Facility: **Catawba Nuclear Station**	Date of Examination: **Sep 2019**
Examination Level: RO ☒ SRO ☐	Operating Test Number: **2019301**

Administrative Topic (see Note)	Type Code*	Describe activity to be performed
Conduct of Operations	R, M	**Perform a Manual Leakage Calculation** G 2.1.7 Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation. 41.5 / 43.5 / 45.12 / 45.13 4.4 / 4.7
Conduct of Operations	R, M	**Perform Manual Shutdown Margin Calculation** G 2.1.25 Ability to interpret reference materials, such as graphs, curves, tables, etc. 41.10 / 43.5 / 45.12 3.9 / 4.2
Equipment Control	R, P	**Determine Isolation Boundary** G 2.2.41 Ability to obtain and interpret station electrical and mechanical drawings. 41.10 / 45.12 / 45.13 3.5 / 3.9
Radiation Control	R, M	**Determine RP Requirements** G 2.3.7 Ability to comply with radiation work permit requirements during normal or abnormal conditions. 41.12 / 45.10 3.5/3.6
Emergency Plan		

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)

Admin JPMs

JPM A.1-1R Perform Manual NC System Leakage Calculation – Modified Bank JPM. Modified by altering values which changed the final answers.

K/A Generic 2.1.7 Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation. (CFR 41.5 / 43.5 / 45.12 / 45.13) RO 4.4

Initial conditions are that Unit 1 Operator Aid Computer is out of service due to emergent system failures and will not be returned to service for an estimated 24 hours. The applicants are directed to perform a manual NC system leakage calculation per PT/1/A/4150/001 D (NC System Leakage Calculation). The applicants will be given a data sheet with needed values for times 2000 & 2104 (required to be > 60 minutes). Following completion of this task, the applicant will determine TS / SLCs in which the LCO is not currently met.

JPM A.1-2R Perform Manual Shutdown Margin Calculation – Modified Bank JPM RB-125. Modified by altering values which changed the final answer. This JPM is time critical with a completion time requirement of 1 hour (to comply with requirement of T.S. 3.1.4).

K/A Generic 2.1.25 Ability to interpret reference materials, such as graphs, curves, tables, etc. (CFR 41.10 / 43.5 / 45.12) RO 3.9

Initial conditions are that the computer program used to calculate shutdown margin is inoperable and that during performance of the RCCA Bank Repositioning Periodic Test, it was determined that Control Rods B6 and H8 were immovable and untrippable. Tech Specs require that a shutdown margin calculation be performed within 1 hour. Applicants are given values for current power level, core life, control rod positions, and current boron concentration and are instructed to perform a manual shutdown margin calculation per OP/0/A/6100/006 (Reactivity Balance Calculations) Enclosure 4.3 (Shutdown Margin – Untrippable / Misaligned RCCA(s) – Modes 1 & 2). Applicant will determine that current calculated shutdown margin is 1343 pcm. Applicant determines that required shutdown margin of 1300 pcm for the current mode does exist.

Admin JPMs

JPM A.2R Use Flow Diagrams, Electrical Prints and Load Lists to Determine Leak Isolation Boundary – Bank JPM 2017 NRC Exam A.2.

K/A Generic 2.2.41 Ability to obtain and interpret station electrical and mechanical drawings. (CFR 41.10 / 45.12 / 45.13) RO 3.5 SRO 3.9

Initial conditions are the 1B Condensate Booster Pump has been shut down in accordance with OP/1/A/6250/001 and is to be tagged out for removal and replacement of 1CM-327 (1B Condensate Booster Pump Suction Header Relief Valve). The applicant is provided CM flow diagrams CN 1590-1.5 and CN 1590-1.7, Load List for 1MXB, and Electrical Drawings CN 1702-1.1 through CN 1702-1.4, and are directed to determine all mechanical isolations, electrical isolations, and to identify applicable vent or drain path for use for the development of a tagout.

JPM A.3R Determine Radiation Protection Requirements for an Activity – Modified Bank JPM (2016 NRC Exam). Modified by replacing the second question. This question originally required calculating total venting time allowed without exceeding dose specified in RWP and now requires calculating total additional time allowed at Low Exposure Waiting Area prior to exceeding 80% of dose specified in RWP. Also changed listed room entry times associated with the first question.

K/A Generic 2.3.7 Ability to comply with radiation work permit requirements during normal or abnormal conditions. (CFR 41.12 / 45.10) RO 3.5

Initial conditions are that Unit 1 has entered AP/1/A/5500/019 (Loss of Residual Heat Removal). The CRS has sent an AO to the 1A ND pump room to stand by in a low exposure waiting area and await word to vent 1A ND pump. The applicant is given a copy of RWP # 5021 (ECCS venting) and a copy of a plan view for 1A ND pump room and a timeline for the evolution. The applicant will calculate total dose received during the waiting period and pump vent and then calculate allowable time at LEWA before exceeding 80% dose specified in RWP.

Facility: **Catawba Nuclear Station**	Date of Examination: **Sep 2019**
Examination Level: RO ☐ SRO ☒	Operating Test Number: **2019301**

Administrative Topic (see Note)	Type Code*	Describe activity to be performed
Conduct of Operations	R, M	**Perform a Manual Leakage Calculation** G 2.1.7 Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation. 41.5 / 43.5 / 45.12 / 45.13 4.4 / 4.7
Conduct of Operations	R, M	**Determine Final BAT level for a Rapid Boration and evaluate Selected License Commitments** G 2.1.23 Ability to perform specific system and integrated plant procedures during all modes of plant operation. 41.10 / 43.5 / 45.2 / 45.6 4.3 / 4.4
Equipment Control	R, N	**Determine Fire Rated Assembly requirements per SLC 16.9-5** G 2.2.40 Ability to apply Technical Specifications for a system. 41.10 / 43.2 / 43.5 / 45.3 3.4 / 4.7
Radiation Control	R, M	**Calculate RL Discharge Flow for Release** G 2.3.11 Ability to control radiation releases. 41.11 / 43.4 / 45.10 3.8 / 4.3
Emergency Plan	R, N	**Classify an Event and Fill Out the Emergency Notification Form** G 2.4.40 Knowledge of SRO responsibilities in emergency plan implementation. 41.10 / 43.5 / 45.11 2.7 / 4.5

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)

Admin JPMs

JPM A.1-1S Perform Manual NC System Leakage Calculation –Bank JPM. Modified supplied leakage information which changed the final calculated values.

K/A Generic 2.1.7 Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation. (CFR 41.5 / 43.5 / 45.12 / 45.13) SRO 4.7

Initial conditions are that Unit 1 Operator Aid Computer is out of service due to emergent system failures and will not be returned to service for an estimated 24 hours. The applicants are directed to perform a manual NC system leakage calculation per PT/1/A/4150/001 D (NC System Leakage Calculation). The applicants will be given a data sheet with needed values for times 2000 & 2104 (required to be > 60 minutes). Once calculations are complete, applicants will determine that entry into T.S. 3.4.13 Condition A is required for Unidentified Leakage being > 1 gpm (~8.7 gpm) and entry into SLC 16.7-9 Condition B is required for Total Accumulated Leakage being > 20 gpm making the Standby Makeup Pump #1 Non-Functional (which also requires entry into SLC 16.7-9 Condition A).

JPM A.1-2S Determine Final BAT level for a Rapid Boration and evaluate Selected License Commitments – Modified Bank JPM (NV-126). Modified by adding a requirement to determine Tech Spec / SLC requirements following Boric Acid addition.

K/A Generic 2.1.23 Ability to perform specific system and integrated plant procedures during all modes of plant operation. *(CFR 41.10 / 43.5 / 45.2 / 45.6) SRO 4.4*

Initial conditions are that Unit 1 is in Mode 3 following shutdown to investigate an equipment issue at 50 EFPD. Preparations are being made to perform a rapid boration to reach refueling boron concentration. The applicants are directed to determine required boric acid addition to reach minimum refueling concentration, determine Boric Acid Tank #1 level following this addition, and evaluate Tech Specs / SLCs. Per procedure, the applicant will calculate the required boric acid addition and final Boric Acid Tank #1 level. The applicant will then determine that SLC 16.9-12, Condition A, is required to be entered because final BAT #1 tank level is less than required per the COLR.

JPM A.2 Determine Fire Rated Assembly requirements per SLC 16.9-5 - New

K/A Generic 2.2.40 Ability to apply Technical Specifications for a system. *(CFR 41.10 / 43.2 / 43.5 / 45.3) SRO 4.7*

Initial conditions are that both units are at 100% power. A maintenance technician has reported an opening in a wall located in the Auxiliary Building. Applicants are required to determine remedial actions and list applicable T.S. / SLC LCOs and applicable Conditions. The applicant will locate the applicable SLC (16.9-5) and follow application instructions. Accordingly, the applicant will review the Architectural Fire Boundary Plan and determine that the reported location is a required Fire Barrier and then review the Fire Protection Equipment drawing to identify the affected Fire Areas. The applicant will then compare these identified Fire Areas with a list of High Safety Significant (HSS) Fire Areas and determine that one of Fire Areas meets the requirements of HSS. This determination will lead the applicant to determine Condition A of SLC 16.9-5 is required to be applied.

Admin JPMs

JPM A.3S Calculate Total RL Discharge Flow—Modification of Bank JPM WL-001 used on 2017 NRC Exam. Modified by altering values which changed the calculation and final flowrate. Modified value also changes the answer related to LWR approval.

K/A Generic 2.3.11 Ability to control radiation releases. (CFR 41.11 / 43.4 / 45.10) SRO 4.3

Initial conditions are that the RL discharge header flow instrumentation is inoperable and an LWR package has been delivered to the control room for approval. Applicants are given plant conditions and directed to calculate and record the total RL discharge flow per PT/0/A/4250/011 (RL Temperature and Discharge Flow Determination) and determine whether sufficient dilution flow exists to approve the LWR. Applicant will calculate Total RL Discharge Flow to be 44,112 gpm (43,933 to 44,383 gpm acceptable). Applicant will determine that sufficient dilution flow does NOT exist for the LWR approval.

JPM A.4 Classify an Event and Fill Out the Emergency Notification Form. NEW JPM.
This JPM is time critical (≤ 15 minutes) from the point that the emergency classification is made.

K/A Generic 2.4.40 Knowledge of SRO responsibilities in emergency plan implementation. (CFR 41.10 / 43.5 / 45.11) SRO 4.5

Initial conditions are that both units are at 100% RTP. Radiography is in progress in the #1 CA Pump Room (this room contains the Auxiliary Shutdown Panels). A fork lift overturns near a Control Room intake requiring evacuation due to resulting gas leak. The Control Room evacuation procedure will direct a transfer of controls to the ASPs. This will be accomplished for Unit 2 resulting in an Alert Classification due to CR evacuation. However, Unit 1 will not be successful in performing a timely transfer to the ASPs. SM will direct transfer to the SSF due to radiography. The delay will result in Unit 1 exceeding 15 minutes for reestablishment of controls requiring declaration of a Site Area Emergency per HS6.1. Following declaration of this event (within 15 minutes), the applicant will complete the Emergency Notification Form within 15 minutes.

ES-301	Control Room/In-Plant Systems Outline	Form ES-301-2

NRC EXAM

Facility: **Catawba Nuclear Station** Date of Examination: **Sep 2019**

Exam Level: RO ☒ SRO-I ☐ SRO-U ☐ Operating Test Number: **2019301**

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. Initiate RCS Bleed and Feed following loss of Secondary Heat Sink WE05 EA1.1 (4.1/4.0)	A,EN,L,N,S	4P
b. Loss of KC Ap-21 step 8 008 A2.01 (3.3/3.6)	A,D,S	8
c. Isolate Faulted S/G 1A in accordance with EP/1/A/5000/E-2 035 A4.06 (4.5/4.6)	A,L,N,S	4S
d. Transfer ECCS to Cold Leg Recirculation 006 A4.07 (4.4/4.4)	A,D,EN,L,S	2
e. Restore Normal Power to 1ETA from the Control Room 064 A4.07 (3.4/3.4)	D,P,S	6
f. Shift Lower Containment Ventilation Units 022 A4.01 (3.6/3.6)	D,S	5
g. Initiate Containment Air Release 073 A4.02 (3.7/3.7)	D,P,S	7
h. Perform Manual Make-up to the VCT 004 A4.12 (3.8/3.3)	D,S	1
In-Plant Systems:* 3 for RO, 3 for SRO-I, and 3 or 2 for SRO-U		
i. Break Condenser Vacuum Locally – Unit 2 045 A1.06 (3.3/3.7)	D,E,L	4S
j. Transfer Control to the Standby Shutdown System 068 AA1.21 (3.9/4.1)	D,E,R	3
k. Locally Start 1B Diesel Generator 064 A2.01 (3.1/3.3)	A,D,E	6

* 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	**(5/5/3)**
(C)ontrol room		
(D)irect from bank	≤ 9/≤ 8/≤ 4	**(9/8/4)**
(E)mergency or abnormal in-plant	≥ 1/≥ 1/≥ 1	**(3/3/3)**
(EN)gineered safety feature	≥ 1/≥ 1/≥ 1	**(2/2/1)**
(L)ow-Power/Shutdown	≥ 1/≥ 1/≥ 1	**(4/4/2)**
(N)ew or (M)odified from bank including 1(A)	≥ 2/≥ 2/≥ 1	**(2/2/1)**
(P)revious 2 exams	≤ 3/≤ 3/≤ 2	**(2/2/0)**
(R)CA	≥ 1/≥ 1/≥ 1	**(1/1/1)**
(S)imulator		

NRC EXAM

Simulator JPMs

JPM a – Initiate RCS Bleed and Feed following loss of Secondary Heat Sink – New - Alternate Path

K/A WE05 EA1.1 – Ability to operate and/or monitor the following as they apply to the (Loss of Secondary Heat Sink); Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.
(CFR: 41.7 / 45.5 / 45.6) RO 4.1 / SRO 4.0

Initial conditions: A Reactor Trip has occurred due to a loss of both main feed pumps. The Auxiliary Feedwater Pumps will not function. EP/1/A/5000/FR-H.1 has been entered and Bleed and Feed initiation criteria has been met. The applicant is directed to initiate Bleed and Feed in accordance with FR-H.1. Applicant will stop all NC pumps and manually initiate both trains of safety injection. The applicant will then attempt to align a bleed path by opening two PZR PORVs (one PORV will not open). This begins the **ALTERNATE PATH**. Following alignment of emergency nitrogen supply and failed verification of bleed path the applicant will ensure instrument air aligned to containment and then open an additional PZR PORV.

JPM b – Loss of KC AP-21 step 8 (Reactor Trip Sequence) Bank JPM– Alternate Path

K/A 008 A2.01 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: Loss of CCW pump (CFR 41.5 / 43.5 / 45.3 / 45.13) RO 3.3 SRO 3.6

Initial conditions: Unit 1 is at 100% power. AP/1/A/5500/021 (Loss of Component Cooling) has been entered. The CRS directs the applicant to perform step 8 of AP/21. The applicant will not be able to verify KC flow to the NC pumps (due to three closed Containment Isolation Valves) and will transition to the RNO. The applicant will successfully open two Containment Isolation Valves and unsuccessfully attempt to open 1KC-425A (NC Pumps Ret Hdr Cont Isol). This begins the **ALTERNATE PATH**. The applicant will place steam dumps in Pressure control mode, ensure the reactor is tripped, when reactor power is verified < 5% will trip the NC Pumps, and will place both Pressurizer Spray Valves in manual and closed. The JPM will be terminated with a cue that the CRS is ready to begin reading EP/1/A/5000/E-0 (Reactor Trip or Safety Injection).

JPM c – Isolate faulted S/G 1A in accordance with EP/1/A/5000/E-2 – New – Alternate Path

K/A 035 A4.06 Ability to manually operate and/or monitor in the control room: S/G isolation on steam leak or tube rupture/leak.
(CFR: 41.7 / 45.5 to 45.8) RO 4.5 SRO 4.6

Initial conditions: A Reactor Trip and Safety Injection have occurred due to a fault of the 1A S/G. The applicant is instructed to isolate 1A S/G in accordance with step 10 of E-2. The applicant will determine that a complete feedwater isolation is not present and attempt to manually close associated isolation valves. The Auxiliary Feed Nozzle Tempering Flow isolation will not close. The applicant will close the Auxiliary Feed Nozzle Tempering Control Valve and associated Bypass Valve to isolate this flowpath. The applicant will then successfully close the 1A S/G blowdown control valve. Next, the applicant will unsuccessfully attempt to isolate aux feed flow by closing 1A Aux Feed Pump Isolation to 1A S/G. This begins the **ALTERNATE PATH**. The applicant will close the aux feed flow control valve associated with 1A Aux Feed Pump, dispatch an operator to manually close the failed isolation valve, and then close the CAPT Isolation to 1A S/G.

NRC EXAM

Simulator JPMs

JPM d - Transfer the ECCS to Cold Leg Recirculation – Bank JPM - Alternate Path

K/A 006 A4.07 – Ability to manually operate and/or monitor in the control room: ECCS pumps and valves (CFR: 41.7/45.5 to 45.8) RO 4.4 / SRO 4.4

Initial conditions: A LOCA has occurred on Unit 1. Annunciator 1AD-9, E/8 "FWST LO-LO LEVEL" is lit. The applicant is instructed to transfer to Cold Leg Recirculation lineup per EP/1/A/5000/ES-1.3 (Transfer to Cold Leg Recirculation) step 6. During verification of automatic actions, it is determined that 1NI-184B (ND Pump 1B Cont Sump Suct) is not open. The applicant continues to perform the lineup for CLR and unsuccessfully attempts to open 1ND-28A (ND Supply to NV and NI Pmps). The applicant will determine that no ND train can be aligned to provide a suction to the NV and NI pumps and transitions to the RNO to begin the **ALTERNATE PATH**. The applicant will secure all NV and NI pumps to finish the JPM.

JPM e – Restore Normal Power to 1ETA From the Control Room - Previous 2 NRC Exams – randomly selected from bank

K/A 064 A4.07 Ability to manually operate and/or monitor in the control room: Transfer ED/G (with load) to grid. (CFR 41.7 / 45.5 to 45.8) RO 3.4 SRO 3.4

Initial conditions: Unit 1 is recovering from a blackout per AP/1/A/5500/007 (Loss of Normal Power) Case I. Power has been aligned to 1ATC (normal offsite power source for 1ETA). CRS directs the applicant to parallel 1A D/G to 1ETA's normal power source (1ATC) and to shutdown 1A D/G per OP/1/A/6350/002 (Diesel Generator Operation) Enclosure 4.17 (Shutdown of D/G 1A After an Automatic Start). Applicant adjusts 1A D/G voltage to be 50-200 volts higher than line volts, increases D/G 1A speed, closes the ETA normal feeder breaker from 1ATC, and stabilizes 1A D/G with a positive load and a lagging power factor. Applicant will then decrease 1A D/G load to 200 KW prior to opening the 1A D/G breaker to 1ETA. Applicant will then depress the 1A D/G 'OFF' pushbutton to complete the JPM.

JPM f – Shift Lower Containment Vent Units – Bank JPM

K/A 022 A4.01 Ability to manually operate and/or monitor in the control room: CCS Fans (CFR 41.7 / 45.5 to 45.8) RO 3.6 SRO 3.6

Initial conditions: Unit 1 is at 100% power. The CRS has instructed the applicant to shift Lower Containment Ventilation Units by securing 1A LCVU and starting 1B LCVU. The applicant will secure 1A LCVU by placing the control switch to OFF, verify the unit secures via flow switch, and verify the associated damper closes. The applicant will then start the 1B LCVU by placing the control switch in the LOW position, verify start via flow switch, and ensure the associated damper opens. Following unit swap the applicant will document ventilation units in service.

JPM g – Initiate a Containment air (VQ) release - Previous 2 NRC Exams – randomly selected from bank

K/A 073 A4.02 Ability to manually operate and/or monitor in the control room: Radiation monitoring system control panel (CFR 41.7 / 45.5 to 45.8) RO 3.7 SRO 3.7

Initial conditions: Unit 1 is at 100% power. The CRS directs the applicant to initiate a containment air release. The applicant will perform the following actions to successfully complete this JPM: verify and document proper EMF setpoints, verify release valve controller setpoint, reset the release totalizer, unisolate release path and start the applicable fan.

NRC EXAM

Simulator JPMs

JPM h – Perform a Manual Makeup to the VCT - Bank JPM

K/A 004 A4.12 Ability to operate and/or monitor in the control room: Boration/dilution batch control (CFR 41.7 / 45.5 to 45.8) RO 3.8 SRO 3.3

Initial conditions: Unit 1 VCT level is 35%. The CRS directs the applicant to perform a manual blended makeup to increase level to 55%. The applicant will determine total makeup volume required and perform calculation to determine amount of boric acid required. The applicant will then perform the makeup by mixing boric acid and reactor makeup water to increase VCT level by 20%.

NRC EXAM

Plant JPMs

JPM i – Break Condenser Vacuum locally– Bank JPM

K/A 045 A1.06 Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the MT/G system controls including: Expected response of secondary plant parameters following T/G trip
(CFR 41.5 / 45.5) RO 3.3 SRO 3.7

Initial conditions: A Unit 2 Reactor trip has occurred. The CRS has instructed the applicant to break condenser vacuum per AP/2/A/5500/006. The applicant will manually open three condenser vacuum breaker valves, isolate steam flow to condensate air ejectors via valve manipulations, and then verify vacuum broken by inspecting vacuum breakers for indication of air flow.

JPM j – Transfer Control to Standby Shutdown System –Bank JPM – (RCA entry required)

K/A 068 AA1.21 Ability to operate and / or monitor the following as they apply to the Control Room Evacuation: Transfer of controls from control room to shutdown panel or local control
(CFR 41.7 / 45.5 /45.6) RO 3.9 SRO 4.1

Initial conditions: A Unit 2 fire has resulted in evacuation of the control room. The applicant is instructed to transfer control to the Standby Shutdown System (SSF) per OP/0/B/6100/013. The applicant will align alternate power (via breaker operations) to Essential Motor Control Center 2EMXS. This will align control of various pressure boundary valves, required for SSF operations, to the SSF Control Panel and align power to the switchgear capable of being powered by the SSF D/G. The applicant will then energize a Reactor Vessel Head Vent capable of being controlled from the SSF, transfer CAPT Trip and Throttle Valve control to the SSF, swap plug disconnects to ensure significant solenoid isolation valves are closed, and swap plug disconnect for nuclear wide range power indication at the SSF.

JPM k – Locally Start 1B Diesel Generator – Bank JPM – Alternate Path

K/A 064 A2.01 Ability to (a) predict the impacts of the following malfunctions or operations on the ED/G system; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Failure modes of water, oil, and air valves (CFR 41.5 / 43.5 /45.3 / 45.13) RO 3.1 SRO 3.3

Initial conditions: Unit 1 has experienced a loss of all AC power to vital bus 1ETB. The reason for the loss of AC power has been corrected. 1ETB load shed is complete. The CRS instructs the applicant to energize 1ETB from 1B D/G by performing AP/1/A/5500/007 (Loss of Normal Power) Enclosure 11 (Energizing 1ETB From D/G). The applicant will locally start 1B D/G, attain proper frequency and voltage, and close the diesel output breaker. Following essential load center power restoration, the applicant will attempt to verify proper cooling water flow via D/G cooling water isolation valve. This valve is not open and cannot be manually opened. This begins the **ALTERNATE PATH**. The applicant will secure the 1B D/G and inform the control room of status to finish the JPM.

ES-301	Control Room/In-Plant Systems Outline	Form ES-301-2

NRC EXAM

Facility: **Catawba Nuclear Station** Date of Examination: **Sep 2019**

Exam Level: RO ☐ SRO-I ☒ SRO-U ☐ Operating Test Number: **2019301**

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. Initiate RCS Bleed and Feed following loss of Secondary Heat Sink WE05 EA1.1 (4.1/4.0)	A,EN,L,N,S	4P
b. Loss of KC Ap-21 step 8 008 A2.01 (3.3/3.6)	A,D,S	8
c. Isolate Faulted S/G 1A in accordance with EP/1/A/5000/E-2 035 A4.06 (4.5/4.6)	A,L,N,S	4S
d. Transfer ECCS to Cold Leg Recirculation 006 A4.07 (4.4/4.4)	A,D,EN,L,S	2
e. Restore Normal Power to 1ETA from the Control Room 064 A4.07 (3.4/3.4)	D,P,S	6
f. Shift Lower Containment Ventilation Units 022 A4.01 (3.6/3.6)	D,S	5
g. Initiate Containment Air Release 073 A4.02 (3.7/3.7)	D,P,S	7

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

i. Break Condenser Vacuum Locally – Unit 2 045 A1.06 (3.3/3.7)	D,E,L	4S
j. Transfer Control to the Standby Shutdown System 068 AA1.21 (3.9/4.1)	D,E,R	3
k. Locally Start 1B Diesel Generator 064 A2.01 (3.1/3.3)	A,D,E	6

* 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	**(5/5/3)**
(C)ontrol room		
(D)irect from bank	≤ 9/≤ 8/≤ 4	**(9/8/4)**
(E)mergency or abnormal in-plant	≥ 1/≥ 1/≥ 1	**(3/3/3)**
(EN)gineered safety feature	≥ 1/≥ 1/≥ 1	**(2/2/1)**
(L)ow-Power/Shutdown	≥ 1/≥ 1/≥ 1	**(4/4/2)**
(N)ew or (M)odified from bank including 1(A)	≥ 2/≥ 2/≥ 1	**(2/2/1)**
(P)revious 2 exams	≤ 3/≤ 3/≤ 2	**(2/2/0)**
(R)CA	≥ 1/≥ 1/≥ 1	**(1/1/1)**
(S)imulator		

NRC EXAM

Simulator JPMs

JPM a – Initiate RCS Bleed and Feed following loss of Secondary Heat Sink – New - Alternate Path

K/A WE05 EA1.1 – Ability to operate and/or monitor the following as they apply to the (Loss of Secondary Heat Sink); Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.
(CFR: 41.7 / 45.5 / 45.6) RO 4.1 / SRO 4.0

Initial conditions: A Reactor Trip has occurred due to a loss of both main feed pumps. The Auxiliary Feedwater Pumps will not function. EP/1/A/5000/FR-H.1 has been entered and Bleed and Feed initiation criteria has been met. The applicant is directed to initiate Bleed and Feed in accordance with FR-H.1. Applicant will stop all NC pumps and manually initiate both trains of safety injection. The applicant will then attempt to align a bleed path by opening two PZR PORVs (one PORV will not open). This begins the **ALTERNATE PATH**. Following alignment of emergency nitrogen supply and failed verification of bleed path the applicant will ensure instrument air aligned to containment and then open an additional PZR PORV.

JPM b – Loss of KC AP-21 step 8 (Reactor Trip Sequence) Bank JPM– Alternate Path

K/A 008 A2.01 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: Loss of CCW pump (CFR 41.5 / 43.5 / 45.3 / 45.13) RO 3.3 SRO 3.6

Initial conditions: Unit 1 is at 100% power. AP/1/A/5500/021 (Loss of Component Cooling) has been entered. The CRS directs the applicant to perform step 8 of AP/21. The applicant will not be able to verify KC flow to the NC pumps (due to three closed Containment Isolation Valves) and will transition to the RNO. The applicant will successfully open two Containment Isolation Valves and unsuccessfully attempt to open 1KC-425A (NC Pumps Ret Hdr Cont Isol). This begins the **ALTERNATE PATH**. The applicant will place steam dumps in Pressure control mode, ensure the reactor is tripped, when reactor power is verified < 5% will trip the NC Pumps, and will place both Pressurizer Spray Valves in manual and closed. The JPM will be terminated with a cue that the CRS is ready to begin reading EP/1/A/5000/E-0 (Reactor Trip or Safety Injection).

JPM c – Isolate faulted S/G 1A in accordance with EP/1/A/5000/E-2 – New – Alternate Path

K/A 035 A4.06 Ability to manually operate and/or monitor in the control room: S/G isolation on steam leak or tube rupture/leak.
(CFR: 41.7 / 45.5 to 45.8) RO 4.5 SRO 4.6

Initial conditions: A Reactor Trip and Safety Injection have occurred due to a fault of the 1A S/G. The applicant is instructed to isolate 1A S/G in accordance with step 10 of E-2. The applicant will determine that a complete feedwater isolation is not present and attempt to manually close associated isolation valves. The Auxiliary Feed Nozzle Tempering Flow isolation will not close. The applicant will close the Auxiliary Feed Nozzle Tempering Control Valve and associated Bypass Valve to isolate this flowpath. The applicant will then successfully close the 1A S/G blowdown control valve. Next, the applicant will unsuccessfully attempt to isolate aux feed flow by closing 1A Aux Feed Pump Isolation to 1A S/G. This begins the **ALTERNATE PATH**. The applicant will close the aux feed flow control valve associated with 1A Aux Feed Pump, dispatch an operator to manually close the failed isolation valve, and then close the CAPT Isolation to 1A S/G.

NRC EXAM

Simulator JPMs

JPM d - Transfer the ECCS to Cold Leg Recirculation – Bank JPM - Alternate Path

K/A 006 A4.07 – Ability to manually operate and/or monitor in the control room: ECCS pumps and valves (CFR: 41.7/45.5 to 45.8) RO 4.4 / SRO 4.4

Initial conditions: A LOCA has occurred on Unit 1. Annunciator 1AD-9, E/8 "FWST LO-LO LEVEL" is lit. The applicant is instructed to transfer to Cold Leg Recirculation lineup per EP/1/A/5000/ES-1.3 (Transfer to Cold Leg Recirculation) step 6. During verification of automatic actions, it is determined that 1NI-184B (ND Pump 1B Cont Sump Suct) is not open. The applicant continues to perform the lineup for CLR and unsuccessfully attempts to open 1ND-28A (ND Supply to NV and NI Pmps). The applicant will determine that no ND train can be aligned to provide a suction to the NV and NI pumps and transitions to the RNO to begin the **ALTERNATE PATH**. The applicant will secure all NV and NI pumps to finish the JPM.

JPM e – Restore Normal Power to 1ETA From the Control Room - Previous 2 NRC Exams – randomly selected from bank

K/A 064 A4.07 Ability to manually operate and/or monitor in the control room: Transfer ED/G (with load) to grid. (CFR 41.7 / 45.5 to 45.8) RO 3.4 SRO 3.4

Initial conditions: Unit 1 is recovering from a blackout per AP/1/A/5500/007 (Loss of Normal Power) Case I. Power has been aligned to 1ATC (normal offsite power source for 1ETA). CRS directs the applicant to parallel 1A D/G to 1ETA's normal power source (1ATC) and to shutdown 1A D/G per OP/1/A/6350/002 (Diesel Generator Operation) Enclosure 4.17 (Shutdown of D/G 1A After an Automatic Start). Applicant adjusts 1A D/G voltage to be 50-200 volts higher than line volts, increases D/G 1A speed, closes the ETA normal feeder breaker from 1ATC, and stabilizes 1A D/G with a positive load and a lagging power factor. Applicant will then decrease 1A D/G load to 200 KW prior to opening the 1A D/G breaker to 1ETA. Applicant will then depress the 1A D/G 'OFF' pushbutton to complete the JPM.

JPM f – Shift Lower Containment Vent Units – Bank JPM

K/A 022 A4.01 Ability to manually operate and/or monitor in the control room: CCS Fans (CFR 41.7 / 45.5 to 45.8) RO 3.6 SRO 3.6

Initial conditions: Unit 1 is at 100% power. The CRS has instructed the applicant to shift Lower Containment Ventilation Units by securing 1A LCVU and starting 1B LCVU. The applicant will secure 1A LCVU by placing the control switch to OFF, verify the unit secures via flow switch, and verify the associated damper closes. The applicant will then start the 1B LCVU by placing the control switch in the LOW position, verify start via flow switch, and ensure the associated damper opens. Following unit swap the applicant will document ventilation units in service.

JPM g – Initiate a Containment air (VQ) release - Previous 2 NRC Exams – randomly selected from bank

K/A 073 A4.02 Ability to manually operate and/or monitor in the control room: Radiation monitoring system control panel (CFR 41.7 / 45.5 to 45.8) RO 3.7 SRO 3.7

Initial conditions: Unit 1 is at 100% power. The CRS directs the applicant to initiate a containment air release. The applicant will perform the following actions to successfully complete this JPM: verify and document proper EMF setpoints, verify release valve controller setpoint, reset the release totalizer, unisolate release path and start the applicable fan.

NRC EXAM

Plant JPMs

JPM i – Break Condenser Vacuum locally– Bank JPM

K/A 045 A1.06 Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the MT/G system controls including: Expected response of secondary plant parameters following T/G trip
(CFR 41.5 / 45.5) RO 3.3 SRO 3.7

Initial conditions: A Unit 2 Reactor trip has occurred. The CRS has instructed the applicant to break condenser vacuum per AP/2/A/5500/006. The applicant will manually open three condenser vacuum breaker valves, isolate steam flow to condensate air ejectors via valve manipulations, and then verify vacuum broken by inspecting vacuum breakers for indication of air flow.

JPM j – Transfer Control to Standby Shutdown System –Bank JPM – (RCA entry required)

K/A 068 AA1.21 Ability to operate and / or monitor the following as they apply to the Control Room Evacuation: Transfer of controls from control room to shutdown panel or local control
(CFR 41.7 / 45.5 /45.6) RO 3.9 SRO 4.1

Initial conditions: A Unit 2 fire has resulted in evacuation of the control room. The applicant is instructed to transfer control to the Standby Shutdown System (SSF) per OP/0/B/6100/013. The applicant will align alternate power (via breaker operations) to Essential Motor Control Center 2EMXS. This will align control of various pressure boundary valves, required for SSF operations, to the SSF Control Panel and align power to the switchgear capable of being powered by the SSF D/G. The applicant will then energize a Reactor Vessel Head Vent capable of being controlled from the SSF, transfer CAPT Trip and Throttle Valve control to the SSF, swap plug disconnects to ensure significant solenoid isolation valves are closed, and swap plug disconnect for nuclear wide range power indication at the SSF.

JPM k – Locally Start 1B Diesel Generator – Bank JPM – Alternate Path

K/A 064 A2.01 Ability to (a) predict the impacts of the following malfunctions or operations on the ED/G system; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Failure modes of water, oil, and air valves (CFR 41.5 / 43.5 /45.3 / 45.13) RO 3.1 SRO 3.3

Initial conditions: Unit 1 has experienced a loss of all AC power to vital bus 1ETB. The reason for the loss of AC power has been corrected. 1ETB load shed is complete. The CRS instructs the applicant to energize 1ETB from 1B D/G by performing AP/1/A/5500/007 (Loss of Normal Power) Enclosure 11 (Energizing 1ETB From D/G). The applicant will locally start 1B D/G, attain proper frequency and voltage, and close the diesel output breaker. Following essential load center power restoration, the applicant will attempt to verify proper cooling water flow via D/G cooling water isolation valve. This valve is not open and cannot be manually opened. This begins the **ALTERNATE PATH**. The applicant will secure the 1B D/G and inform the control room of status to finish the JPM.

ES-301	Control Room/In-Plant Systems Outline	Form ES-301-2

NRC EXAM

Facility: **Catawba Nuclear Station** Date of Examination: **Sep 2019**

Exam Level: RO ☐ SRO-I ☐ SRO-U ☒ Operating Test Number: **2019301**

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. Initiate RCS Bleed and Feed following loss of Secondary Heat Sink WE05 EA1.1 (4.1/4.0)	A,EN,L,N,S	4P
b. Loss of KC Ap-21 step 8 008 A2.01 (3.3/3.6)	A,D,S	8

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

i. Break Condenser Vacuum Locally – Unit 2 045 A1.06 (3.3/3.7)	D,E,L	4S
j. Transfer Control to the Standby Shutdown System 068 AA1.21 (3.9/4.1)	D,E,R	3
k. Locally Start 1B Diesel Generator 064 A2.01 (3.1/3.3)	A,D,E	6

* 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	**(5/5/3)**
(C)ontrol room		
(D)irect from bank	≤ 9/≤ 8/≤ 4	**(9/8/4)**
(E)mergency or abnormal in-plant	≥ 1/≥ 1/≥ 1	**(3/3/3)**
(EN)gineered safety feature	≥ 1/≥ 1/≥ 1	**(2/2/1)**
(L)ow-Power/Shutdown	≥ 1/≥ 1/≥ 1	**(4/4/2)**
(N)ew or (M)odified from bank including 1(A)	≥ 2/≥ 2/≥ 1	**(2/2/1)**
(P)revious 2 exams	≤ 3/≤ 3/≤ 2	**(2/2/0)**
(R)CA	≥ 1/≥ 1/≥ 1	**(1/1/1)**
(S)imulator		

NRC EXAM

Simulator JPMs

JPM a – Initiate RCS Bleed and Feed following loss of Secondary Heat Sink – New - Alternate Path

K/A WE05 EA1.1 – Ability to operate and/or monitor the following as they apply to the (Loss of Secondary Heat Sink); Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.
(CFR: 41.7 / 45.5 / 45.6) RO 4.1 / SRO 4.0

Initial conditions: A Reactor Trip has occurred due to a loss of both main feed pumps. The Auxiliary Feedwater Pumps will not function. EP/1/A/5000/FR-H.1 has been entered and Bleed and Feed initiation criteria has been met. The applicant is directed to initiate Bleed and Feed in accordance with FR-H.1. Applicant will stop all NC pumps and manually initiate both trains of safety injection. The applicant will then attempt to align a bleed path by opening two PZR PORVs (one PORV will not open). This begins the **ALTERNATE PATH**. Following alignment of emergency nitrogen supply and failed verification of bleed path the applicant will ensure instrument air aligned to containment and then open an additional PZR PORV.

JPM b – Loss of KC AP-21 step 8 (Reactor Trip Sequence) Bank JPM– Alternate Path

K/A 008 A2.01 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: Loss of CCW pump (CFR 41.5 / 43.5 / 45.3 / 45.13) RO 3.3 SRO 3.6

Initial conditions: Unit 1 is at 100% power. AP/1/A/5500/021 (Loss of Component Cooling) has been entered. The CRS directs the applicant to perform step 8 of AP/21. The applicant will not be able to verify KC flow to the NC pumps (due to three closed Containment Isolation Valves) and will transition to the RNO. The applicant will successfully open two Containment Isolation Valves and unsuccessfully attempt to open 1KC-425A (NC Pumps Ret Hdr Cont Isol). This begins the **ALTERNATE PATH**. The applicant will place steam dumps in Pressure control mode, ensure the reactor is tripped, when reactor power is verified < 5% will trip the NC Pumps, and will place both Pressurizer Spray Valves in manual and closed. The JPM will be terminated with a cue that the CRS is ready to begin reading EP/1/A/5000/E-0 (Reactor Trip or Safety Injection).

NRC EXAM

Plant JPMs

JPM i – Break Condenser Vacuum locally– Bank JPM

K/A 045 A1.06 Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the MT/G system controls including: Expected response of secondary plant parameters following T/G trip
(CFR 41.5 / 45.5) RO 3.3 SRO 3.7

Initial conditions: A Unit 2 Reactor trip has occurred. The CRS has instructed the applicant to break condenser vacuum per AP/2/A/5500/006. The applicant will manually open three condenser vacuum breaker valves, isolate steam flow to condensate air ejectors via valve manipulations, and then verify vacuum broken by inspecting vacuum breakers for indication of air flow.

JPM j – Transfer Control to Standby Shutdown System –Bank JPM – (RCA entry required)

K/A 068 AA1.21 Ability to operate and / or monitor the following as they apply to the Control Room Evacuation: Transfer of controls from control room to shutdown panel or local control
(CFR 41.7 / 45.5 /45.6) RO 3.9 SRO 4.1

Initial conditions: A Unit 2 fire has resulted in evacuation of the control room. The applicant is instructed to transfer control to the Standby Shutdown System (SSF) per OP/0/B/6100/013. The applicant will align alternate power (via breaker operations) to Essential Motor Control Center 2EMXS. This will align control of various pressure boundary valves, required for SSF operations, to the SSF Control Panel and align power to the switchgear capable of being powered by the SSF D/G. The applicant will then energize a Reactor Vessel Head Vent capable of being controlled from the SSF, transfer CAPT Trip and Throttle Valve control to the SSF, swap plug disconnects to ensure significant solenoid isolation valves are closed, and swap plug disconnect for nuclear wide range power indication at the SSF.

JPM k – Locally Start 1B Diesel Generator – Bank JPM – Alternate Path

K/A 064 A2.01 Ability to (a) predict the impacts of the following malfunctions or operations on the ED/G system; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Failure modes of water, oil, and air valves (CFR 41.5 / 43.5 /45.3 / 45.13) RO 3.1 SRO 3.3

Initial conditions: Unit 1 has experienced a loss of all AC power to vital bus 1ETB. The reason for the loss of AC power has been corrected. 1ETB load shed is complete. The CRS instructs the applicant to energize 1ETB from 1B D/G by performing AP/1/A/5500/007 (Loss of Normal Power) Enclosure 11 (Energizing 1ETB From D/G). The applicant will locally start 1B D/G, attain proper frequency and voltage, and close the diesel output breaker. Following essential load center power restoration, the applicant will attempt to verify proper cooling water flow via D/G cooling water isolation valve. This valve is not open and cannot be manually opened. This begins the **ALTERNATE PATH**. The applicant will secure the 1B D/G and inform the control room of status to finish the JPM.

Site name:				Exam Date:		
OPERATING TEST TOTALS						
	Total	Total Unsat.	Total Edits	Total Sat.	% Unsat.	Explanation
Admin. JPMs	9	2	2	5		SEE ATTACHED COMMENTS.
Sim./In-Plant JPMs	11	0	0	11		
Scenarios	4	0	0	4		
Op. Test Totals:	24	2	2	20	8.3%	

Instructions for Completing This Table:

Update data for this table from quality reviews and totals in the previous tables and then calculate the percentage of total items that are unsatisfactory and give an explanation in the space provided.

1. Enter the total number of items submitted for the operating test in the "Total" column. For example, if nine administrative JPMs were submitted, enter "9" in the "Total" items column for administrative JPMs. For scenarios, enter the total number of simulator scenarios.

2. Enter the total number of (U)nsatisfactory JPMs and scenarios from the two JPMs column 5 and simulator scenarios column 8 in the previous tables. Provide an explanation in the space provided.

3. Enter totals for (E)nhancements needed and (S)atisfactory JPMs and scenarios from the previous tables. This task is for tracking only.

4. Total each column and enter the amounts in the "Op. Test Totals" row.

5. Calculate the percentage of the operating test that is (U)nsatisfactory (Op. Test Total Unsat.)/(Op. Test Total) and place this value in the bolded "% Unsat." cell.

   Refer to ES-501, E.3.a, to rate the overall operating test as follows:
   - satisfactory, if the "Op. Test Total" "% Unsat." is ≤ 20%
   - unsatisfactory, if "Op. Test Total" "% Unsat." is > 20%

6. Update this table and the tables above with post-exam changes if the "as-administered" operating test required content changes, including the following:
   - The JPM performance standards were incorrect.
   - The administrative JPM tasks/keys were incorrect.
   - CTs were incorrect in the scenarios (not including postscenario critical tasks defined in Appendix D).
   - The EOP strategy was incorrect in a scenario(s).
   - TS entries/actions were determined to be incorrect in a scenario(s).

ES-301 **Operating Test Review Worksheet** **Form ES-301-7**

Facility:			Exam Date:										
Admin JPMs	1 ADMIN Topic and K/A	2 LOD (1-5)	3 Attributes							4 Job Content		5 U/E/S	6 Explanation
			I/C Focus	Cues	Critical Steps	Scope (N/B)	Overlap	Perf. Std.	Key	Minutia	Job Link		
RO A.1-1		2										E	SEE COMMENTS ATTACHED
RO A.1-2		1										U	
RO A.2		1										U	
RO A.3		2										S	
SRO A.1-1		1										S	
SRO A.1-2		2										S	
SRO A.2		2										S	
SRO A.3		2										S	
SRO A.4		2										E	
Simulator/In-Plant JPMs	1 Safety Function and K/A												
A		2										S	
B		2										S	
C		2										S	
D		2										S	
E		2										S	
F		2										S	
G		2										S	
H		2										S	
I		2										S	
J		2										S	
K		2										S	

Facility: CATAWBA				Scenario: 4				Exam Date: 2019	
1 Event	2 Realism/Cred.	3 Required Actions	4 Verifiable actions	5 LOD	6 TS	7 CTs	8 Scen. Overlap	9 U/E/S	10 Explanation
1							✓	S	
2								S	
3					✓			S	
4						✓		S	
5					✓			S	
6							✓	S	
7								S	
8						✓		S	
9						✓		S	
10								S	
11							✓	S	
11	0	0	0	0	2	3	8	SAT	

Facility: CATAWBA				Scenario: 1				Exam Date: 2019	
1 Event	2 Realism/Cred.	3 Required Actions	4 Verifiable actions	5 LOD	6 TS	7 CTs	8 Scen. Overlap	9 U/E/S	10 Explanation
1								S	
2							✓	S	
3					✓			S	
4					✓	✓		S	
5						✓		S	
6								S	
7						✓		S	
8								S	
8	0	0	0	0	2	3	7	SAT	

Facility: CATAWBA				Scenario: 2				Exam Date: 2019	
1 Event	2 Realism/Cred.	3 Required Actions	4 Verifiable actions	5 LOD	6 TS	7 CTs	8 Scen. Overlap	9 U/E/S	10 Explanation
1								S	
2								S	
3					✓			S	
4						✓		S	
5								S	
6					✓	✓		S	
7								S	
8								S	
9							✓	S	
10								S	
10	0	0	0	0	2	2	9	SAT	

Facility: CATAWBA				Scenario: 3				Exam Date: 2019	
1 Event	2 Realism/Cred.	3 Required Actions	4 Verifiable actions	5 LOD	6 TS	7 CTs	8 Scen. Overlap	9 U/E/S	10 Explanation
1								S	
2					✓	✓		S	
3					✓			S	
4								S	
5						✓		S	
6								S	
7						✓		S	
8								S	
9								S	
9	0	0	0	0	2	3	0	SAT	

Facility:					Exam Date:				
Scenario	1 Event Totals	2 Events Unsat.	3 TS Total	4 TS Unsat.	5 CT Total	6 CT Unsat.	7 % Unsat. Scenario Elements	8 U/E/S	11 Explanation
1	8	0	2	0	3	0	0	S	
2	10	0	2	0	2	0	0	S	
3	9	0	2	0	3	0	0	S	
4	11	0	2	0	3	0	0	S	

Instructions for Completing This Table:

Check or mark any item(s) requiring comment and explain the issue in the space provided.

1, 3, 5 For each simulator scenario, enter the **total** number of events (column 1), TS entries/actions (column 3), and CTs (column 5). This number should match the respective scenario from the event-based scenario tables (the sum from columns 1, 6, and 7, respectively).

2, 4, 6 For each simulator scenario, evaluate each event, TS, and CT as (S)atisfactory, (E)nhance, or (U)nsatisfactory based on the following criteria:

a. Events. Each event is described on a Form ES-D-2, including all switch manipulations, pertinent alarms, and verifiable actions. Event actions are balanced between at-the-controls and balance-of-plant applicants during the scenario. All event-related attributes on Form ES-301-4 are met. Enter the total number of unsatisfactory events in column 2.

b. TS. A scenario includes at least two TS entries/actions across at least two different events. TS entries and actions are detailed on Form ES-D-2. Enter the total number of unsatisfactory TS entries/actions in column 4. (ES-301, D.5d)

c. CT. Check that a scenario includes at least two preidentified CTs. This criterion is a target quantitative attribute, not an absolute minimum requirement. Check that each CT is explicitly bounded on Form ES-D-2 with measurable performance standards (see Appendix D). Enter the total number of unsatisfactory CTs in column 6.

7 In column 7, calculate the percentage of unsatisfactory scenario elements:

8 If the value in column 7 is > 20%, mark the scenario as (U)nsatisfactory in column 8. If column 7 is ≤ 20%, annotate with (E)nhancement or (S)atisfactory.

9 In column 9, explain each unsatisfactory event, TS, and CT. Editorial comments can also be added here.

Save initial review comments and detail subsequent comment resolution so that each exam-bound scenario is marked by a (S)atisfactory resolution on this form.

Draft Operating Test Comments

Systems JPMs

1. Critical Steps will be evaluated during prep week. For the most part they look fine, but there were just a few which introduced some uncertainty. As usual, we will evaluate each step as we walk through the materials in the simulator.

Admin JPMs

1. RO A.1-1: There does not appear to be a failure mechanism that relates to a lack of nuclear power plant knowledge or a misapplication of nuclear power plant knowledge. It appears to be entirely cookbook, where it could be handed to someone who had not been trained and they would likely obtain the correct answer. Discuss possibly adding a Tech Spec piece at the RO level, such as determining if any LCOs are not met. (The SRO JPM goes a little further in that it has the SRO applicants apply Tech Specs.)
2. RO A.1-2: This JPM appears to be entirely cookbook. There does not appear to be a failure mechanism related to not knowing nuclear power plant knowledge or misapplying nuclear power plant knowledge.
3. RO A.1-2: Applicants are not allowed to be denied normally available references, therefore, redacting normally available references would violate this principle. Redacting the reference would also not be operationally valid. Providing an example of how to perform the task appears to reduce the LOD to an unacceptably low level.
4. RO A.1-2: Why is the applicant told which procedure to use and then handed the procedure? Part of operating the plant is knowing where to find the appropriate procedures and then correctly using them.
5. RO A-2: Again, this JPM appears to be entirely cookbook. How does someone fail by either not knowing nuclear power plant knowledge, or misapplying nuclear power plant knowledge? LOD = 1.
6. SRO A.4: This JPM appears to be testing much the same thing as SRO written question 83.
7. SRO A.4: This JPM should have time critical elements because the SRO is required to perform the emergency notifications for ALERT declaration within associated requirements for State and local agencies and for the NRC.

Scenarios

1. For the most part, scenarios appear to be in good shape. The entire team will evaluate during prep week.

Facility: CATAWBA Date of Exam: SEPTEMBER 2019

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 & Abnormal Plant Evolutions	1	3	3	3	N/A			3	3	N/A		3	18	3	3	6
	2	2	1	1				2	1			2	9	2	2	4
	Tier Totals	5	4	4				5	4			5	27	5	5	10
2. Plant Systems	1	3	2	2	2	2	3	3	2	3	3	3	28	3	2	5
	2	1	1	1	1	1	1	1	1	1	1	0	10	2	1	3
	Tier Totals	4	3	3	3	3	4	4	3	4	4	3	38	5	3	8
3. Generic Knowledge and Abilities Categories		1			2			3			4		10	1	2	3	4	7
		3			2			2			3			1	2	2	2	

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, the "Tier Totals" in each K/A category shall not be less than two). (One Tier 3 Radiation Control K/A is allowed if the K/A 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 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 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 KAs.
8. On the following pages, enter the K/A numbers, a brief description of each topic, the topics= importance ratings (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 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..

KA	NAME / SAFETY FUNCTION:	IR RO	IR SRO	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	TOPIC:
007EA1.10	Reactor Trip - Stabilization - Recovery / 1	3.7	3.7	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	☐	S/G pressure
008AK2.03	Pressurizer Vapor Space Accident / 3	2.5	2.4	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	Controllers and positioners
009EK2.03	Small Break LOCA / 3	3	3.3	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	S/Gs
011EK3.10	Large Break LOCA / 3	3.7	3.9	☐	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	PTS limits on RCS pressure and temperature
022AA1.08	Loss of Rx Coolant Makeup / 2	3.4	3.3	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	☐	VCT level
025AA2.07	Loss of RHR System / 4	3.4	3.7	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	Pump cavitation
027AG2.4.1	Pressurizer Pressure Control System Malfunction / 3	4.6	4.8	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Knowledge of EOP entry conditions and immediate action steps.
029EG2.4.20	ATWS / 1	3.8	4.3	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Knowledge of operational implications of EOP warnings, cautions and notes.
038EA1.40	Steam Gen. Tube Rupture / 3	4	4	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	☐	Adding boron to raise its ppm to the required shutdown concentration.
054AA2.08	Loss of Main Feedwater / 4	2.9	3.3	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	Steam flow-feed trend recorder
055EK1.02	Station Blackout / 6	4.1	4.4	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	Natural circulation cooling

KA	NAME / SAFETY FUNCTION:	IR RO	IR SRO	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	TOPIC:
056AG2.2.42	Loss of Off-site Power / 6	3.9	4.6	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Ability to recognize system parameters that are entry-level conditions for Technical Specifications
057AK3.01	Loss of Vital AC Inst. Bus / 6	4.1	4.4	☐	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	Actions contained in EOP for loss of vital ac electrical instrument bus
058AK1.01	Loss of DC Power / 6	2.8	3.1	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	Battery charger equipment and instrumentation
065AA2.08	Loss of Instrument Air / 8	2.9	3.3	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	Failure modes of air-operated equipment
WE04EK2.2	LOCA Outside Containment / 3	3.8	4.0	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	Facility's heat removal systems, including primary coolant, emergency coolant, the decay heat removal systems and relations between the proper operation of these systems to the operation of the facility.
WE11EK1.2	Loss of Emergency Coolant Recirc. / 4	3.6	4.1	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	Normal, abnormal and emergency operating procedures associated with (Loss of Emergency Coolant Recir).
WE12EK3.2	Steam Line Rupture - Excessive Heat Transfer / 4	3.3	3.9	☐	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	Normal, abnormal and emergency operating procedures associated with (Uncontrolled Depressurization of all Steam Generators).

KA	NAME / SAFETY FUNCTION:	IR RO	IR SRO	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	TOPIC:
005AK1.03	Inoperable/Stuck Control Rod / 1	3.2	3.6	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	Xenon transient
036AG2.1.23	Fuel Handling Accident / 8	4.3	4.4	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Ability to perform specific system and integrated plant procedures during all modes of plant operation.
059AA2.02	Accidental Liquid RadWaste Rel. / 9	2.9	3.9	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	The permit for liquid radioactive-waste release
074EK2.03	Inad. Core Cooling / 4	4	4	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	AFW pump
WE01EA1.2	Rediagnosis / 3	3.3	3.6	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	☐	Operating behavior characteristics of the facility.
WE03EA1.2	LOCA Cooldown - Depress. / 4	3.7	3.9	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	☐	Operating behavior characteristics of the facility.
WE13EK1.3	Steam Generator Over-pressure / 4	3.0	3.2	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	Annunciators and conditions indicating signals, and remedial actions associated with the (Steam Generator Overpressure).
WE14EK3.3	Loss of CTMT Integrity / 5	3.5	3.5	☐	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	Manipulation of controls required to obtain desired operating results during abnormal and emergency situations.
we16EG2.1.23	High Containment Radiation / 9	4.3	4.4	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Ability to perform specific system and integrated plant procedures during all modes of plant operation.

KA	NAME / SAFETY FUNCTION:	IR RO	IR SRO	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	TOPIC:
003K6.02	Reactor Coolant Pump	2.7	3.1	☐	☐	☐	☐	☐	☑	☐	☐	☐	☐	☐	RCP seals and seal water supply
004~~K5.31~~ 5,44	Chemical and Volume Control	~~3.0~~ 3.2	3.4	☐	☐	☐	☐	☑	☐	☐	☐	☐	☐	☐	~~Purpose of flow path around boric acid storage tank~~ P response in pzr during in/out surge.
005A1.05	Residual Heat Removal	3.3	3.3	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	☐	Detection of and response to presence of water in RHR emergency sump
006G2.1.28	Emergency Core Cooling	4.1	4.1	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Knowledge of the purpose and function of major system components and controls.
007A3.01	Pressurizer Relief/Quench Tank	2.7	2.9	☐	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	Components which discharge to the PRT
008A3.03	Component Cooling Water	3.0	3.1	☐	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	All flow rate indications and the ability to evaluate the performance of this closed-cycle cooling system..
010K6.03	Pressurizer Pressure Control	3.2	3.6	☐	☐	☐	☐	☐	☑	☐	☐	☐	☐	☐	PZR sprays and heaters
012K3.01	Reactor Protection	3.9	4.0	☐	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	CRDS
012K4.06	Reactor Protection	3.2	3.5	☐	☐	☐	☑	☐	☐	☐	☐	☐	☐	☐	Automatic or manual enable/disable of RPS trips
013K~~1.01~~ 1.07	Engineered Safety Features Actuation	~~3.9~~ 4.1	~~4.3~~ 4.4	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	~~RPS injection~~ AFW System
013K6.01	Engineered Safety Features Actuation	2.7	3.1	☐	☐	☐	☐	☐	☑	☐	☐	☐	☐	☐	Sensors and detectors

KA	NAME / SAFETY FUNCTION:	IR RO	IR SRO	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	TOPIC:
022A4.01	Containment Cooling	3.6	3.6	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	☐	CCS fans
025K1.02	Ice Condenser	2.7	2.7	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	Refrigerant systems
025K5 01	Ice Condenser	3.0	3.4	☐	☐	☐	☐	☑	☐	☐	☐	☐	☐	☐	Relationships between pressure and temperature
026K2.01	Containment Spray	3.4	3.6	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	Containment spray pumps
039A2.01	Main and Reheat Steam	3.1	3.2	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	Flow paths of steam during a LOCA
059A1.07	Main Feedwater	2.5	2.6	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	☐	Feed Pump speed, including normal control speed for ICS
059A4.12	Main Feedwater	3.4	3.5	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	☐	Initiation of automatic feedwater isolation
061A1.05	Auxiliary/Emergency Feedwater	3.6	3.7	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	☐	AFW flow/motor amps
061G2.4.1	Auxiliary/Emergency Feedwater	4.6	4.8	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Knowledge of EOP entry conditions and immediate action steps.
062K1.04	AC Electrical Distribution	3.7	4.2	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	Off-site power sources
063A3.01	DC Electrical Distribution	2.7	3.1	☐	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	Meters, annunciators, dials, recorders and indicating lights

KA	NAME / SAFETY FUNCTION:	IR RO	IR SRO	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	TOPIC:
063A4.01	DC Electrical Distribution	2.8	3.1	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	☐	Major breakers and control power fuses
064K4.10	Emergency Diesel Generator	3.5	4.0	☐	☐	☐	☑	☐	☐	☐	☐	☐	☐	☐	Automatic load sequencer: blackout
073A2.02	Process Radiation Monitoring	2.7	3.2	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	Detector failure
076G2.2.22	Service Water	4.0	4.7	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Knowledge of limiting conditions for operations and safety limits.
078K2.01	Instrument Air	2.7	2.9	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	Instrument air compressor
103K3.02	Containment	3.8	4.2	☐	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	Loss of containment integrity under normal operations

KA	NAME / SAFETY FUNCTION:	IR RO	IR SRO	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	TOPIC:
001A~~4.07~~ 4.11	Control Rod Drive	~~3.8~~ 3.5	~~3.8~~ 4.1	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	☐	~~Power source transfer check~~ Determination of SDM.
015K4.03	Nuclear Instrumentation	3.9	4.0	☐	☐	☐	☑	☐	☐	☐	☐	☐	☐	☐	Reading of source range/intermediate range/power range outside control room
016K5.01	Non-nuclear Instrumentation	2.7	2.8	☐	☐	☐	☐	☑	☐	☐	☐	☐	☐	☐	Separation of control and protection circuits
027K2.01	Containment Iodine Removal	3.1	3.4	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	Fans
028K6.01	Hydrogen Recombiner and Purge Control	2.6	3.1	☐	☐	☐	☐	☐	☑	☐	☐	☐	☐	☐	Hydrogen recombiners
041A1.02	Steam Dump/Turbine Bypass Control	3.1	3.2	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	☐	Steam pressure
056K1.03	Condensate	2.6	2.6	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	MFW
072A3.01	Area Radiation Monitoring	2.9	3.1	☐	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	Changes in ventilation alignment
075K3.07	Circulating Water	3.4	3.5	☐	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	ESFAS
086A2.04	Fire Protection	3.3	3.9	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	Failure to actuate the FPS when required, resulting in fire damage

KA	NAME / SAFETY FUNCTION:	IR RO	IR SRO	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	TOPIC:
G2.1.18	Conduct of operations	3.6	3.8	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Ability to make accurate, clear and concise logs, records, status boards and reports.
G2.1.34	Conduct of operations	2.7	3.5	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Knowledge of primary and secondary chemistry limits
G2.1.5	Conduct of operations	2.9	3.9	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Ability to locate and use procedures related to shift staffing, such as minimum crew complement, overtime limitations, etc.
G2.2.2	Equipment Control	4.6	4.1	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Ability to manipulate the console controls as required to operate the facility between shutdown and designated power levels.
G2.2.38	Equipment Control	3.6	4.5	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Knowledge of conditions and limitations in the facility license.
G2.3.11	Radiation Control	3.8	4.3	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Ability to control radiation releases.
G2.3.13	Radiation Control	3.4	3.8	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Knowledge of radiological safety procedures pertaining to licensed operator duties
G2.4.11	Emergency Procedures/Plans	4.0	4.2	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Knowledge of abnormal condition procedures.
G2.4.12	Emergency Procedures/Plans	4.0	4.3	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Knowledge of general operating crew responsibilities during emergency operations.
G2.4.20	Emergency Procedures/Plans	3.8	4.3	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Knowledge of operational implications of EOP warnings, cautions and notes.

KA	NAME / SAFETY FUNCTION:	IR RO	IR SRO	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	TOPIC:
015AA2.11	RCP Malfunctions / 4	3.4	3.8	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	When to jog RCPs during ICC
026AA2.02	Loss of Component Cooling Water / 8	2.9	3.6	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	The cause of possible CCW loss
055EA2.03	Station Blackout / 6	3.9	4.7	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	Actions necessary to restore power
062AG2.4.21	Loss of Nuclear Svc Water / 4	4.0	4.6	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Knowledge of the parameters and logic used to assess the status of safety functions
077AG2.2.40	Generator Voltage and Electric Grid Disturbances / 6	3.4	4.7	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Ability to apply technical specifications for a system.
we05EG2.4.1	Inadequate Heat Transfer - Loss of Secondary Heat Sink / 4	3.3	4.0	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Knowledge of the specific bases for EOPs.

KA	NAME / SAFETY FUNCTION:	IR RO	IR SRO	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	TOPIC:
028AA2.02	Pressurizer Level Malfunction / 2	3.4	3.8	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	PZR level as a function of power level or T-ave. including interpretation of malfunction
051AA2.02	Loss of Condenser Vacuum / 4	3.9	4.1	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	Conditions requiring reactor and/or turbine trip
we08EG2.1.20	RCS Overcooling - PTS / 4	4.6	4.6	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Ability to execute procedure steps.
~~we15~~EG2.4.50 033	~~Containment Flooding / 5~~ Loss of IR NI	4.2	4.0	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Ability to verify system alarm setpoints and operate controls identified in the alarm response manual.

KA	NAME / SAFETY FUNCTION:	IR RO	IR SRO	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	TOPIC:
004A2.26	Chemical and Volume Control	2.8	3.0	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	Low VCT pressure
006A2.01	Emergency Core Cooling	2.9	3.1	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	High bearing temperature
022A2.03	Containment Cooling	2.6	3.0	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	Fan motor thermal overload/high-speed operation
062G2.1.30	AC Electrical Distribution	4.4	4.0	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Ability to locate and operate components, including local controls.
064G2.4.45	Emergency Diesel Generator	4.1	4.3	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Ability to prioritize and interpret the significance of each annunciator or alarm.

KA	NAME / SAFETY FUNCTION:	IR RO	IR SRO	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	TOPIC:
002A2.02	Reactor Coolant	4.2	4.4	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	Loss of coolant pressure
014A2.04	Rod Position Indication	3.4	3.9	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	Misaligned rod
055G2.4.8	Condenser Air Removal	3.8	4.5	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Knowledge of how abnormal operating procedures are used in conjunction with EOPs.

KA	NAME / SAFETY FUNCTION:	IR RO	IR SRO	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	TOPIC:
G2.1.41	Conduct of operations	2.8	3.7	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Knowledge of the refueling processes
G2.2.11	Equipment Control	2.3	3.3	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Knowledge of the process for controlling temporary design changes.
G2.2.5	Equipment Control	2.2	3.2	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Knowledge of the process for making design or operating changes to the facility
G2.3.4	Radiation Control	3.2	3.7	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Knowledge of radiation exposure limits under normal and emergency conditions
G2.3.7	Radiation Control	3.5	3.6	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Ability to comply with radiation work permit requirements during normal or abnormal conditions
G2.4.35	Emergency Procedures/Plans	3.8	4.0	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Knowledge of local auxiliary operator tasks during emergency and the resultant operational effects
G2.4.40	Emergency Procedures/Plans	2.7	4.5	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Knowledge of the SRO's responsibilities in emergency plan implementation.

Tier / Group	Randomly Selected K/A	Reason for Rejection
2/1	SYS004 K5.31	CNS has no flow path around the boric acid storage tank that is used. Therefore, an operationally valid question cannot be written for this K/A. Request that a replacement K/A be generated. K/A replaced with SYS004 K5.44.
2/1	SYS013 K1.04	CNS does not have RPS injection. Therefore, an operationally valid question cannot be written for this K/A. Request that a replacement K/A be generated. K/A replaced with SYS013 K1.07.
2/2	SYS001 A4.07	CNS has no power source transfer check related to CRDS. Therefore, an operationally valid question cannot be written for this K/A. Request that a replacement K/A be generated. K/A replaced with SYS001 A4.11.
1/2	WE15 G2.4.50	Inability to write a discriminating question at the SRO level for this K/A. Request that a replacement K/A be generated. K/A replaced with APE033 G2.4.50.

ES-401 **Written Examination Quality Checklist** **Form ES-401-6**

Facility: **Catawba Nuclear Station** Date of Exam: **9/9/19** Exam Level: RO ☒ SRO ☒

Item Description					Initial a	Initial b*	Initial c*#
1.	Questions and answers are technically accurately and applicable to the facility.				✓	✓	MB
2.	a. NRC K/As are referenced for all questions. b. Facility learning objectives are referenced as available. c. Correct answer explanation and distractor analysis provided (ES-401, D.2.g)				✓	✓	MB
3.	SRO questions are appropriate in accordance with Section D.2.d of ES-401				✓	✓	MB
4	The sampling process was random and systematic. (If more than four RO or two SRO questions were repeated from the last two NRC licensing exams, consult the NRR/NRO OL program office).				✓	✓	MB
5.	Question duplication from the licensee screening/audit exam was controlled as indicated below (check the item that applies) and appears appropriate. __ The audit exam was systematically and randomly developed, or __ the audit exam was completed before the license exam was started, or __ the examinations were developed independently, or ✓ the licensee certifies that there is no duplication, or __ other (explain).				✓	✓	MB
6.	Bank use meets limits (no more than 75% from the bank, at least 10% new, and the rest new or modified); enter the actual RO/SRO-only question distribution(s) at right.	Bank 51%/40% ✓ ✓	Modified 11%/15% ✓ ✓	New 38%/44% ✓ ✓	✓	✓	MB
7.	Between 38 and 45 questions of the questions on the RO exam and at least 13 questions of the questions on the SRO-only portion of the exam are written at the comprehension/analysis level (see ES-401, D.2.c); enter the actual RO/SRO-only question distribution(s) at right.	Memory 35 / 8 ✓ ✓	C/A 40 / 17 ✓ ✓		✓	✓	MB
8.	References/handouts provided do not give away answers or aid in the elimination of distractors.				✓	✓	MB
9.	Question content conforms to specific K/A statements in the previously approved examination outline and is appropriate for the tier to which they are assigned; deviations are justified.				✓	✓	MB
10.	Question psychometric quality and format meet the guidelines in Appendix B.				✓	✓	MB
11.	The exam contains the required number of one-point, multiple-choice items; the total is correct and agrees with the value on the cover sheet.				✓	✓	MB

		Printed Name/Signature	Date
a.	Author	Bruce Boyette / [signature]	8/8/19
b.	Facility Reviewer (*)	RP Jones / [signature]	8/8/19
c.	NRC Chief Examiner (#)	Mark A. Bates / [signature]	8/14/19
d.	NRC Regional Supervisor	Gerald J. McCoy / [signature]	8/14/2019

Note: * The facility reviewer's initials or signature are not applicable for NRC-developed examinations.
Independent NRC reviewer initials items in Column "c"; chief examiner concurrence is required.

Catawba 2019-301

Q		1. LOK (F/H)	2. LOD (1-5)	3. Psychomeric Flaws					4. Job Content Flaws				5. Other		6. B, M, N	7. U, E, S	8. Explanation
				Stem Focus	Cues	T / F	Cred. Dist	Partial	Job-Link	Minutia	# Unit	Back ward	Q – K/A	SRO Only			
																	General Comment: Keep track of the (+)/(-) count on the binary question format. For purposes of communication, the questions that use the (IS)/(IS NOT) or (DOES)/(DOES NOT), etc, are sometimes referred to as questions with a binary choice. It is important to track how many of these questions are written in the affirmative and how many in the negative. The exam should be balanced. Some questions can usually be modified to make the other choice correct, if needed. This will help reduce the ability of a test taker to predict the answer by choosing the affirmative if the test favors affirmative choices. (I track this statistic with my (+) and (-) signs under the question number on the 401-9. I am not looking for a 50/50 split – I just need enough balance to not be predictable.
1 (+) P		H	2<LOD<5				?								N	~~E~~ S	EPE007EA1.10 Question analysis discusses the plausibility being if an applicant thinks that 2/3 SGs need to be below the setpt – does this logic for plausibility apply when the plant has 4 SGs, not 3 SGs? Also part of the plausibility discussion is that they would confuse 2/3 SGs being less than setpoint, vs 2/3 channels on a single SG being below the setpt – does this logic for plausibility apply when the various pressure channels are not provided in the stem of the question? I think the plausibility discussion has merit; however, it may be necessary to provide all three channels of pressure for all four SGs. Discuss adding a table with these pressures to create plausible distractors. Deleted old bullets 4 and 5 and added table of steam pressures as suggested. OK – MAB
2		H	2<LOD<5												B	S	APE008AK2.03

Q		1.	2.	3. Psychomeric Flaws					4. Job Content Flaws				5. Other		6.	7.	8. Explanation
		LOK (F/H)	LOD (1-5)	Stem Focus	Cues	T / F	Cred. Dist	Partial	Job-Link	Minutia	# Unit	Back ward	Q – K/A	SRO Only	B, M, N	U, E, S	
																	Question is sat. The question does not test procedure knowledge; however, if emergency/abnormal procedures are adequately covered on the exam, then no changes will be needed.
3 (-) (+) P		H	2<LOD<5												B	S	EPE009EK2.03 Question is satisfactory.
4 (+) P		H	LOD=1				x								N	~~U~~ S	EPE011EK3.10 Credible Distractor: The second part of the question does not offer credible distractors. The question statement is asking if the purpose of the referenced procedure step is to ensure that the procedure was not being performed due to LBLOCA. It is intuitively obvious that an operator would not want to perform a PTS procedure when the reactor coolant system already has a big hole in it. A possible fix may be to provide two reasons for the step in the answer choices, versus toggling between two accident choices. One choice could be the correct answer which you have stated already. The key is to provide a plausible alternative without setting up a comparison between LOCA and MSLB. Rewrote the stem of the question and changed part 1 to ask the entry condition for FR-P.1 and changed part 2 to ask whether the crew will/will NOT remain in FR-P.1 following completion of the first step. OK – MAB
5 P		F	2<LOD<5												N	S	APE022AA1.08 Question is satisfactory.
6 (+) P		H	LOD=1				x								B	~~U~~ S	APE025AA2.07 When you provide that the NC system level is 6.5%, is it necessary to tell them that they are I mid-loop operation? Discuss deleting the “and drained to Mid-loop”.

Q		1.	2.	3. Psychomeric Flaws					4. Job Content Flaws				5. Other		6.	7.	8. Explanation
		LOK (F/H)	LOD (1-5)	Stem Focus	Cues	T / F	Cred. Dist	Partial	Job-Link	Minutia	# Unit	Back ward	Q – K/A	SRO Only	B, M, N	U, E, S	
																	Credible Distractor: The comparison between "runout" and "cavitation" does not lend itself to a credible distractor. With amps and discharge pressure oscillating, "cavitation" becomes the obvious choice without much plausibility remaining for "runout." Because the K/A allows testing the "interpretation" of pump cavitation, the second part of the question is testing the K/A. This may open up other possibilities for the first half. Idea to discuss: Make the second part the new first part. Then test what to do if signs of cavitation still exist – maybe toggle between continue to throttle to a lower value like 500 gpm, or stop the pump altogether. Slight modification to stem of the question and changed part 1 to ask the flowrate that AP/19 will initially have the crew to throttle ND flow to in attempt to stop cavitation, and changed part 2 to ask what AP/19 will have the crew do if throttling was not successful. OK – MAB
7 (+) P		H	2<LOD<5												B	S	APE027G2.4.1 Question is satisfactory.
8 P		F	2<LOD<5												N	S	EPE029G2.4.20 Question is satisfactory.
9 (-) (+) P		H	2<LOD<5												N	S	EPE038EA1.40 Question is satisfactory.
10 (+) (-) P		H	2<LOD<5												N	S	APE054AA2.08 Question is satisfactory.
11		H	2<LOD<5	x			?								B	~~E~~	EPE055EK1.02

Q		1.	2.	3. Psychomeric Flaws					4. Job Content Flaws				5. Other		6.	7.	8. Explanation
		LOK (F/H)	LOD (1-5)	Stem Focus	Cues	T / F	Cred. Dist	Partial	Job-Link	Minutia	# Unit	Back ward	Q – K/A	SRO Only	B, M, N	U, E, S	
(+)																S	Stem Focus (Op Validity of altering the Reference): Supplying the reference lacks operational validity in the sense that when an operator has this reference it will never have important elements blacked out or deleted. If a reference is supplied, it should be in the exact form the operator would see it in the plant. The one exception that I can think of is blacking out portions so they do not impact a different question, but blacking out the information has no detrimental impact on operational validity of the question at hand. Consider not supplying the reference. Added new 4th bullet under "subsequently" and will not provide G-1 Enclosure 15 as suggested. OK – MAB
12 (-) (+) P		H	2<LOD<5												B	~~E~~ S	APE056G2.2.42 Is the correct answer designated. The LCO states that pzr level is required to be < 92%. Pzr pressure is 90% as stated in the stem. Therefore, it appears that the LCO is met with respect to level. The second part looks like the LCO may not be met for heater capacity. This question was changed based off of validator comments on round 2 of validation which altered the correct answer. Correct answer changed to 'D'. Distractor analysis updated. OK – MAB
13 (+) P		F	2<LOD<5												B	S	APE057AK3.01 Question is satisfactory.
14 (-)		H	2<LOD<5				x								B	~~U~~ S	APE058AK1.01 Credible Distractor: "1EMXC" may lack required plausibility because it violates a basic nuclear design principal of train separation. Discuss.

Q		1.	2.	3. Psychomeric Flaws					4. Job Content Flaws				5. Other		6.	7.	8. Explanation
		LOK (F/H)	LOD (1-5)	Stem Focus	Cues	T / F	Cred. Dist	Partial	Job-Link	Minutia	# Unit	Back ward	Q – K/A	SRO Only	B, M, N	U, E, S	
																	Per discussion, question is ok. OK – MAB
15		H	2<LOD<5												B	S	APE065AA2.08 Question is satisfactory.
16 (+) P		F	2<LOD<5												M 2017	S	WE04EK2.2 Question is satisfactory.
17 (+) P		F	2<LOD<5												B	S	WE11EK1.2 Question is satisfactory.
18 (+) P		F	2<LOD<5												N	S	WE12EK3.2 Question is satisfactory.
19 (+) P		H	2<LOD<5				?								N	~~E~~ S	APE005AK1.03 (Pre-review) Should the correct answer be 1.052 or 1.053? Do your upper and lower detector values read out in % power or amps? Do they read close to RTP, or close to half of RTP? Cred. Dist.: If you use all eight values, the highest QPTR that is calculated is 1.037. This would be more plausible than 1.022. The 1.037 comes from (N-42 Ave) / (Ave of all 8). I rated Q as "E" because the fix may be simple. All comments above were addressed and corrected after pre-review. Question is now satisfactory. - MAB
20 (+) (+) P		H	2<LOD<5												B 2017	S	APE036G2.1.23 Question is satisfactory.

Q		1.	2.	3. Psychomeric Flaws					4. Job Content Flaws				5. Other		6.	7.	8. Explanation
		LOK (F/H)	LOD (1-5)	Stem Focus	Cues	T / F	Cred. Dist	Partial	Job-Link	Minutia	# Unit	Back ward	Q – K/A	SRO Only	B, M, N	U, E, S	
21 (-) P		H	2<LOD<5				x								B	~~E~~ S	APE059AA2.02 Credible Distractor: It may be a little too intuitive that a third re-initiation would not be permitted. The question would be a much better test of knowledge, if the timeline and question was modified to test whether the second re-initiation can be performed without re-sampling. This would address plausibility concerns with A(1) ad B(1). Noun names are not provided for the components. This is inconsistent with display of information on other questions. Is there a reason for not providing the noun names in this case? What is the noun name of 1WL-X28? Where are these components located? Why would it be plausible for someone to have a misconception that 1WL-X28 would be correct? More discussion or information is needed for plausibility evaluation. Changed stem of the question to address comment 1. Noun names of valves are as follows: * 1WL-124 (Waste Monit Tnk Pmps Disch) * 1WL-X28 (MTB Disch to RL Isol) Giving the noun names would give away the correct answer. The class knows that they need to know this information from memory, and has been tested in this manner in the past. OK – MAB
22 P		H	2<LOD<5				x	x							N	~~U~~ S	EPE074EK2.03 Partial: Is maximum rate fully correct? It actually is as high a rate as can be achieved without causing a steam line isolation. Does the non-specific wording create a situation where someone could argue not correct answers? One possible solution is to test whether 100 F in any one hour (IS)/(IS NOT) the limit. Credible Distractor: The cooldown rates are < 100 F in any hour. B(2) and D(2) can be eliminated because they state instantaneous rates.

Q		1.	2.	3. Psychomeric Flaws					4. Job Content Flaws				5. Other		6.	7.	8. Explanation
		LOK (F/H)	LOD (1-5)	Stem Focus	Cues	T / F	Cred. Dist	Partial	Job-Link	Minutia	# Unit	Back ward	Q – K/A	SRO Only	B, M, N	U, E, S	
																	Changed Part 2 answers to "Maximum rate while attempting to avoid a MSI" and "< 100°F in any one hour period" to address comment. OK – MAB
23 (+) (+) P		F	2<LOD<5												B 2017	S	WE01EA1.2 Question is satisfactory.
24 P		H	2<LOD<5												B	~~E~~ S	WE03EA1.2 Suggest deleting "Small Break" from first bullet. Conditions are already present in the stem for applicants to dismiss large break. Question is satisfactory, other than minor enhancement stated above. Changed as suggested. OK – MAB
25 (+) (-) P		H	2<LOD<5												B	S	WE13EK1.3 Question is satisfactory.
26 (-) P		H	2<LOD<5				x								N	~~E~~ S	WE14EK3.3 Credible Distractor: Cross connecting trains may not have much plausibility. B(2) does not contain much plausibility. Why would the opposite train ND pump being tagged out be the reason the 1A ND train cannot be aligned for Aux Cont Spray? Discuss credibility of this distractor. Per discussion, question is good. OK – MAB
27		F	2<LOD<5												N	S	WE16G2.1.23

Q		1.	2.	3. Psychomeric Flaws					4. Job Content Flaws				5. Other		6.	7.	8. Explanation
		LOK (F/H)	LOD (1-5)	Stem Focus	Cues	T / F	Cred. Dist	Partial	Job-Link	Minutia	# Unit	Back ward	Q – K/A	SRO Only	B, M, N	U, E, S	
P																	Question is satisfactory.
28		H	2<LOD<5												N	S	SYS003K6.02 Question is satisfactory.
29		H	2<LOD<5												B	S	SYS004K5.44 Question is satisfactory.
30 (-) (+)		F	2<LOD<5												N	~~E~~ S	SYS005A1.05 Will the RESET light being dark be a result of SI occurring? If so, is the second bullet and the picture necessary? Discuss the amount of information supplied, as well as the need to supply a picture of the controls. Agree information is not needed, and deleted 2nd bullet and picture, and revised statements to ask about both 1A and 1B ND & NS sump pumps. OK – MAB
31		F (-) (-)	2<LOD<5												B	S	SYS006G2.1.28 Question is satisfactory.
32		H	2<LOD<5												N	S	SYS007A3.01 Question is satisfactory.
33		H (+)	2<LOD<5												B 2017	~~E~~ S	SYS008A3.03 Will the alarm always come in with these conditions and sequence of events? It may be possible for the min flow valve to be open, but will it always be open? Will the alarm always annunciate? As discussed, with the initial conditions given at 1000, once the KC pump discharge is closed, the miniflow valve will always open when flow drops below 3150 GPM, and once

Q		1.	2.	3. Psychomeric Flaws					4. Job Content Flaws				5. Other		6.	7.	8. Explanation
		LOK (F/H)	LOD (1-5)	Stem Focus	Cues	T / F	Cred. Dist	Partial	Job-Link	Minutia	# Unit	Back ward	Q – K/A	SRO Only	B, M, N	U, E, S	
																	the discharge valve is re-opened 2 minutes after, the KC single pump runout alarm will always annunciate. OK – MAB
34		H	2<LOD<5		x										B	~~E~~ S	SYS010K6.03 (Pre-review) Cue: "Assuming no operator actions," is a large cue. NUREG-1021 already addresses that the applicants cannot make assumptions and that no operator actions have occurred unless the question so states. Can this phrase be deleted? Comment incorporated. Question is now satisfactory. - MAB
35 (+) (-)		F	~~LOD=1~~ 2<LOD<5				x								N	~~U~~ S	SYS012K3.01 (Pre-review) Cred. Dist. / LOD: It does not appear credible that a loss of a single power supply would cause either a Rx Trip or SI. The loss of a single power supply runs counter to the general design principle for nuclear power plant design. Cred. Dist.: The interplay between the two parts of the answer for "C" create a noncredible distractor. With a valid actuation signal for SI, a reactor trip will always occur. There is never a time where you could get a valid SI and a reactor trip not also being required. Initial pre-submittal question replaced. Question is now satisfactory. – MAB
36 (-) (+) P		H	2<LOD<5												B	S	SYS012K4.06 Question is satisfactory.
37 (-) (-)		H	LOD=1				x								B	~~U~~ S	SYS013K1.07 Credible Distractor: Only one out of four lo-lo level channels is provided. ¼ does not appear credible for AMSAC or AFW. Discuss.

Q		1.	2.	3. Psychomeric Flaws					4. Job Content Flaws				5. Other		6.	7.	8. Explanation
		LOK (F/H)	LOD (1-5)	Stem Focus	Cues	T / F	Cred. Dist	Partial	Job-Link	Minutia	# Unit	Back ward	Q – K/A	SRO Only	B, M, N	U, E, S	
																	Agree and modified existing question to address the comment. OK – MAB
38 (-) (-)		H	2<LOD<5				x								N	~~U~~ S	SYS013K6.01 Credible Distractor: The stem states that Ch 4 is in bypass. This hurts the plausibility of any other single channel failure causing an actuation. If the second bullet simply stated that the required actions of LCO 3.3.2 were completed, then the distractors would contain an acceptable amount of plausibility. Agree, and changed as suggested. OK – MAB
39		F	2<LOD<5												B	S	SYS022A4.01 Question is satisfactory.
40		H	2<LOD<5												B	~~E~~ S	SYS025K1.02 Are these truly the only valves impacted? If there are other valves that are not listed that close, then there may be no correct answer. If this is the case, then the answer choices will need to be reworded to state which valves do not close, in addition to listing the valves that do close. Use of the word only has the potential to create non-precise answer choices and should be used judiciously. Changed statement to say "Of the NF system valves listed below, valve(s) _____ will receive a signal to close" to address this comment. OK – MAB
41		H	LOD=1		x		x								B	~~U~~ S	SYS025K5.01 Cues/Credible Distractor: Other questions, such as Q43, show that containment pressure can easily go above 3 psig,

Q		1.	2.	3. Psychomeric Flaws					4. Job Content Flaws				5. Other		6.	7.	8. Explanation
		LOK (F/H)	LOD (1-5)	Stem Focus	Cues	T / F	Cred. Dist	Partial	Job-Link	Minutia	# Unit	Back ward	Q – K/A	SRO Only	B, M, N	U, E, S	
																	which renders 3 psig as the "design pressure" implausible. 3 psig does correspond to phase B, but one would think that you would design a plant to have phase B before hitting the design pressure. If there is a higher value (I.E. 12 psig) that has some context to containment, then the values in the distractors could be changed from 3 psig to the other, much higher, value. Changed A.2 and B.2 distractors to 20 psig, which is referenced in FR-Z.1 step 2.b RNO for contacting station management for guidance when not in a CLR lineup. OK – MAB
42		F	2<LOD<5												B	S	SYS026K2.01 Question is satisfactory.
43 (+) P		H	~~LOD=1~~ 2<LOD<5				x	x							N	~~U~~ S	SYS039A2.01 (Pre-review) The second half of the answer choices need to state the cooldown rates as "100 °F in an hour", vs. "100 °F per hour". Partial: "Less than 100" is technically a correct statement and could be considered an alternate correct answer. Care needs to be taken to ensure the question does not have answers with different degrees of correctness. Each choice need to be either correct or incorrect. Cred. Dist: Just from a common sense perspective, why would an operator not want to cooldown quickly? In this case, the RCS is already broken, so cooling down fast seems even more logical. Consider: Testing whether 100 °F per hour can be exceeded as long as 100 °F in not exceeded in any one hour. This is very operationally valid info for an RO to know. This may be all that is needed to have a satisfactory question. Comments on pre-submittal question were incorporated. Question is now satisfactory. - MAB
44		F	2<LOD<5												B	S	SYS059A1.07

Q		1.	2.	3. Psychomeric Flaws					4. Job Content Flaws				5. Other		6.	7.	8. Explanation
		LOK (F/H)	LOD (1-5)	Stem Focus	Cues	T / F	Cred. Dist	Partial	Job-Link	Minutia	# Unit	Back ward	Q – K/A	SRO Only	B, M, N	U, E, S	
																	Question is satisfactory.
45		F	LOD=1				x								B	~~U~~ S	SYS059A4.12 Credible Distractor: The stem states that CF Containment Isolation Bypass Valves have closed. Is there ever a situation where the CF Containment Isolation Bypass Valves get a close signal and the CF Containment Isolation Valves do not get a close signal? This choice seems so obvious that it leaves little plausibility for the other choices in the second part of the question. Discuss. Perhaps the easiest fix is to revise the stem so that one of the other valves becomes the correct answer, I.E. “S/G Individual Tempering Flow to CA Nozzle Valves.” Agree and changed from the "CF containment isolation valves" to the "CF to CA Nozzle Isolation Valves" to address the comment. OK – MAB
46		H	2<LOD<5												M	S	SYS061A1.05 Question is satisfactory.
47		F P	2<LOD<5												B	S	SYS061G2.4.1 Question is satisfactory.
48		H	2<LOD<5												M 2017	S	SYS062K1.04 Question is satisfactory.
49		H	LOD=1				x								B	~~U~~ S	SYS063A3.01 Credible Distractors/LOD: Adequate info has not been presented in the stem to make an applicant doubt the availability of a DC bus or control power. This impacts the LOD. Discuss.

Q		1.	2.	3. Psychomeric Flaws					4. Job Content Flaws				5. Other		6.	7.	8. Explanation
		LOK (F/H)	LOD (1-5)	Stem Focus	Cues	T / F	Cred. Dist	Partial	Job-Link	Minutia	# Unit	Back ward	Q – K/A	SRO Only	B, M, N	U, E, S	
																	Agree and changed bullet 2 to state that the LOOP occurred 1.5 hours ago and deleted 4th bullet. Vital batteries are capable of carrying their respective trains loads for a minimum of 2 hours. This change lends more credibility to distractors C.1 and D.1. OK – MAB
50		F	2<LOD<5												B	S	SYS063A4.01 Question is satisfactory.
51 (+) (-)		F	2<LOD<5												B	S	SYS064K4.10 Question is satisfactory.
52		F	2<LOD<5												N	S	SYS073A2.02 The first question statement reads a little clunky, "…will be ensured to be…". It may not be wrong, but it is only being pointed out to see if that is the way you want to state it. Question is satisfactory. Agree and changed Part 1 wording to address the comment. OK – MAB
53		H	2<LOD<5												N	S	SYS076G2.2.22 Question is satisfactory.
54		F	2<LOD<5												M	S	SYS078K2.01 Question is satisfactory.
55 (+)		F	2<LOD<5												N	S	SYS103K3.02 Question is satisfactory.
56		F	2<LOD<5				x								B	~~E~~	SYS001A4.11

Q		1.	2.	3. Psychomeric Flaws					4. Job Content Flaws				5. Other		6.	7.	8. Explanation
		LOK (F/H)	LOD (1-5)	Stem Focus	Cues	T / F	Cred. Dist	Partial	Job-Link	Minutia	# Unit	Back ward	Q – K/A	SRO Only	B, M, N	U, E, S	
																S	Credible Distractor: "B" does not appear to be plausible. How would opening RTBs address the issue of two untrippable rods? If immediately inserting the rest of the trippable rods is the required action, why wouldn't they simply initiate a reactor trip using normal methods? Regardless of the method used to trip, the rods are untrippable, so opening RTBs does not seem like a credible action if the misconception of rx trip exists. Discuss if the distractor would be better if it was "trip rx" vs. "open RTBs." It is true that tripping the reactor opens the RTBs, but the way it is worded, an applicant might be led away from the distractor. Agree and changed distractor to "Immediately trip the reactor". Also swapped answers 'A' and 'B' to make answers shortest to longest. OK – MAB
57		F	2<LOD<5												N	S	SYS015K4.03 Question is satisfactory.
58 (-) (+)		F	2<LOD<5												N	S	SYS016K5.01 Question is satisfactory.
59		H	LOD=1				x								B	~~U~~ S	SYS027K2.01 Credible Distractor: With no offsite power and the 1A EDG not running, it does not seem like a reasonable misconception for "A" train equipment to be running. Discuss. Changed stem of the question to reflect that initially 1A and 1B D/Gs are carrying loads on 1ETA and 1ETB, and added that subsequently, an 87G relay actuates for 1A D/G. This is an emergency trip of 1A D/G. Changes made lend more credibility to 'A' train equipment to be running. OK – MAB
60		H	LOD=1 2<LOD<5				x								N	~~U~~	SYS028K6.01 (Pre-review)

Q		1.	2.	3. Psychomeric Flaws					4. Job Content Flaws				5. Other		6.	7.	8. Explanation
		LOK (F/H)	LOD (1-5)	Stem Focus	Cues	T / F	Cred. Dist	Partial	Job-Link	Minutia	# Unit	Back ward	Q – K/A	SRO Only	B, M, N	U, E, S	
P																S	Cred. Dist. / LOD: Using the line on the graph for the wrong train does not appear very credible. Therefore, the plausibility of "C" and "D" does not appear to be acceptable. Consider having containment pressure peak at one value and then lower a couple of pounds. Then "C" and "D" could be replaced with the values from where containment pressure peaked and then use the same 4 kW addition as well. This may not be a perfect alternative, but I think it adds more plausibility than what was submitted. Above comments incorporated. Question is now satisfactory. – MAB
61 (+)		F	2<LOD<5												N	S	SYS041A1.02 Question is satisfactory.
62		F	2<LOD<5												B	S	SYS056K1.03 Question is satisfactory.
63 (+) (-)		H	2<LOD<5												B	S	SYS072A3.01 Question is satisfactory.
64 (+)		H	2<LOD<5												M	S	SYS075K3.07 Question is satisfactory.
65 (-) (+)		F	2<LOD<5										x		N	~~U~~ S	SYS086A2.04 The KA statement requires using procedures to correct, control, or mitigate. It appears that the question can be answered using only systems knowledge. Agree and wrote new question. OK – MAB
66 (+)		F	2<LOD<5												N	S	G2.1.18

Q		1.	2.	3. Psychomeric Flaws					4. Job Content Flaws				5. Other		6.	7.	8. Explanation
		LOK (F/H)	LOD (1-5)	Stem Focus	Cues	T / F	Cred. Dist	Partial	Job-Link	Minutia	# Unit	Back ward	Q – K/A	SRO Only	B, M, N	U, E, S	
																	Question is satisfactory.
67		F	2<LOD<5												B	S	G2.1.34 Question is satisfactory.
68		F	2<LOD<5												B	S	G2.1.5 Question is satisfactory.
69 P		F	2<LOD<5												N	S	G2.2.22 Question is satisfactory.
70 (-)		H	2<LOD<5				x								B	~~E~~ S	G2.2.38 Credible Distractor: The plausibility of IMMEDIATELY is damaged due to the subset issue, in that immediately IS within one hout. The logical statement goes as follows – If the correct answer was IMMEDIATELY, then within one hour would also be correct. This can be addressed with some simple word editing, therefore the question was rated as enhancement required. Agree and added "within a MAXIMUM timeframe of" to part 2 statement. OK – MAB
71		F	2<LOD<5												B	S	G2.3.11 Question is satisfactory. (Note similar to Q21, but OK due to one testing gas release and the other testing liquid release)
72		F	2<LOD<5				x								B	~~E~~ S	G2.3.13 The use of the word ONLY damages the plausibility of the distractors. As a test taker, I know if there is ANY other requirement in that procedure, then the choices with ONLY cannot be correct. This can be easily addressed by being a little more specific with the answer choices or just asking

Q		1.	2.	3. Psychomeric Flaws					4. Job Content Flaws				5. Other		6.	7.	8. Explanation
		LOK (F/H)	LOD (1-5)	Stem Focus	Cues	T / F	Cred. Dist	Partial	Job-Link	Minutia	# Unit	Back ward	Q – K/A	SRO Only	B, M, N	U, E, S	
																	more directly. The only piece of information that you are REALLY testing is whether continuous HP coverage is required, so why not just ask that with an (IS)/(IS NOT) choice. Agree and changed part 2 to say "IAW AD-RP-ALL-2017, continuous RP coverage _____ required." Changed part 2 answers to is/is NOT. OK – MAB
73		F	2<LOD<5												N	S	G2.4.11 Question is satisfactory.
74		F	2<LOD<5												N	S	G2.4.12 Question is satisfactory.
75 (-)		F	2<LOD<5												B	S	G2.4.20 Question is satisfactory.
	SRO EXAM																
76 (-) (+) P		H	2<LOD<5				x								N	~~E~~ S	APE015/017AA2.11 Does containment pressure need to be provided in the stem? Credible Distractor: A(2) does not appear to be plausible due to interplay between the first and second part of the answers. For the first part of the question, the applicant has determined that starting NC pumps is necessary due to the inadequate core cooling conditions, then after verifying that the actions of starting NC pumps actually provided the desired result of lowering CETs, then the applicant transitions to SAMGs anyway? This does not make much sense that the applicant would be required to do something, then that something was successful, but they go to SAMGs anyway. Discuss.

Q		1.	2.	3. Psychomeric Flaws					4. Job Content Flaws				5. Other		6.	7.	8. Explanation
		LOK (F/H)	LOD (1-5)	Stem Focus	Cues	T / F	Cred. Dist	Partial	Job-Link	Minutia	# Unit	Back ward	Q – K/A	SRO Only	B, M, N	U, E, S	
																	Agree, and changed part 2 to ask what RVLIS level is required to allow a transition from FR-C.1 to E-1 once core cooling has been re-established. OK – MAB
77 (+)		H	2<LOD<5												N	S	APE026AA2.02 (Pre-review) Can the bullets associated with the "B" tank level alarm and level indication be deleted? This appears to be unnecessary. Discuss to verify if my assumption is accurate. Comments incorporated. Question is still satisfactory. – MAB
78		H	2<LOD<5												B	S	EPE055EA2.03 Question is satisfactory.
79		H (-) (-)	LOD=1?		x										N	~~U~~ S	APE062G2.4.21 Cues: The second bullet tells the applicant that loops are not filled. Is there a more operationally valid way to provide this information? Is it possible to provide an RCS level or some other indication that would be indicative of loops not being filled. Discuss. LOD=1: When the pertinent references are provided, someone with very little knowledge can easily read through the refences and eliminate disctractors. Discuss the possibility of not providing AD-WC-CNS-0420, Section 6.6. Removed provided reference and re-worded question statements to ask whether one decay heat removal train and secondary heat sink are available. OK – MAB
80		F	2<LOD<5												B	S	APE077G2.2.40 Question is satisfactory.
81		F	2<LOD<5												N	S	WE05G2.4.18

Q		1.	2.	3. Psychomeric Flaws					4. Job Content Flaws				5. Other		6.	7.	8. Explanation
		LOK (F/H)	LOD (1-5)	Stem Focus	Cues	T / F	Cred. Dist	Partial	Job-Link	Minutia	# Unit	Back ward	Q – K/A	SRO Only	B, M, N	U, E, S	
																	Question is satisfactory.
82 (-)		H	2<LOD<5												N	S	APE028AA2.02 (Pre-review) I see where the high and low channel must be within 3.5% of each other, but what supports the inoperability of Channel 3? Is there a calibration procedure that provides the criteria? I am asking because it would be possible to have, for example, Channel 1 at 42% and Channel 3 at 38%, which is a 4% delta, but each are within 3.5% of required value. Discuss. Values changed to address above concern. Question is now satisfactory. – MAB
83 (+)		H	2<LOD<5												N	S	APE051AA2.02 (Pre-review) In general, the question looks ok – I just need to read through the supplied reference to ensure that it does not help with any other questions once the rest of the exam has been submitted. Question remains satisfactory. – MAB
83 (+)		H	2<LOD<5												N	Q	APE051AA2.02 Question is satisfactory.
84 (-)		H	2<LOD<5												M	S	WE08G2.1.20 Question is satisfactory.
85		H	2<LOD<5											x	B	~~U~~ S	WE15G2.4.50 SRO-only: Red/Orange Path procedure selection is RO knowledge. The second part contains detailed knowledge of procedures but does not contain an element of procedure selection. New K/A requested due to inability to write a discriminating question at the SRO level for the initial K/A. New K/A APE033

Q		1.	2.	3. Psychomeric Flaws					4. Job Content Flaws				5. Other		6.	7.	8. Explanation
		LOK (F/H)	LOD (1-5)	Stem Focus	Cues	T / F	Cred. Dist	Partial	Job-Link	Minutia	# Unit	Back ward	Q – K/A	SRO Only	B, M, N	U, E, S	
																	EG2.4.50 provided by Chief Examiner. New question written for replaced K/A. OK- MAB
86 (+)		H	2<LOD<5												N	S	SYS004A2.26 (Pre-review) Q appears to be satisfactory. Question is still satisfactory – MAB
87 (+)		H	2<LOD<5												N	S	SYS006A2.01 Question is satisfactory.
88 (-)		F	2<LOD<5											x	N	~~U~~ S	SYS022A2.03 SRO-only: Basis information is generally SRO-only knowledge, but in this case the K/A must test the use of procedures to correct, control, or mitigate. It appears that the first part of the question meets the K/A; however, the first part of the question only tests RO TS (above-the-line) knowledge. Agree and re-wrote the question. OK – MAB
89		F	2<LOD<5												B	S	SYS062G2.1.30 Question is satisfactory.
90 (-)		H	2<LOD<5										x		M	~~E~~ S	SYS064G2.4.45 K/A: The K/A requires knowledge of the alarms in order to prioritize. With all of the information presented, it may not be necessary to have any knowledge of alarms. Is it possible to delete the bullet for the alarm and still answer the question? The K/A would be matched if the pressure and trends were deleted. Discuss. Per discussion, question is good.

Q		1.	2.	3. Psychomeric Flaws					4. Job Content Flaws				5. Other		6.	7.	8. Explanation
		LOK (F/H)	LOD (1-5)	Stem Focus	Cues	T / F	Cred. Dist	Partial	Job-Link	Minutia	# Unit	Back ward	Q – K/A	SRO Only	B, M, N	U, E, S	
																	OK – MAB
91 (+)		H	2<LOD<5												N	S	SYS002A2.02 Question is satisfactory.
92		H	2<LOD<5												B	~~E~~ S	SYS014A2.04 I am confused about the “minimum” misalignment assumed in the safety analysis being 24 steps (15 inches). Wouldn’t this be the “maximum” misalignment assumed in the safety analysis? Therefore, as long as the plant maintained a misalignment of less than 24 steps, then the plant would be bounded by the analysis. Discuss whether the Bases are worded correctly. The second part appears to test knowledge required by the KA; therefore, if it is believed that he TS Bases is not worded correctly, perhaps the above the line LCO condition could be tested in the first part instead of the safety analysis knowledge. Per discussion, wording in the Bases is correct, and question is good. OK – MAB
93		H	2<LOD<5												M	S	SYS055G2.4.8 Question is satisfactory.
94		F	2<LOD<5												B	~~E~~ S	G2.1.41 The use of the word ONLY can have unintended consequences as stated early for other questions. Many times it is better to just test the differences between the answer choices. If you want to include the non-differences, that is OK, but it is more concise to state the differences. The only information that is different between the second half answer choices is whether CRS notification is required or not. It more concise to limit the choices to the differences and by doing so, you avoid the word ONLY.

Q		1.	2.	3. Psychomeric Flaws					4. Job Content Flaws				5. Other		6.	7.	8. Explanation
		LOK (F/H)	LOD (1-5)	Stem Focus	Cues	T / F	Cred. Dist	Partial	Job-Link	Minutia	# Unit	Back ward	Q – K/A	SRO Only	B, M, N	U, E, S	
																	Agree and changed part 2 to say "IAW MP/1/A/7150/026 B, any interlock bypass, not approved by procedure, _____ require CRS notification when bypassed and restored.". Changed part 2 answers to does/does NOT. OK – MAB
95		F	LOD=1				x								B	~~U~~ S	G2.2.11 Credible Distractor: "A" and "B" do not contain much plausibility. Tagouts and Tech Spec actions to place a channel in trip occur routinely and this procedure is not given any thought. One possible solution may be to use "C" and "D" in an (IS)/(IS NOT) question wrt Controlled Exclusions. Agree and re-wrote question in a 2 part format to address the comment. OK – MAB
96 (+)		F	2<LOD<5												N	S	G2.2.5 (Pre-review) Q appears to be satisfactory. Question is still satisfactory. – MAB
97 (-)		F	2<LOD<5				?								N	~~E~~ S	G2.3.4 10 Rem in the distractors would seem to be more plausible than 25 Rem, which is typically for life saving activities. I think the absence of information in the stem for rescuing someone would lead to 25 Rem being quickly discarded. Agree and changed as suggested. OK – MAB
98 (-) (+)		H	2<LOD<5												B	S	G2.3.7 Question is satisfactory.
99		F	2<LOD<5												B	S	G2.4.35

Q		1.	2.	3. Psychomeric Flaws					4. Job Content Flaws				5. Other		6.	7.	8. Explanation
		LOK (F/H)	LOD (1-5)	Stem Focus	Cues	T / F	Cred. Dist	Partial	Job-Link	Minutia	# Unit	Back ward	Q – K/A	SRO Only	B, M, N	U, E, S	
																	Question is satisfactory.
100		H	2<LOD<5												B	S	G2.4.40 Question is satisfactory.