



LONG ISLAND LIGHTING COMPANY

SHOREHAM NUCLEAR POWER STATION

P.O. BOX 618, NORTH COUNTRY ROAD • WADING RIVER, N.Y. 11792

JOHN D. LEONARD, JR.
VICE PRESIDENT - NUCLEAR OPERATIONS

June 3, 1985

SNRC-1168

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

Fire Protection
Shoreham Nuclear Power Station - Unit 1
Docket No. 50-322

- Reference:
- 1) Letter from NRC (T. Martin) to LILCO (J. D. Leonard) forwarding Appendix A, Notice of Deviation and NRC Inspection Report 84-46.
 - 2) Letter SNRC-1141, dated 1/29/85.
 - 3) Letter SNRC-1122, dated 12/7/84.

Dear Mr. Denton:

The purpose of this letter is to formalize our understanding of the Staff's position on LILCO's resolution of certain fire protection issues outlined in Reference 1 and to provide clarifying information regarding certain of these issues as discussed in a telephone conversation between LILCO and members of your staff on 4/4/85. This information was requested to amplify LILCO's response to Reference 1 as contained in Reference 2, and is as follows:

- (1) Inspection Report 84-46 Deviation A - Fire Detectors
LILCO is presently involved in a program involving the installation of additional fire detectors throughout various areas of the plant as described in Reference 2. In those areas, LILCO is pursuing a design that will be in compliance with NFPA Standards 72D and 72E. If, in the course of accomplishing this design, certain exceptions to these standards become warranted or necessary, justification for those exceptions will be submitted to the NRC. It should be noted that installation of Phase I detectors proceeded on schedule and is physically complete. Except for several detectors on the refueling deck, testing has also been completed for these Phase I detectors.

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(2) Inspection Report 84-46 Deviation B - Fire Doors

In SNRC-1141 LILCO proposed to justify the acceptability of fire doors where welded brackets have been utilized for mounting of magnetic switches, which are part of the plant security system. Discussions with the Staff confirmed their acceptance of those criteria with the clarification that, if a water spray in close proximity to the door is used as a criteria for providing suitable fire door resistance, it will be located such that it either discharges onto a side of the door or provides a "water curtain" protecting the door.

(3) Inspection Report 84-46 - Unresolved Item 84-46-15 - Structural Integrity of Cable Tray Penetration Seals

Your staff has stated that the approach utilized by LILCO (as described in Reference 2) is acceptable. As requested, a copy of the analysis used to verify the integrity of supports in areas not protected by automatic suppression is provided as Attachment 1. (Calculation No. 11600.02/SC-017-62M Rev. 0)

It is LILCO's understanding that several other responses contained in Reference 2, or discussed at the January 15, 1985 meeting have been reviewed and found acceptable by your staff. They are as follows:

1. Deviation C - Fire Pump House Separation
2. Deviation D - Damper between HVAC Equipment Room and Chiller Room
3. Deviation E - Carbon Dioxide Concentration
4. Deviation F - Fire Detectors in Computer Room
5. Deviation G - Damaged Fireproofing
6. Unresolved Item 84-46-06 - RCIC/HPCI Fire Suppression - Cable Routing
7. Unresolved Item 84-46-13 - Fire Hazards Analysis Report for Control Building Corridors and Manhole #1
8. Unresolved Item 84-46-14 - Single Header in Reactor Building
9. Unresolved Item 84-46-16 - Sizing of Fire Water Storage Capacity
10. Cable Tray Concentration - need for suppression

In addition, it should be noted that, as briefly discussed with Mr. R. Caruso on March 28, 1985, implementation of certain near term modifications is being delayed primarily due to problems with material lead times. These consist of the following:

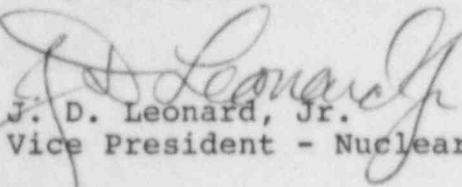
1. Deviation B - Fire Doors - Repairs have been completed for forty of the fifty-nine FHAR fire doors. Due to difficulties in obtaining parts, however, an accurate completion date for these repairs is not available. Completion of most repairs is expected during the late summer of 1985. In an effort to obtain needed parts, LILCO has offered incentives/bonuses to vendors without success. LILCO has also investigated the availability of doors at other utilities via Nuclear Network (Notepad), again without success.

2. Deviation C - Separation of the Electric and Diesel Fire Pumps - Completion of this modification, which was originally scheduled to be completed by the end of April, 1985, has been delayed to June 21, 1985.

Until appropriate repairs/modifications are made, LILCO will continue the compensatory measures stipulated in the Reference 3 letter.

Should you have any questions, please contact this office.

Very truly yours,



J. D. Leonard, Jr.
Vice President - Nuclear Operations

RWG:ck

Attachment

cc: P. Eselgroth

CALCULATION SUMMARY

SHAW & WEBSTER ENGINEERING CORPORATION

SNRC-1168
Attachment 1

JO. W. S. / CALCULATION NO 11600-02 / SC-017-62M		REVISION 0	PAGE 1 OF 11
CLIENT / PROJECT LILCO SNPS #1		SA CATEGORY (V)	
SUBJECT / TITLE REVIEW CABLE TRAY SUPPORT ON TURBINE BLDG SIDE AT PENETRATION IN FIRE WALL BETWEEN TURB BLDG & NORMAL SWITCH GEAR FIRE HAZARD ANALYSIS		☒ I - NUCLEAR SAFETY RELATED ☐ II ☐ III ☐ OTHER	
APPROVALS - SIGNATURE & DATE DEPT.		REV NO OR NEW CALC NO	SUPERSEDES * CALC NO OR REV NO
PREPARER(S) / DATE(S)	REVIEWER(S) / DATE(S)	INDEPENDENT REVIEWER(S) / DATE(S)	CONFIRMATION * REQUIRED (V) YES NO
V. CARRA 1-12-85	H. MANIAR 1-12-85		
H. MANIAR 1-12-85	V. CARRA 1-12-85		
		NEW	✓

OBJECTIVE OF CALCULATION

TO RESOLVE NRC'S CONCERN ABOUT MELTING OF CABLE TRAYS
& CABLE TRAY SUPPORTS IN THE EVENT OF FIRE AND IN TURN THESE
PULLING FIRE STOP AND FIRE SEAL OUT OF PENETRATION AND
THUS AFFECTING THE FIRE RESISTANCE OF THE FIRE WALL

CALCULATION METHOD / ASSUMPTIONS

HAND CALCULATIONS

EARTHQUAKE WILL NOT OCCUR AT THE TIME OF FIRE

CABLE TRAY SUPPORTS ARE REVIEWED FOR D.L. STRESSES ONLY

D.L. STRESSES COMPARED AGAINST THE YIELD STRESS AT THE ELEVATED
TEMP OF 1100°F WHICH IS EQUAL TO 0.5FY PER USS STEEL DESIGN

MANUAL PG. 12

LIST OF DATA / EQUATIONS

1. USS STEEL DESIGN MANUAL PUBLISHED BY UNITED STATES
STEEL CORPORATION, JAN 1981.
2. SH1-159, SECTION 6.
3. UNISTRUT - GENERAL ENGINEERING CATALOG NO. 9
4. AISC STEEL DESIGN MANUAL - 7TH EDITION.

CONCLUSIONS

CABLE TRAY SUPPORTS WILL NOT FALL DOWN DUE TO DEAD LOAD
ELEVATED TEMPERATURE OF 1000°F.

DISTRIBUTION

GROUP	NAME & LOCATION	COPY SENT	GROUP	NAME & LOCATION	COPY SENT
RECORDS MGT	SEO	✓			
FILES (OF FIRE FILE IF NONE)	VAULT				
STRUCTURAL					

CALCULATION SHEET

J.O./W.O./CALCULATION NO.

11600-02/SC-017-62M

REVISION

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PREPARED/DATE

11-12-85

REVIEWER/CHECKER/DATE

1/12/85

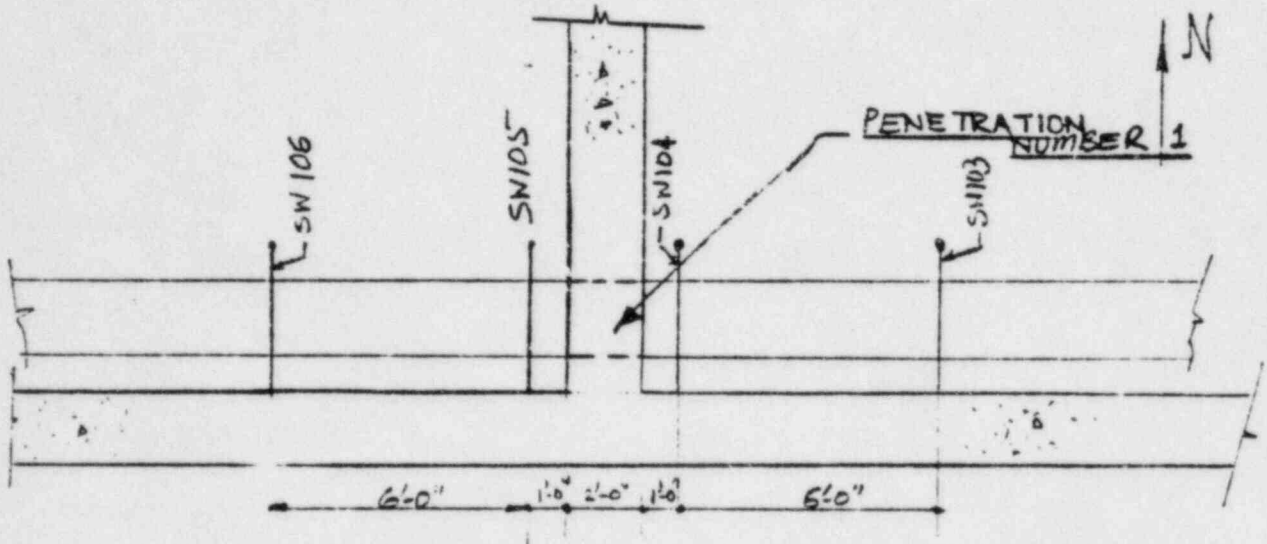
INDEPENDENT REVIEWER/DATE

SUBJECT/TITLE

FIRE HAZARD ANALYSIS OF CABLE TRAY SUPPORTS

QA CATEGORY/CODE CLASS

II/US2



CALCULATION SHEET

STONE & WEBSTER ENGINEERING CORPORATION

J.O./W.O./CALCULATION NO.

11600.02/SC-017-62M

REVISION

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PREPARED BY

V. CAPRARI

1/3/85

REVIEWER/CHECKER/DATE

B. Park / 1-3-85

INDEPENDENT REVIEWER/DATE

SUBJECT/TITLE

SCREENWELL (TRAY SUPP'S SW 104 & 105)

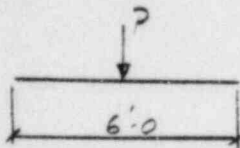
QA CATEGORY/CODE CLASS

I/NSR

MAX. STRESS FOR TRAY SUPPORTS CI. EACH SIDE
OF WALL PENETRATIONS (SW 104 & SW 105)

SW 105 WILL GOVERN SINCE IT IS HEAVIER LOADED
WITH SAME CONFIGURATION AS SW 104 SEE APPENDIX 'A'

MAX. BENDING STRESS WILL OCCUR AT 3RD HORIZ.
MEMB. (ASSUME ALL CND. & TRAY LD. @ CENTER OF S.P.A.)



$$D.L. \text{ of } 1-4" \phi \text{ CND} = 17 \frac{\text{lb}}{\text{ft}} \times 5.1 = 87 \text{ lb/ft}$$

$$24" \text{ TRAY (SEE CALC. 11600.27/E34.F9.1) } = 253.1 \text{ lb/ft}$$

$$P = \text{TOTAL D.L.} = 340 \text{ lb/ft}$$

$$M_{OM} = \frac{340 \times 6 \times 12}{4} = 6120 \text{ lb-ft}$$

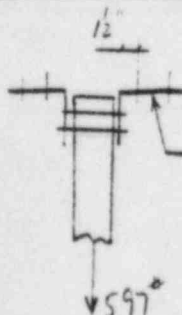
$$f_b = \frac{6120}{.512} = 10700 \text{ PSI} \quad \text{MAX. } < 0.5 \times 36000 = 18000.$$

MAX. TENSION STRESS ON VERT. LEG.:

$$\text{VERT. LD. ON LEG (SEE CALC. 11600.27/E34.F9.1) } = 597 \text{ lb/ft}$$

$$f_T = \frac{597}{1.11} = 538 \text{ PSI} < 18000.0 \text{ PSI}$$

CK. CONN. OF VERT. LEG.:



$$\text{TENSION } 1/2" \phi \text{ BOLT} = 597/4 = 150 \text{ lb}$$

$$f_T (\text{BOLT}) = \frac{150}{.196 \text{ in}^2} = 765 \text{ PSI}$$

$$\text{BEND. MOM. IN } \angle = \frac{597}{2} \times 1.5 = 450 \text{ lb-in}$$

$$f_b = \frac{450 \times 6}{3.25 \times 3.75} = 5908 \text{ PSI} < 0.5 \times 36000.0 = 18000.0 \text{ PSI}$$

CALCULATION SHEET

STONE & WEBSTER ENGINEERING CORPORATION

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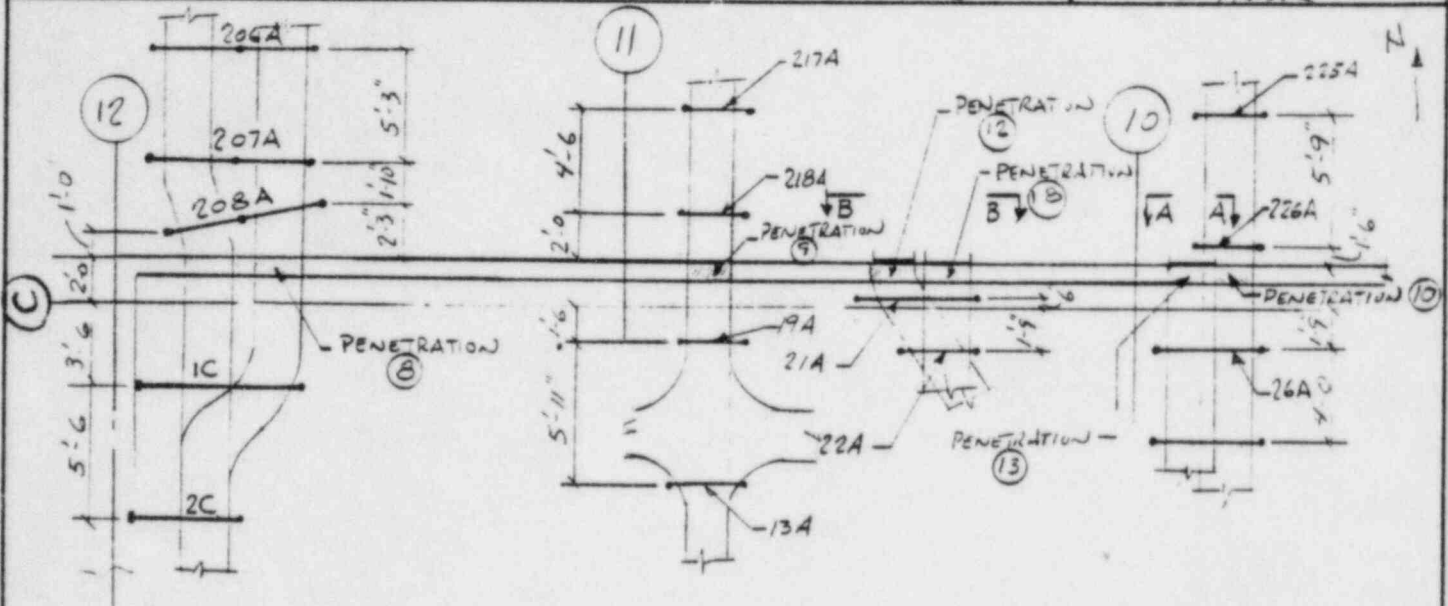
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SUBJECT/TITLE

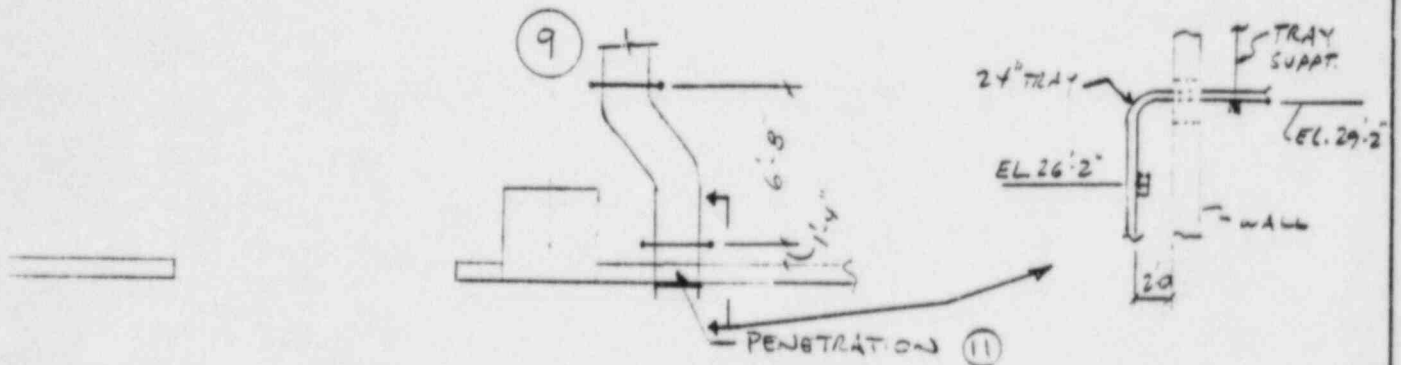
FIRE HAZARD ANALYSIS OF CABLE TRAY SUPPORTS

QA CATEGORY / CODE CLASS

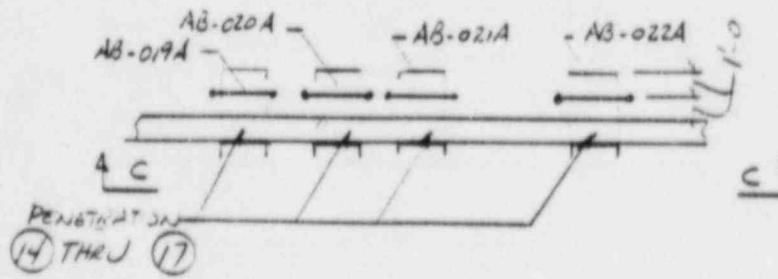
II / NSR



PLAN (NORTH WEST CORNER OF NORM. SWGR)



PLAN (SOUTH EAST CORNER OF NORM. SWGR)



PLAN (NORTH WALL OF MOTOR GEN. ROOM)

CALCULATION SHEET

STONE & WEBSTER ENGINEERING CORPORATION

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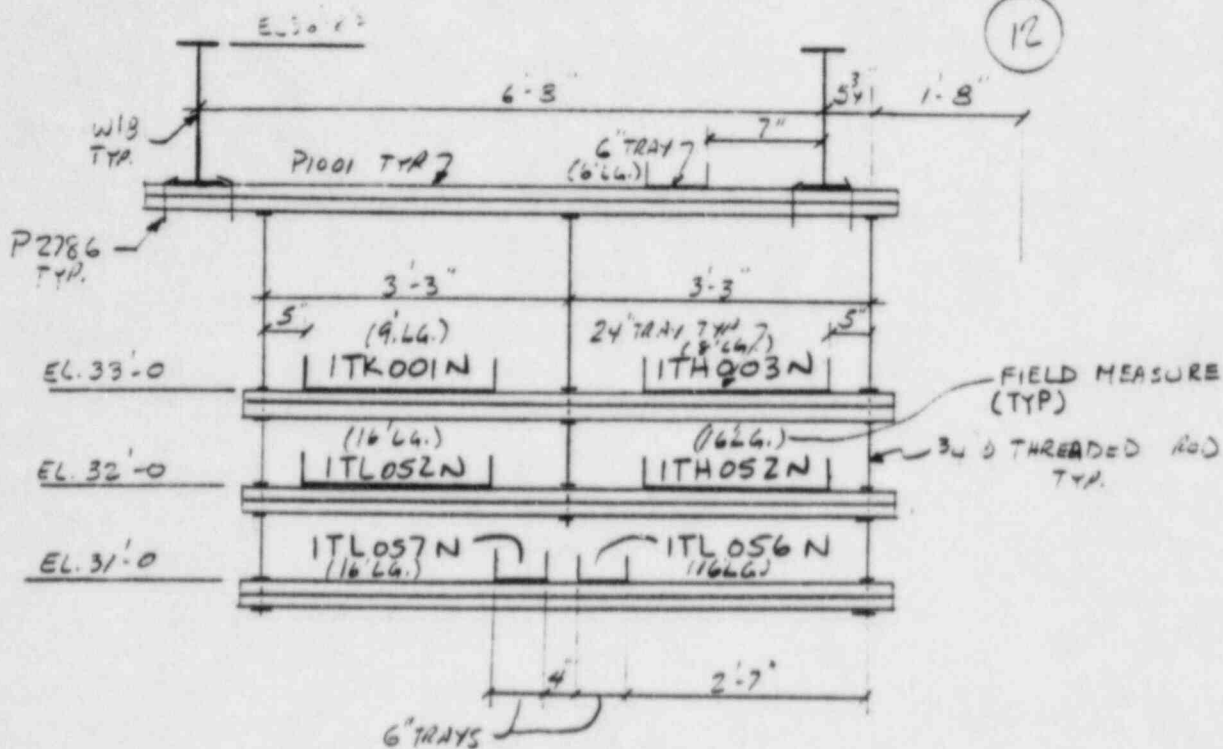
SUBJECT/TITLE

(TURBINE BLDG.)

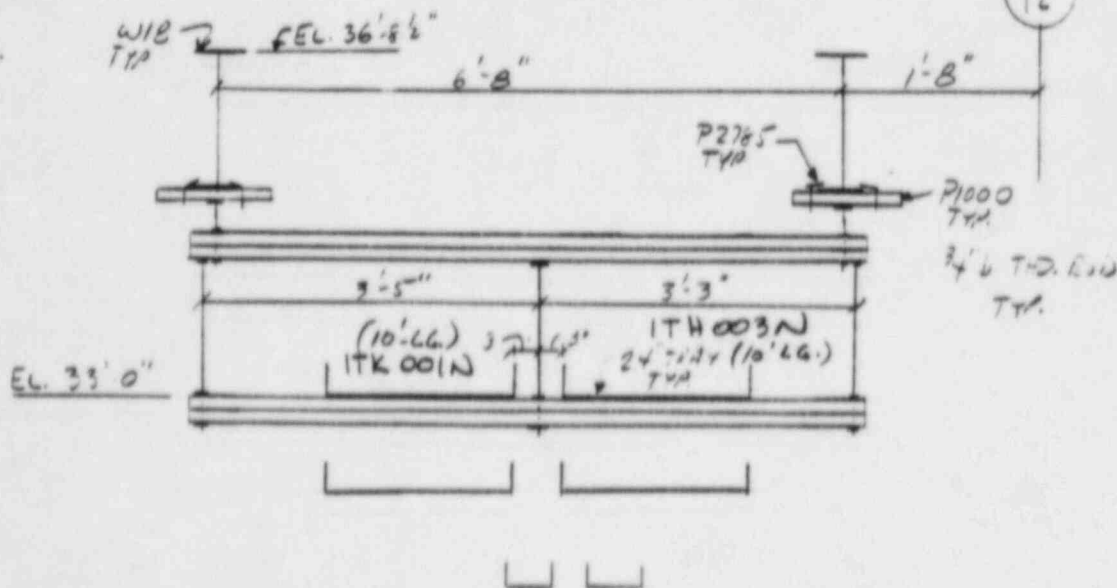
QA CATEGORY/ CODE CLASS

FIRE HAZARD ANALYSIS OF CABLE TRAY SUPPORTS

II/1982



207A (LOOKING SOUTH)
TURBINE BLDG.



208A (LOOKING SOUTH)
TURBINE BLDG.

CALCULATION SHEET

STONE & WEBSTER ENGINEERING CORPORATION

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V. CAPRA 1-10-85

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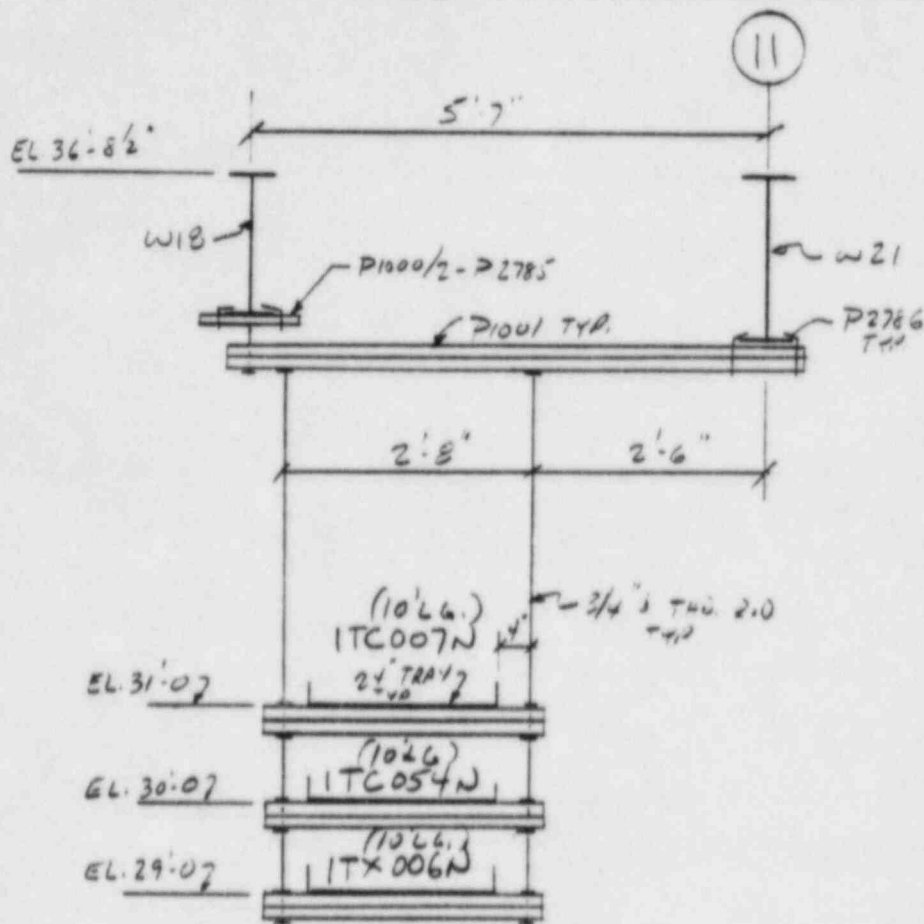
SUBJECT/TITLE

(TURBINE BLDG.)

QA CATEGORY/CODE CLASS

FIRE HAZARD ANALYSIS OF CABLE TRAY SUPPORTS

II / N.L.



218 A (LOOKING SOUTH)

TURBINE BLDG.

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J.O. / W.O. / CALCULATION NO.

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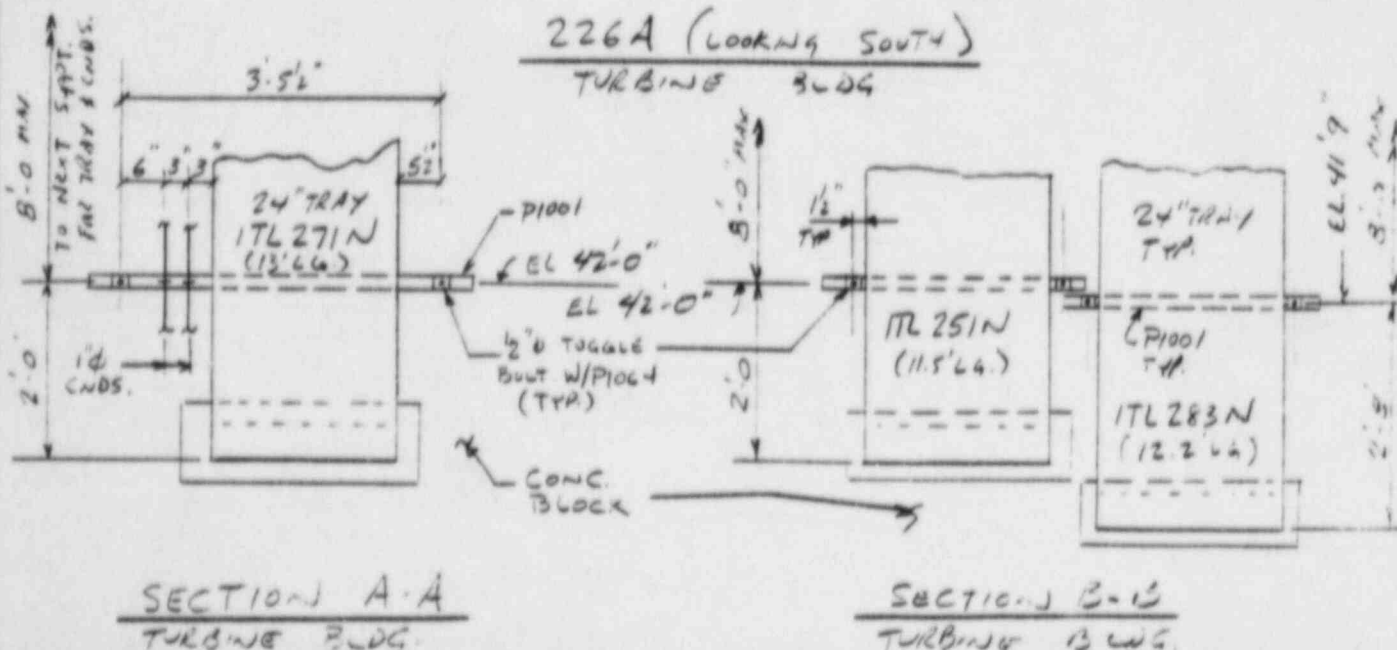
SUBJECT / TITLE

(TURBINE BLDG.)

QA CATEGORY / CODE CLASS

FIRE HAZARD ANALYSIS OF CABLE TRAY SUPPORTS

II/NSR



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SUBJECT/TITLE

FIRE HAZARD ANALYSIS OF CABLE TRAY SUPPORTS (TURBINE BLDG.)

QA CATEGORY/ CODE CLASS

II/NSR

CK. 226A

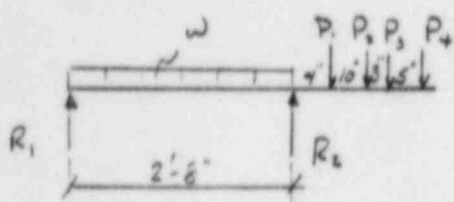
ALL TRAYS HAVE LENGTH: $11'-0''/2 = 5.5'$

D.L. OF 24" TRAY = $(40'' \times 5.5' + 35'') = 255''$

ALL CNDS. HAVE LENGTH: $6.5'/2 = 3.25'$

D.L. OF 3" ϕ CND. = $11'' \times 3.25' = 36''$
 " " 1 1/2" ϕ " = $3.5'' \times 3.25' = 12''$
 " " 1" ϕ " = $2.0'' \times 3.25' = 7''$
 " " 2" ϕ " = $5.0'' \times 3.25' = 17''$

CK. HORIZ. MEMB. C EL. 29'-0 :



$$W = 255''/32' + 3.8/12 = 8.3''$$

$$P_1 = 2 \times 36 = 72''$$

$$P_2 = 12'' = P_3$$

$$P_4 = 2 \times 36 + 3.8 \times 2 = 80''$$

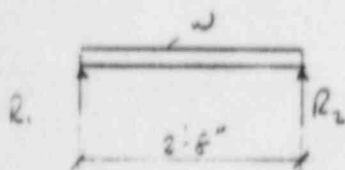
$$R_1 = \left[72'' \times 4' + 12'' \times 14' + 12'' \times 17' + 80'' \times 22' - \frac{8.3 \times 32^2}{2} \right] \div 32 = 57''$$

$$R_2 = 8.3 \times 32 + 72 + 2 \times 12 + 80 - 57 = 385''$$

$$\text{Max. Mom.} = 80 \times 22 + 12 \times 17 + 12 \times 14 + 72 \times 4 = 2420''$$

$$S_b = \frac{2420}{.572} = 4230 \text{ psi}$$

CK. HORIZ. MEMB. C EL. 32'-0 :



$$W = 255''/32 + 7''/32 + 3.8/2 = 8.5''$$

$$M_b = \frac{85 \times 32^2}{8} = 1088''$$

$$S_b = \frac{1088}{.203} = 5360 \text{ psi}$$

$$R_1 = 8.5 \times 32/2 = R_2 = 136''$$

CALCULATION SHEET

STONE & WEBSTER ENGINEERING CORPORATION

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J.O./W.O./CALCULATION NO.

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INDEPENDENT REVIEWER/DATE

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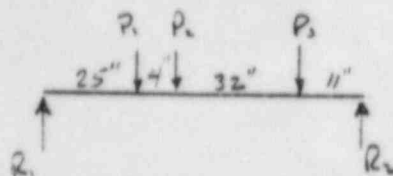
SUBJECT/TITLE

FIRE HAZARD ANALYSIS OF CABLE TRAY SUPPORTS

QA CATEGORY/CODE CLASS

II/NSR

CK. HORIZ. MEMB. & CEILING :



$$P_1 = 17^{\text{lb}}$$

$$P_2 = 57^{\text{lb}} + 136 \times 2 = 329^{\text{lb}}$$

$$P_3 = 385 + 136 \times 2 = 657^{\text{lb}}$$

$$R_1 = \frac{17 \times 47 + 329 \times 43 + 657 \times 11 + \frac{3.8 \times 6}{2}}{72}$$

$$= 320^{\text{lb}}$$

$$R_2 = 17 + 329 + 657 + 3.8 \times 6 = 1020 = 706^{\text{lb}}$$

$$M_b = 706 \times 43 - 657 \times 32 = 9334^{\text{in-lb}}, \quad f_b = \frac{9334}{.572} = 16318 < .5 \times f_y = 18000$$

CK. 3/4" ROD : MAX. LOAD @ BAR. STRUT

$$\text{TENSION / ROD} = 706^{\text{lb}}, \quad f_T = \frac{706}{.334} = 2114 \text{ psi} < .5 f_y$$

CK. BAR. STRUT : ALLOWABLE TENSION = 6000^{lb}/FT.

$$L_{eff} = 2 \times 1.625 \times 2 = 6.5^{\text{ft}}$$

$$.5 \times T_A = \frac{6.5}{12} \times 6000 \times .5 = 1625^{\text{lb}} > 760^{\text{lb}} \quad \text{OK}$$

↑ SEE ATTACHED I.D.C. TO R. WIESEL DATED 7-22-82

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STONE & WEBSTER ENGINEERING CORPORATION

J.O./W.O./CALCULATION NO.

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V. CAPRARA

REVIEWER/CHECKER/DATE

H. MARINER 1-10-85

INDEPENDENT REVIEWER/DATE

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SUBJECT/TITLE

FIRE HAZARD ANALYSIS OF CABLE TRAY SUPPORTS

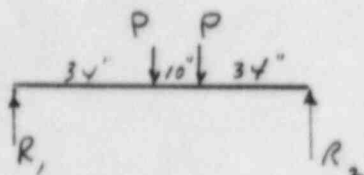
QA CATEGORY/CODE CLASS

1/N.R.

207A, 208A, 218A:

CK. 207A:

CK. HORIZ. MEMB. @ EL. 31'-0":



ET 10-2
P.D.L. OF 6 TRAY = $(20' \times \frac{16}{2} + 12.7) = 173'$

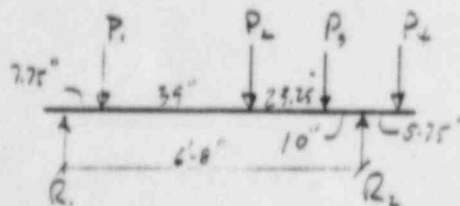
$R_1 = R_2 = \frac{2 \times 173}{2} = \frac{3.8 \times 6.5}{2} = 185'$

M₀ = $185 \times 39 - 173 \times 5 - 12.4 \times 22 = 6077$

$f_b = \frac{6077}{.572} = 10625 < .5 \times 36000$

CK. HORIZ. MEMB. @ TOP:

ET 10-2
DL. OF 24 TRAY (16' LG) = $(40 \times \frac{16}{2} + 35) = 355'$
" " " (9' LG) = $(40 \times \frac{9}{2} + 35) = 215'$
" " " (8' LG) = $(40 \times \frac{8}{2} + 35) = 195'$
" " 6" (6' LG) = $(20 \times \frac{6}{2} + 12.7) = 73'$



$P_1 = 185 + (355 + 215) \frac{22}{39} + \frac{3.25 \times 2}{2} \times 3.8 = 520'$

$P_2 = (215 + 195 + 2 \times 355) \frac{17}{39} + \frac{2 \times 4}{2} \times 3.8 = 513'$

$P_3 = 73'$

$P_4 = P_1 = 520'$

$R_1 = [520 \times 72.25 + 513 \times 33.25 + 73 \times 10 - 520 \times 5.75 + \frac{7 \times 3.8}{2}] \div 80 = 656'$

$R_2 = 520 \times 2 + 513 + 73 + 7 \times 3.8 - 656 = 997'$

M_{0ER} = $656 \times 46.75 - 520 \times 39 - \frac{46.75^2}{12 \times 2} \times 3.8 = 10042'$

$f_b = \frac{10042}{.572} = 17556 < .5 \times 36000 + 18000$

CK. P2786: RECOMMENDED LOAD = $2 \times 1000 = 2000' > 997'$ OK
UNISTRUT CATALOG "9"

ALL OTHER TRAY SUPPORTS IN TURB BLDG OK
B. COM 12-150

CALCULATION SHEET

STONE & WEBSTER ENGINEERING CORPORATION

45010.81

J.O./W.O./CALCULATION NO. 11600.02/SC-017-62M		REVISION 0	PAGE 11 OF 11
PREPARED/DATE H. MAJIAH 1-12-85	REVIEWER/CHECKER/DATE V. CAPRARA 1-12-85	INDEPENDENT REVIEWER/DATE NR	
SUBJECT/TITLE FIRE HAZARD ANALYSIS OF CABLE TRAY SUPPORT (TURBINE BLOC.)		QA CATEGORY/CODE CLASS II / NSR	

PENETRATION 13 TURBINE SIDE TRAY SUPPORT SECTION 'A-A'

$$24" \text{ TRAY LENGTH} = \frac{13.75}{2} = 6.88$$

$$D.L. \text{ OF } 24" \text{ TRAY} = (40 \times 6.88 + 35) = 310.2^{\#}$$

$$D.L. \text{ } 1" \phi \text{ CND} = 2 \times 8 = 16^{\#}$$

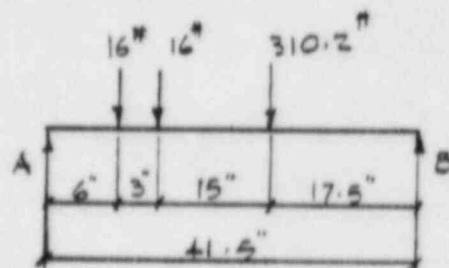
SPEC. SH-1-159 SECTION C

CHECK P1001

$$R_A = \frac{310.2 \times 17.5 + 16 \times 32.5 + 16 \times 35.5}{41.5}$$

$$+ \frac{3.8 \times 41.5}{12 \times 2}$$

$$= 163.6^{\#}$$



$$R_B = 16 + 16 + 310.2 + \frac{3.8}{12} \times 41.5 - 163.6$$

$$192^{\#}$$

$$M = 192 \times 17.5 - \frac{3.8}{12} \times \frac{17.5^2}{2} = 3312^{\#}$$

$$f_b = \frac{3312}{.572} = 5790 < .5 f_y \text{ OK}$$

SHEAR OK BY INSPECTION

CHECK TOGGLE BOLTS

$$S = 192^{\#} \quad \frac{1}{2} \phi \text{ TOGGLE BOLT, } S_A = 250^{\#} > 192^{\#} \text{ OK}$$

SUR ATTACHMENT

PENETRATION 13, TRAY SUPPORT SHOWN IN SECTION 'A-A' IS ACCEPTABLE

PENETRATION 12 & 18 TRAY SUPPORTS SECTION 'B-B' (TURBINE SIDE)

$$24" \text{ TRAY LENGTH} = \frac{11.5}{2} = 5.75'$$

$$D.L. \text{ OF TRAY} = (40 \times 5.75 + 35) = 265^{\#}$$

TRAY SUPPORTS ARE ACCEPTABLE BY COMPARISON WITH TRAY SUPPORT IN SECTION 'A-A' AT PENETRATION 13 AS LOAD IS LIGHTER & SPAN IS SMALLER

600.07 SC 017-624

A1

PREPARED / DATE

H MAUIAZ

1-12-85

REVIEWER / CHECKER / DATE

V. CAPARA

1-12-85

INDEPENDENT REVIEWER / DATE

SUBJECT / TITLE

FIRE HAZARD ANALYSIS OF CABLE TRAYS

QA CATEGORY / CODE CLASS

I

ATTACHMENT A'

- | | | PAGES |
|----|----------------------------------|-------|
| 1. | ALLOWABLE STRESSES IN EMB. STRUT | A2 |
| 2. | ALLOWABLE LOAD ON TOGGLE BOLT | A3~A4 |
| 3. | SUPPORT SW-104 | A5 |
| 4. | SUPPORT SW-105 | A6 |

P. 92

INTEROFFICE CORRESPONDENCE

TO	P. Euser	LOCATION		SUBJECT / REFERENCE / J.O. NO.
FROM	AYC WONG	LOCATION	245/6	Allowable for unstitch P3700 and powerstitch PT50N series

MESSAGE: —

max allowable tension = 6000 #/FT = T_A

max allowable shear = 2500 #/FT = S_A

Interaction formula $\frac{T}{T_A} + \frac{S}{S_A} \leq 1.0$

The above allowable are based on manufacturer test data

7/22/82

DATE

Albert YC Wong

SIGNATURE

X-2665

TELEPHONE

REPLY

DATE

TABLE G-1

COMPARISON OF EXPANSION ANCHOR TENSION VALUES

Type of Anchor	Recommended Tension Values		Min Tension Values	
	Useful Load (New Construction) (lb) (1)	Useful Design Load-New Construction (lb) *	Ultimate Load (lb) (2, 2)	Design Value (lb)
1/4" Sleeve (H)	600/600	180	1,200	300
5/16" Sleeve (H)	725/725 (3)	215	1,329	332
3/8" Sleeve (H)	900/900	240	1,666	416
1/2" Sleeve (H)	1,500/1,500	450	2,431	607
1/4" Sleeve (P)	600/600	180	1,256	314
5/16" Sleeve (P)	725/725	215	1,460	365
3/8" Sleeve (P)	900/900	240	2,328	582
1/2" Sleeve (P)	1,500/1,500	450	3,540	885
1/8" "Pronto" (P)	1,000/500	300/150	2,237/ 1,701	559/425
1/4" Toggle (R)	Not Recommended		650	162
3/8" Toggle (R)	Not Recommended		1,000	250
(H) Hilti	(P) Phillips			100 #
				(R) Rawl

Allow.

Tension

Sheet

(1) Solid block/hollow block - where one value appears no differentiation made

(2) Adjusted for C-90 minimum block properties

(3) From Ref. 3 using ratio of 2.0 "low" useful/ultimate based on anchor pull failures

NA - Nonapplicable

* Recommended design values for DBE seismic loads may be obtained by increasing design values by 1.67

Recommended size and type anchor for most applications

TOGGLE BOLTS

STEVE GETZ OF ITT PHILLIPS IN PHONE CALL
REFERS TO FEDERAL SPEC. FF-B-588 C WHICH
GIVES PROOF LOADS FOR TOGGLE BOLTS
TYPE I CLASS A (WINGS MADE OF SHEET METAL)

<u>BOLT DIA.</u>	<u>PROOF LOAD</u>	<u>FOR DIRECT TENSION</u>
.138 "	175	
.190	350	
.25	600	150# (= PROOF/4)
.3125	900	
.375	1100	
.5	1500	

→ THESE LOADS SHOULD BE DIVIDED BY 4 TO OBTAIN
SAFE WORKING LOADS IN TENSION

(1971) PAUL MCHALE HAS BEEN ASKED BY NINE MILE 2
PROJECT ABOUT THE CAPACITY OF THESE TOGGLE BOLTS
HE HAD ASSUMED THAT THEY WERE BEING INSTALLED
IN CONCRETE BLOCK WALLS AND WOULD BE SUBJECT
TO A VERTICAL SHEARING FORCE.
THE CONCRETE BLOCK WOULD BE THE WEAKEST
COMPONENT. YOU WILL NOTE THAT THE BOLTS
ARE INSTALLED IN OVERSIZE HOLES (.7" DIA.
FOR 3/8" BOLT). HE ASSUMED ALLOW. BEARING
OF .25 F_c F_c FOR BLOCK = 1000 psi

→ IF SHELL THICKNESS OF BLOCK IS 2"
FOR 1/4" DIA. BOLT, $.25 \times 1000 \times 1/4 \times 2$
= 125#

THIS WOULD BE THE ALLOWABLE LOAD
IN SHEAR

↑
ASSUME BOLT SIZES INTO BEARING

PAGE

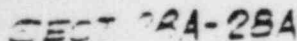
~~8.2~~ 4

INDEPENDENT REVIEWER / DATE

2A CATEGORY / CODE CLASS

CAF. 1 / NSB

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10-2-1999

Mackilman 6/15/62

REVIEWER/CHECKER/DATE
N. MENON 18/5/82

INDEPENDENT REVIEWER/DATE

SUBJECT / TITLE	DATE	TIME	LOCATION	STATUS
...	...	...	...	...

GREENWELL DETOR. SW-1
CABLE TRAY SUPPORT SW105

QA CATEGORY / CODE CLASS
CAT. 1 / N.S.R.

ATTACHMENT 'A'

