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 FACIL:50-261 H.B. Robinson Plant, Unit 2, Carolina Power & Light C 05000261
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 VAUGHN,G.E. Carolina Power & Light Co.
 RECIP.NAME RECIPIENT AFFILIATION
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SUBJECT: Requests relief from ASME B&PV Code,Section XI to allow non-Code repair of welded pipe sleeve of svc water supply & return piping for containment fan cooler HVH-4 due to microbiologically-induced corrosion,per Generic Ltr 90-05.

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Carolina Power & Light Company

P.O. Box 1551 • Raleigh, N.C. 27602

JAN 16 1991

SERIAL: NLS-91-013
10CFR50.55a

G. E. VAUGHN
Vice President
Nuclear Services Department

United States Nuclear Regulatory Commission
ATTENTION: Document Control Desk
Washington, DC 20555

H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2
DOCKET NO. 50-261/LICENSE NO. DPR-23
ASME CODE RELIEF REQUEST - SERVICE WATER

Gentlemen:

In accordance with 10CFR50.55a and the guidance provided in Generic Letter 90-05, "Guidance for Performing Temporary Non-Code Repair of ASME Code Class 1, 2, and 3 Piping," Carolina Power & Light Company hereby requests relief from the requirements of the ASME Boiler and Pressure Vessel Code, Section XI, for the H. B. Robinson Steam Electric Plant, Unit 2 (HBR2). On January 6, 1991, indication of microbiologically-induced corrosion (MIC) was discovered on the Service Water Supply and Return Piping for Containment Fan Cooler HVH-4 and subsequently in Service Water Containment Penetrations. A temporary non-code repair consisting of a welded pipe sleeve will be installed to restore the piping to its original design capability. Enclosure 1 contains a relief request which justifies use of this engineered non-code repair until a permanent, code-approved repair can be implemented. CP&L will perform the permanent repair as outlined in Item 9 of Enclosure 1.

In order to support plant restart and transition to Hot Shutdown condition on January 23, 1991, CP&L requests NRC approval of this relief request by January 22, 1991.

Please refer any questions regarding this submittal to Mr. R. W. Prunty at (919) 546-7318.

Yours very truly,

G. E. Vaughn

GEV/jbw (962RNP)

Enclosure

cc: Mr. S. D. Ebnetter
Mr. L. Garner (NRC-HBR)
Mr. R. Lo

9101180141 910116
PDR ADOCK 05000261
PDR

A047

Containment Fan Coolers
Service Water
Relief Request

SYSTEM: Service Water (Supply and Return Piping for Containment Fan Cooler HVH-4 and Service Water Containment Penetrations).

CLASS: ASME Section XI, Class 3.

REQUIREMENT: Technical Specification 3.3.2 addresses operability of the containment fan coolers. With one HVH unit inoperable, plant operation may continue for up to 24 hours if other conditions are met, after which the plant may remain in hot shutdown for up to an additional 48 hours; if the inoperable cooler is not restored to service in this time, the plant must be placed in cold shutdown.

Technical Specification 4.0.1.a requires compliance with ASME XI for inservice inspection as required by 10CFR50.55a(g), except where specific written relief has been granted by the Commission pursuant to 10CFR50.55a(g)(6)(i).

RELIEF REQUESTED: Service Water System piping inside the Containment Vessel (CV) has been identified with Microbiologically-Induced Corrosion (MIC). Nondestructive and Destructive Examinations have determined that the identified flaws are currently within ASME Code allowable limits. However, flaw growth rates in the presence of MIC are not predictable; therefore, justification for continued operation of the service water system for an additional operating cycle is not possible. Relief is requested to allow the installation of welded stainless steel sleeves over the susceptible welds in the HVH-4 piping and over welds at containment penetrations that have MIC indications. The sleeves constitute an engineered repair, restore the piping to its full structural and pressure-retaining capability, and comply with ASME XI repair requirements with the single exception of not removing the existing flaws. The proposed repair method is consistent with repairs performed previously at H. B. Robinson Unit 2 for similar MIC indications and reflects both experience with the application of the repair method and its effectiveness in restoring the system to full operability. Note that should it not be possible to install a sleeve over some existing weld joints in this piping, a Code repair will be made. For example, it is anticipated that small drain lines will be removed, any MIC defects in the piping will be repaired, and new drain lines will be installed.

BASIS FOR RELIEF: Generic Letter 90-05, "Guidance for Performing Temporary Non-Code Repair of ASME Code Class 1, 2, and 3 Piping," provides a framework for requesting relief for the proposed repair. Although the plant is currently not operating and does not strictly adhere to the conditions outlined in the Generic Letter, it is CP&L's belief that the schedular impact and the timing associated with the discovery of the flaws provides some level of mitigation and latitude in considering this request based upon the impracticality of performing a Code repair. This request is further supported by the relatively low safety significance associated with the indications based upon their presence in a Code Class 3, moderate energy system. The Nondestructive Examination that identified the flaws was performed late in the current refueling outage on the basis of its impact on critical path activities if performed earlier and the belief that it was unlikely that MIC

would be found based on previous inspections and plant conditions. The section of HVH-4 piping for which relief is requested is a 316L stainless steel material which was installed in 1985. This material was expected to be less susceptible to MIC than the 304SS which it replaced and was examined via NDE in 1988 with no MIC indications identified.

The requested relief is based on the guidelines of Generic Letter 90-05. Specific issues to be addressed in support of the relief have been taken from the Generic Letter and are identified below, along with the action, as appropriate, being taken by CP&L:

1. Document the Characterization of the Flaw.

Radiographic examination of 16 out of a total of 53 joints on the six-inch diameter, schedule 40, 316L stainless steel pipe revealed indications appearing to be MIC in 11 joints. Eight service water containment penetration sleeve weld joints containing 304L stainless steel were also radiographed with four joints containing what appears to be MIC indications.

Metallographic cross-sections of the worst location identified by RT examination of the 316L piping revealed a cavity measuring approximately 7/8" long starting in the weld, extending axially into the adjacent pipe base metal, and 7/16" circumferentially in the weld metal (see attached Figure 1). The remaining wall measured 0.120" thick. The path of attack appeared to be the weld metal/base metal joint interface. The RT examinations show indications of an average size in length of 5/16 to 1/2" and the average number of indications ranging from two to four indications per joint. Since no baseline RT was made when the pipe was originally installed, some of the RT indications may be weld joint defect type indications; this was found to be the case for one location in the joint that was metallographically examined.

RT indications found in the penetration weld joints are similar to the piping indications but were of a smaller size.

2. Assess the Structural Integrity of the Flawed Piping. Evaluate for the Design Loading Condition.

Since a flaw growth rate for the MIC in the HVH-4 Supply and Return Lines could not be established to show acceptable stress limits for a full fuel cycle, in accordance with flaw evaluation requirements outlined in NRC Generic Letter (GL) 90-05 and Code Case N-480, a decision was made to add welded sleeves over the flawed welds. An operability evaluation was performed for the worst as-found flawed condition utilizing the minimum wall with analyzed loads. This evaluation concluded that the piping system was in an operable condition at the time of the flaw detection (reference calculation RNP-C/STRS-1120).

For qualification of the piping for an additional fuel cycle, a welded sleeve and welding design (Attachment 1) was performed by Structural Integrity Associates and is contained in calculation CPL-18Q-301, Revision 0. A seismic analysis to qualify the existing line for the additional weight of the welded sleeves was performed by the Nuclear Engineering Department and is contained in calculations SW-9-7109A,

Revision 6 and SW-9-7109B, Revision 5. The welded sleeves will restore the original structural and pressure-retaining capability of the piping.

The design of the welded sleeve to be installed on the penetrations containing MIC indications is contained in Attachment 2.

3. Assess the Overall Degradation by an Augmented Inspection

The remaining 37 weld joints in the piping will not be radiographed since the 16 joints already radiographed provide sufficient data to assess the extent of the MIC attack. Additional radiographs are deemed unnecessary since welded sleeves will be installed over the 316L pipe joints except the one that was replaced, providing a new pressure boundary. Other piping in the containment and auxiliary buildings has been replaced with a more MIC-resistant material, AL6XN, which is being monitored by RT inspection during each refueling outage for evidence of MIC attack. The eight service water penetrations were examined by RT, and those where MIC indications appear will be sleeved.

4. Assess the Integrity of the Affected Piping at Least Every Three Months by a Suitable NDE Method (UT or RT).

The proposed repair method complies with ASME XI except that it does not remove the existing flaws. The sleeves will restore the original structural and pressure-retaining capability of the piping. The affected piping is located within the Containment Vessel, which is an adverse environment during plant operation with respect to both heat stress and radiation levels. In that the repair restores the piping to the equivalent of a "like new" status for which a Code NDE requirement would not exist and due to the environment in which NDE would need to be performed, ongoing periodic NDE is not appropriate and will not be performed for this repair.

5. Perform a qualitative assessment of leakage through the temporary non-code repair at least every week during plant walkdown inspections.

As stated above, the repairs are located inside the containment and are designed to restore the piping to its original capability. Normal inspections of the containment are performed on a monthly basis and will, for the duration that the repair is in place, include a visual inspection of the vicinity of the affected piping for leakage. Leakage during plant operation will also be detected by waste system instrumentation.

6. Determine the Impracticality of Performing a Code Repair.

As of January 15, 1991, H. B. Robinson Unit 2 is in the late stages of Refueling Outage 13. The current schedule includes entering Hot Shutdown on January 23, 1991, at which time the containment fan coolers are required to be operable. A code repair of the HVH-4 piping would require, as a minimum, the removal and replacement of the affected welds, with a more complete solution being to replace the 316L piping. Material to perform a complete replacement will not be available until January 24, 1991, after which the installation work will require a minimum of an additional 14 days. In addition, a code allowable repair method for the containment penetrations has not yet been determined and

therefore, there is no schedule for materials or repairs. From these schedule considerations, it is clear that performance of code repairs would delay the unit's return to service and could not be completed within the limiting condition for operation (LCO) for the containment fan coolers specified in the Technical Specifications; therefore, this situation is considered to meet the intent of impracticality as outlined in Generic Letter 90-05.

7. Perform a Root Cause Determination.

The worst pipe weld joint, cut out for a metallurgical lab analysis at the CP&L Harris Energy and Environmental Center (HE&EC) revealed, that the inside pipe surface had slime deposits high in manganese associated with MIC attack. Laboratory analysis has confirmed that the wall thinning resulted from MIC attack at the weld joints. The path of attack initiation for the 316L stainless steel was along the base metal/weld metal interface and the weld, whereas past MIC indications in 304 stainless steel piping were initiated in the weld joint heat-affected zone adjacent to the weld.

H. B. Robinson Unit 2 first reported MIC attack in 304 stainless steel service water piping in late 1984 after a long plant outage. This is the first confirmation of MIC attack on low carbon grades of 304L and 316L at HBR2.

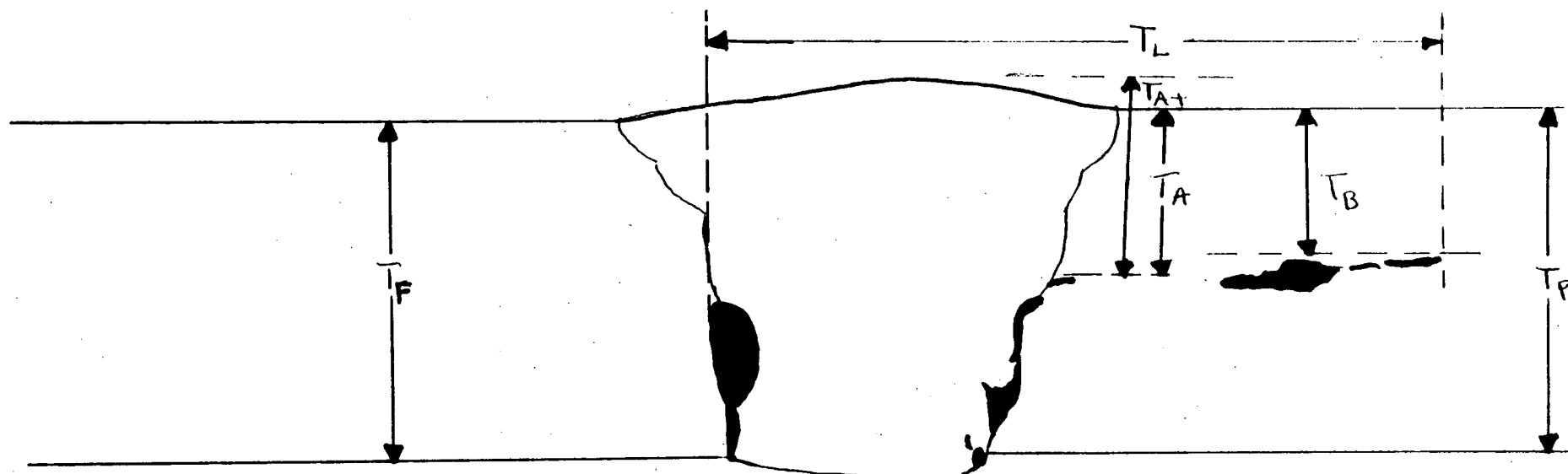
8. Consider System Interactions (Flooding, Spraying Water on Equipment, and Loss of Flow).

As discussed above, the proposed repair returns the affected piping to its original structural and pressure-retaining capability; therefore, the potential for system interactions is not increased over that of the original design. Irrespective, the capability to detect a pipe rupture in the service water system inside containment is available should it be needed. This capability includes waste system instrumentation, containment sump level instrumentation, and service water system flow instrumentation. The UFSAR Chapter 15 accident analysis is not impacted by the proposed repair as the piping is restored to its original design capability. Additionally, the containment cooling function can be satisfied by any one of the following combinations: four fan-cooler units; two containment spray pumps; or any two fan-cooler units with one containment spray pump.

9. Schedule Implementation of Permanent Code Repair.

Carolina Power & Light Company intends to replace the 316L stainless steel supply and return piping to HVH-4 during Refueling Outage 14 in 1992, which will constitute a permanent code repair. A plan for permanent repair of the containment penetrations has not been developed. The potential for long lead time procurement in the event that penetration replacement is warranted makes it impractical to commit to a schedule for permanent repair at this time. A plan and schedule for permanent repair of the containment penetrations will be provided to the NRC by September 30, 1991.

Met. Lab. Sample #1 of 91-32 of HBR-2 SW HVH-4 Type 316L pipe, 6" Sch. 40, Weld Joint #1544 (HBR2-CW-1544)



$$T_F = .300"$$

$$T_P = .268"$$

$$T_W = .334"$$

$$T_A = .134"$$

$$T_{A+} = .168"$$

$$T_B = .120"$$

$$T_L = \sim .875"$$

T_F = Thickness of Fitting

T_P = Thickness of Pipe

T_W = Thickness of Weld

T_A = Remaining Wall Thickness From Cavity To Pipe O.D.

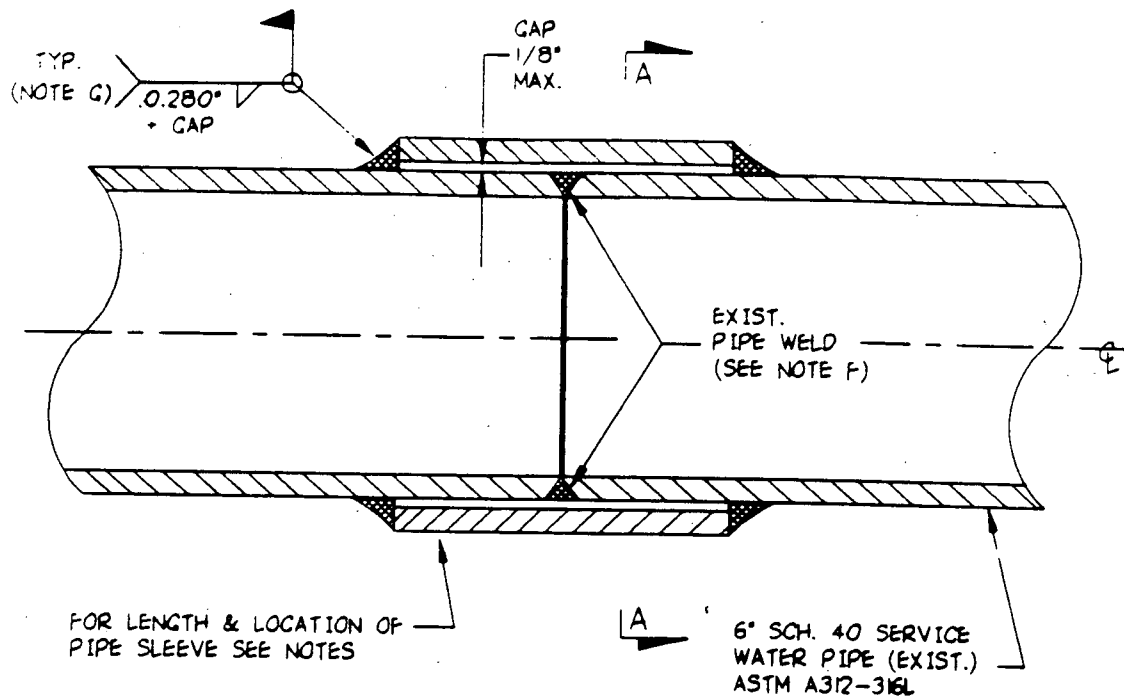
T_{A+} = Remaining Wall Thickness From Cavity To Weld Crown

T_B = Remaining Wall Thickness From Cavity In Pipe Wall To Pipe O.D.

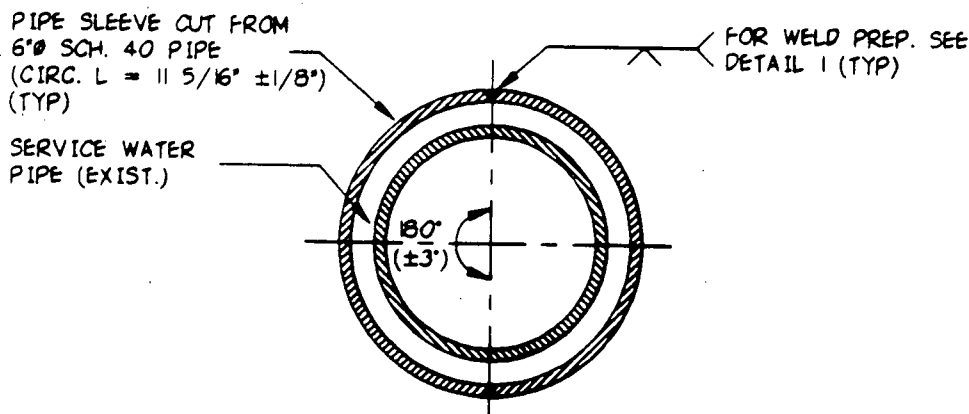
T_L = Length Of Area Containing Cavities

Figure 1

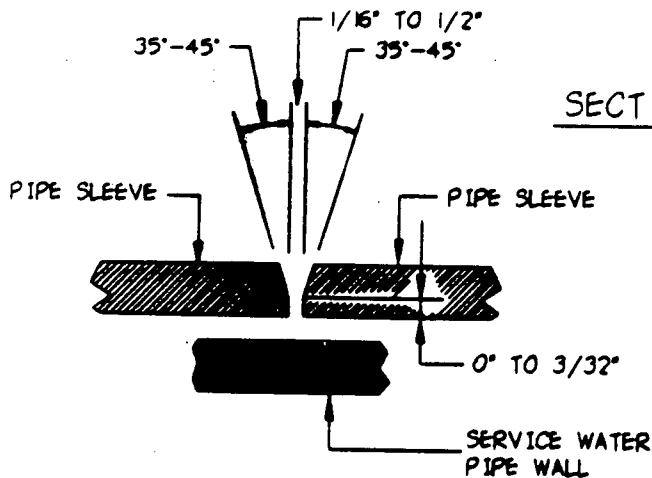
ATTACHMENT 1



SLEEVE DETAIL



SECTION A-A



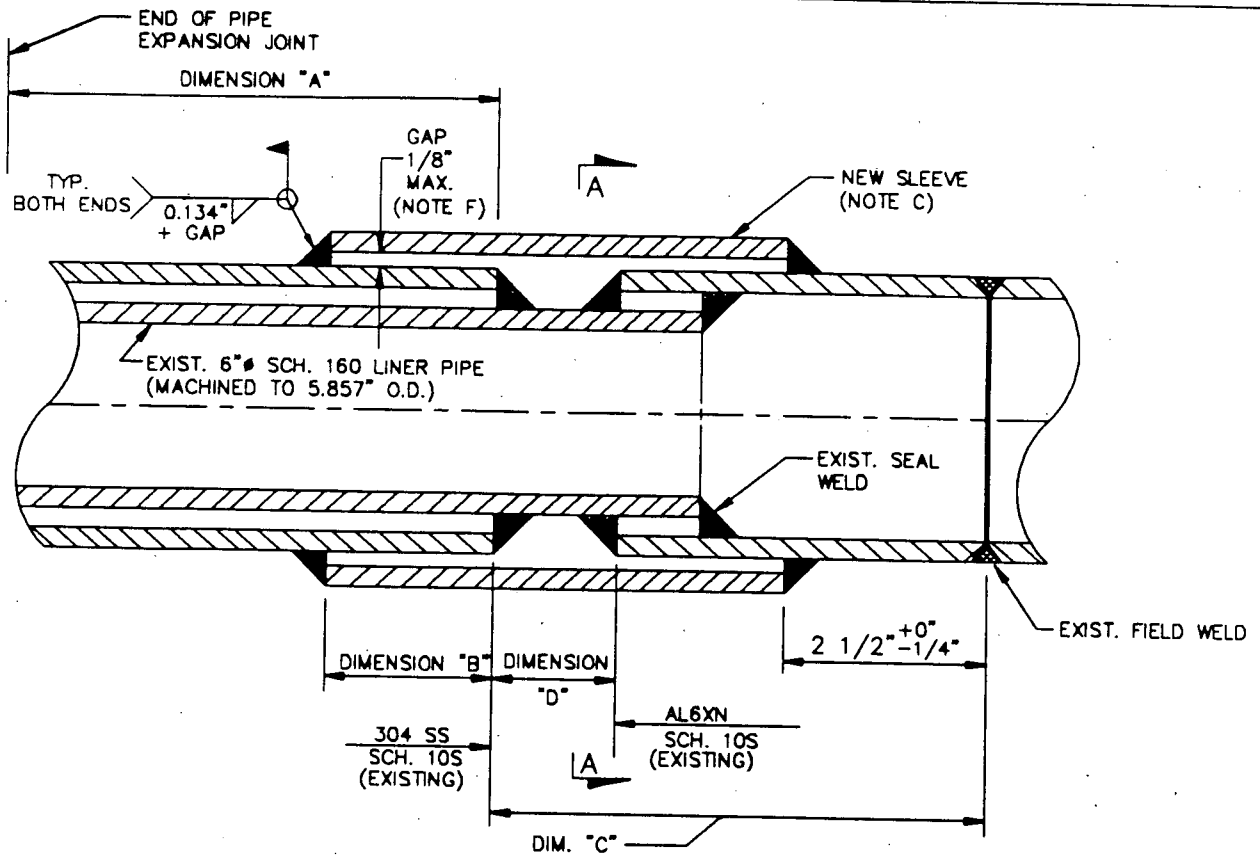
DETAIL 1
TYP. WELD PREP. DETL.

A	1-10-91	ISSUED FOR MOD 91-700	CK	DPPE	LE
REV	DATE	DESCRIPTION	CK	DPPE	LE
DPPE		1			
PROFESSIONAL ENGINEER					
SAFETY RELATED / SEISMIC					
CAROLINA POWER & LIGHT COMPANY NUCLEAR ENGINEERING DEPARTMENT-RALEIGH, N.C.					
PLANT: H.B. ROBINSON PLANT - UNIT 2					
TITLE: SLEEVE DETAIL FOR SERVICE WATER LINES 6-CW-23 AND 6-CW-39 (SCH. 40-316L) UNDER FUEL TRANSFER CANAL					
DWG. NO.	SK-91-700-C-1000		SCALE	NONE	
			SHEET	OF 2	
			REV.	A	

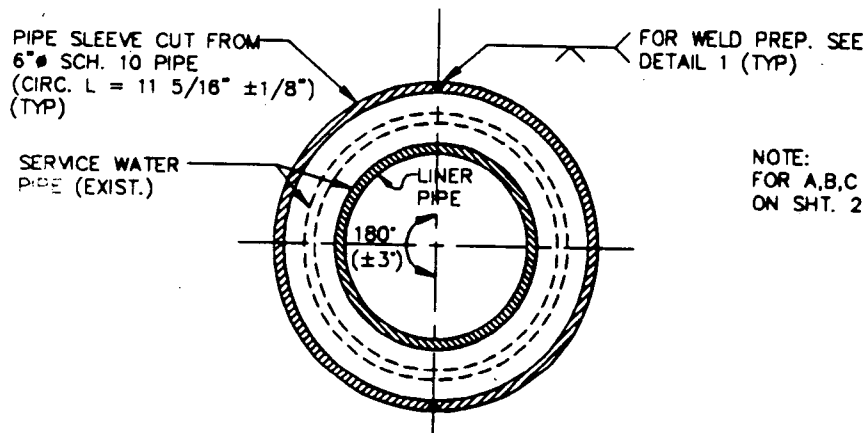
NOTES:

- A) FOR PIPE TO 45° AND 90° ELBOW SLEEVES, LENGTH WILL BE 4.00" (+.25", -0").
DISTANCE FROM SLEEVE EDGE TO EXIST. PIPE WELD EDGE = 0.75" MIN. ON FITTING SIDE.
- B) FOR PIPE TO PIPE SLEEVES, LENGTH WILL BE 6" CENTERED (I.E., 3.00" (±0.5") EACH SIDE OF EXISTING WELD CENTERLINE). ALSO SEE NOTE C AND J.
- C) FOR FITTING TO FITTING SLEEVE, LENGTH WILL BE FIELD DETERMINED. DISTANCE FROM SLEEVE EDGE TO EXISTING PIPE WELD EDGE = 0.75" MIN. ON FITTING SIDE, BOTH SIDES.
- D) ALL WELDING TO BE IN ACCORDANCE WITH CORPORATE WELDING MANUAL.
- E) PIPE SLEEVE SHALL BE CUT FROM 6" SCHED. 40, ASTM A312 TYPE 316L.
- F) EXISTING CROWN WELD MAY BE GROUND FLUSH FOR FIT UP.
- G) WELD SIZE = 0.190" + GAP (MINIMUM) FOR WELD TO AL6XN SCH. 10S MATERIAL.
- H) FOR LOCATION OF SLEEVES, SEE WELD MAPS.
LINE 6-CW-23 SK-91700-M-2000
LINE 6-CW-39 SK-91700-M-2001
- I) LOCAL GRINDING OF BASE METAL ON SLEEVE I.D. NOT TO EXCEED 0.125" DEPTH IS PERMITTED TO ALLOW FIT-UP OF SLEEVE ON ELBOWS. GRINDING OF SLEEVE SHALL BE REPLACED WITH EQUIVALENT WELD BUILDUP ON OUTSIDE OF SLEEVE TO MAINTAIN FILLET WELD LEG DIMENSION.
- J) FOR THE SCHED. 40 TO SCHED. 10S TRANSITION PIECES LESS THAN 7.5" IN LENGTH, INSTALL ONE LONGER SLEEVE TO COVER TWO EXISTING PIPE WELDS WHICH SATISFY DISTANCE REQUIREMENTS OF NOTE A), (I.E., SLEEVE LENGTH = TRANSITION PIECE LENGTH + 4.00" (+.25", -0")).

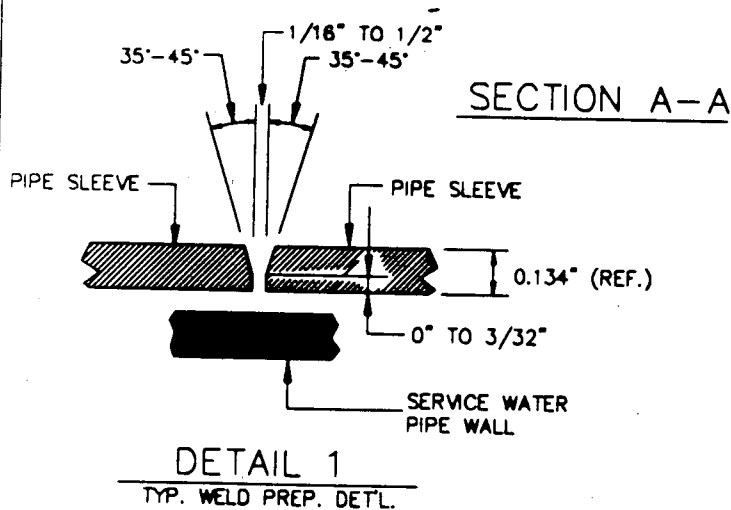
A	1-14-79	ISSUED FOR MOD 91-700	DESIGNED	CHECKED	APPROVED
REV.	DATE	DESCRIPTION	BY	RE	DATE
DPE			CK	DPE	DPPE
PROFESSIONAL ENGINEER					
SAFETY RELATED / SEISMIC					
CAROLINA POWER & LIGHT COMPANY NUCLEAR ENGINEERING DEPARTMENT-RALEIGH, NC.					
PLANT: H.D. ROBINSON PLANT - UNIT 2					
TITLE: SLEEVE DETAIL FOR SERVICE WATER LINES 6-CW-23 AND 6-CW-39 (SCH. 40-316L) UNDER FUEL TRANSFER CANAL					
DWG. NO.	SK-91-700-C-1000		SCALE:	NONE	REV. A
			SHEET	2 OF 2	



SLEEVE DETAIL



NOTE:
FOR A,B,C AND D DIMENSIONS, SEE TABLE
ON SHT. 2 OF 2.



A	1-16-98	ISSUED FOR MOD 91-700	SK	CK	RE	DPPE	LE
REV	DATE	DESCRIPTION	DWN	CK	RE	DPPE	LE
DPE							
PROFESSIONAL ENGINEER							
SAFETY RELATED / SEISMIC							
CAROLINA POWER & LIGHT COMPANY NUCLEAR ENGINEERING DEPARTMENT-RALEIGH, N.C.							
PLANT: H.B. ROBINSON PLANT - UNIT 2							
TITLE: SLEEVE DETAIL FOR 6" SERVICE WATER LINES INSIDE CONTAINMENT AT PENETRATIONS NOS. P-50, 51, 52, & 56							
DWG. NO.	SK-91-700-C-1001				SCALE: NONE	REV. NO. A	
					SHEET 1 OF 2		

NOTES:

- A) PIPE SLEEVE SHALL BE CUT FROM 6" SCHED. 10, AL6XN.
- B) FOR NEW PIPE SLEEVE, LENGTH WILL BE FIELD DETERMINED.
(I.E. LENGTH = DIMENSION "B" PLUS DIMENSION "C" MINUS 2 1/2" WITH APPLICABLE TOLERANCE).
- C) THE EXISTING HALF SLEEVE AS SHOWN ON DWG. NO. G-190225, SHT 5 (B,6) SHALL BE REMOVED AND THE EXISTING FILLET WELD GROUND SMOOTH BEFORE NEW SLEEVE ADDITION.
- D) ALL WELDING TO BE IN ACCORDANCE WITH CORPORATE WELDING MANUAL.
- E) PROVISIONS SHALL BE MADE TO PROTECT BELLOWS ASSEMBLY FROM WELDING/GRINDING SPARKS AND ARC STRIKES.
- F) MINIMIZE GAP TO REDUCE SIZE OF FILLET WELDS BETWEEN SLEEVE AND EXISTING PIPE.

LOCATING DIMENSION SCHEDULE

LINE NO.	SLEEVE NO.	PENETR. NO.	DIMENSION "A"	DIMENSION "B"	DIMENSION "C"	DIMENSION "D"
6-CW-22	S-3	P-50	2 3/4"	2"	7 1/2"	1 3/4"
6-CW-23	S-5	P-51	5 5/8"	3"	7 1/4"	1 3/8"
6-CW-25	S-7	P-52	5 3/4"	3"	6 7/8"	1"
6-CW-38	S-7	P-56	5 3/4"	3"	7 1/8"	1 1/2"

A	1-16-91	ISSUED FOR MOD 91-700	DES	CHK	REV	LE
REV	DATE	DESCRIPTION	OWN	RE	DPPE	LE
DPE			CK	DPE	DPPE	LE
PROFESSIONAL ENGINEER						
SAFETY RELATED / SEISMIC						
CAROLINA POWER & LIGHT COMPANY NUCLEAR ENGINEERING DEPARTMENT-RALEIGH, N.C.						
PLANT: H.B. ROBINSON PLANT - UNIT 2						
TITLE: SLEEVE DETAIL FOR 6" SERVICE WATER LINES INSIDE CONTAINMENT AT PENETRATIONS NOS. P-50, 51, 52, & 56						
DWG. NO.	SK-91-700-C-1001		SCALE: NONE		REV. NO. A	
			SHEET 2 OF 2			