Duke Energy®

BRUCE H HAMILTON
Vice President
Oconee Nuclear Station

Duke Energy Corporation
ON01VP / 7800 Rochester Highway
Seneca, SC 29672

864 885 3487
864 885 4208 fax
bhhamilton@duke-energy.com

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

SUBJECT: Duke Power Company LLC d/b/a Duke Energy Carolinas, LLC (Duke)
Oconee Nuclear Station, Units 1, 2, & 3
Docket Numbers 50-269, -270, -287
Relief Request 06-ON-004 Request for Additional Information

On August 24, 2006 Duke submitted Relief Request 06-ON-004 pursuant to 10 CFR 50.55a(a)(3)(i), requesting NRC approval to use alternatives to the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI inservice inspection (ISI) requirements for the Oconee Nuclear Station, Unit 1, 2, & 3. This proposed alternative approach is to support application of full structural weld overlays on various pressurizer nozzle-to-safe end welds and will provide an acceptable level of quality and safety.

On September 11, 2006, Duke responded to an August 29, 2006 e-mail request from the NRC Staff for additional information regarding several issues contained within the relief request. On September 20, 2006, Duke received another e-mail request for further information and clarification.

Also on September 20, 2006, a conference call was conducted between the NRC Staff and Duke personnel relative to Relief Request 06-GO-001, which is a similar relief request applicable to Duke's McGuire and Catawba Nuclear Stations. During this call, Duke and the staff discussed the same issues as those addressed in the Oconee e-mail. As part of the call the Staff expressed a position that they would not approve the requested reliefs for outages beyond fall 2006. This was based on the fact that the NRC expects newly enhanced guidance, such as contained in ASME Code Case N740, to be incorporated into future relief requests.

Duke submitted a letter dated September 27, 2006 to address these issues for Relief Request 06-GO-001 with respect to McGuire and Catawba. Subsequently, on September 28, 2006, the NRC Staff provided verbal approval of 06-GO-001 for McGuire.

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The Duke response for Oconee and Relief Request 06-ON-004 is attached. The information contained in this response is essentially identical to the September 27, 2006 response related to Relief Request 06-GO-001. This is due to the similarity in the work to be performed, the consistency of applicable processes between the Duke sites, and the desire to facilitate the review by the NRC Staff.

Included in the response is a commitment to provide to the NRC Staff the results of ultrasonic testing (UT) performed on the weld overlays within 14 days after completion of the final UT on those welds. This commitment is described in greater detail within the attachment.

This commitment is in addition to the commitment made in the August 24, 2006 submittal, which stated that prior to entry into Mode 4 from the Oconee Unit 1 outage in the fall of 2006, a summary of the results of the stress analyses demonstrating that the preemptive full structural weld overlay will not hinder the components from performing their design function will be submitted to the NRC.

Also, in accordance with the NRC Staff position stated during the teleconference of September 20, 2006, Duke hereby retracts the portions of Relief Request 06-ON-004 applicable to Oconee Units 2 and 3, or to any time period beyond the Unit 1 fall 2006 refueling outage.

If you have any questions or require additional information, please contact Randy Todd at (864)-885-3418.

Sincerely,

Bruce Hamilton

Bruce H. Hamilton
Site Vice President
Oconee Nuclear Station

Enclosure

ENCLOSURE

OCONEE NUCLEAR STATION
Response To
Second Request for Additional Information
Request for Relief No. 06-ON-004
Pressurizer Alloy 600 Weld Overlays
(TAC No. MD2887)

NRC Question 1:

Identify the UT acceptance criteria that will be used for the complete full structural weld overlay and heat affected zone beneath the weld overlay. If the acceptance criteria to be used is not consistent with the respective positions stated in Regulatory Guide 1.147, Rev. 14, for the applicable code cases, provide the technical bases for its use.

Response

Approval of Code Case N-638-1 stated in Regulatory Guide 1.147, Rev. 14 imposes a condition that the ultrasonic examination be qualified on samples using construction type flaws and that the acceptance criteria be in accordance with NB-5330 of Section III of the ASME Boiler and Pressure Vessel Code. In lieu of this requirement, Duke proposes to use an EPRI Performance Demonstration Initiative (PDI) qualified ultrasonic examination procedure that is designed and qualified to examine the entire volume of the overlay weld as well as the region of the P1 material containing the weld heat affected zone (HAZ) and a volume of unaffected base material beyond the HAZ (see Figures 1, 2 3 and 4)

The provisions of ASME Section XI, Nonmandatory Appendix Q must be met as a condition of acceptance of Code Case N-504-2 by NRC Regulatory Guide 1.147, Revision 14. Appendix Q, Section 4000 requires ultrasonic procedures and personnel to be qualified in accordance with ASME Code, Section XI, Appendix VIII. Ultrasonic examination of the completed preemptive full structural weld overlay (PWOL) will be accomplished in accordance with Section XI, Appendix VIII, Supplement 11, with alternatives to comply with the PDI program.

Code Case N-638-1 addresses the use of the temper bead welding technique including those welds made in deep cavities in ferritic material. In the case of weld overlays to be applied at Oconee, this technique will be used to apply a non-ferritic overlay to the P1 ferritic nozzle base material adjacent to the dissimilar metal weld (DMW). In addition to verifying the soundness of the weld,

a purpose of these examinations is to assure that delayed cracking that may be caused by hydrogen introduced during the temper bead welding process is not present. In the unlikely event that this type of cracking does occur, it would be initiated on the surface on which the welding is actually performed or in the HAZ immediately adjacent to the weld. The most appropriate technique to detect surface cracking is the surface examination technique that Duke will perform on the weld overlay and the adjacent base material in a band at least 1.5 times the thickness of the base material on either side of the overlay. As shown in Figures 1, 2, 3 and 4, a significant fraction of the 1.5T band will be included in the proposed PDI inspection. The combined UT and surface inspection will cover 100% of the area susceptible to weld induced defects. While it would be possible with additional expenditure of time and equipment to extend the examination volume to a larger extent on either side of the weld overlay, it would not be possible with current technology to ultrasonically inspect 100% of the volume within 1.5 times the thickness of the base material because of geometric considerations. Inspection of an increased volume would result in increased dose to inspection personnel without a compensating increase in safety or quality because there is no plausible mechanism for formation of new flaws or propagation of existing flaws into the region. That is, any expanded inspection would be performed on material that would not otherwise be inspected as part of an ASME Section XI or ASME Section III required weld examination. The overlay volume is small relative to the volume of the underlying pipe and does not present the same concerns as those related to welds in deep cavities contemplated by the requirements of Code Case N-638-1. Therefore, the examinations tailored for overlay inspection and required by Code Case N-504-2 and Appendix Q as modified in the request for relief provide full assurance that the weld and adjoining base material are fully capable of performing their intended function.

ASME Section XI pre-service acceptance standards, as specified in Appendix Q, are the appropriate standards for pre-service ultrasonic examinations of weld overlay repairs to nuclear plant components. These standards are consistent with the highly sensitive ultrasonic examination procedures being used, which are qualified in accordance with ASME Section XI, Appendix VIII, Supplement XI, as implemented via the PDI. The post-repair inspection volume includes the full thickness of the weld overlay plus 25% of the underlying base metal/weldment thickness. The specimen sets for PDI qualification of weld overlay examinations include construction type flaws in the overlays in addition to simulated service flaws in the underlying base metal and weldment. Therefore, use of PDI-qualified personnel and procedures will result in the reliable detection of construction type flaws.

The ASME Section XI flaw acceptance standards are based on fracture mechanics principles that evaluate the potential effect of flaw indications on the

safe operation of a component. ASME Section III ultrasonic standards, on the other hand, are derived from radiographic standards in earlier construction codes and tend to be workmanship-based, addressing flaws occurring in the original construction process that are likely to be detected by radiography. The ASME Section III acceptance criteria do not allow the presence of any cracks or crack-like indications, regardless of their size, and are geared more towards construction-type welds. Many indications that are detectable by PDI qualified ultrasonic techniques, and thus require evaluation, would not be detected by the radiographic examinations required by the original construction Code or Section III. It is therefore not reasonable, nor technically logical, to reject such indications based on out-dated, workmanship-based standards when found by much more sensitive examination techniques that are not required by the construction Codes.

The Section XI pre-service examination standards were developed for exactly the above-stated reasons, and consider the materials in which the flaw indications are detected, the orientation and size of the indications, and ultimately their potential structural impact on the component. They are the logical choice for evaluation of potential flaw indications in post-overlay examinations, in which unnecessary repairs to the overlays would result in additional personnel radiation exposure without a compensating increase in safety and quality, and could potentially degrade the effectiveness of the overlays by affecting the favorable residual stress field that they produce.

Acceptance of ultrasonic indications in weld overlay repairs using Section XI acceptance criteria has been approved by NRC in past weld overlay applications (e.g. References 1, 2).

Subsequent inservice examination of the structural weld overlays on pressurizer components will be in accordance with ASME Section XI, Appendix Q, Q-4300.

NRC Question 2:

Provide a commitment to submit within 14 days from completion of UT examination of the weld overlays, a report that summarizes the results of the examinations, consistent with the September 14, 2006 letter from Exelon to NRC regarding Byron Station, Unit 1 Relief Request 13R-03.

Response

The following information will be submitted to the NRC within fourteen days of completion of the final UT of the welds included in this relief request:

- a listing of flaw indications detected[1]
- the disposition of all indications using the standards of ASME Section XI, IWB-3514-2 and/or IWB-3514-3 criteria and, if possible,
- the type and nature of the indications[2]

References

(1) Safety Evaluation by the Office of Nuclear Reactor Regulation related to Three Mile Island Nuclear Station, Unit 1 (TMI-1) Request for Relief from Flaw Removal, Heat Treatment and Non-Destructive Examination (NDE) Requirements for the Third 10-Year Inservice Inspection (ISI) Interval, Amergen Energy Company, LLC Docket No. 50-289, July 21, 2004.

(2) Safety Evaluation by the Office of Nuclear Reactor Regulation Inservice Inspection Program Relief Request ISIR-17, Donald C. Cook Nuclear Plant, Unit 1 (DCCNP-1), Indiana Michigan Power, Docket No. 50-315, February 10, 2006.

[1] The recording criteria of the ultrasonic examination procedure to be used for the examination of the Oconee pressurizer overlays (SI-UT-126 Rev.0) requires that all suspected flaw indications, regardless of amplitude, be investigated to the extent necessary to provide accurate characterization, identity, and location. Additionally, the procedure requires that all indications, regardless of amplitude, that cannot be clearly attributed to the geometry of the overlay configuration be considered flaw indications.

[2] The ultrasonic examination procedure states that all suspected flaw indications should be plotted on a cross sectional drawing of the weld and that the plots should accurately identify the specific origin of the reflector.

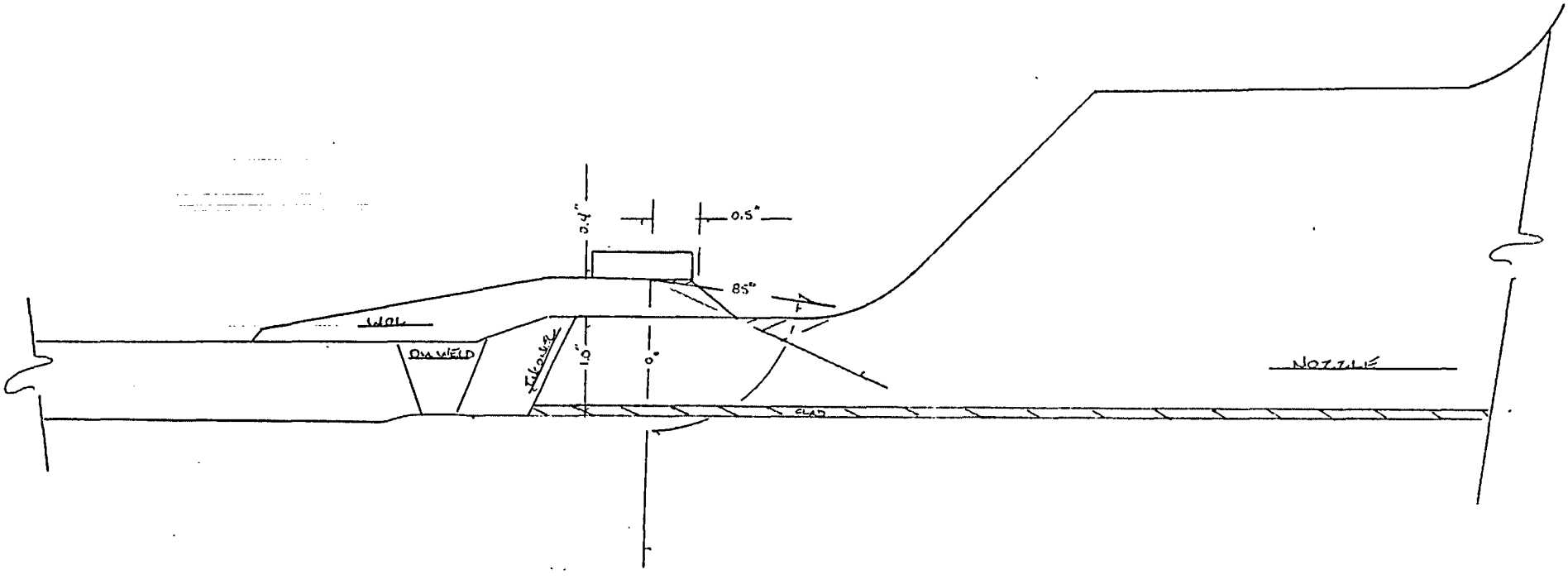

Figure 1 Phased array sector scan of hot leg surge line nozzle. Incomplete coverage illustrated by hatched area in nozzle. Incomplete coverage not illustrated on austenitic end. Dimensions are typical.

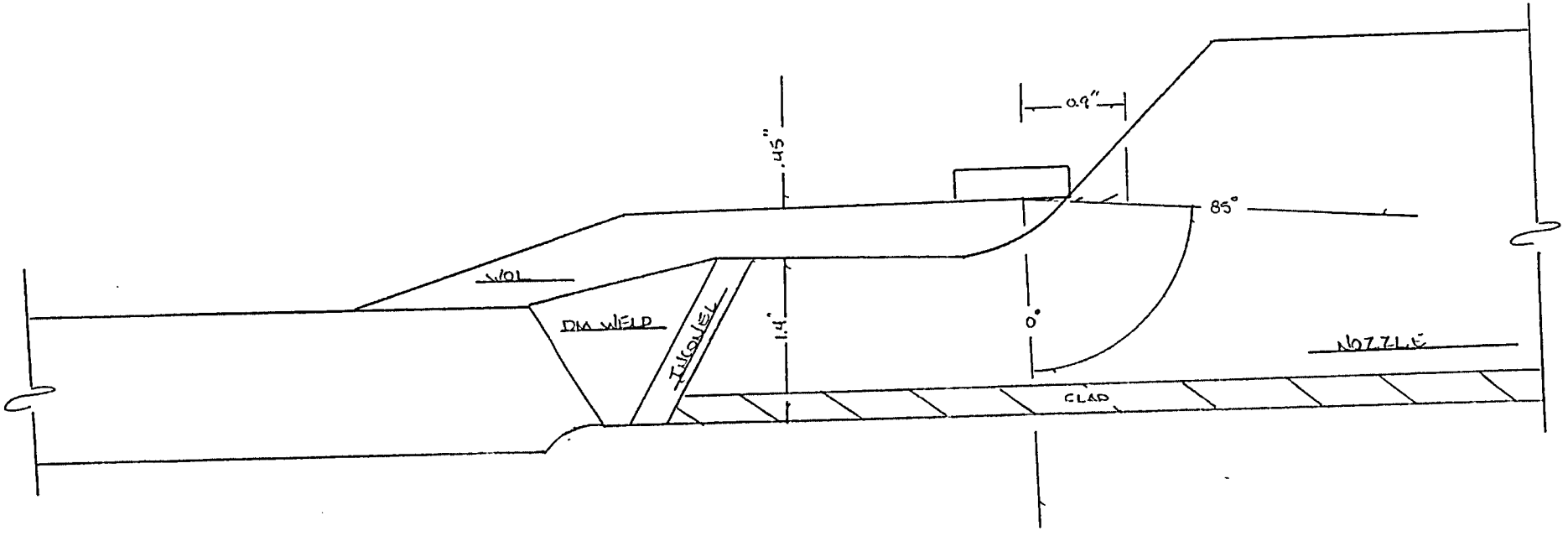

Figure 2 Phased array sector scan of pressurizer surge line nozzle. Incomplete coverage illustrated by hatched area in nozzle. Incomplete coverage not illustrated on austenitic end. Dimensions are typical.

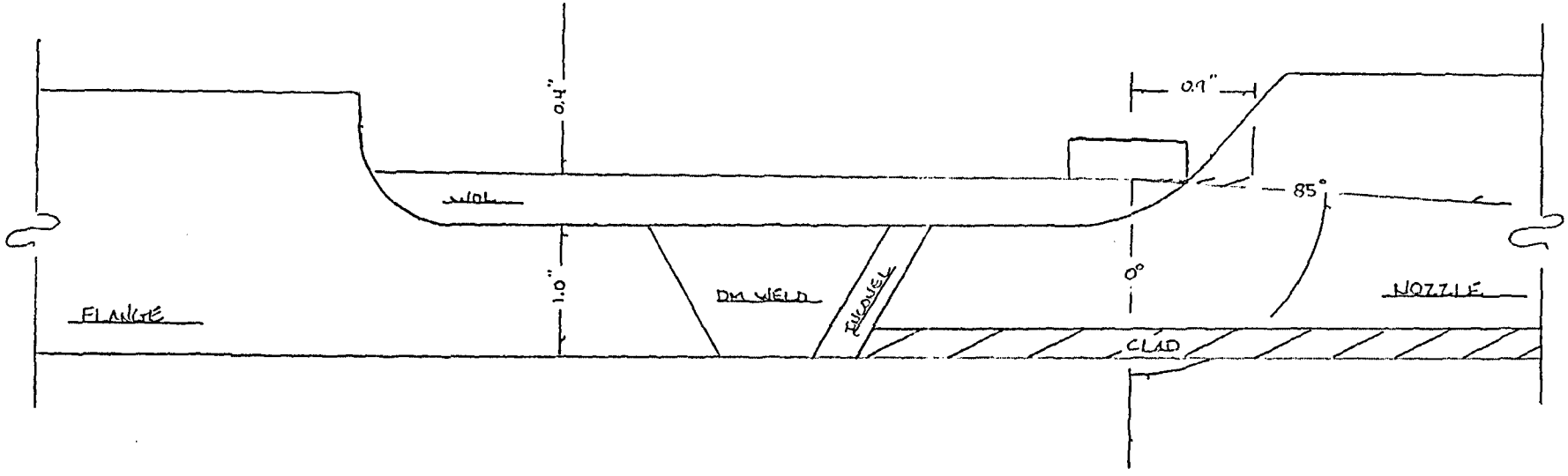

Figure 3 Phased array sector scan of pressurizer safety/relief nozzle. Incomplete coverage illustrated by hatched area in nozzle. Incomplete coverage not illustrated on austenitic end. Dimensions are typical.

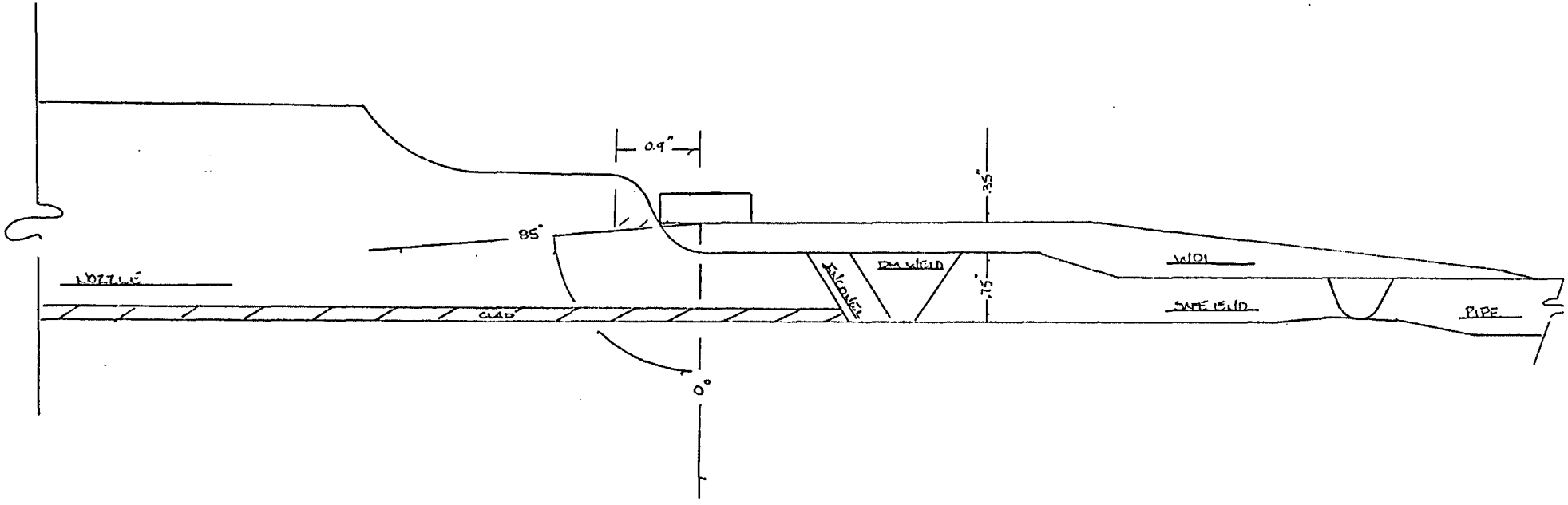

Figure 4 Phased array sector scan of pressurizer spray nozzle. Incomplete coverage illustrated by hatched area in nozzle. Incomplete coverage not illustrated on austenitic end. Dimensions are typical.