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

March 15, 2021

Mr. Terry Brown
Site Vice President
Energy Harbor Nuclear Corp.
Davis-Besse Nuclear Power Station
5501 N. State Rte. 2, Mail Stop A–DB–3080
Oak Harbor, OH 43449–9760

SUBJECT: DAVIS-BESSE NUCLEAR POWER STATION—NRC INITIAL LICENSE EXAMINATION REPORT 05000346/2021301

Dear Mr. Brown:

On February 18, 2021, the U.S. Nuclear Regulatory Commission (NRC) completed the initial operator licensing examination process for license applicants employed at your Davis-Besse Nuclear Power Station. The enclosed report documents the results of those examinations. Preliminary observations noted during the examination process were discussed on February 3, 2021, with yourself, and other members of your staff. An exit meeting was conducted by telephone on February 26, 2021, with yourself, other members of your staff, and Mr. Gregory Roach, Chief Operator Licensing Examiner, to review the final grading of the written examination for the license applicants. During the telephone conversation, NRC resolution of the plant's post-examination comment, received by the NRC on February 18, 2021, was discussed.

The NRC examiners administered an initial license examination operating test during the week of February 1, 2021. The written examination was administered by training department personnel on February 4, 2021. Four Senior Reactor Operator applicants were administered license examinations. The results of the examinations were finalized on February 24, 2021. Three applicants passed all sections of their respective examinations. Three applicants were issued senior operator licenses and one applicant was issued a Preliminary Results Letter.

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 February 18, 2023. However, since an applicant received a Preliminary Results Letter because of a written examination grade that is less than 80.0 percent, the applicant will be provided a copy of the 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,

Patricia J. Pelke Digitally signed by Patricia J. Pelke Date: 2021.03.15 17:35:35 -05'00'

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

Docket No. 50–346
License No. NPF–3

Enclosures:
1. Examination Report 05000346/2021301
2. Post-Examination Comments, Evaluation, and Resolutions
3. Simulator Fidelity Report

cc: Distribution via LISTSERV®
N. Barron, Training Manager

Letter to Terry Brown from Patricia J. Pelke dated March 15, 2021.

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REGION III

Docket No:	50–346
License No:	NPF–3
Report No:	05000346/2021301
Enterprise Identifier:	L-2021-OLL-0020
Licensee:	Energy Harbor Nuclear Corp.
Facility:	Davis-Besse Nuclear Power Station
Location:	Oak Harbor, OH
Dates:	February 1, 2021, through February 18, 2021
Examiners:	G. Roach, Senior Operations Engineer, Chief Examiner D. Lanyi, Senior Operations Engineer, Examiner
Approved By:	P. Pelke, Chief Operations Branch Division of Reactor Safety

SUMMARY

Examination Report 05000346/2021301; 02/01/2021–02/18/2021; Energy Harbor Nuclear Corp.; Davis-Besse Nuclear Power Station; Initial License Examination Report.

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

Examination Summary

Three of four applicants passed all sections of their respective examinations. Three applicants were issued senior operator licenses and one applicant was issued a Preliminary Results Letter. (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 were prepared by the NRC staff and were transmitted to the facility licensee's staff. Members of the facility licensee's staff prepared the operating test outlines and developed the written examination and operating test. The NRC examiners validated the proposed examination during the week of January 11, 2021, with the assistance of members of the facility licensee's staff. During the onsite validation week, the examiners audited four 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 February 1, 2021, through February 2, 2021. The facility licensee administered the written examination on February 4, 2021.

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 NRC developed written examination, several questions were modified or replaced. All changes made to the written examination were made in accordance with NUREG-1021, "Operator Licensing Examination Standards for Power Reactors." Form ES-401-9, "Written Examination Review Worksheet," used primarily for the documentation of metrics on the NRC developed written examination, was updated with post-examination changes. The Form ES-401-9, the written examination outlines (ES-401-1 and ES-401-3), 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 18, 2023, (ADAMS Accession Numbers ML20136A260, ML20136A251, ML20136A254, and ML20136A266, respectively).

On February 18, 2021, 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 is documented in Enclosure 2 of this report.

The NRC examiners completed grading of the written examination on February 24, 2021, 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, developed by the licensee from the NRC prepared outlines, was within the range of acceptability expected for a proposed examination.

Following the review and validation of the operating test, minor modifications were made to multiple job performance measures, and minor modifications were made to the dynamic simulator scenarios. All changes made to the operating test were made in accordance with NUREG-1021, "Operator Licensing Examination Standards for Power Reactors," and were documented on Form ES-301-7, "Operating Test Review Worksheet." The Form ES-301-7, the operating test outlines (ES-301-1, ES-301-2, and ES-D-1s), and both the proposed and final operating tests, will be available electronically in the NRC Public Document Room or from the Publicly Available Records component of NRC's ADAMS on February 18, 2023, (ADAMS Accession Numbers ML20136A260, ML20136A251, ML20136A254, and ML20136A266, respectively).

The NRC examiners completed grading of the operating test on February 9, 2021.

(3) Examination Results

Four applicants at the Senior Reactor Operator level were administered written examinations and operating tests. Four applicants received waivers allowing them to take only the 25 question Senior Reactor Operator portion of the written examination.

Three applicants passed all portions of their examinations. Three applicants were issued senior operator licenses on March 1, 2021. One applicant failed the written portion of the administered examination and was issued a Preliminary Results Letter.

.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 Title10 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 February 3, 2021, to Mr. Terry Brown, Site Vice President, and other members of the Davis-Besse Nuclear Power Station staff.

.2 Exit Meeting

The chief examiner conducted an exit meeting on February 26, 2021, with Mr. Terry Brown, Site Vice President, and other members of the Davis-Besse Nuclear Power Station staff, by telephone. The NRC's final disposition of the station's post-examination comment was disclosed and discussed during the telephone discussion. The chief examiner asked the licensee whether any of the 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

T. Brown, Site Vice President
D. Huey, Plant Manager
G. Laird, Operations Manager
N. Barron, Site Training Manager
P. Norgaard, Fleet Training Manager
R. Brown, Superintendent, Fleet Operations Training
G. Wolf, Regulatory Assurance Supervisor
D. Rowland, Lead Exam Developer, Operations Training
N. Buehler, Superintendent, Electrical Maintenance
C. Hill, Nuclear Operations Training Supervisor
G. Ellithorpe, Regulatory Assurance Staff Nuclear Specialist

U.S. Nuclear Regulatory Commission

D. Mills, Senior Resident Inspector
G. Roach, Senior Operations Engineer, Chief Examiner
D. Lanyi, Senior Operations Engineer, Examiner

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened, Closed, and Discussed

None

LIST OF ACRONYMS USED

ADAMS	Agencywide Documents Access and Management System
NRC	U.S. Nuclear Regulatory Commission

SRO Question 5

Initial conditions:

- Plant shutdown in progress
- Reactor Power is 12%
- Motor Driven Feedwater Pump is lined up in the Main Feedwater mode

The following occurs:

- Loss of Off-site Power
- Loss of all Feedwater

Current conditions:

- AFW Pump 2 is restored and is feeding Steam Generator 2
- AFW Pump 1 cannot be restored and is still unavailable
- Steam Generator 1 has boiled dry
- Steam Generator 1 Tube to Shell differential temperatures are within limits
- Station Blackout Diesel Generator has been started
- AF3871 “Auxiliary Feed Pump 2 to Steam Generator 1” is failed closed

The Command SRO directs the Reactor Operator to restore feedwater to Steam Generator 1, using DB-OP-02000 “RPS, SFAS, SFRCS TRIP, OR SG Tube Rupture” Attachment 5 “Guidelines for Restoring Feedwater”.

(1) Which Section of Attachment 5 will the Command SRO direct the Reactor Operator to perform?

AND

(2) Which of the following actions will be required to restore flow to Steam Generator 1?

A. (1) Section A: Motor Driven Feedwater Pump in the Main Feedwater Mode
(2) Block AND Reset SP7B using both HIS SP7AB and HIS SP7CB, located on panel C5792N, MSIV/MFW Control Valve Reset Switch Panel

B. (1) Section A: Motor Driven Feedwater Pump in the Main Feedwater Mode
(2) Block AND Reset SP7B using both HIS SP7AB and HIS SP7CB, located on panel C5712, CTRM Right Console (MFW Control) Panel

C. (1) Section B: Emergency Feedwater Pump via the Auxiliary Feedwater header
(2) Throttle EFW Flow to Steam Generator 1 using HCEF8-2, EFWP DISCHARGE FLOW VALVE, located on panel C5732, EFW Control Panel

D. (1) Section B: Emergency Feedwater Pump via the Auxiliary Feedwater header
(2) Throttle EFW Flow to Steam Generator 1 using HCEF8-2, EFWP DISCHARGE FLOW VALVE, located on panel C5706, CTRM Center Console (AFW Control) Panel

Answer: __B__

Explanation/Justification:

A. Incorrect – (1) is correct and (2) is plausible since other SFRCS reset switches are located on panel C5792N.

B. Correct – (1) The use of the Emergency Feedwater Pump is limited to beyond design bases events (e.g., loss of both Auxiliary Feedwater trains). Shift Manager's permission under the revisions of 10CFR50.54(x) and (y) is required for any use of the Emergency Feedwater Pump that is not for beyond design bases response. (2) Reset switches HIS SP7AB and HIS SP7CB are located on panel C5712, CTRM Right Console (MWF Control) Panel.

C. Incorrect – (1) Is plausible since per Attachment 5, the AFW header is preferred when feeding a dry steam generator. (2) Is correct (for using the EFW Pump).

D. Incorrect – (1) Is plausible since per Attachment 5, the AFW header is preferred when feeding a dry steam generator. (2) Is plausible since the AFW mimic and other AFW controls are located on panel C5706.

References provided to NRC:

- DB-OP-02000, "RPS, SFAS, SFRCS TRIP, OR STEAM GENERATOR TUBE RUPTURE"
- Updated Final Safety Analysis Report (UFSAR) Chapter 15, Accident Analysis
- DWG OS-017A, Auxiliary Feedwater System, Sheet 1
- DWG OS-012A, Main Feedwater System, Sheet 1
- DWG OS-062, Emergency Feedwater System, Sheet 1

Applicant Comment:

Answer C. should be correct for the following reasons:

1. The stem states there is a Loss of all Feedwater event in progress.
2. In accordance with (DB-OP-02000) Attachment 5.
   a. The EFW Pump can be used during a Loss of all Feedwater.
   b. The Aux Feedwater Header is preferred when feeding a dry SG.
   c. The EFW Pump is normally aligned to #1 SG through the AFW Header.
3. The stem states that the SBODG has been started, however it does not indicate Bus D2 has been energized.

Facility Position on Applicant Comment:

The facility licensee recommends changing the exam answer key such that, answer C. is correct and answer B. is incorrect.

Reasons:

1. Newly discovered technical information that supports a change in the answer key: The loss of all Main Feedwater and the loss of all Auxiliary Feedwater with the subsequent return of an Auxiliary Feedwater pump is not part of the design basis

UFSAR Chapter 15 events. Therefore, in this scenario, a Beyond Design Basis event is still in progress even after the Auxiliary Feedwater pump 2 is restored.

2. A question with an unclear stem that confused the applicants or did not provide all of the necessary information: The stem of the question does not specify the condition of Bus D2, which is the power supply to the Motor Driven Feed Pump (MDFP). (DB-OP-02000, Attachment 6, Section 2.0)

Explanation:

1. A Beyond Design Basis event is in progress based on:
   - The stem states that a Loss of all Feedwater occurred.
   - AFW Pump 1 is unavailable.
   - AFW Pump 2 did not auto start, as expected when the Loss of Offsite Power (LOOP) occurred and was not running for some unspecified time before it was restored.
   - The MDFP is initially not available due to the LOOP and based on the long lead time to restore power to D2, the use of Attachment 6 to reenergize D2 is not directed prior to declaring a TOTAL loss of feedwater.

2. IAW (OP-DB-02000) Attachment 5: Guidelines for Restoring Feedwater
   - The use of the Emergency Feedwater (EFW) Pump is limited to Beyond Design Bases events.
     i. The provisions of 10CFR50.54 (x) and (y) is NOT required
     ii. The Shift Manager's permission is NOT required to use the EFW Pump.
   - The Auxiliary Feedwater header is preferred when feeding a dry steam generator.
     i. The EFW Pump is normally aligned to provide inventory from the Emergency Feedwater Storage Tank to SG1 via the AFW header.
     ii. In this scenario, the MDFP is lined up in the Main Feedwater mode.
   - The AFW or MDFP or EFW Pump may be used to feed a dry Steam Generator via the Auxiliary Feedwater header provided the plant is within limits.
     i. Guidance is provided to start the EFW Pump and control flow to SG1 from the Control Room. No in plant actions are required to align flow to SG1 via the AFW header.
     ii. The MDFP is unavailable initially due to the Loss of Offsite Power. It would become available only when Bus D2 is energized.
     iii. Current conditions state the SBODG is started. However, there is a time delay from when the SBODG is started and Bus D2 can be energized, via further mechanical and operator actions.
     iv. Bases and Deviation Document for DB-OP-02000 page 450, states if the operator is unable to immediately start the MDFP (e.g., time does not permit actions to restore power to allow use of MDFP), a response not obtained (RNO) step provides direction to attempt to restore feedwater flow to SG1 using EFW per Attachment 5. It also states, based on the long lead time to restore power to D2, the use of Attachment 6 is not directed prior to declaring a TOTAL loss of feedwater.

v. AFW Pump 2 is unable to feed SG1 due to AF3871, “Auxiliary Feed Pump 2 to Steam Generator 1” is failed closed.
vi. AFW Pump 1 remains unavailable.

In Summary:

1. Answer C should be correct for the following reasons:
   - The scenario described in the question is a Beyond Design Basis event which allows for the use of the EFW Pump as described in DB-OP-02000, Attachment 5.
   - The Auxiliary Feedwater header is preferred when feeding a dry SG. The EFW Pump is normally aligned to provide inventory to SG1 through the Auxiliary Feedwater header.
   - EFW Pump flow to SG1 is throttled using HCEF8-2 which is located on Panel C5732.

2. Answer B should be incorrect for the following reason:
   - It cannot be assumed that the MDFP is available at this time in the scenario given.

STATION RECOMMENDATION: ACCEPT answer C. as the correct answer and answer B. as incorrect with the following new justifications:

B. Incorrect – (1) The MDFP is unavailable initially due to the Loss of Off-site Power. It would become available only when Bus D2 is restored by starting the SBODG AND closing AD301 IAW DB-OP-02000 Attachment 6 Section 2.0. (2) (Correct for using the MDFP) Reset switches HIS SP7AB and HIS SP7CB are located on panel C5712, CTRM Right Console (MWF Control) Panel. These switches are required to be reset to throttle feedwater as required.

C. Correct – (1) The use of the Emergency Feedwater Pump is limited to beyond design bases events (e.g., loss of both Auxiliary Feedwater trains). The loss of all feedwater with the subsequent return of an AFW Pump is not part of the Davis-Besse UFSAR Chapter 15 events. Therefore, the return of an AFW Pump 2 does not return this event to a “design bases” status. The Auxiliary Feedwater header is preferred when feeding a dry SG. The EFW Pump is normally aligned to provide inventory to SG1 through the Auxiliary Feedwater header. Also, since a TOTAL Loss of Feedwater has not been declared, the EFW Pump is available to use to fill SG 1. (2) EFW Flow to SG1 is throttled using HCEF8-2, EFWP DISCHARGE FLOW CONTROL VALVE POSITION, to obtain desired EFW flow FIEF34-2, EFWP DISCHARGE FLOW (gpm). (DB-OP-02000, Att. 5, Sect. B, Step 1.b.)

NRC Evaluation/Resolution:

The applicant and facility licensee have determined in their assessment that the use of the EFW Pump is appropriate in accordance with DB-OP-02000, Attachment 5, Section B in response to the bullet in the question stem which states that following the initial conditions a, “Loss of all Feedwater” has occurred. For Davis-Besse Nuclear Power Station, a “Loss of all Feedwater” is considered a loss of all Main Feedwater and Auxiliary Feedwater and is considered a Beyond Design Basis event. However, the applicant MUST read the entire question stem in order to determine what plant conditions exist at the time the Control Room Supervisor is tasked with determining which section of DB-OP-02000, Attachment 5 is correct to recover level in the boiled dry SG1. Prior to being asked which method of recovery is required, the applicant is provided with current plant conditions, which indicate that the “Loss of All Feedwater” has been mitigated by the recovery AFW Pump 2 to SG2. In addition, the applicant has been told that the Station Blackout Diesel Generator (SBODG) has been started, which directly provides power to electrical Bus D2 the power supply for the Motor Driven Feedwater Pump (MDFP), and that SG1 shell differential temperatures are within limits. Based on the action taken to restore and feed SG2 using AFW Pump 2, the abnormal condition, “Loss of all Feedwater,” has been mitigated and the plant is once again in an analyzed condition. Use of the EFW Pump is no longer permitted without the Shift Manager’s permission, under 10CFR50.54 (x) and (y), which would not be appropriate under these plant conditions, and is not stated in the stem as an action that was taken. Davis-Besse UFSAR Chapter 15, Accident Analysis, Section 15.2.8.4.2 covers a loss of Main Feedwater event with a single failure resulting in a loss of an Auxiliary Feedwater Pump, so that only one steam generator receives AFW flow. Therefore, when the entire question stem is considered, the plant is within the design basis, and systems and procedures within the licensing basis MUST be used to recover the plant unless the Senior Reactor Operator determines that 10CFR50.54 (x) and (y) are required to be invoked.

The applicant and facility licensee’s second contention is that the preferred pathway to refill a dry steam generator is through the AFW header. Although this statement from Attachment 5 is correct, the question stem does not ask what is the preferred flowpath for feeding a dry Steam Generator, but instead asks “Which of the following actions will be required to restore flow to Steam Generator 1?” Attachment 5 states, “The MDFP, SUFP, and MFW Pumps may be used to feed a dry Steam Generator via the Main Feedwater header providing: Steam Generator Tube to Shell differential temperature . . . [criteria are within limits]” The stem states, as one of the “current conditions,” that the differential temperatures are within limits. Therefore, refilling the dry SG1 is permissible with the MDFP lined up through the Main Feedwater header. Since use of the EFW Pump is not permitted for feeding SG 1 under the conditions presented in the stem, this comment is immaterial to determining the correct answer to the question.

Lastly, the applicant and facility licensee’s third contention was that the MDFP was not available to feed the dry SG1 because of the loss of Bus D2 as a result of a Loss of Offsite Power. The applicant is correct that the stem states, under “current conditions,” that the Station Blackout Diesel Generator has been started but does not state that Bus D2 has been energized. However, the stem does not state that any abnormal or degraded condition exists with either the SBODG or Bus D2 which could preclude re-energizing the bus or restarting the MDFP. The applicant’s implication that either a fault or significant delay in using the MDFP permits use of the EWF Pump would be based on another unwarranted assumption that equipment will not perform as designed, contrary to conditions specified in the stem. NUREG 1021, “Operator Licensing Examination Standards for Power Reactors,” Revision 11, Appendix E states in part, “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.” Therefore, with a power source available to energize the MDFP, it would be considered available to use.

In summary, the applicant and facility licensee incorrectly determined that a beyond design basis condition existed, and remains in progress, because the stem, in its entirety, was not considered when the Control Room Supervisor was expected to direct a recovery plan for the dry SG1 in accordance with DB-OP-02000, Attachment 5. With plant conditions within the design basis, the applicant was expected to use licensing basis structures, systems, components, and procedures to ensure the safe operation of the plant. With a power source available and Steam Generator Shell to Tube temperature differentials within specification, the

MDFP as a licensing basis system was expected to be used to recover the dry steam generator through the Main Feedwater header in accordance with Attachment 5, Section A. NUREG 1021, Appendix E also states, in part, "If you have any questions concerning the intent or the initial conditions of a question, do *not* hesitate to ask them before answering the question. Note that questions asked during the examination are taken into consideration during the grading process and when reviewing requests for informal NRC staff reviews (appeals)." The post-examination package submitted by the facility did not provide any questions related to this question that were asked by the applicants during the administration of the examination.

Therefore, the NRC concluded that no change to the key for this exam question was required.

SIMULATOR FIDELITY REPORT

Facility Licensee:	Davis-Besse Nuclear Power Station
Facility Docket No:	50-346
Operating Tests Administered:	February 1, 2021, through February 2, 2021

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
None.	