Facility:	SONGS	Date of Examination:	06/04/07
Examination Level	RO	Operating Test Number:	NRC

Administrative Topic (see Note)	Type Code*	Describe activity to be performed
Conduct of Operations	M, R	2.1.23 Ability to perform specific system and integrated plant procedures during all modes of plant operation (3.9). JPM: Determine Time to Boil Margin for Shutdown Nuclear Safety (JPM 237A).
Conduct of Operations	M, R	2.1.25 Ability to obtain and interpret station reference materials such as graphs, nomographs, and tables which contain performance data (2.8) JPM: Determine boric acid concentration required for cooldown to Mode 5 (JPM 169A).
Equipment Control	-	
Radiation Control	M, R	2.3.10 Ability to perform procedures to reduce excessive levels of radiation and guard against personnel exposure (2.9). JPM: Determine radiation levels for work to be performed based on HP Surveys (J242A).
Emergency Plan	D, P, S	2.4.39 Knowledge of the RO responsibilities in emergency plan implementation (3.3) JPM: Perform the Siren and PA Coordination (J157A)

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

*Type Codes & Criteria:

(C)ontrol room

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

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

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

(S)imulator

Class(R)oom

A.1.a The candidate will be given plant conditions where the RCS is in a drained down condition and will perform a calculation of RCS Time to Boil Margin for Shutdown Nuclear Safety. Critical tasks include using applicable correction factors for each parameter or factor affecting the Time to Boil Margin. This is a modified bank JPM.

A.1.b The candidate will determine the required boron concentration for RCS cooldown to Mode 5 with several stuck control rods. The critical tasks are to determine target boron concentration and gallons of boric acid required. This is a modified bank JPM.

A.2 N/A

A.3 The candidate will determine radiation levels for work to be performed based on HP Surveys. The critical tasks include determination of area radiation levels, on-contact and 30 cm dose rates, and contamination levels. This is a modified bank JPM.

A.4 The candidate will perform the Siren and PA Coordination during the Emergency Plan. The critical tasks include proper form preparation as well as operating the siren and public address system. This is a bank JPM. This JPM was used on the October 2005 NRC Exam.

Facility: SONGS		Date of Examination:	06/04/07
Examination Level	SRO(I) & (U)	Operating Test Number:	NRC

Administrative Topic (see Note)	Type Code*	Describe activity to be performed
Conduct of Operations	M, R	2.1.23 Ability to perform specific system and integrated plant procedures during all modes of plant operation (4.0). JPM: Determine Time to Boil Margin for Shutdown Nuclear Safety (JPM 237A).
Conduct of Operations	M, R	2.1.25 Ability to obtain and interpret station reference materials such as graphs, nomographs, and tables which contain performance data (3.1) JPM: Determine boric acid concentration required for cooldown to Mode 5 (JPM 169A).
Equipment Control	M, R	2.2.24 Ability to analyze the affect of maintenance activities on LCO status (3.8). JPM: Perform a LCOAR for Reactivity Control (J240A).
Radiation Control	M, R	2.3.10 Ability to perform procedures to reduce excessive levels of radiation and guard against personnel exposure (3.3). JPM: Determine radiation levels for work to be performed based on HP Surveys (J242A).
Emergency Plan	N, R	2.4.41 Knowledge of emergency action level thresholds and classifications (4.1). JPM: Classify an emergency event (New).

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

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

A.1.a The candidate will be given plant conditions where the RCS is in a drained down condition and will perform a calculation of RCS Time to Boil Margin for Shutdown Nuclear Safety. Critical tasks include using applicable correction factors for each parameter or factor affecting the Time to Boil Margin. This is a modified bank JPM.

A.1.b The candidate will determine the required boron concentration for RCS cooldown to Mode 5 with several stuck control rods. The critical tasks are to determine target boron concentration and gallons of boric acid required. This is a modified bank JPM.

A.2 The candidate will complete a manual Limiting Condition for Operation ACTION Requirement (LCOAR) for Reactivity Control (Boration Systems - Operating). The critical task is to choose the correct Technical Specification ACTION(s) and properly complete the paperwork for a manual LCOAR. This is a modified bank JPM.

A.3 The candidate will determine radiation levels for work to be performed based on HP Surveys. The critical tasks include determination of area radiation levels, on-contact and 30 cm dose rates, and contamination levels. This is a modified bank JPM.

A.4 The candidate will perform an EPIP classification for a Security Safeguards Contingency Event. The critical task is to properly classify the event. This is a new JPM. **This JPM was removed from public view because of SUNSI screening.**

Facility:	SONGS	Date of Examination:	06/04/07
Exam Level (circle one):	RO / SRO(I) / **SRO (U)**	Operating Test No.:	NRC

Control Room Systems@ (8 for RO; 7 for SRO-I; 2 or 3 for SRO-U, including 1 ESF)			
	System / JPM Title	Type Code*	Safety Function
S-1	**APE 025 - Loss of RHR (J245FS)** **Perform Alternate Reactor Core Cooling**	**A, D, L, S**	**4-P**
S-2	064 - Emergency Diesel Generators (J188S) Reenergize Bus 2A06 from Unit 3 Diesel Generator	D, S	6
S-3	001 - Control Rod Drive System (J029FS) Perform CEA Exercises	A, D, S	1
S-4	**006 - Emergency Core Cooling System (J226FS)** **Perform Recirculation Actuation System operations**	**A, D, P, S**	**2**
S-5	**010 - Pressurizer Pressure Control System (New)** **Respond to an open Pressurizer Spray Valve**	**A, N, S**	**3**
S-6	061 - Main Feedwater System (J221FS) Feedwater System Operation During a Valid RTO	A, M, S	4-S
S-7	029 - Containment Purge System (J147FS) Place Containment Mini-Purge in Service	A, D, S	8
S-8	012 - Reactor Protection System (J047S) (RO only) Channel A Narrow Range Pressure Transmitter Failure	D, S	7
In-Plant Systems@ (3 for RO; 3 for SRO-I; 3 or 2 for SRO-U)			
P-1	**062 - AC Electrical Distribution (New)** **Security Actions for Loss of Control Room**	**E, N**	**6**
P-2	016 - Non-Nuclear Instrumentation (J003) Place the EPPM in Service	D, E, R	7
P-3	**103 - Containment System (J247)** **Perform Manual Containment Isolation Valve Alignment**	**D, E, R**	**5**

@	All RO and SRO-I control room (and in-plant) systems must be different and serve different safety functions; all 5 SRO-U systems must serve different safety functions; in-plant systems and functions may overlap those tested in the control room.
* Type Codes	Criteria for RO / SRO-I / SRO-U
(A)lternate path	4-6 / 4-6 / 2-3
(C)ontrol room	
(D)irect from bank	≤ 9 / ≤ 8 / ≤ 4
(E)mergency or abnormal in-plant	≥ 1 / ≥ 1 / ≥ 1
(L)ow-Power	≥ 1 / ≥ 1 / ≥ 1
(N)ew or (M)odified from bank including 1(A)	≥ 2 / ≥ 2 / ≥ 1
(P)revious 2 exams	≤ 3 / ≤ 3 / ≤ 2 (randomly selected)
(R)CA	≥ 1 / ≥ 1 / ≥ 1
(S)imulator	≥ 1 / ≥ 1 / ≥ 1

NRC JPM Examination
Summary Description

S-1 The candidate will perform Alternate Reactor Core Cooling with RCS level lowering per SO23-13-15, Loss of Shutdown Cooling System. The candidate will isolate and secure Shutdown Cooling Pumps and RCPs. The alternate path includes isolating the SDC Valves inside and outside Containment. This is a low power; bank JPM under the Residual Heat Removal System – Primary System Heat Removal from Reactor Core safety function. This is a PRA significant action.

S-2 The candidate will reenergize Bus 2A06 from the Unit 3 Emergency Diesel Generator per SO23-12-11, EOI Supporting Attachments, Attachment 24, Supplying 1E 4 KV Bus from Opposite Unit Diesel. This is a bank JPM under the AC Electrical Distribution System – Electrical safety function.

S-3 The candidate will use the Control Rod Drive System to exercise the CEAs per SO23-3-3.5, CEA/Reactor Trip Breaker Operability Test. The alternate path requires a Reactor trip when two rods fall into the core during exercising. This is a bank JPM under the Control Rod Drive System – Reactivity Control safety function.

S-4 The candidate will align for sump recirculation per SO23-12-11, EOI Supporting Attachments, FS-21, Verify Recirculation Actuation Signal Conditions Established. The alternate path requires manual actions to contend with Containment Sump blockage. This is a bank JPM under the Emergency Core Cooling System – Reactor Coolant System Inventory Control safety function. This JPM was previously used on the October 2005 NRC Exam. This meets the ESF function for the SRO upgrade. This is a PRA significant action.

S-5 The candidate will respond to an open Pressurizer Spray Valve per SO23-13-27, Pressurizer Pressure and Level Malfunction. The alternate path includes tripping the Reactor and Reactor Coolant Pump when it is determined that the Pressurizer Spray Valve will not close. This is a new JPM under the Pressurizer Pressure Control System – Reactor Pressure Control safety function.

S-6 The candidate will perform Feedwater Control System operation during a valid Reactor Trip Override (RTO) signal. The alternate path requires that the candidate position the Bypass Feedwater Control Valves following an RTO per SO23-9-6, Feedwater Control System Operation. This is a modified bank JPM under the Main Feedwater System – Secondary System Heat Removal from Reactor Core safety function. This is a PRA significant action.

S-7 The candidate will place Containment Mini-Purge in service per SO23-1-4.2, Containment Purge and Recirculation Filtration System. The alternate path requires securing the mini-purge manually when a Containment high radiation signal fails to isolate the purge. This is a bank JPM under the Containment Purge System – Plant Service Systems safety function.

S-8 The candidate will take corrective actions for Channel "A" Narrow Range Pressurizer Pressure Transmitter failure per SO23-13-18, Reactor Protection System Failure. This is a bank JPM under the Reactor Protection System – Instrumentation safety function.

P-1 The candidate will perform actions at the Remote Shutdown Panel for a security event. This is a new JPM under the AC Electrical Distribution – Electrical Systems safety function.
This JPM was removed from public view due to SUNSI screening.

P-2 The candidate will place the Essential Plant Parameters Monitoring Panel (EPPM) in service per SO23-13-2, Shutdown form Outside the Control Room. This is a bank JPM under the Non-Nuclear Instrumentation System – Instrumentation safety function.

P-3 The candidate will align manual Containment isolation valves per SO23-12-11, EOI Supporting Attachments, Attachment 26, Manual Containment Isolation Valve Alignment. This is a bank JPM under the Containment Integrity - Containment System safety function.

Facility:	San Onofre	Scenario No.:	1	Op Test No.:	NRC
Examiners:	_____	Operators:	_____		
	_____		_____		
	_____		_____		

Initial Conditions:
- 100% power - RCS Boron is 1123 ppm.
- Train A Component Cooling Water Pump (P-025) in service
- Train A Auxiliary Feedwater Pump (P-141) OOS
- Train A Saltwater Cooling Pump (P-307) OOS
- Condenser Air Ejector Low Range Radiation Monitor (RM-7818) OOS

Turnover: Maintain steady-state power conditions.

Critical Tasks:
- Manually trip the Reactor due to Reactor Protection System failure.
- Energize Vital AC Buses A04 & B04 with EDG 2G002.

Event No.	Malf. No.	Event Type*	Event Description
1 + min	RC16B	I (RO, CRS) TS (CRS)	Pressurizer Level Control Channel (LT-0110-2) fails low.
2 + min	FW18A	I (BOP, CRS)	Steam Generator E089 Feed Flow Transmitter (FT-1111) fails high.
3 + min	CV22B CV22A	C (RO, CRS) TS (CRS)	Charging Pump (P191) trip and Charging Pump (P190) start failure.
4 + min	TP02B	C (BOP, CRS)	Turbine Plant Cooling Water Pump (P120) trip with TPCW Pump (P-119) auto start failure.
5 + min	RC07	C (RO, CRS)	Reactor Coolant Pump (P003) seal failure and seized shaft.
6 + min	RP15	M (ALL)	Automatic Reactor trip failure, manual trip required.
7 + min	PG24	M (ALL)	Loss of Offsite Power upon Reactor trip.
8 + min	EG08B	C (BOP)	Diesel Generator (2G003) mechanical failure.
9 + min	EG07A	C (BOP)	Diesel Generator (2G002) Automatic Voltage Regulator failure.

* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor, (TS) Technical Specifications

SCENARIO SUMMARY #1

The crew will assume the watch and maintain steady-state conditions per SO23-5-1.7, Power Operations.

The first event is a Pressurizer Level instrument failure that requires crew actions per the Annunciator Response Procedures (ARPs) and Abnormal Operating Instruction (AOI) SO23-13-27, Pressurizer Pressure and Level Malfunction. The CRS will evaluate Technical Specifications.

When the CRS completes the evaluation of Technical Specifications, a feed flow transmitter will fail high on Steam Generator E-089. The crew will diagnose feed flow instrument failure per the ARPs and be required to bypass the failed signal using SO23-3-2.38, Digital Control System Operation.

When feedwater control is restored and appropriate channels are bypassed, Charging Pump P-191 will trip and Charging Pump P-190 will fail to start. RO actions are addressed per the ARPs and SO23-3-2.1, Chemical and Volume Control System Operations. The CRS will evaluate Technical Specifications.

When plant conditions are stable, Turbine Plant Cooling Water (TPCW) Pump P-120 will trip, and TPCW Pump P-119 fails to automatically start. The BOP must manually start TPCW Pump P-119 in accordance with the ARPs to prevent a potential trip on a Main Generator high stator cooling water temperature.

When the crew has stabilized from the TPCW Pump trip, Reactor Coolant Pump P-003 will sustain a failure that requires entry into AOI SO23-13-6, Reactor Coolant Pump Seal Failure. Once the initial diagnosis is made the RCP shaft will seize. The RO will diagnose the seized shaft and determine that a Reactor trip is required. The automatic Reactor trip failure will require a manual trip by the crew.

A Loss of Offsite Power will occur following the manual trip. The crew will respond per SO23-12-1, Standard Post Trip Actions. A mechanical failure of Emergency Diesel Generator 2G003 and a voltage regulator setpoint failure of Emergency Diesel Generator 2G002 will also occur. The BOP must adjust the EDG voltage in order for the output breaker to close and reenergize Bus 2A04. At this point, the crew will transition to SO23-12-7, Loss of Forced Circulation / Loss of Off-Site Power.

Event termination will occur once an off-site line is restored, the crew has re-energized Bus 2A06 and plant temperature and pressure are stable.

Risk Significance:

- Risk important components out of service: AFW Pump P-141; SWC Pump P-307
- Failure of risk important system prior to trip: Loss of two Charging Pumps
- Risk significant core damage sequence: Failure to recover from LOOP
- Risk significant operator actions: Station Blackout due to EDG voltage regulator failure

Facility:	San Onofre	Scenario No.:	2	Op Test No.:	NRC
Examiners:	_____	Operators:	_____		
	_____		_____		
	_____		_____		

Initial Conditions:
- 70% power – RCS Boron is 977 ppm.
- Train A Component Cooling Water Pump (P-025) in service
- Train A Auxiliary Feedwater Pump (P-141) OOS
- Train A Saltwater Cooling Pump (P-307) OOS
- Condenser Air Ejector Low Range Radiation Monitor (RM-7818) OOS

Turnover: Maintain steady-state power conditions.

Critical Tasks:
- Restore flow to the CCW Non-Critical Loop (RCPs operating).
- Restore feedwater flow to at least one Steam Generator.

Event No.	Malf. No.	Event Type*	Event Description
1 + min	CC06B	C (BOP, CRS) TS (CRS)	CCW Pump P-025 trip.
2 + min	RC10B	I (RO, CRS)	RCS Loop 1 Tcold fails low (TT-0111AY).
3 + min	ED03B	C (BOP, CRS) TS (CRS)	Bus 2A06 Overcurrent trip and lockout.
4 + min		R (RO) N (BOP, CRS)	Perform a rapid downpower per Operations Management directive.
5 + min	RC03	M (ALL)	Small break LOCA @1200 gpm.
6 + min	FW23	M (ALL)	Total loss of Condenser vacuum.
7 + min	FW25	M (ALL)	Loss of all Feedwater due to Turbine Driven Auxiliary Feedwater Pump (P-140) overspeed trip.
8 + min	RP01	C (RO)	LPSI Pump (P-015) fails to start.

* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor, (TS) Technical Specifications

SCENARIO SUMMARY NRC #2

The crew will assume the watch and maintain steady-state conditions per SO23-5-1.7, Power Operations.

When turnover is complete a CCW Pump will trip. The crew will respond per the Annunciator Response Procedures (ARPs) and Abnormal Operating Instruction (AOI) SO23-13-7, Loss of Component Cooling Water (CCW) / Saltwater Cooling (SWC). The crew will align SWC & CCW Trains per pump configuration requirements. The CRS will evaluate Technical Specifications.

When the CCW System flow is restored, a Tcold instrument fails low and will require crew actions per the ARPs and AOI SO23-13-27, Pressurizer Pressure and Level Malfunction.

When the CVCS is restored to normal, a bus fault and lockout will occur on 1E Bus 2A06. The crew will refer to AOI SO23-13-26, Loss of Power to an AC Bus. The BOP will perform actions to preserve the Train B Emergency Diesel Generator. The CRS will evaluate Technical Specifications and determine that a plant shutdown is required.

When the CRS has determined that a Technical Specification LCO 3.0.3 condition exists, Operations Management will direct the crew to commence a rapid downpower per SO23-5-1.7, Power Operations.

Once power has been reduced 3% to 5%, a Loss of Coolant Accident and Loss of all Feedwater will occur. A total loss of Condenser vacuum will render the Main Feedwater Pumps ineffective. The crew performs SO23-12-1, Standard Post Trip Actions and diagnoses a LOCA and a LOFW and transitions to SO23-12-9, Functional Recovery.

Following the trip, a LPSI Pump fails to start and the RO will be required to manually start the pump. The scenario is terminated when the Steam Driven AFW Pump overspeed trip is reset and RCS temperature and pressure are stabilized while in the Functional Recovery procedure and associated Floating Steps.

Risk Significance:

- Risk important components out of service: AFW Pump P-141
SWC Pump P-307
- Failure of risk important system prior to trip: Loss of Bus 2A06
- Risk significant core damage sequence: LOCA and LOFW
- Risk significant operator actions: Failure to manually start LPSI
Failure to supply feedwater

Facility:	San Onofre	Scenario No.:	4	Op Test No.:	NRC
Examiners:	_____	Operators:	_____		
	_____		_____		
	_____		_____		

Initial Conditions:	• Reactor Critical at ~$3x10^{-4}$% power – RCS Boron is 2038 ppm. • Train A Component Cooling Water Pump (P-025) in service. • Condenser Air Ejector Low Range Radiation Monitor (RM-7818) OOS.
Turnover:	Power increase in progress to ~2% power.
Critical Tasks:	• Trip any RCP not satisfying RCP operating limits. • Manually initiate MSIS (Auto actuation failure). • Isolate the most affected Steam Generator (ESDE).

Event No.	Malf. No.	Event Type*	Event Description
1 + min		R (RO) N (BOP, CRS)	Rod withdrawal and power increase in progress
2 + min	CV19	I (RO, CRS)	Letdown Temperature Transmitter (TT-0223) fails low.
3 + min	FWCS LP	C (BOP, CRS)	Auxiliary Feedwater Valve (HV-4762) fails closed.
4 + min	RC15B	I (RO, CRS) TS (CRS)	Pressurizer Pressure Control Channel (PT-0100Y) fails low.
5 + min	RC03	C (RO, CRS) TS (CRS)	RCS leak less than Charging Pump capacity.
6 + min	RC03	M (ALL)	Small break LOCA @ 250 gpm.
7 + min	MS03B	M (ALL)	Excess Steam Demand Event on E-089 inside Containment.
8 + min	RPS LP	I (BOP)	MSIS fails to actuate, manual actuation required.

* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor, (TS)Technical Specifications

SCENARIO SUMMARY NRC #4

The crew will assume the watch at approximately with the Reactor critical at ~$3x10^{-4}$% power. The crew will raise power using rod withdrawal per SO23-5-1.3.1, Plant Startup from Hot Standby to Minimum Load.

With the plant stable at ~2% power, the crew will respond to the Letdown Temperature Control Valve failing closed due to a temperature transmitter failure. This will require action per the Annunciator Response Procedures (ARPs) and Abnormal Operation Instruction (AOI) SO23-3-2.1, CVCS Charging and Letdown Operations.

Once Letdown is restored, the Auxiliary Feedwater Control Valve to Steam Generator E-088 will fail closed. The BOP will align an alternate valve per the ARPs.

After the crew has restored Steam Generator level, a Pressurizer Pressure instrument fails low and will require crew actions per the ARPs and AOI SO23-13-27, Pressurizer Pressure and Level Malfunction. The CRS will evaluate Technical Specifications. This event also initiates a slowly increasing leakrate due to a sensing line failure.

The next event is an RCS leak inside Containment. The crew will respond per the ARPs and AOI SO23-13-14, Reactor Coolant System Leak. The CRS will evaluate Technical Specifications and determine that a plant shutdown per the AOI is required. Once the requirement to shutdown is determined the leak will exceed Charging Pump capacity and the crew will initiate a plant trip and perform SO23-12-1, Standard Post Trip Actions.

When the plant is tripped and the crew is performing actions of SO23-12-1, an ESDE inside Containment will occur. The CRS will evaluate a LOCA and an ESDE and transition to SO23-12-9, Functional Recovery.

Following the trip, the Main Steam Isolation Signal (MSIS) fails to actuate and the ACO will be required to manually actuate MSIS. The scenario is terminated when RCS temperature and pressure are stabilized while in the Functional Recovery procedure and associated Floating Steps.

Risk Significance:

- Failure of risk important system prior to trip: Loss of AFW flow
- Risk significant core damage sequence: LOCA and ESDE
- Risk significant operator actions: Manually actuate MSIS
Isolate affected Steam Generator