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The Northeast Utilities System

March 10, 1994
MP-94-162

Re: NUREG 1021

Mr. T. T. Martin, Administrator
U.S. Nuclear Regulatory Commission, Region I
475 Allendale Road
King of Prussia, PA 19406

REFERENCE: Facility Operating License No. NPF-49
Docket No. 50-423
Written Examination Comments, Millstone Unit No. 3

Dear Mr. Martin:

On February 28, 1994, written examinations were administered to five Millstone Unit No. 3 operator license candidates. Subsequent to the examination, personnel from Millstone Unit No. 3 Operations and the Operator Training staff reviewed the examination to identify questions or answers which warrant formal comment in accordance with NUREG 1021, Operator Licensing Examiner Standards, Section ES-402. Included as Attachment 1 are our comments resulting from this review. As specified in ES-402, each comment is supported with a reference and a recommendation regarding what we believe to be the most appropriate action to resolve the comment.

We were afforded the opportunity to review and comment on the examination during its preparation, and many of our comments were incorporated. Notwithstanding this, the number of comments included within Attachment 1 is significantly higher than for previously administered examinations at Millstone Unit No. 3. Accordingly, we are assessing our pre-examination review process to identify enhancements which we believe will lead to increased effectiveness. We will work with your staff to ensure that the resultant process is acceptable.

As discussed at the meeting held March 3, 1994, the comments contained within Attachment 1 are being provided to the chief examiner by Friday, March 11, 1994.

Should you have any questions regarding our comments, feel free to contact us.

Very truly yours,

FOR: Donald B. Miller
Senior Vice President
Millstone Station

BY: _____
Frank C. Rothen, Director
Maintenance Services

Attachment

cc: Document Control Desk, USNRC
P. D. Swetland, Senior Resident Inspector, Millstone Unit Nos. 1, 2, and 3
P. H. Bissett, Chief Examiner, Region I

ATTACHMENT

MILLSTONE UNIT NO. 3

NRC EXAMINATION COMMENTS

Question 6 The question requires choosing the correct description of the reference junctions relating to the incore thermocouples.

The purpose of the reference junctions as given in the question reference is to provide a transition place for changeover from chromel-alumel to copper wires (Reference 1). The answer given on the exam "two thermocouples compensate for changes in system impedance" is not mentioned in the reference and is not correct. Impedance is a term typically associated with AC circuits versus resistance in DC circuits. The reference explains how junction temperature compensation is accomplished with 3 RTDs. The associated lesson plan (Reference 2) also does not indicate a compensation for system impedance but does describe the usage of RTDs to provide for automatic compensation (software compensation) for reference junction voltage. These two references imply that the purpose of the junction and junction box is to provide a place to change over to copper field wiring and a place to compensate for the opposite EMF produced due to the dissimiliar metals at the junction box and the difference in temperature between the junction box and the junction at the upper core plate. This duality of purpose provides confusion between answer option "a" and "b."

The referenced objective calls for the candidate to demonstrate the ability to **monitor** and **operate** the incore temperature monitor system in the automatic and manual modes. We believe the knowledge required to answer this question goes beyond the intent of the learning objective and therefore does not have the proper test item congruency to the objective. We also do not believe the test item differentiates between those who can meet the intent of the objective and those who can not perform the task successfully.

Given the confusion between the purpose of containment temperature compensation introduced in distractor "a" and the purpose of the junction itself, the required information not in the reference, the incorrect use of the dimension "impedance", and the apparent miss-match between the objective requirement and test item required knowledge, we request credit be given for answers "a" and "b" or that this question be deleted from the exam.

References:

1. Millstone, NSSS Vol 4, Incore Thermocouple System, Section 2.2, Pages 3 and 4

2. Lesson Plan, Inadequate Core Cooling Monitor, ICC-01-C, Pages 6 and 7

Recommendation:

Credit given for answers "a" and "b" or delete question from the examination.

Question 14 The question requires the RO candidate to determine whether or not a single passive failure causing an active failure in the RHR system is in conformance with NRC General Design Criteria relating to the single failure criterion. The candidate was also required to determine the basis of conformance or non-conformance.

We believe this question requires knowledge level beyond that typically required at the RO level. In any case, a further engineering review would have to be done to determine acceptability of this event based on the following FSAR excerpt (Reference 1):

> For fluid systems, the single failure is limited to an active component failure during the short term, and assuming no prior failure during the short term, the single failure is either an active or a passive component failure during the long term.

Since the postulated event occurs within five minutes of the design basis LOCA, and the "short term' is defined as the first 24 hours following the start of an incident, we believe this failure is not required to be postualted within the design basis. In either case, the determination of conformance would not affect how the RO would deal with this failure should it occur, and therefore, is not a performance based question.

The learning objective requires the student to describe a single active and passive failure in simple terms to facilitate understanding of the basic ESF system design. The objective was not intended to enable an RO candidate to make engineering evaluations, but merely to foster a better understanding of ESF design. In that light, the associated lesson plan (Reference 2) defines an active failure as a failure of a powered component, and a passive failure as a failure of a static structural component with no emphasis placed on assorted applications. The Examiners' Handbook (Reference 3) states, "... some learning objectives may be relevant for training, but not for licensing examinations ... accordingly, the things tested in a licensing examination represent a sub-set of what is emphasized in training." We believe this type of knowledge should be excluded because it does not focus squarely on what must be known to protect the public.

The test item is based on the following K/A statement (Reference 4):

> 013000K4.08
> Knowledge of ESFAS design feature(s) and/or interlock(s) which provide for ... redundancy.

This K/A item appears to be related to ESF actuation system's logic and testing rather than the actual ECCS system's engineering design basis as identified in the question, and therefore, not applicable to this situation.

Based on all of the above, we request that this question be deleted from the examination.

References:

1. MNPS-3 FSAR, Chapter 3, Design Of Structures, Components, Equipment, and Systems, 3.1.1.3, Application of Single Failure Criterion

2. Introduction To Engineered Safety Features, ESF-01-C, Rev. 2

3. Examiners' Handbook for Developing Operator Licensing Written Examinations, NUREG/BR-0122, Rev. 5, Page 3-3

4. Knowledge and Abilities Catalog for Nuclear Power Plant Operators: Pressurized Water Reactors, NUREG-1122, Pages 3.2-25 and 3.2-26

Recommendation:

Delete question from the examination.

Question 15 The question asks for the automatic actions that occur as a result of all four SG levels being less than 5% with a reactor trip from 100% power.

There are two answers provided for this question, based on the following reasons:

When the reactor trips from high power, all SG levels shrink below 5% NR level causing all AFW pumps to immediately start and the turbine to trip immediately from the reactor trip. Therefore, under normal reactor trip conditions, distractor "a" details the normal sequence of events.

The AMSAC circuitry also causes the AFW pumps to start and the turbine to trip after a 25 second time delay if 3 of 4 SG levels are less than 5% and turbine power is greater than 40% (Reference 1 & 2.) Therefore, distractor "b" describes the sequence that would occur due to an ATWS event.

However, both distractors are correct because once the turbine goes above 40% power, its signal is sealed in the AMSAC arming circuit for 260 seconds after the turbine decreases below 40% power. This means that every time the reactor trips from high power (> 40%), the AMSAC system will actuate 25 seconds after the trip, providing a start signal to the AFW pumps and a turbine trip signal. This actuation feature will occur every time whether or not the actions have already been completed by the normal means (P-4 and SG low levels.) The AMSAC actuation signals will be initiated because of the locked in turbine power signal and the low SG levels from shrink.

Since the question did not ask which automatic actions occur first and since one could assume that time 0 is 25 seconds into an ATWS event, both options "a" and "b" should be accepted

Reference:

1. AMSAC Lesson Plan AMS-01-C, Rev. 0, pages 6, 7, and 8

2. LSK-01-06Q, Logic Diagram, AMSAC Trip

Recommendation:

Credit given for answers "a" and "b."

Question 16 The question is provided to evaluate understanding of the AFW system design feature which restricts AFW flow during a feed line break accident.

Cavitating venturis are provided in each AFW line and are designed to provide a phase change to limit flow in the AFW piping. The answer provided is misleading in that it describes a "feedwater" phase change instead of an "AFW" phase change. Also, some candidates assumed the phase change referenced in option "a" to be taking place at the break rather than in the venturi upstream of the break, thereby eliminating this option. Since these candidates were unable to find "venturi" in any distractor, they assumed that the nozzle of a venturi also changes the effective pipe size to restrict flow, with or without a phase change. Both candidates that selected pipe size as the answer, made that selection with exam notations written next to that option which said "venturis" and "flow restrictor" indicating knowledge of the correct information. However, they were unable to detect that information in the remaining three options.

References:

1. NSSS Vol. 3, AFW, Page 11, Section 2.8

Recommendation:

Credit given for answers "a" and "d."

Question 31 The question requires the candidate to determine if three given spent fuel pool parameters are in compliance with limits.

The question does not state what limits to consider, e.g., Tech Spec limit, normal operating limit, or alarm limits. Pool water temperature and pool reactivity are in compliance with all limits imposed. However, pool water level is not in compliance with the normal operating limit of 35% as stated in OP 3305, Precaution 6.1 (Reference 1), but is in compliance with the Tech Spec limit (Reference 2) requiring 23' of water above the top of the fuel assemblies. This is shown on Fig 10.1 of OP 3305 as 36' 6" of depth. The text cited as the reference for the question (Reference 3) indicates 23' above the top of the fuel assemblies as the source for the question answer, however, the answer provided indicates the level is not in compliance. In summary, the level is in compliance with the Tech Spec limit and not in compliance with the normal operating limit. Therefore, we request that both answers "a" and "b" be accepted as correct.

References:

1. OP 3305, Fuel Pool Cooling And Purification System, Page 4 and Fig 10.1, Spent Fuel Pool Level Conversion To Elevation

2. Technical Specifications, Millstone Nuclear Station, Unit No. 3, LCO 3.9.11

3. MP3, NSSS Vol 2, Rev 1, pages 5 and 7

Recommendation:

Credit given to answers "a" and "b."

Question 34 The question requires the candidate to describe the effect of the pressurizer master controller failing "high". Several candidates requested clarification of the phrase "controller failing high" and were told that they should know what this means. From an operational standpoint, a Westinghouse controller has three components which can fail when in automatic control:

- Output failure
- Input failure
- Setpoint (reference) failure

Millstone Unit 3's master pressure controller output meter is human factored so that when the operators take manual control and go to "raise" they are attempting to "raise" Pressurizer pressure. By going to raise, the controller output indication increases, the PORVs shut, the spray valves shut, and the heaters turn on. Therefore, if it is assumed that the controller has failed in a manner such that the output meter indicates high, then answer "d" is correct; that is, both PORVs remain shut.

If it is assumed that the controller input has failed "high", then the controller output meter will decrease, indicating the controller is trying to "lower" Pressurizer pressure, and PORV 455A will eventually open. The candidate who assumes this controller failure mode will answer "a" as given on the examination key.

A setpoint (reference) failure is generally not assumed on this controller since the setpoint is fixed by a potentiometer setting. Information to support either answer is not provided in the cited question reference (Reference 1).

Reference:

1. NSSS Vol 4, Pzr. Press & Level Cntrl, Rev 1, Pages 6, 7, and Fig PPL-02.

Recommendation:

Credit given for answers "a" and "d."

Question 38 The question addresses Critical Safety Function (CSF) Status Tree priority, providing consideration for a Blue CSF status tree in the hierarchy of colors. The lesson plan and text are misleading by describing a Blue CSF as having a fixed priority. In fact, there is no "BLUE" CSF Status Tree in the order of action priority. A Blue box appearing on the SPDS computer display indicates the computer program has insufficient information to evaluate status, resulting in an INOPERABLE Status Tree. In this case, it must be addressed manually to determine the actual CSF priority color. (ie; RED, ORANGE, YELLOW, GREEN)

Additionally, the color blue has no established order in the hierarchy of operator action. For example, if the Subcriticality CSF indicates blue and the Heat Sink CSF indicates RED, the Subcriticality CSF must be evaluated manually to determine its actual status before moving on to any other CSF. In this example, it may appear that a "blue" CSF has taken priority over RED or ORANGE paths on other CSF Status Trees, although this is not the case.

The text and lesson plan are being updated to clarify this issue.

Reference:

1. Lesson Plan SPD-01-C, Rev. 1
2. SPDS Text, Rev. 0, page 3
3. OP-3272, Rev. 4, Att. 4, sheet 3 of 3

Recommendation:

Delete question from examination. No correct answer given.

Question 40 The question requires the candidate to calculate the time it would take to reach a predetermined fuel oil storage tank level with the emergency diesel generator at 50% load.

We believe there is no correct answer provided based on an incorrect assumption relating to fuel oil storage tank capacity. The exam key answer assumes 100% level in the storage tank to be 37,227 gal based on 88% level being equal to 32,760 gallons (Tech Spec volume). From this calculation, the given volume of 35,360 gal can be determined to be 95% level and the remaining calculation can be done using the 1%/hr consumption rate at 50% load thumbrule provided in OP 3346A (Reference 1).

The above calculations depend on the assumption that per cent level corresponds linearly with tank volume. This, however, is not the case; the tank is rounded at the top and bottom. This is evidenced by a Caution in OP 3346B (Reference 2) which states in part, "storage tank level indication is actually an indicator of the percent of total tank height, not the percent of total tank volume. Because the storage tanks are round tanks, they will fill near the bottom and top at a faster rate,..." This non-linearity can also be seen on Figure 10.1 of OP 3346B depicting a change in slope at the top and bottom of the tank. Therefore, 100% capacity is not 37,227 gallons. It is closer to 35,000 gallons as shown on Figure 10.1.

Without being provided the figure for this question, the candidates had to make their own assumptions, such as, the given 35,360 gallons was equal to 100%. Using this assumption, time to reach 88% would be 12 hours which is not a given option. Based on these problems, we request this question be deleted from the examination.

References:

1. OP 3346A, Emergency Diesel Generator, Rev. 14, Page 4

2. OP 3346B, Diesel Fuel Oil, Rev. 5, Pages 15 and 20

Recommendation:

Delete the question from the exam.

Question 54 The question requires the candidate to determine the count rate (background + actual) at which an individual is considered to be contaminated given that the background radiation is at the maximum allowed for using a frisker. The question does not state for what purpose the frisking is being done, i.e., for determination of "gross contamination" or for determination of contamination greater than allowed for exit from an RCA.

The stated answer is "c", 400 cpm (300 background + 100 actual). This response is supported by the Radiation Worker Training Manual (Reference 1) which indicates in a note that a check for "gross contamination" may be made in a background as high as 300 cpm. However, the note also states that "you cannot properly use a frisker in an area where the background radiation levels are elevated". The manual states that using a frisker in this high a background would not allow one to exit the RCA and states that an exit can only be made if frisking was done in a background at less than 200 cpm. Millstone Health Physics Operations Procedure, RPM 2.11.1, step 4.1.3 (Reference 2) states that "if background radiation is high (i.e., greater than 200 cpm), direct individual to a frisking station in a low background area." This procedure (RPM) superseded the given reference, SHP 4909A, on 1/1/94. Using the information provided in this procedure, the answer would be "b", 300 cpm.

Given the ambiguity of the purpose of the whole body frisk and dual information available, we request that both answers "b" and "c" be accepted.

References:

1. Radiation Worker Training Manual, Jan. 1994, Pg. 35

2. Millstone Nuclear Power Station Health Physics Operations Procedure, Surveys of Personnel and Clothing, RPM 2.11.1, Rev 0, Page 4 of 9

Recommendation:

Credit given for "b" and "c."

Question 55 Question 55 deals with the placement of tags on a switch if the switch is to be removed. The reference listed is ACP-2.06A, Rev.21, page 3, (Reference 1). Rev 21 of the ACP was due to be effective at Millstone Unit 3 on February 11, 1994. On February 9, 1994, Station Management issued memo MP-94-108, (Reference 2), which delayed the implementation of ACP-2.06A until April 1, 1994. The tagging procedure still in effect, (Attachment 9 of ACP-2.06A) does not specifically address the situation stated in the question. The situation currently would be decided by the SS and the Job leader. The question answer is not supported by the procedure and currently does not have a correct answer.

References:

1. ACP-2.06A, Rev 21

2. Memo MP-94-108

Recommendation:

Delete the question from the examination.

Question 58 The question measures the candidate's knowledge of Millstone Unit 3 operations philosophy as it relates to the appropriate actions a Control Operator should take if he believes a manual reactor trip is required. The appropriate actions in this instance are documented in two operating procedures: OP-3272 and OP-3276.

- OP-3272 states: "If, at any time, a licensed operator observes that a safety signal actuation is required or is needed to place the plant in a safe condition, he may manually initiate the signal and operate the necessary equipment to place the system in the required safe condition."

- OP-3276 states: "If at any time a Control Operator believes that a manual scram/trip or ESF/safeguards actuation is necessary they shall announce the pertinent plant conditions and their recommendation or intention and then perform the required action. No response is required from the SCO or SS."

The answer specified in the examination key, "d," does not contradict this guidance and, therefore, is correct. However, the working in answer "d," "perform the required action without waiting for any supervisory acknowledgement or direction," could imply that awaiting supervisory acknowledgement is not allowed. The procedures referenced clearly indicate that such acknowledgement is not required. However, they are silent regarding the option afforded the Control Operator to await, if appropriate, such acknowledgement. Regarding this, the Operations Manager has stated that it is his preference that the Control Operator report the automatic actuation failure to the SCO, and that the SCO direct the actuation of the RPS.

The candidates were aware of this preference and that this issue had been the topic of some discussion in recent months. They were aware that the Operations Manager believed that this preferred approach is consistent with the requirements of the procedure. Accordingly, we believe that answer "d" and answer "a," "wait and perform the action when directed by the SCO," are both correct.

Reference:

1. OP-3276, Conduct of Operations, Rev. 1, page 12

2. OP-3272, EOP User's Guide, Rev. 4, Att. 3, Special Considerations, sheet 3 of 3

3. Operations manager exam comments of 2/18/94

Recommendation:

Credit given for answer "a" or "d."

Question 64 The question asks the candidate how to verify a locked open valve as an independent verifier. The selected correct answer has the operator position the valve in the open direction. This is contrary to the guidance of 3-OPS-3.07 Rev. 6, page 7 of 7, column 2, item 3.

"Manual Valve - turn valve handwheel in CLOSE direction until it is confirmed OPEN..." (REFERENCE 1.)

The above referenced method is HOW to verify a locked open valve when sufficient slack is available.

ACP-QA-2.20 Methods of Performing Verifications...section 3.1.3 states:

"CHECK the valve stem position or mechanical position indicator and DETERMINE if the valve is in the required position." (REFERENCE 2)

Based on the guidance of reference 2, selection "c" is the most correct.

Reference:

1. 3-OPS-3.07, Valve Operations, Rev. 6, page 7 of 7

2. ACP-QA-2.20, Determination and Performance of Independent and Dual Verifications, Rev. 5, Attachment 5, sheet 3 of 7

Recommendation:

Change correct answer to "c."

Question 66 The question requires selecting the MINIMUM actions that must be taken in the next 30 minutes as a result of a #1 seal failure on an RCP. (The first action - close the seal leakoff valve - is given.)

We believe that there is no correct answer provided. The exam key states "d" as the answer, listing the following steps as the MINIMUM required:

- reduce power < 37%
- defeat loop temperature input
- stop the pump
- close Pzr spray valve

Distractor "c" lists the first three of the above steps, leaving off "close the Pzr spray valve". The procedure, AOP 3554, (Reference 1) states that within 30 minutes reduce power to less than 37% (step 3). This step is followed by a note stating that within 30 minutes steps 4, 5, and 6 must be completed. The high level action statements of these steps that must be completed are:

4. Defeat The Affected Loops Temperature Input
5. Feed The Affected SG To Between 65% And 70%
6. Remove The Affected RCP From Service

It should be noted that the exam answer does not list the major action of feeding the affected SG (to avoid a reactor trip) but does list closing the affected spray valve which is a substep of step 6. The omission of a major action step and other substeps created confusion as to what are "MINIMUM required actions" in the question stem. Therefore, several candidates believed that closing the spray valve was not to be included as a minimum action and subsequently answered "c." It also should be noted that we do not require license candidates to memorize abnormal operating procedure steps and substeps.

References:

1. AOP 3554, RCP Trip Or Stopping A RCP At Power, Rev 4., Pages 4, 5, and 6

Recommendation:

Credit answers "c" and "d" or delete the question from the examination.

Question 88 The question requires the candidate to describe the order of priority for starting ECCS pumps during a loss of inventory condition while in MODE 6 and Reduced Inventory Operation, with a cold leg maintenance opening.

Since the question stem provides conflicting initial conditions, that is, MODE 6 simultaneous with RIO, there are two correct answer options. Reduced Inventory Operations may only be conducted in MODE 5 as stated in OP 3270A (Reference 1). If the plant is in the RIO condition, as suggested in the second part of the stem, the given answer "b" is correct (EOP 3505, Attachment A, Reference 2). However, if the plant is in MODE 6, as given in the first part of the stem; then the closest answer is "a" where the Charging Pump followed by the SI pump is the given order of priority (EOP 3505, Attachment C).

Additionally, although the procedure number and attachment letter designation was provided in the question stem, memorization of steps in attachments falls outside of the memorization requirement of immediate action steps.

Reference:

1. OP 3270A, Reduced Inventory Operation Mode 5 (IPTE), Rev. 0, Page 4 of 65, Prerequisite 2.1.5

2. EOP 3505, Loss Of Shutdown Cooling and/or RCS Inventory, Attachment A, Page 7 of 16 and Attachment C, Page 5 of 6

Recommendation:

Credit given for answers "a" and "b" or delete the question.

Question 96 - The question asks for the instrument failure which does not require placing Main Feed Pump speed control in MANUAL.

Since the stem of the question did not indicate that the source of the answer was to be in accordance with an operating procedure, several candidates assumed the question was seeking a system/component response answer. Using that assumption, the first distractor, narrow range SG level, satisfies the question stem since level is not an input to the feed pump master speed controller and, as such, will not directly affect the response of the master speed controller (Reference 1).

Answer option "d", feed flow, which is the examination key answer, also does not input the master speed controller and coincidentally does not by procedure call for the speed controller to be placed in manual if it fails.

Reference:

1. Westinghouse Process Control Block Diagrams sheet 25 and sheet 33.

Recommendation:

Credit given for answers "a" and "d."

ATTACHMENT 4

SIMULATION FACILITY REPORT

Facility: Millstone 3

Facility Docket No: 50-423

Operating Tests Administered From: March 1-3, 1994

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

The simulator, for the most part, correctly modeled the Millstone, Unit 3 plant. During the simulator examination, the simulator froze up once during one of the scenarios; however, it was early enough that the examiners were able to continue on with the scenario, once the problem was identified and corrected. One of the core exit thermocouples provided an erroneously high temperature, which the simulator software did not recognize, resulting in a stoppage of all simulator functions. The facility simulator operator stated that this situation occasionally happens and that appropriate deficiency reports had been written; however, the problem would not be ultimately corrected until the simulator software was updated. A simulator software upgrade is scheduled within the next couple of years.