Dominion Nuclear Connecticut, Inc.
Millstone Power Station
Rope Ferry Road
Waterford, CT 06385

Dominion

OCT 28 2003

Docket No. 50-336
B19004

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555

Millstone Power Station, Unit No. 2
Response to Request for Additional Information on RR-89-48 for the
Nozzle Inspection Ultrasonic Test Coverage Requirements in Order EA-03-009

On February 11, 2003,[1] the U.S. Nuclear Regulatory Commission (NRC) issued Order EA-03-009 for interim inspection requirements for reactor pressure vessel (RPV) heads at pressurized water reactor facilities. The Order requires specific inspection of the RPV head and associated penetration nozzles. On October 3, 2003,[2] pursuant to the procedure specified in Section IV.F of the Order, Dominion Nuclear Connecticut, Inc. (DNC) requested relaxation from requirements of the Order regarding the ultrasonic test examination (UT) coverage for the control element drive mechanism (CEDM) penetration nozzles.

In a facsimile dated October 16, 2003, the NRC transmitted a draft of a request for additional information. On October 22, 2003, a teleconference was held to discuss this information with the NRC. DNC's response to each of the NRC questions is provided in Attachment 1.

There are no regulatory commitments contained within this letter.

(1) NRC Order EA-03-009, "Issuance of Order Establishing Interim Inspection Requirements for Reactor Pressure Vessel Heads at Pressurized Water Reactors," dated February 11, 2003, (Accession No. ML030380470).

(2) DNC letter, "Millstone Power Station, Unit No. 2, Order EA-03-009 Relaxation Request Number RR-89-48 for Nozzle Inspection Ultrasonic Test Coverage Requirements," October 3, 2003.

A101

If you should have any questions regarding this submittal, please contact Mr. David W. Dodson at (860) 447-1791, extension 2346.

Very truly yours,

DOMINION NUCLEAR CONNECTICUT, INC.

J. Alan Price
Site Vice President - Millstone

Sworn to and subscribed before me

this 28 day of October, 2003

Diane M. Phillipo
Notary Public

My Commission expires DIANE M. PHILLIPO NOTARY PUBLIC MY COMMISSION EXPIRES 12/31/2005

Attachment (1)

cc: H. J. Miller, Region I Administrator
R. B. Ennis, NRC Senior Project Manager, Millstone Unit No. 2
Millstone Senior Resident Inspector

The Director, Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Attachment 1

Millstone Power Station, Unit No. 2

Response to Request for Additional Information on RR-89-48 for the
Nozzle Inspection Ultrasonic Test Coverage Requirements in Order EA-03-009

Millstone Power Station, Unit No. 2
Order EA-03-009 Relaxation Request RR-89-48 for the
Nozzle Inspection Ultrasonic Test Coverage Requirements

In a facsimile dated October 16, 2003, the U.S. Nuclear Regulatory Commission (NRC) transmitted a draft of a request for additional information. On October 22, 2003, a teleconference was held to discuss this information with the NRC. The Dominion Nuclear Connecticut, Inc. (DNC) response to the NRC questions is provided in the balance of this Attachment.

1. *How will the PT surface examinations be expanded to additional CEDM penetration nozzles if indications are found? What will be the criteria for expansion?*

   Response

   Since DNC will perform a liquid penetrant (PT) examination on all of the nozzles where the ultrasonic examination has not provided adequate coverage, there is no plan to expand the PT examinations beyond the original scope. All of the Control Element Drive Mechanism (CEDM) nozzles will be examined to at least a specific minimum distance by either an ultrasonic examination technique or by a PT examination technique.

2. *Provide the scope of the PT surface examinations, and the flaw tolerance on each CEDM penetration. What is the proposed area to be examined? Will the examination be 360 degrees around the nozzle? Provide a drawing or drawings showing the area to be examined by PT. Will the surface examination be performed to the bottom of the nozzle?*

   Response

   The extent of UT examination coverage for each of the CEDM nozzles is provided in Table 1. Where insufficient coverage is obtained by the ultrasonic test (UT) examination technique for any nozzle, a supplemental nondestructive examination (NDE) using PT will be performed. The scope of needed supplemental PT examinations is shown in Table 1 and will include six CEDM nozzles.

   UT examination coverage obtained is a full 360° around the nozzle. The proposed area to be PT examined will be 180° of the nozzle Outside Diameter (OD) centered on the downhill side, (see attached Figure, Section View B-B), from the toe of the weld at the lowest point on the weld, extending down to cover approximately 3/4 inches of the nozzle base material. This examination will overlap the area that was examined ultrasonically and extend below to obtain the desired coverage. An attempt will be made to avoid examining the end of the nozzle, (approximately 1/4 inches from the bottom), because the bleed-out of the penetrant from the mating surface between the nozzle end and funnel could mask the area of interest.

Performing a liquid penetrant examination on the nozzle base material on the uphill side of the nozzle, would result in an increase in radiological exposure, (approximately double), without a commensurate increase in the level of quality or safety for this inspection. A liquid penetrant exam of the uphill side would involve climbing down the ladder, moving the ladder, and climbing back up the ladder to perform the additional PT on that side of the nozzle.

3. *Does the structural integrity evaluation use the crack-growth formula in industry report MRP-55? The staff has not made a determination on the subject industry report. Therefore, if using MRP-55 agree to and document the following condition:*

   If the NRC staff finds that the crack-growth formula in industry report MRP-55 is unacceptable, the licensee shall revise its analysis that justifies relaxation of the Order within 30 days after the NRC informs the licensee of an NRC-approved crack growth formula. If the licensee's revised analysis shows that the crack growth acceptance criteria are exceeded prior to the end of the current operating cycle, this relaxation is rescinded and the licensee shall, within 72 hours, submit to the NRC written justification for continued operation. If the revised analysis shows that the crack growth acceptance criteria are exceeded during the subsequent operating cycle, the licensee shall, within 30 days, submit the revised analysis for NRC review. If the revised analysis shows that the crack growth acceptance criteria are not exceeded during either the current operating cycle or the subsequent operating cycle, the licensee shall, within 30 days, submit a letter to the NRC confirming that its analysis has been revised. Any future crack-growth analyses performed for this and future cycles for RPV head penetrations must be based on an acceptable crack growth rate formula.

   Response

   The crack growth used in the structural integrity evaluation is the same as reported in MRP-55 and the Enclosure 2 to the staff guidance letter to Alex Marion, NEI, Reference 4 of DNC's request RR-89-48. Therefore, DNC agrees to the condition language as stated in this question.

4. *What was the range of the UT examinations that were performed on the CEDM penetration nozzles during the last outage (distance above and below the weld for the 69 CEDM head penetrations?) How is it different than what is required in the Order? Were other examination methods used? What other examinations were performed? What were the results?*

Response

The Order requires that the ultrasonic examination be conducted from at least 2 inches above the J-groove weld to the end of the nozzle. It is not possible to examine the nozzle base material through the funnel. All 69 of the CEDM penetration nozzles were ultrasonically examined from a position greater than 2 inches above the J-groove weld to a distance below the toe of the J-groove weld. At some distance below the J-groove welds, (at approximately 1 and 1/4 inches from the bottom of the nozzles), the ultrasonic transducers encounter the funnel. When the transducers contact the funnel, they lose contact with the nozzle surface, terminating the UT examination of the nozzle base material.

DNC submitted information on the vessel head inspection during the previous refueling outage (2R14) in a letter dated April 30, 2002,[1] in response to Bulletin 2001-01, "Circumferential Cracking of Reactor Pressure Vessel Head Penetration Nozzles." Additional information was subsequently provided in a DNC letter, dated May 30, 2002.[2] During the last outage, in addition to UT examinations of each nozzle, DNC performed liquid penetrant examinations on all nozzles that recorded ultrasonic indications in the nozzle base material. Additionally, DNC performed ultrasonic scanning of the low alloy steel in selected areas to investigate for possible wastage. No wastage of the low alloy steel was detected and all of the nozzles that recorded PT indications were repaired.

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(1) DNC Letter, "Response to NRC Bulletin 2001-01, Circumferential Cracking of Reactor Pressure Vessel Head Penetration Nozzles," dated April 30, 2002, (Accession No. ML021330032).

(2) DNC letter, "Millstone Nuclear Power Station, Unit No. 2, Reply to Request for Additional Information Related to NRC Bulletin 2001-01," dated May 30, 2002, (Accession No. NL021640560).

5. *How were the UT examinations performed during the last outage? Discuss what probes were used. How were indications dispositioned? How was the UT qualified for the last outage?*

Response

DNC letter, dated December 10, 2002,[(3)] documented the inspection plan prior to the previous Unit No. 2 refueling outage (2R14). A January 24, 2002,[(4)] meeting with the NRC discussed DNC plans in response to NRC Bulletin 2001-01.

Framatome ANP, NDE Services, examined 78 reactor vessel head penetrations (RVHPs). These penetrations consisted of 1 vent line nozzle, 8 Incore Instrumentation (ICI) nozzles, and 69 CEDM nozzles. The CEDM and ICI penetration examinations were performed using Framatome ANP ultrasonic examination procedure 54-ISI-100-08, "Remote Ultrasonic Examination Of Reactor Head Penetrations." The vent line penetration was examined using Framatome ANP ultrasonic examination procedure 54-ISI-137-00, "Remote Ultrasonic Examination Of Reactor Vessel Head Vent Line Penetrations." These ultrasonic examinations were performed from under the vessel head with the transducer probe inserted into each of the nozzles for scanning. The examination of the CEDM and ICI penetrations provided an examination for both axial and circumferential oriented flaw detection along with the detection of a leak path associated with a leak between the nozzle outside surface and the vessel head. The examination of the vent line nozzle penetration provided an examination for circumferential oriented flaws.

If recordable indications were detected, these indications were recorded in accordance with the requirements of the examination procedure, and additional confirmatory NDE (PTs) were performed. If no recordable indications were detected, but non-recordable fabrication type reflectors were detected at the nozzle to weld interface, these signals were noted on the examination data sheets.

The examination techniques implemented at Millstone for the RVHP examinations utilized an array of ultrasonic transducers contained within a rotating probe. For the CEDM and ICI penetration examinations, 10 individual transducers were utilized. These transducers provide detection capabilities for axial and circumferential oriented flaws as well as the detection of the leak path between the nozzle penetration and the vessel head through the interference fit region. The ten transducers and their applications are summarized in the following table.

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(3) DNC letter "Supplemental Response to Bulletin 2001-01, "Circumferential Cracking of Reactor Pressure Vessel Head Penetration Nozzles," dated December 10, 2002, (Accession No. ML023610036).

(4) NRC Meeting Summary, "Summary of January 24, 2002, Meeting to Discuss the Licensee's Reactor Pressure Vessel Head Penetration Nozzle Inspection Plans in Response to NRC Bulletin 2001-01 (TAC No. MB2639)," dated March 12, 2002. (Accession No. ML020380688).

Ultrasonic Transducer Application Summary			
Channel	Angle/Mode	Beam Direction	Application
1	0° Longitudinal	N/A	Weld profile, Leak Path Verification (LPV), Axial crack detection, Circumferential crack detection.
2	30° Longitudinal	Axial	Leak Path Verification (LPV), Axial crack detection. Circumferential crack detection and characterization.
3	45° Longitudinal	Axial	Leak Path Verification (LPV), Axial crack detection. Circumferential crack detection and characterization.
4	60° Shear	Axial	Circumferential crack detection and characterization.
5	60° Shear	Axial	Circumferential crack detection and characterization.
6	45° Longitudinal	Circumferential	Weld profile, Leak Path Verification (LPV), Axial crack detection and characterization. Circumferential crack detection.
7	55° Longitudinal	Circumferential	Weld profile, Leak Path Verification (LPV), Axial crack detection and characterization. Circumferential crack detection.
8	65° Longitudinal	Circumferential	Weld profile, Leak Path Verification (LPV), Axial crack detection and characterization. Circumferential crack detection.
9	60° Shear	Circumferential	Axial crack detection and characterization.
10	60° Shear	Circumferential	Axial crack detection and characterization.

The techniques utilized for the examinations are intended for the detection and through-wall (depth) sizing of axial and circumferential Inside Diameter (ID) and OD initiating flaws in the nozzle base metal only. Forward scatter, longitudinal-wave and backward scatter shear wave techniques are used. The examinations were conducted from the bore of the head penetration in the J-groove weld region of the nozzle. Scanning was performed by moving the transducers axially along the length of the nozzle to provide coverage of the weld and interference fit region.

The inspections consisted of scanning for axial and circumferential reflectors within the nozzle. The tooling consisted of a transducer head that holds 10 individual search units. These search units were divided into two sets, one for the axial beam direction and one for the circumferential beam direction. The axial beam direction set of search units consisted of 5.0 MHz, longitudinal wave forward scatter time of flight search units with angles of 30° and 45°; backward scatter pulse echo, 2.25 MHz 60° shear wave search units; and a 5.0 MHz 0° search unit. The circumferential beam direction set of search units consisted of 5.0 MHz, longitudinal wave forward scatter time of flight search units with angles of 45°, 55°, and 65°; backward scatter pulse echo, 2.25 MHz 60° shear wave search units; and a 5.0 MHz 0° search unit.

The detection of flaw indications is based upon the expected responses for each search unit and technique. The 0° transducer provides weld position information and also provides reflector positional information due to lack of backwall response in the region of the reflector. The forward scatter time of flight technique provides reflector detection and sizing information. For the forward scatter transducers, reflector detection is identified by loss of signal response either from the lateral wave or backwall responses as well as crack tip diffracted responses. The 60° shear wave transducer provides detection by means of corner trap responses between the flaw and nozzle surface and sizing with tip diffracted signals.

During the period from September 24, 2001, through September 30, 2001, Framatome ANP conducted a demonstration of ultrasonic techniques for examination of CEDM nozzles from the bore, using Framatome procedure 54-ISI-100-06. This procedure was demonstrated to members of various utilities, the Electric Power Research Institute (EPRI), and an independent inspector from Hartford Steam Boiler.

6. *For Table 1 (on Attachment 1, page 12) in the submittal dated October 3, 2003, provide a drawing identifying – minimum weld height, end point elevation, weld elevation. What is used as the reference point?*

   Response

   The reference point for all of the measurements in question is the bottom of the funnel. The minimum weld height is the lowest point of the weld at the flaw location as listed in the column, "Weld Elevation at Flaw" in Table 1 of the October 3, 2003, request RR-89-48. The end point elevation is the highest and lowest elevations of the flaw. The column, "Weld Elevation at Flaw," lists the maximum and minimum weld heights at the flaw location.

7. *It is unclear how the predicted time for a flaw to grow to a point of contacting the weld of 1.9 years of operation provides adequate margin for the 1.5 years required for the next plant cycle. Describe uncertainties in this calculation (e.g., stress levels, crack growth rate, etc.) and the uncertainty in the result.*

   Response

   The 26 percent margin on the time for a postulated flaw to reach the specified acceptance limit is considered adequate. The recommended staff guidelines referenced in footnote 4 of DNC's request RR-89-48 does not require a margin on time to reach the bottom of the weld. Uncertainty in the flaw propagation time to the acceptance limit is addressed by the margin inherent in the propagation limit itself, since there is no structural integrity or leakage issue until the flaw has progressed well beyond the limit. The primary conservatism is that the analysis does not include any time for a crack to grow through the weld. Until a crack grows through the weld, a leak cannot occur.

For Millstone there is an additional conservatism relative to the recommended guidelines in that the CEDM nozzles fabricated from Huntington Alloy materials are likely to have a significantly lower flaw propagation rate than that recommended by the guidelines and MRP-55 Rev. 1. In Table 5-3 of the MRP-55, five Huntington alloy heats (comprising 30 specimens) are listed and for these, the maximum mean *alpha* coefficient in the growth formula is 1.37E-12 as compared to the MRP-55 value of 2.67E-12. None of the Huntington materials exceeds the MRP-55 value. Since it is considered that the Huntington test data are indicative of the expected results for the Millstone nozzle materials, the mean growth rate for the Millstone nozzle materials is about half the MRP-55 recommended value, resulting in a significant margin in crack growth duration to reach the acceptable limit.

The major inputs to calculation of time to grow to the weld are discussed below. More information can also be found in chapters 5 and 6 of the submitted WCAP-15813-P.

- Stress analysis results – The stress analysis was performed with a three dimensional finite element model. The weld was simulated by two weld passes. The results are expected to be a best estimate of the stress with very small uncertainties.
- Flaw sizing – the flaw sizing is postulated so there is no uncertainty. Postulating a though-wall flaw conservatively bounds any flaw that could exist in the head penetration.
- Material yield strength – The yield strength has an effect on crack initiation time but has been shown to have no impact on the Primary Water Stress Corrosion Cracking (PWSCC) growth rate.[5]

8. *Discuss the basis for the 0.38 inch level below the J-groove weld. From what point on the J-groove weld will the 0.38 inches be measured?*

Response

The basis for the 0.38 inch criteria came from an evaluation of the data collected during the previous inspection in March 2002 and the application of this information to the crack growth prediction curves found in the WCAP. As discussed in the response to question 12 below, the point that UT is calling the bottom of the weld is where weld metal stops. This is conservative since the theoretical tangent of the fillet weld is closer to the head. The data from March 2002, had a number of points

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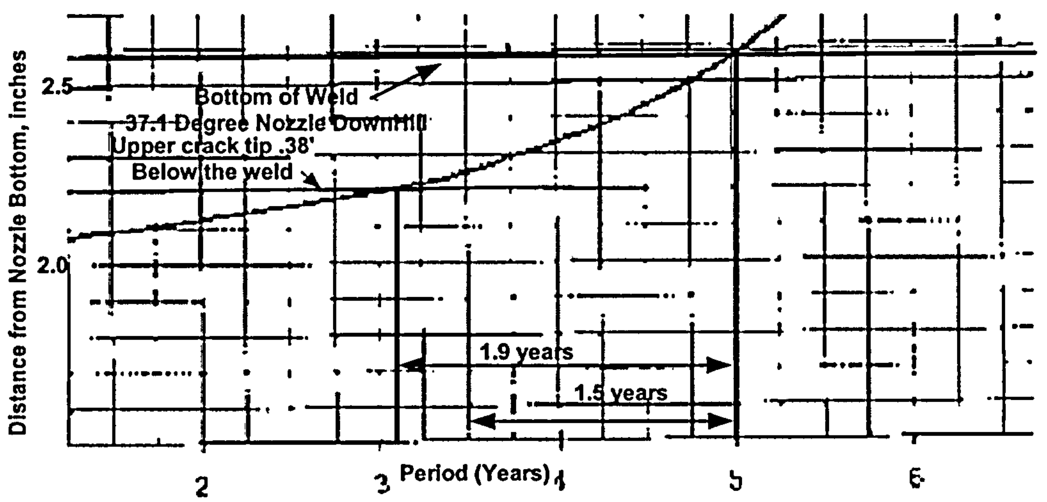
[5] Foster, Bamford and Pathania, Proceedings of Eighth Int. Conference on Environmental Degradation, NACE, 1997.

clustered around 0.38 inches below the weld and 0.30 inches below the weld. A check of the 0.30 dimension on the crack growth prediction curves showed that for most of the nozzles the predicted time for a through wall flaw to grow to the weld was less than 1.5 years. At the 0.38 inch dimension, the predicted times were as shown in the Millstone submittal. The Figure below shows the graphical determination of the time until a crack 0.38 inches below the weld reaches the bottom of the weld for the 37.1 degree penetration which turned out to be the most limiting case. This Figure is an enlarged section of Figure 6-15 from WCAP 15813-P.



The 'below the weld' dimension was verified for each nozzle. The results were presented in the response to item 2. The extent of this UT examination coverage achieved in the current refueling outage (2R15) is provided in Table 1. The scope of needed supplemental PT examinations is shown in Table 1 and will include six CEDM nozzles.

9. *Provide a cross sectional figure of the head and penetrations showing how far each penetration protrudes below the bottom surface of the head using as built dimensions and considering the UT results from the last inspection. Are there any photos from the last or previous outages? If so provide any photos that show how far the penetrations protrude below the head.*

Response

Photos have not been included. The CEDM nozzle arrangement is described by the figures provided in the balance of this Attachment.

10. *Describe the meaning of the statement on page 7 of Attachment 1 of the submittal dated October 3, 2003, "The establishment of the 0.38-inch minimum coverage is consistent with the approach that is described in Footnote 1 of the NRC Order EA-03-009 for the criteria to set the necessary height of the surface examination."*

    Footnote 1 refers to "Flaw Evaluation Guidelines" and not the setting of minimum coverage.

    Response

    This item is addressed in the discussion on item 11 below.

11. *Page 7 of Attachment 1 of the submittal dated October 3, 2003, states, "As noted in reference [footnote] 3, prediction of crack growth is required for only one cycle of operation." Where in reference 3 (Order EA-03-009) is this noted? Provide justification and clarification of this statement.*

    Response

    The reference to footnote 3 of the submittal would have been clearer if it had been to footnote 4 of the submittal, a reference to the letter from Office of Nuclear Reactor Regulation (NRR) to Alex Marion, Nuclear Energy Institute (NEI), "Flaw Evaluation Guidelines," dated April 11, 2003. This letter references the letter to NEI, dated November 21, 2001, originally referenced in footnote 1 of the Order, and states that the newer letter has superseded it. To respond to the question, the guidelines enclosure of the newer letter states, under "Evaluation Procedure," the second bullet:

    > *"A flaw growth analysis shall be performed on each detected flaw to determine maximum growth due to fatigue, stress corrosion cracking or both mechanisms, when applicable, during a specified evaluation period. The minimum time interval for the flaw growth evaluation shall be until the next inspection."*

    The basic technical approach in request RR-89-48 is to justify the minimum UT coverage requirement by a flaw tolerance evaluation for hypothetical undetected flaws below the exam coverage area. Since evaluation of a hypothetical undetected flaw is no different from evaluation of an actual flaw as was addressed in the guideline, the guidance on the assumption of crack growth to the next inspection (one cycle) was considered applicable to the flaw tolerance evaluation used in DNC's request RR-89-48. It may be noted that DNC's flaw tolerance evaluation used the same crack growth rate formulation that was required by the guidelines, and the same acceptance criterion (no OD crack growth into the weld region).

    The statement that the minimum coverage is consistent with the footnote to the Order means that the exam coverage is sufficient to identify all flaws that would be unacceptable by the referenced guidelines for flaw evaluation, and if a flaw existed below that coverage area, it would be acceptable by the same referenced guidelines.

12. *Does the crack growth analysis consider growth in the base metal to the "fillet weld cap" or the "J-groove weld" in setting the required inspection scope. The fillet weld cap should be used to preclude the possibility of rapid crack growth in the weld metal.*

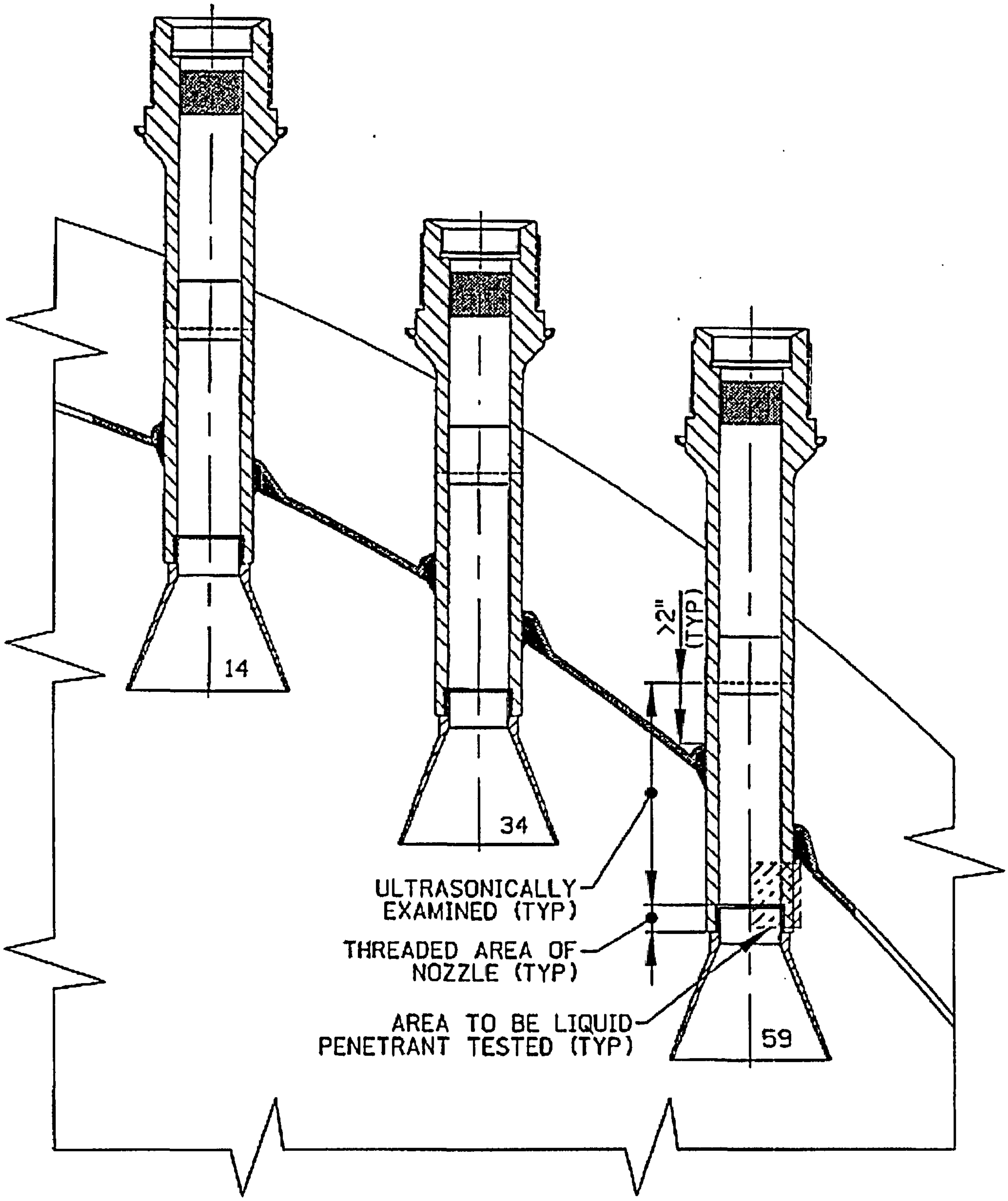
    Response

    The crack growth analysis as presented in the request RR-89-48 permits growth only to the bottom of the detectable weld material. All measurements "below the weld" are with respect to this UT detected point, which is considered the toe of the "fillet weld cap." This latter portion of the weld is not a distinct separate weld but an extension of the J-weld extending below the local surface plane of the cladding on the vessel head. It has a minimum specified throat size of 1/4 inch and a specified intersection fillet radius of 3/16 inch at both the J-weld surface and the nozzle OD. For direct consistency with the finite element analysis predicting stress levels, measurements of distance below the weld should be with respect to the linear intersection of the fillet weld cap and the nozzle OD surface, instead of the toe of radiused weld as detected by UT, however the hypothetical linear intersection is not detectable by UT and the radiused weld intersection is conservatively used instead. Thus a measurement of 0.38 inches below the weld will be greater than 0.38 inches below the analyzed weld by a margin that depends on the actual fillet radius and the hillside angle of the penetration.

TABLE 1
EXTENT OF ULTRASONIC TEST (UT) EXAMINATION COVERAGE IN CEDM NOZZLES IN (2R15)
- List Sorted by Downhill Side Coverage -

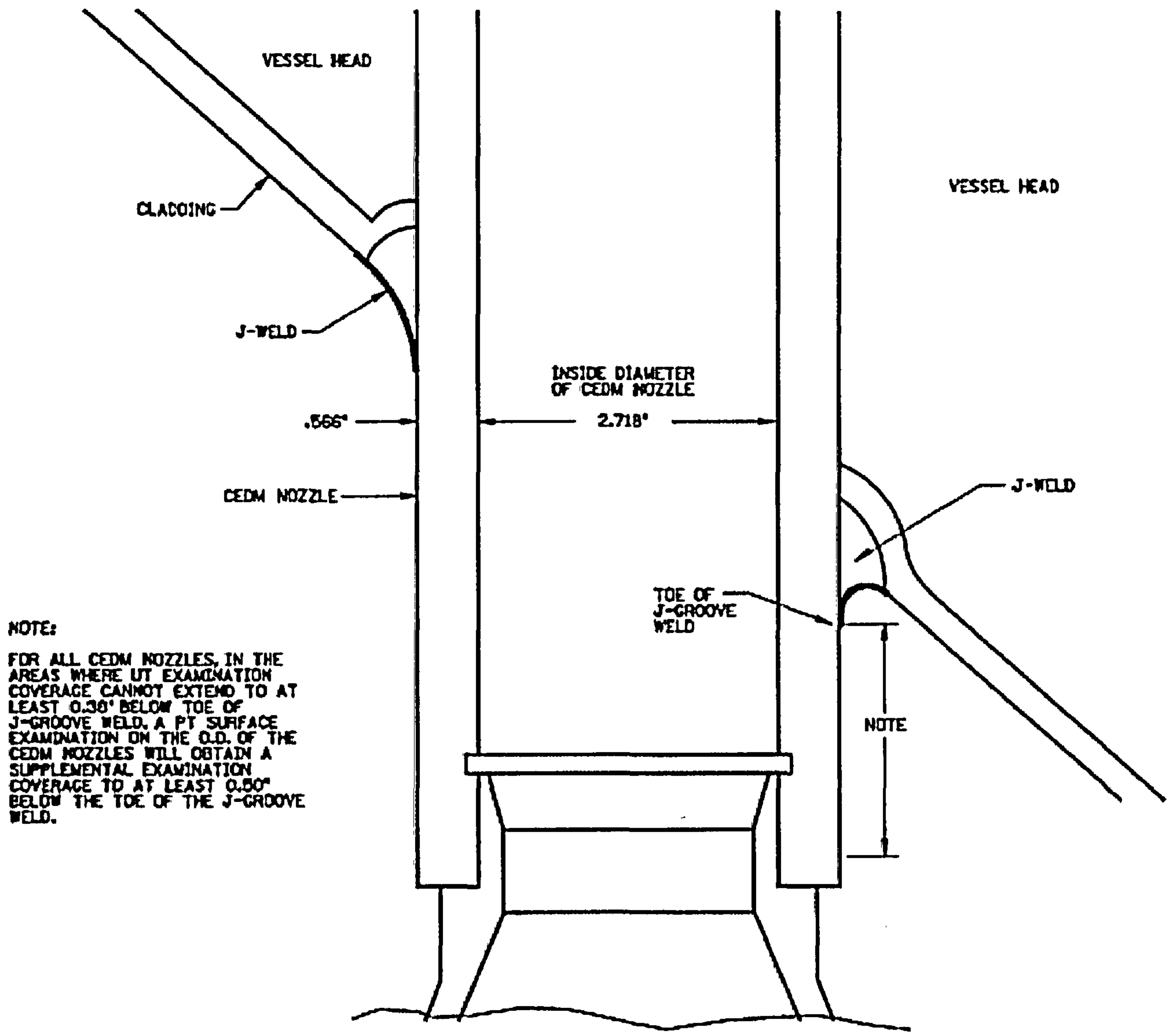
Penet. No.	Minimum Distance Below the Weld Toe (Inches)			Penet. No.	Minimum Distance Below the Weld Toe (Inches)		
	On the Downhill Side	90° From Downhill	270° From Downhill		On the Downhill Side	90° From Downhill	270° From Downhill
55 (1)	0.23	2.32	2.30	58	0.55	2.99	2.76
59 (1)	0.25	3.10	2.67	69	0.55	3.00	2.70
42 (2)	0.31	2.28	2.31	31	0.56	1.93	2.12
27 (1)	0.33	1.76	1.85	10	0.59	1.49	1.47
33 (1)	0.35	1.57	1.41	29	0.59	1.69	1.69
56 (1)	0.35	1.97	2.05	46	0.59	2.56	2.63
65 (1)	0.37	2.69	2.67	57	0.59	2.56	2.28
32	0.39	1.55	1.63	61	0.59	2.60	2.75
60	0.40	2.99	2.71	63	0.59	3.14	2.79
38	0.42	2.20	2.80	13	0.63	1.89	1.69
36	0.47	1.92	2.12	25	0.63	1.61	1.68
43	0.47	2.38	2.62	37	0.63	2.11	2.11
44	0.47	2.63	2.68	49	0.63	2.79	2.26
45	0.47	2.50	2.54	14	0.70	1.69	1.75
66	0.47	2.95	2.53	16	0.70	1.84	1.75
9	0.48	1.36	1.42	35	0.71	2.33	1.84
11	0.48	1.36	1.42	12	0.74	1.80	1.66
48	0.48	2.20	2.27	39	0.74	2.26	2.00
51	0.48	2.52	2.60	53	0.74	2.38	2.50
68	0.48	3.01	2.95	3	0.75	1.26	1.18
20	0.49	1.77	1.53	5	0.75	1.12	1.31
23	0.49	1.75	1.85	64	0.75	3.11	2.79
26	0.50	1.88	1.95	1	0.78	0.98	0.98
19	0.51	1.65	1.57	4	0.79	1.20	1.30
41	0.51	1.99	2.04	8	0.79	1.22	1.18
62	0.51	2.97	2.71	47	0.79	2.79	2.61
67	0.53	2.41	2.52	7	0.80	1.27	1.16
6	0.55	1.77	1.49	17	0.80	1.84	1.75
15	0.55	1.69	1.65	22	0.82	1.89	1.97
18	0.55	1.81	1.73	40	0.82	2.43	2.24
24	0.55	1.76	1.68	2	0.88	1.37	1.39
28	0.55	1.96	2.14	21 (3)	n/a	n/a	n/a
30	0.55	1.69	1.73	34 (3)	n/a	n/a	n/a
52	0.55	2.67	2.34	50 (3)	n/a	n/a	n/a
54	0.55	2.31	2.23				

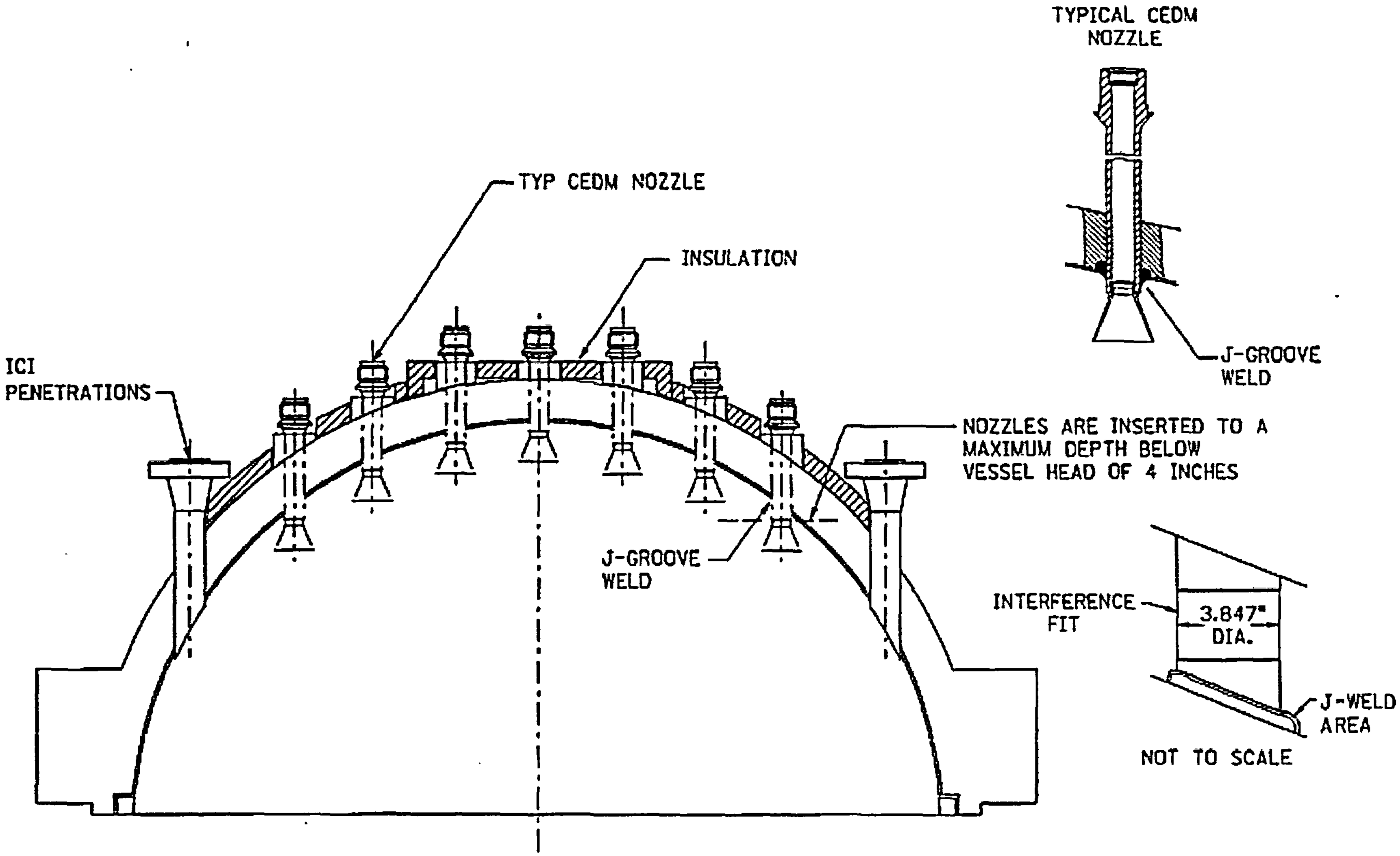
NOTES: (1) A supplemental PT is required. (2) Repair on this nozzle in 2R15 will preclude the need for a supplemental PT. (3) Previously repaired nozzle in 2R14 with greater than 1 inches extent of coverage below pressure boundary weld.



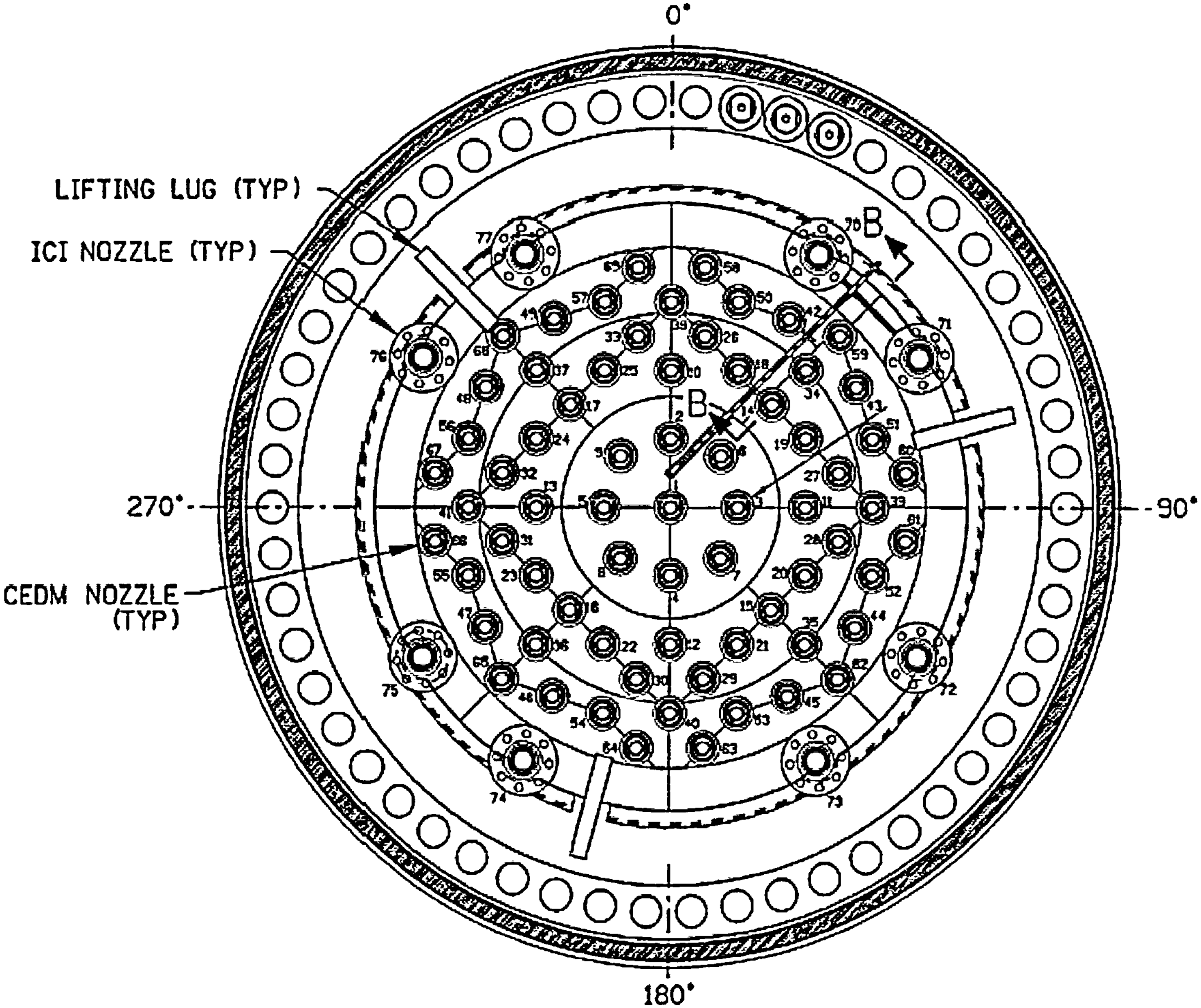
SECTION VIEW B-B

℄ CLOSURE HEAD LOOKING NORTHEAST
AT NOZZLES 14, 34 & 59
SCALE: NONE


VESSEL HEAD
CLADDING
J-WELD
.566"
CEDM NOZZLE
INSIDE DIAMETER OF CEDM NOZZLE
2.718"
VESSEL HEAD
J-WELD
TOE OF J-GROOVE WELD
NOTE
NOTE:
FOR ALL CEDM NOZZLES, IN THE AREAS WHERE UT EXAMINATION COVERAGE CANNOT EXTEND TO AT LEAST 0.30" BELOW TOE OF J-GROOVE WELD, A PT SURFACE EXAMINATION ON THE O.D. OF THE CEDM NOZZLES WILL OBTAIN A SUPPLEMENTAL EXAMINATION COVERAGE TO AT LEAST 0.50" BELOW THE TOE OF THE J-GROOVE WELD.



REACTOR PRESSURE VESSEL
CLOSURE HEAD



PLAN VIEW A-A

(MP2 REACTOR VESSEL CLOSURE HEAD)

NORTH

SCALE: NONE