

August 22, 2000

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Mr. John K. Wood  
Vice President - Nuclear, Perry  
FirstEnergy Nuclear Operating Company  
P.O. Box 97, A200  
Perry, OH 44081

**SUBJECT: PERRY NUCLEAR POWER PLANT, UNIT 1 - ISSUANCE OF AMENDMENT  
RE: EMERGENCY SERVICE WATER SLUICE GATES (TAC NO. MA9093)**

Dear Mr. Wood:

The U.S. Nuclear Regulatory Commission has issued the enclosed Amendment No. 114 to Facility Operating License No. NPF-58 for the Perry Nuclear Power Plant, Unit 1. This amendment is in response to your application dated June 1, 2000 (PY-CEI/NRR-2492L), as supplemented by submittal dated June 30, 2000 (PY-CEI/NRR-2505L).

The amendment approves a proposed modification that changes the Perry Nuclear Power Plant as described in the Updated Safety Analysis Report by installing inflatable seals that surround the Emergency Service Water (ESW) alternate intake sluice gates. This modification is necessary so that the licensee may use inflatable seals to minimize leakage of warm water into the ESW forebay from the Service Water discharge and thus maintain the ESW temperature below the design limit.

A copy of the Safety Evaluation is also enclosed. The Notice of Issuance will be included in the Commission's next biweekly Federal Register notice.

Sincerely,

/RA/

Douglas V. Pickett, Sr. Project Manager, Section 2  
Project Directorate III  
Division of Licensing Project Management  
Office of Nuclear Reactor Regulation

Docket No. 50-440

Enclosures: 1. Amendment No. 114 to  
License No. NPF-58  
2. Safety Evaluation

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DATE	8/7/00	8/3/00	8/11/00	7/20/00	8/21/00

See RCaruso to SBajwa memo dated 7/20/00

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UNITED STATES  
NUCLEAR REGULATORY COMMISSION

WASHINGTON, D.C. 20555-0001

August 22, 2000

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Vice President - Nuclear, Perry  
FirstEnergy Nuclear Operating Company  
P.O. Box 97, A200  
Perry, OH 44081

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cc w/encls: See next page

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

FIRSTENERGY NUCLEAR OPERATING COMPANY

DOCKET NO. 50-440

PERRY NUCLEAR POWER PLANT, UNIT 1

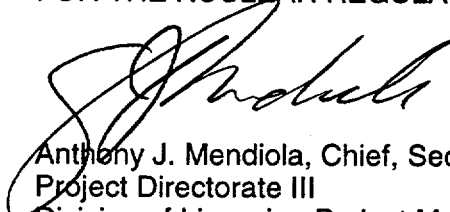
AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 114  
License No. NPF-58

1. The U.S. Nuclear Regulatory Commission (the Commission) has found that:
  - A. The application for amendment by the FirstEnergy Nuclear Operating Company (the licensee) dated June 1, 2000, as supplemented by submittal dated June 30, 2000, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations 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.
2. Accordingly, the license is amended to authorize revision of the Updated Safety Analysis Report (USAR) as set forth in the application for amendment by the licensee, dated June 1, 2000, and as supplemented by letter dated June 30, 2000. The licensee shall update the USAR by adding a description of the modification that incorporates inflatable seals surrounding the Emergency Service Water alternate intake sluice gates, as authorized by this amendment and in accordance with 10 CFR 50.71(e).

3. This license amendment is effective as of its date of issuance and shall be implemented not later than 90 days after issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

A handwritten signature in black ink, appearing to read 'A. Mendiola', is written over the typed name and title.

Anthony J. Mendiola, Chief, Section 2  
Project Directorate III  
Division of Licensing Project Management  
Office of Nuclear Reactor Regulation

Date of Issuance: August 22, 2000



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
RELATED TO AMENDMENT NO. 114 TO FACILITY OPERATING LICENSE NO. NPF-58

FIRSTENERGY NUCLEAR OPERATING COMPANY

PERRY NUCLEAR POWER PLANT, UNIT 1

DOCKET NO. 50-440

1.0 INTRODUCTION

By letter dated June 1, 2000, as supplemented by letter dated June 30, 2000, FirstEnergy Nuclear Operating Company (FENOC, or the licensee) requested Nuclear Regulatory Commission (NRC) approval of an amendment to modify the Emergency Service Water (ESW) alternate intake sluice gate automatic opening function for up to five months per year. This modification will help maintain the ESW temperature below the design limit by minimizing leakage of warm water into the ESW forebay from the Service Water discharge during the summer months.

The licensee proposes to use an inflatable seal and seal retainer on the ESW alternate intake sluice gates to minimize leakage into the ESW forebay. To avoid damaging the seal, the seal must be deflated before raising or lowering the gates. Thus, use of the inflatable seal requires defeating the automatic opening function of the ESW alternate intake sluice gates. A manual safety related key operated Class 1E selector switch will be installed to enable or defeat both the manual raise/lower capability and the automatic open signal of the sluice gates. The licensee included an analysis to support the proposed modification.

The supplemental information contained clarifying information and did not change the initial no significant hazards consideration determination and did not expand the scope of the original *Federal Register* notice.

2.0 BACKGROUND

The ESW System supplies cooling water to equipment required for normal and emergency shutdown of the reactor. It can also provide water to the site Fire Protection System, the Fuel Pool Cooling and Cleanup System, the emergency Closed Cooling Water System, the Residual Heat Removal System, and the Standby Liquid Control System.

The source of the water and the Ultimate Heat Sink for the ESW System is Lake Erie. As the water enters the ESW pumphouse from the intake tunnel, it travels over a weir structure into the ESW forebay area. From the forebay, water passes through two sets of traveling screens which remove any large debris. The water then flows into the pump suction basin from which the ESW pumps take their suction.

An alternate intake pathway is provided in the event the normal intake tunnel becomes obstructed. This alternate pathway is a branch tunnel that connects the discharge tunnel with the ESW pumphouse forebay. Two parallel Sluice Gates normally isolate this branch but will automatically open on low ESW forebay water level.

The function of the sluice gates is to provide a barrier between the discharge tunnel and the ESW forebay. The original design of the ESW sluice gates included non-safety related inflatable seals on both sides of the sluice gate to prevent warm water from the plant's discharge water from entering the ESW pumphouse and being circulated back to the ESW suction. The original seals tended to bind in the tracks thus preventing the gates from fully closing. Therefore, they were removed prior to commercial operation.

The loss-of-coolant accident (LOCA) analysis as described in the Perry Updated Safety Analysis Report (USAR) assumes a maximum ESW temperature of 85 °F. Due to leakage of warm ESW discharge flow past the sluice gates into the ESW forebay, the ESW forebay temperature typically exceeds that of the lake. Using conservative assumptions, the licensee has calculated that leakage past the sluice gates can increase the ESW forebay temperature by as much as 3.5 °F above the lake temperature. Therefore, when the lake temperature reaches 81.5 °F, leakage of service water effluent through the sluice gates may cause the ESW forebay temperature to approach the accident analysis design limit of 85 °F.

In order to minimize ESW forebay temperatures, plant operators have been operating an ESW pump to circulate cooler lake water through the ESW forebay area whenever the service water effluent reaches or exceeds 80 °F. This additional run time on the ESW pumps is not desired.

The licensee proposes to use an inflatable seal on each sluice gate to minimize the leakage of water from the alternate intake tunnel and thus reduce the heatup of the ESW forebay. These seals must be deflated prior to opening/closing the sluice gates in order to prevent damage to the seals and the sluice gate operating mechanism. A safety-related Class 1E selector switch will be used to defeat the automatic opening feature of the ESW sluice gates for a maximum of five months per year. This key-operated OFF/AUTO selector switch will be installed in each local sluice gate control panel. In the AUTO position, the seals will be deflated and the switch contact is closed which allows the circuit to function as currently designed. In the OFF position, the seals will be inflated and the switch contact is open which prevents both automatic and manual open and close capability of the sluice gates. The local and control room gate position lights remain functional, as well as the circuit's loss of power and low-level alarms.

Inflation and deflation of the seals will be accomplished by local manual action. The air supply will be provided by the instrument air system and backed up by air bottles. Redundant check valves, located in series in the instrument air system, will be provided for isolation and redundancy. When the seals are inflated, seal integrity will be verified twice daily. The redundant check valve integrity will be verified on an annual basis prior to inflating the seals.

The design work associated with the inflatable seal modification has been completed and the inflatable seals have been installed and are ready to be inflated. However, the licensee has determined that defeating the automatic opening function of the sluice gates and inflating the

seals involves an unreviewed safety question. The purpose of this amendment request is to obtain NRC review and approval of the proposed use of the sluice gate inflatable seals.

Following a preliminary review of the amendment request by the NRC and discussions with the staff, the licensee provided additional information and clarification in a letter dated June 30, 2000. The licensee indicated that while the inflatable seals were not originally classified as safety-related, upon further review, FENOC determined that the seals perform a safety-related function and, therefore, they should be classified as safety-related. The licensee indicated that since the existing seals and supporting air system do not satisfy the requisite quality requirements for safety-related equipment, they will be treated as non-conforming under the Perry Quality Assurance Program. This non-conforming condition will be addressed in accordance with the site's corrective action program, and the seals and associated air system will be upgraded to safety-grade prior to their use during the summer of 2001. The licensee provided justification for using the existing sluice gate seals during the summer of 2000.

### 3.0 EVALUATION

The safety function of the sluice gates is to minimize leakage of warm service water being discharged from the plant back into the ESW forebay area, thereby maintaining the intake cooling water temperature within accident analysis assumptions. While the sluice gates are safety related, the sluice gate seals, inflation system and air supply system are non-safety related.

The licensee has determined that the proposed use of the sluice gate inflatable seals poses an unreviewed safety question because 1) the automatic opening capability of the sluice gates will be removed when the seals are inflated, and 2) reliance will be placed on the non-safety related sluice gate seals and inflation system to mitigate an accident. The staff notes that the alternate ESW flow path will remain functional when the sluice gate seals are inflated, but operator action must be relied upon to perform the alignment which will require additional time and diligence on the part of the plant operators.

#### 3.1 Automatic Opening Capability

The purpose of the alternate ESW intake is to provide a source of cooling water if the normal ESW intake becomes disabled either by shipping accidents or severe icing. Since the seals will only be inflated when lake temperatures are elevated (i.e., during the summer months), icing is not a concern. In minimizing the vulnerability to shipping accidents, the licensee will limit use of the inflatable seals to no more than five months per year. Based on a probabilistic analysis, the licensee estimated that loss of the normal intake due to a shipping accident during the five month period when the alternate ESW intake is unavailable is  $8E-8$ . The criteria provided in Regulatory Guide 1.27, "Ultimate Heat Sink for Nuclear Power Plants," only requires one ESW intake if the probability of failure of the single intake is extremely low. The staff considers this to be the case during the five-month period when lake temperatures may be elevated and the seals are inflated. Thus, the proposed change satisfies the staff's review criteria in this respect.

The licensee has installed a key-lock selector switch in each of the two local sluice gate control panels for defeating the auto-open and manual control capability. The selector switches are safety-related Class IE, and satisfy environmental and seismic qualification requirements. The keys for the selector switches will be administratively controlled in accordance with plant procedures. Administrative controls have also been established to ensure that the automatic



opening function of the sluice gates is not intentionally blocked when there is a potential for the lake to freeze, or for more than five months per year.

Other elements of the plant modification that were assessed by the licensee included the design of the seal retainers, which are seismically attached, and the reliability and redundancy of the air supply. One air source is the normal non-safety instrument air system, and the other source is provided by compressed air cylinders. Both air supplies are connected to the seals via seismically supported lines and check valves are used to isolate the non-safety instrument air from the other air source.

In order to ensure that the sluice gate seals and inflation system are functioning properly and are not degraded, the licensee has established the following commitments:

- When the seals are inflated, verification of seal integrity will be provided twice daily.
- The redundant check valve integrity will be verified on an annual basis, prior to inflating the seals, to ensure their integrity.
- Administrative controls will be in place to ensure that the automatic opening, on low forebay level, function of the sluice gates is not intentionally blocked when the potential exists for the lake to freeze or for more than five months per year.

When the seals are inflated, the twice daily verification of seal and air supply integrity will include:

- Checks of the seal air pressure,
- Verifying that the air flow is below a set value and that the pressure in the compressed air cylinder(s) is sufficient to ensure at least a 24-hour supply of air, and
- Measuring the temperature of the ESW forebay to monitor seal bypass flow.

The staff considers these measures to be appropriate and adequate to assure the integrity and functionality of the sluice gate seals and associated inflation system.

### 3.2 Non-Conforming Condition

Accident analysis methodology defined in Chapter 15 of the Perry USAR indicates that the seals and sealing system cannot be credited during mitigation of accidents (e.g., loss-of-coolant accident (LOCA)) because the components are non-safety related. In this regard, the staff informed the licensee that the sluice gate seals and the associated inflation system (up to and including the instrument air system isolation check valves) must satisfy the quality requirements stated in 10 CFR 50, Appendix B, and in the Perry Quality Assurance Program for safety-related components. In their letter of June 30, 2000, the licensee identified this as a non-conforming condition to be addressed in accordance with the Perry corrective action program. Since use of the non-safety elastomeric seal and inflation system is considered a non-conforming condition, the licensee has declared this configuration temporary and will be permanently addressed by the following commitment:

- The Perry Nuclear Power Plant (PNPP) staff will upgrade the elastomeric seal and associated inflation system (inclusive of the upstream instrument air check valve

[OP45-F0004A/B]) to safety grade in accordance with 10 CFR 50 Appendix B, and requirements for components important to safety prior to relying on the seal, during the summer of 2001.

In justifying interim use of the existing sluice gate seals and the associated inflation system during the summer of 2000, the licensee performed a failure modes and effects analysis of the inflatable seal and associated retainer and concluded that there would be no adverse impact on the operability of safety-related equipment. Any potentially damaging elastomeric seal parts or metallic retainer parts would either sink to the bottom of the ESW forebay area or be captured by the 3/8-inch openings of the traveling screens. In addition, the licensee assessed the effect of seal failure on plant safety concurrent with a LOCA and seismic event (individually), with and without offsite power available. The licensee concluded that due to the many conservatisms that exist in the LOCA and seismic analyses, if the sluice gate seals were postulated to fail along with an additional single-failure during these events, it was unlikely that any design limits would be exceeded.

In justifying interim use of the sluice gate seals, the licensee also reviewed the specific design attributes of the seal materials in order to establish a sense of durability and ruggedness. The seal manufacturer indicated that the seal is manufactured from fabric-reinforced Ethylene Propylene Diene Monomer (EPDM), with a nominal wall thickness of 0.109 inches. According to the manufacturer, seals (including fabric-reinforced inflatable seals) made from EPDM are used in many applications and have demonstrated reliable and durable operating characteristics. The manufacturer indicated that EPDM displays good tear resistance and proves durable when exposed to abrasion and other forms of mechanical wear and is an excellent general purpose material with a serviceable temperature range of -60 °F to 300 °F. Based on vendor recommendations, the inflatable seals are expected to have a 10-year service life for the intended application at Perry.

Based on the information that was provided and discussed above, the staff agrees with the licensee's justification for using the sluice gate seals and associated inflation system on a one-time basis, not to exceed a five-month period, during the summer of 2000. The licensee's commitment regarding the non-conforming condition provides adequate assurance that the concern will be properly resolved in a timely manner. This is acceptable to the staff.

The licensee's letter of June 1, 2000, included commitments to ensure that the sluice gate seals and inflation system are functioning properly and are not degraded. In addition, the licensee's letter of June 30, 2000, included a commitment to upgrade the elastomeric seal and associated inflation system to safety grade in accordance with 10 CFR 50 Appendix B, and requirements for components important to safety prior to relying on the seal during the summer of 2001. The staff finds that reasonable controls for the implementation and for subsequent evaluation of proposed changes pertaining to these regulatory commitments are best provided by the licensee's administrative processes, including its commitment management program. These regulatory commitments do not warrant the creation of regulatory requirements (i.e., items requiring prior NRC approval of subsequent changes).

Based on our review of the licensee's request to install and use a sluice gate sealing system as discussed above, the staff concludes that installation and use of the sluice gate seals in the manner that is proposed does not pose an undue risk to public health and safety. The staff concludes that the measures taken by the licensee to assure that the sluice gate seals and inflation system are capable of performing their safety function are acceptable. Additionally, the staff agrees with the licensee's assessment and justification for interim use of the existing (non-

conforming) sluice gate sealing system during the summer of 2000, and considers the licensee's commitment to resolve the non-conforming condition prior to use during the summer of 2001 to be acceptable. Given these considerations, the staff has determined that the modification to install and use a sluice gate sealing system, and operation of the Perry Nuclear Plant in the manner that is proposed, is acceptable.

#### 4.0 STATE CONSULTATION

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

#### 5.0 ENVIRONMENTAL CONSIDERATION

This amendment changes a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluent 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 this amendment involves no significant hazards consideration and there has been no public comment on such finding (65 FR 37414 and 65 FR 39964). Accordingly, this 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 this amendment.

#### 6.0 CONCLUSION

The staff 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) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public.

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Date: August 22, 2000