Duke Energy.

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U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001
ATTENTION: Document Control Desk

SUBJECT: Duke Energy Corporation
McGuire Nuclear Station Units 1 and 2
Docket Nos. 50-369 and 50-370
Catawba Nuclear Station Units 1 and 2
Docket Nos. 50-413 and 50-414
RAI "Relief Request 99-GO-003"

REFERENCE: Duke Relief Request, dated May 4, 2000

Duke Energy Corporation (Duke) submitted Relief Request 99-GO-003, dated May 4, 2000. In followup teleconferences, the NRC staff requested additional information with respect to several issues in the relief request. In response to those questions, as listed below, Duke provides the following information.

1. **For the Catawba Unit 1 steam generator (SG) feedwater nozzle inner radii, the submittal stated that preservice inspections achieved 8.4% coverage and inservice inspections (ISI) achieved 100% coverage.**

Question 1.a:

Explain the difference between preservice (8.4%) and inservice inspection coverage (100%)? Use sketches if necessary to show beam angles, skew angles, and scan directions.

Answer to question 1.a

Catawba Unit 1 Steam Generator Feedwater Nozzle inner Radius was examined during PSI from the vessel plate surface using a 70° angle beam search unit with a 38° skew clock-wise and counter clock-wise. As shown in Attachment 3 page 5 of 5 of the Relief Request, a taper exists on the nozzle that prevents scanning any closer to the area of interest. This

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resulted in only 8.4% coverage. The examination was performed in accordance with ASME Section XI, Appendix I and ASME Section V, Article 4.

Evaluation of the geometry during PSI showed that more coverage could be obtained from the outside blend radius of the nozzle. Duke Energy Corporation contacted the EPRI NDE Center staff for assistance in performing computer modeling and developing a scan plan for the feedwater nozzle inner radius. A new calibration block was also designed to duplicate the nozzle geometry using notches as calibration reflectors. This effort was completed in approximately three months. With the new scan plan, calibration block and new wedges 100% coverage can be obtained. The increased coverage was achieved using the following angles:

70° beam angle/32.4° skew

50° beam angle/30° skew

35° beam angle/94° skew

The coverage for each beam angle/skew combination is shown in Figure 1.

Question 1.b:

Explain the changes, if any, to the prescriptive requirements in Code that created the improvement in coverage to 100% (computer modeling, different beam angles, etc)?

Answer to question 1.b

The PSI was performed in accordance with the requirements of ASME Section XI, Appendix I and ASME Section V, Article 4. The prescriptive requirements contained in the referenced Code sections that were deviated from in order to achieve 100% coverage are as follows:

1. <u>ASME Section XI, Appendix I, Supplement 10 Recording Criteria</u>
   The recording level used was based on the beam angle and metal path for the specific examination area. This criterion was developed from the EPRI computer modeling study.

2. <u>ASME Section V, Article 4, T-441.1.1 Basic Calibration Block</u>
   The Basic Calibration Block described in T-441.1.1 was

not used. A calibration block that duplicated the ID and OD geometry was used to demonstrate coverage and for calibration. This calibration block uses only notches in lieu of side drilled holes. See Figure 2

3. ASME Section V, Article 4,T-432.3.1 (b) Distance Amplitude Correction
   Notches machined as shown in Figure 2 were used to establish sensitivity for the examination. No distance-amplitude correction was used.

4. ASME Section V, Article 4, T-432.3.1 (e) Beam Spread, Vertical Plane
   Beam spread measurement was not practical due to the compound design of the search units.

5. ASME Section V, Article 4, T-441.3.2.3 Scan for Interference With Angle Beam Examination
   The scan surface is on the nozzle blend radius and a straight beam examination is not practical.

Question 1.c:

If the changes that produced the coverage improvement are performance-based, explain how they differ from the prescriptive requirements in Code.

Answer to question 1.c

The changes resulting in 100% coverage are not performance based.

Question 1.d:

If the changes are performance-based, discuss differences or similarities between what was used and the rule for reactor pressure vessel inner nozzle radius examination (Supplement 5 to Appendix VIII of Section XI of the Code).

Answer to question 1.d

Not applicable due to the answer given in 1.c

2. For the McGuire, Units 1 and 2 and Catawba, Unit 1 inlet/outlet SG nozzle inner radii, the submittal stated that the preservice inspections achieved 83.3% coverage.

Question 2.a:

Is the 83.3% coverage the same for all inlet/outlet SG nozzle inner radii in the submittal? If not, what is the range? Discuss the differences in coverage, if any.

Answer to question 2.a

Coverage for all Inlet and Outlet Nozzle Inner Radii are the same for McGuire 1 and 2 and Catawba 1. The steam generators in these units are of the same design.

Question 2.b:

Explain how the coverage of 83.3% was determined. Use sketches if necessary showing beam angles, skew angles, and scan directions.

Answer to question 2.b

Please see Attachment 1 page 3 of 10 and page 4 of 10 of the relief request for sketch and calculations.

Question 2.c:

Were any evaluations performed to improve ISI coverage? Are any evaluations contemplated that may improve coverage? Are the changes used to achieve coverage improvements in Catawba, Unit 1 feedwater nozzle inner radii applicable to SG nozzles at Catawba and McGuire (i.e. computer modeling, performance-based demonstrations, beam angles, etc)?

Answer to question 2.c

Computer modeling is being considered for achieving greater coverage on the Inlet and Outlet Nozzle Inner Radii.

Please direct questions on this Response to Norman T. Simms at (704) 875-4685.

Very truly yours,

H B Barron

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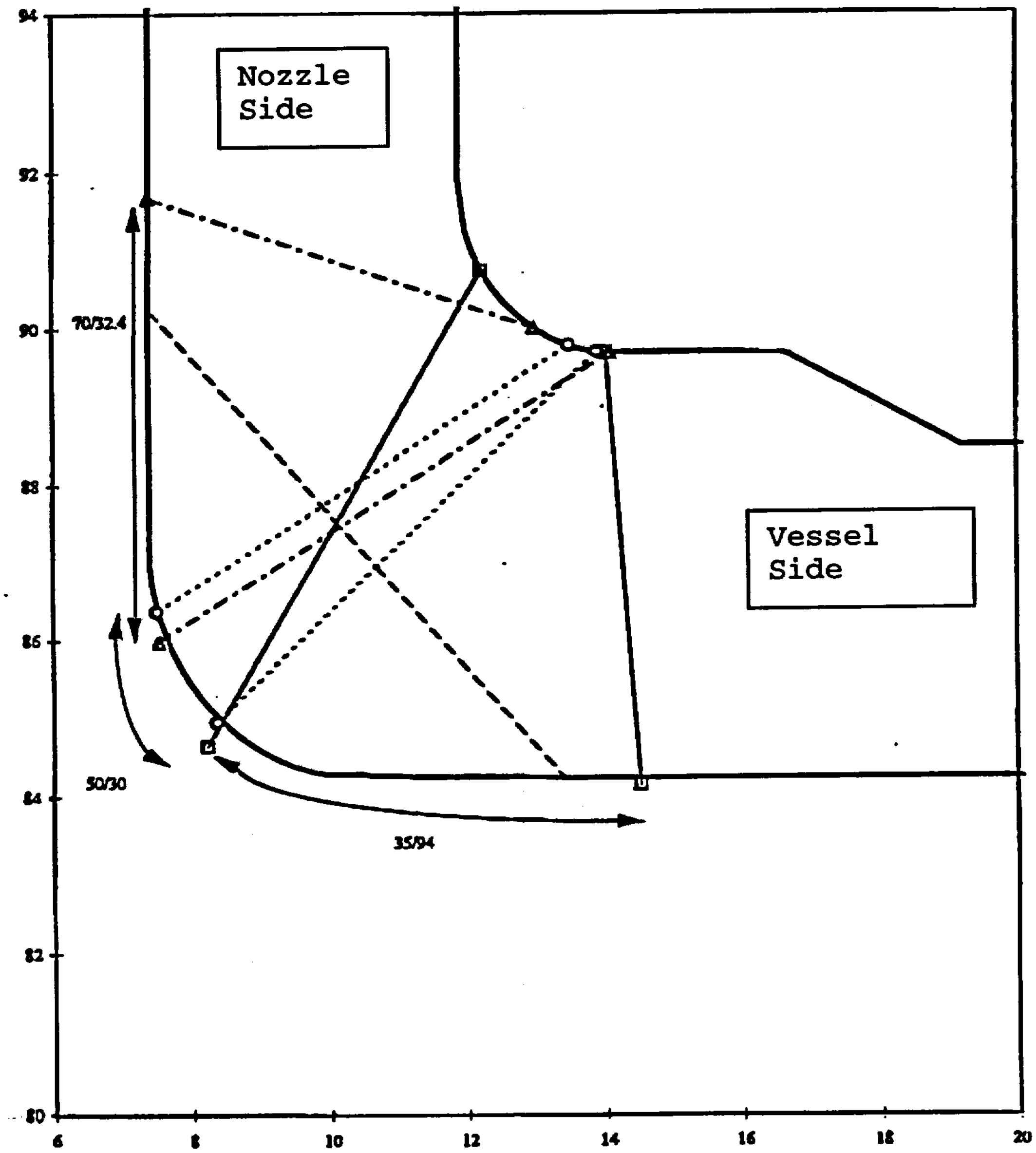
MNS Regulatory Compliance File
McGuire Master File 1.3.2.13

ATTACHMENT 1

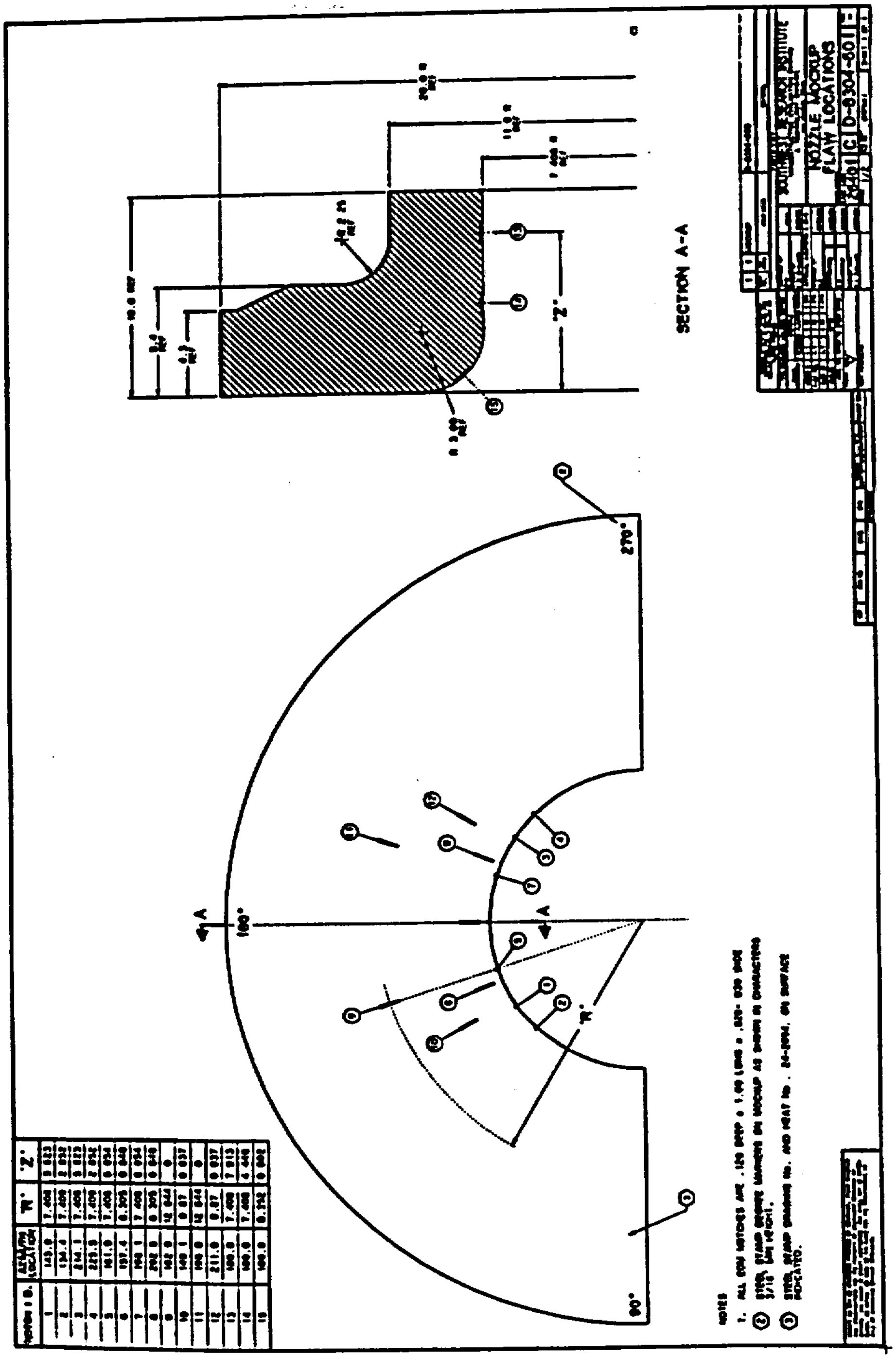
FIGURES

U.S. Nuclear Regulatory Commission
July 20, 2000
Attachment 1



Examination Volume and Coverage

Figure 1



BASIC CALIBRATION BLOCK

Figure 2