CP&L

Carolina Power & Light Company

OCT 09 1992

SERIAL: NLS-92-260

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

BRUNSWICK STEAM ELECTRIC PLANT, UNIT NOS. 1 AND 2
DOCKET NOS. 50-325 & 50-324/LICENSE NOS. DPR-71 & DPR-62
SHORT-TERM STRUCTURAL INTEGRITY ITEMS

Gentlemen:

The purpose of this letter is to provide, at the request of the NRC staff, the status of four short-term structural items that were discussed in Carolina Power & Light Company's July 16, 1992 letter (Serial No. NLS-92-136) concerning masonry block walls. These four items, which were discussed in the response to NRC Question III.A, are (1) air tubing supports, (2) RWCU supports, (3) fuel oil small bore piping supports, and (4) main steam line radiation monitor supports.

As discussed with the NRC staff during a telephone conference call on September 10, 1992, item 1 and item 2 above have been modified to restore them to their design configuration (i.e., long-term qualified). Enclosure 1 provides third-party review of the justification of short-term qualification of item 3 above. Enclosure 2 provides third-party review of the justification of short-term qualification of item 4 above.

Please refer any questions regarding this submittal to Mr. M. R. Oates at (919) 546-6063.

Yours very truly,

D. C. McCarthy
Manager
Nuclear Licensing Section

WRM/wrm (atsil1.wpf)

Enclosures

cc: Mr. S. D. Ebneter
Mr. R. H. Lo
Mr. R. L. Prevatte

A40070

411 Fayetteville Street • P. O. Box 1551 • Raleigh, N. C. 27602

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ENCLOSURE 1

BRUNSWICK STEAM ELECTRIC PLANT, UNITS 1 AND 2
NRC DOCKET NOS. 50-325 & 50-324
OPERATING LICENSE NOS. DPR-71 & DPR-62
SHORT TERM STRUCTURAL INTEGRITY ITEMS

JUSTIFICATION OF SHORT TERM QUALIFICATION OF THE FUEL OIL SUPPORTS

STSI ITEM REVIEW
SUMMARY REPORT
MAY 27, 1992

Scope of Work:

The workscope for this report is the review of STSI Item #169, the Fuel Oil diesel piping on stress iso 109. This problem was raised due to the following concerns:

1. The acceptability of attaching the pipe and supports to non-Q platform steel, and

2. The acceptability of attaching the platform to blockwalls.

Applicable Documents

This review covered the following items:

1. Stress Analysis Calculation No. SA-FOD-109A, Revision 0.

2. Stress Analysis Calculation No. SA-FOD-109B, Revision 0.

3. Pipe Support Calculation No. PS-FOD-B109, Revision 0.

4. Miscellaneous Steel Calculation No. ODGB-0002, Revision 0

5. Mechanical Design Guide MDG-2, Revision 2.

6. Engineering Evaluation Report No. 91-0246, Revision 1.

7. Specification No. BSE 005-011, "Seismic Design Criteria", Rev. 2.

Field Conditions

The pipe routing, its attachment to the platform, and the platforms attachment to the building structure were evaluated in the field. With the exception of one handrail to platform connection in Tank Bay #4 that was not welded, the field condition for the four fuel tank bay piping runs were found to be as analyzed. The non-welded connection was judged to have minimal impact on the analysis as a review of the calculations showed this to be a low stress area. The masonry wall attachments for bays 2 & 3 were found to utilize thru-bolts as analyzed in the calculations. All other aspects of the piping and platform were reflected in the calculations.

Anchorage and Support Assumptions

The modeling techniques utilized in the calculation were judged to accurately reflect the field conditions.

Loading Conditions

The calculations used correct loading conditions for member weights and all seismic loading conditions.

Modeling Assumptions

The assumptions made in the calculations adequately address the field conditions.

Design Input

The calculations utilized field-verified drawings to develop computer models. In addition, the pipe stress calculations follow the guidelines as described in Mechanical Designs Guide DG-2.

Material Strength Assumptions

The assumptions used in the calculations correctly account for member and bolt strength values.

Summary and conclusions:

The conclusion of this review is that the short term and long term operability concerns have been adequately addressed and answered. The field conditions were analyzed and found to be acceptable for all operability requirements.

Attached are three (3) pages of review notes.

Prepared by: _____ Date 5-27-92

EXECUTIVE SUMMARY

DATE: 6/17/92 TO: FROM: ACTION REQUIRED: For Your Information ✓ Response Required To Be Approved DATE REQUIRED: / / to	DATE: / / TO: FROM: ACTION REQUIRED: For Your Information Response Required To Be Approved DATE REQUIRED: / / to	DATE: / / TO: FROM: ACTION REQUIRED: For Your Information Response Required To Be Approved DATE REQUIRED: / / to

SUBJECT: TRIP REPORT; EQE STSI SUMMARY REPORT FOR ITEM #176

BACKGROUND/SITUATION

OF CP&L MET WITH
OF EQE. THE SUBJECT OF THE MEETING WAS EQE'S MAY 29,1992 SUMMARY REPORT FOR STSI ITEM REVIEW OF THE MSLRM DETECTOR WELL ASSEMBLY. DWL PRESENTED THE ATTACHED SET OF RESPONSES TO EQE COMMENTS.

THE BASIC THRUST OF EQE'S SUMMARY REPORT COMMENTS WERE THAT THE MISMATCHED, LOOSE BOLT CONDITIONS FOUND IN THE FIELD DID NOT MATCH THE "ASSUMPTIONS" FOUND IN CP&L STSI CALC OMS-0004.

DWL'S BASIC RESPONSE WAS THAT OMS-0004 WAS WRITTEN IN RESPONSE TO BSEP'S REQUEST FOR THE BOLT TYPE AND TORQUE REQUIREMENTS TO PROVIDE SHORT TERM STRUCTURAL INTEGRITY OF THE RAD MONITORS. THUS, THE BOLTING CONDITIONS WERE NOT ASSUMED, THEY WERE SPECIFIED.

CONCLUSIONS

AFTER FURTHER DISCUSSION, SEVERAL KEY POINTS WERE MADE:

1. EQE'S UNDERSTANDING OF THEIR JOB SCOPE WAS TO INSPECT EXISTING FIELD CONDITIONS FOR AGREEMENT WITH STSI CALCULATIONS. IT WAS NOT EQE'S UNDERSTANDING THAT THEY SHOULD BE LOOKING FOR A ROOT CAUSE OF A PROBLEM.

2. THE BSEP BLUE MEMO WAS QUESTIONED AS THE BEST METHOD FOR REQUESTING AND RESPONDING TO FIELD INSTALLATION CHANGES.

3. A REVIEW OF THE BSEP TROUBLE TICKETS SHOWED THAT THE RAD MONITOR INSTALLATION HAD BEEN CLOSED OUT.

4. AFTER DETERMINING THAT THE TROUBLE TICKET HAD BEEN CLOSED OUT, EQE REINSPECTED THE RAD MONITORS AND DETERMINED THAT THE BOLTS DID IF FACT HAVE B7 MARKINGS AND THAT THE BOLTS MAY BE TIGHT EVEN THOUGH THEY APPEAR TO BE LOOSE (BECAUSE A SLEEVE MAY EXIST BETWEEN THE BOLT HEAD AND THE WASHER). EQE SUGGESTS THAT FURTHER INVESTIGATION IS NEEDED.

RECOMMENDATIONS/JUSTIFICATION

RESPONSE TO STSI ITEM REVIEW
SUMMARY REPORT
MAY 29,1992

Introduction:

This document provides a response to the comments made by EQE concerning STSI Item #176, seismic evaluation of MSIV Radiation Monitors. The STSI evaluation is provided in CP&L Calc OMS-0004.

Comment:
"Based on field inspection, the STSI caculation does not represent the existing field conditions. The caculation was performed assuming A193 Gr.B7 bolts. The actual bolt material currently in the field is not known. The calculation models the bolts as being tight, although the actual configuration found in Unit 2 includes loose or bottomed-out bolts. The loose bolts could cause excessive deflaction of the detector well, and the bolts will be subjected to potential non-linear impact loads."

Response:
The STSI evaluation found in calculation OMS-004 is a response to BSEP Site Memorandum BPN-042886. A copy of the memorandum is included in the calculation as attachment A. The memorandum identifies that several different types of bolts have been used to anchor the radiation monitors. It requests that NED specify the required bolt material. In response to the memo, NED specified A193 Gr.B7 bolts. The response also specified that flat washers should be used to prevent botoming out of the bolts. The bolt material and tight fit conditions found in OMS-004 are not assumptions; they represent the conditions required by the NED response.

Comment:
"The effective throat of the weld at the top flange was modeled as .12 inches on page 3 of the EZHANG input file. The actual effective throat should be .707 X .125 inches = .088 inches. This will increase the stress on the weld considerably. This increase could possibly be offset by increased allowable weld stress (see Material Strength Assumptions)."

Response:
The STSI evaluation is based on STSI criteria found in CP&L Structural Design Guide SDG-7. This design guide is referenced in the OMS-004 calculation. Page 17 of SDG-7 specifies that STSI weld joint limits are controlled by the base metal. In this case the base metal thickness, SCH 10 pipe, is 0.12". STSI allowable shear stress in the base metal is 0.625xFy.

Comment:
"The calculation does not adequately reference the STSI bending stress allowable used. The calculation states that STSI allowable are not required for pipe bending because the pipe meets normal DBE allowable."

Response:
Page 6 of OMS-004 does present the STSI bending stress allowable. CP&L SDG7 is specifically referenced, and a calculation is presented which shows that the allowable STSI bending stress is 57847 psi. The intent of the note on page 6 is to indicate that although the STSI allowable was calculated, it is not needed because the bending stresses generated by the computer model fall below normal DBE allowable stress limits. Bending stress in the pipe is not a significant STSI issue.

Comment:
"The top flange is modeled as if it were in close contact with the concrete underside of the shield plugs. The model shows restraint points in the +Y direction at nodes 36 and 37. The actual configuration in the field has a slight gap between the flange and the concrete."

Response:
The fundamental frequency of the radiation monitor ,as modelled, is 3.45 Hz. This matches the peakg frequency of the horizontal floor response spectra. Without the vertical restraints at nodes 36 and 37, the frequency of the fundamental mode can only go down and therefore reduce the seismic inertia load. The vertical restraints are included on only one side of the flange model; the other side of the flange is free to deflect. The vertical restraints are included in the model to account for the possibility of the flange tipping and bearing against the underside of the shield plug in any of the radiation dectector locations.

ENCLOSURE 2

BRUNSWICK STEAM ELECTRIC PLANT, UNITS 1 AND 2
NRC DOCKET NOS. 50-325 & 50-324
OPERATING LICENSE NOS. DPR-71 & DPR-62
SHORT TERM STRUCTURAL INTEGRITY ITEMS

JUSTIFICATION OF SHORT TERM QUALIFICATION OF MAIN STEAM LINE RADIATION MONITOR SUPPORTS

STSI ITEM REVIEW
SUMMARY REPORT
MAY 29, 1992

Scope of Work

The scope of work for th report is the review of STSI Item #176, which applies to the MSLRM Detector Well assembly. There are four main steam line (MSL) radiation monitor detector wells in each unit bolted to the underside of the two MSIV pit shield plugs located on the 50' elevation, reactor building. Bolts were observed to be loose, and the bolting material was observed to be of several different types.

Applicable Documents

The following documents were reviewed:

- EER No. 91-0466, Revision 0
- WR/JO 91-AKMA2 (11-20-91)
- WR/JO 91-AKMA1 (6-7-91)
- WR/JO 91-AKMA1 (6-6-91)
- BPN 042886 (11-13-91)
- Calculation OMS-0004, Revision 0, 12-12-91
- OPN 037271, 11-20-91
- GE Seismic Qualification Report No. 994-79-015
- Drawing 9527-F-1247, Revision 2
- Drawing 9527-F-12047, Revision 3
- Drawing 9527-LL-7044, Sheet 181, Revision 2
- EWR 07813, closed out 7-2-91

Field Conditions

The four assembled MSLRM detector well assembles in Unit 2 were visually inspected on 5-14-92. The attached field sketch notes the conditions observed. From this review it is apparent that the loose bolts identified in the reference WR/JO's have not been tightened or replaced. Existing bolts are either loose or bottomed out in the holes. There is a visible gap between the bolt head/washer and the surface of the top flange on all four bolts on the N-E well assembly. The other assemblies were not as accessible, however, the bolts for these also appear to be loose or bottomed out. It was not possible to read the markings on the bolt heads to determine the bolt material.

EQE

Anchorage and Support Conditions

The detector well assembly consists of a 4" diameter pipe which cantilevers approximately 16' from the underside of the 50' elevation MSIV shield plugs. There are no intermediate supports on this assembly. The top flange is welded to a 4" diameter schedule 10S pipe embedded in the shield plug.

Loading Conditions

From a review of calculation OMS-0004, the only loading conditions are dead load plus seismic. A 2D analysis was performed. The vertical and horizontal load cases were absolutely summed, and added to the dead load case.

DBE floor spectra using 7% damping was applied for the seismic loading.

Use of 2D analysis and 7% damping is judged to be acceptable for an STSI evaluation of this structure.

Modeling Assumptions

The detector well assembly was analyzed using a finite element model run on the EZHANG program.

The finite element model does not agree with the existing field conditions in the following areas:

- The bolts are modeled as rigid elements indicating they are in a tightened condition. As noted under "Field Conditions", the existing bolts are loose.

- The top flange is modeled as if it were in close contact with the concrete underside of the shield plugs. The model shows restraint points in the +Y direction at nodes 36 and 37. The actual configuration in the field has a slight gap between the flange and the concrete.

- The length of element 30 should be greater than 1/2" to include the width of the gap.

A review of the calculation also resulted in the following observations:

- The modeling of the flange stops at the centerline of the bolts. The entire flange should be modeled, including the section outside the bolts. The flange thickness of 3/8" is not necessarily thick enough to allow rigid plate behavior, and the potential exists that prying action could increase the bolt loads. The full width of the flange should be modeled.

- The effective throat of the weld at the top flange was modeled as .12 inches on page 3 of the EZHANG input file. The actual effective throat should be .707 X .125 inches = .088 inches. This will increase the stress on the weld considerably. This increase could possibly be offset by increased allowable weld stress (see Material Strength Assumptions).

- The weld of the 3/8" S.S. flange to the pipe is not specified in the model.

- The EZHANG output file in attachment C is not signed off as checked.

Design Input

The calculation states that it is based on an assumed worst case condition for Unit 1, which has not been physically verified (page 1 of 10).

Page 1 states that the Unit 2 configuration was inspected. There is no reference or input document which this information can be traced to.

All design input other than the physical conditions appears to be adequate.

Material Strength Assumptions

ASTM A106 Gr.B material was assumed for the pipe and a conservative Fy was used. A conservative Fy of 30,000 psi was assumed for the stainless steel flange. These assumptions are acceptable.

The calculation does not adequately reference the STSI bending stress allowables used. The calculation states that STSI allowables are not required for pipe bending because the pipe meets normal DBE allowables.

The allowable weld stress from the EZHANG output appears to be conservative. A value of 18,750 psi was used. This could be increased based on STSI allowables.

The STSI analysis was performed using ASTM A193 Gr.B7 bolt material. This is a high tensile strength material with Fy = 105,000 psi. The calculation does not include a reference or source document showing that this bolting material was installed.

Summary and Conclusions

Based on field inspection, the STSI calculation does not represent the existing field conditions. The calculation was performed assuming A193 Gr.B7 bolts. The actual bolt material currently in the field is not known. The calculation models the bolts as being tight, although the actual configuration found in Unit 2 includes loose or bottomed-out bolts. The loose bolts could cause excessive deflection of the detector well, and the bolts will be subjected to potential non-linear impact loads.

EQE

The actual conditions for Unit 1 were not inspected by CP&L for input into the calculation, and the calculation assumes a worst case. This assumption may not be valid.

Other modeling changes are recommended, including increasing the flange model to include the full flange width, account for the actual gap between the top of the flange and the concrete, revise the effective throat of the top flange weld, and include the weld of the flange to the lower pipe.

5.2.4-9a

BRUNSWICK STEAM ELECTRIC PLANT

SITE MEMORANDUM

BCDO-2 79/71

TO: _____ DEPT. NEO

SUBJECT: UNIT REPLACEMENT ON THE MAIN STEAM LINE RADIATION MONITORING DETECTOR WELLS.

BAN - 042886
PM NO. N/A
PID/PCN N/A
FILE 7005
DATE 11-13-91

THIS MEMO IS TO REQUEST A DETERMINATION FROM NEO AS TO THE WASHER AND BOLT MATERIAL THAT SHOULD BE USED TO ATTACH THE MAIN STEAM LINE RADIATION MONITOR DETECTOR WELLS TO THE BOTTOM OF THE MSIV PIT PLATES. UPON REMOVAL IT WAS DETERMINED THAT SEVERAL DIFFERENT TYPES OF BOLTS AND WASHERS HAD BEEN PREVIOUSLY INSTALLED. PLANT DRAWINGS DO

DISTRIBUTION

A SEP FILE

BY:

SIGNED: 11/13/91

*RELEASING AUTHORITY: _____ DATE: 11/13/91

RESPONSE: BOLT, HX, 1/2-13 x LTH, A193, GR B7
WASHER, LK, 1/2
WASHER, FL, 1/2*
LTH = LENGTH REQ'D TO FULLY ENGAGE THREADS IN 1/2" SS FLANGE
* = USE FLAT WASHER, AS NEEDED, TO PREVENT BOTTOMING OUT OF BOLT
TORQUE TO 62-70 FT-LB
(REF. CALC ID OMS-0004)

DISTRIBUTION

DDC-850

BY:

SIGNED: _____

* RELEASING AUTHORITY: _____ DATE: 11/21/91

* PLEASE PRINT NAMES OVER SIGNATURES IF THEY ARE NOT LEGIBLE.

MEMORANDUM CONTINUATION SHEET

SITE MEMO NO. BAW - #42886

SHEET 2 OF 2

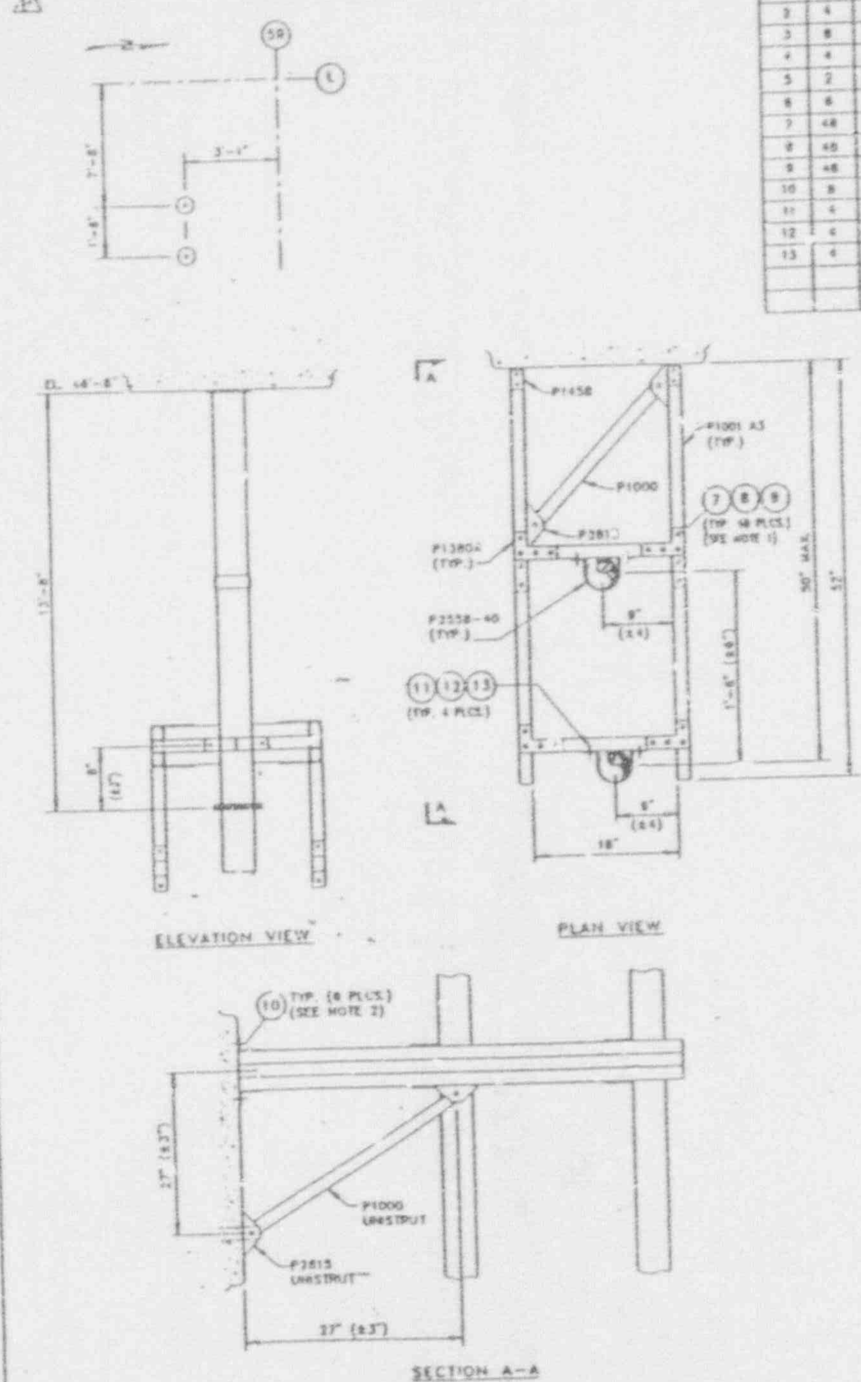
NOT SHOW THESE BOLTS.

STORES HAS G-LIST A307 STRUCTURAL STEEL BOLTS IN STOCK IF THEY ARE SUITABLE FOR THIS APPLICATION. SIS SHOWS THESE BOLTS UNDER SEVERAL CPM PART #'S INCLUDING 736-259-99 AND 737-084-71. THESE BOLTS ARE NEEDED FOR RE-INSTALLATION OF THE MAIN STEAM LINE RADIATION MONITORS AND SHOULD BE TREATED AS A UNIT 2 START-UP ITEM.

FUNDING VIA NRC BUDGETED GENERAL ENGINEERING ASSISTANCE REQUEST (GEAR)

NECO RESPONSE BY 11-15-91.

ITEM	QTY	PART NO.	DESCRIPTION	Q CLASS	SPEC	PROCURED BY
1	3	———	UNISTRUT, P1000 CHANNEL	Q	CQ-1004-A	SPC/PEG
2	4	———	UNISTRUT, P1000-A3 CHANNEL	Q	CQ-1004-W	SPC/PEG
3	8	———	UNISTRUT, P1380A FLAT PLATE	Q	CQ-1004-V	SPC/PEG
4	4	———	UNISTRUT, P1458 63 DEGREE ANGLE	Q	CQ-1004-B	SPC/PEG
5	2	———	UNISTRUT, P2558-40 4" DIA. PIPE STRAP	Q	CQ-1004-G	SPC/PEG
6	6	———	UNISTRUT, P2815 ADJUSTABLE BRACE	Q	CQ-1004-AA	SPC/PEG
7	48	———	UNISTRUT, 1/2" X 1 1/2" HEX HEAD CAP SCREW, HHC5050150EG	Q	CQ-1004-G	SPC/PEG
8	48	———	UNISTRUT, 1/2" FLAT WASHER, HFLW050EG	Q	CQ-1004-F	SPC/PEG
9	48	———	UNISTRUT, 1/2" LOCK WASHER, HLKW050EG	Q	CQ-1004-AJ	SPC/PEG
10	8	———	HILTI, STANDARD KWIK BOLT, 1/2" X 3 1/2"	Q	CQ-1001-D	SPC/PEG
11	4	———	UNISTRUT, 3/8" X 1 1/2" HEX HEAD CAP SCREW, HHC5037150EG	Q	CQ-1004-C	SPC/PEG
12	4	———	UNISTRUT, 3/8" FLAT WASHER, HFLW037EG	Q	CQ-1004-F	SPC/PEG
13	4	———	UNISTRUT, 3/8" LOCK WASHER, HLKW037EG	L	CQ-1004-AJ	SPC/PEG



NOTES:

1. TORQUE UNISTRUT SCREW TO 50 FT-LBS.
2. TORQUE HILTI KWIK BOLT TO 50 FT-LBS. THE HILTI KWIK BOLT INCLUDES THE STUD, WEDGE, NUT, AND WASHER.
3. INSTALL PER SPEC. 248-107

Plant Mod. No. 91-011

Field Rev. No. B3

Page No. N/A

SUPPORT NO. FS-1725

CALC. NO. 0VISV-0002

REV	DATE	DESCRIPTION
B		REV TO INCORP PLANT COMMENTS
A		FIRST ISSUE PER PM 91-011

PROFESSIONAL ENGINEER

QUALITY LEVEL: SAFETY RELATED, SEISMIC

CAROLINA POWER & LIGHT COMPANY
NUCLEAR ENGINEERING DEPARTMENT

CP&L

PLANT: BRUNSWICK STEAM ELECTRIC PLANT

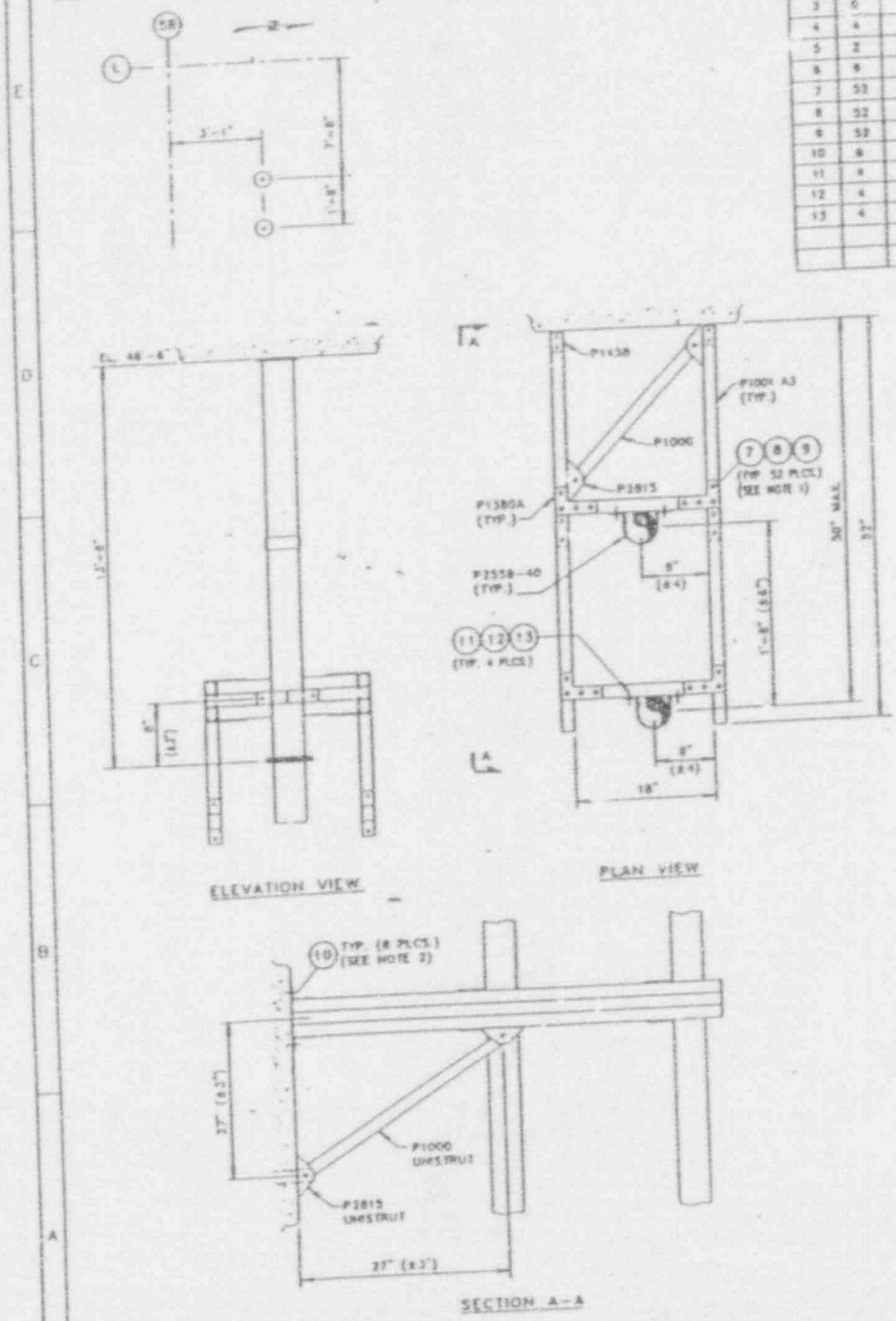
SCALE: NONE

TITLE: UNIT 1, REACTOR BUILDING
MSIV RADIATION MONITOR SUPPORTS

PLANT DWG NO. C-84093 — SH 1 OF 1

MOD SKETCH NO. SK-21011-C-1233 — SH 1 OF 1

ITEM	QTY	PART NO.	DESCRIPTION	Q CLASS	SPEC	PROCURED BY
1	3	———	UNISTRUT, P1000 CHANNEL	0	CQ-1004-A	SPC/PEG
2	4	———	UNISTRUT, P1000-A3 CHANNEL	0	CQ-1004-W	SPC/PEG
3	6	———	UNISTRUT, P1380A FLAT PLATE	0	CQ-1004-V	SPC/PEG
4	4	———	UNISTRUT, P1458 90 DEGREE ANGLE	0	CQ-1004-W	SPC/PEG
5	2	———	UNISTRUT, P2558-40 4" DIA. PIPE STRAP	0	CQ-1004-O	SPC/PEG
6	8	———	UNISTRUT, P2815 ADJUSTABLE BRACE	0	CQ-1004-AA	SPC/PEG
7	52	———	UNISTRUT, 1/2" X 1 1/2" HEX HEAD CAP SCREW, HHCS050150EG	0	CQ-1007-E	SPC/PEG
8	52	———	UNISTRUT, 1/2" FLAT WASHER, HFLW050EG	0	CQ-1004-P	SPC/PEG
9	52	———	UNISTRUT, 1/2" LOCK WASHER, HLKW050EG	0	CQ-1504-AJ	SPC/PEG
10	8	———	HILTI, STANDARD KWIK BOLT, 1/2" X 5 1/2"	0	CQ-1001-O	SPC/PEG
11	4	———	UNISTRUT, 3/8" X 1 1/2" HEX HEAD CAP SCREW, HHCS037150EG	0	CQ-1004-O	SPC/PEG
12	4	———	UNISTRUT, 3/8" FLAT WASHER, HFLW037EG	0	CQ-1004-P	SPC/PEG
13	4	———	UNISTRUT, 3/8" LOCK WASHER, HLKW037EG	0	CQ-1004-AJ	SPC/PEG



NOTES:

1. TORQUE UNISTRUT SCREW TO 50 FT-LBS.
2. TORQUE HILTI KWIK BOLT TO 50 FT-LBS. THE HILTI KWIK BOLT INCLUDES THE STUD, WEDGE, NUT, AND WASHER.
3. INSTALL PER SPEC. 248-107.

Plant Mod. No. 91-011

Field Rev. No. 83

Page No. N/A

REV	DATE	DESCRIPTION
B		REVISED TO INCORPORATE PLANT COMMENTS [illegible]
A		FIRST ISSUE PER PM 91-011

PROFESSIONAL ENGINEER

QUALITY LEVEL: SAFETY RELATED, SEISMIC

CAROLINA POWER & LIGHT COMPANY
NUCLEAR ENGINEERING DEPARTMENT

CP&L

SCALE NONE

PLANT BRUNSWICK STEAM ELECTRIC PLANT

TITLE UNIT 1, REACTOR BUILDING
MSIV RADIATION MONITOR SUPPORTS

SUPPORT NO. FS-7726
CALC NO. 0MSV-0002

PLANT DWG NO. C-84098 — REV LATER — SHT 1 OF 1

MOD SKETCH NO. SK-91011-C-1866 — SHT 1 OF 1