Entergy

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Michael A. Krupa
Director
Nuclear Safety & Licensing

CNRO-2003-00030

July 24, 2003

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

SUBJECT: Entergy Operations, Inc.
Response to Request for Additional Information Pertaining to
Relaxation Requests to NRC Order EA-03-009

Arkansas Nuclear One, Unit 2
Docket No. 50-368
License No. NPF-29

Waterford Steam Electric Station, Unit 3
Docket No. 50-382
License No. NPF-38

REFERENCE: Entergy Operations, Inc. Letter CNRO-2003-00027 to the NRC, "Relaxation Requests to NRC Order EA-03-009," dated July 1, 2003

In the referenced letter, Entergy Operations, Inc. (Entergy) requested relaxation from Section IV.C(1)(b) of NRC Order EA-03-009 for Arkansas Nuclear One, Units 1 and 2 (ANO-1 and ANO-2), and Waterford Steam Electric Station, Unit 3 (Waterford 3). In telephone calls held on July 14 and July 15, 2003, representatives of the NRC staff and Entergy discussed these requests. As a result of these discussions, Entergy is submitting revisions to the ANO-2 and Waterford 3 requests, as Enclosures 1 and 2, respectively, and withdraws the ANO-1 relaxation request. The enclosed ANO-2 and Waterford 3 relaxation requests supercede the previous versions in their entirety.

Entergy requests approval of these proposed relaxation requests by August 18, 2003, in order to support inspection activities scheduled during the upcoming fall 2003 refueling outages at ANO-2 and Waterford 3.

This letter contains one commitment for each facility as identified in Enclosure 3.

A101

Should you have any questions, please contact Guy Davant at (601) 368-5756.

Sincerely,

M. A Krupa

MAK/GHD/bal

Enclosure:
1. Relaxation Request #2 for Arkansas Nuclear One, Unit 2
2. Relaxation Request #2 for Waterford Steam Electric Station, Unit 3
3. Licensee-Identified Commitments

cc: Mr. C. G. Anderson (ANO)
Mr. W. A. Eaton (ECH)
Mr. G. D. Pierce (ECH)
Mr. J. E. Venable (W3)

Mr. T. W. Alexion, NRR Project Manager (ANO-2)
Mr. R. L. Bywater, NRC Senior Resident Inspector (ANO)
Mr. T. P. Gwynn, NRC Region IV Regional Administrator
Mr. M. C. Hay, NRC Senior Resident Inspector (W3)
Mr. N. Kalyanam, NRR Project Manager (W3)
Mr. J. L. Minns, NRR Project Manager (ANO-1)

ENCLOSURE 1

CNRO-2003-00030

ARKANSAS NUCLEAR ONE, UNIT 2
RELAXATION REQUEST #2

ENTERGY OPERATIONS, INC.
ARKANSAS NUCLEAR ONE, UNIT 2
RELAXATION REQUEST #2 TO NRC ORDER EA-03-009

I. COMPONENT/EXAMINATION

Component/Number: 2R-1

Description: Reactor Pressure Vessel (RPV) head penetration nozzles

Code Class: 1

References:

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
2. Letter 2CAN020304 from Entergy Operations, Inc. to the NRC, "Entergy Operations, Inc. – Answer to Issuance of Order Establishing Interim Inspection Requirements for Reactor Pressure Vessel Heads at Pressurized Water Reactors", dated February 28, 2003

Unit: Arkansas Nuclear One, Unit 2 (ANO-2)

Inspection Interval: Third (3rd) 10-Year Interval

II. REQUIREMENTS

The NRC issued Order EA-03-009 (the Order) that modified the current licenses at nuclear facilities utilizing pressurized water reactors (PWRs), which includes ANO-2. The Order establishes inspection requirements for RPV head penetration nozzles. ANO-2 is categorized as a "High" primary water stress corrosion cracking (PWSCC) susceptibility plant based on an effective degradation year (EDY) value greater than 12.

According to Section IV.C.1(b) of the Order, RPV head penetration nozzles in the "High" PWSCC susceptibility category shall be inspected using ***either*** of the following non-destructive examination (NDE) techniques each refueling outage:

(i) Ultrasonic testing (UT) of ***each*** RPV head penetration nozzle (i.e., nozzle base material) from two (2) inches above the J-groove weld to the bottom of the nozzle and an assessment to determine if leakage has occurred into the interference fit zone, ***or***

(ii) Eddy current testing (ECT) or dye penetrant testing (PT) of the wetted surface of ***each*** J-groove weld and RPV head penetration nozzle base material to at least two (2) inches above the J-groove weld.

III. PROPOSED ALTERNATIVES

The ANO-2 RPV head has ninety (90) penetration nozzles that include eighty-one (81) Control Element Drive Mechanism (CEDM) nozzles, eight (8) Incore Instrument (ICI) nozzles, and one (1) vent line nozzle. Entergy Operations, Inc. (Entergy) requests relaxation from and proposes an alternative to the requirements of the Order as discussed below.

A. NDE Inspection Technique for the Vent Line Nozzle

Entergy understands that the Order requires the same technique, specified in Section IV.C(1)(b), be used to inspect the entire population of RPV head penetration nozzles; combining techniques or using one technique on one nozzle and the other technique on another nozzle is not permitted.

Entergy plans to inspect the CEDM and ICI nozzles using the UT inspection technique as specified in Section IV.C(1)(b)(i) of the Order or in accordance with approved relaxation requests. In lieu of using the UT inspection technique on every RPV head penetration nozzle, Entergy requests authorization to inspect the vent line nozzle and J-groove weld using the ECT technique per Section IV.C(1)(b)(ii) of the Order.

B. NDE Inspection Technique for the ICI Nozzles

In lieu of performing inspections as prescribed in Section IV.C(1)(b)(i) of the Order, Entergy proposes to inspect the eight (8) ICI nozzles as follows:

1. Perform an assessment to determine if leakage has occurred into the interference fit zone of the nozzle using UT; and

2. Perform a UT inspection of the nozzle base material from 2 inches above the J-groove weld to the bottom of the nozzle, except where meaningful UT data cannot be collected due to nozzle configurations and/or UT inspection probe limitations; and

3. Where meaningful UT data cannot be collected, supplement the UT inspection with a surface examination of those un-inspected portions of the nozzle base material to determine the condition of the nozzle.

Contingent upon authorization of this relaxation request, Entergy will provide in the 60-day report for ANO-2, as required by the Order, specific inspection information; i.e., extent of inspections and results of those inspections.

IV. BASIS FOR PROPOSED ALTERNATIVES

A. NDE Inspection Technique for the Vent Line Nozzle

The Order requires inspecting the entire population of RPV head penetration nozzles using only one of the techniques specified in Section IV.C(1)(b). This limits the licensee's options without measurably increasing the level of quality or safety. Entergy believes that using either inspection technique is sufficient to detect the PWSCC phenomena, and that no significant benefit is gained by requiring the same technique to be used on all nozzles.

Conditions at ANO-2 warrant using a different technique on different nozzles due to nozzle configuration. Specifically, the UT inspection probe used to examine the CEDM and ICI nozzles is not suitable for the leakage assessment due to the lack of an interference fit on the smaller vent line nozzle; therefore, Entergy proposes to use a different technique (ECT) to perform this inspection, as requested in Section III.A, above.

B. NDE Inspection Technique for the ICI Nozzles

Entergy believes the proposed alternative specified in Section III.B, above, satisfies the objective of Section IV.C(b)(1)(i) of the Order by providing adequate inspection of the nozzle base material and an assessment for leakage in the interference fit zone. Specifically, the leakage assessment and integrity of the nozzle base material is determined via the UT inspection per Sections III.B.1 and III.B.2, and surface examinations per Section III.B.3.

Surface examinations are needed due to reduced UT inspection coverage of the nozzle, which is caused by nozzle configuration and UT inspection probe design. The ICI nozzle has a counterbore within the 2-inch length above the J-groove weld for some portion on the upper hillside of the nozzle (see Figures 1 and 5). In addition to the counterbore, the bottom of the nozzle is cut at an angle approximating the contour of the RPV head. See Figure 1 for a sketch of a typical ICI nozzle.

The UT inspection probe to be used to inspect the ANO-2 ICI nozzles consists of seven (7) individual transducers. The configuration of the probe has been optimized for maximum coverage. The probe is designed so that the ultrasonic transducers are slightly recessed into the probe holder. This recess must be filled with water to provide coupling between the transducer and the nozzle wall. Because of this design, the complete diameter of the transducer must fully contact the inspection surface before ultrasonic information can be collected. Coupling will be lost at the counterbore and also at the end of the nozzle due to loss of contact. See Figures 2 through 7 for sketches showing the UT probe at various locations along the length of the ICI nozzle.

The proposed alternative specified in Section III.B addresses this condition by supplementing the UT inspection with surface examinations for those portions of the nozzle that cannot be inspected by UT. This alternative ensures that 100% of the nozzle base material is inspected.

V. CONCLUSION

Section IV.F of NRC Order EA-03-009 states:

"Licensees proposing to deviate from the requirements of this Order shall seek relaxation of this Order pursuant to the procedure specified below. The Director, Office of Nuclear Reactor Regulation, may, in writing, relax or rescind any of the above conditions upon demonstration by the Licensee of good cause. A request for relaxation regarding inspection of specific nozzles shall also address the following criteria:

(1) The proposed alternative(s) for inspection of specific nozzles will provide an acceptable level of quality and safety, or

(2) Compliance with this Order for specific nozzles would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety."

Entergy believes the requested authorization to use ECT on the vent line nozzle (Section III.A, above) and the proposed alternative to use a combination of inspection techniques on the ICI nozzles (Section III.B, above) maintain the level of quality and safety prescribed in Section IV.C(1)(b) based upon the justification provided in Section IV, above. Therefore, Entergy requests that the proposed alternative be authorized pursuant to Section IV.F of the Order.

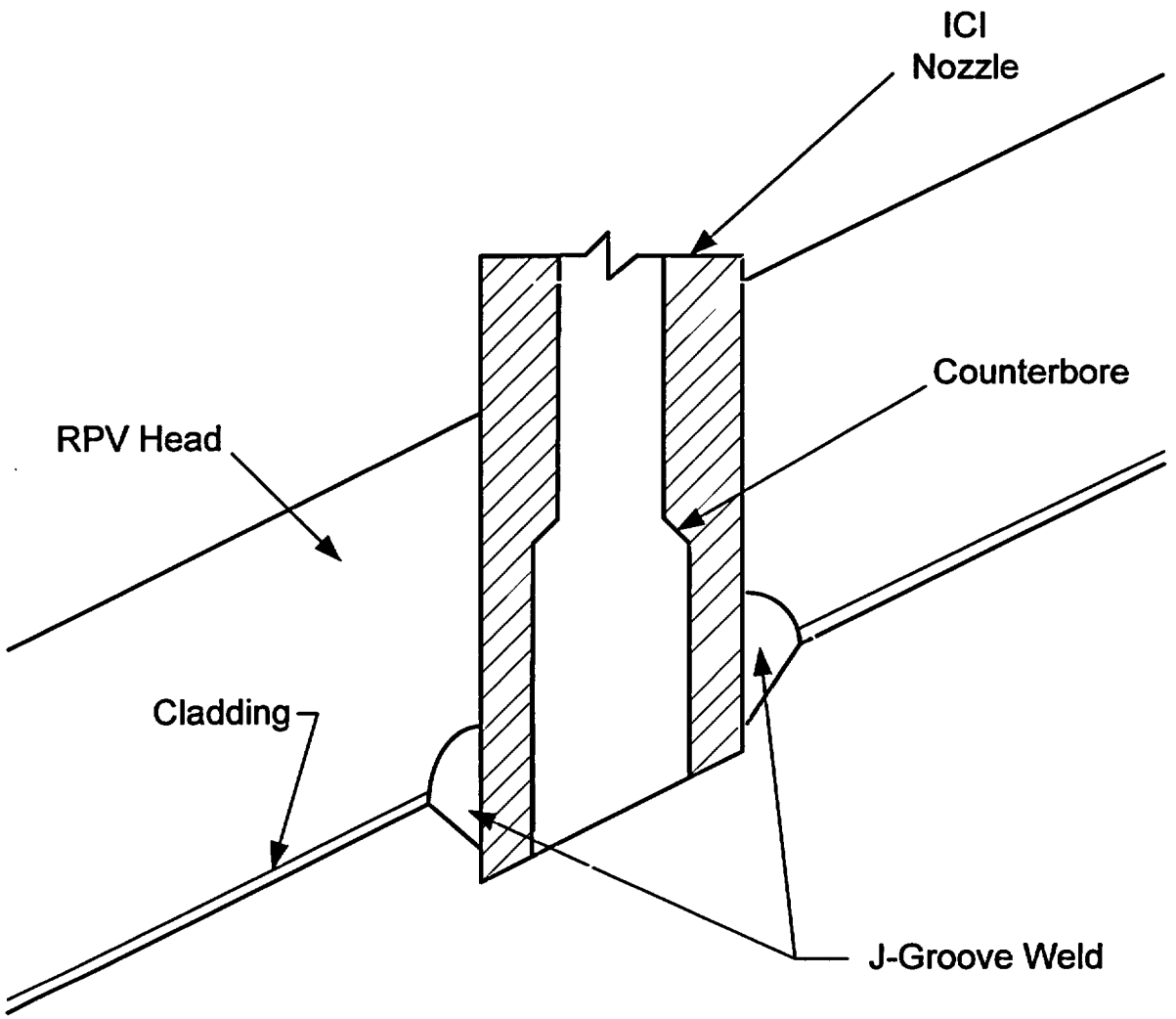

FIGURE 1
ICI NOZZLE CONFIGURATION

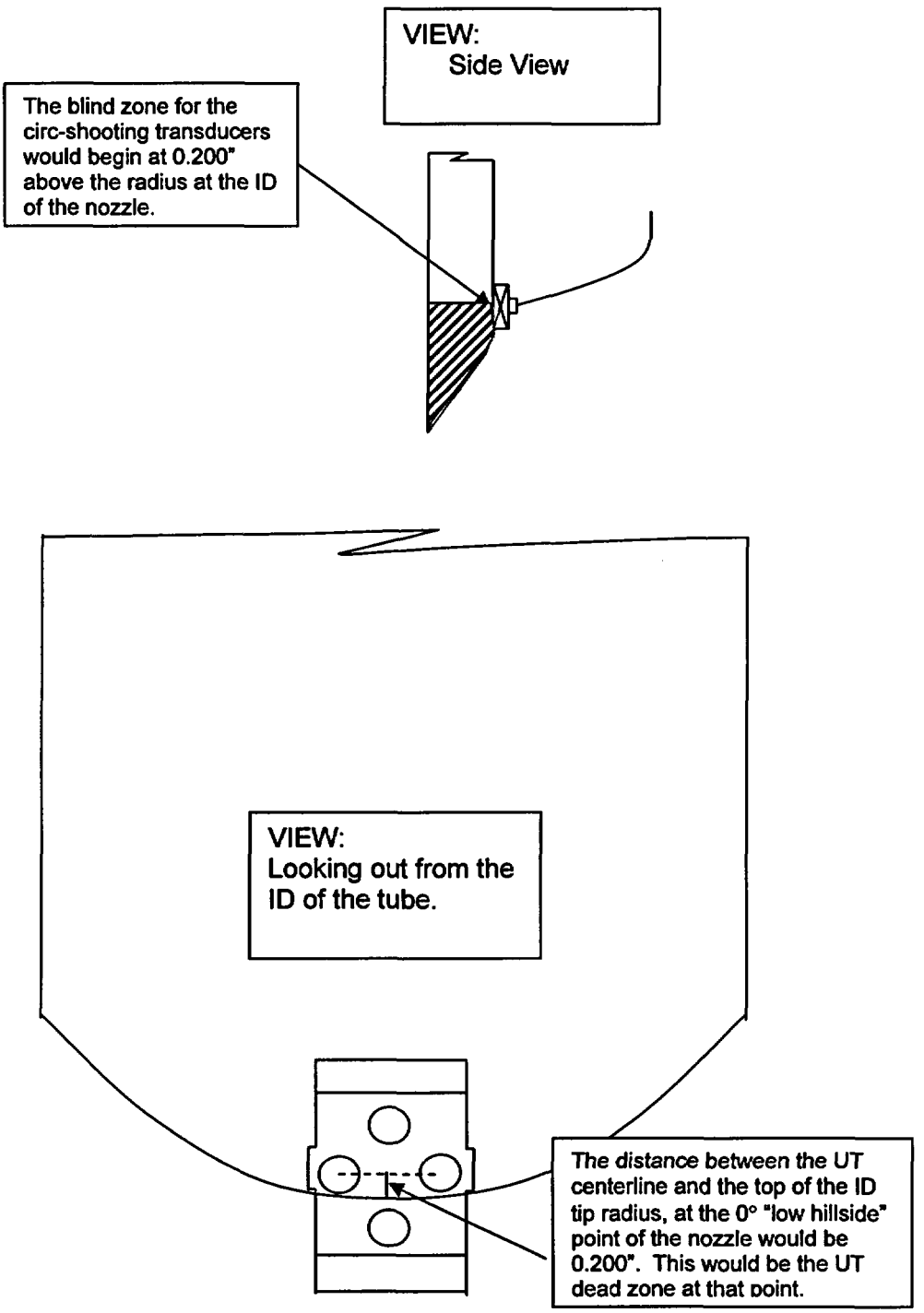

FIGURE 2
UT INSPECTION PROBE
END OF NOZZLE – LOWER HILLSIDE POSITION

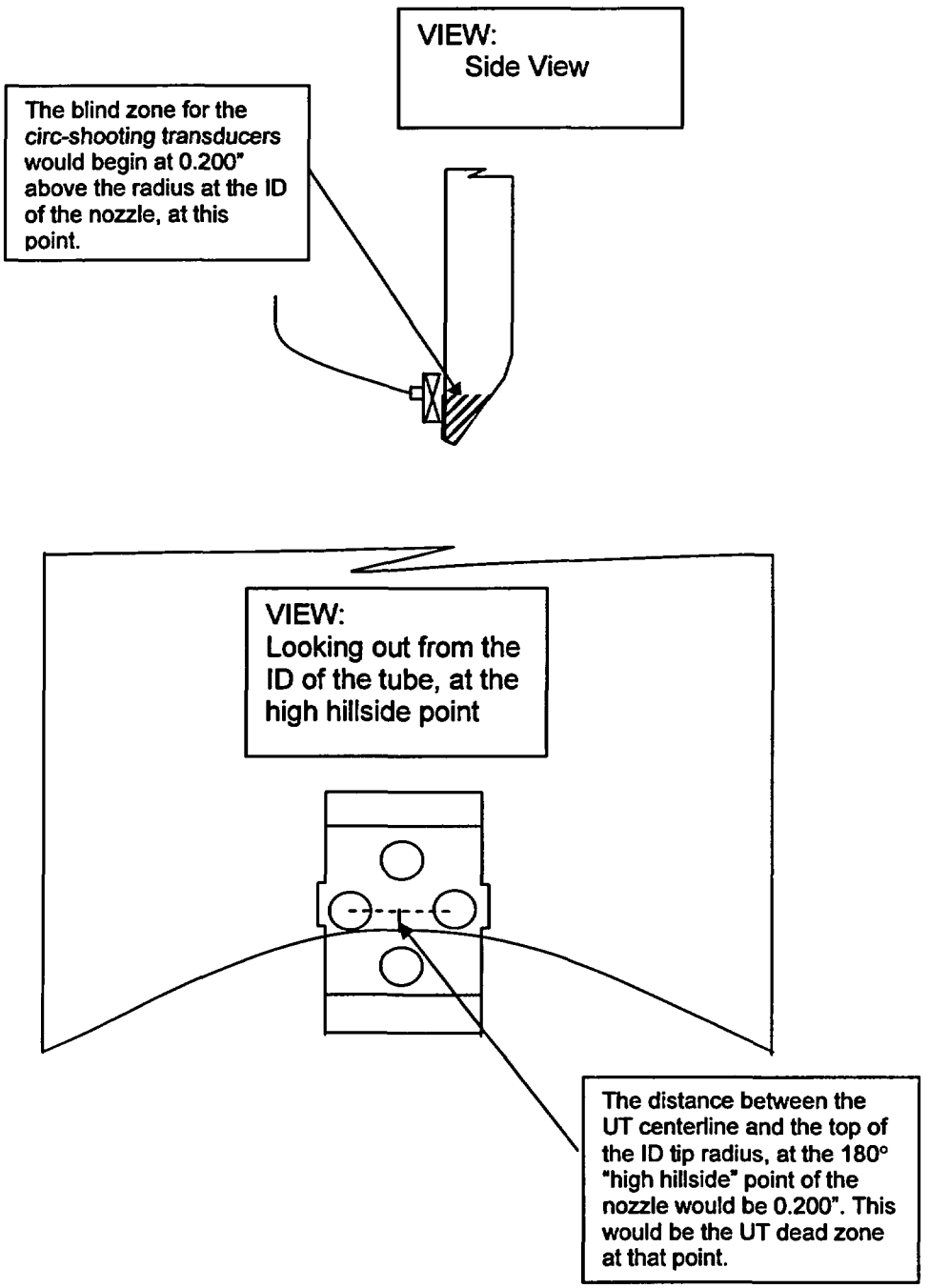

FIGURE 3
UT INSPECTION PROBE
END OF NOZZLE- UPPER HILLSIDE POSITION

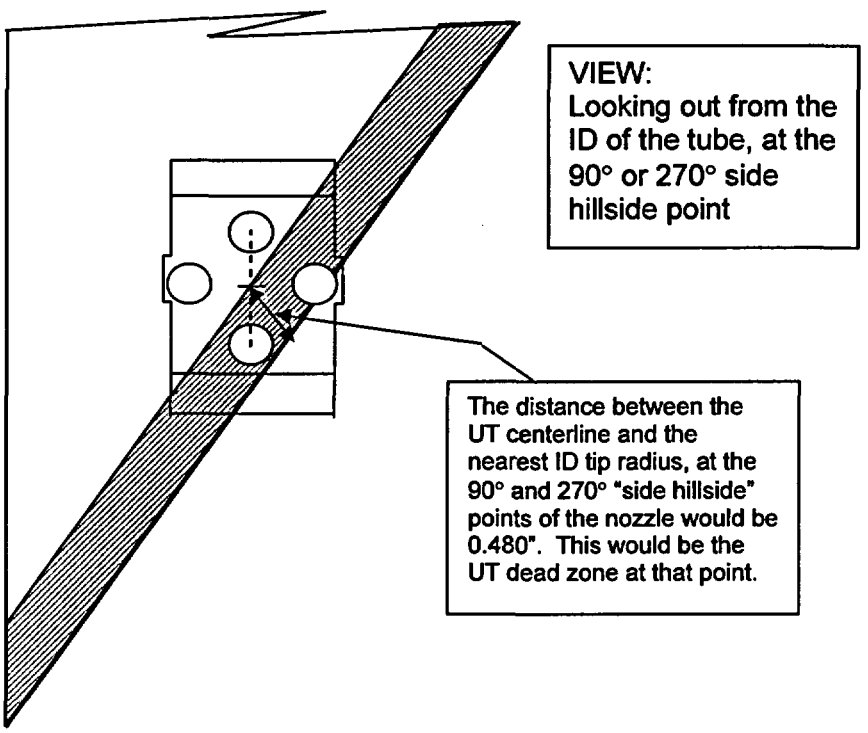

FIGURE 4
UT INSPECTION PROBE
END OF NOZZLE – SIDE VIEW @ 90° and 270°

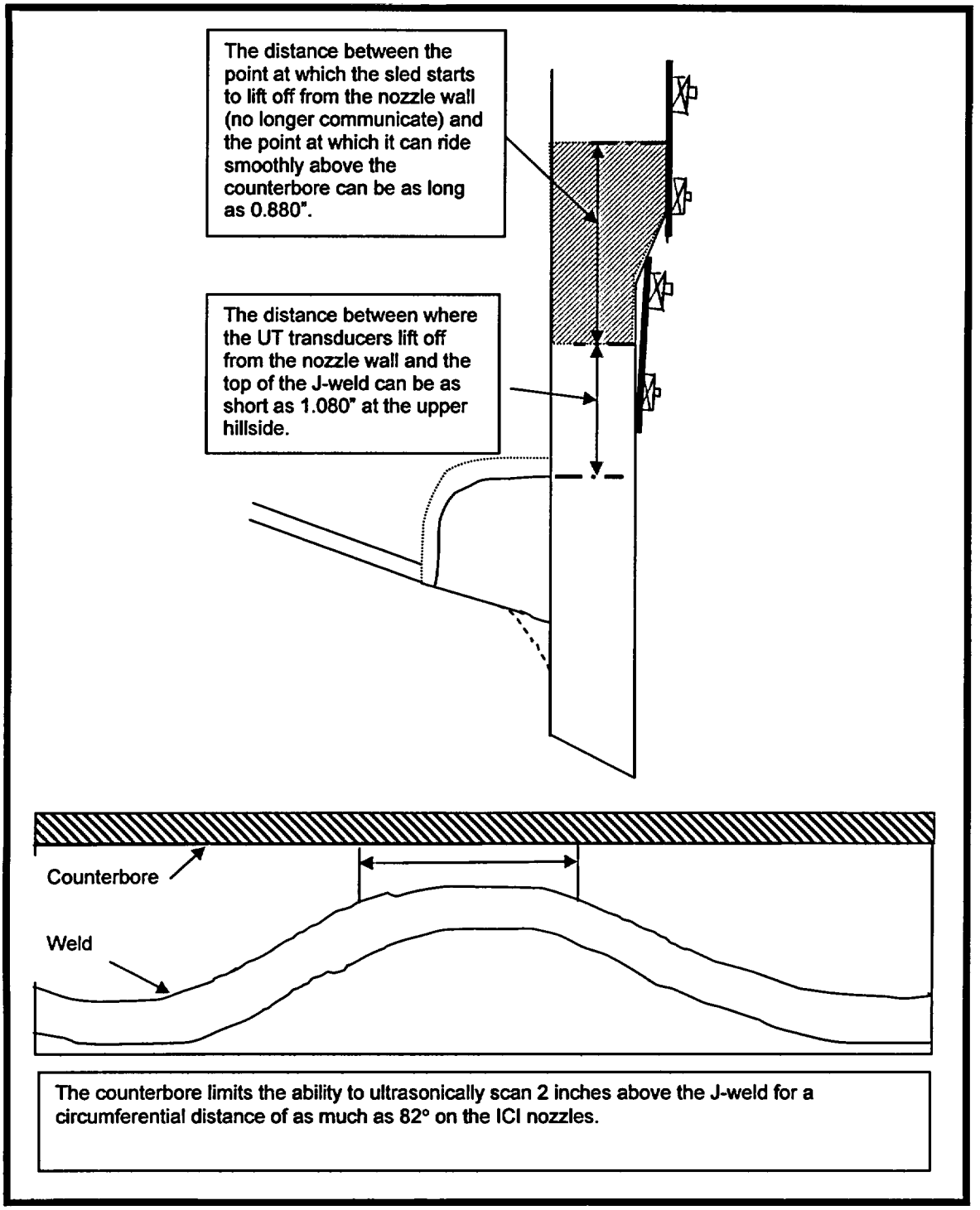

FIGURE 5
COUNTERBORE – UPPER HILLSIDE POSITION

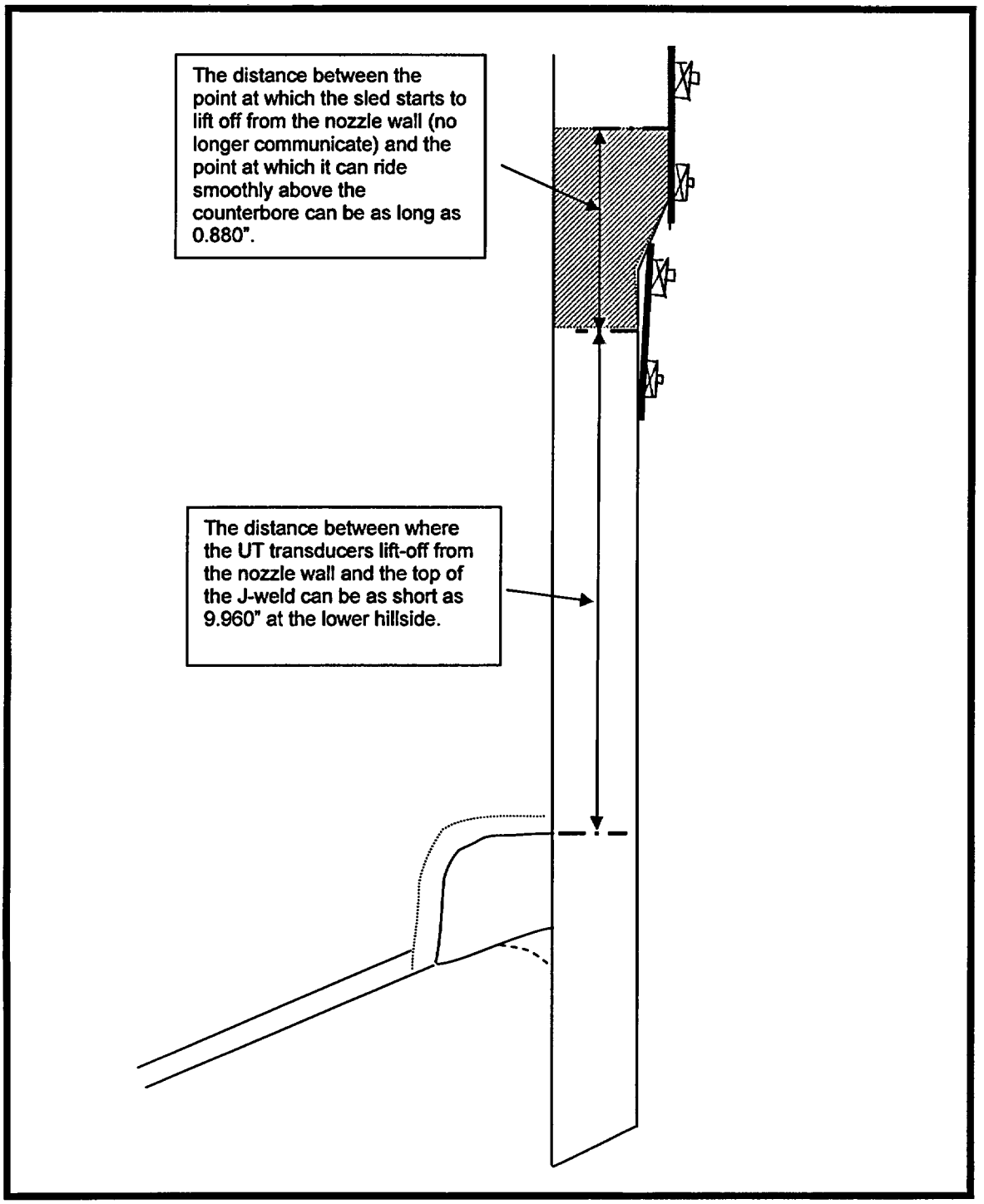

FIGURE 6
COUNTERBORE – LOWER HILLSIDE POSITION

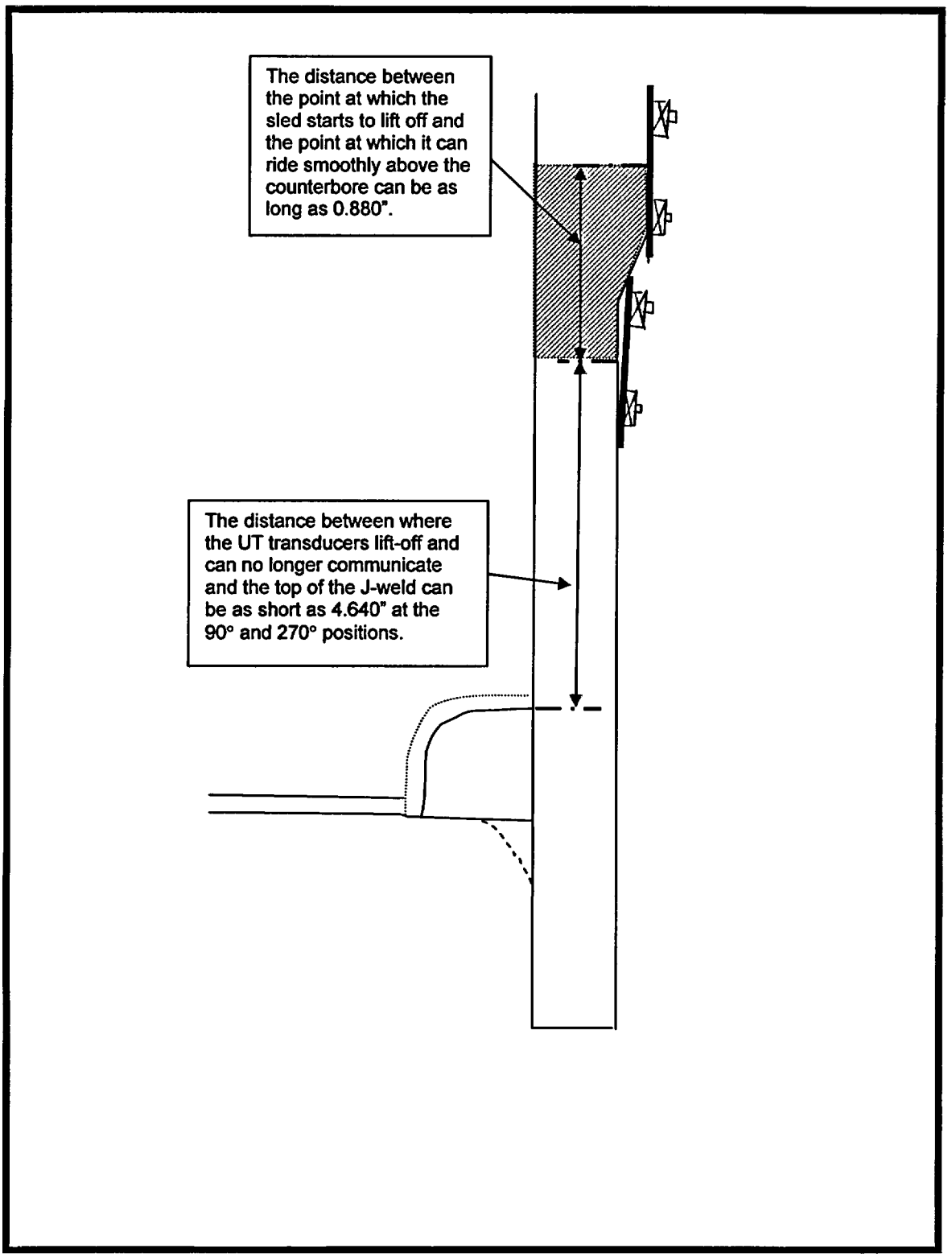

FIGURE 7
COUNTERBORE @ 90° AND 270° POSITIONS

ENCLOSURE 2

CNRO-2003-00030

WATERFORD STEAM ELECTRIC STATION, UNIT 3
RELAXATION REQUEST #2

ENTERGY OPERATIONS, INC.
WATERFORD STEAM ELECTRIC STATION, UNIT 3
RELAXATION REQUEST #2 TO NRC ORDER EA-03-009

I. COMPONENT/EXAMINATION

Component/Number:	MRCT0001
Description:	Reactor Pressure Vessel (RPV) head penetration nozzles
Code Class:	1
References:	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 2. Letter WF3F1-2003-0014 from Entergy Operations, Inc. to the NRC, "Entergy Operations, Inc. – Answer to Issuance of Order Establishing Interim Inspection Requirements for Reactor Pressure Vessel Heads at Pressurized Water Reactors", dated February 28, 2003
Unit:	Waterford Steam Electric Station, Unit 3 (Waterford 3)
Inspection Interval:	Second (2^{nd}) 10-Year Interval

II. REQUIREMENTS

The NRC issued Order EA-03-009 (the Order) that modified the current licenses at nuclear facilities utilizing pressurized water reactors (PWRs), which includes Waterford 3. The Order establishes inspection requirements for RPV head penetration nozzles. Waterford 3 is categorized as a "High" primary water stress corrosion cracking (PWSCC) susceptibility plant based on an effective degradation year (EDY) value greater than 12.

According to Section IV.C.1(b) of the Order, RPV head penetration nozzles in the "High" PWSCC susceptibility category shall be inspected using ***either*** of the following non-destructive examination (NDE) techniques each refueling outage:

(1) Ultrasonic testing (UT) of ***each*** RPV head penetration nozzle (i.e., nozzle base material) from two (2) inches above the J-groove weld to the bottom of the nozzle and an assessment to determine if leakage has occurred into the interference fit zone, ***or***

(2) Eddy current testing (ECT) or dye penetrant testing (PT) of the wetted surface of ***each*** J-groove weld and RPV head penetration nozzle base material to at least two (2) inches above the J-groove weld.

III. PROPOSED ALTERNATIVES

The Waterford 3 RPV head has one hundred-two (102) penetration nozzles that include ninety-one (91) Control Element Drive Mechanism (CEDM) nozzles, ten (10) Incore Instrument (ICI) nozzles, and one (1) vent line nozzle. Entergy Operations, Inc. (Entergy) requests relaxation from and proposes an alternative to the requirements of the Order as discussed below.

A. NDE Inspection Technique for the Vent Line Nozzle

Entergy understands that the Order requires the same technique, specified in Section IV.C(1)(b), be used to inspect the entire population of RPV head penetration nozzles; combining techniques or using one technique on one nozzle and the other technique on another nozzle is not permitted.

Entergy plans to inspect the CEDM and ICI nozzles using the UT inspection technique as specified in Section IV.C(1)(b)(i) of the Order or in accordance with approved relaxation requests. In lieu of using the UT inspection technique on every RPV head penetration nozzle, Entergy requests authorization to inspect the vent line nozzle and J-groove weld using the ECT technique per Section IV.C(1)(b)(ii) of the Order.

B. NDE Inspection Technique for the ICI Nozzles

In lieu of performing inspections as prescribed in Section IV.C(1)(b) of the Order, Entergy proposes to inspect the ten (10) ICI nozzles as follows:

1. Perform an assessment to determine if leakage has occurred into the interference fit zone of the nozzle using UT; and

2. Perform a UT inspection of the nozzle base material from 2 inches above the J-groove weld to the bottom of the nozzle, except where meaningful UT data cannot be collected due to nozzle configurations and/or UT inspection probe limitations; and

3. Where meaningful UT data cannot be collected, supplement the UT inspection with a surface examination of those un-inspected portions of the nozzle base material to determine the condition of the nozzle.

Contingent upon authorization of this relaxation request, Entergy will provide in the 60-day report for Waterford 3, as required by the Order, specific inspection information; i.e., extent of inspections and results of those inspections.

IV. BASIS FOR PROPOSED ALTERNATIVES

A. NDE Inspection Technique for the Vent Line Nozzle

The Order requires inspecting the entire population of RPV head penetration nozzles using only one of the techniques specified in Section IV.C(1)(b). This limits the licensee's options without measurably increasing the level of quality or safety. Entergy believes that using either inspection technique is sufficient to detect the PWSCC phenomena, and that no significant benefit is gained by requiring the same technique to be used on all nozzles.

Conditions at Waterford 3 warrant using a different technique on different nozzles due to nozzle configuration. Specifically, the UT inspection probe used to examine the CEDM and ICI nozzles is not suitable for the leakage assessment due to the lack of an interference fit on the smaller vent line nozzle; therefore, Entergy proposes to use a different technique (ECT) to perform this inspection, as requested in Section III.A, above.

B. NDE Inspection Technique for the ICI Nozzles

Entergy believes the proposed alternative specified in Section III.B, above, satisfies the objective of Section IV.C(b)(1)(i) of the Order by providing adequate inspection of the nozzle base material and an assessment for leakage in the interference fit zone. Specifically, the leakage assessment and integrity of the nozzle base material is determined via the UT inspection per Sections III.B.1 and III.B.2, and surface examinations per Section III.B.3.

Surface examinations are needed due to reduced UT inspection coverage of the nozzle, which is caused by nozzle configuration and UT inspection probe design. The ICI nozzle has a counterbore within the 2-inch length above the J-groove weld for some portion on the upper hillside of the nozzle (see Figures 1 and 5). In addition to the counterbore, the bottom of the nozzle is cut at an angle approximating the contour of the RPV head. See Figure 1 for a sketch of a typical ICI nozzle.

The UT inspection probe to be used to inspect the Waterford 3 ICI nozzles consists of seven (7) individual transducers. The configuration of the probe has been optimized for maximum coverage. The probe is designed so that the ultrasonic transducers are slightly recessed into the probe holder. This recess must be filled with water to provide coupling between the transducer and the nozzle wall. Because of this design, the complete diameter of the transducer must fully contact the inspection surface before ultrasonic information can be collected. Coupling will be lost at the counterbore and also at the end of the nozzle due to loss of contact. See Figures 2 through 7 for sketches showing the UT probe at various locations along the length of the ICI nozzle.

The proposed alternative specified in Section III.B addresses this condition by supplementing the UT inspection with surface examinations for those portions of the nozzle that cannot be inspected by UT. This alternative ensures that 100% of the nozzle base material is inspected.

V. CONCLUSION

Section IV.F of NRC Order EA-03-009 states:

"Licensees proposing to deviate from the requirements of this Order shall seek relaxation of this Order pursuant to the procedure specified below. The Director, Office of Nuclear Reactor Regulation, may, in writing, relax or rescind any of the above conditions upon demonstration by the Licensee of good cause. A request for relaxation regarding inspection of specific nozzles shall also address the following criteria:

(1) The proposed alternative(s) for inspection of specific nozzles will provide an acceptable level of quality and safety, or

(2) Compliance with this Order for specific nozzles would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety."

Entergy believes the requested authorization to use ECT on the vent line nozzle (Section III.A, above) and the proposed alternative to use a combination of inspection techniques on the ICI nozzles (Section III.B, above) maintain the level of quality and safety prescribed in Section IV.C(1)(b) based upon the justification provided in Section IV, above. Therefore, Entergy requests that the proposed alternative be authorized pursuant to Section IV.F of the Order.

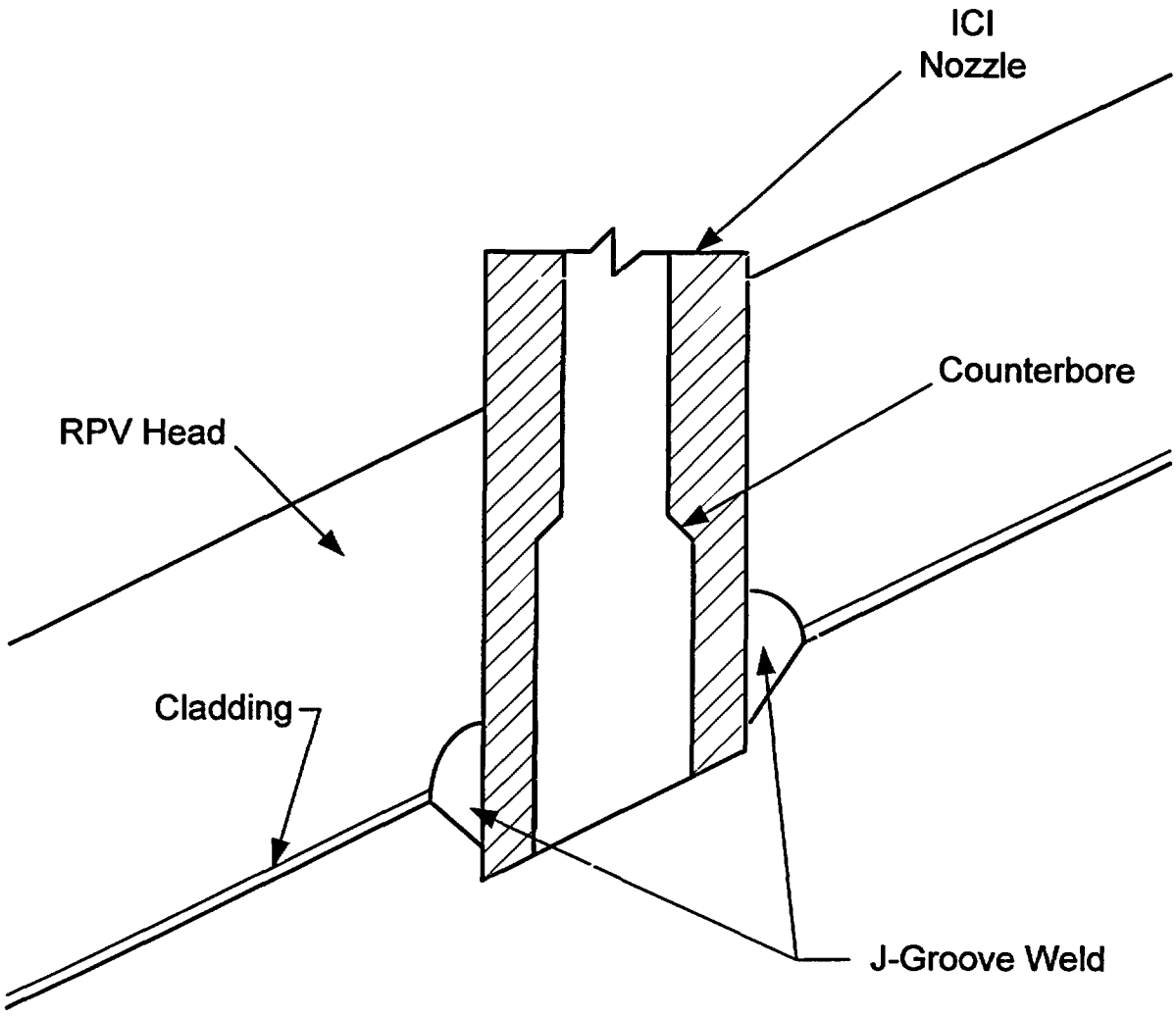

FIGURE 1
ICI NOZZLE CONFIGURATION

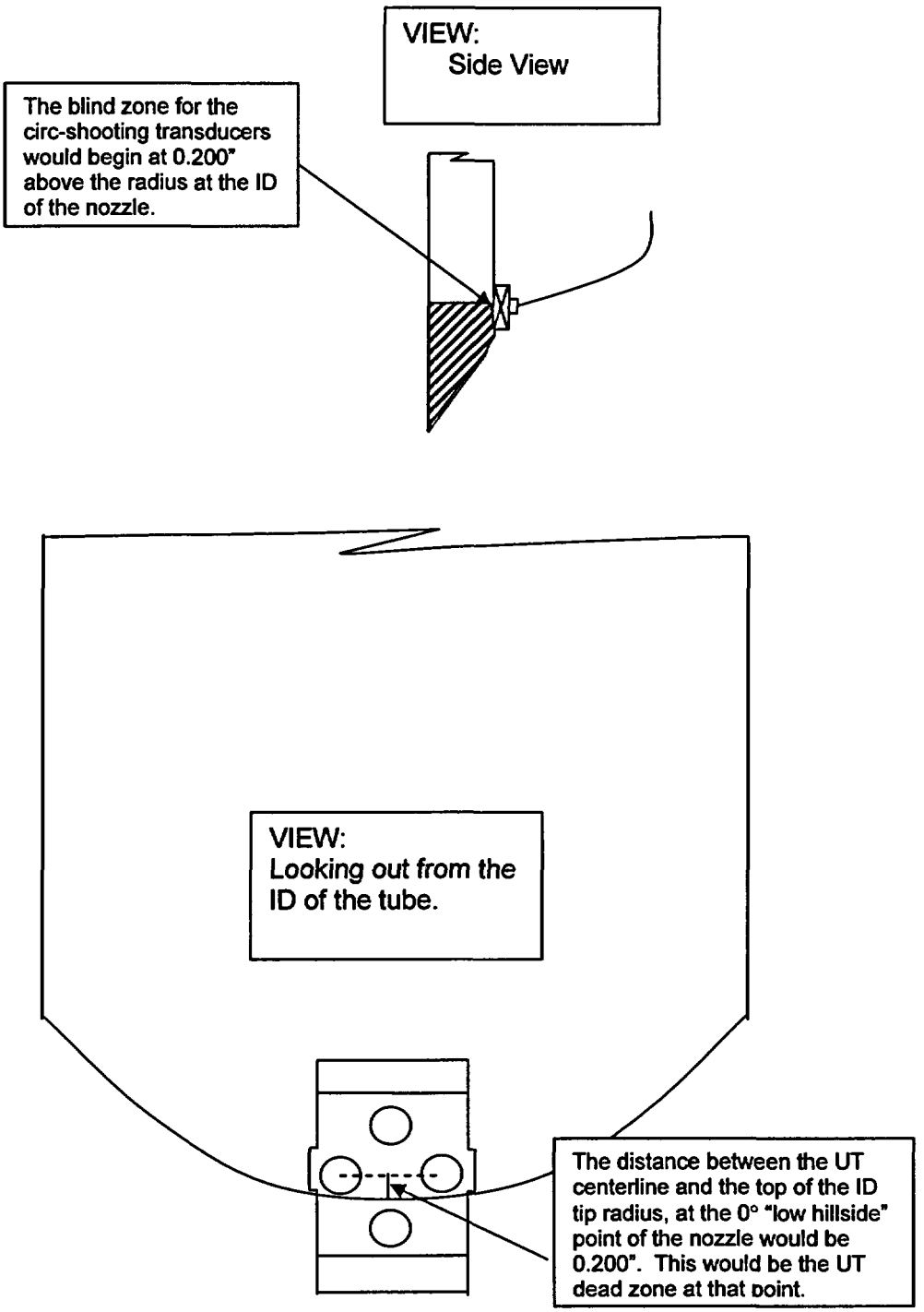

FIGURE 2
UT INSPECTION PROBE
END OF NOZZLE – LOWER HILLSIDE POSITION

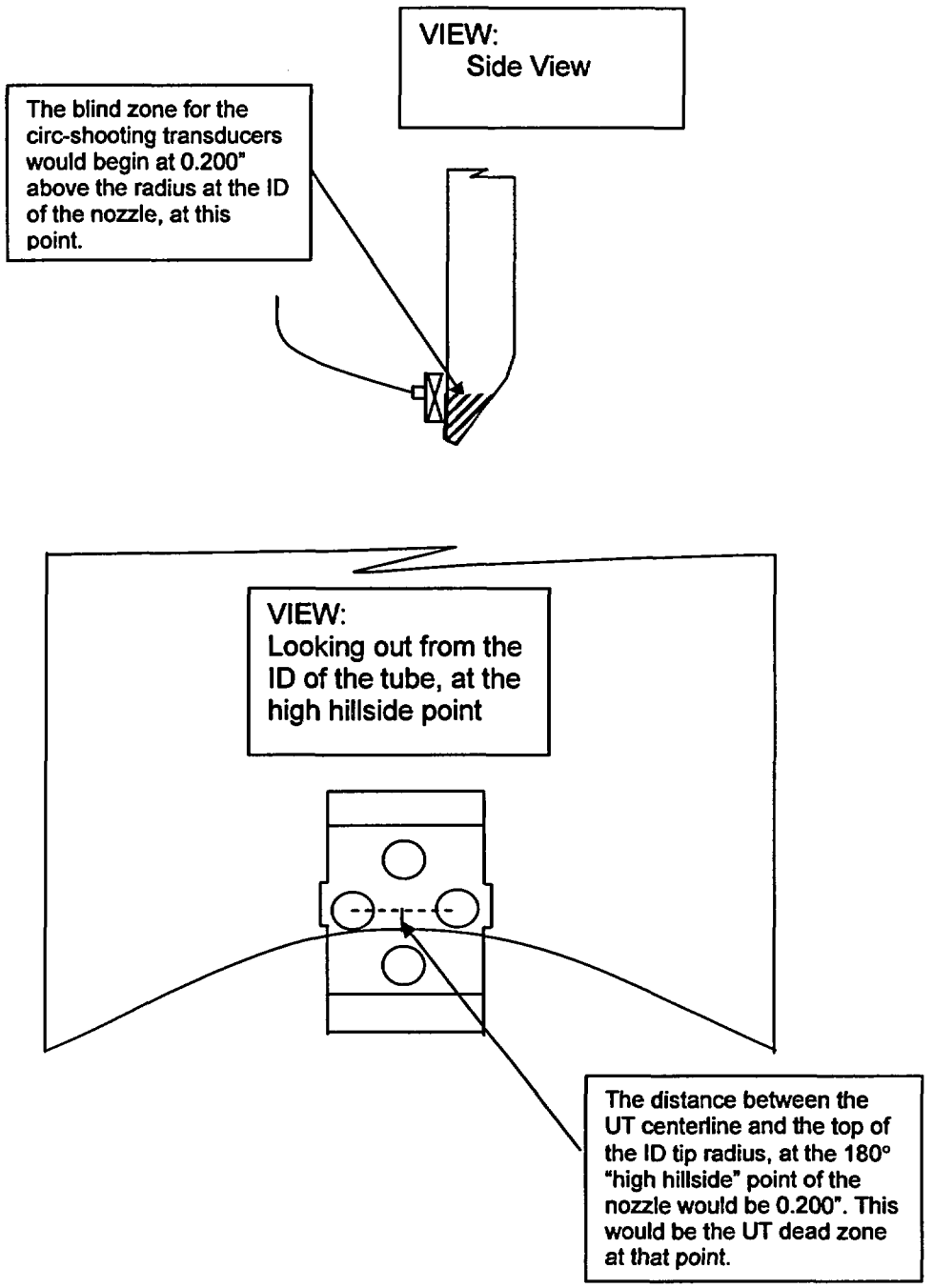

FIGURE 3
UT INSPECTION PROBE
END OF NOZZLE- UPPER HILLSIDE POSITION

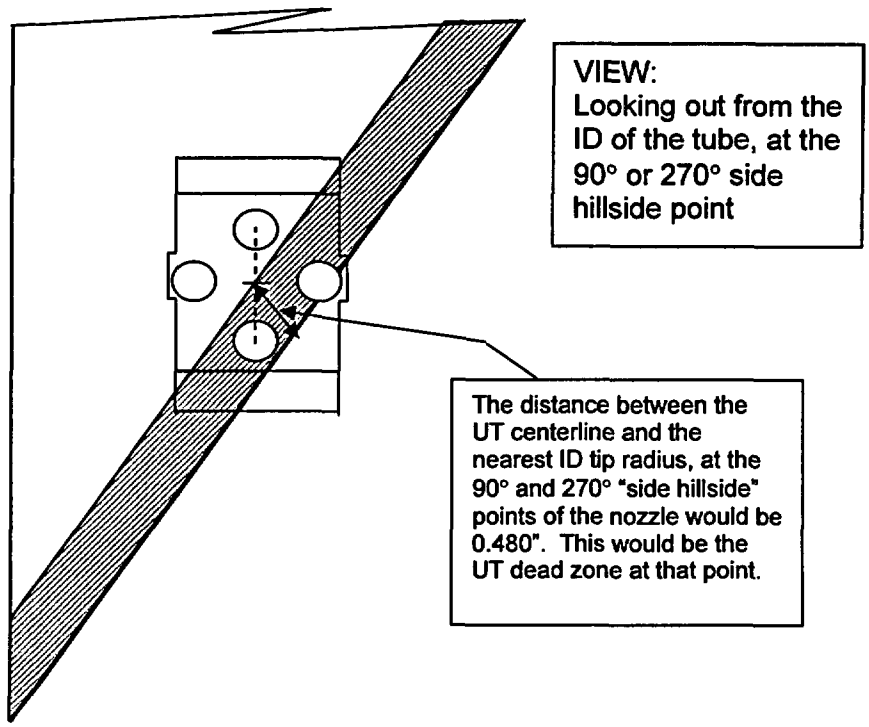

FIGURE 4
UT INSPECTION PROBE
END OF NOZZLE – SIDE VIEW @ 90° AND 270°

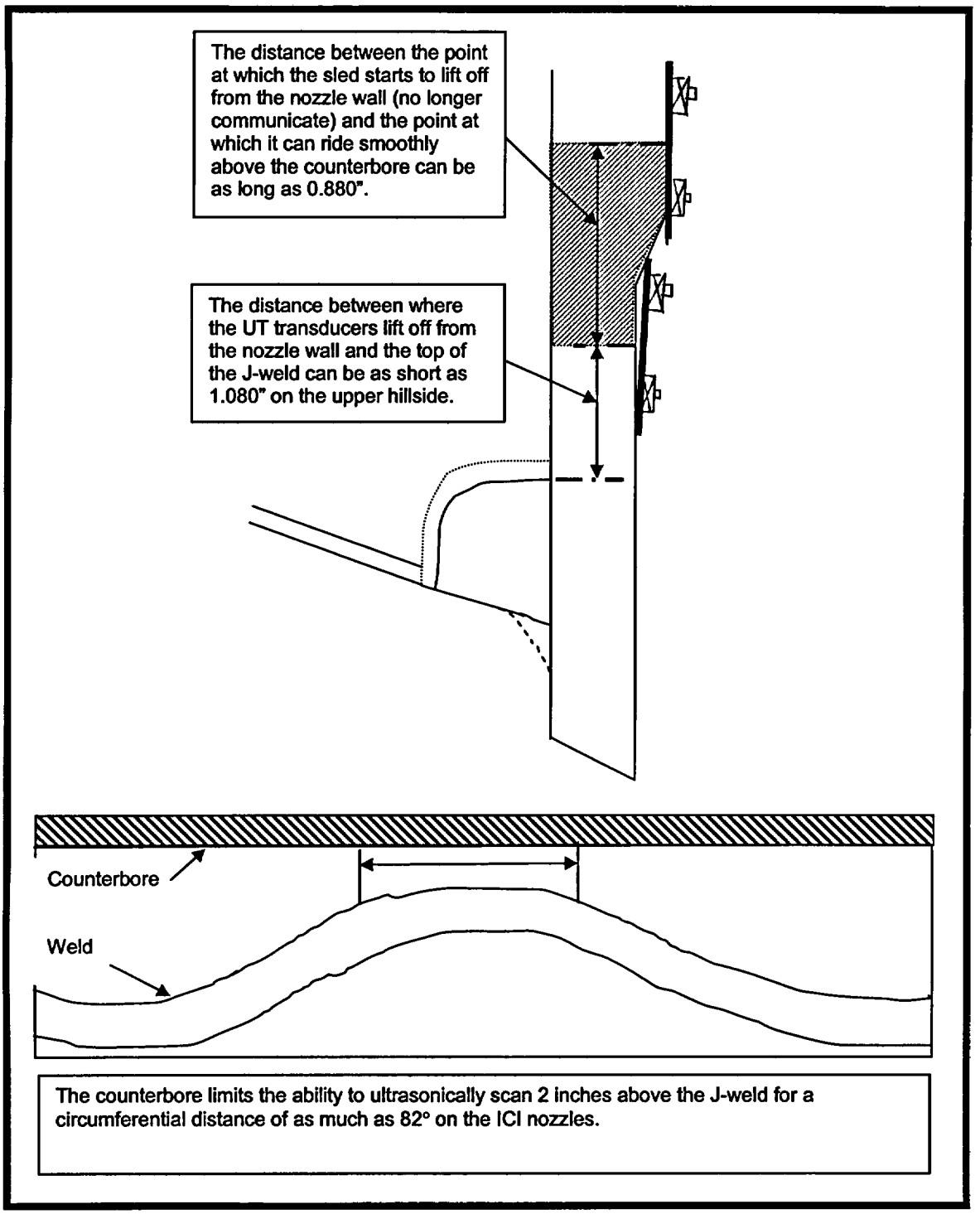

FIGURE 5
COUNTERBORE – UPPER HILLSIDE POSITION

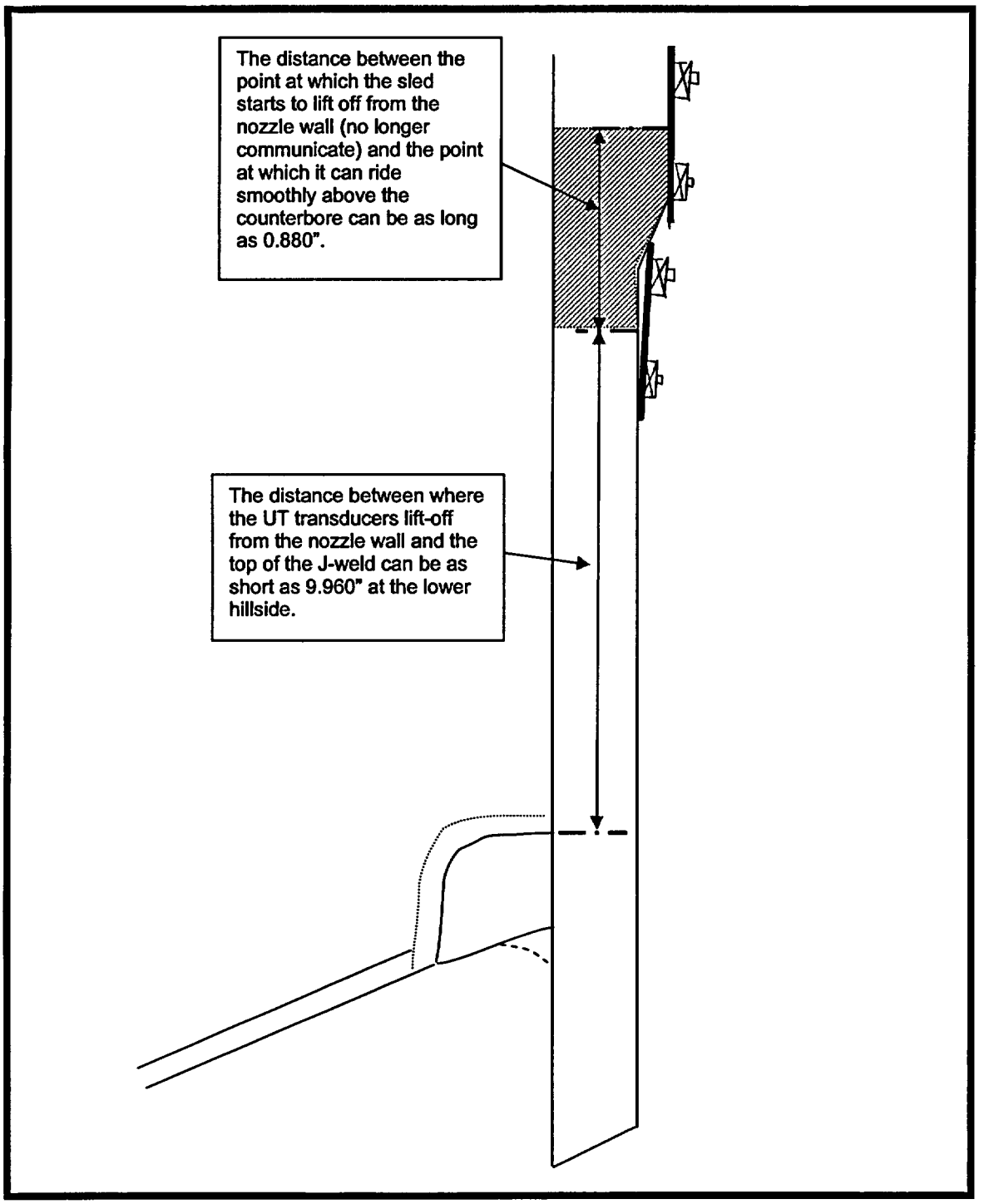

FIGURE 6
COUNTERBORE – LOWER HILLSIDE POSITION

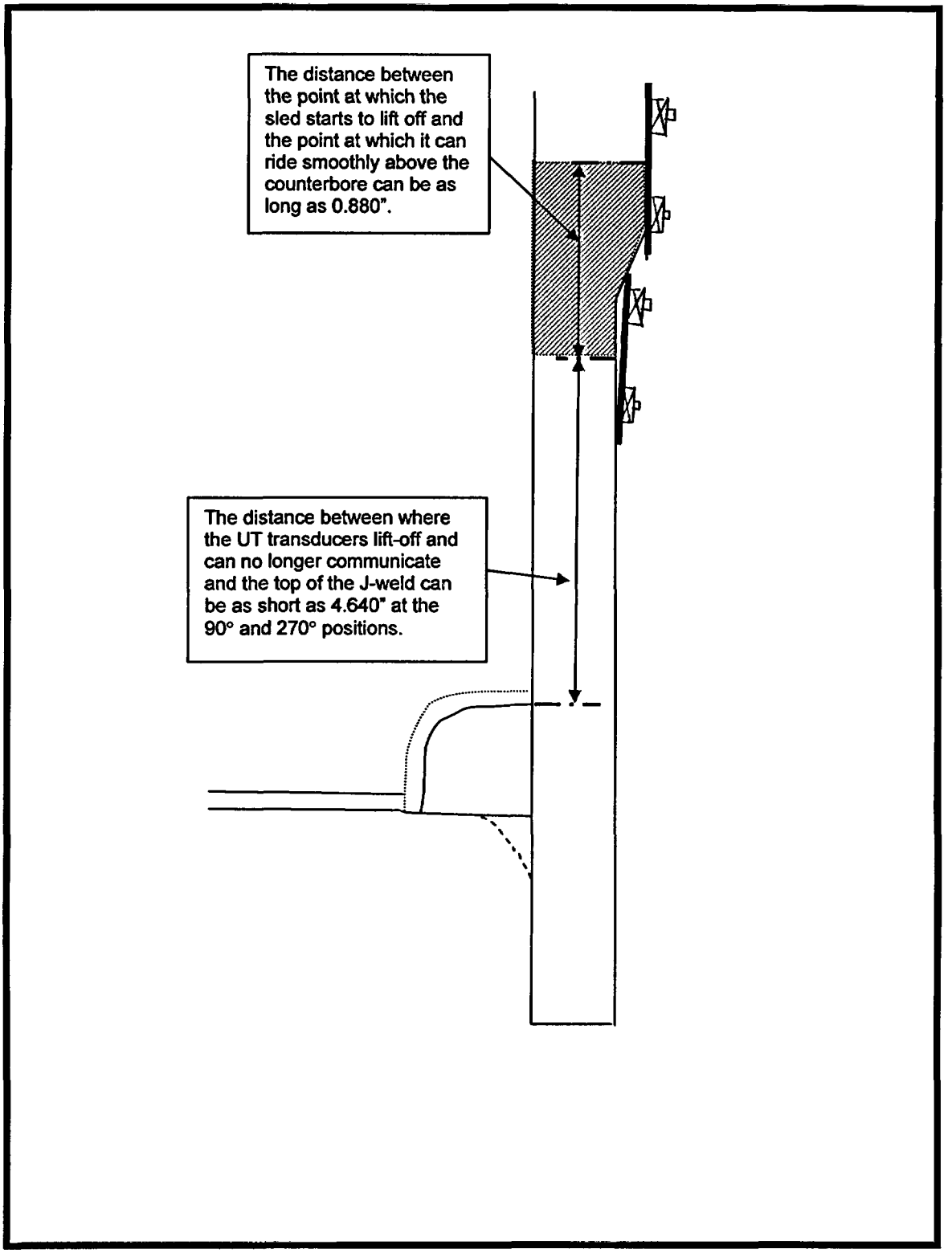

FIGURE 7
COUNTERBORE @ 90° AND 270° POSITIONS

ENCLOSURE 3

CNRO-2003-00030

LICENSEE-IDENTIFIED COMMITMENTS

LICENSEE-IDENTIFIED COMMITMENTS

COMMITMENT	TYPE (Check one)		SCHEDULED COMPLETION DATE
	ONE-TIME ACTION	CONTINUING COMPLIANCE	
For ANO-2, Enclosure 1, Section III: Contingent upon authorization of this relaxation request, Entergy will provide in the 60-day report for ANO-2, as required by the Order, specific inspection information; i.e., extent of inspections and results of those inspections.		✓	60 days after startup from the next refueling outage
For Waterford 3, Enclosure 1, Section III: Contingent upon authorization of this relaxation request, Entergy will provide in the 60-day report for Waterford 3, as required by the Order, specific inspection information; i.e., extent of inspections and results of those inspections.		✓	60 days after startup from the next refueling outage