

April 1, 2008

Vice President, Operations  
Entergy Nuclear Operations, Inc.  
Indian Point Energy Center  
450 Broadway, GSB  
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SUBJECT: INDIAN POINT NUCLEAR GENERATING UNIT NO. 2 - RELIEF REQUEST P-2  
ON TESTING OF RECIRCULATION PUMPS (TAC NO. MD8174)

Dear Sir or Madam:

By letter dated February 25, 2008, as supplemented by letter dated March 5, 2008, Entergy Nuclear Operations, Inc. (the licensee), submitted a relief request for Nuclear Regulatory Commission (NRC) approval. The licensee requested a one-time relief from the comprehensive pump test reference value requirement for flow contained in the 2001 Edition through 2003 Addenda of the American Society of Mechanical Engineers Code for Operation and Maintenance of Nuclear Power Plants.

Based on the information provided in the licensee's submittal, the NRC staff approves this relief request pursuant to Title 10 of the *Code of Federal Regulations*, Section 50.55a(a)(3)(ii), on the basis that compliance with the specified requirement results in a hardship or unusual difficulty without a compensating increase in the level of quality and safety. The licensee's proposed alternative provides reasonable assurance of the operational readiness of the containment recirculation pumps. This alternative is authorized until the modification of the containment recirculation pumps' recirculation piping can be done during refueling outage 2R19, which is scheduled in the spring of 2010. The NRC safety evaluation is provided in the enclosure.

If you have any questions regarding this approval, please contact the Indian Point Project Manager, John Boska, at (301) 415-2901.

Sincerely,

*/RA/*

Mark G. Kowal, Chief  
Plant Licensing Branch I-1  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket No. 50-247

Enclosure:  
Safety Evaluation

cc w/encl: See next page

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

REQUEST FOR RELIEF NO. P-2

ENTERGY NUCLEAR OPERATIONS, INC.

INDIAN POINT NUCLEAR GENERATING UNIT NO. 2

DOCKET NO. 50-247

1.0 INTRODUCTION

By letter dated February 25, 2008, as supplemented by letter dated March 5, 2008, (Agencywide Documents Access and Management System (ADAMS) Accession Numbers ML080640827, and ML080720678, respectively) Entergy Nuclear Operations, Inc. (Entergy or the licensee) submitted a request to the Nuclear Regulatory Commission (NRC) for approval of relief request P-2 for the fourth 10-year inservice testing (IST) program interval at Indian Point Nuclear Generating Unit 2 (IP2). The licensee requested one-time relief from the comprehensive pump test reference value requirement for flow contained in the 2001 Edition through 2003 Addenda of the American Society of Mechanical Engineers Code for Operation and Maintenance of Nuclear Power Plants (ASME OM Code).

2.0 REGULATORY EVALUATION

As specified in Title 10 of the *Code of Federal Regulations* (10 CFR) 50.55a(f), IST of certain ASME Code Class 1, 2, and 3 pumps and valves shall be performed at 120-month (10-year) IST program intervals in accordance with the specified ASME Code incorporated by reference in the regulations, except where alternatives have been authorized or relief has been requested by the licensee and granted by the NRC pursuant to paragraphs (a)(3)(i), (a)(3)(ii), or (f)(6)(i) of 10 CFR 50.55a. Pursuant to 10 CFR 50.55a(a)(3), alternatives to the requirements of paragraph (f) may be used, when authorized by the NRC, if (i) the proposed alternatives would provide an acceptable level of quality and safety, or (ii) compliance with the specified requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety. As stated in 10 CFR 50.55a(f)(5)(iii), if the licensee has determined that conformance with certain Code requirements is impractical for its facility, the licensee shall notify the Commission and submit, as specified in 10 CFR 50.4, "Written communications," information to support the determinations. NRC guidance contained in Generic Letter (GL) 89-04, "Guidance on Developing Acceptable Inservice Testing Programs," provides alternatives to Code requirements which are acceptable. Further guidance is given in GL 89-04, Supplement 1, and NUREG-1482, Revision 1, "Guidance for Inservice Testing at Nuclear Power Plants."

The information provided by the licensee in support of its relief request has been evaluated by the NRC staff, and the bases for disposition are documented below.

Enclosure

### 3.0 TECHNICAL EVALUATION

#### 3.1 Licensee's Relief Request P-2

##### 3.1.1 Code Requirements

The licensee's Code of Record is the 2001 Edition through 2003 Addenda of the ASME OM Code. The licensee requested a one time relief from the requirements of ASME OM Code, paragraph ISTB-3300(e)(1), "Reference Values," for the containment recirculation pumps 21RP and 22RP. The pumps are categorized as Group B pumps. ISTB-3300(e)(1) states that reference values shall be established within  $\pm 20\%$  of pump design flow rate for the comprehensive test.

##### 3.1.2 Licensee's Basis for Requesting Relief

The licensee states:

The Containment Recirculation Pumps are standby pumps which are credited for mitigating the effects of certain hypothetical accident scenarios. These pumps take suction from the recirculation sump in the containment floor and deliver spilled reactor coolant and borated refueling water back to the core through the residual heat exchangers. The pumps do not have any function for support of normal plant operation.

The Unit 2 Recirculation Pumps are vertical pumps installed inside the sump. The pumps have hydraulic bearings, as such the process water provides the lubrication. They do not have oil or greased bearings. The motors are mounted on the top of the pump and they sit outside the sump. The motors have greased bearings (not oil).

The new requirement of ISTB-3300(e)(1) applicable for the fourth Ten-year interval cannot be met with the existing configuration of the recirculation piping associated with the Containment Recirculation Pumps. Compliance with the new requirement will require a modification of the system piping.

The design flow rate of the Containment Recirculation Pumps is 3000 gpm [gallons per minute] so that a test reference value of  $\pm 20\%$  of the design flow rate per ISTB-3300(e)(1) would require testing at 2400-3600 gpm. The existing recirculation piping for these pumps is a 2-inch diameter [pipe] which supports a nominal test flow rate of 300 gpm, or 10% of the design flowrate. Testing at 80-120% of the design flowrate will require a plant modification to replace the existing 2-inch diameter recirculation piping with 6-inch diameter piping.

The pumps and the recirculation piping are located in the sump which has limited accessibility and open space as a result of the installation of enhanced suction strainers which provide for improved performance under the new debris blocking assumptions. The modification to meet the new requirement for the 4th interval involves flowrate that is within  $\pm 20\%$  of the pump design flowrate will conflict with the modification to the IP2 sump being completed to meet the requirements of GSI [Generic Safety Issue]-191.

The work in Containment during IP2 2R18 refueling outage for the completion of the sump modification in support of GSI-191 would be performed just below the modification work required for the new full flowrate pump testing. Both of these modifications will require workers to be working in the same area of Containment at the same time with very limited space. This leads to issues and problems with industrial safety and increased dose.

Therefore, Entergy is requesting an extension to the timing of the installation of the modification. Entergy is requesting delaying the modification two years, from the 2008 scheduled refueling outage 2R18 (March 25-April 2008), until the following scheduled IP2 refueling outage, 2R19 in the spring of 2010.

### 3.1.3 Licensee's Proposed Alternative Testing

The licensee states:

The proposed alternative consists of a pump test flow rate of 300 gpm which is 10% of the 3000 gpm design flow. The pump curve for these Ingersoll-Dresser pumps is shown in Figure Two [of the licensee's submittal] for information. This flowrate is an increase over the 160 gpm test flowrate which was applicable for the previous IST 10-year intervals. Engineering analysis confirms that 300 gpm is achievable with the existing system configuration and does not introduce a risk of localized cavitation at the pump suction. Pump vibration will be measured and recorded in accordance with the criteria specified in the Code. Vibration spectral analysis will also be performed which is a more accurate method of detecting mechanical degradation or changes than that of the traditional inservice test vibration requirements.

In addition, motor current analysis will be used for each pump motor in the 2R18 refueling outage to ensure the motor meets test specifications. The analysis examines the motor for: winding resistance, insulation resistance, polarization index, and motor circuit evaluation. This methodology is used to detect degraded insulation, high resistance shorts and grounds, and the integrity of all motor connections. The predictive maintenance tasks for spectral bearing vibration analysis and motor current analysis will provide additional assurance of operational readiness. With a lack of any significant wear degradation mechanisms, the most likely cause for these pumps to be unavailable would be an electrical fault. The motors are environmentally qualified and the motor current analysis tasks ensure that possible problems are detected and remedied in a timely manner.

The Recirculation Pumps were replaced in 2000 and testing has consistently demonstrated satisfactory performance within the narrow acceptance band established by Engineering for these pumps. A major modification to the pump suction strainer capability for these pumps was completed in 2006. The test arrangement permits testing of the Recirculation Pumps without wetting of the suction strainer mesh filtration system. The analysis values for minimum and maximum head result in an acceptable operation band which is more conservative than the reduced band allowed in Table ISTB-5200-1 used for comprehensive testing. Therefore, degradation will be monitored and action taken conservatively with respect to the Code.

In addition, the pump is located in a dry sump section (separated by a weir from the strainer assembly). The pump is only operated at refueling frequency for Code test purposes. The pump does not contain any liquid when not in use. When the test is conducted, the sump section is filled with non-borated water which is removed after the test. Therefore, there is no degradation mechanism which could result in reducing pump effectiveness over time.

The proposed alternative provides a means of assuring the performance capability of these pumps in 2R18, and provides an acceptable level of quality and safety.

The proposed alternate testing, consisting of a flow test of at least 10% of design flow, special vibration monitoring and motor current analysis will be performed on the pumps during the 2008 refueling outage.

#### 3.1.4 Evaluation

The licensee requested one-time relief from the ASME OM Code IST reference value requirement of ISTB-3300(e)(1) for containment recirculation pumps 21RP and 22RP comprehensive tests. ISTB-3300(e)(1) requires that reference values shall be established within  $\pm 20\%$  of pump design flow for the comprehensive test. The licensee proposes to perform the comprehensive tests at a flow rate of at least 10% of design flow (300 gpm), and also perform special vibration monitoring (vibration spectral analysis) and motor current analysis. This will be done during the 2R18 refueling outage (March 25-April 2008).

The installed system piping configuration does not permit testing of the containment recirculation pumps within  $\pm 20\%$  of pump design flow (2400-3600 gpm). Testing within  $\pm 20\%$  of pump design flow requires replacing the existing 2-inch recirculation piping with 6-inch piping. It would be a hardship for the licensee to perform this piping modification during the 2008 refueling outage, because GSI-191 modifications will be performed in the same area during the outage. Because there is limited space in this area, there would be issues with industrial safety and increased radiation dose for the licensee's personnel.

The containment recirculation pumps were replaced in 2000. The analysis values for minimum and maximum pump head established by the licensee are more conservative than the values in the Code, and pump IST has consistently demonstrated satisfactory pump performance within the licensee's analysis values.

The licensee's proposed comprehensive test flow rate is 300 gpm, which is greater than the past testing flow rate of 160 gpm, but less than the Code-required flow rate of 2400-3600 gpm. However, the licensee has also proposed to perform a vibration spectral analysis and a motor current analysis for these pumps. These mechanisms will provide reasonable assurance of operational readiness and will provide an acceptable level of quality and safety for containment recirculation pump testing activities until a comprehensive test meeting Code requirements can be completed prior to the end of refueling outage 2R19 in the spring of 2010.

Additionally, the pumps are located in a normally dry section of the sump. They are only operated for testing purposes, and the pump piping does not contain any liquid when not in use. Therefore, there is no active degradation mechanism for these pumps.

Authorizing the licensee's proposed comprehensive testing for containment recirculation pumps during refueling outage 2R18 will allow time to plan and execute permanent system modifications to support testing at the substantial flow rate required by the Code.

#### 4.0 CONCLUSION

Based on the above evaluation, the NRC staff concludes that the requested delay in testing per the ASME OM Code is acceptable pursuant to 10 CFR 50.55a(a)(3)(ii) on the basis that compliance with the specified requirement results in a hardship or unusual difficulty without a compensating increase in the level of quality and safety. The licensee's proposed alternative provides reasonable assurance of the operational readiness of the containment recirculation pumps. This alternative is authorized until the modification of the containment recirculation pumps' recirculation piping can be done during refueling outage 2R19, which is scheduled in the spring of 2010.

Principal Contributor: Robert J. Wolfgang

Date: April 1, 2008