ML22200A040

ENCLOSURE 4

Post Examination Substantive Comments

POST exam items for 2205 SQN NRC Exam

INVALID JPM

During the Initial License Operating Exam in 2022, the JPM developed for the Administrative Topic "Radiation Control" it was determined to not be capable of completion. Specifically, the valve stroke times were not located in the procedures referenced in the JPM.

The error in the JPM was discovered in the first round of administration of the JPM. The JPM was administered to all RO candidates because the resolution was not immediately clear.

The Bank JPM was affected by a procedure change that removed the stroke times. The JPM was not updated to the new procedure. During Validation an assumption was made to yield the right answer. Based on different assumptions a few different stoke times could be found in different procedures. Because the CUE statement was invalid and referred to stroking a valve per a procedure that didn't contain guidance for that specific valve and the need for an assumption to determine the correct time, the JPM was deemed INVALID.

A new similar JPM was developed, validated, approved, and administered to the RO candidates.

TECH SPEC CALL DURING OP EXAM

During a simulator session, a candidate stated that in MODE-1 TS-3.5.5 Seal Injection Flow was applicable. This was not listed in the Scenario Guide as a required condition.

The Scenario 5 guide did not list any applicable Tech Spec items for Event 4. This was questioned by the NRC Examiner team and asked for Operations Department to review the required Tech Specs for the given condition.

Operations department determined the following conditions are applicable for event 4 and should have been listed in the Scenario Guide:

TS-3.5.2 ECCS, Condition A

TRM-8.1.1 Reactivity Control Systems, Condition A

Question 50

Which one of the following completes the statements below?

RE-90-125, Control Room Ventilation Radiation instrument, is powered from _(1)_. When RE-90-125 is in HIGH Alarm _(2)_ train(s) of Control Room Isolation will automatically actuate.

	(1)	(2)
A	Unit 1	ONLY one
B.	Unit 1	two
C.	Unit 2	ONLY one
D.	Unit 2	two

"A" was designated as the correct answer on the approved exam.

References: SQN-0-45N706-1-CC, 1-AR-M6-C

Question Challenge:

There is confusion on what specific equipment to which the question is referring. 0-RE-090-0125-A is a UNID that is typically used to refer to the associated monitoring instrument and all associated equipment for the Main Control Room Radiation Monitor. "RE" in the UNID specifically refers to the radiation element within the radiation monitor, but it is widely accepted to use that UNID for the entire radiation monitor including associated equipment as evidenced in the annunciator response and drawings associated with the radiation monitor. To indicate the confusion of the operator, the annunciator for high radiation from this radiation monitor (1-AR-M12-B, window C-7) is displayed as "0-RA-90-125A MAIN CNTL RM INTAKE MON HIGH RAD".

Here is a list of some UNIDs specific to the Main Control Room Intake Monitor:

0-RM-90-125 – Main Control Room intake monitor indicator
0-RM-90-125TA – Main Control Room intake monitor isolator
0-RE-90-125 – Main Control Room intake monitor radiation element
0-FI-90-125 – Main Control Room intake monitor flow indicator
0-RA-90-125 – Main Control Room intake monitor ratemeter
0-FS-90-125 – Main Control Room intake monitor flow switch
0-RI-90-125 – Main Control Room intake monitor rate indicator
0-PI-90-125 – Main Control Room intake monitor pressure indicator

As a challenge for the first part of the question, the applicants took the verbiage "RE-90-125, Control Room Ventilation Radiation Instrument" to mean the equipment in its entirety as opposed to just the indicating and alarm circuit. In this case, parts of that equipment (the indications) are powered from Unit 1 while other parts of that equipment (sample pumps, temperature monitor) are powered from Unit 2. With this information, Unit 1 or Unit 2 would be the correct answer based on what part of the equipment you are discussing. The question, as written, is not detailed enough in asking which part of the equipment it is asking about as a power supply (see 0-SO-90-2 Attachment 1).

For the second part of the question, the stem does not state "**only** RE-90-125 in alarm", it specifically states "**when** RE-90-125 is in alarm". This implies that with all equipment operating correctly (no instrument malfunction on any radiation monitor nor other abnormal condition stated in the stem), the operator's thought process would be reasonable to think that an actual high radiation signal is what caused RE-90-125 to alarm "high". With a high radiation signal causing RE-90-125 to alarm, and with no other equipment stated to be out of service or malfunctioning in the stem, it is also reasonable to assume RE-90-125 (A-train) and RE-90-126 (B-train) would both actuate causing "both trains" to actuate their respective Control Room Isolation signals. This is given, since they sample from the same location connected to outside of the control building in order to redundantly protect the MCR envelope from high radiation (see 47W866-4).

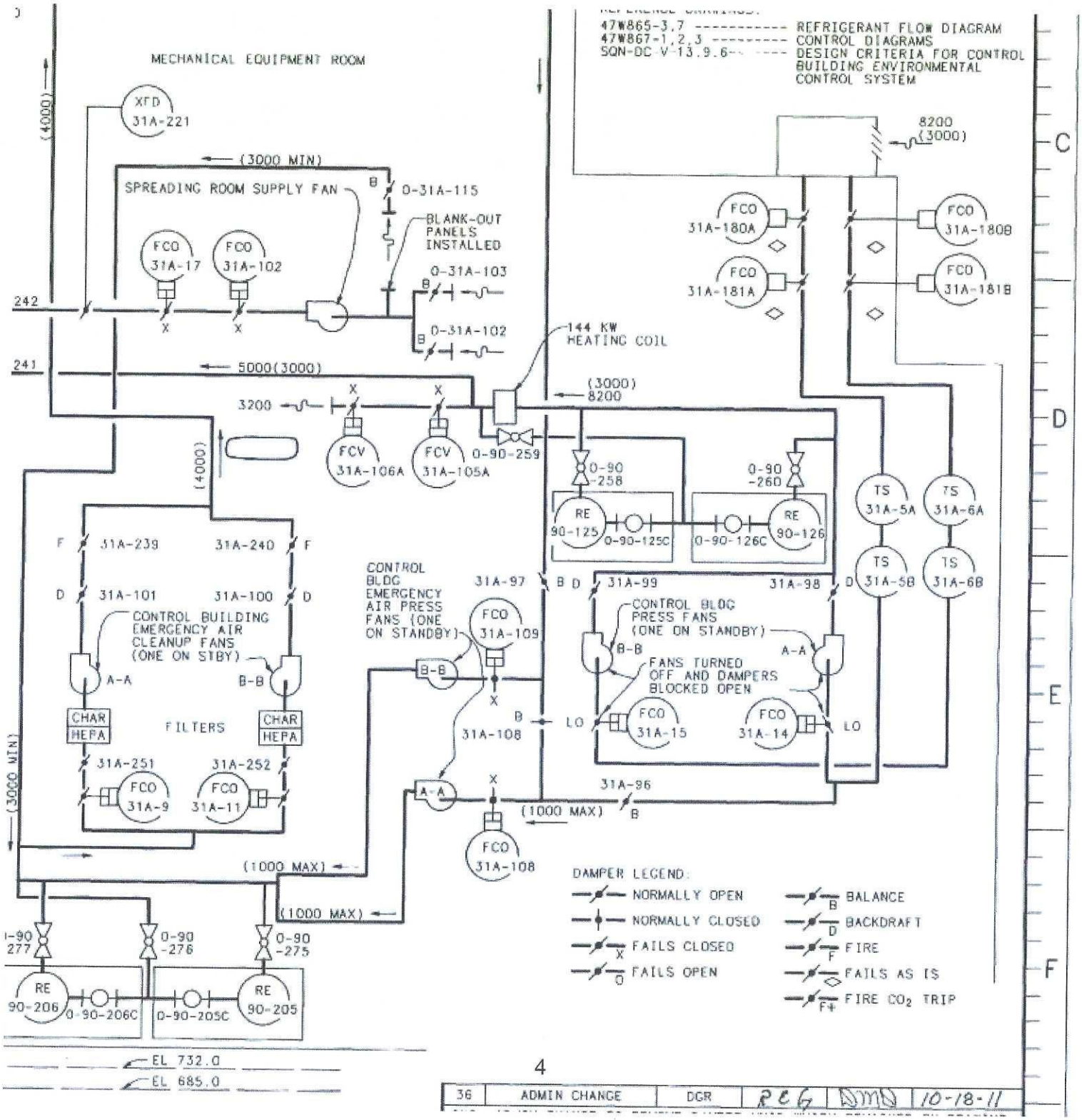
Recommend changing the answer to "B" and "D" as correct answers.

Station Response:

For the first part of the question, RE-90-125 has specific power supplies from both units for the monitor and associated equipment. For the second part of the question, it is correct that no statement was made in the stem for redundant equipment out of service or an abnormal condition such as an instrument malfunction on RE-90-125 or RE-90-126. Therefore, any legitimate (non-spurious) high radiation signal that actuates RE-90-125 would also actuate RE-90-126. Considering this, both trains of control room isolation would actuate in this condition, making B and D correct for the second portion of the question. As such, request the answer key be modified to accept B and D as the two correct answers; or remove the question from the exam as determined in accordance with ES-4.4 section C.3.c.

Performed On _____

EQUIPMENT	PRINT NO.	BREAKER POSITION	BREAKER POSITION	INITIALS
Service Building Vent Monitor (0-RE-90-132) (0-FIC-90-132)	45N756-2 45N708-5 45N1620-3	480V Cont & Aux Bldg Vent Bd 1A1-A Compt 5E2 1-BCTC-90-JE/5E2 CLOSED	120V AC Radiation Process & Area Monitor Power Dist Pnl 1 Bkr 14 0-BKRB-90-132 CLOSED	_____ 1st _____ IV
Auxiliary Building Vent Monitor (0-RE-90-101)	45N756-2 45N708-5 45N1620-3	N/A	120V AC Radiation Process & Area Monitor Power Dist Pnl 1 Bkr 15 0-BKRB-90-101 CLOSED	_____ 1st _____ IV
Auxiliary Building Vent Monitor Sample Pump (0-PMP-90-101)	45N756-5	480V Cont & Aux Bldg Vent Bd 2B1-B Compt 12C 0-BCTD-90-101 CLOSED	N/A	_____ 1st _____ IV
Main Control Room Intake Monitor (0-RE-90-125) Train A	45N756-2 45N706-1 45N1620-4	480V Cont & Aux Bldg Vent Bd 2A1-A Compt 6E2 2-BCTD-90-125-A CLOSED	120V AC Vital Inst Bd 1-I Bkr 13 1-BKRA-250-NC-13-D CLOSED	_____ 1st _____ IV



36	ADMIN CHANGE	DGR	RCG	AMD	10-18-11

Question 61

Question:

Given the following:

- Unit 1 is performing main turbine roll to 1800 RPM,

Which one of the following completes the statements below in accordance with 0-GO-4, Power Ascension from less than 5% Reactor Power to 30% Reactor Power?

When the TV-GV transfer occurs SG level _(1)_ is expected.

At 1800 rpm for greater than 2 hours not synchronized to the grid can cause _(2)_.

	(1)	(2)
A.	swell	a bowed rotor
B.	swell	turbine blade overheating
C.	shrink	a bowed rotor
D.	shrink	turbine blade overheating

"B" was designated as the correct answer on the approved exam.

References: 0-GO-4 R110

Definitions:
EHC – Electro-hydraulic Control System (previously installed analog system)
DEHC – Digital Electro-hydraulic Control System (current digital system)

Question Challenge:

This question locks the operator into making an absolute choice on whether the Steam Generators will shrink or will swell upon TV-GV transfer (throttle valve/governor valve transfer).

With the previously installed EHC system, the TV-GV transfer process commenced by the throttle valve opening at 1700 RPM, then the governor valve throttling closed to reduce the increased speed in the main turbine, known as "catching" the turbine close to 1800 RPM. This operation is reflected by the caution in 0-GO-4. The screenshot below is from 0-GO-4 and a small excerpt is also included from the original Westinghouse manual on EHC describing the TV-GV transfer process.

Upon entering the transfer phase, the ATVC is converted to a two mode (proportional plus reset) controller and the AGVC is converted to a single mode (proportional) controller with the 100 RPM speed error bias removed. This circuit transfer has the initial result of a slight increase in turbine speed because the ATVC will attempt to reduce the speed error to zero. The Governor Valves are now positioned by the speed error times the regulation gain to proportionally control the speed. As the speed error begins to be reduced toward zero, due to the ATVC action, the Governor Valves will move toward closed. They will continue to close until the steam flow is reduced sufficiently to have the Governor Valves controlling speed. When this occurs the resultant proportional speed error will cause the ATVC to integrate the throttle valves toward wide open. This will continue until the Throttle Valves reach wide open. When the Throttle Valves are wide open, ATHI bias is applied to clamp the valves wide open. After the Throttle Valves are clamped open they are not affected by speed or load change. Speed is then controlled only by the Governor Valves.

[41.2] **DEPRESS** the HOT START button on the MSR control panel. _____

STARTUP_____ **Unit** _____ **Date** _____

5.3 Turbine Roll (continued)

CAUTIONS

1) SG level may "swell" during TV-GV transfer.
2) When FCV-47-191 is throttled to control seal steam pressure, operator action will be required after TV/GV transfer to control seal steam pressure.

[42] **IF** while performing the following steps seal steam pressure PI-47-189 lowers due to TV/GV transfer
AND seal steam spillover bypass FCV-47-191 in service,
THEN
CLOSE seal steam spillover bypass FCV-47-191 as required to control Seal Steam pressure. ☐

[43] **WHEN** the turbine reaches 1700 rpm, **THEN**

[43.1] **ENSURE** VPL is set to 6% using DEH screen or VPL buttons. _____

With the described process prior to DEHC upgrade, the expected response typically occurs and the SG level "may" swell, as indicated on the caution in 0-GO-4.

With the plant upgrade to DEHC, the system design was changed to eliminate the possibility of swell of the SG levels and to maintain positive control of turbine speed (reduced the catching effect), see attached graphs indicating pre and post DEHC TV-GV transfers (M1 to M3 on attached graphs). The following is an excerpt from the DEHC software design manual specifically for the TV-GV transfer portion:

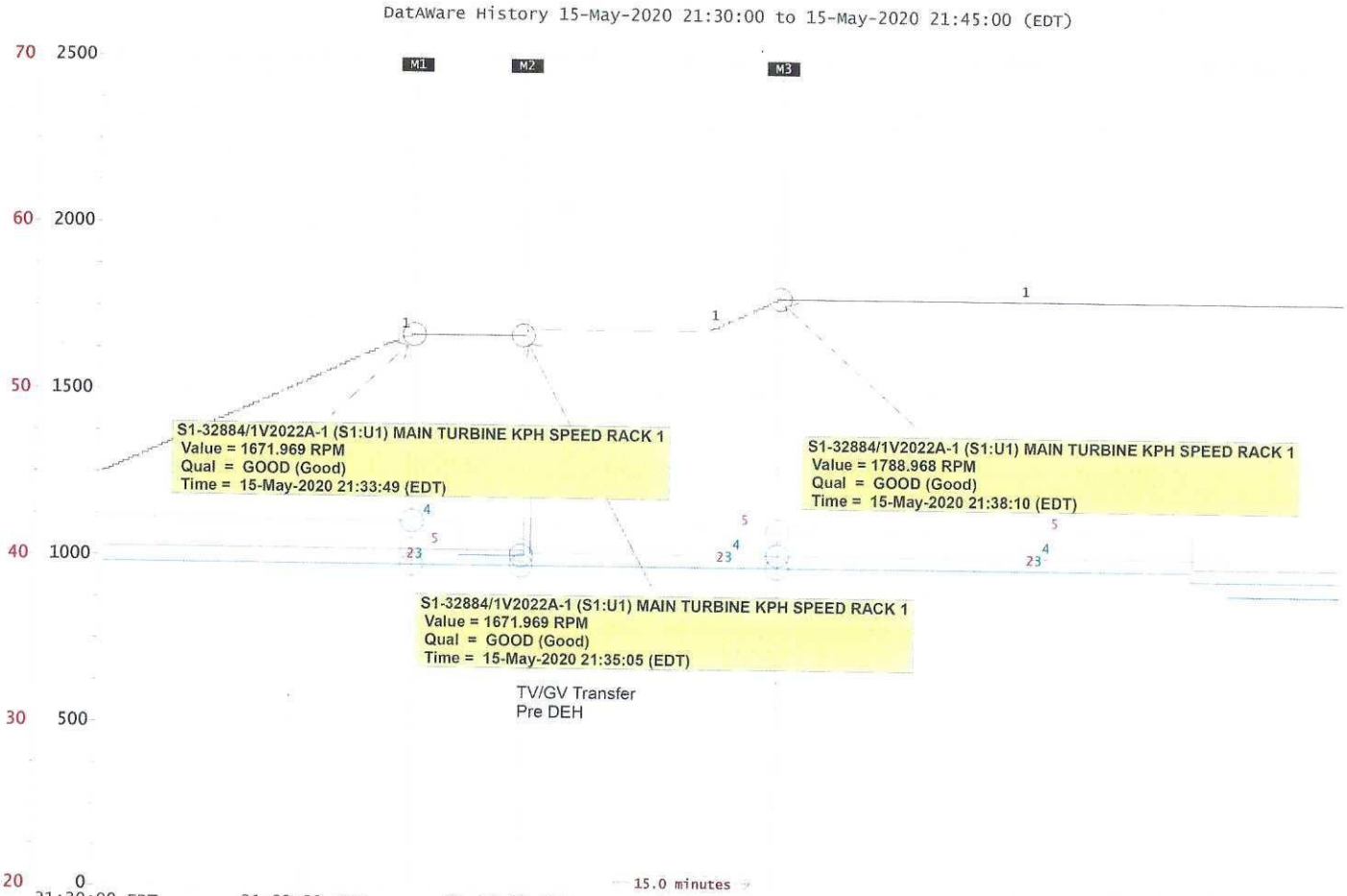
	HOLD ON if REFERENCE not = 520 rpm.	
SET 1700 RPM	When control mode is Speed Control and TV or GV Control, pressing will make SETTER directly 1700 rpm, causing HOLD ON if REFERENCE not = 1700 rpm.	Because the action is immediate and feedback is SETTER value, there is no light indication needed.
SET 1800 RPM	When control mode is Speed Control and GV Control, pressing will make SETTER directly 1800 rpm, causing HOLD ON if REFERENCE not = 1800 rpm.	Because the action is immediate and feedback is SETTER value, there is no light indication needed.
LATCH	When the turbine is TRIPPED and all trip conditions available to the control system are cleared, pressing LATCH while also holding HS-47-24 in RESET, will energize the circuits for the four (4) trip solenoids. While latch is in progress the LATCH indication will flash and the LATCH pushbutton and HS-47-24 may be released. Once the ET Header pressure has increased to the normal value to close the actuator dump valves, the turbine is Latched and LATCH will turn ON.	When the turbine is Tripped, LATCH is OFF.
TV-GV TRANS	When in TV Speed Control, Pressing TV-GV- TRANS will activate the transfer from TV Control to GV Control. This process will ramp down the GV until they control the steam flow, then ramp up the TV to 100 %. During the transfer, TV-GV TRANS will flash; it will turn OFF once the transfer is complete.	There is a (tunable) minimum speed for the transfer (currently = 1690 rpm). There is an alarm if speed exceeds a (tunable) maximum speed (currently =1775 rpm) and TV Control is still active.
IMP OUT	Pressing IMP OUT will select the Close Loop out of Service, turn IMP	

With the DEHC system installed, the governor valves (GVs) lower speed an incremental value (10 RPM) to ensure positive control prior to the throttle valves (TVs) fully opening. The lowering of turbine speed/steam demand will cause a negligible effect of steam generator level for two reasons (1) the turbine is not under load so slowly lowering speed 10 RPM on a free spinning, connected turbine shaft is less than .0025% of total steam flow and (2) that amount of steam flow change would be split among the four steam generators to further reduce any change in indicated steam generator water level due to shrink which would be negligible and near impossible to detect by visual or graphical analysis. The entire TV-GV transfer process from TVs controlling at 1700 RPM to GVs controlling at 1800 RPM takes several minutes by design, as to prevent any perturbation to the system.

Recommend deleting the first portion of this question making "B" and "D" the correct answers.

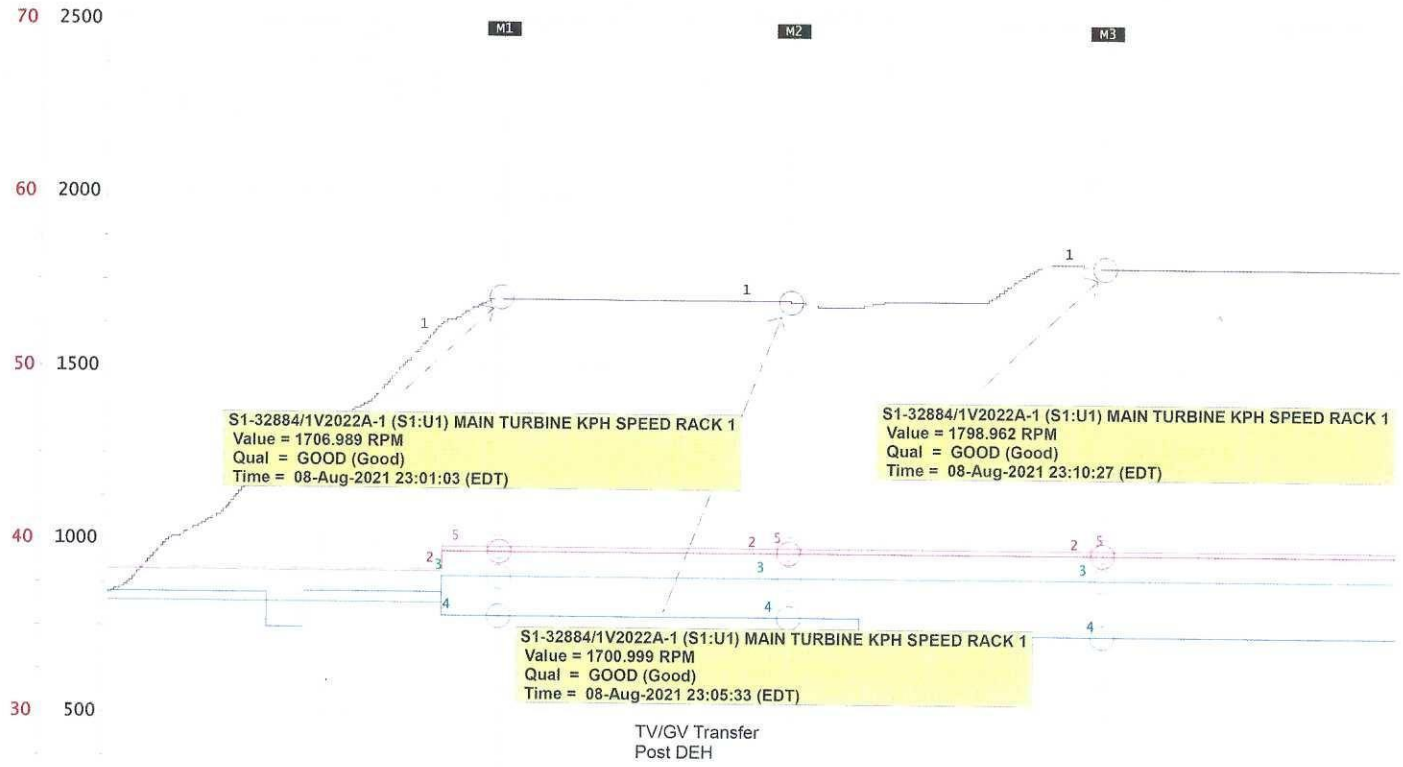
Station Response:

The recent upgrades to the turbine control system would constitute "newly discovered technical information that supports a change in the answer key" as described in ES-4.4 C. Since shrink nor swell occurs anymore upon TV-GV transfer with the DEHC system (per design), recommend changing the answer key to "B" and "D" being correct since the second part of this question is not being challenged. Since "B" and "D" have mutually exclusive information in the answer for part 1 (shrink and swell), removing the question from the exam may be determined as appropriate per ES-4.4.



Point ID/Description	Low-Y	Hi-Y	Units	M1: 21:33:45 05/15/20	M2: 21:35:05 05/15/20	M3: 21:38:11 05/15/20
(1) S1-32884/1V2022A-1 (S1:U1) MAIN TURBINE KPH SPEED RACK 1	0	2500	RPM	1671.969	1671.969	1788.968
(2) S1-18922/1L0420A (S1:U1) SG #2 NARROW RANGE LEVEL	20	70	% LEVEL	39.63631	39.63631	39.63631
(3) S1-18922/1L0420A (S1:U1) SG #2 NARROW RANGE LEVEL	20	70	% LEVEL	39.63631	39.63631	39.63631
(4) S1-18934/1L0441A (S1:U1) SG #3 NARROW RANGE LEVEL	20	70	% LEVEL	42.26353	40.23476	40.37519
(5) S1-18944/1L0461A (S1:U1) SG #4 NARROW RANGE LEVEL	20	70	% LEVEL	40.55813	40.55813	41.89075

DataAWare History 08-Aug-2021 22:55:00 to 08-Aug-2021 23:15:00 (EDT)



20.0 minutes

22:55:00 EDT 08-Aug-2021	22:58:20 EDT 08-Aug-2021	23:01:40 EDT 08-Aug-2021	23:05:00 EDT 08-Aug-2021	23:08:20 EDT 08-Aug-2021	23:11:40 EDT 08-Aug-2021	23:15:00 EDT 08-Aug-2021

Point ID/Description	Low-Y	Hi-Y	Units	M1: 23:01:04 08/08/21	M2: 23:05:34 08/08/21	M3: 23:10:26 08/08/21
(1) S1-32884/1V2022A-1 (S1:U1) MAIN TURBINE KPH SPEED RACK 1	0	2500	RPM	1706.989	1695.964	1798.962
(2) S1-18912/1L0400A (S1:U1) SG #1 NARROW RANGE LEVEL	20	70	% LEVEL	39.45457	39.45457	39.45457
(3) S1-18922/1L0420A (S1:U1) SG #2 NARROW RANGE LEVEL	20	70	% LEVEL	38.00169	38.00169	38.00169
(4) S1-18934/1L0441A (S1:U1) SG #3 NARROW RANGE LEVEL	20	70	% LEVEL	35.73642	35.73642	34.76762
(5) S1-18944/1L0461A (S1:U1) SG #4 NARROW RANGE LEVEL	20	70	% LEVEL	39.72016	39.72016	39.72016

Question 84

Question:

0000 – Unit 2 is 100% RTP, an unplanned load reduction was started

0015 – The load reduction was completed to 80% RTP

Which one of the following completes the statements below?

In accordance with 0-GO-5, Normal Power Operation, this reduction _(1)_ the rate of change limits.

SR 3.4.16.2 Dose Equivalent I-131 _(2)_ required to be performed.

	(1)	(2)
A.	exceeded	is
B.	exceeded	is NOT
C.	was within	is
D.	was within	is NOT

"C" was designated as the correct answer on the approved exam.

References: 0-GO-5 R108

Question Challenge:

This question asks the student to determine if the load reduction/thermal power change is within the "rate of change limits" of 0-GO-5 (Normal Power Operation). Based on the context given in the question, it is assumed that the question intended to test the student's knowledge on the limitations of 0-GO-5 relating to power/reactivity changes. This analysis will look at the applicable limitations of 0-GO-5 to determine if the down power was within or exceeded any limits in 0-GO-5.

When referring to 0-GO-5, the stem specifically asks about "limits". This implies that there are several limits associated with power and rate of change within 0-GO-5. There are several rate of change limits in 0-GO-5 (see section 3.2 "Limitations" in 0-GO-5):

- 3.2[A.]: Do not exceed a load change rate of plus or minus 5% per minute or a step change of 10%. - **MET**
- 3.2[E.]: For each instance of change in the rated thermal power level exceeding 15% in one hour, Chemistry must be notified to initiate the conditional portions of 0-SI-CEM-000-877.0, 0-SI-CEM-030-407.2 and 0-SI-CEM-030-415.0 due to the thermal power change and ensure narrative log entries are made for each power change exceeding 15% in one hour (SR 3.4.16.2). – **DID NOT MEET**

The stem of the question gives the operator power levels in RTP (Rated Thermal Power measured in MW Thermal) and not load (MW Electric or MWe) to analyze that a limit was or was not exceeded per 0-GO-5. While the load reduction value (initial and final value in MWe) was not given, the initial and final value of rated thermal power was given indicating the reduction focuses on thermal power and not load or MWe.

A rate limitation that was exceeded in this question was the 0-GO-5 3.2 [E.] limit that requires actions by chemistry when rated thermal power is reduced by 15% or greater in a one-hour period. The stem then asks the chemistry specific actions in the second part of the question if this limit (15% RTP or greater change in one hour) were to be exceeded.

Recommend changing the answer to "A" for this question since a limit in 0-GO-5 was exceeded. No challenge on the second part of the question.

Station Response:

A rate of change limit in 0-GO-5 was exceeded in the form of 15% power (RTP) change in less than a one hour period. Since the questions asks if "limits" were exceeded, based on the information provided, a rate of change limit of 0-G0-5 was exceeded (15% power reduction in one hour) making "A" the only correct answer. Request the answer key be changed to reflect "A" as the correct answer in accordance with ES-4.4 section C.3.c.

Question 90

Given the following:

- Unit 1 has a leaking fuel assembly
- #3 S/G tube leak occurred at 0745
- Radiation monitor data:

	Main Steam Line 3 RM, 1-RM-90-423	Condenser Vacuum Exhaust, 1-RM-90-256A
0745	1.55E- 02 µCi/cc	1.70E+00 mR/hr
0800	1.96E- 01 µCi/cc	4.70E+02 mR/hr
0815	2.90E- 01 µCi/cc	1.64E+04 mR/hr
0830	3.96E- 01 µCi/cc	2.85E+04 mR/hr
0845	4.04E- 01 µCi/cc	3.76E+04 mR/hr
0900	3.15E+00 µCi/cc	4.64E+04 mR/hr
0915	4.50E+00 µCi/cc	4.69E+04 mR/hr

REFERENCE PROVIDED

SED judgement should NOT be considered

Based on Radiation Monitor Readings, what is the LATEST time the FIRST classification declaration is required?

A. 0800

B. 0815

C. 0830

D. 0900

"C" was designated as the correct answer on the approved exam.

Technical References: EPIP-1 R57

References provided to operators: RA-1 and RU-1 blocks from the Hot Matrix Wall Board

Question Challenge:

The operator was given the knowledge that the unit has a leaking fuel assembly (high RCS activity) and that the unit also has a tube leak (stem informed the operator this happened at 0745). In this instance, the NOUE Criteria was met just prior to 0800 and the ALERT criteria was met at some time prior to 0815.

See EPIP-1, an ALERT declaration criteria requires 1-RM-90-256 to be above a reading of 11,200 mR/hr for 15 minutes or longer. At 0815, 1-RM-90-256 reading was 16,400 mR/hr which indicates that the ALERT criterion for that radiation monitor was exceeded some time before 0815. With 60 minutes given to declare the NOUE and 15 minutes given to declare an ALERT, no correct answer is given from which to choose. The monitor indicated an ALERT value prior to 0815, so the answer could not be 0830 as you would have exceeded 15 minutes prior to this time.

Recommend removing the question from the exam since there is no correct answer and it is unreasonable to determine when the ALERT criterion was exceeded (to the minute) without a plotted graph.

Station Response:

Based on the information given, it is accepted to reasonably determine that at some point in time before 0815 the ALERT criteria was met. In this instance, no correct answer exists for the +15 minute requirement to declare an ALERT. In an actual event, the ALERT declaration would be late if it was declared at 0830. There was no note in the stem stating to not interpolate data or to only view the data timeframes given which confused the operators. Per ES-4.4 section C, recommend removal of this question from the exam for a confusing or misleading stem to where there is no correct answer.