February 10, 2004

Mr. Bryce L. Shriver
Senior Vice President and
Chief Nuclear Officer
PPL Susquehanna, LLC
769 Salem Blvd., NUCSB3
Berwick, PA 18603-0467

SUBJECT: SUSQUEHANNA STEAM ELECTRIC STATION UNITS 1 & 2 STATION SENIOR REACTOR OPERATOR INITIAL RETAKE EXAMINATION REPORT NO. 05000387/2004301 AND 05000388/2004301

Dear Mr. Shriver:

This report transmits the results of the senior reactor operator (SRO) licensing written retake examination conducted by the NRC December 15, 2003. This examination addressed areas important to public health and safety and was developed and administered using the guidelines of the "Examination Standards for Power Reactors" (NUREG-1021, Draft Revision 9).

Based on the results of the examination, two Senior Reactor Operator Upgrade applicants passed the written retake examination. On January 9, 2004, the NRC provided final examination results, including individual license numbers, during a telephone call between myself and Mr. Robert Boesch and others of your staff. No findings of significance were identified.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). These records include the final SRO Written examination and are available in ADAMS - Accession Number ML040150659, and Facility Post Examination Comments on the Written Exam - Accession No.ML040150675. ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

Should you have any questions regarding this examination, 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 Nos. 50-387, 50-388
License Nos. NPF-14, NPF-22

Enclosure: Initial Examination Report No. 05000387/2004301 and 05000388/2004301 w/attachments

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REGION I

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|---|---|
| Docket Nos: | 50-387, 50-388 |
| License Nos: | NPF-14, NPF-22 |
| Report Nos: | 05000387/2004301 and 05000388/2004301 |
| Licensee: | PPL, Susquehanna, LLC |
| Facility: | Susquehanna Steam Electric Station Units 1 and 2 |
| Dates: | December 15, 2003 (Written Examination Administration)<br>December 18, 2003 (Licensee Initial Post Exam Comments)<br>January 5, 2004 (Licensee Final Post Exam Comments) |
| Examiner: | J. Caruso, Senior Operations Engineer (Chief Examiner) |
| Approved by: | Richard J. Conte, Chief<br>Operational Safety Branch<br>Division of Reactor Safety |

Enclosure

## SUMMARY OF FINDINGS

IR 05000387/2004-301 and 05000388/2004-301; 12/15/03; Susquehanna Steam Electric Station Units 1 and 2; Initial Operator Written Retake Licensing Examination; Two of two SRO upgrade applicants passed the examination.

The written examinations were administered by the facility.

A. Inspector Identified Findings

No findings of significance were identified.

B. Licensee Identified Findings

None.

Report Details

## 1. REACTOR SAFETY

Mitigating Systems - Reactor Operator (RO) and Senior Reactor Operator (SRO) Initial License Examination

a. Scope of Review

The licensee's examination team developed the written and operating initial examinations and together with NRC personnel verified or ensured, as applicable, the following:

- The examination was prepared and developed in accordance with the guidelines of Draft Revision 9 of NUREG-1021, "Operator Licensing Examination Standards for Power Reactors." A review was conducted both in the Region I office and at the Susquehanna Unit 1 and 2 station plant and training facility.

- A test item analysis was completed on the written examination for feedback into the systems approach to training program.

- Examination security requirements were met.

Susquehanna Station training staff administered the written examination on December 15, 2003.

b. Findings

Grading and Results

Two SRO upgrade applicants s passed all portions of the initial licensing examination.

Two written post-examination comments initial submittal dated December 18, 2003 and follow-up final post-examination comments were submitted January 5, 2004 by the licensee for SRO question numbers 5 and 9, see Attachment 2 for the NRC's resolution.

Examination Preparation and Quality

The quality of the draft examinations was within acceptable range.

Examination Administration and Performance

No concerns were identified.

## 4. OTHER ACTIVITIES

4OA6 Meetings, including Exit

The written retake examination was administered December 15, 2003. Grading and evaluation of post examination comments occurred from December 15, 2033 - January 8, 2004 with interim telephone calls in support of the process . Final post examination comments were submitted by the facility licensee on January 5, 2004. On January 9, 2004, the NRC provided conclusions and examination results to Mr. R. Boesch, Operations Training Manager, via telephone. License numbers for both applicants that passed the initial written retake licensing examination were also provided during this time.

The NRC expressed appreciation for the cooperation and assistance that was provided during the preparation and administration of the examination by the licensee's training staff.

**Attachment 1**

**SUPPLEMENTAL INFORMATION**

**KEY POINTS OF CONTACT**

LICENSEE PERSONNEL

R. Boesch, Operations Training Manager
J. Seek, Nuclear Operations Training Supervisor (initial)
R. Brooks, Facility Exam Contact
R. Halm, Facility Exam Contact

NRC PERSONNEL

J. Caruso, Senior Operations Engineer (Chief Examiner)

**LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED**

None

**ATTACHMENT 2**

**NRC RESOLUTION OF LICENSEE COMMENTS**

Licensee's Post Written Examination Comments Publically Available
in ADAMS Accession No. ML040150675

**Question: SRO 5**

Licensee Comment Summary:

The stem of the question poses a situation where a control room evacuation is required and a transfer switch malfunction occurs at the Unit 1 Remote Shutdown Panel (RSP) preventing control of the "B" RHR pump. The question then asks "As Unit Supervisor what direction will be given to start an RHR pump when using the MANUAL method for suppression pool cooling?"

If the control room is evacuated, both control rooms would be evacuated concurrently since the control rooms share a common area. Unit 1 control room personnel would be dispatched to the Unit 1 RSP and attempt to start the "1B" RHR pump and Unit 2 control room personnel would be dispatched to the Unit 2 RSP and start the "2A" RHR pump as required since they are the only pumps with controls at RSPs.

Answer choice "C" is the correct answer to this question based on the most logical and practical approach to reaching the desired outcome. The design of the Unit 1 Remote Shutdown Panel (RSP) is to control the "B" loop of RHR from the RSP which consists of the "B" & "D" RHR pumps and all the associated valves to operate the Loop in the various modes of RHR operation. Although, not specifically directed by procedure, if the "1B" RHR pump is unavailable then the Unit Supervisor would direct the "1D" RHR pump to be started locally at the pump breaker which would still allow controlling the "B" loop from the U-1 RSP. The design of the U-2 RSP is to control A Loop of RHR from the RSP, which consists of the "A" & "C" RHR pumps. At the U-2 RSP the "2A" RHR pump would be placed in service to provide either suppression pool cooling or other RHR functions, as addressed IAW Unit 2 procedures. With U-2 using "2A" RHR pump, it is not possible for Unit 1 to energize "1A" RHR pump due to an electrical interlock.

Answer choice "B" is incorrect. Procedurally the operators at Unit 1 RSP would use OP-149-005 "RHR Suppression Pool Cooling" section 2.5 to place RHR "B" loop in SPC. The following note is in the procedure, "If RHR loop B is unavailable for suppression pool cooling, section 2.7 provides the necessary instructions for placing A loop in service..." The loss of "1B" RHR pump does not constitute a loss of RHR loop B because the "1D" RHR pump is still available. In addition, if the decision was made to start the "1A" RHR pump locally to support operations from the Unit 1 RSP, all valve manipulations required to support placing RHR in Suppression Pool Cooling would also need to be performed manually in the field for U-1 (i.e., 15 breakers to be opened and 15 valves to be checked and/or operated). Furthermore, if U-1 used the 1A RHR pump to support suppression pool cooling, then U-2 would be prevented from using the 2A RHR pump (i.e., the preferred pump) due to a breaker interlock. Finally, the operators at Unit 2 RSP would use OP-249-005 "RHR Suppression Pool Cooling" section 2.5 to place RHR

"A" loop in SPC. At step 2.5.5 the operator would be directed to determine if the 1A RHR pump is running and trip it locally if it is. This interlock between each Unit's RHR pumps and the fact that U-2 would be running "2A" RHR pump makes both the "A" and "B" distractors incorrect. The "D" distractor is also incorrect since the DC trip and control power knife switch is not opened for this type of evolution.

NRC Resolution: In the event of a control room evacuation, the U-1 operators are procedurally directed to utilize the "B" Loop and the U-2 would utilize the "A" Loop of RHR for suppression pool cooling at their respective RSPs. Based on the conditions posed in the stem of the question, the "1B" RHR pump control has been lost at the U-1 RSP (i.e., the "1B" is the only pump actually controlled at the U-1 RSP). However, the "B" Loop of RHR would still be available by starting the "1D" RHR pump locally at the breaker. OP-149-005 does not specifically direct starting the "1D" RHR pump on a loss of the "1B" RHR. However, "1D" RHR is part of the RHR "B" Loop and would therefore be the logical choice to place the "B" Loop in Suppression Pool Cooling, since all the valves and the associated controls for the remainder of the "B" Loop would still be functional at the U-1 RSP. This action would allow all Loop "B" RHR valve manipulations and system monitoring to be accomplished at the U-1 RSP as designed and avoid unnecessary manual valve manipulations that would be required as a consequence of using the "1A" RHR pump. Furthermore, U-2 could still utilize their "2A" RHR pump as directed by procedures and as designed from the U-2 RSP (i.e., the "2A" is the only pump actually controlled at the U-2 RSP). Finally, the use of "1D" RHR pump is consistent with Emergency Operating Procedures that direct the use of "available suppression pool cooling". As noted above, "1D" RHR pump is "available".

Since OP-149-005 does not specifically direct starting the "1D" RHR pump on a loss of the "1B" RHR, the Chief Examiner contacted the licensee on January 8, 2003, and asked, if there was any other procedure guidance that would procedurally support the starting of the "1D" RHR pump. In addition to the guidance in OP-149-005, the licensee's representative indicated that in this situation licensed operators would rely on the guidance in OP-AD-055, section 7.2 which states, "If no procedure exists which addresses the evolution and the current circumstances... Find another means of accomplishing the same thing that is covered by a procedure. This could mean using another component, another system, or another line-up". In this situation, since "1D" would be the preferred pump, guidance for manual local starting a pump is described in OP-149-005, section 2.7.6.a, at the breaker place the lateral control switch to the **HANDLE OUT** position.

Although, the guidance in both OP-149-005 and OP-249-005 procedures needs enhancement as mentioned in the licensee's response, answer choice "C" that would start the "1D" RHR pump locally at the breaker is the correct answer.

The question originally designated choice "B" as the correct answer which would utilize "1A" RHR pump for Suppression Pool Cooling by staring it locally. The "1A" RHR pump is electrically interlocked with the "2A" RHR pump such that only one of these pumps can be operated at any given time. Because of this interlock and since U-2 would by design preferentially use the '2A" RHR pump, the "1A" RHR pump is effectively unavailable. This is a reasonable determination for the conditions in the stem of the question (i.e., U-1 and 2 control rooms are common and would be evacuated). In any case, the use of the "1A" pump would not be a logical choice since control of the RHR system could no longer be accomplished as

designed at the U-1 RSP. Furthermore, all valve manipulations required to support placing RHR in Suppression Pool Cooling would also need to be performed manually in the field for U-1.

Although "1C" RHR pump would have been available for use based on the posed question, it was not provided as an answer choice to this question. Additionally, using "1C" RHR would involve numerous unnecessary manual manipulations and would also be a less desirable choice ( but not procedurally incorrect) than "1B". In summary, for the given situation, the order of preference for use of the still functional U-1 RHR pumps would have been to use "1D" first, "1C" second and "1A" only as a last resort and with careful coordination with U-2 personnel at the U-2 RSP.

Note: The licensee's original recommendation for this question was submitted by letter December 18, 2003. The licensee provided a revised, more detailed justification as an attachment to a letter dated January 5, 2004 in response to questions raised by the Region I staff via telecoms with the licensee's representative during the week of December 29, 2003. These questions concerned more specific details of the RHR system and RSP designs such as which RHR pumps could be operated at each of the RSPs, as well as some procedure details (e.g. OP-149-005, section 2.5.2 and 2.7.2 precaution notes, and OP-249-005 , section 2.5.5) that were not included in the original submittal.

The recommendation of licensee's final comment is accepted to change the answer key answer for SRO question 5 to "C".

**Question: SRO 9**

Licensee Original Comment: The licensee's original comment was sent by letter dated December 18, 2003. The stem of the question sets up initial conditions where a Main Steam Line isolation from 100% power has occurred. The plant response to a MSIV isolation will cause SRVs to open for control of the initial pressure rise and auto start of HPCI and RCIC due to shrink caused by pressure increasing and rapid reduction in power. The scram resulting from the MSIVs closing, and the low level due to collapsed voids cause entry into EO-100-102 RPV Level as stated in the stem. The candidates were not provided any references to answer this question.

The stem shows that the suppression pool bulk volume was initially heated up due to three factors; HPCI and RCIC in service with an initial surge of steam from open SRVs. The stem provides temperature indications of suppression pool temperatures which indicate bulk pool temperatures (MAT 37) are higher than normal (90°F), and the SPOTMOS Div I & II indications being influenced by the current HPCI exhaust discharge are 101°F and 103°F respectively. The question then asks "Assess these Suppression Pool water temperature indications and determine what actions are required.

The answer key answer was "D" HPCI exhaust steam is heating a local area of the Suppression Pool. Direct 'B' Loop of RHR Suppression Pool Cooling to be placed in service. This answer was based on following a note in OP-152-001 which addresses using Loop "B" of RHR as the preferred loop when HPCI is in service.

However, the stem of the question also has the bulk fluid temperature of the suppression pool at 90°F, as indicated by MAT 37 and the SPOTMOS Div I & II indications at 101°F and 103°F. These temperature indications meet the entry conditions for EO-100-103 "PC CONTROL" (attached). The instructions of this higher tier procedure do not contain the directions to place "B" loop of suppression pool cooling into service, RATHER this procedure instructs the operating crew to Maximize suppression pool cooling by placing all available loops into service. This would require BOTH loops of suppression pool cooling into service. NONE of the choices in the question address placing both loops into service, therefore, there is no correct answer to the question. The licensee original recommendation based on the above arguments was to delete question #9 from the exam, since there is no correct answer.

NRC Initial Response: Essentially the licensee was making the case that the stem had (inadvertently) put the plant into an entry condition for the Primary Containment Control EOP and, therefore, the operators would be directed to "maximize suppression pool cooling". Since "available suppression pool cooling" would include two RHR loops and since starting two loops was not an answer offered for the question there is NO correct answer for this question.

The Region I staff contacted the licensee via telecom the week of December 29, 2003 and discussed some major comments/ concerns regrading the licensee's initial comment.

1. The basis document for Primary Containment Control, EO-000-103, revision 2, step SP/T-1, states the most accurate method of determining Suppression Pool temperature is by using bulk Suppression Pool temperature as calculated by MAT 37 or 38. In the stem of the question MAT 37 indicates 90 deg F.

2. The EOP entry condition is greater than 90 deg. F and the stem indicates temperature is at 90 deg. F. Therefore, there is no compelling reason to ENTER EO-100-103 at this moment. Use of the "normal" system operating procedure is "allowed" by conditions specified in the stem.

3. OP-152-001, Step 2.2.12, directs the operator to "Place Suppression Pool Cooling in operation in accordance with OP-149-005" and is preceded by the note regarding the "B" RHR Pump being preferable. Once HPCI is operating suppression pool cooling is initiated (using the "B" RHR Pump). There is no need to "wait" for entry into EO-100-103. In addition, the operator is directed to use the "normal" RHR Procedure (OP-149-005).

4. Procedure OP-149-005 directs the operator to Start RHR Pump (A)(B(C)(D) for suppression pool cooling. It does NOT say Start RHR Pump(s) (A)(B)(C) and/or(D). This indicates the intent is to start only one RHR pump when initiating "normal" Suppression Pool Cooling. Since the note in OP-152-001 indicates the "B" RHR pump is preferable, then it is assumed the operator would follow the "normal" system operating procedures and start RHR Pump B. Therefore, "D" is a correct answer for the SRO following the "normal" procedures.

Attachment

5. Since the HPCI is in CST to CST mode the operators would have had to manually change the configuration (from injection mode) using Section 2.7 of the “normal” procedure. This would take approximately 4-5 minutes to line-up and by this time bulk pool temperature would be stable and the only source of heat would be localized heating from the HPCI system. The question stem stated SPOTMOS Division I & II indicated 101 deg F and 103 deg., respectively, which would be indicative of a HPCI localized heating condition when considering all the conditions provided in the stem of the question. Further, alarm response procedure AR-112-001, section 1.1, note states, ”With HPCI in operation, the suppression pool may stratify so that plant computer reads 88F when SPOTMOS reads 105F”.

6. EO-000-103, step SP/T-2 states that “When supp pool temp cannot be maintained < 90 degrees F, maximize supp cooling...”. An experienced Unit Supervisor could look at the information in the stem (HPCI exhaust steam is the only input of heat to the suppression pool) and conclude that one RHR Pump should be able to reduce the temperature below 90 degrees F (once started) and therefore would see no compelling need to start additional RHR pumps.

Licensee Follow-up Comment: On January 6, 2004, Region I received a follow-up comment (licensee letter dated January 5, 2004) to SRO question #9 indicating that after additional review the licensee had concluded that there is sufficient information in the stem of the question to support “D” as the only correct answer to the question as originally written.

NRC Resolution: The recommendation of licensee’s follow-up comment is accepted. There is sufficient information in the stem of the question to support “D” as the only correct answer to the question as originally written and as explained above.

Attachment