



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

ON ASME CODE CASE N-416-1

FOR

VIRGINIA ELECTRIC & POWER COMPANY

SURRY POWER STATION, UNITS 1 AND 2

DOCKETS NOS.: 50-280 AND 50-281

1.0 INTRODUCTION

The Technical Specifications for Surry Power Station, Units 1 and 2, state that the inservice inspection 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, 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 ten-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 twelve months prior to the start of the 120-month interval, subject to the limitations and modifications listed therein. The applicable edition of Section XI of the ASME Code for the Surry Power Station, Units 1 and 2, second 10-year inservice inspection (ISI) Interval is the 1980 Edition, through Winter 1980 Addenda. 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.

By letter dated June 22, 1994, Virginia Electric and Power Company (licensee) requested approval for the implementation of the alternative rules of ASME Section XI Code Case N-416-1 dated February 15, 1994, entitled "Alternative Pressure Test Requirement for Welded Repairs or Installation of Replacement

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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 (ISI) program for Surry Power Station, Units 1 and 2.

2.0 EVALUATION

CODE CASE N-416-1 ALTERNATIVE PRESSURE TEST REQUIREMENT FOR WELDED REPAIRS OR INSTALLATION OF REPLACEMENT ITEMS BY WELDING CLASS 1, 2, and 3 - SECTION XI, DIVISION 1

Component Identification

ASME Class 1, 2, and 3 Piping Systems

ASME Code Section XI Second Interval Requirements

The 1980 Edition through Winter 1980 Addenda, Section XI, IWA-4700(a) requires that a system hydrostatic test be performed in accordance with IWA-5000 after repairs by welding on the pressure retaining boundary.

Licensee's Basis for Request

"In past situations we have found it necessary to defer hydrostatic tests or ask relief from post ASME Section XI hydrostatic tests following repair or replacement activities. This was due to various reasons of impracticality in testing, ranging from boundary valve isolation problems to incorporation of steam generators within the hydrostatic test boundary. These situations are typically unexpected and are usually only identified during the actual inservice inspection. As a consequence, some of these situations have necessitated immediate communication with the NRC to avoid exceeding limiting conditions of operation or startup delays.

"Use of hydrostatic test deferrals, which are presently allowed in the current Code Case N-416 for Class 2 components, [is] not a satisfactory solution because the test must eventually be performed, and it is the performance of the test itself that is considered burdensome. Deferred hydrostatic testing requirements should be assessed considering that the 10-year hydrostatic test is no longer required with the NRC endorsement of Code Case N-498, Alternate Rules for 10-year Hydrostatic Pressure Testing for Class 1 and 2 Systems Section XI, Division 1.

"Code Case N-416-1 provides increased testing flexibility to the Owner, which should considerably reduce, if not eliminate, relief request requirements associated with post welded repair/replacement hydrostatic testing. This is accomplished while maintaining an acceptable level of safety and quality as determined by the ASME Code."

Proposed Alternative Examination

The licensee proposes to apply Code Case N-416-1 as alternative rules for welded repairs or installation of replacement items by welding in Class 1, 2, and 3 piping.

Evaluation/Conclusions

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 non destructive 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 has not been changed. The hold times for these tests has either remained unchanged or increased. The corrective actions with respect to removal of bolts from leaking bolted connections has been relaxed in the 1992 Edition, but use of this change 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. For example, since hydrostatic test pressure would be higher than nominal operating pressure, 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 indicates that experience has demonstrated that leaks are not being discovered as a result of hydrostatic test pressures propagating a preexisting flaw through wall. They indicate 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 during system walkdowns by plant operators 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 only requires 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.

With this provision applied to Code Class 3 components, 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 Surry Power Station, Units 1 and 2, pursuant to 10CFR50.55a(a)(3)(ii) provided 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 provision as noted above, is authorized until such time as the Code Case is published in a future revision of Regulatory Guide 1.147. At that time, if the licensee intends to continue to implement this Code case, the licensee is to follow all provisions in Code Case N-416-1, with limitations issued in Regulatory Guide 1.147, if any.

Principal Contributor: T. McLellan

Date: October 14, 1994