NORTHEAST UTILITIES

THE CONNECTICUT LIGHT AND POWER COMPANY
WESTERN MASSACHUSETTS ELECTRIC COMPANY
HOLYOKE WATER POWER COMPANY
NORTHEAST UTILITIES SERVICE COMPANY
NORTHEAST NUCLEAR ENERGY COMPANY

General Offices • Selden Street, Berlin, Connecticut

P.O. BOX 270
HARTFORD, CONNECTICUT 06141-0270
(203) 665-5000

November 19, 1985

Docket No. 50-423
B11878

Director of Nuclear Reactor Regulation
Mr. B. J. Youngblood, Chief
Licensing Branch No. 1
Division of Licensing
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

References: (1) B. J. Youngblood letter to J. F. Opeka, Request for Additional Information, dated September 10, 1985.

(2) J. F. Opeka letter to B. J. Youngblood, Responses to Seismic Qualification Review Team (SQRT) Audit Questions, dated October 8, 1985.

Dear Mr. Youngblood:

Millstone Nuclear Power Station, Unit No. 3
Revised Responses to Seismic Qualification Review Team (SQRT) Audit Questions

The NRC Staff conducted a SQRT audit during the week of March 4 through 8, 1985 for Millstone Unit No. 3. A small number of equipment specific questions were raised by the Staff during the SQRT audit. In Reference (2), Northeast Nuclear Energy Company (NNECO) transmitted responses to the SQRT audit questions contained in Reference (1). Representatives from NNECO and Stone & Webster met with the Staff on November 1, 1985 to discuss the Staff's concerns regarding our submittal (Reference 2). Attachment 1 provides a summary of the status of SQRT audit questions. Questions identified as "closed" are based upon formal or informal communications or agreements with the Staff. Please inform us of any disagreement you may have with the status described on the attached list.

B001
3/40

If you have any questions, please contact our licensing representative directly.

Very truly yours,

NORTHEAST NUCLEAR ENERGY COMPANY
et. al.

BY NORTHEAST NUCLEAR ENERGY COMPANY
Their Agent

J. F. Opeka

J. F. Opeka
Senior Vice President

C. F. Sears

By: C. F. Sears
Vice President

STATE OF CONNECTICUT)
) ss. Berlin
COUNTY OF HARTFORD)

Then personally appeared before me C. F. Sears, who being duly sworn, did state that he is Vice President of Northeast Nuclear Energy Company, an Applicant herein, that he is authorized to execute and file the foregoing information in the name and on behalf of the Applicants herein and that the statements contained in said information are true and correct to the best of his knowledge and belief.

Jennifer L. Powers

Notary Public
My Commission Expires March 31, 1989

Attachment I

Status of SORT Audit Questions

Item No.	Description	Question Number	Status/Remarks
BOP-1	Main Control Board	1	See the attached response
		2	Closed
BOP-2	4.16 KV Emergency Switchgear	1	See the attached response
		2	Closed
BOP-5	Motor-operated Damper	1	Closed
BOP-6	1-1/2" Globe Valve Assembly	1	See the attached response
		2	See the attached response
BOP-7	120/240 VAC Distribution Panel	1	See the attached response
BOP-8	RHS Inlet Isolation Valve	1	See the attached response
BOP-11	Transformer	1	Closed
BOP-12	Static Inverter	1	Closed
NSSS-1	Reactor Coolant Pump	1	Closed
NSSS-2	Safety Injection Pump	1	See the attached response
NSSS-3	Charging Pump Discharge Isolation Valve	1	See the attached response
NSSS-4	7300 Process Protection System	1	Closed
	Cabinets	2	Closed
		3	Closed
		4	Closed/see the attached response

Item No.	Description	Question Number	Status/Remarks
NSSS-5	Nuclear Instrumentation System	1	Closed
	Console	2	Closed/see the attached response
		3	Closed
NSSS-6	Reactor Trip Switchgear	1	Closed
		2	See the attached response
		3	Closed/see the attached response

BOP-1-3CES*MLB-MB1 thru MB3

Question 1:

Demonstrate adequacy of the structural connections.

Response:

In order to address the adequacy of the structural connections in the main control boards, a calculation (12179.34 - NM(s) - 784 - CZC) has been performed. This analysis is preliminary and is attached for your information. As you will notice this is a QA Category I calculation and will be reviewed and approved in accordance with established QA procedures. The calculation has several attachments which are not included here. They are excerpts from an extensive weld reinspection and reevaluation program to address deficiencies in Reliance equipment. Reliance has agreed to make their original calculations available for review at their offices if necessary. However, the attached calculation adequately addresses connection design.

CALCULATION TITLE PAGE

*SEE INSTRUCTIONS ON REVERSE SIDE

CLIENT & PROJECT	PAGE 1 OF
NUSCO . MILLSTONE NUCLEAR POWER STA. UNIT 3	

CALCULATION TITLE (indicative of the Objective)	QA CATEGORY (✓)
MAIN CONTROL BOARD CONNECTION EVALUATION	☒ I - NUCLEAR SAFETY RELATED ☐ II ☐ III ☐ ______ OTHER

CALCULATION IDENTIFICATION NUMBER

J.O. OR W.O NO	DIVISION & GROUP	CURRENT CALC. NO	OPTIONAL TASK CODE	OPTIONAL WORK PACKAGE NO
12179.34	NM(S)	784	CZC	

* APPROVALS - SIGNATURE & DATE

PREPARER(S)/DATE(S)	REVIEWER(S)/DATE(S)	INDEPENDENT REVIEWER(S)/DATE(S)	REV. NO. OR NEW CALC NO	SUPERSEDES * CALC. NO OR REV. NO.	CONFIRMATION *REQUIRED (✓) YES	NO
STEVE WAINIO Steve Wainio 11/11/85						✓

PRELIMINARY

FOR INFORMATION ONLY

DISTRIBUTION*

GROUP	NAME & LOCATION	COPY SENT (✓)	GROUP	NAME & LOCATION	COPY SENT (✓)
RECORDS MGT. FILES (OR FIRE FILE IF NONE)					

CALCULATION IDENTIFICATION NUMBER				
J.O. OR W.O. NO.	DIVISION & GROUP	CALCULATION NO.	OPTIONAL TASK CODE	PAGE 2
9179.34	NM(S)	784	CZC	

OBJECTIVE

THIS ANALYSIS IS PERFORMED TO VERIFY THE ADEQUACY OF THE WELDED CONNECTION DETAILS AND TO EVALUATE THE COMPOSITE ACTION OF BUILT UP ATTACHMENT AT THE BASE OF THE MAIN CONTROL BOARD. REFER TO FIGURE 1 FOR DETAILS OF THE COMPOSITE SECTION.

INTRODUCTION

A REVIEW OF THE MAIN CONTROL BOARD DOCUMENTATION WAS PERFORMED TO LOCATE EXISTING ANALYSIS WHICH HAS BEEN PREVIOUSLY PERFORMED ON MAIN CONTROL BOARD CONNECTIONS AND THE BASE COMPOSITE SECTION. THE VENDOR WAS ALSO CONTACTED TO GAIN MORE INSIGHT INTO THEIR ANALYTICAL APPROACH. THE AVAILABLE DATA IN THE SEISMIC QUALIFICATION REPORT (REF. 1), RELIANCE REINSPECTION PROGRAM (ATTACHMENT 1) AND THE NOTES OF TELEPHONE CONVERSATION (ATTACHMENT 2) WERE REVIEWED AND COGENT DATA WAS GATHERED FOR DESIGN INPUT TO THE EVALUATION. IN ADDITION, THE MAIN CONTROL BOARD WAS FIELD INSPECTED AND AS-BUILT CONNECTION DETAILS WERE DEFINED.

CONCLUSIONS

THE RESULTS OF THIS ANALYSIS SUPPORT THE RELIANCE CONCLUSION THAT THE PRIMARY MEMBER CONNECTIONS ARE DESIGNED TO DEVELOP THE FULL MEMBER STRENGTH. THE EXTENSIVE REINSPECTION, REWORK AND REANALYSIS PROGRAM PERFORMED BY RELIANCE ENGINEER'S HAVE IDENTIFIED CONNECTIONS WHICH DO NOT CONFORM TO THEIR ENGINEERING REFERENCE DRAWINGS. RELIANCE HAS RESOLVED ANY NONCONFORMANCE WITH REANALYSIS, BASED ON THE AS-BUILT

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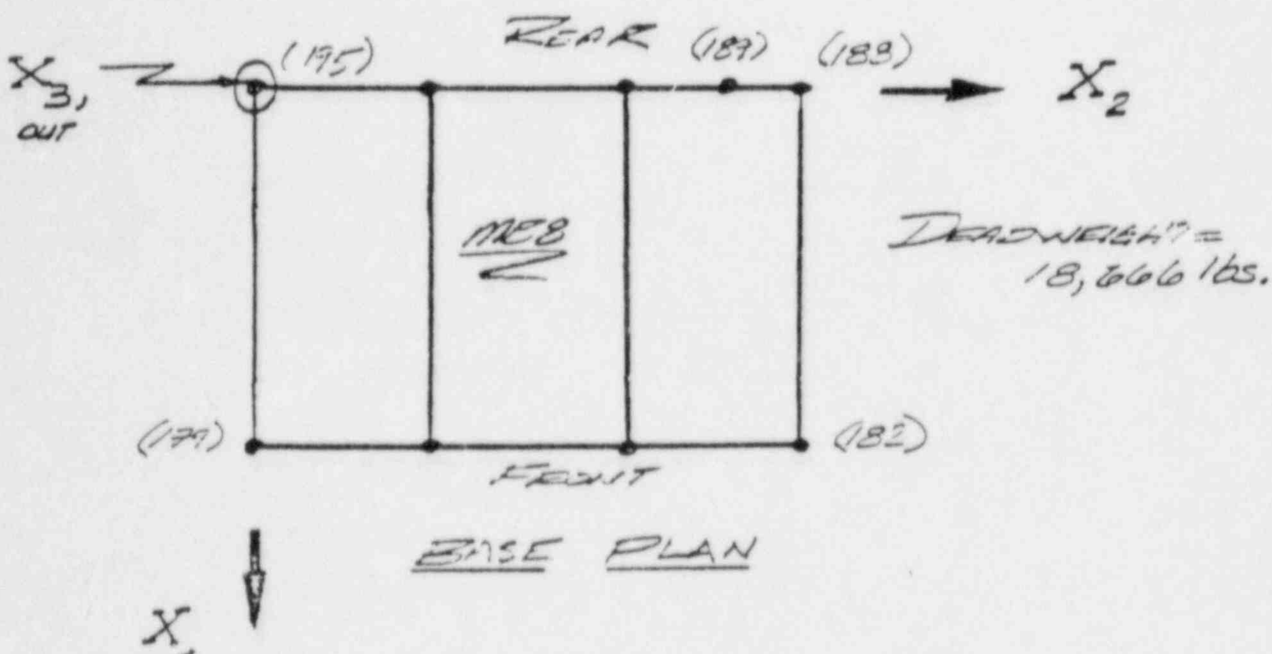
CONCLUSIONS CONTINUED

CONDITION OR BY REWORKING THE WELD TO AN ACCEPTABLE CONDITION.

THE RESULTS OF THIS ANALYSIS SHOW THAT THE BASE COMPOSITE SECTION IS GENERALLY SUBJECTED TO A COMPRESSIVE FORCE AS EVIDENCED BY SEVERAL OF RELIANCE'S SUMMARIES. MINOR AMOUNTS OF UPLIFT (LESS THAN 1 KIP) HAVE BEEN NOTED.

EXAMPLE:

MAIN BOARD 8



NODE NO.	X_1 (lbs)	X_2 (lbs)	X_3 (lbs) (1/2 SSE)	
179	1870.	825.	0.	
182	3090.	874.	0.	
188	2750.	764	722.	(UPLIFT)
189	1240.	269.	59.4	UPLIFT
195	1920.	829.	0.	

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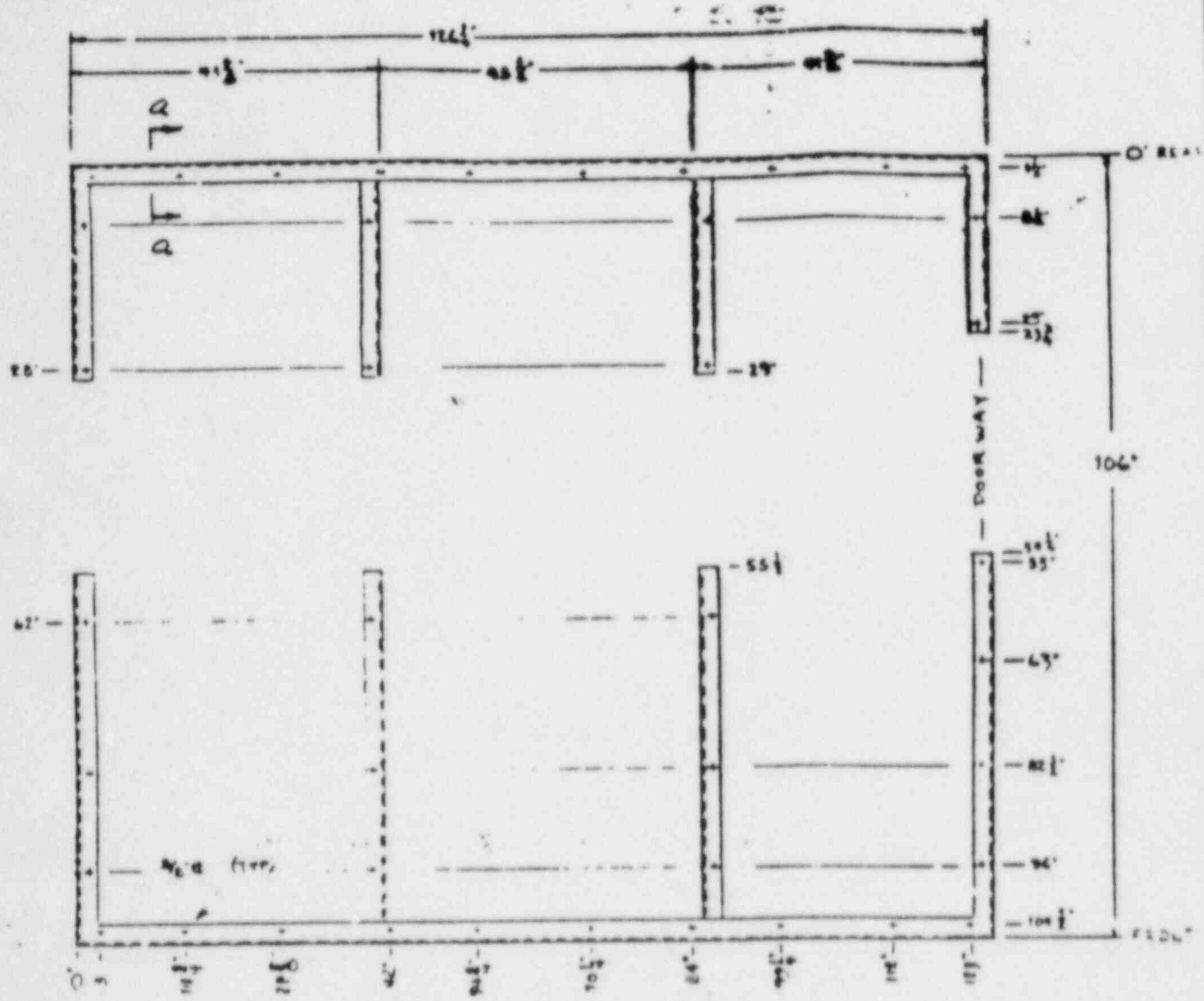
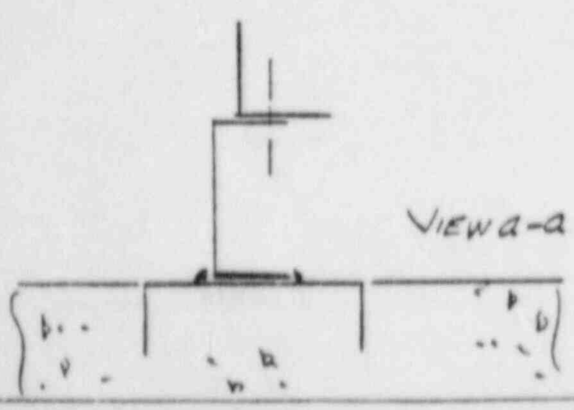


CHANNEL BASE DETAIL M.B.-8

FIGURE 1

Dwg. No. 12179-EE-25BB-1

(REF. 3)



View a-a - Base Composite Section

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CONCLUSIONS CONTINUED

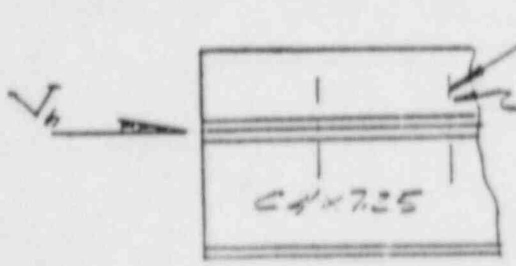
THE MAIN BOARD REACTION LOADS INDICATE THAT THE MAIN BOARD IS A SINGLE STRUCTURE UNTO ITSELF CAPABLE OF RESISTING OVERTURNING MOMENTS WITHOUT NEED OF EXTERNAL ATTACHMENTS. SINCE THE STRUCTURE IS RIGID ALL THAT REMAINS IS TO EVALUATE FOR HORIZONTAL SHEAR AND COMPRESSION. THE HORIZONTAL SHEAR AND COMPRESSION MUST TRANSFER THRU THE BASE COMPOSITE SECTION (REFERENCE FIGURE 1 VIEW a-a).

- MAXIMUM HORIZONTAL SHEAR V_h

$$V_h = \sqrt{\Sigma X_1^2 + \Sigma X_2^2} \quad \text{(SEE ATTACHMENT 2)}$$

$$V_h = 19,600 \text{ lbs (SSE)}$$

THE V_h FORCE MUST TRANSFER THRU THE BOLTS OF THE COMPOSITE SECTION



$A_s = A_t$ THRU THE THREADS

$$A_t = .7854\left(0.5" - \frac{.9743}{13}\right)^2$$

$$A_t = 0.533 \text{ in}^2$$

$$N = \frac{19,600 \text{ lbs}}{(.46)(30,000 \text{ psi})(0.393 \text{ in}^2)} = 3.12 \text{ SAY 4 BOLTS}$$

- CONCLUSION, 4 - 1/2 - BUNG FASTENERS ARE MORE THAN ADEQUATE FOR SHEAR. THERE ARE A MINIMUM OF $\frac{478 \text{ in (PERIMETER LENGTH)}}{20" \text{ ON CENTER / BOLT}}$ = 24 BOLTS PROVIDED.

- CONCLUSION, THE DEADWEIGHT + 1.5 × SSE + 1.0 × ABOVE CONSIDERATIONS COMPRESSIVE LOAD ENSURES AT LEAST ONE BOLT IN THE AREA BETWEEN MAXIMUM [illegible]

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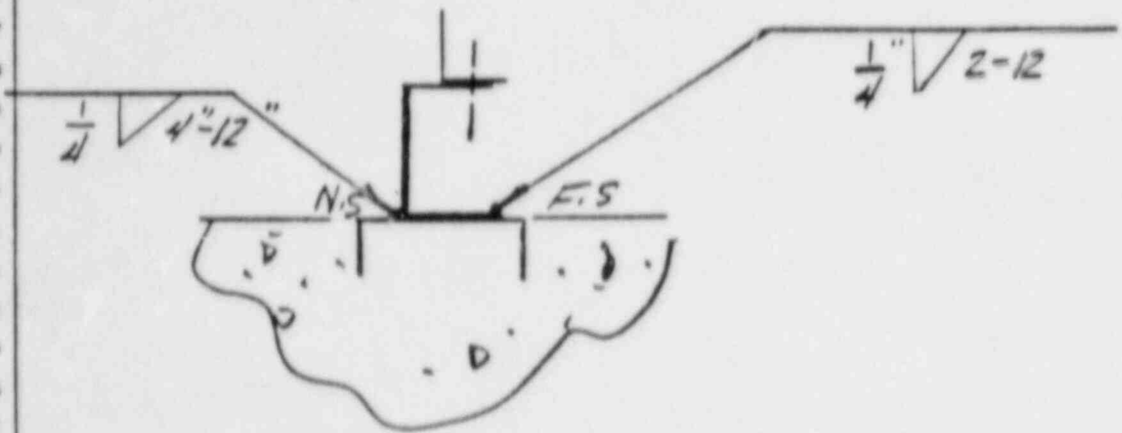
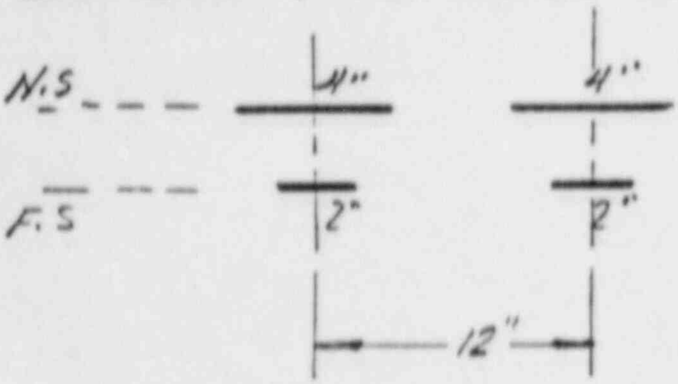
CONCLUSIONS CON'T.

ZERO MOMENT AT THE BASE. SEE PAGES 24-26

— WELDS ARE (INTERMITTENT WELDS) AS SHOWN



THE WELD IS THEREFORE BETTER THEN THE AISC PROVISION 1.17.8; IN EFFECT THERE IS 6" OF WELD LENGTH (N.S. + F.S) ON 12 IN CENTERS.



— THE RESULTS OF RELIANCE'S STRUCTURAL ANALYSIS INDICATE THE MEMBER STRESSES ARE WELL WITHIN ALLOWABLES (REF. 1)

BASE COMPOSITE SECTION IS THEREFORE ACCEPTABLE

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CONCLUSIONS CONTINUED

THE MAIN BOARD IS DESIGNED WITH STIFFNESS CONSIDERED AS THE CONTROLLING CRITERIA. THE MAIN BOARD SECTIONS ARE RIGID AND ALL PRIMARY LOAD CARRYING PLATE WELDMENTS AND BEAMS ARE UNDER A LOW STATE OF STRESS.

CONNECTIONS BETWEEN THE MAIN BOARD SECTIONS

THE MAIN BOARD SECTIONS ARE BOLTED TOGETHER. THE MAIN BOARD SECTIONS ARE INDIVIDUALLY RIGID AND THEREFORE ALL MOTION OF THE SECTIONS ARE INPHASE WITH THE FLOOR MOTION. THE MAIN BOARD DISPLACEMENTS ARE SMALL (LESS THAN 0.01 INCHES). FOUR BOLTS WOULD BE ADEQUATE TO RESTRAIN THE SRSS OF THE HORIZONTAL LOADS (19,600 lbs); THIRTY (30) BOLTS ARE PROVIDED. THEREFORE, THE BOLTED CONNECTION IS ADEQUATE AND NO FURTHER EVALUATION IS REQUIRED.

SCOPE OF EVALUATION

THE ANALYTICAL SCOPE OF THE EVALUATION HAS BEEN LIMITED TO MAIN BOARD EIGHT (8). A GENERAL REVIEW OF ALL SECTIONS WAS PERFORMED TO INSURE THAT MAIN BOARD EIGHT (8) IS A REPRESENTATIVE SECTION.

- BASIS FOR SELECTING M.B. 8
  - ALL SECTIONS ARE RIGID.
  - ALL SECTIONS USE THE K-FRAME.
  - ALL SECTIONS USE IDENTICAL ANCHORAGE DETAILS.
  - ALL SECTIONS USE THE SAME WIRING STANDARDS.
  - ALL SECTIONS REMAIN AT A LOW STATE OF STRESS.

① NOTE! THE FORCE 19,600 lbs IS THE SRSS OF THE HORIZONTAL LOADS TO THE BASE ANCHORING SECTION OF M.B. 8.

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[illegible]	[illegible]	78.4	CZC	

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METHOD OF ANALYSIS

STANDARD STRENGTH OF MATERIAL METHODS WERE USED IN DETERMINING WELD STRENGTH. THE EVALUATION STOPPED WHEN THE WELD GROUP WAS SHOWN TO BE CAPABLE OF DEVELOPING THE CONNECTING MEMBER'S FULL STRENGTH. THE PROVISIONS OF THE AISC (REF. 2) ON COMPOSITE SECTIONS 1.11.4 WAS USED TO DETERMINE ADEQUACY OF BOLT SPACING FOR THE BASE COMPOSITE SECTION. THE BASE SECTION WAS CHECKED FOR SHEAR USING LOADS FROM (REF. 1).

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12179.34	NM(S)	734	LBC	

DESIGN INPUT

1. RELIANCE M.B.8 SEISMIC ANALYSIS (REF. 1)
2. STONE & WEBSTER DRAWINGS

   12179-EE-25J-1
   12179-EE-25BB-1

3. RELIANCE VENDOR DRAWINGS

   12179-2424.100-245 -627B
   " " " " -656A
   " " " " -663F

WELDING STANDARDS:

   " " " " -630B
   " " " " -631B
   " " " " -655A
   " " " " -654A
   " " " " -636B
   " " " " -634D
   " " " " -658B

NOTE: RELIANCES WELDING STANDARDS QUALIFY MOST OF RELIANCES K-FRAME CONNECTIONS. THIS ANALYSIS PERFORMED EVALUATIONS ON SOME OF THE CONNECTION DETAILS TO SATISFY THE ANALYST OF THE CONNECTION ADEQUACY IN CARRYING THE INTENDED LOADS. THE REMAINDER OF WELDS ARE SIMILAR AND ACCEPTABLE.

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MATERIAL ALLOWABLES

ASTM A-36 STEEL

— PLATES, BARS, STRUCTURAL SHAPES

$\sigma_{YIELD} = 36{,}000$ psi

SSE TENSION ALLOW.; $.9\sigma_y = 32{,}400$ psi

SSE SHEAR ALLOW.; $(.5)(.9)\sigma_y = 16{,}200$ psi

FASTENERS TO BASE COMPOSITE SECTION

— TAKEN AS A-307 $\sigma_y = 36{,}000$ psi

SSE TENSION ; $.9\sigma_y = 32{,}400$ psi

SSE SHEAR ; $.45\sigma_y = 16{,}200$ psi

WELD USING E70XX ELECTRODES

(SHEAR SSE), $\sigma_v = 21{,}000$ psi

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ASSUMPTIONS

NO SIGNIFICANT ASSUMPTIONS WERE MADE FOR THIS EVALUATION.

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12179.[illegible]	NM(S)	78.4	CZC	

REFERENCES

1. SEISMIC ANALYSIS OF THE MAIN EXHAUST SECTION ME-3, RELIANCE ANALYSIS REPORT NO. AAI-118, P.O. NO. 2424.100-[illegible], INCLUSIVE OF REVISION E DATED JUNE [illegible], 19[illegible].

2. AISC, MANUAL OF STEEL CONSTRUCTION, 7th EDITION, COPY RIGHT DATE 1970 AND 1973.

3. S&W DRAWING NO. 12179-EE-25J-1

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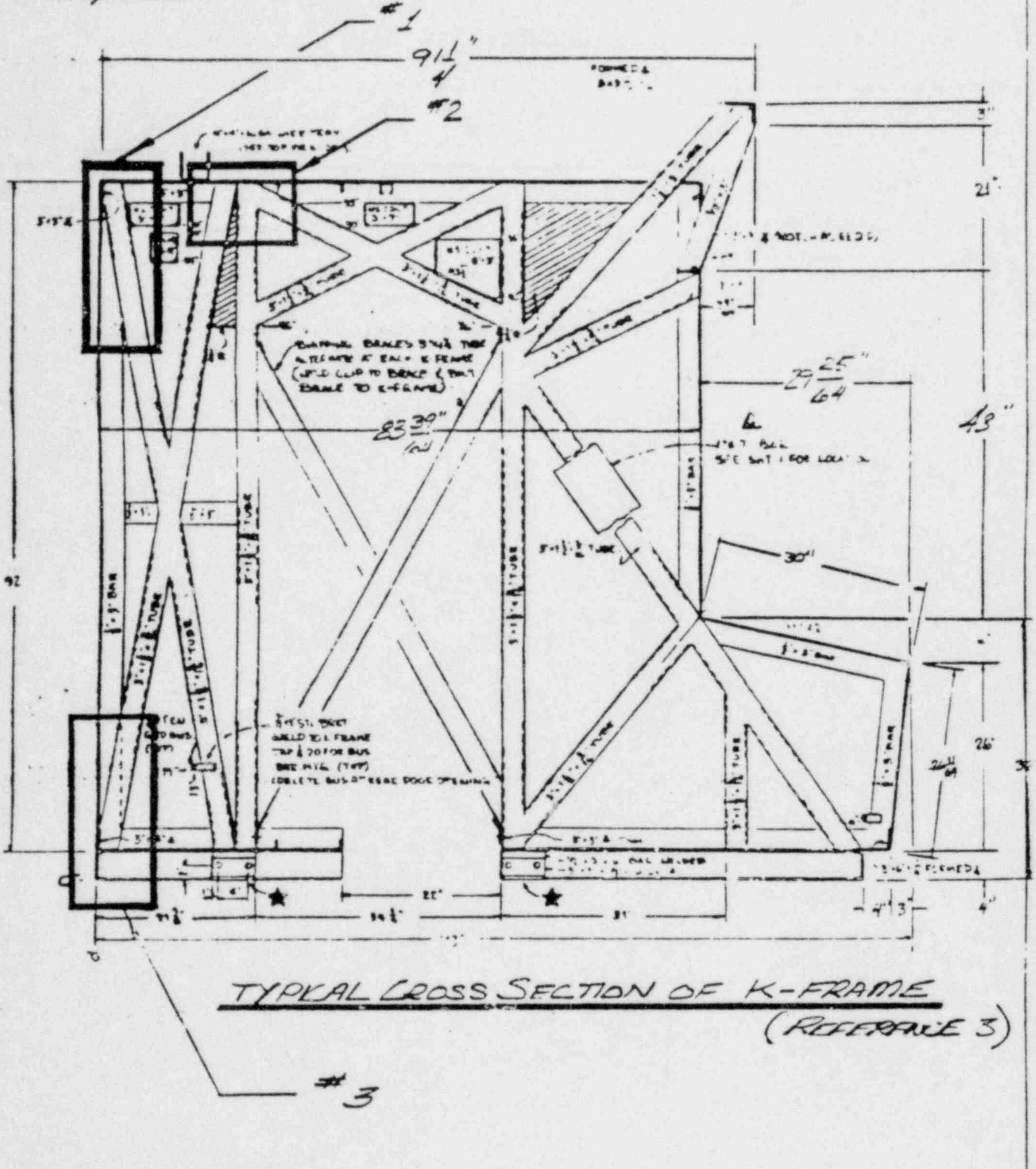
J.O. OR W.O. NO.	DIVISION & GROUP	CALCULATION NO.	OPTIONAL TASK CODE	PAGE 14
12179.34	NM(S)	78A	CZC	

ANALYSIS



TYPICAL CROSS SECTION OF K-FRAME
(REFERENCE 3)

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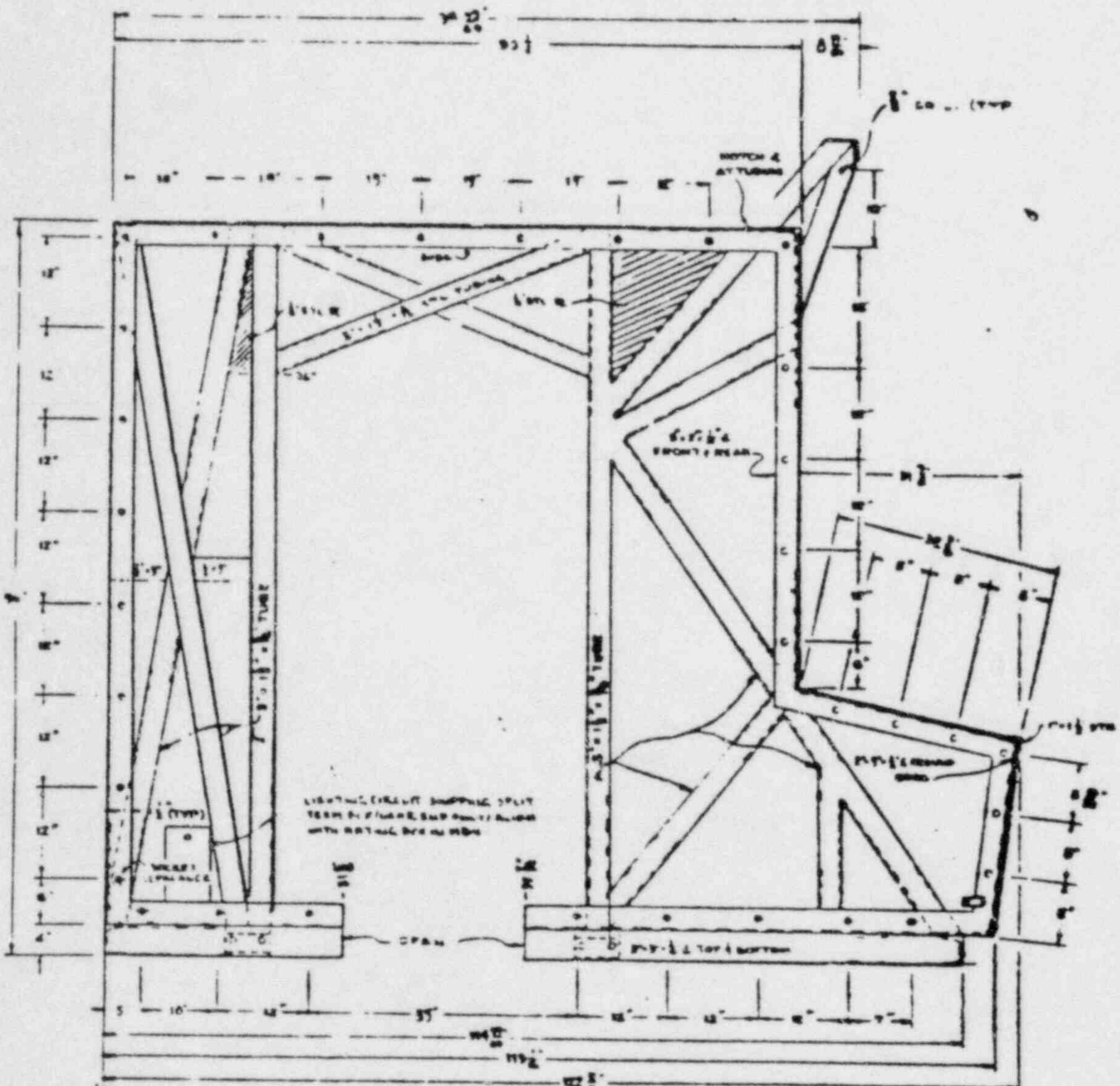
12179.34	NM(S)	784	CZL	



TYPICAL MATING END (22°30')

CALCULATION IDENTIFICATION NUMBER				
J.O. OR W.O. NO	DIVISION & GROUP	CALCULATION NO	OPTIONAL TASK CODE	PAGE 16
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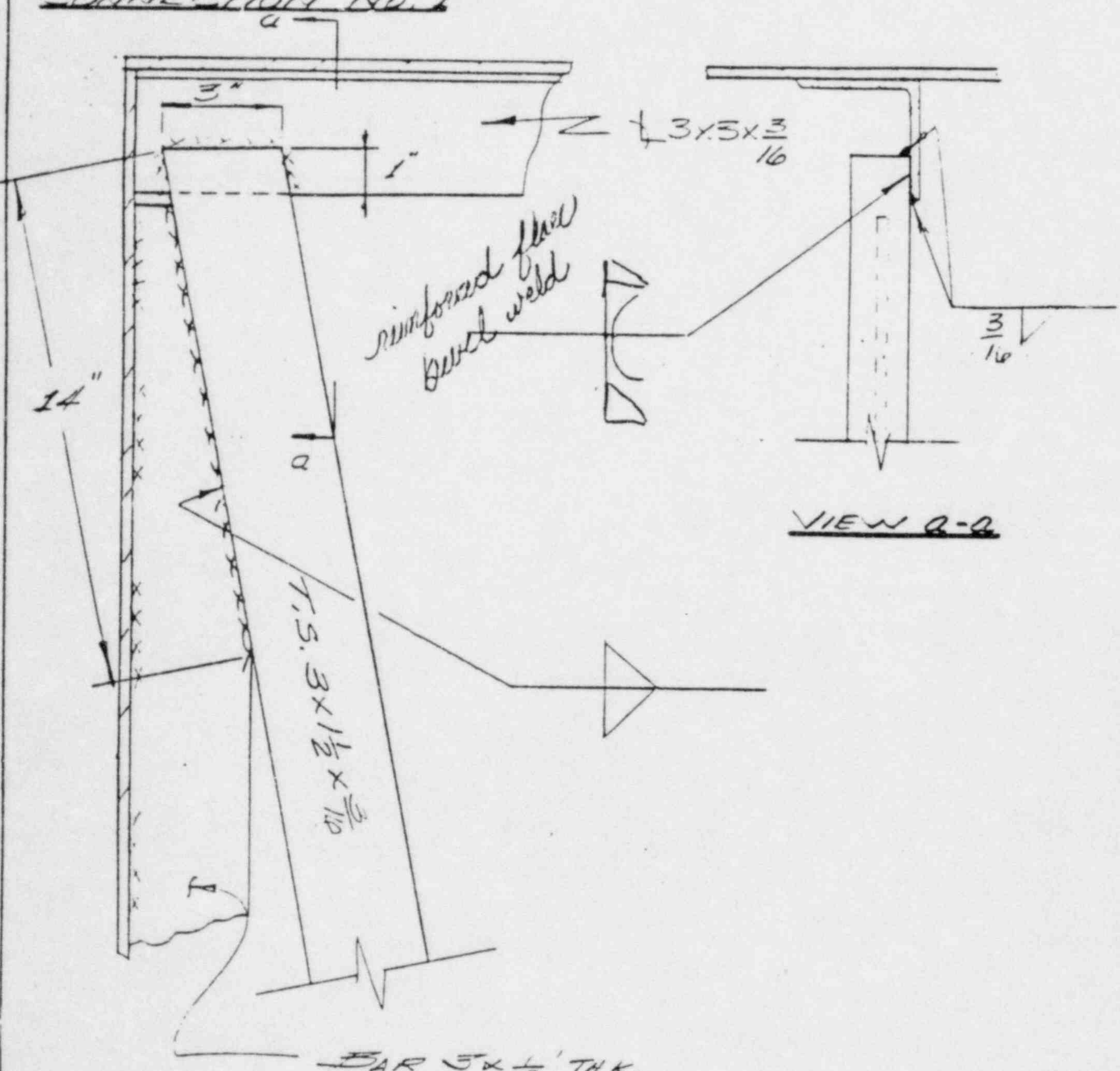
CONNECTION No. 1



NOTE:

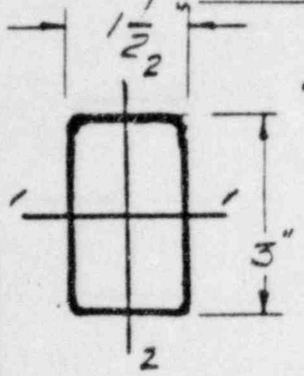
THE FIELD INSPECTION INDICATES THAT EITHER FILLET OR FLARE BEVEL WELD EXISTS ON ALL CONTACT SURFACES.

CALCULATION IDENTIFICATION NUMBER				
J.O. OR W.O. NO	DIVISION & GROUP	CALCULATION NO	OPTIONAL TASK CODE	PAGE 17
12177.34	NM(S)	78.4	CPL	

CONNECTION 1 CONT.

COMPARE WELD STRENGTH TO MEMBER STRESS

MEMBER PROPERTIES (T.S. $3 \times 1\frac{1}{2} \times \frac{3}{16}$)



$$A_{SL} = 1.5\,in^2$$

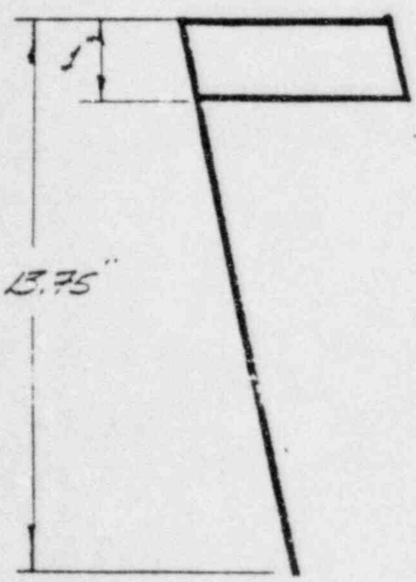
$$I_{1\text{-}1} = \left(\frac{(1.5")(0.1875")^3}{12}\right) \times 2 + 2(1.5")(.1875")(1.5")^2$$

$$+ \frac{(.1875")(3.0")^3}{12} \times 2 = \underline{1.55\,in^4}$$

$$I_{2\text{-}2} = \left(\frac{(3.")(0.1875")^3}{12}\right) \times 2 + 2(3.0")(.1875")(.75")^2$$

$$+ \frac{(.1875")(1.5")^3}{12} \times 2 = \underline{0.74\,in^4}$$

WELD GROUP PROPERTIES



– IS SIMILAR TO →

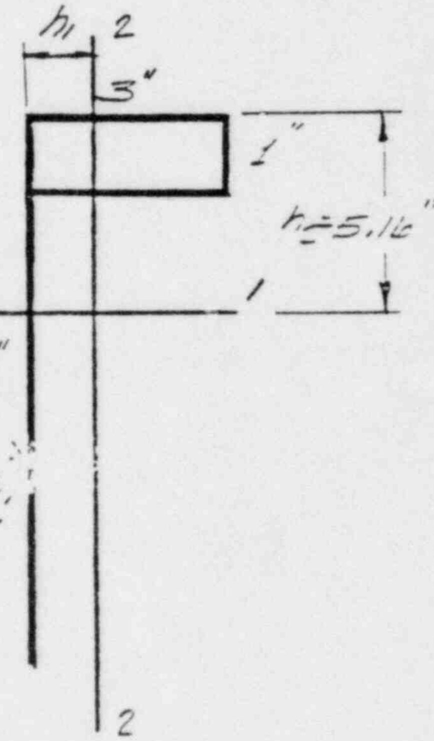
$L_w = 17\,in$

$$h_1 = \frac{2(3")(1.5") + (1")(3")}{17"}$$

$h_1 = 0.71"$

$$h_2 = \frac{[illegible]}{17"}$$

$h_2 = 5.16\,in$



CONNECTION NO. 1 CONT.

WELD GROUP PROPERTIES CONT.

$$A_w = (17\,in)(0.1875\,in) = \underline{3.1875\,in^2}$$

$$I_{1-1} = (3'')(5.16'')^2 + (3'')(4.16'')^2 + \frac{(1'')^3}{12} + (1'')([illegible])^2$$

$$\frac{(13'')^3}{12} + (13'')(2.34'')^2 = 407.9\,in^3$$

$$I_{2-2} = (13'')(.71'')^2 + 2(3'')(.79'')^2 + \frac{(3'')^3}{12}\times 2 + (1'')([illegible])^2$$

$$= 17.0\,in^3$$

$$I_{1-1} = (407.9\,in^3)(.1875\,in) = \underline{[illegible]\,in^4}$$

$$I_{2-2} = (17.0\,in^3)(.1875\,in) = \underline{3.188\,in^4}$$

COMPARISON

	MEMBER PROPERTIES		WELD GROUP PROPERTIES		
I_{1-1}	$1.55\,in^4$	<	$76.5\,in^4$	∴	O.K.
I_{2-2}	$0.74\,in^4$	<	$3.183\,in^4$	∴	O.K.
A_w	$1.5\,in^2$	<	$3.1875\,in^2$	∴	O.K.

[illegible]

SINCE WELD GROUP PROPERTIES ARE GREATER THAN THE MEMBER PROPERTIES THE FAILURE WILL OCCUR ONLY IN THE MEMBER. THEREFORE WELD GROUP DEVELOPS FULL STRENGTH OF THE TUBE STEEL SECTION.

STONE & WEBSTER ENGINEERING CORPORATION

CALCULATION SHEET

5010.65

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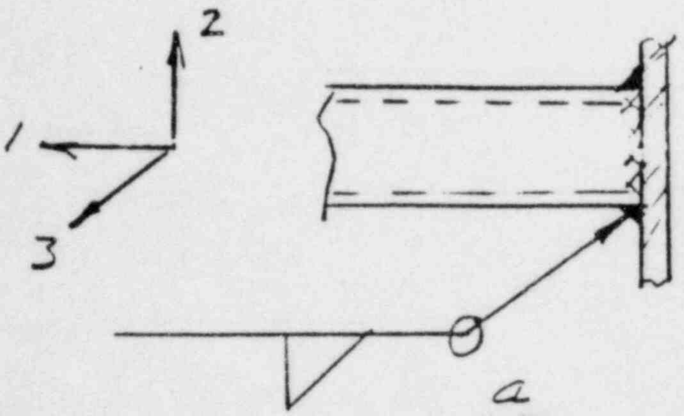
CONNECTION 1

ANALYST'S COMMENTARY ON CONNECTION 1

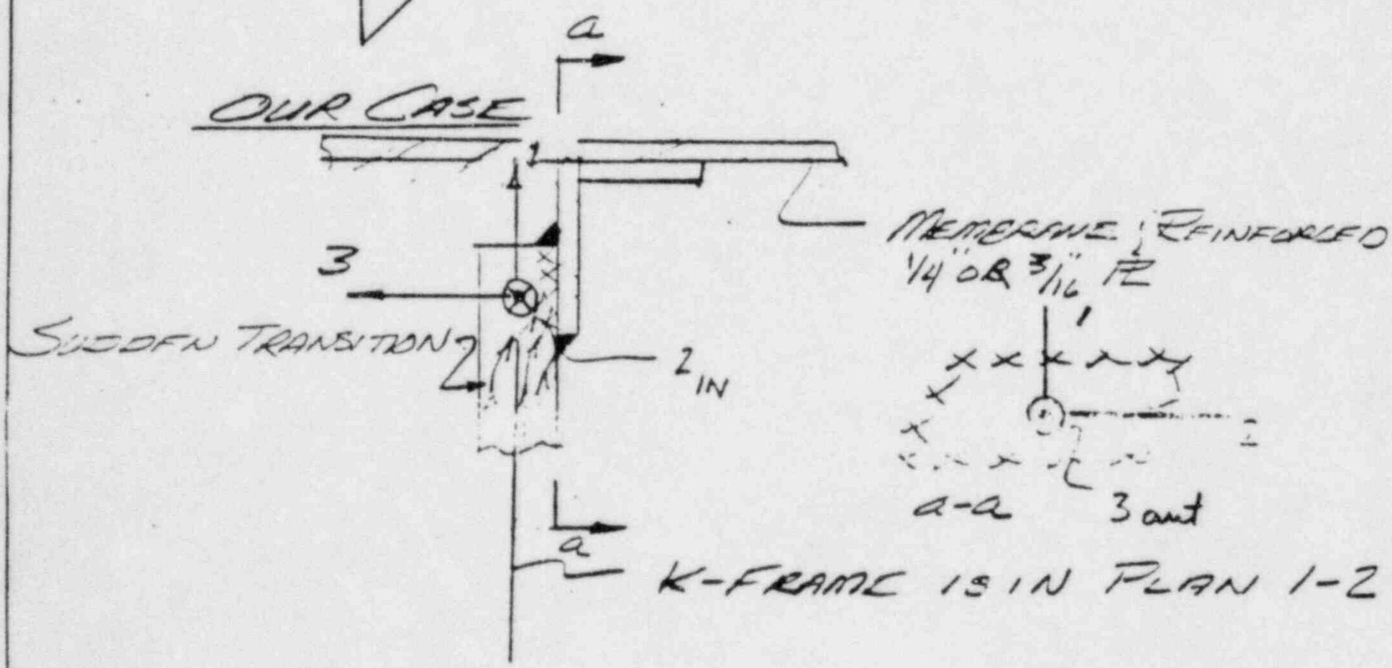
A CONNECTION WHICH IS INTENDED TO TRANFER FORCES AND MOMENTS SHOULD ENGAGE ALL SIDES OF THE CONNECTING MEMBER.

EXAMPLE:



THIS CONNECTION PROVIDES FOR TRANSFER OF ALL FORCES F1, F2, F3, M1, M2, M3 UNIFORMLY THRU THE MEMBERS SECTION.

OUR CASE



THIS CONNECTION WILL DEAL WITH F1, F2, F3, M3 FAIRLY WELL, HOWEVER

M1 AND M2 WOULD IDEALLY WANT THE OUT BOARD SIDE OF THE MEMBER ENGAGED. THE CONNECTION PROVIDED

CALCULATION IDENTIFICATION NUMBER

J.O. OR W.O. NO.	DIVISION & GROUP	CALCULATION NO.	OPTIONAL TASK CODE	PAGE 20
[illegible]	[illegible]	784	CEC.	

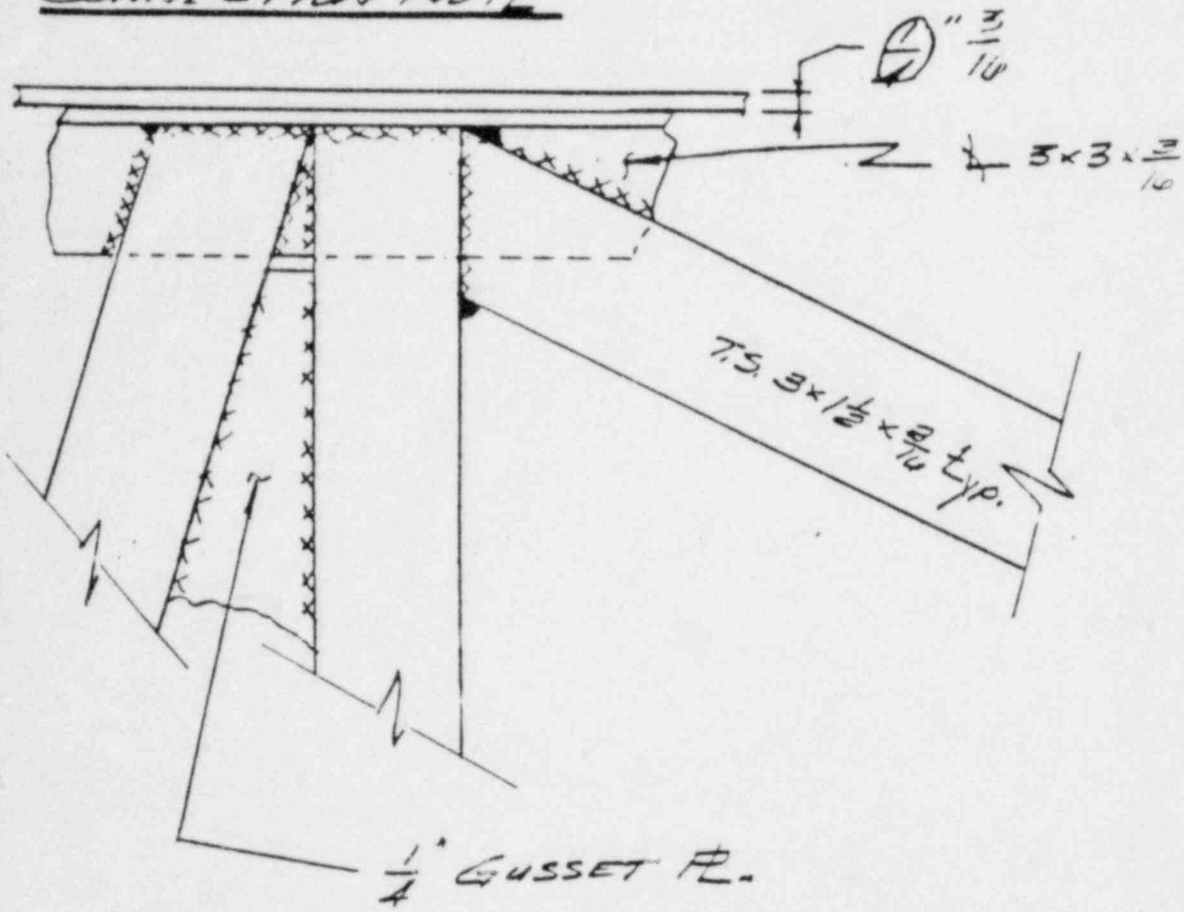
IS CONSIDERED ADEQUATE SINCE THE MEMBER IS UNDER A LOW STATE OF STRESS.

BEAM NO (JOINTS)	NORMAL STRESS PSI
286 (140, 28)	1,360.
309 (142, 26)	1,310.
332 (144, 24)	1,230.

ALSO, VERY LITTLE OF THE M_2 MOMENT TRANSFER TO THE K-FRAME DUE TO THE MEMBRANE ACTION WHICH TRANSFERS MOST OF F3 LATERAL FORCE DIRECTLY INTO THE BASE OF THE BRACE IN SHEAR.

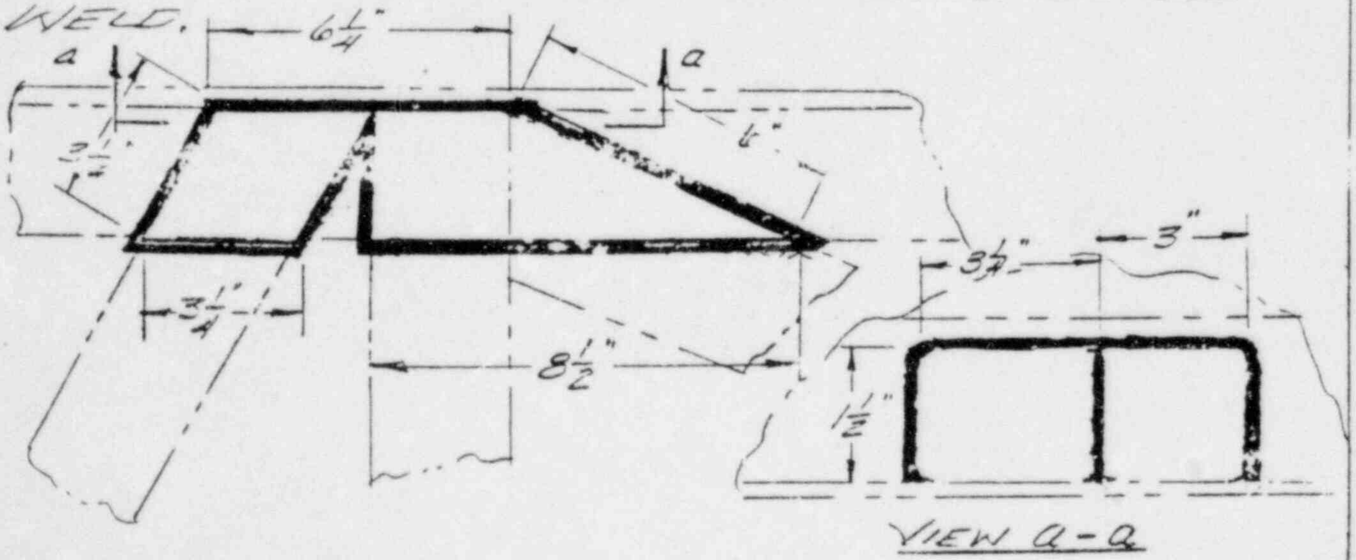
CALCULATION IDENTIFICATION NUMBER				
J.O. OR W.O. NO.	DIVISION & GROUP	CALCULATION NO.	OPTIONAL TASK CODE	PAGE 21
12179.34	NM(S)	7.4	CEC	

CONNECTION NO. 2



NOTE:

THE FIELD INSPECTION SHOWED WELDS EXISTING ON ALL EXPOSED LINES OF INTERSECTION BETWEEN THE TUBE STEEL, 1/4 INCH PLATE AND STRUCTURAL ANGLE. THE WELDING WAS EITHER A FILLET OR FLARE BEVEL WELD.



STONE & WEBSTER ENGINEERING CORPORATION

CALCULATION SHEET

5010.65

CALCULATION IDENTIFICATION NUMBER				
J.O. OR W.O. NO.	DIVISION & GROUP	CALCULATION NO.	OPTIONAL TASK CODE	PAGE 22
12179.34	NM(S)	784	C&C	

CONNECTION 2 CONT.

THE INSPECTION REPORTS OF RECORD INDICATE THAT FILLET WELDS ARE $\frac{3}{16}$" MINIMUM. BY INSPECTION THIS WELD IS CAPABLE OF TRANSFERING SHEAR ACROSS ALL FOUR SIDES OF THE STRUCTURAL TUBE AND DEVELOPING THE FULL STRENGTH OF THE CONNECTING MEMBERS.

– AREA OF MEMBER STEEL :

$$A_{st} = 3\,(1.5\,in^2) \qquad \text{– FOR T.S. } 3 \times 1\tfrac{1}{2} \times \tfrac{3}{16} \text{ ONLY}$$

$$= 4.5\,in^2$$

– AREA OF WELD $\frac{5}{16}$" $= t_w$; $A_w = L_w \times t_w \times .707$

$$L_w = 3(3.25in) + 8.5in + 6in + 6.5in + 3(1.5in) + 3in$$

$$L_w = 38.25\,in$$

$$A_w = 38.25in \times \text{~~0.3125in~~ } .1875 \times 0.707 = \text{~~8.45in~~ } 5.07in^2$$

CONCLUSION:

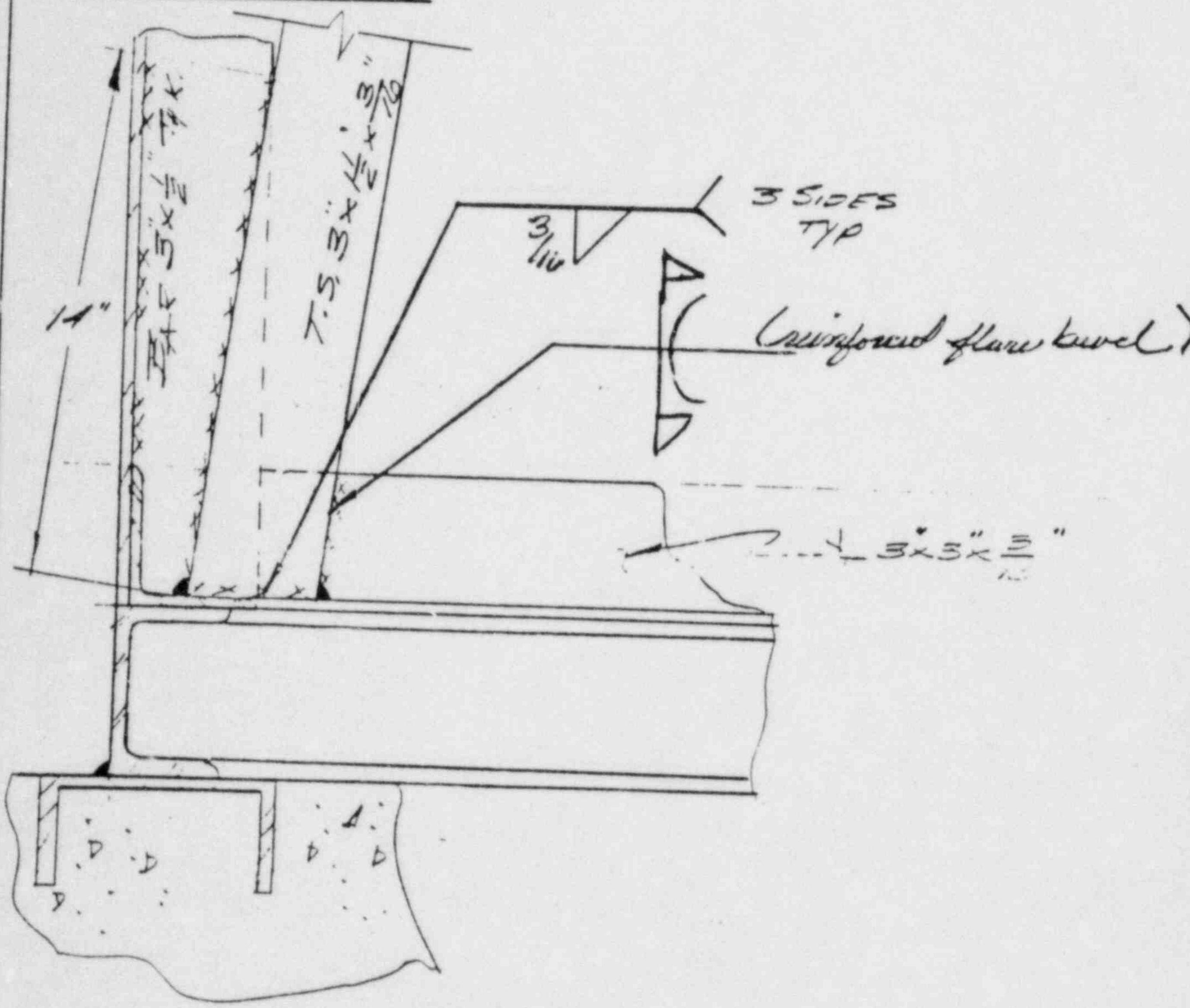
SINCE $A_w > A_{st}$, THE WELD IS STRONGER THEN MEMBER STEEL, THE WELD GROUP HAS A HIGHER MOMENT OF INERTIA THEN THE MEMBER GROUP BY INSPECTION.

CALCULATION SHEET

▲ 5010 65

CALCULATION IDENTIFICATION NUMBER				
J.O. OR W.O. NO	DIVISION & GROUP	CALCULATION NO	OPTIONAL TASK CODE	PAGE 23
12179.34	NM(S)	72.4	CEC	

CONNECTION 3



NOTE:

THE WELD GROUP E/ INSPECTION IS STRONGER THAN THE CONNECTION 1 WELD GROUP AND THEREFORE CAPABLE OF DEVELOPING THE FULL STRENGTH OF THE TUBE STEEL (T.S. $3 \times 1\frac{1}{2} \times \frac{3}{16}$).

CONCLUSION

FAILURE WILL OCCUR IN STRUCTURAL TUBE STEEL BEFORE WELD GROUP FAILURE.

CALCULATION SHEET

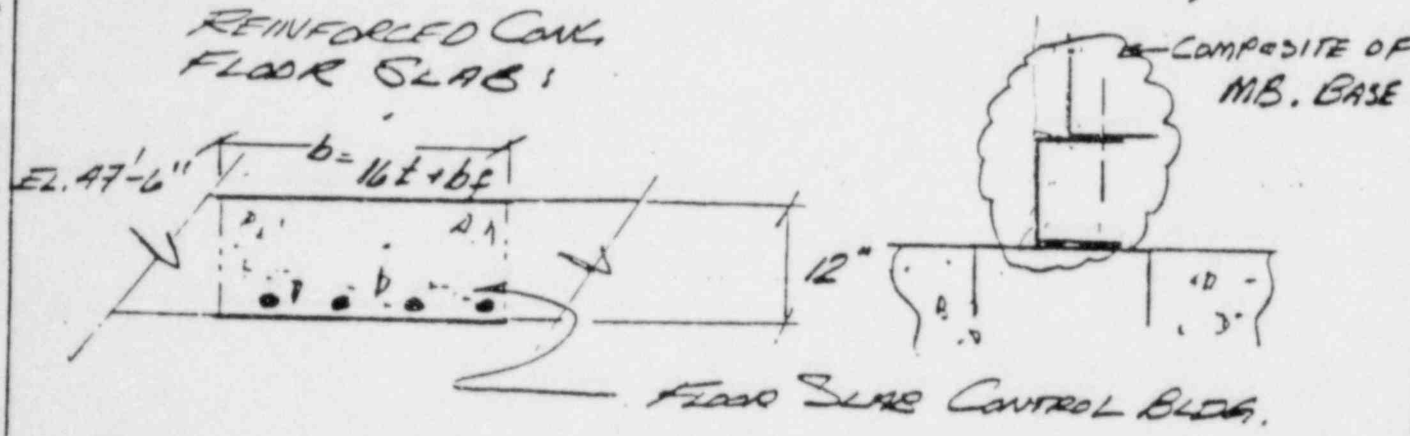
5010 65

CALCULATION IDENTIFICATION NUMBER				
J.O. OR W.O. NO	DIVISION & GROUP	CALCULATION NO	OPTIONAL TASK CODE	PAGE 24
12179.34	NM(S)	72.4	CZC	

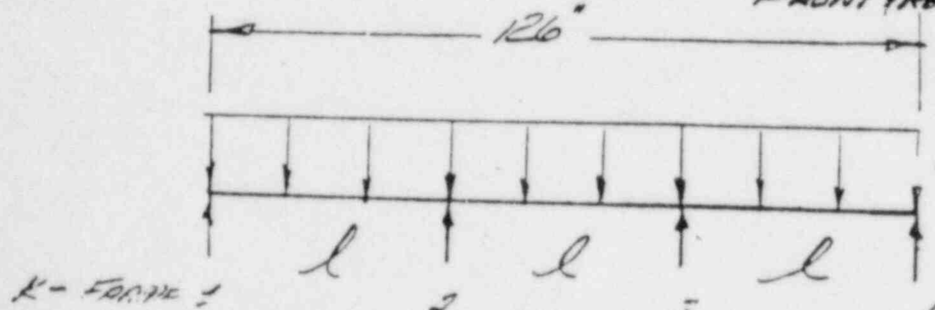
ANALYSIS

- CHECK FASTNER SPACING TO MAINBOARD BASE (COMPOSITE SECTION OF MAIN BOARD BASE)

GIVEN THE AMOUNT OF DEADWEIGHT SAY 20 KIPS VERSUS THE CONCRETE FLOOR SLAB AT ELEV. 47'-6" CONTROL BUILDING ASSUME THE FLOOR COMPLETELY RIGID.



THE BASE SECTION OF THE MAIN BOARD & REAR LOADED AS FOLLOWS: PERIMETER LENGTH = 478 IN
FRONT + REAR = 252" SIDES = 226"



$w = 0.10$ kips/in

$l = \frac{126}{3}" = 42"$

$$w = \left\{1.5 \times \frac{126"}{478"} \times 20\text{kips}\right\} \div 126"$$

PRO-RATED TO REAR OF CABINET

GRAVITY + SSE_V (.5g) + 1g

ADD CONSERVATISM

$w = 0.10$ kips/in

CALCULATION SHEET

5010 65

CALCULATION IDENTIFICATION NUMBER				
J.O. OR W.O. NO.	DIVISION & GROUP	CALCULATION NO.	OPTIONAL TASK CODE	PAGE 25
12179.34	NMK(S)	78.4	CEC	

ANALYSIS

AISC FORMULA ; 1.11-6

$$N_2 = \frac{N_1 \left\{ \frac{M\beta}{M_{max}} - 1 \right\}}{\beta - 1}$$

N_2 - No. OF FASTNERS REQUIRED BWT. CONCENTRATED LOAD & ZERO MOMENT POINT

N_1 = No. OF FASTNERS USED TO CARRY HORZ. SHEAR

M = MOMENT UNDER CONCENTRATED LOAD OTHER THAN MAX. MOM.

M_{max} = MAXIMUM MOMENT

$\beta = \frac{4.06\,IN^3}{2.92\,IN^3}$ SAY 1.39

BEAM No. 380 $\frac{I_z}{H_z}$ (REF. 1)

	J_A	J_B
380	193	194

(C4X7.25)

CONTINOUS BEAM 3 EQUAL SPANS - AISC CASE 36 (REF.)

$M = 0.080\, w l^2$

$M_{max} = 0.10\, w l^2$

$N_1 = \frac{[illegible]}{20\,IN/BOLT}$ = 6.0 BOLTS 1/2-13UNC

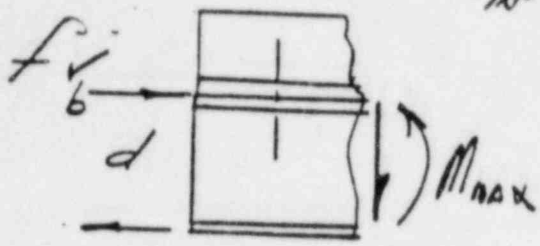
$$N_2 = 6\, \frac{\left(\frac{(0.080 w l^2)(1.39)}{0.10\, w l^2} - 1 \right)}{1.39 - 1} = 0.287$$

N_2 = AT LEAST 1.0 FASTNER O.K BY INSPECTION OF BOLT SPACING REFER TO FIGURE 1.0 PAGE 4

CALCULATION SHEET

ANALYSIS

$$M_{max} = (0.10)(0.1\ \tfrac{kip}{in})(42.\ in)^2 = 17.64\ kip\text{-}in$$



$d = 4.0''$

f_{v_b} – Shear force couple from bending

$$f_{v_b} = \frac{17.64\ kip\text{-}in}{4.0\ in} = 4.41\ kips$$

– SHEAR LOAD ALLOW. PER BOLT

$$F_V = (.4)(.338\ in^2)(36{,}000\ \tfrac{lbs}{in^2})$$

$$F_V = 5.6\ kips > 4.4\ kips \quad O.K.$$

BOP-2-3ENS*SWGA

Question 1:

The original test reports from Wyle Labs and from G.E. were not available during the audit.

Response:

During our November 1, 1985 meeting a copy of the G.E. summary qualification report was provided for the Staff's review. As we discussed during the meeting, the adequacy of the equipment anchorage and the appropriateness of the test response spectra were established during the site audit. The test response spectra envelope the required response spectra for the floor where the switchgear is mounted and the floor above which supports the bus duct. The maximum relative movements between these two floors are:

N-S	E-W	Vert.
.027"	.026"	.0018"

G.E. is an approved supplier with a Quality Assurance program in accordance with 10 CFR Part 50 Appendix B. This equipment was purchased with the requirement that G.E. adhere to their quality assurance program. Therefore a certificate of compliance with the purchase specification and the summary report are sufficient to accept the switchgear qualification and to assure that NNECO will be notified of deficiencies in this equipment should they arise in the future as required by 10 CFR 21. It is our position that G.E. is qualified to make judgements regarding the similarity of the provided equipment and tested equipment, and to determine the applicability of previous testing programs to the qualification of the supplied equipment.

In order to more fully respond to the Staff's concern, we have requested that G.E. provide more details regarding the bases for judgements, stated in the summary report. We will request that this matter be given priority treatment by G.E. and will inform you of a schedule by December 1, 1985.

BOP-6-3LMS*MOV40A

Question 1:

The finite element analysis in the qualification report does not address the as-built supporting conditions of the valve.

Question 2:

Qualification of the structural supporting system was not demonstrated.

Response:

As discussed in response to generic item 2, (Refer to NNECO letter dated October 8, 1985) the g values for in line piping equipment have been checked against the qualification levels. For valves with g levels beyond their required limit, local supports are added to reduce accelerations. The extended structure of the valve and the additional supports are incorporated into the piping analysis. Support loads are developed and the support is designed in the same manner as other seismic Category I pipe supports. When it is necessary to provide a strut at the top of the extended structure, the load applied to the valve is compared against the load applied during operability qualification. The load from the piping analysis must be less than the qualification load. The load transmittal form, suport analysis, and static deflection test report for 3LMS*MOV40A have been forwarded under separate cover to BNL and the Staff. (Reference Stone & Webster calculations 12179-NP(F)-762-XD Rev. 1 and 12179-NP(F)-2-614-A-703-H001 through H005).

This information in conjunction with the October 8, 1985 response and the information provided in our meeting on November 1, 1985 establishes the adequacy of the valve qualification.

Question 1:

The relays (circuit breaker) for the inspected panel are different from those with the tested panels. Are the installed relays on panel board 3SCV*PNL240 considered seismically adequate?

Response:

The larger relay was selected because General Electric considers them to be more sensitive to seismic loading relative to the other smaller relays. All the relays are light weight and therefore insensitive to seismically induced inertia loads. However, the larger relay was chosen since its internal spring retention mechanism was evaluated as more sensitive to seismic loading. The panel board and relay assembly was subjected to significantly higher acceleration[1] levels than required by the specification. In addition, General Electric report no.[2] 1180TUSI117, dated 11/10/80, includes relays of similar size as those mounted on panelboard 3SCV*PNL240. The relays in G.E. report no. 1180TUSI117 functioned properly during and after the random multifrequency tri-axial tests.

(1) Required ZPA (SSE) S/S .40; F/B .40; .18
Test ZPA (SSE) S/S 1.4; F/B 1.4;

(2) General Electric Report No. 1180TUSI117

Seismic Durability Qualification Report

125 Volt DC Switchboards and 125 Volt DC, 208/120, 120 and 118 VAC Panelboards for the Texas Utilities Services, Inc. Comanche Peak Steam Electric Station.

BOP-8-3RHS*MV8702C

Question 1:

Operability test by static deflection was not adequately demonstrated.

Response:

The existing static deflection test adequately demonstrates operability of the valve.

Critical loading due to deflection of the extended structure occurs at the yoke to bonnet and bonnet to valve joints. The static input (deflection) force was input at the yoke to motor operator joint, a point 36 inches above the centerline of the valve body. If the center of gravity of the extended structure is conservatively taken to be at the center of the motor operator. This would put the CG at a point 48 inches above the centerline of the valve body. The valve was tested at 4.5g versus the required level, from the Piping Stress Reconciliation Analysis, of 1.7g, maximum.

Since 4.5g/1.7g is greater than $48^3/36^3$, the force input below the CG has been adequately compensated by the increase in acceleration level.

NSSS-2-3SIH*P

Question 1:

Torsional frequency of assembly needs to be completed and compared to motor's operational speed.

Response:

As demonstrated during the audit, this pump is seismically qualified through an extensive testing program. We have been in touch with Westinghouse and the pump manufacturer, Pacific Pumps. Attached for your information is Pacific Pumps' response to Westinghouse, regarding torsional vibrations. In short there is no history of torsional vibration problems with this type of pump. Further there is no source of significant torsional excitation energy, with the possible exception of "certain transient conditions and abnormal operational modes (such as motor phase problems or extreme misalignment)".

This pump has been through our Startup Testing program to verify proper operation and establish pump base line information. During preoperation and operation this pump is maintained under the Production Maintenance Management (PMMS) System. Both the Startup Testing and PMMS programs have been reviewed as part of the PVORT audit. These programs in conjunction with the information from Pacific Pumps leads us to believe that torsional vibration will not be a problem with this pump. To verify this a torsional frequency analysis will be performed. This analysis will be completed prior to reaching initial criticality.

PACIFIC PUMPS DRESSER

5715 BICKETT STREET ☐ HUNTINGTON PARK, CALIFORNIA 90255-2676
TELEPHONE 213/588-2201 ☐ TELEX 673-223

October 28, 1985

Westinghouse Electric Corp
NSID - 4830 Old William Penn Highway
3 Murry Center
Export, PA 15632

Attention: M. D. Veltri

Subject: Torsional Analysis for NEU & NAH Pumps
P. O. MN38566 O, letter 85 MDV 273.

Dear Mickey:

In the reference letter you requested Pacific to furnish a torsional rotor dynamics analysis of these pumps and their drive trains. Normally, we do not recommend that such an analysis be made except when engines are used as prime movers. The basic reason for this is that centrifugal pumps, when driven by either electric motors or turbines, have negligible torsional excitation energy and as a result no damaging vibrations can be set up.

Under certain transient conditions and abnormal operational modes (such as motor phase problems or extreme misalignment) torsional excitation could theoretically become large enough to be a problem. However, these conditions are much more serious in themselves as far as operability is concerned. The torsional energy that would exist under these conditions is also being absorbed by the considerable damping in the fluid filled pump, part fits, and material of the rotors. Pacific Pumps has never identified a torsional resonance related failure in the types of pumps that we manufacture. Finally, the specific pumps to which this letter is addressed have all been thorourhly tested and are successfully operating in several plants without any problems.

Please review and determine if a torsional rotor dynamic analysis is still required.

Very truly yours,

D. W. Linn
Nuclear Repair Manager

DWL:vf
cc- John Dudiak (Rapifax)

NSSS-3-3CHS*MV

Question 1:

Operability test by static deflection was not adequately demonstrated.

Response:

The existing static deflection tests adequately demonstrates operability of the valve.

Critical loading due to deflection of the extended structure occurs at the yoke to bonnet and bonnet to valve joints. The static input force was applied at the yoke to motor operator joint, a point 24.5 inches above the centerline of the valve body. If the center of gravity (CG) of the extended structure is conservatively taken to be at the center of the motor operator, this would put the CG at a point 32 inches above the centerline of the valve body. The valve was tested at 4.5g. The actual valve acceleration from the Piping Stress Reconciliation Analysis is 1.73g maximum.

Since $4.5/1.73$ is greater than $32^3/24.5^3$ the force input below the CG has been adequately compensated by the increase in acceleration level.

Question 4:

Some devices are qualified for five years and need replacement. No document was presented during the audit to demonstrate inclusion of this requirement in the maintenance manual. This should be resolved for an overall qualification of the equipment.

Response:

The Westinghouse supplied equipment, 7300 Process Protection cabinet is located in environmental zone CB-01. This zone has been designated as Mild Environment by the plant design conditions. As such, the equipment located in this zone (CB-01) and other mild zones do not fall under the requirements of 10 CFR 50.49. Therefore, no qualified life is specified or required.

However, in order to maintain the equipment to the manufacturer's requirements, normal plant maintenance is performed. This normal maintenance is performed on specified plant maintenance cycles designated by the appropriate maintenance group.

Question 2:

Meeting the requirement of 1 SSE test preceded by 5 OBE tests was not demonstrated during the audit.

Response:

A response to the above question was provided to the NRC in a letter dated August 6, 1985 (B11611).

NRC Position Regarding NNECO Response

Provide additional justification on a time duration basis that the seismic tests performed for the NIS console provided the equivalent of 5 OBEs and 1 SSE at the resonance of the equipment (5 Hz) for the Millstone Unit No. 3 application. The assumption that fatigue damage at any acceleration for non-metallic materials is proportional to the cube or square of the acceleration level may not be conservative.

Revised Response (11/85)

The Nuclear Instrumentation System (NIS) console was seismically tested using single frequency sine beat tests. Sine beat vibration waveforms were employed as input at the base in each principal axis of the equipment separately. The equipment was excited at frequencies which were uniformly spaced over the frequency range of 1 to 35 Hz. In addition, testing was performed at equipment resonances determined from a resonance search in the 1 to 35 Hz frequency range prior to performing the sine beat testing.

Five (5) consecutive sine beats were applied at each test frequency, with a minimum pause of two (2) seconds between each sine beat. Each sine beat consisted of ten (10) sine waveform cycles at the required peak test acceleration amplitude. The NIS console has been seismically tested to each of the three (3) levels defined in Figure 1 using the same equipment. The NIS console was qualified for Millstone Unit No. 3 application using the "High Seismic" level. Documentation of these test levels are provided in the following reports:

- WCAP-8587, EQDP-ESE-10, "Equipment Qualification Data Package - Nuclear Instrumentation System (NIS) Console", Revision 5, March 1985.

- WCAP-7817, "Seismic Testing of Electrical and Control Equipment (Low Seismic Plants)", Revision 0, December 1971.

  WCAP-7821, "Seismic Testing of Electrical and Control Equipment (High Seismic Plants)", Revision 0, December 1971.

- WCAP-8021, "Seismic Testing of Electrical and Control Equipment (PG&E Plants)", Revision 0, May 1973.

An earlier response (Refer to NNECO letter dated August 6, 1985) provided the equivalent stress cycles from single frequency test input for 5 OBEs and 1 SSE. The time duration associated with these cycles can be obtained by dividing the equivalent stress cycles by 5 (5 Hz frequency used in the evaluation) as shown below:

Comparison of Millstone Unit No. 3 Fatigue
Requirements Versus Equivalent
NIS Console Fatigue Cycles at Five (5) Hertz

Event	Required Spectral @ Accel. 4% Damping	Req'd. Stress Cycles	Req'd. Time Duration (sec)	Equivalent Stress Cycle From Single Frequency Test Input*	Equivalent Time Dur. (sec) From Single Frequency Test Input
5 OBEs	0.55g	500	100	Cubic 222,443 Square 11,903	44,489 2,381
1 SSE	1.05g	100	20	Cubic 31,970 Square 3,266	6,394 653

Westinghouse believes that the computation of equivalent number of stress cycles based on the assumption that the fatigue damage is proportional to the square of the acceleration level is conservative in regards to non-metallic material. This is due to the non-metallic material not being used in any highly concentrated stress areas.

An ultra conservative approach would be to compute the equivalent number of stress cycles based on unity of the acceleration level.

$$N_i(f_i) = \sum_j n_j \frac{[a_j]}{a_r}$$

Where,

N_i = equivalent number of stress cycles associated with the oscillator frequency.

a_j = jth acceleration amplitude as obtained from response time history.

* 5 sine beats at 10 cycles per beat were analyzed at 4% damping for direct comparison. Derivation of equivalent stress cycles provided in EQ&T-EQT-1518.

a_j = required acceleration amplitude corresponding to the oscillator frequency.

n_j = number of stress cycles corresponding to amplitude a_j.

The equivalent stress cycles for the unity case can be obtained by plotting the equivalent number of cycles verse A^3 and A^2 on a log scale and extrapolating (see Figure 2). The results of performing the extrapolation are listed below:

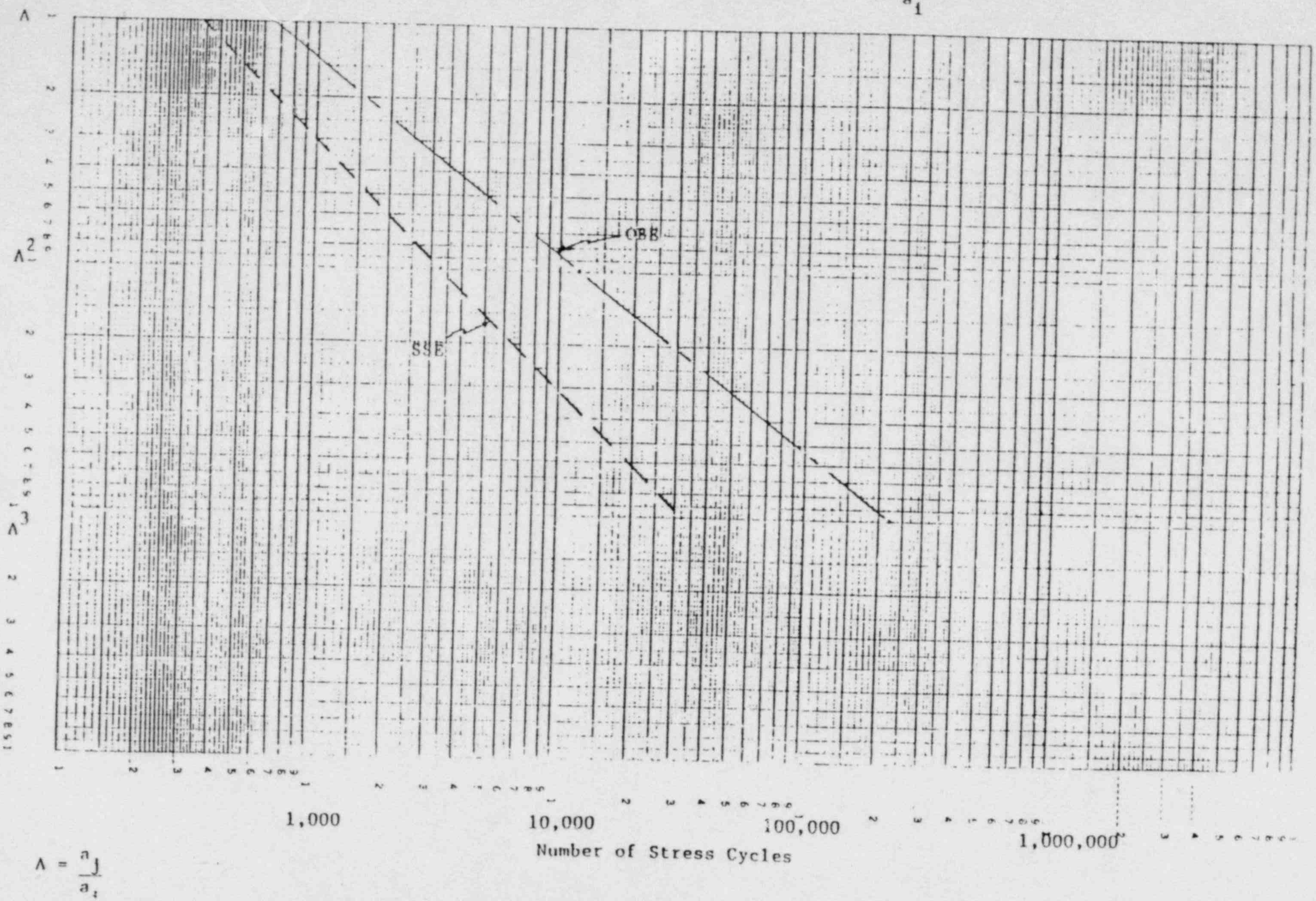
Event	Required Spectral @ Accel. 4% Damping	Req'd. Stress Cycles	Req'd. Time Duration (sec)	Equivalent Stress Cycle From Single Frequency Test Input	Equivalent Time Dur. (sec) From Single Frequency Test Input
5 OBEs	0.55g	500	100	660	132
1 SSE	1.05g	100	20	335	67

Therefore based on the above comparisons and the additional testing performed prior to the "High Seismic" Level test (used for the Millstone Unit No. 3 qualification comparison), it is concluded that the equivalent test fatigue stress cycles which the NIS console experienced exceed the Millstone Unit No. 3 required fatigue stress cycles.

46 7602

FIGURE 2

PLOT OF NIS CONSOLE EQUIVALENT STRESS CYCLES VERSUS THE RATIO ACCELERATION LEVEL $(\frac{a_j}{a_1})$



Question 2:

The proximity of the installed switchgear to an adjacent non-Category I cabinet and the possible dynamic interaction between the two cabinets were not addressed in the qualification documents.

Response:

Attached for your information is a copy of the E&DCR which has been issued to connect the switchgear to the adjacent non-Category I cabinet. (E&DCR T-J-07957)

Question 3:

Per available qualification documents, some devices are qualified for 5 years and need replacement. No document was presented during the audit to demonstrate inclusion of this requirement in the maintenance program.

Response:

The Westinghouse supplied equipment, Reactor Trip Switchgear, is located in environmental zone ES-01. This zone has been designated as Mild Environment by the plant design conditions. As such, the equipment located in this zone (ES-01) and other mild zones do not fall under the requirements of 10 CFR 50.49. Therefore, no qualified life is specified or required.

However, in order to maintain the equipment to the manufacturer's requirements, normal plant maintenance is performed. This normal maintenance is performed on specified plant maintenance cycles designated by the appropriate maintenance group.

STONE AND WEBSTER ENGINEERING CORPORATION

ENGINEERING & DESIGN COORDINATION REPORT

34

PAGE 1 OF 8

E&DCR NO. T-J-07157

JOB ORDER NO. 12179.34

PROJECT/CLIENT: MILLSTONE UNIT III / NUSCO

P.O. NO.(S)/S.A.: 2240.000-001

REASON CODE(S): A.F.

EQUIP. I.D. NO.(S)/SYS. CODE(S): 3RPSKSWG 1RPS / 3/MA

REFERENCE DOCUMENTS:

SUPPLIER(OR SUBSUPPLIER) NAME: WESTINGHOUSE (94920)

DESCRIPTION SUMMARY: CABINET SPACING

REMARKS: SQRT AUDIT FINDING -NSSS-

PROBLEM DESCRIPTION

THE NRC SEISMIC QUALIFICATION REVIEW TEAM (SQRT) IDENTIFIED THE PHYSICAL SEPARATION OF CATEGORY I ELECTRICAL CABINETS AS A CONFIRMATORY ITEM AND GENERIC IN NATURE.. INADEQUATE SEPARATION MAY CAUSE ADJACENT ELECTRICAL CABINETS TO IMPACT AGAINST EACH OTHER DUE TO SEISMIC INERTIAL LOADS. THE WESTINGHOUSE REACTOR TRIP SWITCHGEAR (3RPSKSWG1 & 2) ARE IN CONTACT WITH THEIR 3RDS-MG1A & B CATEGORY II CABINTS. PROVIDE SUFFICIENT CLEARANCE BETWEEN THESE CABINETS OR HARDWARE DETAILS TO STRAP THE CABINETS TOGETHER.

INITIATOR	AREA/DEPT DIV	TEL. EXT.	DATE	DATE NEEDED BY	APPROVED	ENGR. RESP.
S. WAINIO	4712	5051	11/12/85	ASAP	W.K. (W.W. KENNEDY)	NME

PROBLEM SOLUTION

REFER TO ATTACHED PAGES 2-8 TO 8-8 FOR PROBLEM SOLUTION.

ISO. No.:	
PLI AFFECTED	PLI NOT AFFECTED

NS ; N/A

AFFECTED DOCUMENT NUMBERS	TYPE	STATUS
12179-EE-27	D	C

RELATED ACTIVITIES: N/A

QA CAT: I

CLIENT APP: REQ'D ☐ NR ☒

REF:

DATE:

ANSWERED BY: Stew Wainio — DATE: 11/12/85

RESP. LEAD ENGR: — DATE:

MATERIALS ENGR: — DATE:

EQUIP. SPEC.: -N/A- — DATE:

QSD OR EA: -N/A- — DATE:

PROJ. ENGR.: — DATE:

SUB ITEM	WORK RESP	SUB ITEM	WORK RESP
01		02	
EQ RELEASE NO. 3407A		EQ RELEASE NO.	
WBS NO.		WBS NO.	

WORK COMPLETION: NWR ☐ — DATE:

INSP. REPORT NO/SIG: — DATE:

FINAL WORK TRACKING CLOSURE: — DATE:

STATUS

C - WILL BE INCORPORATED

N - WILL NOT BE INCORPORATED

I - NO CHANGE

DESCRIPTION (01):

REMARKS (01):

DESCRIPTION (02):

REMARKS (02):

CU

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PReilly
JKrechting
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GMSchierberg
LMidttun (enc)
JGrove/Chrono File
JGrove/Job Book File
2240.000-001
EDC Word Proc
JOssmann
SWainio

Mr. J. Steinmetz
Project Manager MP3
Westinghouse Nuclear Energy System
P.O. Box 355
Pittsburgh, PA 15230

November 1, 1985
J.O. No. 12179
NES-39981

E&DCR T-J-07957
PAGE 2 OF 8

Attn: Mr. L. Walker

PURCHASE ORDER NO. 240.000-001
REACTOR TRIP SWITCHGEAR PHYSICAL SEPARATION
MILLSTONE NUCLEAR POWER STATION - UNIT 3
NORTHEAST UTILITIES SERVICE COMPANY

In a recent audit by the NRC Seismic Qualification Review Team (SQRT), a possible physical separation concern was identified against the reactor trip switchgear (3RPS*SWG 1).

Mr. J. Parello of Westinghouse has been notified of the physical separation concern. Mr. Parello requested an as-built sketch showing the relative position of the adjacent cabinets. The requested sketch is attached to this letter.

Westinghouse is aware of the importance of resolving the reactor trip switchgear physcial separation issue and has agreed to provide a response including any required hardware modification recommendations by November 29, 1985.

If you have any questions, please contact Mr. S. Wainio at (203) 442-0751 extension 5051.

P. Reilly for

J.K. Krechting
Assistant Project Engineer

SW:dh

NEU-5972

Westinghouse Electric Corporation

Water Reactor Divisions

Nuclear Operations Division

Box 355
Pittsburgh Pennsylvania 15230

November 12, 1985

S.O. No: NEU-219

Ref: NES-39981

E&DCR T-J-07957
PAGE 3 OF 8

Mr. R. W. Ackley
Project Engineer
STONE & WEBSTER ENGINEERING CORPORATION
P.O. Box 345
Waterford, Connecticut 06385

NORTHEAST UTILITIES SERVICE COMPANY
MILLSTONE NUCLEAR POWER STATION
UNIT NO. 3
REACTOR TRIP SWITCHGEAR (M-G) CABINET
FIELD LINE UP REINFORCEMENT

Dear Mr. Ackley:

Westinghouse has completed the evaluation of mounting a Class 1-E reactor trip switchgear next to a non-Class 1-E rod drive control cabinet (M-G). Based on our evaluation (attached), we have concluded that the seismic qualification of the Class 1-E RTD cabinet will be maintained by connecting the two cabinets at the top, thereby forcing the two cabinets to move together and eliminating the possibility of intercabinet impacting. The attachment provides the design details and procedure for the cabinet connection.

Very truly yours,

WESTINGHOUSE ELECTRIC CORPORATION

For J. N. Steinmetz, Manager
Millstone 3 Project

VP/ak/7923d:1/

Attachment

cc:	R. W. Ackley (Waterford)	6L, 3A
	S. Orefice	4L, 4A
	J. O. Crockett	1L
	B. Nichols	1L, 1A
	S. Wainio	1L, 1A

ATTACHMENT A

Summary Report for Seismic Qualification
For Reactor Trip Switchgear/Rod Drive Control Cabinet:
Millstone Unit 3 Plant

INTRODUCTION

The Reactor Trip Switchgear (RTS) supplied to Millstone Unit 3 was seismically qualified by test in a free standing configuration. Dynamic interaction between the Reactor Trip Switchgear and the Rod Drive Control Cabinet could lead to impacting between these two units during a seismic event. Although the RTS is Class 1E, the Rod Control Cabinet is not.

EVALUATION

As presently installed, the Reactor Trip Switchgear and Rod Drive control cabinet are bolted together at the base by means of busbars while the tops of the cabinets are free to move independently. Based on an evaluation of the seismic response of this equipment, it was concluded that the seismic qualification of the switchgear would be maintained if the two cabinets were joined to each other to ensure that the two units would move together to eliminate the possibility of inter-cabinet impacting. Based on the measurements provided by Stone and Webster in Ref. 1, two brackets were designed to tie the two cabinets together. The details of the brackets are shown in the following sketches:

1. Sketch SK-RTSMG-NEU-01 Plan
2. Sketch SK-RTSMG-NEU-02 Detail 1 - Front Bracket
3. Sketch SK-RTSMG-NEU-03 Detail 2 - Rear Bracket

HARDWARE

Two bracket assemblies fabricated from angle and plate material; fasteners as specified on the sketches. All hardware should be procurred locally at the site.

Note: The locations of bolts shown on sketches are the recommended locations.

List of References

1. Letter from Stone and Webster to J. Steinmetz, NES-39981, dated November 1, 1985.

INSTALLATION PROCEDURE

1. Disconnect all power.

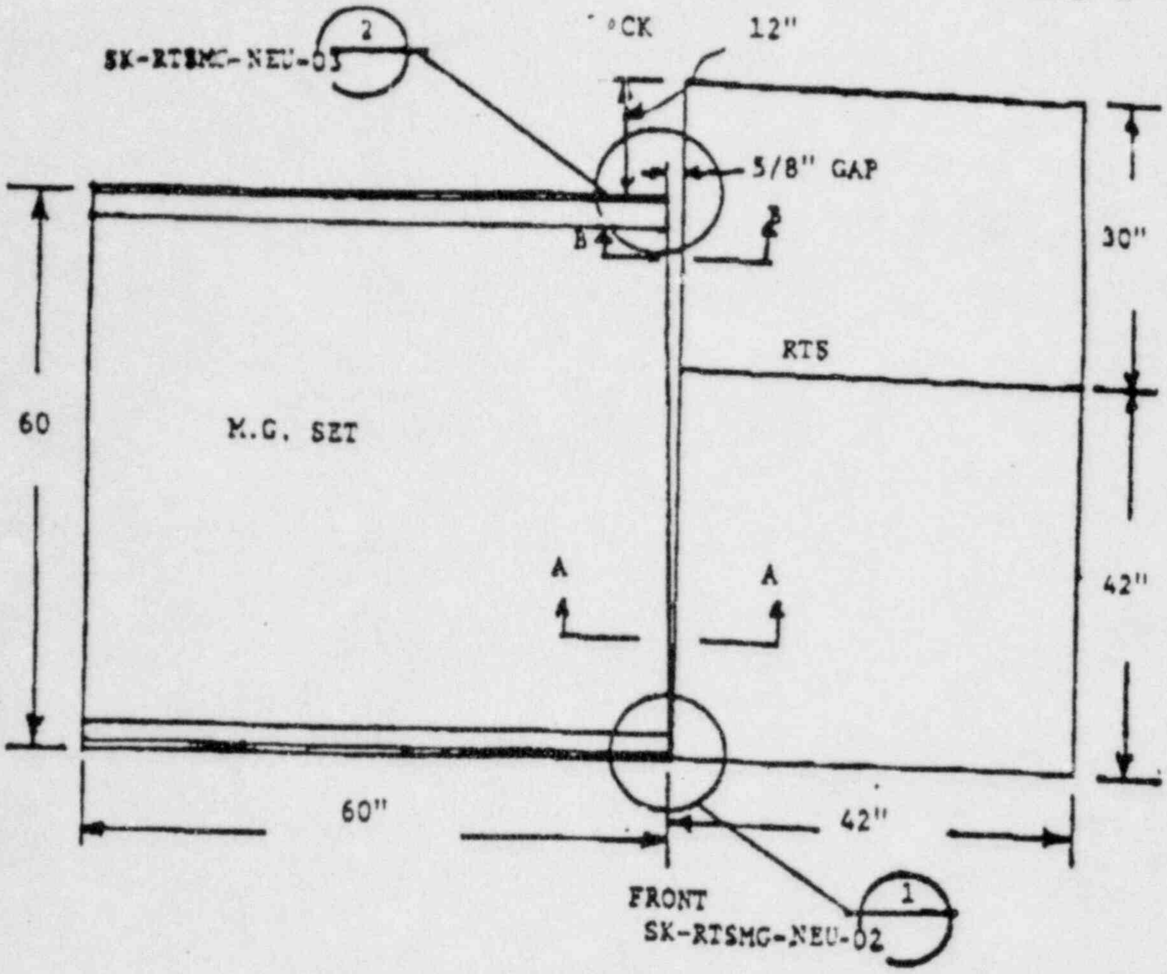
2. Work areas are identified in details 1-2.

3. Prepare the front bracket assembly prior to mounting on the RTS/Control Cabinet lineup. Since no clearance exists in the front between the units, the vertical leg (4") of angle must be shortened to clear top of MG set when positioned as shown in detail 1. The exact vertical location of 4" x 3/8" plate relative to vertical leg of angle must be determined in field. The attached sketch shows the nominal location. Mount the bracket assembly on the equipment and drill holes at location identified. Secure the brackets with specified hardware.

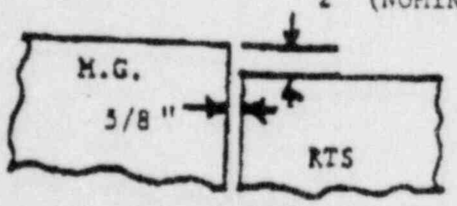
4. Prepare the rear bracket assembly. Determine the proper location of the two bolts used to connect bracket to RTS. The holes should be as shown in sketch. Mount the bracket assembly as shown in Detail 2. Secure the brackets with specified hardware.

5. Note brackets are fabricated using A-36 material or equivalent for plates and angles. Welding is to be done using E70 electrodes or equivalent and an approved site welding procedure.

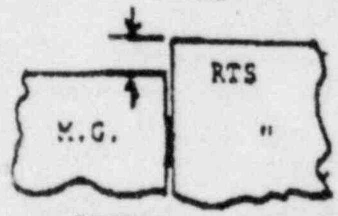
6. Installation is now complete. Remove all tools, clean debris, etc.



TOP PLAN VIEW
(as built)



SECTION B-B



SECTION A-A

LAYOUT OF NEU REACTOR TRIP SWITCHGEAR
M.G. SET INTERFACE

SKETCH-SK-RTSMG-NEU-01

BRACKET (ONE REQ'D)

E&DCR T-J-07957
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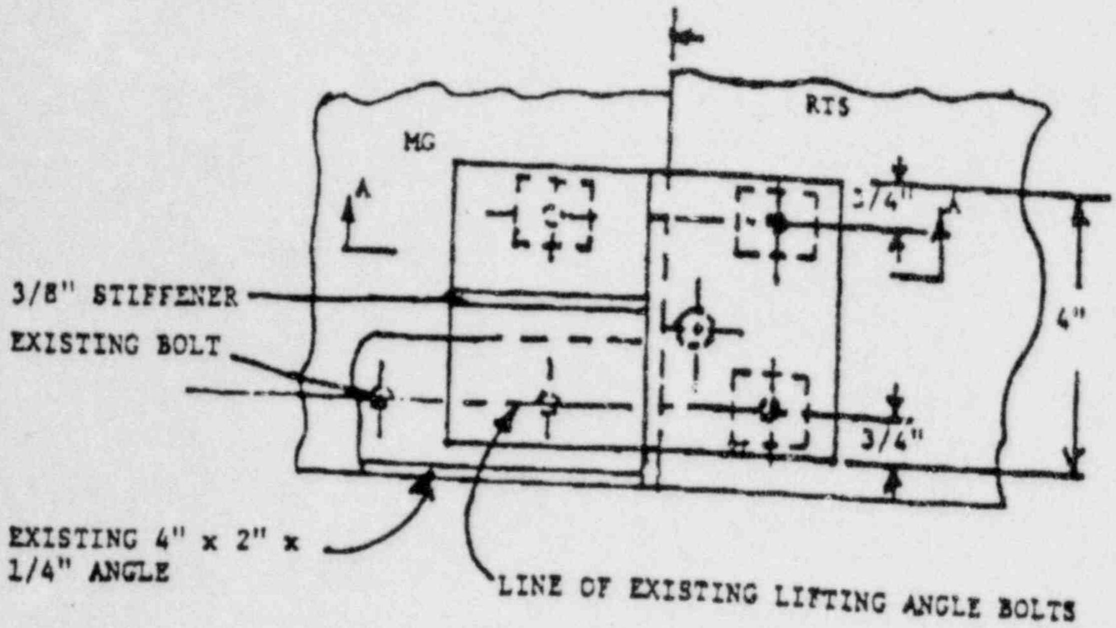

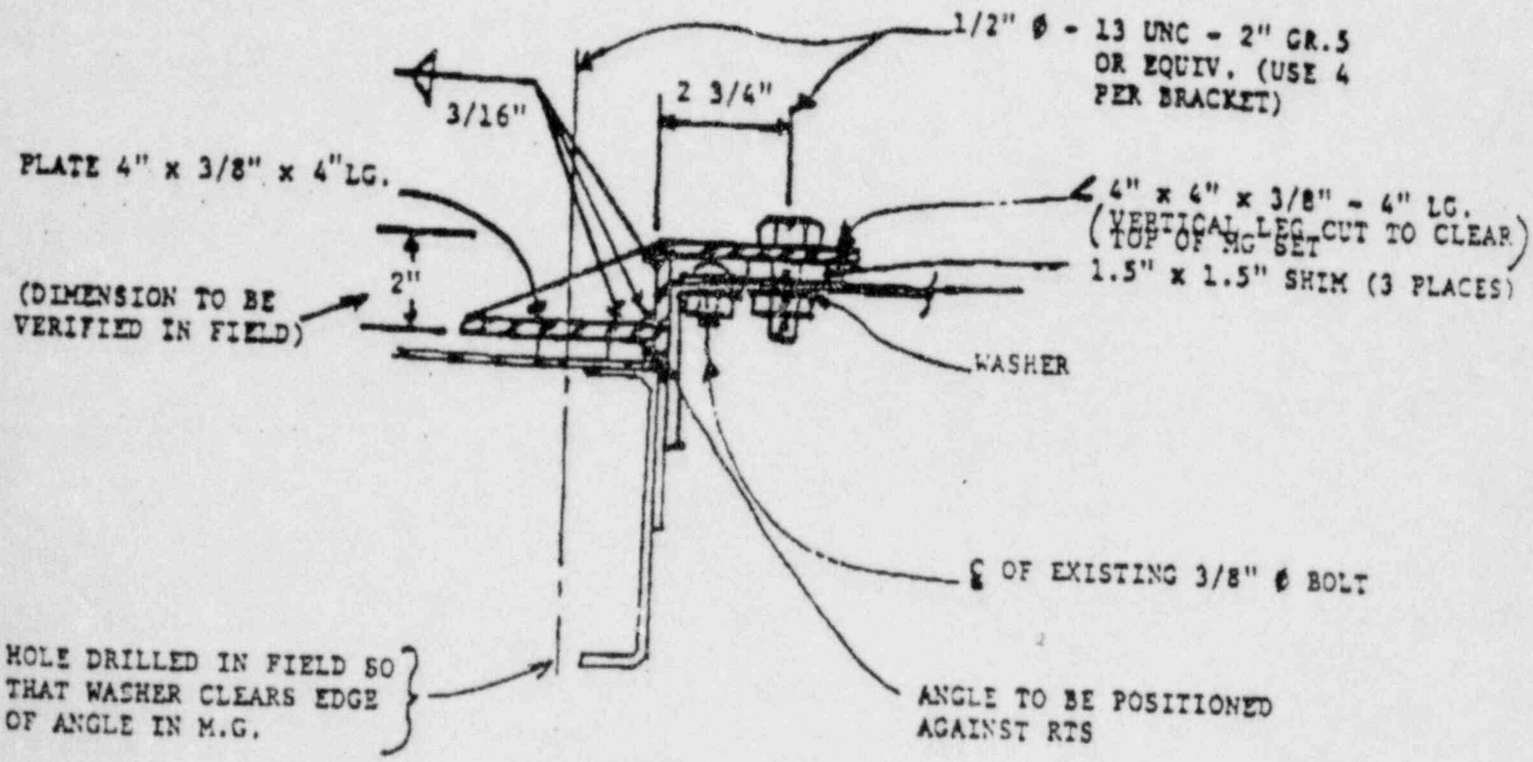

SECTION A-A

DETAIL - 1

SKETCH SK-RTSMG-NEU-02

REAR BRACKET (ONE REQUIRED)

E&DCR T-J-07957
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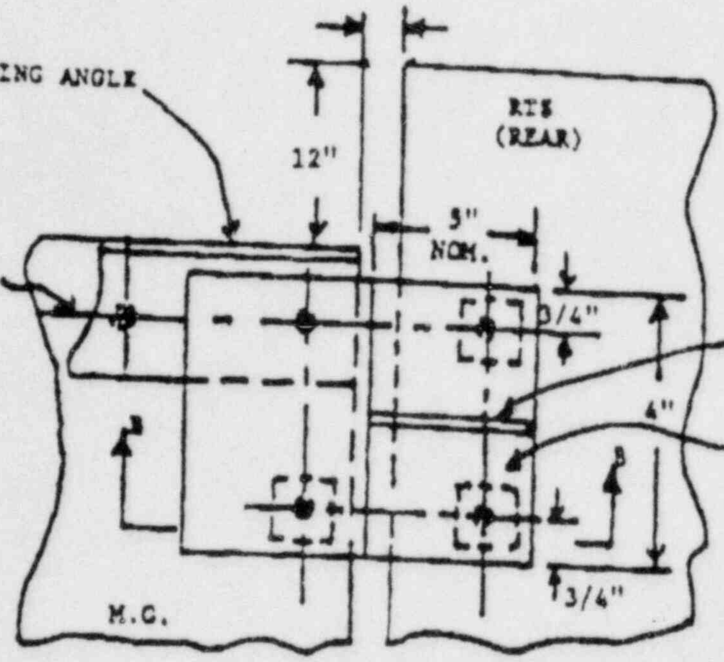

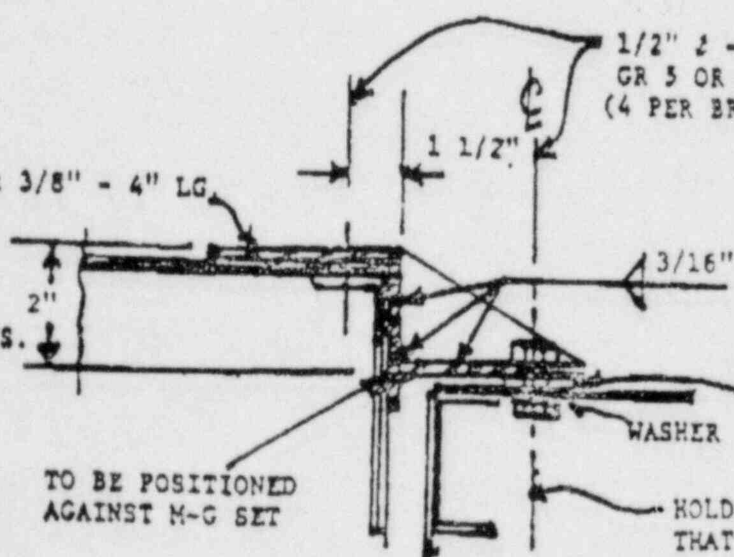

SECTION B-B

DETAIL 2

SKETCH SK-RTSMG-NEU-03