



Three Mile Island Unit 1
Route 441 South, P.O. Box 480
Middletown, PA 17057

Telephone 717-948-8000

January 11, 2019
TMI-18-110

USNRC, Region I
2100 Renaissance Blvd, Suite 100
King of Prussia, PA 19406-2713

THREE MILE ISLAND NUCLEAR STATION, UNIT 1 (TMI-1)
RENEWED OPERATING LICENSE NO. DPR-50
DOCKET NO. 50-289

SUBJECT: SUBMITTAL OF INITIAL OPERATOR LICENSING EXAMINATION OUTLINES

Enclosed are the examination outlines, supporting the Initial License Examination scheduled for the week of June 10, 2019, at Three Mile Island Unit 1.

This submittal includes all appropriate Examination Standard forms and outlines in accordance with NUREG 1021, "Operator Licensing Examination Standards for Power Reactors," Revision 11.

In accordance with NUREG 1021, Revision 11, Section ES-201, "Initial Operator Licensing Examination Process," please ensure that these materials are withheld from public disclosure until after the examinations are complete.

Should you have any questions concerning this letter, please contact Mike Fitzwater of Regulatory Assurance at (717) 948-8228. For questions concerning examination materials, please contact Todd Beaver, Exam Author, at (717) 948-2080.

Respectfully,

A handwritten signature in black ink, appearing to read "Edward W. Callan".

Edward W. Callan
Site Vice President, Three Mile Island Unit 1
Exelon Generation Co., LLC

Enclosures: (Mailed to Peter Presby, Chief Examiner, NRC Region I)

Examination Security Agreement (Form ES-201-3)
Administrative Topics Outline (Form ES-301-1)
Control Room/In-Plant Systems Outline (Form ES-301-2)
PWR Examination Outline (Form ES-401-2)

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Generic Knowledge and Abilities Outline (Tier 3) (Form ES-401-3)
Scenario Outline (Form ES-D-1)
Record of Rejected K/As (Form ES-401-4)
Completed Checklists:
 Examination Outline Quality Checklist (Form ES-201-2)
 Transient and Event Checklist (Form ES-301-5)

cc: (without attachments)
Chief, NRC Operator Licensing Branch
NRC Senior Resident Inspector – TMI Unit 1

bcc: Regulatory Assurance Manager – TMI Unit 1
Training Manager – TMI Unit 1

| Facility: Three Mile Island | | Date of Examination: 6/10/19 | | |
|--|---|--|----|-----|
| Item | Task Description | Initials | | |
| | | a | b* | c** |
| 1. WRITTEN | a. Verify that the outline(s) fit(s) the appropriate model in accordance with ES-401 or ES-401N. | TB | TA | RO |
| | b. Assess whether the outline was systematically and randomly prepared in accordance with Section D.1 of ES-401 or ES-401N and whether all K/A categories are appropriately sampled. | TB | TA | RO |
| | c. Assess whether the outline overemphasizes any systems, evolutions, or generic topics. | TB | TA | RO |
| | d. Assess whether the justifications for deselected or rejected K/A statements are appropriate. | TB | TA | RO |
| 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. | TB | TH | RO |
| | 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. | TB | TH | RO |
| | c. To the extent possible, assess whether the outline(s) conforms with the qualitative and quantitative criteria specified on Form ES-301-4 and described in Appendix D and in Section D.5, "Specific Instructions for the 'Simulator Operating Test,'" of ES-301 (including overlap). | TB | TH | RO |
| 3. WALKTHROUGH | a. Verify that the systems walkthrough outline meets the criteria specified on Form ES-301-2: (1) The outline(s) contains 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 applicant's 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 radiologically controlled area tasks meets the criteria on the form. | TB | TH | RO |
| | 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. | TB | TH | RO |
| | c. Determine whether there are enough different outlines to test the projected number and mix of applicants and ensure that no items are duplicated on subsequent days. | TB | TH | RO |
| 4. GENERAL | a. Assess whether plant-specific priorities (including probabilistic risk assessment and individual plant examination insights) are covered in the appropriate exam sections. | TB | TH | RO |
| | b. Assess whether the 10 CFR 55.41, 55.43, and 55.45 sampling is appropriate. | TB | TH | RO |
| | c. Ensure that K/A importance ratings (except for plant-specific priorities) are at least 2.5. | TB | TH | RO |
| | d. Check for duplication and overlap among exam sections and the last two NRC exams. | TB | TH | RO |
| | e. Check the entire exam for balance of coverage. | TB | TH | RO |
| | f. Assess whether the exam fits the appropriate job level (RO or SRO). | TB | TH | RO |
| a. Author <u>Timothy M. Benner</u> b. Facility Reviewer (*) <u>Timothy Heindl</u> c. NRC Chief Examiner (#) <u>Peter Presby</u> d. NRC Supervisor <u>Donald Jackson</u> | | Printed Name/Signature Date 6/10/19 6/10/19 2/1/19 2/1/19 | | |

* Not applicable for NRC-prepared examination outlines.
 # The independent NRC reviewer initials items in column "c"; the chief examiner's concurrence is required.

Facility: Three Mile IslandDate of Examination: 06/10/19Examination Level: RO ☒ SRO ☐Operating Test Number: TMI2019

| Administrative Topic (see Note) | Type Code* | Describe activity to be performed |
|---------------------------------|------------|--|
| Conduct of Operations | N, R | Perform a Reactivity Balance at Power K/A: 2.1.25 (3.9) |
| Conduct of Operations | D, R | Complete RB Average Air Temperature Calculation K/A: 2.1.7 (4.4) |
| Equipment Control | N, R | Station Print Reading – Isolate Instrument Air Leak K/A: 2.2.41 (3.9) |
| Radiation Control | | |
| Emergency Plan | D, S | Perform State and Local Event Notification K/A: 2.4.43 (3.2) |

NOTE: All items (five total) are required for SROs. RO applicants require only four items unless they are retaking only the administrative topics (which would require all five items).

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

JPM RA1-1 – The examinee will have to perform a Reactivity Balance at Power for the given parameters. The examinee will determine that we are within correct bands.

JPM RA1-2 – The examinee will be given a picture of the RB Air Temperature Yokogawa recorder and must complete the shift and daily checks procedure 1301-1. The examinee must perform a calculation and identify any out-of-specification reading.

JPM RA2 – The examinee must identify isolation points for a leaking instrument air valve and determine the effect on plant components.

JPM RA4 – The examinee must perform a state and local event notification for the declared EAL.

Facility: Three Mile IslandDate of Examination: 06/10/19Examination Level: RO ☐ SRO ☒Operating Test Number: TMI2019

| Administrative Topic (see Note) | Type Code* | Describe activity to be performed |
|---------------------------------|------------|---|
| Conduct of Operations | M, R | Issue a Controlled Key K/A: 2.1.13 (3.2) |
| Conduct of Operations | D, R | Calculate and Approve an ECB K/A: 2.1.37 (4.6) |
| Equipment Control | D, R | Evaluate completed surveillance and perform actions K/A: 2.2.37 (4.6) |
| Radiation Control | D, R | Authorize emergency personnel exposure in excess of 5 REM K/A: 2.3.4 (3.7) |
| Emergency Plan | N, R | EAL and PAR K/A: 2.4.44 (4.4) |

NOTE: All items (five total) are required for SROs. RO applicants require only four items unless they are retaking only the administrative topics (which would require all five items).

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

JPM SA1-1 – The examinee must issue a key for a Locked High Radiation Area and a CDA key. The examinee must review all the requirements and ensure that the examiner possesses the correct paperwork and qualifications to be issued the key. A CDA key can only be issued by shift management.

JPM SA1-2 – The examinee will be given a shutdown boron calculation with errors. The examinee will have to find the errors and calculate the correct shutdown boron.

JPM SA2 – The examinee will be given a surveillance procedure with some parameters exceeding a threshold. The examinee must identify the out-of-specification parameters and determine any technical specification required actions.

JPM SA3 – The examinee must authorize dose in excess of 5 REM for emergency personnel. The examinee will have to determine which personnel meet the requirements for the dose.

JPM SA4 – The examinee will have to classify an EAL and make a PAR based on plant conditions.

Facility: Three Mile IslandDate of Examination: 06/10/19Exam Level: RO ☒ SRO-I ☐ SRO-U ☐Operating Test Number: TMI2019

Control Room Systems: 8 for RO, 7 for SRO-I, and 2 or 3 for SRO-U

| System/JPM Title | Type Code* | Safety Function |
|--|----------------|-----------------|
| a. 001 / Respond to a dropped control rod - ICS fails to complete runback 003AA1.02 - Control Rod System | D, A, S | 1 |
| b. 013 / Manually Initiate ESAS 013A4.01 – ECCS system | M, A, S, EN, L | 2 |
| c. 006 / Lower CFT level and pressure from the Control Room - 006 A4.02 – Core Flood System | D, S | 3 |
| d. 061 / Respond to Emergency Feedwater Actuation - ALT 061A2.05 – Emergency Feedwater | D, A, S | 4S |
| e. 003 / Restore SI with a loss of ICCW 003A3.01 – Reactor Coolant Pump | D, A, S, P | 4P |
| f. 007 / Pump RCDT to MWST 007A1.01 – Pressurizer Relief Tank | D, S | 5 |
| g. 064 / Energize 1E 4kV Bus from the SBO 064A4.01 – Emergency Diesel Generators | D, L, S | 6 |
| h. 072 / Respond IAW OP-TM-MAP-C0101 Fuel Handling Incident in the Spent Fuel Pool – Radiation Monitors | N, A, S | 7 |

In-Plant Systems: 3 for RO, 3 for SRO-I, and 3 or 2 for SRO-U

| | | |
|--|---------|----|
| i. 008 / Loss of Instrument Air – 008A2.05 – Intermediate Closed Cooling Water System | D, E, R | 8 |
| j. 071 / Purge of the Waste Gas System Radiation Monitor (RM-A-7) 071A4.09 – Waste Gas Disposal System | D, R | 9 |
| k. 061 / Respond to a failure of EF-P-2A and EF-V-30D 061A2.04 – Emergency Feedwater | D, E | 4S |

* All RO and SRO-I control room (and in-plant) systems must be different and serve different safety functions, all five SRO-U systems must serve different safety functions, and in-plant systems and functions may overlap those tested in the control room.

* Type Codes

Criteria for R /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 | $\geq 1/\geq 1/\geq 1$ (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 | |

Random Selection: JPM E was selected by assigning the JPMs of the previous 2 years a number then using a random number generator to select the JPM.

JPM A - A rod is dropped into the core, which initiates a plant runback. The examinee will observe the plant runback but must recognize the plant did not runback to the appropriate power level. The examinee must run the plant back in manual at the ULD or SG/RX demand station. This JPM is similar to Scenario 2, Event 4. This JPM is different because of the power level in which it starts. In this JPM, the power will drop then the plant will runback. In the scenario, the power is low and control rods will pull to maintain power.

JPM B - The reactor is in a tripped state, with the loss of the 1D 4kV bus when an RCS leak occurs. The examinee must initiate the 'B' ES, but the manual pushbuttons will fail. The examinee must manually start the 'B' ES equipment.

JPM C - The core flood tanks are above their admin and technical specification limits. The examinee will have to lower level and pressure to within band.

JPM D - The examinee will respond to an RCS leak that is large enough to lose Subcooling Margin. The examinee will perform Rule 1, to secure reactor coolant pumps, initiate a 1600# ES, and initiate Emergency Feedwater (EFW). Emergency Feedwater will fail to feed to the desired level (50% in the operating range), the examinee will have to take manual control of EFW and begin feeding to the desired level. This JPM is similar to Scenario 4, Event 7. This JPM provides at least 2 significant actions (critical tasks) that the simulator event does not perform. The simulator event does not have any failures with Emergency Feedwater, whereas the standard for the JPM requires the examinee to identify and mitigate an Emergency Feedwater failure.

JPM E - The examinee will be directed to restore seal injection due to a makeup pump trip. Once seal injection is restored, Intermediate Closed Cooling Water (ICCW) pumps will trip and not be able to be restarted. The examinee must recognize that this should have tripped all reactor coolant pumps on interlock. The examinee must trip the reactor and then trip the reactor coolant pumps.

JPM F - The examinee will be directed to pump the Reactor Coolant Drain Tank and maintain level to above the technical specification limit.

JPM G – A loss of offsite power has just occurred. The 1E 4kV bus is powered from the EG-Y-1B. When the examinee takes the watch, EG-Y-1B will trip and the examinee will have to load the SBO diesel on the 1E 4kV bus.

JPM H – Fuel is being handled in the spent fuel pool. A fuel assembly is dropped, which cause RM-G-9 and RM-A-4 counts to rise to the alarm setpoint. The interlock fails, the examinee will have to secure ventilation in the spent fuel pool and the combined ventilation exhaust.

JPM I – A loss of instrument air occurs. The examinee will be dispatched to IC-V-4, Letdown Cooler / Reactor Coolant Pump Intermediate Closed Cooling Water Valve, to ensure it is open. The examinee will then have to block it open.

JPM J – The examinee will have to purge RM-A-7, Waste Gas System Radiation Monitor.

JPM K – The examinee will be directed to investigate steam binding of EF-P-2A. The examinee will find that the pump is steam bound and take steps in accordance with the procedure to fix the pump.

| | |
|--|---------------------------------------|
| Facility: <u>Three Mile Island</u> | Date of Examination: <u>06/10/19</u> |
| Exam Level: RO <input type="checkbox"/> SRO-I <input checked="" type="checkbox"/> SRO-U <input type="checkbox"/> | Operating Test Number: <u>TMI2019</u> |

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| System/JPM Title | Type Code* | Safety Function |
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| c. 006 / Lower CFT level and pressure from the Control Room - 006 A4.02 – Core Flood System | D, S | 3 |
| d. 061 / Respond to Emergency Feedwater Actuation - ALT 061A2.05 – Emergency Feedwater | D, A, S | 4S |
| e. 003 / Restore SI with a loss of ICCW 003A3.01 – Reactor Coolant Pump | D, A, S, P | 4P |
| f. N/A | | |
| g. 064 / Energize 1E 4kV Bus from the SBO 064A4.01 – Emergency Diesel Generators | D, L, S | 6 |
| h. 072 / Respond IAW OP-TM-MAP-C0101 Fuel Handling Incident in the Spent Fuel Pool – Radiation Monitors | N, A, S | 7 |
| In-Plant Systems: * 3 for RO, 3 for SRO-I, and 3 or 2 for SRO-U | | |
| i.008 / Loss of Instrument Air – 008A2.05 – Intermediate Closed Cooling Water System | D, E, R | 8 |
| j. 071 / Purge of the Waste Gas System Radiation Monitor (RM-A-7) 071A4.09 – Waste Gas Disposal System | D, R | 9 |
| k. 061 / Respond to a failure of EF-P-2A and EF-V-30D 061A2.04 – Emergency Feedwater | D, E | 4S |
| <p>* All RO and SRO-I control room (and in-plant) systems must be different and serve different safety functions, all five SRO-U systems must serve different safety functions, and in-plant systems and functions may overlap those tested in the control room.</p> | | |
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| | |
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JPM H – Fuel is being handled in the spent fuel pool. A fuel assembly is dropped, which cause RM-G-9 and RM-A-4 counts to rise to the alarm setpoint. The interlock fails, the examinee will have to secure ventilation in the spent fuel pool and the combined ventilation exhaust.

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JPM J – The examinee will have to purge RM-A-7, Waste Gas System Radiation Monitor.

JPM K – The examinee will be directed to investigate steam binding of EF-P-2A. The examinee will find that the pump is steam bound and take steps in accordance with the procedure to fix the pump.

ILT 18-01 NRC EXAM MATERIAL

| | | | | | |
|---|-----------------------|-------------------------|---|--------------|---------|
| Facility: | Three Mile Island | Scenario No.: | 1 | Op Test No.: | TMI2019 |
| Examiners: | | | Operators: | | |
| Initial Conditions: | | | | | |
| <ul style="list-style-type: none"> 85% power, MOL as ordered by the load dispatcher. AH-E-18B is running for a surveillance (1303-5.5B) EF-P-1 is OOS for the next 24 hours. | | | | | |
| Turnover: | | | | | |
| Maintain 85% power | | | | | |
| Critical Tasks: | | | | | |
| <ul style="list-style-type: none"> Shutdown reactor – ATWS (CT-24) Restore feed to a dry OTSG (CT-26) | | | | | |
| Event No. | Malf. No. | Event Type* | Event Description | | |
| 1 | CH630TCRC | TS CRS C ARO | AH-E-18 trip (ARO: Re-aligns ventilation, CRS: TS call). | | |
| 2 | RD10B | I CRS I URO I ARO | Uncontrolled inward rod motion, entry into OP-TM-AOP-070 (ATC/BOP: Manual control of ICS) | | |
| 3 | MU06 | TS CRS C URO | MU-V-18 fails partially closed (ATC: Controls pwr level with HPI) | | |
| 4 | FW16A | C CRS R URO C ARO | 'A' MFP Trips, manual runback required (ATC/BOP: manual runback) | | |
| 5 | FW15B RD28 RD32 | M CRS M URO M ARO | 'B' MFP trips, Reactor Trip with an ATWS | | |
| 6 | FW18A FW18B | C CRS C URO C ARO | Sequential loss of all EFW pumps. Entry into OP-TM-EOP-004, Lack of Heat Transfer. (URO: Secures RCP, ARO: Condensate Booster pump cooling) | | |
| | | C CRS C URO | (If required) HPI-PORV cooling, entry into OP-TM-EOP-009, HPI Cooling (URO: Opens PORV) | | |
| * (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor | | | | | |

| Facility: | Three Mile Island | Scenario No.: | 2 | Op Test No.: | <u>TMI2019</u> |
|--|--|-------------------------|---|--------------|----------------|
| Examiners: | _____ | Operators: | _____ | | |
| | _____ | | _____ | | |
| | _____ | | _____ | | |
| Initial Conditions: | <ul style="list-style-type: none"> • 28% power • RC-P-1B ready to start • NI-8 OOS due to a failed power supply • RPS Channel 'D' is in manual bypass, RPS logic is 2 out of 3 to trip | | | | |
| Turnover: | Start RC-P-1B | | | | |
| Critical Tasks: | <ul style="list-style-type: none"> • Isolate OTSG SG(s) (CT-17) • Control HPI (CT-5) | | | | |
| | | | | | |
| | | | | | |
| Event No. | Malf. No. | Event Type* | Event Description | | |
| 1 | | N CRS N ARO | Start RC-P-1B IAW OP-TM-226-102 (ARO: Start RCP) | | |
| 2 | RCR42 RCR43 | I CRS I URO | Pressurizer Spray Valve Failure (URO: Closes spray block valve) | | |
| 3 | NI15B | TS CRS C ARO | NI-6 failure (fails low) (ARO: Places RPS channel 'B' in tripped state) | | |
| 4 | RD0117 | TS CRS C URO | Dropped rod group 7 (URO: Recovers dropped rod) | | |
| 5 | MS02A | C CRS R URO C ARO | Steam leak in RB entry into OP-TM-AOP-051 and 1102-4 (URO: Lower power, ARO: RB Emergency Cooling) | | |
| 6 | MS02A | M CRS M URO M ARO | Steam line rupture in RB, Reactor Trip, OP-TM-EOP-003, XHT entry. | | |
| 7 | FW19A | C CRS C ARO | EF-V-30A fails open, entry into OP-TM-424-901 (ARO: Closes EF-V-2A, secures EF-P-2A) | | |
| * (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor | | | | | |

| | | | | | |
|--|--------------------|-------------------------|---|--------------|----------------|
| Facility: | Three Mile Island | Scenario No.: | 3 | Op Test No.: | <u>TMI2019</u> |
| Examiners: | | | Operators: | | |
| Initial Conditions: | | | | | |
| <ul style="list-style-type: none"> 2% power, MOL, ICS is in manual with reactivity control at the diamond Turbine Reset and all 6 Circulating Water Pumps are running for a PMT. FW-P-1B is operating with control on the MSC Engineers are doing systems walkdowns in the control tower and turbine building. | | | | | |
| Turnover: | | | | | |
| Raise reactor power to 10%, initiate a bleed to the 'B' RCBT | | | | | |
| Critical Tasks: | | | | | |
| <ul style="list-style-type: none"> Establish and Maintain Reactor Shutdown Requirements (CT-23) Control HPI (CT-5) | | | | | |
| | | | | | |
| Event No. | Malf. No. | Event Type* | Event Description | | |
| 1 | | N CRS R URO N ARO | Raise reactor power from 3% to 10% (URO: Power ascension with ICS in Manual, ARO: Bleeds to 'B' RCBT) | | |
| 2 | RM0323 | TS CRS | Reactor Building Hi Range Radiation Monitor, RM-G-23, Failure | | |
| 3 | RC04A | I CRS I URO | Pressurizer Level Transmitter fails, entry into OP-TM-MAP-G0105, OP-TM-MAP-G0205 (URO: Controls MU-V-17 in HAND) | | |
| 4 | ED40A EG21A | TS CRS C ARO | Loss of the 'D' 4kv Bus, EG-Y-1A fails to auto start (ARO: Starts EG-Y-1A) | | |
| 5 | | C CRS C ARO | Cavitating Circ Water Pump (ARO: Secure cavitating circ water pump) | | |
| 6 | MU07 | I CRS I URO | Seal Flow Instrument Fails, RCP Seal flow High (URO: Normalizes Seal Injection) | | |
| 7 | PLA-4-9 PLB-8-3 | M CRS M URO M ARO | Circ Water Rupture, Loss of Vacuum, Reactor Trip, Entry into EOP-001, Stuck Rods | | |
| 8 | TH06 | C CRS C URO C ARO | RCS leak, PZR Level Cannot be maintained without HPI, Entry into EOP-006 (URO: Initiate HPI, ARO: Initiate EFW) | | |
| * (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor | | | | | |

| FFacility: TMI | | Date of Exam: June 2019 | | | | | | | | | | | | | | | |
|---|-------------|-------------------------|----|----|-----|----|----|----|----|-----|----|----|-----------------|----|----|-------|----|
| 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 and Abnormal Plant Evolutions | 1 | 3 | 1 | 5 | N/A | | | 3 | 4 | N/A | | | 2 | 18 | 2 | 4 | 6 |
| | 2 | 2 | 1 | 1 | | | | 2 | 2 | | | | 1 | 9 | 2 | 2 | 4 |
| | Tier Totals | 5 | 2 | 6 | | | | 5 | 6 | | | | 3 | 27 | 4 | 6 | 10 |
| 2. Plant Systems | 1 | 3 | 2 | 2 | 3 | 1 | 2 | 3 | 3 | 4 | 2 | 3 | 28 | 2 | 3 | 5 | |
| | 2 | 1 | 0 | 1 | 2 | 1 | 2 | 2 | 0 | 0 | 1 | 0 | 10 | 2 | 0 | 1 | 3 |
| | Tier Totals | 4 | 2 | 3 | 5 | 2 | 4 | 5 | 3 | 4 | 3 | 3 | 38 | 4 | 4 | 8 | |
| 3. Generic Knowledge and Abilities Categories | | | | | 1 | 2 | 3 | 4 | 10 | | | | | | | | |
| | | | | | 3 | 3 | 1 | 3 | | | | | | | | | |

- 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 outline sections (i.e., except for one category in Tier 3 of the SRO-only section, the "Tier Totals" in each K/A category shall not be less than two). (One Tier 3 radiation control K/A is allowed if it is replaced by a K/A from another Tier 3 category.)
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 outline. Systems or evolutions that do not apply at the facility should be deleted with justification. Operationally important, site-specific systems/evolutions that are not included on the outline should be added. Refer to Section D.1.b of ES-401 for guidance regarding the 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 K/As 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/As.
8. On the following pages, enter the K/A numbers, a brief description of each topic, the topics' IRs 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 a category 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 10 CFR 55.43.

G* Generic K/As

- * These systems/evolutions must be included as part of the sample (as applicable to the facility) when Revision 3 of the K/A catalog is used to develop the sample plan. They are not required to be included when using earlier revisions of the K/A catalog.
- ** These systems/evolutions may be eliminated from the sample (as applicable to the facility) when Revision 3 of the K/A catalog is used to develop the sample plan.

| ES-401 | | PWR Examination Outline | | | | | | Form ES-401-2 | |
|--|----|-------------------------|----|----|----|----|---|---------------|----|
| Emergency and Abnormal Plant Evolutions—Tier 1/Group 1 (RO/SRO) | | | | | | | | | |
| E/APE # / Name / Safety Function | K1 | K2 | K3 | A1 | A2 | G* | K/A Topic(s) | IR | # |
| 000007 (EPE 7; BW E02&E10; CE E02) Reactor Trip, Stabilization, Recovery / 1 | | | X | | | | K3.01 Knowledge of the reasons for the following as the apply to a reactor trip: | 4.0 | 1 |
| 000008 (APE 8) Pressurizer Vapor Space Accident / 3 | | | | | X | | AA2.25 Ability to determine and interpret the following as they apply to the Pressurizer Vapor Space Accident: Expected leak rate from open PORV or code safety | 2.8 | 2 |
| 000009 (EPE 9) Small Break LOCA / 3 | | | | | | X | 2.4.18 Knowledge of the specific bases for EOPs. | | 3 |
| 000011 (EPE 11) Large Break LOCA / 3 | X | | | | | | EK1.01 Knowledge of the operational implications of the following concepts as they apply to the Large Break LOCA : Natural circulation and cooling, including reflux boiling | 4.1 | 4 |
| 000015 (APE 15) Reactor Coolant Pump Malfunctions / 4 | | | X | | | | AK3.07 Knowledge of the reasons for the following responses as they apply to the Reactor Coolant Pump Malfunctions (Loss of RC Flow) : Ensuring that S/G levels are controlled properly for natural circulation enhancement | 4.1 | 5 |
| 000022 (APE 22) Loss of Reactor Coolant Makeup / 2 | | | | | X | | AA2.02 Ability to determine and interpret the following as they apply to the Loss of Reactor Coolant Makeup: Charging pump problems | 3.2 | 6 |
| 000025 (APE 25) Loss of Residual Heat Removal System / 4 | | | X | | | | AK3.01 Knowledge of the reasons for the following responses as they apply to the Loss of Residual Heat Removal System: Shift to alternate flowpath | 3.1 | 7 |
| | | | | | | X | 2.1.25 Ability to interpret reference materials, such as graphs, curves, tables, etc. | 4.2 | 76 |
| 000026 (APE 26) Loss of Component Cooling Water / 8 | | | | X | | | AA1.03 Ability to operate and / or monitor the following as they apply to the Loss of Component Cooling Water: SWS as a backup to the CCWS | 3.6 | 8 |
| 000027 (APE 27) Pressurizer Pressure Control System Malfunction / 3 | | X | | | | | AK2.03 Knowledge of the interrelations between the Pressurizer Pressure Control Malfunctions and the following: Controllers and positioners | 2.6 | 9 |
| 000029 (EPE 29) Anticipated Transient Without Scram / 1 | | | X | | | | EK3.02 Knowledge of the reasons for the following responses as the apply to the ATWS: Starting a specific charging pump | 3.1 | 10 |
| | | | | | | X | 2.4.41 Knowledge of the emergency action level thresholds and classifications. | 4.6 | 77 |
| 000038 (EPE 38) Steam Generator Tube Rupture / 3 | | | | X | | | EA1.36 Ability to operate and monitor the following as they apply to a SGTR: Cooldown of RCS to specified temperature | 4.3 | 11 |
| 000040 (APE 40; BW E05; CE E05; W E12) X Steam Line Rupture—Excessive Heat Transfer / 4 | X | | | | | | AK1.04 Knowledge of the operational implications of the following concepts as they apply to Steam Line Rupture: Nil ductility temperature | 3.2 | 12 |
| | | | | | | X | 2.4.21 Knowledge of the parameters and logic used to assess the status of safety functions, such as reactivity control, core cooling and heat removal, reactor coolant system integrity, containment conditions, radioactivity release control, etc | 4.0 | 78 |
| 000054 (APE 54; CE E06) Loss of Main Feedwater / 4 | | | | | X | | AA2.02 Ability to determine and interpret the following as they apply to the Loss of Main Feedwater (MFW): Differentiation between loss of all MFW and trip of one MFW pump | 4.1 | 13 |

| | | | | | | | | | |
|--|---|---|---|---|-----|-----|--|-----|------|
| 000055 (EPE 55) Station Blackout / 6 | | | | | X | | EA2.01 Ability to determine or interpret the following as they apply to a Station Blackout: Existing valve positioning on a loss of instrument air system . | 3.7 | 79 |
| 000056 (APE 56) Loss of Offsite Power / 6 | X | | | | | | AK1.01 Knowledge of the operational implications of the following concepts as they apply to Loss of Offsite Power: Principle of cooling by natural convection. | 3.7 | 14 |
| 000057 (APE 57) Loss of Vital AC Instrument Bus / 6 | | | | | X | | AA2.20 Ability to determine and interpret the following as they apply to the Loss of Vital AC Instrument Bus: Interlocks in effect on loss of ac vital electrical instrument bus that must be bypassed to restore normal equipment operation | 3.6 | 15 |
| 000058 (APE 58) Loss of DC Power / 6 | | | | | | X | 2.2.44 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. | 4.4 | 80 |
| 000062 (APE 62) Loss of Nuclear Service Water / 4 | | | X | | | | AK3.01 Knowledge of the reasons for the following responses as they apply to the Loss of Nuclear Service Water: The conditions that will initiate the automatic opening and closing of the SWS isolation valves to the nuclear service water coolers | 3.2 | 16 |
| 000065 (APE 65) Loss of Instrument Air / 8 | | | | X | | | AA1.05 Ability to operate and / or monitor the following as they apply to the Loss of Instrument Air: RPS | 3.3 | 17 |
| 000077 (APE 77) Generator Voltage and Electric Grid Disturbances / 6 | | | | | X | | AA2.09 Ability to determine and interpret the following as they apply to Generator Voltage and Electric Grid Disturbances: Operational status of emergency diesel generators | 3.9 | 81 |
| (W E04) LOCA Outside Containment / 3 | | | | | | | | | |
| (W E11) Loss of Emergency Coolant Recirculation / 4 | | | | | | | | | |
| (BW E04; W E05) Inadequate Heat Transfer—Loss of Secondary Heat Sink / 4 | | | | | | X | 2.1.31 Ability to locate control room switches, controls and indications, and to determine that they correctly reflect the desired plant lineup. | 4.6 | 18 |
| | | | | | | | | | |
| K/A Category Totals: | 3 | 1 | 5 | 3 | 4/2 | 2/4 | Group Point Total: | | 18/6 |

| ES-401 | | PWR Examination Outline | | | | | | Form ES-401-2 | | |
|--|----|-------------------------|----|----|----|----|--|---------------|----|--|
| Emergency and Abnormal Plant Evolutions—Tier 1/Group 2 (RO/SRO) | | | | | | | | | | |
| E/APE # / Name / Safety Function | K1 | K2 | K3 | A1 | A2 | G* | K/A Topic(s) | IR | # | |
| 000001 (APE 1) Continuous Rod Withdrawal / 1 | | | | | X | | AA2.04 Ability to determine and interpret the following as they apply to the Continuous Rod Withdrawal : Reactor power and its trend | 4.2 | 19 | |
| 000003 (APE 3) Dropped Control Rod / 1 | | | | X | | | AA1.01 Ability to operate and / or monitor the following as they apply to the Dropped Control Rod: Demand position counter and pulse/analog converter | 2.9 | 20 | |
| 000005 (APE 5) Inoperable/Stuck Control Rod / 1 | X | | | | | | AK1.06 Knowledge of the operational implications of the following concepts as they apply to Inoperable / Stuck Control Rod: Bases for power limit, for rod misalignment | 2.9 | 21 | |
| 000024 (APE 24) Emergency Boration / 1 | | | | | | X | 2.4.30 Knowledge of events related to system operation/status that must be reported to internal organizations or external agencies, such as the State, the NRC, or the transmission operator | 2.7 | 82 | |
| 000028 (APE 28) Pressurizer (PZR) Level Control Malfunction / 2 | | | | | | | | | | |
| 000032 (APE 32) Loss of Source Range Nuclear Instrumentation / 7 | | X | | | | | AK2.01 Knowledge of the interrelations between the Loss of Source Range Nuclear Instrumentation and the following: Power supplies, including proper switch positions | 2.7 | 22 | |
| 000033 (APE 33) Loss of Intermediate Range Nuclear Instrumentation / 7 | | | | | X | | AA2.12 Ability to determine and interpret the following as they apply to the Loss of Intermediate Range Nuclear Instrumentation: Maximum allowable channel disagreement | 2.5 | 23 | |
| 000036 (APE 36; BW/A08) Fuel-Handling Incidents / 8 | | | | | X | | AA2.02 Ability to determine and interpret the following as they apply to the Fuel Handling Incidents: Occurrence of a fuel handling incident | 4.1 | 83 | |
| 000037 (APE 37) Steam Generator Tube Leak / 3 | | | | | | | | | | |
| 000051 (APE 51) Loss of Condenser Vacuum / 4 | | | | | | | | | | |
| 000059 (APE 59) Accidental Liquid Radwaste Release / 9 | | | | | | | | | | |
| 000060 (APE 60) Accidental Gaseous Radwaste Release / 9 | | | | | | | | | | |
| 000061 (APE 61) Area Radiation Monitoring System Alarms / 7 | | | | | | | | | | |
| 000067 (APE 67) Plant Fire On Site / 8 | | | | | | | | | | |
| 000068 (APE 68; BW A06) Control Room Evacuation / 8 | | | | | | | | | | |
| 000069 (APE 69; W E14) Loss of Containment Integrity / 5 | X | | | | | | AK1.01 Knowledge of the operational implications of the following concepts as they apply to Loss of Containment Integrity: Effect of pressure on leak rate | 2.6 | 24 | |

| | | | | | | | | | | |
|---|---|---|---|---|-----|-----|--------------------|--|-----|-----|
| 000074 (EPE 74; W E06 & E07) Inadequate Core Cooling / 4 | | | | | | | X | 2.2.49 Ability to perform without reference to procedures those actions that require immediate operation of system components and controls | 4.6 | 84 |
| 000076 (APE 76) High Reactor Coolant Activity / 9 | | | | | | | | | | |
| 000078 (APE 78*) RCS Leak / 3 | | | | | | | | | | |
| (W E01 & E02) Rediagnosis & SI Termination / 3 | | | | | | | | | | |
| (W E13) Steam Generator Overpressure / 4 | | | | | | | | | | |
| (W E15) Containment Flooding / 5 | | | | | | | | | | |
| (W E16) High Containment Radiation / 9 | | | | | | | | | | |
| (BW A01) Plant Runback / 1 | | | | | | | X | AA2.1 Ability to determine and interpret the following as they apply to the (Plant Runback): Facility conditions and selection of appropriate procedures during abnormal and emergency operations. | 3.7 | 85 |
| (BW A02 & A03) Loss of NNI-X/Y/7 | | | | | | | | | | |
| (BW A04) Turbine Trip / 4 | | | | | | | | | | |
| (BW A05) Emergency Diesel Actuation / 6 | | | | | | X | | AA1.3 Ability to operate and / or monitor the following as they apply to the (Emergency Diesel Actuation): Desired operating results during abnormal and emergency situations. | 3.7 | 25 |
| (BW A07) Flooding / 8 | | | | | | | X | 2.2.22 Knowledge of limiting conditions for operations and safety limits. | 4.0 | 26 |
| (BW E03) Inadequate Subcooling Margin / 4 | | | | | | | | | | |
| (BW E08; W E03) LOCA Cooldown—Depressurization / 4 | | | | | | | | | | |
| (BW E09; CE A13**; W E09 & E10) Natural Circulation/4 | | | | | | | | | | |
| (BW E13 & E14) EOP Rules and Enclosures | | | | X | | | | EK3.02 Knowledge of the reasons for the following responses as they apply to the (EOP Rules): Normal, abnormal and emergency operating procedures associated with (EOP Rules). | 3.2 | 27 |
| (CE A11**; W E08) RCS Overcooling—Pressurized Thermal Shock / 4 | | | | | | | | | | |
| (CE A16) Excess RCS Leakage / 2 | | | | | | | | | | |
| (CE E09) Functional Recovery | | | | | | | | | | |
| (CE E13*) Loss of Forced Circulation/LOOP/Blackout / 4 | | | | | | | | | | |
| K/A Category Point Totals: | 2 | 1 | 1 | 2 | 2/2 | 1/2 | Group Point Total: | | | 9/4 |

| ES-401 | | PWR Examination Outline Plant Systems—Tier 2/Group 1 (RO/SRO) | | | | | | | | | | | Form ES-401-2 | |
|---|----|--|----|----|----|----|----|----|----|----|----|--|---------------|----|
| System # / Name | K1 | K2 | K3 | K4 | K5 | K6 | A1 | A2 | A3 | A4 | G* | K/A Topic(s) | IR | # |
| 003 (SF4P RCP) Reactor Coolant Pump | | | | X | | | | | | | | K4.03 Knowledge of RCPS design feature(s) and/or interlock(s) which provide for the following: Adequate lubrication of the RCP | 2.5 | 28 |
| | | | | | | | | | | | X | 2.1.31 Ability to locate control room switches, controls, and indications, and to determine that they correctly reflect the desired plant lineup. | 4.6 | 54 |
| 004 (SF1; SF2 CVCS) Chemical and Volume Control | | X | | | | | | | | | | K2.05 Knowledge of bus power supplies to the following: MOVs | 2.7 | 29 |
| | | | | | | | | | | | X | 2.1.30 Ability to locate and operate components, including local controls. | 4.0 | 86 |
| 005 (SF4P RHR) Residual Heat Removal | | | | | | X | | | | | | K6.03 Knowledge of the effect of a loss or malfunction on the following will have on the RHRS: RHR heat exchanger | 2.5 | 30 |
| 006 (SF2; SF3 ECCS) Emergency Core Cooling | | | | | | | X | | | | | A1.09 Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the ECCS controls including: Pump amperage, including start, normal and locked | 2.8 | 31 |
| | | | | | | | | | | | X | A4.02 Ability to manually operate and/or monitor in the control room: Valves | 4.0 | 51 |
| 007 (SF5 PRTS) Pressurizer Relief/Quench Tank | | | X | | | | | | | | | K3.01 Knowledge of the effect that a loss or malfunction of the PRTS will have on the following: | 3.3 | 32 |
| 008 (SF8 CCW) Component Cooling Water | | | | | | | | X | | | | A2.04 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: PRMS alarm | 3.3 | 33 |
| | | | | | | | | | X | | | A2.03 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 CCW temperature | 3.2 | 87 |
| 010 (SF3 PZR PCS) Pressurizer Pressure Control | X | | | | | | | | | | | K1.08 Knowledge of the physical connections and/or cause-effect relationships between the PZR PCS and the following systems: PZR LCS | 3.2 | 34 |
| | | | | | X | | | | | | | K5.02 Knowledge of the operational implications of the following concepts as they apply to the PZR PCS: Constant enthalpy expansion through a valve | 2.6 | 49 |

| | | | | | | | | | | | | | | | | | | | | |
|--|---|--|---|--|--|--|--|---|---|---|--|--|--|---|--|--|--|---|-----|----|
| 012 (SF7 RPS) Reactor Protection | X | | | | | | | X | | | | | | | | | | A2.07 Ability to (a) predict the impacts of the following malfunctions or operations on the RPS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Loss of dc control power | 3.2 | 35 |
| | | | | | | | | | | | | | | | | | | K1.02 Knowledge of the physical connections and/or cause effect relationships between the RPS and the following systems: 125V dc system | 3.4 | 50 |
| 013 (SF2 ESFAS) Engineered Safety Features Actuation | | | X | | | | | | | | | | | | | | | K3.01 Knowledge of the effect that a loss or malfunction of the ESFAS will have on the following: Fuel | 4.4 | 36 |
| 022 (SF5 CCS) Containment Cooling | | | | | | | | | X | | | | | | | | | A3.01 Ability to monitor automatic operation of the CCS, including: Initiation of safeguards mode of operation | 4.1 | 37 |
| | | | | | | | | | | | | | | X | | | | 2.2.12 Knowledge of surveillance procedures. | 4.1 | 88 |
| 025 (SF5 ICE) Ice Condenser | | | | | | | | | | | | | | | | | | | | |
| 026 (SF5 CSS) Containment Spray | X | | | | | | | | | | | | | | | | | K2.01 Knowledge of bus power supplies to the following: Containment spray pumps | 3.4 | 38 |
| 039 (SF4S MSS) Main and Reheat Steam | | | | | | | | X | | | | | | | | | | A1.05 Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the MRSS controls including: RCS T-ave | 3.2 | 39 |
| | | | | | | | | | X | | | | | | | | | A2.03 Ability to (a) predict the impacts of the following malfunctions or operations on the MRSS; and (b) based on predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Indications and alarms for main steam and area radiation monitors (during SGTR) | 3.7 | 89 |
| 059 (SF4S MFW) Main Feedwater | X | | | | | | | | | | | | | | | | | K1.07 Knowledge of the physical connections and/or cause effect relationships between the MFW and the following systems: ICS | 3.2 | 40 |
| | | | | | | | | | | X | | | | | | | | A3.03 Ability to monitor automatic operation of the MFW, including: Feedwater pump suction flow pressure | 2.5 | 53 |
| 061 (SF4S AFW) Auxiliary/Emergency Feedwater | | | X | | | | | | | | | | | | | | | K4.06 Knowledge of AFW design feature(s) and/or interlock(s) which provide for the following: AFW startup permissives | 4.0 | 41 |
| | | | | | | | | | | X | | | | | | | | A3.02 Ability to monitor automatic operation of the AFW, including: RCS cooldown during AFW operations | 4.0 | 52 |

[illegible]

| | | | | | | | | | | | | | | | |
|--|---|---|---|---|---|---|---|-----|---|---|-----|--------------------|---|-----|------|
| 086 Fire Protection | | | | | | X | | | | | | | K6. Knowledge of the effect of a loss or malfunction on the Fire Protection System following will have on the : Fire, smoke, and heat detectors | 2.6 | 65 |
| 050 (SF 9 CRV*) Control Room Ventilation | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| K/A Category Point Totals: | 1 | 0 | 1 | 2 | 1 | 2 | 2 | 0/2 | 0 | 1 | 0/1 | Group Point Total: | | | 10/3 |

| Facility: TMI | | Date of Exam: June 2019 | | | | |
|------------------------------|----------|---|-----|----|----------|----|
| Category | K/A # | Topic | RO | | SRO-only | |
| | | | IR | # | IR | # |
| 1. Conduct of Operations | 2.1.34 | Knowledge of primary and secondary plant chemistry limits. | 2.7 | 66 | | |
| | 2.1.36 | Knowledge of procedures and limitations involved in core alterations. | 3.0 | 67 | | |
| | 2.1.43 | Ability to use procedures to determine the effects on reactivity of plant changes, such as reactor coolant system temperature, secondary plant, fuel depletion, etc. | 4.1 | 68 | | |
| | 2.1.5 | Ability to use procedures related to shift staffing, such as minimum crew complement, overtime limitations, etc. | | | 3.9 | 94 |
| | 2.1.8 | Ability to coordinate personnel activities outside the control room. | | | 4.1 | 95 |
| | | | | | | |
| | Subtotal | | | 3 | | 2 |
| 2. Equipment Control | 2.2.17 | Knowledge of the process for managing maintenance activities during power operations, such as risk assessments, work prioritizations, and coordination with the transmission system operator | 2.6 | 69 | | |
| | 2.2.42 | Ability to recognize system parameters that are entry-level conditions for Technical Specifications. | 3.9 | 70 | | |
| | 2.2.14 | Knowledge of the process for controlling equipment configuration or status. | 3.9 | 71 | | |
| | 2.2.6 | Knowledge of the process for making changes to procedures. | | | 3.6 | 96 |
| | 2.2.19 | Knowledge of maintenance work order requirements. | | | 3.4 | 97 |
| | | | | | | |
| | Subtotal | | | 3 | | 2 |
| 3. Radiation Control | 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 | | |
| | 2.3.12 | Knowledge of radiological safety principles pertaining to licensed operator duties, such as containment entry requirements, fuel handling responsibilities, access to locked high-radiation areas, aligning filters, etc. | | | 3.7 | 98 |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | Subtotal | | | 1 | | 1 |
| 4. Emergency Procedures/Plan | 2.4.3 | Ability to identify post-accident instrumentation. | 3.7 | 73 | | |
| | 2.4.50 | Ability to verify system alarm setpoints and operate controls identified in the alarm response manual. | 4.2 | 74 | | |
| | 2.4.2 | Knowledge of system set points, interlocks and automatic actions associated with EOP entry conditions | 4.5 | 75 | | |

ES-401**Generic Knowledge and Abilities Outline (Tier 3)****Form ES-401-3**

| | | | | | | |
|--------------------|----------|---|--|----|-----|-----|
| | 2.4.37 | Knowledge of the lines of authority during implementation of the emergency plan. | | | 4.1 | 99 |
| | 2.4.9 | Knowledge of low power/shutdown implications in accident (e.g., loss of coolant accident or loss of residual heat removal) mitigation strategies. | | | 4.2 | 100 |
| | | | | | | |
| | Subtotal | | | 3 | | 2 |
| Tier 3 Point Total | | | | 10 | | 7 |

[illegible]

ES-401

Record of Rejected K/As

Form ES-401-4