Nebraska Public Power District
Nebraska's Energy Leader

NLS980178
October 26, 1998

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555-0001

Gentlemen:

Subject: Main Steam Nozzle Weld Indication Relief Request
Cooper Nuclear Station, NRC Docket 50-298, DPR-46

Reference:
1. Letter (NLS950240) to USNRC from J. H. Mueller (NPPD), dated December 16, 1995, "Report of Feedwater Nozzle Examination Results and Relief Request"

2. Letter to G. R. Horn (NPPD) from William D. Beckner (USNRC), dated June 7, 1996, "Relief Request from the ASME Code Successive Examination Requirements for Feedwater Nozzle to Shell Weld (TAC No. M94260)"

Gentlemen:

The Nebraska Public Power District (District) hereby submits Relief Request, RI-27, for Nuclear Regulatory Commission (NRC) review and approval. The relief request, contained in Attachment 1, is in response to findings related to the ultrasonic examinations of the Main Steam nozzle to vessel weld, N3A at Cooper Nuclear Station (CNS). These examinations have identified an indication that exceeds the acceptance standards of IWB-3512 of ASME XI, 1989 Edition (Code). The indication is being evaluated and is expected to be acceptable for continued service in accordance with Subarticle IWB-3600. A copy of the fracture mechanics evaluation will be submitted under a separate cover letter no later than October 30, 1998.

The District has reasonable assurance that the indication in nozzle N3A is a welding discontinuity that has been present since original construction based on the following:
- Ultrasonic Testing (UT) has identified this indication since 1976.
- UT signal has the characteristics of slag inclusion from original welding. This condition would not appear on the radiographs but has sufficient interface to reflect ultrasonic signals.
- The location of the discontinuity is not characteristic of an inservice flaw initiation mechanism.

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The nature of this indication is similar to the indications previously identified in Feedwater nozzle to vessel welds N4A, N4C, and N4D which were determined to be construction artifacts (References 1 and 2). A description of the indication and an evaluation of the examination data from the previous two intervals is provided as Attachment 2.

Based on the information provided, the District requests approval of the relief request prior to startup from Refueling Outage 18 (RFO-18). The District requests a response to this letter by November 11, 1998 in order to support the current outage schedule.

Should you have any questions concerning this matter, please contact me.

Sincerely,

John H. Swailes
Vice President of Nuclear Energy

/kbt/dnm
Attachment

cc: Regional Administrator
USNRC - Region IV

Senior Project Manager
USNRC - NRR Project Directorate IV-1

Senior Resident Inspector
USNRC

NPG Distribution

INSERVICE INSPECTION RELIEF REQUESTS
RELIEF REQUEST NUMBER: RI-27, REVISION 0

COMPONENT IDENTIFICATION

Code Class:	1
References:	IWB-2430(a), ASME XI, 1989 Edition
Examination Category:	B-D
Item Numbers:	B3.10
Description:	Additional Examinations
Component Numbers:	Main Steam Nozzle to Vessel Weld NVE-BD-N3A

CODE REQUIREMENT

IWB-2430(a) states that when examinations performed in accordance with Table IWB-2500-1 reveal indications exceeding the acceptance standards of Table IWB-3410-1, additional examinations shall be performed during the same outage. The additional examinations shall include the remaining welds, areas, or parts included in the inspection item listing and scheduled for this and the subsequent period.

BASIS FOR RELIEF

Specific relief is requested on the basis that the proposed alternative would provide an acceptable level of quality and safety.

During the Fall 1998 Refueling outage, the last outage of the first period, an indication was identified in Main Steam nozzle to vessel weld N3A that exceeds the acceptance criteria of IWB-3512. The District has reasonable assurance that the indication is a welding discontinuity that has been present since original construction. The location of the indication and the signal characteristics are consistent with the presence of a thin layer of slag. This condition would not appear on the radiographs but has sufficient interface to reflect ultrasonic signals. This condition is being evaluated and is expected to be acceptable for continued operation in accordance with IWB-3600.

The nine nozzle to vessel welds, scheduled for examination in the first period of the Third Ten-year interval, have been performed during the Fall 1998 Refueling outage. Nine nozzle to vessel welds are scheduled to be examined during the second period. Strict application of the Code would require these nine nozzles to be examined during the current outage and again during the next period. In order to perform the ultrasonic examinations of these additional welds, the nozzles are first hydrolyzed to reduce the dose, and then scaffolding is erected (as needed), insulation and shield blocks are removed, and the surface is cleaned. These activities, plus the time for the examinations, followed by the reinstallation of shield blocks and insulation, and scaffold removal will add several days to the outage. The dose for these additional weld examinations is estimated to be 12 person-rem.

INSERVICE INSPECTION RELIEF REQUESTS

The only potential service degradation mechanisms that could affect the steam nozzles are fatigue, stress corrosion cracking and erosion corrosion. For all these mechanisms, cracking indications would be expected to occur at the inside surface. Since the indications of current concern are subsurface near the mid-depth of the nozzle, fabrication is the most likely cause of origin.

In the 1991 Addenda, IWB-2430(a) was revised to clarify that the additional examinations shall be selected from welds, areas, or parts of similar material and service. This clarification was provided to ensure that the additional examinations focused on welds, areas, or parts that would be subject to a possible common service degradation mechanism. A common service degradation mechanism does not exist for original welding related discontinuities. The Main Steam nozzles are unique when considering all aspects of service conditions applicable to reactor vessel nozzles. The most notable factor is that the main steam nozzles are in a steam environment during normal plant operation. The thermal cycles that the vessel can experience are not greatly different when comparing the upper vessel where the steam nozzles are located and the mid-vessel where most other nozzles are located. However the steam environment has significantly different heat transfer properties which make the thermal response of the nozzles in the steam region different from those below the water line.

In addition to the main steam nozzles, the top head nozzles are also in the steam region. However, the top head nozzles are small diameter nozzles welded to the hemispherical top head, where it is just over three inches thick. The steam nozzles are 24 inch diameter nozzles welded to the six inch thick cylindrical shell. Therefore, the stress conditions associated with the nozzle-specific geometries are significantly different.

PROPOSED ALTERNATE EXAMINATION

Based on the nature of the indication, the anticipated dose, the impact on the outage schedule, and the changes to IWB-2430(a) in later editions of the Code, the District requests that the additional examinations of reactor vessel nozzles be limited to the two Main Steam nozzle to vessel welds scheduled for period two, and that the remaining additional nozzle to vessel weld examinations required by IWB-2340(a) be deferred until the next refueling outage. The person-rem exposure for inspecting the additional nozzles this outage and again next period provides no concurrent safety benefit.

Relief is requested in accordance with 10CFR50.55a(g)(6)(i). The ASME Section XI requirement is impractical due to dose considerations and the proposed alternative provides an adequate level of quality.

APPLICABLE TIME PERIOD

Relief is requested for the first period of the Third Ten-year interval of the Inservice Inspection Program for CNS.

Description of Indication

Preservice ultrasonic examinations were performed in accordance with ASME Section XI, 1971 Edition. No actual data reports were available for review; however the summary report for the preservice examinations shows main steam nozzle N3A as having no recordable indications.

During the first refueling outage in 1976, manual ultrasonic examinations were performed on nozzle N3A in accordance with the 1974 Edition of ASME Section XI. During the examination with the 60° shear wave transducer one (1) indication with the following parameters was recorded: Distance to weld centerline = 3.25"; Metal path to reflector = 5.4"; Length to maximum amplitude = 14.5"; and Maximum amplitude = 100% distance amplitude correction (DAC). The evaluation of this indication determined that it was located in the nozzle forging and not in the weld. See attached sketch.

Main Steam nozzle (N3A) was examined again in 1986 with similar results. During the examination with the 60° shear wave transducer one (1) indication with the following parameters was recorded: "W" distance = 1.75"; Metal path to reflector = 5.3"; and Maximum amplitude = 90% DAC. The evaluation of this indication determined that it was located in the nozzle forging and not in the weld.

In 1998 (RFO-18) the examination with the 60° shear wave transducer identified one (1) recordable indication with the following parameters: "W" distance = 1.20"; Metal path to reflector = 5.5"; Length to maximum amplitude = 13"; and Maximum amplitude = 80% DAC. This indication is located at mid-wall along the nozzle side fusion line between 10.5" and 22.75" (see attached sketch). No flaw indication could be found in the nozzle forging as was found in 1976 and 1986. The 1976 and 1986 indication mislocation were entered into the District's corrective action program. The following comparisons clarifies the size and locational differences.

Comparison

The construction drawings show the weld prep to be a 1.5" gap between the nozzle and the vessel wall with a backing ring attached to the outside. After welding the backing ring was removed and a cosmetic weld cap was installed. This cap was machined to a 5.5" radius to provide a smooth transition between the nozzle outside diameter and the vessel wall. This resulted in a weld cap which is approximately 3.5" wide on top of a weld which is 1.5" wide. Due to this 2.0" difference between the weld cap and weld width, the plotted location of indications could also vary by 2.0" due to differences in the "Wo" reference.

The metal path to the reflector is very consistent in all three examinations which would indicate the same reflector. The 14.5" length location in 1976 is well within the length of the 1998 location. The differences in "W" locations may be explained by differences in the reference point. If the 1976 data used the center of the weld crown cap as "Wo" then the 3.25" recorded is essentially the same measurement as the 1.2" location recorded in 1998 which used the nozzle blend radius weld toe as "Wo" reference.

The 1976 and the 1986 examinations were performed to editions of the ASME code which required only a 50% DAC recording level with 0.9" increment measurements. Using this criterion, this indication was recorded as a series of spot indications which were observed all around the weld at this metal path. The 1998 data was recorded at 20% DAC levels which resulted in the 12.25" length. Other indications were observed below the 20% recording levels at the same metal path around the weld.

Conclusions

Based on the similar metal path to the reflector and the changes in the "Wo" reference points, this appears to be the same indication. Because of the change in recording criteria, no comparisons can be made to the length of these indications. Due to the improved techniques available for plotting recorded indications this indication is shown to be located in the weld material.

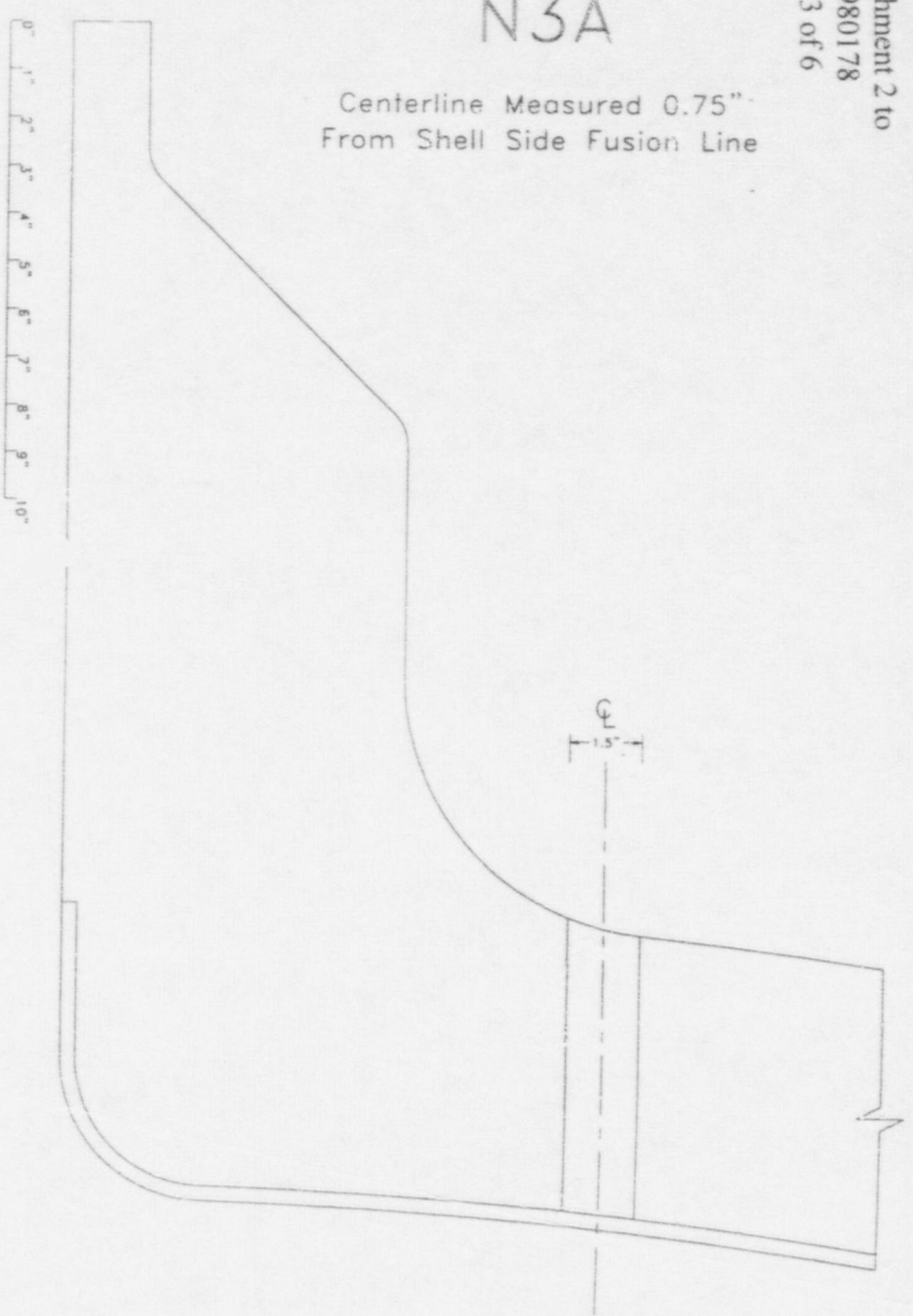
The flaw signal characteristics are typical of those of a slag type flaw with multiple reflectors and the ability to maintain signals over a wide range of skew angles. The flaw signal characteristics are not similar to those expected from lack of fusion or fatigue cracking. These indications have been recorded since 1976 and the signal characteristics observed. Thus, it is apparent that the indication was the result of the original construction process and not service induced.

N3A

Centerline of Weld Prep
Main Steam as Designed

N3A

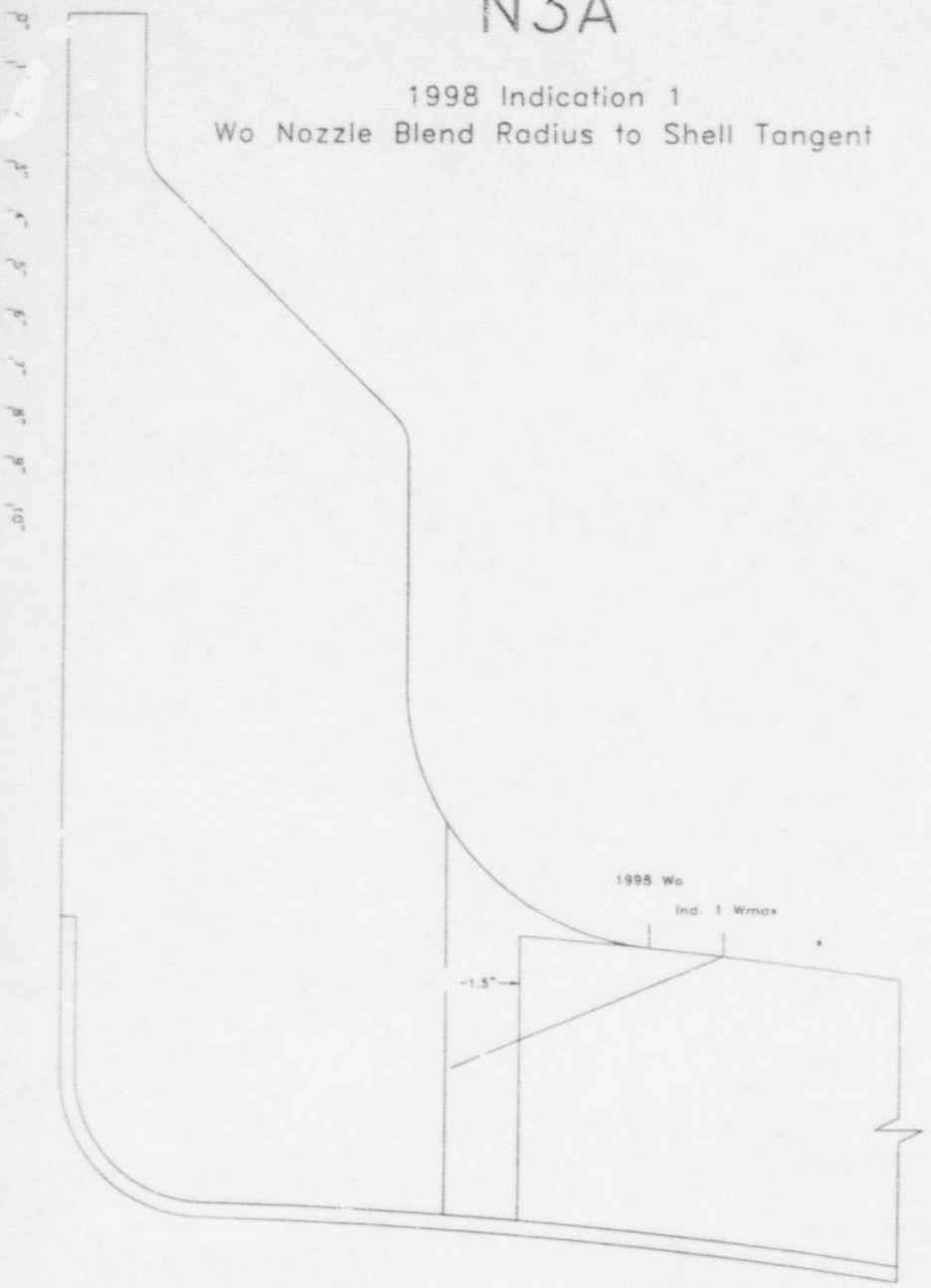
Centerline Measured 0.75"
From Shell Side Fusion Line



Drawn by: C. A. Minor / UT III

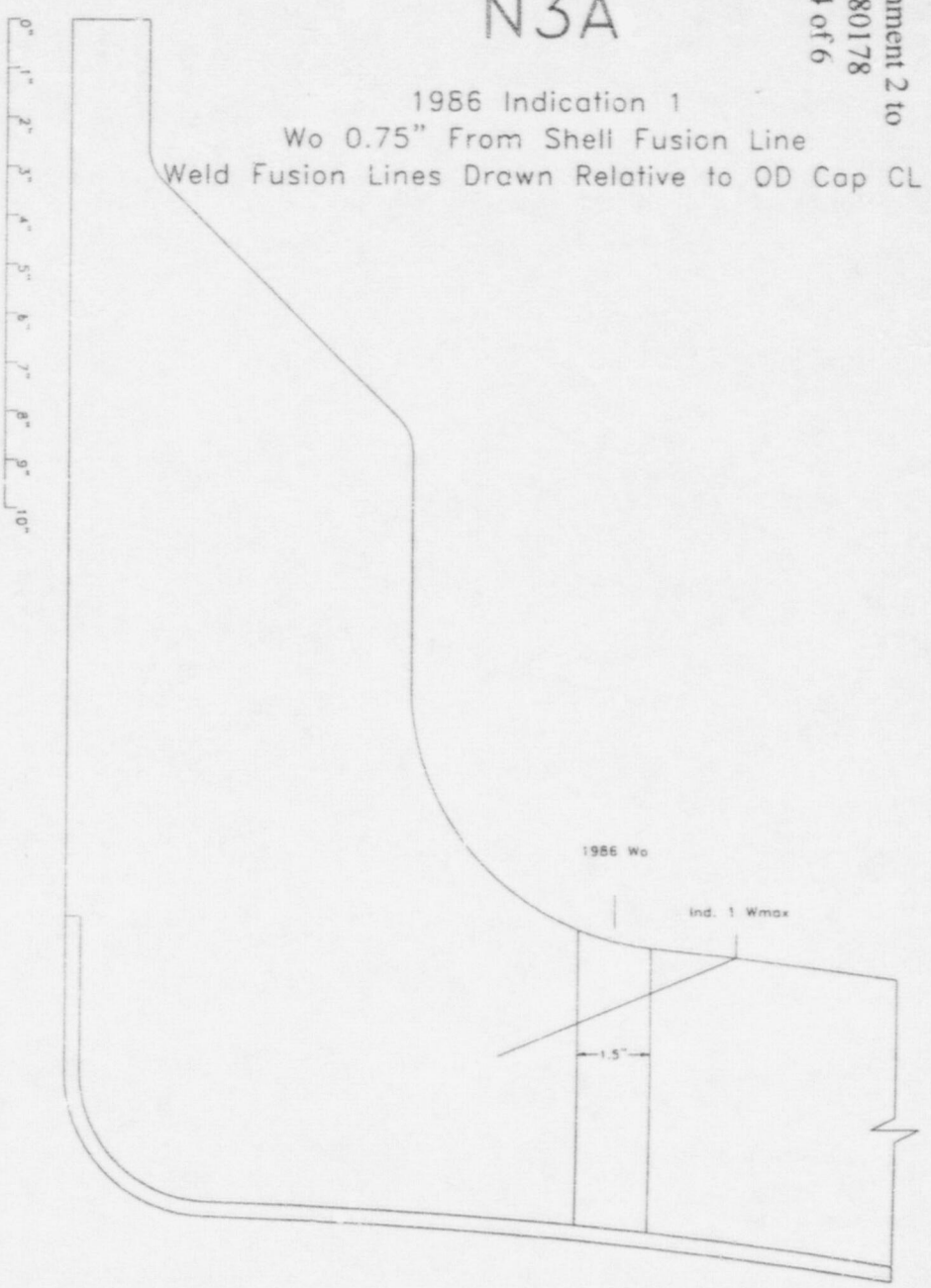
N3A

1998 Indication 1
Wo Nozzle Blend Radius to Shell Tangent



N3A

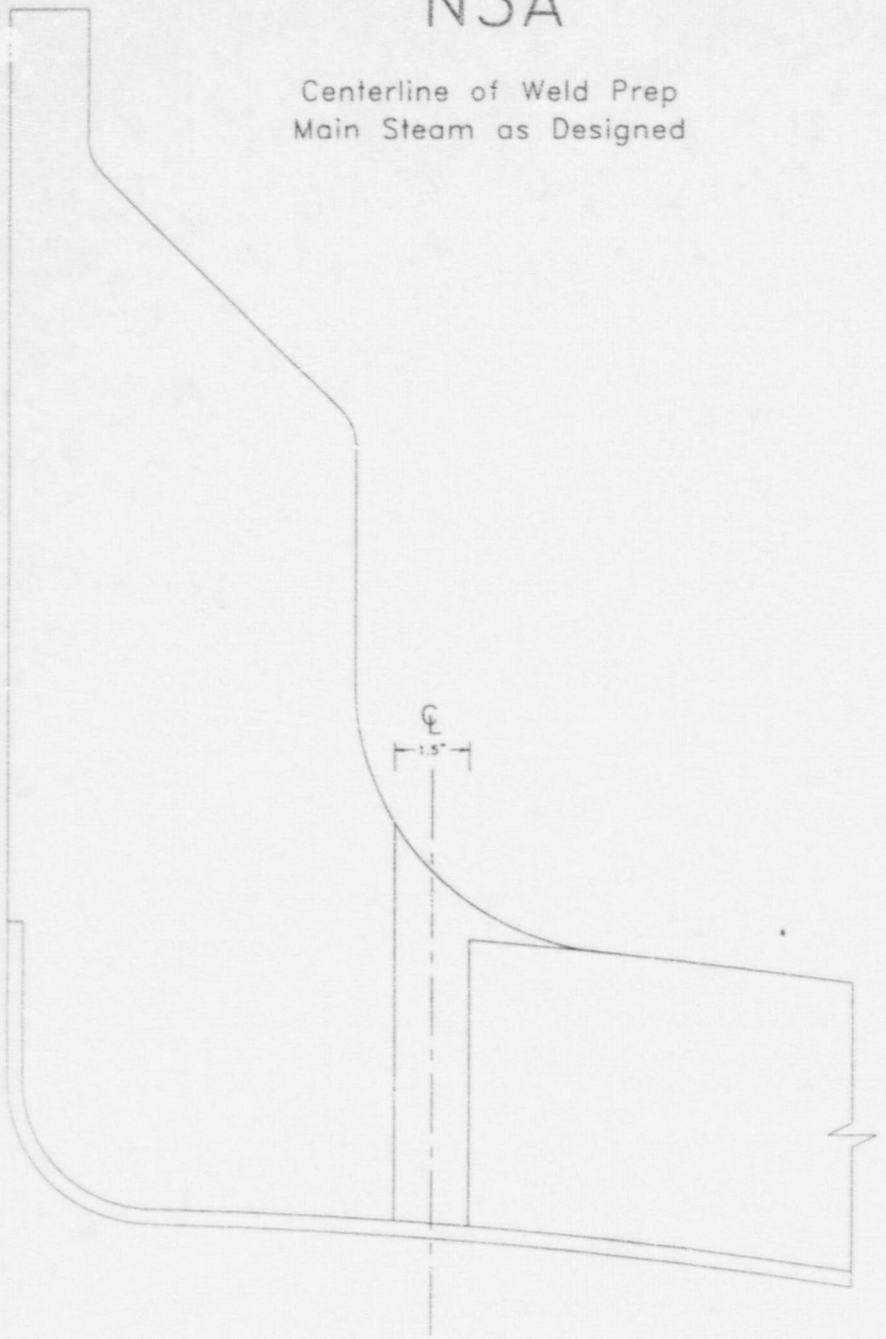
1986 Indication 1
Wo 0.75" From Shell Fusion Line
Weld Fusion Lines Drawn Relative to OD Cap CL



Drawn by: C. A. Minor / UT III

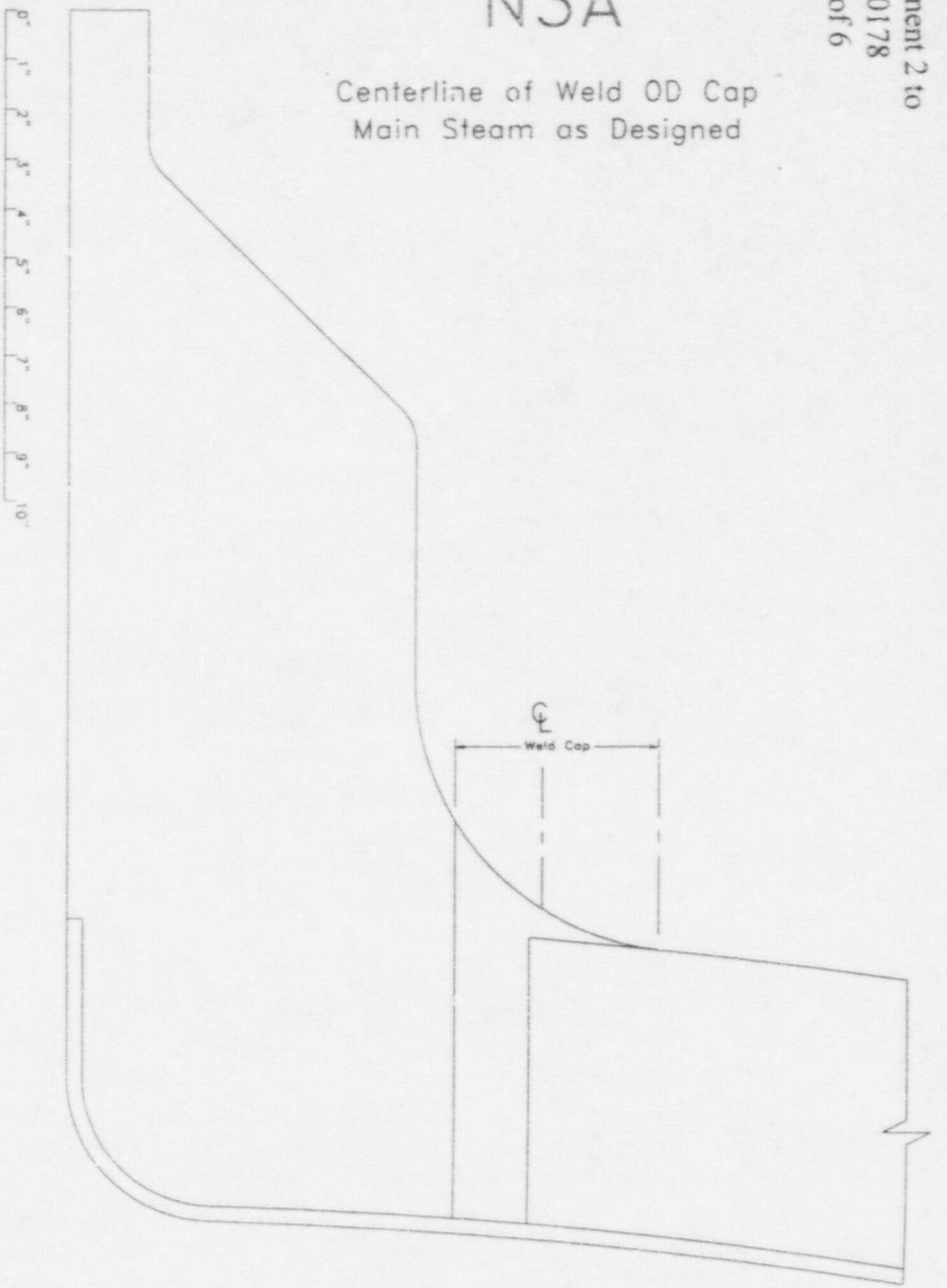
N3A

Centerline of Weld Prep
Main Steam as Designed



N3A

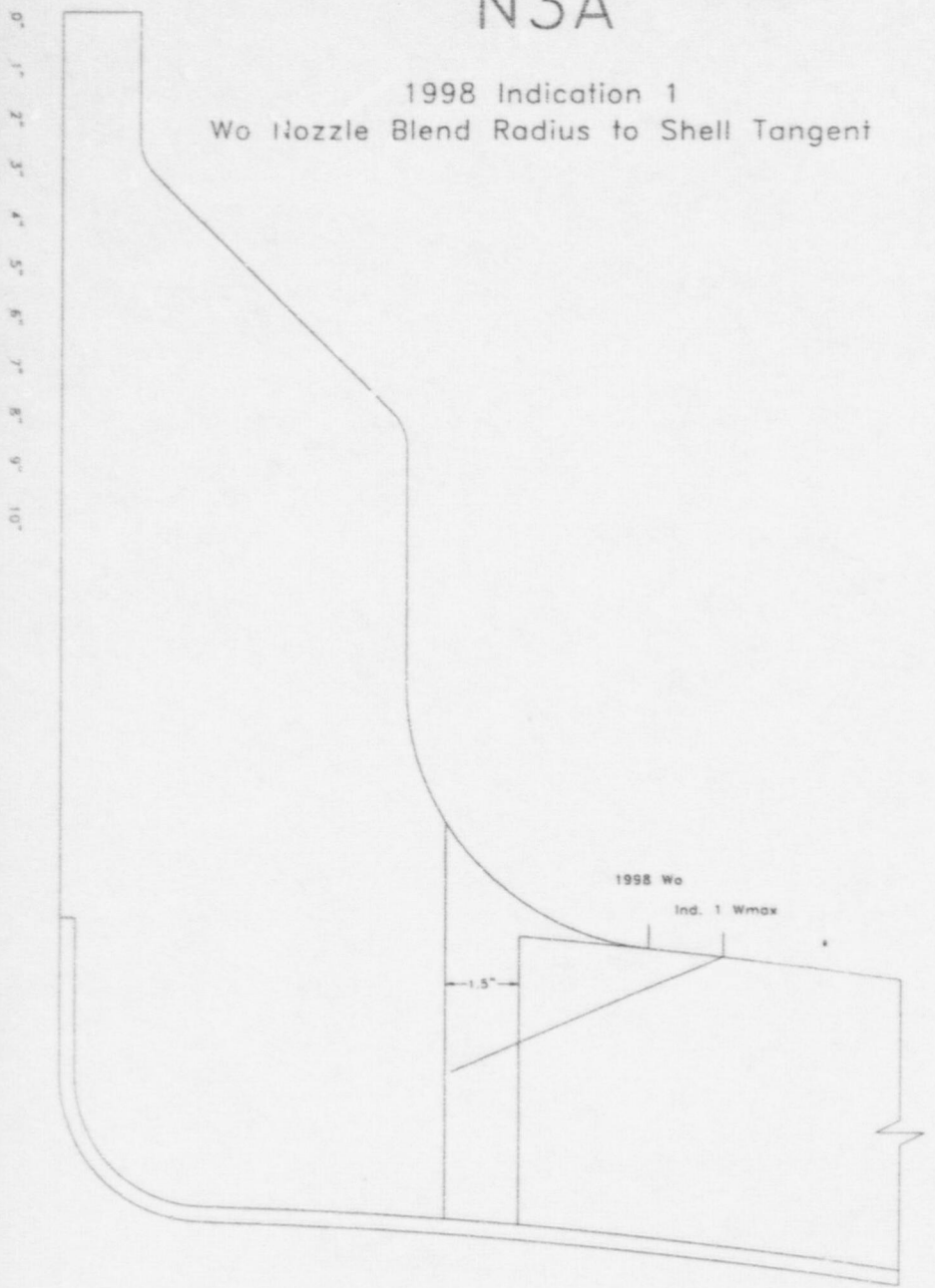
Centerline of Weld OD Cap
Main Steam as Designed



Drawn by: C. A. Minor / UT III

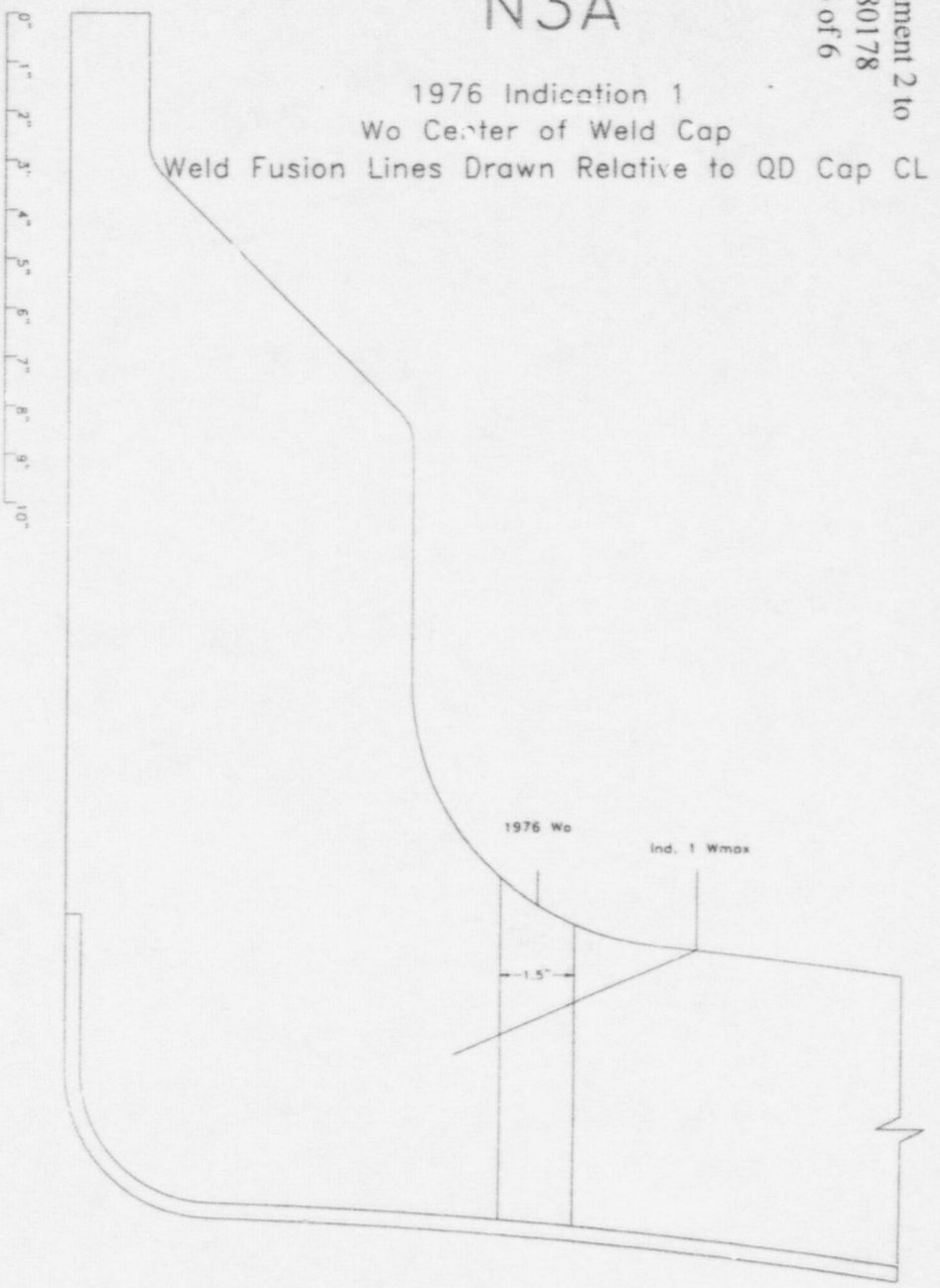
N3A

1998 Indication 1
Wo Nozzle Blend Radius to Shell Tangent



N3A

1976 Indication 1
Wo Center of Weld Cap
Weld Fusion Lines Drawn Relative to QD Cap CL



Drawn by: C. A. Minor / UT III

Correspondence No: NLS980178

The following table identifies those actions committed to by the District in this document. Any other actions discussed in the submittal represent intended or planned actions by the District. They are described to the NRC for the NRC's information and are not regulatory commitments. Please notify the NL&S Manager at Cooper Nuclear Station of any questions regarding this document or any associated regulatory commitments.

COMMITMENT	COMMITTED DATE OR OUTAGE
Examine two additional Main Steam Nozzle to vessel welds as required by ASME XI.	Refueling Outage No.18
Examine remaining Period two Nozzle to vessel welds as required next outage.	Refueling Outage No.19
Submit fracture Mechanics evaluation of MS-A Nozzle to vessel weld indication	10/30/98