

# Duquesne Light Company

Beaver Valley Power Station  
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Nuclear Services  
Nuclear Power Division

June 7, 1993

U. S. Nuclear Regulatory Commission  
Attn: Document Control Desk  
Washington, DC 20555

**Subject: Beaver Valley Power Station, Unit No. 2  
Docket No. 50-412, License No. NPF-73  
Request for Relief for a Non-Code  
Repair on 2-SWS-EJM-237A and 2-SWS-EJM-237B**

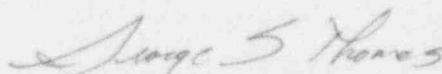
Attached for NRC review and approval is a request for relief for temporary non-code repairs on Unit 2 Service Water System metal expansion joints (MEJ) 2-SWS-EJM-237A and 2-SWS-EJM-237B. This request supercedes the request for relief for a non-code repair on 2-SWS-EJM-237A submitted on May 28, 1993.

These MEJs cannot be isolated and repaired or replaced during the time permitted (72 hours) by Tech Spec 3.7.4.1, and the performance of an ASME Code repair would necessitate a plant shutdown. Based on the above and guidance provided by Generic Letter 90-05, an ASME Code repair during power operation is impractical. Therefore, pursuant to 10 CFR 50.55a(g)(6)(i), it is requested that the NRC grant relief for the temporary non-code repairs to be used until the next scheduled outage exceeding 30 days, but no later than the next refueling outage which is scheduled to begin in September, 1993.

This request was discussed with the NRC staff during telecons on 5/25/93, 5/26/93, 6/2/93 and 6/3/93. Based on these discussions, the NRC staff provided verbal approvals for the non-code repair of 2-SWS-EJM-237A on 5/26/93 and for the non-code repair of 2-SWS-EJM-237B on 6/3/93, contingent on their review and approval of the formal submittal.

If there are any questions concerning this matter, please contact Mr. N. R. Tonet at (412) 393-5210.

Sincerely,

  
George S. Thomas

## Attachment

cc: Mr. L. W. Rossbach, Sr. Resident Inspector  
Mr. T. T. Martin, NRC Region I Administrator  
Mr. G. E. Edison, Project Manager  
Mr. M. L. Bowling (VEPCO)

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PDR ADOCK 05000412  
P PDR

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DUQUESNE LIGHT COMPANY  
Nuclear Power Division  
Beaver Valley Power Station, Unit 2

Request for Relief for Non-Code  
Repairs on 2-SWS-EJM-237A and 2-SWS-EJM-237B

A small leak was discovered on a Class 3 metal expansion joint (MEJ) 2-SWS-EJM-237A located in the west side of the service water valve pit on Train B of the Unit 2 Service Water System. The maximum leakage rate observed since discovery is estimated to be less than one gallon per hour. During augmented inspections of the remaining six MEJs located on the Service Water System, a weeping joint was observed on 2-SWS-EJM-237B. This weeping MEJ is located in the east side (Train A) of the service water valve pit, and is the "sister" joint of the leaking MEJ. The weep rate was observed to be one drop every five minutes.

The leakage on both the leaking MEJ and the weeping MEJ is on the downstream weld between the stainless steel bellows and the carbon steel flange (see Figure 1). The leakage is suspected to be caused by erosion and/or corrosion/pitting in the region of the weld joint which is a dissimilar weld between a stainless steel bellows and carbon steel flange (a stainless steel weld filler material was used). Both of the MEJs will be inspected following their removal for repair or replacement in the next scheduled outage exceeding 30 days. A failure analysis will also be performed to determine the failure mechanism.

The leakage was discovered during power operation on Class 3 piping sections of the Service Water System. This system is moderate energy (temperature < 200°F, pressure ≤ 275 psig) that supplies river water to various safety related heat exchangers for cooling purposes. The MEJs cannot be isolated and repaired or replaced during the time permitted (72 hours) by Tech Spec 3.7.4.1 and the performance of an ASME Code repair would necessitate a plant shutdown. Based on the above and guidance provided by Generic Letter 90-05, an ASME Code repair during power operation is impractical. Therefore, pursuant to 10 CFR 50.55a(g)(6)(i), it is requested that the NRC grant relief for temporary non-code repairs to be used until the next scheduled outage exceeding 30 days, but no later than the next refueling outage which is scheduled to begin in September, 1993.

Evaluation of Flaw

The leakage on both of the MEJs is on the downstream weld between the stainless steel bellows and the carbon steel flange. The configuration of the joint (see Figure 1) does not permit the flaw to be evaluated by either the "Through-Wall Flaw" or "Wall Thinning" approaches provided by Enclosure 1 to Generic Letter 90-05. Therefore, the following alternative evaluation is provided for NRC staff review and approval.

Seismic evaluations were performed on the subject piping runs when decoupling the piping system at the metal expansion joints. The expansion joints were decoupled to conservatively evaluate the piping system when the expansion joint weld is leaking.

The loading conditions evaluated were for pressure, deadweight, thermal, pressure thrust and seismic. The evaluation included a Nupipe Computer Study run on the Train B piping (Train A piping run is identical) when decoupled, and a review of the piping stress levels, pipe supports, flanges, piping displacements and accelerations at the valve connections for any adverse affect to their integrity while the piping is decoupled.

Note: The axial pressure thrust loading considered is 111,846 lbs. This value of 111,846 lbs. was applied in the north direction on the embedded wall anchors PSA829T and PSA835T and associated buried piping and applied in the south direction on the embedded wall anchors PSA828T and PSA856T and associated buried piping.

#### Conclusions/Results

- The piping stress values are acceptable.
- The piping deflection values are acceptable.
- The pipe supports are acceptable.
- The pipe flanges are acceptable.
- The valve acceleration levels are acceptable.

There were no significant changes to stress levels.

#### Non-Code Repair

The proposed non-code repair on each MEJ will consist of:

1. A fiberglass reinforced epoxy resin material wrapped completely around the joint between the bellows and the flange. This material is pressure rated and will seal the joint and prevent gross leakage or water spray.
2. In order to prevent the possibility of the bellows from disengaging from the flange, six (6) dogs (see Figures 2 and 3) will be bolted to the flange joint. These dogs will hold the first bellows convolution in place. In the unlikely event of a complete weld failure, this modification will hold the bellows inside of the flange joint. This modification will not prevent the bellows from performing its normal function.

In the event of a complete weld failure, the repairs described above will prevent the joint from coming apart and minimize leakage or water spray. The above non-code repairs were applied to both of the affected MEJs, based on verbal NRC approval granted on 5/26/93 and 6/3/93.

### Examination of Flaw

Limited ultrasonic examinations have been performed on the leaking Train B MEJ (2-SWS-EJM-237A) and also the weeping Train A MEJ (2-SWS-EJM-237B) as shown in the attached report WP-93-111.

Further ultrasonic (UT) examination of the MEJ pressure-retaining weld is impractical for the following reasons:

1. Weld joint design is incompatible with conventional ASME Code techniques. The weld joint illustrated in Pathway Bellows Drawing D-3-3213 Rev A-1 (Figure 1) is essentially a dissimilar metal seal weld set within a counterbore in the carbon steel flange surface.
2. The taper angle and flat surface of the 150# weld neck flange creates geometrical limitations with regard to examination beam angles and examination surface access.
3. There are no reference standards or readily available mockups available to allow development of UT techniques and/or reference sensitivity determination.

### System Interactions

The following is an evaluation of possible system interactions from flooding, spraying water on equipment and loss of flow:

Flooding: Each MEJ is located in the side of the service water valve pit associated with its respective train and is physically separated from the opposite train's side. This buried valve pit is located in the yard area and is separate from any other structure (see Figure 4). Any leakage from a complete weld failure will be minimal due to design of non-code repair. However, any leakage from an MEJ will be collected in one of the two valve pit sumps. Each sump has a high level alarm (at 9" level) in the control room and is equipped with an automatic sump pump rated at 28 gpm. The alarm response procedure, will be revised to provide specific operator action to check the affected MEJ leakage rate and initiate further actions if required. However, in the event of catastrophic failure of an MEJ, only the equipment located in that valve pit would be affected, the other service water train will be unaffected. Loss of a complete service water train has been previously analyzed in UFSAR Section 9.2. Therefore, this failure would not create an unanalyzed condition.

Water Spray: The design of the non-code repair should eliminate any concern due to water spray. However, if water spray should occur, it would only affect a limited amount of equipment located in the side of the valve pit associated with that train. Again, loss of one train of service water has been previously analyzed.

Loss of Flow: A catastrophic failure of a MEJ would cause a complete loss of flow to a service water header. The design of the non-code repair should eliminate the possibility of a catastrophic failure of an MEJ due to a complete weld failure. However should this failure occur, it would result in a low header pressure alarm in the control room. Alarm response Procedure 20M-30.4.AAB directs the operators to OM-2.53C.4 Abnormal Operating Procedure (AOP) 2.30.1 "Severe Water/Normal Intake Structure Loss." This failure mode is analyzed by UFSAR Section 9.2. The loss of one header will not affect the ability of the other train's header to fulfill its safety function.

#### Periodic Assessment of Structural Integrity

The MEJs are located in confined spaces. Both MEJs will be inspected twice per day by plant operators during walkdowns. A temporary log has been initiated to track and trend the leakage rate for each MEJ. Any significant increase in the leakage rate will require notification of the Nuclear Shift Supervisor and Nuclear Engineering. In the event that leakage from one of the MEJs increases to the rate of one gallon per minute (1 GPM), we will notify the NRC.

Augmented inspections of the other two MEJs located on the main 30" Service Water System headers (2-SWS-EJM-221A and 2-SWS-EJM-221B) will be performed on a weekly frequency. In addition, the MEJs located on the discharge piping from the operating service water pumps will be inspected on a monthly frequency. The augmented inspections will consist of VT-2 leakage examinations performed by certified examiners and will be conducted until the affected MEJs are repaired or replaced.

As discussed above, further ultrasonic examinations of other MEJs are impractical due to the configuration of the joint.



# NOTES

1. ASSEMBLY TO BE DESIGNED, FABRICATED & TESTED IN ACCORDANCE W/ ASME, B1.1 CODE SECT. III, CL. 3, 1974 EDITION W/ ALL ADDENDA THRU WINTER 1975 (CUSTOMER SPEC. 20VS-240 ADDENDUM DATED 8-19-77 MATERIAL TEST REPORTS REQ'D PER MR 3767.41.5 FOR ITEM 20VS-240. 5/3 TO BE CERTIFIED IN THE SOLUTION ANNEALED & UNSENSITIZED CONDITION (HAS EITHER BEEN WATER QUENCHED OR MET ALL THE CRITERIA OF ASTM A-262 PRACTICE A OR E). CERTIFICATE OF COMPLIANCE REQ'D FOR ITEM 20VS-240. 1/2 WELD FILLER METAL TO HAVE 5% MIN. FERRITE CONTENT. ASSEMBLY TO BE CLEAN & FREE OF ALL LOOSE & FOREIGN MATERIAL, FINAL CLEAN W/ ACETONE FOR APPROVED PROCEDURE. ASSEMBLY MATERIAL NOT TO COME IN CONTACT WITH CHLORIDES, HALOGENS, CYANIDE, LEAD, ZINC, COPPER, MERCURY & LOW MELTING POINT METALS.
2. HYDRO TEST UNIT TO 225 PSIG @ AMBIENT TEMP.
3. ALL EXTERNAL SURFACES TO RECEIVE ONE COAT OF STD. SHOP PRIMER, FACE OF FLANGE NOT INCLUDED.
4. SHIPPING BARS ARE REQ'D, ARE TO BE PAINTED YELLOW & TRESSED WITH PRODUCT INSTALLATION INSTRUCTIONS.
5. NAMEPLATE DATA:
 

2" MIN. - 4"

1/4" PT

150 PSIG @ 885 °F.

0-3 - 3213-N2-H

1977

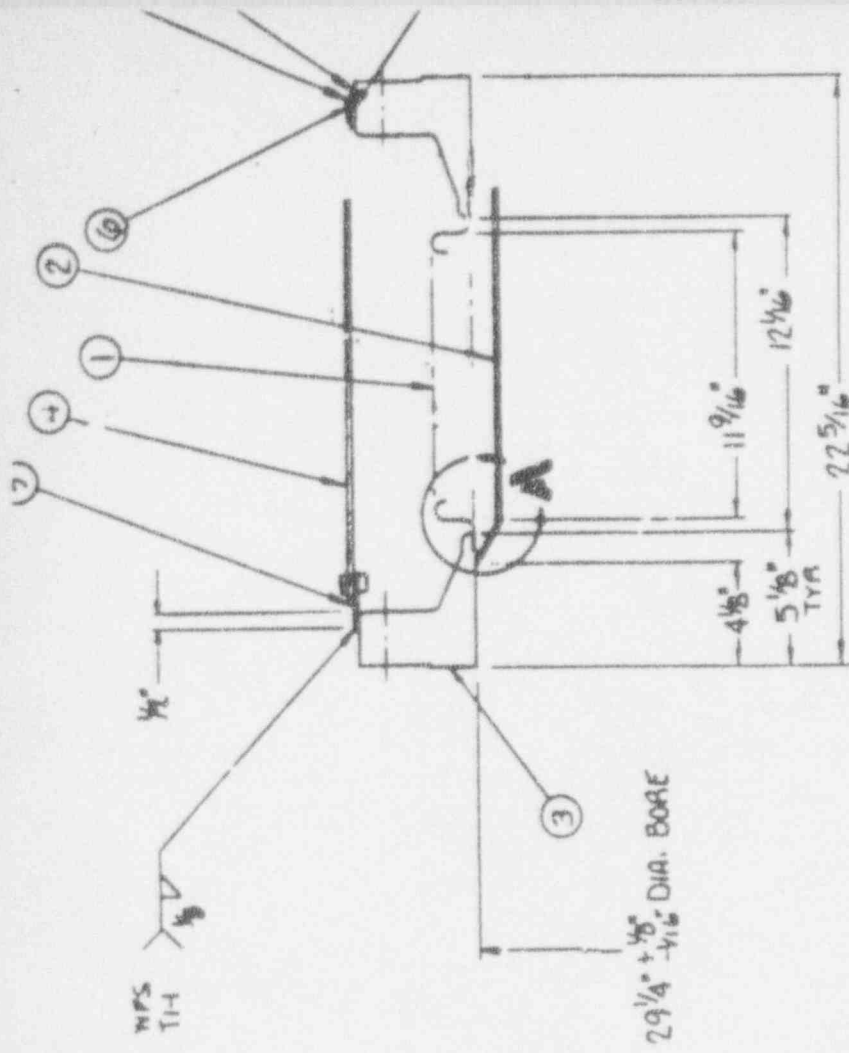
0.05" AXIAL, 0.05" LAT., 0.044" ANG.

TEST 225 PSIG @ AMBIENT TEMP.

30 DIAMETER

3A240 T 304 / TAG. X

FIGURE 1



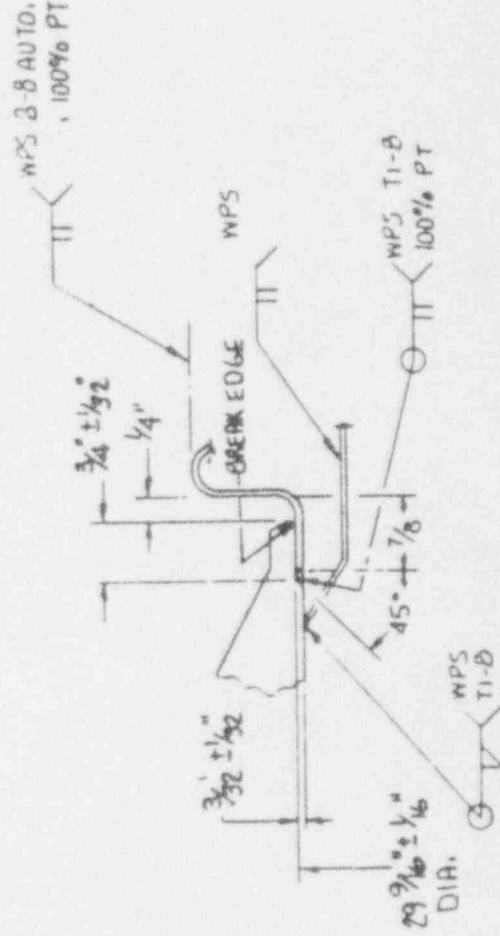
FLOW

1. ENGINEER: -N2-913 FOR TAG 2-SWS-EJM-257A
2. -N2-914 FOR TAG 2-SWS-EJM-237B

DEC 2 1977

12. THIS EXPANSION JOINT DESIGN HAS BEEN QUALIFIED TO ASME SECT. III, ND 3649.4(E)(1)

13. EXPANSION JOINT DESIGN TEMPERATURE IS CORRECTLY SHOWN UNDER ENGINEERING DATA AS 108°F. REVISED FROM ORIGINAL DESIGN TEMPERATURE OF 88°F. NAMEPLATE WILL NOT BE CHANGED. THIS IS ACCEPTABLE BASED ON NOTATION ADDED TO APPLICABLE SYSTEM N-3 DATA REPORTS ADDRESSING DESIGN CONDITION DISCREPANCIES FOR PARTS.



DETAIL A

FIGURE 2

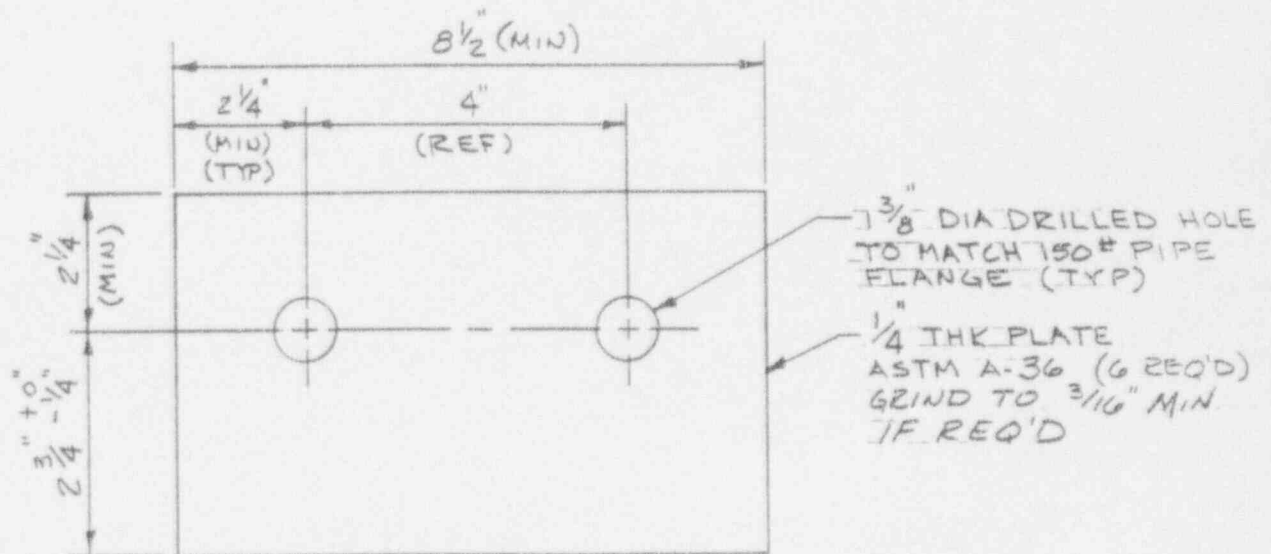
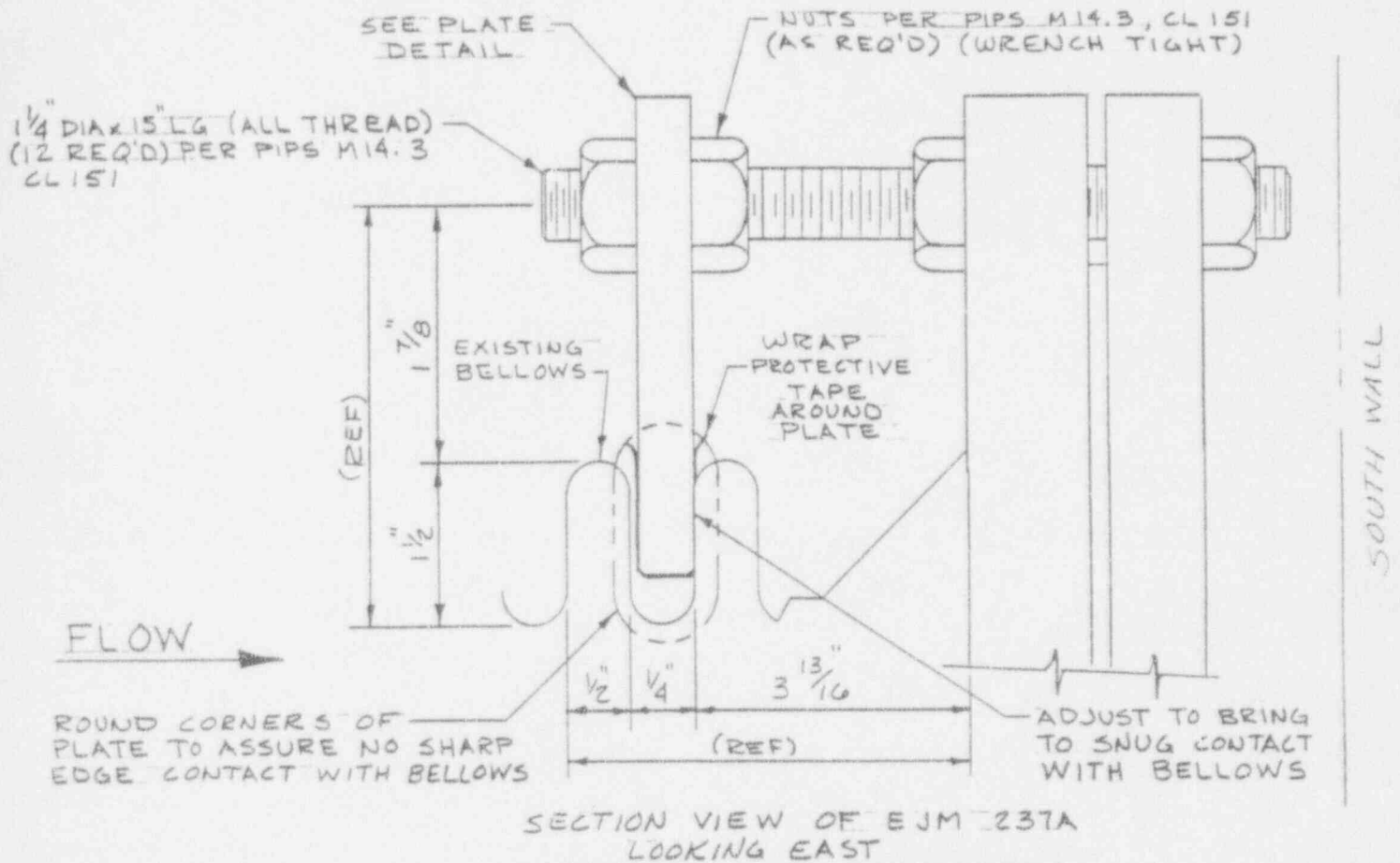
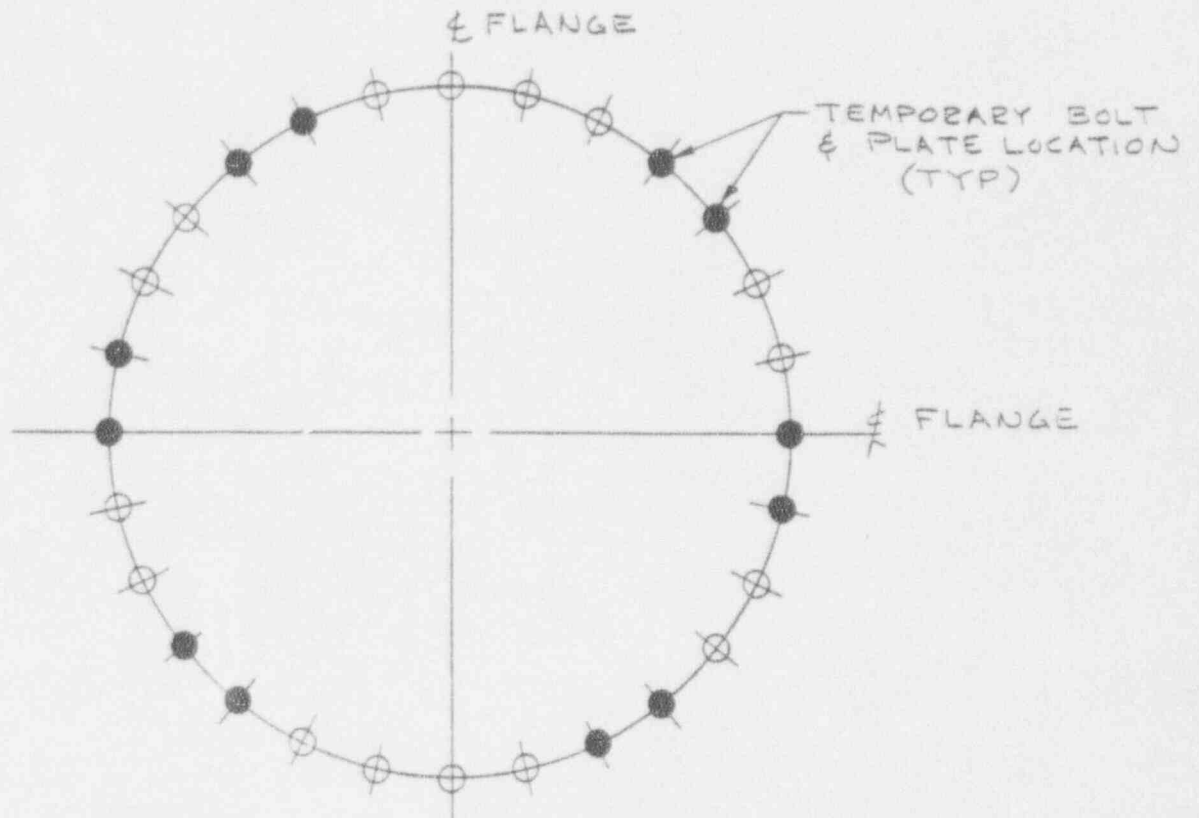


PLATE DETAIL

BY: K CLARKE

FIGURE 3



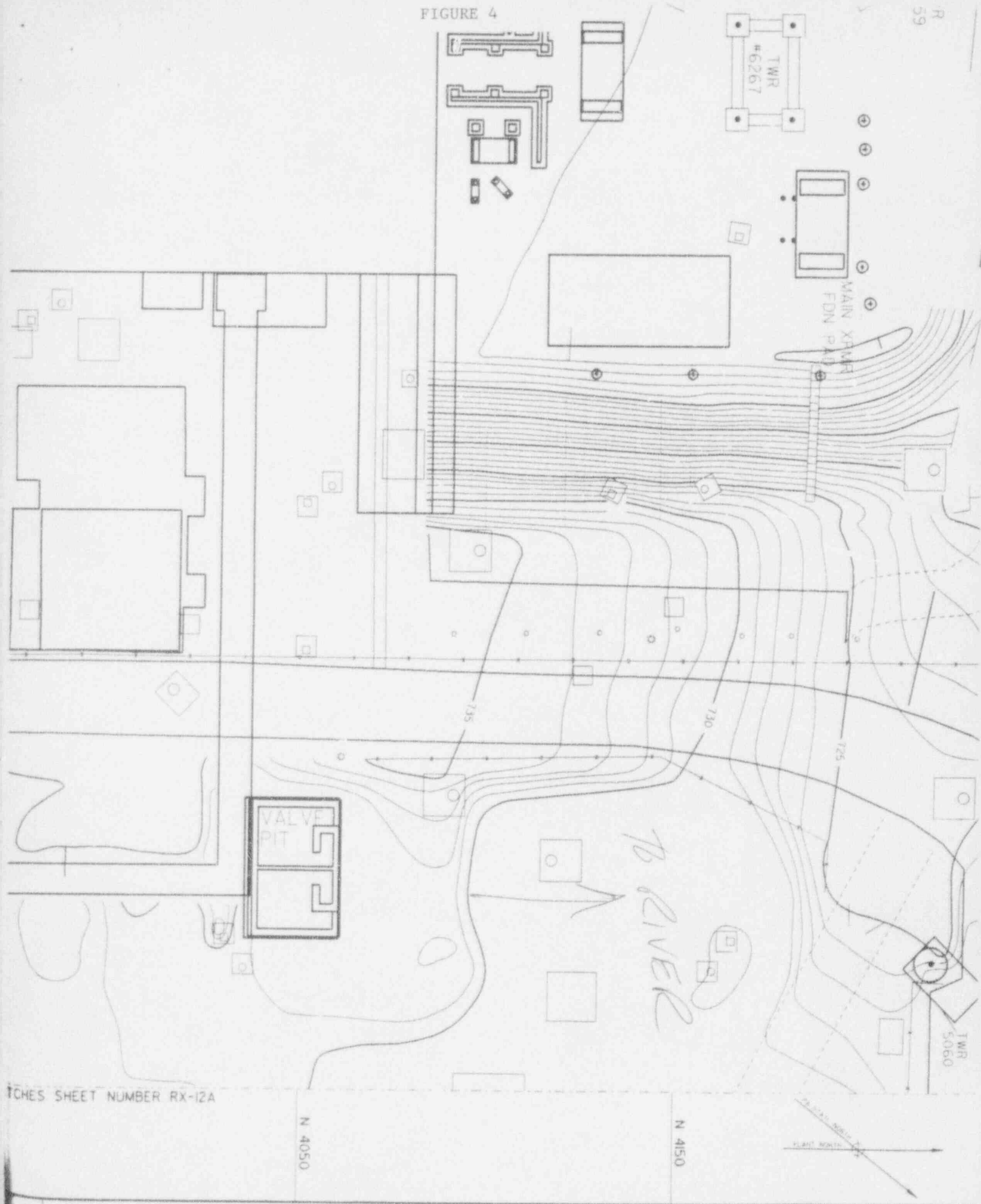
FLANGE BOLT ORIENTATION  
LOOKING SOUTH

BY: K. CLARKE



FIGURE 4

R  
59





Component Profiling/Thickness Measurement Report		PROCEDURE(S)/REV.: <i>UT-308/REV 6</i>		REPORT NO.: <i>WP-93-111</i>
COMPONENT: <i>2-SWS-EJM-237A, B</i>	LINE: <i>2-SWS-030</i>	DWG/ISO: <i>2806.260-420-391</i>	(Rev) <i>30</i>	PAGE <i>1 OF 2</i>
LOCATION OF PROFILE: <i>SEE SKETCH - PAGE 2</i>		FROM DATUM: <i>- C 90</i>		NOM. THICK & DIA. <i>.375" / 30"</i>
COMMENTS:			OTHER INFORMATION APPLICABLE TO CRT SCOPES	
ULTRASONIC INSTRUMENT		Calibration Block I.D.: <i>SW1</i>	dB# <i>192</i>	Sweep Length: <i>7.48</i> Delay: <i>6.42</i>
Mfg. & Model No.: <i>KRAUTKRAMER LSM-2</i>		Type & Material: <i>C/S ROUNDS .050"-.500"</i>		Freq. Select: <i>N/A</i> Mode: <i>DUAL</i>
Serial No.: <i>24020-6405</i>	dB# <i>41</i>	Calibration Block Temp.: <i>72°</i>		Filter: <i>N/A</i> Video: <i>N/A</i>
Cal. Due Date: <i>9-15-93</i>		Weld/Component Temp.: <i>68°</i>		Jack: <i>Ⓡ</i> or <i>Ⓡ</i> Rep Rate: <i>N/A</i>
Transducer S/N & Size: <i>84988 5/16" Ø</i>		Temperature Measuring	dB#: <i>376</i>	Reject: <i>OFF</i> Range: <i>0.5"</i>
Transducer Type: <i>NORTEC IESM 5/16 5MHZ DUAL</i>		Device & Due Date:	Due: <i>6-14-93</i>	Gain Setting: Course: <i>0</i> AS REQ'D FOR BR Fine:
Couplant/Batch No.: <i>ULTRAYEL II 8976</i>	Cal. In: <i>1120</i>	Calibration Surface: <i>MACHINED SMOOTH</i>		C.R.T. Calibrated In: <i>INCHES</i>
Velocity Setting: <i>N/A</i>	Cal. Out: <i>1350</i>	Exam Surface: <i>SMOOTH-WIRE BRUSHED</i>		Each Major Division: <i>0.1"</i>

BOTH FLANGES ON BOTH EXPANSION JOINTS EXAMINED  
360° FOR THICKNESS AS ILLUSTRATED ON PAGE #2.

REF: MWR 020163/020164  
NDE REQUEST #1086

<u>2-SWS-EJM-237A</u>	<u>2-SWS-EJM-237B</u>
<u>INLET</u> <u>OUTLET</u>	<u>INLET</u> <u>OUTLET</u>
<i>.275"-.285"</i> <i>.275"-.285"</i>	<i>.260"-.280"</i> <i>.275"-.295"</i>

MEASUREMENTS LIMITED IN SOME AREAS ON 237A DUE TO HEAVY RUST  
AND ON 237B DUE TO A NARROWER CONTACT AREA (~3/16" wide).  
BACKREFLECTION MAINTAINED IN AREAS WITH GOOD CONTACT SURFACE -  
THICKNESS VARIATIONS APPEAR TO BE DUE TO FABRICATION MACHINING.

EXAMINER: <i>Imanah P. Hamel</i>	LEVEL: <i>III</i>	DATE: <i>5-23-93</i>	D.L.CO. LEVEL: <i>George Buck 6708</i>	DATE: <i>5-24-93</i>
EXAMINER: <i>Gary Buck 6813</i>	LEVEL: <i>II</i>	DATE: <i>5-23-93</i>	REVIEWER (TITLE): <i>[Signature]</i>	DATE: <i>5-24-93</i>



RTL#  
A9730K

Duquesne Light

NDE SUPPLEMENTARY REPORT

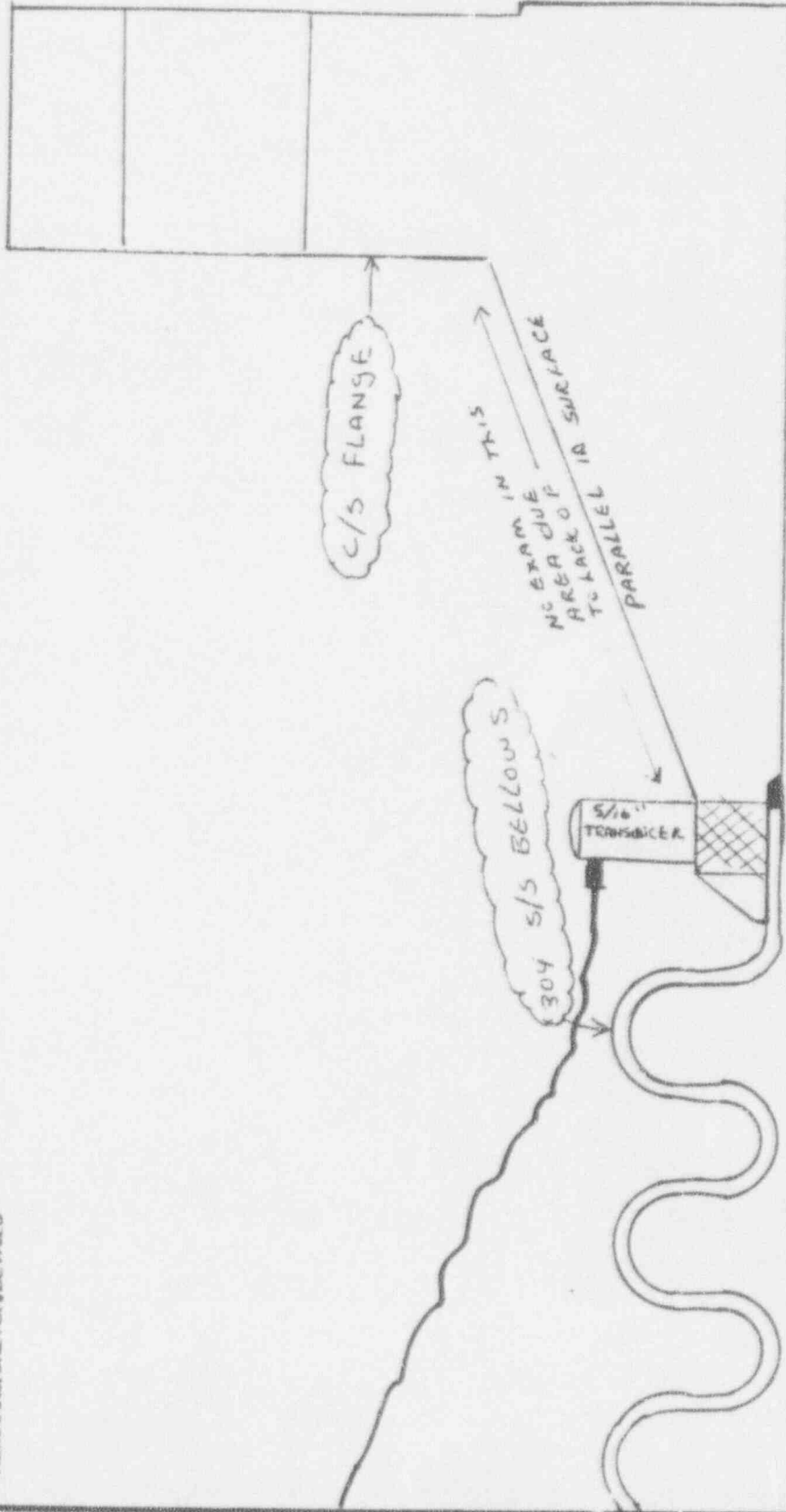
REPORT NO.

WP-93-111

PAGE

2 OF 2

REMARKS/SKETCH/DETAILS



WELD PER PATHWAYS BELLOWS DWS.



= EXAMINED AREA