01</b> SRV's <b>RO 4.4 / SRO 4.4</b>	D,S	3
d. SOP Run of Core Spray System in Test Mode <b>209001 Low Pressure Core Spray System</b> <b>A2.</b> Ability to (a) predict the impacts of the following on the LOW PRESSURE CORE SPRAY SYSTEM; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: <b>A2.06</b> Inadequate system flow <b>RO 3.2 / SRO 3.2</b>	P,EN,D,A,S	4
e. Restore a RWCU Pump After Oil Sample (Plant Hot) With System Leak and Failure to Isolate <b>223002 Primary Containment Isolation System /Nuclear Steam Supply Shut-Off</b> <b>A2.</b> Ability to (a) predict the impacts of the following on the PRIMARY CONTAINMENT ISOLATION SYSTEM/NUCLEAR STEAM SUPPLY SHUT-OFF ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: <b>A2.03</b> System logic failures <b>RO 3.0 / SRO 3.3</b>	N,S	5
f. Respond to Multiple Rod Drifts and RPS Failure <b>212000 Reactor Protection System</b> <b>A2.</b> Ability to (a) predict the impacts of the following on the REACTOR PROTECTION SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: <b>A2.16</b> Changing mode switch position <b>RO 4.0 / SRO 4.1</b>	D,A,S	7

g. Respond to Refuel Floor High Radiation <b>272000 Radiation Monitoring System</b> <b>A2.</b> Ability to (a) predict the impacts of the following on the RADIATION MONITORING SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: <b>A2.12</b> Refuel floor handling accidents/operations <b>RO 3.3 / SRO 4.0</b>	P,D,A,L,S	9
h. Manually Initiate Div 1 Emergency Equipment Cooling Water <b>400000 Component Cooling Water Systems (CCWS)</b> <b>A4.</b> Ability to manually operate and / or monitor in the control room: <b>A4.01</b> CCW indications and control <b>RO 3.1 / SRO 3.0</b>	N,A,S	8
In-Plant Systems <sup>@</sup> (3 for RO); (3 for SRO-I); (3 or 2 for SRO-U)		
i. Shift In Service IAS Dryers <b>300000: Instrument Air System</b> <b>A2.</b> Ability to (a) predict the impacts of the following on the INSTRUMENT AIR SYSTEM and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operation: <b>A2.01</b> Air dryer and filter malfunctions <b>RO 2.9 / SRO 2.8</b>	D,R	8
j. Defeat ARI Logic Trips <b>216000: Nuclear Boiler Instrumentation</b> <b>Generic 2.4.34</b> Knowledge of RO tasks performed outside the main control room during emergency operations including system geography and system implications. <b>RO 4.2 / SRO 4.1</b>	D,R,E	7
k. Place ESF Battery Charger in Service <b>263000: DC Electrical Distribution</b> <b>Generic 2.1.30</b> Ability to locate and operate components, including local controls. <b>RO 4.4 / SRO 4.0</b> <b>K1.</b> Knowledge of the physical connections and/or cause effect relationships between D.C. ELECTRICAL DISTRIBUTION and the following: <b>K1.02</b> Battery charger and battery <b>RO 3.2 / SRO 3.3</b>	D,R,	6
<sup>@</sup> All RO and SRO-I control room (and in-plant) systems must be different and serve different safety functions; all 5 SRO-U systems must 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 (C)ontrol room (D)irect from bank (E)mergency or abnormal in-plant (EN)gineered safety feature (L)ow-Power / Shutdown (N)ew or (M)odified from bank including 1(A) (P)revious 2 exams (R)CA (S)imulator	4-6 / 4-6 / 2-3  ≤ 9 / ≤ 8 / ≤ 4 ≥ 1 / ≥ 1 / ≥ 1 - / - / ≥ 1 (control room system) ≥ 1 / ≥ 1 / ≥ 1 ≥ 2 / ≥ 2 / ≥ 1 ≤ 3 / ≤ 3 / ≤ 2 (randomly selected) ≥ 1 / ≥ 1 / ≥ 1	



Facility: Fermi-2Date of Examination: 01/28/2008Exam Level: RO ☐ SRO-I ☒ SRO-U ☐Operating Test Number: 2008-1

Control Room Systems® (8 for RO); (7 for SRO-I); (2 or 3 for SRO-U, including 1 ESF)

System / JPM Title	Type Code*	Safety Function
a. Manually Start the RCIC System <b>217000 Reactor Core Isolation Cooling System</b> <b>A4.</b> Ability to manually operate and/or monitor in the control room: <b>A4.04</b> Manually initiated controls <b>RO 3.6 / SRO 3.6</b>	D,S	2
b. Manually Initiate Low Low Set (No Fault) <b>239002 Relief/Safety Valves</b> <b>A4.</b> Ability to manually operate and/or monitor in the control room: <b>A4.01</b> SRV's <b>RO 4.4 / SRO 4.4</b>	D,S	3
c. SOP Run of Core Spray System in Test Mode <b>209001 Low Pressure Core Spray System</b> <b>A2.</b> Ability to (a) predict the impacts of the following on the LOW PRESSURE CORE SPRAY SYSTEM; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: <b>A2.06</b> Inadequate system flow <b>RO 3.2 / SRO 3.2</b>	P,EN,D,A,S	4
d. Restore a RWCU Pump After Oil Sample (Plant Hot) With System Leak and Failure to Isolate <b>223002 Primary Containment Isolation System /Nuclear Steam Supply Shut-Off</b> <b>A2.</b> Ability to (a) predict the impacts of the following on the PRIMARY CONTAINMENT ISOLATION SYSTEM/NUCLEAR STEAM SUPPLY SHUT-OFF ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: <b>A2.03</b> System logic failures <b>RO 3.0 / SRO 3.3</b>	N,S	5
e. Respond to Multiple Rod Drifts and RPS Failure <b>212000 Reactor Protection System</b> <b>A2.</b> Ability to (a) predict the impacts of the following on the REACTOR PROTECTION SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: <b>A2.16</b> Changing mode switch position <b>RO 4.0 / SRO 4.1</b>	D,A,S	7

<p>f. Respond to Refuel Floor High Radiation  <b>272000 Radiation Monitoring System</b>  <b>A2.</b> Ability to (a) predict the impacts of the following on the RADIATION MONITORING SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations:  <b>A2.12</b> Refuel floor handling accidents/operations <b>RO 3.3 / SRO 4.0</b></p>	P,D,A,L,S	9
<p>g. Manually Initiate Div 1 Emergency Equipment Cooling Water  <b>400000 Component Cooling Water Systems (CCWS)</b>  <b>A4.</b> Ability to manually operate and / or monitor in the control room:  <b>A4.01</b> CCW indications and control <b>RO 3.1 / SRO 3.0</b></p>	N,A,S	8
h.		
In-Plant Systems® (3 for RO); (3 for SRO-I); (3 or 2 for SRO-U)		
<p>i. Shift In Service IAS Dryers  <b>300000: Instrument Air System</b>  <b>A2.</b> Ability to (a) predict the impacts of the following on the INSTRUMENT AIR SYSTEM and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operation:  <b>A2.01</b> Air dryer and filter malfunctions <b>RO 2.9 / SRO 2.8</b></p>	D,R	8
<p>j. Defeat ARI Logic Trips  <b>216000: Nuclear Boiler Instrumentation</b>  <b>Generic 2.4.34</b> Knowledge of RO tasks performed outside the main control room during emergency operations including system geography and system implications. <b>RO 4.2 / SRO 4.1</b></p>	D,R,E	7
<p>k. Place ESF Battery Charger in Service  <b>263000: DC Electrical Distribution</b>  <b>Generic 2.1.30</b> Ability to locate and operate components, including local controls. <b>RO 4.4 / SRO 4.0</b>  <b>K1.</b> Knowledge of the physical connections and/or cause effect relationships between D.C. ELECTRICAL DISTRIBUTION and the following:  <b>K1.02</b> Battery charger and battery <b>RO 3.2 / SRO 3.3</b></p>	D,R,	6
<p>@ All RO and SRO-I control room (and in-plant) systems must be different and serve different safety functions; all 5 SRO-U systems must serve different safety functions; in-plant systems and functions may overlap those tested in the control room.</p>		

*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	$\leq 9$ / $\leq 8$ / $\leq 4$
(E)mergency or abnormal in-plant	$\geq 1$ / $\geq 1$ / $\geq 1$
(EN)gineered safety feature	- / - / $\geq 1$ (control room system)
(L)ow-Power / Shutdown	$\geq 1$ / $\geq 1$ / $\geq 1$
(N)ew or (M)odified from bank including 1(A)	$\geq 2$ / $\geq 2$ / $\geq 1$
(P)revious 2 exams	$\leq 3$ / $\leq 3$ / $\leq 2$ (randomly selected)
(R)CA	$\geq 1$ / $\geq 1$ / $\geq 1$
(S)imulator	

Facility: Fermi-2Date of Examination: 01/28/2008Exam Level: RO ☐ SRO-I ☐ SRO-U ☒Operating Test Number: 2008-1Control Room Systems<sup>@</sup> (8 for RO); (7 for SRO-I); (2 or 3 for SRO-U, including 1 ESF)

System / JPM Title	Type Code*	Safety Function
a. Temporary Removal and Restoration of SDC for I&C Surveillances <b>205000 Shutdown Cooling System (RHR Shutdown Cooling Mode)</b> <b>A4.</b> Ability to manually operate and/or monitor in the control room: <b>A4.01</b> SDC/RHR pumps RO 3.7 / SRO 3.7 <b>A4.03</b> SDC/RHR discharge valves RO 3.6 / SRO 3.5 <b>A4.05</b> Minimum flow valves RO 3.2 / SRO 3.2	N,EN,A,S	4
b. Respond to Refuel Floor High Radiation <b>272000 Radiation Monitoring System</b> <b>A2.</b> Ability to (a) predict the impacts of the following on the RADIATION MONITORING SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: <b>A2.12</b> Refuel floor handling accidents/operations RO 3.3 / SRO 4.0	P,D,A,L,S	9
c. Manually Start the RCIC System <b>217000 Reactor Core Isolation Cooling System</b> <b>A4.</b> Ability to manually operate and/or monitor in the control room: <b>A4.04</b> Manually initiated controls RO 3.6 / SRO 3.6	D,S	2

In-Plant Systems<sup>@</sup> (3 for RO); (3 for SRO-I); (3 or 2 for SRO-U)

i. Place ESF Battery Charger in Service <b>263000: DC Electrical Distribution</b> <b>Generic 2.1.30</b> Ability to locate and operate components, including local controls. RO 4.4 / SRO 4.0 <b>K1.</b> Knowledge of the physical connections and/or cause effect relationships between D.C. ELECTRICAL DISTRIBUTION and the following: <b>K1.02</b> Battery charger and battery RO 3.2 / SRO 3.3	D,R	6
j. Defeat ARI Logic Trips <b>216000: Nuclear Boiler Instrumentation</b> <b>Generic 2.4.34</b> Knowledge of RO tasks performed outside the main control room during emergency operations including system geography and system implications. RO 4.2 / SRO 4.1	D,R,E	7

@ All RO and SRO-I control room (and in-plant) systems must be different and serve different safety functions; all 5 SRO-U systems must 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	$\leq 9$ / $\leq 8$ / $\leq 4$
(E)mergency or abnormal in-plant	$\geq 1$ / $\geq 1$ / $\geq 1$
(EN)gineered safety feature	- / - / $\geq 1$ (control room system)
(L)ow-Power / Shutdown	$\geq 1$ / $\geq 1$ / $\geq 1$
(N)ew or (M)odified from bank including 1(A)	$\geq 2$ / $\geq 2$ / $\geq 1$
(P)revious 2 exams	$\leq 3$ / $\leq 3$ / $\leq 2$ (randomly selected)
(R)CA	$\geq 1$ / $\geq 1$ / $\geq 1$
(S)imulator	

Facility:		Fermi 2		Date of Exam:								1/28/2008							
Tier	Group	RO K/A Category Points												SRO-Only Points					
		K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G *	Total	A2		G*		Total	
1. Emergency & Plant Evolutions	1	3	3	4				3	4				3	20	4		3		7
	2	1	1	1				1	1				2	7	2		1		3
	Tier Totals	4	4	5				4	5				5	27	6		4		10
2. Plant Systems	1	2	2	2	3	3	2	2	3	2	2	3	26	2		3		5	
	2	1	1	1	1	1	1	2	1	1	1	1	12	0	1	2		3	
	Tier Totals	3	3	3	4	4	3	4	4	3	3	4	38	3		5		8	
3. Generic Knowledge & Abilities Categories					1		2		3		4		10	1	2	3	4	7	
					2		3		2		3			1	2	2	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  $\pm 1$  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 section D.1.b of ES-401, 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. Refer to Section D.1.b of ES-401 for the applicable K/A's
  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. If fuel handling equipment is sampled in other than Category A2 or G\* on the SRO-only exam, enter it on the left side of Column A2 for Tier 2, Group 2 (Note #1 does not apply). 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

ES-401		BWR Examination Outline						Form ES-401-1	
Emergency and Abnormal Plant Evolutions – Tier 1/Group 1 (RO / SRO)									
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	IR	#
295004 Partial or Total Loss of DC Pwr / 6						X	2.2.25 - Knowledge of bases in technical specifications for limiting conditions for operations and safety limits.	4.2	76
295016 Control Room Abandonment / 7						X	2.1.30 - Conduct of Operations: Ability to locate and operate components, including local controls.	4.0	77
295024 High Drywell Pressure / 5					X		EA2.01 - Drywell pressure	4.4	78
295025 High Reactor Pressure / 3					X		EA2.06 - Ability to determine and/or interpret the following as they apply to HIGH REACTOR PRESSURE: Reactor water level	3.8	79
295030 Low Suppression Pool Water Level / 5					X		EA2.04 - Ability to determine and/or interpret the following as they apply to LOW SUPPRESSION POOL WATER LEVEL : Drywell/ suppression chamber differential pressure: Mark-I&II	3.7	80
295038 High Off-site Release Rate / 9					X		EA2.03 - Ability to determine and/or interpret the following as they apply to HIGH OFF-SITE RELEASE RATE : Radiation levels	4.3	81
600000 Plant Fire On-site / 8						X	2.4.41 - Knowledge of the emergency action level thresholds and classifications.	4.6	82
295001 Partial or Complete Loss of Forced Core Flow Circulation / 1 & 4			X				AK3.05 - Knowledge of the reasons for the following responses as they apply to PARTIAL OR COMPLETE LOSS OF FORCED CORE FLOW CIRCULATION : Reduced loop operating requirements: Plant-Specific	3.2	39
295003 Partial or Complete Loss of AC / 6					X		AA2.03 - Ability to determine and/or interpret the following as they apply to PARTIAL OR COMPLETE LOSS OF A.C. POWER : Battery status: Plant-Specific	3.2	40
295004 Partial or Total Loss of DC Pwr / 6					X		AA2.01 - Ability to determine and/or interpret the following as they apply to PARTIAL OR COMPLETE LOSS OF D.C. POWER : Cause of partial or complete loss of D.C. power	3.2	41
295005 Main Turbine Generator Trip / 3					X		AA2.05 - Ability to determine and/or interpret the following as they apply to MAIN TURBINE GENERATOR TRIP : Reactor power	3.8	42
295006 SCRAM / 1		X					AK2.07 - Knowledge of the interrelations between SCRAM and the following: Reactor pressure control	4.0	43
295016 Control Room Abandonment / 7			X				AK3.03 - Knowledge of the reasons for the following responses as they apply to CONTROL ROOM ABANDONMENT : Disabling control room controls	3.5	44
295018 Partial or Total Loss of CCW / 8			X				AK3.06 - Knowledge of the reasons for the following responses as they apply to PARTIAL OR COMPLETE LOSS OF COMPONENT COOLING WATER : Increasing cooling water flow to heat exchangers	3.3	45
295019 Partial or Total Loss of Inst. Air / 8					X		AA2.01 - Ability to determine and/or interpret the following as they apply to PARTIAL OR COMPLETE LOSS OF INSTRUMENT AIR : Instrument air system pressure	3.5	46
295021 Loss of Shutdown Cooling / 4		X					AK2.07 - Knowledge of the interrelations between LOSS OF SHUTDOWN COOLING and the following: Reactor recirculation	3.1	47

ES-401		BWR Examination Outline						Form ES-401-1	
Emergency and Abnormal Plant Evolutions – Tier 1/Group 1 (RO / SRO)									
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	IR	#
295023 Refueling Accidents / 8	X						AK1.01 - Knowledge of the operational implications of the following concepts as they apply to REFUELING ACCIDENTS : Radiation exposure hazards	3.6	48
295024 High Drywell Pressure / 5						X	2.1.27 - Conduct of Operations: Knowledge of system purpose and / or function.	3.9	49
295025 High Reactor Pressure / 3	X						EK1.04 - Knowledge of the operational implications of the following concepts as they apply to HIGH REACTOR PRESSURE : Decay heat generation	3.6	50
295026 Suppression Pool High Water Temp. / 5	X						EK1.02 - Knowledge of the operational implications of the following concepts as they apply to SUPPRESSION POOL HIGH WATER TEMPERATURE : Steam condensation	3.5	51
295031 Reactor Low Water Level / 2		X					EK2.03 - Knowledge of the interrelations between REACTOR LOW WATER LEVEL and the following: Low pressure core spray	4.2	52
295028 High Drywell Temperature / 5				X			EA1.01 - Ability to operate and/or monitor the following as they apply to HIGH DRYWELL TEMPERATURE: Drywell spray: Mark-I&II.	3.8	53
295030 Low Suppression Pool Water Level / 5				X			EA1.02 - Ability to operate and/or monitor the following as they apply to LOW SUPPRESSION POOL WATER LEVEL: RCIC: Plant-Specific	3.4	54
295037 SCRAM Condition Present and Power Above APRM Downscale or Unknown / 1						X	2.1.25 - Conduct of Operations: Ability to interpret reference materials, such as graphs, curves, tables, etc.	3.9	55
295038 High Off-site Release Rate / 9						X	2.1.32 - Conduct of Operations: Ability to explain and apply all system limits and precautions.	3.8	56
600000 Plant Fire On-site / 8			X				AK3.04 - Knowledge of the reasons for the following responses as they apply to PLANT FIRE ON SITE: Actions contained in the abnormal procedure for plant fire on site	2.8	57
700000 Generator Voltage and Electric Grid Disturbances				X			AA1.03 - Ability to operate and/or monitor the following as they apply to GENERATOR VOLTAGE AND ELECTRIC GRID DISTURBANCES: Voltage regulator controls.	3.8	58
K/A Category Totals:	3	3	4	3	8	6	Group Point Total:		20/7



ES-401		BWR Examination Outline Emergency and Abnormal Plant Evolutions – Tier 1/Group 2 (RO / SRO)						Form ES-401-1	
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	IR	#
295008 High Reactor Water Level / 2					X		AA2.02 - Ability to determine and/or interpret the following as they apply to HIGH REACTOR WATER LEVEL : Steam flow/feedflow mismatch	3.4	83
295012 High Drywell Temperature / 5						X	2.2.39 - Equipment Control: Knowledge of less than one hour technical specification action statements for systems.	4.5	84
295033 High Secondary Containment Area Radiation Levels / 9					X		EA2.02 - Ability to determine and/or interpret the following as they apply to HIGH SECONDARY CONTAINMENT AREA RADIATION LEVELS : Equipment operability	3.2	85
295007 High Reactor Pressure / 3	X						AK1.02 - Knowledge of the operational implications of the following concepts as they apply to HIGH REACTOR PRESSURE : Decay heat generation	3.1	59
295010 High Drywell Pressure / 5					X		AA2.06 - Ability to determine and/or interpret the following as they apply to HIGH DRYWELL PRESSURE : Drywell temperature	3.6	60
295012 High Drywell Temperature / 5				X			AA1.01 - Ability to operate and/or monitor the following as they apply to HIGH DRYWELL TEMPERATURE : Drywell ventilation system	3.5	61
295022 Loss of CRD Pumps / 1						X	2.4.18 - Emergency Procedures / Plan: Knowledge of the specific bases for EOPs.	3.3	62
295032 High Secondary Containment Area Temperature / 5			X				EK3.03 - Knowledge of the reasons for the following responses as they apply to HIGH SECONDARY CONTAINMENT AREA TEMPERATURE : Isolating affected systems	3.8	63
295033 High Secondary Containment Area Radiation Levels / 9						X	2.4.45 - Emergency Procedures / Plan: Ability to prioritize and interpret the significance of each annunciator or alarm.	4.1	64
295036 Secondary Containment High Sump/Area Water Level / 5		X					EK2.02 - Knowledge of the interrelations between SECONDARY CONTAINMENT HIGH SUMP/AREA WATER LEVEL and the following: Post-accident sampling system: Plant-Specific	2.6	65
K/A Category Totals:	1	1	1	1	3	3	Group Point Total:		7/3

ES-401		BWR Examination Outline Plant Systems – Tier 2/Group 1 (RO / SRO)											Form ES-401-1	
System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G	K/A Topic(s)	IR	#
223002 PCIS/Nuclear Steam Supply Shutoff											X	2.1.23 - Conduct of Operations: Ability to perform specific system and integrated plant procedures during all modes of plant operation.	4.4	86
218000 ADS								X				A2.06 - Ability to (a) predict the impacts of the following on the AUTOMATIC DEPRESSURIZATION SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: ADS initiation signals present	4.3	87
215003 IRM											X	2.4.31 - Emergency Procedures / Plan: Knowledge of annunciator alarms, indications, or response procedures.	4.1	88
215005 APRM / LPRM								X				A2.10 - Ability to (a) predict the impacts of the following on the AVERAGE POWER RANGE MONITOR/LOCAL POWER RANGE MONITOR SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions Changes in void concentration	2.9	89
262001 AC Electrical Distribution											X	2.1.19 - Conduct of Operations: Ability to use plant computers to evaluate system or component status.	3.8	90
203000 RHR/LPCI: Injection Mode	X											K1.01 - Knowledge of the physical connections and/or cause- effect relationships between RHR/LPCI: INJECTION MODE (PLANT SPECIFIC) and the following: Condensate storage and transfer system: Plant-Specific	2.8	1
205000 Shutdown Cooling							X					A1.01 - Ability to predict and/or monitor changes in parameters associated with operating the SHUTDOWN COOLING SYSTEM (RHR SHUTDOWN COOLING MODE) controls including: Heat exchanger cooling flow	3.3	2
206000 HPCI								X				A2.04 - Ability to (a) predict the impacts of the following on the HIGH PRESSURE COOLANT INJECTION SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: A.C. failures: BWR-2,3,4	2.7	3
209001 LPCS			X									K3.03 - Knowledge of the effect that a loss or malfunction of the LOW PRESSURE CORE SPRAY SYSTEM will have on following: Emergency generators	2.9	4
211000 SLC	X											K1.02 - Knowledge of the physical connections and/or cause- effect relationships between STANDBY LIQUID CONTROL SYSTEM and the following: Core plate differential pressure indication	2.7	5
212000 RPS									X			A3.06 - Ability to monitor automatic operations of the REACTOR PROTECTION SYSTEM including: Main turbine trip: Plant-Specific	4.2	6

ES-401		BWR Examination Outline Plant Systems – Tier 2/Group 1 (RO / SRO)										Form ES-401-1		
System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G	K/A Topic(s)	IR	#
215003 IRM											X	2.4.31 Knowledge of annunciator alarms, indications, or response procedures.	4.2	7
215003 IRM		X										K2.01 - Knowledge of electrical power supplies to the following: IRM channels/detectors	2.5	8
215004 Source Range Monitor				X								K4.01 - Knowledge of SOURCE RANGE MONITOR (SRM) SYSTEM design feature(s) and/or interlocks which provide for the following: Rod withdrawal blocks	3.7	9
215005 APRM / LPRM					X							K5.04 - Knowledge of the operational implications of the following concepts as they apply to AVERAGE POWER RANGE MONITOR/LOCAL POWER RANGE MONITOR SYSTEM : LPRM detector location and core symmetry	2.9	10
217000 RCIC											X	2.2.44 - Equipment Control: Ability to interpret control room indications to verify the status and operation of a system, and understand how operator actions and directives affect plant and system conditions.	4.2	11
218000 ADS						X						K6.04 - Knowledge of the effect that a loss or malfunction of the following will have on the AUTOMATIC DEPRESSURIZATION SYSTEM : Air supply to ADS valves: Plant-Specific	3.6	12
223002 PCIS/Nuclear Steam Supply Shutoff										X		A4.06 - Ability to manually operate and/or monitor in the control room: Confirm initiation to completion	3.6	13
239002 SRVs						X						K6.05 - Knowledge of the effect that a loss or malfunction of the following will have on the RELIEF/SAFETY VALVES : Discharge line vacuum breaker	3.0	14
239002 SRVs					X							K5.04 - Knowledge of the operational implications of the following concepts as they apply to RELIEF/SAFETY VALVES : Tail pipe temperature monitoring	3.3	15
259002 Reactor Water Level Control								X				A2.05 - Ability to (a) predict the impacts of the following on the REACTOR WATER LEVEL CONTROL SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Loss of applicable plant air systems	3.2	16
261000 SGTS			X									K3.06 - Knowledge of the effect that a loss or malfunction of the STANDBY GAS TREATMENT SYSTEM will have on following: Primary containment oxygen content: Mark-I&II	3.0	17
261000 SGTS								X				A2.11 - Ability to (a) predict the impacts of the following on the STANDBY GAS TREATMENT SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: High containment pressure	3.2	18

ES-401		BWR Examination Outline Plant Systems – Tier 2/Group 1 (RO / SRO)										Form ES-401-1		
System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G	K/A Topic(s)	IR	#
262001 AC Electrical Distribution					X							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	3.1	19
203000 RHR/LPCI: Injection Mode							X					A1.02 - Ability to predict and/or monitor changes in parameters associated with operating the RHR/LPCI: INJECTION MODE (PLANT SPECIFIC) controls including: Reactor pressure	3.9	20
263000 DC Electrical Distribution										X		A4.01 - Ability to manually operate and/or monitor in the control room: Major breakers and control power fuses: Plant-Specific	3.3	21
263000 DC Electrical Distribution											X	2.4.35 - Emergency Procedures / Plan: Knowledge of local auxiliary operator tasks during emergency and the resultant operational effects.	3.8	22
264000 EDGs				X								K4.06 - Knowledge of EMERGENCY GENERATORS (DIESEL/JET) design feature(s) and/or interlocks which provide for the following: Governor control	2.6	23
300000 Instrument Air				X								K4.03 - Knowledge of (INSTRUMENT AIR SYSTEM) design feature(s) and or interlocks which provide for the following: Securing of IAS upon loss of cooling water	2.8	24
300000 Instrument Air									X			A3.02 - Ability to monitor automatic operations of the INSTRUMENT AIR SYSTEM including: Air temperature	2.9	25
400000 Component Cooling Water		X										K2.01 - Knowledge of electrical power supplies to the following: CCW pumps	2.9	26
K/A Category Totals:	2	2	2	3	3	2	2	5	2	2	6	Group Point Total:	26/5	

ES-401		BWR Examination Outline Plant Systems – Tier 2/Group 2 (RO / SRO)										Form ES-401-		
System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G	K/A Topic(s)	IR	#
219000 RHR/LPCI: Torus/Pool Cooling Mode											X	2.4.11 - Knowledge of abnormal condition procedures.	4.2	91
223001 Primary Containment System and Auxiliaries											X	2.1.20 - Ability to interpret and execute procedure steps.	4.6	92
271000 Off-gas								X				A2.17 - Ability to (a) predict the impacts of the following on the OFFGAS SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Reactor power changes	3.1	93
201002 RMCS						X						K6.01 - Knowledge of the effect that a loss or malfunction of the following will have on the REACTOR MANUAL CONTROL SYSTEM : Select matrix power	2.5	27
204000 RWCU									X			A3.01 - Ability to monitor automatic operations of the REACTOR WATER CLEANUP SYSTEM including: System pressure downstream of the pressure regulating valve: LP-RWCU	3.3	28
214000 RPIS								X				A2.02 - Ability to (a) predict the impacts of the following on the ROD POSITION INFORMATION SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Reactor SCRAM	3.6	29
215001 Traversing In-core Probe				X								K4.01 - Knowledge of TRAVERSING IN-CORE PROBE design feature(s) and/or interlocks which provide for the following: Primary containment isolation: Mark-I&II(Not-BWR1)	3.4	30
215002 RBM					X							K5.01 - Knowledge of the operational implications of the following concepts as they apply to ROD BLOCK MONITOR SYSTEM : Trip reference selection: Plant-Specific	2.6	31
234000 Fuel Handling Equipment							X					A1.02 - Ability to predict and/or monitor changes in parameters associated with operating the FUEL HANDLING EQUIPMENT controls including: Refuel floor radiation levels/ airborne levels	3.3	32
201001 Control Rod Drive Hydraulic System							X					A1.07 - Ability to predict and/or monitor changes in parameters associated with operating the CONTROL ROD DRIVE HYDRAULIC SYSTEM controls including: Reactor water level	3.3	33
245000 Main Turbine Gen. / Aux.	X											K1.06 - Knowledge of the physical connections and/or cause- effect relationships between MAIN TURBINE GENERATOR AND AUXILIARY SYSTEMS and the following: Component cooling water systems	2.6	34
256000 Reactor Condensate			X									K3.02 - Knowledge of the effect that a loss or malfunction of the REACTOR CONDENSATE SYSTEM will have on following: CRD hydraulics system	3.2	35
271000 Off-gas										X		A4.03 - Ability to manually operate and/or monitor in the control room: System temperatures	2.8	36

ES-401		BWR Examination Outline Plant Systems – Tier 2/Group 2 (RO / SRO)											Form ES-401-	
System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G	K/A Topic(s)	IR	#
272000 Radiation Monitoring		X										K2.05 - Knowledge of electrical power supplies to the following: Reactor building ventilation monitors: Plant-Specific	2.6	37
288000 Plant Ventilation											X	2.2.40 - Equipment Control: Ability to apply technical specifications for a system.	3.4	38
K/A Category Totals:	1	1	1	1	1	1	2	2	1	1	3	Group Point Total:	12/3	

Facility: Fermi-2		Date of Exam: 1/28/2008				
Category	K/A #	Topic	RO		SRO-Only	
			IR	Q#	IR	Q#
1. Conduct of Operations	2.1.43	Ability to use procedures to determine the effects on reactivity of plant changes, such as RCS temperature, secondary plant, fuel depletion, etc.			4.3	94
	2.1.41	Knowledge of the refueling process.	2.8	66		
	2.1.5	Ability to use procedures related to shift staffing, such as minimum crew complement, overtime limitations, etc.	2.9	67		
	Subtotal			2		1
2. Equipment Control	2.2.14	Knowledge of the process for controlling equipment configuration or status.			4.3	95
	2.2.35	Ability to determine Technical Specification Mode of Operation.			4.5	96
	2.2.43	Knowledge of the process used to track inoperable alarms.	3.0	68		
	2.2.15	Ability to determine the expected plant configuration using design and configuration control documentation, such as drawings, line-ups, tag-outs, etc.	3.9	69		
	2.2.40	Ability to apply technical specifications for a system.	3.4	70		
	Subtotal			3		2
3. Radiation Control	2.3.5	Ability to use radiation monitoring systems, such as fixed radiation monitors and alarms, portable survey instruments, personnel monitoring equipment, etc.			2.9	97
	2.3.4	Knowledge of radiation exposure limits under normal or emergency conditions.			3.7	98
	2.3.13	Knowledge of Radiological Safety Procedures pertaining to licensed operator duties, such as response to radiation monitor alarms, containment entry requirements, fuel handling responsibilities, access to locked high radiation areas, aligning filters, etc.	3.4	71		
	2.3.15	Knowledge of radiation monitoring systems, such as fixed radiation monitors and alarms, portable survey instruments, personnel monitoring equipment, etc.	2.9	72		
	Subtotal			2		2

Category	K/A #	Topic	RO	SRO - Onl y	Cate gory	K/A #
4. Emergency Procedures / Plan	2.4.20	Knowledge of operational implications of EOP warnings, cautions, and notes.			4.3	99
	2.4.23	Knowledge of the bases for prioritizing emergency procedure implementation during emergency operations.			4.4	100
	2.4.1	Knowledge of EOP entry conditions and immediate action steps.	4.6	73		
	2.4.27	Knowledge of "fire in the plant" procedures.	3.4	74		
	2.4.43	Knowledge of emergency communications systems and techniques.	3.2	75		
	Subtotal			3		2
Tier 3 Point Total				10		7



Facility: Fermi 2 Scenario No. 1 Op-Test No: 2008-1

Examiners: M. Bielby Operators: \_\_\_\_\_  
C. Moore \_\_\_\_\_  
B. Palagi \_\_\_\_\_

**Initial Conditions:** IC-18, MOL, 75% Rx. Power

**Turnover:** The plant has been operating for 103 days. Reactor Power is currently 75% of Rated Thermal Power with Control Rods at the 86% Rod Line following rod pattern adjustment. General Service Water Pump #4 is out of service for motor replacement with an expected return to service in 2 days. This shift will start the East Heater Feed Pump and raise Reactor Power to 85% of rated with Recirculation flow. Reactor Engineering will be ready in one hour to pull rods for another rod pattern adjustment. GOP 22.000.03, "Plant Operation 25% to 100% to 25%" (Rev 73) actions for power increase are complete through Step 4.2.17.1.

**NOTE:** The crew's Pre-job Briefing for the reactor power increase is to be conducted prior to entering the simulator. (Suggested time 30 minutes prior to beginning the scenario.)

Event No.	Malf. No.	Event Type*	Event Description
1.	N/A	N (BOP) N (SRO)	Start the Third HFP using SOP 23.107, "Reactor Feedwater and Condensate Systems", Section 5.5.
2.	N/A	R (ATC) R (SRO)	Increase Reactor Power With Recirculation Flow per GOP 22.000.03, "Power Operation 25% To 100% To 25%".
3.	B31RF0015	C (ATC) C (SRO)	RRMG "B" Walkaway Uncontrolled RRMG "B" Speed Change (>10%), crew trips the affected RRMG (Immediate Action per AOP 20.138.03, "Uncontrolled Recirc Flow Change"). Crew enters AOP 20.138.01, "Recirc Pump Trip", Condition C & D. <b>NOTE:</b> OPRMs are operable. CRS directs increased core monitoring for instability. He also directs increasing speed on the operating RRMG to raise core flow (>43%) and exit the Scram/Exit Region of the Power to Flow Map. CRS reviews TS 3.4.1.A, Recirc Loops Operating, 2 hours to declare loop inop and 4 hours to adjust RPS trip setpoints to single loop values.
4.	E51MF0009	C (BOP) C (SRO)	Spurious RCIC Initiation Spurious start of RCIC, BOP verifies no valid actuation signal and trips RCIC when directed. CRS reviews TS 3.5.3.A, RCIC System, (Immediately verify HPCI operable and 14 day LCO).

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

Facility: Fermi 2 Scenario No. 1 Op-Test No: 2008-1  
 Examiners: M. Bielby Operators: \_\_\_\_\_  
C. Moore \_\_\_\_\_  
B. Palagi \_\_\_\_\_

Initial Conditions: IC-18, MOL, 75% Rx. Power.

NOTE: Continued from page 1

Event No.	Malf. No.	Event Type*	Event Description
5.	R11MF0001 N20MF0023	M (All)	Loss of Div 2 Offsite Power / EDGs start / Loss of all Heater Feed Pumps, and Reactor Feed Pumps. Loss of all Div 2 Buses. EDGs 13 & 14 auto start and re-energize ESF buses only. CRS enters AOP 20.300.345kV, Mode Switch in SHUTDOWN, and performs AOP 20.000.21, "Reactor Scram". CRS enters EOP 29.100.01, "RPV Control", Sheet 1 (Level 3).
6.	E41MF0009 E41MF0005	C (BOP) C (SRO)	HPCI Auto Start Failure HPCI fails to start on Level 2. The crew will identify and manually start HPCI using SOP 23.202, "HPCI System", Encl C. (Hard Card), but HPCI will isolate after about 1 min of operation.
7.	N21MF0031 N21RF0019	C (BOP) C (SRO)	SBFW F001 Fails As Is BOP will start SBFW Pump A, for level control, and identify a F001 failure to open. When he depresses the valve's Open pushbutton the valve will lose power. The BOP will direct an operator to investigate and restore. <b>NOTE:</b> SBFW Pump A is the only available pump.
8a.	B31MF0066	M (All)	Recirc Loop A Rupture LOCA - A Recirculation leak will cause High Drywell Pressure and level to decrease. EOP 29.100.01, RPV Control, Sheet 1 re-entry on high Drywell Pressure and EOP Primary Containment Control, Sheet 2 entry on High Drywell Pressure. The crew will start all available high pressure injection systems. (SLC and re-starts RCIC by resetting the Trip Throttle Valve due to spurious initiation still in 23.206, RCIC, Sect 7.1 or Encl B Hard Card) At ~100" RPV Water Level BOP reports water level cannot be maintained > TAF. CRS briefs crew for Emergency Depressurization.
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor			

Appendix D, 38 of 39

Facility: Fermi 2 Scenario No. 2 Op-Test No: 2008-1

Examiners: M. Bielby

Operators: \_\_\_\_\_

C. Moore

B. Palagi

**Initial Conditions:** IC-20, MOL, 100% Rx. Power

**Turnover:** The plant has been operating for 23 days. Reactor Power is 100% of Rated Thermal Power. The South RBCCW Pump is out of service for motor replacement. It is scheduled to be restored tomorrow. Plans are to shift from Division 1 CCHVAC to Division 2 to collect routine vibration data on Division 2 CCHVAC equipment.

**NOTE:** The Pre-job Briefing for the CCHVAC shift is to be conducted prior to entering the simulator. (Suggested time 30 minutes prior to beginning the scenario.)

Event No.	Malf. No.	Event Type*	Event Description
1.	N/A	N (BOP) N (SRO)	Crew shifts from Division 1 CCHVAC to Division 2 CCHVAC
2.	C11MF0445	C (ATC) C (SRO)	Control Rod 26-15 Drifts IN CRS enters AOP 20.106.07, "Control Rod Drift" and determines TS 3.1.3.C, Control Rod Operability, (3 hrs to insert and 4 hrs to disarm). ATC inserts and directs disarming control rod 26-15.
3.	C97MF1087 MF EBAORL _TCTVSP 1	C (BOP) C (SRO)	Seismic System Event / Trouble Alarm 6D69 Crew monitors the plant and performs AOP Actions. CRS enters AOP 20.000.01, "Acts of Nature". BOP starts RHRSW MDCT Fans. When MDCT Fan B is started, it trips. CRS enters TS 3.7.2.B, Ultimate Heat Sink (UHS), (72 hr LCO).
4.	N61MF0003	M (ALL)  C (ATC) C (SRO) R (ATC) R (SRO)	East Condenser Air Leak CRS enters AOP 20.125.01, "Loss of Condenser Vacuum". BOP starts an additional SJAE and OG Ring Water Pump. ATC attempts Rapid Power Reduction, per SOP 23.623, Reactor Manual Control System, Section 9.7, and determines failure of Manual Runback. ATC takes individual manual control to reduce recirc speeds to 55-60% core flow.

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

Facility: Fermi 2 Scenario No. 2 Op-Test No: 2008-1

Examiners: M. Bielby

Operators: \_\_\_\_\_

C. Moore

B. Palagi

Initial Conditions: IC-20, MOL, 100% Rx. Power.

NOTE: Continued from page 1.

Event No.	Malf. No.	Event Type*	Event Description
5.		M (ALL)	Reactor Scram Performs override action 20.125.01 and places Mode Switch in SHUTDOWN $\leq 2.5$ psia. After Scram Reports, CRS enters EOP 29.100.01 RPV Control, Sheet 1 (Level 3) and directs entry into AOP 20.000.21, Reactor Scram. BOP controls water level 173 – 214 inches.
6.	C97MF1087 B21MF0059 B21MF0060 B21MF0073	M (ALL) I (ALL)	Aftershock Seismic Event / Event Trouble Alarm (6D69) Loss of all level indication. Div 1 and Div 2 Level Instrument Reference Leg Ruptures. Flood up Level Indication fails upscale high. (Level 8 trip on Main Turbine, RFPs, HPCI, RCIC, and SBFW.) CRS enters (EOP C-4) EOP RPV Flooding, 29.100.01, Sheet 3. (Level cannot be determined) CRS enters EOP 29.100.01, Primary Containment Control, Sheet 2. (High Drywell Pressure)
7.	B21MF0037	C (BOP) C (SRO)	When BOP is directed to open 5 SRVs, SRV "R" fails to open. BOP will select and open another SRV and report this to the CRS. (CT)
8.	N/A	ALL	The crew floods to the Main Steam Lines using Feedwater, SBFW, and Low Pressure ECCS Systems. (CT)

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

Facility: Fermi 2 Scenario No. 3 Op-Test No: 2008-1

Examiners: M. Bielby Operators: \_\_\_\_\_  
C. Moore \_\_\_\_\_  
B. Palagi \_\_\_\_\_

Initial Conditions: IC-19, EOL, 100% Rx. Power

**Turnover:**

The plant has been operating for 403 days. Reactor Power is currently 100% of Rated Thermal Power with Control Rods at the 86% Rod Line following rod pattern adjustment. The N. Turbine Lube Oil Vapor Extractor is out of service for motor replacement. APRM #1 is bypassed due to a power supply failure and a tracking LCO is written for it. The plan for the shift is to remove the North TBCCW Pump from service for lubrication and outboard motor bearing replacement. The shift is also to perform 27.109.01, "Turbine Steam Valves Test. The crew will begin with the LPSV and LPCV portion of the test because I&C support will not be available to perform the on-line valve position calibration on #1 LPIV later in the shift.

**NOTE:** The crew's Pre-job Briefing for the reactor power decrease and "Turbine Steam Valves Test" is to be conducted prior to entering the simulator. (Suggested time 30 minutes prior to beginning the scenario.)

Event No.	Malf. No.	Event Type*	Event Description
1.	N/A	N (BOP) N (SRO)	Crew shifts TBCCW Pumps due to scheduled maintenance on North TBCCW Pump.
2.	N/A	R (ATC) R (SRO)	Lower reactor power to 93% with Recirculation Flow per GOP 22.000.03, "Power Operation 25% to 100% to 25%", in preparation to perform 27.109.01, Turbine Steam Valves Test.
3.	N30MF0036	C (BOP) C (SRO)	Crew performs section 5.7 of 27.109.01. Tests LPSV #1 and closes LPIV #1 for on-line valve position calibration. When I&C reports complete BOP determines, #1 LPIV fails to re-open. Crew stops test, informs Ops Management, and System Engineer of problem.
4.	C51MF0001 C51MF0002	I (ATC) I (SRO)	#2 APRM fails upscale high. When directed, ATC removes APRM #1 from bypass and bypasses #2 APRM per 23.605, "Average Power Range Monitoring (APRM) System", Sect 6.4. (APRM #1 downscale and rod block in alarm.) SRO reviews TS 3.3.1.1.F (Mode 2 – 6 hrs).
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor			

Facility: Fermi 2 Scenario No. 3 Op-Test No: 2008-1

Examiners: M. Bielby Operators: \_\_\_\_\_  
C. Moore \_\_\_\_\_  
B. Palagi \_\_\_\_\_

Initial Conditions: IC-19, EOL, 100% Rx. Power.

NOTE: Continued from page 1

Event No.	Malf. No.	Event Type*	Event Description
5.	B21MF0029	C (BOP) C (SRO)	SRV G fails open. BOP takes immediate actions per AOP 20.000.25, "Failed Safety Relief Valve (SRV)", by depressing the open and closed pushbuttons repeatedly. The SRV will close. The CRS reviews TS 3.4.3.A, SRVs (tracking LCO), TS 3.6.1.6.A, Low – Low Set Valves (14 day LCO), and TS 3.6.1.8, Suppression Chamber-to-Drywell Vacuum Breakers (SR 3.6.1.8.2, 12 hrs to perform the vacuum breaker test after a SRV discharge to Torus). May direct removing fuses to prevent re-occurrence per AOP 20.000.25, Enclosure A.
6.	PO P603 _B087_1	C (ATC) C (SRO)	CRD Flow Control Valve drifts close. ATC observes and reports. SRO enters AOP 20.106.03, "CRD Flow Control Valve Failure", Condition A. ATC takes manual control, opens, and adjusts CRD Pressure.
7.	N30MF0044 C71MF0006 C11MF0001	M (ALL) C (ATC) C (SRO)	Turbine Trips / Failure to Scram (ATWS) Failure to scram is reported and the crew enters the EOPs on Scram Condition with power > 3%. CRS directs actions from 29.100.01 Sheet 1A, RPV Control-ATWS. ATC performs FSQ 1-8 actions (unsuccessful) and BOP performs inhibit ADS, bypasses Drywell Pneumatics, and directs 29.ESP.11.
8.	C41MF0003 C41MF0004	C (ATC) C (SRO)	Initial SLC Pump selected trips. When ATC is ordered to inject SLC. He informs CRS and starts second SLC Pump. SLC is successfully injected. (CT)
9.	N/A	M (ALL)	BOP lowers water level and maintains 0 - 50" wr (EOP C-5, Level / Power Control) ATC performs manual rod insertion (CT). When 29.ESP.10 (Defeat of ARI Logic Trips) is complete and ARI Trip Logic is reset, the scram discharge volume will drain (3D94 Clear). The ATC will perform the Scram-Reset-Scram section of 29.ESP.03, "Alternate Control Rod Insertion", which will insert all rods.

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

Facility: Fermi 2 Scenario No. 4 Op-Test No: 2008-1

Examiners: M. Bielby Operators: \_\_\_\_\_  
C. Moore \_\_\_\_\_  
B. Palagi \_\_\_\_\_

**Initial Conditions:** IC-20, MOL, 100% Rx. Power

**Turnover:** The plant has been operating at 100% power for 400 days. Reactor Power is currently 100% of Rated Thermal Power with Control Rods at the 86% Rod Line following rod pattern adjustment. The plan for the shift is to shift RBCCW Pumps for scheduled maintenance on the center pump.

**NOTE:** The crew's Pre-job Briefing for the reactor power increase is to be conducted prior to entering the simulator. (Suggested time 30 minutes prior to beginning the scenario.)

Event No.	Malf. No.	Event Type*	Event Description
1.	N/A	N (BOP) N (SRO)	Shift RBCCW Pumps in accordance with SOP 23.127, Section 6.1
2.	B21MF0044	C (ATC) C (SRO)	Jet Pump 5/6 Failure ATC observes Recirc Loop Flow changes and diagnoses Jet Pump failure. The crew enters AOP 20.138.02, "Jet Pump Failure". The SRO evaluates TS 3.3.1.1.C (1 hr LCO), TS 3.3.1.1.F (6 hrs to Mode 2), TS 3.4.1.A (2 hr LCO), and TS 3.4.2.A (12 hrs to Mode 3). The CRS declares JP #5 inoperable and directs the ATC to monitor for thermal hydraulic instabilities.
3.	N21MF0029	R (ATC) R (SRO) C (BOP) C (SRO)	Spurious N. RFP Trip / RRS Runback / Loss of Heater Drains Crew enters AOP 20.107.01, "Loss of Feedwater or Feedwater Control". The crew verifies RR runs back, starts SBFW and injects at 1200 gpm, and inserts the Cram Array to lower reactor power to $\leq 65\%$ . (~15% reactivity change)
4.	C51MF0198	I (ATC) I (SRO)	RBM B Fails High The crew bypasses RBM B per 23.607, "Rod Block Monitoring System", Section 5.1. The CRS declares RBM B inoperable and enters TS 3.3.2.1.A (24 hr LCO).
5a.	E41MF0007 EOPRF0022 E41MF0001 E41MF0008	C (BOP) C (SRO)	HPCI Steam Leak & E4150-F002 Failure to Auto Isolate / E4150-F600 Thermal Overload Fire Alarm in the HPCI Quad, the crew may enter AOP 20.000.22, "Plant Fires". When 3D34, SEC CONTM TEMP HIGH – HIGH EOP ENTRY alarms the crew will enter EOP 29.100.01, SC/RR, Sheet 5 due to HPCI Area temperature greater than Max Normal Operating (MNO) 148 °F..

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



Facility: Fermi 2 Scenario No. 4 Op-Test No: 2008-1

Examiners: M. Bielby Operators: \_\_\_\_\_  
C. Moore \_\_\_\_\_  
B. Palagi \_\_\_\_\_

Initial Conditions: \_\_\_\_\_

NOTE: Continued from page 1

Event No.	Malf. No.	Event Type*	Event Description
5b.			<p><b>NOTE:</b> 1D66, STEAM LEAK DETECTION AMBIENT TEMP HIGH alarms at <math>\geq 154</math> °F in HPCI area and an isolation signal is generated.</p> <p>When BOP attempts to isolate and E4150-F002 will not close (failed as is) and when E4150-F600 valve close pushbutton is depressed or an isolation signal is received, the valve loses power. The leak cannot be isolated.</p>
6.	N/A	M (ALL)	<p>Reactor Manual Scram (Mode Switch to Shutdown)</p> <p>Before the HPCI Area temperature reaches the Max Safe Operating Temperature (MSO) of 210 °F, the crew briefs and places the Mode Switch in Shutdown. (CT)</p> <p>When Scram Reports are complete the crew enters EOP 29.100.01, RPV Control, Sheet 1 (Level 3) and AOP 20.000.21, Reactor Scram.</p>
7.	B21MF0103 B21MF0015 B21MF0009 B21MF0054	C (BOP) C (SRO)	<p>RB Steam Tunnel Leak / MSIVs Fail to Isolate</p> <p>Crew observes increasing temperature in RB Steam Tunnel on IPCS. Crew should attempt to isolate the steam leak, by closing the MSIVs, when the area temperature is <math>\geq 160</math> °F (MNO), to isolate all systems discharging into the area. IF area temp is <math>\geq 200</math> °F and the MSIVs are not closed, then the crew should close them due to the auto isolation failure.</p> <p><b>NOTE:</b> MSL C MSIVs do not fully close.</p>
8.	N/A	M (ALL)	<p>When Area Temperatures are <math>&gt;</math> MSO (210 °F) in 2 areas the EOP directs Emergency Depressurization, EOP 29.100.01 RPV Flood/ED, Sheet 3 (EOP Contingency 2).</p> <p>CRS directs BOP to open 5 SRVs (ADS preferred) (CT) and while the plant is depressurizing the crew briefs water level restoration and control.</p>
9.	N/A		The crew restores and maintains water level 173 – 214".
<p>• (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor</p>			

Outline Review  
10/30/07

COMMENT	RESPONSE/RESOLUTION
<b>WRITTEN EXAM:</b>	
No comments.	
<b>ADMIN JPMs:</b>	
Suggestions: -On the RO and SRO ES 301-1 forms, assign / align common letter designators to the admin JPMs.	
<b>SYSTEM JPMs:</b>	
Suggestions: -On the RO and SRO-I;-U ES 301-2 forms, align similar JPMs to the same "letter designator" -Pick the 5 SRO-U from the SRO-I JPMs (created 1 new JPM).	
1. How did you select the JPMs from the previous 2 exams?	Licensee followed their process for randomly selecting exam material (submitted copy with outline).
2. The Emergency or Abnormal inplant JPM KAs have to come from the 295 ___ KAs vice the Generic 2.4. ___ section (SF 7, 216000, Defeat ARI Logic Trips).	Licensee will look to see if they can apply one of the 295 ___ KAs to the existing JPM.
3. Delete the reference to Generic 2.1.30 from the system JPM, DC Electrical Distribution, 263000, on ES-301-2.	Agreed.
<b>SCENARIOS:</b>	
1. No "low power" scenario (ref: ES 301, D.5.c).	ES 301, D.5.c says "should." QA sheets, ES-301-4 and -201-2 do not require a low power scenario. Have used low power scenarios on previous exams and minimum number of events that can be used (don't want to be predictable).
<b>SCENARIO 1:</b>	
1. Event 3, where should the RRMG walk-away occur to ensure entry into the scram/exit region?	If RRMG speed is 57%, will enter the prohibited region. Will coordinate with examiner directing events and practice during validation.
2. Event 4, are there enough verifiable actions for an evaluation of the BOP, or does he only depress the trip pushbutton? Need to look at taking more actions to achieve a better evaluation.	BOP should runback RCIC, then trip the pump. Will look at providing more actions (ie, injection valve not closing...).
3. Event 7, if there is no success path for aligning SBFW A, how do we hold the BOP accountable if he decides not to investigate the SBFW A F001 failure, or does not identify it?	Will include manual startup of SLC and/or RCIC as part of the evaluation success path to achieve adequate RWL.

Outline Review  
10/30/07

COMMENT	RESPONSE
5. Event 9, what are consequences of failing to isolate P44-F606B? Suppose ATC fails, or decides not to perform the action, how do we hold him accountable?	Failure to isolate Div 2 EECW could result in an inner system LOCA due to heating of water in DW that causes piping to rupture. Isolation is required by EOP for PCP Sheet 2.
6. Event 10, spraying the Torus and DW is not a "N" evolution. It is an action directed by the EOPs when specific plant conditions require the action.	Delete Event 10 as "N."
<b>SCENARIO 2:</b>	
1. Event 2, why not have the rod drift out vice into, the core? What are the ATC verifiable actions?	The selected rod is full out, so will select a partially inserted rod, and allow it to drift out. The operator will be required to fully insert rod. Power will exceed required power limit.
2. Event 3, are there enough verifiable actions for an evaluation of the BOP? This is not a "C" because there are no actions to take in response to the fan trip.	Will delete event as "C," but will leave in for a TS call.
3. Event 4: -not a "M." -not a "C" because starting SJAE and OG Ring Water pump does not provide a success path, still lose vacuum. -sufficient verifiable BOP actions for an evaluation? How do we hold the BOP accountable if he decides not to start SJAE or OG RWP, or is unsuccessful? -why is ATC given credit for "C?" Only "R" for SRO and ATC. -may give "C" for failure of the RMCS?	Need to break up event and clarify who is getting what credit. The "C" for ATC/SRO is for failure of the RRP Master Controller and taking individual manual control of RRP (not starting the SJAE and OG RWP).  The "R" is for the Rapid Power Reduction.
4. Event 6, this is "M-ALL" not "I-ALL," cannot restore level instrumentation, only take EOP directed actions for a flood.	Delete the "I-ALL."
<b>SCENARIO 3:</b>	
1. Event 3, not a "C." BOP cannot take any verifiable actions, cannot restore operability, can only stop test and make notifications.	Delete "C."
2. Event 7: -what is the "C" and subsequent verifiable actions? What is the success path (manually insert rods)? -can't get a "C" and "M" for the same event.	Clarify that "C" is failure of the normal scram function, and manual insertion of control rods is the success path.
3. Event 8, what are the verifiable ATC actions for an evaluation (ie, what is criteria for being unsat)?	Clarify the success criteria for starting the second SLC pump, ie, before BIT exceeds 110 degrees F.
<b>SCENARIO 4:</b>	

Outline Review  
10/30/07

COMMENT	RESPONSE/RESOLUTION
1. Event 2, what audible cues does the ATC receive? Suppose ATC doesn't identify the failure (BOP or SRO may unless we pull them back somehow).	High RWL on P-603. Need to verify during validation.
2. Event 3, SRO cannot get both "R" and "C" for same event.	SRO will only get "R."
3. Event 5a and b, not a "C," because can't isolate HPCI steam leak. Don't have to take any action and get same result. Only provides a reason to scram.	Delete "C."
4. Event 7, good chance BOP/SRO will not identify "failure of MSIVs to auto-isolate" if they manually close valves before exceeding 200 degrees F (would not get credit for "C.")	Will leave in, but not depend on.