

August 30, 2005

Mr. Jeffrey S. Forbes
Site Vice President
Arkansas Nuclear One
Entergy Operations, Inc.
1448 S. R. 333
Russellville, AR 72801

SUBJECT: ARKANSAS NUCLEAR ONE, UNIT NO. 1 - ISSUANCE OF AMENDMENT RE:
REVISION TO SAFETY ANALYSIS REPORT TO ALLOW THE USE OF A
TRIPOD TO REMOVE AND INSTALL THE REACTOR VESSEL HEAD AND
OTHER REACTOR VESSEL INTERNALS (TAC NO. MC5450)

Dear Mr. Forbes:

The Commission has issued the enclosed Amendment No. 225 to Renewed Facility Operating License No. DPR-51 for Arkansas Nuclear One, Unit No. 1 (ANO-1). The amendment consists of changes to the ANO-1 Safety Analysis Report (SAR) in response to your application dated December 20, 2004, as supplemented by letters dated June 6 and August 10, 2005.

The amendment revises the ANO-1 SAR to allow the use of a lifting tripod (a special lifting device) to remove and install the reactor vessel head and certain vessel internals during refueling outages, using the reactor building polar crane.

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

Be aware that the changes to the SAR document are controlled in accordance with the requirements of Title 10 of the *Code of Federal Regulations*, Section 50.59, "Changes, tests, and experiments."

Sincerely,

/RAI

Mohan C. Thadani, Senior Project Manager, Section 1
Project Directorate IV
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-313

Enclosures: 1. Amendment No. 225 to DPR-51
2. Safety Evaluation

cc w/encls: See next page

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ENTERGY OPERATIONS INC.

DOCKET NO. 50-313

ARKANSAS NUCLEAR ONE, UNIT NO. 1

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 225
Renewed License No. DPR-51

1. The Nuclear Regulatory Commission (the Commission) has found that:
 - A. The application for amendment by Entergy Operations, Inc. (the licensee) dated December 20, 2004, as supplemented by letters dated June 6 and August 10, 2005, 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 license 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, by Amendment No. 225, the license is amended to authorize revision to the Safety Analysis Report (SAR), as set forth in the application for amendment by Entergy Operations, Inc., dated December 20, 2004, as supplemented by letters dated June 6 and August 10, 2005. Entergy Operations, Inc., shall update Section 9.8.1.7.1 of the SAR to allow the use of a tripod (a special lifting device) under increased loads when lifting the reactor vessel head using the reactor building polar crane as described in the application dated December 20, 2004, as supplemented by letters dated June 6 and August 10, 2005, and the staff's Safety Evaluation attached to this amendment. The licensee shall submit the revised section authorized by this amendment with the next update of the SAR.
3. The license amendment is effective as of its date of issuance and shall be implemented within 30 days from the date of issuance. The SAR changes shall be implemented in the next periodic update to the SAR in accordance with 10 CFR 50.71(e).

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

David Terao, Chief, Section 1
Project Directorate IV
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Date of Issuance: August 30, 2005

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 225 TO

RENEWED FACILITY OPERATING LICENSE NO. DPR-51

ENTERGY OPERATIONS, INC.

ARKANSAS NUCLEAR ONE, UNIT NO. 1

DOCKET NO. 50-313

1.0 INTRODUCTION

By application dated December 20, 2004 (Reference 1), as supplemented by letters dated June 6 (Reference 2) and August 10, 2005 (Reference 3), Entergy Operations, Inc. (Entergy or the licensee) submitted a request to amend the Arkansas Nuclear One, Unit No. 1 (ANO-1) Safety Analysis Report (SAR). The supplements provided additional information that clarified the application, did not expand the scope of the application as originally noticed, and did not change the staff's original proposed no significant hazards consideration determination as published in the *Federal Register* on February 1, 2005 (70 FR 5242).

The amendment would revise the SAR (as updated) to allow the licensee the use of a lifting tripod (a special lifting device) to remove and install the reactor vessel (RV) head and certain RV internals during refueling outages, using the reactor building polar crane. The reactor building polar crane is an electric, circular traveling bridge crane with a single trolley. It consists of a main hoist used to lift the RV head, the reactor upper plenum assembly and reactor core barrel assembly, and an auxiliary hoist used to perform lifting of the refueling equipment.

The licensee has committed to "revise Section 9.6.1.7.1 of the ANO-1 SAR during the next ANO-1 SAR amendment after NRC approval of the license amendment."

The licensee has determined that the proposed use of a tripod will not meet the criterion of Section 50.59 (c)(2)(vi) in Title 10 of the *Code of Federal Regulations* (CFR) for allowing the licensee to use the lifting device without prior approval of the Nuclear Regulatory Commission (NRC). Accordingly, the licensee proposes to revise Section 9.6.1.7.1, "Control of Heavy Loads Requirements," of the ANO-1 SAR (as updated) to reflect the proposed change, and requests Nuclear Regulatory Commission (NRC) approval.

The lifting tripod is classified as a special lifting device in accordance with NUREG-0612 (Reference 4), "Control of Heavy Loads at Nuclear Power Plants." NUREG-0612 invokes American National Standards Institute (ANSI) N14.6-1978 (Reference 5) as a standard. Since the design does not meet the specific requirements of ANSI N14.6-1978, when using typical minimum yield material strengths, the licensee is proposing to use actual material strength data from the tripod's certified material test reports (CMTRs).

The amendment is requested by the licensee to support activities associated with the ANO-1 refueling outages.

2.0 REGULATORY EVALUATION

The regulations in 10 CFR Part 50.59(c)(2), criterion (vi), requires that a licensee shall obtain NRC approval for a license amendment pursuant to 10 CFR 50.90 prior to implementing a proposed change, test, or experiment; if the change, test, or experiment would create a possibility of an accident of a structure, system, or component important to safety; and the accident would have a different result than any previously evaluated in the SAR (as updated).

The NRC issued NUREG-0612, "Control of Heavy Loads at Nuclear Power Plants," to enable the licensees to expedite reviews to ensure proper handling of heavy loads. In a letter dated February 3, 1981, the NRC issued Generic Letter (GL) 81-07, which provided the licensees the schedule for implementing the guidance of NUREG-0612.

NUREG-0612 provides regulatory guidelines for the licensees to assure safe handling of heavy loads in areas where the drop of the load could impact the stored spent fuel, fuel in the reactor core, or equipment that may be required to achieve safe shutdown or permit continued decay heat removal. The objectives of the guidelines are to assure that either: (1) the potential for a load drop is extremely small, or (2) the potential hazards of a load drop do not exceed acceptable guidelines. NUREG-0612 provides guidelines that are implemented in two phases.

Phase I guidelines address measures for reducing the likelihood of dropping heavy loads by providing criteria establishing safe load paths, procedures for load-handling operations, training for crane operators; design, testing, inspection, and maintenance of cranes and lifting devices; and analyses of the impact of heavy-load drops.

Phase II guidelines address alternatives for mitigating the consequences of heavy-load drops, including using either (1) a single-failure-proof crane for increased handling system reliability, (2) electrical interlocks and mechanical stops for restricting crane travel, or (3) load drops and consequence analyses for assessing the impact of dropped loads on plant safety in the spent fuel area, containment building, and other areas affecting plant safety and operations. In GL 85-11, "Completion of Phase II of 'Control of Heavy Loads at Nuclear Power Plants,' NUREG-0612," dated June 28, 1985, the NRC concluded that satisfying the NUREG-0612 Phase I guidelines assure that the potential for a load drop is extremely small and dismissed the need for licensees to implement the guidelines of NUREG-0612, Phase II. However, GL 85-11 encouraged licensees to implement actions they perceive to be appropriate to provide adequate safety.

The licensee has classified the lifting tripod as a special lifting device in accordance with guidance in Section 5.1.1(4) of NUREG-0612. The guidance in Section 5.1.1(4) NUREG-0612 adopted the ANSI Standard N14.6-1978, "Special Lifting Devices for Containers Weighing 10,000 Pounds or More for Nuclear Materials," for a special lifting device qualification, including an added dynamic load factor, in addition to the static load of the limiting load being lifted.

3.0 TECHNICAL EVALUATION

The licensee has scheduled replacement of the ANO-1 RV closure head during the fall 2005 refueling outage. The new head, service structure, control rod drive mechanisms, shield blankets, and most of the RV closure head studs will result in a total tripod lift weight of approximately 184 tons, which exceeds the current 150 tons rating of the polar crane and special lifting devices. Consequently, the licensee determined that the tripod will not meet criterion 10 CFR 50.59(c)(2)(vi) and proposed a change in Section 9.6.1.7.1, "Control of Heavy Loads Requirements," of the ANO-1 SAR (as updated) to state:

The reactor vessel head and internals lifting tripod is classified as a special lifting device in accordance with NUREG-0612 which requires these devices to meet ANSI N14.6-1978. ANSI N14.6-1978 specifies that minimum yield strength of the material be used to determine the yield and ultimate strengths. Instead of the minimum yield strength of the material, the actual tripod Certified Materials Test Reports were used to ensure a safety factor of 3 for yield strengths.

Section 3.2.1.1 in ANSI N14.6-1978 states that special devices shall be capable of lifting three times the combined weight of the shipping container with which they will be used, in addition to the weight of the intervening components of the special lifting device; without generating a combined shear stress or maximum tensile stress at any point in the device in excess of the corresponding minimum yield strength of their materials of construction. It shall also be capable of lifting five times that weight without exceeding the ultimate strength of the materials. In addition, NUREG-0612, Section 5.1.1(4) states that a dynamic factor be included to the static-load stress. In its submittal, the licensee stated that the calculated safety factor resulting from its strength analysis for the lifting eye of the special lifting device is 2.78. Since the licensee was unable to meet the specific requirements of ANSI N14.6-1978 when using the typical minimum yield material strength, the licensee proposed to use the material yield strength specified in the CMTR to achieve a safety factor of 3.57 which is larger than 3.0 and complies with NUREG-0612 guidelines.

Section 5.2.1, "Acceptance Testing," of NUREG-0612 states that each device shall be subjected to a load test equal to 150 percent of the maximum load to which the device is to be subjected. NUREG-0612 does not provide a specific dynamic factor, but states that the overall stress design factor should be based on the combined maximum static and dynamic loads that could be imparted on the handling device. The licensee will use Crane Manufacturers Association of America (CMAA) 70-1983, "Specifications for Electric Overhead Traveling Crane," guidance in determining appropriate dynamic factors. CMAA 70-1983, Section 3.3.2.1.1.4.2, states that the hoist load factor is the greater value of 0.005 times the hoisting speed in feet per minute (fpm), and 0.15 times the static load. The ANO-1 polar crane has a hoisting speed of approximately 4 fpm, which results in a load factor of 0.02 well below the 0.15 minimum dynamic factor specified in CMAA, and therefore, the licensee is applying a dynamic factor of 0.15 to the static load. The licensee also stated that the portion of the lifting tripod that does not meet the ANSI N14.6-1978 criteria is the lifting eye, but that the existing tripod retains a sufficient design margin to warrant continued use with the new loads being planned.

In its submittal, the licensee provided an analysis of the stresses on the tripod performed under the guidance of NUREG-0612 and ANSI N14.6-1978. The polar crane and lifting devices were conservatively uprated to 190 tons. During its review, it was not clear to the NRC staff how the

equations used by the licensee to calculate the allowable stresses were developed. In its response to the NRC staff's request of additional information (Reference 2), the licensee explained that the equations established by the American Society of Mechanical Engineers were used as they related to the tensile stress " F_t " and provided the derivation of other equations used in the evaluation. The NRC staff finds that response acceptable, because the equations were based on established practice by a voluntary consensus standards organization. For the design of the tripod, the licensee stated that, because it is unable to meet the specific requirements of ANSI N14.6-1978 when using typical minimum yield material strengths, it used the actual material strength data from the tripod CMTRs. In addition, the licensee committed to perform a load test of the tripod at 150 percent of the static load that is further increased by a factor of 1.15 to account for dynamic load amplification to confirm the adequacy of using the CMTR value for the design.

Based on its review the NRC staff finds that the proposed use of the actual material strength data from the CMTRs is not an acceptable basis for establishing the structural adequacy of components in the lifting device. The NRC staff discussed this finding with the licensee staff during telephone conversations dated August 2 and 4, 2005. Subsequently, by letter dated August 10, 2005 (Reference No. 3), the licensee revised its request for revision to the updated SAR as follows:

The reactor vessel head and internals lifting tripod is classified as a special lifting device in accordance with NUREG-0612, which [states that] these special lifting devices meet ANSI N14.6-1978 [standard]. ANSI N14.6-1978 [standard] specifies that minimum yield strength be used for meeting a factor of 3.0 to yield and 5.0 to ultimate. The lifting tripod was evaluated and is acceptable using a reduced safety factor of 2.78 to yield.

The NRC staff has reviewed the licensee's submittals and determined that, although the calculated stress in one of the components exceeds the allowable value (meeting a safety factor of 2.78 instead of 3.0 to yield) specified in the ANSI qualification standard, the ANO-1 SAR (as updated) amendment is acceptable based on the level of conservatism inherent in allowable stress limits specified in the ANSI standard.

On the basis of the above discussion, the NRC staff concludes that the proposed use of the actual material strength data from the tripod's CMTRs is not acceptable as a basis for establishing the structural adequacy of components in the lifting device. The NRC staff further concludes that, although the calculated stress in one of the components (lifting eye) exceeds the allowable limit specified in the ANSI standard, the increase is not significant, and the NRC staff approves the licensee's proposed amendment based on the level of conservatism inherent in allowable stress limits specified in the ANSI standard. The NRC staff notes that its approval for exceeding the specified ANSI allowable stress, is limited only to the designated component, the requested lifting application, and the approved magnitude of a stress increase.

4.0 STATE CONSULTATION

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

5.0 ENVIRONMENTAL CONSIDERATION

The 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 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 amendments involve no significant hazards consideration, and there has been no public comment on such finding published February 1, 2005 (70 FR 5242). 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) 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.

5.0 REFERENCES

1. Letter from Entergy Operations, Inc. to the NRC, "Proposed Operating License Amendment Regarding Uprating of the Tripod Special Lifting Device," dated December 20, 2004 (Agencywide Documents and Access Management System (ADAMS) Accession No. ML050180523).
2. Letter from Entergy Operations, Inc. to the NRC, "Response to NRC Request for Additional Information on Proposed Operating License Amendment Regarding Uprating of the Tripod Special Lifting Device for Arkansas Nuclear One, Unit 1," dated June 6, 2005 (ADAMS Accession No. ML051660298).
3. Letter from Entergy Operations, Inc. to the NRC, "Supplemental letter on Proposed Operating License Amendment Regarding Uprating of the Tripod Special Lifting Device," dated August 10, 2005.
4. NUREG-0612, "Control of Heavy Loads at Nuclear Power Plants," July 1980.
5. ANSI N14.6-1978, "American National Standard for Special Lifting Devices for Shipping Containers Weighing 10,000 pounds (4500 kg) or more for Nuclear Materials," February 15, 1978.

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Date: August 30, 2005

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May 2005