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A Duke Energy Company

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U.S. Nuclear Regulatory Commission
Document Control Desk
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Subject: Duke Energy
Oconee Nuclear Station, Unit 1,
Docket No. 50-269
Replacement of Steam Generators
Request for Relief No. 04-ON-007

Pursuant to 10 CFR 50.55a(g)(5)(iii), attached is a Request for Relief associated with the replacement of Steam Generators on Oconee Unit 1.

Specifically, in accordance with 10CFR50.55a(3)(i) Duke Energy Corporation (Duke) proposes an alternative to the requirements of ASME Section III, that provides an acceptable level of quality and safety as those described in Subarticle NB 4232, 1989 Edition with no addendum.

During the replacement of Steam Generators A and B on Unit 1 of the Oconee Nuclear Station, it was determined that the as-built weld configurations at several locations on the Reactor Cooling System piping did not meet taper requirements stipulated in NB 4232.1.

Relief is requested to use NB 3650, "Analysis of Piping Products" and NB 3200, "Design by Analysis", to show that the as-built weld configurations are within the stress and fatigue allowable limits of the ASME Section III Code, 1989 Edition and are acceptable.

Therefore, Duke requests that the NRC grant relief as authorized under 10 CFR 50.55a(g)(6)(i).

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If there are any questions or if further information is needed you may contact R. P. Todd at (864) 885-3418.

Very truly yours,

R. A. Jones,
Site Vice President,
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Attachment

xc w/att: L. A. Reyes, Regional Administrator
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Duke Energy Corporation
Oconee Nuclear Station (ONS)
Unit 1
Replacement of Steam Generators

Request for Relief 04-ON-007

Pursuant to 10CFR50.55a(3)(i) Duke Energy Corporation (Duke) proposes an alternative to the requirements of ASME Section III, that provide an acceptable level of quality and safety as those described in Subarticle NB 4232, 1989 Edition with no addendum.

1. Components for Which Relief is Requested

The following Reactor Coolant System welds that were completed during the replacement of Steam Generators A & B on Unit 1:

1-RC-289-7V Cold Leg 1A1	1-RC-289-6V	Hot Leg 1A Riser
1-RC-289-8V Cold Leg 1A2	1-RC-289-5V	Hot Leg 1A RSG Nozzle
1-RC-289-3V Cold Leg 1B2	1-RC-289-2V	Hot Leg 1B Riser
1-RC-289-4V Cold Leg 1B1	1-RC-289-1V	Hot Leg 1B RSG Nozzle

2. Code Requirement

ASME Section III, Paragraph NB 4232, "Alignment Requirements When Components are Welded from Two Sides" and Subparagraph NB 4232.1, "Fairing of Offsets", 1989 Edition.

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3. Code Requirements for Which the Alternative is Requested

Relief is requested from the requirements of ASME Code, Section III, 1989 Edition, no Addendum, Paragraph NB 4232 for at least a 3 to 1 straight line taper over the width of the finished weld.

4. Basis for Relief

During the replacement of Steam Generators A and B on Unit 1 of the Oconee Nuclear Station, it was determined that the as-built weld configurations at several locations on the Reactor Cooling System piping did not meet the taper requirements on the inside diameter (ID) of the welds as stipulated in NB 4232.1. The actual geometry over the width of the finished weld resembles a counterbore rather than the required 3:1 taper.

Base metal was applied to the counterbore area on the inside diameter avoiding welding ferritic filler material over the cladding. Cladding was then applied as weld metal overlay on the ID base metal and faired in opposing directions across the weld leaving a smooth surface with a small amount of concavity.

Relief is requested to use NB 3650, "Analysis of Piping Products" and NB 3200, "Design by Analysis", to show that the as-built weld configurations are acceptable

5. Proposed Alternative

Duke proposes to use a combination of NB 3200, "Design by Analysis" and NB 3650, "Analysis of Piping Products" to show that the subject welds are within the stress and fatigue allowables of the ASME Section III Code, 1989 Edition.

6. Justification for the Granting of Relief

Deviations from standard code configurations for welds and other piping components are allowed as long as the piping analysis performed in accordance with NB 3650 reflects the actual configurations (as-built) and still meets code allowable stresses. Even when a design does not satisfy the requirements of NB 3650, NB 3630, "Piping Design and Analysis Criteria", allows the use of the more detailed alternative analysis methods of NB 3200.

Duke has performed the piping analysis of the as-built configuration of the joints using NB 3683 stress indices in the stress intensity and fatigue calculations as required in NB 3650. Cross sectional properties for the stress calculations were based on the minimum measured thickness at each location. In all locations, the actual stresses and cumulative usage factors were below the allowables of NB 3650.

The hot leg to Replacement Steam Generator weld does not fit entirely into any of the joint categories of NB 3683. The stress indices used in the as-built analysis for this location were for an "as welded" 3 to 1 taper with consideration for the intersecting "flush" longitudinal butt weld in the piping. The indices are not completely applicable because the 1.1T to 0.875T restriction of NB 3683.5 could not be completely satisfied. The weld transition does satisfy the 3 to 1 taper. The use of the 3 to 1 transition indices was substantiated by performing a confirmatory NB 3200 analysis to illustrate that the indices chosen were conservative. This analysis consisted of an axi-symmetric 2-D finite element model of the as-built joint to calculate stress indices for the internal pressure case, and a 3-D 180° finite element model of the as-built joint to calculate stress indices for the moment loading case. The following table provides the results of the finite element

analyses and shows that the NB 3683 stress indices used in the NB 3650 stress and fatigue calculations for this weld joint are conservative.

Stress Indices	B1	C1	B2	C2
NB 3200 Finite Element	0.39	0.89	0.91	1.19
NB 3683	0.5	1.0	1.0	2.1

7. Implementation

Duke has confirmed that primary stress intensities (NB 3650 Eqn. 9), primary plus secondary range stress intensities (NB 3650 Eqn. 10), and cumulative usage factors of the as-built piping configurations, including weld joints, are within allowables of the ASME Section III Code, Subsection NB 3650, 1989 Edition. Therefore this alternative provides an acceptable level of quality and safety.

Sponsored By _____ Date 5/12/04

Approved By _____ Date 05/12/04