



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
REGION III  
2443 WARRENVILLE ROAD, SUITE 210  
LISLE, ILLINOIS 60532-4352

April 13, 2022

Mr. David Rhoades  
Senior Vice President  
Constellation Energy Generation, LLC  
President and Chief Nuclear  
Officer (CNO)  
Constellation Nuclear  
4300 Winfield Road  
Warrenville, IL 60555

SUBJECT: CLINTON POWER STATION, UNIT 1—NRC INITIAL LICENSE EXAMINATION  
REPORT 05000461/2022301

Dear Mr. Rhoades:

On February 16, 2022, the U.S. Nuclear Regulatory Commission (NRC) completed the initial operator licensing examination process for license applicants employed at your Clinton Station. The enclosed report documents the results of those examinations. Preliminary observations noted during the examination process were discussed on January 24, 2022, with Ms. Norha Plumey and other members of your staff. An exit meeting was conducted by telephone on March 9, 2022, between Mr. Bruce Bartlett, Chief Operator Licensing Examiner and Ms. Norha Plumey, Plant Manager to review the proposed final grading of the written examination for the license applicants. During the telephone conversation, NRC resolution of the facility's post-examination comments, initially received by the NRC on February 16, 2022, were discussed.

The NRC examiners administered an initial license examination operating test during the week of January 17, 2022. The written examination was administered by training department personnel on January 27, 2022. Five senior reactor operator and three reactor operator applicants were administered license examinations. The results of the examinations were finalized on March 11, 2022. Seven applicants passed all sections of their respective examinations. Five applicants were issued senior operator licenses and two applicants were issued operator licenses.

The administered written examination and operating test, as well as documents related to the development and review (outlines, review comments and resolution, etc.) of the examination will be withheld from public disclosure until January 27, 2024. However, since one applicant received a proposed license denial letter because of a written examination grade that was less than 80 percent, the applicant was provided a copy of the administered written examination. For examination security purposes, your staff should consider that written examination uncontrolled and exposed to the public.

This letter, its enclosure, and your response (if any) will be made available for public inspection and copying at <http://www.nrc.gov/reading-rm/adams.html> and at the NRC Public Document Room in accordance with Title 10 of the *Code of Federal Regulations*, Part 2.390, "Public Inspections, Exemptions, Requests for Withholding."

Sincerely,



Signed by Pelke, Patricia  
on 04/13/22

Patricia J. Pelke, Chief  
Operations Branch  
Division of Reactor Safety

Docket No. 50-461  
License No. NPF-62

Enclosures:

1. OL Examination  
Report 05000461/2022301
2. Post-Examination Comments,  
Evaluation, and Resolutions
3. Simulator Facility Fidelity Report

cc: Distribution via LISTSERV®  
T. Krawcyk, Senior Training Manager

Letter to David Rhoades from Patricia J. Pelke dated April 13, 2022.

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REPORT 05000461/2022301

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U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Docket No: 50-461

License No: NPF-62

Report No: 05000461/2022301

Enterprise Identifier 000474/05000461/L-2022-OLL-0000

Licensee: Constellation Nuclear

Facility: Clinton Station Unit 1

Location: Clinton, IL

Dates: January 18, 2022 through February 16, 2022

Examiners: B. Bartlett, Senior Operations Engineer, Chief Examiner  
T. Iskierka-Boggs, Operations Engineer, Examiner  
J. Nance, Operations Engineer, Examiner  
T. Wingfield, Operations Engineer, Examiner

Approved by: P. Pelke Chief  
Operations Branch  
Division of Reactor Safety

## **SUMMARY OF FINDINGS**

Examination Report 05000461/2022301; 1/18/2022 – 2/16/2022; Constellation Nuclear; Clinton Station, Unit 1; Initial License Examination Report.

The announced initial operator licensing examination was conducted by regional U.S. Nuclear Regulatory Commission examiners in accordance with the guidance of NUREG-1021, "Operator Licensing Examination Standards for Power Reactors," Revision 11.

### Examination Summary

Seven of eight applicants passed all sections of their respective examinations. Five applicants were issued senior operator licenses and two applicants were issued operator licenses. One applicant was issued a denial letter for failure of one section of the administered examination. (Section 4OA5.1).

## **REPORT DETAILS**

### 4OA5 Other Activities

#### .1 Initial Licensing Examinations

##### a. Examination Scope

The U.S. Nuclear Regulatory Commission (NRC) examiners and members of the facility licensee's staff used the guidance prescribed in NUREG-1021, "Operator Licensing Examination Standards for Power Reactors," Revision 11 to develop, validate, administer, and grade the written examination and operating test. The written examination outlines and operating test outlines were prepared by the NRC staff and were transmitted to the licensee's staff. Members of the facility licensee's staff developed the written examination and operating test. The NRC examiners validated the proposed examination during the week of December 13, 2021, with the assistance of members of the facility licensee's staff. During the on-site validation week, the examiners audited eight license applications for accuracy. The NRC examiners, with the assistance of members of the facility licensee's staff, administered the operating test, consisting of job performance measures and dynamic simulator scenarios, during the period of January 18, 2022, through January 22, 2022. The facility licensee administered the written examination on January 27, 2022.

##### b. Findings

##### (1) Written Examination

The NRC examiners determined that the written examination, as proposed by the licensee, was within the range of acceptability expected for a proposed examination. Less than 20 percent of the proposed examination questions were determined to be unsatisfactory and required modification or replacement.

During validation of the written examination, several questions were modified or replaced. All changes made to the proposed written examination, were made in accordance with NUREG-1021, "Operator Licensing Examination Standards for Power Reactors," and documented on Form ES-401-9, "Written Examination Review Worksheet." The Form ES-401-9, the written examination outlines, and both the proposed and final written examinations, will be available electronically in the NRC Public Document Room or from the Publicly Available Records component of NRC's Agencywide Documents Access and Management System (ADAMS) on February 17, 2024, (ADAMS Accession Numbers ML20136A322, ML20136A320, ML20136A321 and ML20136A325, respectively).

On February 17, 2022, the licensee submitted documentation noting that there was one post-examination comment for consideration by the NRC examiners when grading the written examination. The post-examination comment and the NRC resolution for the post-examination comment, are provided in Enclosure 2 to this report.

The NRC examiners graded the written examination on March 7, 2022, and conducted a review of each missed question to determine the accuracy and validity of the examination questions.

(2) Operating Test

The NRC examiners determined that the operating test, as originally proposed by the licensee, was within the range of acceptability expected for a proposed examination. Less than 20 percent of the proposed operating test portion of the examination was determined to be unsatisfactory and required modification or replacement.

During the validation of the operating test, several Job Performance Measures (JPMs) were modified or replaced, and some modifications were made to the dynamic simulator scenarios. Changes made to the operating test portion of the examination, were made in accordance with NUREG-1021, "Operator Licensing Examination Standards for Power Reactors," and documented on Form ES-301-7, "Operating Test Comments." The Form ES-301-7, the operating test outlines (ES-301-1 and ES-301-2), and both the proposed and final as administered dynamic simulator scenarios and JPMs, will be available electronically in the NRC Public Document Room or from the Publicly Available Records component of NRC's ADAMS on February 17, 2024, (ADAMS Accession Numbers ML20136A322, ML20136A320, ML20136A321 and ML20136A325, respectively).

The NRC examiners completed operating test grading on March 11, 2022.

(3) Examination Results

Five applicants at the Senior Reactor Operator (SRO) level and three applicants at the Reactor Operator (RO) level were administered written examinations and operating tests. Seven applicants passed all portions of their examinations and were issued their respective operating licenses on March 11, 2022. One applicant was issued a denial letter for failure of the written examination.

.2 Examination Security

a. Scope

The NRC examiners reviewed and observed the licensee's implementation of examination security requirements during the examination validation and administration to assure compliance with Title 10 of the *Code of Federal Regulations*, Part 55.49, "Integrity of Examinations and Tests." The examiners used the guidelines provided in NUREG 1021, "Operator Licensing Examination Standards for Power Reactors," to determine acceptability of the licensee's examination security activities.

b. Findings

None.

#### 4OA6 Management Meetings

##### .1 Debrief

The chief examiner presented the examination team's preliminary observations and findings on January 24, 2022, to Ms. Norha Plumey, Plant Manager and other members of the Clinton Station staff.

##### .2 Exit Meeting

The chief examiner conducted an exit meeting on March 9, 2022, with Ms. Norha Plumey, Plant Manager by telephone. The NRC's final disposition of the station's grading of the written examination and post-examination comments were disclosed and discussed during the telephone discussion. The chief examiner asked the licensee whether any of the retained submitted material used to develop or administer the examination should be considered proprietary. No proprietary or sensitive information was identified during the examination or debrief/exit meetings.

ATTACHMENT: SUPPLEMENTAL INFORMATION



## **SUPPLEMENTAL INFORMATION**

### **KEY POINTS OF CONTACT**

#### Licensee

N. Plumey, Plant Manager  
M. Beeler, Senior Operations Training instructor  
R. Ringenberg, Manager Operations Training  
D. Shelton, Design Engineer Manager  
R. Hatcher, Human Resources Generalist  
T. Krawcyk, Senior Training Manager  
D. Livingston, Operations Services Manager  
D. Wells, Senior Operations Training instructor  
M. McGuire, Shift Operations Supervisor

#### U.S. Nuclear Regulatory Commission

P. Pelke, Chief Operator Licensing Branch  
B. Bartlett, Senior Operations Engineer, Chief Examiner  
T. Wingfield, Operations Engineer, Examiner  
T. Iskierka-Boggs, Operations Engineer, Examiner  
J. Nance, Operations Engineer, Examiner

### **ITEMS OPENED, CLOSED, AND DISCUSSED**

#### Opened, Closed, and Discussed

None

### **LIST OF ACRONYMS USED**

ADAMS	Agencywide Documents Access and Management System
CPS	Clinton Power Station
CRD	Control Rod Drive
ILT	Initial License Test
IRM	Intermediate Range Monitors
JPM	Job Performance Measure
K/A	Knowledge/Ability
NRC	U.S. Nuclear Regulatory Commission
RO	Reactor Operator
SRO	Senior Reactor Operator

## SIMULATION FACILITY FIDELITY REPORT

Facility Licensee: Clinton Power Station

Facility Docket No: 050-461

Operating Tests Administered: January 18, 2022 – January 22, 2022

The following documents observations made by the U.S. Nuclear Regulatory Commission examination team during the initial operator license examination. These observations do not constitute audit or inspection findings and are not, without further verification and review, indicative of non-compliance with Title 10 of the *Code of Federal Regulations*, Part 55.45(b). These observations do not affect U.S. Nuclear Regulatory Commission certification or approval of the simulation facility other than to provide information which may be used in future evaluations. No licensee action is required in response to these observations.

During the conduct of the simulator portion of the operating tests, the following items were observed:

ITEM	DESCRIPTION
1.	During a JPM, damper 1VR007B did not open when the applicant rotated the control switch to the open position. This happened for three applicants. When the hand switch was held not quite full open the damper would open. None of the applicants was prevented from carrying out the critical steps of the JPM due to the hand switch issue.
2.	Several IRM indicator lights were mis-labeled. One crew was briefly impacted during one scenario. None of the applicants was prevented from carrying out the critical steps.
3.	After the scenarios were completed the examiners determined that the facility would disable the annunciator alarm test feature for NRC exams to avoid startling the applicants in case they accidentally pressed the wrong annunciator pushbutton. Even though this was minor, altering the performance of the simulator just for NRC exams is not acceptable. None of the applicants was prevented from carrying out critical steps.
4.	There were several instances of burned out light bulbs that were identified by an applicant just prior to a JPM or scenario being used for the first time. None of the applicants were prevented from carrying out the critical steps but there were several instances of delayed JPMs.

## POST-EXAMINATION COMMENTS, EVALUATION, AND RESOLUTIONS

### NRC Resolution to the Clinton Power Station Post-Examination Comments

#### RO Question 26

A reactor startup is in progress.

THEN, the operating (Control Rod Drive) CRD pump trips.

What is the potential impact of immediately restarting the CRD pump without closing the Pump Stop Chk Discharge Valve (1C11-FO14A/B) and the CRD Flow Control Valve (1C11-F0002A/B) ?

- A. The CRD pump will cavitate.
- B. Control rod drive mechanisms will overheat due to the lack of cooling water.
- C. The CRD pump will trip on motor overcurrent while the CRD Header repressurizes.
- D. Multiple control rods may drift in due to the pressure surge in the Cooling Water Header.

<b>Answer</b>	<b>D</b>
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#### Applicant Comment:

None

#### Facility Comment:

Proposed justification for accepting two correct answers for question #26 (ID 2202939) on the CPS ILT NRC Written Exam administered on 1/27/22. Clinton Power Station management supports the challenge to this question.

The question asks what the potential impact is of restarting a control rod drive pump without closing the discharge check valve and system flow control valve. The intent of the question, based on the associated K/A, was to ascertain the candidates' knowledge of the operational implications of a Loss of a CRD pump on reactivity control. The challenge is specific to whether another answer was a potential impact due to the stem conditions.

## POST-EXAMINATION COMMENTS, EVALUATION, AND RESOLUTIONS

Choice D is the keyed correct answer and remains a correct answer based on the information presented in the explanation. D is correct. Per N-CL-OPS-201001, Control Rod Drive Hydraulic System, "care must be exercised if the CRD pump trips to ensure the FCV is closed to minimum prior to restarting a CRD pump otherwise the hydraulic surge may result in rod motion."

The question stem states that during a plant startup the CRD pump trips and is immediately restarted without closing the discharge check valve or system flow control valve. The stem does not bound the request with a clarifier, such as most likely, or in accordance with a reference. The system operating procedure and annunciator response procedure for CRD pump trip were reviewed and neither contained a direct link to rod motion due to the loss of a CRD pump. Additionally, the word immediately does not account for the time required to validate the pump start interlocks are met prior to attempted restart. The time required to diagnose the trip and validate the pump start interlocks (specifically low oil pressure- see references for detail) would allow the system to depressurize prior to restarting a CRD pump.

Since the stem used the words 'potential impact' and did not contain sufficient clarification to limit the answers to only hydraulic surge, a second answer would also be correct. The pump could trip on overcurrent.

The overcurrent trip could be expected based on information contained in the vendor manual and in the generic fundamentals training information. The vendor manual states that currents may be high, if the discharge valve is not closed, and the generic fundamentals material specifically states that not closing the discharge valve may cause runout, which could result in an overcurrent trip (to protect the motor). Due to the system being depressurized, which amounts to no system backpressure, the pump pressure would be low and current would be high until the system repressurized. Choice C states that the pump would trip on overcurrent during system re-pressurization and is therefore a potential impact. The overcurrent pump trip links to reactivity control as the stem states the plant is in startup.

Choice C explanation was only partially correct. The statement that runout would not occur due to the conditions in the stem is unsupported by the vendor documentation and generic fundamentals. The explanation incorrectly uses the pressurized system runout of a CRD pump, while the conditions in the stem would indicate a depressurized system with no back pressure. C is incorrect but plausible. While it is possible to achieve pump runout with the discharge valve of the pump open, CRD pump runout is 200 gpm at 3400 ft. head (approx. 1475 psig). This will not occur under the conditions given in the stem.

Choice C and Choice D do not conflict as both are potential impacts. The impacts are time dependent on when they could occur. Choice C is possible, after pump start while the system is depressurized and both valves are open, until backpressure is developed during re-pressurization. Choice D is possible as the system repressurizes, the high demand seen by the flow control valve (no flow would result in the FCV being full open) could create a hydraulic surge condition resulting in rod motion as unrestricted flow is initiated. The flow control valve would eventually close down, in automatic, but rod motion would be expected prior to that response.

The other choice explanations (A and B) are not discussed and are accepted as accurate and the insufficient bounding in the stem does not affect their plausibility nor make them correct.

This was a high miss question by the Candidates. Five (5) of the candidates missed this question (Question 26) and all five answered Choice C.

## POST-EXAMINATION COMMENTS, EVALUATION, AND RESOLUTIONS

### Conclusion

The stem did not sufficiently bound the answer to only rod motion. The potential impact of starting the CRD pump, without closing the discharge check valve or flow control valve, could result in an overcurrent trip condition. Choice C and Choice D would both be correct based on the stem structure not differentiating the potential impacts. This presents a situation where a question with an unclear stem confused the applicants (see ES-403, Step D.1.b, bullet 1).

### Facility Recommendation

Recommend accepting two choices, Answer C and Answer D, as correct for Question 26.

### **NRC Evaluation/Resolution:**

NUREG-1021, Appendix E, is read to all applicants prior to examination administration and was read to the applicants for this examination during the NRC examination validation week of December 13, 2021. A copy was also available during the examination. Appendix E, Page E-2, states in part (underline added for emphasis), "When answering a question, do not make assumptions regarding conditions that are not specified in the question unless they occur as a consequence of other conditions that are stated in the question. For example, you should not assume that any alarm has activated unless the question so states or the alarm is expected to activate as a result of the conditions that are stated in the question. Similarly, you should assume that no operator actions have been taken, unless the stem of the question or the answer choices specifically state otherwise."

The licensee agrees with the correct answer of D and no additional discussion need be made of the question and the correct answer. To address the recommended answer C, the licensee assumed that there was a delay of some unquantified time before which the CRD pump is then restarted. During the delay for the operators to prepare the CRD pump for starting, the licensee assumes and has some basis in equipment history that the CRD system will depressurize. Given the depressurization the licensee goes on to state that when the CRD pump is restarted that motor overcurrent may occur due to system depressurization and pump runout.

The licensee does not go on to discuss why Answer A of cavitation would be wrong even though they state that pump runout would be occurring. Nevertheless, in order for the CRD system to depressurize it would take some defined length of time yet the Question stem states that the CRD pump would be immediately restarted. By definition, immediately means instantly which would directly lead to the conclusion that no time for pump starting checks was allowed. As the Question stem did not call for a length of time for pump starting checks but stated that the CRD pump would be immediately started, and because assumptions are not allowed nor required in order to answer the question, the licensee's position is wrong and is rejected.

## **POST-EXAMINATION COMMENTS, EVALUATION, AND RESOLUTIONS**

### **CONCLUSION:**

Based on the information provided above, the NRC staff concludes that Answer D is the only correct answer, and no changes to the answer key are required.