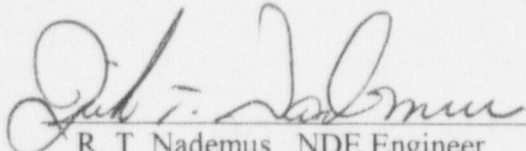
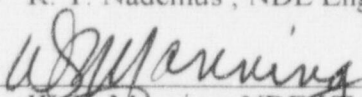
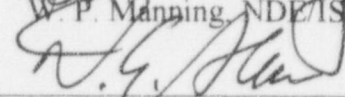


*Oyster Creek Core Spray System
Inspection Program - 17R*

*Topical Report No. TR-119
Project No. 320005*

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Abstract

During the 1998 refueling outage (17R) at Oyster Creek Nuclear Generating Station, an augmented Inspection Program was implemented on the Core Spray Sparger System. In addition to the augmented program, GPUN performed visual examinations per the recommendation of the BWRVIP, (Boiling Water Reactor Vessel and Internals Project), document BWRVIP-18, "BWR Core Spray Internals Inspection and Flaw Evaluation Guidelines". The inspection scope included the in-vessel annulus piping, sparger assemblies, and sparger brackets utilizing remote visual examination and supplemental air test *. In accordance with the above reference document, BWRVIP-18, under the BWRVIP reinspection approach the following inspections were performed:

All welds with a crevice in the annulus piping, 25% or better of butt welds in the annulus piping, the sparger end cap welds, sparger nozzles, sparger piping, all repair clamps, and 25% of sparger brackets. Cleaning with a nylon brush was necessary for the end cap welds, welds with a crevice and annulus piping butt welds. These items were inspected to the VIP enhanced VT technique called EVT-1, with ½ mil resolution. A best effort approach to clean and EVT-1 inspect the sparger T-Box welds was done. All 4 (four) of the T-Boxes are clamped and very little weld is accessible for inspection. The nozzles and brackets were inspected to the BWRVIP visual technique, CSVT-1 or 1 mil resolution. Remote visual examinations revealed no new indications. The air test revealed leakage reported in previous outages in System II at the 208 ° azimuth repair clamp and the fillet weld L-3A at the downcomer at 240°, System I. This also was reported as a through weld hole in previous outages.

*** Oyster Creek performed a baseline's inspection per BWRVIP-18 during the 16R outage, 1996.**

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OYSTER CREEK CORE SPRAY SPARGER SYSTEM
INSPECTION PROGRAM

INTRODUCTION

The Augmented Inspection for the Core Spray Sparger System was performed during the 1998 refueling outage (17R). The results of the inspection reported herein meet the requirements outlined by "Section 6.9.3 d, Unique Reporting Requirements", of the Oyster Creek Technical Specification.

Visual Inspection

The Core Spray Spargers and Annulus piping were visually inspected utilizing the IST, ETV-1250 underwater camera with the twin 50 watt underwater lighting affixed and the REE RJ-2100 color camera. Auxiliary lighting was provided as needed by acorn lights and/or area lights lowered into the vessel from the refueling bridge. Auxiliary lighting was controlled by a rheostat. This inspection program has exceeded inspections prior to 16R by conforming to the BWRVIP, Reference 6 Page 9. The video tapes were reviewed by at least two visual Level III individuals. Agreement of the individuals was required to finalize the disposition of these inspections.

Core Spray Spargers

Accessible portions of the end cap welds on the spargers, (8 places), were cleaned using a nylon brush attached to an underwater motor. These welds were inspected utilizing the (BWRVIP) enhanced VT-1 designated as EVT-1. This technique uses a ½ mil wire for camera/system resolution. The remainder of the spargers were inspected to the CSVT-1 technique using a 1 mil wire for camera/system resolution. Oyster Creek utilized the refueling bridge and an auxiliary bridge to perform these inspections. The primary means of operating the camera system was by hand held camera manipulated by ropes. A portable pole system from the refueling bridge was used when accessibility permitted. The calibration standards used for qualification of the camera system were as stated above.

The visual inspection of the Core Spray Spargers was performed as follows (Reference Figure 1 & 2):

Sparger A & C

1. Upper view - looking down on the sparger from above.
2. Front view - looking straight at the sparger.
3. Nozzle view - looking below the sparger directly at the nozzles and tack welds.
4. End cap welds- cleaned and EVT-1.

Sparger B & D

1. Upper view - looking down on the sparger from above.
2. Front view - looking straight at the sparger.
3. Nozzle view - looking below the sparger directly at the nozzles and tack welds
4. End cap welds - cleaned and EVT-1.

No relevant indications were noted during the inspections or subsequent review of the video tapes.

Annulus Piping

Accessible portions of the Core Spray Annulus Piping welds (Figures 3 through 7) were cleaned using a nylon brush and visual inspections performed utilizing the EVT-1 technique. All accessible portions of the following piping welds were visually inspected: U2, U3, U3A, U4, U5, U6, U13, U14, U15A, U21, U22, U23, U24, & U24A on System II; and L2, L3, L3A, L4, L9, L10, L11, L12, L13, L13A, L17, L18, L19, & L20 on System I, (See Figure 3 & 4) Inspections were performed using the ETV-1250 camera system. No new relevant indications were noted during the inspection or subsequent review of the video tapes.

Air Test

Air tests were performed on the core spray system I and II spargers. Because of the configuration of the Core Spray piping, the upper spargers with downward pointing nozzles were filled completely with air (System II). The down leg between the reactor vessel penetration and the horizontal circumferential pipe run in the annulus was filled completely with air. All other piping was partially filled with air or just passed air bubbles along its upper inside surface.

The Core Spray Sparger Systems air test was performed in accordance with GPUN Spec. SP-1302-22-007, rev. 3. The pressure was held at 70PSI for System II and 80PSI for System I, as verified through GPUN I&C Department.

System I (Lower Spargers)

During the performance of the air test, the core spray sparger system I, was inspected utilizing a hand held IST ETV-1250 camera manipulated with an attached rope from the bridge for the annulus piping. The REES RJ2100 attached to a hand held pole was used for the sparger inspections.

Inspection of the sparger during the air test noted air bubbles coming from the nozzles. With no means of isolating the nozzles, air escaping is normal during this examination. Inspection of the balance of the lower spargers on system I revealed no additional air leaks. Air bubbles were observed from the downcomer at 240°, weld L-3A as previously observed.

System II (Upper Spargers)

During the performance of the air test, the core spray sparger system II was inspected utilizing a hand held IST ETV-1250 camera manipulated with an attached rope from the bridge for the annulus piping. The REES RJ 2100 attached to a hand held pole was used for the sparger inspections.

As pointed out during system I air test, air bubbles were also observed emitting from the sparger nozzles. Air bubbles were also observed coming from the end (204 degrees) and middle (208 degrees) of the repair clamp located between azimuth 204 - 210 degrees. No other air bubbles were observed coming from the other eight repair clamps, spargers or annulus piping other than that previously noted above.

Conclusions

The following are the conclusions relative to the inspection of the Core Spray System conducted during the Oyster Creek Refueling Outage (17R):

- The number of confirmed cracks in the core spray sparger systems is one (1) in system II, that being the through wall crack at 208 degrees identified and clamped in 1978 and confirmed by continuous stream of air bubbles. No change was noted from previous inspections.
- Visual inspection of the spargers and annulus piping showed various scuff marks, scrapes, undercut, arc strikes, oxide deposits, (in locations that had not been brushed), and discoloration's on the sparger surfaces. No changes from previous inspections were noted.
- All repair clamps appear to be intact and in good condition.
- No indications that could be interpreted as crack like in appearance were noted during the examination or post examination review of the sparger assembly.
- One rounded, through wall, indication was observed in the toe of weld designated as L-3A. This weld is in System I of the annulus piping. Visual examination during 17R and previous air test revealed no change in this indication since it was discovered in 14R. This indication was determined to be a fabrication flaw.
- Two linear indications originally observed during outage 14R in the annulus piping in system II, weld U-3A appear to be a weld pass between 2 beads, as determined after cleaning. No changes and no air bubbles were observed emanating from this location during the air test.

References

- 1 - NRC I&E Bulletin 80-13, "Cracking in Core Spray Spargers".
- 2 - GPUN Procedure NDE- VIS-04, Rev.1, "Visual Examination of Reactor Vessel Internals".
- 3 - GPUN Specification SP-1302-56-130, Rev.1, "Reactor Vessel Internals Inspection - 17R".
- 4 - GPUN Topical Report No. TR-110, "Oyster Creek Core Spray System Inspection Program -16R".
- 5 - GPUN SP-1302-22-007, Rev.3, "Core Spray Sparger Piping Air Test".
- 6 - BWRVIP-18, "BWR Core Spray Internals Inspection and Flaw Evaluation Guidelines".

TABLE 1
CORE SPRAY PIPING INSPECTION SUMMARY

	<u>Spargers</u>		<u>Annulus Piping</u>		<u>Air Test</u>	<u>Remarks</u>
	<u>Visual</u>	<u>Ultrasonic</u>	<u>Visual</u>	<u>Ultrasonic</u>		
1978	1 through wall crack	-----	No indications	-----	Air release observed from 1 crack (208° only)	One repair bracket installed at 208° (Sys. II)
1980	19 indications	16 indications	2 indications	-----	" " "	Seven repair brackets installed (Sys. II) two repair brackets installed (Sys. I)
	28 Total Indications (excluding 1978 indication)					
1982	Video enhanced 1980 visual indications. Results identified: 3 cracks 2 possible cracks	-----	Video enhanced on 1980 indication Results: Not a crack on the 6x5 reducer)	-----	-----	-----
1983	No indications* (4 of the 1980 indications examined)	No indications* (5 of 16-1980 indications examined)	No indications	No indications 7 welds inspected	" " "	*Area of inspection limited by repair brackets
1986	No indications*	No indications*	No indications	-----	-----	-----
1988	No indications*	-----	No indications	-----	** Air release observed from repair brackets upper sparger	** Air release from 196° repair bracket intermittent Air release from 208° repair bracket

TABLE 1 (Continued)
CORE SPRAY PIPING INSPECTION SUMMARY

	<u>Spargers</u>		<u>Annulus Piping</u>		<u>Air Test</u>	<u>Remarks</u>
	<u>Visual</u>	<u>Ultrasonic</u>	<u>Visual</u>	<u>Ultrasonic</u>		
1991	No indications*	-----	No indications	-----	Air release observed from one repair bracket (208°) upper sparger	Air release from 208° repair bracket continuous (Sys. II)
1992	No indications*	-----	Initial no indications	-----	Air release observed from one repair bracket	Air release from 208° repair bracket continuous (Sys. II)
			*** Additional Visual 3 indications A) 1 through weld hole B) 2-linear	-----	Air release from downcomer at 240°. Weld L-3A has through weld hole	Air release from weld L-3A is continuous (Sys. I)
1994	No indications*	-----	No indications	-----	Air release observed from repair bracket Air release from downcomer at 240°, Weld L-3A has through weld hole	Air release from 208° repair bracket continuous (Sys. II) Air release from Weld L-3A is continuous (Sys. I) No change from 2 linears Not on Weld U-3A (Sys. II)
1996	No indications*	-----	***No indications	-----	Air release from one repair clamp	Air release from 208° repair bracket (Sys. II) No visual change to indication in U-3A (Sys. II) & L-3A (Sys. I)

TABLE 1 (Continued)
CORE SPRAY PIPING INSPECTION SUMMARY

	<u>Spargers</u>		<u>Annulus Piping</u>		<u>Air Test</u>	<u>Remarks</u>
	<u>Visual</u>	<u>Ultrasonic</u>	<u>Visual</u>	<u>Ultrasonic</u>		
1998	No indications*	-----	*** No indications	-----	Air release from one repair bracket. Air release from downcomer at 240° weld L-3A through weld hole.	Air release from 208° repair bracket (Sys. II) No visual change to indication in U-3A Sys.II & L-3A(Sys. I)

* Area of inspection limited by repair brackets

** A subsequent air test confirmed that air bubbles were released from the sparger nozzles beneath the 196° repair clamp

*** Through weld hole in weld L-3A System I; 2 linear indications, both in same weld U-3A System II

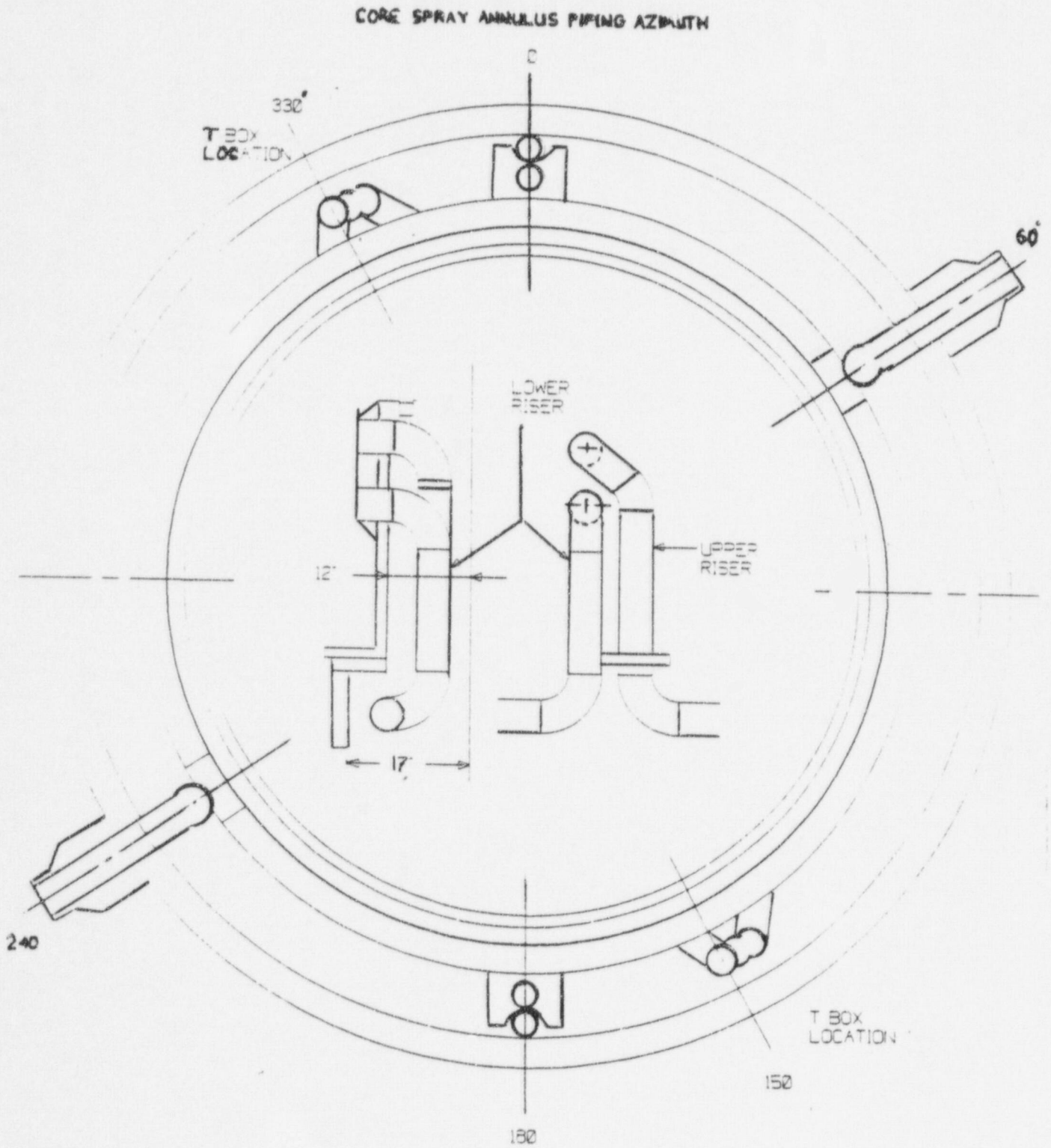
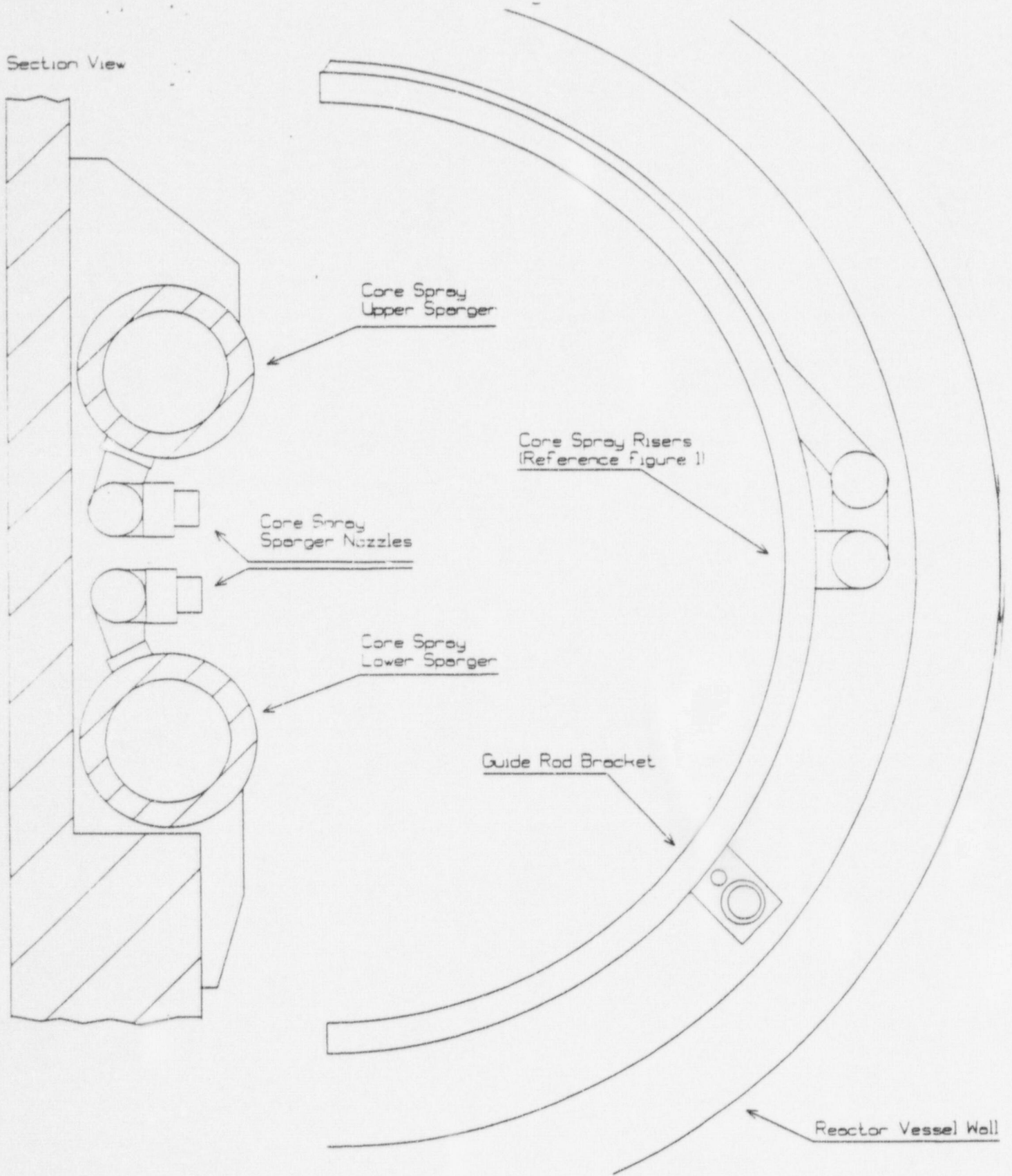


FIGURE 1

Section View



Oyster Creek Nuclear Generating Station

Figure Number 2

UPPER PIPING UNIT

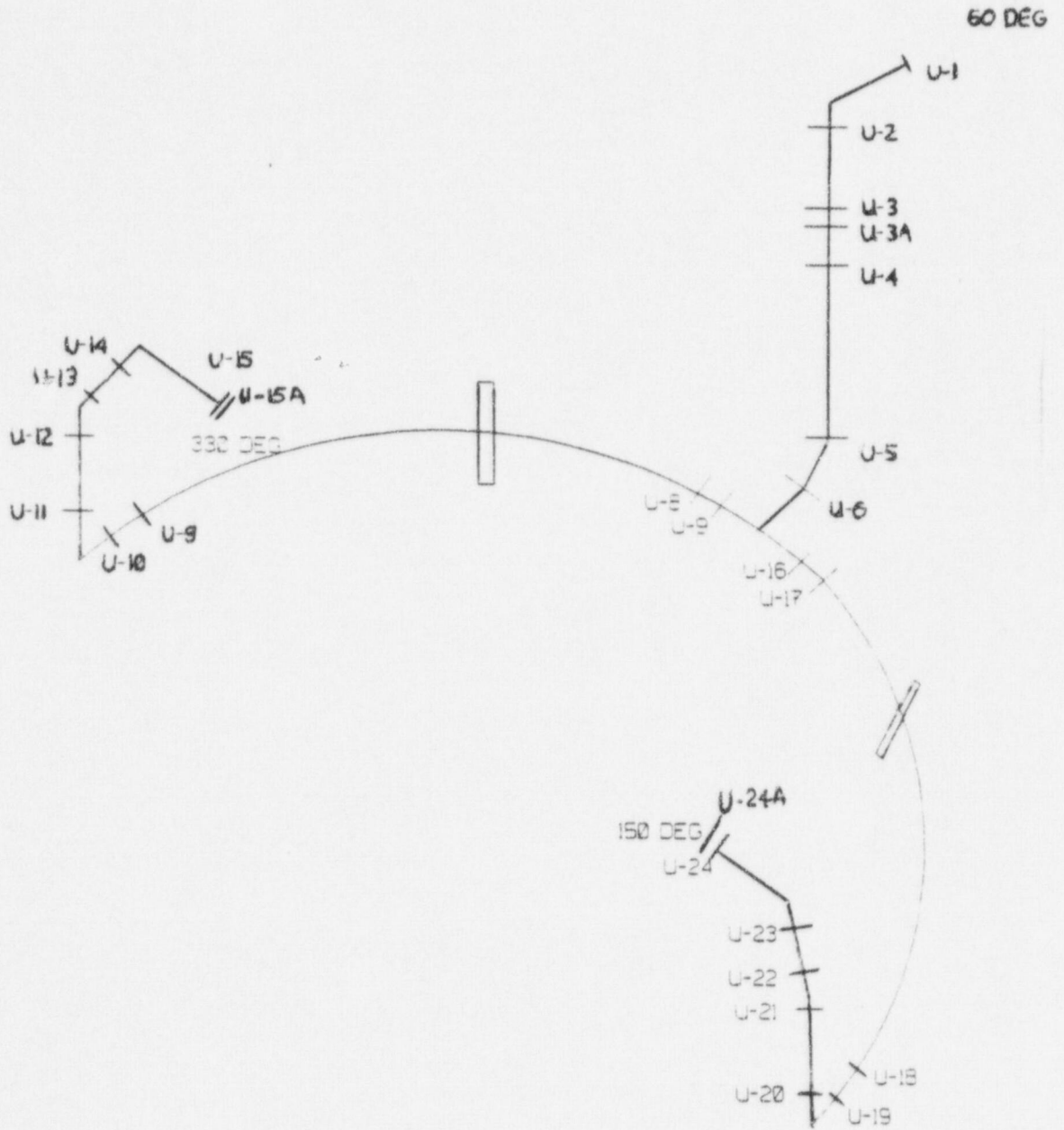


FIGURE 3

LOWER PIPING UNIT

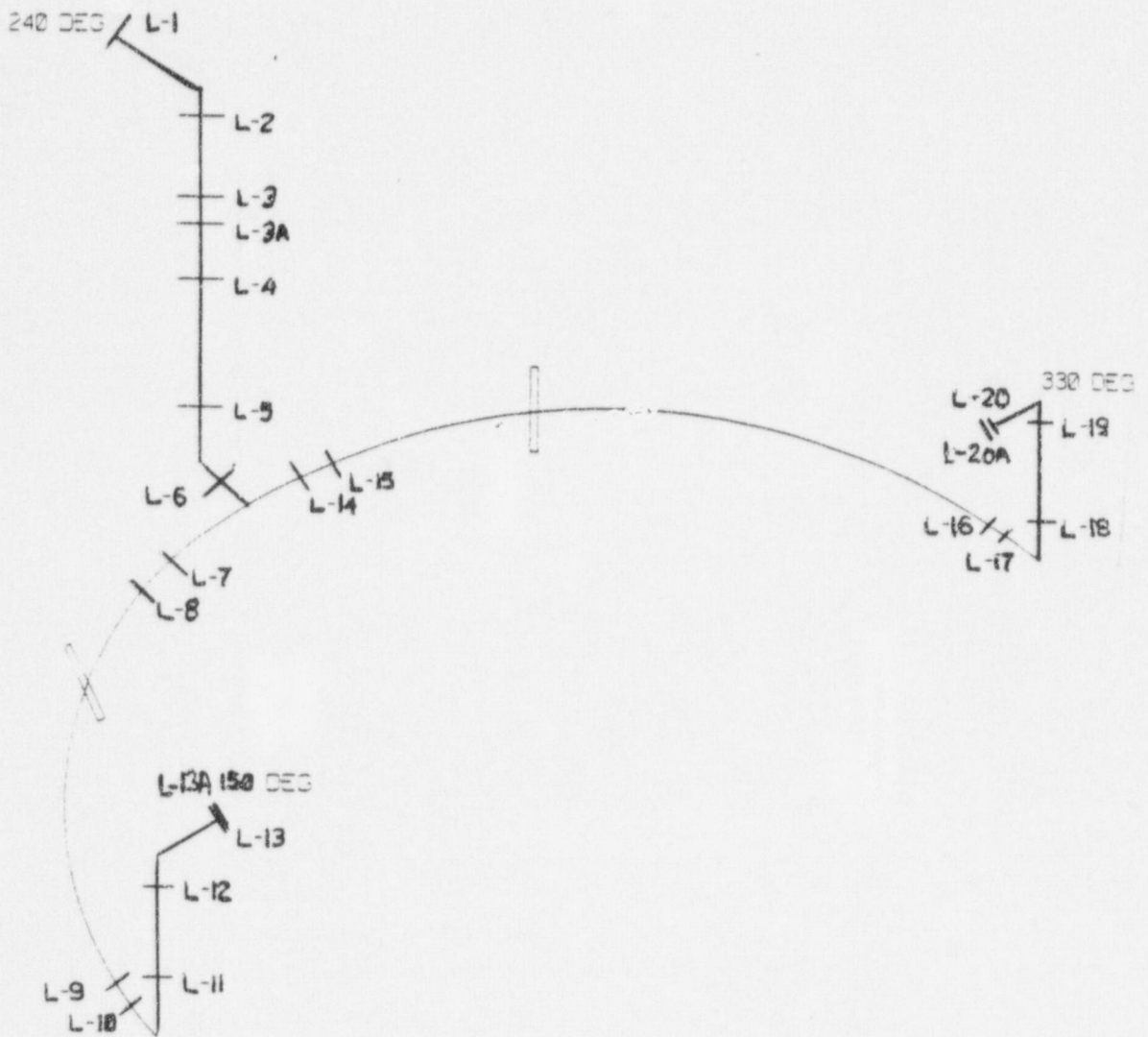


FIGURE 4

OYSTER CREEK CORE SPRAY SPARGER INLET PIPE COUPLING

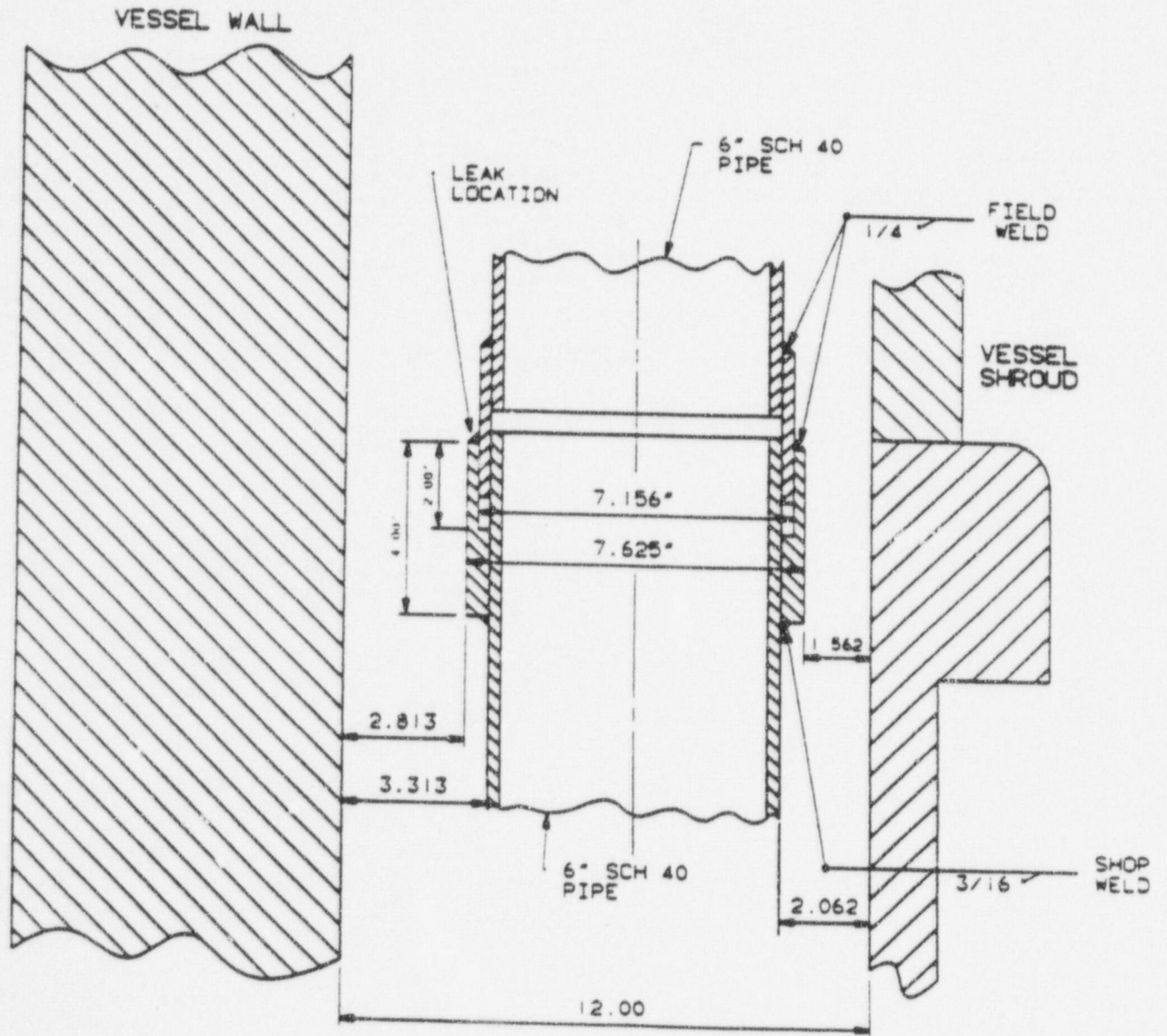


FIGURE 5

CORE SPRAY PIPING WELD ID'S
INDICATION AT WELD U-3A

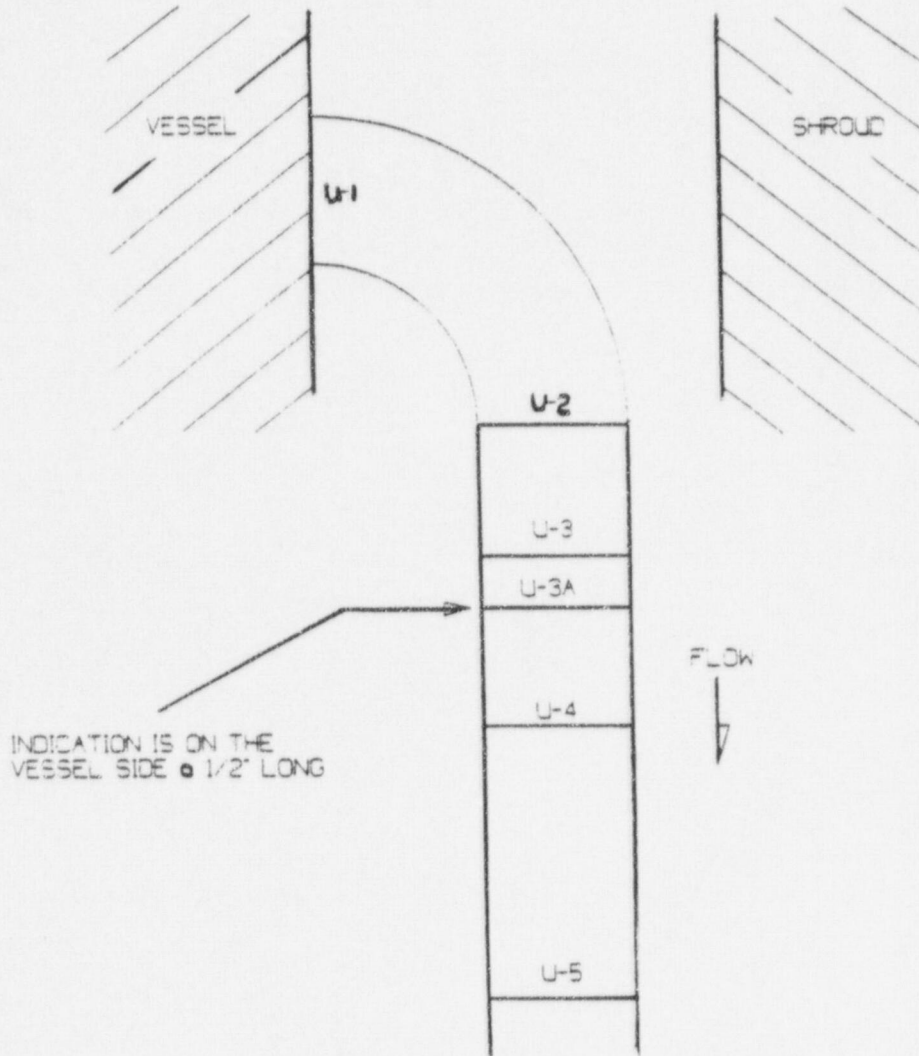


FIGURE 6

CORE SPRAY PIPING WELD IDS
LEAKER AT WELD L-3A

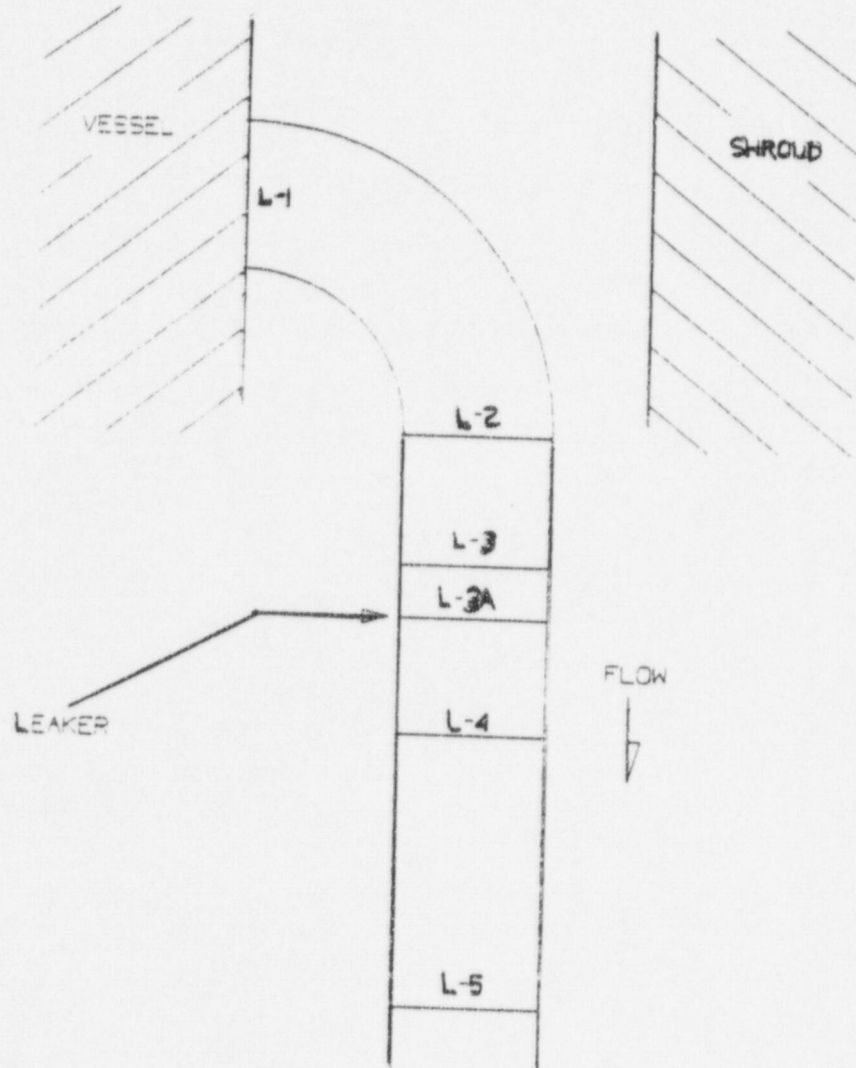


FIGURE 7