



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

May 22, 2020

Mr. Frank R. Payne  
Site Vice President  
Energy Harbor Nuclear Corp.  
Perry Nuclear Power Plant  
P.O. Box 97, SB306  
Perry, OH 44081-0097

SUBJECT: PERRY NUCLEAR POWER PLANT, UNIT NO. 1 – ISSUANCE OF  
AMENDMENT NO. 189 REGARDING SPECIAL LIFTING DEVICE  
NONDESTRUCTIVE EXAMINATION FREQUENCY (EPID L-2019-LLA-0294)

Dear Mr. Payne:

The U.S. Nuclear Regulatory Commission (the Commission) has issued the enclosed Amendment No. 189 to Facility Operating License No. NPF-58 for the Perry Nuclear Power Plant, Unit No. 1 (PNPP). The amendment consists of changes to the PNPP updated safety analysis report (USAR) in response to your application dated December 18, 2019.

The amendment revises PNPP USAR Section 9.1.4, "Fuel Handling System," and Section 9.1.5, "Control of Heavy Loads Over or Near Spent Fuel and Other Critical Plant Systems/Components," to modify the nondestructive examination inspection interval for special lifting devices from typically prior to each refueling outage to a 10-year interval.

A copy of our related safety evaluation is also enclosed. The Notice of Issuance will be included in the Commission's biweekly *Federal Register* notice.

Sincerely,

/RA/

Scott P. Wall, Senior Project Manager  
Plant Licensing Branch III  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket No. 50-440

Enclosures:

1. Amendment No. 189 to NPF-58
2. Safety Evaluation

cc w/encls: Listserv



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ENERGY HARBOR NUCLEAR CORP.  
ENERGY HARBOR NUCLEAR GENERATION LLC  
DOCKET NO. 50-440  
PERRY NUCLEAR POWER PLANT, UNIT NO. 1  
AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 189  
License No. NPF-58

1. The U.S. Nuclear Regulatory Commission (the Commission) has found that:
  - A. The application for amendment filed by FirstEnergy Nuclear Operating Company, et al.,<sup>1, 2</sup> dated December 18, 2019, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations as set forth in 10 CFR Chapter I;
  - B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;
  - C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;
  - D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and
  - E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

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<sup>1</sup> Effective February 27, 2020, Facility Operating License No. NPF-58 was transferred from FirstEnergy Nuclear Generation, LLC and FirstEnergy Nuclear Operating Company to Energy Harbor Nuclear Generation LLC and Energy Harbor Nuclear Corp., as the licensed owner and operator, respectively. In a letter dated February 20, 2020, Energy Harbor Nuclear Corp. requested that the NRC continue the regulatory reviews and actions on the outstanding licensing actions and applications on Docket No. 50-440 (Agencywide Documents Access and Management System Accession No. ML20054B733).

<sup>2</sup> Energy Harbor Nuclear Corp. is authorized to act as agent for Energy Harbor Nuclear Generation LLC and has exclusive responsibility and control over the physical construction, operation, and maintenance of the facility.

2. Accordingly, by Amendment No. 189, Facility Operating License No. NPF-58 is hereby amended to authorize revision to the Perry Nuclear Power Plant, Unit No. 1, Updated Safety Analysis Report, as set forth in the licensee's application dated December 18, 2019, and evaluated in the NRC staff's safety evaluation enclosed with this amendment.
3. This license amendment is effective as of its date of issuance and shall be implemented within 60 days of the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Nancy L. Salgado, Chief  
Plant Licensing Branch III  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Date of Issuance: May 22, 2020



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
RELATED TO AMENDMENT NO. 189 TO FACILITY OPERATING LICENSE NO. NPF-58  
ENERGY HARBOR NUCLEAR CORP.  
ENERGY HARBOR NUCLEAR GENERATION LLC  
PERRY NUCLEAR POWER PLANT, UNIT NO. 1  
DOCKET NO. 50-440

1.0 INTRODUCTION

By application dated December 18, 2019 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML19352D548), FirstEnergy Nuclear Operating Company (FENOC) requested an amendment to change the Perry Nuclear Power Plant, Unit No. 1 (PNPP) updated safety analysis report (USAR). The change would revise PNPP USAR Section 9.1.4, "Fuel Handling System," and Section 9.1.5, "Control of Heavy Loads Over or Near Spent Fuel and Other Critical Plant Systems/Components," to modify the nondestructive examination (NDE) inspection interval for special lifting devices from annually or prior to each use, typically prior to each refueling outage, to a 10-year interval. The current NDE inspection interval is consistent with American National Standards Institute (ANSI) N14.6-1978, "American National Standard for Special Lifting Devices for Shipping Containers Weighing 10,000 Pounds (4500kg) or More for Nuclear Materials," and NUREG-0612, "Control of Heavy Loads at Nuclear Power Plants – Resolution of Generic Technical Activity A-36," dated July 1980 (ADAMS Accession No. ML070250180).

By order dated December 2, 2019 (ADAMS Accession No. ML19303C953), the NRC staff approved the direct and indirect transfers of several FENOC-owned and operated plants, including Perry. By letter dated December 3, 2019 (ADAMS Accession No. ML19337B181), FENOC indicated that the entities taking control of the plants, which had previously been referred to as New HoldCo, OwnerCo, and OpCo would be named Energy Harbor Corp., Energy Harbor Nuclear Generation LLC, and Energy Harbor Nuclear Corp., respectively. Under this new set-up, Energy Harbor Corp. would indirectly own the plants as a parent company, Energy Harbor Nuclear Generation LLC would directly own the plants, and Energy Harbor Nuclear Corp. would have authority to operate the plants.

On February 20, 2020, FENOC informed the NRC (ADAMS Accession No. ML20054B733) that:

Upon completion of the license transfer, Energy Harbor Nuclear Corp. will adopt and endorse the outstanding commitments, licensing actions, applications, and similar items on the aforementioned docket numbers. Energy Harbor Nuclear

Corp. requests NRC continuation of the regulatory reviews and actions on these items.

On February 27, 2020, Energy Harbor Nuclear Corp., informed the NRC that the transaction closed on February 27, 2020 and that it adopted and endorsed the outstanding commitments, licensing actions, applications and similar items on dockets submitted by FENOC on behalf of the licensees (ADAMS Accession No. ML20058D315). On February 27, 2020 (ADAMS ML20030A440), the NRC staff issued Amendment No. 187 to reflect the license transfer. Accordingly, Energy Harbor Nuclear Corp. is now authorized to act as agent for Energy Harbor Nuclear Generation, LLC, and has exclusive responsibility and control over the physical construction, operation, and maintenance of the facility at Perry.

## 2.0 REGULATORY EVALUATION

In a letter dated December 22, 1980, later identified as Generic Letter (GL) 80-113, as supplemented by GL 81-07, "Control of Heavy Loads," dated February 3, 1981, the NRC staff requested that all licensees describe how they satisfied the guidelines of NUREG-0612 at their facility and what additional modifications would be necessary to fully satisfy these guidelines. The NRC staff divided this request into two phases (Phase I and Phase II) for implementation by licensees. Phase I guidelines addressed measures for reducing the likelihood of dropping heavy loads and provided criteria for establishing safe load paths; procedures for load handling operations; training of crane operators; design, testing, inspection, and maintenance of cranes and special lifting devices; and selection and use of slings. Phase II guidelines addressed alternatives to reduce further the probability of a load handling accident or mitigate the consequences of heavy load drops.

In Section 5.1 of NUREG-0612, the NRC staff provided recommended guidelines to preserve defense-in-depth (DID) for the handling of heavy loads at nuclear power plants. The first element of the DID identified in Section 5.1 involved reducing the probability of a load drop by improving the reliability of the handling system components through design, operation, maintenance, and inspection of cranes and associated lifting devices to appropriate standards, as specified in Section 5.1.1 of NUREG-0612. Item (4) of Section 5.1.1 specified that special lifting devices used to handle heavy loads in the area of the reactor vessel or spent fuel pool, or in areas where an accidental load drop could damage safe shutdown systems, should satisfy the guidelines of ANSI N14.6-1978.

In PNPP USAR, Revision 21, Section 9.1.5.4.1, "Licensee Response to <NUREG-0612>, Phase I Elements," the licensee provides the following information regarding special lifting devices:

PNPP "Control of Lifting Operations" procedure requires special lifting devices to meet the requirements of ANSI N14.6-1978. In addition, as required in <NUREG-0612>, the procedure requires that special lifting devices be designed for combined static and dynamic loads imparted on the lifting device based on crane characteristics.

Section 5.3, "Testing to Verify Continuing Compliance," of ANSI N14.6-1978 states that each special lifting device shall be subjected annually (period not to exceed 14 months) to either of the following:

- (1) A load test equal to 150% of the maximum loads to which the device is to be subjected. After sustaining the test load for a period not less than 10 minutes,

critical areas, including major load-bearing welds, shall be subjected to visual inspection for defects, and all components shall be inspected for permanent deformation.

- (2) In cases where surface cleanliness and conditions permit, the load testing may be omitted, and dimensional testing, visual inspection, and nondestructive testing of major load-carrying welds and critical areas in accordance with 5.5 of this standard shall suffice. If the device has not been used for a period exceeding one year, this testing shall not be required. However, in this event, the test shall be applied before returning the device to service.

The requirements of 10 CFR 50.34(b) specify, in part, that the final safety analysis report (FSAR) shall include a description and analysis of the structures, systems, and components of the facility, with emphasis upon performance requirements and the evaluations required to show that safety functions will be accomplished. The requirements of 10 CFR 50.71(e) specify, in part, that licensees shall update the FSAR to include the effects of all safety analyses and evaluations performed by the licensee either in support of approved license amendments or in support of conclusions that changes did not require a license amendment, and all analyses of new safety issues performed by or on behalf of the licensee at Commission request. The effects of these changes include appropriate revisions of descriptions in the FSAR such that the report (as updated) is complete and accurate. As a result of this requirement, the licensee incorporated maintenance and testing of special lifting devices into the PNPP USAR.

### 3.0 TECHNICAL EVALUATION

#### 3.1 Background

The following special lifting devices at PNPP are subject to periodic NDE:

- Refuel Shield Strongback
- Dryer Separator Strongback
- Reactor Pressure Vessel (RPV) Head Strongback/Carousel
- Insulation Frame Strongback and Adapter
- Stud Strongback and Hardware

The licensee provided the following descriptions of these components:

#### Refuel Shield Strongback

During reactor vessel disassembly, the refuel shield strongback is used during transport of the refueling shield from its storage location in the separator storage pool to its position to span between the reactor pressure vessel (RPV) flange and pool floor at the wall between the reactor cavity pool and dryer storage pool. Following its use, the shield is transported back to its storage location as part of reactor reassembly. During transport, the refueling shield center of gravity is not permitted to pass inside the diameter of RPV studs. The refueling shield strongback is stored on the refuel floor when not in use.

### Dryer Separator Strongback

The dryer separator strongback is used during transport of the separator and transport of the dryer between the reactor vessel and pool storage location during reactor vessel assembly and reassembly. When not in use during the refueling outage, the strongback is normally stored on the refuel floor, or atop either the dryer or separator in the storage pool during outages. The strongback may also be used to lift the dryer and separator for repositioning in the storage pool.

### RPV Head Strongback/Carousel

During reactor disassembly, the RPV head strongback/carousel is used during transport of the RPV head and RPV studs/tensioners from the reactor vessel to the storage location on the refuel floor. The strongback/carousel is transported back to its storage location as part of reactor reassembly. The strongback/carousel is stored on the refuel floor when not in use.

### Insulation Frame Strongback and Adapter

During reactor vessel disassembly, the insulation frame strongback and adapter are used to transport the insulation and framework above the reactor vessel head to the storage location on the refuel floor. The strongback transports the insulation and framework back to its location above the RPV head as part of reactor reassembly. The strongback is stored on the refuel floor when not in use.

### Stud Strongback and Hardware

During reactor vessel disassembly and reassembly, the stud strongback may be used to transport multiple removed reactor vessel head studs. The strongback transports the studs between the reactor flange and the storage position on the refuel floor. The strongback is stored on the refuel floor when not in use.

In addition, PNPP USAR Section 9.1.4.2.2.1, "Containment Polar Crane," includes the following descriptions related to the design of the RPV head and dryer separator strongbacks:

The vessel head strongback is cruciform-shaped. It attaches to the crane sister hook by means of an integral hook box and two hook pins. Each pin is capable of carrying the rated load. Each leg of the cruciform is capable of carrying the rated load.

On both ends of each leg are adjustable lifting rods, suspended vertically to attach the lifting legs to the RPV head. These are for adjustment for even four point load distribution and allow for some flexibility in diametrical location of the lifting lugs on the head....

The shroud head load of 53 tons and the steam dryer load of 36.4 tons will both be lifted with the dryer/separator strongback.

This strongback is a cruciform shape with box-shaped sockets at the four ends. Each socket box is adjustable to accommodate the two different lug spacings on

the dryer and on the shroud head. Pneumatically operated lifting pins will penetrate the sockets to engage the lifting lugs and pneumatically operated hook box pins will engage the polar crane sister hook.

### 3.2 Proposed Change

The licensee requested a change to the NDE inspection interval because the proposed interval will result in reductions to refueling outage durations for those outages during which load testing or NDE is not required. This will correspondingly result in decreases to inspection personnel radiation exposures given that the special lifting devices may be contaminated and in high dose areas. The standard for design, fabrication, testing, and maintenance of the special lifting devices is ANSI N14.6-1978. This standard applies to a range of special lifting devices used with heavy objects, including applications where the special lifting devices and associated containers for radioactive material are in frequent use and shipped between sites. At PNPP, the licensee uses the special lifting devices under controlled conditions and at low frequencies.

The current PNPP licensing basis for overhead bridge crane load testing is specified USAR Section 9.1.4.2.2.1, which states, in part:

Each of the above strongbacks are load tested at 125 percent rated load or higher.

The licensee proposes to specifically indicate that loading testing will occur prior to initial use by changing this language to:

Prior to initial use, each of the above strongbacks are load tested at 125 percent rated load or higher.

The licensee proposes to extend the NDE test interval to 10 years. The licensee proposes to add to PNPP USAR Section 9.1.5, "Control of Heavy Loads Over or Near Spent Fuel and Other Critical Plant Systems/Components," the following:

Per ANSI N14.6-1978, to verify continuing compliance, each special lifting device shall be subjected annually (period not to exceed 14 months) to a load test equal to 150% of the maximum loads to which the device is to be subjected and to visual inspection of critical areas (including major load-bearing welds) for defects, and all components shall be inspected for permanent deformation. As an alternative, the load testing may be omitted, and dimensional testing, visual inspection, and nondestructive testing of major load-carrying welds and critical areas can be performed. If the device has not been used for a period exceeding one year, this testing is not required, but is conducted before returning the device to service. For the refuel special lifting devices, i.e., the Refuel Shield Strongback, Dryer Separator Strongback, RPV Head Strongback/Carousel, Insulation Frame Strongback and Adapter, Stud Strongback and Hardware, testing to verify continuing compliance is performed consistent with ANSI N14.6-1978 with the exception the NDE or load testing is conducted on a 10-year interval.

### 3.3 NRC Staff Evaluation

The licensee proposes to extend the NDE test interval to 10 years. The licensee provided the following reasons supporting the decreased NDE frequency:

- The requirements in ANSI N14.6-1978 were specifically written for devices used for lifting shipping containers with much greater utilization than the PNPP refuel special lifting devices. In contrast, the refuel special lifting devices at PNPP are used intermittently. The Refuel Shield Strongback, RPV Head Strongback/Carousel, Insulation Frame Strongback, and Stud Strongback and Hardware would typically be used for two lifts per refueling outage for each device. The Dryer Separator Strongback is used for four to six lifts per refueling outage. Based upon low usage, any fatigue usage would not be of concern for evaluation. Therefore, as these devices are not subject to large numbers of repetitive load cycles causing fatigue damage, it is concluded that performing NDE or load test inspections less frequently will not result in reduction in reliability of the special lifting devices due to concerns of service-related defects attributed to fatigue.
- Visual inspection of the special lifting devices' load bearing components, to identify flaws or deficiencies that could lead to failure of the components, is required prior to each use controlled by PNPP preventive maintenance procedures. The interval for the other inspections required by ANSI N14.6 section 5.3.1 (visual, dimensional checks, etc.) will remain at annually (or if not used for greater than a year, then prior to use), typically at each refueling outage. Also, continued compliance with the incident testing and inspection requirements of ANSI N14.6 sections 5.3.2 through 5.3.8 will be maintained within the proposed amendment.
- FENOC has reviewed available records of past NDE results, from 2004 to current, which show that previous relevant indications have been evaluated. In no instance did the indications noted through NDE result in service-related defects or failures relative to the lifting function of the devices.
- The Refuel Shield Strongback, RPV Head Strongback/Carousel, Insulation Frame Strongback, Stud Strongback and Hardware, and Dryer Separator Strongback are stored and used within the containment building. The area is not subject to harsh external temperature variations or a normally wetted corrosive environment. Use and storage under these conditions provide assurances that the potential for deterioration due to environmental concerns is mitigated.

The NRC staff reviewed the bases that the licensee provided in support of the proposed increase in the NDE inspection interval to 10 years. Specifically, the licensee determined that the proposed change to the NDE inspection interval would be appropriate considering that:

- The specifications of ANSI N14.6-1978 were written for devices with much higher utilization rates than the utilization rates of the PNPP special lifting devices.

- The licensee continues to perform visual inspections and dimensional checks prior to each use, consistent with the ANSI N14.6-1978.
- The licensee reviewed available past NDE records to verify that no previous indications resulted in service-related defects or failures that affect the lifting function of the devices.
- The licensee stores the special lifting devices in controlled environments which reduces the potential for corrosion or other environmental degradation.

The NRC staff agrees that the above factors support an increased NDE inspection interval. Furthermore, the proposed reduction in the frequency of load testing or NDE for the special lifting devices is consistent with operating experience and more recent national consensus standards. As documented in NUREG-1774, "A Survey of Crane Operating Experience at U.S. Nuclear Power Plants from 1968 through 2002," issued July 2003 (ADAMS Accession No. ML032060160), the NRC staff identified that operating experience over many years revealed no failures of special lifting devices. The American Society of Mechanical Engineers (ASME) NML-1, "Rules for the Movement of Loads using Overhead Handling Equipment in Nuclear Facilities," 2019, includes provisions for NDE demonstrating continuing compliance for special lifting devices used for critical lifts. This standard specifies a frequency of NDE based on the number of lifts that would be consistent with an interval exceeding 10 years for infrequently used lifting devices stored in a controlled environment, such as those used for nuclear reactor refueling.

### 3.4 NRC Staff Evaluation Conclusion

The NRC staff evaluated the proposed change in the NDE frequency for special lifting devices at PNPP against the recommended guidelines in Section 5.1 of NUREG-0612; specifically, the preservation of DID for the handling of heavy loads at nuclear power plants. The first element of DID identified in Section 5.1 involves reducing the probability of a load drop by improving the reliability of the handling system components through design, operation, maintenance, and inspection of cranes and associated lifting devices to appropriate standards. The licensee has demonstrated that the proposed NDE frequency of once per 10 years is appropriate for special lifting devices at PNPP based on the usage of the lifting devices, the reliability of the lifting devices demonstrated through operating experience, and the continued maintenance and inspection of the lifting devices. Therefore, the staff finds that the proposed change in the NDE frequency is acceptable because analyses and evaluations demonstrate that the safety functions of the special lifting devices will continue to be accomplished, consistent with the requirements of 10 CFR 50.34(b) and 10 CFR 50.71(e).

### 4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the State of Ohio official was notified of the proposed issuance of the amendment on April 24, 2020. The State official had no comments.

### 5.0 ENVIRONMENTAL CONSIDERATION

The amendment changes requirements with respect to the installation or use of facility components located within the restricted area as defined in 10 CFR Part 20. The NRC staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no

significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendment involves no significant hazards consideration, which was published in the *Federal Register* on February 11, 2020 (85 FR 7792), and there has been no public comment on such finding. Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

## 6.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) there is reasonable assurance that such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributor: S. Jones, NRR

Date of issuance: May 22, 2020

SUBJECT: PERRY NUCLEAR POWER PLANT, UNIT NO. 1 – ISSUANCE OF  
AMENDMENT NO. 189 REGARDING SPECIAL LIFTING DEVICE  
NONDESTRUCTIVE EXAMINATION FREQUENCY (EPID L-2019-LLA-0294)  
DATED MAY 22, 2020

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SJones, NRR

**ADAMS Accession No.: ML20118C167**

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