

U S. NUCLEAR REGULATORY COMMISSION  
REGION 1

Docket No: 50-289

Report No: 50-289/98-301

License No: DPR-50

Licensee: General Public Utilities Nuclear

Facility: Three Mile Island Unit 1 Nuclear Station

Location: Middletown, Pennsylvania

Dates: August 24 - 27, 1998

Chief Examiner: P. Bissett, Senior Operations Engineer/Examiner

Examiners: D. McNeil, Senior Operations Examiner (RIII)

Approved by: Richard J. Conte, Chief  
Operator Licensing and Human Performance Branch  
Division of Reactor Safety

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## EXECUTIVE SUMMARY

Three Mile Island Unit 1 Nuclear Station  
Inspection Report No. 50-289/98-301

### Operations

Four senior reactor operator (SRO) applicants passed all portions of the initial license examination.

The applicants performed well on both the written and operating portions of the examination. The applicants were well prepared for the examination, indicating that the facility thoroughly evaluated the knowledge and ability of each candidate in an effort to determine their readiness to sit for an initial NRC senior reactor operator examination. Crew communications and crew briefings during the simulator scenario portion of the examinations were good.

The training department did an excellent job in following the guidance set forth in the examiner standards during the development of the examinations. With few exceptions, excellent attention to detail prevailed throughout the examination development process.

On the quality of the original exam submittal by the TMI training department, several administrative questions were deemed direct lookup questions and, as a result, administrative job performance measures (JPMs) were substituted for these questions. These administrative JPMs were appropriately developed by the TMI training department to test the knowledge level of the applicants in the administrative area. Overall, examination quality was good, with the majority of changes having dealt with editorial changes or enhancements.



## Report Details

### I. Operations

#### 05 Operator Training and Qualifications

##### 05.1 Senior Reactor Operator Initial Examinations

###### a. Scope

The examinations were prepared by Three Mile Island (TMI) Unit 1 personnel in accordance with the guidelines in interim Revision 8, of NUREG-1021, "Operator Licensing Examination Standards for Power Reactors." The initial operator licensing examinations were administered to four senior reactor operator (SRO) applicants. One of the SRO applicants was an SRO instant, whereas the other three applicants were SRO upgrades. The NRC administered the operating portion of the examinations, whereas the written examinations were administered by the TMI training organization following the completion of the operating examinations.

###### b. Observations and Findings

###### Grading and Results

The results of the SRO examinations are summarized below:

SRO Pass/Fail	
Written	4/0
Operating	4/0
Overall	4/0

###### Preparations

The written examination, job performance measures (JPMs), including follow-up questions, and simulator scenarios were developed by TMI personnel in accordance with NUREG-1021. All individuals involved signed a security agreement once the development of the examination commenced. TMI personnel also validated the examination prior to their submitting it to the NRC. During the exam preparation week of August 10, 1998, the NRC subsequently reviewed and validated, together with TMI personnel, all portions of the proposed examinations.

For the most part, the written exam, JPMs and scenarios required only minor changes. However, the examiners determined that several of the administrative questions were essentially direct look-up questions. After discussion with TMI training representatives, it was agreed upon that administrative JPMs would be developed to replace those administrative questions that were not considered appropriate by the examiners. TMI subsequently developed several administrative

JPMs that met the guidelines of NUREG-1021. A couple of JPM follow-up questions were also deemed to fall into the category of a direct lookup question. These questions were subsequently replaced with higher cognitive thinking level questions.

#### Administration and Performance

The written portion of the examination was administered by TMI training personnel on August 27, 1998, and consisted of 100 multiple choice questions. There were no comments by either the NRC or TMI concerning the validity of questions on the written examination, however one question was determined to have had the wrong answer designated in both the answer key and supporting documentation. TMI training personnel and the NRC subsequently verified the validity of the answer and appropriately changed the answer key.

The operating portion of the examination was conducted from August 24 - 25, 1998, and consisted of three simulator scenarios for each applicant. Also, ten JPMs were administered to the SRO instant applicant, whereas the three SRO upgrade applicants were required to perform only five JPMs. All JPMs were followed up with two system-related questions. As previously mentioned, administrative JPMs were developed and administered to all applicants to evaluate the administrative requirement portion of the examination.

Simulator and JPM performance by the SRO applicants was good. Communications was also good, including the use of repeat backs. Crew briefings were held when time permitted and was deemed necessary by the SRO. Procedural usage was appropriate throughout the conduct of all scenarios. Good control board awareness by all of the candidates was evident throughout each of the four scenarios observed by the NRC examiners.

For feedback to the initial licensed operator training program, the examiners noted, as did the facility, that questions 23, 47, 65, and 70 were missed by three or more of the applicants. These questions, respectively, dealt with power level vs rod realignment; bus power supplies to major DC loads; automatic protective actions for the waste gas decay system; and, reactor building access authorization requirements. Also, three of four applicants failed to correctly answer one JPM follow-up question which called for the identification of inoperable control rods as a result of control rod misalignment.

#### c. Conclusions

The four SRO applicants passed all portions of the initial license examination. The applicants performed well on both the written and operating portions of the examination. The applicants were well prepared for the examination, indicating that the facility thoroughly evaluated the knowledge and ability of each candidate in an effort to determine their readiness to sit for an initial NRC senior reactor operator examination. Crew communications and crew briefings during the simulator scenario portion of the examinations were good.

The training department did an excellent job in following the guidance set forth in the examiner standards during the development of the examinations. With few exceptions, excellent attention to detail prevailed throughout the examination development process.

On the quality of the original exam submittal by the TMI training department, several administrative questions were deemed direct lookup questions; and, as a result, administrative job performance measures (JPMs) were substituted for these questions. These administrative JPMs were appropriately developed by the TMI training department to test the knowledge level of the applicants in the administrative area. Overall, examination quality was good, with the majority of changes having dealt with editorial changes or enhancements.

**E8 Review of the FSAR**

While performing the preexamination activities discussed in this report, the inspectors reviewed applicable portions of the FSAR, that related to the selected examination questions or topic areas. No discrepancies were noted.

**V. Management Meetings**

**X1 Exit Meeting Summary**

On August 26, 1998 the NRC discussed their observations regarding the examination with Three Mile Island Unit 1 operations and training management representatives. The examiner discussed generic candidate performance, as observed during the administration of the simulator scenarios and job performance measures.

The NRC also expressed their appreciation for the cooperation and assistance that was provided during both the preparation and examination week by licensed operator training and operations personnel.



## PARTIAL LIST OF PERSONS CONTACTED

### Three Mile Island

D. Boltz, Instructor, TMI Training  
R. Hess, Plant Training Manager  
J. Langenbach, Vice President, Director TMI  
M. Ross, Director, Operations and Maintenance  
R. Parnell, Operations Training Manager

### NRC

P. Bissett, Senior Operations Engineer/Examiner  
D. McNeil, Senior Operations Examiner

### Attachments:

1. Three Mile Island Unit 1 SRO Written Examination w/Answer Key
2. Simulation Facility Report

Attachment 1

**TMI-1 SRO WRITTEN EXAMINATION W/ANSWER KEY**

Distribution w/encl and Attachments 1-2:

DRS Master Examination File

PUBLIC

Nuclear Safety Information Center (NSIC)

V. Curley, DRS

Distribution w/encl; w/o Attachments 1-2:

Region I Docket Room (with concurrences)

NRC Resident Inspector

H. Miller, RA/W. Axelson, DRA

P. Eselgroth, DRP

N. Perry, DRP

D. Haverkamp, DRP

C. O'Daniell, DRP

J. Wiggins, DRS

L. Nicholson, DRS

P. Bissett, Chief Examiner, DRS

DRS OL Facility File

DRS File

Distribution w/encl; w/o Attachments 1-2 (VIA E-MAIL):

B. McCabe, OEDO

C. Thomas, PD1-3, NRR

T. Colburn, PD1-3, NRR

R. Eaton, PDI-3, NRR

R. Correia, NRR

F. Talbot, NRR

DOCDESK

Inspection Program Branch, NRR (IPAS)



**U.S Nuclear Regulatory Commission  
Site-Specific  
Written Examination**

Applicant Information

Name:	Region: I
Date: August 27, 1998	Facility/Unit: Three Mile Island Unit 1
License Level: SRO	Reactor Type: B&W-177
Start Time:	Finish Time:

Instructions

Use the answer sheets provided to document your answers. Staple this cover sheet on top of the answer sheets. The passing grade requires a final grade of at least 80.00 percent. Examination papers will be collected four hours after the examination starts.

Applicant Certification

All work done on this examination is my own. I have neither given nor received aid.

\_\_\_\_\_  
Applicant's Signature

Results

Examination Value	_____ 100 _____	Points
Applicant's Score	_____	Points
Applicant's Grade	_____	Percent

QUESTION: 001 (1.00)

Selected Pressurizer level signal indicates off-scale low. An evaluation must be conducted to determine if the transmitter has failed low or if it is accurately displaying a low pressurizer level condition. Which ONE (1) parameter can be used IMMEDIATELY to make this determination?

- A. Pressurizer spray valve position
- B. RCS pressure
- C. Makeup tank level
- D. Pressurizer water temperature

QUESTION: 002 (1.00)

Current plant conditions are:

- The reactor is tripped.
- RCS subcooled margin is zero.

Which ONE (1) action results in increasing RCS subcooling margin?

- A. Decrease RCS pressurizer level
- B. Decrease RCS hot leg flow
- C. Increase RCS loop pressure
- D. Increase RCS hot leg temperature



QUESTION: 003 (1.00)

Reactor power is at 100% when the controlling RCS pressure channel, RC3A-PT1, fails instantaneously LOW. With NO operator action, which ONE (1) statement describes the SHORT-TERM plant response?

- A. Reactor trip occurs on high RCS pressure
- B. SASS shifts control to RC3B-PT1 RCS pressure channel to stabilize the plant
- C. Pressurizer heaters energize from RC3A-PT1 to increase RCS pressure
- D. Reactor trips and Safety Injection is actuated on low RCS pressure

QUESTION: 004 (1.00)

The reactor is super critical and just entering the intermediate range (4000 cps on the Source Range) when detector compensating voltage to NI-3 is lost. Which ONE (1) statement explains the effect this loss of compensating voltage will have on NI-3 indication?

- A. NI-3 would be unaffected at this low power level.
- B. NI-3 would indicate higher than NI-4.
- C. NI-3 would come on scale some time after NI-4.
- D. NI-3 would go off scale low before NI-4 if a reactor trip occurred while at  $1E-8$  amps.

QUESTION: 005 (1.00)

The plant is at 100% power when control room indications reveal the following:

- Reactor power is DECREASING
- RCS pressure is INCREASING
- Main Steam safety valves are OPEN
- MS-V-3s and MS-V-4s are OPEN
- Indicating lights on Panel SS-1 are GREEN for the breakers for the Middletown 1092, Jackson 1051 and 500 kV tie lines
- Indicating lights on Panel SS-1 for the Middletown 1091 breaker switches are GREEN and YELLOW
- Indicating lights for both main generator breakers are RED
- Main generator electrical megawatts are 56 MW

Which ONE (1) event is described by these symptoms?

- A. Loss of 230 kV substation DC
- B. Load rejection
- C. Auxiliary transformer fault
- D. Loss of station power



QUESTION: 006 (1.00)

Which ONE (1) statement describes the requirements for an individual to be allowed to receive a TEDE dose greater than 4000 mRem per year, excluding a planned special exposure?

- A. A special RWP is written covering the individual to be permitted to exceed 4000 mRem
- B. Approval from RadCon/Safety Director and Site Director
- C. Approval from the President, GPU Nuclear
- D. Notification of the NRC

QUESTION: 007 (1.00)

Given a Switching and Tagging Request to remove a fire system heat detector in the EG-Y-1A diesel room from service, identify ONE (1) action is required to compensate for this detector being removed from service.

- A. Establish a fire watch PATROL within one hour to inspect the diesel room at least ONCE PER HOUR.
- B. Station a CONTINUOUS fire WATCH in EG-Y-1A diesel room WITHIN ONE HOUR.
- C. START EG-Y 1A to perform the one-hour surveillance to verify OPERABILITY.
- D. Restore detector to operable status WITHIN 14 DAYS or commence plant shutdown to hot shutdown.

QUESTION: 008 (1.00)

Which ONE (1) statement describes the purpose of the protective action guidelines?

- A. Protect plant workers from receiving excessive radiation exposures in excess of 10CFR20 limits
- B. Prevent radioactive releases from exceeding 10CFR20 limits
- C. Recommend sheltering or evacuation for the general population
- D. Determine if potassium iodide tablets should be administered to reduce thyroid dose



QUESTION: 009 (1.00)

With the plant operating at 50% power, BOTH Intermediate Range NI detectors fail LOW. Which ONE (1) statement describes the required action(s).

- A. Continue power operations but limit power to 50%.
- B. Continue power operations, power may be increased.
- C. Immediately take action to place the unit in hot shutdown within 6 hours.
- D. Take action within one hour to restore at least one Intermediate Range channel to operable status or place the unit in hot shutdown within 6 hours.

QUESTION: 010 (1.00)

10 CFR 50.54 (x) specifically allows "reasonable action that departs from a license condition or a technical specification in an emergency when this action is immediately needed to protect the public health and safety." Select the MINIMUM position that may approve 10 CFR 50.54 (x) actions.

- A. Director Operations & Maintenance
- B. Plant Operations Director
- C. Licensed Senior Reactor Operator
- D. Licensed Reactor Operator

QUESTION: 011 (1.00)

In addition to the person having the clearance, which ONE (1) of the following must grant permission to change the condition of BLUE tagged ES equipment?

- A. Director Operations and Maintenance
- B. Plant Operations Director
- C. Duty Shift Supervisor/Shift Foreman
- D. Licensed Control Room Operator



QUESTION: 012 (1.00)

Following a reactor trip, the following conditions exist:

- A OTSG level is 87" and decreasing slowly
- B OTSG level is 82" and decreasing slowly
- MFW flow is 0 gpm
- MFW valve D/P is 0 psig
- RCS pressure is 1725 psig and stable
- MUT level is 62 inches
- PZR level is 35 inches
- MU flow is 60 gpm

Which ONE (1) statement describes the action required per AP 1210-1, Reactor Trip?

- A. Increase MFW pump speed.
- B. Open MU-V-14A or MU-V-14B as necessary.
- C. Initiate HPI.
- D. Start second Makeup Pump and open MU-V-217.

QUESTION: 013 (1.00)

Current plant conditions are:

- Reactor is operating at 80% power.
- RM-L-1 (RC Letdown) has increased to the ALERT setpoint.
- Chemistry analysis indicates dose equivalent I-131 concentration is 0.28 uci/gm.
- RCS specific activity is 220 uci/gm.
- E-BAR is 0.5.

Which ONE (1) statement describes the required Tech Spec actions?

- A. Reduce RCS activity to less than the Tech Spec limit within 48 hours or be in hot shutdown within the following 6 hours.
- B. Reduce RCS activity to less than Tech Spec limit within 72 hours or be in hot shutdown within the following 6 hours.
- C. Initiate actions to place the unit in hot shutdown within 6 hours.
- D. Reduce RCS activity to less than Tech Spec limit within 12 hours or place the reactor in cold shutdown.

QUESTION: 014 (1.00)

Current plant conditions are:

- Reactor is operating at 100% power.
- RCS Tavg is constant at 579°F.
- Make up tank level is decreasing slowly - MU-V-17 is in MANUAL control.
- Letdown flow has been constant at 45 gpm.
- RCP total seal injection flow is 38 gpm (normal) – MU-V-32 is in AUTO.
- RCP labyrinth seal D/P indicators show low off-scale (negative).
- Auxiliary Building airborne activity is increasing.

Which ONE (1) statement describes the cause for the abnormal conditions?

- A. RCP seal #1 leak-off flow is aligned to the Auxiliary Building sump.
- B. RCP total seal injection flow transmitter has failed.
- C. RCP seal injection flow is not reaching the RCPs.
- D. RCP seal #1 leak-off flow has been isolated by closure of MU-V-26.



QUESTION: 015 (1.00)

Some reactor trip situations require large volumes of makeup water for RCS inventory control simultaneous with the need to emergency borate the core. Which ONE (1) source should be used for this condition?

- A. 4% BAMT (CA-T-8)
- B. Concentrated Waste Storage Tank (WDT-6A/B)
- C. RC Bleed Tank 1C (WDL-T-1C)
- D. BWST (DH-T-1)

QUESTION: 016 (1.00)

It is necessary to evacuate the control room due to a serious fire in the relay room. Which ONE (1) required action must be performed prior to exiting the control room?

- A. Perform notifications for an ALERT.
- B. Start EG-Y-1A and EG-Y-1B.
- C. Trip the MFW pumps.
- D. Close MU-V-3.

QUESTION: 017 (1.00)

RCPs are bumped during inadequate core heat removal conditions. Which ONE (1) statement describes the reason for this action?

- A. Decrease RCS pressure
- B. Induce OTSG heat transfer
- C. Prevent RCS inventory loss
- D. Increase OTSG pressure



QUESTION: 018 (1.00)

A small break LOCA is in progress. Which ONE (1) set of conditions requires tripping all RCPs?

	RCS TEMP	RCS PRESS
A.	579°F	1800 psig
B.	537°F	1300 psig
C.	525°F	1000 psig
D.	473°F	800 psig

QUESTION: 019 (1.00)

Which ONE (1) condition requires a Core Flood Tank to be declared inoperable?

- A. Boron is 2290 ppm.
- B. Pressure is 620 psig.
- C. Level is 14 ft.
- D. Temperature is 100 degrees F.

QUESTION: 020 (1.00)

Plant conditions require manual reactor trip. Upon depressing the Trip AND DSS pushbuttons, the reactor does not trip (reactor power remains at 100%). Which ONE (1) statement describes the required action?

- A. Place the EHC pump control switches in P-T-L and open EHC-FV-1.
- B. Place the diamond rod control station in manual and reduce reactor power.
- C. Initiate HPI and maintain primary to secondary heat transfer until power level is less than 10%.
- D. Transfer FW to manual to control OTSG levels.



QUESTION: 021 (1.00)

BS-P-1B is running for surveillance. Which ONE (1) condition would result in automatic trip of the BS-P-1B breaker?

- A. 1A Aux Transformer fault with Auto Transfer of loads to 1B Aux Transformer
- B. 1B Aux Transformer fault with Auto Transfer of loads to 1A Aux Transformer
- C. Fault downstream of 1P 480v Bus low side feeder breaker
- D. Fault downstream of 1S 480v Bus low side feeder breaker

QUESTION: 022 (1.00)

Current plant conditions are:

- Pump down of RCS is in progress.
- DH-P-1A is in service
- Low DH Pump Flow annunciator C-1-7 is actuated.
- RCS temperature is increasing.
- Discharge pressure for DH-P-1A is unstable
- Motor amperage indication for DH-P-1A is unstable.
- Noise is reported in DH-P-1A vault.

Which ONE (1) statement describes the required operator actions?

- A. Place Loop B Decay Heat Removal System in service, and trip DH-P-1A.
- B. Trip DH-P-1A, and do NOT restart this pump until appropriate actions have been completed.
- C. Place Loop B Decay Heat Removal System in service, and leave DH-P-1A running until conditions stabilize.
- D. Start one Makeup Pump and do NOT trip this pump until Incore Thermocouple temperatures stabilize.

QUESTION: 023 (1.00)

Current plant conditions are:

- Reactor is operating at 100% power.
- At 0715 a regulating rod became stuck and misaligned by 12" from the group average.
- At 0750 (current time) the problem causing the rod to be stuck is corrected and the rod is ready to be realigned.

What is the MAXIMUM PERMISSIBLE power level at which the control rod may be realigned with the group?

- A. 45%
- B. 55%
- C. 60%
- D. 100%



QUESTION: 024 (1.00)

Current RC-P-1A conditions:

- Number one seal leak-off flow indication is 5.8 gpm.
- Periodic RCP shaft vibration ALERT alarms are actuating – alarms can be reset without immediate re-actuation.
- Bentley-Nevada vibration readings are ranging between 14 and 18 mils.
- Number one Seal leak-off temperature indication is 197°F.
- Radial Bearing temperature indication is 170°F.
- High Standpipe level alarm is clear.

Which ONE (1) failure could cause the above indications?

- A. Seal #1
- B. Seal #2
- C. Seal #3
- D. Labyrinth seal

QUESTION: 025 (1.00)

Current plant conditions are:

- Reactor is operating at 95% power.
- RCS pressure is 2150 psig and decreasing slowly.
- Pzr level is 200 inches and decreasing slowly.
- MU TANK LEVEL LO alarm is actuated.
- SEAL INJECTION FLOW LOW alarm is actuated.
- Total RCP seal injection flow indication has decreased to 22 gpm.

Which ONE (1) abnormal condition could result in these indications?

- A. RCP seal failure
- B. MU-V-17 failed open
- C. Seal injection line leak
- D. Makeup line leak

QUESTION: 026 (1.00)

Current plant conditions are:

- Reactor is operating at 100% power.
- INST AIR PRESS LOW TURBINE AREA alarm is actuated.
- INSTRUMENT AIR PRESS LOW AUX BLDG AREA alarm is actuated
- Instrument Air pressure is 58 psig.
- Secondary plant is stable.

Which ONE (1) statement describes the required actions?

- A. Manually trip the reactor and perform the Immediate Manual Actions of 1210-1, Reactor Trip.
- B. Dispatch operators to start backup instrument air compressors.
- C. Maintain power at present level and make plant page and radio announcement to all personnel using instrument air to stop use immediately.
- D. Cross connect instrument and service air headers until cause for low header pressure is determined and corrected.



QUESTION: 027 (1.00)

Current plant conditions are:

- RCS LOCA is in progress.
- ESAS actuation (A & B) occurred 1 minute ago.

Which ONE (1) statement describes the operation of the RB fans and coolers (AH-E-1A/1B/1C)?

- A. Fans run in slow speed with river water flowing through the emergency cooling coils.
- B. Fans run in fast speed with river water flowing through the emergency cooling coils.
- C. Fans run in slow speed with river water flowing through the normal and emergency cooling coils.
- D. Fans run in fast speed with river water flowing through the normal and emergency cooling coils.

QUESTION: 028 (1.00)

Initial plant conditions are:

- Reactor is shutdown.
- RCS temperature is 250°F and stable.
- RCS pressure is 250 psig and stable.
- Pressurizer level is 200 inches and stable.
- DR-P-1A, DC-P-1A, and DH-P-1A are operating.
- DC-V-2A is closed, and DC-V-65A is open.
- Operators have just initiated DHR flow through the "A" DHR Cooler.

The following parameters are now changing:

- Pressurizer level is slowly decreasing.
- LT-109 indicates DC-T-1A is increasing.
- RM-L-2 count rate is increasing.

Identify the ONE (1) cause for the above conditions:

- A. DHCCW temperature is increasing due to energy transfer from the DHRS.
- B. DC-T-1A fill valve (DC-V-19A) is failing open.
- C. DHR cooler is leaking into the DHCCWS.
- D. LT-109 is failing high.

QUESTION: 029 (1.00)

Initial plant conditions are:

- Reactor is operating at 100% power.
- CO-P-1A and CO-P-1B are running, CO-P-1C is in Normal-After-Stop.
- CO-P-2A and CO-P-2B are running, CO-P-2C is in Normal-After-Stop.
- CO-P-1B trips on an electrical fault.
- After a period of two (2) seconds, CO-P-1C automatically starts.

Which ONE (1) statement describes the response for these conditions?

- A. One condensate booster pump will trip, both main feed pumps remain running, with an ICS runback.
- B. One condensate booster pump and one main feed pump will trip, with an ICS runback.
- C. One main feed pump will trip, both condensate booster pumps remain running, with an ICS runback.
- D. Both main feed pumps trip, one condensate booster pump trips and the reactor trips.



QUESTION: 030 (1.00)

Current plant conditions are:

- The reactor is operating at 95% power.
- Control Rod exercising is in progress.
- Rod Control, Feedwater, and Reactor-Steam Generator Master controls are in MANUAL.
- An "OUT-INHIBIT" condition is illuminated on the Diamond rod control panel.
- A rapid reduction in power level has just occurred with fluctuations in RCS temperature, pressure and pressurizer level.
- Asymmetric Rod alarm is actuated.
- Current NI readings are as follows:

<u>NI-5</u>	<u>NI-6</u>	<u>NI-7</u>	<u>NI-8</u>
90%	96%	97%	96%

Identify the ONE (1) cause for the above conditions:

- A. NI detector power supply fault
- B. Partial insertion of rods during exercising
- C. Azimuthal xenon oscillation
- D. Dropped rod

QUESTION: 031 (1.00)

Current plant conditions are:

- Reactor is operating at 100% power.
- RCS pressure is 2155 psig.
- CRO closed RC-V-2 one minute ago due to suspected PORV leakage.
- RC Drain Tank pressure is 5.0 psig.

If the PORV is leaking, what is the expected tailpipe temperature?

- A. 162 degrees F
- B. 212 degrees F
- C. 228 degrees F
- D. 267 degrees F

QUESTION: 032 (1.00)

Current plant conditions are:

- Reactor is at cold shutdown condition.
- "A" Decay Heat Removal string is operating.
- Decay Heat Closed Cooling flow through the Decay Heat Removal cooler is throttled to maintain the RCS at 130°F.
- Total loss of Instrument Air (0 psig) occurred.

Which ONE (1) statement describes the response of the cooling system and subsequent effect on RCS temperature for this situation?

- A. Closure of DC-V-65A (Cooler bypass) AND DC-V-2A (Cooler inlet) results in RCS heatup.
- B. Opening of DC-V-65A (Cooler bypass) AND DC-V-2A (Cooler inlet) results in RCS cooldown.
- C. Closure of DC-V-2A (Cooler inlet) results in RCS heatup.
- D. Opening of DC-V-2A (Cooler inlet) results in RCS cooldown.



QUESTION: 033 (1.00)

Which ONE (1) statement describes the requirements for performing an Independent Verification for an open valve (located in a High Radiation Area) that is required to be closed?

- A. One individual closes the valve, SECOND individual verifies from an independent remote position DEMAND indicator that the valve closed.
- B. One individual closes the valve, SAME individual independently uses a remote position DEMAND indicator to verify valve is closed.
- C. One individual closes valve, SECOND individual independently verifies the valve is closed (locally).
- D. One individual closes valve (locally), SAME individual verifies from an independent remote POSITION indicator that the valve is closed.

QUESTION: 034 (1.00)

Current plant conditions are:

- Reactor is tripped.
- Large break LOCA is in progress.
- RCS pressure is 540 psig.
- Reactor Building pressure is 35 psig.

When ESAS actuates properly, which ONE (1) statement describes the expected lineup for the listed support systems?

- A. Seal Injection is isolated to the RCPs since they should be tripped.
- B. NSCC is isolated to the RCP motors since they should be tripped.
- C. NSCC is aligned to the RCP motors to support pump operation if needed.
- D. ICCW is aligned to the RCDT cooler to prevent flashing in the tank.

QUESTION: 035 (1.00)

During a radioactive gaseous release from a Waste Gas Decay Tank, RM-A-7 HIGH alarm actuated. Which ONE (1) statement describes required automatic actions for this condition?

- A. Trips AH-E-11
- B. Trips AH-E-10 & 11, closes WDG-V-47, and starts MAP-5 iodine Sampler
- C. Closes WDG-V-47
- D. Closes WDG-V-47 and starts MAP-5 iodine sampler



QUESTION: 036 (1.00)

Which ONE (1) statement is the basis for the power-imbalance RPS trip envelop for nuclear overpower?

- A. Assure acceptable power distribution is maintained for control rod misalignment analysis.
- B. Assure Nuclear Peaking Factors are within limits in the event of a cold water accident.
- C. Assure transient protection (minimum DNBR) is maintained for loss of coolant flow events.
- D. Assure uniform fuel burn-up over core life.

QUESTION: 037 (1.00)

Current plant conditions are:

- Large break LOCA is in progress.
- RB pressure and temperature are elevated.

Which ONE (1) statement describes the cause and effect for erroneous pressurizer level indication during LOCA conditions?

- A. Level indicates high due to RB depressurization effects by RB spray.
- B. Level indicates low due to RB depressurization effects by RB spray.
- C. Level indicates high due to reference leg boiling.
- D. Level indicates low due to reference leg boiling.

QUESTION: 038 (1.00)

Emergency feedwater pump suction can be lined up directly from the hotwell. After vacuum is broken, the Emergency Alignment pushbutton is depressed to realign the following valves:

- Condensate Reject Valve CO-V-6
- Normal Makeup Valve to the Hotwell CO-V-7
- Emergency Makeup Valve to the Hotwell CO-V-8

Which ONE (1) statement describes valve response to operation of this pushbutton?

- A. CO-V-6 and CO-V-7 open, CO-V-8 closes.
- B. CO-V-6 and CO-V-7 close, CO-V-8 opens.
- C. CO-V-6 opens, CO-V-7 and CO-V-8 closes.
- D. CO-V-6 and CO-V-8 open, and CO-V-7 closes.



QUESTION: 039 (1.00)

Which ONE (1) accident situation would result in a direct Main Feedwater isolation by HSPS?

- A. Feedwater line break outside RB at FW-V-17A/B
- B. Steam line rupture outside RB
- C. Large break LOCA
- D. OTSG tube rupture

QUESTION: 040 (1.00)

Which ONE (1) statement describes the restrictions on operation of TMI-1 230KV switchyard auxiliary transformer disconnect switches?

- A. Opening operations limited to normal load current interruption.
- B. Opening operations limited to isolation of energized transformers (unloaded).
- C. Opening operations limited to isolation of transformers currently de-energized.
- D. Closing operations ONLY after synchronization is completed due to possible arcing.

QUESTION: 041 (1.00)

Current plant conditions are:

- Reactor power is 12%.
- Main turbine is on line in manual control.
- Unit load demand is 12%.
- Turbine Bypass Valves are fully closed in automatic control.
- Steam header pressure is 885 psig.

Without operator actions, which ONE (1) statement describes the response of the turbine bypass valves to a pressure increase in both OTSGs to 960 psig?

- A. Valves remain closed, since the pressure is less than setpoint plus selected bias.
- B. Valves open to reduce pressure to setpoint plus 10 psig.
- C. Valves open to reduce pressure to setpoint plus 75 psig.
- D. Valves open to reduce pressure to setpoint plus 125 psig.



QUESTION: 042 (1.00)

An anticipatory reactor trip due to a turbine trip, or a trip of both feedwater pumps is designed to prevent which ONE (1) condition?

- A. Challenges to steam generator tube integrity
- B. Exceeding core thermal limits (KW/ft limits)
- C. Challenges to the PORV and pressurizer code safeties
- D. Exceeding core DNBR limits

QUESTION: 043 (1.00)

Current plant conditions are:

- Plant has experienced a reactor trip and loss of offsite power.
- EG-Y-1B diesel failed to automatically START.

Which ONE (1) condition will prevent automatic startup of the diesel generator?

- A. The exciter Auto Manual switch in the control room is in the Manual position.
- B. The Emergency Bypass selector switch at the EDG breaker cubicle is in the Emergency position.
- C. The Unit/Parallel switch is in the Parallel position.
- D. 1B Diesel Auto-Standby/Manual-Exercise switch in the control room is in the Manual Exercise position.

QUESTION: 044 (1.00)

Which ONE (1) statement describes the purpose of the emergency diesel generator governor speed droop adjustment.

- A. Limits voltage changes during load changes when running in Unit.
- B. Adjusts engine response to load changes.
- C. Limits maximum engine load.
- D. Prevents engine overspeed during initial start.



QUESTION: 045 (1.00)

Current plant conditions are:

- Unit is operating at 100% power.
- Total loss of Nuclear Services Closed Cooling Water occurred 5 minutes ago.
- Attempts to start NS-P-1A/B/C were unsuccessful.

Which ONE (1) condition requires the operator to trip Reactor Coolant Pumps?

- A. Motor stator temperature indication is 140 degrees C.
- B. Motor bearing temperature indication is 180 degrees F.
- C. Motor thrust bearing temperature indication is 200 degrees F.
- D. Seal #1 leak-off temperature indication is 220 degrees F.

QUESTION: 046 (1.00)

An unexpected illness of a CRO has occurred. With action being taken to correct the situation, which ONE (1) condition describes the maximum time the shift crew may remain below minimum staffing requirements?

- A. 4 hours with RCS  $T_{AVE} < 200^{\circ}\text{F}$
- B. 2 hours at all RCS temperatures
- C. 1 hour with RCS  $T_{AVE} > 200^{\circ}\text{F}$
- D. 1 hour if during shift relief regardless of RCS temperature

QUESTION: 047 (1.00)

Current plant conditions are:

- Reactor is at hot shutdown condition.
- All RCPs are operating.
- Plant electrical configuration is normal for power operating conditions.
- MU-P-1B is operating.
- CW-P 1A and CW-P-1C are not operating.

A tagging request requires 1E 125/250 VDC Bus to be removed from service. Which ONE (1) statement describes impact of de-energizing 1E 125/250 VDC Bus?

- A. MU-P-1A will not start manually (from the Control Room) or automatically.
- B. MU-P-1C will not start manually (from the Control Room) or automatically.
- C. CW-P-1A will not start manually (from the Control Room).
- D. CW-P-1C will not start manually (from the Control Room).



QUESTION: 048 (1.00)

Current plant conditions are:

- Time is ten minutes after reactor trip due to loss of both Main Feedwater Pumps.
- EF-P-2A is operating, EF-P-1 and EF-P-2B are not operating.
- $T_H$  is 585°F and slowly increasing.
- RCS pressure is 2300 psig and slowly increasing.
- All RCPs are operating.
- OTSG 1A level is 25 inches.
- OTSG 1B level is 0 inches.
- OTSG 1A pressure is stable at 1010 psig.
- OTSG 1B pressure is 800 psig and decreasing.
- RCS heat up rate is +75°F/Hr.

Which ONE (1) action is required concerning operation of the RCPs?

- A. Stop 1 RCP per loop.
- B. Stop 3 RCPs.
- C. Stop 4 RCPs.
- D. Continue to operate 4 RCPs.

QUESTION: 049 (1.00)

To support plant start-up, the valve line-up of a system is required to be modified until work is completed on that system. From the list below, select ONE (1) choice that identifies the position(s) required to approve this change in the valve line up?

- A. Shift Supervisor
- B. One CRO and one Shift Supervisor/Shift Foreman with an SRO license
- C. One CRO and the on-shift STA
- D. System Engineer

QUESTION: 050 (1.00)

A Tech Spec Surveillance is satisfactorily completed upon returning a plant component to service that has a Regulatory Retest tag. It is now permissible to remove the Regulatory Retest tag. From the list below, select ONE (1) choice that identifies the person who is responsible to ensure the Retest Tag book is properly closed out.

- A. CRO who completed the test.
- B. Responsible System Engineer witnessing the test.
- C. IST Coordinator
- D. Shift Foreman



QUESTION: 051 (1.00)

Which ONE (1) Abnormal Transient procedure has the highest priority during an emergency situation?

- A. Excessive Primary to Secondary Heat Transfer
- B. Lack of Primary to Secondary Heat Transfer
- C. Loss of 25°F Subcooling Margin
- D. Steam Generator Tube Leak

QUESTION: 052 (1.00)

Which ONE (1) statement describes the reason for manually tripping or verifying turbine trip in the Immediate Actions of ATP 1210-1 Reactor Trip?

- A. Ensures OTSGs are no longer cross connected through the Main Steam lines.
- B. Reduces Main Feedwater flow requirements.
- C. Minimizes steam generator tube-to-shell delta-T.
- D. Prevents an uncontrolled RCS cooldown.

QUESTION: 053 (1.00)

Current plant conditions are:

- The reactor is operating at 50% power with rod control in automatic.
- Uncontrolled withdrawal of group 7 control rods is occurring.
- Control rod withdrawal command does not exist.

Which ONE (1) statement describes required action for these conditions?

- A. Select group 7 and turn the Single Select switch to ALL.
- B. Dispatch an operator to pull the fuses on group 7 programmer motor.
- C. Depress the In-Limit-Bypass pushbutton and attempt to insert group 7.
- D. Select Sequence Override at the CRD operator's console.



QUESTION: 054 (1.00)

Which ONE (1) condition requires initiation of HPI cooling according to the Abnormal Transient procedures?

- A. Pressurizer level cannot be maintained greater than 200 inches with the reactor at 100% power.
- B. RCS subcooling is 30°F.
- C. Post trip RCS pressure is 1750 psig with incore exit thermocouples indicating 560 degrees.
- D. Neither OTSG is available as a heat sink.

QUESTION: 055 (1.00)

Completion of the Containment Integrity Checklist is in progress in preparation to begin refueling operations. Which ONE (1) condition prevents start of refueling operations?

- A. RB purge is in progress.
- B. MU-V-25 and MU-V-26 are physically removed for rebuilding.
- C. Service Air is in use inside the RB.
- D. One door of the RB equipment hatch is open.

QUESTION: 056 (1.00)

A point source in the Auxiliary Building is reading 500 mRem/hr at 2 feet. Two options exist to complete a mandatory task near this radiation source:

- Option 1: Operator X can complete the task in 30 minutes working at a distance of 4 feet from the point source.
- Option 2: Operators Y and Z, using a special extension tool can complete the same task in 75 minutes at a distance of 8 feet from the point source.

Which ONE (1) statement describes personnel exposure for completion of this task in accordance with ALARA guidance?

- A. Option 1 will expose Operator X to 62.5 mRem.
- B. Option 1 will expose Operator X to 125 mRem.
- C. Option 2 will expose each operator Y and Z to 39 mRem.
- D. Option 2 will expose each operator Y and Z to 156 mRem.



QUESTION: 057 (1.00)

Current plant conditions are:

- Reactor is operating at 20% power.
- CO-P-1A and CO-P-2A are operating.
- One Main Feedwater Pump is operating.
- The following alarms are actuated simultaneously:
  - A-1-8 Battery 1B Discharging
  - A-2-8 Battery Charger 1B/1D/1F Trouble
  - A-3-8 Inverter 1B/1D Inverter System Trouble
  - PRF 1-1-1 CRDM Bkr Test Trouble
  - H&V A3-2-3 Cont. Bldg. Batt. Chargers B Damper Tbl. Fire-Smoke
  - AA-3-2 7 KV Bus Trouble
  - AA-3-3 4 KV BOP Bus Trouble
  - AA-3-5 480V BOP Bus Trouble

Which ONE (1) action is required for this condition?

- A. Close DC tie switches to provide an alternate source of DC power.
- B. Open suction valve (VA-V-5B) for VA-P-1B.
- C. Reduce power to within the reduced capability of the condensate system.
- D. Transfer Alterex Excitation System DC power supply to B side DC power.

QUESTION: 058 (1.00)

An emergency event has been declared. Which ONE (1) statement describes the maximum time limits for initial notification of the NRC, state, and local agencies?

- A. 15 minutes for NRC notification, 15 minutes for state and local notifications
- B. 30 minutes for NRC notification, 15 minutes for state and local notifications
- C. 1 hour for NRC notification, 15 minutes for state and local notifications
- D. 1 hour for NRC notification, 30 minutes for state and local notifications

QUESTION: 059 (1.00)

Which ONE (1) condition will actuate the CRD PATTERN ASYMMETRIC annunciator?

- A. Safety rods greater than 7 inches (5%) from group average position as determined by absolute position indication.
- B. Safety or regulating rods greater than 9 inches (6.5%) from group average position as determined by relative position indication.
- C. Safety or regulating rods greater than 7 inches (5%) from group average position as determined by absolute position indication.
- D. Regulating rods greater than 9 inches (6.5%) from group average position as determined by relative position indication.



QUESTION: 060 (1.00)

Current plant conditions are:

- Reactor is operating at 100% power.
- ICS is in full automatic.
- $\Delta T_c$  is ZERO.
- Selected Loop A Main Feedwater Flow instrument calibration is slowly drifting low - 2% decrease (linear) over the past hour.
- SASS actuation has not occurred.

Which ONE (1) statement describes the comparison between INITIAL and FINAL Feedwater Loop ACTUAL FLOWS at the end of the one hour?

- A. Loop A FW flow same as initial flow, Loop B FW flow same as initial flow.
- B. Loop A FW flow decreased by 1% and Loop B FW flow increased by 1%.
- C. Loop A FW flow decreased by 2%, Loop B FW flow increased by 2%.
- D. Loop A FW flow increased by 2%, Loop B FW flow decreased by 2%.

QUESTION: 061 (1.00)

The crew has reduced RCS pressure to minimize subcooling margin in accordance with ATP 1210-5, OTSG Tube Leakage. Which ONE (1) statement describes the reason for minimizing subcooling margin?

- A. Minimize RCS leakage through the leaking OTSG tube.
- B. Minimize time required for cooldown of the RCS.
- C. Minimize potential of lifting Main Steam safety valves.
- D. Minimize tensile stresses on affected OTSG tubes.

QUESTION: 062 (1.00)

Data contained on survey sheet:

- 2,500 DPM/100 cm<sup>2</sup>. beta-gamma
- 10 DPM/100 cm<sup>2</sup> alpha
- 450 mRem/hr general area
- 470 mRem/hr on the surface of a tank
- Airborne activity < 10% of a! DACs

Which ONE (1) posting is required for these conditions?

- A. Contaminated/High Radiation Area
- B. Contaminated/Radiation Area
- C. High Radiation Area
- D. Airborne Radiation Area



QUESTION: 063 (1.00)

Current plant conditions are:

- Numerous fire alarms are actuated on panels HVB, PLA, and PLB.
- Fire dampers AH-D-4 and AH-D-5 have automatically closed.
- Air tunnel deluge systems have actuated.
- Air tunnel halon system has actuated.
- Aux and Fuel Handling Building ventilation supply fans have tripped.

Which ONE (1) statement describes the action(s) required for this condition?

- A. Trip Aux and Fuel Handling Building ventilation exhaust fans.
- B. Actuate Relay Room CO<sub>2</sub> system manually.
- C. Trip reactor.
- D. Start three fire pumps.

QUESTION: 064 (1.00)

Auxiliary Operator erroneously initiates a liquid release from A WECST. The Release Permit is for B WECST. Which ONE (1) condition causes automatic termination of the accidental release of radioactive liquid?

- A. RM-L-7 in ALERT alarm OR loss of sample flow through RM-L-6
- B. RM-L-6 HIGH alarm OR high tank release rate
- C. High MDCT effluent flow OR low tank release rate
- D. RM-L-6 ALERT alarm OR RM-L-7 ALERT alarm

QUESTION: 065 (1.00)

Waste Gas Decay Tank relief valve WDG-V-36 has opened due to high tank pressure. This valve is now failed open. Which ONE (1) statement describes automatic action(s) initiated by the Radiation Monitoring system related to this accidental gaseous release?

- A. Trips AH-E-14A/C (B/D)
- B. Trips AH-E-10 AND AH-E-11
- C. Trips AH-E-10 ONLY
- D. Trips AH-E-11 ONLY



QUESTION: 066 (1.00)

The reactor is operating at 100% power. Which ONE (1) list identifies systems/tanks which ALL require sampling and analysis for boron concentration FOLLOWING EACH MAKEUP rather than relying solely upon a prescribed sample schedule or frequency?

- A. BWST, Core Flood Tanks, Spent Fuel Pool
- B. Reactor Coolant System, BWST, Core Flood Tanks
- C. Core Flood Tanks, Spent Fuel Pool, Boric Acid Mix Tank or Reclaimed Boric Acid Tank
- D. Reactor Coolant System, Core Flood Tanks, Spent Fuel Pool

QUESTION: 067 (1.00)

Sequence of events:

- Reactor is operating at 35% power.
- FW-P-1A is in operation; FW-P-1B trip has not been reset.
- Steam line rupture occurs upstream of Main Steam Isolation Valve MS-V1A.
- The reactor and turbine trip.
- Main turbine Stop Valves 1-4 fail to close.

Which ONE (1) statement describes why only one OTSG depressurizes as a direct result of the steam line break?

- A. HSPS isolates Main Feedwater to OTSG 1A.
- B. MS-V-1A and MS-V-1B are stop check valves that prevent back flow from OTSG 1B.
- C. Closure of turbine Control Valves 1-4 results in separation of the two steam generators.
- D. Automatic open command for EF-P-1 steam supply valve MS-V-13B is delayed for 40 seconds following MS-V-13A automatic operation.

QUESTION: 068 (1.00)

Current plant conditions are:

- A reactor trip has occurred.
- Three control rods failed to fully insert into the core.
- Power Range NIs are off scale low.

Which ONE (1) statement describes the required action(s) for this condition?

- A. Emergency borate the RCS.
- B. Maintain primary to secondary heat transfer.
- C. De-energize 1G and 1L 480 volt buses.
- D. Perform immediate actions of EP 1202-8, CRD Equipment Failure for stuck rods.



QUESTION: 069 (1.00)

Current plant conditions are:

- Reactor is operating at 100% power.
- 6 CW Pumps are operating.
- Winter conditions exist.

Which ONE (1) statement describes when the CRO is required to manually trip the turbine?  
Assume no automatic reactor trip.

- A. Loss of one CW Pump
- B. Condenser pressure is 8.7 inches Hg absolute
- C. Loss of the Gland Steam Exhauster
- D. Condenser pressure is 7.7 inches Hg absolute

QUESTION: 070 (1.00)

Current plant conditions are:

- Reactor is operating at 75% power.
- RC-P-1C is shutdown due to high motor winding temperatures.
- Entry into the RB is required to verify the NSCCW valve line up for RC-P-1C.
- RB purge must be initiated prior to the entry.
- D-Rings will not be entered.

Which ONE (1) position is authorized to approve this entry into the RB?

- A. Director of Operations and Maintenance
- B. Plant Operations Director
- C. Shift Supervisor
- D. Group Rad Con Supervisor

QUESTION: 071 (1.00)

Which ONE (1) statement does NOT satisfy the Superheat Determination/Limit Rule as defined in ATP-1210-10?

- A. 25°F of superheat as determined by the most conservative of the two subcooling margin meters on panel PCL
- B. 25°F of superheat as determined by the plant computer
- C. 25°F of superheat as determined by the average of 5 highest operable incore thermocouples and RCS wide range pressure
- D. 25°F of superheat as determined by the highest operable BIRO incore thermocouple and RCS wide range pressure



QUESTION: 072 (1.00)

Current plant conditions are:

- Refueling operations are in progress.

While lowering a spent fuel assembly into the upender, the assembly drops into the upender basket. The fuel handling bridge operator suspects the fuel assembly is damaged.

Which ONE (1) set of statements describes Refueling Supervisor actions required for this event?

- A. Stop all fuel movement. Further handling of the damaged assembly is allowed only under your supervision with Core Load Engineer concurrence.
- B. Direct the dropped fuel assembly to remain in the basket. Continue refueling operations using the alternate transfer mechanism.
- C. Stop all fuel movement. Further handling of any fuel is allowed after obtaining approval from the Director O&M.
- D. Direct the dropped fuel assembly to be transferred out of the RB to the Spent Fuel Pool. Continue refueling operations using the alternate transfer mechanism.

QUESTION: 073 (1.00)

Initial Plant Conditions

- Plant is in the Cold Shutdown condition.
- RB purge is in progress.
- A radioactive liquid release is in progress from A WECST.
- RM-A-4 (FH Building exhaust monitor) interlock control switch is in Defeat for I&C calibration surveillance.

Twenty gallons of highly radioactive liquid is accidentally spilled in the Fuel Handling Building. Which ONE (1) statement describes required automatic action(s) related directly to this spill incident?

- A. AH-V-1A/B/C/D close to terminate RB purge.
- B. AH-E-14A/C (B/D) trip to terminate exhaust ventilation flow.
- C. AH-E-10 and AH-E-11 trip to terminate supply ventilation flow.
- D. WDL-V-257 closes to terminate liquid release.

QUESTION: 074 (1.00)

Current plant conditions are:

- Tube leak exists on OTSG 1A.
- Plant cooldown is in progress per ATP 1210-5.
- BWST level is 48 feet.
- $T_H$  is 500°F.
- RCS pressure is 980 psig.

Which ONE (1) statement describes the reason why OTSG 1A should NOT be isolated?

- A. Buildup of radioactive water in OTSG 1A
- B. Extension of time needed to reach Cold Shutdown
- C. Increased probability of lifting Main Steam safety valve
- D. Isolation of one source of steam to EF-P-1



QUESTION: 075 (1.00)

Current plant conditions are:

- Refueling operations are in progress.
- FTC water level is 24 feet above the fuel assemblies.
- BWST is drained to 5 feet.
- RCS temperature is 90 degrees.
- Loop A DHR is in service.
- Repair work is in progress on OTSG 1A and OTSG 1B.

Which ONE (1) statement describes Tech Spec requirements for the DHR System during these conditions?

- A. One DHR string is required to be operable; it is required to be operating.
- B. Two DHR strings are required to be operable; one is required to be operating.
- C. One DHR string is required to be operable; it is not required to be operating.
- D. Two DHR strings are required to be operable; neither is required to be operating.

QUESTION: 076 (1.00)

Current plant conditions are:

- A large break LOCA has occurred.
- RCS pressure is 30 psig.
- Operator actions have been performed up to this point in accordance with ATPs.
- BWST level is 6 ft. 4 inches.

Which ONE (1) statement describes the required sequence of operator actions to be performed based upon the conditions described above?

- A. Open the suction of the DH and BS pumps from the RB Sump (DH-V-6A/B).
- B. Close the suction of the DH pumps from the NaOH Tank (BS-V-2A/B), then open DH pump suction from the RB Sump (DH-V-6A/B).
- C. Open DH and BS pump suction from the RB Sump (DH-V-6A/B), then close BWST outlet valves (DH-V-5A/B), then close NaOH tank Outlet Valves (3S-V-2A/B).
- D. Verify open DH and BS pump suctions from the RB sump (DH-V-6A/B), then close BWST outlet valves (DH-V-5A/B), then close NaOH Tank Outlet Valves (BS-V-2A/B).

QUESTION: 077 (1.00)

The reactor is operating at 100% power. Which ONE (1) statement explains the reason for entering a Tech Spec time clock?

- A. BS-V-1A does not open automatically during ESAS testing.
- B. Sodium Hydroxide Storage Tank NaOH concentration is 10.4%.
- C. BS-V-49A (BS-V-2A inlet isolation valve) is not locked closed.
- D. Sodium Hydroxide Storage Tank level is 8 ft. 2 inches lower than BWST level.



QUESTION: 078 (1.00)

Current plant conditions are:

- Reactor startup (approach to criticality) is in progress.
- Control rods reach upper ECP limit prior to achieving criticality.

Which ONE (1) statement describes requirements for this condition?

- A. Commence immediate boration to achieve 1%  $\Delta k/k$  subcritical condition; reactor startup may not be continued until authorized by Nuclear Engineering.
- B. Stop rod withdrawal and recalculate critical boron concentration; commence slow controlled dilution to achieve criticality.
- C. Trip the reactor; re-commence reactor startup after authorized by Plant Operations Director.
- D. Insert rods to achieve at least 1%  $\Delta k/k$  subcritical condition; notify Nuclear Engineering to evaluate ECP conditions prior to re-commencing startup.

QUESTION: 079 (1.00)

Which ONE (1) condition will DIRECTLY close the letdown isolation valve, MU-V-3?

- A. High letdown temperature
- B. 30# RB pressure ESAS signal
- C. Reactor Trip Isolation
- D. High Makeup demineralizer D/P

QUESTION: 080 (1.00)

Which ONE (1) document is NOT required to be reviewed prior to assuming shift duties as the licensed Shift Foreman?

- A. ESAS Checklist
- B. Locked Valve Book
- C. TCN/STP Book
- C. Revision Review Book



QUESTION: 081 (1.00)

Which ONE (1) statement describes a function of the Technical Support Center (TSC)?

- A. Perform off-site dose prediction calculations.
- B. Approve official press releases.
- C. Notify off-site agencies for event re-classification.
- D. Perform backup RCS leakrate calculations.

QUESTION: 082 (1.00)

Which ONE (1) statement explains the reason(s) EFW is injected into the OTSG near the top of the tube bundle?

- A. Reduce the thermal stress on the lower tubesheet since the upper tubesheet can withstand a higher thermal stress than the lower tube sheet.
- B. Reduce the thermal stress on the lower tubesheet and elevate the thermal center of the OTSG.
- C. Reduce the thermal stress on the upper shell (steam exit region) and elevate the thermal center of the OTSG
- D. Reduce the thermal stress on the upper tubesheet and MFW nozzles.

QUESTION: 083 (1.00)

The OTSG maximum allowable secondary pressure shall be limited to less than \_\_\_\_\_ when OTSG shell temperature is below \_\_\_\_\_.

- A. 100 psig, 100°F
- B. 100 psig, 200°F
- C. 200 psig, 100°F
- D. 200 psig, 200°F



QUESTION: 084 (1.00)

The SBO diesel has the capability to energize \_\_\_\_\_ 4160V bus through cross-tie breakers via \_\_\_\_\_ start and loading.

- A. Only C or D, manual
- B. C, D or E, auto
- C. Only D or E, auto
- D. C, D or E, manual

QUESTION: 085 (1.00)

An RCS sample is being drawn when RM-G-18 goes into HIGH alarm. Which ONE (1) statement describes the automatic actions associated with RM-G-18 for this situation.

- A. CA-V-4A and CA-V-5A close.
- B. CA-V-4B and CA-V-5B close.
- C. CA-V-2 and CA-V-13 close.
- D. The Control Building ventilation system is shifted to emergency recirculation mode.

QUESTION: 086 (1.00)

Linear signal failure rates are described in each condition listed. Which ONE (1) condition will cause an automatic TRANSFER by the Smart Auto Signal Selector (SASS) during full power operation?

- A. Selected RCS narrow range pressure instrument drifts to produce a difference error of 4% over a five minute period.
- B. Selected "B" OTSG pressure fails high at a rate of 10%/sec.
- C. Selected Loop A Feedwater Flow instrument drift produces a difference error of 5% over 10 minutes.
- D. Selected NI Power Range Channel fails low at a rate of 10%/30 seconds.



QUESTION: 087 (1.00)

A reactor trip from 100% power has occurred.

- All RCPs were tripped 60 minutes ago.
- Steam flow and feedwater flow have been verified.
- Incore thermocouples are tracking  $T_H$ .

Which ONE (1) set of plant conditions indicates natural circulation is occurring?

	OTSG Pressure	RCS Cold Leg Temperature	RCS Hot Leg Temperature
A.	700 psig, decreasing	540 deg F, increasing	550 deg F, stable
B.	750 psig, stable	513 deg F, stable	545 deg F, decreasing
C.	800 psig, stable	550 deg F, decreasing	570 deg F, increasing
D.	940 psig, increasing	540 deg F, increasing	600 deg F, stable

QUESTION: 088 (1.00)

Which ONE (1) statement describes the function of the PORV NDTT Key Lock Switch on Control Room panel PCR?

- A. In the AUTO position, setpoint is 2450 psig ONLY if RCS temperature is BELOW 275°F.
- B. In the OFF position, setpoint is 485 psig at ANY RCS temperature.
- C. In the AUTO position, setpoint is 485 psig ONLY if RCS temperature is ABOVE 275°F.
- D. In the OFF position, setpoint is 2450 psig at ANY RCS temperature

QUESTION: 089 (1.00)

Which ONE (1) statement describes the operation of RC-V-1 Pressurizer Spray Valve?

- A. In Manual control, the JOG circuit directs movement of the valve using momentary contact pushbuttons; valve position is limited to 40% open position.
- B. In Manual control, the JOG circuit directs movement of the valve using momentary contact pushbuttons; valve can be opened to 100% open position.
- C. In Automatic control, valve operation is controlled by RCS pressure conditions; valve is opened to 60% open position in response to open commands.
- D. In Automatic control, valve operation is controlled by RCS pressure conditions; valve is opened to 100% open position in response to open commands.



QUESTION: 090 (1.00)

Which ONE (1) condition actuates the control rod withdrawal Out-Inhibit?

- A. Sequence Fault condition due to 30% overlap between 2 successive regulating rod groups
- B. ICS neutron error signal of  $-5\%$
- C. Reactor power at 56% with Asymmetric Rod Fault
- D. Startup rate at  $+3.2$  DPM on one Intermediate Range NI channel

QUESTION: 091 (1.00)

Current plant conditions are:

- Plant is shutdown in preparation for a Refueling Outage.
- RB purge is in progress for one hour.
- RB sump liquid is being gravity drained to the Auxiliary Building sump.

Which ONE (1) statement describes required actions for actuation if RM-A-9G HIGH alarm?

- A. WDL-V-534 and WDL-V-535 RB sump drain line isolation valves close.
- B. Kidney Filter Fan (AH-E-101) trips.
- C. RC Drain Tank vent isolation valves (WDG-V-3/4) close.
- D. RCS letdown isolation valves (MU-V-2A/2B) close.

QUESTION: 092 (1.00)

The reactor is operating at 100% power. Which ONE (1) condition causes automatic start of ALL Emergency Feedwater Pumps?

- A. FW-P-1A hydraulic oil pressure at 68 psig, AND loss of two RCPs in RCS Loop A
- B. Loss of two RCPs in RCS Loop B AND 24 inches OTSG 1B Startup Range level
- C. RB pressure at 5 psig, OR 9 inches OTSG 1B Startup Range level
- D. FW-P 1B hydraulic oil pressure at 74 psig, OR 24 inches 1B OTSG Startup Range level



QUESTION: 093 (1.00)

Current plant conditions are:

- Reactor is at cold shutdown condition.
- DHR Loop A is operating.
- PARTIAL loss of ICS/NNI Hand Power (DH AUTO SUBFEED) has occurred.

Which ONE (1) statement describes information the operator can use to quickly determine if any or all Control Room DHR Loop A analog meters are inoperable due to LOSS OF DH AUTO POWER?

- A. Analog meters FAIL LOW when instrument power is lost.
- B. Flow instrument fluctuations (flow noise) STOP when instrument power is lost.
- C. EP 1202-40 Loss of ICS Hand and Auto Power enclosures identify specific meters affected by loss of DH AUTO POWER.
- D. Plastic labels glued onto the control console identify DHR analog meter power supplies.

QUESTION: 094 (1.00)

Current plant conditions are:

- Reactor is operating at 100% power.
- ICS is in full Automatic.
- Due to relay actuations, a trip of ALL 230 KV LINE Breakers EXCEPT those associated with the 1091 line (Middletown Junction) occurs.

Which ONE (1) statement describes the expected plant design response to these conditions?

- A. Plant remains at 100% load, 1A & 1B Aux Transformers remain energized.
- B. Plant remains at 100% load, 1A Aux Transformers is de-energized, 1B Aux Transformer remains energized, carrying all station loads.
- C. Automatic load reduction to 50% due to inadequate line capacity, 1A & 1B Aux Transformers remain energized.
- D. Reactor Trip, loss of off-site power.

QUESTION: 095 (1.00)

During refueling operations RM-G-6, the Auxiliary Fuel Handling Bridge monitor, becomes inoperable. Which ONE (1) condition allows Refueling Operations to continue?

- A. Install a suitable portable instrument of comparable range and sensitivity.
- B. Verify RM-G-7 is operable on the adjacent Fuel Handling Bridge.
- C. Obtain the approval of the Fuel Handling Supervisor.
- D. Obtain the approval of the Radiological Controls GRCS.



QUESTION: 096 (1.00)

Current plant conditions are:

- A LOCA has occurred.
- Off-site power is being supplied.
- Hydrogen Recombiner is in service due to elevated RB hydrogen concentration.
- Plant electrical systems are aligned normally.
- No equipment failures have occurred.

Control Room staff has just been informed that the Hydrogen Recombiner reaction chamber temperature has steadily decreased over the last half-hour from 1300°F down to 1280°F.

Which ONE (1) statement describes the reason for the slowly decreasing Reaction Chamber temperature?

- A. RB Pressure decreasing.
- B. RB Pressure is increasing.
- C. Hydrogen concentration is decreasing.
- D. Hydrogen concentration is increasing.

QUESTION: 097 (1.00)

Current plant conditions are:

- Reactor is tripped from full power.
- HPI has been manually actuated due to LOCA.
- RCS Subcooling Margin is 3 degrees F.
- 4 RCPs are running.

After stopping one RCP in each loop, the primary CRO was distracted. No other control manipulations have taken place for the last 4 minutes. Which ONE (1) statement describes required actions for this situation?

- A. Trip remaining RCPs, verify EFW, and raise OTSG levels to 75-85%.
- B. Trip remaining RCPs, verify EFW, and raise OTSG levels to 50%.
- C. Trip one RCP, start EFW, and raise OTSG levels to 50%.
- D. Continue operation of both RCPs, start EFW, and raise OTSG levels to 75%-85%.

QUESTION: 098 (1.00)

Current plant conditions are:

- Reactor is operating at 90% power
- All RCPs are operating.
- High Vibration alarm actuates on RC-P-1A (15 mils and slowly increasing).
- Reset of vibration alarm has failed to clear the alarm.

Which ONE (1) statement describes the required actions required for this situation?

- A. Start the oil lift pump, then if vibration does not decrease trip the RCP.
- B. Trip RC-P-1A, then reduce power as necessary to stabilize plant.
- C. Reduce power to 50% - 75%, then trip RC-P-1A.
- D. Close #1 Seal Leakoff valve (MU-V-33A), within 5 minutes, reduce power to 50% - 75%, and trip the affected pump within 30 minutes.



QUESTION: 099 (1.00)

Current plant conditions are:

- Reactor is tripped.
- Manual HPI and Manual 4 PSI ES actuation on BOTH trains.
- Automatic ESAS actuation has NOT occurred.

Refer to the attached control panel drawing. The control room operator momentarily depresses the following pushbuttons:

- 2 of 3 Enable/Defeat pushbuttons on the 4 PSI Manual actuations (ONCE) for both trains
- All 3 Enable/Defeat pushbuttons on the HPI Manual actuations (ONCE) for both trains

Which ONE (1) statement describes the status of the Manual ES signals to affected plant components (pumps, valves, etc.)?

- A. BOTH the Manual 4 PSI and the Manual HPI ES actuation signals ARE DEFEATED for ALL affected plant components.
- B. The Manual 4 PSI ES actuation signals ARE DEFEATED for ALL components affected by the 4 PSI actuation - but the Manual HPI actuation signals ARE NOT DEFEATED for ALL components affected by the HPI ES actuation.
- C. The Manual HPI ES actuation signals ARE DEFEATED for ALL components affected by the HPI actuation - but the Manual 4 PSI actuation signals ARE NOT DEFEATED for ALL components affected by the 4 PSI ES actuation.
- D. BOTH the Manual 4 PSI AND the Manual HPI signals ARE NOT DEFEATED for ALL affected plant components.

# MANUAL ES ACTUATION

FUNCTIONS ACTUATED BY  
1600 PSIG  
RC PRESS

DEFEAT/ENABLE		
PB2/RCA	PB3/RCA	PB4/RCA
DEFEAT	DEFEAT	DEFEAT
ENABLE	ENABLE	ENABLE

DO START	RC PLS	RD	RD 2/26	RD 2/26	LETTERED	RD 2/26	RD 2/26	RD 2/26	RD 2/26
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FUNCTIONS ACTUATED BY  
4 PSIG  
RB PRESS

DEFEAT/ENABLE		
PB2/RBA	PB3/RBA	PB4/RBA
DEFEAT	DEFEAT	DEFEAT
ENABLE	ENABLE	ENABLE

DO START	RC PLS	RD	RD 2/26	RD 2/26	LETTERED	RD 2/26	RD 2/26	RD 2/26	RD 2/26
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FUNCTIONS ACTUATED BY  
30 PSIG  
RB PRESS

DEFEAT/ENABLE	
PB6/RBA	PB7/RBA
DEFEAT	DEFEAT
ENABLE	ENABLE

DO NOT TOUCH  
DO NOT TOUCH  
DO NOT TOUCH  
DO NOT TOUCH

DO NOT TOUCH  
DO NOT TOUCH  
DO NOT TOUCH

QUESTION: 100 (1.00)

Current plant conditions are:

- Reactor is operating at 90% power
- EG-Y-1A is being started for surveillance.
- Synchroscope indicator is at 12:00 and is not moving in either forward or reverse direction.
- Indications at time of EG-Y-1A breaker closure:
  - Generator load is 0.15 MW.
  - Generator reactive load is - 0.3 MVars.

After closing the output breaker, the operator pauses for five seconds to monitor generator output conditions. Which ONE (1) statement describes the status of the output breaker and generator FIVE SECONDS after the breaker was initially closed?

- A. Output breaker is closed with generator load slowly increasing above 0.15 MW.
- B. Output breaker is open due to over-current relay trip protection.
- C. Output breaker is closed with generator output at 0.15 MW.
- D. Output breaker is open due to reverse power trip relay protection.



# TMI UNIT 1 SRO LICENSING EXAMINATION

8/27/98

## ANSWER KEY

1..... B	26. .... A	51..... C	76..... D
2..... C	27. .... A	52..... D	77..... A
3..... B	28. .... C	53..... D	78..... D
4..... B	29. .... B	54..... D	79..... A
5..... B	30. .... D	55..... B	80..... B
6..... B	31. .... C	56..... A	81..... D
7..... A	32. .... D	57..... C	82..... B
8..... C	33. .... C	58..... C	83..... C
9..... B	34. .... B	59..... C	84..... D
10..... C	35. .... C	60..... A	85..... C
11..... C	36. .... C	61..... A	86..... B
12..... D	37. .... C	62..... A	87..... B
13..... C	38. .... B	63..... D	88..... D
14..... C	39. .... B	64..... B	89..... B
15..... D	40. .... B	65..... B	90..... D
16..... C	41. .... B	66..... A	91..... A
17..... B	42. .... C	67..... B	92..... C
18..... C	43. .... D	68..... A	93..... D
19..... C	44. .... B	69..... B	94..... A
20..... C	45. .... C	70..... B	95..... A
21..... A	46. .... B	71..... A	96..... C
22..... B	47. .... A	72..... A	97..... D
23..... D	48. .... A	73..... C	98..... C
24..... A	49. .... B	74..... B	99..... C
25..... D	50. .... D	75..... C	100..... D

Attachment 2

**SIMULATION FACILITY REPORT**

Facility Licensee: Three Mile Island Unit 1

Facility Docket No: 50-289

Operating Tests Administered from: August 24-25, 1998

This form is used only to report simulator observations. These observations do not constitute audit or inspection findings and are not, without further verification and review, indicative of noncompliance with 10 CFR 55.45(b). These observations do not affect NRC certification or approval of the simulation facility other than to provide information that may be used in future evaluations. No licensee action is required in response to these observations.

No simulator deficiencies, that affected the scenario examinations or JPMs, were identified during the conduct of the examination.