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See Rpt.

SUBJECT: Forwards info re upcoming 10 yr inservice insp.New inservice insp techniques will be demonstrated on 890110 & 11.

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December 27, 1988

U.S. Nuclear Regulatory Commission
Document Control Desk
Attn: Mr. Carl Stahle
PWR Project Directorate No. 1
Washington, D.C. 20555

Subject: Demonstration of ISI Technique at Southwest Research Institute
R.E. Ginna Nuclear Power Plant
Docket No. 50-244

Dear Mr. Stahle:

Enclosed is information concerning the upcoming 10-year ISI of the Ginna Reactor Vessel. This also includes historical information from the 1979 Ginna reactor vessel inspection and the 1986 Point Beach reactor vessel inspection.

The new In-Service Inspection techniques to be employed for the 1989 inspection will be demonstrated at the Southwest Research Institute facilities in San Antonio on January 10 and 11, 1989. The NRC has expressed interest in this topic, and are invited to this demonstration. An agenda for January 10 is included. The 11th will be set aside to discuss any questions arising from the demonstration.

Very truly yours,

Robert C. Mecredy
General Manager
Nuclear Production

GJW\011
Enclosures

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Ginna Senior Resident Inspector

Robert Winters, Region I

Bob Hermann, NRR

A049
11

January 10, 1989 Enclosure 1

Introduction	-	RG&E	John Smith
Description of Reactor Vessel Ultrasonic Examination	-	SwRI	Bill Clayton
Review of the Results of the 1979 R.E. Ginna Reactor Vessel Ultrasonic Examination	-	RG&E	Mike Saporito
Review of the Results of the 1986 Point Beach Unit 1 Reactor Vessel Ultrasonic Examination	-	WE	Jim Kohlwey/Gary Sherwood
Discuss Indication Sizing Techniques Used in 1979 R.E. Ginna and 1986 Point Beach Unit 1 Examinations	-	SwRI	Bill Clayton
Discussion of Heavy Wall Sizing Techniques	-	NDEC	Frank Ammirato
Discussion of Nozzle Flaw Sizing Program			
1) Overview	-	SwRI	Bill Clayton
2) Mockups	-	SwRI	Bill Clayton
3) Techniques and Transducers	-	SwRI	George Gruber/Glen Light
Buffet Lunch			
Demonstration			
1) Presentation of Data Format	-	SwRI	Bill Clayton
2) Description of Demonstration	-	SwRI	Bill Clayton
3) Preselected Flaw, One or More Flaws to be Selected by NRC			
4) Scanning of Selected Flaws	-	SwRI	Bill Clayton
5) Evaluation of Selected Flaws	-	SwRI	Bill Clayton
Program Results	-	SwRI	Bill Clayton
Closing Comments	-	RG&E	John Smith

Enclosure 2

1989 REACTOR VESSEL EXAMINATIONS

The 1989 Ginna Station Reactor Vessel Examination will consist of two phases, a visual examination of the internal surfaces, nozzles and internal components of the reactor vessel and an ultrasonic examination of the vessel welds. These examinations will satisfy the requirements of the Ginna Second Interval Inspection Plan, ASME Section XI (1974 Edition including Addenda thru Summer 1975) and Regulatory Guide 1.150, Rev.1.

The visual examination will utilize the Benthos Mark II Mini-Rover Submersible Camera System, which has been used successfully by Surry and Point Beach for reactor vessel examinations. The examination plan will allow 100% inspection of all the internal surfaces, nozzles and internals. The internal surfaces will be examined by moving the submersible in a vertical motion and then indexing around the vessel circumference until all surfaces have been covered. The inlet and outlet nozzles will be inspected to the extent feasible by driving the submersible into the nozzle and tilting the TV Camera to view the nozzle ID surface and its weld. Reactor vessel internals will be examined after they have been removed from the vessel, but while still under water in the reactor vessel cavity. The entire examination will be performed in accordance with written RG&E Visual Inspection Procedures.

The ultrasonic examination will be performed on the reactor vessel welds and nozzle to piping welds from the inside surface utilizing The Southwest Research Institute (SWRI) Programmed and Remote (PAR) ISI-2 Device and Fast PAR Equipment. In addition, the SWRI Enhanced Data Acquisition System (EDAS), will be utilized for data collection, correlation and analysis of ultrasonic data. EDAS provides color graphics and data analysis and presents the data in easy to interpret displays. The ultrasonic examination will include 100% examination of all the reactor vessel welds as shown in Attachment 1. The Ginna examination will include 100% of the weld length even though the ASME Code requires only 5% of the weld length to be examined. Ultrasonic transducers will be utilized that satisfy the requirements of Section XI of the ASME Code.

Described in Attachment 2 are the results of the Reactor Vessel Exam performed during the 1979 (end of the first inspection interval) outage. This exam included both a visual and ultrasonic examination. The visual exam was performed utilizing cameras mounted on poles and on the PAR device. The ultrasonic examination was done utilizing the PAR device and the SWRI Standard Data Acquisition System (SDAS). This examination identified an indication in the "N2B" Inlet Nozzle to Vessel Weld. This indication was detected from the nozzle bore utilizing the 15 degree angle beam longitudinal wave technique. Based on beam spread correction the indication was sized as approximately Ac= .160" X Lc = 4.52", as described in Figure 3 of Attachment 3. This size indication is allowable per the ASME Code Table IWB-3510.

A Fracture Mechanics Evaluation of the indication was also performed to demonstrate its acceptability and is described in Attachment 4.

In conjunction with the two previously discussed evaluations, a review of the original fabrication radiographs confirmed the presence of slag at the identified location.

As a result of these evaluations it is believed that this indication is a code allowable thin planar slag inclusion located mid-wall of the vessel to nozzle weld.

During the 1989 examination of the Ginna Reactor Vessel new techniques and technology will be applied to better resolve any indications identified. To accomplish this the following actions are being taken:

* A joint flaw sizing program has been initiated by Wisconsin Electric (WE) and Rochester Gas and Electric (RGE) utilizing SWRI and EPRI for support. The purpose of the program is to develop optimized techniques for flaw sizing.

* Two full size mockups have been being fabricated; one representative of the inlet/outlet configuration and the other representative of the safety inspection nozzle. The mockups have built-in defects, similar to indications in the RGE/WE nozzles.

* Focused Transducers and Time-of-Flight Techniques are being investigated for more accurately sizing indications. These technologies will be integrated with the Southwest Research Institute EDAS System.

* A demonstration has been scheduled for mid-January 1989. The purpose of the demonstration will be to compare 1979 flaw sizing techniques with the enhanced techniques developed through this program. Representatives of RG&E and WE will witness this demonstration and representatives of the NRC and the Authorized Nuclear Insurers will be invited to attend.

More specific information regarding the Nozzle Sizing Program can be found in Attachment 5.

M.J. Saporito
Rev.0
11/28/88

The following is a listing of mechanized ultrasonic examinations of the reactor pressure vessel welds and adjacent piping welds. These examinations will include 1/2T base material for vessel welds and 1/4 inch base material for piping welds. Also shown are the anticipated examination angles and the direction of the beam component.

The lower head is forged and has no meridional welds and the shell courses are ring sections with no longitudinal welds. In all cases the goal is to examine 100% of the weld plus 1/2T each side of the weld. Examination of 100% of the weld length is the goal also for the circumferential vessel welds even though 74/S75 Section XI only requires 5%. Interference from other vessel components may limit the desired examination coverage. If this was the case in previous examinations, it has been noted. A complete discussion of the individual examination area coverage will be provided in the final report of the examinations as required by Regulatory Guide 1.150 Rev. 1.

Mech UT examinations will be performed on the reactor vessel welds and selected reactor coolant piping welds from the inside surface utilizing the PaR ISI-2 Device and SwRI Fast PaR equipment. Examination areas include vessel circumferential, nozzle-to-shell, and nozzle piping welds.

The Mech UT examinations of the RPV will be performed in accordance with the requirements of the 74/S75 Section XI and Regulatory Guide 1.150, Rev. 1.

a) RPV Shell and Head Welds

1) 0-degree longitudinal wave (UTOL) examinations will be performed for detection of laminar reflectors which might affect interpretation of angle-beam results.

2) 0-degree longitudinal wave (UTOW) examinations will also be performed for detection of reflectors in the weld and base material.

3) 45-degree and 60-degree shear wave (UT45 and UT60) examinations will be performed for detection of reflectors in the weld and base material oriented parallel to the weld.

4) 45-degree and 60-degree transverse shear wave (UT45T and UT60T) examinations will be performed for detection of reflectors in the weld and base material oriented transverse to the weld.

5) In the case of the RPV welds, SwRI 50/70 tandem search units will be used to examine to a depth of approximately 2.25 inches for detection of reflectors in the clad-to-base metal interface area and also in the volume between the examination surface and the depth of the first Code calibration reflector.

These dual-element tandem search units develop an interactive beam with longitudinal wave propagation and produce an examination with significantly improved signal-to-noise ratio over conventional near-surface techniques.

ATTACHMENT 1

SCOPE OF ULTRASONIC EXAMINATIONS
OF THE REACTOR PRESSURE VESSEL WELDS

b) RPV Nozzle Areas

The inlet, outlet, and safety injection nozzle-to-vessel welds will be examined from the bore utilizing 15-degree (for inlet nozzles), 10 degree (for outlet nozzles) 10-degree (for safety injection nozzle) and 45-degree beams for detection of reflectors in the weld and base material. In addition, UT45T and UT60T examinations will be performed from the shell inside surface for detection of reflectors oriented transverse to the weld and base material. These transverse examinations will utilize a computer to control the X-Y-Z movements of the PaR device to assure accurate positioning around the nozzle during examinations. 50/70 tandem search units will be utilized from the bore and shell inside surfaces for detection of reflectors located in the clad-to-base metal interface region and also the volume between the examination surface end the first Code calibration reflector for the purpose of satisfying the requirements in Section XI.

c) Piping Welds

Nozzle Piping Welds

For the inlet safe end-to-nozzle welds, a UTOL scan will be used for detection of reflectors which might affect interpretation of the angle-beam results. UT45 and UT 60 scans will be used for detection of reflectors parallel to the weld from both sides of the weld. A UT45T scan will be used for detection of reflectors oriented transverse to the weld. The acoustic properties of the inlet elbows preclude examination from the elbow side; therefore, a UT0W scan will be performed in addition to the scans identified above.

Limitations are expected around the vessel support lugs, safety injection and inlet nozzles due to the proximity of these components. Other limitations are listed.

I. Circumferential welds — Estimated time - (2.5 *shifts*)

A. Ring forging-to-lower head weld (RPV-E)

Examination area	Angle	Beam Component
0 - 360	0,45,60,50/70	up/dn
0 - 360	0,45T,60T,50/70T	cw/ccw

B. Lower shell-to-ring forging weld (RPV-D)

Examination area	Angle	Beam Component
0 - 360	0,45,60,50/70	up/dn
0 - 360	0,45T,60T,50/70T	cw/ccw

Limitations due to proximity of core support lugs @
0 from (344.20 - 15.90) CG-1
90 from (74.20 - 105.80) CG-2
180 from (164.20 - 195.80) CG-3
270 from (255.25 - 284.75) CG-4

C. Intermediate shell-to-lower shell weld (RPV-C)

Examination area	Angle	Beam Component
0 - 360	0,45,60,50/70	up/dn
0 - 360	0,45T,60T,50/70T	cw/ccw

D. Upper shell-to-intermediate shell weld (RPV-B)

Examination area	Angle	Beam Component
0 - 360	0,45,60,50/70	up/dn
0 - 360	0,45T,60T,50/70T	cw/ccw

II. Upper shell region area (A) Estimated time - (3.0 Shifts)

A. Flange-to-upper shell weld (RPV-A) from shell

Examination area	Angle	Beam Component
0 - 360	0,45,60,50/70	up
0 - 360	0,45T,60T,50/70T	cw/ccw

B. Outlet nozzle-to-shell welds (N1A), (N1B) from shell

Examination area	Angle	Beam Component
nozzle (0 - 360)	0,45T,60T,50/70T	cw/ccw

C. Inlet nozzle-to-shell welds (N2A), (N2B) from shell

Examination area	Angle	Beam Component
nozzle (0 - 360)	0,45T,60T,50/70T	cw/ccw

D. Safety injection nozzle-to-shell weld (AC-1002), (AC-1003) from shell

Examination area	Angle	Beam Component
nozzle (0 - 360)	0,45T,60T,50/70T	cw/ccw

III. Upper shell region area (B) Estimated Time - (1.5 shifts)

A. Flange-to-upper shell weld (RPV-A) from seal surface

Examination area	Angle	Beam Component
0 - 360	18, 11, 4	dn

B. Vessel support lugs

Examination area	Angle	Beam Component
Vessel support (RPV-VSL-1)	0,45,60,50/70	up/dn
Vessel support (RPV-VSL-1)	0,45T,60T,50/70T	cw/ccw
Vessel support (RPV-VSL-2)	0,45,60,50/70	up/dn
Vessel support (RPV-VSL-2)	0,45T,60T,50/70T	cw/ccw

IV. Nozzle inner radius, integral extention and nozzle bore — Estimated time - (3.5 shifts)

A. Outlet nozzle inner radius section integral extension region and nozzle bore.

Examination area	Angle	Beam Component
Outlet A (N1A-IRS)	10,45,50/70	To Vessel C/L cw/ccw
Outlet B (N1B-IRS)	10,45,50/70	To Vessel C/L cw/ccw
Outlet A (N1A-IE)	50/70	To Vessel C/L
Outlet B (N1B-IE)	50/70	To Vessel C/L

B. Inlet nozzle inside radius region

Examination area	Angle	Beam Component
Inlet A (N2A-IRS)	50/70	cw/ccw
Inlet B (N2B-IRS)	50/70	cw/ccw

C. Nozzle-to-shell welds from nozzle bore

Examination area	Angle	Beam Component
Inlet A (N2A)	15,45,50/70	To Vessel C/L cw/ccw
Inlet B (N2B)	15,45,50/70	To Vessel C/L cw/ccw

D. Safety injection inside radius region and nozzle bore

Examination area	Angle	Beam Component
Safety injection A(AC-1003-IRS)	0,10	To Vessel C/L
Safety injection B(AC-1002-IRS)	0,10	To Vessel C/L

E. Safety injection nozzle integral extension

Examination area	Angle	Beam Component
Safety injection A(AC-1003-IE)	70	cw
Safety injection B(AC-1002-IE)	70	cw

V. Nozzle-to-piping welds — Estimated Time - (3.5 Shifts)

A. Elbow-to inlet nozzle welds

Examination area	Angle	Beam Component
Inlet A (PL-FW-V)	0,45,60	Away from Vessel C/L
Inlet B (PL-FW-VII)	0,45,60	Away from Vessel C/L
Inlet A (PL-FW-V)	45RLT	cw/ccw
Inlet B (PL-FW-VII)	45RLT	cw/ccw
Inlet A (PL-FW-V)	45RL	To Vessel C/L
Inlet B (PL-FW-VII)	45RL	To Vessel C/L

B. Nozzle-to piping welds

Examination area	Angle	Beam Component
Outlet A (PL-FW-II)	0,45,60,45T,60	Away from Vessel C/L
Outlet A (PL-FW-II)	0,45,60,45T,60	To Vessel C/L
Outlet B (PL-FW-IV)	0,45,60,45T,60	Away from Vessel C/L
Outlet B (PL-FW-IV)	0,45,60,45T,60	To Vessel C/L

C. Safe end-to-nozzle welds

Examination area	Angle	Beam Component
Safety injection A(AC-1003-1)	0,45,45T,60	Away from Vessel C/L
Safety injection A(AC-1003-1)	0,45,45T,60	To Vessel C/L
Safety injection B(AC-1002-1)	0,45,45T,60	Away from Vessel C/L
Safety injection B(AC-1002-1)	0,45,45T,60	To Vessel C/L

D. Piping-to-safe end welds

Examination area	Angle	Beam Component
Safety injection A(AC-1003-2)	0,45,45T,60	Away from Vessel C/L
Safety injection A(AC-1003-2)	0,45,45T,60	To Vessel C/L
Safety injection B(AC-1002-2)	0,45,45T,60	Away from Vessel C/L
Safety injection B(AC-1002-2)	0,45,45T,60	To Vessel C/L

SCHEDULE OF MECHANIZED EXAMINATIONS
FOR R. E. GINNA RPV

```
                                                                                                  Days On
                          Day 1       Day 2       Day 3       Day 4       Day 5       Day 6       Day 7     <==Vessel
Examination Areas         1     2  |  1     2  |  1     2  |  1     2  |  1     2  |  1     2  |  1     2  |<==Crew Shift
========================= =====|=====|=====|=====|=====|=====|=====|=====|=====|=====|=====|=====|=====|=====|
Circumferential Welds     >-------------->      .           .           .           .           .           .
   RPV-E,-D,-C,-B                     .         .           .           .           .           .           .
                                      .         .           .           .           .           .           .
Upper Shell Region                    .         .           .           .           .           .           .
  Area Welds (A)                      .  >------------------->          .           .           .           .
    RPV-A, N1A, N1B,                  .         .           .           .           .           .           .
    N2A, N2B, AC-1002,                .         .           .           .           .           .           .
    & AC-1003                         .         .           .           .           .           .           .
                                      .         .           .           .           .           .           .
Upper Shell Region                    .         .           .           .           .           .           .
  Area Welds (B)                      .         .      >---------->     .           .           .           .
    RPV-VSL1, RPV-VSL2,               .         .           .           .           .           .           .
    & RPV-A                           .         .           .           .           .           .           .
                                      .         .           .           .           .           .           .
Nozzle Inside Radius Sections         .         .           .           .           .           .           .
  and Integral Extension              .         .           .    >------------------------->    .           .
    Outlet A (N1A-IRS,-IE)            .         .           .           .           .           .           .
    Outlet B (N1B-IRS,-IE)            .         .           .           .           .           .           .
    Inlet A (N2A-IRS)                 .         .           .           .           .           .           .
    Inlet B (N2B-IRS)                 .         .           .           .           .           .           .
    Safety Injection                  .         .           .           .           .           .           .
      AC-1003-IRS,-IE                 .         .           .           .           .           .           .
      AC-1002-IRS,-IE                 .         .           .           .           .           .           .
                                      .         .           .           .           .           .           .
Piping Welds                          .         .           .           .           .  >--------------------X
    Elbow to Inlet Nozzle             .         .           .           .           .           .           .
      A  PL-FW-V                      .         .           .           .           .           .           .
      B  PL-FW-VII                    .         .           .           .           .           .           .
    Outlet Nozzle to Pipe             .         .           .           .           .           .           .
      A  PL-FW-II                     .         .           .           .           .           .           .
      B  PL-FW-IV                     .         .           .           .           .           .           .
    SI Safe End to Nozzle             .         .           .           .           .           .           .
      A  AC-1003-1                    .         .           .           .           .           .           .
      B  AC-1002-1                    .         .           .           .           .           .           .
    SI Pipe to Safe End               .         .           .           .           .           .           .
      A  AC-1003-2                    .         .           .           .           .           .           .
      B  AC-1002-2                    .         .           .           .           .           .           .
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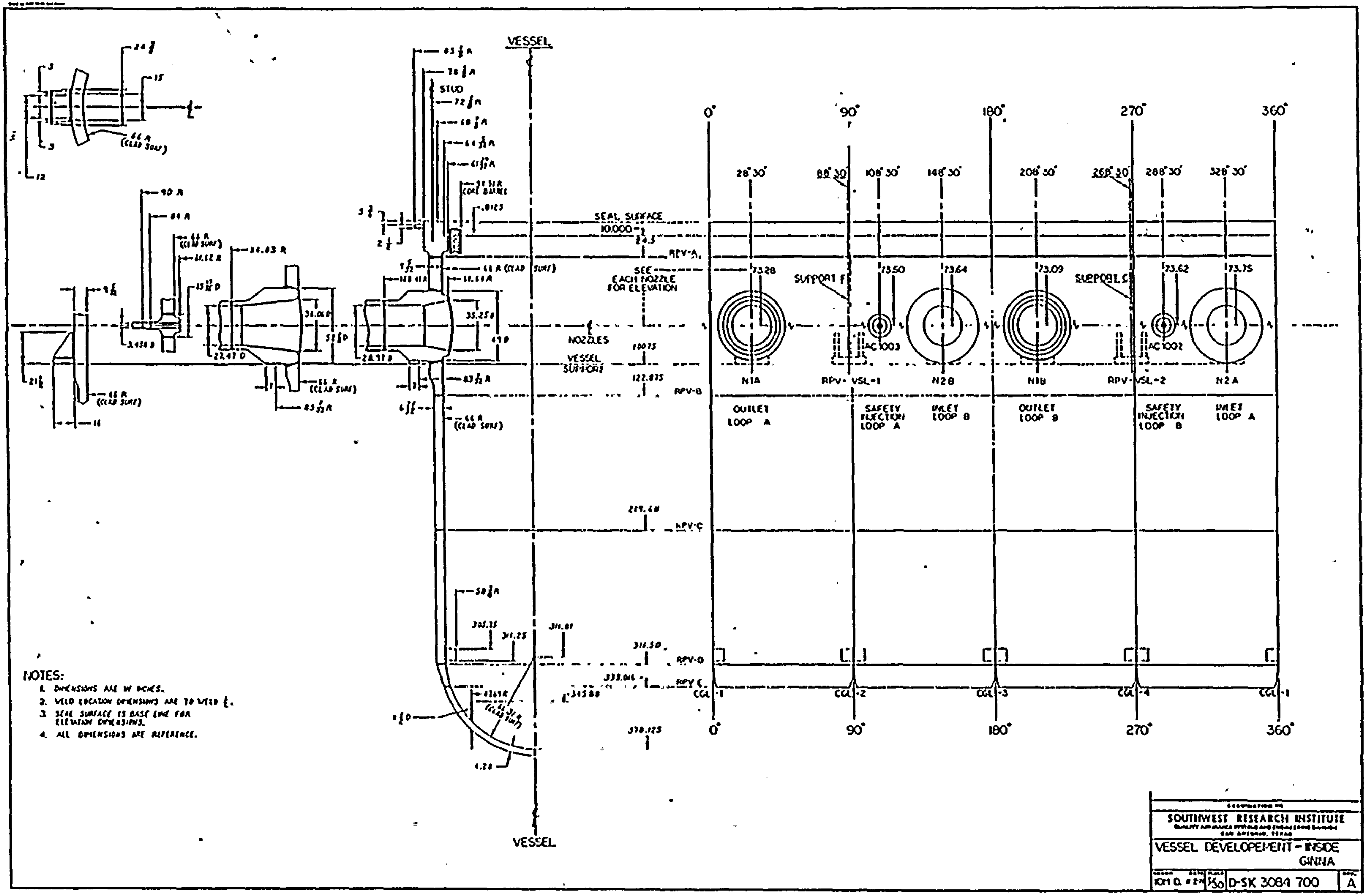
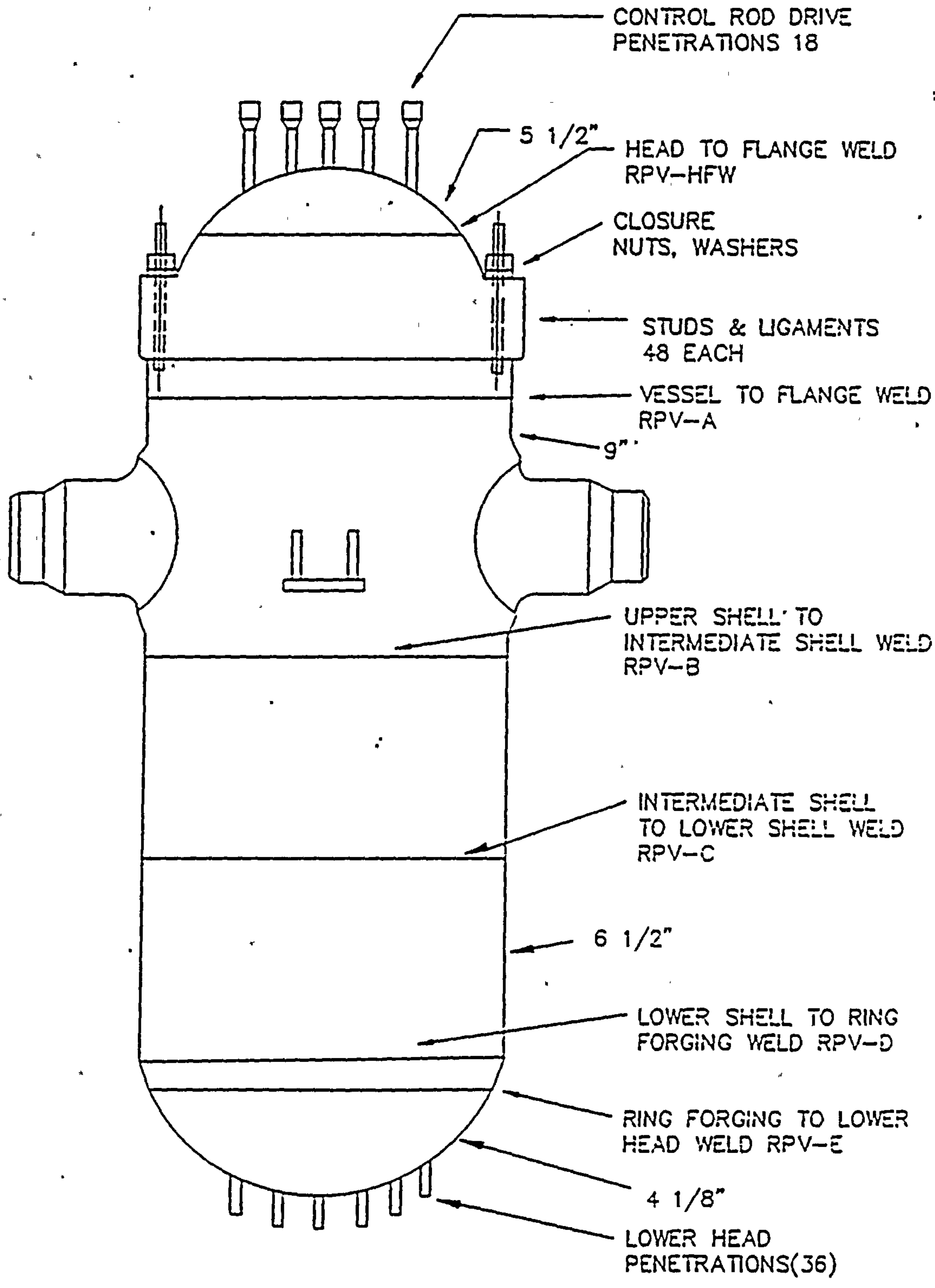

VESSEL
STUD
SEAL SURFACE
10.000
RPV-A
SEE EACH NOZZLE FOR ELEVATION
NOZZLES
VESSEL SUPPORT
RPV-B
RPV-C
RPV-D
RPV-E
0° 90° 180° 270° 360°
28°30' 88°30' 108°30' 148°30' 208°30' 268°30' 288°30' 328°30'
73.28 73.50 73.64 73.09 73.62 73.75
SUPPORT F
SUPPORT C
AC 1003
AC 1002
N1A RPV-VSL-1 N2B N1B RPV-VSL-2 N2A
OUTLET LOOP A
SAFETY INJECTION LOOP A
INLET LOOP B
OUTLET LOOP B
SAFETY INJECTION LOOP B
INLET LOOP A
CGL-1 CGL-2 CGL-3 CGL-4 CGL-1
NOTES:
1. DIMENSIONS ARE IN INCHES.
2. WELD LOCATION DIMENSIONS ARE TO WELD ℄.
3. SEAL SURFACE IS BASE LINE FOR ELEVATION DIMENSIONS.
4. ALL DIMENSIONS ARE REFERENCE.
SOUTHWEST RESEARCH INSTITUTE
VESSEL DEVELOPEMENT - INSIDE
GINNA
1/30
D-SK 3084 700
A



REACTOR PRESSURE VESSEL

FACILITY R. E. GINNA

SCALE

ROCHESTER GAS & ELECTRIC CORP.
ROCHESTER, NEW YORK

ORIGINAL — INITIAL WCZ — DATE 12-7-94

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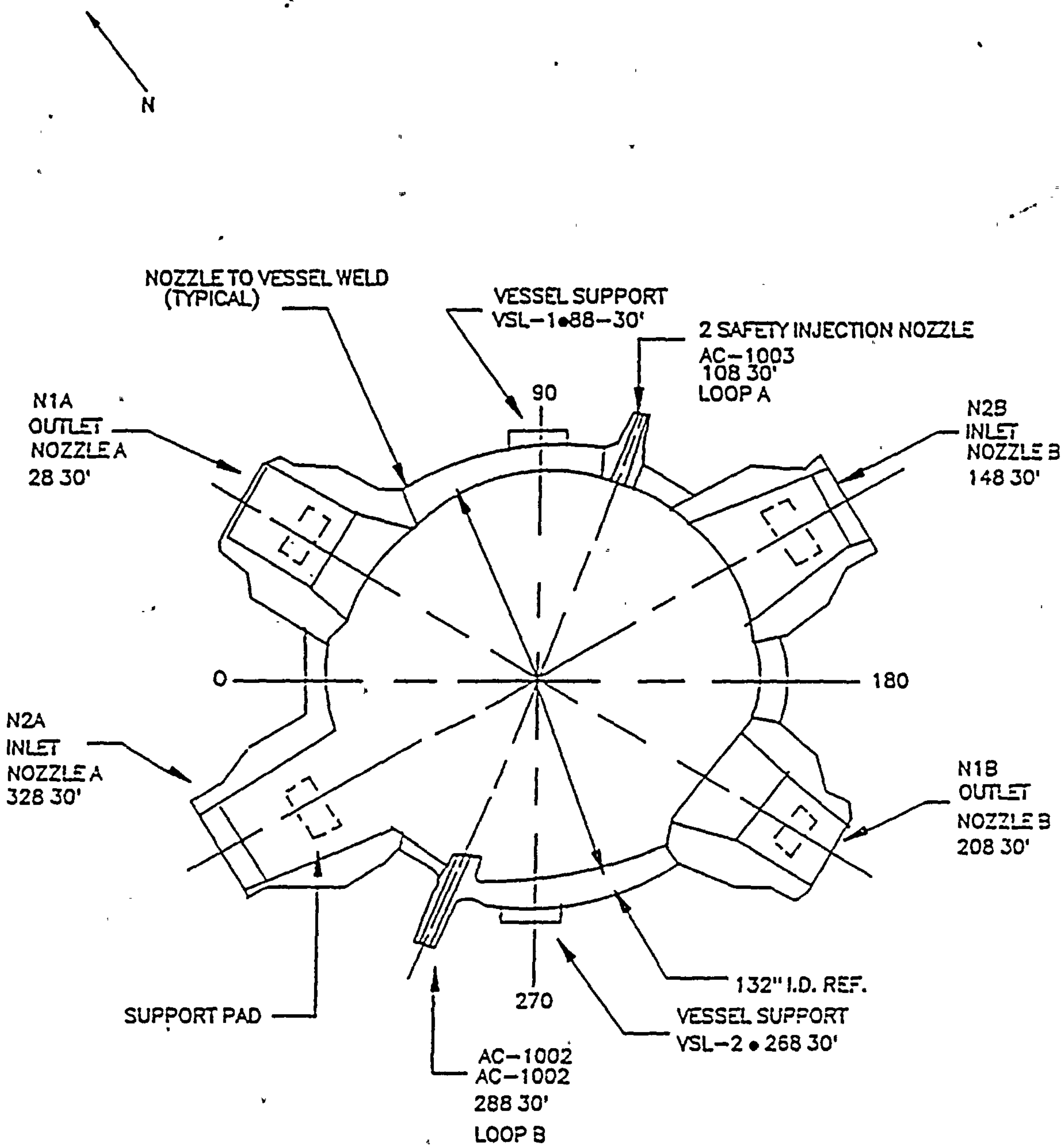

						REACTOR PRESSURE VESSEL
						FACILITY R. E. GINNA — ROCHESTER GAS & ELECTRIC CORP. ROCHESTER, NEW YORK
						SCALE
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NUMBER	REVISION	DRAWN BY	CHECKED	INTERP. EVAL.	CHG. MNGR.	

ATTACHMENT 2

RESULTS OF 1979 REACTOR VESSEL EXAMINATIONS

ATTACHMENT 2

INTRODUCTION

The 1979 ISI of the R.E. Ginna Reactor Pressure Vessel (RPV) and associated nozzle piping welds was performed in accordance with Section XI of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code, 1974 Edition with Addenda through Summer 1975.

The SwRI Data Acquisition System (now referred to as the Standard Data Acquisition System or SDAS) was used for recording and processing of ultrasonic test information obtained during mechanized examinations. This system included Sonic Mark II ultrasonic instruments. These instruments were also used for thickness gauging and as an aid in determining the acoustic characteristics and attenuation of the materials. Various brands, sizes and frequencies of ultrasonic transducers were used to perform the examinations.

In general, information obtained from the examinations was processed by the SwRI Data Acquisition System in the following manner. Signal information from each of the ultrasonic instruments was displayed on the analog cathode ray tube (CRT) for each instrument. Amplitude and time analog information was channeled through electronic gates and examined according to preselected levels. For the signals which exceeded these levels, calibrated voltages were generated which were analogous to the signal amplitude and the sound beam distance to the reflector. The time analog and amplitude analog voltages corresponded to the first triggering signal encountered along the sound beam and the signal with the largest amplitude, respectively. These data were combined with location information and sent to a six-channel strip chart recorder and an analog tape recorder. The SwRI Data Acquisition System handled information from three ultrasonic instruments simultaneously.

This versatile system produced the following types of examination records for this ISI:

- Video Tape
- Strip Chart
- Analog Tape

The PaR Examination Device, fabricated by Programmed and Remote Systems Corporation, with technical design input from SwRI, was used to perform ultrasonic examinations of the RPV welds, components, or areas. The system was utilized during this ISI for examination from the interior of the nozzles and from the vessel inside surface. The device was mounted on the top flange of the vessel by three legs which clamped to the guide studs for accurate reproducible positioning. Attached to the boom assembly were various SwRI accessories which enabled examination of the nozzle-to-shell welds, nozzle-to-safe end welds, the nozzle high-strain areas, the vessel shell-to-flange weld, the vessel circumferential welds, and the vessel support welds.

The results of the 1979 mechanized examinations of the R.E. Ginna RPV were put into four categories:

The term "No Recordable" was applied when no indications were observed greater than the recording level and no indications were observed between 50 percent of the Distance Amplitude Correction (DAC) curve and the recording level.

"Insignificant" was applied when (1) the amplitude of any indication observed was equal to or greater than the recording level, but less than 100 percent of the DAC curve, and not resolved as being relevant, or (2) nonrelevant indications, such as reflections due to standing waves, water multiples, etc., were observed.

"Geometric" indications were (1) those indications which had an amplitude equal to or greater than 100 percent of the DAC curve, and were resolved and documented to be geometric in nature, or (2) indications that are less than 100 percent of the DAC curve but were suspected by the Level II examiners to be other than geometric in nature, and were then resolved and documented to be geometric in nature.

"Other" indications include those indications evaluated to be other than "Insignificant" or "Geometric" indications, as described above.

SUMMARY OF RESULTS

The following Table list all MECH UT indications; Insignificant, Geometric and Other, along with the type of search unit used, and how the indications were resolved.

Examination Area	Insignificant	Geometric	Other	Resolution
Circumferential Welds				
RPV-B Upper Shell to Intermediate Shell	45°			Water Multiple
		45°		Redirected Shear due to Clad
RPV-C Intermediate Shell to Lower Shell				No recordable Indications
RPV-D Lower Shell to Ring Forging	0° L 0° W 45° T 60° T			Water Multiple Water Multiple Water Multiple Water Multiple
		45°		Redirected Shear
RPV-E Ring Forging to Lower Head	0° L 0° W 45° T 60° T			Water Multiple Water Multiple Water Multiple Water Multiple
			45°	Redirected Shear to Outside Surface (OD)
			60°	Redirected Shear to OD
RPV-A Vessel to Flange	0° L 0° W 45°			Water Multiple Water Multiple Water Multiple
		45° 4°RL} 11°RL} 18°RL}		Redirected Shear to OD }Vessel OD Between Stud Holes
Vessel Supports				
VSL-1				No Recordable Indications
VSL-2				No Recordable Indications

Examination Area	Insignificant	Geometric	Other	Resolution
Loop B Outlet Nozzle N-1B				
Nozzle to Vessel	45°			Water Multiple
	15°			Water Multiple, Integral Extension OD Geometry
	60°T			Water Multiple
Nozzle Inside Radius and Integral Extension	60°T			Water Multiple
Safe End to Nozzle				No Recordable Indications
Loop B Inlet Nozzle N2B				
Nozzle to Vessel	0°L			Water Multiple
	45°			Water Multiple
	45°T			Water Multiple
	15°RL			Water Multiple
			15°RL	Slag like indications at 310° (A)
Nozzle Inside Radius			SW	Surface Irregularities (B)
Safe End to Nozzle	0°L			Water Multiple
	0°W			Water Multiple
	45°			Water Multiple
	45°T			Water Multiple

( ) Denotes Appendix containing resolution information for that indication.

Examination Area	Insignificant	Geometric	Other	Resolution
Loop A Outlet Nozzle N1A				
Nozzle to Vessel	15°RL			Water Multiple, Integral Extension
				Water Multiple, Integral Extension
	45°			
				Code Allowable (C)
			45°	Code Allowable (D)
			15°RL	
				Water Multiple
		45°T		OD Geometry
		60°T		
Nozzle Inside Radius and Integral Extension	60°T			Water Multiple
Nozzle to Safe End				No Recordable Indications
Loop A Inlet Nozzle N2A				
Nozzle to Vessel	45°			Water Multiple
	15° RL			Water Multiple
Nozzle Inside Radius				
			SW	Surface Irregularities (E)
Safe End to Nozzle	45°			Water Multiple
	0° L			
	0° W			Water Multiple
	45°			Water Multiple
	45°T			Water Multiple
				Water Multiple

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Examination Area	Insignificant	Geometric	Other	Resolution
Loop B Safety Injection Nozzle (AC-1002)				
	45°			Water Multiple
Nozzle to Vessel				
		45°		OD Surface
		60°		Redirected Shear to OD
		0°		Integral Extension
		10°		Integral Extension
			0° L	Metallurgical Conditions (F)
			10° RL	Metallurgical Conditions (F)
Nozzle Inside Radius				No Recordable Indications
Safe End to Nozzle	0°L			Water Multiple
	45°			Water Multiple
	45°T			Water Multiple
	60°			Water Multiple
Loop A Safety Injection Nozzle (AC-1003)				
	0°L			Water Multiple
Nozzle to Vessel	0°W			Water Multiple
	45°			Water Multiple
		45°T		Outside Surface
		0° L		Integral Extension, Metallurgical Conditions (F)
		10° RL		Integral Extension
Nozzle Inside Radius	0°L			Water Multiple, OD Surface
	10°RL			Water Multiple
Safe End to Nozzle	0°L			Water Multiple
	45°			Water Multiple
	45°			Water Multiple
	60°			Water Multiple

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ATTACHMENT 3

ULTRASONIC EVALUATION OF INLET NOZZLE
INSERVICE INSPECTION INDICATION