



Commonwealth Edison

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August 26, 1983

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Subject: Byron Generating Station Unit 1
Preservice Inspection Program Plan
NRC Docket No. 50-454

Reference (a): March 1, 1983, letter from T. R.
Tramm to H. R. Denton.

Dear Mr. Denton:

This is to provide copies of preservice inspection relief requests for Byron 1. These requests are to be included with the other requests submitted with reference (a) as Appendix B to the Preservice Inspection Program Plan.

Enclosed are relief requests NR-3 (Rev. 0), NR-4 (Rev. 0), and NR-8 (Rev 0) concerning volumetric examination of cast stainless steel welds. Justification for each request is provided in these documents.

Please address questions regarding this matter to this office.

One signed original and fifteen copies of this letter and the enclosures are provided for your review.

Very truly yours,

T. R. Tramm
Nuclear Licensing Administrator

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Enclosures

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PDR ADUCK 05000454
PDR

7206N

13001
11/1

RELIEF REQUEST NR-3

1. SYSTEM: Reactor Coolant
2. NUMBER OF ITEMS: 8

Cast Stainless Steel SA-351-CF8A (Elbow)

to

Cast Stainless Steel SA-351-CF8 (Pump)

| <u>Line Number</u> | <u>Weld Number</u> | <u>Attachment Numbers</u> |
|--------------------|--------------------|---------------------------|
| IRC02AA-31" | J-8 | 1 & 2 |
| IRC02AB-31" | J-8 | 1 & 2 |
| IRC02AC-31 | J-8 | 1 & 2 |
| IRC02AD-31 | J-8 | 1 & 2 |

Cast Stainless Steel SA-351-CF8A (Elbow)

to

Cast Stainless Steel SA-351-CF8M (Valve)

| <u>Line Number</u> | <u>Weld Number</u> | <u>Attachment Numbers</u> |
|--------------------|--------------------|---------------------------|
| IRC01AA-29" | J-4 | 1 & 3 |
| IRC01AB-29" | J-4 | 1 & 3 |
| IRC01AC-29" | J-4 | 1 & 3 |
| IRC01AD-29" | J-5 | 1 & 3 |

3. ASME CODE CLASS: 1
4. ASME CODE SECTION XI REQUIREMENTS: Table IWB-2500-1, Examination Category B-J, Item B.9.11 requires a surface and volumetric examination of the regions described in Figure IWB-2500-8 for piping 4 in. nominal pipe size and greater. In addition, Examination Category B-P, Item B15.50 requires a system leakage test in accordance with IWB-5221 each refueling outage for all pressure retaining components. Article IWB-2200, "Preservice Examination" states that:

- a. Examinations required by this Article shall be completed prior to initial plant startup. In addition, the preservice examinations shall be extended to include essentially 100% of the pressure retaining welds in all Class 1 components except in those components exempted from examination by IWB-1220 (a), (b), or (c).
 - b. Shop and field examinations may serve in lieu of the on-site preservice examination provided:
 - 1). In the case of vessels only, the examination is performed after the hydrostatic test required by Section III has been completed;
 - 2). such examinations are conducted under conditions and with equipment and techniques equivalent to those that are expected to be employed for subsequent inservice inspections;
 - 3). the shop and field examinations records are, or can be, documented and identified in a form consistent with those required in IWA-6000.
5. BASIS FOR RELIEF: All of the welds listed above are cast austenitic stainless steel to cast austenitic stainless steel. At this time we have completed acceptable radiographic examinations of these welds to meet the preservice volumetric requirement. However, we do not intend to use radiography as our inservice volumetric examination method. Attempts have been made to ultrasonically examine these welds without success.
- Harrisonics Laboratory, a design and manufacturing firm for ultrasonic search units, was sent a piece of SA-351-CF8 material with a side drilled hole and rectangular notch and was requested to design a special transducer that could adequately resolve these two reflectors, see Attachment 4 for block arrangement. After six months of effort, Harrisonics reported that they failed to find any combination of search unit parameters that would penetrate the material more than 1/2 to 3/4 of an inch of metal path with

a useful signal-to-noise ratio. The transducer which provided this penetration was a dual element, refracted "L" wave, 45° focused transducer with the focal point at 2.5", the nominal thickness of the welds in question.

6. ALTERNATE TEST METHOD: None.
7. JUSTIFICATION: The welds listed above are joining SA-351-CF8A (elbow) to either SA-351-CF8 (pump casing) or SA-351-CF8M (valve body). These materials have very poor acoustic properties which do not lend themselves to ultrasonic examination.

Presently, conventional radiography is not a viable inservice examination as the background radiation will increase over the course of plant life. This increase in radiation will likely cause the film to fog which will reduce the resolution of any defects.

At this time, EPRI's MINAC, the portable high energy x-ray source, has not been demonstrated as a viable alternative in examining these welds. Typical concerns include the MINAC's size and mobility in the areas in which these welds are located. The MINAC's development will be followed and when it is determined that it can be used to examine these welds with good quality radiographs, it will be given further consideration.

In that cast austenitic stainless steels are extremely tough and resistant to intergranular stress corrosion cracking, leakage long before complete failure is virtually certain. Leakage within the Reactor Coolant System is checked each refueling outage. In addition to this leakage test, leakage within the containment will be monitored by two (2) remote methods. First, leakage from within the containment will flow into the weir box of the containment sump.

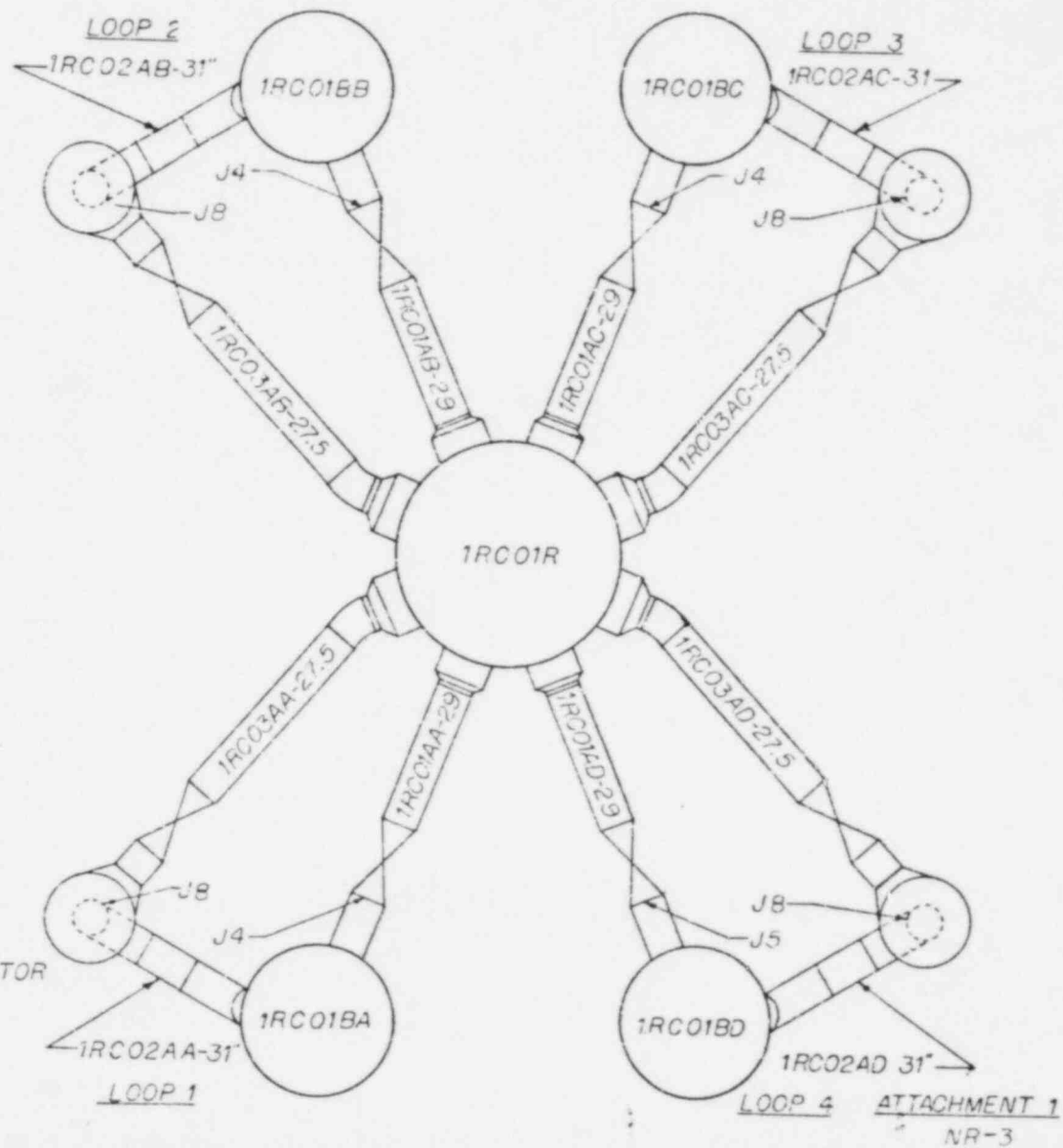
Within this weir box there is a capacitance type level indicator capable of detecting a 2 gallon per minute leak within 1 hour. In addition to the level indicator there are sump-pump-run-time totalizers which measure pump-run time.

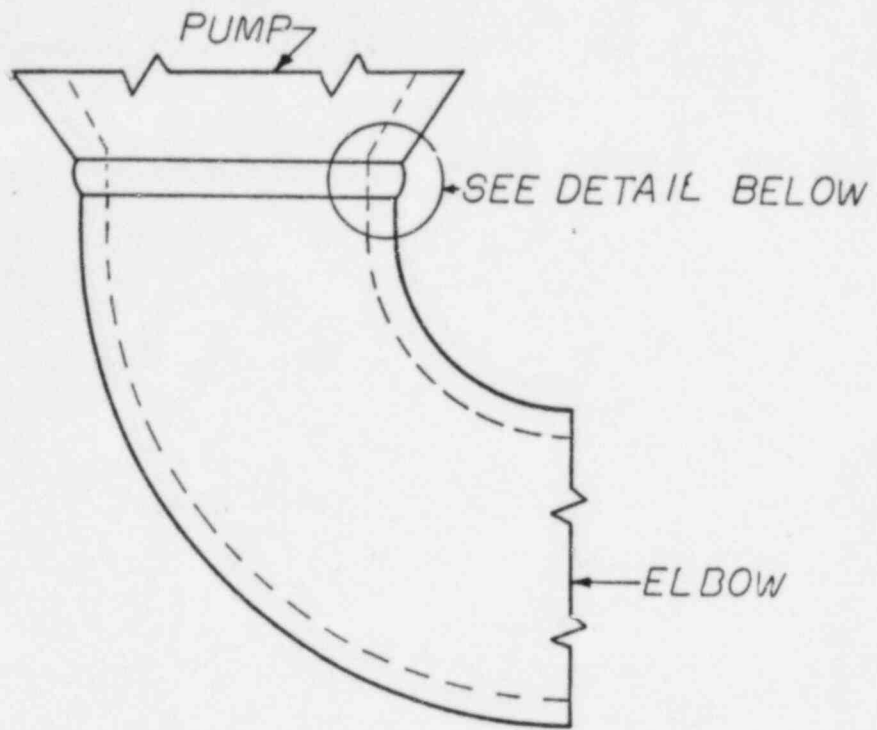
The second method utilizes a containment radiation monitoring system capable of detecting a 1 gallon per minute leak within 1 hour. Additional atmospheric monitoring is provided by pressure, temperature, and humidity monitors. All atmospheric monitors are monitored in the main control room. By use of the above mentioned leakage detection systems and the high resistance of cast austenitic stainless steel to stress corrosion cracking, an high level of structural integrity for these welds will be assured.

TYPICAL COLD LEG

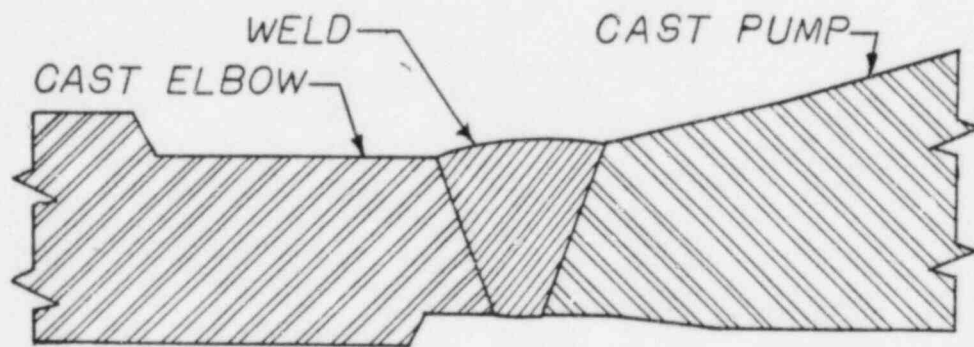
TYPICAL CROSSOVER LEG

TYPICAL HOT LEG

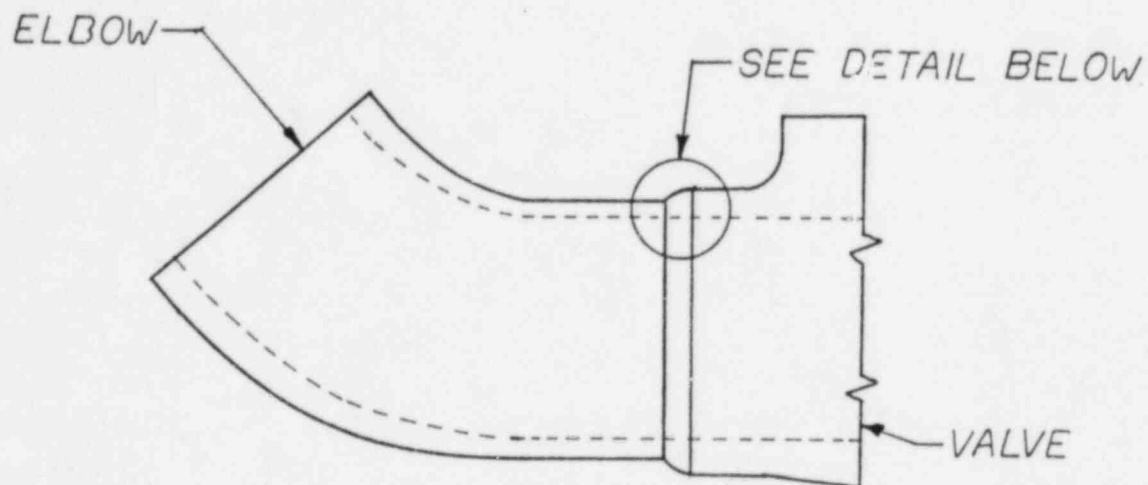




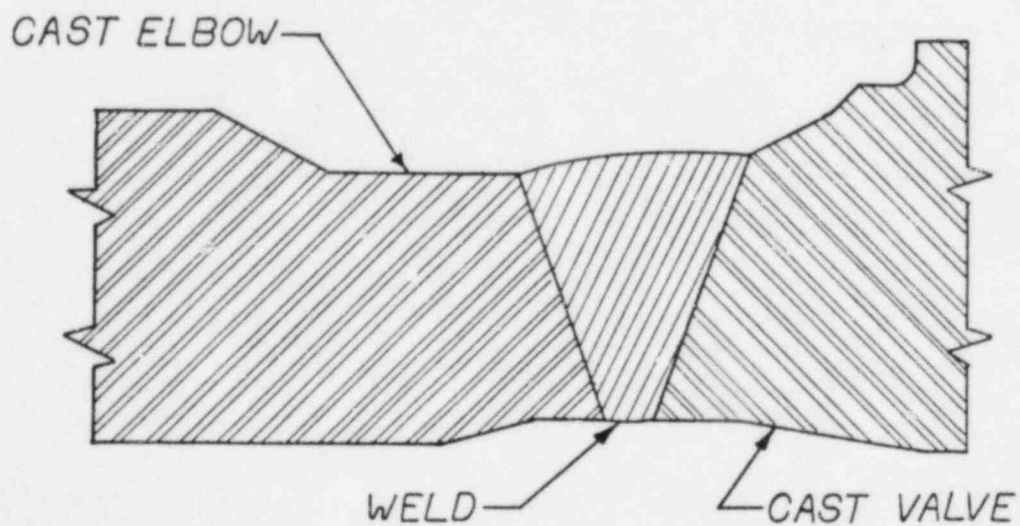
ELBOW TO PUMP



WELD DETAIL

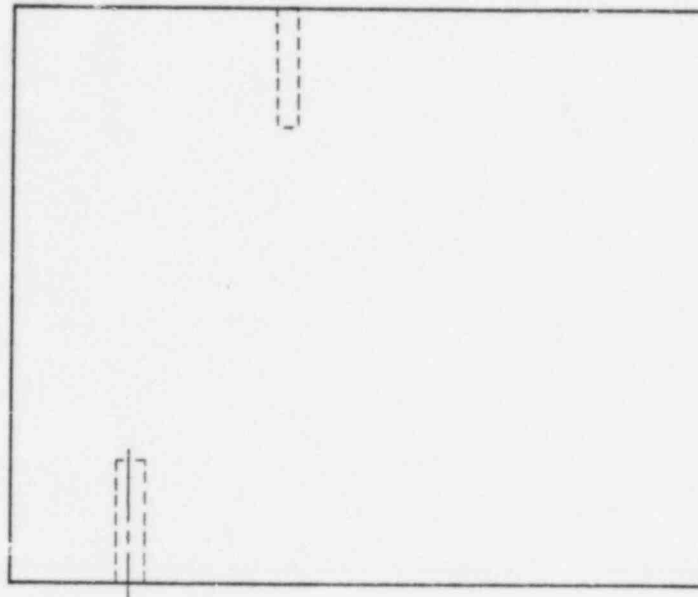


ELBOW TO VALVE

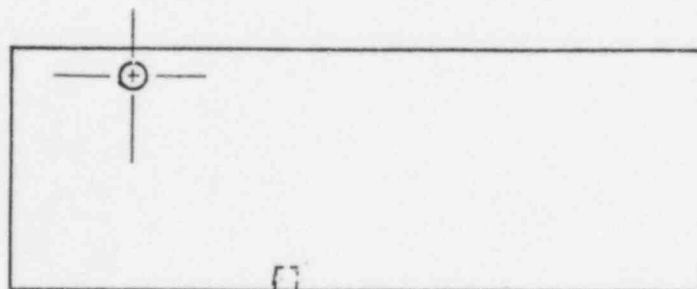


WELD DETAIL

SA-351-CF8 TEST BLOCK



TOP VIEW



SIDE VIEW

RELIEF REQUEST NR-4

1. SYSTEM: Reactor Coolant
2. NUMBER OF ITEMS: 8

Cast Stainless Steel SA-351-CF8A(Elbow)

to

Cast Carbon Steel SA-216 GR-WCC (Nozzle)

| <u>Line Number</u> | <u>Weld Number</u> | <u>Attachment Numbers</u> |
|--------------------|--------------------|---------------------------|
| 1RC01AA-29" | F-2 | 1 & 2 |
| 1RC02AA-31" | F-1 | 1 & 2 |
| 1RC01AB-29" | F-2 | 1 & 2 |
| 1RC02AB-31" | F-1 | 1 & 2 |
| 1RC01AC-29" | F-2 | 1 & 2 |
| 1RC02AC-31" | F-1 | 1 & 2 |
| 1RC01AD-29" | F-2 | 1 & 2 |
| 1RC02AD-31" | F-1 | 1 & 2 |

3. ASME CODE CLASS: 1
4. ASME CODE SECTION XI REQUIREMENTS: Table IWB-2500-1, Examination Category B-F, Item B5.30 requires surface and volumetric examination of the regions described in Figure IWB-2500-8 for all Steam Generator nozzle-to-safe end welds. In addition, Examination Category B-P, Item B15.30 requires a system leakage test in accordance with IWB-5221 each refueling outage for the Steam Generator pressure retaining boundary.

Article IWB-2200, "Preservice Examination", states that:

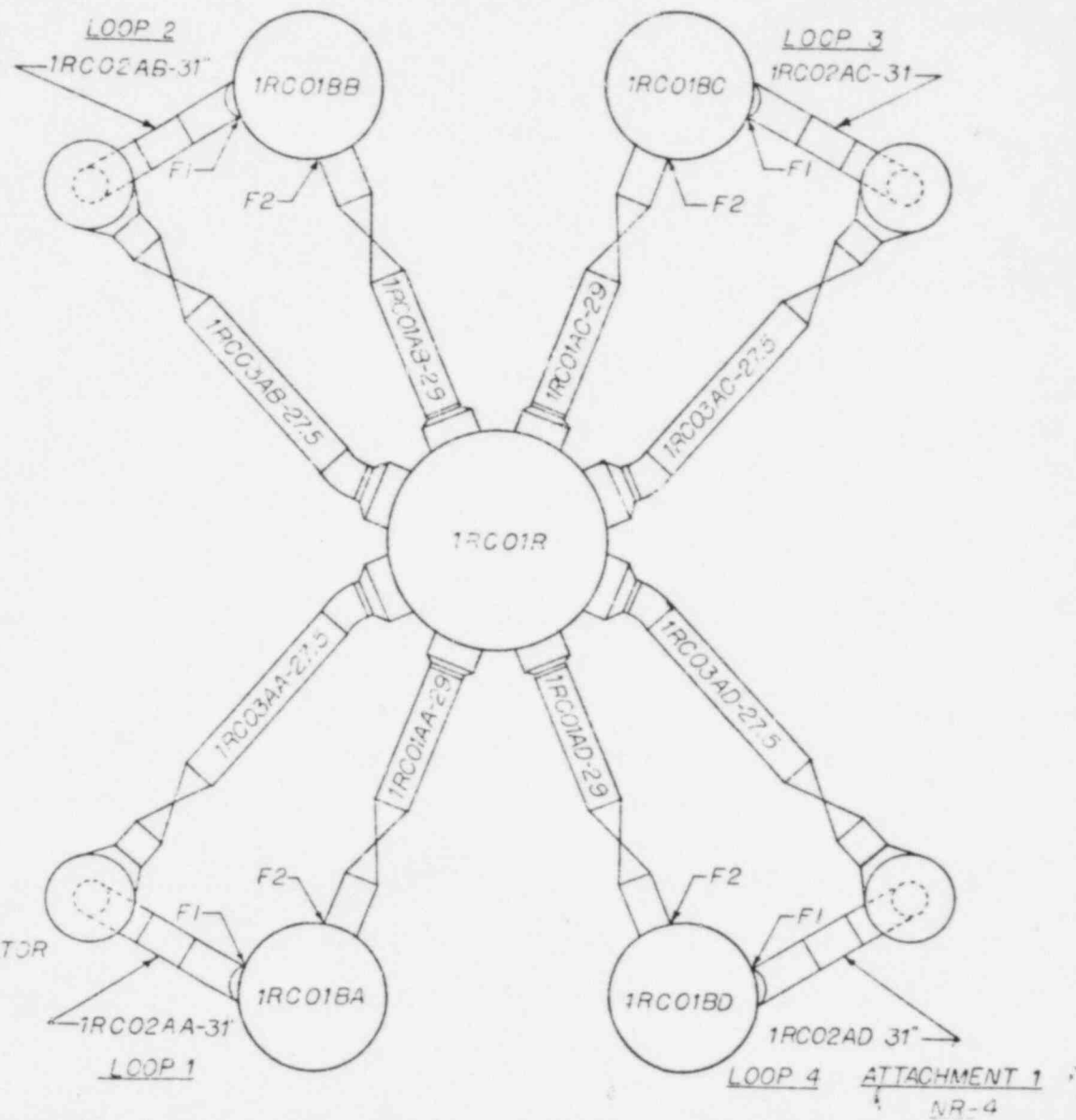
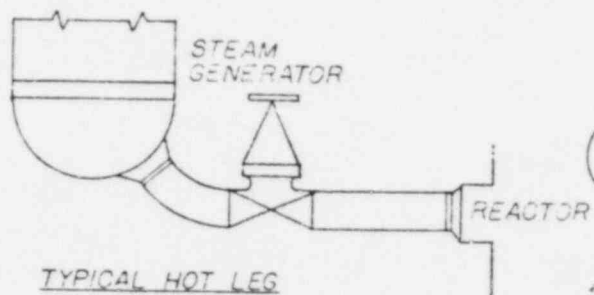
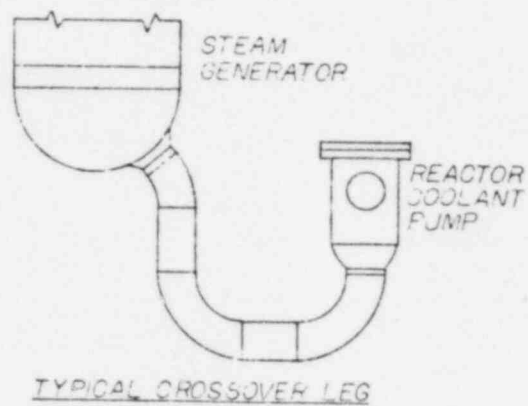
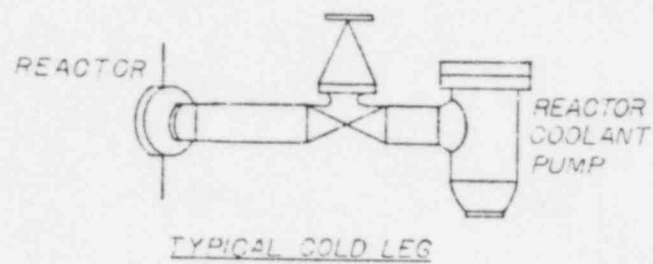
- a. Examinations required by this Article shall be completed prior to initial plant startup. In addition, the preservice examinations shall be extended to include essentially 100% of the pressure retaining welds in all Class 1 components except in those components exempted from examination by IWB-1220 (a), (b), or (c).

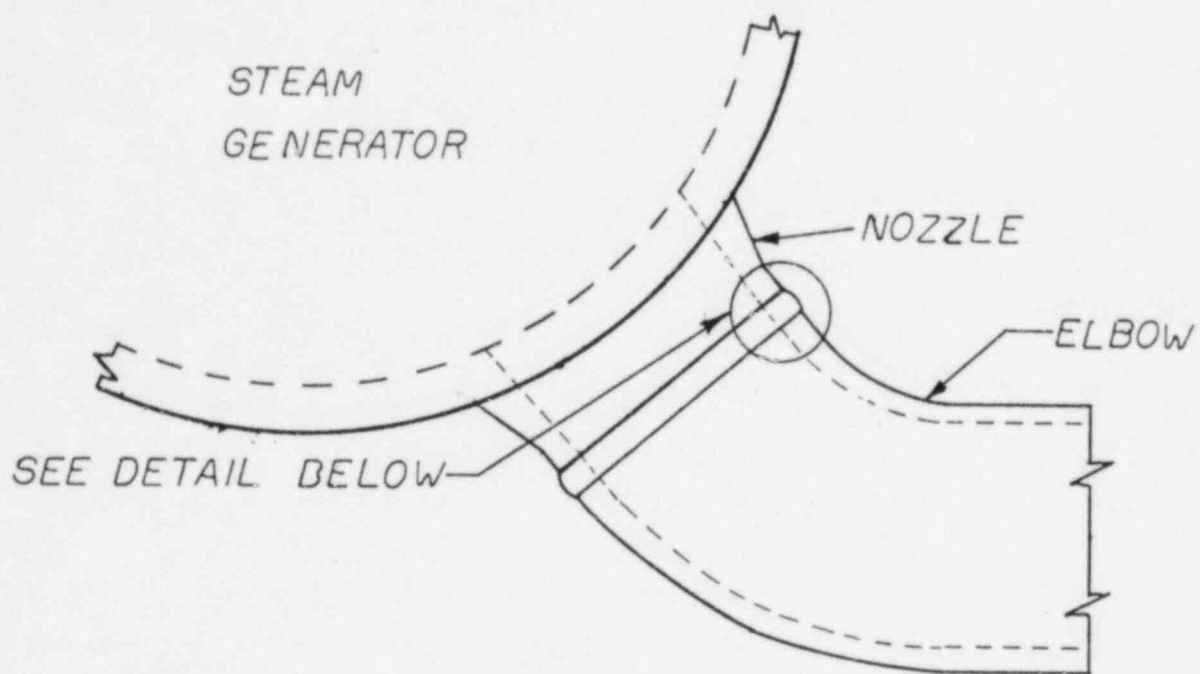
- b. Shop and field examinations may serve in lieu of on-site preservice examinations provided:
 - 1). In the case of vessels only, the examination is performed after the hydrostatic test required by Section III has been completed;
 - 2). such examinations are conducted under conditions and with equipment and techniques equivalent to those that are to be employed for subsequent inservice inspections;
 - 3). the shop and field examination records are, or can be, documented and identified in a form consistent with those required in IWA-6000.
- Ultrasonic examination requirements from Mandatory Appendix III, Article III-4000, require examination for:
- a. Reflectors parallel to the weld seam. The angle beam examination for reflectors parallel to the weld seam shall be performed by a full V path from one side or a one-half V path from two sides of the weld, where practicable.
 - b. Reflectors transverse to the weld seam.
 - 1). The angle beam examination for reflectors transverse to the weld seam shall be performed on the weld crown on a single scan path to examine the weld root by one-half V path in two directions along the weld.
 - 2). For inservice examination, only those welds showing reportable preservice indications need be examined for transverse reflectors.
5. BASIS FOR RELIEF: The welds listed above are cast austenitic stainless steel SA-351-CF8A to cast carbon steel SA-216 GR-WCC with austenitic stainless steel cladding. We have completed acceptable radiographic and surface examinations to meet the preservice volumetric and surface requirements.

In addition, ultrasonic examinations were performed circumferentially in both directions for transverse reflectors, and axially from the steam generator nozzle side for parallel reflectors with a one-half V path scan. Neither the circumferential or axial scan located any rejectable indications.

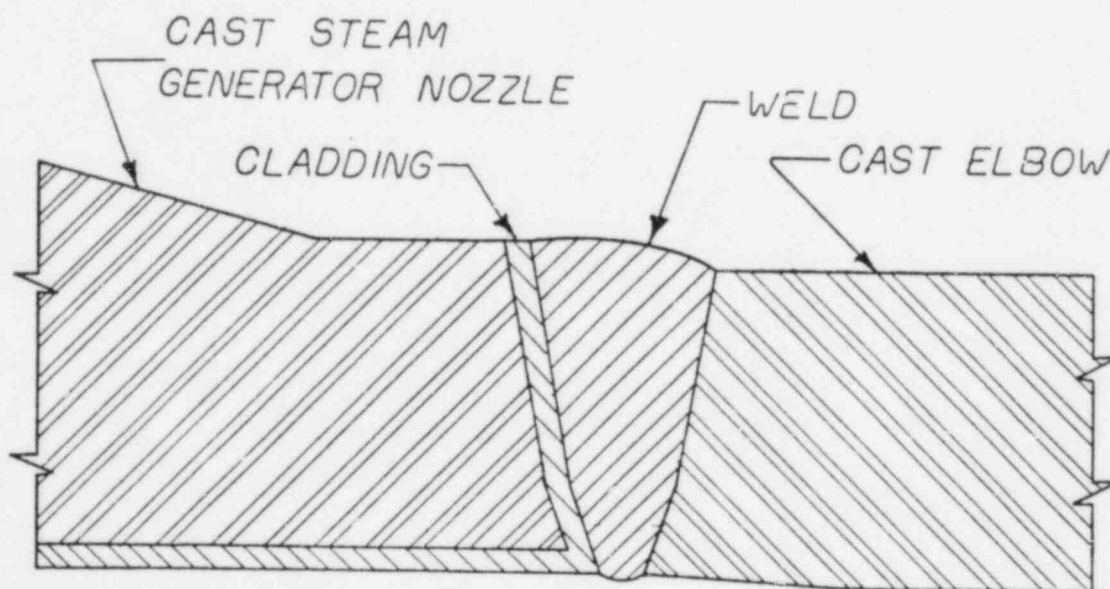
The one-half V path examination from the elbow side of the weld could not be performed due to the poor acoustic properties of the cast austenitic stainless steel.

6. ALTERNATE TEST METHOD: None.
7. JUSTIFICATION: A high level of Structural integrity has been assured for the noted welds over the life of the plant by:
 - a). Having performed an acceptable one-sided ultrasonic examination.
 - b). Having performed acceptable radiographic and surface examinations, and
 - c). Having the leakage detection system described in NR-3.





ELBOW TO NOZZLE



WELD DETAIL

RELIEF REQUEST NR-8

1. SYSTEM: Reactor Coolant
2. NUMBER OF ITEMS: 4

Cast Stainless Steel SA-351-CF8A (Elbow)

to

Stainless Steel SA-182 GR-F316 (Safe-end)

| <u>Line Number</u> | <u>Weld Number</u> | <u>Attachment Number</u> |
|--------------------|--------------------|--------------------------|
| IRC03AA-27.5" | J-11 | 1 & 2 |
| IRC03AB-27.5" | J-10 | 1 & 2 |
| IRC03AC-27.5" | J-12 | 1 & 2 |
| IRC03AD-27.5" | J-10 | 1 & 2 |

3. ASME CODE CLASS: 1
4. ASME CODE SECTION XI REQUIREMENTS: Table IWB-2500-1, Examination Category B-J, Item B9.11 requires surface and volumetric examination of the regions described in Figure IWB-2500-8 for piping 4 in. nominal pipe size and greater. In addition, Examination Category B-P, Item B15.50 requires a leakage test in accordance with IWB-5221 each refueling outage for all pressure retaining components.

Article IWB-2200 "Preservice Examination" states that:

- a. Examinations required by this Article shall be completed prior to initial plant startup. In addition, the preservice examinations shall be extended to include essentially 100% of the pressure retaining welds in all Class 1 components except in those components exempted from examination by IWB-1220 (a), (b), or (c).
- b. Shop and field examinations may serve in lieu of on-site preservice examination provided:
 - 1) In the case of vessels only, the examination is performed after the hydrostatic test required by Section III has been completed;

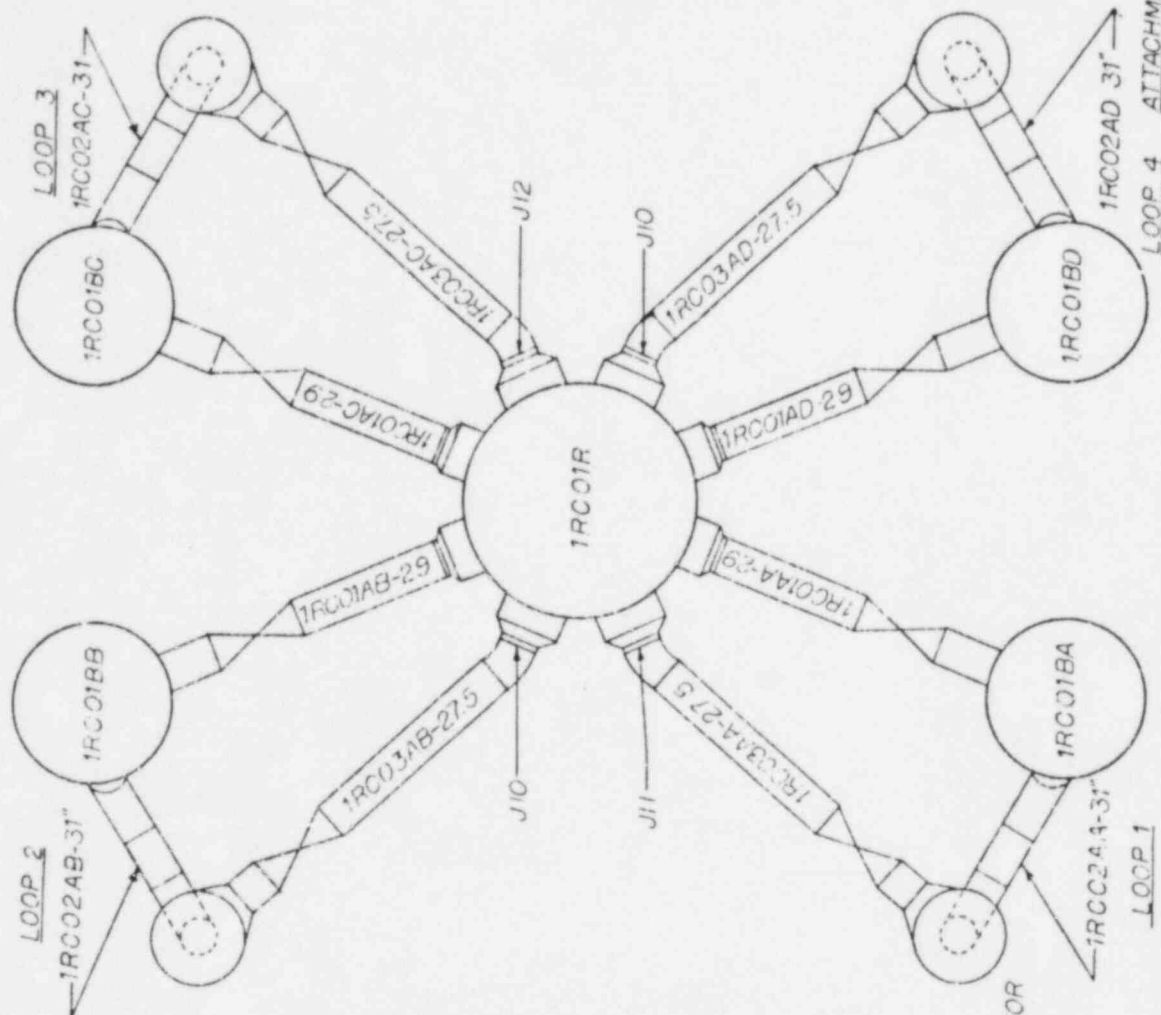
- 2). such examinations are conducted under conditions and with equipment and techniques equivalent to those that are expected to be employed for subsequent inservice inspections;
- 3). the shop and field examination records are, or can be, documented and identified in a form consistent with those required in IWA-6000.

Ultrasonic examination requirements from Mandatory Appendix III, Article III-4000, require examination for:

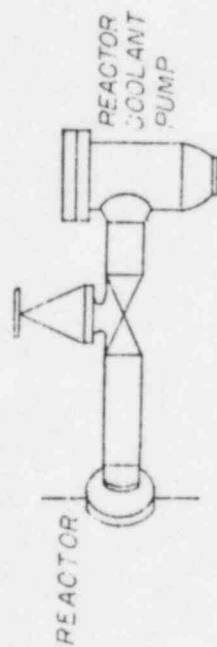
- a. reflectors parallel to the weld seam. The angle beam examination for reflectors parallel to the weld seam shall be performed by a full V path from one side or a one-half V path from two sides of the weld, where practicable.
- b. reflectors transverse to the weld seam.
 - 1). The angle beam examination for reflectors transverse to the weld seam shall be performed on the weld crown on a single scan path to examine the weld root by one-half V path in two directions along the weld.
 - 2). For inservice examination, only those welds showing reportable preservice indications need be examined for transverse reflectors.

5. BASIS FOR RELIEF: The welds listed above are all cast austenitic stainless steel to Reactor Vessel nozzle safe-ends. These welds have received radiographic and surface examinations to meet the preservice volumetric and surface examination requirements. In addition, ultrasonic examination were performed circumferentially in both directions for transverse reflectors, and axially from the safe-end side only for parallel reflectors. The axial scan from the elbow was not performed due to the poor acoustic properties of cast austenitic stainless steel.

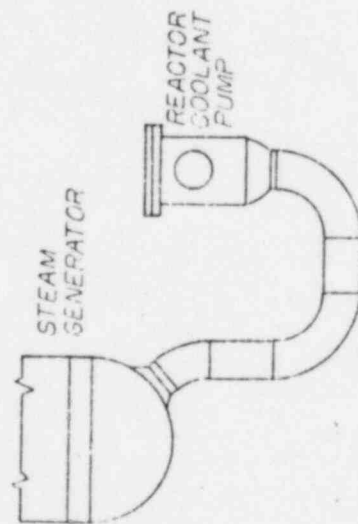
6. ALTERNATE TEST METHOD: None.
7. JUSTIFICATION: A high level of structural integrity has been assured for the noted welds over the life of the plant by:
 - a). Having performed an acceptable one-sided ultrasonic examination.
 - b). Having performed acceptable radiographic and surface examinations, and
 - c). Having the leakage detection system described in NR-3.



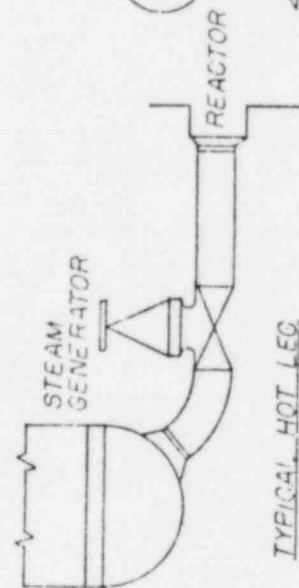
LOOP 4 ATTACHMENT 1
NR 2



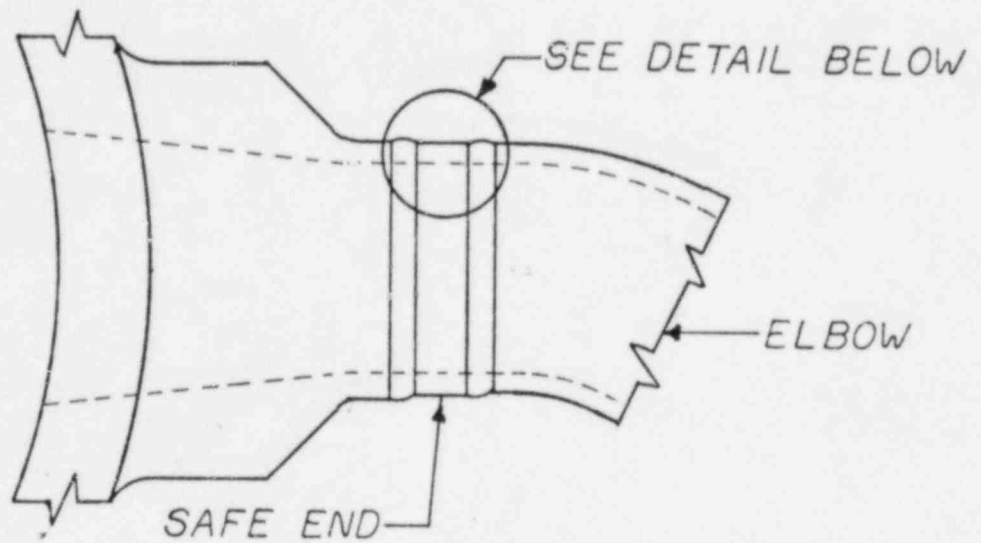
TYPICAL COLD LEG



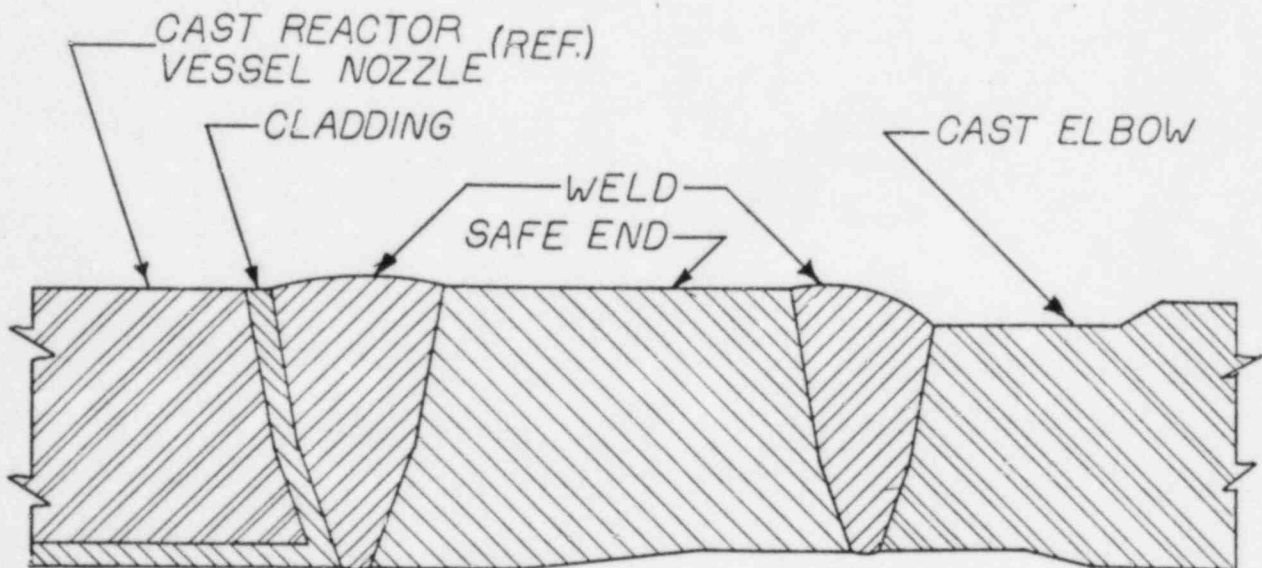
TYPICAL CROSSOVER LEG



TYPICAL HOT LEG



ELBOW TO SAFE END



WELD DETAIL

ATTACHMENT 2

NR-8