## RECIRCULATION SYSTEM WELDS - SEPTEMBER 1984 OUTAGE

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# INTRODUCTION

The James A. FitzPatrick Nuclear Power Plant was shut down on September 15, 1984 for the purpose of performing maintenance and modification activities including an Induction Heat Stress Improvement (IHSI) of 84 welds in the Recirculating Water and RHR System.

Personnel from Ebasco and KWU/UTL, as well as from NYPA, performed Ultrasonic Testing (UT) for the purpose of detecting IGSCC. These examinations consisted of performing a pre-IHSI examination on most weldments either during this outage or during previous 1983 and 1984 outages and also performing a post-IHSI U.T. examination on all weldments treated during this outage. The UT procedures, calibration standards, equipment, and IGSCC detection capabilities were satisfactorily demonstrated in accordance with I&E Bulletin 83-02, and the same procedures and techniques were used in the UT examination. All UT personnel conducting these inspections have received appropriate training in IGSCC inspection.

The indications were found by Ebasco personnel using 45° and 60° angles of shear waves at 2-1/4 MHz. The sizing was performed by KWU/UTL using various techniques including:

- ID mode conversion - creeping wave
- SLIC 40-dual element multiple angle
- 45°, 4 MHz
- 60°, 4 MHz
- SUSI, dual element focused beam
- crack tip diffraction, 45°, 4 MHz
- head wave, creeping wave on ID

The results of the examinations indicated that a total of 11 welds showed reportable indications. The detailed evaluation of the results is presented in the section entitled, "Ultrasonic Examination."

Structural Integrity performed flow evaluations on the defective welds to determine whether overlay repair is needed or not. Five defective welds required weld overlay. Structural Integrity also performed weld overlay design. Region I of the NRC has confirmed that the weld overlay repairs were performed in accordance with the qualified and approved procedures consistent with industry and ASME Code requirements.

In summary, during the current scheduled FitzPatrick outage, a total of 84 welds were ultrasonically examined and treated with IHSI. The UT results indicated that 11 welds showed crack indications. Of these, 5 welds were overlay repaired. The remaining 6 cracks were evaluated and found to meet acceptance criteria delineated in Generic Letter 84-11 for operation until the upcoming refueling outage.

ULTRASONIC EXAMINATION

An Ultrasonic Examination for the purpose of detecting IGSCC was performed on all weldments subject to IHSI treatment. This examination consisted of performing a pre-IHSI examination on most weldments either during this outage or during previous 1983 and 1984 outages and also performing a post-IHSI U.T. examination on all weldments treated during this outage.

The Ultrasonic Examination consisted of three phases; they are U.T. Detection, UT Discrimination, and UT Flaw Sizing. All personnel and procedures utilized in performing these examinations were qualified in accordance with I&E Bulletin 83-02 for detection and flaw sizing, as applicable.

The detection examinations were performed primarily by personnel from Ebasco Services, Incorporated. For the detection of IGSCC, Ebasco used equipment and personnel demonstrated to be qualified in accordance with the EPRI NDE Center Course, "UT Operator Training for the Detection of IGSCC." This detection consisted of establishment of the weldment ID & OD profile (see Attachment 1 for details). Performing a manual 45° angle beam examination from both sides, when applicable, and when possible. All pipe-to-pipe, and pipe-to-elbow configurations were scanned on both sides. All pipe-to-pump, pipe-to-valve, and pipe-to-tee configurations were completed on the pipe side only. The heavy sections of the fitting and necessary weld taper preclude any examinations in these areas. No relevant ultrasonic information is available on the component side of the weld because ultrasonic examinations of the component side of the weld joint is not possible. However, the component side of the weld joint is usually fabricated from IGSCC resistant material such as cast stainless steel. The specific examination restrictions were summarized on the attached Examination Summary Sheets. When a 45° angle beam examination was not possible due to excess weld crowns or ID weld contour (see Attachment 2), the weldment was examined by a 60° angle beam transducer. The 60° angle beam was also utilized by Ebasco in addition to the 45° examination when additional information was desired in discriminating U.T. signals (see attachment 3 for further details on Ebasco U.T. techniques). Ebasco provided results of all U.T. examinations to the NYPA Level III Examiner. The NYPA Level III Examiner, upon review of the Ebasco data and performance of any additional, informational U.T. examinations, would direct the UTL/KWU examiners to perform additional discrimination and flaw sizing (see Attachment 4 for details of NYPA Level III involvement).

The additional discrimination and flaw sizing was performed primarily by personnel from KWU. The flaw sizing of IGSCC was performed both manually and semi-automatically (Robby) by examiners that passed the EPRI NDE Center Course, "UT Operator Training for Planar Flaw Sizing." The discrimination and flaw sizing consisted of the detection of areas which were identified by Ebasco (through the NYPA Level III) where signals were obtained which are suspicious for crack indications. Techniques used by KWU WSY 70° and 45° shear wave are highly sensitive to corner like reflectors. KWU would next determine the position at which the assumed crack should be deepest by a rough crack depth estimation (using correlated echo No. 1 and/or amplitude functions). KWU then measures the OD/ID profile (see Attachment 5 for details). Consideration for detectability and discrimination of cracks/geometry are done using the OD/ID profile.

ULTRASONIC EXAMINATION (Cont.)

Based on conclusions drawn above, further detection techniques (for example 60° shear wave) were used where the inspection of geometry does not allow a complete coverage of the area which has to be examined. To discriminate between cracks and geometry, KWU performed further techniques when necessary, such as 70° longitudinal probes to detect the possibility of cracks on the top of the counterbore. In the cases where the discrimination results indicate a crack, the crack depth was determined by detecting crack facettes and the crack tip. All available techniques were used. Upon completion of discrimination and flaw sizing, all data is presented to the NYPA UT Level III for final review and acceptance.

Final KWU flaw sizing data, including manual plots, are then presented to Structural Integrity Associates through the NYPA Site Responsible Engineer for performance of flaw evaluation.

FLAW EVALUATION

The post-IHSI ultrasonic examinations performed both in March and September, 1984 revealed eleven (11) indications considered to be IGSCC. Structural Integrity Associates (SIA) performed a flaw evaluation for each indication. Their evaluations indicated that five (5) of the defective welds required weld overlay repairs and that six (6) were acceptable for continued operation without repair.

The reported crack depths in the six (6) unrepaired defective welds were shallow, ranging from less than 5% to 17% of wall thickness. The crack lengths reported for these indications were less than 5% of the total circumference in all six welds.

The evaluations for these flaws determined the crack growth of each flaw in both the as-welded and post-IHSI stress state. The time period for each crack to reach the allowable end-of-cycle flaw size in terms of allowable flaw depth versus length as detailed in ASME Section XI, Article IWB-3840 was determined. This limit is further reduced by one-third in accordance with Generic Letter 84-11 and then used to determine the period of operation without repair. Using the as-welded case, and not taking any credit for the successful application of IHSI performed on these joints, the worst case crack growth occurs in weld 12-17. It is calculated that this crack would exceed 2/3 of the IWB-3840 limit in 5.5 months, which is in excess of the time until the next refuel outage.

However, when the post-IHSI residual stess state is considered in the crack growth calculations, no future growth for any of these flaws over the remaining plant life. This conclusion holds true even when considerable errors are included for uncertainties in crack depth sizing. Also included in these evaluations, for conservatism, are the influence of thermal stresses to account for the possible effects of low toughness weldment material.

Based on these evaluations, it is believed that continued operation with these unrepaired flaws until the next refueling outage, in a worst case, and for the remaining plant life, if the benefits of IHSI are included, would not reduce the piping design margins and not lead to a reduction in plant safety.

## WELD OVERLAYS

Structural Integrity Associates also provided the overlay designs for the five welds that required overlay repairs. The welds have indications of cracking with depths ranging from 45% to 100% of wall (three of the five had through leaks). Four of these welds were riser pipe to safe-end and had cracks that ran intermittently around 360° of the circumference. The pipe-to-elbow cracking had a length of 12.5% of the circumference.

The overlays were designed to meet the requirements for full structural strength and load transfer from the cracked piping. The overlay design thicknesses do not take credit for the first dye penetrant test acceptable weld layer. This additional conservatism was added to reduce the significance of any uncertainties in ultrasonic sizing of IGSCC indications.

All layers were made with stainless steel weld metal with a maximum carbon content of 0.020% and each layer had a minimum ferrite content equivalent to 10 FN. All overlay designs took no credit for the effect of prior performance of IHSI, nor for the development of compressive residual stresses by the overlay welding itself, on future crack propagation. All overlays exhibit an "as-built" thickness after the first (dye penetrant acceptable) layer which is greater than the design requirements. The final as-built lengths also meet or exceed the design requirements. Additionally, the welding was performed using a relatively low heat input ($<$ 40 KJ/in) to minimize additional sensitization of the underlying adjacent piping material while developing a compressive residual stress pattern. These benefits were not considered in the overlay design and add further conservatisms to ensure no propagation of the observed IGSCC into the weld overlay.

### Examination of Weld Overlays

A thickness check utilizing ultrasonic (UT) was performed on the pipe prior to any welding being performed. A Liquid Penetrant (PT) exam was also performed on the pipe prior to the 1st pass. After the 1st pass was completed, a PT and a visual (VT) exam was performed. If satisfactory, a ferrite check was made to ensure ferrite content between $10_N$ - $20_N$ and another UT thickness was taken. Successive passes were then performed to bring the cladding up to the required overlay design thickness and width criteria with visual exams and ferrite content checks performed after each pass. On the final pass, a VT, PT, UT thickness check, and ferrite content exam was performed. If satisfactory, a lack-of-bond exam was performed using U.T. techniques (4 automatic & 1 manual). If any automatic exams showed any indication of loss of back wall reflection, these areas were re-examined utilizing manual techniques.

The results of these lack-of-bond exams are as follows:

12-02-2-70 - Sat. (Manual)
12-02-2-69 - Sat. (Auto.)
12-02-2-64 - Sat. (Auto.)
12-02-2-23 - Sat. (Auto.)

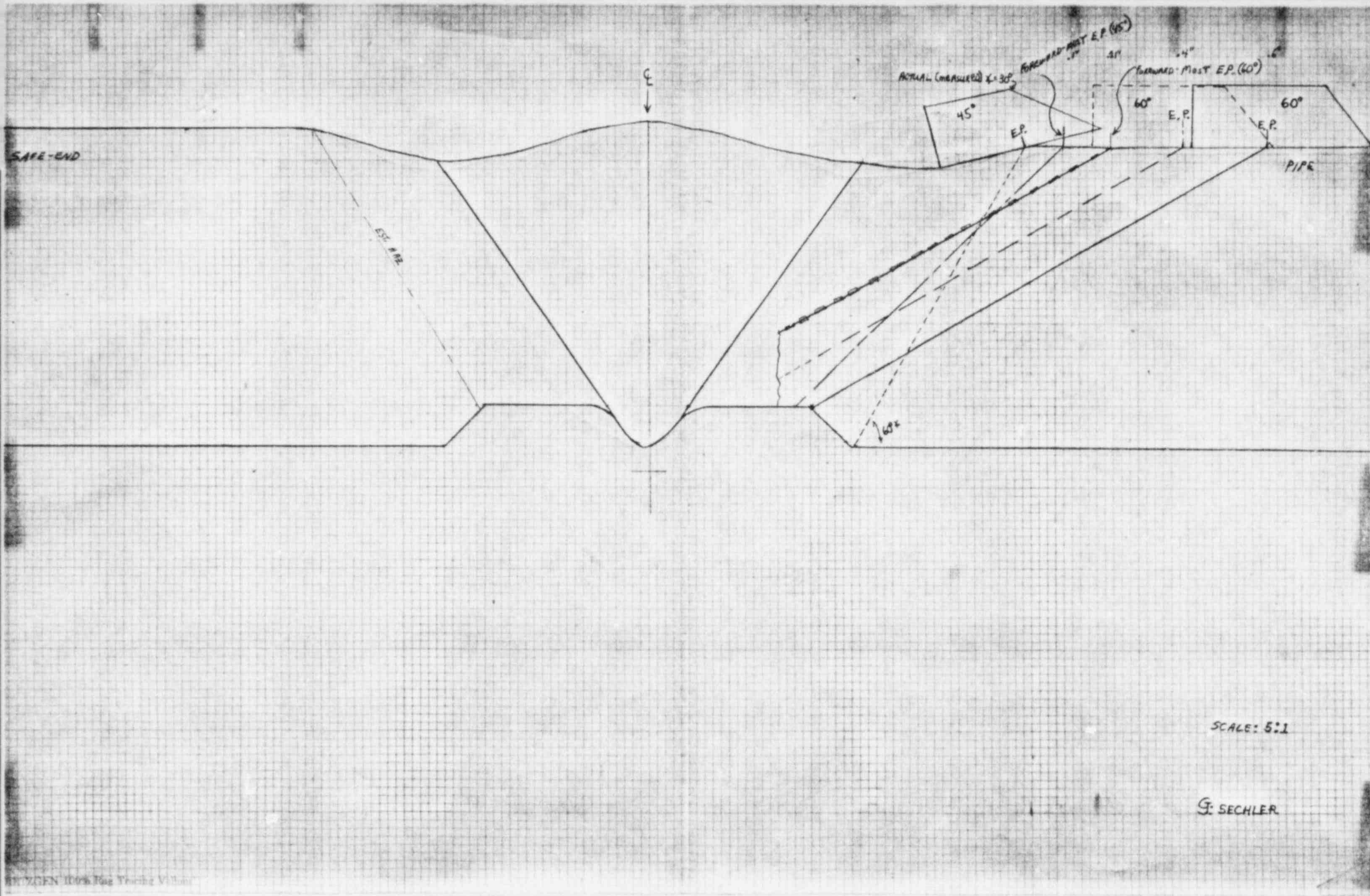
WELD OVERLAYS (Cont.)

12-02-2-12 - 1 small area (.125" x .8") made up of four (4) small, rounded indications believed to be porosity indications in the seal weld placed manually over the cracked area prior to clad overlay. (This seal weld was performed using fast-freezing material, E-308L-16.)

Finally, the weld overlay integrity was verified by a 100% operating pressure test of the recirculation system during which a visual examination for leakage was performed. No evidence of leakage was observed.

# METHOD OF DETERMINING EBASCO WELD ID & OD PROFILE

The O.D. profile is taken by use of a weld profile needle gauge. This ID profile is formulated through a combination of various sources of information; the main source being a thorough 0° examination taken at various points around the weld. This exam is performed by scanning across the weld from base metal across weld material to base metal while observing the screen. Notations are made during this scan; ie: counterbore and root locations, variances in thickness, abnormalities, etc. This information is then compared to the baseline radiographs and an accurate I.D. profile is assembled.




ATTACHMENT 2

## DESCRIPTION OF EBASCO DETECTION METHODS

The detection methods employed by Ebasco personnel include the following steps:

A) Generally a nominal 45° shear wave examination was used as the primary detection angle.

B) The calibration for this technique is performed using the 3/4T side drilled hole for sensitivity and establishing metal path.

C) The primary area of interest is marked on the screen between the 3/8 node and the 5/8 node for quick reference of reflectors.

D) If there are any recordable reflectors detected in the primary area of interest that whose source can not be readily identified by the inspector, ID and OD profiles of the weld are constructed. This is done by using a contour gauge on the weld and adjacent base material at the locations that the reflectors are noted. It is then necessary to do a 0° longitudinal examination for precise thickness readings in these areas. A weld profile is then drawn from these measurements.

E) Once the profile has been established, the surface distances and metal path measurements taken during the angle beam examinations are included in the drawing to graphically display the locations of the reflectors.

F) A detailed analysis of the weld plots are then made by the level III and if it is determined that additional data is required for final analysis, supplemental examinations are performed.

G) If additional data is required, a 60° angle beam examination is implemented using a senior technician and following the same parameters and techniques as the 45° examination. A second review is then performed comparing both sets of results for consistency, placement and through wall dimensioning.

H) These reports are then forwarded to the NYPA for review and further analysis.

A. Smith Level III
ISI Coordinator/QA Specialist

# NYPA LEVEL III U.T. EXAMINER INVOLVEMENT

The NYPA Level III oversaw the entire operation of NDE involved in the testing for the IHSI and overlay programs. This included performing surveillances upon arrival on site for both Ebasco and KWU/UTL personnel, equipment and materials. In addition, constant surveillance in the field enabled the NYPA Level III to remain aware of the status of the examinations being performed.

The NYPA Level III aided Ebasco in detection by furnishing details derived from baseline radiographs and archive files of previous exams. He also accompanied Ebasco personnel into the drywell to observe indications and to apply other techniques (O.D. creeping wave and crack tip diffraction for example) to aid in determining the nature of the reflectors.

He also assigned portions of weld exams to KWU/UTL personnel for further discrimination and sizing as deemed necessary. These examinations were also observed by the NYPA Level III when time allowed.

The NYPA Level III performed further analysis of confirmed cracks by obtaining more information regarding length and thru-wall dimensioning on some welds so as to be able to construct a 'B' scan-type plot to assist in assembling an overall view of what the condition actually appeared to be.

KWU STEP BY STEP PROCEDURE FOR ESTABLISHING THE ID/OD WELD PROFILE

1. Examination of the region of interest for determination of the ID/OD weld profile is measured.

    a) A rough crack depth estimation using:

        - WSY probe considering correlated echo No. 1 which is sensitive only for crack depths greater than 10%.

        - 45° shear wave probe, amplitude based on the assumption that deep cracks have a larger extended opening.

2. Measurement of the OD is accomplished with the use of a contour gauge.

3. Then the O.D. weld profile is transferred to the Contour Inspection Sheet.

4. The root centerline is determined by using a straight beam probe (longitudinal) and marking the position on the weld and on the contour inspection sheet.

5. Measurements on the weld crown and adjacent parent material on each side of the weld are taken and recorded.

6. Evaluation of the ID profile is based upon the measured data. Special consideration should be given for the gap between the probe shoe and the OD. The change of sound velocity in the weld material and the directivity pattern of the probe used.

# KWJ GENERAL INSPECTION CRITERIA FOR DETECTION, DISCRIMINATION AND SIZING

## 1st Step

Detection of areas where signals were obtained which are suspicions for crack indications. The used techniques WSY 70° and 45° shear wave are highly sensitive to corner like reflectors. For example, used sensitivity for riser welds: 0.1 mm/0.004" WSY 70 and 0.4 mm/0.016" 45° shear wave probe. See examples of typical amplitude functions.

## 2nd Step

Determination of the position at which the assumed crack should be deepest by a rough crack depth estimation, by using correlated echo No. 1 and/or amplitude function.

## 3rd Step

Measurement of the OD/ID profile.

## 4th Step

Consideration for detectability and discrimination of cracks/geometry were done using the OD/ID profile.

## 5th Step

By the conclusions of Step 4, further detection techniques (for example 60° shear wave probe) were used where the inspection of geometry does not allow a complete coverage of the area which has to be examined.

## 6th Step

To discriminate between geometry and cracks, further techniques should be used as far as it is necessary. Example: Counterbore indications with a machined groove should be re-inspected using 70° longitudinal probe to detect cracks on the top of the counterbore.

7th Step

In case that the discrimination results in a cracked pipe, the crack depth will be determined by detecting crack facettes and the crack tip. All available techniques should be used to the extent that the results are confirmed. The choice of the transducers depends on the ID/OD profile and the sound attenuation. These techniques include the sizing methods of EPRI.

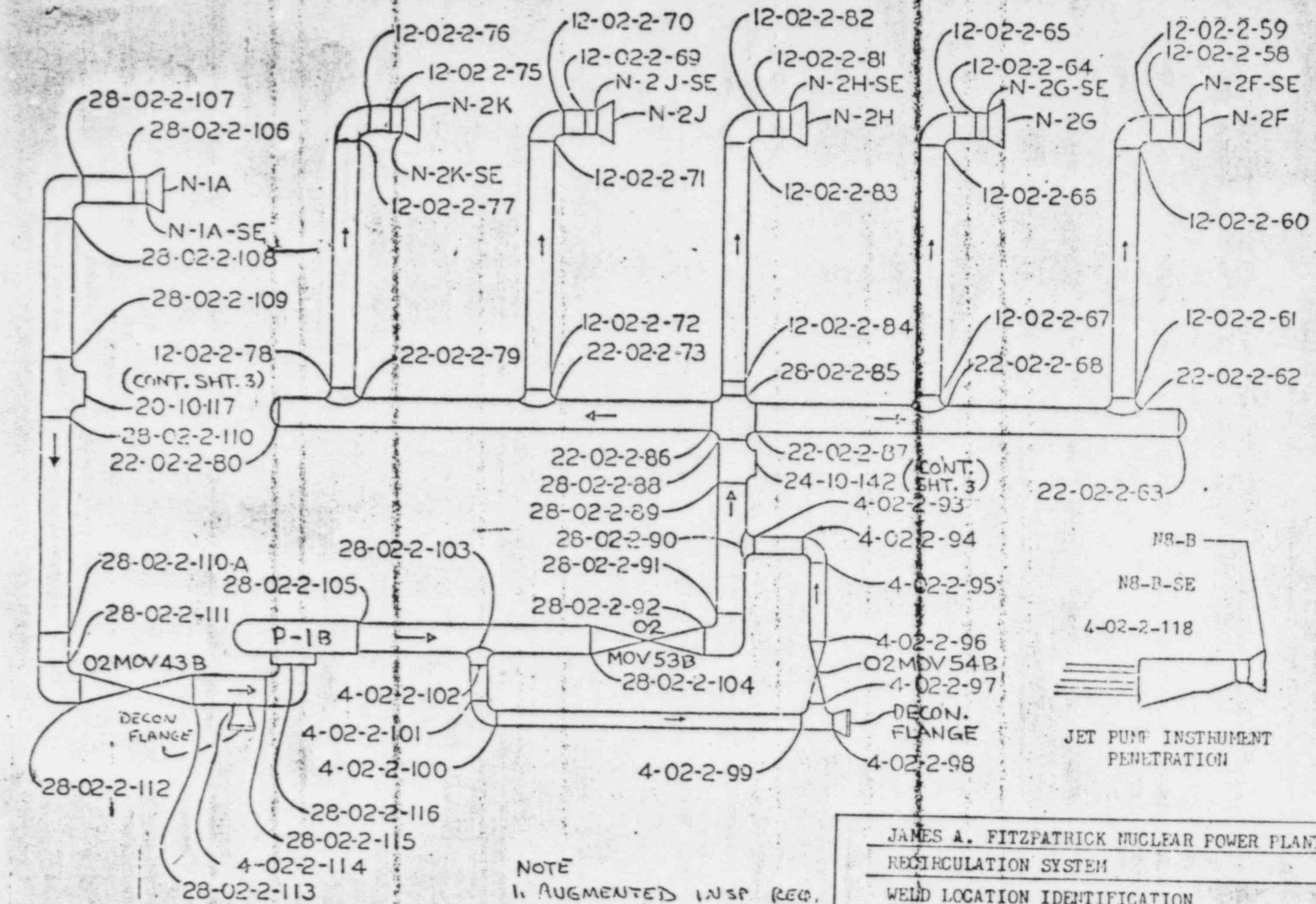
ATTACHMENT 7

EXPLANATION OF NYPA COMPUTER PLOTS

On 360° weld plots how was the plot assembled and how were areas not measured and unflawed areas plotted? The weld is scanned 360° (100% of weld). Measurements are taken in one inch (1") increments. If an abrupt change in the indication or geometry occurs between the 1" increments, it is recorded between these one inch increments. If no recorded abrupt change occured, then the computer will extrapolate the information between the two recorded one inch (1") pts and average values are assigned in 1/4" increments. The computer plots were validated by comparison with hand plots developed by the NYPA Level III and found to be correct in detail.

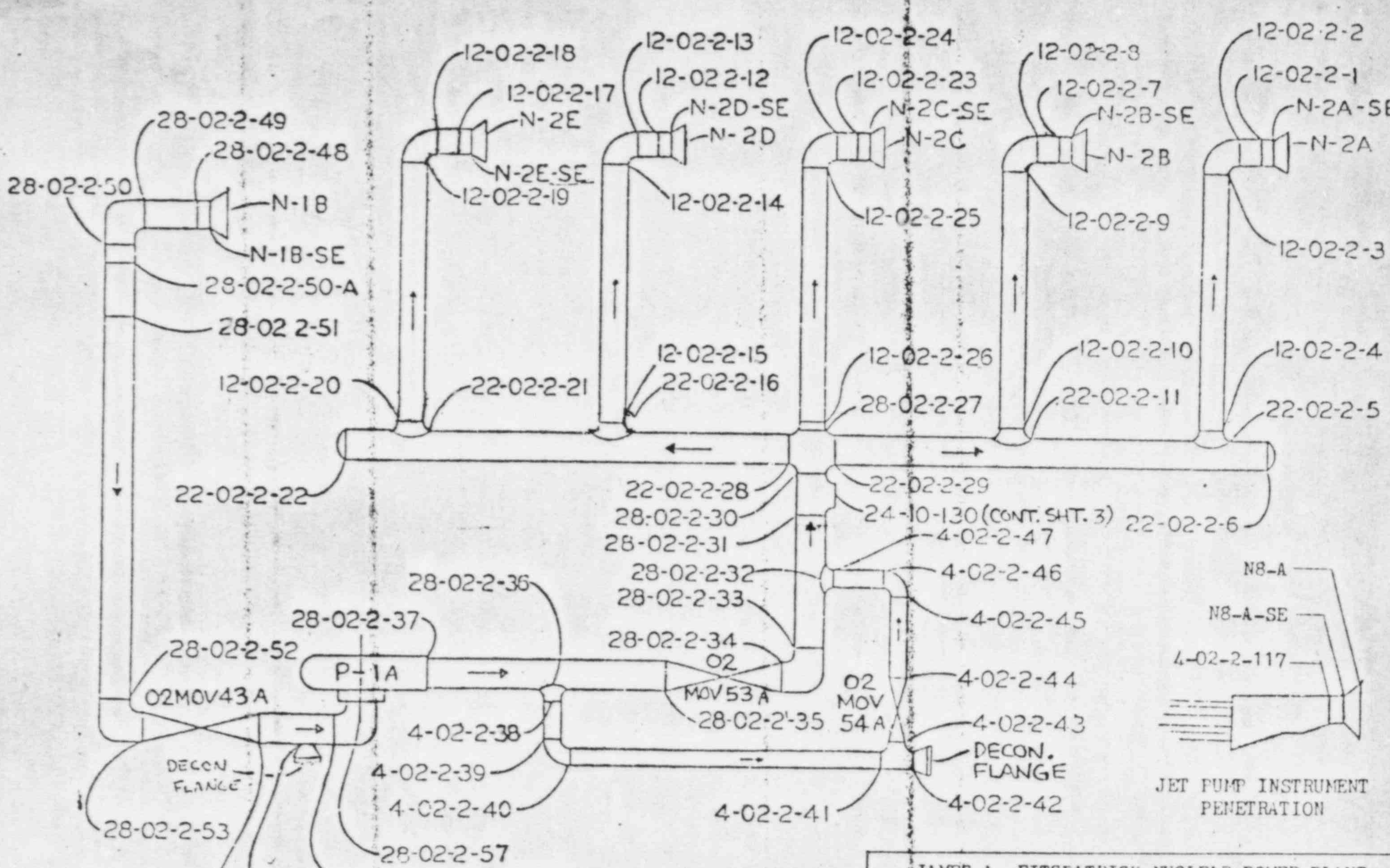
How do you interpret the plots if there was an obstruction? If this question is regarding a physical obstruction (none were noted as all physical obstructions were removed), the computer plotting technique would not be utilized but rather a hand plot reflecting actual conditions (e.g., skewered angle, opposite side of weld, etc.) would be incorporated into the plotting technique.

The computer plots provided to the NRC with the U.T. data packages (See JAFP-84-0979) were informational only. They provide an additional graphic representation of the crack profile and were not utilized as a means for flaw evaluation.




NOTE
1. AUGMENTED INSP. REQ. ON ALL WELDS

JAMES A. FITZPATRICK NUCLEAR POWER PLANT
RECIRCULATION SYSTEM
WELD LOCATION IDENTIFICATION
ISI-J-2
Rev 3




NOTE
1. REFER TO STONE & WEBSTER DRAWING NO. 11825-FP-87A FOR ADDITIONAL INFORMATION
2. AUGMENTED INSP. REQ. ON ALL WELDS

| |
|---|
| JAMES A. FITZPATRICK NUCLEAR POWER PLANT |
| RECIRCULATION SYSTEM |
| WELD LOCATION IDENTIFICATION |
| ISI-J-1 Rev. 3 |

WELD SUMMARY

TABLE 1

JAMES A. FITZPATRICK - RESULTS OF IGSCC INSPECTIONS

| Weld No. | Loop | Weld Location | Crack Type | Length | Thru Wall | Depth Var. | IHSI | Discovery Method | Previous Inspection | Corrective Action | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 12-4 | A | Pipe to sweep-o-let | C | 1.0% | No | 7.5% | Yes 9/84 | UT-Pre & Post IHSI | 6/83 | IHSI & Analysis | |
| 12-12 | A | Pipe to safe end | C | 100% | Yes 1 | Avg.50% Max.100% Min.<5% | Yes 9/84 | PT, Visual, UT, Post IHSI | | Weld Overlay | See Note 1 |
| 12-17 | A | Pipe to safe end | C | 4.0% 3.0% | No | Max.10% | Yes 9/84 | UT, Post IHSI | 12/81 | None | Indications 90% apart |
| 12-23 | A | Pipe to safe end | C | 100% int. | No | Avg.40% Max.75% Min.<5% | Yes 9/84 | UT, Post IHSI | 6/83 | Weld Overlay | See Note 1 |
| 12-64 | B | Pipe to safe end | C | 100% int. | Yes 2 | Avg.30% Max.100% Min.<5% | Yes 9/84 | PT, Visual, UT, Post IHSI | | Weld Overlay | See Note 1 |
| 12-69 | B | Pipe to safe end | C | 100% | Yes 2 | Not aplt | Yes 9/84 | PT, Visual UT, post IHSI | 12/81 | Weld Overlay | See Note 1 |
| 12-70 | B | Elbow to pipe | C | 12.6% | No | 45% | Yes 9/84 | UT, Pre-IHSI | 12/81 | Weld Overlay | |
| 28-48 | A | Pipe to safe end | C | 1.1% | No | 15% | Yes 3/84 | UT, Pre-IHSI | | IHSI & Analysis | |
| 28-53 | A | Elbow to valve | C | .3% | No | 5% | Yes 9/84 | UT, Pre-IHSI | 6/83 | IHSI & Analysis | |
| 28-112 | B | Elbow to valve | C | .6% | No | 17% | Yes 9/84 | UT, Pre-IHSI | 6/83 | IHSI & Analysis | |
| 28-113 | B | Valve to pipe | C | .5% | No | 10% | Yes 9/84 | UT, Pre-IHSI | 6/83 | IHSI & Analysis | |

Note 1 - No pre-IHSI UT examination performed.

TABLE 2

| WELD NUMBER | EXAMINED BY: | | | IHSI RELATIONSHIP | | E B A S C O | | | | | | | RESULTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | PRE - IHSI | POST IHSI | EXAM ANGLE | | | EXTENT OF EXAM | | | | |
| | EBASCO | KWU | NYPA | | | 0° | 45° | 60° | CIRC. | SIDE ONE | SIDE TWO | REASON | |
| 12-1 | X | | | N/A | N/A | X | X | | 360° | | X | | N/A |
| 12-2 | X | | | N/A | N/A | X | X | | 360° | | X | | N/A |
| 12-3 | X | | | N/A | N/A | X | | X | 360° | | X | 60° transducer used due to weld crown | Root Geo 360° Intermit. |
| 12-4 | X | | | N/A | N/A | X | X | | 360° | X | | Sweep-o-let (Partial Exam) | " " " " |
| 12-5 | X | | | N/A | N/A | X | X | | 360° | X | | Sweep-o-let (partial exam) | N/A |
| 12-7 | X | | | N/A | N/A | X | X | | 360° | | X | | Root Geo 360° Intermit. |
| 12-8 | X | | | N/A | N/A | X | X | | 360° | | X | | |
| 12-9 | X | | | N/A | N/A | X | | X | 360° | | X | 60° transducer used due to weld crown | Root Geo 360° Intermit. |
| 12-10 | X | | | N/A | N/A | X | X | | 360° | | X | | Root Geo 360° Intermit. |
| 12-23 | X | | | N/A | N/A | X | X | | 360° | | X | | " " " " |
| 12-24 | X | | | N/A | N/A | X | X | | 360° | | X | | " " " " |
| 12-25 | X | | | N/A | N/A | X | | X | 360° | | X | 60° transducer used due to weld crown | " " " " |
| 12-26 | X | | | N/A | N/A | X | X | | 360° | | X | | N/A |
| 12-75 | X | | | N/A | N/A | X | X | | 360° | | X | | Root Geo 360° Intermit. |
| 12-76 | X | | | N/A | N/A | X | X | | 360° | | X | | Root Geo 360° Intermit. |
| | | | | | | | | | | | | | |

NOTE: N/A = No recordable indications.

| WELD NUMBER | EXAMINED BY: EBASCO | KWU | NYPA | IHSI RELATIONSHIP PRE - IHSI | POST IHSI | EBASCO EXAM ANGLE 0° | 45° | 60° | EXTENT OF EXAM CIRC. | SIDE ONE | TWO | REASON | RESULTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12-77 | X | | | N/A | N/A | X | | X | 360° | | X | 60° Transducer used due to weld crown | Root Geo 360° Intermit. |
| 12-78 | X | | | N/A | N/A | X | X | | 360° | X | | Sweep-o-let Partial | " " " (L.A.) |
| 12-80 | X | | | N/A | N/A | X | X | | 360° | | X | | Laminar Indication Root Geo 360° Intermit. |
| 22-6 | X | | | N/A | N/A | X | X | | 360° | | X | | N/A |
| 22-11 | X | | | N/A | N/A | X | X | | 360° | X | | Sweep-o-let | N/A |
| 22-22 | X | | | N/A | N/A | X | X | | 360° | | X | | 1.9" L - 20% |
| 22-28 | X | | | N/A | N/A | X | X | | 360° | | X | | N/A |
| 22-29 | X | | | N/A | N/A | X | X | | 360° | | X | | Root Geo 360° Intermit. |
| 22-63 | X | | | N/A | N/A | X | X | | 360° | | X | End Cap Laminar Indication | N/A |
| 22-79 | X | | | N/A | N/A | X | X | | 360° | X | | Sweep-o-let Partial | N/A |
| 22-86 | X | | | N/A | N/A | X | X | | 360° | X | | Partial Exam due to tee configuration | Root Geo 360° Intermit. |
| 22-77 | X | | | N/A | N/A | X | X | | 360° | X | | Partial exam due to tee configuration | Root Geo 360° Intermit. |
| 28-27 | X | | | N/A | N/A | X | X | | 360° | X | | Partial exam due to reducer interference | N/A |
| 28-31 | X | | | N/A | N/A | X | X | | 360° | X | | Partial exam due to tee interference | N/A |
| 28-32 | X | | | N/A | N/A | X | X | | 360° | | X | | N/A |
| 28-33 | X | | | N/A | N/A | X | X | | 360° | | X | | N/A |

| WELD NUMBER | EXAMINED BY: | | | IHSI RELATIONSHIP | | EBASCO | | | | | | | RESULTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | EXAM ANGLE | | | EXTENT OF EXAM | | | | |
| | EBASCO | KWU | NYPA | PRE IHSI | POST IHSI | 0° | 45° | 60° | CIRC. | SIDE | | REASON | |
| | | | | | | | | | | ONE | TWO | | |
| 28-37 | X | | | N/A | N/A | X | X | | 360° | X | | Partial exam support interference | N/A |
| 28-49 | X | | | N/A | N/A | X | X | | 360° | | X | | Root Geo 360° Intermit. |
| 28-50 | X | | | N/A | N/A | X | X | | 360° | | X | | N/A |
| 28-53 | X | | | N/A | N/A | X | X | | 360° | X | | Partial exam due to valve | Root Geo |
| 28-54 | X | | | N/A | N/A | X | X | | 360° | X | | Partial exam due to valve | Root Geo |
| 28-56 | X | | | N/A | N/A | X | X | | 360° | | X | | Root Geo 180° Intermit. |
| 28-57 | X | | | N/A | N/A | X | X | | 360° | X | | Partial exam due to pump interference | N/A |
| 28-85 | X | | | N/A | N/A | X | X | | 360° | X | | Partial exam reducer interference | N/A |
| 28-89 | X | | | N/A | N/A | X | X | | 360° | | X | | N/A |
| 28-90 | X | | | N/A | N/A | X | X | | 360° | | X | | N/A |
| 28-105 | X | | | N/A | N/A | X | X | | 360° | X | | Partial exam pump interference | N/A |
| 28-107 | X | | | N/A | N/A | X | X | | 360° | | X | | Root Geo 360° |
| 28-108 | X | | | N/A | N/A | X | X | | 360° | | X | | Root Geo 360° |
| 28-112 | X | | | N/A | N/A | X | X | | 360° | X | | Partial exam due to valve | Root Geo 360° Intermit. |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |

| WELD NUMBER | EXAMINED BY: | | | IHSI RELATIONSHIP | | E B A S C O | | | | | | | RESULTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | EXAM ANGLE | | | EXTENT OF EXAM | | | | |
| | EBASCO | KWU | NYPA | PRE IHSI | POST IHSI | 0° | 45° | 60° | CIRC. | SIDE | | REASON | |
| | | | | | | | | | | ONE | TWO | | |
| 28-113 | X | | | N/A | N/A | X | X | | 360° | X | | Partial due to valve configuration | Root Geo 360° Intermit. |
| 28-115 | X | | | N/A | N/A | X | X | | 360° | | X | | " " " " |
| 28-116 | X | | | N/A | N/A | X | X | | 360° | X | | Partial due to pump | " " " " |

TABLE 3

| WELD NUMBER | EXAMINED BY: EBASCO | KWU | NYPA | IHSI RELATIONSHIP PRE - IHSI | POST IHSI | E B A S C O EXAM ANGLE 0° | 45° | 60° | EXTENT OF EXAM CIRC. | SIDE ONE | SIDE TWO | REASON | RESULTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12-8 | X | | | X | X | X | X | | 360 | | X | | No indications |
| 12-15 | X | | | X | X | X | X | | 360 | X | | Partial exam - sweep-o-let Pipe side only | No indications |
| 12-18 | X | | | X | X | X | X | | 360 | | X | | No indications |
| 12-20 | X | | | X | X | X | X | | 360 | X | | Partial exam - sweep-o-let Pipe side only | No indications |
| 12-76 | X | | | X | X | X | X | | 360 | | X | | No indications |
| 22-22 | X | | | X | X | X | X | | 360 | | X | | Relevant indications turned over to KWU |
| 28-48 | X | | | X | X | X | X | X | 360 | | X | | 10% Wall, L = 1.6" |
| 28-49 | X | | | X | X | X | X | | 360 | | X | | 360° Geo. Reflector Pre & Post Exam |
| 28-106 | X | | | X | X | X | X | | 360 | | X | | No indications |
| 28-107 | X | | | X | X | X | X | | 360 | | X | | No indications |

TAPLE 4

| WELD | IHSI RELATIONSHIP | | KWU EXAM ANGLE | | | | | | KWU EXTENT OF EXAM | |
|---|---|---|---|---|---|---|---|---|---|---|
| NUMBER | PRE | POST | 0° | 45° | 60° | 70° | | | DEG | KWU RESULTS |
| 28-48 | | X | X | X | X | X | | | | < 10% wall, L = 1.6" |
| 12-75 | X | X | X | X | | X | | | | 360° Geo Reflect., Pre & Post |
| 22-22 | | X | | X | X | X | 70/ 30 WSY | | One side - Sizing only | Counterbore plus out of roundness |
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MARCH 1984 - NYPA

TABLE 5

| WELD | IHSI RELATIONSHIP | | NYPA EXAM ANGLE | | | | | | NYPA EXTENT OF EXAM | |
|---|---|---|---|---|---|---|---|---|---|---|
| NUMBER | PRE | POST | 0° | 45° | 60° | 70° | Crack | | DEG | NYPA RESULTS |
| 28-48 | | X | X | X | | | Tip 45° | | 100% | 2.875" L, 17% wall + |
| | | | | | | | | | | |
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TABLE 6

| WELD NUMBER | EXAMINED BY: | | | IHSI RELATIONSHIP | | EBASCO | | | | | | | RESULTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | EXAM ANGLE | | | EXTENT OF EXAM | | | | |
| | | | | | | | | | | SIDE | | | |
| | EBASCO | KWU | NYPA | PRE - IHSI | POST IHSI | 0° | 45° | 60° | CIRC. | ONE | TWO | REASON | |
| 12-01 | X | | | N/A | X | | X | 1<br>X | X | 2<br>X | | 1. Excess concaved weld toe limits 45° exam. 2. Safe-end on downstream side | Turned over to NYPA/KWU for further evaluation |
| 12-02 | X | | | N/A | X | | | 1<br>X | X | | X | 1. Excessive weld crown limits 45° exam | Turned over to NYPA/KWU for further evaluation |
| 12-03 | X | | | X | X | | | X | X | | X | N/A | No indications. Acceptable |
| 12-04 | X | | | N/A | X | | X | X | X | 1<br>X | | 1. Pipe side scan due to pipe to saddle geometry | Turned over to NYPA/KWU for further evaluation |
| 12-07 | X | | | N/A | X | | | 1<br>X | X | 2<br>X | | 1. Excessive concavity at weld toe limits 45° exam. 2. Safe end on downstream side | Turned over to NYPA/KWU for further evaluation |
| 12-09 | X | | | X | X | | | 1<br>X | X | | X | 1. Excessive weld crown limits 45° exam | No indications. Acceptable |
| 12-12 | X | | | N/A | X | | | 1<br>X | X | 2<br>X | | 1. Excess concave at weld toe limits 45° exam. 2. Safe-end on downstream side. | Turned over to NYPA/KWU for further evaluation |
| 12-13 | X | | | X | X | | | 1<br>X | X | | X | 1. Excessive weld crown limits 45° exam | No indications. Acceptable |
| 12-14 | X | | | X | X | | | 1<br>X | X | | X | 1. Excessive weld crown limits 45° exam | No indications. Acceptable |
| 12-17 | X | | | N/A | X | | | 1<br>X | X | 2<br>X | | 1. Excess concave at weld tow limiets 45 exam. 2. Safe-end on downstream side | Turned over to NYPA/KWU for further evaluation |
| 12-19 | X | | | X | X | | | 1<br>X | X | | X | 1. Excessive weld crown limits 45° weld exam. | No indications. Acceptable |
| 12-23 | X | | | N/A | X | | X | 1<br>X | X | 2<br>X | | 1. Excess concave at toe limits 45° exam 2. Safe-end on downstream side | Turned over to NYPA/KWU for further evaluation |
| 12-10 | X | | | N/A | X | | X | | X | 1<br>X | | 1. One side due to saddle geometry | No indications. Acceptable |
| 12-24 | X | | | N/A | X | | | 1<br>X | X | | X | 1. Excessive weld crown limits 45° weld exam | No indications. Acceptable |
| 12-25 | X | | | N/A | X | | | 1<br>X | X | | X | 1. Excessive weld crown limits 45° weld exam | No indications. Acceptable |
| 12-26 | X | | | N/A | X | | X | | X | 1<br>X | | 1. Pipe side exam due to reducer geometry | No indications. Acceptable |

12"

| WELD NUMBER | EXAMINED BY: EBASCO | KWU | NYPA | IHSI RELATIONSHIP PRE IHSI | POST IHSI | EBASCO EXAM ANGLE 0° | 45° | 60° | EXTENT OF EXAM CIRC. | SIDE ONE | SIDE TWO | REASON | RESULTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12-58 | X | | | N/A | X | | | 1 X | X | 2 X | | 1. Excess concavity at weld toe limits 45° exam. 2. Safe end on downstream side | Mult.non-record.ind's in B.M.360°Int.to NYPA Accept. |
| 12-59 | X | | | N/A | X | | | 1 X | X | | X | 1. Excess wide weld crown limits 45° exam | Turned over to NYPA/KWU for further evaluation |
| 12-60 | X | | | X | X | | | 1 X | X | | X | 1. Excess wide weld crown limits 45° exam | I.D. Geometry 360° Int Acceptable |
| 12-61 | X | | | X | X | | X | X | X | 1 X | | 1. Exam from pipe side due to saddle geometry | Turned over to NYPA/KWU for further evaluation |
| 12-64 | X | | | N/A | X | | | 1 X | X | 2 X | | 1. Excess concave at weld toe limits 45° exam. 2. Safe end on downstream side | Turned over to NYPA/KWU for further evaluation |
| 12-65 | X | | | X | X | X | | 1 X | X | | X | 1. Excess wide weld crown limits 45° exam | Turned over to NYPA/KWU for further evaluation |
| 12-66 | X | | | X | X | | | 1 X | | | | 1. Excess wide weld crown limits 45° exam | No indications Acceptable |
| 12-67 | X | | | X | X | | X | | X | X | | Scan from pipe side due to saddle geom. | No indications Acceptable |
| 12-69 | X | | | N/A | X | | | 1 X | X | 2 X | | 1. Excess concavity at weld toe limits 45° exam. 2. Safe end on downstream side | Turned over to NYPA/KWU for further evaluation |
| 12-70 | X | | | N/A | X | | | 1 X | X | | X | 1. Excess wide weld crown limits 45° exam | Turned over to NYPA/KWU for further evaluation |
| 12-71 | X | | | N/A | X | | | 1 X | X | | X | 1. Excess wide weld crown limits 45° exam | Root geometry Acceptable |
| 12-72 | X | | | X | X | | X | | X | 1 X | | 1. Scan from pipe side due to saddle geometry | Low-level non-recordable indications;acceptable |
| 12-75 | X | | | N/A | X | | | 1 X | X | 2 X | | 1. Excess concavity at weld toe limits 45° exam. 2. Safe end on downsteam side | Turned over to NYPA/KWU for further evaluation |
| 12-76 | X | | | N/A | X | | X | 1 X | X | | X | 1. Performed for further evaluation of indications | Turned over to NYPA/KWU for further evaluation |
| 12-77 | X | | | N/A | X | | | 1 X | X | | X | 1. Excess wide weld crown limits 45° scan | Turned over to NYPA/KWU for further evaluation |
| 12-78 | X | | | X | X | | X | | X | 1 X | | 1. Scan from pipe side due to saddle geometry. | No indications Acceptable |

12"

| WELD NUMBER | EXAMINED BY: EBASCO | KWU | NYPA | IHSI RELATIONSHIP PRE IHSI | POST IHSI | EBASCO EXAM ANGLE 0° | 45° | 60° | EXTENT OF EXAM CIRC. | SIDE ONE | SIDE TWO | REASON | RESULTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12-81 | X | | | N/A | X | | X | 1 X | X | 2 X | | 1. Excess concavity at weld toe limits 45° exam. 2. Safe-end on downstream side | Turned over to NYPA/KWU for further evaluation |
| 12-82 | X | | | X | X | | | 1 X | X | | X | 1. Excess wide weld crown limits 45° exam. | No indications. Acceptable |
| 12-83 | X | | | X | X | | | 1 X | X | | X | 1. Excess wide weld crown limits 45° exam. | No indications. Acceptable |
| 12-84 | X | | | X | X | | X | | X | X | | 1. Scan from pipe due to pipe to reducer geometry | No indications. Acceptable |
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20"

| WELD NUMBER | EXAMINED BY: | | | IHSI RELATIONSHIP | | E B A S C O | | | | | | | RESULTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | EXAM ANGLE | | | EXTENT OF EXAM | | | | |
| | EBASCO | KWU | NYPA | PRE - IHSI | POST IHSI | 0° | 45° | 60° | CIRC. | SIDE | | REASON | |
| | | | | | | | | | | ONE | TWO | | |
| 20-117 | X | | | X | X | | X | X | X | 1 X | | 1. Scanned from pipe only due to tee geometry | Turned over to NYPA/KWU for further evaluation |
| 20-118 | X | | | X | X | | X | | X | | X | N/A | No indications. Acceptable |
| | | | | | | | | | | | | | |
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22"

| WELD NUMBER | EXAMINED BY: EBASCO | KWU | NYPA | IHSI RELATIONSHIP PRE - IHSI | POST IHSI | E B A S C O EXAM ANGLE 0° | 45° | 60° | EXTENT OF EXAM CIRC. | SIDE ONE | SIDE TWO | REASON | RESULTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 22-05 | X | | | X | X | | X | | X | 1<br>X | | 1. Pipe side scan only due to saddle geometry | No indications. Acceptable |
| 22-06 | X | | | X | X | | X | | X | | X | N/A | No indications. Acceptable |
| 22-11 | X | | | N/A | X | | X | | X | 1<br>X | | 1. Pipe side scan only due to saddle geometry | No indications. Acceptable |
| 22-16 | X | | | X | X | | X | | X | 1<br>X | | 1. Pipe side scan only due to saddle geometry | No indications. Acceptable |
| 22-21 | X | | | X | X | | X | | X | 1<br>X | | 1. Pipe side scan due to saddle geometry | No indications. Acceptable |
| 22-28 | X | | | N/A | X | | X | X | X | 1<br>X | | 1. Pipe side scan due to cross geometry | No indications. Acceptable |
| 22-29 | X | | | N/A | X | | X | X | X | 1<br>X | | 1. Pipe side exam due to cross geometry | No indications. Acceptable |
| 22-62 | X | | | X | X | | X | | X | 1<br>X | | 1. Scanned from pipe due to saddle geometry | No indications. Acceptable |
| 22-63 | X | | | N/A | X | | X | | X | | X | N/A | No indications. Acceptable |
| 22-68 | X | | | X | X | | X | | X | 1<br>X | | 1. Scanned from pipe due to saddle geometry | No indications. Acceptable |
| 22-73 | X | | | X | X | | X | | X | 1<br>X | | 1. Scanned from pipe side due to saddle geometry | Root geometry 360° Acceptable |
| 22-79 | X | | | X | X | | X | | X | 1<br>X | | 1. Scanned from pipe side due to saddle geometry | Root Geometry 360° Acceptable |
| 22-80 | X | | | X | X | | X | | X | | X | N/A | No indications. Acceptable |
| 22-86 | X | | | N/A | X | | X | | X | X | | Scanned pipe side only due to cross geo. | Root geometry 360° Acceptable |
| 22-87 | X | | | N/A | X | | X | | X | X | | Scanned pipe side only due to cross geo. | Root geometry 360° Acceptable |
| | | | | | | | | | | | | | |

28"

| WELD NUMBER | EXAMINED BY: | | | IHSI RELATIONSHIP | | E B A S C O | | | | | | | RESULTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | EXAM ANGLE | | | EXTENT OF EXAM | | | | |
| | EBASCO | KWU | NYPA | PRE - IHSI | POST IHSI | 0° | 45° | 60° | CIRC. | SIDE ONE | SIDE TWO | REASON | |
| 28-27 | X | | | X | X | X | N/A | N/A | N/A | N/A | N/A | 0° Exam due to geometry of base metal taper | No indications. Acceptable |
| 28-30 | X | | | X | X | X | N/A | N/A | N/A | N/A | N/A | 0° exam due to geometry of base metal taper | No indications. Acceptable |
| 28-31 | X | | | X | X | | X | | X | | X | N/A | No indications. Acceptable |
| 28-32 | X | | | N/A | X | | X | | X | X | | 4" Sockolet to 28" pipe, geo. allows effective scan from 28" side only | I.D. Geometry 360° Int. Acceptable |
| 28-33 | X | | | N/A | X | | X | | X | | X | N/A | No indications. Acceptable |
| 28-34 | X | | | X | X | | X | X | X | 1<br>X | | 1. Elbow scan only due to valve geometry | Low-level non-recordable ind. geometry; acceptable |
| 28-35 | X | | | X | X | | X | | X | 1<br>X | | 1. Tee side scan due to valve geometry | No indications. Acceptable |
| 28-36 | X | | | X | X | | X | | X | 1<br>X | | 1. 4" Sockolet to 28" pipe, geometry allows effective scan from 28" side only | I.D. Geometry 360° Int. Acceptable |
| 28-37 | X | | | X | X | | X | | | 1<br>X | | 1. Scan from tee only due to pump geometry | Low-amp non-recordable signals, acceptable |
| 28-50A | X | | | X | X | | X | | X | | X | N/A | No indications. Acceptable |
| 28-51 | X | | | X | X | | X | | X | | X | N/A | No indications. Acceptable |
| 28-52 | X | | | X | X | | X | | X | | X | N/A | Low-level non-recordable indication; Acceptable |
| 28-53 | X | | | X | X | | X | X | X | 1<br>X | | 1. Scan from elbow only due to valve geometry | Turned over to NYPA/KWU for further evaluation |
| 28-54 | X | | | X | X | | X | | X | 1<br>X | | 1. Scan from pipe only due to valve geometry | Root geometry Acceptable |
| 28-55 | X | | | X | X | | X | | X | 1<br>X | | 1. 4" sockolet to 28" pipe, geo. only allows effective scan from 28" side only | No indications. Acceptable |
| 28-56 | X | | | | X | | X | X | X | | X | N/A | Turned over to NYPA/KWU for further evaluation |

28"

| WELD NUMBER | EXAMINED BY: | | | IHSI RELATIONSHIP | | EBASCO | | | | | | | RESULTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | EXAM ANGLE | | | EXTENT OF EXAM | | | | |
| | EBASCO | KWU | NYPA | PRE - IHSI | POST IHSI | 0° | 45° | 60° | CIRC. | SIDE ONE | SIDE TWO | REASON | |
| 28-57 | X | | | X | X | | X | X | X | 1 X | | 1. Elbow scan only due to pump geometry | Turned over to NYPA/KWU for further evaluation |
| 28-85 | X | | | N/A | X | X | | | N/A | N/A | N/A | 0° scan only due to base metal geometry and taper | No indications. Acceptable |
| 28-88 | X | | | X | X | X | | | N/A | N/A | N/A | 0° scan only due to base metal geometry and taper | No indications. Acceptable |
| 28-89 | X | | | X | X | | X | | X | | X | N/A | No indications. Acceptable |
| 28-90 | X | | | N/A | X | | X | | X | 1 X | | 1. 4" sockolet to 28" pipe, scanned 28" side only due to geometry | No indications. Acceptable |
| 28-91 | X | | | X | X | | X | | X | | X | N/A | No indications. Acceptable |
| 28-92 | X | | | X | X | | X | X | X | 1 X | | 1. Scanned from elbow side due to valve geometry | Turned over to NYPA/KWU for further evaluation |
| 28-103 | X | | | X | X | | X | | X | 1 X | | 1. 4" sockolet to 28" pipe scanned 20" side only due to geometry | Turned over to NYPA/KWU for further evaluation |
| 28-104 | X | | | X | X | | X | | X | 1 X | | 1. Scan from pipe side only due to valve geometry | No indications. Acceptable |
| 28-105 | X | | | X | X | | X | | X | 1 X | | 1. Scanned from pipe side due to pump geometry | No indications. Acceptable |
| 28-109 | X | | | X | X | | X | | X | 1 X | | 1. Scanned from pipe side only due to tee geometry | Root geometry Acceptable |
| 28-110 | X | | | X | X | | X | X | X | 1 X | | 1. Scanned from pipe side only due to tee geometry | Turned over to NYPA/KWU for further evaluation |
| 28-110A | X | | | X | X | | X | | X | | X | N/A | No indications. Acceptable |
| 28-111 | X | | | X | X | | X | | X | | X | N/A | No indications. Acceptable |
| 28-112 | X | | | N/A | X | | X | X | X | 1 X | | 1. Scan from elbow side due to valve geometry | Turned over to NYPA/KWU for further evaluation |
| 28-113 | X | | | N/A | X | | X | X | X | 1 X | | 1. Scanned from pipe side only due to valve geometry | Turned over to NYPA/KWU for further evaluation |

28"

| WELD NUMBER | EXAMINED BY: | | | IHSI RELATIONSHIP | | EBASCO | | | | | | | RESULTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | EXAM ANGLE | | | EXTENT OF EXAM | | | | |
| | EBASCO | KWU | NYPA | PRE - IHSI | POST IHSI | 0° | 45° | 60° | CIRC. | SIDE ONE | SIDE TWO | REASON | |
| 28-114 | X | | | X | X | | X | | X | 1 X | | 1. 4" sockolet to 28" pipe scanned 28" pipe only due to geometry | No indications. Acceptable |
| 28-115 | X | | | | X | | X | | X | | X | N/A | No indications. Acceptable |
| 28-116 | X | | | | X | | X | | X | 1 X | | 1. Scanned from elbow side due to pump geometry | No indications. Acceptable |
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| WELD NUMBER | IHSI RELATIONSHIP PRE | POST | KWU EXAM ANGLE 45° | 60° | WSY | RTD | SUS | SLIC 40 | KWU EXTENT OF EXAM DEG | KWU RESULTS |
|---|---|---|---|---|---|---|---|---|---|---|
| 12-1 | | X | X | X | X | X | X | | Pipe side only 33" - 0 - .5" CW | ID - Geometry |
| 12-2 | | X | X | X | X | | | | 2" - 7" CW | Geometry |
| 12-4 | | X | X | X | X | | | MWB 70° | Pipe side only 6" - 12" CW | < 7.5% thru wall crack |
| 12-7 | | X | X | X | X | | | | Pipe side only 32" - 0 - 1.5" CW | ID - Geometry |
| 12-17 | | X | X | X | X | | | | Pipe side only 8" - 14.5" CW | < 10% thru-wall-crack |
| 12-23 | | X | | X | X | X | | | Pipe side only 38" - 0 - 8" CW | 75% thru-wall crack |
| 12-61 | X | X | X | X | X | | | | Pipe side only 9" - 17" CW | ID - Geometry |
| 12-65 | | X | X | X | X | | | | 0" - 4" CW | No recordable indications |
| 12-69 | | X | | | X | | | | Pipe side only 360° | 360° intermittent cracking |
| 12-75 | | X | X | X | X | | | | Pipe side only 8.5" - 18.5" CW | Geometry |
| 12-76 | | X | X | X | X | | | | 360° | Geometry |
| 12-77 | X | | X | X | X | | | | 11" - 13" CW | No recordable indications |
| 12-81 | | X | X | X | X | X | | X | Pipe side only 9" - 13" CW | Geometry |
| 12-59 | X | | X | X | X | | | | 33" - 38" CCW | Geometry |
| 12-70 | | X | X | X | X | X | MWB 70 | X | 7.5" - 12.5 CW | 45% thru-wall crack |

RTD: High Angle Longitudinal Creeping Wave (OD)
SUS: High Damped 52° Shear Wave
SLIC 40: Shear-and-longitudinal-mode interpretation and calculation prove (angle summary approx. 40°)
WSY: 30-70-70 shear-and-longitudinal probe with ID - creeping wave.

| WELD | IHSI RELATIONSHIP | | KWU EXAM ANGLE | | | | | | KWU EXTENT OF EXAM | |
|---|---|---|---|---|---|---|---|---|---|---|
| NUMBER | PRE | POST | 45° | 60° | WSY | RTD | SUS | SLIC 40 | DEG | KWU RESULTS |
| 20-117 | X | | X | X | X | | | | Elbow side only<br>5.5" - 14.5" CW | No recordable indicaitons |
| 28-53 | X | X | X | X | X | | | | Elbow side only<br>27" - 29" CCW | < 5% |
| 28-56 | | X | X | X | X | | | | 1.5" - 5.5" CCW | Geometry |
| 28-57 | X | X | X | X | X | | X | | Elbow side only<br>13" - 17" CCW | < 5% |
| 28-92 | X | | X | | X | X | X | X | 14"-22" CW Elbow Side Only<br>14"-22" CCW | Geometry |
| 28-103 | X | | X | X | X | | X | | Pipe side only<br>5" - 10" CW | No recordable indications |
| 28-110 | X | | X | X | X | | | | Pipe side only<br>17.5" - 25.5" CW | < 5% |
| 28-112 | | X | X | X | X | | X | | Elbow side only<br>5" - 12" CW | 17% thru-wall crack |
| 28-113 | | X | X | X | X | | | | Pipe side only<br>5" - 9" CW | 10% thru-wall crack |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |

RTD: High Angle Longitudinal Creeping Wave (OD)

SUS: High Damped 52° Shear Wave

SLIC 40: Shear-and-longitudinal-mode interpretation and calculation probe (angle summary approx. 40°)

WSY: 30-70-70 Shear and longitudinal probe with ID - creeping wave

| WELD | IHSI RELATIONSHIP | | NYPA EXAM ANGLE | | | | | | NYPA EXTENT OF EXAM | |
|---|---|---|---|---|---|---|---|---|---|---|
| NUMBER | PRE | POST | 0° | 45° | 60° | 70° | | | DEG | NYPA RESULTS |
| 12-12 | | X | | X | | X | O.D. Creeping | | 360° Pipe side only | 360° Int. - one thru-wall |
| 12-17 | | X | | X | | X | O.D. Creeping | | 360° Pipe side only | two small (≤ 10%) Ind. |
| 12-58 | | X | | X | | X | O.D. Creeping | | 360° Pipe side only | geometric reflectors |
| 12-61 | X | X | | X | X | X | O.D. Creeping | | 360° Pipe side only | geometric reflectors |
| 12-64 | | X | | X | | X | O.D. Creeping | | 360° Pipe side only | 360° Int. - two thru-wall |
| 12-75 | | X | | X | | X | O.D. Creeping | | 360° Pipe side only | geometric reflectors |
| 12-81 | | X | | X | | X | O.D. Creeping | | 360° Pipe side only | geometric reflectors |
| | | | | | | | | | | |

NOTE: Pipe side only exams performed on pipe to safe end welds. Safe end examinations not required for IGSCC detection. Weld 12-61 performed on pipe side only because no relevant information is available on component side of weld because ultrasonic examination of the component side of weld joint is not possible.