April 3, 2000

Mr. John B. Cotton
Vice President TMI Unit 1
AmerGen Energy Company, LLC
Three Mile Island Nuclear Station
P. O. Box 480
Middletown, Pennsylvania 17057-0480

SUBJECT: THREE MILE ISLAND UNIT 1 REACTOR OPERATOR INITIAL EXAMINATION REPORT NO. 05000289/1999301

Dear Mr. Cotton:

This report transmits the findings of the reactor operator (RO) licensing examinations, conducted by NRC examiners, during the week of February 14 - 18, 2000 at the Three Mile Island Unit 1 Nuclear Station. Based on the results of the examinations, eight of nine RO applicants passed all portions of the examination. One applicant failed the written examination. On March 3, 2000, Mr. P. Bissett, via telephone conference call, discussed the results of the examinations and any generic findings with members of your staff.

The examinations addressed areas important to public health and safety and were developed and administered under Revision 8 of the Examiner Standards (NUREG-1021). All portions of the examinations were developed by Three Mile Island (TMI) personnel, while the NRC provided oversight and final approval prior to the administration of the examinations.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter and its enclosures will be placed in the NRC Public Document Room.

No reply to this letter is required, but should you have any questions regarding these examinations, please contact me at 610-337-5183 or by E-mail at RJC@NRC.GOV.

Sincerely,

/RA/

Richard J. Conte, Chief
Operational Safety Branch
Division of Reactor Safety

Docket No. 05000289
DPR-50

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 012 Q 012

Point Value: 1

Plant conditions:
- Reactor power is 100%.
- Fire in the Control Room requires immediate evacuation.

Due to degrading Control Room conditions, time is not available to complete ALL Immediate Actions of ATP 1210-1.

From the list below, identify the ONE (1) statement that describes the action(s) procedurally REQUIRED to be completed PRIOR TO LEAVING THE CONTROL ROOM, in accordance with EP 1202-37, Cooldown Outside the Control Room.

A. Start a second Makeup Pump AND Open MU-V-217.

B. Verify Safety System Status.

C. Verify Subcooling Margin exists.

D. Manually trip the Turbine.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 013 Q 013

Point Value: 1

Initial plant conditions:
- Reactor power was 100%.

Sequence of events:
- Loss of entire 1B 125-250 Volt DC Electrical Distribution System.
- Manual Reactor Trip due to Main Feedwater control problems.
- Loss of RCS Subcooled Margin.

From the list below, identify the ONE (1) statement that describes how to secure the RCPs under these conditions.

A. Trip ALL 4 RCPs using their associated extension controls (4) on Console Center.

B. Trip RC-P-1A and RC-P-1C using extension controls on Console Center; Stop RC-P-1B and RC-P-1D by de-energizing 1B 6900 Volt Buses at Panel PR.

C. Trip RC-P-1B and RC-P-1D using extension controls on Console Center; Stop RC-P-1A and RC-P-1C by de-energizing 1A 6900 Volt Buses at Panel PR.

D. Stop ALL 4 RCPs by de-energizing 1A and 1B 6900 Volt Buses.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 014 Q 014

Point Value: 1

Plant conditions:
- Reactor power is 100%.
- Significant increase in RCS activity causes high alarms on RM-L-1 and RM-L-1 Low.

Identify the ONE (1) statement below that describes the expected automatic action(s) for these plant conditions.

A. MU-V-3 closes.

B. MU-V-1A AND MU-V-1B close.

C. MU-V-2A AND MU-V-2B close.

D. MU-V-2A, MU-V-2B, AND MU-V-3 close.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 015 **Q 015**

Point Value: 1

Plant conditions:
- Reactor Power is 42%.
- The following ICS Stations are in HAND due to ICS automatic control problems:
  FW-P-1A, FW-P-1B (FWP flows are matched).
  FW-V-16A, FW-V-16B.
  FW-V-17A, FW-V-17B.
- All other ICS controls are in AUTOMATIC.

LOSS OF ICS HAND POWER occurs, followed immediately by a TURBINE TRIP.

Identify the ONE (1) statement below that describes procedurally required operator action(s) for this situation.

A. Trip the reactor AND trip both Main Feedwater Pumps.

B. Stabilize reactor power equal to Main Feedwater flow.

C. Transfer control of BOTH Feedwater Pumps to the Motor Speed Changers in the Control Room.

D. Transfer BOTH Main Feedwater Pumps to LOCAL SPEED CONTROL at the feedwater pump control panel.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 016 Q 016

Point Value: 1

Sequence of events:
- Reactor power is initially 100%.
- Steam Line Rupture in the Intermediate Building, upstream of MS-V-1C.
- HSPS actuates.
- OTSG 1B depressurizes to 40 psig.

RCS Subcooling Margin is maintained throughout this event. No operator action has been taken to isolate OTSG 1B.

Identify the ONE (1) statement below that describes the response of EF-V-30A, EF-V-30B, EF-V-30C and EF-V-30D under these conditions.

A. EF-V-30A and EF-V-30D remain closed in automatic;
EF-V-30B and EF-V-30C control OTSG 1B level at 25 inches in the Startup Range.

B. EF-V-30A and EF-V-30D remain closed in automatic;
EF-V-30 B and EF-V-30C control OTSG 1B level at 50% in the Operating Range.

C. EF-V-30A and EF-V-30D control OTSG 1A level at 25 inches in the Startup Range;
EF-V-30B and EF-V-30C remain closed due to HSPS (low pressure) actuation.

D. EF-V-30A and EF-V-30D control OTSG 1A level at 25 inches in the Startup Range;
EF-V-30B and EF-V-30C control OTSG 1B level at 25 inches in the Startup Range.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 017 Q 017

Point Value: 1

The Control Room Operator MANUALLY trips the reactor. Identify the ONE (1) situation below that confirms ALL the CRD breakers have OPENED.

A. All rods in CRD Groups 1-7 drop, fully inserted into the core.

B. Alarms G-1-3 (CRD DC Trip Brkr Open) AND G-1-4 (CRD AC Trip Brkr Open) actuate.

C. RPS Breaker Trip Lights on ALL 4 RPS Cabinets are energized.

D. RPS Protective Subsystem Lights on ALL 4 RPS Cabinets are energized.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 018 Q 018

Point Value: 1

Plant conditions:
- Reactor power is 58% on NI-5.
- 3 RCPs operating.
- All ICS HAND-AUTO stations and the Diamond Control Panel are in AUTO.
- G-2-1 CRD Pattern Asymmetrical alarm is actuated.
- Group In Limit Lamp for Safety Group 2 energized on the Diamond Control Panel.
- Asymmetric Rod Fault Lamp energized on the Diamond Control Panel.

From the list below, identify the ONE (1) statement that describes the required immediate manual action(s) for this situation.

A. Monitor Quadrant Power Tilt AND reduce power as necessary to maintain tilt limitations.

B. Verify that the highest reading NI Channel is less than 60%.

C. Manually reduce power to less than 45% using the ULD.

D. Compare API to RPI to validate rod position.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 019 Q 019

Point Value: 1

Plant conditions:
- 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-hot 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.

From the list below, identify the ONE (1) required action concerning operation of the Reactor Coolant Pumps.

A. Stop 1 RCP per loop.

B. Stop 3 RCPs.

C. Stop 4 RCPs.

D. Continue to operate 4 RCPs.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 020 Q 020

Point Value: 1

Plant conditions:
- Reactor power 85%.
- ICS in full automatic.

Sequence of events:
- FW-P-1A tripped concurrent with a total loss of ICS Hand Power.
- ICS Runback failed to occur.
- The following alarms are actuated:
  - ICS IN TRACK
  - ICS HIGH LOAD LIMITED

From the list below, identify the ONE (1) statement that describes required operator action(s) for this condition.

A. Trip the Reactor/Turbine AND go to ATP 1210-1.

B. Place FW-P-1B in HAND AND increase feedwater flow.

C. Reduce the ULD output demand to 68% (585 MWe) AND verify the plant runs back.

D. Place the SG/Rx Master in HAND AND reduce power to 68% (585 MWe).

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 021 Q 021

Point Value: 1

Plant conditions:
- Reactor power is 35%, during plant startup.
- All ICS stations in auto EXCEPT FW-P-1A.

Considering these plant conditions, from the list below identify the ONE (1) statement that describes the operational status of the MAIN TURBINE if the main generator breakers trip due to a generator ground fault.

A. Must be manually tripped.

B. Will trip automatically without a time delay.

C. Will trip automatically after a 30 second time delay.

D. Will revert to Speed Control and remain at 1800 RPM.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 022 Q 022

Point Value: 1

Plant conditions:
- Reactor is tripped due to a loss of all main and emergency feedwater.
- PORV is manually opened and flow has been confirmed.
- RCS pressure is currently 2000 psig.
- All 4 RCPs have been stopped.
- RB pressure is 0.2 psig and rising at 0.05 psig per minute.
- Pressurizer level is 220 inches.
- Average of the 5 highest incore thermocouples is 640 degrees F.
- Pressurizer temperature is 616 degrees F.

Identify ONE (1) statement below that describes why current Pressurizer level indication is NOT providing accurate indication of RCS inventory conditions.

A. Mass transport through the Pressurizer PORV.

B. Voids are forming in the RCS.

C. Pressurizer temperature is low.

D. Level sensor reference leg fluid is flashing.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 023 **Q 023**

Point Value: 1

From the list below, identify the ONE (1) statement that describes the reason for the Abnormal Transient Procedure requirement to obtain primary to secondary heat transfer even under small break LOCA conditions with core cooling provided by high pressure injection.

A. Maintain main steam supply to EF-P-1.

B. Expedite recovery of at least 25 degrees F Subcooled Margin.

C. Achieve and maintain core cooldown rate greater than 100 degrees F per hour.

D. Ensure core cooling is maintained if HPI cooling flow is insufficient.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 024 **Q 024**

Point Value: 1

Plant conditions:
- A small break LOCA has occurred, concurrent with a makeup line break downstream of MU-V-18 inside containment.
- 1600# and 4# ESAS components have actuated, including MU-V-18 closure.

From the list below, identify the ONE (1) statement that describes the basis for MU-V-18 closure.

A. Prevent release of radioactivity from containment.

B. Prevent makeup pump runout if only one train of HPI is available.

C. Ensure sufficient HPI flow into core if only one train of HPI is available.

D. Ensure sufficient NPSH for makeup pumps taking suction from BWST.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 025 **Q 025**

Point Value: 1

Plant conditions:
- Large break LOCA.
- Following ES actuation, DH-P-1A tripped and could not be restarted.
- RB pressure is now 18 psig, decreasing from peak of 35 psig.
- RCS pressure indication is 100 psig, slowly decreasing.
- Incore thermocouples indicate 345 degrees, slowly decreasing.
- 2 HPI pumps are delivering COMBINED FLOW of 1100 gpm.
- DH-P-1B is delivering 500 gpm FLOW TO EACH LPI LOOP.

Identify the ONE (1) ATOG rule below that requires (or permits) HPI THROTTLING with these conditions.

A. HPI MUST be throttled to prevent pump runout.

B. HPI MAY be throttled for subcooling margin concerns.

C. HPI MUST be throttled to prevent exceeding Reactor Vessel P-T limits.

D. HPI MAY be throttled because LPI flow is greater than ATOG minimum requirements.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 026 Q 026

Point Value: 1

Sequence of events:
- Reactor trip from 100% power.
- LOSS OF STATION POWER.
- EG-Y-1A and EG-Y-1B loaded onto their respective 4160V buses.
- MU-P-1A was started during performance of ATP 1210-1.
- MU-P-1A and MU-P-1C are ES selected.
- EG-Y-1A tripped 30 seconds after MU-P-1A manual start.

Under these conditions, from the list below identify the ONE (1) statement that describes MU-P-1A breaker status light indication on Console Center.

A. MU-P-1A breaker RED light energized.

B. MU-P-1A breaker GREEN light energized.

C. MU-P-1A breaker RED AND AMBER lights energized.

D. MU-P-1A breaker GREEN AND AMBER lights energized.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 027 Q 027

Point Value: 1

From the list below, identify the ONE (1) statement that describes the basis for the RCS 400 psig interlock for valves DH-V-1 and DH-V-2.

A. Ensures that the discharge pressure of the Decay Heat pumps does not violate RV-PT concerns.

B. Ensures that the operating temperatures of the Decay Heat system falls within design basis.

C. Ensures that the RCS fluid void fraction is within acceptable limits to prevent vortexing.

D. Ensures that the Decay Heat Pump suction piping is protected from overpressure.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 028 Q 028

Point Value: 1

Plant conditions:
- Plant cooldown in progress due to OTSG 1B tube leak.
- Shift Supervisor has requested leak rate calculation per ARP MAP C-1-1.
- There is NO makeup to the Makeup Tank during this time.
- Shrink/expansion coefficient for RCS volume/temperature ratio is 45 gal/degree F.

Time	1300	1310
Pzr Level	140 inches	125 inches
MU Tank Level	71 inches	68 inches
RCS Tavg (AO5066)	405 degrees F	400 degrees F

Using Page 13 (Note 1) of ARP MAP C-1-1 (supplied) and the operational data above, identify the ONE (1) value below that represents OTSG 1B leak rate.

A. 4.5 gpm.

B. 18 gpm.

C. 45 gpm.

D. 180 gpm.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 029 **Q 029**

Point Value: 1

Plant conditions:
- Reactor power is 40%.
- FW-P-1A is operating.
- FW-P-1B is reset at minimum speed on governor (motor speed changer).

FW-P-1A trips due to low oil pressure, followed by a turbine and reactor trip.

Assuming NO operator action, identify the ONE (1) statement below that describes the expected response for EF-P-1, EF-P-2A, and EF-P-2B.

A. Eventually start on OTSG low level.

B. Eventually start on OTSG low pressure.

C. Immediately start due to the Feedpump trip.

D. Immediately start due to the turbine and reactor trip.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 030 **Q 030**

Point Value: 1

From the list below, identify the ONE (1) statement that describes the basis for the procedural requirement to trip all operating Reactor Coolant Pumps under saturated coolant conditions.

A. Increase High Pressure Injection flow.

B. Protect the Reactor Coolant Pump Motor.

C. Minimize the rate of RCS mass inventory loss.

D. Prevent Reactor Coolant Pump #1 Seal damage.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 031 **Q 031**

Point Value: 1

Plant conditions:
- Reactor power is 100%.
- Loss of B Train DC distribution system.
- Battery Charger 1D has been returned to service.
- Battery charger 1B is being returned to service.

From the list below, identify the ONE (1) statement that explains why the DC output breaker on FRONT OF THE CHARGER is required to be closed BEFORE the AC input breaker.

A. Satisfy a closing interlock for the AC breaker.

B. Prevent damage to the rectifier stack and/or blowing a rectifier anode fuse.

C. Provide a reference voltage for the battery charger regulator control circuit.

D. Ensure the charger is immediately placed in service to minimize the loading on Battery Charger 1D.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 032 Q 032

Point Value: 1

Waste Gas Decay Tank relief valve, WDG-V-36, has opened due to high tank pressure. This valve is now FAILED OPEN.

From the list below, identify the ONE (1) statement that 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.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 033 **Q 033**

Point Value: 1

From the list below, identify the ONE (1) set of automatic actions that will occur if RM-G-18 (RCS Sample Line Monitor) High Alarm actuates.

A. CA-V-2 AND CA-V-13 CLOSE.

B. CA-V-4A AND CA-V-5A CLOSE.

C. WDL-V-534 AND WDL-V-535 CLOSE.

D. WDL-V-303 AND WDL-V-304 CLOSE.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 034 **Q 034**

Point Value: 1

Plant conditions:
- Reactor power is 100%.
- MU-P-1B is operating in normal makeup system alignment.
- MU-V-17 is in AUTO with makeup flow at 22 gpm.
- MU-V-32 is in HAND for maintenance with seal injection flow at 38 gpm.

The selected Pressurizer temperature transmitter suddenly fails low.

From the list below, identify the ONE (1) statement that describes makeup and seal injection flow responses to this condition, with no operator action.

A. Makeup flow will decrease and seal injection flow will increase.

B. Makeup flow will decrease, but seal injection flow will not change.

C. Makeup flow will increase and seal injection flow will decrease.

D. Makeup flow will increase, but seal injection flow will not change.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 035 Q 035

Point Value: 1

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-hot.
- Adequate RCS Subcooled Margin has been verified.

From the list below, identify the ONE (1) set of plant conditions that indicates natural circulation is occurring.

A. OTSG pressure is 700 psig, and decreasing;
RCS Cold Leg temperature is 540° F, and increasing;
RCS Hot Leg temperature is 550° F, and stable.

B. OTSG pressure is 750 psig, and stable;
RCS Cold Leg temperature is 513° F, and stable;
RCS Hot Leg temperature is 545° F, and decreasing.

C. OTSG pressure is 800 psig, and stable;
RCS Cold Leg temperature is 550° F, and decreasing;
RCS Hot Leg temperature is 570° F, and increasing.

D. OTSG pressure is 940 psig, and increasing;
RCS Cold Leg temperature is 540° F, and increasing;
RCS Hot Leg temperature is 600° F, and stable.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 036 Q 036

Point Value: 1

The procedure for restoration of ES Components following inadvertent ES actuation requires the diesels to be loaded to at least 2 MWe for at least 20 minutes if they have been run unloaded for greater than 5 minutes.

From the list below, identify the ONE (1) statement that describes the basis for this procedural requirement.

A. Reduce engine exhaust system fire hazard.

B. Repressurize the starting air system.

C. Prevent generator field damage.

D. Refill fuel oil day tank.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 037 Q 037

Point Value: 1

Initial conditions:
- Reactor power is 100%.
- Control rod index is 293%.
- The following ICS stations are in HAND or MANUAL for CRD breaker testing:
  - SG/Rx Master, Reactor Demand, both FW Loop Masters, and Diamond.
- Diamond Control Panel is in SEQUENCE mode of operation.
- GROUP AND SINGLE ROD SELECT switches are BOTH selected to OFF.

Sequence of events:
- When the CRD breaker is tripped for testing, a rod in Group 7 drops into the core.
- Main annunciator alarms and CRD PI panel indicate an asymmetric rod condition.
- The asymmetric rod fault lamp on the Diamond panel energizes.

From the list below, identify the ONE (1) statement that describes MINIMUM required operator actions under these plant conditions in order to insert Group 7 to reduce reactor power.

A. Go to INSERT on the CRD Insert/Withdraw switch.

B. Select SEQUENCE OVERRIDE AND go to INSERT on the CRD Insert/Withdraw switch.

C. Depress the LATCH pushbutton AND go to INSERT on the CRD Insert/Withdraw switch.

D. Select GROUP 7 on Group Select switch AND go to INSERT on the CRD Insert/Withdraw switch.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 038 **Q 038**

Point Value: 1

Plant conditions:
- Reactor power is 90%.
- ICS in FULL AUTOMATIC.
- RPI is inadvertently selected to RELATIVE at the CRD position indication panel.
- STP for Control Rod Testing has been started.

Group 7 control rod insertion (using the ICS ULD toggle switch) was terminated 8% below the original position; it was discovered that Rod #1 was stuck at its original position (initially aligned with the rest of the group).

Due to a fault detection circuit malfunction, no overhead alarms actuated, and no CRD fault lights energized during Group 7 insertion. From the list below, identify the ONE (1) automatic action that WOULD HAVE OCCURRED under these conditions.

A. ICS Asymmetric Rod RUNBACK.

B. Actuate CRD OUT-INHIBIT.

C. Actuate CRD MOTOR FAULT interlock.

D. Energize CRD SYSTEM FAULT lights.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 039 **Q 039**

Point Value: 1

Sequence of events:
- MU-P-1A is placed in service for normal makeup and seal injection.
- IC-P-1B is started and IC-P-1A is secured per the On-Line Risk Maintenance Document.
- MU-P-1B is secured for maintenance.

From the list below, identify the ONE (1) phrase that correctly completes the following statement:

IC-P-1A and IC-P-1B are shifted for this makeup pump configuration change to prevent a trip of RC Pumps if a(an) _____ and the standby IC pump fails to start.

A. Loss of the 1D 4KV bus occurs.

B. Loss of the 1E 4KV bus occurs.

C. Loss of station power occurs.

D. Emergency Safeguards actuation occurs.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 040 **Q 040**

Point Value: 1

From the list below, identify the ONE (1) statement that describes the basis for the RPS automatic trip based on FLUX-TO PUMPS.

A. Prevent challenges to the PORV while maintaining Code Safety Valve capability.

B. Prevent the minimum core DNBR from decreasing below design limits.

C. Prevent excessive core coolant temperature in the operating range.

D. Prevent exceeding power peaking Kw/ft limits.

Enclosure: Initial Examination Report No. 05000289/1999301

cc w/encl; w/Attachments 1-2:
R. Parnell, Operations Training Manager

cc w/encl; w/o Attachments 1-2:
PECO Energy Company - Correspondence Control Desk
TMI-Alert (TMIA)
D. Allard, PADER

Distribution w/encl; w/Attachments 1-2:
DRS Master Exam File
PUBLIC
Nuclear Safety Information Center (NSIC)

Distribution w/encl; w/o Attachments 1-2:
Region I Docket Room (with concurrences)
NRC Resident Inspector
H. Miller, RA/J. Wiggins, DRA
J. Rogge, DRP
N. Perry, DRP
C. O'Daniell, DRP
W. Lanning, DRS
B. Holian, DRS
P. Bissett, Chief Examiner, DRS
V. Curley, DRS, OL Facility File
DRS File

Distribution w/encl; w/o Attachments 1-2 **(VIA E-MAIL)**:
J. Shea, OEDO
E. Adensam, PD1, NRR
S. Black, NRR
T. Colburn, NRR
H. Pastis, NRR
W. Scott, NRR
DOCDESK
Inspection Program Branch, NRR (IPAS)

DOCUMENT NAME: G:\OSB\BISSETT\TMI1999301.WPD
To receive a copy of this document, indicate in the box: **"C"** = Copy without attachment/enclosure **"E"** = Copy with attachment/enclosure **"N"** = No copy

OFFICE	RI/DRS	C	RI/DRP		RI/DRS					
NAME	PBissett		JRogge		RConte					
DATE	03/22/00		03/ /00		03/22/00					

OFFICIAL RECORD COPY

U. S. NUCLEAR REGULATORY COMMISSION

REGION 1

Docket No:	05000289
Report No:	05000289/1999301
License No:	DPR-50
Licensee:	AmerGen Energy Company, LLC
Facility:	Three Mile Island Unit 1 Nuclear Station
Location:	Middletown, Pennsylvania
Dates:	February 14 - 18, 2000
Chief Examiner:	P. Bissett, Senior Operations Engineer
Examiners:	J. Caruso, Operations Engineer
Approved By:	Richard J. Conte, Chief Operational Safety Branch Division of Reactor Safety

EXECUTIVE SUMMARY

Three Mile Island Unit 1 Nuclear Station
Inspection Report No. 05000289/1999301

Operations

Eight of nine reactor operator (RO) applicants passed all portions of the initial license examination. One applicant failed the written portion, however he passed the operating portion of the examination.

The candidates appeared 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 were good, however, some instances were noted in which communications were lacking in information delivered and received. A number of instances were noted in which applicants did not refer to abnormal procedures when responding to abnormal plant events, although no adverse conditions resulted.

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, by TMI training personnel, prevailed throughout the examination development process.

Report Details

I. Operations

05 Operator Training and Qualifications

05.1 Reactor Operator Initial Examinations

a. Scope

The examinations were prepared by Three Mile Island (TMI) Unit 1 personnel in accordance with the guidelines in Revision 8, of NUREG-1021, "Operator Licensing Examination Standards for Power Reactors." The initial operator licensing examinations were administered to nine reactor operator (RO) applicants. The NRC administered the operating portion of the examinations, whereas the the written examinations were administered by the TMI training organization prior to the start of the operating examinations.

b. Observations and Findings

The results of the RO examinations are summarized below:

	RO Pass/Fail
Written	8/1
Operating	9/0
Overall	8/1

The written examination, job performance measures (JPMs), and simulator scenarios were developed by TMI personnel in accordance with NUREG-1021. All individuals involved signed onto 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 January 10, 2000, 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.

The written portion of the examination was administered by TMI training personnel on February 10, 2000 and consisted of 100 multiple choice questions. One question was later determined to have had two correct answers. TMI provided appropriate reference material to substantiate the additional correct answer and the answer key was subsequently changed to reflect the additional correct answer. Details and resolution of this comment is documented in Attachment 2 of this report.

The operating portion of the examination was conducted from February 14 - 18, 2000, and consisted of two simulator scenarios for each applicant. Also, ten JPMs were administered to all applicants. Administrative JPMs were developed and administered to evaluate the administrative requirement portion of the examination.

Simulator performance by the RO applicants was good. Communications was also good, however, there were instances observed by the examiners in which communications did not quite meet management expectations. Good control board awareness by all of the applicants was evident throughout all of the scenarios observed by the NRC examiners. However, a number of instances were noted in which the applicants did not refer to abnormal operating procedures during unexpected plant events (i.e., controlling instrument malfunctions).

TMI training also provided to the NRC an analysis of the written examination in an effort to identify any generic weaknesses associated with any specific topic area that was examined. One area was identified as a potential generic weakness and action was taken to address this area during future training.

During the performance of two particular JPMs, several applicants demonstrated difficulty with the applicable procedure that was used to perform the associated task. The JPMs were 11.2.05.177, "Perform a Safety Group Withdrawal," and JPM 11.2.05.153, "Energize the Reactor Protection System". The applicable procedures were Operating Procedure (OP) 1105-9 "Control Rod Drive System," and OP 1107-2, "Emergency Electrical System," respectively. Appropriate actions were taken by the licensee to address these problems.

c. Conclusions

The applicants performed well during the operating portions of the examination. The applicants appeared, for the most part, to be 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 reactor operator examination. Crew communications, during the simulator examination, were good; however, there were instances in which repeatbacks or directions were not acknowledged. Also, during the scenarios, there were a number of instances, in which the applicants did not refer to procedures during abnormal plant events or occurrences. No adverse conditions resulted.

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 detailed prevailed throughout the examination development process.

V. Management Meetings

X1 Exit Meeting Summary

On March 3, 2000, via telephone, the NRC discussed their observations regarding the examination with Three Mile Island Unit 1 operations and training management representatives. Also, license numbers for the eight applicants who passed all portions of the examination were provided. 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. Atherholt, Director, Operations
D. Boltz, Instructor, Lead Instructor, Training
R. Hess, Plant Training Manager
L. Killpach, Sr. Engineer, Regulatory Engineering
J. Langenbach, Vice President, Director TMI
F. Kacinko, Lead Instructor, Training
R. Parnell, Operations Training Manager

NRC

P. Bissett, Senior Operations Engineer
J. Caruso, Operations Engineer

Attachments:
1. Three Mile Island Unit 1 RO Written Examination w/Answer Key
2. Resolution of Post-Exam Written Examination Comment

ATTACHMENT 1

TMI-1 RO WRITTEN EXAMINATION W/ANSWER KEY

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

Applicant Information	
Name:	**Region I**
Date:	**Facility/Unit: Three Mile Island**
License Level: RO / SRO	**Reactor Type: B&W**
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 five 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	_____ Points

Nuclear Regulatory Commission
CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Examination Answer Key - correction

001	D	026	A	051	B	076	D
002	C + B	027	D	052	B	077	D
003	C	028	A	053	D	078	C
004	D	029	A	054	D	079	B
005	D	030	C	055	B	080	D
006	B	031	B	056	D	081	D
007	A	032	B	057	D	082	C
008	B	033	A	058	A	083	D
009	A	034	C	059	B	084	C
010	B	035	B	060	A	085	D
011	C	036	A	061	A	086	B
012	D	037	C	062	B	087	A
013	D	038	B	063	B	088	C
014	C	039	A	064	A	089	B
015	A	040	B	065	B	090	D
016	A	041	A	066	D	091	C
017	C	042	D	067	B	092	C
018	C	043	D	068	A	093	D
019	A	044	D	069	C	094	C
020	D	045	D	070	A	095	C
021	B	046	C	071	A	096	D
022	B	047	B	072	D	097	B
023	D	048	C	073	D	098	D
024	C	049	C	074	C	099	A
025	A	050	B	075	C	100	B

#9 vacuum breaker 2/15/00

Change approved
R. Powell 2/15/00
O'H Bassett 2/15/00

NRC INITIAL LICENSING WRITTEN EXAMINATION
TMI UNIT 1 February 10, 2000

NAME: _____ SS No. _____
DATE: _____

Darken the correct answer – if you change your answer, write your final selection in the blank.

1.	(A)	(B)	(C)	(D)	___	26.	(A)	(B)	(C)	(D)	___
2.	(A)	(B)	(C)	(D)	___	27.	(A)	(B)	(C)	(D)	___
3.	(A)	(B)	(C)	(D)	___	28.	(A)	(B)	(C)	(D)	___
4.	(A)	(B)	(C)	(D)	___	29.	(A)	(B)	(C)	(D)	___
5.	(A)	(B)	(C)	(D)	___	30.	(A)	(B)	(C)	(D)	___
6.	(A)	(B)	(C)	(D)	___	31.	(A)	(B)	(C)	(D)	___
7.	(A)	(B)	(C)	(D)	___	32.	(A)	(B)	(C)	(D)	___
8.	(A)	(B)	(C)	(D)	___	33.	(A)	(B)	(C)	(D)	___
9.	(A)	(B)	(C)	(D)	___	34.	(A)	(B)	(C)	(D)	___
10.	(A)	(B)	(C)	(D)	___	35.	(A)	(B)	(C)	(D)	___
11.	(A)	(B)	(C)	(D)	___	36.	(A)	(B)	(C)	(D)	___
12.	(A)	(B)	(C)	(D)	___	37.	(A)	(B)	(C)	(D)	___
13.	(A)	(B)	(C)	(D)	___	38.	(A)	(B)	(C)	(D)	___
14.	(A)	(B)	(C)	(D)	___	39.	(A)	(B)	(C)	(D)	___
15.	(A)	(B)	(C)	(D)	___	40.	(A)	(B)	(C)	(D)	___
16.	(A)	(B)	(C)	(D)	___	41.	(A)	(B)	(C)	(D)	___
17.	(A)	(B)	(C)	(D)	___	42.	(A)	(B)	(C)	(D)	___
18.	(A)	(B)	(C)	(D)	___	43.	(A)	(B)	(C)	(D)	___
19.	(A)	(B)	(C)	(D)	___	44.	(A)	(B)	(C)	(D)	___
20.	(A)	(B)	(C)	(D)	___	45.	(A)	(B)	(C)	(D)	___
21.	(A)	(B)	(C)	(D)	___	46.	(A)	(B)	(C)	(D)	___
22.	(A)	(B)	(C)	(D)	___	47.	(A)	(B)	(C)	(D)	___
23.	(A)	(B)	(C)	(D)	___	48.	(A)	(B)	(C)	(D)	___
24.	(A)	(B)	(C)	(D)	___	49.	(A)	(B)	(C)	(D)	___
25.	(A)	(B)	(C)	(D)	___	50.	(A)	(B)	(C)	(D)	___

NRC INITIAL LICENSING WRITTEN EXAMINATION
TMI UNIT 1 February 10, 2000

NAME: _____ SS No. _____
DATE: _____

Darken the correct answer – if you change your answer, write your final selection in the blank.

51.	(A)	(B)	(C)	(D)	___	76.	(A)	(B)	(C)	(D)	___
52.	(A)	(B)	(C)	(D)	___	77.	(A)	(B)	(C)	(D)	___
53.	(A)	(B)	(C)	(D)	___	78.	(A)	(B)	(C)	(D)	___
54.	(A)	(B)	(C)	(D)	___	79.	(A)	(B)	(C)	(D)	___
55.	(A)	(B)	(C)	(D)	___	80.	(A)	(B)	(C)	(D)	___
56.	(A)	(B)	(C)	(D)	___	81.	(A)	(B)	(C)	(D)	___
57.	(A)	(B)	(C)	(D)	___	82.	(A)	(B)	(C)	(D)	___
58.	(A)	(B)	(C)	(D)	___	83.	(A)	(B)	(C)	(D)	___
59.	(A)	(B)	(C)	(D)	___	84.	(A)	(B)	(C)	(D)	___
60.	(A)	(B)	(C)	(D)	___	85.	(A)	(B)	(C)	(D)	___
61.	(A)	(B)	(C)	(D)	___	86.	(A)	(B)	(C)	(D)	___
62.	(A)	(B)	(C)	(D)	___	87.	(A)	(B)	(C)	(D)	___
63.	(A)	(B)	(C)	(D)	___	88.	(A)	(B)	(C)	(D)	___
64.	(A)	(B)	(C)	(D)	___	89.	(A)	(B)	(C)	(D)	___
65.	(A)	(B)	(C)	(D)	___	90.	(A)	(B)	(C)	(D)	___
66.	(A)	(B)	(C)	(D)	___	91.	(A)	(B)	(C)	(D)	___
67.	(A)	(B)	(C)	(D)	___	92.	(A)	(B)	(C)	(D)	___
68.	(A)	(B)	(C)	(D)	___	93.	(A)	(B)	(C)	(D)	___
69.	(A)	(B)	(C)	(D)	___	94.	(A)	(B)	(C)	(D)	___
70.	(A)	(B)	(C)	(D)	___	95.	(A)	(B)	(C)	(D)	___
71.	(A)	(B)	(C)	(D)	___	96.	(A)	(B)	(C)	(D)	___
72.	(A)	(B)	(C)	(D)	___	97.	(A)	(B)	(C)	(D)	___
73.	(A)	(B)	(C)	(D)	___	98.	(A)	(B)	(C)	(D)	___
74.	(A)	(B)	(C)	(D)	___	99.	(A)	(B)	(C)	(D)	___
75.	(A)	(B)	(C)	(D)	___	100.	(A)	(B)	(C)	(D)	___

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 001 **Q 001**

Point Value: 1

Sequence of events:
- Plant STARTUP in progress (4 RCPs operating).
- Power escalation stopped at 69% reactor power.
  - Group 7 Rod #1 mechanically stuck, 10 inches below the rest of Group 7.
  - Group 7 Absolute Group Average position indication = 55% withdrawn.
- 90 minutes later:
  - Rod #1 is unstuck, withdrawn and re-aligned with remaining Group 7 rods.
  - Power escalation to 100% is resumed at 30% per hour.

Identify the ONE (1) statement below that describes IF and WHY the above actions are procedurally ACCEPTABLE or UNACCEPTABLE in accordance with EP 1202-8, CRD Equipment Failure.

A. Actions are ACCEPTABLE; adverse power peaking will not occur - the stuck rod was re-aligned with its group within two (2) hours.

B. Actions are ACCEPTABLE; adverse power peaking will not occur - the stuck rod was re-aligned with its group while the group was less than 60% withdrawn.

C. Actions are UNACCEPTABLE; adverse power peaking could occur - the rate of power escalation was too rapid after the stuck rod was re-aligned with its group.

D. Actions are UNACCEPTABLE; adverse power peaking could occur - the stuck rod was (withdrawn) re-aligned with Group 7 with reactor power greater than 60%.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 002 **Q 002**

Point Value: 1

Plant conditions:
- Reactor power is 100%.
- PPC Point A0961, RC-P-1A UPPER OIL POT LOW alarm actuates.

From the list below, identify the ONE (1) condition that would require the operator to secure RC-P-1A as conditions continue to degrade.

A. RCP Backstop Oil Flow Low Alarm actuates.

B. Motor Thrust Bearing temperature = 192 degrees F.

C. Motor Radial Bearing temperature = 188 degrees F.

D. Motor Stator temperature = 140 degrees C (284 degrees F).

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 003 Q 003

Point Value: 1

Sequence of events:
- Reactor power 100%.
- Loss of station power.
- Emergency systems respond as designed, except EF-P-1 TRIPS.
- Main Condenser vacuum is broken.
- Turbine Gland Sealing Steam is ISOLATED.
- RCS Subcooled margin has been maintained.

Identify the ONE (1) set of secondary plant conditions below that, if sustained, will result in LOSS OF RCS NATURAL CIRCULATION with the plant conditions described above.

A. OTSG levels at 15% on Operating Range and slowly increasing;
EFW flows throttled to 100 gpm to each OTSG;
Atmospheric dump valves open 20% with OTSG pressures slowly decreasing.

B. OTSG levels at 15% on Operating Range and slowly increasing;
EFW flows throttled to 250 gpm to each OTSG;
Atmospheric dump valves closed with OTSG pressures slowly decreasing.

C. OTSG levels maintained at 55% on Operating Range;
EFW flows throttled to 0 gpm to each OTSG;
Atmospheric dump valves closed with OTSG pressures constant.

D. OTSG levels maintained at 55% on Operating Range;
EFW flows throttled to 100 gpm to each OTSG;
Atmospheric dump valves 20% open with OTSG pressures constant.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 004 **Q 004**

Point Value: 1

RCS Emergency boration has been initiated from the Boric Acid Mix Tank (BAMT) via MU-V-51. From the list below, identify the ONE (1) indication that can be used to satisfy the PROCEDURAL REQUIREMENT to verify flow from the BAMT.

A. CA P-1A/1B Control Room breaker RED LIGHTS ENERGIZED.

B. MU System Batch Controller TOTALIZER INCREASING.

C. CA-P-1A/1B STROKE COUNTERS OPERATING.

D. Indication of BAMT LEVEL DECREASING.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 005 Q 005

Point Value: 1

Plant conditions:
- Reactor power initially is 100%.
- Large Break LOCA occurs at RC-P-1C suction.

Based on expected plant response, identify the ONE (1) actuation signal that would result in ISOLATION of NSCC to the Reactor Building.

A. Reactor Trip Isolation.

B. 1600 psig RCS Pressure ESAS.

C. 4 psig RB Pressure ESAS.

D. 30 psig RB Pressure ESAS.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 006 Q 006

Point Value: 1

Sequence of events:
- Initial reactor power = 90%.
- FW-P-1A trips and an automatic ICS runback is in progress.
- At 2225 psig RCS pressure (still increasing), the selected RCS pressure transmitter fails low (SASS DOES NOT ACTUATE).
- NO manual operations have been performed.

From the list below, identify the ONE (1) group of automatic actions that will occur if this plant situation continues and no operator actions are taken.

A. RC-V-1 CLOSES;
Pressurizer heaters ENERGIZE;
Reactor trips on LOW RCS pressure.

B. RC-V-1 CLOSES;
Pressurizer heaters ENERGIZE;
Reactor trips on HIGH RCS pressure.

C. RC-V-1 remains OPEN;
Pressurizer heaters DE-ENERGIZE;
Reactor trips on HIGH RCS pressure.

D. RC-V-1 remains OPEN;
Pressurizer heaters DE-ENERGIZE;
Reactor trips on LOW RCS pressure.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 007 **Q 007**

Point Value: 1

Plant conditions:
- Hot Shutdown.
- 650 EFPD.

From the list below, identify the ONE (1) statement that correctly describes the BASIS for the difference between Hot Shutdown Boron Concentration requirements for normal OTSG Level (25 inches) and FLOODED NOZZLE conditions.

A. Offset reactivity effects of additional RCS Cooldown in the event of a Steam Line Rupture.

B. Boron differential reactivity worth (delta-K/K per 100 PPM) decreases as the concentration is increased.

C. Additional mass and stored energy in the OTSGs (secondary) will decrease RCS cooldown rate in the event of a LOCA into the RB.

D. Additional mass and stored energy in the OTSGs (secondary) will decrease tube leak rate in the event of an OTSG Tube Rupture.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 008 **Q 008**

Point Value: 1

Plant conditions:
- A loss of station power has occurred.
- Only the 1D 4KV bus has been re-energized.
- Pressurizer heaters have NOT been energized.
- Pressurizer level is being maintained at 100 inches.
- OTSG levels are being maintained at 50% operating range.
- RCS natural circulation has been obtained and verified.
- RCS Subcooled margin is 50 degrees F.
- Core cooldown rate is 0 degrees F/hour.

From the list below, identify the ONE (1) statement that describes expected RCS Subcooled margin response.

A. Increase as core temperatures decrease.

B. Decrease as Pressurizer temperature decreases.

C. Remain fairly constant with constant Pressurizer level.

D. Remain fairly constant with constant core cooldown rate.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 009 Q 009

Point Value: 1

Initial plant conditions:
- Reactor power is 100%.
- ICS in FULL AUTOMATIC.

Event:
- Total loss of ICS/NNI AUTO POWER due to loss of 120V AC Panel ATA.

From the list below, identify the ONE (1) means of OTSG/steam pressure control that would NOT be available to the operator if the plant remains on-line in this situation.

A. MAIN TURBINE CONTROL VALVES, using the Main Turbine ICS Hand/Auto station.

B. MAIN TURBINE CONTROL VALVES, using the DTCS Operator Work Station (OWS).

C. TURBINE BYPASS VALVES, using their ICS Hand/Auto stations.

D. ATMOSPHERIC DUMP VALVES, using the Backup Manual Loaders.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 010 **Q 010**

Point Value: 1

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. Identify the ONE (1) statement that describes 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.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 011 Q 011

Point Value: 1

Plant conditions:
- Refueling Shutdown mode with core reload in progress.
- Fire occurs in a trailer just south of the Unit-1 Air Supply Tunnel.
- EP 1202-31, Fire, has been implemented and the Fire Brigade is on the scene.
- Smoke enters the Unit-1 Air Supply Tunnel and causes numerous alarms on H&V panel including:
  - HVB-1-6, AIR SUPPLY TUNNEL FIRE-SMOKE

From the list below, identify the ONE (1) fan that, if operating, should have tripped based on these conditions.

A. Control Building Second Floor Booster Fan, AH-E-95A.

B. Control Building Emergency Recirculation Fan, AH-E-18A.

C. Fuel Handling Building Supply Fan, AH-E-10.

D. Control Building Supply Fan, AH-E-17A.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 041 **Q 041**

Point Value: 1

During a plant cooldown, MU-V-16A/B/C/D are CLOSED and the breakers tagged OPEN prior to cooling down below 332 degrees F. Identify the ONE (1) statement below that describes the basis for this step.

A. Prevent potential severe over pressurization of the RCS.

B. Prevent makeup pump runout at lower RCS pressures.

C. Prevent challenging the PORV when NDTT protection is in effect.

D. Remove the HPI system from service since it is no longer required by Tech Specs.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 042 **Q 042**

Point Value: 1

Plant conditions:
- Reactor power is 100%.
- RCS Letdown flow is 45 gpm.

From the list below, identify the ONE (1) condition that will result in AUTOMATIC TERMINATION of RCS letdown flow in the event of a LETDOWN LINE RUPTURE at the RB outside wall penetration.

A. Low Pressurizer level.

B. Reactor Trip Isolation.

C. Low Makeup Tank level.

D. High letdown line temperature.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 043 **Q 043**

Point Value: 1

Identify the ONE (1) statement below that describes the signal(s) that will actuate ES LINE BREAK ISOLATION on Nuclear Services Closed Cooling System.

A. 1600 psig RCS ES Actuation.

B. 30 psig RB HI HI ES Actuation.

C. Reactor Trip Isolation (RTI) concurrent with NSCC System Low Surge Tank Level.

D. 4 psig RB ES Actuation concurrent with NSCC System Low Surge Tank Level.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 044 Q 044

Point Value: 1

Plant conditions:
- Small Break LOCA is in progress.
- RCS pressure is 1500 psig and decreasing.
- Pressurizer level is 120 inches and decreasing.
- Reactor Building pressure is 1.9 psig and increasing.
- MU-P-1A and MU-P-1B are operating.
- MU-V-217 is THROTTLED OPEN.
- Makeup flow rate is 300 gpm .

Identify the ONE (1) statement below that describes required operator actions for this condition.

A. Fully open MU-V-217.

B. Start MU-P-1C AND open MU-V-16A/B/C/D.

C. Depress Train B 4 psig RB Pressure ESAS manual actuation button.

D. Depress Train A AND Train B 1600 psig ESAS manual actuation buttons.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 045 Q 045

Point Value: 1

Initial conditions:
- Reactor power was 100%.
- NR-P-1A and NR-P-1C were running (both are ES selected).
- NR-P-1B powered from 1T 480V Bus and in standby (normal after stop).

Sequence of events:
- Small break LOCA.
- Reactor trip.
- ESAS Actuations: 1600# AND 4#.
- No safety systems have been bypassed or defeated.

From the list below identify the ONE (1) statement that describes NR-P-1B status if NR-P-1A trips under these conditions.

A. NR-P-1B will automatically start on 1T 480V Bus.

B. NR-P-1B can be manually started on 1T 480V Bus.

C. NR-P-1B can be manually started if transferred to the 1R 480V Bus.

D. NR-P-1B will automatically start if transferred to the 1R 480V Bus AND ES selected.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 046 Q 046

Point Value: 1

Plant conditions:
- Reactor power is 60%, following response to an asymmetric (dropped) rod in Group 5.
- Reactor power channel SASS mismatch is present due to the dropped rod.
- All ICS stations are in AUTO.
- NI-5 is selected for ICS control.

With no operator action, from the list below identify the ONE (1) set of events that will initially result if NI-5 output fails to 0%.

A. Control rods will NOT insert/withdraw, AND feedwater flow will DECREASE.

B. Control rods will NOT insert/withdraw, AND feedwater flow will NOT change.

C. Control rods will WITHDRAW, AND feedwater flow will DECREASE.

D. Control rods will WITHDRAW, AND feedwater flow will INCREASE.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 047

Q 047

Point Value: 1

Plant conditions:
- Reactor power is 85% following a failure in ICS SG/Rx Master.
- ICS stations in HAND:
  - SG/Rx Master.
  - Reactor Demand.
  - BOTH FW Loop Masters.
- All other stations, including the Diamond Rod Control Panel, are in AUTO.
- Control rod index is 275%.

The reactor operator inserts Group 8 rods from 30% to 20% to adjust core power imbalance. This action adds negative reactivity to the core and causes a decrease in reactor power.

From the list below identify the ONE (1) statement that describes Control Rod Group 7 response during the insertion of Group 8 rods under the conditions described above.

A. Insert due to a negative ICS neutron error.

B. Withdraw due to a positive ICS neutron error.

C. Not move because Group-8 is being inserted.

D. Not move because neutron error will be zero (0).

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 048 Q 048

Point Value: 1

Plant conditions:
- Reactor Trip following LOSS OF STATION POWER.
- Current plant parameters:
  - Loop A SCM meter indication = 7 F Loop B SCM meter indication = 12 F.
  - Loop A T-Hot 460 F Loop B T-Hot 455 F.
  - Loop A T-Cold 425 F Loop B T-Cold 425 F.
  - RCS Wide Range Pressure (PI-949A) = 485 psig.
  - Average of the 5 highest operable incore thermocouples (Pt. C4006) = 440 F.

Natural circulation cooling has NOT been confirmed. From the list below, identify the ONE(1) correct value for RCS subcooling margin under these conditions.

A. 7 degrees F.

B. 12 degrees F.

C. 27 degrees F.

D. 42 degrees F.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 049 Q 049

Point Value: 1

Plant conditions:
- Reactor trip from 100% power.
- Large break LOCA.
- ATOG immediate actions have been completed.
- RR-P-1A tripped, and cannot be restarted.
- RR-P-1B is operating.
- RB pressure and temperature are elevated.
- Pressurizer level indication = 18 inches.

Identify the ONE (1) statement below that describes the EFFECT AND CAUSE for erroneous Pressurizer Level indication under these plant 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 boiling in the reference leg.

D. Level indicates low due to boiling in the reference leg.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 050 **Q 050**

Point Value: 1

Plant conditions:
- Plant heatup in progress, RCS temperature is 428 degrees F.
- OTSG 1A/1B pressures are both 330 psig.
- OTSG 1A/1B levels are both 25" on Startup Range.
- FW-V-16A and FW-V-16B are in hand control.
- Startup Feedwater Flow is 0.1E6 lbm per hour to each OTSG.
- CO-P-1A is operating, CO-P-1B and CO-P-1C are in Normal After Stop.
- CO-P-2A is operating, CO-P-2B is Out-of-Service, CO-P-2C is in Normal After Stop.
- FW-P-1A/1B are both tripped.

From the list below, identify the ONE (1) statement that describes initial startup feedwater flow response if CO-P-2A trips and CO-P-2C does not auto start.

A. Decrease to 0 lbm/hr due to automatic trip of CO-P-1A.

B. Decrease to 0 lbm/hr due to condensate pump operating characteristics.

C. Remain the same.

D. Increase.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 051 Q 051

Point Value: 1

Initial plant conditions:
- Reactor power is 100%.
- 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 breaker trips on an electrical fault.
- After a period of two (2) seconds, CO-P-1C automatically starts.

From the list below, identify the ONE (1) statement that describes the plant 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.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 052 **Q 052**

Point Value: 1

Plant conditions:
- Reactor power is 90%.
- ICS is in full automatic.
- A high pressure feedwater heater string has just been removed from service.

From the list below, identify the ONE (1) statement that describes the expected ICS response to these conditions.

A. Steam Generator BTU limits would be reached AND the unit would be placed in TRACK.

B. The Feedwater Demand signal would be modified to DECREASE feedwater flow.

C. Feedwater to Reactor Crosslimits would be reached AND the unit would be placed in TRACK.

D. The Feedwater Demand signal would be modified to INCREASE feedwater flow.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 053 Q 053

Point Value: 1

Plant conditions and events:
- A loss of B-DC power occurs while at 100% power.
- Power is reduced to 65% and stabilized.
- Main FW valve differential pressure is stable at 35 psid.
- FW-P-1A ICS station is transferred to HAND due to speed oscillations.
- FW-P-1B vibrations begin to increase above operating limits.
- The shift foreman orders you to reduce FW-P-1B speed and flow.
- FW-P-1B ICS station will NOT transfer to HAND.

Under these conditions, from the list below identify how FW-P-1B speed and flow can be reduced FROM THE CONTROL ROOM.

A. Lower FW-P-1B motor speed changer setting.

B. Lower FW-P-1B ICS demand using FW-P-1A bias control.

C. Raise FW-P-1A ICS demand using FW-P-1A bias control.

D. Raise FW-P-1A ICS demand using its ICS station.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 054 **Q 054**

Point Value: 1

During operation at 100% power, Auxiliary Transformer 1B develops a fault and is automatically isolated by protective relay operation.

From the list below identify the ONE (1) source of power that would NOT be available to support operation of EF-P-2A.

A. SBO Diesel.

B. Auxiliary Transformer 1A.

C. A Emergency Diesel Generator.

D. B Emergency Diesel Generator.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 055 **Q 055**

Point Value: 1

From the list below, identify the ONE (1) statement that explains the reason(s) EFW is injected into the OTSG near the top of the tube bundle.

A. Reduce the thermal stress on the upper tubesheet AND MFW nozzles.

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 lower tubesheet since the upper tubesheet can withstand a higher thermal stress than the lower tube sheet.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 056 Q 056

Point Value: 1

Identify the ONE (1) parameter associated with a radioactive liquid release to the river that can be monitored ONLY OUTSIDE THE CONTROL ROOM.

A. RM-L-7, Plant Effluent radiation monitor.

B. SR-FR-146, Plant Effluent flowrate to river.

C. RM-L-6, Radwaste Release radiation monitor.

D. WDL-FR-84, Radwaste Release Flowrate to Plant Effluent.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 057 Q 057

Point Value: 1

Initial plant conditions:
- Reactor power 100%.
- ICS in full automatic.

Plant conditions require a manual reactor trip. After the CRO depresses the Manual Reactor Trip and DSS pushbuttons, the following plant conditions exist:
- Reactor power is stable at 22%.
- All 4 RCPs are operating.
- RCS hot leg temperatures are stable at 584 degrees F.
- RCS pressure is 2025 psig and rising slowly.
- Turbine Stop Valve SV-2, is open.
- Turbine Stop Valves SV-1, SV-3, and SV-4 are closed.
- Turbine Control Valves CV-1, CV-2, CV-3, and CV-4 are open.
- OTSG levels are 10% on the Operating Range and stable.
- OTSG pressures are stable at 1042 psig.

From the list below, identify the ONE (1) statement that describes the procedurally required action(s) for these conditions.

A. Secure 1 RCP in each loop.

B. Transfer ICS FW stations to manual to control OTSG levels.

C. Place the EHC pump control switches in P-T-L and open EHC-FV-1.

D. Initiate HPI and maintain primary to secondary heat transfer until power level is less than 10%.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 058 Q 058

Point Value: 1

Plant conditions:
- Control Building ventilation system in normal operation.
- AH-E-17A and AH-E-19A, normal control building supply and return fans, are running.

From the list below, identify the ONE (1) statement that describes the automatic action(s) that will result from a High alarm on the Control Room RM-A-1 Gas radiation monitoring channel.

A. AH-E-17A, Control Building Supply Fan, trips.

B. AH-E-18B, Control Building Emergency Recirculation Fan, starts.

C. AH-E-17A, Control Building Supply Fan, trips, AND AH-E-18A, Control Building Emergency Recirculation Fan, starts.

D. AH-E-17A, Control Building Supply Fan, trips, AND AH-E-18B, Control Building Emergency Recirculation Fan, starts.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 059 Q 059

Point Value: 1

From the list below, identify the ONE (1) statement that describes Reactor Building Purge System response to a High alarm condition on RM-A-9G, Reactor Building Purge Duct monitor.

A. Purge supply fans AH-E-6A/B trip.

B. Purge supply and exhaust isolation valves AH-V-1A/B/C/D close.

C. Purge exhaust fans AH-E-7A/B trip AND purge exhaust isolation valves AH-V-1A/B close.

D. Purge exhaust fans AH-E-7A/B trip AND purge supply and exhaust isolation valves AH-V-1A/B/C/D close.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 060 **Q 060**

Point Value: 1

The crew has taken action to minimize subcooling margin in accordance with ATP 1210-5, OTSG Tube Leakage. Identify the ONE (1) statement below that describes the reason for minimizing subcooling margin in this situation.

A. Minimize the differential pressure between the OTSG and RCS.

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.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 061 **Q 061**

Point Value: 1

Sequence of events:
- Reactor trip from 100%.
- LOCA occurs resulting in 1600 psig RCS and 4 psig RB automatic ES actuations.
- The plant stabilizes at the following parameters:
  - RCS pressure is 1850 psig.
  - RB pressure is 6 psig.
- Shift Supervisor orders 1600 psig and 4 psig ES actuations cleared so HPI can be throttled.

From the list below, identify the ONE (1) statement that describes procedurally required actions to clear both the 1600 psig and 4 psig automatic actuation signals on both ES train A & B.

A. Depress the three 1600 psig ENABLE & CHANNEL RESET pushbuttons AND two 4 psig DEFEAT pushbuttons.

B. Depress the three 1600 psig ENABLE & CHANNEL RESET pushbuttons AND two 4 psig ENABLE pushbuttons.

C. Depress the three 1600 psig BYPASS pushbuttons AND two 4 psig DEFEAT pushbuttons.

D. Depress the three 1600 psig BYPASS pushbuttons AND two 4 psig ENABLE pushbuttons.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 062 Q 062

Point Value: 1

Initial plant conditions:
- Cooldown in progress.
- RCS temperature is 430 degrees F.
- RCS pressure is 690 psig.
- RC-P-1A and RC-P-1C are operating.
- PORV NDTT switch is in AUTO.
- Pressurizer level control is in AUTO maintaining 100 inches.

Sequence of events:
- Plant cooldown was stopped in order to cycle CF-V-1A and CF-V-1B.
- All plant parameters were stabilized.
- Loop A Wide Range T-cold signal FAILED LOW.

From the list below, identify the ONE (1) statement that describes plant response to this situation.

A. RC-P1A AND RC-P-1C BOTH TRIP.

B. RCDT cooling valve IC-V-20 OPENS.

C. Pressurizer level control valve MU-V-17 OPENS.

D. Loop A Subcooling Margin Meter indication INCREASES.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 063 Q 063

Point Value: 1

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.

From the list below, identify the ONE (1) statement that describes why only one OTSG depressurizes as a direct result of the steam line rupture.

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.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 064 Q 064

Point Value: 1

Plant conditions:
- Reactor power is 100%.
- B RPS Channel is in MANUAL BYPASS for monthly surveillance testing.
- The following ICS stations are in HAND for CRD breaker testing:
  - SG/Rx Master.
  - Reactor Demand.
  - Both FW Loop Masters.
  - Diamond Rod Control Panel.
- CRD Breaker #11 is now open.

From the list below, identify the ONE (1) event that, if occurring under these conditions, would result in an automatic reactor trip.

A. Inverter 1C failure.

B. Inverter 1D failure.

C. A-RPS channel trip.

D. C-RPS channel trip.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 065 Q 065

Point Value: 1

Initial plant conditions:
- Reactor power was 100%.
- 100 EFPD.

Sequence of events:
- (Time = 1800) #1 Seal for RC-P-1D failed.
- (Time = 1830) Power reduced to 60% AND RCP-1D was tripped.

Current plant conditions:
- RCS Average Temperature 579 degrees F.
- APSRs are at 30% withdrawn.
- Imbalance is -10% and within acceptable limits.
- Group 7 control rods are 8% BELOW the Rod Insertion Limit in the RESTRICTED OPERATING REGION for the current power and RCP combination.

From the list below, identify the ONE (1) statement that describes required operator actions to attain acceptable control rod position AND maintain plant parameters within normal ranges.

A. Drive APSRs IN.

B. Borate to drive Group 7 control rods out.

C. Reduce power to 50% by Group 7 control rod insertion.

D. Initially dilute RCS boron then borate to follow the Xenon transient.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 066 Q 066

Point Value: 1

Initial plant conditions:
- Reactor power is 100%.
- ICS is in FULL AUTOMATIC.

RCS Loop A flow is slowly failing low and a SASS Mismatch alarm occurs but there is NO SASS actuation. Total RCS Flow signal to ICS is normal.

From the list below, identify the ONE (1) set of ICS Hand/Auto Stations that is required to be transferred to hand to mitigate the consequence of this event.

A. A Feedwater Pump AND A Startup & Main Feedwater Valves.

B. A & B Feedwater Loop Masters.

C. A & B Startup AND Main Feedwater Valves.

D. A & B Feedwater Pumps AND A & B Startup & Main Feedwater Valves.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 067 Q 067

Point Value: 1

Sequence of events:
- Reactor trip.
- Large Break LOCA.
- ESAS Actuations:
  - 1600 psig RCS pressure.
  - 4 psig RB pressure.
- Current RB pressure is 20 psig.
- 1600 psi ES has been bypassed and 4 psi ES actuation has been placed in defeat.
- No ES component positions have been changed.
- The leak in the RCS gets larger resulting in RB pressure rising to 35 psig.

From the list below, identify the status of the Reactor Building Spray pumps under these conditions.

A. Will automatically start.

B. Must be manually started using the BS pump extension control switch.

C. Must be started by pushing the manual ES 30 psi actuation pushbuttons.

D. Must be secured since their suction and discharge valves are closed.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 068 Q 068

Point Value: 1

From the list below, identify the ONE (1) condition that will cause Reactor Building Purge valve, AH-V-1A, to close.

A. Reactor Trip Isolation.

B. 1600 psig ESAS Actuation.

C. RM-A-2, RB Radiation Monitor, in HIGH Alarm.

D. RM-G-6, RB Main Fuel Handling Bridge, in HIGH Alarm.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 069 **Q 069**

Point Value: 1

Plant conditions:
- Reactor power is 100%.
- SF-P-1A Spent Fuel Cooling Pump is operating in recirc mode.
- SF-P-2 Borated Water Recirc Pump is operating for Pool A (LWDS) cleanup.
- Spent fuel assembly rack location change in progress in Spent Fuel Pool A.

Due to equipment failure, a spent fuel assembly is dropped – lying on top of the fuel racks in Pool A. Fuel pin clad rupture has resulted in significant activity release to the spent fuel pool water.

Identify the ONE (1) statement below that describes plant design response to RM-L-5 indication, which pegs high due to the increase in radioactivity described above.

A. SF-P-2 trips.

B. SF-P-1A trips.

C. MAP C-1-1 RADIATION LEVEL HIGH actuates.

D. MAP C-1-1 RADIATION LEVEL HIGH actuates AND Fuel Handling Building Supply Fan, AH-E-10, trips.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 070 Q 070

Point Value: 1

Sequence of events:
- Reactor power was reduced to 70%.
- RC-P-1A was manually tripped.
- Delta T-C is currently 0 degrees F.

Plant shutdown is now in progress.

From the list below, identify the ONE (1) statement that describes how long Delta T-C will be controlled at 0 degrees F during the plant shutdown, considering the events and conditions described above.

A. Until OTSG 1A reaches Low Level Limits.

B. Until OTSG 1B reaches Low Level Limits.

C. Until both OTSG 1A AND OTSG 1B reach Low Level Limits.

D. Until both OTSG 1A AND OTSG 1B reach High Level Limits.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 071 Q 071

Point Value: 1

MS-V-13A and MS-V-13B sequentially open on an EFW actuation signal. From the list below, identify the ONE (1) statement that describes the basis for this sequential valve operation.

A. Ensures that the pressure controller for MS-V-6 can control steam chest pressure of EF-P-1 during startup.

B. Ensures that MS-V-6 will not be pressure locked on its closed seat during the starting transient.

C. Ensures that high initial steam flow will not result in excessive RCS cooling.

D. Ensures that excessive EFW flow is not introduced to the OTSGs.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 072 **Q 072**

Point Value: 1

Plant conditions:
- Reactor tripped from 100% power.
- LOSS OF STATION POWER has occurred.
- Primary and secondary parameters are being maintained in the P-T Plot post trip stability windows.
- NO increase in RCS activity following trip.
- Mass balance calculations indicate the existence of 5 gpm RCS leakage.
- 1210-1 Immediate Actions are being performed.

Considering the conditions above, identify the ONE (1) instrument below that, if evaluated alone, would support a valid determination that OTSG tube leakage exists.

A. RM-A-2 (RB Atmospheric Monitor).

B. RM-A-5 (Condenser Off-Gas Monitor).

C. RM-G-25 (Condenser Off-Gas Monitor).

D. RM-G-26 (Main Steam Line Monitor).

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 073 Q 073

Point Value: 1

Use the attached copy of SS-208-138 to identify the ONE (1) condition, from the list below, when CONTROL ROOM 4 KV ES motor feeder breaker status lights (red/green) are (operable) capable of providing Control Room indication of breaker position.

A. BDD FULLY RACKED OUT position with BOTH close and trip fuses installed.

B. BDD in TEST (disconnected) position with BOTH close and trip fuses installed.

C. BDD RACKED IN (connected) position with close fuse installed - trip fuse removed.

D. BDD RACKED IN (connected) position with trip fuse installed - close fuse removed.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 074 Q 074

Point Value: 1

From the list below, identify the ONE (1) statement that describes the status of the power transfer scheme for 1M DC Distribution Panel following a RCS 1600 psig ES actuation.

A. Automatic transfer is blocked but the manual transfer is operable.

B. Manual transfer is blocked but the automatic transfer is operable.

C. Automatic AND manual transfer is blocked.

D. Manual AND automatic transfer is operable.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 075 Q 075

Point Value: 1

Plant conditions:
- Loss of Station Power has occurred.
- EG-Y-1B diesel had to be started manually from the Control Room using the Manual Start Pushbutton.
- EG-Y-1B generator Ready to Load light is DE-ENERGIZED.

All other Control Room controls associated with EG-Y-1B were in the normal STANDBY line-up when the diesel was started.

From the list below, identify the ONE (1) action that would ENERGIZE the Ready to Load light under these conditions.

A. Place the 1A and 1B Aux Transformer supply breakers to the 1E 4160V bus in PTL.

B. Adjust the manual voltage controller on CR to obtain an output voltage of 4.1 KV.

C. Adjust the local voltage regulator to obtain an output voltage of 4.1KV.

D. Energize the synchroscope for EG-Y-1B generator output breaker, G11-02.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 076 **Q 076**

Point Value: 1

Plant Conditions:
- Reactor power is 100%.
- Liquid Release is in progress from A WECST.
- IWTS release is in progress.

A high alarm is received from RM-L-6 Radioactive Waste Water Discharge Monitor, however RM-L6 Enable/Defeat switch is in Defeat.

From the list below, identify the ONE (1) statement that describes required operator action(s) for this condition.

A. Close IW-V-73, IWTS Effluent valve on the Control Room LWDS panel.

B. Close WDL-V-257, Liquid Release Effluent Valve, on the Control Room LWDS panel.

C. Place RM-L6 to Enable AND verify IW-V-73, IWTS Effluent valve, closes.

D. Place RM-L6 to Enable AND verify WDL-V-257, Liquid Release Effluent Valve, closes.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 077 **Q 077**

Point Value: 1

Current plant conditions:
- Reactor is operating at 100% power.
- Main Generator output = 870 MW.
- 6 CW Pumps are operating.
- Winter weather conditions (outside air temperature is 20 degrees F).

Considering these conditions, and in the absence of any automatic turbine or reactor trip, identify the ONE (1) situation below that would require the CRO to initiate a MANUAL TURBINE TRIP.

A. Loss of one CW Pump.

B. Loss of the Gland Steam Exhauster.

C. Condenser pressure is 7.7 inches Hg absolute.

D. Condenser pressure is 8.7 inches Hg absolute.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 078 **Q 078**

Point Value: 1

Current plant conditions:
- Reactor is operating at 100% power.
- RCS Tavg is constant at 579 degrees 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 – MU-V-32 is in AUTO.
- RCP labyrinth seal DP indicators show low off-scale.
- Auxiliary Building airborne activity is increasing.

From the list below, identify the ONE (1) statement that 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.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 079 Q 079

Point Value: 1

Plant conditions:
- Reactor tripped.
- Fire Protection System failed to extinguish a fire in the Relay Room.
- EP 1202-37, Cooldown Outside the Control Room, immediate actions complete.
- All REMOTE TRANSFER SWITCHES have been selected to EMERGENCY.
- Shift Supervisor has established control of the plant at the Remote Shutdown Area.

If RC-V-1 (automatically) opens due to a high impedance fault, identify the ONE (1) statement below that describes use of redundant equipment to isolate Pressurizer spray flow, considering current plant conditions.

A. Close RC-V-1 at the Remote Shutdown Panel.

B. Close the Pressurizer spray block valve, RC-V-3, at the Remote Shutdown Panel.

C. Close RC-V-1, using the keyswitch located on the front of the RC-V-1 breaker at the 480 VAC motor control center.

D. Close RC-V-3, using the keyswitch located on the front of the RC-V-3 breaker at the 480 VAC motor control center.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 080 **Q 080**

Point Value: 1

Plant conditions:
- Reactor is at cold shutdown condition.
- Decay Heat Removal Train A 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.

From the list below, identify the ONE (1) statement that 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.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 081 Q 081

Point Value: 1

Plant conditions:
- Reactor power is 100%.
- IC-P-1A is operating.
- IC-P-1B is in Normal-After-Stop.

From the list below, identify the ONE (1) plant situation that will result in IC-P-1B starting, with no operator action.

A. Intermediate Closed flow to the CRDMs drops below 100 gpm.

B. IC Cooler Outlet temperature goes above 160 degrees F.

C. Loss of Nuclear Services River Water.

D. RB pressure exceeds 30 psig.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 082

Q 082

Point Value: 1

Current plant conditions:
- 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.

From the list below, identify the value for expected tailpipe temperarure if the PORV is leaking under these conditions.

A. 162° F.

B. 212° F.

C. 228° F.

D. 267° F.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 083 Q 083

Point Value: 1

A fuel assembly has just been lifted from the upender and is transitioning to the core to be placed in core position H-8. The assembly is currently 2 feet away from the upender when spent fuel pool level is observed do be dropping at 10 inches per minute.

From the list below, identify the ONE (1) statement that describes the procedurally required disposition of the fuel assembly.

A. Placed in core position H-8.

B. Placed in the nearest available core location.

C. Placed in the upender to be returned to the Spent Fuel Pool.

D. Lowered between the plenum and the upender until it just touches the floor.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 084 Q 084

Point Value: 1

Plant conditions:
- Reactor power is 100%.
- All ICS Stations in Auto EXCEPT Turbine Bypass Valves, which are in HAND.

Identify the ONE (1) plant condition that automatically transfers the Atmospheric Dump Valve Control to the ICS Hand/Auto Control Station.

A. Loss of ICS Auto Power.

B. Loss of ICS Hand Power.

C. Loss of Condenser Vacuum.

D. OTSG pressure at 1040 psi or greater.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 085 **Q 085**

Point Value: 1

From the list below, identify the ONE (1) signal used to automatically trip the Main Turbine when the reactor trips.

A. RPS channel trip relays.

B. RPS channel under-voltage coil status.

C. Control Rod Groups 1 through 7 In-Limit relays.

D. Reactor trip confirm relay from CRD breaker positions.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 086 Q 086

Point Value: 1

From the list below, identify the ONE (1) AUTOMATIC action that could occur as a result of increasing Secondary Services Closed Cooling system temperature due to loss of the Secondary River Water pumps.

A. Main Turbine trip due to high turbine bearing lube oil temperature.

B. Main Turbine-Generator runback on high stator cooling temperature.

C. Main Generator breaker(s) trip on high Bus Duct Cooling air temperature.

D. Main Feedwater Pump(s) trip on high pump bearing lube oil temperature.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 087 **Q 087**

Point Value: 1

Plant conditions:
- Reactor power is 100%.
- EF-P-1 has automatically started.
- RCP seal injection valve MU-V-20 and seal return valve MU-V-26 have closed.
- Reactor Building penetration temperatures are increasing.

From the list below, identify the ONE (1) cause for these conditions.

A. Loss of Instrument Air.

B. Emergency Safeguards Blocks 1 through 4 have actuated.

C. HSPS Channels 1 through 4 have actuated.

D. 30 psig RB Pressure Isolation has actuated.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 088 Q 088

Point Value: 1

From the list below, identify the ONE (1) statement that describes the requirements for performing an Independent Verification for an easily accessible manual valve 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, second individual independently uses a remote POSITION indicator to verify the valve is closed.

C. One individual closes the valve, second individual independently verifies the valve is closed by physically turning in the closed direction.

D. One individual closes the valve, while the second individual visually observes the first individual closing the valve.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 089 Q 089

Point Value: 1

From the list below, identify the ONE (1) plant condition that would require the operator to IMMEDIATELY initiate a MANUAL REACTOR TRIP.

A. 15% power, Pressurizer level decreasing from 120 inches at 3 inches/minute.

B. 60% power, loss of 1A 6900 V Bus.

C. 75% power, confirmed OTSG 1B tube leak rate = 60 gpm.

D. 100% power, verified INADVERTANT ESAS actuation, with HPI flow initiated to the RCS.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 090 **Q 090**

Point Value: 1

You are the only licensed person in the Control room. From the list below, identify the ONE (1) condition that is permissible for you to be the SOLE NRC LICENSED PERSON IN THE CONTROL ROOM.

A. Reactor power is 100% power;
One additional CRO (NOT LICENSED) is in the Control Room.

B. Plant is in Hot Shutdown condition;
The Shift Technical Advisor (NOT LICENSED) is in the Control Room.

C. RCS temperature is 210 degrees F;
The duty Shift Supervisor (LICENSED) is in the Shift Managers Office.

D. RCS temperature is 189 degrees F;
The duty Shift Supervisor (LICENSED) is in the Operations Office Building.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 091 Q 091

Point Value: 1

Plant conditions:
- Maximum Generation Emergency declared.
- Reactor power is 100%.
- Generator MVAR loading is 460 MVARS OUT.
- Main Generator Hydrogen pressure is 60 psig.

Refer to the attached Figure B-2B from OP 1106-1. From the list of values provided below, identify the MAXIMUM GENERATOR MEGAWATT OUTPUT CAPABILITY for these conditions.

A. 0 MW.

B. 600 MW.

C. 800 MW.

D. 870 MW.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 092 Q 092

Point Value: 1

From the list below, identify the ONE (1) witness required when hand-cranking a motor operated ESAS valve.

A. Licensed Reactor Operator.

B. Member of Plant Engineering staff.

C. Shift Foreman.

D. Shift Technical Advisor.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 093 **Q 093**

Point Value: 1

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, identify the ONE (1) correct description of approval(s) that satisfies requirements to permit this valve line up change, in accordance with AP 1001A.

A. Two Licensed CROs.

B. Shift Supervisor with an SRO License.

C. One Licensed CRO AND the on-shift STA.

D. One Licensed CRO AND one Shift Supervisor/Shift Foreman with an SRO license.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 094 **Q 094**

Point Value: 1

Plant conditions:
- Reactor power is 100%.

During performance of SP 1301-1, Shift and Daily Checks, RM-A-4P failed to respond to the source check.

Identify the ONE (1) statement that describes PROCEDURALLY REQUIRED reactor operator actions.

A. Apply a CAUTION TAG to RM-A-4P.

B. Apply a DO NOT OPERATE TAG to RM-A-4P.

C. Complete a SDR (Surveillance Deficiency Report) sheet.

D. Notify the Radcon Department that RM-A-4P is inoperable.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 095 **Q 095**

Point Value: 1

In addition to the person having clearance, identify ONE (1) specific person whose approval is required prior to changing the condition or position of BLUE tagged ES equipment (SINGLE manipulation).

A. Plant Manager.

B. Director, Operations.

C. Duty Shift Supervisor.

D. Licensed Control Room Operator.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 096 Q 096

Point Value: 1

A mechanical maintenance repairman did not report clear/tags to remain prior to leaving the site, and he cannot be contacted.

From the list below, identify the ONE (1) person authorized per AP 1002 to report the repairman clear with tags to remain -YES.

A. Director, Maintenance.

B. Director, Operations.

C. Shift Supervisor/Shift Foreman knowledgeable of job status.

D. Shift Maintenance Foreman knowledgeable of job status.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 097 Q 097

Point Value: 1

Identify the ONE (1) statement that describes the MINIMUM requirement(s) for an individual to be allowed to receive a TEDE dose of 4100 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. Approvals from the Radcon/Environmental Health & Safety Director AND the Site Director.

C. Approval from the President of the Company.

D. Notification of the NRC.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 098 Q 098

Point Value: 1

A job is to be performed in an area that has a general radiation dose rate of 60 mRem/hr. Installation of temporary shielding to reduce the dose rate to 10 mRem/hr will require a total dose of 30 mRem (for installation and removal).

From the list below, identify the ONE (1) option that will meet ALARA expectations for the entire job process.

A. 2 workers each taking 35 minutes to perform the job.

B. 1 worker taking 60 minutes to perform the job.

C. Utilize temporary shielding, 2 workers each taking 35 minutes to perform the job.

D. Utilize temporary shielding, 1 worker takes 60 minutes to perform the job.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 099 **Q 099**

Point Value: 1

From the list below, identify the ONE (1) condition that requires entry into EP 1202-33, Tornado/High Winds.

A. A Tornado Watch has been issued by the National Weather Service.

B. Wind Speed Recorder (NWS-R-501E) indicates sustained wind speed of 45 mph.

C. Wind Speed Recorder (NWS-R-501E) indicates sustained wind speed of 40 mph with gusts up to 55 mph.

D. System Dispatcher identifies unstable grid conditions due to a storm in the Philadelphia area.

NRC CRO Licensing Examination
Three Mile Island Nuclear Station
February 2000

Q 100 Q 100

Point Value: 1

Plant conditions:
- 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.

From the list below, identify the ONE (1) statement that describes required operator actions for this situation.

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.

ATTACHMENT 2

RESOLUTION OF POST-EXAM WRITTEN EXAMINATION COMMENT

Question number 2: The question asked when the reactor coolant pump 1A would be secured based upon a set of given conditions.

Licensee's comment: There are two correct answers, "c" as designated in the answer key, and also "b." Answer "b" is also correct, because the stem of the question included the statement "as conditions continue to degrade," and guidance is given to tripping the reactor coolant pump in procedure 1203-6, based upon the given conditions in the stem of the question.

NRC resolution: Agree with the licensee's comment. The answer key was changed to reflect two correct answers, both "b" and "c" for question number 2.