UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
1600 E. LAMAR BLVD
ARLINGTON, TX 76011-4511

April 10, 2017

Mr. Mark E. Reddemann
Chief Executive Officer
Energy Northwest
MD 1023
P.O. Box 968
Richland, WA 99352

SUBJECT: COLUMBIA GENERATING STATION - NRC EXAMINATION REPORT 05000397/2017301

Dear Mr. Reddemann:

On March 3, 2017, the U.S. Nuclear Regulatory Commission (NRC) completed an initial operator license examination at Columbia Generating Station. The enclosed report documents the examination results and licensing decisions. The preliminary examination results were discussed on March 3, 2017, with Mr. B. Sawatzke, Chief Nuclear Officer, and other members of your staff. A telephonic exit meeting was conducted on March 24, 2017, with Mr. R. Meyers, Operations Training Manager, who was provided the NRC licensing decisions.

The examination included the evaluation of four applicants for reactor operator licenses, five applicants for instant senior reactor operator licenses, and one applicant for upgrade senior reactor operator license. The license examiners determined that eight of the ten applicants satisfied the requirements of 10 CFR Part 55, and the appropriate licenses have been issued. One license is being held in abeyance pending resolution of any potential written examination appeals, per the guidance of NUREG 1021, "Operator Licensing Examination Standards for Power Reactors," Revision 10, ES-501.D.3.d. There were two post-examination comments submitted by your staff. Enclosure 1 contains details of this report and Enclosure 2 summarizes post-examination comment resolution.

No findings were identified during this examination.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice and Procedure," 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

Agencywide Documents Access and Management System (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

Sincerely,

/RA/

Vincent G. Gaddy, Chief
Operations Branch
Division of Reactor Safety

Docket No. 50-397
License No. NPF-21

Enclosures:
1. Examination Report 05000397/2017301
   w/Attachment: Supplemental Information
2. NRC Post Examination Comment
   Resolution

cc w/enclosure:
Electronic Distribution for Columbia Generating Station

COLUMBIA GENERATING STATION - NRC EXAMINATION REPORT 05000397/2017301 – April 10, 2017

DISTRIBUTION:
K. Kennedy, RA
S. Morris, DRA
T. Pruett, DRP
A. Vegel, DRS
J. Clark, DRS
R. Lantz, DRP
T. Hipschman, IPAT
M. Herrera, DRMA
K. Fuller, RC
V. Dricks, ORA
E. Uribe, IPAT
J. Weil, OCA
A. Moreno, RIV/CAO
J. Bowen, RIV/OEDO
B. Maier, RSLO
J. Klos, NRR
RIV ACES
J. Groom, DRP
M. Haire, DRP
R. Alexander, DRP
M. Kirk, DRP
T. Sullivan, DRP
G. Kolcum, DRP
D. Bradley, DRP
A. Elam, DRP

ADAMS ACCESSION NUMBER: ML17100A960
☒ SUNSI Review: By: VGaddy ADAMS: ☒ Yes ☐ No ☐ Non-Publicly Available ☒ Publicly Available ☒ Non-Sensitive ☐ Sensitive Keyword: NRC-002

OFFICE	SOE:OB	SOE:OB	OE:OB	ERS:RCB	C:OB	C:PBA
NAME	TFarina	COsterholtz	MHayes	MBloodgood	VGaddy	MHaire
SIGNATURE	/RA/	/RA/	/RA/	/RA/	/RA/	/RA/
DATE	3/29/17	3/29/17	4/3/17	3/31/17	3/30/17	4/6/17
OFFICE	C:OB					
NAME	VGaddy					
SIGNATURE	/RA/					
DATE	4/10/17					

OFFICIAL RECORD COPY

U.S. NUCLEAR REGULATORY COMMISSION

REGION IV

Docket:	50-397
License:	NPF-21
Report:	05000397/2017301
Licensee:	Energy Northwest
Facility:	Columbia Generating Station
Location:	MD 1023 76 North Power Plant Loop P.O. Box 968 Richland, WA 99352
Dates:	February 27 – March 24, 2017
Inspectors:	T. Farina, Chief Examiner, Senior Operations Engineer C. Osterholtz, Senior Operations Engineer M. Hayes, Operations Engineer M. Bloodgood, Emergency Response Specialist
Approved By:	Vincent G. Gaddy, Chief Operations Branch Division of Reactor Safety

Enclosure

SUMMARY

ER 05000397/2017301; 02/27/2017 – 03/24/2017; Columbia Generating Station; Initial Operator Licensing Examination Report.

NRC examiners evaluated the competency of four applicants for reactor operator licenses, five applicants for instant senior reactor operator licenses, and one applicant for upgrade senior reactor operator license at Columbia Generating Station.

The licensee developed the examinations using NUREG-1021, "Operator Licensing Examination Standards for Power Reactors," Revision 10. The written examination was administered by the licensee on March 9, 2017. NRC examiners administered the operating tests on February 27 – March 3, 2017.

The examiners determined that eight of the ten applicants satisfied the requirements of 10 CFR Part 55, and the appropriate licenses have been issued. One license is being held in abeyance pending resolution of any potential written examination appeals, per the guidance of NUREG 1021, Revision 10, ES-501.D.3.d.

A. NRC-Identified and Self-Revealing Findings

None.

B. Licensee-Identified Violations

None.

REPORT DETAILS

4. OTHER ACTIVITIES (OA)

4OA5 Other Activities (Initial Operator License Examination)

.1 License Applications

a. Scope

NRC examiners reviewed all license applications submitted to ensure each applicant satisfied relevant license eligibility requirements. Examiners also audited three of the license applications in detail to confirm that they accurately reflected the subject applicant's qualifications. This audit focused on the applicant's experience and on-the-job training, including control manipulations that provided significant reactivity changes.

b. Findings

No findings were identified.

.2 Examination Development

a. Scope

NRC examiners reviewed integrated examination outlines and draft examinations submitted by the licensee against the requirements of NUREG-1021. The NRC examination team conducted an on-site validation of the operating tests.

b. Findings

NRC examiners provided outline, draft examination, and post-validation comments to the licensee. The licensee satisfactorily completed comment resolution prior to examination administration.

NRC examiners determined the written examinations and operating tests initially submitted by the licensee were within the range of acceptability expected for a proposed examination.

.3 Operator Knowledge and Performance

a. Scope

On March 9, 2017, the licensee proctored the administration of the written examinations to all ten applicants. The licensee staff graded the written examinations, analyzed the results, and presented their analysis and post-examination comments to the NRC on March 16, 2017.

The NRC examination team administered the various portions of the operating tests to all applicants on February 27 – March 3, 2017.

b. Findings

No findings were identified.

Eight of ten applicants passed the written exam, and all applicants passed all parts of the operating test. The final written examinations and post examination analysis and comments may be accessed in the ADAMS system under the accession numbers noted in the attachment.

The examination team noted five generic weaknesses associated with applicant performance on the dynamic scenario, administrative job performance measure (JPM), and simulator JPM sections of the operating tests. Specifically:

- During performance of dynamic scenario 1, all three crews failed to trip the reactor core isolation cooling (RCIC) turbine following a malfunction of its speed controller, which caused the turbine speed to rapidly cycle between 0-4400 RPM approximately every ten seconds from the time the RCIC pump started. Multiple procedures provide direction that the RCIC pump turbine should have been tripped under these conditions. Specifically:

  - Procedure SOP-RCIC-INJECTION-QC, RCIC RPV Injection – Quick Card, Basis 2.1: "RCIC Turbine operation less than 2100 RPM can cause water hammer damage to the Turbine Discharge Check Valve."

  - Procedure SOP-RCIC-INJECTION-QC, RCIC RPV Injection – Quick Card, Section 2.2, Stopping RCIC During Plant Transients, Note 1: "Minimize the amount of time to less than approximately 1 minute that RCIC is in minimum flow (75-100 GPM) operation to prevent pump degradation. For continuous operation, the pump should be operated at a minimum of 300 GPM."

  - Procedure SOP-RCIC-START, "RCIC Start in Test Return Mode," Precaution and Limitation Step 4.1: "To prevent low steam flow conditions in the exhaust line and the possibility of check valve damage from water hammer, do not operate the RCIC Turbine below a speed of 2100 RPM."

- During performance of dynamic scenario 2, two of three crews failed to recognize that annunciator 603.A7-5.8 (CRD PUMP SUCTION FLTR D/P HIGH) was caused by abnormally high system flow, due to CRD flow control valve controller CRD-FC-600 output failing high in automatic mode. These two crews incorrectly believed that the malfunction was due to a fouled CRD suction strainer, and focused their recovery efforts exclusively on that component, without evaluating diverse board indications for other potential causes of the alarm. Annunciator Response Procedure 603.A7-5.8 was also observed to contain inadequate guidance to diagnose all potential causes of this alarm, as it too only addresses the CRD suction strainer as a potential cause.

- During performance of administrative JPM A-9, three applicants demonstrated a weakness in determining if state criteria for administering KI were satisfied, given an offsite release. Given a dose assessment printout, the applicants were expected to determine that state criteria were met due to exceeding

250 mrem/hr thyroid or because an unfiltered/unmonitored release was in progress. Several applicants either initially determined that state criteria were not met, or incorrectly determined that state criteria for administering KI were met due to the release exceeding 1.4E-7 µCi/cc I-131. This reason was incorrect because the dose assessment printout included an I-131 release rate of 1.75 Ci/sec, but did not provide an atmospheric concentration of I-131 in µCi/cc. This information is not available from the dose assessment printout, but rather must be obtained by reports from response teams in the field taking portable air samples. Portable air sample data was not available for this JPM.

- During performance of simulator JPM S-6, most applicants demonstrated a failure to understand that when opening a bypass valve in MANUAL mode, it takes approximately five iterations of pressing the JOG pushbutton to cause a fully-closed bypass valve to unseat and commence opening. Several applicants incorrectly believed that the JOG pushbutton was malfunctioning when they failed to observe a response from the bypass valve after two or three iterations.

- During performance of simulator JPM S-3, several applicants did not recognize that HPCS minimum flow bypass valve, HPCS-V-12, failed to automatically close when HPCS flow exceeded 1300 GPM during system initiation. These applicants consequently failed to manually shut HPCS-V-12 prior to closing HPCS-V-4, injection valve. The examiners noted that Procedure SOP-HPCS-INJECTION-QC, "HPCS RPV Injection – Quick Card," does not contain guidance to check the status of HPCS-V-12 during initiation of HPCS.

These issues were entered into the licensee's corrective action program under Action Request (AR) 00362543. Copies of all individual examination reports were sent to the facility Training Manager for evaluation and determination of appropriate remedial training.

.4 Simulation Facility Performance

a. Scope

The NRC examiners observed simulator performance with regard to plant fidelity during examination validation and administration.

b. Findings

No findings were identified.

.5 Examination Security

a. Scope

The NRC examiners reviewed examination security during both the on-site preparation week and examination administration week for compliance with 10 CFR 55.49 and NUREG-1021. Plans for simulator security and applicant control were reviewed and discussed with licensee personnel.

b. Findings

No findings were identified. However, one minor violation of 10 CFR 55.49, Integrity of examinations and tests, was identified by the NRC during exam administration. Specifically, an NRC examiner found completed log sheets for Reactor Building area temperatures from the second run of scenario 3 stuffed under the CRS desk during the third run of scenario 3. Had applicants identified and viewed this material, they could have gained insight into the major event for scenario 3. However the examiners determined that no applicant had been exposed to the exam material, no applicant gained an undue benefit, and that the equitable and consistent administration of the exam was not actually affected. Therefore this violation was determined to be minor. The issue was entered into the licensee's corrective action program as AR 00362548.

4OA6 Meetings, Including Exit

Exit Meeting Summary

The chief examiner presented the preliminary examination results to Mr. B. Sawatzke, Chief, Nuclear Officer, and other members of the staff on March 3, 2017. A telephonic exit was conducted on March 24, 2017, between Mr. T. Farina, Chief Examiner, and Mr. R. Meyers, Operations Training Manager.

The licensee did not identify any information or materials used during the examination as proprietary.

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee Personnel

R. Meyer, Operations Training Manager
G. Wyatt, Simulator and Exam Group Supervisor
D. Crawford, Exam Writer

NRC Personnel

G. Kolcum, Senior Resident Inspector

ADAMS DOCUMENTS REFERENCED

Accession No. ML17081A533 - FINAL WRITTEN EXAMS
Accession No. ML17081A534 - FINAL OPERATING TEST
Accession No. ML17081A535 - POST EXAM ANALYSIS-COMMENTS

NRC Resolution to the Columbia Generating Station Post-Examination Comments

A complete text of the licensee's post examination analysis and comments can be found in ADAMS under Accession Number ML17081A535.

A panel of three Region IV examiners was convened on March 20, 2017, to resolve two post-exam comments submitted by Columbia Generating Station. All three examiners were independent of the exam team. The following recommendations were submitted for branch chief review, and accepted by the branch chief on March 21, 2017.

RO QUESTION # 9

COMMENT: The licensee recommended deleting this question due to having no correct answer. The question involved a loss of Shutdown Cooling (SDC) train A in Mode 4, in conjunction with a stuck-closed Shutdown Cooling Suction Isolation Valve, RHR-V-8. The licensee determined that the originally-proposed correct answer, "B: Shift RHR-P-2B to SDC mode with suction from the spent fuel pool per ABN-RHR-SDC-ALT, Residual Heat Removal Alternate Shutdown Cooling," could not be performed in Mode 4 because the Reactor Cavity would not be flooded up and the fuel pool gate would not be removed under the given conditions. The licensee determined that the given distractors were all still incorrect due to the originally-proposed reasons. With no correct answer provided, the licensee recommended deleting the question.

NRC RESOLUTION: The question presents a plausible abnormal operating condition and requires the applicants to apply knowledge of the SDC system and its associated abnormal operating procedures to determine the best course of action for the crew to take. Because it is a plausible condition, it follows that there exists some sequence of actions that would be required to respond to the event and ultimately "restore SDC." In this particular case, it appears that a return to Mode 3 would be unavoidable. Temperature is 195 degrees Farenheit (195 °F) and going up, and SDC cannot be immediately restored via ABN-RHR-SDC-LOSS. Distractors 'A' and 'D' are clearly incorrect due to the unavailability of RHR-V-8, shutdown cooling suction isolation valve, and the inability of RHR-P-2A to take suction from the spent fuel pool. The originally-proposed answer, 'B', is incorrect under the given plant conditions, due to the imminent entry into Mode 3 and the time-consuming need to perform vessel disassembly and equalization between the spent fuel pool and reactor cavity levels. The panel determined that distractor C, "Initiate shutdown cooling through main steam line drain valves per ABN-ADHR, Alternate Decay Heat Removal," could plausibly be performed once the reactor entered Mode 3; however, the entry conditions for this procedure require that an Alternate Shutdown Cooling method already be in use, which it is not. Additionally, the question stem specifically asks about restoring Shutdown Cooling, not Decay Heat Removal; the method described by distractor C is not considered a method of Shutdown Cooling, semantically.

Procedure ABN-RHR-SDC-ALT, Residual Heat Removal Alternate Shutdown Cooling, Section 4.0 NOTE states, in part, "The alternate methods are listed in order of preference, provided no core damage has occurred." There are no indications of core damage, and the first preferred method is found in step 4.2, "If normal Shutdown Cooling is tripped and cannot be restored, THEN PERFORM Attachment 7.1." In section 7.1, Alternate Shutdown Cooling (Mode 3, 4, or 5), the first preferred method is Section 7.1.1, "Discharge Steam to the Main Condenser." This method would be used until Normal Shutdown Cooling was restored or RPV pressure was reduced to 0 psig; it cannot maintain RPV temperature less than 200 degrees F; therefore, if entry into Mode 4 was required, step 7.1.3 would need to be used:

"Discharge Water through the SRV to Suppression Pool." Neither of these methods is given as one of the four answer choices of Question #9. Therefore, the panel determined that RO Question #9 has no correct answer choice and that the question should therefore be deleted from the exam. The panel also determined that this question was written at the SRO level. While the K/A does ask for knowledge of abnormal operating procedures, this question goes beyond procedure knowledge and presents a complicated abnormal operating condition that requires the applicant to analyze the situation and select the correct procedure sub-path in the ABN network. Per NUREG 1021, ES-403.D.1.b, a question at the wrong license level is "most likely to result in post-examination changes agreeable to the NRC."

Because of the above, the panel unanimously determined that RO Question #9 should be deleted.

SRO QUESTION #90

COMMENT: The licensee recommended accepting two correct answers to this question, "B: start CRD-P-1B and secure CRD-P-1A per SOP-CRD-PUMPS, Control Rod Drive System Pump Operations [original answer]," and "C: transfer the FPC system cooling to Service Water per SOP-FPC-OPS, Fuel Pool Cooling and Cleanup Operations." The question involves a degradation of Reactor Core Cooling (RCC), with rising temperatures on RCC-cooled components. The licensee stated that during initial question development, the actions of abnormal procedures beyond ABN-RCC were not considered. When considering actions of ABN-RCC only, addressing rising CRD pump temperature would be the priority since the CRD pump meets the conditions required to take actions per ABN-RCC, step 4.2.6. Although Fuel Pool Cooling (FPC) temperature is slowly rising, it is below 125 °F, which is the maximum temperature that would be allowed prior to transferring FPC to Service Water (SW) per ABN-RCC, step 4.2.11. For this reason, answer B was proposed as correct and answer C was proposed as incorrect, originally.

During post-exam question analysis, the licensee determined that conditions existed for concurrent entry into ABN-FPC-LOSS, independent of ABN-RCC. ABN-FPC-LOSS gives direction to align SW to FPC independent of Fuel Pool temperature, once it is determined that an unplanned loss of cooling has occurred and RCC cannot be restored to the fuel pool cooling heat exchangers. For this reason the licensee recommended accepting both B and C as correct answers.

NRC RESOLUTION: The question presents a series of adverse conditions associated with the loss of cooling to multiple systems and then asks the applicant to determine what action "should" be taken "next." It is clear that the actions associated with all four answer choices would likely need to eventually be taken, therefore the applicant must determine which condition is a) required to be addressed first by procedure, and b) presents the most immediate operating concern. The licensee contends in their post-examination comments that both ABN-FPC-LOSS and ABN-RCC can be implemented concurrently, and that ABN-FPC-LOSS directs restoration of fuel pool cooling using the SW system, "If RCC cannot be restored." Therefore, the licensee contends that this action should be accepted as a second correct answer.

While it is true that both procedures can be entered concurrently, the CRS still needs to prioritize the "next" action that "should" be taken. While ABN-FPC-LOSS provides a viable procedure path for addressing a loss of cooling to the fuel pool prior to temperature exceeding 125 °F, this is a secondary effect of the primary malfunction, a loss of RCC, which is addressed by ABN-RCC. ABN-RCC determines the priority of actions that "should" be taken for this event.

ABN-RCC addresses the fuel pool cooling concern after the CRD pump cooling concern and establishes a critical parameter value of 125 °F for when action must be taken to transfer fuel pool cooling to the SW system (a value that is not yet met). As such, ABN-RCC effectively designates the swapping of CRD pumps as the "next" action to be taken in this particular scenario. It is true that, if no other concerns were ongoing, ABN-FPC-LOSS "could" be used to restore fuel pool cooling prior to exceeding 125 °F. However, in this case, multiple systems are threatened by the loss of a common cooling system, and that cooling system's abnormal operating procedure sets the priority of response actions to this scenario. Fuel pool temperature is well below the critical value of 125 °F, and is increasing only slowly, whereas CRD Pump 1A is already demonstrating signs of impending degradation.
In line with that point, on the originally submitted question worksheet the licensee explicitly stated that, "… the CRD pump is a more immediate issue" in its justification for why transferring Fuel Pool Cooling to Service Water was incorrect.

NUREG 1021, ES-403.D.1.c states, "If it is determined that there are two correct answers, both answers will be accepted as correct. If, however, both answers contain conflicting information, the question will likely be deleted." Considering that the CRS cannot physically direct both of the actions associated with answer choices "B" and "C" simultaneously, and that the question asks for the "next" action, then two correct answers cannot be accepted. Therefore, the NRC must determine if the question should be deleted or left unchanged. The question stem presents a plausible scenario and lacks any ambiguity as to the choice the applicant is expected to make. Delaying actions to address CRD pump cooling, in order to address fuel pool cooling when it has not yet reached a critical value and is far from doing so, would be the wrong course of action both procedurally and from a command and control perspective. As an additional reference point, given the same conditions on the operating test, an applicant who chose not to address a degrading CRD pump in favor of a slowly rising fuel pool temperature could be downgraded in rating factor 1(a), which requires that SRO applicants "recognize and attend to off-normal trends and status in order of their importance and severity."

Because of the above, the panel unanimously determined that no change to SRO Question #90 was warranted.