energy harbor

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***Frank R. Payne***
*Site Vice President, Perry Nuclear*

*440-280-5382*

April 17, 2020
L-19-143

10 CFR 50.55a

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

SUBJECT:
Perry Nuclear Power Plant
Docket No. 50-440, License No. NPF-58
Impractical American Society of Mechanical Engineers Boiler and Pressure Vessel Code Section XI Examination Requirements

Pursuant to 10 CFR 50.55a(g)(5)(iii), Energy Harbor Nuclear Corp. hereby provides the Nuclear Regulatory Commission (NRC) with the basis for the determination that the inservice examination of the welds listed below, as specified by the American Society of Mechanical Engineers Boiler and Pressure Vessel Code Section XI, or as specified by the NRC approved Risk-Informed Inservice Inspection Program, have been determined to be impractical. These determinations are based on experience obtained during the Perry Nuclear Power Plant, Unit No.1 third 10-year inservice inspection interval, which began May 18, 2009 and ended May 17, 2019.

The affected welds are:

1. Reactor vessel shell-to-flange weld 1B13-AE
2. Feedwater nozzle to vessel weld 1B13-N4A-KA
3. Feedwater nozzle to vessel weld 1B13-N4B-KA
4. Feedwater nozzle to vessel weld 1B13-N4C-KA
5. Feedwater nozzle to vessel weld 1B13-N4D-KA
6. Feedwater nozzle to vessel weld 1B13-N4E-KA
7. Feedwater nozzle to vessel weld 1B13-N4F-KA
8. Control rod drive housing to flange weld 1B13-02/35-FW
9. Control rod drive housing to flange weld 1B13-54/15-FW
10. Feedwater nozzle to safe end weld 1B13-N4C-KB
11. Reactor recirculation pipe to sweep-o-let weld 1B33-0028

Information to support the basis for the impracticality determinations is enclosed.

There are no regulatory commitments contained in this submittal. If there are any questions or if additional information is required, please contact Mr. Phil H. Lashley, Acting Manager – Nuclear Licensing and Regulatory Affairs, at (330) 315-6808.

Sincerely,

Frank R. Payne

Enclosure:
Perry Nuclear Power Plant, 10 CFR 50.55a Request IR-062, Rev. 0

cc: NRC Region III Administrator
NRC Resident Inspector
NRC Project Manager

L-19-143
Enclosure

Perry Nuclear Power Plant
10 CFR 50.55a Request IR-062, Rev. 0
(36 pages follow)

**Relief Request**
**in Accordance with 10 CFR 50.55a(g)(5)(iii)**
- Inservice Inspection Impracticality -

## 1. ASME Code Component(s) Affected

The Perry Nuclear Power Plant (PNPP) Class 1 welds with limited inservice inspection (ISI) examinations are listed in the Attachment, Table 1.

| | |
|---|---|
| Code Class: | 1 |
| Examination Categories: | B-A, B-D, B-O and R-A |
| Item Numbers: | B1.30, B3.90, B14.10, R2.11 and R2.ND |

## 2. Applicable Code Edition and Addenda

The applicable ASME Boiler and Pressure Vessel Code of Record (hereafter referred to as the "Code") edition and addenda for the third PNPP ISI interval is ASME Section XI, *Rules for Inservice Inspection of Nuclear Power Plant Components,* 2001 Edition through 2003 Addenda, (Reference 1). The Appendix VIII requirements and use of performance demonstration initiative (PDI) requirements at PNPP are in accordance with the 2001 Edition of Section XI as conditioned by 10 CFR 50.55a(b)(2).

## 3. Applicable Code Requirements

As an alternative to the requirements above for ASME Section XI Examination Category B-F and B-J welds, Energy Harbor Nuclear Corp. received NRC authorization for PNPP on November 14, 2012 to use a risk-informed inservice inspection (RI-ISI) program (Reference 2). The duration of this alternative to Section XI is for the third 10-year ISI interval. This program is based in part on using ASME Code Case N-578, "Risk-Informed Requirements for Class 1, 2, and 3 Piping, Method B, Section XI, Division 1" (Reference 3), and EPRI Topical Report TR-112657 "Revised Risk-Informed Inservice Inspection Evaluation Procedure" (Reference 4), as guidance. Examination Categories B-F and B-J welds were included under Examination Category R-A of the new RI-ISI program.

ASME Code Case N-460, "Alternative Examination Coverage for Class 1 and Class 2 Welds," (Reference 5), states that a reduction in examination coverage due to part geometry or interference for any Class 1 and 2 weld is acceptable provided that the reduction in coverage is less than 10 percent (%) (greater than 90% coverage is obtained).

Table IWB-2500-1, Examination Category B-A, *Pressure Retaining Welds in Reactor Vessel*

Item B1.30 shell-to-flange weld requires the volumetric examination depicted in Figure IWB-2500-4.

Table IWB-2500-1, Examination Category B-D, *Full Penetration Welded Nozzles in Vessels*

Per ASME Code Case N-613-1 (Reference 6 item B3.90 nozzle-to-vessel welds previously ultrasonically examined using the examination volumes of Figures IWB-2500-7(a), (b), and (c) may be examined using the reduced examination volumes as specified in ASME Code Case N-613-1 Figures 1, 2, and 3.

Table IWB-2500-1, Examination Category B-O, *Pressure Retaining Welds in Control Rod Drive (CRD) and Instrument Nozzle Housings*

Item B14.10 reactor vessel welds in CRD housings requires the volumetric or surface examinations depicted in Figure IWB-2500-18.

Examination Category R-A, Table 1 of Code Case N-578, *Risk-Informed Requirements for Class 1, 2, and 3 Piping, Method B, Section XI, Division 1* (Reference 3)

The RI-ISI program utilizes non-standard item numbering, combining risk category and degradation mechanism. For the items listed, a R2.11 item is a Risk Category 4 or 5 weld subjected to thermal fatigue (equivalent to R1.11 of N-578), and a R2.ND is a Risk Category 4 or 5 weld with no credible degradation mechanism.

Per Code Case N-578, Table 1, Examination Categories, welds subjected to thermal fatigue or with no degradation mechanism require the volumetric examination depicted in Figure IWB-2500-8(c), as modified by Note 1 of Table 1.

## 4. Impracticality of Compliance

Pursuant to 10 CFR 50.55a(g)(5)(iii), Energy Harbor Nuclear Corp. has determined that compliance with the code requirements of achieving greater than 90% coverage of the welds and items listed in this request is impractical. The determination is based on actual demonstrated limitations experienced when attempting to comply with the code examination requirements. The details of the examination coverage for the welds summarized below are attached.

Table IWB-2500-1, Examination Category B-A, *Pressure Retaining Welds in Reactor Vessel*

Item B1.30 reactor vessel shell-to-flange weld 1B13-AE is a Class 1, pressure retaining weld. The examination is limited to a single sided examination from the shell side due to the proximity of the reactor vessel flange and interference from the reactor vessel flange leak-off nozzle N17. The examination volume obtained is 2.9% greater than the prior examination due to improved technology and changes in scanner configuration. In order to achieve more credible one-sided coverage of the weld, and in accordance with IWA-2240, in lieu of Section V, Article 4 ultrasonic examinations, the examinations were performed using Section XI, Appendix VIII, Supplement 4 and 6 procedures and personnel that were qualified for single-sided examination.

Examination Category B-D, *Full Penetration Welded Nozzles in Vessels*

Item B3.90 reactor vessel feedwater nozzle-to-vessel welds 1B13-N4A-KA through 1B13-N4F-KA are Class 1, pressure retaining welds. The examination is limited due to the configuration of the nozzle forging.

Examination Category B-O, *Pressure Retaining Welds in Control Rod Drive (CRD) and Instrument Nozzle Housings*

Item B14.10 reactor vessel welds in CRD housing-to-flange welds 1B13-02/35-FW and 1B13-54/15-FW are Class 1 welds that require a volumetric or surface examination in 10% of the peripheral CRD housings as depicted in Figure IWB-2500-18 for greater than 90% of the weld volume or surface area. The examination is limited on these lower CRD welds due to the proximity of adjacent components and cables.

Examination Category: R-A, *Risk-Informed Requirements for Class 1, 2, and 3 Piping, Method B, Section XI, Division 1 (Reference 3)*

Item R2.11 feedwater nozzle-to-safe end weld 1B13-N4C-KB is a Class 1 pressure retaining dissimilar metal weld. This weld was classified in the RI-ISI program as a medium risk weld subject to thermal degradation. Additionally, this weld has been repaired by a full structural overlay in accordance with NUREG-0313 Rev. 2, “Technical Report on Material Selection and Processing Guidelines for BWR Coolant Pressure Boundary Piping,” Category E, with the repair and overlay design approved by the NRC (Reference 7). Design of the full structural weld overlay limited scanning of the required volume on the upstream side of the component.

Item R2.ND risk-informed weld 1B33-0028 is a Class 1, pressure retaining weld joining a nominal 16-inch diameter pipe to a 16-inch by 12-inch sweep-o-let on the

reactor recirculation system ring header. This RI-ISI weld is a Category 4 weld not subjected to a credible degradation mechanism, constructed of stainless steel (NUREG-0313, Category A). Volumetric coverage was limited by the configuration of the sweep-o-let to pipe weld allowing only single sided scanning. Per 10 CFR 50.55a(b)(2)(xv)(A)(2), for austenitic welds, full coverage credit from a single side may be claimed only after completing a successful single-sided Appendix VIII demonstration using flaws on the opposite side of the weld. This weld was examined using the latest techniques and PDI procedures.

## 5. Burden Caused by Compliance

To comply with the code required examination volumes for obtaining greater than 90% coverage for the welds listed in this relief request, the welds and their associated components would have to be physically modified or disassembled beyond their current design. Overall, components and fittings associated with the welds listed in this relief request are constructed of standard design items meeting typical national standards that specify required configurations and dimensions. To replace these items with alternate configurations to enhance examination coverage would require unique redesign and fabrication. Because these items are in the Class 1 boundary and form a part of the reactor coolant pressure boundary, their redesign and fabrication would be an extensive effort based on the limitations that exist.

Radiographic testing (RT) is not a desired option in lieu of ultrasonic testing (UT) because RT is limited in the ability to detect service-induced flaws. Additionally, the water must be drained from the systems where radiography is to be performed. This increases operational risk through prolonged system restoration times and increased general radiation dose rates over a much broader area than in the area of the weld being examined.

Overall, it is not possible to obtain examination coverage of greater than 90% of the required code examination volume or area for the welds and items in this request without extensive design modifications. Examinations have been performed to the maximum extent possible.

The examination techniques used for each weld or item in this relief request were reviewed to determine if additional coverage could be achieved by improving those techniques, and none could be identified.

## 6. Proposed Alternative and Basis for Use

Proposed Alternative

In lieu of the ASME BPV Section XI greater than 90% surface or volumetric examination requirement, the Energy Harbor Nuclear Corp. proposes limited

examination coverage for the subject welds achieved by UT and surface liquid penetrant testing (PT) as listed in the attachment.

Basis for Use

The in-service examinations of selected welds and items were performed in accordance with the requirements of 10 CFR 50.55a and the ASME BPV Section XI, 2001 Edition through the 2003 Addenda, including Appendix VIII requirements in accordance with the 2001 edition of Section XI and applicable PDI requirements. When a component was found to have condition(s) that limit the examination volume the licensee is required to submit this information to the enforcement and regulatory authorities having jurisdiction at the plant site. This relief request addresses areas where these conditions exist and where the required amount of coverage is reduced below that required by ASME BPV Section XI.

The weld examinations listed in this relief request were performed to the maximum extent possible for each of the welds identified with limitations in Table 1. Plant-specific or industry operating experience regarding potential degradation specific to welds in this relief request has been considered with the identification of potential degradation mechanisms within the scope of the applied RI-ISI program.

All the Class 1 welds with limited examinations included in this relief request are located inside the drywell at PNPP. Operational leakage from the reactor coolant system (RCS) within the drywell is monitored per Technical Specification 3.4.5, *RCS Operational Leakage* with the following requirements:

a. No pressure boundary leakage
b. Less than or equal to (≤) 5 gallons per minute (gpm) unidentified leakage
c. ≤ 30 gpm total leakage averaged over the previous 24-hour period; and
d. ≤ 2 gpm increase in unidentified leakage within the previous 24-hour period in Mode 1.

Monitoring of operational leakage will provide early detection of any RCS leakage within the drywell. Additionally, system leakage tests (VT-2 examinations) are performed each refueling outage as required by ASME BPV Section XI to detect RCS leakage from Class 1 piping.

## 7. Duration of Proposed Alternative

This relief request is applicable to the PNPP third 10-year ISI interval, which began on May 18, 2009 and ended on May 17, 2019.

## 8. Precedent

Prior relief was granted for ASME Item B1.30 under Perry Relief Request IR-057 (Reference 9). Prior relief was granted for ASME Item B3.90 welds under Perry Relief Request IR-001 (Reference 8). Prior relief was granted for ASME Item B14.10 welds under Perry Relief Request IR-009 (Reference 8).

## 9. References

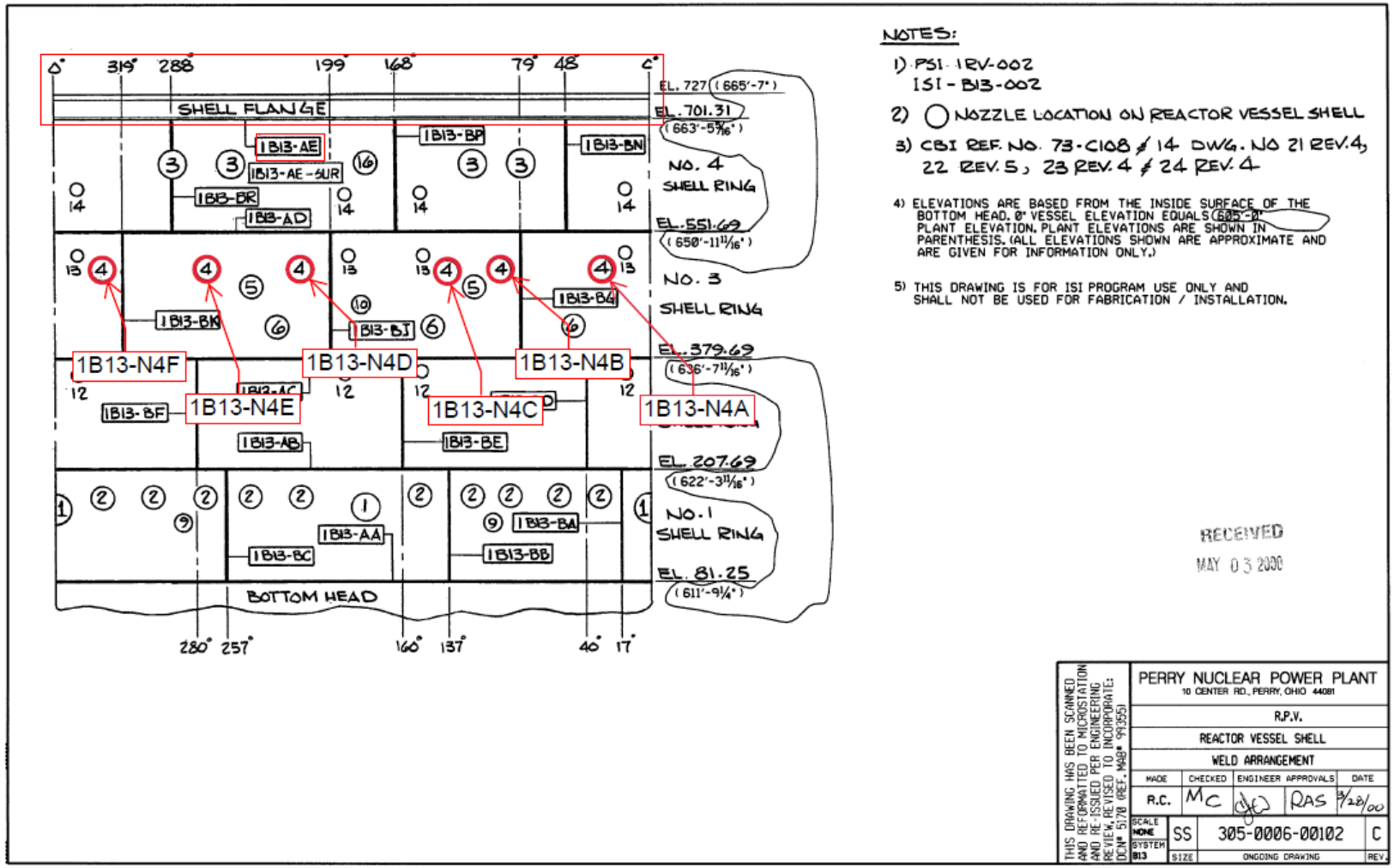
1. ASME Boiler and Pressure Code, Section XI, “Rules for Inservice Inspection of Nuclear Power Plants,” 2001 Edition through 2003 Addenda.
2. NRC Letter to FENOC, “Perry Nuclear Power Plant, Unit 1 – Safety Evaluation in Support of 10 CFR 50.55a Requests for Alternative Examination Requirements for American Society of Mechanical Engineers Class 1 Piping Welds (TAC No. ME7564),” dated November 14, 2012 (ML12313A153).
3. ASME Code Case N-578, “Risk-Informed Requirements for Class 1, 2, and 3 Piping, Method B, Section XI, Division 1.”
4. EPRI Topical Report TR-112657 “Revised Risk-Informed Inservice Inspection Evaluation Procedure,” Rev B-A, December 1999 (ML013470102).
5. ASME Code Case N-460, “Alternative Examination Coverage for Class 1 and Class 2 Welds, Section XI, Division 1.”
6. ASME Code Case N-613-1, “Ultrasonic Examination of Full Penetration Nozzles in Vessels, Examination Category B-D, Item No’s. B3.10 and B3.90, Reactor Nozzle-to-Vessel Welds, Figs. IWB-2500-7(a), (b), and (c), Section XI, Division 1.”
7. NRC Letter to FENOC, “Safety Evaluation of Proposed Alternatives to ASME Code Requirements for Repair and Inspection of a Feedwater Nozzle to Safe-End Weld – Perry Nuclear Power Plant (TAC No. MA5061),” dated April 29, 1999
8. NRC Letter to FENOC, “Safety Evaluation of the Inservice Inspection Program Second 10-Year Interval Relief Requests for Relief for FirstEnergy Nuclear Operating Company – Perry Nuclear Power Plant, Unit 1 (TAC No. MA3437),” dated November 22, 1999.
9. NRC Letter to FENOC, “Perry Nuclear Power Plant, Unit No. 1 – Request for Relief Related to Inservice Inspection Relief Requests Nos. IR-056 and IR-057 (TAC Nos MD8198 and MD8199),” dated December 16, 2008 (ML083100284).

The following table tabulates the examination results for the welds and items associated with this relief request.

| Table 1 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Component Information** | | | | | | | |
| **Exam Cat.** | **Item No.** | **Component ID** | **Item Description** | **Material 1 and Product Form** | **Material 2 and Product Form** | **Examination Code Coverage Obtained** | **Examination Limitations and Results** |
| B-A | B1.30 | 1B13-AE | No. 4 shell ring to shell flange circumferential seam (Figures 1, 2A, Report A) | SA-533 Gr. B Cl. 1 Plate w/ SS cladding | SA-508 Class II Forging | UT=70.9% | Exam was limited due to proximity of N17 nozzle drain line and the configuration of the RPV flange. Two acceptable indications |
| B-D | B3.90 | 1B13-N4A-KA | Feedwater nozzle N4A to vessel weld (Figures 1, 3B, 4B, Report B) | SA-533 Gr. B Cl. 1 Plate w/ SS cladding | SA-508 Class II Forging | UT=83.2% | Nozzle design limits scan due to nozzle taper. No recordable indications |
| B-D | B3.90 | 1B13-N4B-KA | Feedwater nozzle N4B to vessel weld (Figures 1, 5C, 6C, Report C) | SA-533 Gr. B Cl. 1 Plate w/ SS cladding | SA-508 Class II Forging | UT=83.2% | Nozzle design limits scan due to nozzle taper. No recordable indications |
| B-D | B3.90 | 1B13-N4C-KA | Feedwater nozzle N4C to vessel weld (Figures 1, 7D, 8D, Report D) | SA-533 Gr. B Cl. 1 Plate w/ SS cladding | SA-508 Class II Forging | UT=83.2% | Nozzle design limits scan due to nozzle taper. No recordable indications |
| B-D | B3.90 | 1B13-N4D-KA | Feedwater nozzle N4D to vessel weld (Figures 1, 9E, 10E, Report E) | SA-533 Gr. B Cl. 1 Plate w/ SS cladding | SA-508 Class II Forging | UT=83.2% | Nozzle design limits scan due to nozzle taper. No recordable indications |
| B-D | B3.90 | 1B13-N4E-KA | Feedwater nozzle N4E to vessel weld (Figures 1, 11F, 12F, Report F) | SA-533 Gr. B Cl. 1 Plate w/ SS cladding | SA-508 Class II Forging | UT=82.7% | Nozzle design limits scan due to nozzle taper. No recordable indications |
| B-D | B3.90 | 1B13-N4F-KA | Feedwater nozzle N4F to vessel weld (Figures 1, 13G, 14G, Report G) | SA-533 Gr. B Cl. 1 Plate w/ SS cladding | SA-508 Class II Forging | UT=83.2% | Nozzle design limits scan due to nozzle taper. Three acceptable indications (no through-wall depth) |
| B-O | B14.10 | 1B13-02/35-FW | CRD Housing to Flange weld (Figures 15, 16) | SA-312 TP304 Seamless Pipe | SA-182 F304 Forging | PT=85% | Exam was limited due to proximity of other components. |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| B-O | B14.10 | 1B13-54/15-FW | CRD Housing to Flange weld (Figures 15, 16) | SA-312 TP304 Seamless Pipe | SA-182 F304 Forging | PT=75% | Exam was limited due to proximity of other components |
| R-A | R2.11 | 1B13-N4C-KB | Feedwater nozzle N4C to safe end (overlayed) (Figures 1, 17, and 18) | SB-166 Forging | SA-508 Class II Forging Overlay is Alloy 52 | UT=70.5% | Design of full structural weld overlay does not permit scanning of required volume on upstream side. Existing recordable indications (lack of bond, lack of fusion) unchanged. |
| R-A | R2.ND | 1B33-0028 | 16” pipe to 16” x 12” sweepolet (Figures 19H, 20H, Reports H) | SA-358 Type 304 Class 1 welded pipe | SA-403 WP304 sweepolet | UT=50% | Design configuration limitation, no scans from the sweepolet side of the weld. No recordable indications. |

Figure 1
Examination Category: B-A, B-D and R-A
Item No. B1.30, B3.90 and R2.11
Component ID: 1B13-AE, 1B13-N4A-KA through 1B13-N4F-KA and 1B13-N4C-KB



Report A
Examination Category: B-A
Item No. B1.30
Component ID: 1B13-AE

## Perry Unit 1 RFO17 1B13-AE Circumferential Seam

| Weld Length = 801.50<br>Exam Volume = 78.70 | | CODE CROSS-SECTIONAL AREA | | TOTAL CODE COVERAGE | | |
|---|---|---|---|---|---|---|
| | | Required Exam Area Sq. in. | Area Examined | Percent of Area Examined | Weld Length Examined | Percent Examined |
| 70° T-Scan (S6 NS) | A | 14.3 | 8.1 | 10.3% | 788.00 | 5.1% |
| 45° T-Scan (S6 FV) | A | 53.5 | 51.0 | 64.8% | 785.00 | 31.7% |
| 60° T-Scan (S4 LKUP) | A | 10.9 | 10.9 | 6.9% | 782.00 | 3.4% |
| 60° T-Scan (S4 LKDN) | A | 10.9 | 0.0 | 0.0% | 0.00 | 0.0% |
| 70° P-Scan (S6 NS) | A | 14.3 | 6.6 | 8.4% | 797.00 | 4.2% |
| 45° P-Scan (S6 FV) | A | 53.5 | 35.0 | 44.5% | 794.00 | 22.0% |
| 60° P-Scan (S4 LKCW) | A | 10.9 | 7.3 | 4.6% | 791.00 | 2.3% |
| 60° P-Scan (S4 LKCC) | A | 10.9 | 7.3 | 4.6% | 791.00 | 2.3% |
| | | | | | | |
| 70° T-Scan (S6 NS) | | | | | | |
| 45° T-Scan (S6 FV) | | | | | | |
| 60° T-Scan (S4 LKUP) | | | | | | |
| 60° T-Scan (S4 LKDN) | | | | | | |
| 70° P-Scan (S6 NS) | | | | | | |
| 45° P-Scan (S6 FV) | | | | | | |
| 60° P-Scan (S4 LKCW) | | | | | | |
| 60° P-Scan (S4 LKCC) | | | | | | |
| | | | | | | |
| 70° T-Scan (S6 NS) | | | | | | |
| 45° T-Scan (S6 FV) | | | | | | |
| 60° T-Scan (S4 LKUP) | | | | | | |
| 60° T-Scan (S4 LKDN) | | | | | | |
| 70° P-Scan (S6 NS) | | | | | | |
| 45° P-Scan (S6 FV) | | | | | | |
| 60° P-Scan (S4 LKCW) | | | | | | |
| 60° P-Scan (S4 LKCC) | | | | | | |

% Total Composite Coverage = 70.9%

Comments: A - Automated scanning was limited due to the proximity of the N17 nozzle drain line and the configuration of the RPV flange. Unable to obtain full coverage for inner 15% T due to single side scanning restrictions specified in 10 CFR 50.55a (xxiv).

Note - Rounding methods may affect calculated values. FV-Full volume, NS-Near Surface. Weld length in inches.

Figure 2A
Examination Category: B-A
Item No. B1.30
Component ID: 1B13-AE

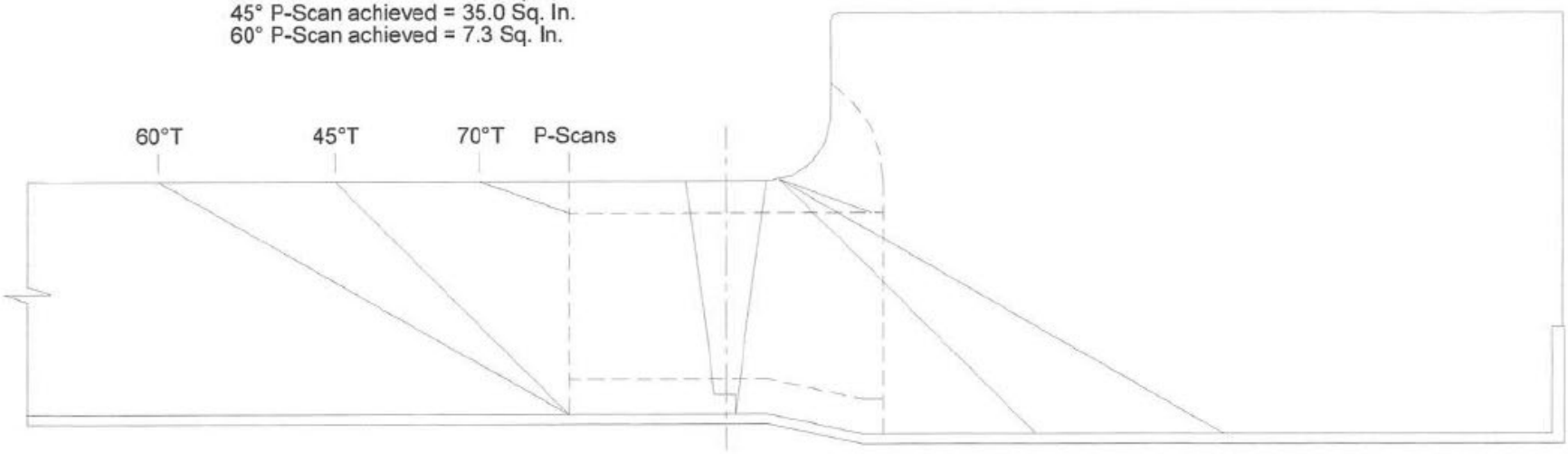
-|-

Perry Unit 1
1B13-AE Vessel to Flange Weld

70° Exam Volume = 14.3 Sq. In.
45° Exam Volume = 53.5 Sq. In.
60° Exam Volume = 10.9 Sq. In.

70° T-Scan achieved = 8.1 Sq. In.
45° T-Scan achieved = 51.0 Sq. In.
60° T-Scan achieved = 10.9 Sq. In.

70° P-Scan achieved = 6.6 Sq. In.
45° P-Scan achieved = 35.0 Sq. In.
60° P-Scan achieved = 7.3 Sq. In.




Auto UT coverage plot for single sided scans

Report B
Examination Category: B-D
Item No. B3.90
Component ID: 1B13-N4A-KA

HITACHI

## SP2000 RPV Examination Coverage Calculation Sheet

Perry Nuclear Power Plant, 1R14, 2013
1B13-N4A-KA

| Weld Length = 360. / Exam Volume = 20.5 | | CODE CROSS-SECTIONAL AREA | | TOTAL CODE COVERAGE | | |
|---|---|---|---|---|---|---|
| | | Required Exam Area Sq. in. | Area Scanned Automated | Percent of Area Automated | Weld Length Automated | Percent Automated |
| 70° T-Scan (S6 NS) | A | 3.3 | 2.8 | 13.7% | 360 | 6.8% |
| 45° T-Scan (S6 FV) | A | 14.1 | 13.9 | 67.8% | 360 | 33.9% |
| 60° T-Scan (S4) | A | 3.1 | 3.1 | 15.1% | 360 | 7.6% |
| 70° P-Scan (S6 NS) | A | 3.3 | 1.7 | 8.3% | 360 | 4.1% |
| 45° P-Scan (S6 FV) | A | 14.1 | 9.5 | 46.3% | 360 | 23.2% |
| IRS P-Scan (S4) | A | 3.1 | 3.1 | 15.1% | 360 | 7.6% |
| | | | | | | |
| 70° T-Scan (S6 NS) | | | | | | |
| 45° T-Scan (S6 FV) | | | | | | |
| 60° T-Scan (S4) | | | | | | |
| 70° P-Scan (S6 NS) | | | | | | |
| 45° P-Scan (S6 FV) | | | | | | |
| IRS P-Scan (S4) | | | | | | |
| | | | | | | |
| 70° T-Scan (S6 NS) | | | | | | |
| 45° T-Scan (S6 FV) | | | | | | |
| 60° T-Scan (S4) | | | | | | |
| 70° P-Scan (S6 NS) | | | | | | |
| 45° P-Scan (S6 FV) | | | | | | |
| IRS P-Scan (S4) | | | | | | |

% Total Composite Coverage = 83.2%

Rev. 0 8/23/05

Comments: A - Automated scanning was restricted due to the nozzle configuration.

Note - Rounding methods may affect calculated values. UC-Underclad, FV-Full volume, NS-Near Surface. Weld length in degrees.

Figure 3B
Examination Category: B-D
Item No. B3.90
Component ID: 1B13-N4A-KA

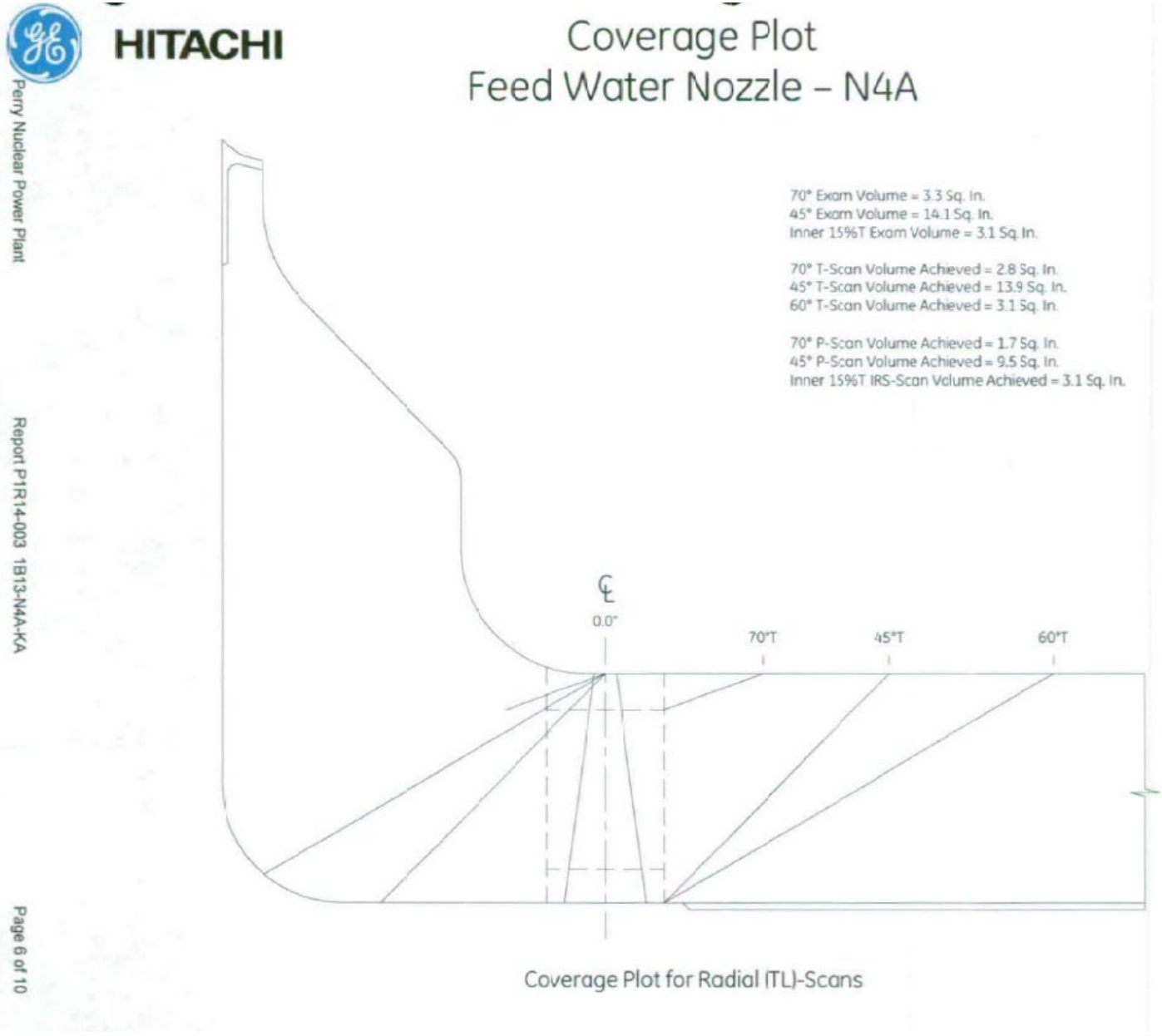
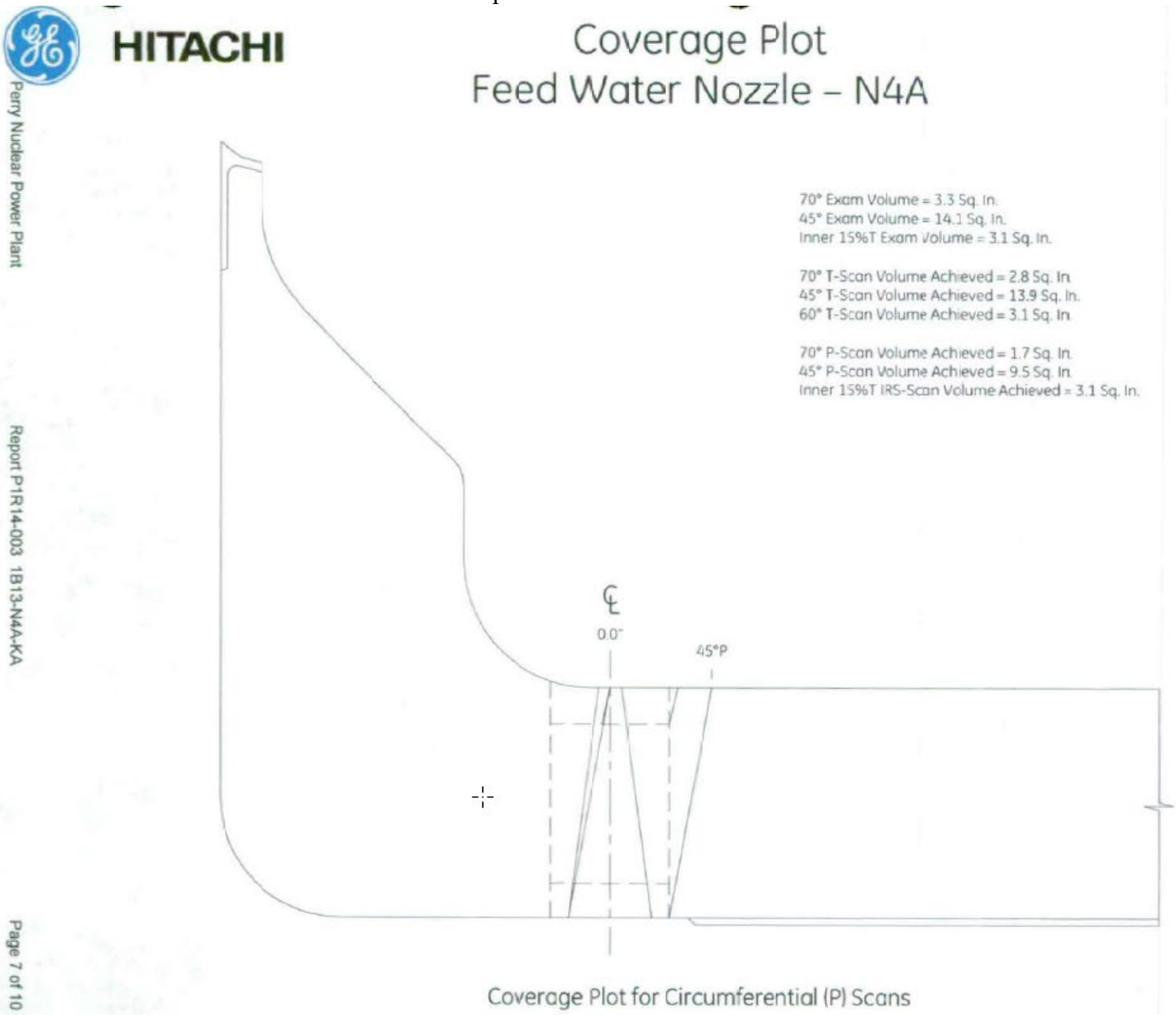


Figure 4B
Examination Category: B-D
Item No. B3.90
Component ID: 1B13-N4A-KA



Report C
Examination Category: B-D
Item No. B3.90
Component ID: 1B13-N4B-KA

HITACHI

## SP2000 RPV Examination Coverage Calculation Sheet

Perry Nuclear Power Plant, 1R14, 2013
1B13-N4B-KA

| Weld Length = 360. / Exam Volume = 20.5 | | CODE CROSS-SECTIONAL AREA | | TOTAL CODE COVERAGE | | |
|---|---|---|---|---|---|---|
| | | Required Exam Area Sq. in. | Area Scanned Automated | Percent of Area Automated | Weld Length Automated | Percent Automated |
| 70° T-Scan (S6 NS) | A | 3.3 | 2.8 | 13.7% | 360 | 6.8% |
| 45° T-Scan (S6 FV) | A | 14.1 | 13.9 | 67.8% | 360 | 33.9% |
| 60° T-Scan (S4) | A | 3.1 | 3.1 | 15.1% | 360 | 7.6% |
| 70° P-Scan (S6 NS) | A | 3.3 | 1.7 | 8.3% | 360 | 4.1% |
| 45° P-Scan (S6 FV) | A | 14.1 | 9.5 | 46.3% | 360 | 23.2% |
| IRS P-Scan (S4) | A | 3.1 | 3.1 | 15.1% | 360 | 7.6% |
| | | | | | | |
| 70° T-Scan (S6 NS) | | | | | | |
| 45° T-Scan (S6 FV) | | | | | | |
| 60° T-Scan (S4) | | | | | | |
| 70° P-Scan (S6 NS) | | | | | | |
| 45° P-Scan (S6 FV) | | | | | | |
| IRS P-Scan (S4) | | | | | | |
| | | | | | | |
| 70° T-Scan (S6 NS) | | | | | | |
| 45° T-Scan (S6 FV) | | | | | | |
| 60° T-Scan (S4) | | | | | | |
| 70° P-Scan (S6 NS) | | | | | | |
| 45° P-Scan (S6 FV) | | | | | | |
| IRS P-Scan (S4) | | | | | | |

% Total Composite Coverage = 83.2%

Rev. 0 9/23/05

Comments: A - Automated scanning was restricted due to the nozzle configuration.

Note - Rounding methods may affect calculated values. UC-Underclad, FV-Full volume, NS-Near Surface. Weld length in degrees.

Figure 5C
Examination Category: B-D
Item No. B3.90
Component ID: 1B13-N4B-KA

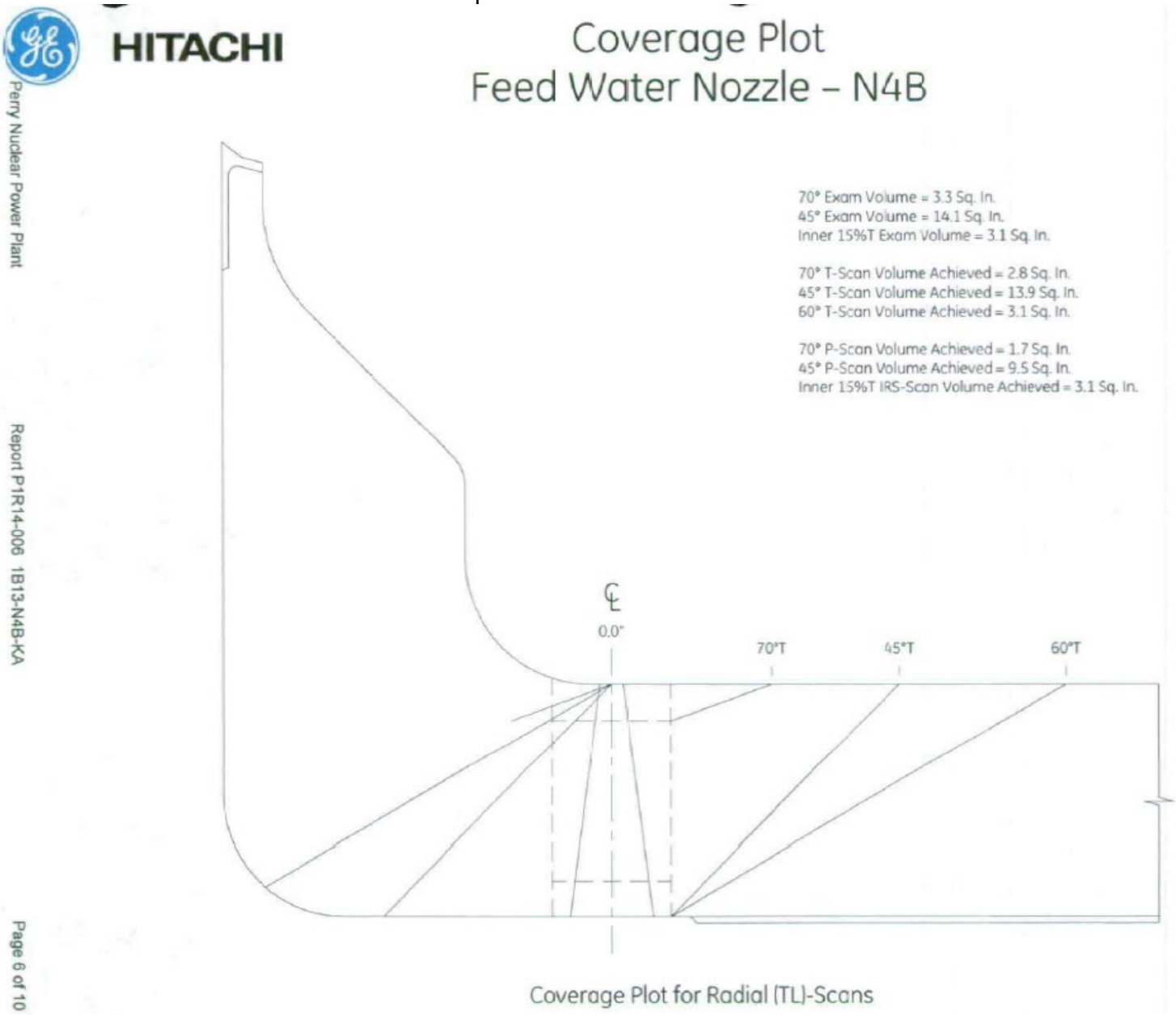
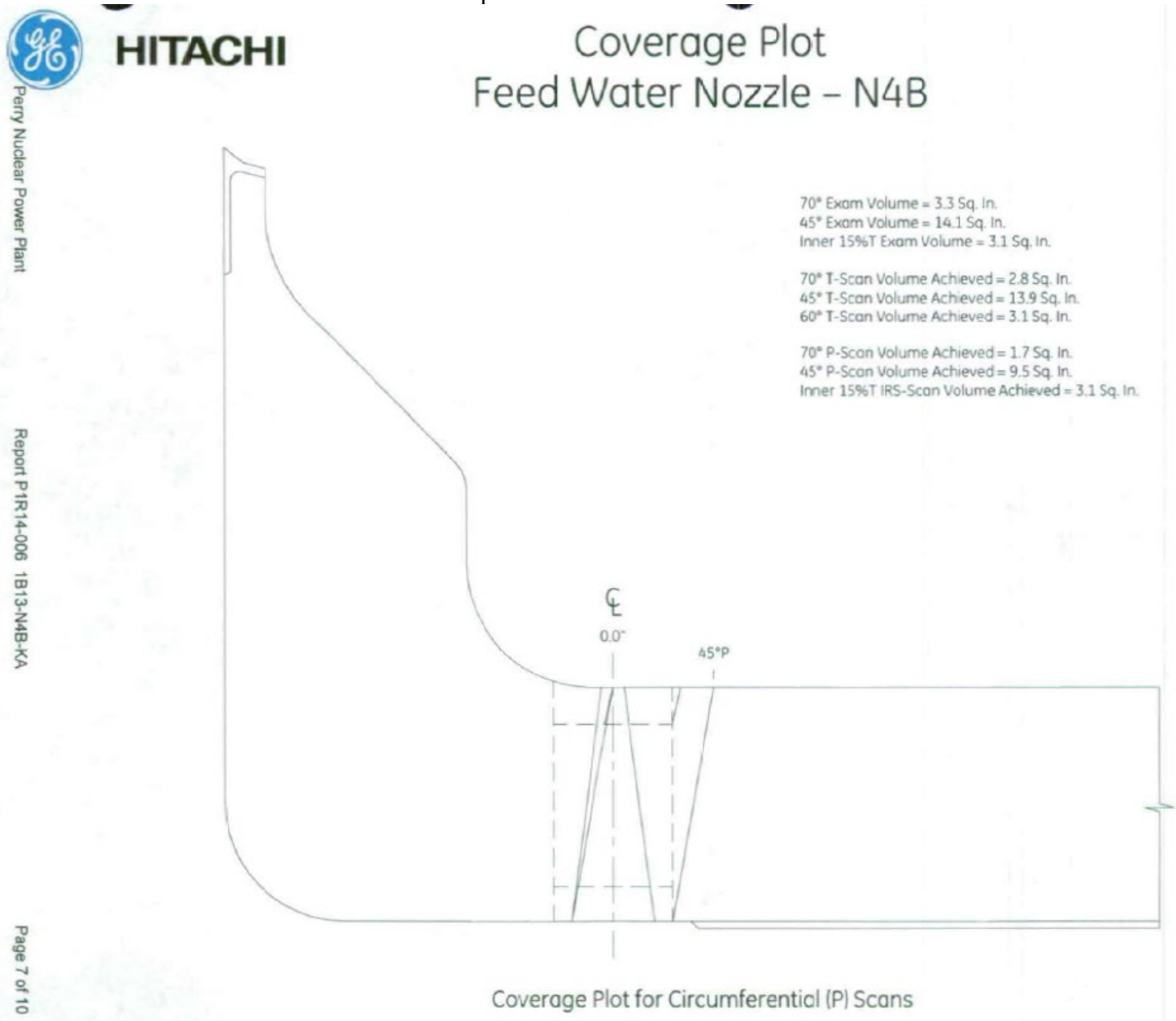


Figure 6C
Examination Category: B-D
Item No. B3.90
Component ID: 1B13-N4B-KA



Report D
Examination Category: B-D
Item No. B3.90
Component ID: 1B13-N4C-KA

HITACHI

## SP2000 RPV Examination Coverage Calculation Sheet

Perry Nuclear Power Plant, 1R14, 2013
1B13-N4C-KA

| Weld Length = 360. Exam Volume = 20.5 | | CODE CROSS-SECTIONAL AREA | | TOTAL CODE COVERAGE | | |
|---|---|---|---|---|---|---|
| | | Required Exam Area Sq. in. | Area Scanned Automated | Percent of Area Automated | Weld Length Automated | Percent Automated |
| 70° T-Scan (S6 NS) | A | 3.3 | 2.8 | 13.7% | 360 | 6.8% |
| 45° T-Scan (S6 FV) | A | 14.1 | 13.9 | 67.8% | 360 | 33.9% |
| 60° T-Scan (S4) | A | 3.1 | 3.1 | 15.1% | 360 | 7.6% |
| 70° P-Scan (S6 NS) | A | 3.3 | 1.7 | 8.3% | 360 | 4.1% |
| 45° P-Scan (S6 FV) | A | 14.1 | 9.5 | 46.3% | 360 | 23.2% |
| IRS P-Scan (S4) | A | 3.1 | 3.1 | 15.1% | 360 | 7.6% |
| | | | | | | |
| 70° T-Scan (S6 NS) | | | | | | |
| 45° T-Scan (S6 FV) | | | | | | |
| 60° T-Scan (S4) | | | | | | |
| 70° P-Scan (S6 NS) | | | | | | |
| 45° P-Scan (S6 FV) | | | | | | |
| IRS P-Scan (S4) | | | | | | |
| | | | | | | |
| 70° T-Scan (S6 NS) | | | | | | |
| 45° T-Scan (S6 FV) | | | | | | |
| 60° T-Scan (S4) | | | | | | |
| 70° P-Scan (S6 NS) | | | | | | |
| 45° P-Scan (S6 FV) | | | | | | |
| IRS P-Scan (S4) | | | | | | |

% Total Composite Coverage = 83.2%

Rev. 0 9/23/05

Comments: A - Automated scanning was restricted due to the nozzle configuration.

Note - Rounding methods may affect calculated values. UC-Underclad, FV-Full volume, NS-Near Surface. Weld length in degrees.

Figure 7D
Examination Category: B-D
Item No. B3.90
Component ID: 1B13-N4C-KA

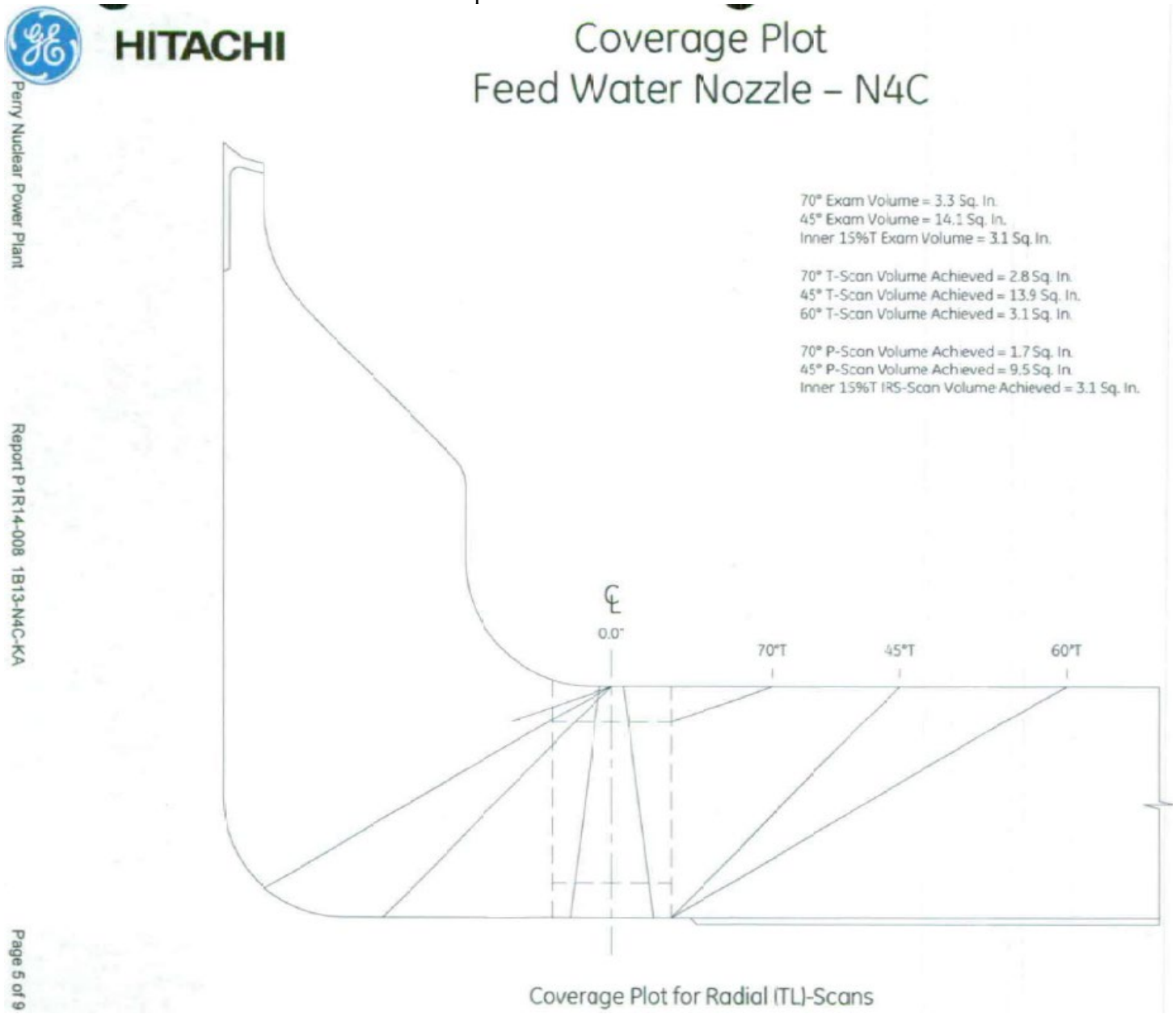
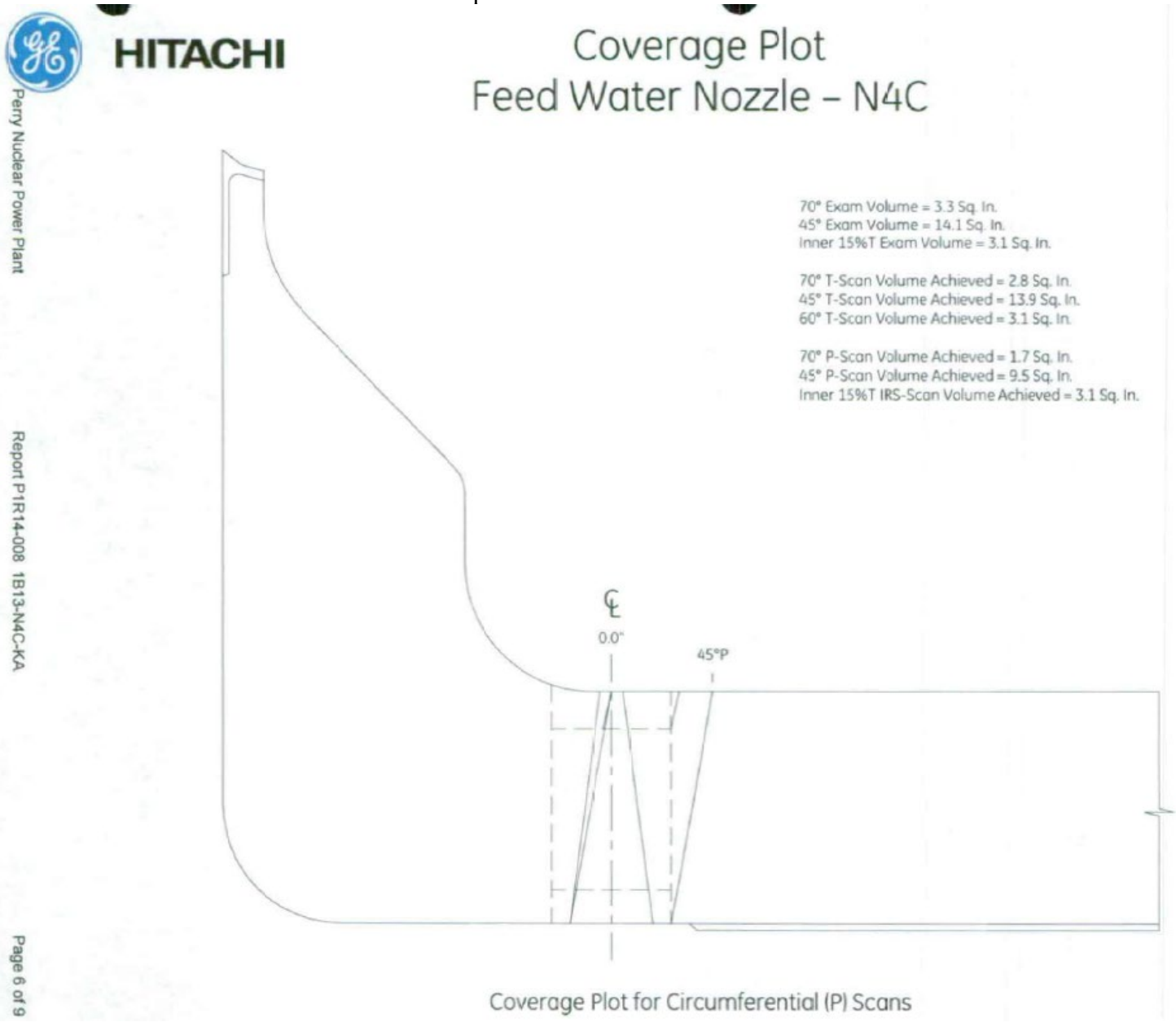


Figure 8D
Examination Category: B-D
Item No. B3.90
Component ID: 1B13-N4C-KA



Report E
Examination Category: B-D
Item No. B3.90
Component ID: 1B13-N4D-KA

HITACHI

## SP2000 RPV Examination Coverage Calculation Sheet

Perry Nuclear Power Plant, 1R14, 2013
1B13-N4D-KA

| Weld Length = 360. / Exam Volume = 20.5 | | CODE CROSS-SECTIONAL AREA | | TOTAL CODE COVERAGE | | |
|---|---|---|---|---|---|---|
| | | Required Exam Area Sq. in. | Area Scanned Automated | Percent of Area Automated | Weld Length Automated | Percent Automated |
| 70° T-Scan (S6 NS) | A | 3.3 | 2.8 | 13.7% | 360 | 6.8% |
| 45° T-Scan (S6 FV) | A | 14.1 | 13.9 | 67.8% | 360 | 33.9% |
| 60° T-Scan (S4) | A | 3.1 | 3.1 | 15.1% | 360 | 7.6% |
| 70° P-Scan (S6 NS) | A | 3.3 | 1.7 | 8.3% | 360 | 4.1% |
| 45° P-Scan (S6 FV) | A | 14.1 | 9.5 | 46.3% | 360 | 23.2% |
| IRS P-Scan (S4) | A | 3.1 | 3.1 | 15.1% | 360 | 7.6% |
| | | | | | | |
| 70° T-Scan (S6 NS) | | | | | | |
| 45° T-Scan (S6 FV) | | | | | | |
| 60° T-Scan (S4) | | | | | | |
| 70° P-Scan (S6 NS) | | | | | | |
| 45° P-Scan (S6 FV) | | | | | | |
| IRS P-Scan (S4) | | | | | | |
| | | | | | | |
| 70° T-Scan (S6 NS) | | | | | | |
| 45° T-Scan (S6 FV) | | | | | | |
| 60° T-Scan (S4) | | | | | | |
| 70° P-Scan (S6 NS) | | | | | | |
| 45° P-Scan (S6 FV) | | | | | | |
| IRS P-Scan (S4) | | | | | | |

% Total Composite Coverage = 83.2%

Rev. 0 9/23/05

Comments: A - Automated scanning was restricted due to the nozzle configuration.

Note - Rounding methods may affect calculated values. UC-Underclad, FV-Full volume, NS-Near Surface. Weld length in degrees.

Figure 9E
Examination Category: B-D
Item No. B3.90
Component ID: 1B13-N4D-KA

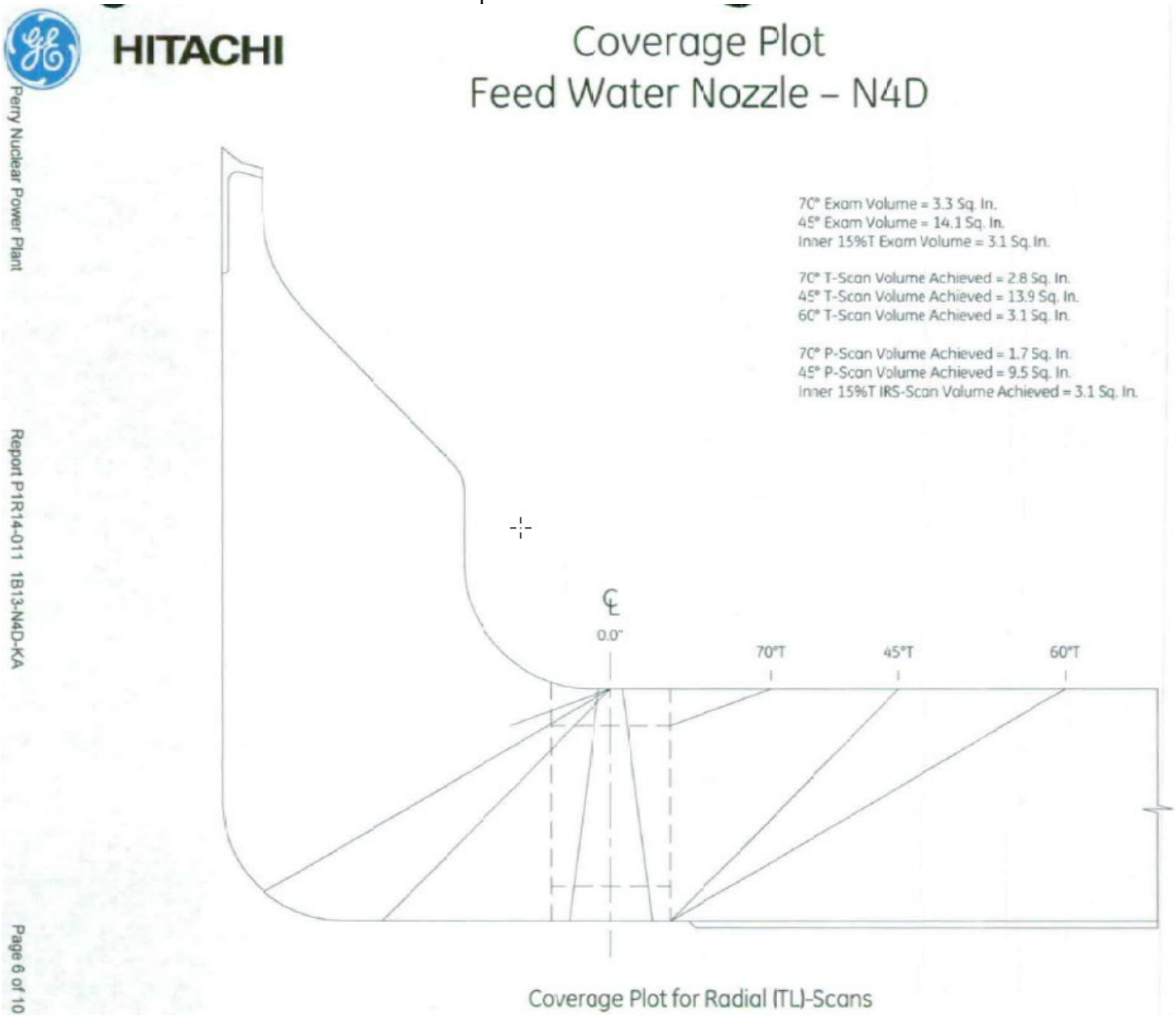
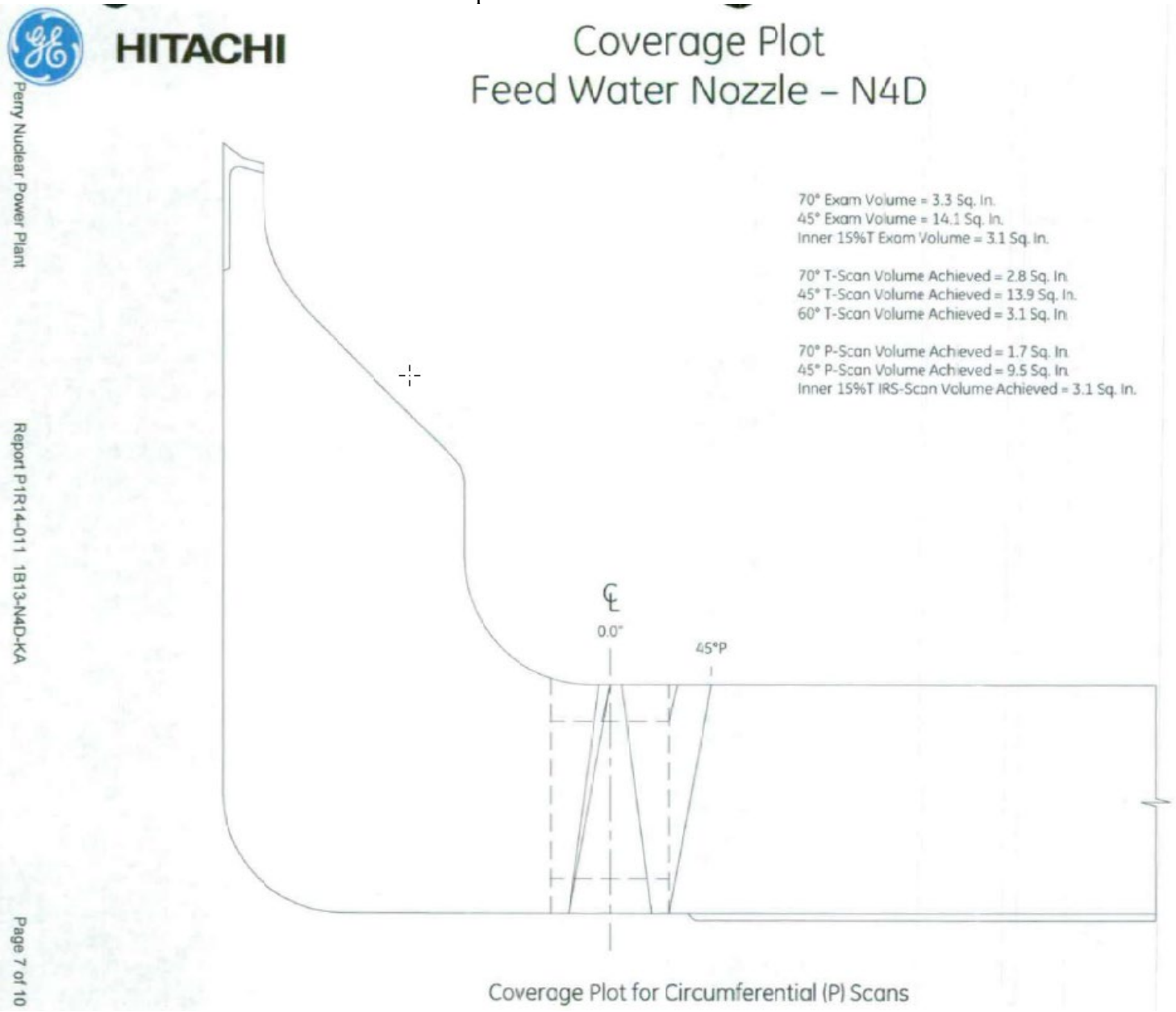


Figure 10E
Examination Category: B-D
Item No. B3.90
Component ID: 1B13-N4D-KA



Report F
Examination Category: B-D
Item No. B3.90
Component ID: 1B13-N4E-KA

HITACHI

## SP2000 RPV Examination Coverage Calculation Sheet

Perry Nuclear Power Plant, 1R14, 2013
1B13-N4E-KA

| Weld Length = 360. / Exam Volume = 20.5 | | CODE CROSS-SECTIONAL AREA | | TOTAL CODE COVERAGE | | |
|---|---|---|---|---|---|---|
| | | Required Exam Area Sq. in. | Area Scanned Automated | Percent of Area Automated | Weld Length Automated | Percent Automated |
| 70° T-Scan (S6 NS) | A | 3.3 | 2.8 | 13.7% | 360 | 6.8% |
| 45° T-Scan (S6 FV) | A | 14.1 | 13.9 | 67.8% | 360 | 33.9% |
| 60° T-Scan (S4) | A | 3.1 | 3.1 | 15.1% | 360 | 7.6% |
| 70° P-Scan (S6 NS) | A | 3.3 | 1.7 | 8.3% | 360 | 4.1% |
| 45° P-Scan (S6 FV) | A | 14.1 | 9.5 | 46.3% | 360 | 23.2% |
| IRS P-Scan (S4) | A * | 3.1 | 3.1 | 15.1% | 180 | 3.8% |
| | | | | | | |
| 70° T-Scan (S6 NS) | | | | | | |
| 45° T-Scan (S6 FV) | | | | | | |
| 60° T-Scan (S4) | | | | | | |
| 70° P-Scan (S6 NS) | | | | | | |
| 45° P-Scan (S6 FV) | | | | | | |
| IRS P-Scan (S4) | A * | 3.1 | 2.7 | 13.2% | 180 | 3.3% |
| | | | | | | |
| 70° T-Scan (S6 NS) | | | | | | |
| 45° T-Scan (S6 FV) | | | | | | |
| 60° T-Scan (S4) | | | | | | |
| 70° P-Scan (S6 NS) | | | | | | |
| 45° P-Scan (S6 FV) | | | | | | |
| IRS P-Scan (S4) | | | | | | |

% Total Composite Coverage = 82.7%

Rev. 0 9/23/05

Comments: A - Automated scanning was restricted due to the nozzle configuration.
A* - Coverage reduced due to an area approximately 180° long of marginal uni-directional contact on Channel 4.
Uni-directional contact is allowed by procedure in accordance with paragraph 7.13.5. Reduction in coverage applied for conservatism.

Note - Rounding methods may affect calculated values. UC-Underclad, FV-Full volume, NS-Near Surface. Weld length in degrees.

Figure 11F
Examination Category: B-D
Item No. B3.90
Component ID: 1B13-N4E-KA

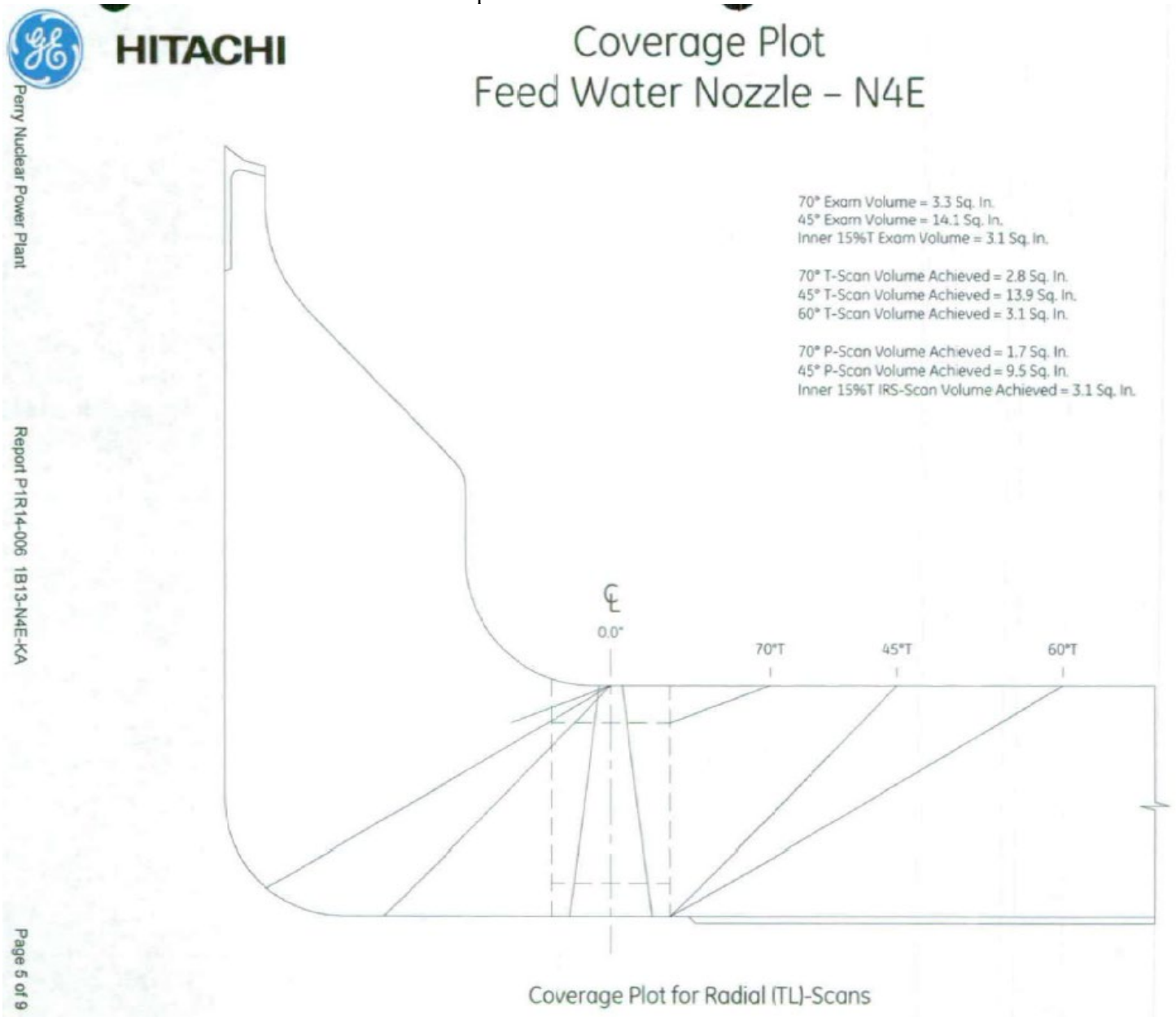
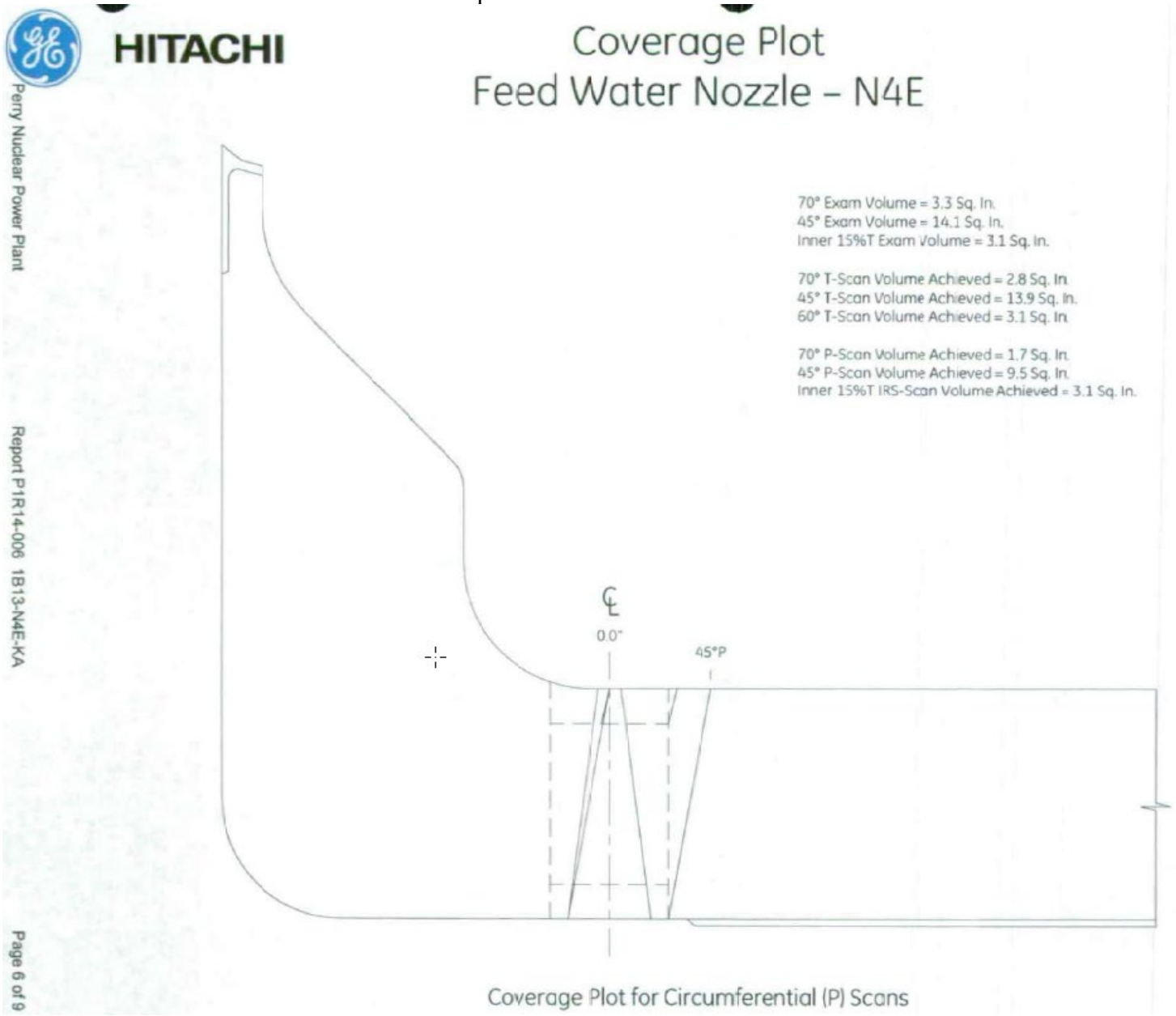


Figure 12F
Examination Category: B-D
Item No. B3.90
Component ID: 1B13-N4E-KA



Report G
Examination Category: B-D
Item No. B3.90
Component ID: 1B13-N4F-KA

HITACHI

## SP2000 RPV Examination Coverage Calculation Sheet

Perry Nuclear Power Plant, 1R14, 2013

1B13-N4F-KA

| Weld Length = 360. Exam Volume = 20.5 | | CODE CROSS-SECTIONAL AREA | | TOTAL CODE COVERAGE | | |
|---|---|---|---|---|---|---|
| | | Required Exam Area Sq. in. | Area Scanned Automated | Percent of Area Automated | Weld Length Automated | Percent Automated |
| 70° T-Scan (S6 NS) | A | 3.3 | 2.8 | 13.7% | 360 | 6.8% |
| 45° T-Scan (S6 FV) | A | 14.1 | 13.9 | 67.8% | 360 | 33.9% |
| 60° T-Scan (S4) | A | 3.1 | 3.1 | 15.1% | 360 | 7.6% |
| 70° P-Scan (S6 NS) | A | 3.3 | 1.7 | 8.3% | 360 | 4.1% |
| 45° P-Scan (S6 FV) | A | 14.1 | 9.5 | 46.3% | 360 | 23.2% |
| IRS P-Scan (S4) | A | 3.1 | 3.1 | 15.1% | 360 | 7.6% |
| | | | | | | |
| 70° T-Scan (S6 NS) | | | | | | |
| 45° T-Scan (S6 FV) | | | | | | |
| 60° T-Scan (S4) | | | | | | |
| 70° P-Scan (S6 NS) | | | | | | |
| 45° P-Scan (S6 FV) | | | | | | |
| IRS P-Scan (S4) | | | | | | |
| | | | | | | |
| 70° T-Scan (S6 NS) | | | | | | |
| 45° T-Scan (S6 FV) | | | | | | |
| 60° T-Scan (S4) | | | | | | |
| 70° P-Scan (S6 NS) | | | | | | |
| 45° P-Scan (S6 FV) | | | | | | |
| IRS P-Scan (S4) | | | | | | |

% Total Composite Coverage = 83.2%

Rev. 0 9/23/05

Comments: A - Automated scanning was restricted due to the nozzle configuration.

Note - Rounding methods may affect calculated values. UC-Underclad, FV-Full volume, NS-Near Surface. Weld length in degrees.

Figure 13G
Examination Category: B-D
Item No. B3.90
Component ID: 1B13-N4F-KA

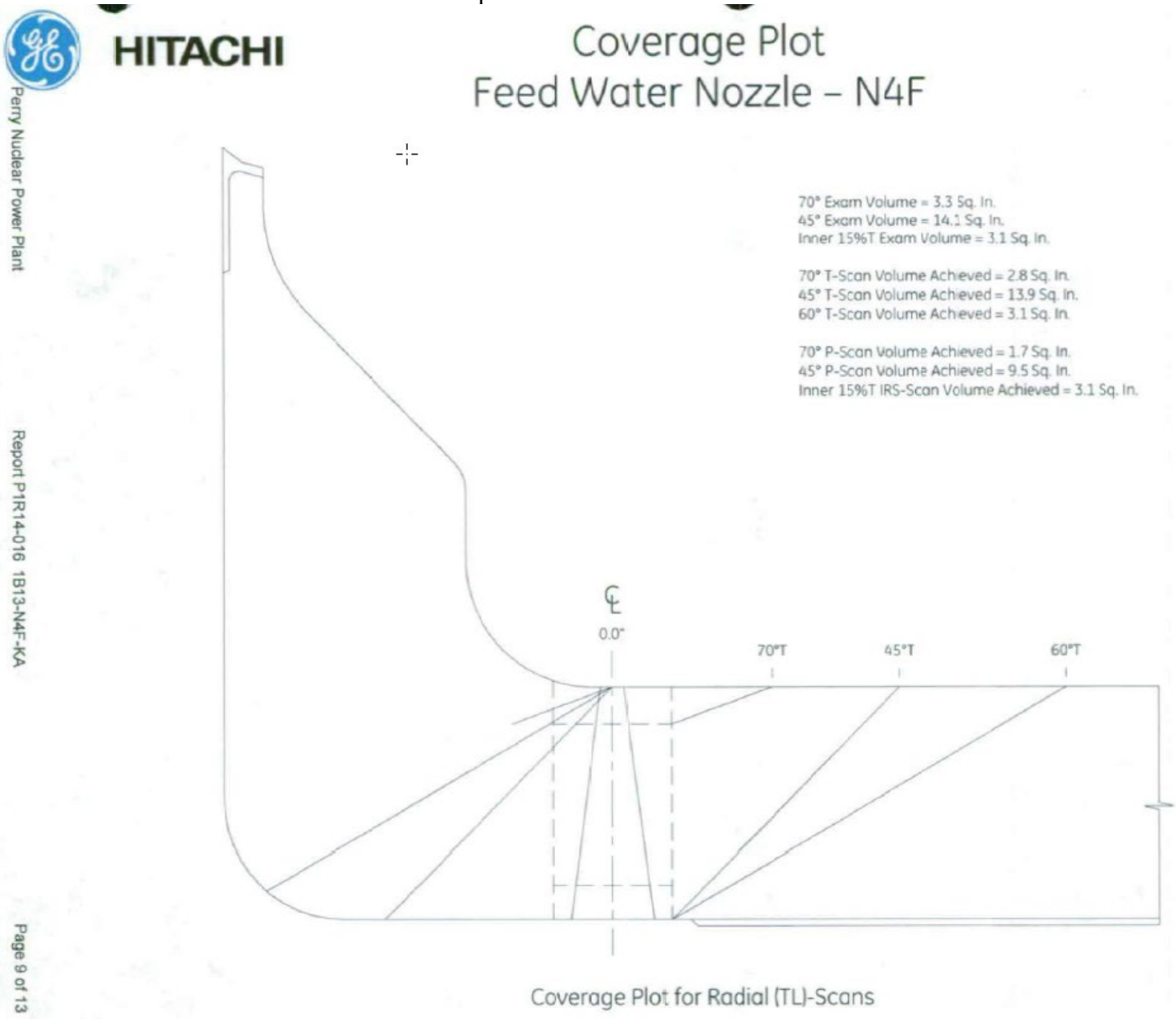


Figure 14G
Examination Category: B-D
Item No. B3.90
Component ID: 1B13-N4F-KA

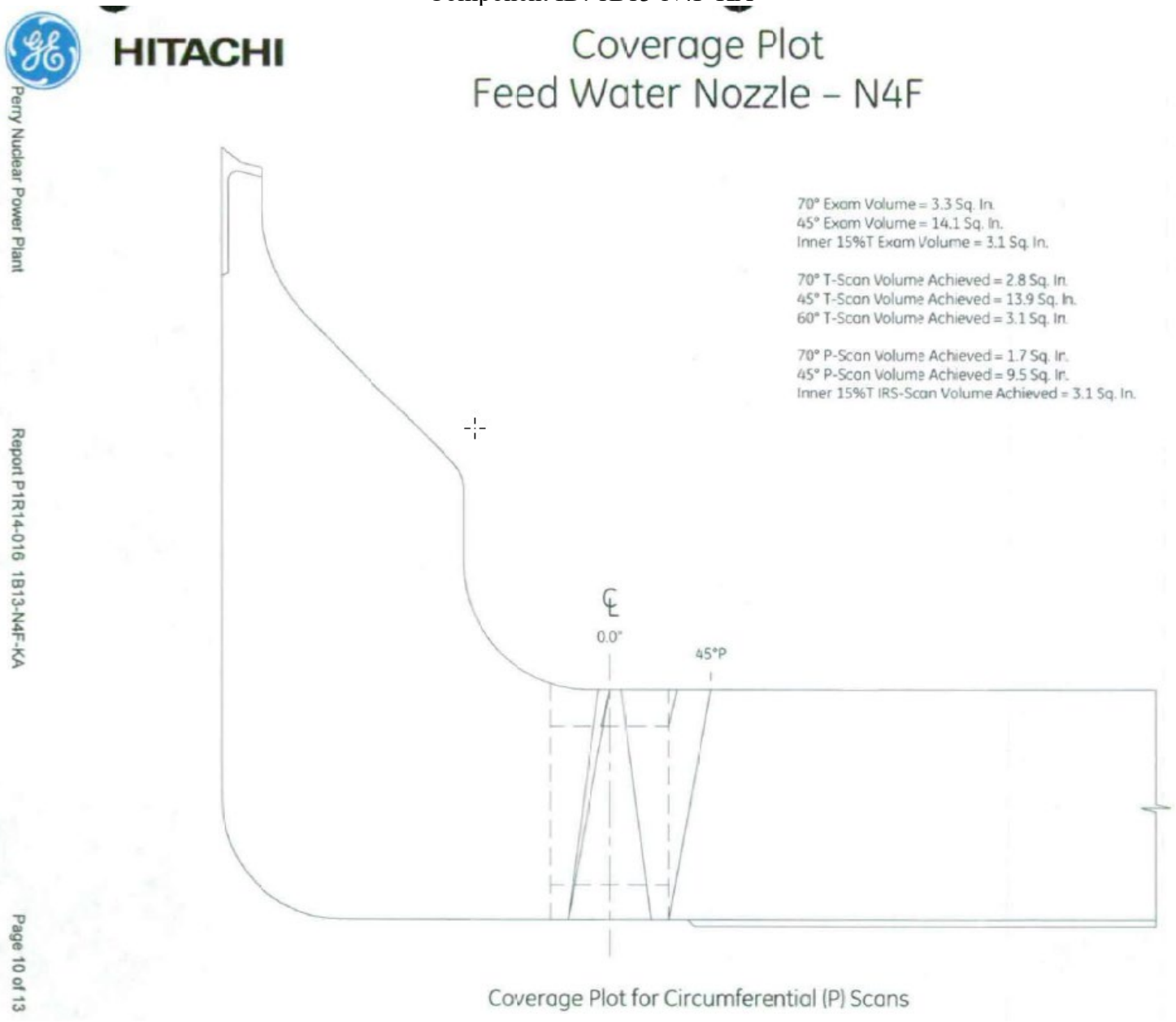


Figure 15
Examination Category: B-O
Item No. B14.10
Component ID: 1B13-02/35-FW and 1B13-54/15-FW

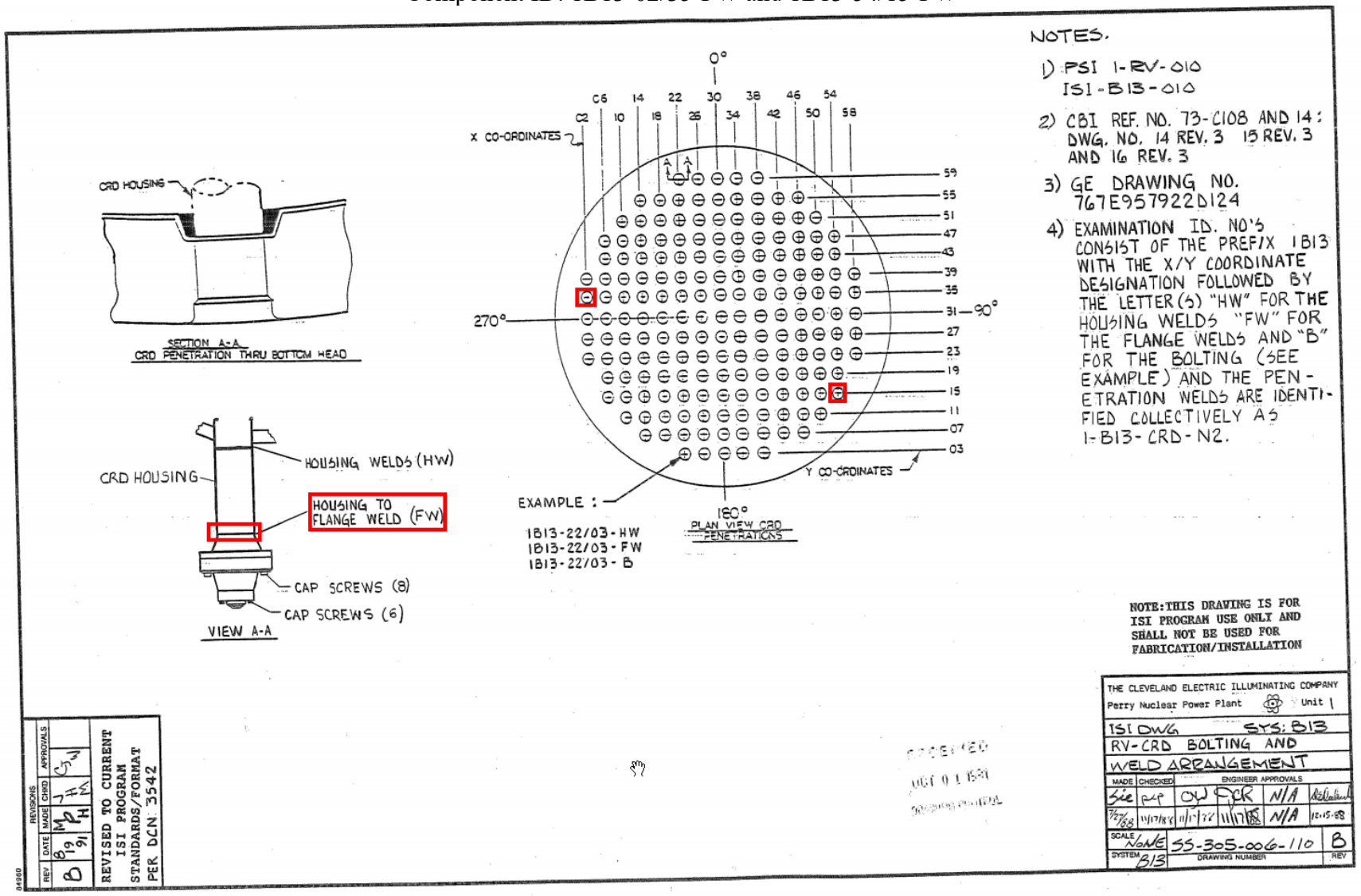


Figure 16
Examination Category: B-O
Item No. B14.10
Component ID: 1B13-02/35-FW and 1B13-54/15-FW
Typical housing to flange weld configuration

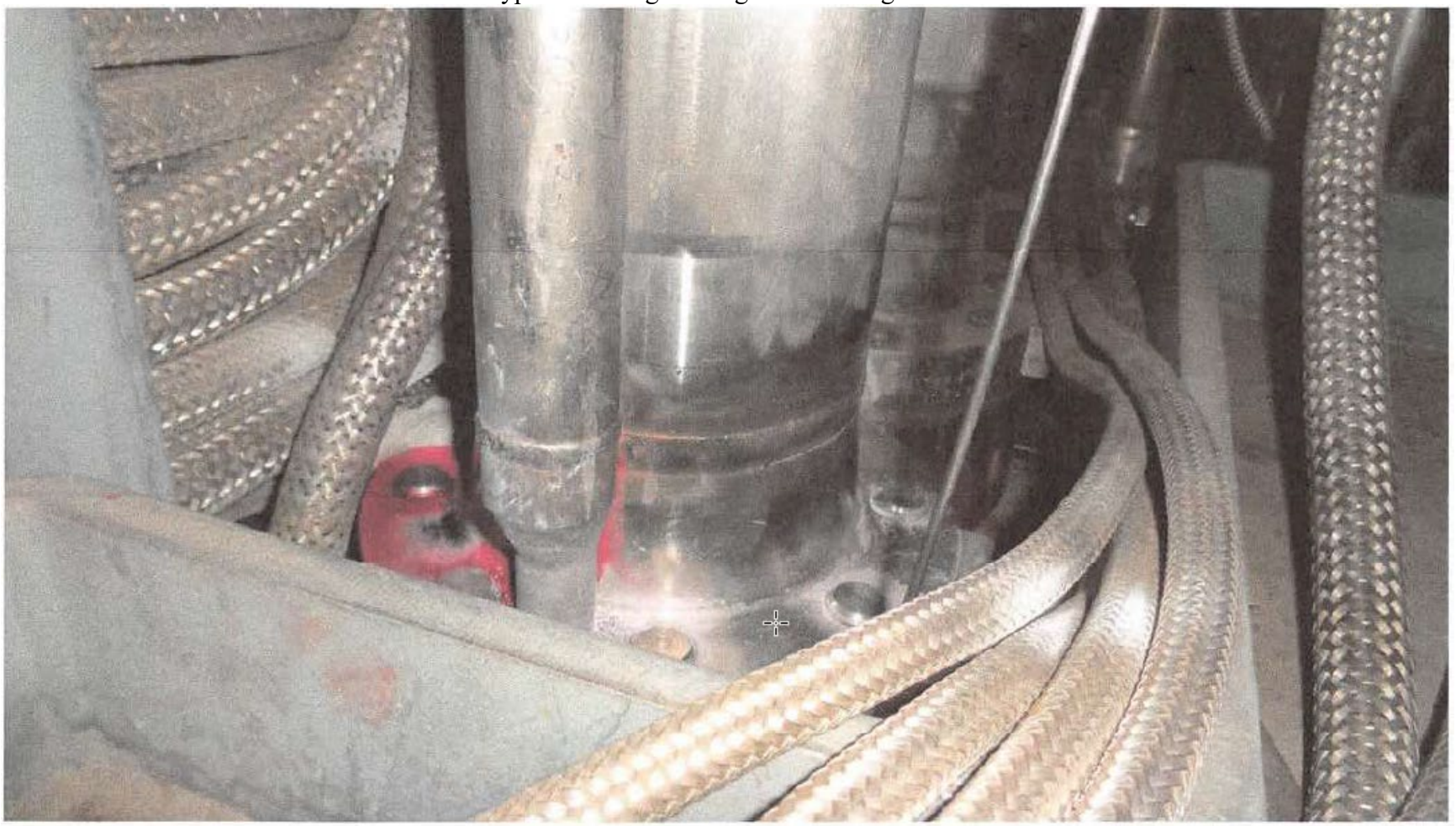


Figure 17
Examination Category: R-A
Item No. R2.11
Component ID: 1B13-N4C-KB

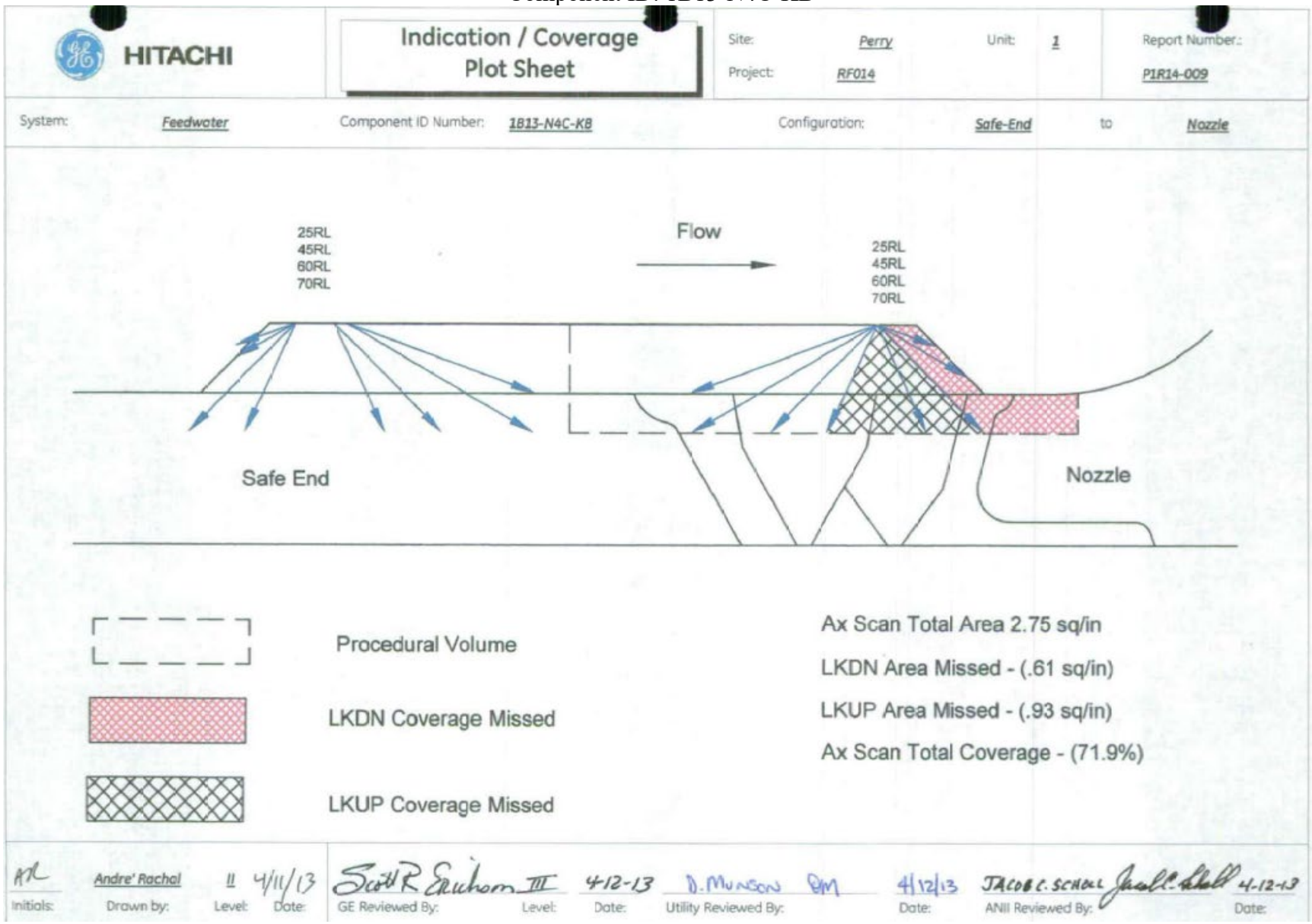


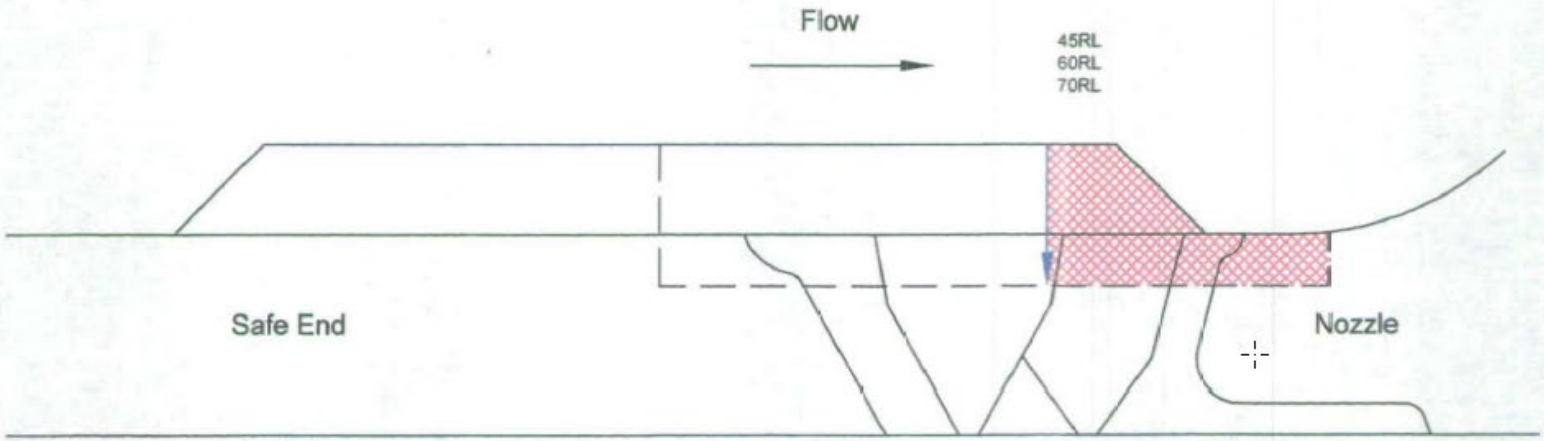
Figure 18
Examination Category: R-A
Item No. R2.11
Component ID: 1B13-N4C-KB

HITACHI

Indication / Coverage Plot Sheet

Site: Perry Unit: 1 Report Number.: P1R14-009
Project: RF014

System: Feedwater Component ID Number: 1B13-N4C-KB Configuration: Safe-End to Nozzle




Procedural Volume

Circ Scan Coverage Missed

Circ Scan Total Area 2.75 sq/in
LKCW/LKCCW Area Missed - (.85 sq/in)
Circ Scan Total Coverage - (68.9%)

| Initials: | Drawn by: | Level: | Date: | GE Reviewed By: | Level: | Date: | Utility Reviewed By: | Date: | ANII Reviewed By: | Date: |
|---|---|---|---|---|---|---|---|---|---|---|
| ARR | Andre' Rachal | II | | Scott R Erickson III | | 4-12-13 | D. Munson | 4/12/13 | JACOB C. SCHOLL | 4-12-13 |

Report H
Examination Category: R-A
Item No. R3.ND
Component ID: 1B33-0028

**Determination of Percent Coverage for**
**UT Examination – Pipe**

| Site/Unit: | **Perry / 1** | Procedure: | **NQI-0957** | Outage No.: | **RFO13** |
|---|---|---|---|---|---|
| Summary No.: | **021540** | Procedure Rev.: | **0** | Report No.: | **UT-11-E024** |
| Workscope: | **ISI** | Work Order No.: | **200380083** | Page: | **5 of 5** |

| | | | | | | |
|---|---|---|---|---|---|---|
| **45 deg** | | | | | | |
| Scan 1 | **100.000** | % Length x | **100.000** | % volume of length / 100 = | **100.000** | % total for Scan 1 |
| Scan 2 | **0.000** | % Length x | **0.000** | % volume of length / 100 = | **0.000** | % total for Scan 2 |
| Scan 3 | **100.000** | % Length x | **100.000** | % volume of length / 100 = | **100.000** | % total for Scan 3 |
| Scan 4 | **0.000** | % Length x | **0.000** | % volume of length / 100 = | **0.000** | % total for Scan 4 |
| | | | | | | |
| Add totals and divide by # of scans = **50.000 % total for 45 deg** | | | | | | |
| | | | | | | |
| **Other deg. - _____ (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 | | % Length x | | % volume of length / 100 = | | % total for Scan 1 |
| Scan 2 | | % Length x | | % volume of length / 100 = | | % total for Scan 2 |
| Scan 3 | | % Length x | | % volume of length / 100 = | | % total for Scan 3 |
| Scan 4 | | % Length x | | % volume of length / 100 = | | % total for Scan 4 |
| | | | | | | |
| **Percent complete coverage** | | | | | | |
| Add totals for each scan required and divide by # of scans to determine: | | | | | | |
| **50.000 % Total for complete exam** | | | | | | |

Figure 19H
Examination Category: R-A
Item No. R2.ND
Component ID: 1B33-0028

Component sketch from preservice examination records

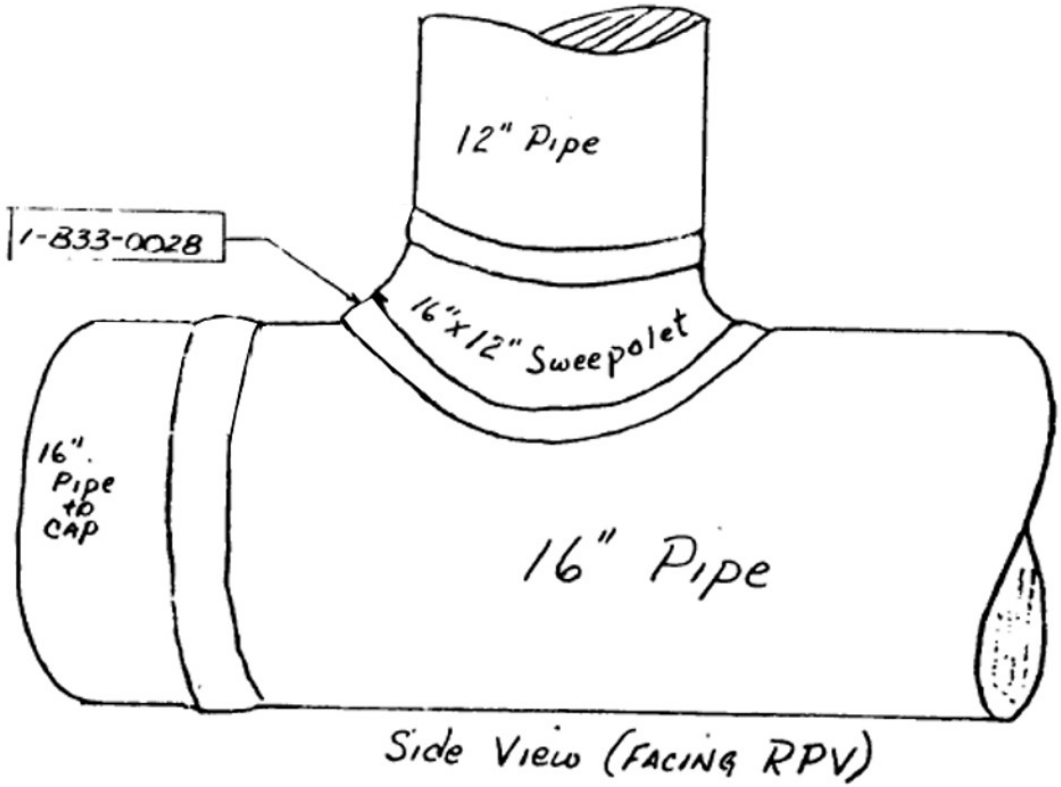


Figure 20H
Examination Category: R-A
Item No. R2.ND
Component ID: 1B33-0028

Weld 1B33-0028 coverage plot