



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

INSERVICE INSPECTION REQUESTS FOR RELIEF

FOR

INDIANA MICHIGAN POWER COMPANY

D.C. COOK, UNITS 1 AND 2

DOCKET NOS. 50-315 AND 50-316

1.0 INTRODUCTION

The Technical Specifications for D. C. Cook, Unit Nos. 1 and 2, state that the inservice inspection (ISI) and testing of the American Society of Mechanical Engineers (ASME) Code Class 1, 2, and 3 components shall be performed in accordance with Section XI of the ASME Boiler and Pressure Vessel Code and applicable Addenda as required by 10 CFR 50.55a(g), except where specific written relief has been granted by the Commission pursuant to 10 CFR 50.55a(g)(6)(i). 10 CFR 50.55a(a)(3) states that alternatives to the requirements of paragraph (g) 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 difficulties without a compensating increase in the level of quality and safety.

Pursuant to 10 CFR 50.55a(g)(4), ASME Code Class 1, 2, and 3 components (including supports) shall meet the requirements that become effective subsequent to editions specified in 10 CFR 50.55a(g)(2) and g(3), except the design and access provisions and the preservice examination requirements, set forth in the ASME Code, Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," to the extent practical within the limitations of design, geometry, and materials of construction of the components. The regulations require that inservice examination of components and system pressure tests conducted during the first 10-year interval and subsequent intervals comply with the requirements in the latest edition and addenda of Section XI of the ASME Code incorporated by reference in 10 CFR 50.55a(b) on the date 12 months prior to the start of the 120-month interval, subject to the limitations and modifications listed therein. The 1983 Edition, Summer 1983 Addenda, of Section XI is the applicable edition of the ASME Code for the D. C. Cook, Units 1 and 2, second 10-year ISI Interval. The components (including supports) may meet the requirements set forth in subsequent editions and addenda of the ASME Code incorporated by reference in 10 CFR 50.55a(b), subject to the limitations and modifications listed therein and subject to Commission approval.

Pursuant to 10 CFR 50.55a(g)(5)(iii), if the licensee determines that conformance with an examination requirement of Section XI of the ASME Code is

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impractical for its facility, information should be submitted to the Commission in support of that determination. After evaluation of the determination, pursuant to 10 CFR 50.55a(g)(6)(i), the Commission may grant relief and may impose alternative requirements that are determined to be authorized by law; will not endanger life, property, or the common defense and security; and are otherwise in the public interest, giving due consideration to the burden upon the licensee that could result if the requirements are imposed.

In a letter dated May 2, 1995, the licensee, Indiana Michigan Power Company (IPMCo), proposed an alternative examination to the requirements of the ASME Boiler and Pressure Code, Section XI. IPMCo requested approval for the implementation of the alternative rules of ASME Section XI Code Case N-416-1, dated February 15, 1994, "Alternative Pressure Test Requirement for Welded Repairs or Installation of Replacement Items by Welding Class 1, 2, and 3, Section XI, Division 1," pursuant to 10 CFR 50.55a(a)(3) to be applied to the Inservice Inspection Program for D. C. Cook Nuclear Plant, Unit Nos. 1 and 2.

## 2.0 EVALUATION

### 2.1 Licensee's Request

The licensee's May 2, 1995, letter stated the following request:

In accordance with 10 CFR 50.55a(a)(3)(ii), approval to use ASME Code Case N-416-1, "Alternative Pressure Test Requirements for Welded Repairs or Installation of Replacement Items by Welding, Class 1, 2 and 3, Section XI, Division 1" at Donald C. Cook Nuclear Plant is requested.

#### 2.1.1 Licensee's Component Identification

Components identified for this relief include Class 1, 2, and 3 systems subject to hydrostatic testing.

#### 2.1.2 ASME Code, Section XI, Requirements

The 1983 Edition, Section XI, IWA-4400(a) requires that a system hydrostatic test be performed in accordance with IWA-5000 after repairs by welding on the pressure retaining boundary.

#### 2.1.3 Licensee's Proposed Alternative Testing

The licensee proposed to use the alternative contained in Code Case N-416-1, a system leakage test, in lieu of hydrostatic testing, for Class 1, 2, and 3 systems.

#### 2.1.4 Licensee's Basis for Relief

The licensee's May 2, 1995, letter provided the following basis for use of Code Case N-416-1:

The system hydrostatic test is not a test of the structural integrity of the system. Rather, it is an enhanced leakage detection test. Leakage from Class 1, 2, and 3 systems is normally the result of erosion/corrosion or joint seal/sealant age deterioration and is readily apparent to inspectors during a system pressure test. Industry experience indicates that, in most cases, leaks are found when the system is at normal operating pressure. Thus, we consider that the alternate requirements proposed in Code Case N-416-1 constitute a reasonable, safe alternative to the existing hydrostatic testing requirements.

#### 2.1.5 Evaluation

In lieu of hydrostatic pressure testing for welded repairs or installation of replacement items by welding, Code Case N-416-1 requires a visual examination (VT-2) be performed in conjunction with a system leakage testing using the 1992 Edition of Section XI, in accordance with paragraph IWA-5000, at nominal operating pressure and temperature. This code case also specifies that nondestructive examination (NDE) of the welds be performed in accordance with the applicable subsection of the 1992 Edition of Section III.

The 1989 Edition of Sections XI and III are the latest editions referenced in 10 CFR 50.55a. The staff has compared the system pressure test requirements of the 1992 Edition of Section XI to the requirements of IWA-5000 of the 1989 Edition of Section XI. In summary, the 1992 Edition imposes a more uniform set of system pressure test requirements for Code Class 1, 2, and 3 systems. The terminology associated with the system pressure test requirements for all three code classes has been clarified and streamlined. The test frequency and test pressure conditions associated with these tests have not been changed. The hold times for these tests have either remained unchanged or increased. The corrective actions with respect to removal bolts from leaking bolted connections have been relaxed in the 1992 Edition. This relaxation has been accepted by the staff in previous safety evaluations. The post-welded repair NDE requirements of the 1992 Edition of Section III remain the same as the requirements of the 1989 Edition of Section III. Therefore, the staff finds this aspect of Code Case N-416-1 to be acceptable.

Hardships are generally encountered with the performance of hydrostatic testing performed in accordance with the code. The staff is aware that hydrostatic pressure testing frequently requires significant effort to set up and perform. The need to use special equipment, such as temporary attachment of test pumps and gages, and the need for individual valve lineups can cause the testing to be on critical path.

Piping components are designed for a number of loadings that would be postulated to occur under the various modes of plant operation. Hydrostatic testing only subjects the piping components to a small increase in pressure over the design pressure and, therefore, does not present a significant

challenge to pressure boundary integrity. Accordingly, hydrostatic pressure testing is primarily regarded as a means to enhance leakage detection during the examination of components under pressure, rather than solely as a measure to determine the structural integrity of the components.

The industry experience has demonstrated that leaks are not being discovered as a result of hydrostatic test pressures propagating a preexisting flaw through wall. This experience indicates that leaks in most cases are being found when the system is at normal operating pressure. This is largely due to the fact that hydrostatic pressure testing is required only upon installation and then once every 10-year inspection interval, while system leakage tests at nominal operating pressures are conducted a minimum of once each refueling outage for Class 1 systems and each 40-month inspection period for Class 2 and 3 systems. In addition, leaks may be identified by plant operators during system walkdowns which may be conducted as often as once a shift.

Following the performance of welding, the code requires volumetric examination of repairs or replacements in Code Class 1 and 2, but would also allow only a surface examination of the final weld pass in Code Class 3 piping components. There are no ongoing NDE requirements for Code Class 3 components except for visual examination for leaks in conjunction with the 10-year hydrostatic tests and the periodic pressure tests.

Considering the NDE performed on Code Class 1 and 2 systems and considering that the hydrostatic pressure tests rarely result in pressure boundary leaks that would not occur during system leakage tests, the staff believes that increased assurance of the integrity of Class 1 and 2 welds is not commensurate with the burden of performing hydrostatic testing. However, considering the nature of NDE requirements for Code Class 3 components, the staff does not believe that eliminating the hydrostatic pressure testing and only performing system pressure testing is an acceptable alternative to hydrostatic testing, unless additional surface examinations are performed on the root pass layer of butt and socket welds on the pressure-retaining boundary of Class 3 components, when the surface examination method is used in accordance with Section III.

For clarification, it should be noted that, consistent with the code case requiring performance of NDE in accordance with the methods and acceptance criteria of the 1992 Edition of Section III, the scope of examination should also be in accordance with the 1992 Edition of Section III. The additional surface examination of the root layer of Class 3 pressure-retaining welds should be performed only when those pressure-retaining welds are required to have a surface examination performed in accordance with the 1992 Edition of Section III. For those Class 3 welds receiving radiography in lieu of a surface examination in accordance with Section III, no additional surface examination of the root layer needs to be performed.

3.0 CONCLUSION

The staff concludes that compliance with the code hydrostatic testing requirements for welded repairs or replacements of Code Class 1, 2, and 3 components would result in hardships without a compensating increase in the level of quality and safety. Accordingly, the licensee's proposed alternative to use Code Case N-416-1 is authorized for D. C. Cook Nuclear Plant, Units 1 and 2, pursuant to 10 CFR 50.55a(a)(3)(ii) provided the additional surface examinations are performed on the root pass layer of butt and socket welds on the pressure-retaining boundary of Class 3 components when the surface examination method is used in accordance with Section III. Use of Code Case N-416-1, with the required additional surface examination as noted above, is authorized for the duration of the second and third ISI program plan interval.

Principal Contributor: John Hickman  
John Huang (By precedent)

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