



GARY R. PETERSON  
Vice President  
McGuire Nuclear Station

Duke Energy Corporation  
MG01VP / 12700 Hagers Ferry Rd.  
Huntersville, NC 28078

704 875 5333  
704 875 4809 fax  
grpeters@duke-energy.com

August 31, 2006

U. S. Nuclear Regulatory Commission  
Document Control Desk  
Washington, D.C. 20555-0001

Subject: Duke Power Company LLC d/b/a  
Duke Energy Carolinas, LLC (DUKE)  
McGuire Nuclear Station Unit 1  
Docket No. 50-369  
Relief Request (RR) 06-MN-002

Pursuant to 10 CFR 50.55a(a)(3), Duke requests approval to use alternatives to Section XI of the ASME Boiler and Pressure Vessel Code. Compliance with the specified requirements of this section would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety. However, the proposed alternatives will provide an acceptable level of quality and safety. Specific details are described in the attached relief request.

Questions on this matter should be directed to Kenneth L. Ashe, McGuire Regulatory Compliance, at (704) 875-5715.

Sincerely,

G.R. Peterson

Attachments (15 pages total)

A047

cc w/attachment:

Mr. W.D. Travers  
Regional Administrator, Region II  
U. S. Nuclear Regulatory Commission  
Atlanta Federal Center  
61 Forsyth Street, SW, Suite 23T85  
Atlanta, Georgia 30303

Mr. J.F. Stang Jr., Project Manager (addressee only)  
Office of Nuclear Reactor Regulation  
U. S. Nuclear Regulatory Commission  
One White Flint North, Mail Stop O8-H4A  
11555 Rockville Pike  
Rockville, MD 20852-2738

Mr. J.B. Brady  
Senior NRC Resident Inspector  
McGuire Nuclear Station

**ATTACHMENT**

**Relief Request 06-MN-002**

(5 pages including cover sheet)

Proposed Relief in Accordance with 10 CFR 50.55a(g)(5)(iii),

Inservice Inspection Impracticality

Duke Energy Corporation

McGuire Nuclear Station – Unit 1 (EOC-17)

Third 10-Year Interval – Inservice Inspection Plan

Interval Start Date= December 1, 2001 Interval End Date= December 1, 2011

ASME Section XI Code – 1998 Edition with 2000 Addenda and \*Westinghouse Owner's Group (WCAP-14572)

Code Case N-460 is applicable

Examination Dates April 13, 2004 to October 18, 2005

List Number	I. Limited Area/Weld I.D. Number	II. System / Component for Which Relief is Requested: Area or Weld to be Examined	III. Code Requirement from Which Relief is Requested: 100% Exam Volume Coverage Exam Category Item No. Fig. No. Limitation Percentage	IV. & V. Impracticality/ Burden Caused by Compliance	VI. Proposed Alternate Examinations or Testing	VII. Implementation Schedule and Duration	VIII. Justification for Granting Relief
1.	INV1FW53-51 (RI-ISI Segment NV-080A)	NV System Pipe to Tee	Exam Category R-A (Table 4.1-1) Item No. R01.011.157 Fig. IWB-2500-8 (c) & Note 1 58.3% Volume Coverage	See Paragraph "A" See Attachment 1 Pages 1-9	See Paragraph "B".	See Paragraph "C".	See Paragraph "D" See Attachment 1 Pages 1-9

\*Piping Welds examined under the RI-ISI Program developed in accordance with methodology contained in the Westinghouse Owner's Group (WOG) Topical Report, WCAP-14572, Revision 1-NP-A and Request for Relief 01-005 approved by SER, dated June 12, 2002.

\*\*WCAP-14572 Table 4.1-1 Examination Category R-A lists the Examination Requirement as Figure No. IWB-2500-8 (c) <sup>1</sup> which normally applies to NPS 4" or larger. Since the risk-informed program requires a volumetric examination, this figure was used to define the exam volume on these less than NPS 4" welds also.

**IV. & V. Impracticality/Burden caused by Code Compliance**

**Paragraph A:** (The Pipe to Tee material is stainless steel. The diameter of this weld is 3.000 inches with a wall thickness of .438 inches.)

During the ultrasonic examination of this weld, 100% coverage of the required examination volume could not be obtained. Coverage was limited because of the tee configuration, which prevented scanning from four directions. The amount of coverage reported presents the aggregate coverage from all scans performed on the weld and base material. The required volume was scanned using 45-degree, 60-degree shear waves and 70-degree shear waves. The 45-degree beam covered 47.2% of the volume in two circumferential directions. The 60-degree beam covered 69.44% of the volume in one axial direction from the pipe side of the weld. The 70-degree shear wave covered 21.12% of the volume from one axial direction from the reducer side of the weld but was not included in the percent of coverage because of the requirements in 10CFR50.55a(b)(2)(xv)(A)(2). In order to achieve more coverage, the weld would have to be redesigned to allow scanning from both sides of the weld, which is impractical.

Current technology is not capable of reliably detecting or sizing flaws on the inaccessible side of austenitic weld configurations common to U.S. nuclear applications. Instead of a full single side qualification, PDI offers a "best effort" approach, which demonstrates that the best available technology is applied. This best effort approach does not meet the requirements. PDI PDQS austenitic piping certificates list the limitation that single-side examination be performed on a best efforts basis. This requires the inaccessible side of the weld to be listed as an area of no coverage.

There were no recordable indications found during the inspection of this weld.

**VI. Proposed Alternate Examinations or Testing**

**Paragraph B:**

None. The scheduled 10-year code examination was performed on the referenced area/welds and it resulted in the noted limited coverage of the required ultrasonic volume. No additional examinations are planned for the area/weld during the current inspection interval.

**VII. Implementation Schedule and Duration**

**Paragraph C:**

None. The scheduled 10-year code examination was performed on the referenced area/welds and it resulted in the noted limited coverage of the required ultrasonic volume. No additional examinations are planned for the area/weld during the current inspection interval.

## VIII. Justification for Granting Relief

### **Paragraph D:**

Ultrasonic examination of this weld for item R01.011 was conducted using personnel, procedures and equipment qualified in accordance with ASME Section XI, Appendix VIII, Supplement 2. The subject weld is located in the Reactor Containment Building, on a 3" tee downstream of INV-454 (manual 75gpm letdown throttle valve). The weld is located outside the cranewall, thus it is not subject to neutron fluence and the resultant material embrittlement concerns. Any leakage from this weld would be confined within the Containment Building, and it is readily isolable via two, series, fail closed, Class A isolation valves (INV1A and 2A). Additional isolation capability is afforded just upstream of the weld via Class B containment isolation valves (INV-457A, 458A and 35A). A leak at this weld location would constitute Reactor Coolant System (RCS) unidentified leakage. Early detection of a leak at this weld location would be assured by one or more of the following means:

1. The Technical Specification for RCS Operational Leakage (3.4.13), limits RCS unidentified leakage to <1 gpm during Modes 1 thru 4. The associated Technical Specification Surveillance (3.4.13.1) further requires performance of the Reactor Coolant System Leakage calculation every 72 hours.
2. The Technical Specification for RCS Leakage Detection Instrumentation (3.4.15) requires that diverse leakage detection instrumentation be operable during Modes 1 thru 4. Leakage from the subject weld would be readily detectable by either the Containment Floor & Equipment Sump Level instrumentation, and/or the containment ventilation condensate drain tank level instrumentation.
3. Declining level trends and/or increased make-up frequency for the Volume Control Tank (VCT).
4. A decrease in indicated letdown flow rates, and/or an increased mismatch between charging and letdown flow rates.

Historical McGuire letdown piping weld leaks were caused by vibration, and/or water hammer. Letdown header vibration primarily resulted from letdown orifice/valve cavitation. The cavitation and resultant vibration has been eliminated during normal operation thru use of a multi-stage valve trim. Use of the 45 gpm letdown orifice is further limited to low pressure operation, or in-the-event of failure on the normal letdown throttle valve. Similarly, the potential for water hammer has been minimized by requiring local, manual repressurization of the letdown header after an extended loss of letdown. If a potential water hammer did occur, local visual inspection of the piping would be probable.

One additional NDE ultrasonic examination was performed on a 3.00" diameter, .438 wall thickness weld in the NV System. The result of this examination was acceptable with 100% coverage.

IX. Other Information

Jim McArdle (Principal UT NDE Level III Examiner) provided Sections III., IV., V. and part of Section VIII.

Bryan D. Meyer McGuire (MNS Systems Engineer) provided parts of Section VIII.

Gary Underwood (Sponsor) compiled the remaining sections of this relief request.

Sponsored By:

Gary Underwood

Date

3-23-06

Approved By:

R. Kevin Rhyme

Date

3/23/06

Attachment 1

UT Examination Data R01.011.157

**ATTACHMENT 1**  
(10 pages including cover sheet)





# UT Pipe Weld Examination

Site/Unit: McGuire / 1

Procedure: NDE-600

Outage No.: MNS1-17

Summary No.: R01.011.157

Procedure Rev.: 16

Report No.: UT-05-290

Workscope: ISI

Work Order No.: 98683506

Page: 1 of 6

Code: 1998 thru 2000 Addenda

Cat./Item: R-A/R1.11.157

Location: N/A

Drawing No.: MCFI-1NV53

Description: PIPE TO TEE

System ID: NV

Component ID: R01.011.157 /1NV1FW53-51

Size/Length: N/A Thickness/Diameter: .438/3.0

Limitations: Yes Start Time: 0934 Finish Time: 0937

Examination Surface: Inside  Outside  Surface Condition: GROUND

Lo Location: 9.1.1.1 Wo Location: Centerline of Weld Couplant: ULTRAGEL II Batch No.: 03125

Temp. Tool Mfg.: FISHER Serial No.: MCNDE32768 Surface Temp.: 78 °F

Cal. Report No.: CAL-05-290

Angle Used	0	45	45T	60		
Scanning dB				46		

Indication(s): Yes  No  Scan Coverage: Upstream  Downstream  CW  CCW

Comments:

Scan for additional coverage  
FC 05-08

Results: Accept  Reject  Info

Initial Section XI Exam

Percent Of Coverage Obtained > 90%: NO - 58.3%

Reviewed Previous Data: No

Examiner	Level	Signature	Date	Reviewer	Signature	Date
Moss, Gary J.	II	<i>Gary Moss</i>	10/1/2005	<i>[Signature]</i>	III	10/10/05
Examiner	Level	Signature	Date	Site Review	Signature	Date
Leeper, Winfred C.	II	<i>Winfred C. Leeper</i>	10/1/2005	N/A		
Other	Level	Signature	Date	ANII Review	Signature	Date
N/A	N/A			<i>Jessie F. Swan</i>		10/13/05

*R/W*  
10-17-05



## Determination of Percent Coverage for UT Examinations - Pipe

Site/Unit: <u>McGuire / 1</u>	Procedure: <u>NDE-600</u>	Outage No.: <u>MNS1-17</u>
Summary No.: <u>R01.011.157</u>	Procedure Rev.: <u>16</u>	Report No.: <u>UT-05-290</u>
Workscope: <u>ISI</u>	Work Order No.: <u>98683506</u>	Page: <u>2</u> of <u>6</u>

**45 deg**

Scan 1	<u>                    </u> % Length X	<u>                    </u> % volume of length / 100 =	<u>                    </u> % total for Scan 1
Scan 2	<u>                    </u> % Length X	<u>                    </u> % volume of length / 100 =	<u>                    </u> % total for Scan 2
Scan 3	<u>100.000</u> % Length X	<u>47.200</u> % volume of length / 100 =	<u>47.200</u> % total for Scan 3
Scan 4	<u>100.000</u> % Length X	<u>47.200</u> % volume of length / 100 =	<u>47.200</u> % total for Scan 4

Add totals and divide by # scans = 47.200 % total for 45 deg

**Other deg - 60** (to be used for supplemental scans)

The data to be listed below is for coverage that was not obtained with the 45 deg scans.

Scan 1	<u>40.000</u> % Length X	<u>47.200</u> % volume of length / 100 =	<u>18.880</u> % total for Scan 1
Scan #1	<u>60.000</u> % Length X	<u>100.000</u> % volume of length / 100 =	<u>60.000</u> % total for Scan #1
Scan #2	<u>40.000</u> % Length X	<u>0.000</u> % volume of length / 100 =	<u>0.000</u> % total for Scan #2
Scan #2	<u>60.000</u> % Length X	<u>100.000</u> % volume of length / 100 =	<u>60.000</u> % total for Scan #2

**Percent complete coverage**      AXIAL SCAN 1 & 2 AGGREGATE = 69.44%

Add totals for each scan required and divide by # of scans to determine;

58.3 % Total for complete exam

Site Field Supervisor: David K. Zimmerman *DKZ*

Date: 10/4/2005

*JFK III 10/10/05*  
*R G 10-17-05*  
*JFK AN II 10/13/05*

Note: 70° shear scan not included in percent coverage per requirements of 10CFR50.55a(b)(2)(xx)(A)(2). Best effort scan with 70°shear obtained 21.12 % coverage in one axial direction.

Summary No.: R01.011.157

Examiner: Moss, Gary J. Dan Moss Level: II

Reviewer: David H. [Signature]

Date: 10/04/05

Examiner: Leeper, Winfred C. Winfred Leeper Level: II

Site Review: N/A

Date:

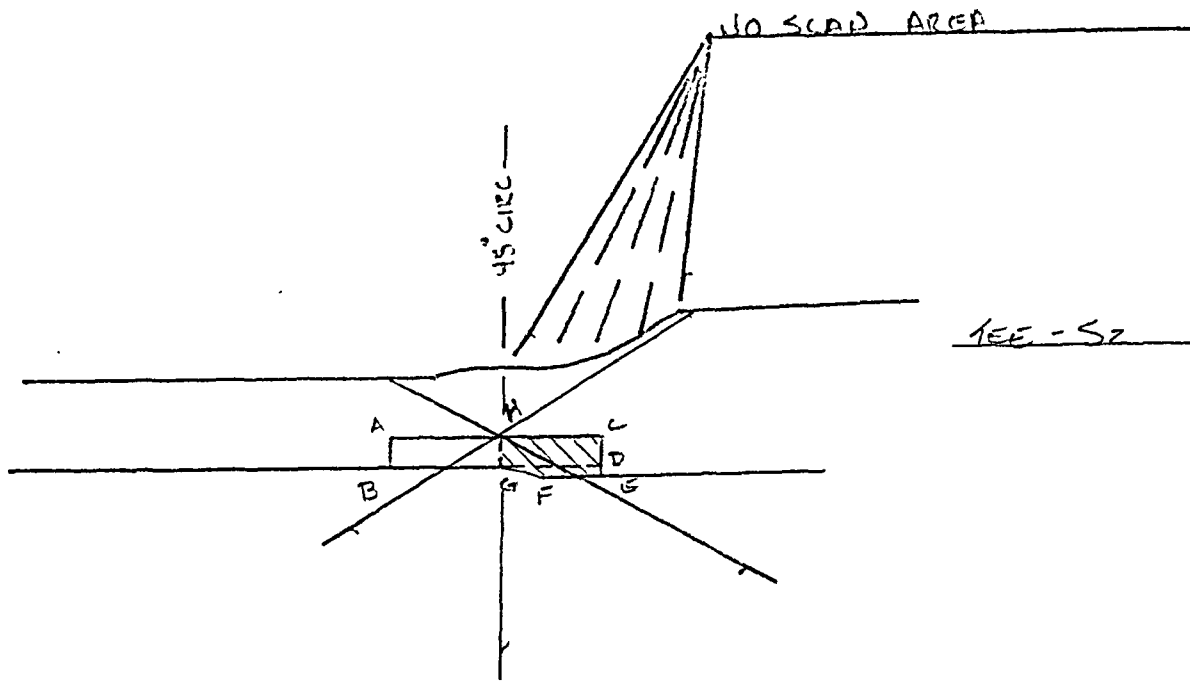
Other: N/A Level: N/A

ANII Review: [Signature]

Date: 10/13/05

Comments: 45 and 60 degree shear wave coverage/caculations. Represents 6.6"(60%) of total weld length.

Sketch or Photo:



AREA OF INTEREST

ABCD:  $1.1in \times .16Sin = .182in^2$

DEFG:  $\left(\frac{.5Sin + .3Sin}{2}\right) \times .02Sin = .011in^2$

TOTAL =  $.193in^2$

SCAD COVERAGE

SCAD 1 FULL COVERAGE = 100%

SCAD 2 FULL COVERAGE = 100%

SCAD 3  $ABGH: .5Sin \times .16Sin = .091in^2 / .193in^2 (100) = 47.2%$

SCAD 4  $ABGH: .5Sin \times .16Sin = .091in^2 / .193in^2 (100) = 47.2%$

FULL COVERAGE

PART COVERAGE

SCAD: FULL

Summary No.: R01.011.157

Examiner: Moss, Gary J. [Signature] Level: II

Reviewer: [Signature]

Date: 10/04/05

Examiner: Leeper, Winfred C. [Signature] Level: II

Site Review: N/A

Date: \_\_\_\_\_

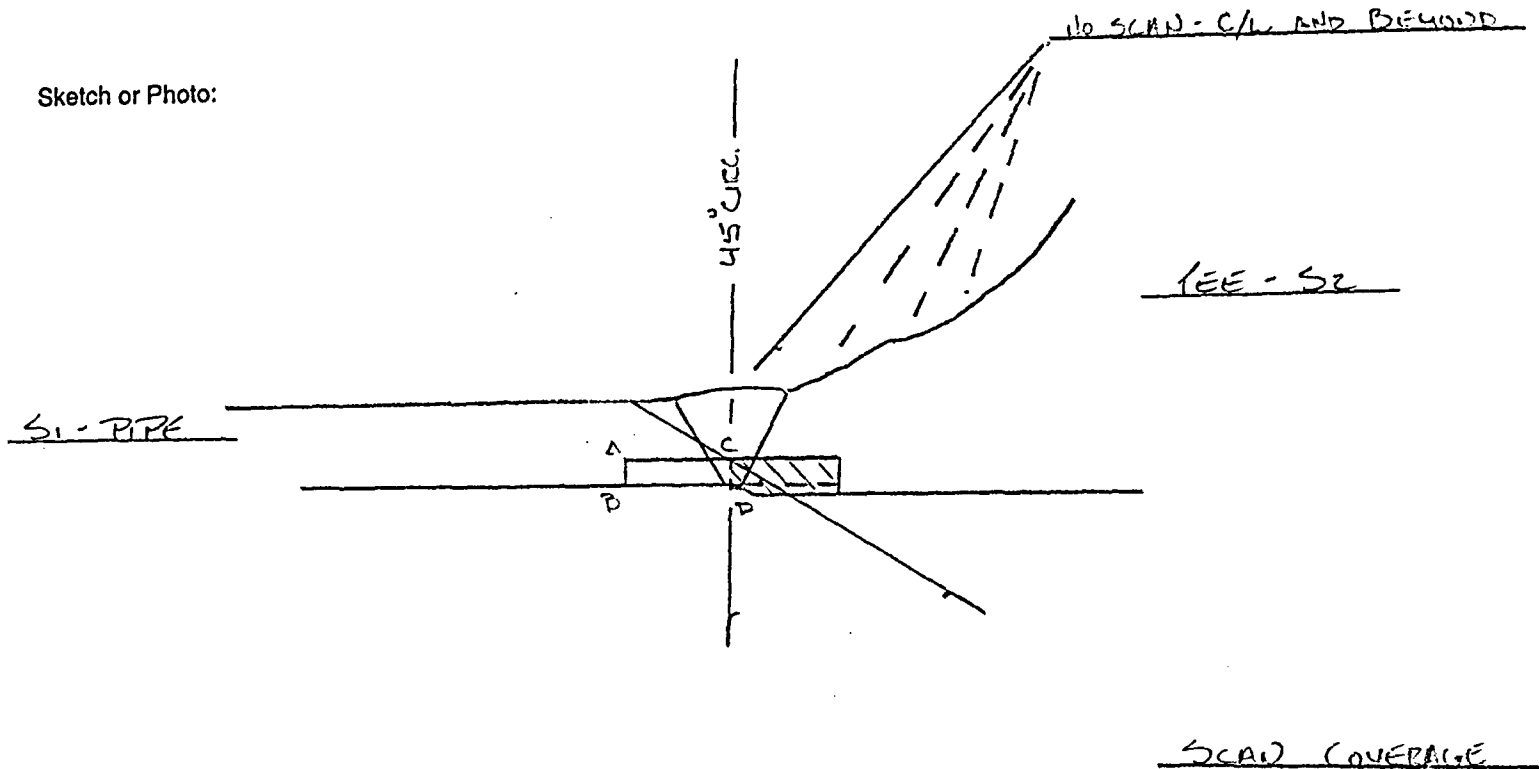
Other: N/A Level: N/A

ANII Review: [Signature]

Date: 10/13/05

Comments: 45 and 60 degree shear wave coverage/calculations in area of limiting tee configuration. Represents 4.4" (40%) of total weld length.

Sketch or Photo:



SCAN 1    ABCD: .55sin<sup>2</sup> ∙ .16sin<sup>2</sup> = .091in<sup>2</sup> / .193in<sup>2</sup> (100) = 47.2%

SCAN 2    NO COVERAGE    0%

SCAN 3    ABCD: .55sin<sup>2</sup> ∙ .16sin<sup>2</sup> = .091in<sup>2</sup> / .193in<sup>2</sup> (100) = 47.2%

SCAN 4    ABCD: .55sin<sup>2</sup> ∙ .16sin<sup>2</sup> = .091in<sup>2</sup> / .193in<sup>2</sup> (100) = 47.2%

Full Coverage

Partial Coverage

SCALE: Full

Summary No.: R01.011.157

Examiner: Moss, Gary J. Dan Moss Level: II

Reviewer: David K. [Signature]

Date: 10/04/05

Examiner: Leeper, Winfred C. [Signature] Level: II

Site Review: N/A

Date: \_\_\_\_\_

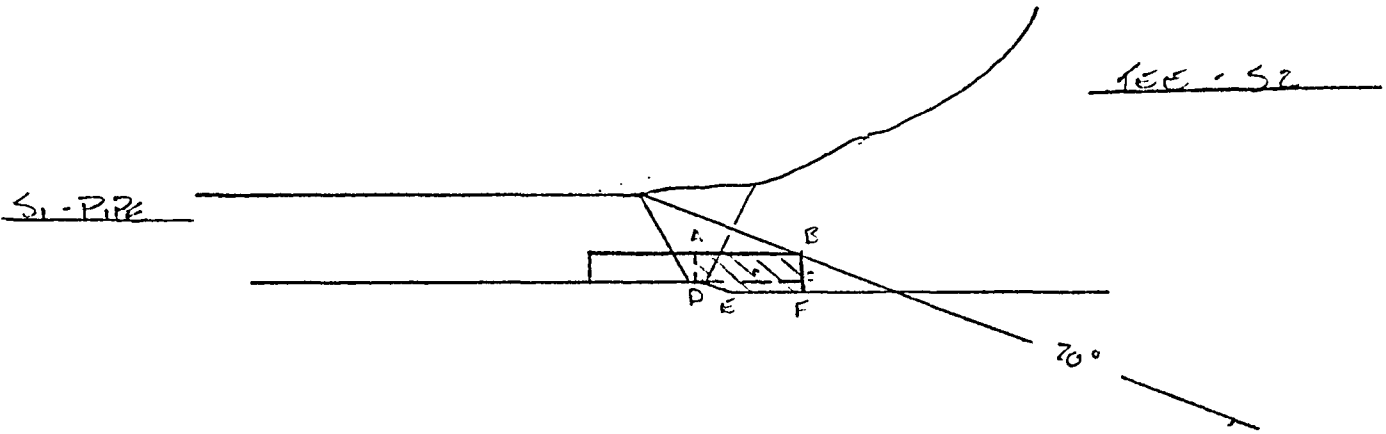
Other: N/A Level: N/A

ANII Review: J.F. [Signature]

Date: 10/13/05

Comments: 70 degree shear wave supplemental coverage/caculations in area of limiting tee configuration. Represents 4.4" (40%) of total weld length.

Sketch or Photo:

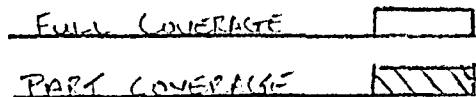


SUPPLEMENTAL COVERAGE

$$\underline{ABCD = 0.55 \sin \times .16 \sin = 0.091 \text{ in}^2}$$

$$\underline{CDEF = 0.025 \sin \left( \frac{0.55 \text{ in} + 0.35 \text{ in}}{2} \right) = 0.011 \text{ in}^2}$$

$$\underline{\text{Total} = 0.102 \text{ in}^2 / 193 \text{ in}^2 (100) = 52.8\% \left( \frac{4.4''}{11.0''} \right) = 21.2\%}$$



SCALE: Full

# DUKE POWER COMPANY

## ISI LIMITATION REPORT

Component/Weld ID: <u>1NV1FW53-51</u> Item No: <u>R01.011.157</u>		remarks:
<input checked="" type="checkbox"/> NO SCAN <input type="checkbox"/> LIMITED SCAN	SURFACE <input type="checkbox"/> 1 <input checked="" type="checkbox"/> 2	BEAM DIRECTION <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> cw <input type="checkbox"/> ccw
FROM L <u>6.1</u> to L <u>10.5</u>	INCHES FROM W0 <u>.5</u> to <u>Beyond</u>	
ANGLE: <input type="checkbox"/> 0 <input type="checkbox"/> 45 <input checked="" type="checkbox"/> 60 other _____	FROM <u>N/A</u> DEG to <u>N/A</u> DEG	
<input checked="" type="checkbox"/> NO SCAN <input type="checkbox"/> LIMITED SCAN	SURFACE <input type="checkbox"/> 1 <input checked="" type="checkbox"/> 2	BEAM DIRECTION <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input checked="" type="checkbox"/> cw <input checked="" type="checkbox"/> ccw
FROM L <u>N/A</u> to L <u>N/A</u>	INCHES FROM W0 <u>C/L</u> to <u>Beyond</u>	
ANGLE: <input type="checkbox"/> 0 <input checked="" type="checkbox"/> 45 <input type="checkbox"/> 60 other _____	FROM <u>0</u> DEG to <u>360</u> DEG	
<input type="checkbox"/> NO SCAN <input type="checkbox"/> LIMITED SCAN	SURFACE <input type="checkbox"/> 1 <input type="checkbox"/> 2	BEAM DIRECTION <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> cw <input type="checkbox"/> ccw
FROM L _____ to L _____	INCHES FROM W0 _____ to _____	
ANGLE: <input type="checkbox"/> 0 <input type="checkbox"/> 45 <input type="checkbox"/> 60 other _____	FROM _____ DEG to _____ DEG	
<input type="checkbox"/> NO SCAN <input type="checkbox"/> LIMITED SCAN	SURFACE <input type="checkbox"/> 1 <input type="checkbox"/> 2	BEAM DIRECTION <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> cw <input type="checkbox"/> ccw
FROM L _____ to L _____	INCHES FROM W0 _____ to _____	
ANGLE: <input type="checkbox"/> 0 <input type="checkbox"/> 45 <input type="checkbox"/> 60 other _____	FROM _____ DEG to _____ DEG	
		Sketch(s) attached
		<input checked="" type="checkbox"/> yes <input type="checkbox"/> No
Prepared By: Gary Mossy <i>Gary Mossy</i>	Level: II	Date: 10/01/05
Sheet <u>6</u> of <u>6</u> UT-05-290		
Reviewed By: David Zimmerman <i>David Zimmerman</i>	Date: 10/04/05	Authorized Inspector: <i>J.F. Swan</i> Date: <u>10/13/05</u>



# UT Base Metal Examination

Site/Unit: McGuire / 1

Procedure: NDE-640

Outage No.: MNS1-17

Summary No.: R01.011.157

Procedure Rev.: 3

Report No.: UT-05-283

Workscope: ISI

Work Order No.: 98683506

Page: 1 of 2

Code: 1998 thru 2000 Addenda

Cat./Item: R-A/R1.11.157

Location: N/A

Drawing No.: MCFI-1NV53

Description: PIPE TO TEE

System ID: NV

Component ID: R01.011.157 /1NV1FW53-51

Size/Length: N/A Thickness/Diameter: .438/3.0

Limitations: None

Start Time: 1030 Finish Time: 1033

Examination Surface: Inside  Outside  Surface Condition: GROUND

Lo Location: 9.1.1.1 Wo Location: Centerline of Weld Couplant: ULTRAGEL II Batch No.: 03125

Temp. Tool Mfg.: FISHER Serial No.: MCNDE32768 Surface Temp.: 78 °F Scanning dB: 57

Cal. Report No.: CAL-05-283

Ind. No.	% Loss Back Wall	Amplitude % Full Screen	Position One				Position Max				Position Two				Remarks
			L1	W1	W2	MP	LM	W1	W2	MP	L2	W1	W2	MP	
NRI															

Comments:

Results: Accept  Reject  Info  Initial Section XI Exam

Percent Of Coverage Obtained > 90%: Yes-100% Reviewed Previous Data: No

Examiner	Level	Signature	Date	Reviewer	Signature	Date
Moss, Gary J.	II	<i>Gary J. Moss</i>	9/29/2005	<i>[Signature]</i>	III	10/10/05
Examiner	Level	Signature	Date	Site Review	Signature	Date
Leeper, Winfred C.	II	<i>Winfred C. Leeper</i>	9/29/2005	N/A		
Other	Level	Signature	Date	ANII Review	Signature	Date
N/A	N/A			<i>J.F. Swan</i>		10/13/05

*R/G*  
10-17-05



# Supplemental Report

Report No.: UT-05-283

Page: 2 of 2

Summary No.: R01.011.157

Examiner: Moss, Gary J. *Gary J. Moss*

Level: II

Reviewer: *JFK III*

Date: 10/10/05

Examiner: Leeper, Winfred C. *Winfred C. Leeper*

Level: II

Site Review: N/A

Date:           

Other: N/A

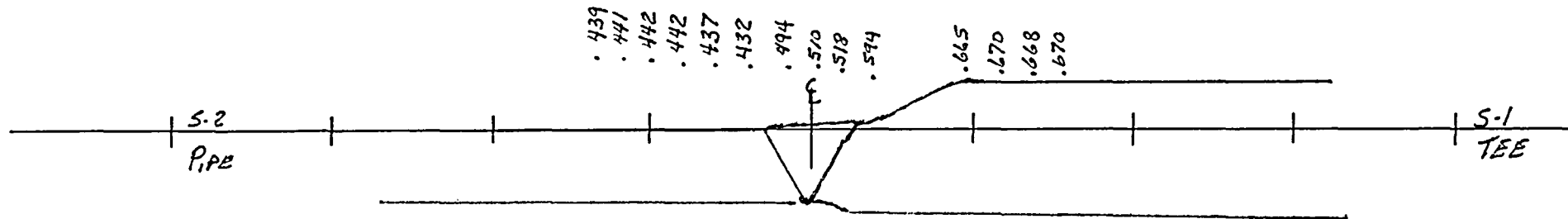
Level: N/A

ANII Review: *J. F. Swan*

Date: 10/13/05

Comments:

Sketch or Photo: Z:\UTIDDEAL\ProfileLine2.jpg



*Rice*  
10-17-05





# UT Pipe Weld Examination

Site/Unit: McGuire / 1

Procedure: NDE-600

Outage No.: MNS1-17

Summary No.: R01.011.157

Procedure Rev.: 16

Report No.: UT-05-284

Workscope: ISI

Work Order No.: 98683506

Page: 1 of 1

Code: 1998 thru 2000 Addenda

Cat./Item: R-A/R1.11.157

Location: N/A

Drawing No.: MCFI-1NV53

Description: PIPE TO TEE

System ID: NV

Component ID: R01.011.157 /1NV1FW53-51

Size/Length: N/A Thickness/Diameter: .438/3.0

Limitations: Yes - See Attached Limitation Report on REPORT NO. UT-05-290

Start Time: 1039 Finish Time: 1059

Examination Surface: Inside  Outside

Surface Condition: GROUND

Lo Location: 9.1.1.1

Wo Location: Centerline of Weld

Couplant: ULTRAGEL II

Batch No.: 03125

Temp. Tool Mfg.: FISHER

Serial No.: MCNDE32768

Surface Temp.: 78 °F

Cal. Report No.: CAL-05-284, CAL-05-285, CAL-05-286

Angle Used	0	45	45T	60	70	
Scanning dB			41	46	49	

Indication(s): Yes  No

Scan Coverage: Upstream  Downstream  CW  CCW

Comments:

**FC 05-08**

Results: Accept  Reject  Info

Initial Section XI Exam

Percent Of Coverage Obtained > 90%: No - 58.3%

Reviewed Previous Data: No

Examiner	Level	Signature	Date	Reviewer	Signature	Date
Moss, Gary J.	II	<i>Gary J. Moss</i>	9/29/2005	<i>[Signature]</i>	III	10/10/05
Examiner	Level	Signature	Date	Site Review	Signature	Date
Leeper, Winfred C.	II	<i>Winfred C. Leeper</i>	9/29/2005	N/A		
Other	Level	Signature	Date	ANII Review	Signature	Date
N/A	N/A			<i>J.F. Swan</i>		10/13/05

*R Lee 10-17-05*