

**Susquehanna Learning Center**  
769 Salem Boulevard  
Berwick, PA 18603-0467  
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September 9, 2003

Mr. John Caruso  
USNRC Chief Examiner  
USNRC Region 1  
475 Allendale Road  
King of Prussia, PA 19406-1415

Susquehanna Learning Center  
**Follow-up Post-Examination Comments**  
PLA 005673 File A14-13D

Dear Mr. Caruso:

In our Post-Examination Materials letter to you, dated August 20, 2003, (PLA 005667; File A14-13D), we requested a modification to the Written Examination Answer Key for Question Number 82, and supplied documentation for the requested modification in Attachment 1 to the letter.

After additional review of this question, we respectfully retract our request to modify the Written Examination Answer Key for Question Number 82. During the additional review, we concluded that the stem of the question is flawed. In that question, the given value for Wide range level is -146 inches, and that of the Fuel Zone is -93 inches. At the given reactor pressure of 50 psig, these two values should be nearly the same. Therefore, the stem of the question poses conditions that are not realistic. Additionally, under the conditions stated in the stem of the question, two of the distractors are not plausible.

Based on the information provided by the additional review, we request Question Number 82 be deleted from the Written Examination.

If you have any questions or require more information, please contact me at 570-542-3326 or Rich Brooks at 570-542-1891.

*-KMR*

K. M. Roush  
Manager - Nuclear Training

Response: No

cc: Ops Letter File  
Nuc Records – NUCPT

rb post exam follow-up memo 1

KMR/RB/vah

**Susquehanna Learning Center**

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August 20, 2003

Mr. John Caruso  
USNRC Chief Examiner  
USNRC Region 1  
475 Allendale Road  
King of Prussia, PA 19406-1415

Susquehanna Learning Center  
**Post Examination Materials**  
PLA 005667                      File A14-13D

Dear Mr. Caruso:

In accordance with the guidance provided in NUREG 1021, "Operating Licensing Examination Standards for Power Reactors" (Draft Revision 9) ES-501 "Initial Post-Examination Activities", the following materials are submitted in support of the Susquehanna Initial Licensing Examination that concluded on August 15, 2003.

1. The graded, ORIGINAL, written examinations.
2. Two clean copies of each Applicant's answer sheet.
3. The MASTER examination and answer key. (One change to the MASTER was necessary during the administration of the examination. See Question #82 typographical correction.)
4. All questions asked by the Applicants during the administration of the examination and the Proctor's responses to those questions.
5. The written examination seating chart.
6. Form ES-403-1 "Written Examination Grading Quality Checklist"
7. Requested modification to the Written Examination answer key (Question #82), with supporting documentation. (Attachment 1)

After the written examination was completed, an exam analysis was performed, and the Applicants participated in a review session to determine if enhancements to the questions were necessary. Results of this analysis/review indicate several questions (Questions 28, 70, 72, 81, 82, and 88) that should be enhanced prior to reuse. Additionally, four generic weaknesses (Questions missed by 50 percent or more of the Candidates) in the Training Program were identified with Questions 16, 70, 71, and 91. Correction of the generic weaknesses and enhancement of these questions will be tracked by the Corrective Action Program.

All individuals signed on to Form ES-201-3, " Examination Security Agreement", have not yet completed the post-examination signature. When Form ES-201-3, " Examination Security Agreement", has been completed, it will be forwarded to you, thus completing the necessary documentation for this Susquehanna Initial Licensing Examination.

If you have any questions, or require more information, please contact me at 570-542-3326 or Rich Brooks at 570-542-1891.



K. M. Roush  
Manager - Nuclear Training

Response: No

Enclosures

cc: Ops Letter File  
Nuc Records - NUCPT

rb post exam memo

RB/KMR/vah

## Attachment 1 Facility Comments for Question #82

### Comment:

The question presents a LOCA with RPV slowly trending downward and various additional plant conditions and then asks, Using ON-145-004 which Reactor level instrument would you instruct the operators to use **as water level lowers**. The answer key answer was "D. Wide Range". This was an open-book question, the students were given ON-145-004 "RPV Water Level Anomaly" to use for this question.

The given value, in the question, of -146 inches for the wide range can be extended to -147 inches using ON-145-004 "RPV Water Level Anomaly" Attachment C (Attachment 2 page 2). This would leave only 1 inch of useable level indication as water level continued to drop.

The question provided a value of -93 inches for the Fuel Zone. For the given RPV pressure of 50 PSIG (use the 100 psig graph for conservative level indication) and using Attachment D of ON-145-004 "RPV Water Level Anomaly" (Attachment 2 page 3) the Fuel Zone would be on scale at -93 inches and would extend down to -307 inches. This would leave 214 inches of useable level indication as water level continued to drop.

Based on this information, we consider the only correct answer to question #82 is "B. Fuel Zone".

# TEMPERATURE AFFECT ON THE USABILITY OF RPV WATER LEVEL INSTRUMENTS

RPV water level indication is affected by RPV pressure and instrument run temperatures. Figures 1 - 7 provide pressure and temperature limitations to be considered in determining whether level indication is "usable." Per EOP Caution #1, an RPV water level instrument may be usable when determined usable in accordance with ON-145-004, or it reads within the prescribed band.

Figure 1 is a saturation temperature curve. When temperatures near instrument runs are above Figure 1, flashing of water in the instrument runs will cause unreliable water level indication.

Figures 2 - 7 are graphs of indicated RPV water level vs temperature near the reference leg vertical runs. Below the curves, indicated level could be caused by off-calibration Drywell and Reactor Building temperatures which may result in on-scale indication even when water level is below the instrument tap.

The "prescribed band" of Caution #1 is a result of simplifying information from Figures 2 - 7. The upper end of the "prescribed band" is the upper limit of the instrument indicator range. The lower end of the "prescribed band" is the "Minimum Indicated Level (MIL)." MIL is derived from Figures 2 - 7 assuming a maximum Drywell temperature of 350°F near the reference leg vertical runs (except for Fuel Zone which is assumed to be 100°F). 350°F is assumed because EO-100-103, Primary Containment Control, requires Rapid Depressurization before exceeding 340°F.

| Instrument                   | MIL    | Caution 1    | Assumed DW temp | Limiting RB temp |
|------------------------------|--------|--------------|-----------------|------------------|
| Narrow Range A (B) (C)       | 2.1    | <b>2</b>     | 350             | 350              |
| Wide Range A(B)-FIRE ON 749' | -126.8 | <b>-125</b>  | 350             | 350              |
| -NO FIRE ON 749'             | -147   | <b>-145</b>  | 350             | 212              |
| Extended Range A             | -88    | <b>-85</b>   | 350             | 350              |
| Extended Range B             | -87.7  |              | 350             | 350              |
| Fuel Zone A                  | -304.3 | <b>-290*</b> | 100             | 350              |
| Fuel Zone B                  | -293.8 |              | 100             | 350              |
| Shutdown Range               | 46.5   | <b>50</b>    | 350             | 350              |
| Upset Range                  | 42.1   | <b>45</b>    | 350             | 350              |

\* Fuel Zone is calibrated for drywell temp of 212° F and is effected inversely by elevated Drywell temperatures.

ACTUAL RPV WATER LEVEL (INCHES)

| Fuel Zone Indicated   |      | RPV Pressure (psig) |      |      |      |      |      |      |      |      |      |      |      |
|-----------------------|------|---------------------|------|------|------|------|------|------|------|------|------|------|------|
|                       |      | 0                   | 100  | 200  | 300  | 400  | 500  | 600  | 700  | 800  | 900  | 1000 | 1100 |
| INCHES<br>OF<br>WATER | -110 | -110                | -93  | -83  | -76  | -70  | -64  | -58  | -53  | -48  | -43  | -37  | -32  |
|                       | -120 | -120                | -104 | -95  | -88  | -82  | -76  | -71  | -66  | -61  | -56  | -51  | -46  |
|                       | -130 | -130                | -114 | -106 | -99  | -93  | -88  | -83  | -79  | -74  | -69  | -64  | -60  |
|                       | -140 | -140                | -125 | -117 | -111 | -105 | -101 | -96  | -91  | -87  | -83  | -78  | -74  |
|                       | -150 | -150                | -136 | -128 | -122 | -117 | -113 | -108 | -104 | -100 | -96  | -92  | -88  |
|                       | TAF  | -160                | -147 | -139 | -134 | -129 | -125 | -120 | -117 | -113 | -109 | -106 | -102 |
|                       | -170 | -170                | -157 | -150 | -145 | -141 | -137 | -133 | -130 | -126 | -123 | -119 | -116 |
|                       | -180 | -180                | -168 | -161 | -157 | -153 | -149 | -145 | -142 | -139 | -136 | -133 | -130 |
|                       | -190 | -190                | -179 | -173 | -168 | -164 | -161 | -158 | -155 | -152 | -150 | -147 | -144 |
|                       | -200 | -200                | -189 | -184 | -180 | -176 | -173 | -170 | -168 | -165 | -163 | -160 | -158 |
|                       | -210 | -210                | -200 | -195 | -191 | -188 | -186 | -183 | -181 | -178 | -176 | -174 | -172 |
|                       | -220 | -220                | -211 | -206 | -203 | -200 | -198 | -195 | -193 | -191 | -190 | -188 | -186 |
|                       | -230 | -230                | -222 | -217 | -214 | -212 | -210 | -208 | -206 | -204 | -203 | -201 | -200 |
|                       | -240 | -240                | -232 | -228 | -226 | -224 | -222 | -220 | -219 | -218 | -217 | -215 | -215 |
|                       | -250 | -250                | -243 | -239 | -237 | -235 | -234 | -233 | -232 | -231 | -230 | -229 | -229 |
|                       | -260 | -260                | -254 | -251 | -249 | -247 | -246 | -245 | -244 | -244 | -243 | -243 | -243 |
|                       | -270 | -270                | -265 | -262 | -260 | -259 | -258 | -257 | -257 | -257 | -257 | -257 | -257 |
|                       | -280 | -280                | -275 | -273 | -272 | -271 | -271 | -270 | -270 | -270 | -270 | -270 | -271 |
|                       | -290 | -290                | -284 | -284 | -283 | -283 | -282 | -283 | -283 | -283 | -284 | -286 | -285 |
|                       | -300 | -300                | -297 | -295 | -295 | -295 | -295 | -295 | -295 | -296 | -297 | -297 | -299 |
|                       | -310 | -310                | -307 | -306 | -306 | -306 | -307 | -307 | -308 | -309 | -310 | -311 | -313 |

The below table lists calibration data.

| NAME                | CALIBRATED   |
|---------------------|--|
| Wide Range          | 1035 psig in vessel, 135°F in Drywell                |
| Narrow Range        | Saturated, 1035 psig in vessel, 135°F in Drywell     |
| Upset Range         | Saturated, 1035 psig in vessel, 135°F in Drywell     |
| Shutdown Range      | 120°F water at 0 psig, 80°F in Drywell               |
| Extended Wide Range | 1035 psig in vessel, 135°F in Drywell                |
| Fuel Zone           | 0 psig in vessel, 212°F in Drywell, no jet pump flow |