Conrad McC
RAPP

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION V

1450 MARIA LANE
WALNUT CREEK, CALIFORNIA 94596-5368

APR 16 1992

MEMORANDUM FOR: Frank J. Miraglia, Deputy Director
Office of Nuclear Reactor Regulation

FROM: R. P. Zimmerman, Director
Division of Reactor Safety and Projects

SUBJECT: WASHINGTON NUCLEAR PROJECT, UNIT 2 -
FIRE PROTECTION PROGRAM CONCERNS

In our memorandum of January 28, 1992 we stated our intentions to conduct an inspection at WNP-2 to address the fire protection program related concerns identified by Messrs. Loren Plisco and Steven West. The inspection, initially planned for May 4-8, 1992, has been rescheduled for the week of July 27, 1992 due to the availability of the inspector. This change has been coordinated with your staff. If you have any comments about our proposed course of actions, please contact Paul Narbut (FTS 448-0313) or Bill Wagner (FTS 448-0316) of my staff.

R. P. Zimmerman, Director
Division of Reactor Safety and Projects

cc:
B. Boger, NRR
P. Eng, NRR
B. Grimes, NRR
L. Plisco, NRR
S. West, NRR
C. Sorensen, RV
H. Wong, RV

INTEROFFICE MEMORANDUM

TO: WMcPHAIL AP3
FROM: MKQUICK SO1
DATE: APRIL 13, 1992

RE: THERMO-LAG FIRE TEST DETAILS

DISCUSSION:

The attached "CPSES Specific" Thermo-lag fire test details were faxed to Omega Point Labs on April 9, 1992 for review and comments. The incorporation of their comments/requirements are necessary in order to ensure a valid and efficient test specimen. These changes are indicated by the clouded areas hereafter. Please review and adjust materials accordingly. Notice also impact to changes in member lengths. In one case, a deletion of both top and bottom supports (to be supplied and installed by Omega Point Labs) should work to our scheduling advantage.

Further conversations with Omega Point Labs revealed the following resource activities which will also be absorbed by them are:

1. Assemble all raceway components - **No site electrical craft required.**

2. Perform raceway QC - **No site electrical QC required.**

3. Pull all cables - **No site electrical craft or QC required.**

Melvin K. Quick, Sr.
Coordinator
X6577

cc: KWilliamson
MClem
RDible
BWright
JDuke
KCasey
CMoore

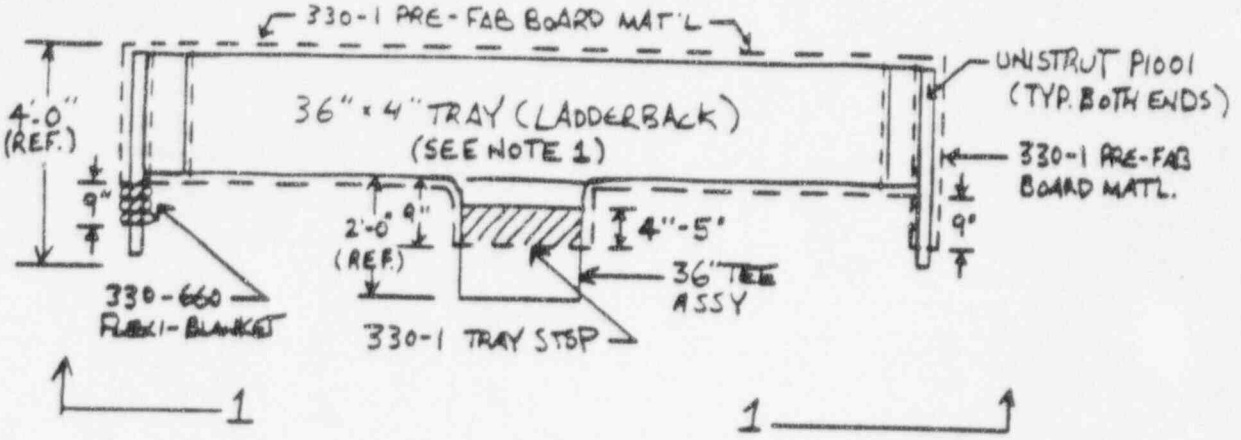
L/176

SCHEME #1

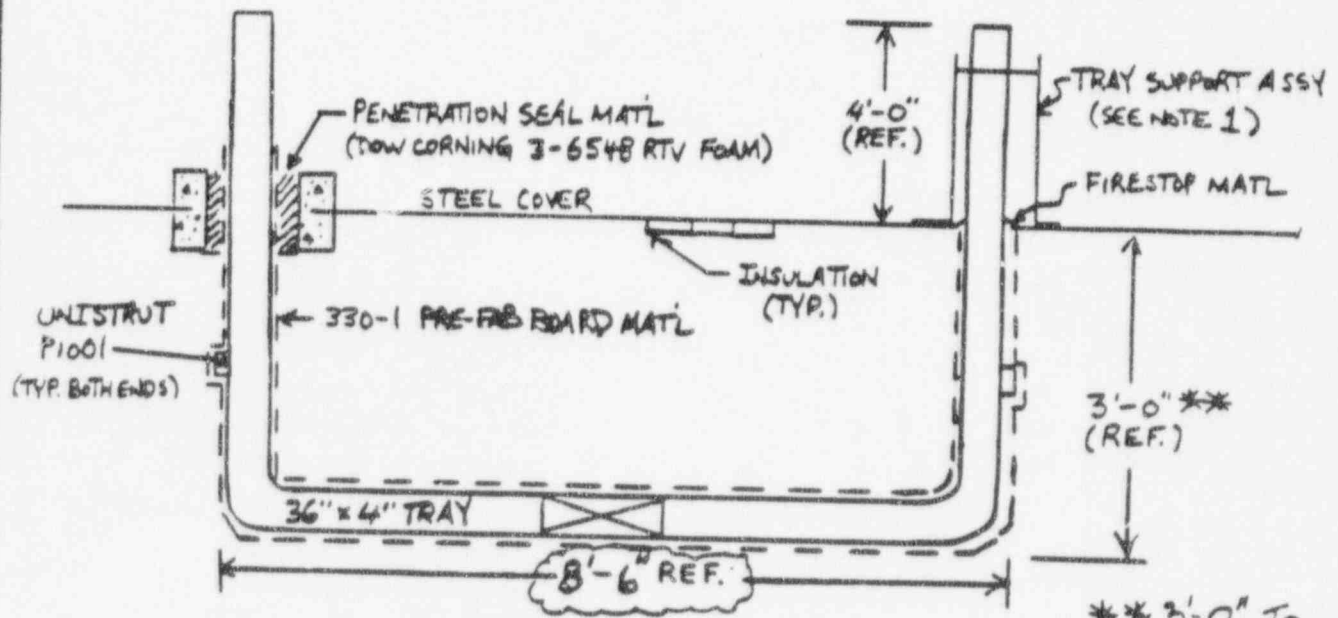
PROPOSED "CPSES SPECIFIC" CABLE TRAY TEST SPECIMEN ASSEMBLY (CONCEPTUAL) N.T.S

(2 SPECIMENS REQ'D)

INFO ONLY



PLAN VIEW



ELEVATION VIEW (1-1)

** 3'-0" TO MEASURE TO BOTTOM OF HORIZ. TRA

SUPPORT MECHANISM

NOTES:

1) SUPPORT MECHANISMS FOR CABLE TRAY NOT SHOWN COMPLETELY

2) 9'-0" REF. DIM. SUBJECT TO LIMITATIONS OF HORZ. FURNACE CLEARANCES

REV	BY	DATE	CHECKED	DATE		JOB NO	PAGE
0	XLD	3/12/92				CALC NO	OF

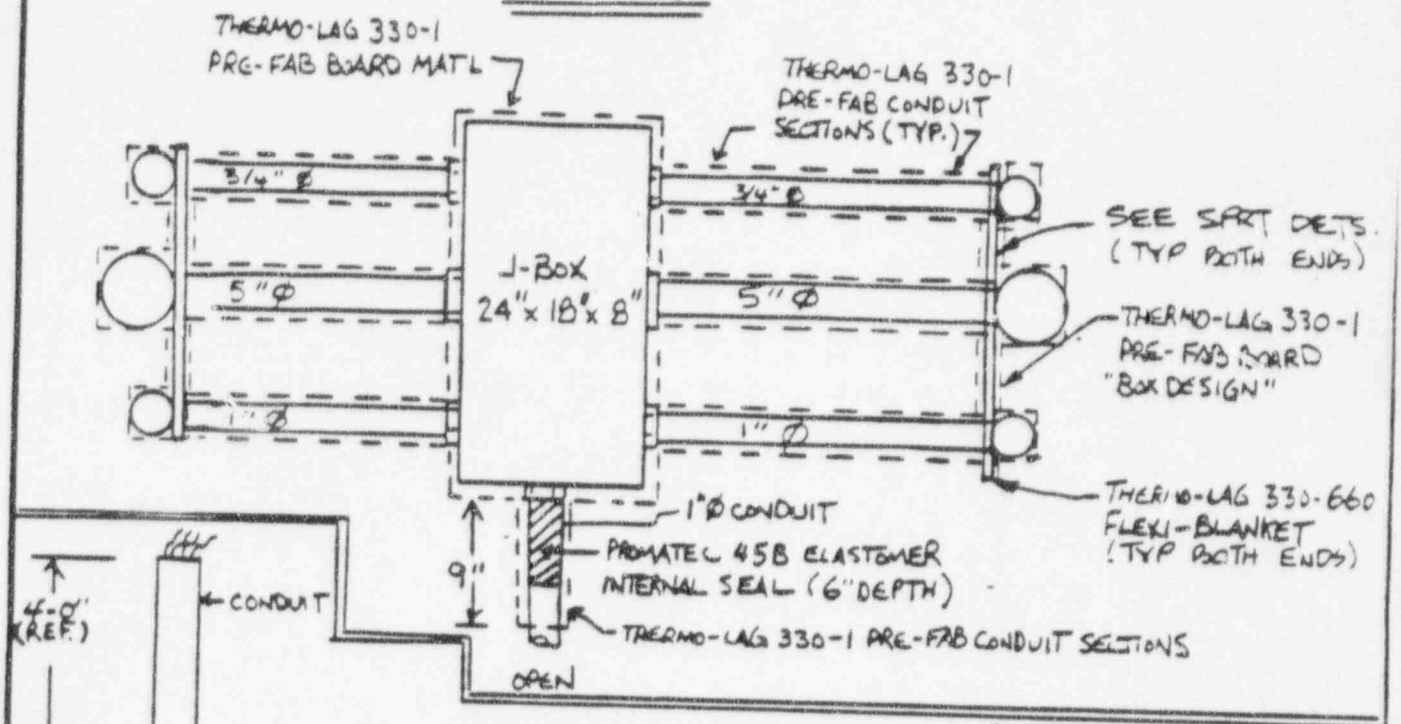
SCHEME # 2

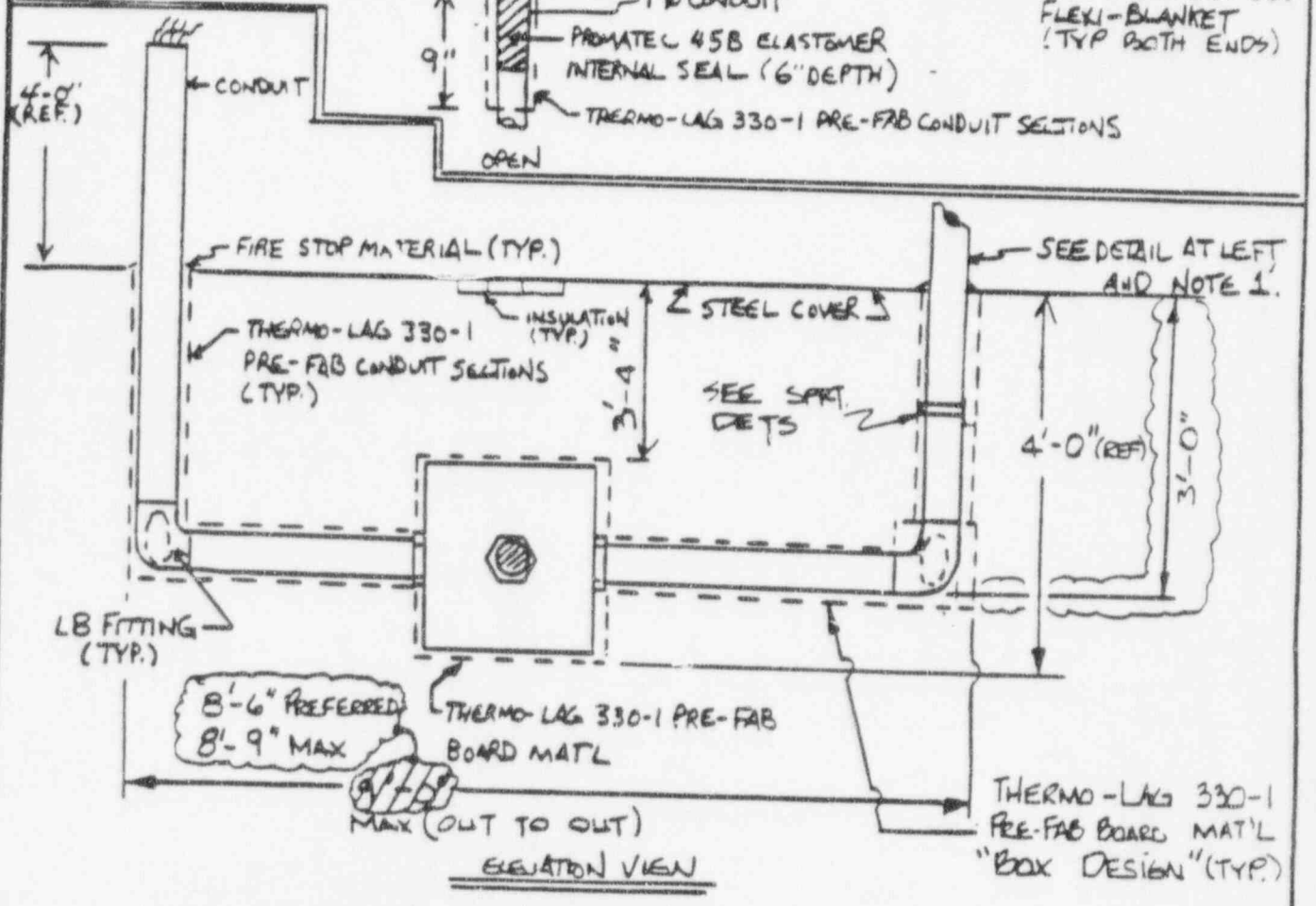
PROPOSED "CASES SPECIFIC" CONDUIT TEST SPECIMEN ASSEMBLY (CONCEPTUAL) N.T.S.

(2 SPECIMENS REQ'D)

INFO ONLY

PLAN VIEW





ELEVATION VIEW

NOTES: 1.) SUPPORT MECHANISMS FOR CONDUIT ABOVE TEST "SLAB" ASSEMBLY NOT SHOWN

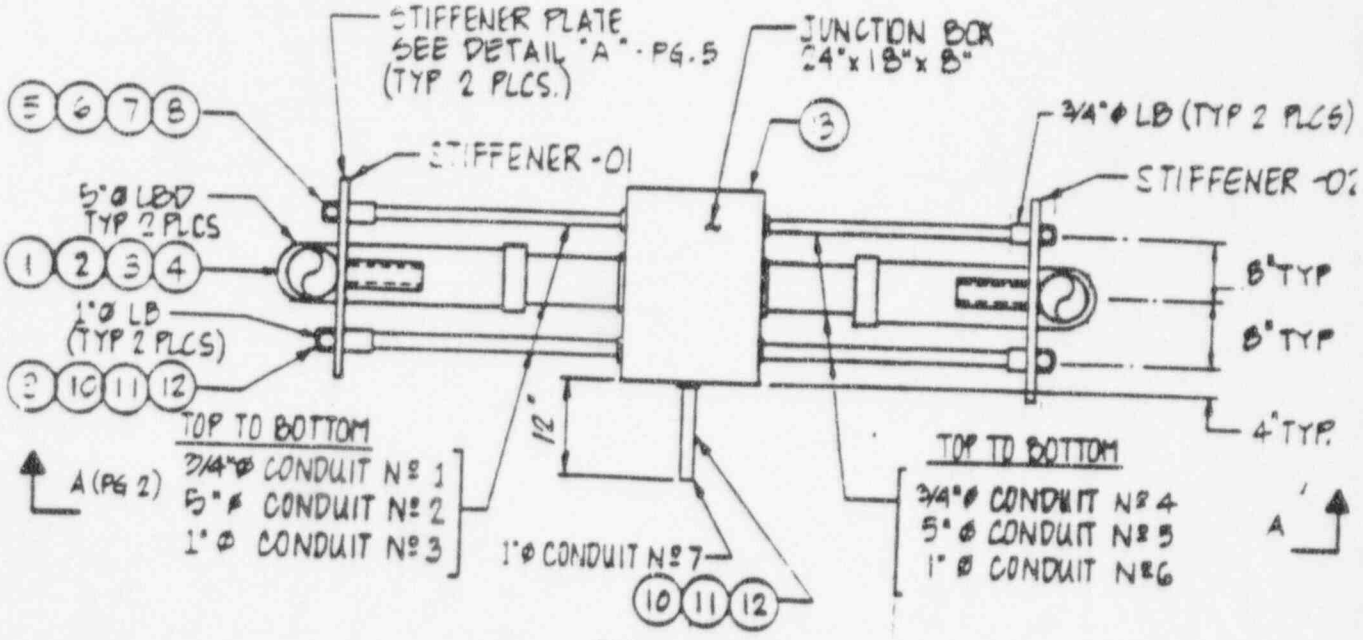
REV	BY	DATE	CHECKED	DATE	JOB NO	PAGE
0	RLD	3/12/92			CALC NO	OF

SCHEME # 2

PAGE 1 OF 6

CONDUIT MOCK-UP DRAWING

REV. NO.	0									



PLAN VIEW

SUPPORTS NOT SHOWN FOR CLARITY

NOTES

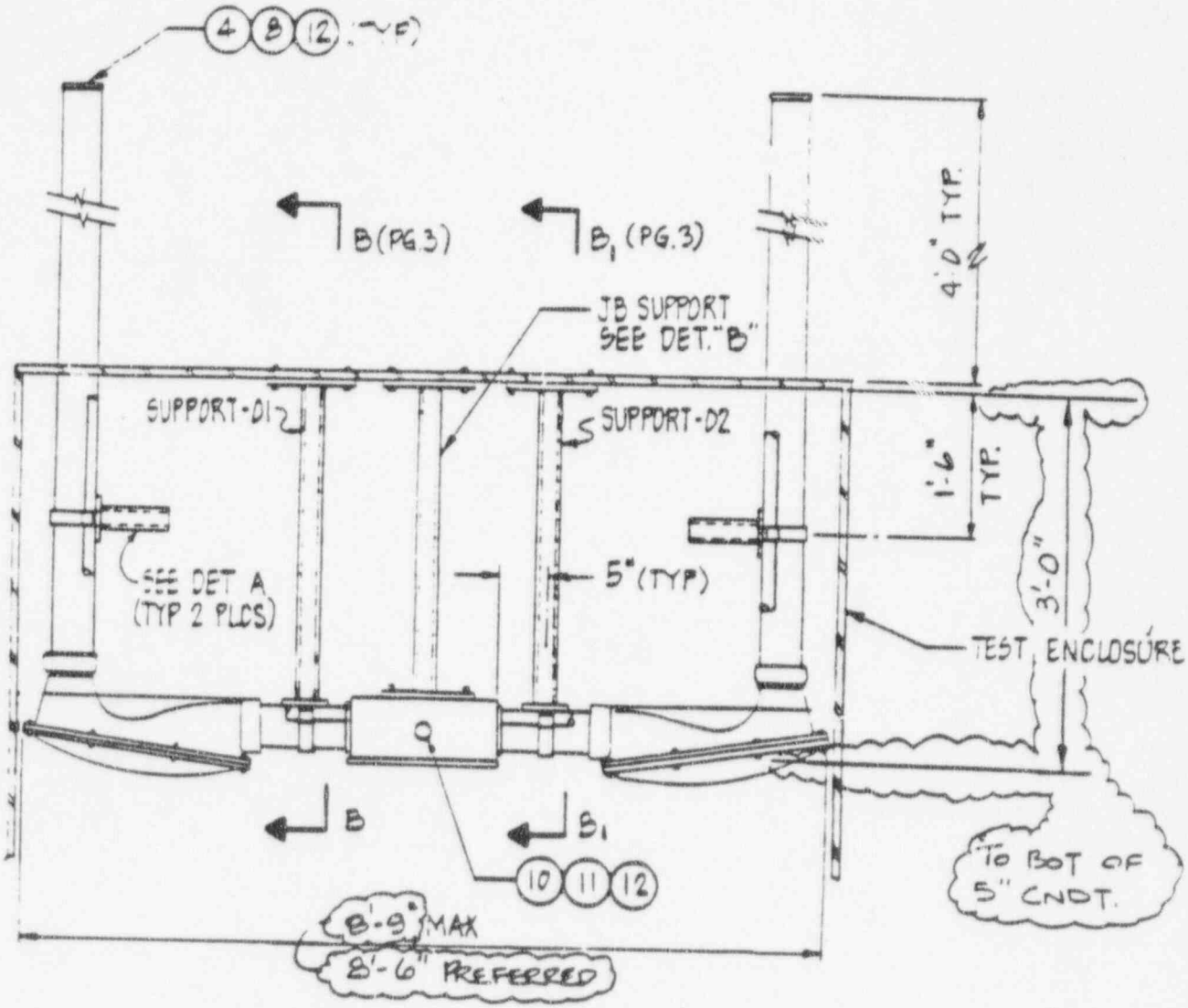
1. ALL DIMENSIONS ARE ± 1" U.O.N. (TYP)
2. NUMBERS IN CIRCLES INDICATES B.O.M. ITEM Nº SEE PAGE 6 FOR BOM LIST.

SCHEME #2

PAGE 2 OF 6 PAG

CONDUIT MOCK-UP DRAWING

REV. NO.	0								



SECTION A-A

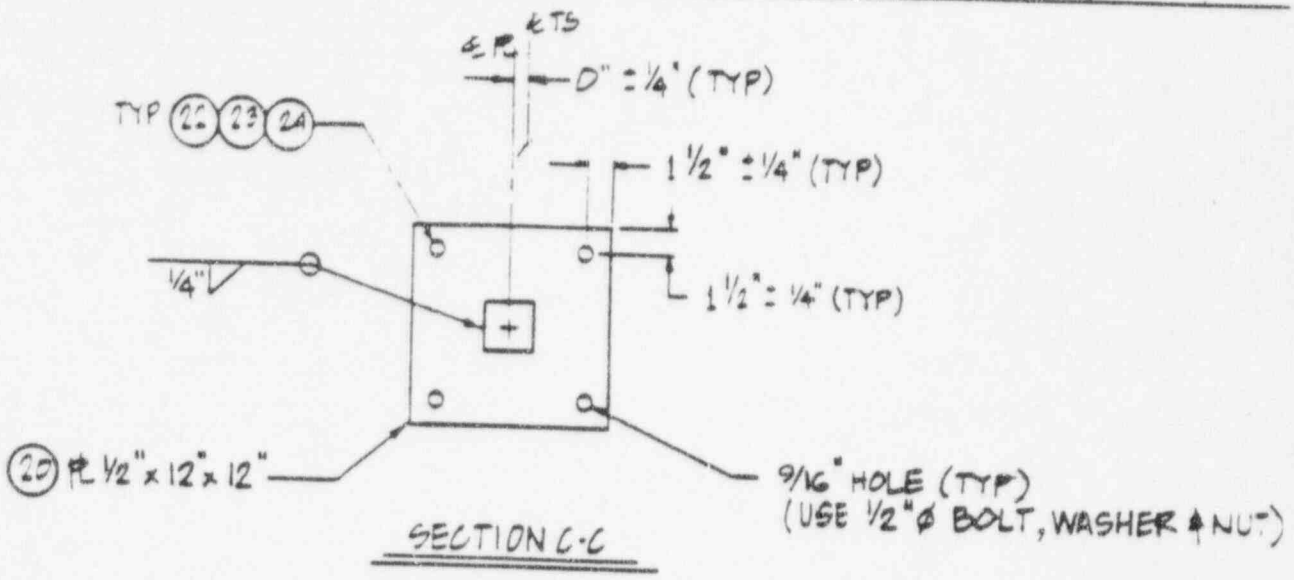
11 PAGE 3 OF 6 PAGES

2

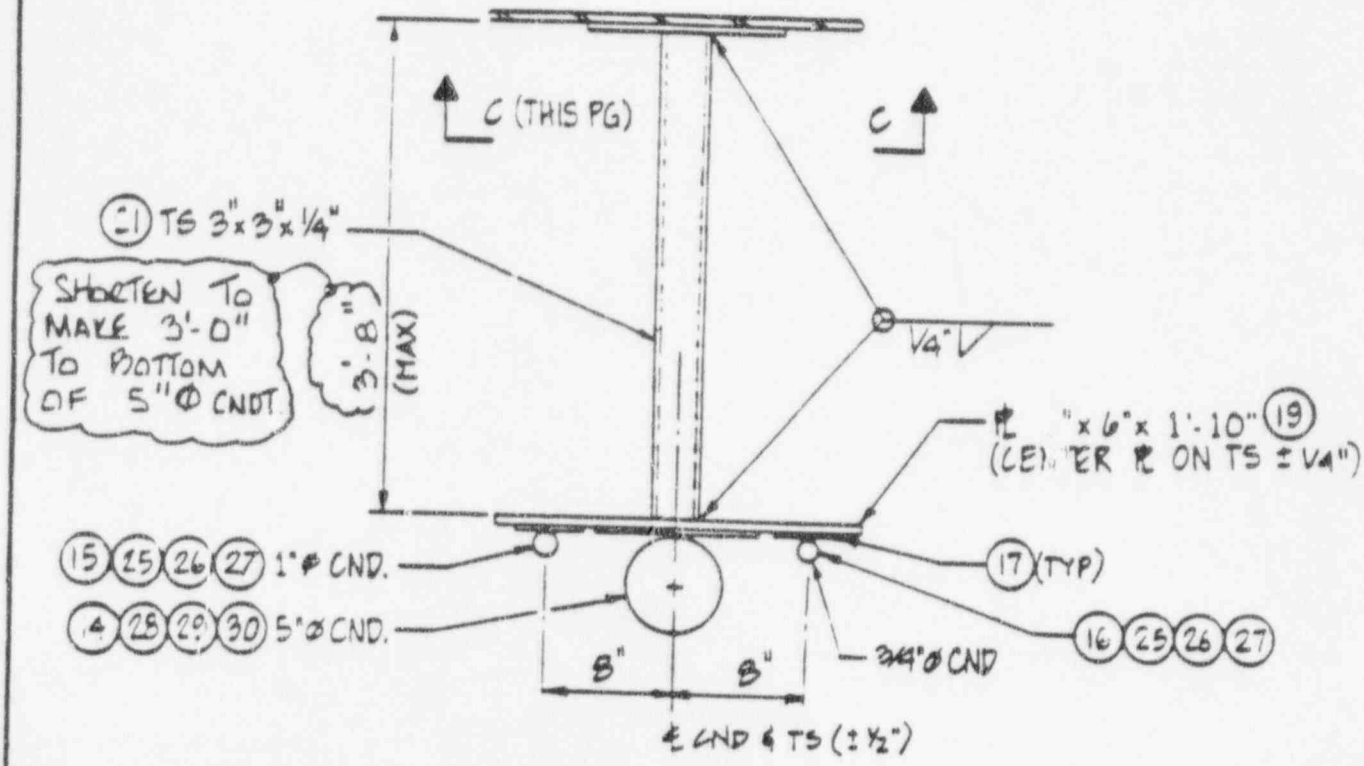
CONDUIT MOCK-UP DRAWING

15 REV. NO.

17



SECTION C-C



SECTION B-B
SECTION B1-B1 (BOX NOT SHOWN FOR CLARITY)

SEE SZ-09ND SH CSD-SC-I FOR ATTACHMENT DETAILS (EXCEPT AS NOTED)

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7-13-87

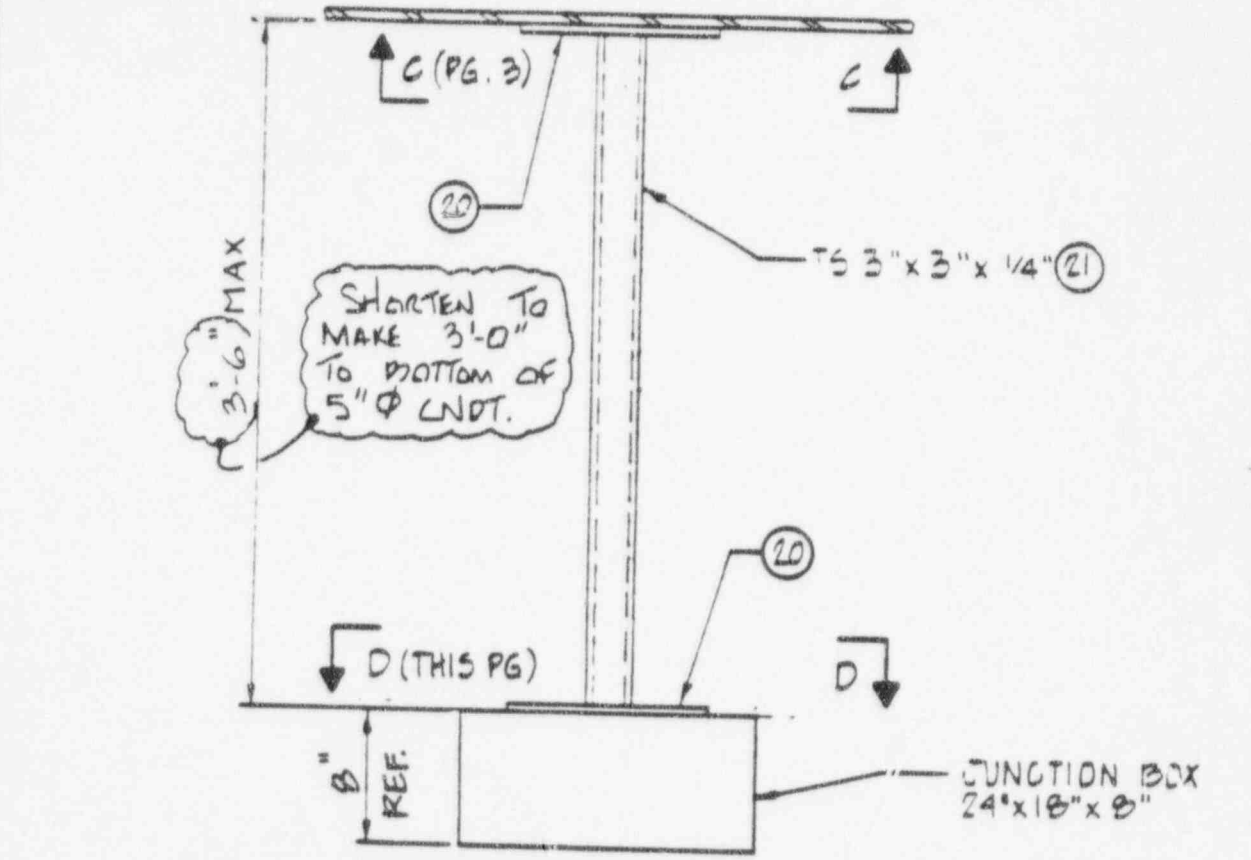
11 PAGE 4 OF 6 PAGES

2 CONDUIT MOCK-UP DRAWING

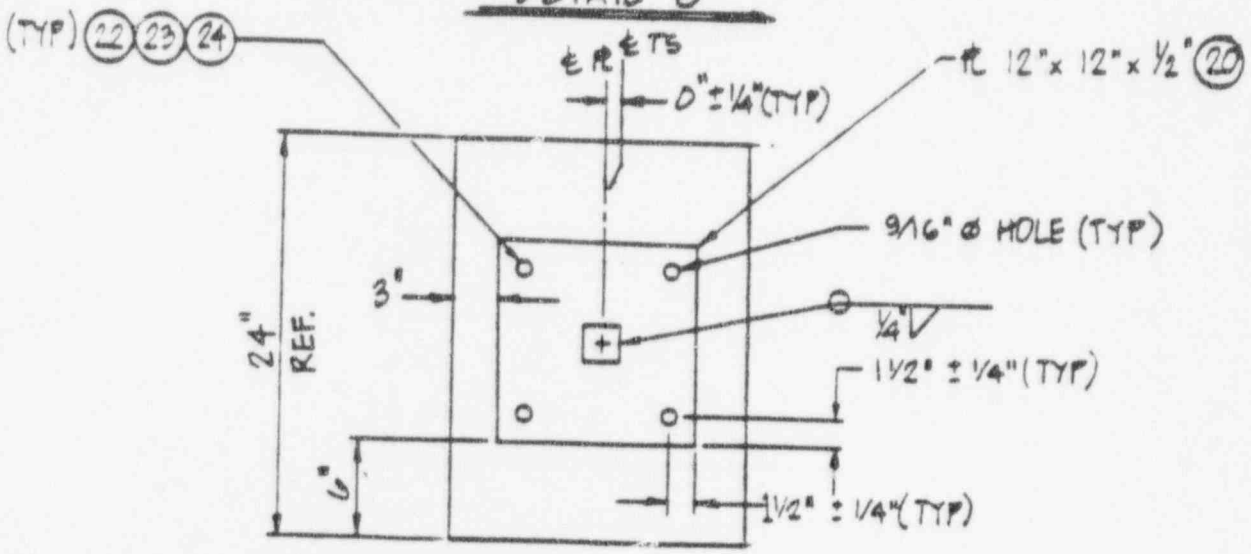
15

REV. NO.	0									

13



DETAIL B



SECTION D-D

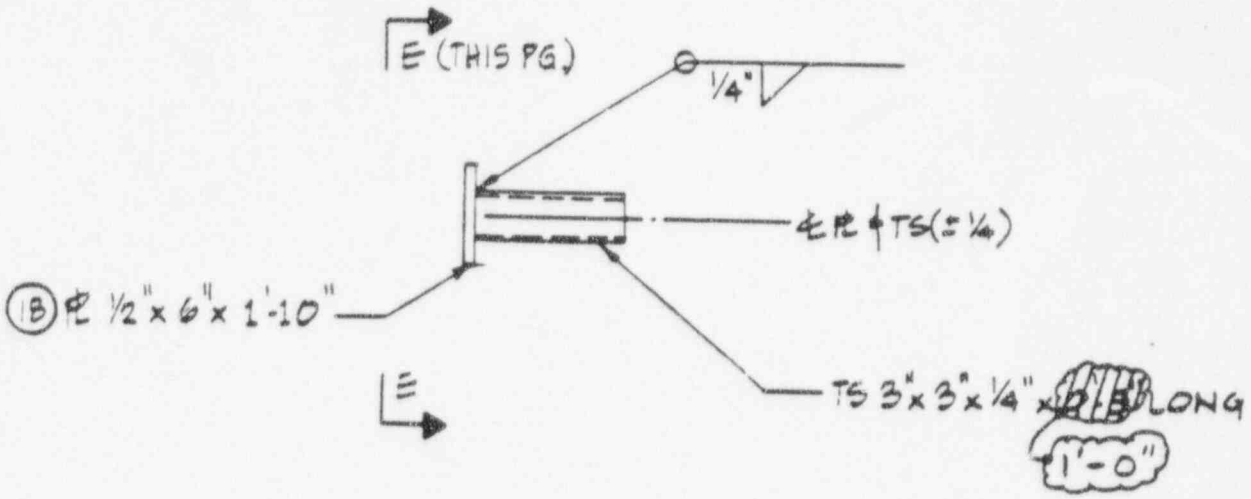
11 PAGE 5 OF 6 PAGE

2

CONDUIT MOCK-UP DRAWING

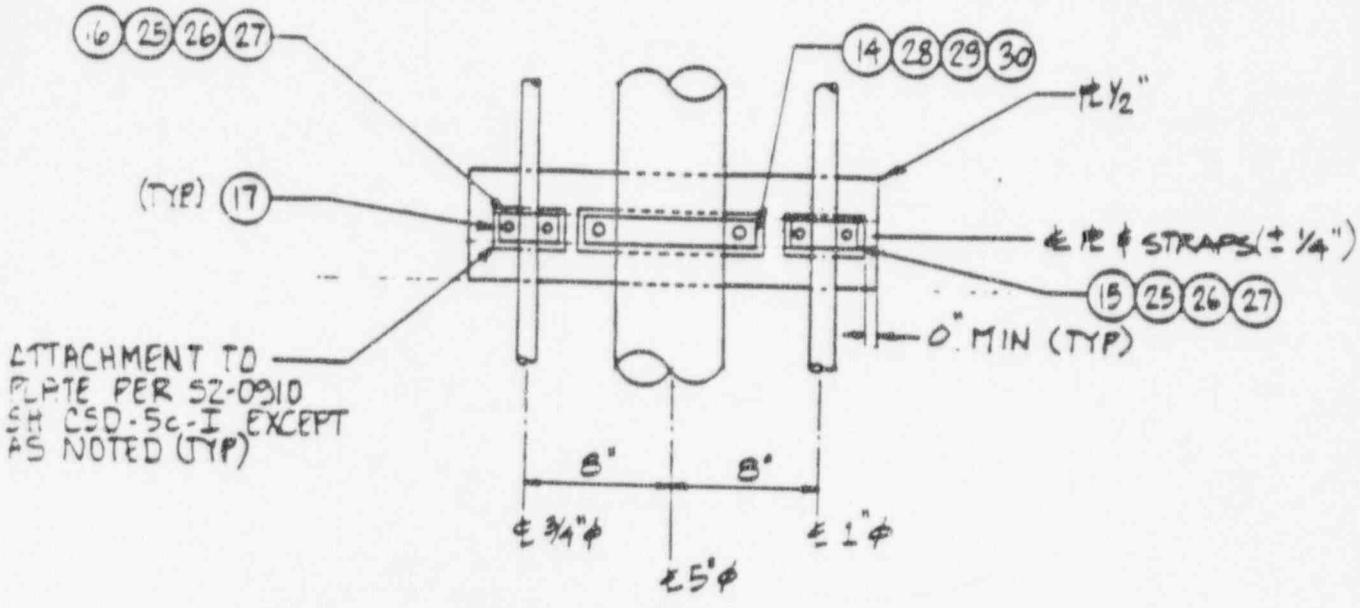
15 REV. NO.

13



DETAIL A

CONDUIT NOT SHOWN FOR CLARITY



SECTION E-E

NOTE: SECTION DEPICTS STIFFENER PLATE ON LEFT SIDE OF PLAN. IT IS SHOWN AS OPP. HAND FOR STIFFENER PLATE ON RIGHT SIDE OF PLAN VIEW.

11 PAGE 6 OF 6 PAGE

2 CONDUIT MOCK-UP DRAWING

15

REV. NO.										

13 BILL OF MATERIALS (1 MOCK-UP)

ITEM NO.	QTY	DESCRIPTION	TSN NUMBER
1	2	5"Ø LBD	353370
2	20'	5"Ø RIGID CONDUIT	356366
3	2	5"Ø LOCKNUT	296971
4	4	5"Ø BUSHING	296970
5	2	3/4"Ø LBD	353250
6	20'	3/4"Ø RIGID CONDUIT	379329
7	2	3/4"Ø LOCKNUT	105332
8	4	3/4"Ø BUSHING	142635
9	2	1"Ø LBD	353369
10	20'	1"Ø RIGID CONDUIT	379328
11	3	1"Ø LOCKNUT	105333
12	6	1"Ø BUSHING	359641
13	1	24"x 18"x 8 JUNCTION BOX	375903
14	4	5"Ø P2558 CONDUIT STRAP	353208
15	4	1"Ø P2558 CONDUIT STRAP	363834
16	4	3/4"Ø P2558 CONDUIT STRAP	359911
17	AS REQ'D	1/4" THK FILLER PLATE MATERIAL	FAB SHOP
18	2	PLATE: 1/2" x 6" x 1'-10"	356875
19	2	PLATE: 1" x 6" x 1'-10"	351756
20	3	PLATE: 1/2" x 12" x 12"	356075
21	12'	TUBE STEEL: 3" x 3" x 1/4"	296351
22	16	1/2"Ø BOLT x 1 1/2"	353549
23	16	1/2"Ø NUT	296398
24	16	1/2"Ø WASHER	291995
25	16	3/8"Ø x 1 1/2" NELSON STUD	355611
26	16	3/8"Ø NUT	350511
27	16	3/8"Ø WASHER	291028
28	8	5/8"Ø x 1 1/2" NELSON STUD	254674
29	8	5/8"Ø NUT	292310
30	8	5/8"Ø WASHER	370689

R-0
7-13-

SCHEME #2

PG 1

Figure 7.4

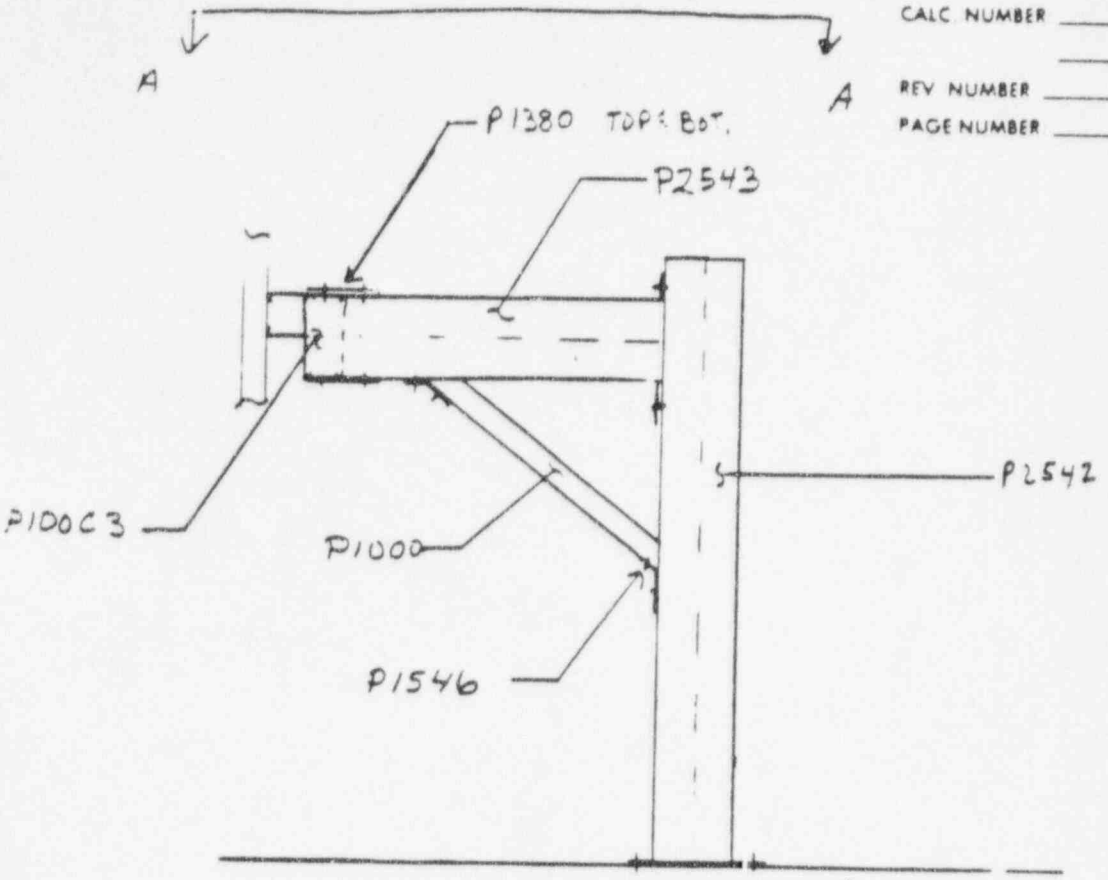
CALCULATION CONTINUATION SHEET

CALC. NUMBER _____

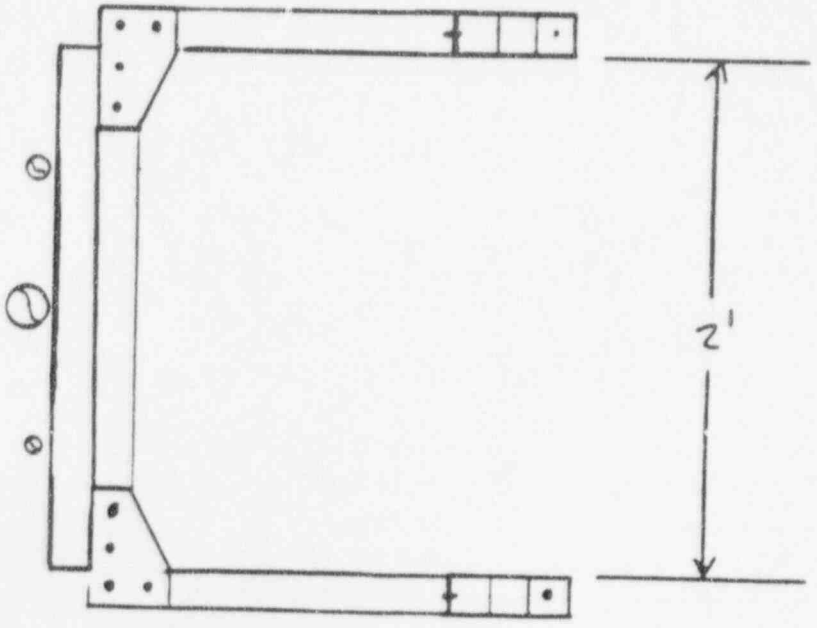
_____

REV NUMBER _____

PAGE NUMBER _____



(2) REQ'D FOR (1) MOCK UP



A - A

SCHEME #2

FIG 2 (B, D. M.)

Figure 7.4

CALCULATION CONTINUATION SHEET

CALC. NUMBER _____

REV. NUMBER _____

PAGE NUMBER _____

QUANTITIES TO BUILD (2) SUPPORTS
(1) MOCK UP

MATERIAL LIST FOR CONDUIT SUPPORTS

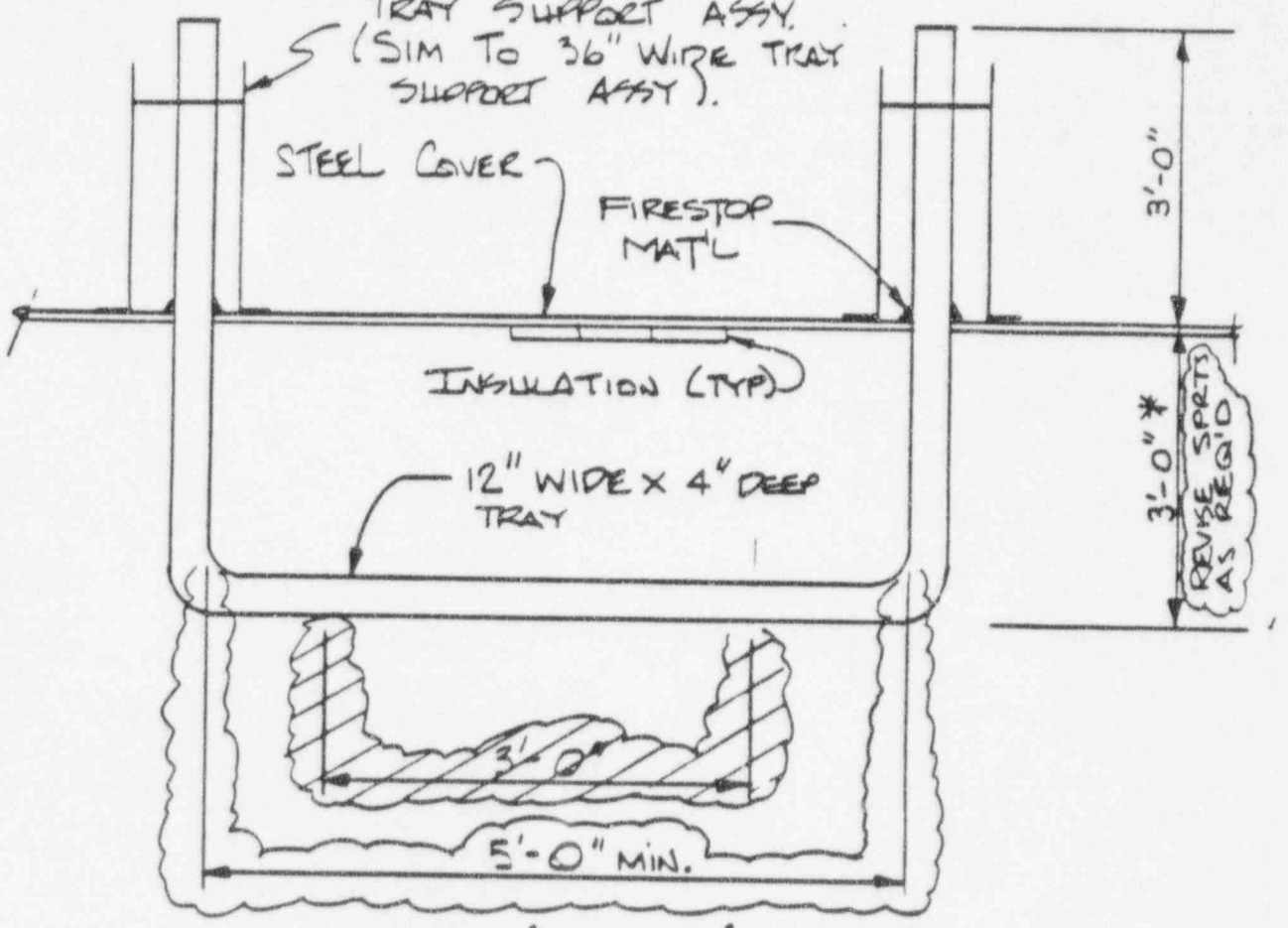
ITEM	QUNTY.	DESC.	TSN
1	66	1/2" x 1 1/4" BOLTS	295329
2	58	1/2" SPRING NUTS P-1010	294108
3	8	1/2" WASHERS	291575
4	8	1/2" NUTS	296398
5	4	P2545 'T' HANGERS	353216
6	4	P2543 'T' HANGERS	358335
7	8	P1380 PLATE FITTINGS	355777
8	8	P1546 45° L FITTINGS	369107
9	4'	P1001 C3 UNISTRUT	366623
10	8'	P1000	362146
11	2	P2558-07	359911
12	2	P2558-10	363834
13	8	P1006 1/4" SPRING NUTS	894111
14	16	1/4"-20 BOLTS (1" LONG)	294094
15	2	P-2558-	353208

SCHEME #3

INFO ONLY

ADDITIONAL PROPOSED "CPSES SPECIFIC" CABLE TRAY TEST SPECIMEN (CONCEPTUAL) N.T.S.

PLAN VIEW NOT SHOWN (SEE NOTE #2)



ELEVATION VIEW (1 SPECIMEN REQ'D)

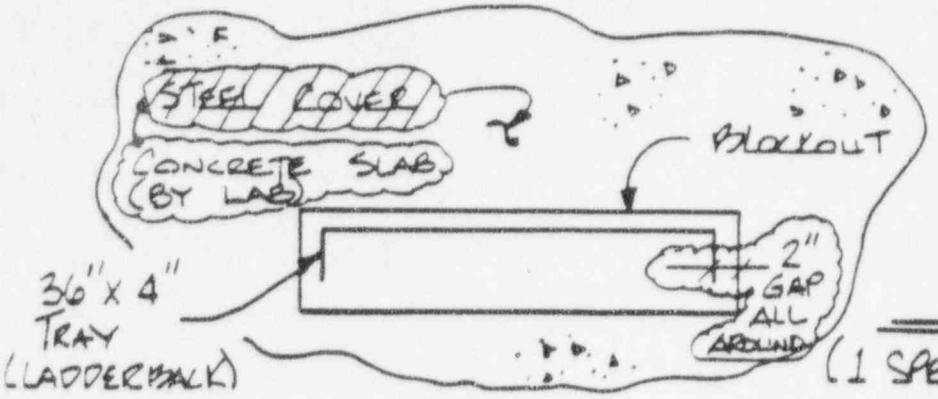
NOTES:

1. * 3'-0" MEASURES DOWN TO BOTTOM OF CABLE TRAY HORIZONTAL SUPPORT MEMBER
2. PLAN VIEW OF 12" WIDE TRAY SIMILAR TO PLAN VIEW OF 36" WIDE TRAY EXCEPT TEE NOT INCLUDED AND DIMENSIONS ARE AS SHOWN ABOVE.
3. PROVIDE 2 SUPPORTS ABOVE DECK AND (2) SUPPORT BELOW DECK.

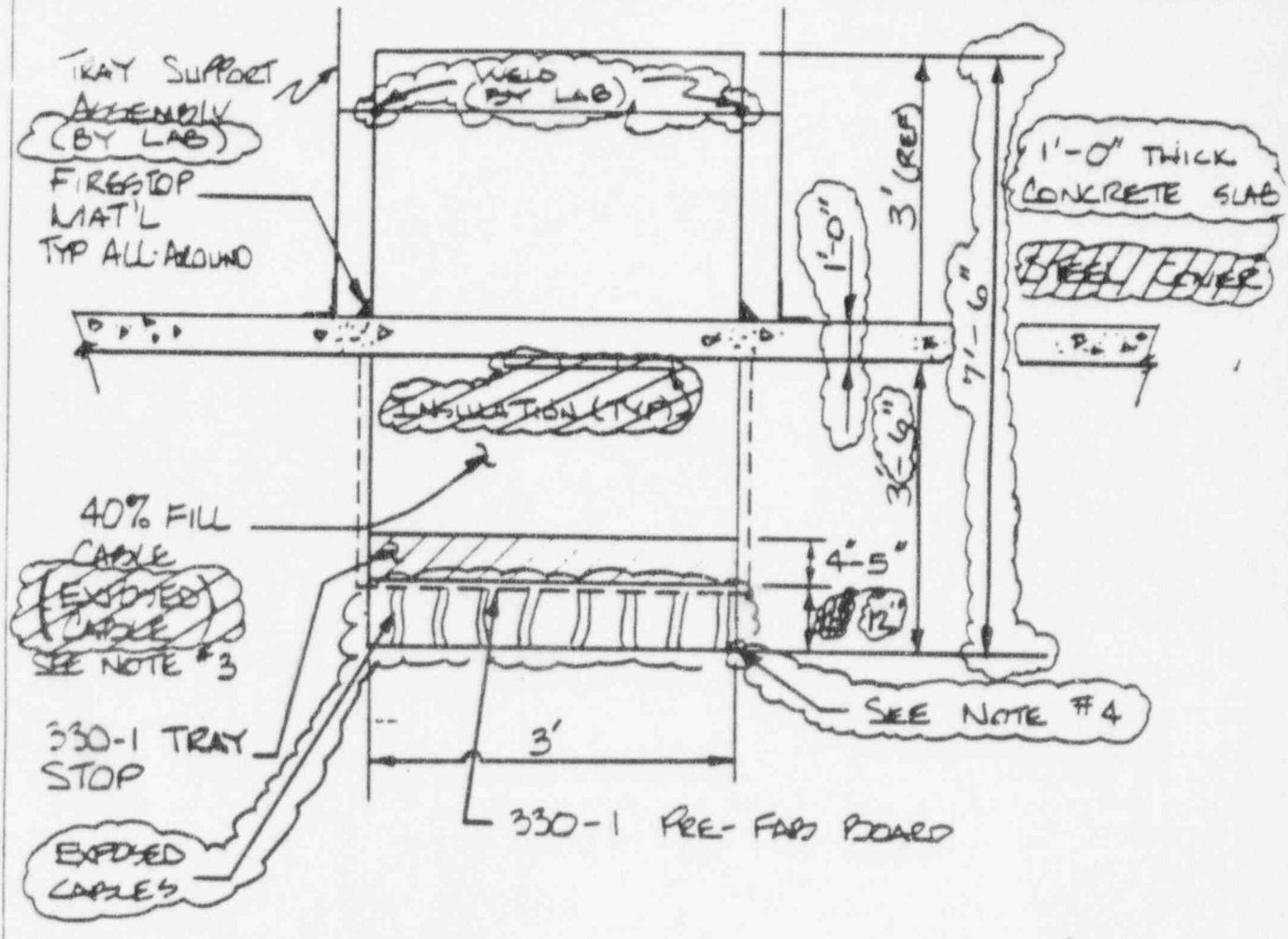
SCHEME # 4

INFO ONLY

PROPOSED "CPSES SPECIFIC" VERTICAL STRAIGHT CABLE TRAY TEST SPECIMEN ASSEMBLY (CONCEPTUAL) N.T.S



PLAN VIEW
(1 SPECIMEN REQ'D)



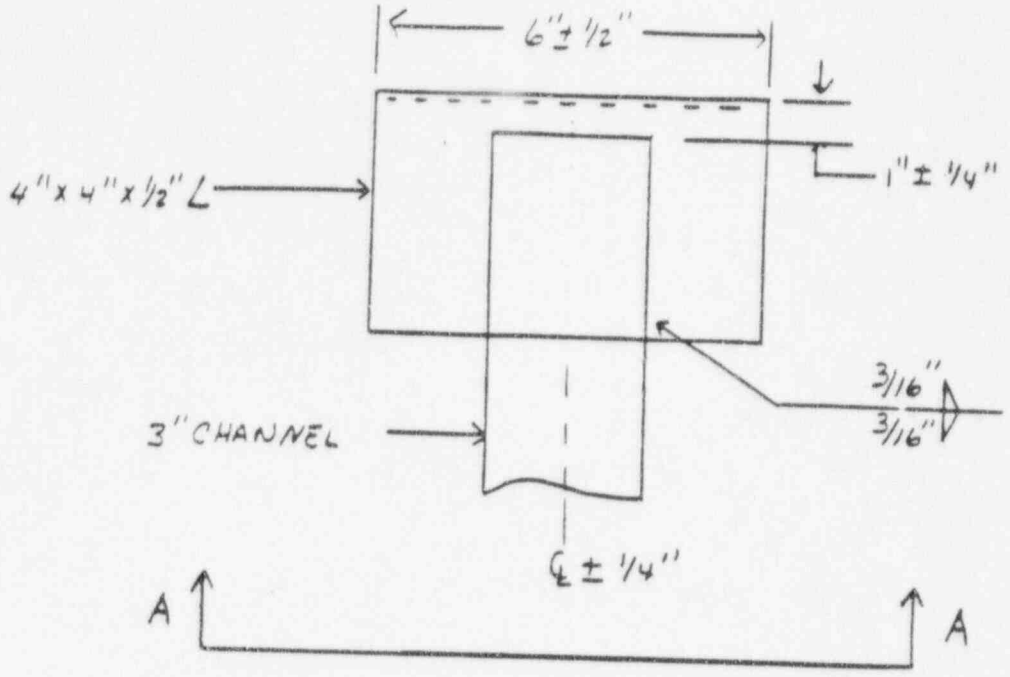
ELEVATION

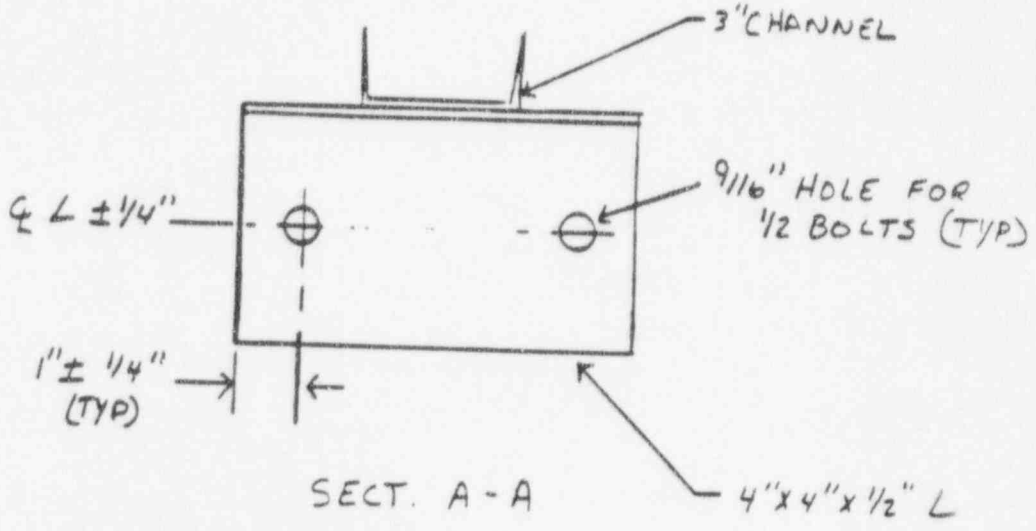
NOTES:

1. NEED SUPPORT CONFIGURATION INSIDE TEST MODULE
2. NEED C OF C FOR ALL RACEWAY MAT'LS USED.
3. PROPOSED CABLE TO BE USED ARE 7c 12, 5c 12, & 2c 12
4. BOTTOM TRAY SUPPORT AS REQ'D BY LAB

SUPPORTS SCHEME #'S 1, 3 & 4

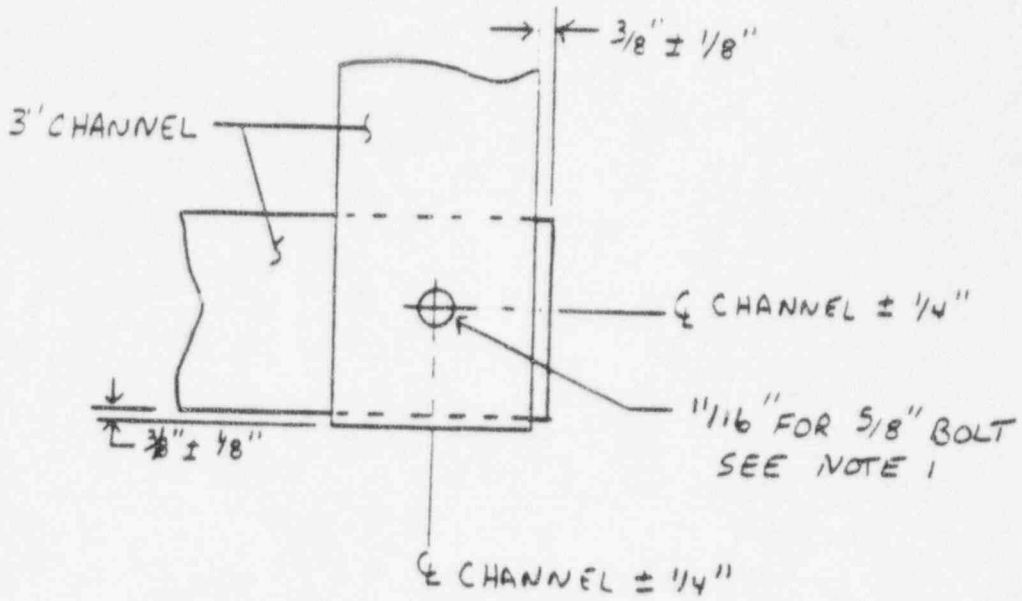
DETAIL #1





SUPPORTS SCHEME #'S 1, 3 & 4

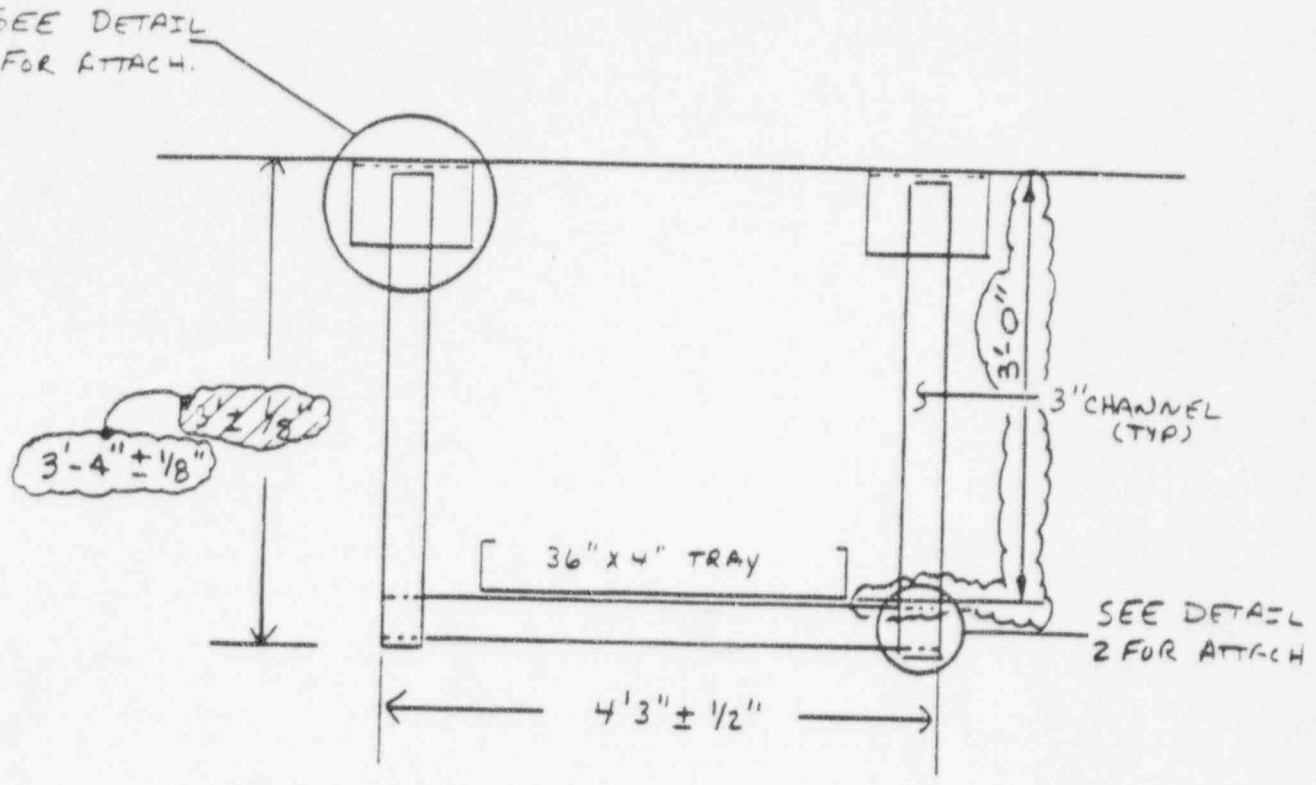
DETAIL # 2



NOTE 1 - BOLTED CONNECTION USING 5/8" x 1 1/2" A 325 BOLT W/ WASHER & NUT

QUANTITIES FOR (1) MOCK UP

ITEM	QUNTY	DESCR	TSN
(1)	16'	LADDER TRAY 36"X4"	376561
(2)	1ea	LADDER TRAY "T" 24" RAD. 36"X4"	376337
(3)	8ea	4" SPLICE PLATES	377751
(4)	64 ea	3/8" BOLTS	333500
(5)	64 ea	3/8" NUTS	365411
(6)	16 ea	TIW FITTINGS	(INVEST REC.

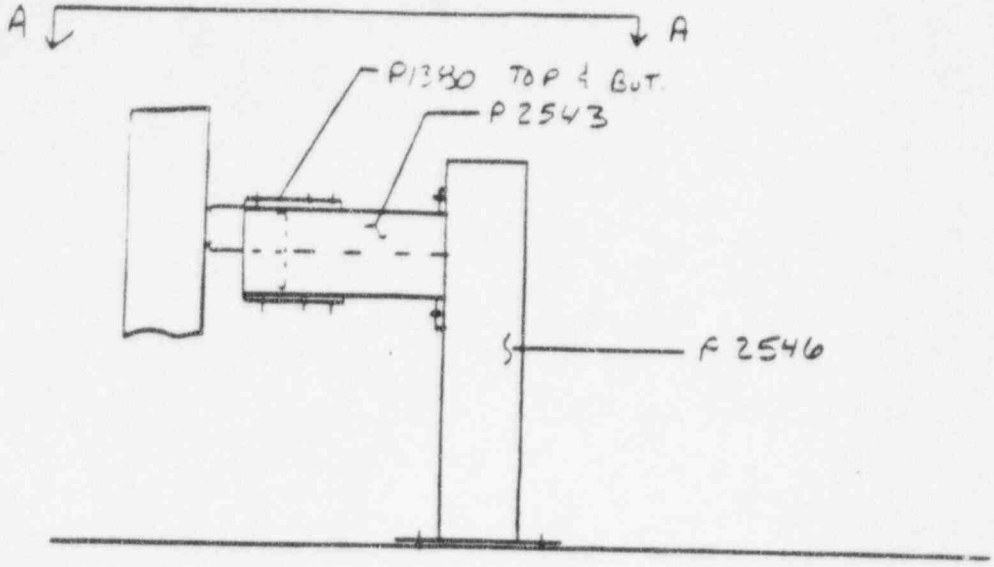


(3) REQUIRED FOR (1) MOCK UP

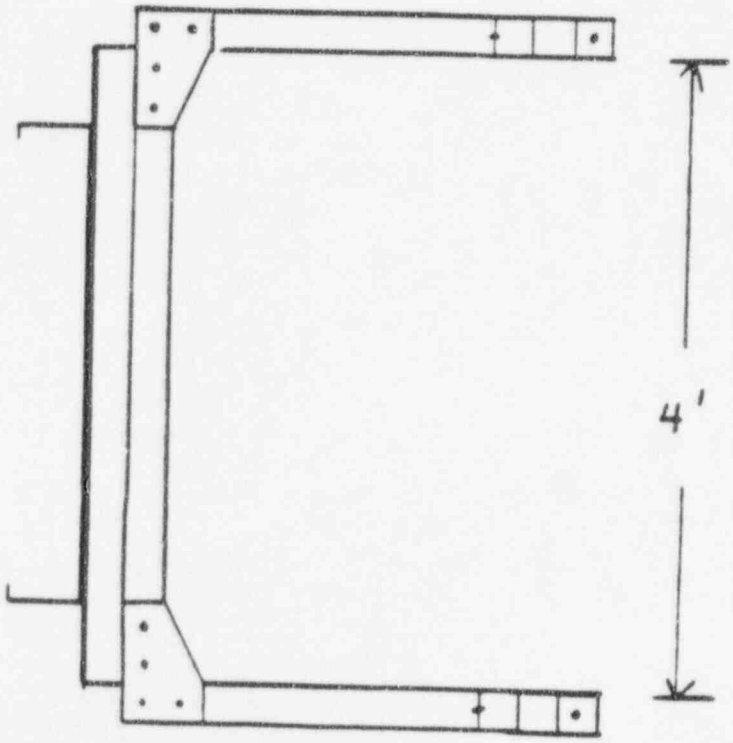
ITEM	QUNTY.	DESCR	TSN
1)	31'	C3 x 4.1	BULK MAT'L
2)	3'2"	4"x4"x 1/2" L	BULK MAT'L
3)	12	1/2" x 1 1/4" BOLTS	295329
4)	12	1/2" WASHERS	291895
5)	12	1/2" NUTS	296396
6)	6	5/8" x 2" BOLTS	382222
7)	6	5/8" WASHERS	270687
8)	6	5/8" NUTS	378097
9)	6	TRAY CLAMP ASSY.	371E78

SCENE #1

PS 1



(2) REQ'D FOR (1) MOCK UP



A-A

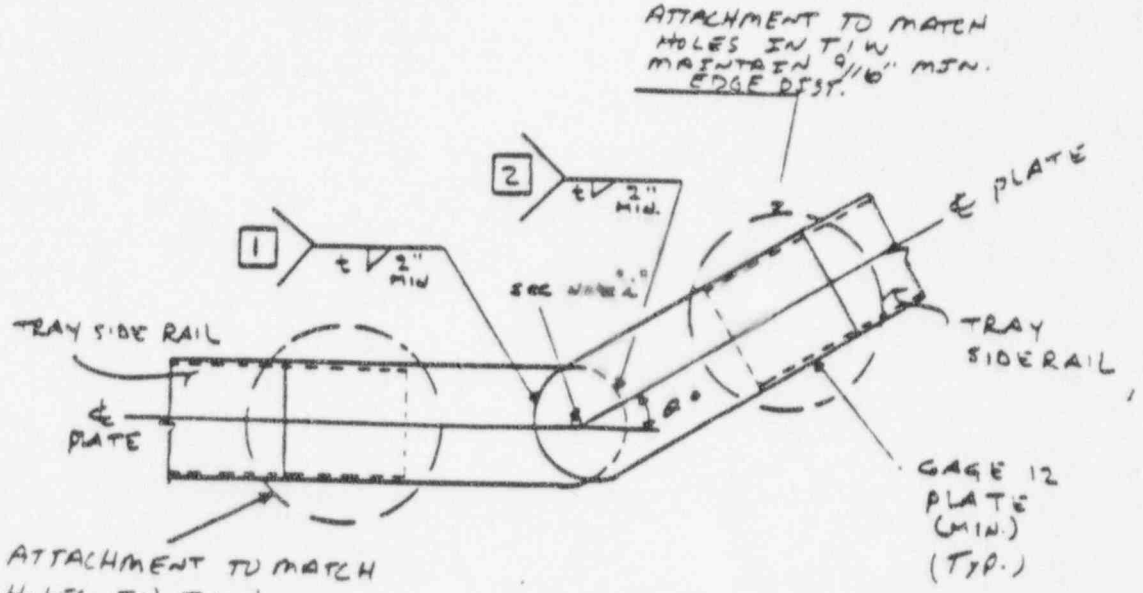
ITEM #1 TRAY SUPPORT ASSY. PL 2

QUANTITIES TO BUILD (2) SUPPORTS ASSY.
(1) MOCK UP

MATERIAL LIST FOR TRAY SUPPORT ASSY.

ITEM	QUNTY.	DESCR	TSN
(1)	48	1/2" x 1 1/4" BOLTS	295329
(2)	40	1/2" SPRING NUTS P-1010	294108
(3)	8	1/2" WASHERS	291895
(4)	8	1/2" NUTS	296398
(5)	4	P2543 T-HANGERS	358335
(6)	4	P2546 T-HANGERS	353209
(7)	8	P1380 PLATE FITTINGS	362146
(8)	8'	P1001C3 UNISTRUT	366623
(9)	4	TRAY CLAMP ASSY	371878
(10)	4	5/8" SPRING NUTS	353212

USED ON SCHEME #1



ELEV. VIEW (LOOKING FROM OUTSIDE OF TRAY) (TYP. NEARSIDE AND FARSIDE)

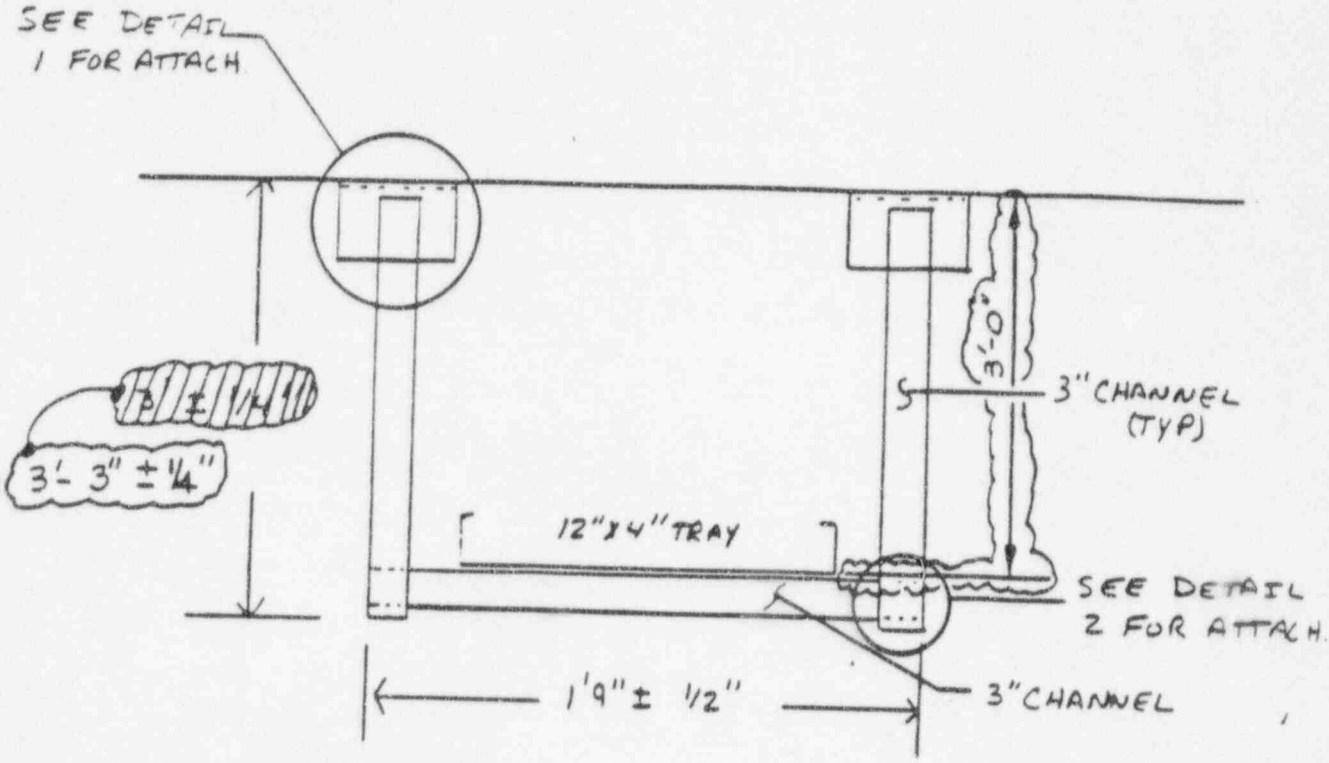
* θ = 0° TO ± 60°

WELD SIZE t SHALL BE MINIMUM THICKNESS OF THE THINNER PART JOINED

1. BOLT AND BOLT HOLE ARE NNS

QUANTITIES FOR (1) MOCK UP

ITEM	QUNTY.	DESCR.	TSN
1)	12'	LADDER 12"x4"	[illegible]
2)	2 ea	LADDER TRAY 90° V INSIDE BEND 12"x4"	[illegible]
3)	8 ea	4" SPLICE PLATES	377751
4)	64 ea	3/8" BOLTS	333500
5)	64 ea	3/8" NUTS	365411



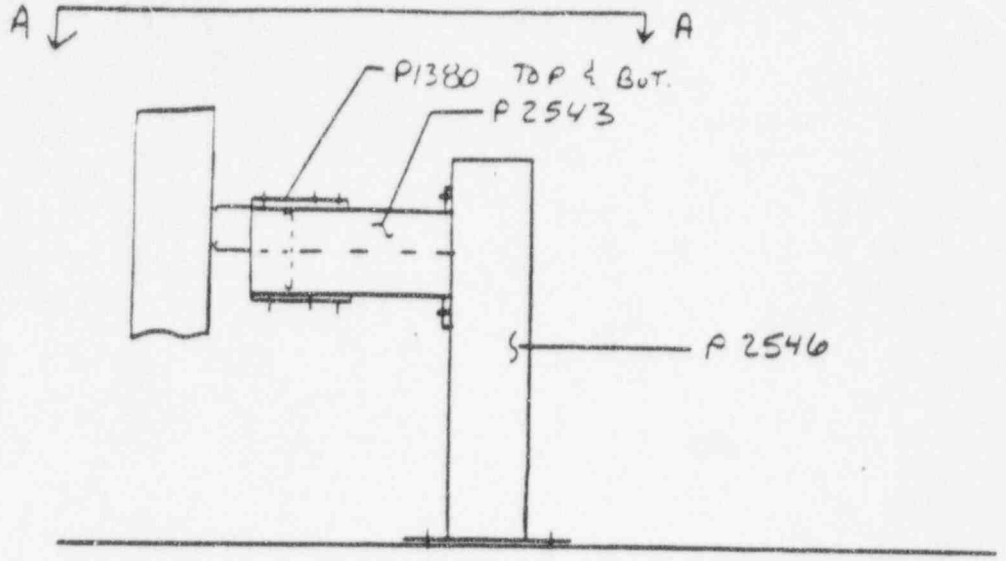
(2) REQUIRED FOR (1) MOCK UP

ITEM	QUNTY.	DESCR	TSN
1)	16'	C3X 4.1	BULK MAT'L.
2)	2'	4"X4"X 1/2" L	BULK MAT'L.
3)	8	1/2"X1 1/4" BOLTS	295329
4)	8	1/2" WASHERS	291895
5)	8	1/2" NUTS	296398
6)	4	5/8" X 2 " BOLTS	382222
7)	4	5/8" WASHERS	370677
8)	4	5/8" NUTS	378098
9)	4	TRAY CLAMP ASSY	371872

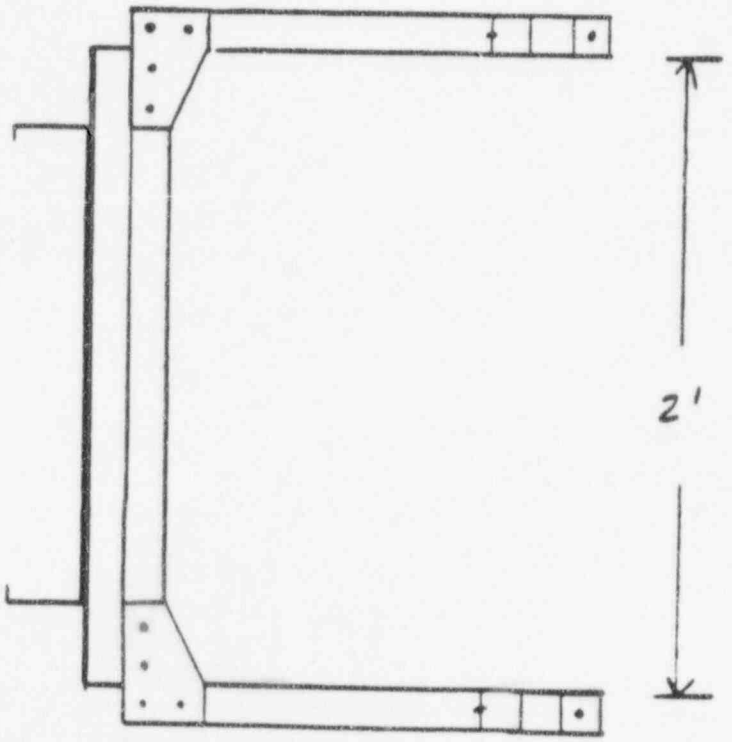
NOT TO BE INSPECTED, DEAD LOAD SUPPORT ONLY.

PS 1

SCHEME #3



(2) REQ'D FOR (1) MOCK UP



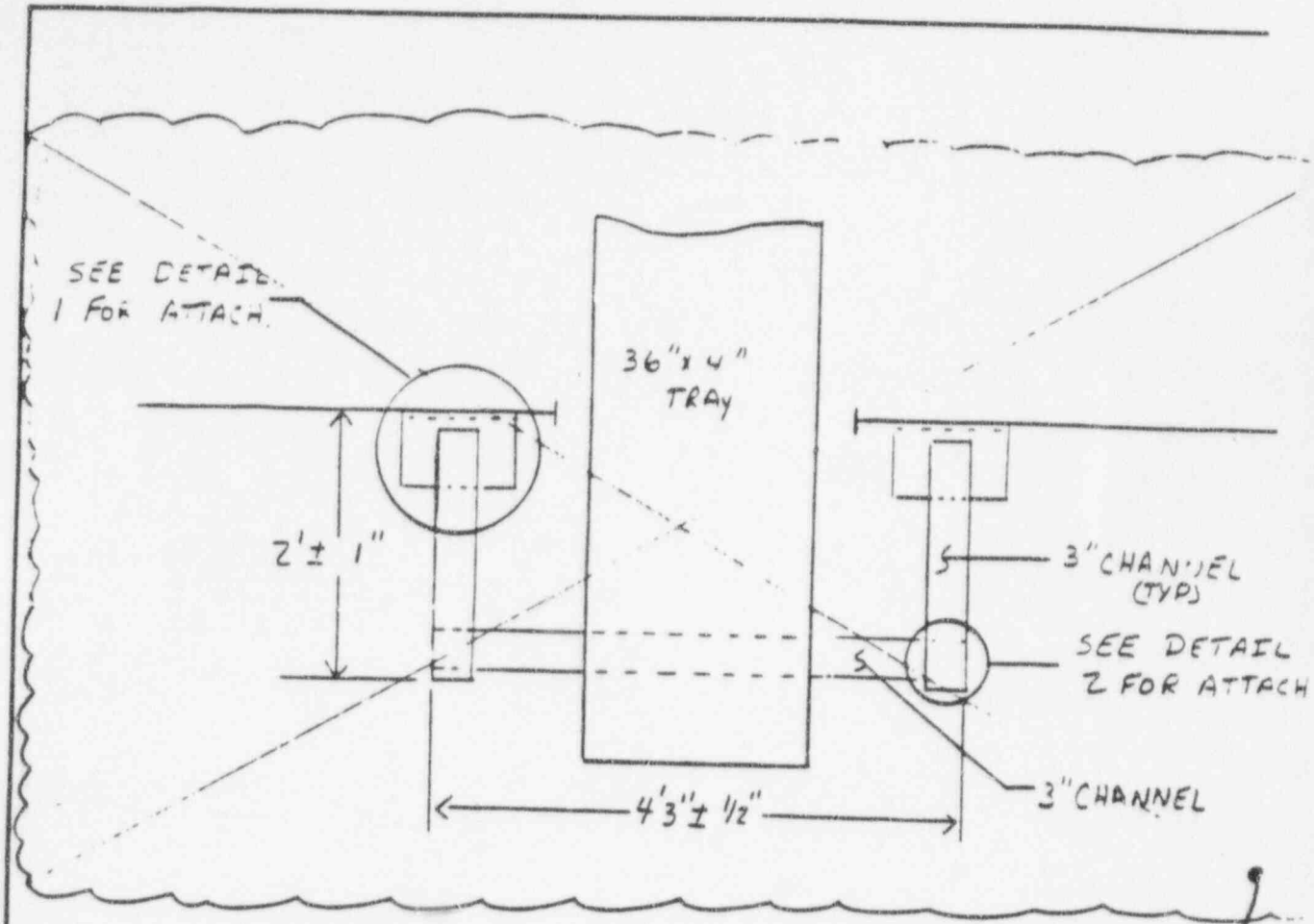
A - A

LINE #3 TRAY SUPPORT ASSY. PL 2

QUANTITIES TO BUILD (2) SUPPORTS
1) MOCK UP

MATERIAL LIST FOR TRAY SUPPORT ASSY.

ITEM	QUNTY.	DESCR.	TSN
(1)	48	1/2" x 1 1/4" BOLTS	295329
(2)	40	1/2" SPRING NUTS P-1010	294108
(3)	8	1/2" WASHERS	291895
(4)	8	1/2" NUTS	296398
(5)	4	P2543 T-HANGERS	358335
(6)	4	P2546 T-HANGERS	353209
(7)	8	P1380 PLATE FITTINGS	362146
(8)	4'	P1001C3 UNISTRUT	366623
(9)	4	TRAY CLAMP ASSY.	371878
(10)	4	5/8" SPRING NUTS	353212



QUANTITIES REQUIRED FOR (1) MOCK UP

SUPPORT MAT'L FURNISHED/INST. BY LAB

TRAY ITEM	QUANTITIES	DESCR	TSN (INVEST. REL.)
1)	4 @ 7'-6"	36"x4" TRAY	

TRAY SUPPORTS

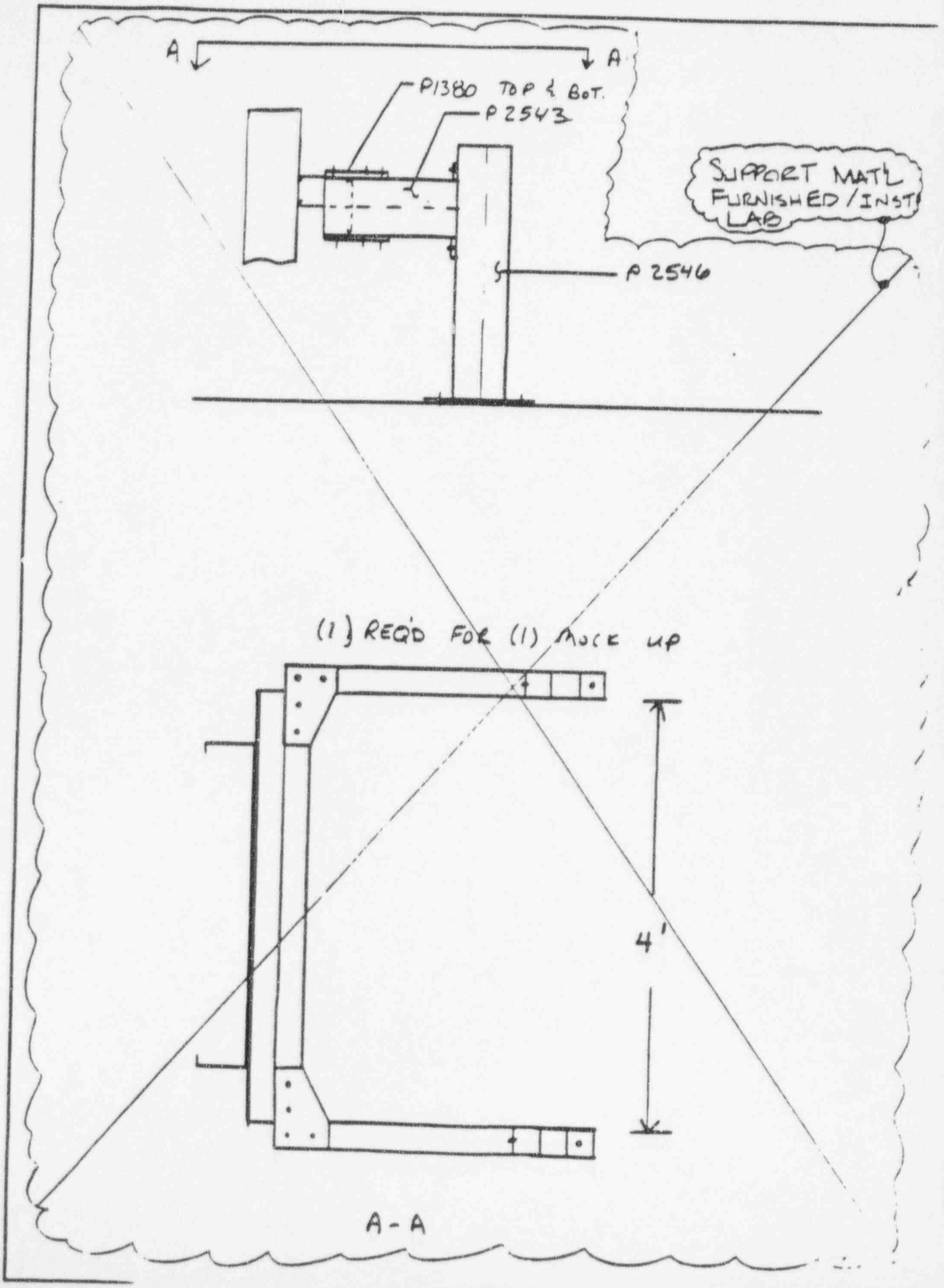
QUANTITIES REQ'D. FOR (1) MOCK UP

ITEM	QUNTY	DESCR	TSN
1)	8'9"	C 3 x 4.1	BULK MAT'L.
2)	1'	4"x4"x1/2" L	BULK MAT'L.
3)	4	1/2" x 1 1/4" BOLTS	295329
4)	4	1/2" WASHERS	291895
5)	4	1/2" NUTS	296398
6)	2	5/8" x 2" BOLTS	[illegible]
7)	2	5/8" WASHERS	370689
8)	2	5/8" NUTS	378?98
9)	2	TRAY CLAMP ASSY.	371875

TRAY SUPPORT ASSY. TO BE INSTALLED ON TOP OF STEEL COVER NOT TO BE INSPECTED, DEAD LOAD SUPPORT ONLY.

PG 1

SCHEME #4



AS 2 (B.O.M)

SUPPORT MAT'L BY LAB

QUANTITIES TO BUILD (1) SUPPORT (1) MOCK UP

ITEM	QUNTY.	DESCR	TSN
(1)	24	1/2" x 1 1/4" BOLTS	295329
(2)	20	1/2" SPRING NUTS	294108
(3)	4	1/2" WASHERS	291895
(4)	4	1/2" NUTS	296398
(5)	2	P-2543	358335
(6)	2	P-2546	353209
(7)	4	P-1380	362146
(8)	4'	P1001C3	366623
(9)	2	TRAY CLAMP ASSY.	371878
(10)	2	5/8" SPRING NUTS	353212

October 31, 1991

Mr. Rubin Feldman
Thermal Science, Inc.
2200 Cassens Drive
St. Louis, MO 63026

Dear Mr. Feldman:

I am forwarding a copy of the official transcript of our meeting held on October 17, 1991, as agreed during the meeting. We are reviewing the document and will send a list of the items that you agreed to provide additional information and any remaining followup questions under separate correspondence.

We appreciate the time and effort you spent in responding to our written questions and meeting with us. Your cooperation has been helpful to our understanding of the current issues regarding THERMO-LAG 330.

If you have any additional questions, please call me at 301-492-1272.

Sincerely,

Frank J. Miraglia, Deputy Director
Office of Nuclear Reactor Regulation

Enclosure:
As stated

b:feldman

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DF03

Add: S. West
L. Plisco
P. Madden
R. Architzel

Ltr 1 1 1 1

Cer S. West 1/0

9203180429 911031
PDR GA999 EECTMALS
99901226 PDR

Docket No.: 50-382
License No.: NPF-38

APR 3 1992

Entergy Operations, Inc.
ATTN: R. P. Barkhurst, Vice President
Operations, Waterford
P.O. Box B
Killona, Louisiana 70066

Gentlemen:

SUBJECT: NOTICE OF VIOLATION (NRC INSPECTION REPORT NO. 50-382/92-03)

This refers to the inspection conducted by Messrs. W. F. Smith, I. Barnes, S. D. Butler, M. E. Murphy, and D. R. Hunter of this office during the period February 2 through March 14, 1992. The inspection included a review of activities authorized for your Waterford Steam Electric Station, Unit 3, facility. At the conclusion of the inspection, the findings were discussed with those members of your staff identified in the enclosed report.

Areas examined during the inspection are identified in the report. The areas included plant status, followup, onsite response to events, monthly maintenance observation, bimonthly surveillance observation, operational safety verification, and reliable decay heat removal during outages. Within these areas, the inspection consisted of selective examination of procedures and representative records, interviews with personnel, and observations of the activities in progress.

Based on the results of this inspection, certain of your activities appeared to be in violation of NRC requirements, as specified in the enclosed Notice of Violation (Notice). We are concerned about the first violation because it reflected inadequate technical reviews of licensee event reports, which are required to be complete and accurate to accomplish their intended use in the interest of safety. This was the third licensee event report in the past year that had to be revised due to inaccurate or incomplete reporting identified by the resident inspectors. We are concerned about the second violation because inspection requirements in an instruction were deleted by a quality assurance examiner without proper review and approval.

Your staff identified a violation of NRC requirements involving operation of the safety injection tanks. This violation will not be subject to enforcement action because their efforts in identifying and correcting the violation meet the criteria specified in Section VII of the Enforcement Policy.

We have identified two unresolved items in this report. The first involved resolution of the use of helical coil threaded inserts on your steam generator primary manways, while not specifically allowed by the ASME Code. The second was pending an investigation of mispositioned valves on Emergency Diesel

RIV:RI	DRS/MQPS	DRS/MQAS	C:MQPS	SRI	C:DRP/A	D:DRP
SDButler	MEMurphy	DRHunter	IBarnes	WFSmith	WDJohnson	ABBeach
3/27/92	3/27/92	3/27/92	3/27/92	3/27/92	3/27/92	4/3/92

IE01 1/1

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PDR ADOCK 05000382
Q PDR

Wise, Carter, Child & Caraway
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P.O. Box 651
Jackson, Mississippi 39205

Entergy Operations, Inc.
ATTN: D. F. Packer, General
Manager Plant Operations
P.O. Box B
Killona, Louisiana 70066

Entergy Operations, Inc.
ATTN: L. W. Laughlin
Licensing Manager
P.O. Box B
Killona, Louisiana 70066

Chairman
Louisiana Public Service Commission
One American Place, Suite 1630
Baton Rouge, Louisiana 70825-1697

Entergy Operations, Inc.
ATTN: R. F. Burski, Director
Nuclear Safety
P.O. Box B
Killona, Louisiana 70066

Hall Bohlinger, Administrator
Radiation Protection Division
P.O. Box 82135
Baton Rouge, Louisiana 70884-2135

President, Parish Council
St. Charles Parish
Hahnville, Louisiana 70057

Mr. William A. Cross
Bethesda Licensing Office
3 Metro Center
Suite 610
Bethesda, Maryland 20814

Winston & Strawn
ATTN: Nicholas S. Reynolds, Esq.
1400 L Street, N.W.
Washington, D.C. 20005-3502

bcc to DMB (IE01)

bcc distrib. by RIV:
R. D. Martin
Section Chief (DRP/A)
DRSS-RPEPS
Project Engineer (DRP/A)
RIV File
Lisa Shea, RM/ALF
M. Murphy, DRS
Resident Inspector
DRP
MIS System
RSTS Operator
DRS
I. Barnes, DRS
D. Hunter, DRS

APPENDIX A

NOTICE OF VIOLATION

Entergy Operations, Inc.
Waterford Steam Electric Station, Unit 3

Docket No.: 50-382
Operating License No.: NPF-38

During an NRC inspection conducted on February 2 through March 14, 1992, violations of NRC requirements were identified. In accordance with the "General Statement of Policy and Procedure for NRC Enforcement Actions," 10 CFR Part 2, Appendix C, the violations are listed below:

A. 10 CFR Part 50.73(b) requires the contents of licensee event reports to contain a clear, specific, narrative description of the event and a description of any corrective actions planned as a result of the event, including those to reduce the probability of similar events occurring in the future.

Contrary to the above, Licensee Event Report 92-001, which addressed a problem with the core operating limit supervisory system (COLSS) azimuthal tilt alarm setting and surveillance test deficiencies, failed to address related problems found on the COLSS margin alarms associated with peak linear heat generation rate and departure from nucleate boiling ratio.

This is a Severity Level V Violation (Supplement I) (VIO 92003-1).

B. Criterion V of Appendix B to 10 CFR Part 50 and the licensee's approved quality assurance program description require that activities affecting quality shall be prescribed by and accomplished in accordance with documented instructions, procedures, or drawings of a type appropriate to the circumstances.

The specified postmaintenance retest for Work Authorizations 01071582 and 01071648 stated, "OPS QA to perform VT-2 of S/G primary manways at normal RCS operating temperature and pressure."

Contrary to the above, the postmaintenance retest was signed off by inspection personnel as completed when, in fact, the VT-2 inspections were performed at 490°F, which was below normal RCS operating temperature of at least 544°F.

This is a Severity Level IV violation (Supplement I) (VIO 92003-3).

Pursuant to the provisions of 10 CFR Part 2.201, Entergy Operations, Inc., is hereby required to submit a written statement or explanation to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, D.C. 20555 with a copy to the Regional Administrator, Region IV, and a copy to the NRC Resident Inspector, within 30 days of the date of the letter transmitting this Notice of Violation (Notice). This reply should be clearly marked as a "Reply to a Notice of Violation" and should include for each violation: (1) the reason for the violation or, if contested, the basis for disputing the violation, (2) the corrective steps that have been taken and the results achieved, (3) the corrective steps that will be taken to avoid further violations, and (4) the date when full compliance will be achieved. If an adequate reply is not received within the time specified in this Notice, an

order may be issued to show cause why the license should not be modified, suspended, or revoked, or why such other action as may be proper should not be taken. Where good cause is shown, consideration will be given to extending the response time.

Dated at Arlington, Texas,
this 3rd day of April 1992

APPENDIX B

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

NRC Inspection Report No: 50-382/92-03

Docket No: 50-382 License No: NPF-38

Licensee: Entergy Operations, Inc.
P.O. Box B
Killona, Louisiana 70066

Facility Name: Waterford Steam Electric Station, Unit 3 (Waterford 3)

Inspection At: Taft, Louisiana

Inspection Conducted: February 2 through March 14, 1992

Inspectors: W. F. Smith, Senior Resident Inspector
Project Section A, Division of Reactor Projects

I. Barnes, Chief, Materials and Quality Programs Section,
Division of Reactor Safety

S. D. Butler, Resident Inspector
Project Section A, Division of Reactor Projects

M. E. Murphy, Reactor Inspector, Test Programs Section,
Division of Reactor Safety

D. R. Hunter, Reactor Inspector, Operational Programs Section,
Division of Reactor Safety

Approved: for Mark A. Satorius
William D. Johnson, Chief, Project Section A 3/30/92
Date

Inspection Summary

Inspection Conducted February 2 through March 14, 1992 (Report 50-382/92-03)

Areas Inspected: Routine, unannounced inspection of plant status, followup, onsite response to events, monthly maintenance observation, bimonthly surveillance observation, operational safety verification, and reliable decay heat removal during outages.

Results:

The inspector concluded that the licensee's actions on the thermo-lag issue were proactive and appropriate. The licensee has expended considerable resources and has made good progress in a long-term effort to resolve all fire

barrier issues identified in the past 4 years, and appeared to be approaching completion in the near future (paragraph 3.2.1). A violation was identified in paragraph 3.3.2 involving failure to provide a complete and accurate licensee event report (LER) on the COLSS margin alarm issue. This was a third example in the past year where required information was not provided in an LER, which may be indicative of weaknesses in both LER writing and technical reviews. The overall format and content of recent LERs have been good, with exception of these specific inaccuracies (paragraph 3.3).

The licensee's performance in dealing with the safety injection tank (SIT) pressure problem in paragraph 3.4.2 was a strength. Therefore, a violation was not cited. The licensee's actions to prevent recurrence of the Struthers Dunn 600 series relay failing were adequate in that the failure appeared to be an isolated case. Both LERs were well written (paragraph 3.4).

Based on a review of past installation and retesting practice used on steam generator (SG) primary manways, the inspectors identified a violation involving failure to follow written instructions (paragraph 4.1).

Weaknesses were identified in the licensee's procurement process in that inadequate controls were placed on the procurement of commercial equipment that could have an effect on important balance-of-plant or safety-related equipment.

The licensee's actions to repair the leaking SG manway were excellent. An unresolved item was initiated to permit further review as to whether or not the previous installation of helicoils was in violation of NRC regulations; however, they were installed using a sound technical basis.

The licensee's nonlicensed auxiliary operator (NAO) exhibited excellence in the performance of his routine inspection tour by finding the Emergency Diesel Generator (EDG) A control air supply valves out of position (paragraph 4.3); however, a second unresolved item was initiated to allow the licensee to determine whether or not EDG A was operable during the period the valves were out of position (paragraph 4).

Overall performance of maintenance activities observed during this inspection period was excellent. Work was accomplished in a timely and professional manner. A minor weakness was noted in the planning and procedures aspect of the work observed, including errors in the hot gas bypass modification on Essential Chiller B, causing it to fail the acceptance test (paragraph 5).

Surveillance testing continued to be a strength at Waterford 3. A minor weakness was identified during fuel handling building (FHB) ventilation system testing in that the test director, who was a system engineer, failed to sign off completed steps as they were done. This was a poor practice (paragraph 6).

The licensee's performance in executing the planned outage was excellent. Close management involvement, maintenance of appropriate priorities, and a high sense of concern and vigilance over operations during reduced reactor coolant system (RCS) inventory all contributed to the orderly completion and success of the outage. However, the inspectors identified a weakness in the licensee's

handling of SI-405A and -B pressure switch drift. Only after the inspectors intervened did the licensee take action to ensure there was sufficient margin to ensure the valves would open if called upon.

Housekeeping during and after the outage was a strength. The inspectors noted a distinct improvement in this area over this inspection period (paragraph 7).

DETAILS

1. PERSONS CONTACTED

1.1 Principal Licensee Employees

*D. F. Packer, General Manager, Plant Operations
*T. R. Leonard, Technical Services Manager
R. S. Starkey, Operations and Maintenance Manager
R. E. Allen, Security and General Support Manager
*J. J. Zabritski, Quality Assurance Manager (Acting)
*D. E. Baker, Director, Operations Support and Assessments
*J. B. Houghtaling, Director, Design Engineering (Acting)
J. A. Ridgel, Radiation Protection Superintendent
*G. M. Davis, Events Analysis Reporting & Response Manager
*R. F. Burski, Director, Nuclear Safety
*L. W. Laughlin, Licensing Manager
T. J. Gaudet, Operational Licensing Supervisor
*J. G. Hoffpauir, Maintenance Superintendent
D. W. Vinci, Operations Superintendent
R. D. Peters, Assistant Maintenance Superintendent, Electrical
D. E. Marpe, Assistant Maintenance Superintendent, Mechanical
D. C. Matheny, Assistant Maintenance Superintendent, Instrumentation and Controls
A. L. Holder, Supervisor, Fire Protection & Safety
O. P. Pipkins, Licensing Support
L. R. LeBlanc, Licensing Support Supervisor
*T. B. Brennan, Design Engineering Manager
*R. W. Prados, Senior Engineer, Licensing
*G. G. Davie, OAID Manager

*Present at exit interview.

In addition to the above personnel, the inspectors held discussions with various operations, engineering, technical support, maintenance, and administrative members of the licensee's staff.

2. PLANT STATUS (71707)

The plant was operated at full power until February 16, 1992, when the plant was shut down for a 10-day planned outage to replace the primary manway gaskets on both SGs (see paragraph 4.1). The plant was cooled down and depressurized and the RCS was partially drained to accommodate the work. During the outage, several other work items were accomplished (see paragraphs 5. and 7.). On February 23, plant heatup commenced and, by February 26, the plant was again operating at full power where it remained until the end of this inspection period.

3. FOLLOWUP

3.1 Followup of Previous Inspection Findings (92701, 92702)

3.1.1 (Closed) Inspection Followup Item (IFI) 90022-1

This item was opened to follow up on the licensee's investigation and corrective action for a September 19, 1990, transient caused by loss of extraction steam to the high pressure feedwater heaters. The inspector reviewed Significant Occurrence Report 90-023, which was completed and approved by the plant manager on August 5, 1991. The report concluded that the transient was caused by valve mislabeling on the high pressure feedwater heaters, which led an operator to close an isolation valve for the level switch, which closed the extraction steam Isolation Valve ES-109 on an indicated high heater level. The operator had intended to isolate and tag a level controller on the heater for maintenance. Corrective action included correcting the identified labeling error and requesting the Operations Quality Assurance Group to perform a surveillance of component labeling on the condensate, feedwater and the feedwater heater drain systems to determine the extent of the problem. Surveillance QS-90-032 was completed January 16, 1991, and of the 133 randomly selected components one was mislabeled. The Operations department had already developed and implemented a component tag and labeling enhancement program which was projected to take approximately 3 years to complete. They indicated that this program should aid in identifying and correcting other component labeling problems. This item is closed.

3.1.2 (Closed) Inspection Followup Item IFI 90024-2

This item was opened to follow up on the licensee's corrective action for deficiencies identified with fuses and fuse holders in the power supplies for their Westinghouse 7300 Process Analog Control (PAC) cabinets. Several fuse and/or fuseholder failures had caused minor plant transients and temporary loss of some indication. The inspector reviewed the licensee's "Fuse and Fuse Holder Failure Report" dated December 6, 1990, and their root cause investigation report, RCI 90-021, dated March 22, 1991. The licensee had done an excellent job of investigating the cause of the fuse and fuseholder failures and establishing corrective actions to prevent recurrence. They had determined that the 20-ampere rated fuse holders were not sufficient to supply the required power to some of the PAC card racks. Specifically, some of the triple-frame card racks drew as much as 17.8 amperes under normal conditions and would overheat and degrade the fuseholders over time and, in some cases, cause the fuses to fail even though current through them was less than the 20-ampere rating. With the concurrence of Westinghouse, the licensee replaced the power supply fuse holders in cabinets with triple-frame card racks with 30-ampere rated holders and used soldered connections to further reduce the resistance, which caused heating and degradation. The system engineer indicated that he periodically monitored the PAC cabinets with a thermographic camera and did not see any further signs of overheating in the fuse holders. He also indicated that a design change to supply forced ventilation to the cabinets was pending and, even though it was intended to prolong the life of the PAC cards, it should further reduce the heat load on the power supply fuse holders. It

was found during the investigation that some of the power supply fuse holders had 15-ampere fuses installed instead of the 20-ampere fuses specified on the vendor drawings. The licensee has established a program for control of electrical fuses at Waterford 3, which should prevent incorrect fuses from being installed in the future. This item is closed.

3.1.3 (Closed) Violation VIO 90026-5

This violation was cited under Enforcement Action 91-006 dated March 15, 1991, as a two-part, Severity Level III problem. The issues involved the licensee's conclusion in late December 1990, that problems associated with work control, surveillance testing, and operation of the control room air conditioning system had placed into question the integrity of the control room envelope and, therefore, the protection afforded control room operators from events such as radiation releases and toxic gas emergencies. The licensee responded to the Notice of Violation on April 15, 1990, and committed to the corrective actions discussed below. The objective of this followup inspection was to verify satisfactory completion of the corrective actions.

Repairs to leakage paths in the control room were completed by December 21, 1990, such that subsequent testing results achieved at least 0.125 inches water gauge positive pressure in the control room, with less than 200 cubic feet per minute makeup air. The inspectors reviewed the test results and found no problems. Surveillance Procedure PE-5-004, Revision 5, "Control Room Air Conditioning Surveillance," was changed to include the 200 cubic feet per minute makeup air flowrate limit as an explicit acceptance criterion, and detailed guidance was provided when any of the acceptance criteria could not be met. On March 4, 1992, the inspectors reviewed Revision 6 and noted that the changes were incorporated, with improved format, in the new revision.

Under long-term, permanent corrective actions, the licensee's Maintenance Review Committee audited the condition identification (CI) report database to ensure that CIs open for more than 3 months were adequately addressed. The inspector noted documentation stating that the results were satisfactory. Also, PE-5-004 was evaluated and revised appropriately to ensure that interfacing ventilation systems were always in the same condition while testing the control room air conditioning system and that measured makeup air flowrates were normalized to 0.125 IWG pressure in the control room to permit meaningful precursor trending. The inspector noted that the new Revision 6 retained those attributes.

On June 14, 1991, the licensee developed a case study on this event so that it could be discussed on a recurring basis with their technical staff. The inspector noted that Training Request No. 91094 was implemented to accomplish this and was scheduled to be covered as part of continuing training beginning December 1991.

The licensee performed an evaluation of procedures used for design change development. The inspector noted that two procedures were changed accordingly on February 28, 1992. The inspector reviewed a sampling of nine Design Document Revision Notices, which showed objective evidence that the licensee revised the

nuclear penetration list to identify air pressure seals within the control room envelope or the controlled ventilation area section (CVAS) in the reactor auxiliary building. On February 27, 1992, the licensee completed an evaluation of the feasibility of labeling seals that affect pressure envelopes controlled by Technical Specifications (TS). Based upon changes made to procedures, and a new "Barrier Functional List" created to work in conjunction with the Nuclear Penetration List, the licensee considered field labeling of nuclear penetrations related to air boundaries was not warranted. The inspector had no problem with that decision since other controls had been implemented as discussed above.

Finally, the inspector reviewed the licensee's actions to revise Design Change No. 3197 to address the fire seals that affected the integrity of the control room, CVAS, FHB, and shield building boundaries. The inspector noted that appropriate changes were made to address the control room and CVAS boundaries, but none were made to address the FHB and shield building because nothing in the scope of the design change package impacted FHB and shield building boundaries. This violation is closed.

3.1.4 (Closed) Violation VIO 91013-1

This violation involved four examples of a failure to properly implement procedures required by TS 6.8.1. The first example involved a failure of Refueling Procedure RF-006-001, Revision 3, "Reactor Vessel Head and Internals Installation," to properly control refueling cavity water level to prevent high radiation during the lift of the upper guide structure from causing unnecessary radiation exposure to personnel and an unnecessary actuation of containment purge isolation. As corrective action, the licensee made revisions to RF-006-001, RF-004-001, "Reactor Vessel Head and Internals Removal," and RF-004-002, "Incore Instrumentation Removal and Disposal," to give adequate guidance on controlling refueling cavity water level during high exposure lifts to minimize radiation exposure to personnel and on precautions to ensure that the containment purge system was shut down to prevent an unnecessary challenge to that safety system. The inspector noted that the changes to the above procedures were made before the committed date and found them to be satisfactory.

The next example involved a failure to respond to an alarm that was intended to alert the operators to a failure of the Safety Parameter Display System (SPDS). As a result, the SPDS was not functioning for over 24 hours, which diminished the licensee's ability to make offsite dose assessments during an accident. This was reportable to the NRC under 10 CFR Part 50.72. The licensee's corrective action included a letter to all licensed operators to heighten their awareness of the importance of this alarm and review their responsibilities to acknowledge alarms as required by Procedure OP-100-001, "Duties and Responsibilities of Operators on Duty." They also indicated that their computer group would investigate ways of enhancing the alarm indication for a nonfunctioning SPDS to ensure it would get the attention of the operators in the control room. The letter to licensed operators was issued by the committed date and was found to be satisfactory upon review by the inspectors.

Another example of the violation involved a failure to properly perform an independent verification during motor-operated valve analysis and test system (MOVATS) testing of Valve BAM-113A. Because the valve was located inside a contaminated area, the workers were not able to follow the strict guidance in Procedure UNT-005-010, Revision 2, "Independent Verification Program," and obtain verification and signatures before they proceeded beyond the applicable steps. The licensee's corrective action included changing Procedure UNT-005-010 to provide some flexibility to workers as allowed by their upper tier document, Site Directive W2.101, "Procedure Compliance." This guidance allowed the use of communications between a verifier and a procedure reader when working conditions prohibited direct procedural usage. The change to Procedure UNT-005-010 was made by the committed date and was found to be satisfactory.

The final example of procedural noncompliance involved a mispositioning of Valves EGF-123A and -124A which caused a test run of EDG A to be aborted due to an overflow of fuel oil. Since the licensee was unable to identify the circumstances which led to the valves being mispositioned, they immediately increased administrative controls by changing the standby valve lineup of Procedure OP-009-002, Revision 11, "Emergency Diesel Generator," to require EGF-123A(B) and -124A(B) to be locked open. Since it was known that the valves were sometimes operated when filling the fuel oil storage tanks, this was proceduralized in Procedure OP-003-009, "Fuel Oil Receipt," to prevent the inadvertent mispositioning of the valves. The change to Procedure OP-003-002 was made as committed and also found to be satisfactory. The inspectors will continue to monitor the licensee's procedural compliance during routine inspections. This violation is closed.

3.1.5 (Closed) Violation VIO 91021-1

The violation cited three examples of the licensee's failure to meet the requirements of 10 CFR Part 50, Appendix B, for corrective action, and their Corrective Action Program as described in Site Directive W2.501. The inspector reviewed their response to the Notice of Violation dated September 17, 1991, and the indicated corrective action which included issuance of Quality Notices for the three cited conditions adverse to quality and training for maintenance and maintenance engineering personnel. The training consisted of a memorandum from the Maintenance Superintendent covering the violation and the requirements of the licensee's Corrective Action Program and his expectations for maintenance personnel to identify and document conditions adverse to quality. The content of the memorandum was covered with maintenance engineering and electrical, mechanical, and instrumentation and control maintenance personnel in shop meetings by the committed date as demonstrated by meeting rosters. The inspector considered the corrective action adequate for the violation and properly implemented in accordance with the licensee's commitment. This violation is closed.

3.1.6 (Closed) Violation VIO 91021-3

This violation was cited for a failure to comply with TS 3.8.1.1 action requirements for an inoperable EDG to ensure the operability of offsite A.C.

power sources by verifying correct breaker alignment within 1 hour. The inspector reviewed the licensee's response dated September 17, 1991, and their stated corrective action which included the issuance of a new procedure, OP-100-014, Revision 0, "Technical Specification Compliance," which was intended to standardize and provide procedural guidance for TS compliance, particularly for inoperable EDGs resulting from inoperable support systems. In addition, precautions and guidance were added to the operating procedures for "Component Cooling Water," Procedure OP-002-003, and "Chilled Water," Procedure OP-002-004, which alerted the operators to use the guidance in OP-100-014 when a train of the system became inoperable. The inspector reviewed the procedure and procedure changes and considered the corrective action appropriate and adequate to prevent recurrence. This violation is closed.

3.2 Other Followup (92701)

3.2.1 Fire Protection Program Followup

The objective of this inspection followup was to review the licensee's actions as a result of NRC Information Notices 91-47, "Failure of Thermo-Lag Fire Barrier Material to Pass Fire Endurance Test," and 91-79, "Deficiencies in the Procedures for Installing Thermo-Lag Fire Barrier Materials." These information notices alerted licensees to problems that could result from the improper use or installation of thermo-lag material to satisfy fire protection requirements for safe shutdown components specified in 10 CFR Part 50, Appendix R.

The use of thermo-lag material by the licensee at Waterford 3 was very limited. Thermo-lag was used to construct two barriers located on the +46 foot elevation of the reactor auxiliary building in the heating and ventilation room. One of these barriers was a 1-hour fire wall separating Essential Chiller AB from Essential Chillers A and B. The other barrier was a 1-hour fire wall separating Air Handling Units 13A and 13B. Both fire walls were only partitions and did not separate their respective components into separate rooms. The licensee requested, and was granted, an exemption by the NRC for this configuration. A third barrier was constructed with thermo-lag panels on the +35-foot elevation of the reactor auxiliary building adjacent to the reactor containment building in the Train A electrical penetration area. This barrier enclosed Containment Electrical Penetration No. 107.

Thermo-lag was also used to provide 1-hour barriers for fire damper installations where the damper assembly was installed external to the fire rated barrier penetrated by the ventilation duct.

All thermo-lag installations had been declared inoperable by the licensee and the required compensatory measures implemented. This action was initiated by the performance of the fire barrier inspection surveillance test in late 1988. The conditions discovered were reported in LER 88-025. Design Change No. 3134 was issued and subsequently revised to correct the identified deficiencies. The inspector was informed by the licensee that partitions in the heating and

ventilation rooms and some of the fire damper barriers would be replaced with different barrier material. The disposition of the remaining thermo-lag applications was pending further review of the use of thermo-lag.

Conclusions:

The inspector concluded that the licensee's actions on the thermo-lag issue were proactive and appropriate. The licensee has expended considerable resources and has made good progress in a long-term effort to resolve all fire barrier issues identified in the past 4 years and appeared to be approaching completion in the near future.

3.3 In-Office Review of LERs (90712)

The following LERs were reviewed. The inspectors verified that reporting requirements had been met, causes had been identified, corrective actions appeared appropriate, generic applicability had been considered, and that the LER forms were complete. The inspectors confirmed that unreviewed safety questions and violations of TS, license conditions, or other regulatory requirements had been adequately described. The Region IV staff determined that an onsite inspection followup of the event was not appropriate. The NRC tracking status is indicated below.

3.3.1 (Closed) LER 91-022, "Inadvertent Engineered Safety Features Actuations due to Plant Protection System Test Circuit Malfunction"

The inspector reviewed the LER and found that it was complete, accurate, and timely. Prior to the event, the licensee was actively pursuing improvements to the plant protection system test circuitry due to previous malfunctions and indicated that the corrective action for the latest malfunction would be included in a design change that was currently planned to be implemented during the next refueling outage. The corrective actions were considered appropriate to prevent recurrence of the failure. This LER is closed.

3.3.2 (Open) LER 92-001, "Failure to Satisfy Technical Specification Surveillance Requirement due to Inadequate Administrative Controls and Inadequate Attention to Detail"

On February 26, 1992, the inspector reviewed this LER for accuracy and completeness, in addition to the above attributes. This issue was addressed in NRC Inspection Report 50-382/91-31, paragraph 4.2. The licensee found the azimuthal power tilt alarm not properly set and determined, upon investigating the causes, that Surveillance Procedure NE-5-103, Revision 3, "COLSS Alarm Verification," did not properly meet the stated requirements of TS 4.2.3.2.a. The procedure verified that the COLSS alarm was functional, but failed to verify the correct setpoint. A violation was not cited for failure to meet TS surveillance requirements because the error had minor safety significance and the licensee's corrective actions appeared to address all of the concerns. During a separate surveillance program inspection conducted by Region IV on February 4-7, the regional inspector identified a similar problem with the COLSS margin alarm associated with the core power operating limit based on peak

linear heat generation rate (PLHGR) in kilowatts per foot (TS 4.2.1.3). When the regional inspector identified the problem, the licensee informed him that the problem was being addressed along with the azimuthal tilt alarm problem. The Region IV inspector documented this in NRC Inspection Report 50-382/92-04, paragraph 3, and stated that NRC would follow up. When the licensee completed their review, they found that a similar problem existed for the Departure from Nucleate Boiling Ratio (DNBR) margin alarm (TS 4.2.4.3). The procedure for all three alarm surveillances was revised, and software changes were implemented in order to meet the TS surveillance requirements. There was no concern about the alarm setpoint for the DNBR and PLHGR margin alarms because the COLSS continuously calculated the margins. With azimuthal tilt, however, a fixed addressable constant was set into both the COLSS and the core protection calculator (CPC), and it was subject to adjustment by the operators during power operation.

The LER focused on the azimuthal tilt problem and failed to address the problems found with the DNBR and PLHGR margin alarms. On Page 7 it stated "No other COLSS-CPC related procedures exist which could have a similar error." The inspector discussed this with the licensee, who explained there was a communications breakdown between personnel who performed the corrective actions and those responsible for properly reporting the issue pursuant to 10 CFR Part 50.73. This was also indicative of a weakness in the review and approval process of the LER. The licensee stated that the LER would be revised. Over the past year, the resident inspectors identified two other cases where an LER failed to accurately and fully report an event, resulting in revisions (see LERs 91-008 and 91-011). Failure to identify the DNBR and PLHGR margin alarm surveillance problems is a violation of 10 CFR Part 50.73(b) in that information provided to the NRC by the licensee did not include a complete and accurate description of the event and actions taken to prevent a recurrence (VIO 92003-1).

This LER shall remain open until an acceptable revision is issued and satisfactorily reviewed.

Conclusions:

A violation was identified in paragraph 3.3.2 above involving failure to provide a complete and accurate LER on the COLSS margin alarm issue. This was a third recent example where required information was not provided in an LER, which may be indicative of weaknesses in both LER writing and technical reviews. The overall format and content of recent LERs have been good, with exception of the above specific inaccuracies.

3.4 Onsite LER Followup (92700)

The following LERs were selected for onsite followup inspection to determine whether the licensee has taken the corrective actions as stated in the LER and whether responses to the events were adequate and met regulatory requirements, licensee conditions, and commitments. The NRC tracking status is indicated below.

3.4.1 (Closed) LER 91-011, "Reactor Trip Due to Faulty Relay"

The inspector reviewed the revised LER published on August 8, 1991. The licensee submitted a revised LER after the inspectors pointed out that the original report failed to mention the actuation of a main steam isolation signal which occurred following the reactor trip. A violation of 10 CFR Part 50.73 was not cited because, at the time, this omission appeared to be the second of two isolated cases. In addition, the licensee provided some additional information on related corrective action associated with the failed Struthers Dunn 600 series relay. The failed relay prevented the electrical bus supplying two reactor coolant pumps from transferring to the startup transformer following a turbine trip and resulted in the reactor trip on May 28, 1991. The licensee inspected three other similar relays for the electrical buses supplying reactor coolant pumps during the recent outage under Work Authorization 01080665 and reported that no problems were found. Numerous other Struthers Dunn relays were used throughout the plant, but the licensee did not feel that sufficient information was available to indicate that the relay that failed on May 28 was an indicator of a generic problem. The relay failed due to a coil failure caused by degradation of the plastic sleeve surrounding the core. They felt this was an isolated case since previous failures were due primarily to high contact resistance. The licensee indicated that any future malfunctions of Struthers Dunn relays would be investigated to gather data that might determine if the relays had a generic problem. This LER is closed.

3.4.2 (Closed) LER 91-017, "Operation in Technical Specification 3.0.3 for Inaccurate Safety Injection Tank Pressure Indication due to an Inadequate Procedure"

The inspector reviewed the LER and determined that it was complete, accurate, and submitted in a timely manner. The licensee determined that the inaccurate pressure indication for SITs 1A and 2B was due to water in the pressure instrument sensing lines. They believed that the water came from the SITs when they were refilled following maintenance during the last refueling outage. Operating Procedure OP-009-008, Revision 9, "Safety Injection System," required that a drained SIT be refilled to 100 percent and then drained down to its normal operating level under nitrogen pressure. The licensee felt that the procedure was deficient in that it did not require that the instrument line be checked for water following the fill evolution. The pressure instrument lines come off the top of the tanks. The TS violation was due to the fact that indicated pressure was higher than actual nitrogen pressure in the two SITs due to the water in the pressure instrument lines. The licensee indicated that the error was small and would not have significantly affected the predicted postaccident fuel peak clad temperatures.

The inspector reviewed the licensee's long-term corrective action, which consisted of a change to Procedure OP-009-008 to add the requirement to drain the pressure instrument sensing lines following refill of the tanks. The procedure change was issued September 20, 1991, and was considered adequate to prevent recurrence of the problem. The violation of TS described in the LER will not be subject to enforcement action because the licensee's efforts in identifying and correcting the violation meet the criteria specified in Section VII of the NRC Enforcement Policy (NCV 92003-2). This LER is closed.

Conclusions:

The licensee's performance in dealing with the SIT pressure problem in paragraph 3.4.2 was a strength. Therefore, a violation was not cited, pursuant to Section VII of the NRC Enforcement Policy. The licensee's actions to prevent a recurrence of the failed Struthers Dunn 600 series relay were adequate in that the failure appeared to be an isolated case. Both LERs were well written.

4. ONSITE RESPONSE TO EVENTS (93702)

4.1 RCS Leak

On January 9, 1992, the licensee discovered boric acid crystals and water leaking below SG No. 1. As described in paragraph 4.3 of NRC Inspection Report 50-382/91-31, the licensee could not gain sufficient access to find the exact source of leakage. Radiation levels were too high to gain safe access with the plant at power. The licensee concluded, based on the available information, that it was the SG No. 1 primary cold leg manway gasket that was leaking and began planning an outage to make repairs.

On February 3, the licensee discovered that 150 pounds per square inch (psi) design gaskets were installed on the hot and cold leg primary manways on both SGs, when the gaskets should have been 2500 psi design. The SG vendor, Combustion Engineering (CE), identified the required gaskets in the SG technical manual by Part Number 276-102, "commercial grade," with dimensions and material notes which called for stainless steel and asbestos "Flexitallic Special" or equal. The pressure rating was not specified. The licensee performed an operability determination in accordance with Site Directive W4.101, "Nonconformance/Indeterminate Analysis Process." The determination was documented on February 4, and the licensee concluded that the four primary manways were operable and that no immediate safety concerns existed. This was based primarily on discussion with CE who, in turn, discussed the problem with Flexitallic, the gasket manufacturer. The inspectors noted that the joint design was such that the gasket was completely captured, and that catastrophic failure could not occur. The licensee noted that the remaining three SG manways were not leaking.

4.1.1 Steam Generator Primary Manway Gasket Procurement

The inspector was provided a review by licensee personnel of the procurement history of SG primary manway gaskets. Included in this review was a discussion of the circumstances pertaining to the purchase orders (POs) erroneously specifying 150 psi design gaskets for the application. This error was described to have resulted from a clerical error during transfer of gaskets from the plant constructor's (Ebasco) inventory control to the licensee's inventory control. The transfer requisition, which was prepared by nontechnical licensee personnel with no technical review performed, identified the gaskets by the CE Part Number 276-102 and as 18-inch, 150 psi. No reason had been established for the 150 psi pressure rating, in that the gaskets were not tagged with the

rating, and the Ebasco and CE documentation did not indicate any pressure rating. This error was subsequently carried forward to other documents (including POs) without the error being detected.

The inspector reviewed the licensee POs that were applicable to procurement of SG primary manway gaskets (i.e., L-23519-H, WP026851, WP030370, WP040096, and WP04006). It was ascertained from this review that all of the POs were placed with a local distributor and that the following three types of procurement occurred:

4.1.1.1 PO L-23519-H, which was issued on December 14, 1982, identified the gasket size and specified that the gaskets be flexitallic, manway gaskets, 2500 psi, with Type 304 stainless steel backing.

4.1.1.2 POs WP026851 and WP040061, dated August 2, 1989, and April 24, 1991, respectively, identified the gasket size and specified that the gaskets be stainless steel/asbestos, 150 psi. In addition, the POs identified: (1) that the gaskets were intended to be used in SG primary manways, (2) the original CE PO number, (3) the applicable CE drawing and part number, (4) that the gaskets were to be flexitallic type, and (5) the dimensional tolerances listed on the CE drawing. Certain technical and quality requirements were also included in the text of PO WP026851 and by attachment of Procurement Specification PROC-M-100, "Gasket, Spiral-Wound," Revision 1, to PO WP040061. These requirements included chemical limitations and the furnishing of a certificate of conformance.

The installed 150 psi gaskets were determined by licensee personnel to have been procured by PO WP026851. Review by the inspector of receipt documentation for this PO showed that the gasket manufacturer had furnished to the distributor a certificate of conformance which addressed the chemical limitations of the PO. In addition, a final inspection report was furnished by the gasket manufacturer to the distributor which contained a statement of conformance to distributor PO requirements and also identified PO WP026851 as a "customer reference." It could not be concluded whether the "customer reference" signified that PO WP026851 had been transmitted to the manufacturer by the distributor or was simply a notation of the ultimate customer. Licensee examination of the gaskets received for PO WP040061 found that they appeared to be higher pressure gaskets than the 150 psi gaskets that had been specified.

4.1.1.3 POs WP030370 and WP040096, dated December 4, 1989 and April 25, 1991, respectively, identified the gasket size and specified that the gaskets be flexitallic stainless steel. In addition, the POs identified: (1) that the gaskets were intended for steam generator manways, (2) the part number, but without indicating that it was a CE part number, and (3) that the materials were to be furnished in accordance with Purchase Specification PROC-M-100, Revision 1. The POs did not identify a required pressure rating or specify the original CE PO number, CE drawing number, or CE dimensional tolerances. Licensee examination of gaskets received for these two POs found that those furnished to PO WP030370 appeared to be the same as those received for PO WP026851. Those received for PO WP040096 appeared to be a higher pressure design gasket.

The licensee did not consider the primary manway gaskets to be safety-related. This was based, in part, on the specific exclusion by Article NB-2000 in Section III of the American Society of Mechanical Engineers (ASME) Code of gaskets for consideration as pressure retaining material. The licensee's root cause investigation was still in progress as of the end of this inspection, but the preliminary root cause of the problem was determined to be the documentation error that occurred during transfer of the gaskets to the licensee's inventory control. Contributing causes were determined to be not specifying pressure ratings on two of the POs, the vendor supplying a high pressure gasket when a 150 psi gasket was specified, and a misunderstanding that Flexitallic could cross-reference a CE part number and supply the correct gasket.

Observations made by the inspector during review of the procurement history were as follows:

4.1.1.4 The gasket procurement history was an indicator that insufficient attention had been given to technical review of important nonsafety-related procurements.

4.1.1.5 The 150 psi value should have been identified as an error during development of the requirements for PO WP026851. This observation would be contingent on the procurement engineer being cognizant of the technical requirements contained in the original CE PO that was referenced in PO WP026851.

4.1.1.6 The failure to recognize that a 150 psi gasket was not appropriate for primary pressure during the PO technical review was an indicator of a training weakness.

4.1.1.7 The present methods, when procuring through distributors, did not assure that the manufacturer either received the licensee purchase order or was fully cognizant of the procurement requirements (i.e., a certificate of conformance was required from the supplier rather than the manufacturer).

4.1.2 Review of Manway Cover Installation Practices

The inspector verified that the thread lubricants used by the licensee for SG primary manway studs were of a type that would not contribute to initiation of stress corrosion cracking (i.e., the lubricants did not contain molybdenum disulfide). In addition, the inspector reviewed Work Authorizations (WAs) 01071648 and 01071582 to ascertain the installation practices that were used for the SG manway covers during the previous refueling outage (RFO-4) following completion of eddy current testing. It was noted during this review that the postmaintenance retest listed on page 4 of both WAs was for Operations Quality Assurance to perform a visual inspection for leakage (VT-2) of the SG primary manways at normal RCS temperature and pressure. This visual inspection was signed off as being completed on May 20, 1991, by two different Level II examiners for each SG.

Examination of the two inspection reports that were referenced by the WAs identified, however, that the test temperature was marked "N/A" for the visual

examination of the primary manways in each SG. Both inspection reports had been signed as being reviewed by a Level III examiner. In addition, the ASME Section XI Work Package Review Form for the two WAs showed that the opening review by the repair/replacement engineer had identified that a VT-2 inspection was required to be performed at normal operating pressure and temperature. The closing review by the repair/replacement engineer for each WA was signed off without identification of any deviation from the VT-2 requirement. At the inspector's request, the licensee reviewed temperature charts and inspection logs and confirmed that the VT-2 inspections were performed at 490°F, which was below the normal no-load operating temperature of about 544°F. The inspector reviewed ASME Section XI Code requirements and verified that the VT-2 inspection was required by ASME Code to be performed at normal operating pressure and not necessarily at normal operating temperature. However, the WA should have been changed and properly approved to delete the normal operating temperature requirement. The failure to comply with the WA VT-2 instruction indicates a weakness in work control practices and is a violation of Criterion V of Appendix B to 10 CFR Part 50 (VIO 92003-3).

4.1.3 Use of Helical Coil Threaded Inserts on SG Manway Studs

On February 4, the licensee informed the inspectors that they had installed a helical coil threaded insert (helicoil) on one stud for the SG No. 1 hot leg manway and two others on the SG No. 2 cold leg manway during the previous refueling outage completed in May 1991. ASME Boiler and Pressure Vessel Code Case N-496, "Helical Coil Threaded Inserts," permitted the use of helicoils; however, the NRC had not accepted the code case as required by 10 CFR Part 50.55a. On February 5, the licensee sent a letter to the NRC Office of Nuclear Reactor Regulation Project Manager for Waterford 3, informing NRC of the condition and providing some background information. On February 14, the licensee formally requested specific approval for the use of helicoils on any SG manway and to extend the approval to the 3 helicoils already installed. The basis for the request included a 10 CFR Part 50.59 evaluation, CE Calculation CENC-1805, "Waterford Unit No. 3 Steam Generator Manways," which confirmed that helicoils may be used in any or all stud holes, and ASME Code Case N-496, not yet accepted by the NRC in accordance with 10 CFR Part 50.55a. The licensee entered the deficiency (failure to comply with 10 CFR Part 50.55a) in their corrective action program by initiating Quality Notice No. 92-008. As it turned out, the licensee had no need to utilize additional helicoils during the manway gasket replacement. On February 21, the NRC approved the specific application of the three helicoils already installed in the SGs. Failure to comply with the 10 CFR Part 50.55a requirement to apply only those ASME Code Cases that have been determined suitable for use by the NRC would be a violation if the Code Case had been the basis for using helicoils. Since the licensee had a sound technical basis for applying the existing helicoils, there remained a question as to whether or not the helicoils could have been installed absent the Code Case. Therefore, it remained unresolved, as of the end of this inspection period, whether or not NRC regulations were violated. The NRC is in the process of reviewing this issue (UNR 92003-4).

On February 16, the plant was shut down and the licensee confirmed that the RCS leak under SG No. 1 was the primary cold leg manway. The inspectors reviewed

the video tapes of the leak, which showed some steam coming out the bottom of the manway between two studs and minor leakage coming out of the threads of the nut on a stud at the top of the manway. The licensee decided to cool down the plant, repair the leak, and replace the 150 psi design gaskets discussed above with the correct 2500 psi design gaskets on the hot and cold leg manways of both SGs. The licensee had planned for this decision and had also planned some other outage work that could be accomplished in parallel.

By February 19, the SG No. 1 cold leg manway was removed. The 4.88-inch thick manway cover had boric acid wastage in the area where it contacted the stainless steel cover plate gasket area. The wastage was about 5/16 inch deep from about the 4 o'clock position to the 7 o'clock position. Because this area was needed to properly compress the gasket, even though minimum thickness was not reached, CE recommended machining the cover to remove the wastage, but not to exceed 3/8 inch of material removal. The licensee successfully machined 5/16 inch from the cover face. This restored the flatness and removed the wastage. The SG nozzle face had boric acid wastage at the 6 o'clock position, but under CE guidance and acceptance, the licensee faired in the rough surface by grinding. The stainless steel gasket seating surface was not damaged. The inspectors inspected studs removed from all four manways. The studs removed from SG No. 1 hot leg were free of wastage, except two had minor thread corrosion in a small area that could not be removed. Apparently, there had been a slight RCS leak near these studs for a short time. Three of the SG No. 1 cold leg studs had wastage. One had about 6 threads eaten away and about a 10 percent diameter reduction. This was on the threads extending beyond the nuts which had no load. The two other studs had corrosion on the reduced diameter shank, but very minor reduction in cross section. The licensee replaced all of the corroded or questionable studs and nuts on the SG No. 1 manway.

There was some minor corrosion in spots on the SG No. 1 bowl underneath the manway. CE evaluated the condition and supervised fairing in by grinding. On February 24, while the plant was at 1650 psia and normal operating temperature, the inspectors inspected both SG No. 1 manways and the areas below the manways. There was no evidence of leakage, and all of the boric acid deposits resulting from the leak were removed.

Later that day, the plant was pressurized to normal operating pressure, and the four manways were inspected by the licensee for leakage to satisfy retest requirements. No leakage was found.

4.2 COLSS Margin Adjustment

On February 21, 1992, the licensee informed the inspectors that, prior to the startup following the February 16 planned outage, addressable constants would be conservatively readjusted to reflect a possible increase in the statistical uncertainties that were input to the COLSS and the CPC. This would result in a reduced COLSS margin as it applied to DNBR and PLHGR. On February 20, CE was performing a verification of statistical uncertainties in support of developing a modified combination of statistical uncertainties for COLSS and CPC to be used after Refueling Outage No. 5 in September 1992. They discovered during a

scoping analysis that the 3°F uncertainty that had been in use for temperature instruments was closer to 3.9°F. This was because they assumed the licensee was using metering and test equipment accurate to 0.25 percent when in fact it was 0.50 percent. The significance of this issue was that the potential existed that DNBR and PLHGR margins might have been exceeded without a COLSS alarm to alert the operators. The licensee was confident that such was not the case, because there were conservatisms in other parameters contributing to the uncertainty, i.e., installed instrument drift had been much smaller than the assumed value. The licensee initiated a nonconformance condition report and commenced reevaluating the 3.9°F uncertainty. Until it was reevaluated, the licensee stated that the plant would be operated assuming the greater uncertainty. If the uncertainty could not be evaluated back to, or below, the original 3°F, the licensee stated they would determine whether or not any margins were exceeded and make the appropriate reports as required by NRC regulations. Since COLSS monitored licensed full power operating limits using a calorimetric calculation, and it had been most limiting in the past, it was unlikely that any margins were exceeded. The inspectors will monitor the licensee's actions and will track the final resolution of this issue under IFI 92003-5.

4.3 EDG A Valves Out of Position

At 8:28 a.m. on March 11, 1992, one of the licensee's nonlicensed auxiliary operators (NAOs) found the EDG A left bank cranking control air shutoff Valve EGA-302A and the left bank nonfailsafe air supply Valve EGA-404A in the closed position when they were required to be open. He found this condition during a routine tour, and remembered both valves were in the correct open position about the same time on March 10. These were tubing valves located on a control air panel, and the status was easily determined at a glance. The significance of this was that the left bank air start valve (one of two redundant valves) was disabled with Valve EGA-302A closed. Valve EGA-404A being shut had no consequence because this air supply was cross-connected to the right bank air supply. Also, Valve EGA-404A supplied air to EDG trip devices that would be bypassed during an emergency start.

During the timeframe that EGA-302A may have been closed, Air Compressor A1, which was supplying air to the right bank air start valve, was taken out of service for maintenance. Therefore, the only source of starting air was Receiver A1, with no air compressor to maintain pressure. The pressure had dropped to below the low pressure alarm point of 175 psig by about 9:30 a.m. on March 10 and was not restored to the normal pressure of 260 psig until after 12 noon on March 10. EDG A may not have been operable with degraded starting air pressure on the right bank and with the left bank disabled (EGA-302A closed) for up to 3 hours on March 10. TS 3.8.1.1 required both EDGs to be operable during this period, because the plant was operating at full power.

The licensee promptly restored the valves to the proper position after the discovery was made on March 11. They also conducted breaker and valve lineup checks in accordance with the EDG operating procedure and found no other problems. Utilizing a security printout, the licensee also investigated who was in the EDG A room from the time the valves were seen in the correct

position on March 10, until the valves were found out of position on March 11. As of the end of this inspection period, the licensee was still in the process of contacting the approximately 40 people who were in the room.

At about 6 p.m. on March 11, the licensee informed the inspectors that on Monday, March 9 (which was a compressed work week day off for most employees), the NAOs reported discrepancies in waste control panel valve positions compared with information they had received during shift turnover. This panel was located in a passageway near the exit from the radiologically controlled area. While this had no safety significance, it added to the licensee's concerns about unexplained valve mispositioning. The licensee included the investigation on this problem with the EDG A problem above, because there might have been some connection as to the cause.

The licensee directed watchstanders to increase vigilance over the plant systems and to watch for suspicious activity. As of the end of this inspection period, the licensee had not made a determination of whether or not EDG A was operable during the 3-hour period on March 10 when right bank starting air pressure was below the alarm point. Also, the licensee had not established a cause for the two left bank control air supply valves being out of position. Therefore, it remains unresolved as to whether or not a violation of NRC regulations occurred (UNR 92003-6).

Conclusions:

Based on a review of past installation and retesting practice used on SG primary manways, the inspectors identified a violation involving failure to follow written instructions (paragraph 4.1). Weaknesses were identified in the licensee's procurement process in that inadequate controls were placed on the procurement of commercial equipment that could have an effect on important balance-of-plant, or safety-related equipment. The licensee's actions to repair the leaking SG manway were excellent. It remains unresolved as to whether or not the previous installation of helicoils was in violation of NRC regulations; however, they were installed using a sound technical basis. The licensee's NAO exhibited excellence in the performance of his routine inspection tour by finding the EDG A control air supply valves out of position (paragraph 4.3). It remains unresolved as to whether or not EDG A was operable during the period Compressor A1 was out of service and the control air supply valve was inappropriately closed.

5. MONTHLY MAINTENANCE OBSERVATION (62703)

The station maintenance activities affecting safety-related systems and components listed below were observed and documentation reviewed to ascertain that the activities were conducted in accordance with approved WAs, procedures, TS, and appropriate industry codes or standards.

5.1 WA 01055179, 01087318: Wet Cooling Tower B Maintenance

On February 10, 1992, the inspector observed maintenance on the wet cooling tower for Auxiliary Component Cooling Water System B. One WA was written to

replace a broken spray header nozzle and another was to perform a periodic inspection of the wet cooling tower for signs of deterioration or damage. The inspector reviewed the WAs and found them properly prepared, approved, and adequate for the work being performed. The persons performing the maintenance were familiar with the equipment being maintained. No problems were identified.

5.2 WA 01086148: Packing Adjustment and Subsequent MOVATS Test of Valve MS-401B

On February 7, 1992, the inspector observed portions of the MOVATS testing on Emergency Feedwater Pump A/B steam supply Valve MS-401B. In November 1991, a packing leak was identified on Valve MS-401B. The inspectors noted that the leak slowly deteriorated while awaiting maintenance action. On or about January 31, 1992, the inspectors expressed concern to the Shift Supervisor that the leakage appeared quite severe. By February 7, the packing was finally adjusted. The technicians retested the valve in accordance with Maintenance Procedure ME-007-027, Revision 5, "Using MOVATS 2150/2151 System for Test MOV." The inspector reviewed the data and found no significant problems. After the MOVATS test was completed and the test equipment removed, the operators conducted a retest of the valve in its normal configuration by performing Surveillance Procedure OP-903-046, Revision 9, "Emergency Feedwater Pump Operability Check." The valve and pump operated satisfactorily; however, the valve packing began to leak slightly. Since the valve could not be safely repacked while the plant was operating (the valve could not be isolated and depressurized because it was piped directly from the main steam header upstream of the main steam isolation valve), the licensee chose to initiate a new CI report and close out the above WA. The valve packing appeared to be leaking to an acceptable degree.

While reviewing the WA, the inspector noted instructions to obtain a clearance, remove the packing, and install new packing in the valve if leakage could not be stopped by adjusting the existing packing. In view of the plant conditions (operating at full power) and the fact that MS-401B could not be isolated from the steam header, these instructions did not appear appropriate to the circumstances. The inspector discussed this with the Mechanical Maintenance Superintendent and expressed it as a weakness in planning.

During the outage, the valve was repacked. A minor burr was found on the valve stem which appeared to be a cause of packing leakage. The burr was removed and the valve successfully MOVATS retested prior to the plant startup following the outage. After several days of plant operation at power, the inspector checked the packing for leakage and found none.

5.3 WA 01089639: Repair of Essential Chiller B Evaporator

On January 28, 1992, Essential Chiller B was taken out of service to perform an overhaul and to implement five design changes developed to improve performance. On or about February 3, while the overhaul was in progress, a workman inadvertently bumped the refrigerant isolation valve which isolated the refrigerant reservoir from the drained evaporator, releasing refrigerant back to the evaporator. The partially opened valve apparently acted as an expansion

valve, reducing the released refrigerant temperature to below freezing. The tubes were still full of water and over 70 tubes were frozen. After checking, the licensee found that most of the 70 tubes were ruptured. The above WA was implemented to replace the damaged tubes and perform the required retests. The repairs were done with the assistance of a Carrier service representative, with special tools for removing and replacing tubes furnished by Carrier. The inspector reviewed the WA and found the instructions to be sufficiently detailed and well engineered to assure a quality repair. The evaporator shell had to be cut open to enable the mechanics to remove the damaged and swollen tubes by cutting them and pulling them out the side. They could not be pulled through the tubesheet, which would be the normal method, because of the swelling. The major portions of this work were observed by the inspector on February 11-13.

The work was being done in a professional manner and good work practices were executed. ASME pressure vessel code requirements were incorporated into the documentation and were met. When needed, a firewatch was provided in accordance with the licensee's procedures when hot work was being done. On March 6, all five modifications were completed and the machine had been cleaned, evacuated, charged with Refrigerant 12, and leak tested. The machine was started up in accordance with the operating procedure and loaded. The inspector observed no abnormalities and the compressor functioned smoothly. The 5 modifications were: (1) a motor ammeter was added to the control panel, (2) a dehydrator was added which could be monitored and the water drained without shutting down the machine, (3) an oil recovery line with sightglass, (4) a fixed motor current feedback resistor, and (5) a new modulating hot gas bypass valve. The acceptance tests specified for the modifications were completed satisfactorily except for the hot gas bypass modification, Station Modification 3176. The essential chillers each had a hot gas bypass which was designed to open under very low load conditions to prevent the units from tripping off the line on low suction pressure. They had not worked well, and consequently there have been many low load shut downs, especially during cool weather. This has not been a safety problem in that when a load was sensed the units would automatically restart (after a time delay). The hot gas bypass modification added an air operated valve with pneumatic-electric controls designed to modulate the bypass during low load conditions. This new feature did not function when operationally tested. The maintenance technicians concluded, with engineering assistance, that the wiring design was flawed and needed redesign and alteration before it would work. The inspectors met with Design Engineering to determine the cause of the problem. The hot gas bypass control vendor had apparently miscommunicated with the designer over what adjustments must be made if an isolation device was not utilized in the circuit. Consequently, the design called for wiring connections that would not work. This appeared to be an isolated case, and it was detected by the acceptance test and, therefore, was not of significant concern. The licensee corrected the design on March 13, and the inspectors will follow up on satisfactory completion of the modification and the acceptance test during the next inspection period.

5.4 WA 01090142: EDG B Fuel Oil Storage Tank (FOST) Cleanup

On February 19, 1992, the inspector observed the licensee using a fuel tank maintenance contractor to clean up the diesel fuel in the FOST for EDG B. A portable filtration unit was used to recirculate the fuel and remove particulate matter. The fuel met the TS requirements for cleanliness, but the licensee desired to reduce the fuel contaminants prior to reaching a required action level. The WA which was used to connect the filtration unit to the tank was reviewed and found to be properly prepared and approved and adequate for the work. The system engineer for the EDGs was directing the work. A change to Procedure OP-003-009, Revision 7, "Fuel Oil Receipt," was made to align the tank for the recirculation. The change required closing the discharge valve for the fuel transfer pump, which made the EDG inoperable. It still would have emergency started and sufficient time would have been available to open the pump discharge valve before the feed tank ran out of fuel. The unit was in Mode 5 and only one EDG was required to be operable by TS. The licensee intended to keep the EDG available during the evolution since the unit was on shutdown cooling (SDC) with the RCS drained to midloop to facilitate replacing the SG primary manway gaskets. The tank was recirculated and filtered for approximately 24 hours and particulates were reduced from 26.0 mg/liter down to 1.14 mg/liter. The FOST for EDG A was filtered following restoration of the tank for EDG B with similar results. No problems were noted with the work.

5.5 WA 01089136: Investigate Possible Seat Leakage for Valve SI-243

On February 19, 1992, the inspectors observed work on High Pressure Safety Injection Check Valve SI-243. The valve was suspected of leaking back through its seat and contributing to the leakage from SIT 2-A. The tagout for the work was reviewed and found to be adequate to isolate the valve. The WA was reviewed and found to be properly prepared and approved. The package did not contain specific instructions for reinstalling the valve bonnet to insure that the seal ring was properly seated. SI-243 was an Anchor-Darling check valve similar to RC-303 which developed a significant leak after the fourth refueling outage due to the seal ring being cocked (see NRC Inspection Report 50-382/91-18). The mechanic assigned to work the valve stated that all the maintenance personnel qualified to work these valves had been adequately trained subsequent to the RC-303 problem and that more specific work instructions were not needed. The inspector later discussed this with the Mechanical Maintenance Assistant Superintendent and he indicated that he was satisfied that current training of his people was sufficient for working on this type of valve. Consideration was being given to adding detailed instructions to their valve maintenance procedure to ensure assembly techniques obtained from the vendor were not lost. The inspector observed work on the valve and noted good radiological work practices. The valve was disassembled, cleaned, and inspected. The valve seat and disk were in excellent condition and no further rework was necessary. No other problems were identified with the work.

Conclusions:

Overall performance of maintenance activities observed during this inspection period was excellent. Work was accomplished in a timely and professional manner. A minor weakness was noted in the planning and procedures aspect of the work observed, including errors in the hot gas bypass modification on Essential Chiller B, causing it to fail the acceptance test.

6. BIMONTHLY SURVEILLANCE OBSERVATION (61726)

The inspectors observed the surveillance testing of safety-related systems and components listed below to verify that the activities were being performed in accordance with the TS. The applicable procedures were reviewed for adequacy, test instrumentation was verified to be in calibration, and test data was reviewed for accuracy and completeness. The inspectors ascertained that any deficiencies identified were properly reviewed and resolved.

6.1 Procedure MI-03-504, Revision 3, "Broad Range Gas Detection System Channel Functional Test and Calibration"

On February 11, 1992, the inspector observed the weekly calibration of the Broad Range Gas Monitor "B," which was required by TS Surveillance Requirement 4.3.3.7.3. The calibration was performed in accordance with Section 8.2 of Procedure MI-03-504. The surveillance test was properly authorized and performed by qualified personnel in accordance with an approval procedure using calibrated test equipment. The detector was calibrated using Benzene as the calibration gas with the instrument span corrected to the standard gas, Acrolein, in accordance with Attachment 10.1 of the procedure. The surveillance procedure was considered adequate for the task and followed well by the technicians. No problems were identified.

6.2 Procedure PE-005-006, Revision 4, "Fuel Handling Building Ventilation System Surveillance"

On February 11 and 12, 1992, the inspector observed the performance of sections of PE-005-006 for both trains of the FHB emergency filtration units. The procedure instructed surveillance testing of the units as required by TS Surveillance Requirements 4.9.1.2. The sections of PE-005-006 that were being performed were 8.1, "Pretest Visual Inspection," 8.5, "Airflow Capacity and HEPA/HECA DP Check," 8.6, "In-Place Leak Test, HEPA Filters," and 8.7, "In-Place Leak Test, Adsorbent." The inspector verified that the testing was properly authorized and was being performed in accordance with an approved procedure. Properly qualified personnel were performing the testing using calibrated test equipment. The licensee used contract personnel to do the testing and they were directed by a licensee system engineer. The inspector reviewed the training and qualifications of the test personnel and the calibration certification for their test equipment. No problems were identified.

On February 11, the inspector observed testing on the Train A filtration unit. He noted that, with the testing well underway, a significant number of test steps, prerequisites, and data sheets had not been signed-off or completed even

though it appeared that the steps had been done. This was discussed with the system engineer directing the test and he confirmed that the work had been performed but that the documentation had not been kept current. The procedure was reviewed and it was determined that no steps had been performed which required signatures prior to proceeding. On February 12, the inspector reviewed the procedure for the sections which were completed on the Train A unit and the documentation was complete and all applicable acceptance criteria were met. The inspector witnessed performance of Section 8.5, "Airflow Capacity and HEPA/HECA DP Check," for the Train B unit and noted that adjustments had to be made to the unit inlet damper, HVF-202B, to bring the airflow down into the required range. Airflow was remeasured and met the acceptance criteria. No other problems were noted with the surveillance test.

6.3 Procedure OP-903-033, Revision 9, "Cold Shutdown IST Valve Tests"

On February 23, 1992, the inspector observed the performance of OP-903-033 for Valve SI-405A. The test was being performed as a retest for the valve after the nitrogen pressure was reduced in the valve's closing accumulator (See paragraph 7) as required by TS 4.0.5. The test was properly authorized and performed in accordance with an approved procedure. A qualified individual performed the test. The valve closing time met the test acceptance criteria. No problems were identified.

6.4 Procedure OP-903-008, Revision 3, "Reactor Coolant System Isolation Leakage Test"

On February 23, 1992, the inspector observed the performance of Procedure OP-903-008 for Valves SI-405A and SI-405B. The test was being performed for the valves as required by TS Surveillance Requirement 4.4.5.2.3.b following maintenance on the valves. The test was properly authorized and performed in accordance with an approved procedure by qualified individuals. Both valves met the TS and procedural acceptance criteria for seat leakage. No problems were identified.

Conclusions:

Surveillance testing continued to be a strength at Waterford 3. A minor weakness was identified during FHB ventilation system testing in that the test director, who was a system engineer, failed to sign off completed steps as they were done. This was a poor practice.

7. OPERATIONAL SAFETY VERIFICATION (71707)

The objectives of this inspection were to ensure that this facility was being operated safely and in conformance with regulatory requirements, to ensure that the licensee's management controls were effectively discharging the licensee's responsibilities for continued safe operation, to assure that selected activities of the licensee's radiological protection programs were implemented in conformance with plant policies and procedures and in compliance with regulatory requirements, and to inspect the licensee's compliance with the approved physical security plan.

The inspectors conducted control room observations and plant inspection tours and reviewed logs and licensee documentation of equipment problems. Through in-plant observations and attendance of the licensee's plan-of-the-day meetings, the inspectors maintained cognizance over plant status and TS action statements in effect.

During the 10-day outage to replace SG manway gaskets, the inspectors frequently monitored control room activities while the plant was in reduced inventory conditions, the inspectors monitored the licensee's compliance with the requirements of Procedure OP-001-003, Revision 13, "Reactor Coolant System (RCS) Drain Down," which contained special precautions and requirements for monitoring RCS level and SDC system operation when the RCS was partially drained. The licensee maintained redundant indicators of RCS level, a dedicated operator to monitor SDC system operation, and cognizance of activities that had the potential for interrupting SDC, or containment integrity in the event that SDC was lost, as required by NRC regulations.

On February 17, while attempting to place SDC in service, the operators were unable to open one of the Train A SDC suction valves from the RCS hot leg, Valve SI-405A. The redundant Train B was successfully placed in service, that is, Valve SI-405B opened. The licensee found that the hydraulic actuator pressure switch setpoint had drifted downward by about 150 psi and, as a consequence, the actuator could not generate sufficient hydraulic pressure to unseat the valve. The switch was reset and SI-405A was opened. For the duration of the outage, SI-405A and -B were gagged open, which was a normal practice to prevent inadvertent loss of SDC and isolation of the low temperature over-pressure reliefs from the RCS.

The inspectors followed up on the actions being taken by the licensee to address the SI-405A failure. During the previous refueling outage, new Paul-Munroe hydraulic open, nitrogen pressure close, actuators were installed on the valves to improve reliability. The first time they were called upon to open, one failed. The purpose of the pressure switches was to maintain hydraulic opening pressure at 2975 plus or minus 25 psig. The pressure switches had an adjustable setpoint range of 800 to 2800 psig (increasing), according to the vendor manual but, upon consulting with Paul-Munroe, the licensee was told that since the maximum recommended system pressure was 3000 psig and proof pressure was 5000 psig, it was acceptable to set the switch at 2975 psig.

The licensee told the inspector that exact replacement switches were on hand, the setpoint for SI-405B would be checked, and engineering was evaluating, for the long term, whether to adjust the hydraulic and/or nitrogen pressure to lower operating values. Upon checking the switch on SI-405B, the licensee found that it had drifted down 85 psig. Nitrogen pressures were verified correct for both valves. On the basis of the manufacturer's assurance that it was acceptable to use the pressure switches even though the setpoints were beyond the design adjustment range, the license indicated an intent to start up from this outage and operate with no further action on SI-405A and -B until Design Engineering completed its long-term evaluation. The inspector expressed concern that no further immediate corrective action was unacceptable. Both

valves had demonstrated a pressure switch drift, and there was no assurance that either or both would not drift during power operation such that they might not perform their intended safety function. This issue had safety significance, because the valves must open to provide SDC and RCS low temperature over-pressure protection following a small break loss of coolant accident. The valves were located in the containment building and, as such, would not be accessible during such an accident scenario.

In response to the inspector's concern, the licensee reduced the nitrogen pressure by 160 psi to provide a margin for potential hydraulic pressure switch drift. The nitrogen pressure alarm was also changed accordingly. The licensee used the proper administrative controls, reviews, and approvals. The change was made consistent with 10 CFR Part 50.59 requirements. The inspector reviewed the documentation and found no problems. The licensee also placed the replacement pressure switches in an environment approximating that of the containment during operation, so that the setpoint could be monitored for drift on a periodic basis. If these switches drifted, the licensee would check (and adjust, if necessary) the installed switches. The licensee's actions to reduce the nitrogen pressure on SI-405A and -B, with the appropriate engineering considerations, coupled with monitoring the setpoints of the replacement switches, was considered appropriate. Failure to take prompt and appropriate corrective actions without the prompting of the NRC inspectors is considered a weakness in the licensee's staff to recognize and apply the correct priority to what might have been a significant condition adverse to quality. The inspectors will follow up on the long-term corrective actions taken by the licensee (IFI 92003-7).

For the duration of the planned outage, close management controls and involvement was evident. Through the plan-of-the-day and plan-of-the-evening meetings the inspectors were able to keep abreast of many of the challenges and how they were dealt with. Since manpower resources were limited, priorities were kept in focus. Health Physics personnel resources were strained by the high work load. To help relieve this, the licensee enlisted the aid of volunteers from the administrative staff to assist. Several volunteers from the secretarial staff appeared at the containment control point and they were very helpful and effective in keeping operations at the control point running smoothly. This was a positive aspect of the good teamwork frequently observed at Waterford 3.

On February 24, while the RCS was at normal operating temperature and pressure (Mode 3), the licensee performed an inspection of repairs made to correct RCS leakage, and also the SG primary manway gaskets, as discussed in paragraph 4.1 above. Prior to the outage, hot leg injection Check Valve SI-512B had been leaking past the hinge pin cover gaskets. Since opening this particular valve involved a high degree of risk in terms of potential loss of SDC (see NRC Inspection Report 50-382/91-17), the licensee decided to replace the four studs and nuts holding each of two cover plates in place, with higher strength studs and nuts. In this manner, higher torque could be applied, thus compressing the gasket to provide a better seal to stop the leak. This was done, and during the inspection there was no leakage found. However, three of the four nuts on one cap were cracked, as were two of the nuts on the

other cap. The cracks went all the way through one side of each nut in question. Maintenance, with the concurrence of the Duty Plant Manager, secured the caps with a "C" clamp and added a nut to each stud (the studs had surplus length), and then replaced all of the nuts one at a time. The replacement nuts came from a different source, substituted in accordance with the licensee's procedures. This action was timely and appropriate and prevented subjecting the plant to an unnecessary pressure and temperature transient.

The cracked nuts were machined from liquid quenched and tempered ASME SA-194 Grade 6 stainless steel by NOVA Machine Products Corporation of Middleburg Heights, Ohio. The licensee had purchased 24 nuts on February 5, 1992, and some of the unused nuts in the warehouse were similarly cracked. The licensee accounted for all 24 nuts and noted that none were installed elsewhere in the plant. The cracked nuts were sent to an independent laboratory for failure analysis, and NOVA was informed of the problem. The licensee informed the inspector that NOVA was very responsive and had commenced a search to determine if any other customers had purchased fasteners made from that heat number of bar stock. They were also determining reportability pursuant to 10 CFR Part 21, which was invoked by the purchase order for the 24 nuts. The inspectors will monitor the licensee's actions on this problem.

On February 24, the resident inspectors conducted a detailed inspection tour of the reactor containment building as the licensee heated up the plant for startup. The inspectors verified that no foreign material was in the safety injection recirculation sump, and that there was no loose material in containment that could block the sump screens during a postulated accident. The inspectors discussed several minor deficiencies and questions with the shift supervisor. These were addressed to the inspectors' satisfaction prior to startup. Although there was limited work done, the cleanup of boric acid deposits and overall housekeeping in containment was excellent.

On February 27, while the plant was operating at full power, the inspector noted a large number of scaffolds erected in the Safeguards Rooms, which housed the emergency core cooling system pumps. The scaffolds had just been erected to support smoke detector surveillance testing. Some of the scaffolds were attached to structures that support seismic pipe supports for safety-related systems. The inspector reviewed the documentation required by Procedure NOCP-207, "Erecting Scaffold," and found that the appropriate engineering reviews were made. Still concerned about the large number of scaffolds with a weekend coming up, the inspector was assured that the surveillance would be quickly implemented, and overtime was authorized to get the scaffolding out of the safeguards rooms at the earliest opportunity. The inspector followed up after the weekend on March 3 and found that the scaffolding was removed. The licensee's control of scaffolding has improved since the subject was brought up as a concern in April 1991 (See NRC Inspection Report 50-382/91-09).

Conclusions:

The licensee's performance in executing the planned outage was excellent. Close management involvement, maintenance of appropriate priorities, and a high

sense of concern and vigilance over operations during reduced RCS inventory all contributed to the orderly completion and success of the outage. However, the inspectors identified a weakness in the licensee's handling of SI-405A and -B pressure switches drift. Only after the inspectors intervened did the licensee take action to ensure there was sufficient margin to ensure the valves would open if called upon. Housekeeping during and after the outage was a strength. The inspectors noted a distinct improvement in this area over this inspection period.

8. RELIABLE DECAY HEAT REMOVAL DURING OUTAGES (TI 2515/113)

On February 20 through 24, 1992, the inspectors reviewed the licensee's procedures and practices in dealing with outage activities which had the potential for contributing significantly to a loss of capability to remove decay heat from the reactor. The outage conducted during this period involved core heat removal operations while the RCS was drained to midloop. No major safety concerns were identified; however, the licensee was still in the process of refining and developing outage risk assessment practices.

Information obtained in accordance with Temporary Instruction No. 2515/113 will be transmitted to the Reactor Systems Branch, NRC Office of Nuclear Reactor Regulation, for review as directed by paragraph 2515/113-04.

9. SUMMARY OF TRACKING ITEMS OPENED IN THIS REPORT

The following is a synopsis of the status of all open items generated, closed, and left open in this inspection report:

IFI 90022-1 was closed.
IFI 90024-2 was closed.
VIO 90026-5 was closed.
VIO 91013-1 was closed.
VIO 91021-1 was closed.
VIO 91021-3 was closed.
LER 91011 was closed.
LER 91017 was closed.
LER 91022 was closed.
LER 92001 remained open.

VIO 92003-1, Failure to meet 10 CFR Part 50.73 requirements, was opened.
NCV 92003-2, Operation in TS 3.0.3 due to incorrect SIT pressure was identified and is closed.
VIO 92003-3, Failure to comply with instructions, was opened.
UNR 92003-4, Resolution of Helicoil Issue, was opened.
IFI 92003-5, Followup on COLSS/CPC Uncertainty Evaluation, was opened.
UNR 92003-6, Resolution of EDG A operability during valve mispositioning, was opened.
IFI 92003-7, Followup on actions for SI-405A & -B, was opened.

10. EXIT INTERVIEW

The inspection scope and findings were summarized on March 13, 1992, with those persons indicated in paragraph 1 above. The licensee acknowledged the inspectors' findings. The licensee did not identify as proprietary any of the material provided to, or reviewed by, the inspectors during this inspection.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION III
799 ROOSEVELT ROAD
GLEN ELLYN, ILLINOIS 60137

April 3, 1992

MEMORANDUM FOR: Frank J. Miraglia, Deputy Director, Office Nuclear Reactor Regulation

FROM: A. Bert Davis, Regional Administrator, Region III

SUBJECT: CALLAWAY PLANT - THERMO-LAG CONCERNS

Your memorandum dated February 6, 1992, identified concerns pertaining to missing test results and engineering analyses to support Thermo-Lag installations at the Callaway Plant. From discussion with Loren Plisco of your staff, we understand the problem of missing test results and analyses is widespread. This is based upon additional site visits made since your memorandum on Callaway. You have, therefore, concluded that this issue should be addressed in a generic letter which is being prepared by the special NRR team reviewing Thermo-Lag issues.

Accordingly, no further action on the issue will be taken with respect to specific plants until issuance of the generic letter. Following issuance of the generic letter, we will proceed with whatever inspections are required. Currently, our next routine fire protection inspection at Callaway is planned for February 1994.

We will address the second issue in your memorandum (licensee's inability to locate a specific vendor supplied record) as part of a general inspection of Callaway engineering and technical support activities now scheduled for July 1992.

Please contact Mr. H. J. Miller (FTS 388-5788) of my staff if you have any questions on our response.

A. Bert Davis
Regional Administrator

cc: J. Zwolinski, NRR
B. Grimes, NRR
L. Plisco, NRR
S. West, NRR
SRI, Callaway

Central Files/Docket File No 9901224/RIPS IE:0
A T Hadam
G Hola han
C McCracken
K Architzel
P. Madden

9204220053

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

April 8, 1992

MEMORANDUM FOR: TSI File

THRU: Ralph Architzel, Chief
Special Projects Section
Plant Systems Branch
Division of Systems Technology
Office of Nuclear Reactor Regulation

FROM: Patrick M. Madden
Senior Fire Protection Engineer
SPLB/DST/NRR

SUBJECT: SUMMARY OF RUBIN FELDMAN'S PRESENTATION CONCERNING THE ISSUES ASSOCIATED WITH THERMO-LAG FIRE BARRIERS AT THE EDISON ELECTRIC INSTITUTE (EEI) FIRE PROTECTION COMMITTEE MEETING, PHOENIX, ARIZONA, MARCH 29 - APRIL 1, 1992

On March 31, 1992, Mr. Feldman, President of Thermal Science, Inc. made a presentation to the open session of the EEI fire protection committee. Mr. Feldman's presentation consisted of giving a brief history of his company and his early involvement with the aerospace industry. The overall purpose of Mr. Feldman's presentation was to state the issues as TSI views them. Throughout the presentation, Mr. Feldman stated and stressed that TSI was a supplier of a product and only that TSI assured that the product supply was consistent.

Mr. Feldman also indicated that TSI had a good fire test facility and a well equipped lab. Mr. Feldman indicated that they will make their furnace available to help the industry.

Mr. Feldman discussed the December 1991, NRC vendor inspection. The areas inspected consisted of the manufacturing process, QA/QC, installation procedures, testing, and test facility. Mr. Feldman indicated that there were no major findings identified during the exit interview, and that he is still waiting for the NRC inspection report to be issued.

With respect to fire testing, Mr. Feldman indicated that he is familiar with only one test failure. The test criteria used by TSI in qualifying the Thermo-Lag product was American Nuclear Insurers (ANI) Bulletin No. 5 and ASTM E-119. The specific test criteria used/monitored was the standard time temperature curve versus furnace temperature, hose stream test, and circuit integrity monitoring. Mr. Feldman claimed that the ANI reports on the acceptability of his material by ANI for "insurance purposes only" were reviewed by the NRC. In addition, Mr. Feldman indicated that TSI itself has conducted 50 tests on over 100 prototype configurations items and that he was aware of only 8 tests that exceed 325 F internal temperature criteria of ASTM E-119.

Mr. Feldman discussed ampacity concerns. He indicated that TSI used an ampacity test procedure developed by Bechtel and performed ampacity testing at Underwriter's Laboratories (UL) in January 1987. TSI felt that the results of these tests were conservative. In addition, Mr. Feldman indicated that the results of these tests were sent to the NRC. Using the results of the UL ampacity test results, TSI is offering the industry a simplified method to relate ampacity reduction to an open top tray configuration.

TSI planned activities to address the concerns identified by the NRC will consist of revising the installation procedures, conducting additional fire tests, and retraining installers. Mr. Feldman indicated that TSI plans to fire test a 36" tray and a small diameter conduit (3/4 - 1 inch size). Mr. Feldman also indicated that TSI is revoking all installer training certifications issued prior to 1991. His new training program will consist of "hands on" activities and testing of the installer on the required installation basics and material properties (health/safety/material). The new training certification issued, through the TSI revised training program, will be valid for 2-years.

Mr. Feldman indicated that TSI plans to stand behind their product and work with NUMARC and utilities. At the end of his presentation Mr. Feldman reinforced his opening remarks by stating that TSI is a supplier only and the details of installation is the responsibility of the utility or their Architect Engineer.

Patrick M. Madden
Sr. Fire Protection Engineer

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[Feldman.PMM]

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
611 RYAN PLAZA DRIVE, SUITE 400
ARLINGTON, TEXAS 76011-8064

APR 9 1992

NOTICE OF SIGNIFICANT LICENSEE TECHNICAL MEETING

Name of Licensee:	Gulf States Utilities
Name of Facility:	River Bend Station
Docket:	50-458
Date and Time of Meeting:	April 20, 1992, at 9 a.m. (CST)
Location of Meeting:	River Bend Station, Executive Conference Room Administrative Building
Purpose of Meeting:	Technical meeting to discuss the findings associated with an inspection of licensee actions regarding the application of Thermo-Lag fire barrier and compliance with the requirements of Appendix R to 10 CFR Part 50
NRC Attendees:	D. D. Chamberlain, Deputy Director, Division of Reactor Safety (DRS) P. Harrell, Chief, Project Section C, Division of Reactor Projects (DRP) E. Ford, Senior Resident Inspector D. Pickett, Project Manager, NRR A. Singh, Reactor Inspector, DRS P. Madden, Senior Fire Protection Engineer, NRR
Licensee Attendees:	J. Deddens, Senior Vice President M. Sankovich, Manager, Engineering P. Graham, Plant Manager J. Hamilton, Director, Design Engineering W. O'Dell, Manager, Oversight L. England, Director, Nuclear Licensing

Note: (1) Attendance by NRC personnel at the NRC/licensee meeting should be made known by COB on April 16, 1992, via telephone call to P. Harrell at 817/860-8250. (2) This meeting is open to attendance by members of the general public.

Approved By:
A. Bill Beach, Director
Division of Reactor Projects

IE45
1/1

Distribution:
J. H. Sniezek, DEDR
H. L. Thompson, DEDS
T. E. Murley, D/NRR
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J. G. Partlow, ADP/NRR
J. Lieberman, D/OE
L. J. Chandler, Asst. GC for Enf.
S. Shankman, OEDO Staff
L. R. Plisco, LPEB/NRR
R. D. Martin, RIV
G. F. Sanborn, EO
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DRA Secretary
Division Secretary
DMB IE45
Licensee Address List

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION V

1450 MARIA LANE
WALNUT CREEK, CALIFORNIA 94596-5368

APR 16 1992

MEMORANDUM FOR: Frank J. Miraglia, Deputy Director
Office of Nuclear Reactor Regulation

FROM: R. P. Zimmerman, Director
Division of Reactor Safety and Projects

SUBJECT: WASHINGTON NUCLEAR PROJECT, UNIT 2 -
FIRE PROTECTION PROGRAM CONCERNS

In our memorandum of January 28, 1992 we stated our intentions to conduct an inspection at WNP-2 to address the fire protection program related concerns identified by Messrs. Loren Plisco and Steven West. The inspection, initially planned for May 4-8, 1992, has been rescheduled for the week of July 27, 1992 due to the availability of the inspector. This change has been coordinated with your staff. If you have any comments about our proposed course of actions, please contact Paul Narbut (FTS 448-0313) or Bill Wagner (FTS 448-0316) of my staff.

L. L. Perkins for

R. P. Zimmerman, Director
Division of Reactor Safety and Projects

cc:
B. Boger, NRR
P. Eng, NRR
B. Grimes, NRR
L. Plisco, NRR
S. West, NRR
C. Sorensen, RV
H. Wong, RV

L177

9210060022 IP

RESPONSE TO VENDOR INSPECTION.

04/23/92
CC: KWALKER, CIG
E PANLIK, RIII/LI
RARCHITZEL
P MADDEN
L PLISCO

TSI

20 April 1992

RUBIN FELDMAN, P.E.
President

U S Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D C 20555

Reference: Reply To Notice Of Nonconformance
(Docket No. 99901226/91-01)

VENDOR PROGRAM

Ladies and Gentlemen:

This is in response to the above subject Notice of Nonconformance issued by you to Thermal Science, Inc. (TSI), which raised questions about TSI's documentation of quality assurance procedures. An accompanying letter from Leif J. Norrholm also raised questions about the level of installation support provided by TSI to its customers. This reply describes TSI's corrective actions and preventive measures taken in response to the NRC's communications.

A. Nonconformance 91-01-01

The NRC's notice states that TSI's documented instructions and procedures used for certain NRC licensee purchase orders did not require verification of the maximum weight and minimum thickness of THERMO-LAG Prefabricated Panels and THERMO-LAG Preshaped Conduit Sections of the THERMO-LAG 330 Fire Barrier System. In practice, quality control sheets are prepared for each panel manufactured, which state the maximum weight and minimum thickness required for shipment. In order to correct TSI's documented instructions and procedures to reflect actual practice, TSI has revised the following sections of the Quality Control Operating Test Procedures of TSI's Nuclear Quality Assurance Program Manual by including maximum weight and minimum thickness requirements:

A-32 Dry Film Thickness
THERMO-LAG Preshaped Conduit Sections

A-33 Dry Film Thickness
THERMO-LAG Prefabricated Panels

C-4 Selected Properties
THERMO-LAG Prefabricated Panels

C-7 Selected Properties
THERMO-LAG Preshaped Conduit Sections

9204230273

THERMAL SCIENCE, INC. • 2200 CASSENS DR. • ST. LOUIS, MO 63026 • (314) 349-1233
Telex: Domestic 44-2384 • Overseas 209901 • Telecopier (314) 349-1207

L179

B. Nonconformance 91-01-02

The NRC's notice states that TSI failed to comply with its documented instructions and procedures when conducting tests to qualify fire barriers for commercial nuclear power plants. Specifically, the NRC determined that (1) TSI's test plans did not adequately specify specimen construction, (2) TSI did not maintain written procedures for the method and time interval of calibration of furnace thermocouples, (3) TSI did not contractually specify the role of Industrial Testing Laboratories (ITL) in fire endurance qualification tests, and (4) TSI did not have a record of auditing ITL.

(1) Specimen Construction. TSI's Nuclear Quality Assurance Program Manual covers the manufacture of the actual product and not of test specimens, which are covered in separate test plans and daily work sheets for each test. In the future, all test plans will provide complete dimensioned instructions for fabricating the test specimen.

(2) Calibration. A procedure for the calibration of furnace thermocouples will be implemented prior to TSI's performing any future testing for the nuclear power generating industry.

(3) Contract Specifying ITL's Role. ITL at all relevant times had a legally binding oral agreement with TSI, was fully aware of the test criteria and received a copy of the test plan prior to the test. Nevertheless, any future testing by third party test laboratories will be done pursuant to a written contract specifying the role of the laboratory in detail. All future test plans will be in writing and will contain provisions indicating all applicable requirements, regulations, codes, specifications and standards, and the test report format will more clearly indicate the laboratory's function in the testing process.

(4) Audit of ITL. Because ITL has performed third party observations and testing for TSI for many years and its personnel have suitable credentials, TSI has considered ITL to be qualified by previous history in lieu of an ongoing audit process. However, all future testing subject to 10 CFR 50 will include procedures for qualify the testing organization by means of a survey and/or audit. Such procedures will be incorporated in the test plans and purchase orders.

C. Installation Support

TSI is sensitive to the NRC's comments about installation support. TSI is in the process of expanding its installation procedures manual. TSI has not previously tested 36 inch wide steel ladder back cable trays or 3/4 inch diameter steel conduits. TSI's expanded installation procedures manual will be released, therefore, as soon as its presently scheduled tests at Omega Point Fire Test Laboratories on these cable trays and conduits are complete and the resultant installation designs have been properly incorporated into the expanded manual.

In addition, TSI has already taken steps to encourage nuclear power industry customers to avail themselves of additional training programs offered by TSI. All personnel who have participated in training will be encouraged to obtain retraining every two years. An improved training program including an expanded training manual is also being developed.

We trust this has been responsive to your Notice of Nonconformance. If we can do anything further to assist you in evaluating our safety procedures, please do not hesitate to contact the undersigned.

Yours truly,

Rubin Feldman
President

RF/meg

cc: Mr. Leif J. Norrholm, Chief
Vendor Inspection Branch
Division of Reactor Inspection
and Safeguards
Office of Nuclear Reactor Regulation

P. MADDEN

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

March 26, 1992

Docket No. 99901226

Mr. Rubin Feldman, President
Thermal Science, Incorporated
2200 Cassens Drive
St. Louis, Missouri 63026

SUBJECT: NRC INSPECTION REPORT 99901226/91-01

Dear Mr. Feldman:

This letter addresses the December 16-20, 1991, inspection of Thermal Science, Incorporated (TSI) in St. Louis, Missouri. The inspection was conducted by Messrs. R. C. Wilson and R. N. Moist of this office. The inspection findings were discussed at the conclusion of the inspection with you and the members of your staff identified in the enclosed report. The purpose of the inspection was to review TSI's program for supplying Thermo-Lag fire barrier material for use in commercial nuclear power plants.

Areas examined during the NRC inspection and our findings are discussed in the enclosed report. This inspection consisted of an examination of procedures and records, interviews with personnel, and observations by the inspectors. The inspection identified that the implementation of your QA program failed to meet certain U.S. Nuclear Regulatory Commission (NRC) requirements. Specifically, your quality assurance procedures failed to specify a requirement for measuring the minimum thickness and maximum weight of prefabricated panels and conduit sections of Thermo-Lag fire barrier material. These measurements are important to safety because thin sections may not provide assured fire barrier capability, and overweight sections could exceed cable tray and conduit support capabilities. Although in only one case was a maximum thickness specified in a purchase order, evidence was not available to show conformance with this requirement. Maximum thickness may be an important consideration in licensee ampacity derating calculations.

In addition, although the inspection did not concentrate on qualification tests, we found that your procedures did not adequately specify controls over such tests, particularly regarding incomplete definition of test specimen construction and the role of Industrial Testing Laboratories, Inc. (ITL) in observing tests performed by TSI. These concerns challenge the validity of these tests and their use by NRC licensees in verfiying conformance with NRC requirements.

The specific findings and references to the pertinent requirements for the above nonconformances are identified in the enclosed Notice of Nonconformance.

We were also concerned by the installation support provided by TSI to your customers. Although TSI trained installers and provided an installation guide, some licensees have reported installation deficiencies with Thermo-Lag material in commercial nuclear power plants. These deficiencies resulted in inadequate fire barriers and possible loss of redundancy in engineered safety feature systems. Based on actual nuclear plant experience, the TSI position that customer installation procedures supplemented by general customer training should be sufficient to ensure adequate installation of Thermo-Lag may not be correct.

The response requested by the enclosed Notice of Nonconformance is not subject to the clearance procedures of the Office of Management and Budget as required by the Paperwork Reduction Act of 1980, Public Law No. 96-511. The inspection was restricted to documents and personnel at TSI, and the inspectors did not review any site documents or attempt to close any ongoing NRC reviews.

In accordance with 10 CFR Part 2.790 of the NRC's "Rules of Practice," a copy of this letter and its enclosures will be placed in the NRC's Public Document Room.

Sincerely,

Leif J. Norrholm, Chief
Vendor Inspection Branch
Division of Reactor Inspection
and Safeguards
Office of Nuclear Reactor Regulation

Enclosures:
1. Notice of Nonconformance
2. Inspection Report 99901226/91-01

~~BGrimes~~
cc: K. West - please make sure that IG & OI task force members get a copy.
cc: R. Architzel

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* SEE PREVIOUS CONCURRENCE

OFFICE	DRIS:VIB	DRIS:VIB	DRIS:VIB	NRR	DRIS:VIB
NAME	RWILSON	RMOIST	CVANDENBURGH	SWEST	LNORRHOLM
DATE	3/6 /92*	3/9 /92*	3/9 /92 *	3/6 /92*	3/ 9/92*

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NAME	BGRIMES				
DATE	3/6 /92*	3/ /92	3/ /92	3/ /92	3/ /92

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ENCLOSURE 1

NOTICE OF NONCONFORMANCE

Thermal Science, Incorporated
St. Louis, Missouri 63026

Docket No.: 99901226/91-01

During a U.S. Nuclear Regulatory Commission (NRC) inspection conducted at Thermal Science, Incorporated (TSI) in St. Louis, Missouri on December 16-20, 1991, the NRC inspection team determined that certain activities were not conducted in accordance with NRC requirements that were contractually imposed on TSI by purchase orders from an NRC licensee. The NRC has classified these items as nonconformances to the requirements of Title 10 of the Code of Federal Regulations, Part 50 (10 CFR Part 50), Appendix B, Quality Assurance Program.

A. Criterion V, "Instructions, Procedures, and Drawings," of Appendix B to 10 CFR Part 50 requires in part that activities affecting quality be prescribed by documented instructions or procedures.

Section 6.1 of TSI's Nuclear Quality Assurance (QA) Program Manual, Revision X, dated January 12, 1987, states that documented instructions and procedures are provided to prescribe all TSI activities affecting QA.

Contrary to the above, TSI's documented instructions and procedures used for purchase orders invoking 10 CFR Part 50, Appendix B, did not require verification of the maximum weight and minimum thickness of prefabricated panels and conduit sections during final inspection. (91-01-01)

B. Criterion V, "Instructions, Procedures, and Drawings," of Appendix B to 10 CFR Part 50 requires in part that activities affecting quality be prescribed by documented instructions and accomplished in accordance with the instructions.

Several instances were observed of the failure of TSI's qualification testing to conform to Appendix B to 10 CFR Part 50, including the following.

1. Section 6.1 of TSI's Nuclear QA Program Manual, Revision X, dated January 12, 1987, states that documented instructions and procedures are provided to prescribe all TSI activities affecting QA.

Contrary to the above, TSI's fire endurance qualification test plans did not provide complete instructions for fabricating the test specimens. Several dimensions were not specified and instructions for filling joints

were not specific. (Test records provided as-built data for some but not all of this information.)

2. Section 13.4 of TSI's Nuclear QA Program Manual, Revision X, dated January 12, 1987, states that written calibration procedures shall specify the method to be used and the time interval between calibrations for test equipment.

   Contrary to the above, no documentation was found specifying calibration of furnace thermocouples used for qualification testing of fire barrier specimens for use in commercial nuclear power plants.

3. Section 5.3 of TSI's Nuclear QA Program Manual, Revision X, dated January 12, 1987, states in part that the requisitioning of services for use in nuclear safety-related activities shall use the purchase requisition form, which shows information such as the applicable regulations, codes, specifications and standards.

   Section 5.6 of TSI's Nuclear QA Program Manual, Revision X, dated January 12, 1987, states that the purchase order shall contain all pertinent and applicable requirements listed on the purchase requisition.

   Contrary to the above, TSI had no written contract with Industrial Testing Laboratories, Inc. (ITL), which served as an independent observer for qualification tests actually conducted by TSI. The TSI president stated that only an oral agreement existed, which specified rates but not scope of work.

4. Section 19.4 of TSI's Nuclear Quality Assurance Program Manual, Revision X, dated January 12, 1987, states in part that suppliers to TSI of services for nuclear safety-related activities shall be audited as required by the Manager of Quality Assurance. The frequency of such audits normally will be determined by the purchased item's potential to adversely affect quality, the complexity of the purchased item, the quantities involved and the past performance of the vendor.

   Contrary to the above, there was no record of audit of Industrial Testing Laboratories Inc. to support their role in qualification testing of fire barrier material and ITL was listed on TSI's Approved Vendor List based only on experience. (91-01-02)

Please provide a written statement or explanation to the U. S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, D.C. 20555 with a copy to the Chief, Vendor Inspection

Branch, Division of Reactor Inspection and Safeguards, Office of Nuclear Reactor Regulation, within 30 days of the date of the letter transmitting this Notice of Nonconformance. This reply should be clearly marked as a "Reply to a Notice of Nonconformance" and should include for each nonconformance: (1) a description of steps that have been or will be taken to correct these items; (2) a description of steps that have been or will be taken to prevent recurrence; and (3) the dates your corrective actions and preventive measures were or will be completed.

Dated at Rockville, Maryland
this 26th day of March 1992

ORGANIZATION:	THERMAL SCIENCE, INCORPORATED ST. LOUIS, MISSOURI
REPORT NO.:	99901226/91-01
CORRESPONDENCE ADDRESS:	Mr. Rubin Feldman, President Thermal Science, Incorporated 2200 Cassens Drive St. Louis, Missouri 63026
ORGANIZATIONAL CONTACT:	Mr. Rubin Feldman, President (314) 349-1233
NUCLEAR INDUSTRY ACTIVITY:	Thermo-Lag fire barrier materials and related installation training services
INSPECTION CONDUCTED:	December 16-20, 1991
SIGNED:	R C Wilson — 3/6/92 Richard C. Wilson, Team Leader — Date Reactive Inspection Section No. 2 Vendor Inspection Branch (VIB)
OTHER INSPECTORS:	Randolph N. Moist, VIB
APPROVED:	for Gregory C Cwalina — 3/9/92 Chris A. VanDenburgh, Chief — Date Reactive Inspection Section No. 2 Vendor Inspection Branch
INSPECTION BASES:	10 CFR Part 21, 10 CFR Part 50, Appendix B and 10 CFR Part 50.48
INSPECTION SCOPE:	To review Thermal Science, Inc.'s program for supplying Thermo-Lag fire barrier materials and related services for fire protection applications in nuclear power plants
PLANT SITE APPLICABILITY:	Numerous.

1 INSPECTION SUMMARY

1.1 Nonconformances

1.1.1 Nonconformance 91-01-01 (Open)

Contrary to Criterion V, "Instructions, Procedures, and Drawings," of 10 CFR Part 50, Appendix B, Thermal Science, Inc.'s (TSI's) documented instructions and procedures used for NRC licensee purchase orders invoking 10 CFR Part 50, Appendix B, did not require maximum weight and minimum thickness measurements of prefabricated panels and conduit sections during final inspection (Nonconformance 91-01-01. See Section 3.3 of this report).

1.1.2 Nonconformance 91-01-02 (Open)

Contrary to Criterion V, "Instructions, Procedures, and Drawings," of 10 CFR Part 50, Appendix B, TSI failed to comply with its documented instructions and procedures when conducting tests intended to qualify fire barriers for commercial nuclear power plants. (Nonconformance 91-01-02. See sections 3.4, 3.5, 3.7, and 3.8 of this report.)

2 STATUS OF PREVIOUS INSPECTION FINDINGS

The NRC had not previously inspected TSI.

3 INSPECTION FINDINGS AND OTHER COMMENTS

3.1 Entrance and Exit Meetings

In the entrance meeting on December 16, 1991, the NRC inspectors discussed the scope of the inspection, outlined areas of concern, and established interfaces with TSI's management and staff. In the exit meeting on December 20, 1991, the inspectors discussed their findings and concerns with TSI's management and staff.

3.2 Inspection Scope

TSI manufactures Thermo-Lag patented heat blocking and fire retardant materials. Major applications include aerospace, oil drilling, commercial nuclear reactors, and tank cars. TSI employs between 50 and 100 personnel in a 60,000 square foot building. Commercial nuclear power plant sales grew to about half of TSI's business in the mid-1980s, and have declined to a very low current level. Only the Thermo-Lag 330 product line is supplied for commercial nuclear plants, usually in the form of panels or pre-cast conduit sleeves and trowelable mastic. TSI performs on-site training and certification of installation personnel provided by the licensees. TSI also supplies fire

endurance qualification and ampacity derating test reports, and installation procedures manuals.

The NRC inspectors reviewed TSI's program for supplying Thermo-Lag 330 materials and related services both generically and against the requirements of numerous licensee purchase orders. The inspection was restricted to documents and personnel at TSI, and the inspectors did not review any site documents.

3.3 Manufacturing Process

TSI mixes Thermo-Lag 330 material in batches of 20,000 pounds maximum, with 10,000 pounds typical. Material is mixed for specific orders, rather than to maintain an inventory. Tests performed on each batch of material include a drop test and a mandrel bend test which verifies that a thin sample is essentially cured within 72 hours at 77°F and 50 percent humidity. The bulk material is loaded into drums or five gallon pails labeled with batch tickets that are coded to show constituent materials. TSI either ships the containers of material to a plant site, or uses them to fabricate flat panels or preshaped conduit sections.

The panels are cured in a large oven at 120 to 180°F for 15 to 30 days, based on in-process moisture measurements. The measurements are performed on a sample of panels using TSI Test Procedure A-29, Revision 0. A moisture content of less than ten percent is required. Although the procedure's purpose states that it applies to panel coatings, TSI's QC manager stated that it is used for Thermo-Lag 330 panels. Numerous thickness measurements are made after drying and before final QA acceptance testing. High and low spots are corrected.

Minimum thickness limits for panels and conduit sections are 0.500 inch for a one hour fire rated panel and 1.000 inch for a three hour fire rated panel. These thicknesses are intended to provide the minimum mass of material necessary to ensure the fire rating of the panel. Maximum thickness is not usually specified in Purchase Orders (POs) and is not usually certified, even though an overly thick section could affect ampacity deratings. TSI provides customers a weight sheet dated June 7, 1986, with guaranteed maximum weights for prefabricated conduit and panel sections that can be used by the customer for seismic calculations (such as cable tray hanger load). The maximum weights for flat panels are 3.5 lb/ft^2 for a one hour panel and 7.0 lb/ft^2 for a three hour panel. Minimum weights are not guaranteed.

Thickness is verified using TSI Test Procedure A-33, Revision 0, which specifies 18 measurements per panel. Weight is verified using an unnumbered TSI test procedure titled "Panel Weight Determination." Even though TSI performed thickness and weight

measurements to TSI test procedures, the NRC inspectors found no procedure requiring performance of the measurements. TSI's president and QC manager stated that they were not aware of any TSI procedure that required that thickness and weight measurements be performed. These values are important to safety because thin sections may not provide assured fire barrier capability, and overweight sections could exceed cable tray and conduit support capabilities. Criterion V of 10 CFR Part 50, Appendix B requires that activities affecting quality be prescribed by documented instructions or procedures. For safety-related procurements, TSI's failure to specify a requirement for performing thickness and weight measurements is designated as Nonconformance 91-01-01.

TSI's inspector signs off on the maximum weight and minimum thickness verifications on a form titled, "Thermo Lag Prefabricated Panel Q C Form." The material batch number and stress skin lot number are written on the panels and on tags attached to the panel stress skins.

The NRC inspectors reviewed shipping invoice No. 18802 under Texas Utilities (TU) Generating Co. Purchase Order (PO) No. 665-71871, Supplement 10, dated December 7, 1989, for Thermo-Lag prefabricated panels without the normal stiffener ribs. TSI personnel stated that panels without the ribs are intended for use only when attached to steel structural supports in the plant, where the stiffening capability of the ribs is not needed. No records of other shipments of panels without ribs were observed by the inspectors.

The NRC inspectors asked about a "cure accelerator." The QA manager advised that an accelerator is available which promotes early mechanical setup and is useful in cold weather. The accelerator actually does not affect drying or curing. Like the Thermo-Lag 330 materials, it is water-based. TSI does not use the accelerator in poured panels, but it can be used in spray or trowel applications and has been provided to customers. TSI's QA manager stated that an Underwriters Laboratories Inc. (UL) fire test showed that the accelerator has no adverse effects. TSI stated that UL fire tests also showed no problems with the topcoat material that TSI provides for weather resistance. The NRC inspectors did not review the UL test reports or form any conclusions regarding the use or effects of the accelerator.

The NRC inspectors asked how the six month shelf life is established for bulk Thermo-Lag 330 material in containers. TSI's QC manager stated that the bulk material's shelf life starts on the day the material is shipped to the customer. The policy is to not manufacture any material with shelf life limitations until a customer order is received. TSI can perform thermogravimetric analysis on samples returned by customers to determine if the material is still usable, because the subliming material has a

relatively low volatility temperature. TSI's Bills of Lading specify that bulk material must be stored above 32°F and below 100°F at all times, and shipments are accompanied by a pail containing a temperature recorder.

The NRC inspectors showed TSI's QA manager paragraph 6.6.6 of TU's Comanche Peak nuclear plant procedure ECC 10.07, Revision 3, dated March 5, 1989, regarding the plant's criteria for repair of surface cracks or pinholes in prefabricated panels. The only criterion listed was for the width of the defect, with no repair required for less than 0.050 inch. Surface patching was specified for larger cracks or holes. There were no depth or length criteria. TSI's QA manager could not provide a basis for this procedure. He indicated that the paragraph needed more context to be meaningful, including the definitions for surface cracks and pinholes. The inspectors did not pursue this matter further.

3.4 Quality Assurance Program

TSI'S Nuclear Quality Assurance (QA) Program Manual, Revision X, dated January 12, 1987, governed its 10 CFR Part 50, Appendix B, quality assurance program. TSI Quality Control Operating Procedures Manual, Revision X, dated September 22, 1986, implemented and supported the Nuclear Quality Assurance Program Manual. The implementing procedures controlled activities affecting quality during raw materials receiving inspection and the manufacture of the Thermo-Lag 330 materials.

TSI has applied its Nuclear QA program to all Thermo-Lag 330 materials shipped to commercial nuclear power plants, regardless of what QA requirements were specified in the PO or whether the procurement was by the licensee or by another party. TSI personnel stated that the principal improvements related to the nuclear QA program are care of manufacture, records, traceability, and material purity. Although TSI's procedures make provision for procuring raw materials in accordance with 10 CFR Part 50, Appendix B, TSI personnel stated that all of their procurements have been commercial grade.

The NRC inspectors verified the implementation of TSI's QA program by reviewing selected criteria from 10 CFR Part 50, Appendix B, including nonconforming materials, identification and control of materials, handling, storage and shipping of materials, control of measuring and test equipment, and control of purchased materials. TSI did not manufacture any Thermo-Lag 330 materials during this inspection.

To verify traceability, the NRC inspectors selected batch numbers from TSI Certificates of Conformance (COCs) for selected materials (Thermo-Lag bulk material, prefabricated panels and conduit sections) that were shipped to commercial nuclear power plants. The NRC inspectors traced the batch numbers back to the batch

mixes, including the lot numbers of the raw materials used. The NRC inspectors concluded that TSI had adequate quality control records and procedures for demonstrating the traceability of raw materials purchased from suppliers used in manufacturing Thermo-Lag 330 material.

The NRC inspectors selected measuring and test equipment that TSI used to verify the adequacy of the purchased raw materials, batch samples, and finished prefabricated panels (fire endurance test instruments were not reviewed, except as noted in the next paragraph). The inspectors concluded that TSI's calibration program, QC records, and procedures were adequate to perform and document the testing. In addition, the NRC inspectors verified that the calibration of measuring and test equipment was traceable to the National Institute of Standards and Technology.

The NRC inspectors briefly addressed the calibration of thermocouples used in American Society for Testing and Material (ASTM) Standard E 119 fire endurance type qualification tests. The thermocouples that monitor specimen temperature are replaced with each specimen, and new units are obtained with current supplier calibrations. However, the thermocouples that monitor furnace temperatures are never calibrated after installation and TSI has no procedure specifying calibration. Since these chromelalumel thermocouples are exposed to flames reaching about 2000°F and remain in the furnaces for years, their ability to maintain calibration is questionable. Criterion V of 10 CFR Part 50, Appendix B requires that activities affecting quality be prescribed by documented instructions or procedures. TSI's failure to maintain calibration of the furnace thermocouples forms a portion of Nonconformance 91-01-02.

The NRC inspectors asked how TSI controls the calibration of its test and measuring equipment at nuclear power stations. The QC manager indicated that TSI has no inspection function or acceptance function at any site; therefore, any TSI test and measuring equipment at a site is not under TSI calibration control.

The NRC inspectors verified that TSI had a nonconformance program in place. In addition, the NRC inspectors reviewed several nonconformance notices and verified that TSI closed the notices on a timely basis and took adequate corrective actions.

The NRC inspectors verified that TSI had 10 CFR Part 21 procedures in place and met the posting requirements of 10 CFR Part 21. No notifications had been submitted to TSI's clients. Within the scope reviewed the inspectors did not identify any concerns with TSI's program for satisfying 10 CFR Part 21.

TSI's QA manager stated that about one dozen licensees had audited TSI's QA program. The NRC inspectors reviewed records

of audits that TU performed at TSI between 1982 and 1989. TU's audits did not identify any major concerns with TSI's QA program.

TSI had not audited its material suppliers. TSI obtains commercial COCs and performs infrared spectroscopic analyses on all lots of material purchased for Thermo-Lag 330 use. The NRC inspectors verified that TSI had receiving records, QC reports, and COCs for the lot numbers selected for subliming powder and stress skin procurements. In addition, the NRC inspectors verified that a certified material test report from the mill was in the data package for the lot number selected for the stress skin.

Based on the observations reported above and the file review of POs for six commercial nuclear power plant sites, the NRC inspectors concluded that TSI's QA program for supplying Thermo-Lag 330 material was adequate with the exception of the two nonconformances cited in this inspection report.

3.5 Customer Purchase Order (PO) Requirements

This section of the inspection report addresses PO contractual requirements on TSI as observed by the NRC inspectors, with the exception of the on-site support requirements discussed in the next section. The content of TSI's Certificates of Conformance is also addressed.

The NRC inspectors reviewed records for all of the POs in TSI's files for Thermo-Lag 330 material for the following six commercial nuclear power plant sites:

Callaway Nuclear Power Generating Plant
Comanche Peak Steam Electric Station
Perry Nuclear Power Plant
River Bend Station
Susquehanna Steam Electric Station
Washington Nuclear Project, Unit-2 (WNP-2)

Site selection was based primarily on Thermo-Lag site problems reported in NRC Inspection Reports, NRC Information Notices and Licensee Event Reports. The inspectors were also interested in whether different PO QA criteria affected what TSI supplied, and had asked TSI to prepare a list of plants that specified various criteria including 10 CFR Part 50, Appendix B. TSI was unable to complete the list by the end of the inspection, partly because a typical plant file included either numerous POs or numerous PO change orders.

3.5.1 Commercial Grade PO Requirements

Procurements for the listed plants began between 1981 and 1984. For four plants (all except Comanche Peak and WNP-2) the initial procurements were by the architect-engineer or another contractor

to the licensee. By the mid-to-late 1980s all six licensees were procuring directly from TSI. All of the procurements were commercial grade except for Comanche Peak, where all of the POs reviewed (except those for on-site services) invoked 10 CFR Part 50, Appendix B.

The typical PO covered both bulk material and prefabricated panels and conduit sections. Certification that the materials meet specified criteria, including TSI's QA/QC program, was often required. Material certifications are of limited value because the qualification type tests covered fabricated installation designs, not generic materials or the prefabricated panels and conduit sections supplied by TSI. Other criteria that some POs specified are identified below in the COC discussion.

The Callaway nuclear plant provided an example of a requirement for material certification. Daniel PO No. 7186-NS-87593, dated February 7, 1984, invoked Bechtel Specification No. 10466-E-097, "Technical Specification for Furnishing and Installation of Fire Barrier Materials for the Standardized Nuclear Unit Power Plant System (SNUPPS)," Revision 0, dated October 11, 1983. Section 4.1.b of the specification required the following: "Manufacturer's certification showing material has been tested and is qualified for use as 1-hour and 3-hour rated barriers by the applicable standards or codes."

The NRC inspectors also obtained a copy of a February 7, 1984, letter to Daniel from TSI's national sales manager which stated: "This will advise you that TSI's THERMO-LAG 330 Fire Barrier Materials Systems meets [sic] all the prerequisites delineated in the reference specification." The NRC inspectors also noted that the PO invoked no QA requirements on TSI (except repetition of the cited requirement to submit material certification), and that TSI's COC merely certified that the materials "meet TSI's manufacturing and written quality control specifications."

The inspectors reviewed Stone & Webster Engineering Corp. (S&W) PO No. 12210-30454, dated September 24, 1984, for the River Bend Station. The technical and QA requirements were specified per S&W Nonengineered Item Data Sheet 211.161, which described the materials and specified thickness ranges for prefabricated panels. One hour panels and shapes were to be 1/2 inch -0.00, +0.125 inch and three hour to be 1 inch -0.00, +0.250 inch. The NRC inspectors observed a TSI COC dated March 14, 1985, which certified only a 1.00 inch minimum thickness for a three hour panel.

3.5.2 Comanche Peak 10 CFR Part 50, Appendix B PO Requirements

The NRC inspectors found that POs for TU (the licensee for Comanche Peak) appeared to impose two types of additional requirements on TSI beyond the scope of the typical PO. First, TU's POs

invoked the safety-related QA requirements of 10 CFR Part 50, Appendix B, on TSI's scope. Second, TU's POs imposed a specification which appeared to impact TSI's responsibilities for the applicability of qualification test reports and installation procedures to the plant installations of Thermo-Lag material.

The NRC inspectors reviewed TU PO No. CPF 1557-S, dated April 19, 1982. The PO and its supplements specified materials and technical assistance services for a Thermo-Lag 330 subliming coating envelope system for the Comanche Peak nuclear power plant. The PO specified that all materials and services must be in strict compliance with TU Specification 2323-MS-38H, "Cable Raceway Fire Barriers," Revision 1, dated April 2, 1982, (prepared by Gibbs and Hill, Inc.) and any subsequent revisions. Although the specification is labeled "Non-Nuclear Safety Related QA Program Applicable," the PO specified that "work performed herein shall be performed as applicable in compliance with T.S.I. Inc.'s nuclear quality assurance program manual" as qualified by the licensee. The PO also specified that "services shall be accomplished in accordance with T.S.I. Inc.'s written quality assurance program conforming to the requirements of ANSI [American National Standards Institute Standard] N45.2 [and] 10CFR50, Appendix B ... as applicable, subject to verification by [TU's] quality assurance department." The PO stated that the provisions of 10 CFR Part 21 may apply.

Specification 2323-MS-38H placed broad requirements on the vendor (and, in some cases, the "vendor/applicator"). Section 3.1.1 defined the vendor/applicator scope to include "the design, furnishing, quality assurance/quality control, and performance testing of all materials and components required for the cable raceway fire barriers." Section 3.3.1 required the vendor to "guarantee the satisfactory material performance, and installation instructions and procedures of all cable raceway fire barrier materials furnished." Section 3.4.1 invoked (without distinguishing between vendor and vendor/applicator) NRC Branch Technical Position APCSP 9.5.1, which included criteria for the design and qualification of fire barriers.

Section 3.7.1.1 of specification 2323-MS-38H required the vendor to "supply documented tests of product performance referencing the materials used, the type of installation and the method of application as a basis for meeting the requirements specified herein." Section 3.10.4 requires submittal for approval of "Certified test results which demonstrate that all fire barrier arrangements have been tested in accordance with the requirements of" the specification. These requirements contribute to the basis for Nonconformance 91-01-02 as defined elsewhere in this inspection report.

TU exercised its contractual right to approve documents, as evidenced by a TU letter to TSI dated June 22, 1989, subject:

"Notification of Document Status" for PO No. 665-71871, which showed general approval of six Industrial Testing Laboratories, Inc. (ITL) test reports; another test report; two TSI Technical Notes regarding thermal and dynamic loads and ampacity rating; and documents titled, "Determination of Chloride, Fluoride, Sodium and Silicate concentrations in Thermo-Lag 330-1 Subliming Coating," and "Summary of Ampacity Derating Tests." The NRC inspectors noted, however, that TU's letter did not address installation procedures or drawings.

By reviewing TU source inspection reports, the NRC inspectors verified that TU exercised its contractual right to perform source inspections prior to shipment, although TU sometimes waived that right. TU's source inspections included verification of thickness and weight measurements.

The NRC inspectors reviewed a November 10, 1989, TSI internal memorandum for PO No. 665-71871 to all quality control and production personnel. TSI's QC and production managers issued the memorandum to implement an agreement between TU and TSI to add additional steps to TSI's inspection program. Specifically, in addition to the normal 18-point thickness inspection of prefabricated panels, the memorandum specified additional thickness checks to be made along the panel edges to identify undesirable compressions. The weight of each prefabricated panel would also be recorded by the QC inspector on his acceptance tag (this was normally a go/no go signoff).

The NRC inspectors found another example of TU invoking Specification 2323-MS-38H. TU's PO No. 8 0029731, dated October 30, 1991, procured safety-related replacement parts from TSI. The PO invoked Pre-Engineered Item Data Sheet # NES0011, which stated in Section 1.2 that "products listed in the purchase order are identical to those products previously tested and supplied in accordance with TU Electric Specification 2323-MS-38H Revision 1."

The NRC inspectors noted that the Comanche Peak site used a Thermo-Lag installation procedure designated as "TU Electric - Generating Division, Engineering and Construction, Construction Department Procedure ECC 10.07, Application of Fire Protection Materials (for example, Revision 3 dated May 5, 1989)." This procedure did not reference any TSI documents, but did reference licensee drawings for Thermo-Lag installation details. Thus, despite the wording of Specification 2323-MS-38H, the NRC inspectors saw no evidence that TU relied upon TSI to guarantee the completeness of TU installation procedures. However, the inspectors did not review site records that might clarify this issue.

3.5.3 Certificates of Conformance (COCs)

The typical COC stated "this will certify that the materials listed above [or below] under purchase order number _____ meet

TSI's manufacturing and written quality control specifications." The COC also listed the materials shipped, showing product type, quantity, and batch or lot number; date; bill of lading number; and truckline. Each COC was signed by TSI's manager of quality control. Many COCs named TSI's QA manual and cited a specific controlled copy that had been issued to the customer. For Comanche Peak only, the COCs generally stated that 10 CFR Part 50, Appendix B and ANSI N45.2 applied.

The NRC inspectors observed numerous variations of the typical COC format. Often the materials were certified as being identical to those that had been qualification-tested (although the tests qualified only specific configurations). Some COCs named specific criterion documents, such as ASTM Standard E 119 and American Nuclear Insurers (ANI) Bulletin 5-79, with words such as, "when used in approved configurations." Additional standards addressed in this manner were ASTM E 84, "Surface Burning Characteristics of Building Materials," ANSI A2-1, and NRC Regulatory Guide (RG) 1.36, "Nonmetallic Thermal Insulation for Austenitic Stainless Steel." Some COCs stated that the requirements of the PO were met. Some stated, under "product description," a 1.00 inch minimum thickness for three hour panels.

TSI also provided some Certificates of Analysis. Those observed covered density, pH, and sometimes leachable chloride content for material batches. TSI's QC manager told the NRC inspectors that TSI discontinued chloride analysis of Thermo-Lag material on November 20, 1989, because the leachable chloride limit never approached the 200 ppm limit specified in RG 1.36. Since that date TSI's COCs and COAs have not specified individual batch chloride tests, and TSI now recommends that customers desiring the analysis obtain it from another source.

3.6 On-Site Responsibilities

3.6.1 Discussions with TSI personnel

TSI usually contracts to perform on-site training of installation and quality control personnel provided by the licensee. TSI informed the NRC inspectors that it does not perform, inspect, or approve installation work. Occasionally, as at the WNP-2 and Comanche Peak plants, TSI personnel have been on-site for cumulative periods of more than a year. TSI's QA manager noted that such extended residence was sometimes the result of a licensee ensuring that a TSI representative would be available for training several groups of craftspersons, and that the representative might perform additional duties such as inventory monitoring. In this regard, the NRC inspector noted in the WNP-2 file an inventory list signed by the representative whose living expenses were billed to the licensee over an extended period.

TSI's QA procedures provide for the position of Manager of Field Service Operations, whose responsibility includes "exercising technical control over product application activities at the client nuclear plant site" (procedure NQAP 3-1, section 3.3.3). TSI's QA manager stated that TSI has never had a field service manager.

TSI regards training as a best-effort activity. Although trainees must pass a test, TSI stated that trainee retention is beyond TSI's capability. TSI stated that personnel to be trained are normally experienced in heating, ventilating, and air conditioning (HVAC) installations. Often on newer plants they are the personnel who installed the plant HVAC, penetration seals, and pipe wraps. Although TSI stated that many were journeymen and master craftsmen, TSI does not select the personnel or specify selection criteria.

The documentation of TSI's on-site training is poor. Prior to the inspection TSI provided to the NRC a two-page training outline that contained no installation information, but merely named various applications (such as "prefabricated panel design for junction boxes - installation of one hour fire barrier design"). During the inspection, the TSI QA manager provided a new informal "Applicator Training Program Lesson Plan." In addition to simply naming the applications covered, the new plan also named aspects of each installation (such as "spacing of tie wire, banding and fasteners" and "joint filling and sealing"). TSI still provides no written training documentation covering concerns such as those noted in the following paragraphs. The TSI position is that the customer's installation procedures, supplemented by hands-on training of customer-selected personnel in the general nature of Thermo-Lag 330 installations and the customer's QC inspection of the plant installations, should be sufficient to ensure adequate installation.

TSI routinely supplies customers with TSI Technical Note 20684, "Thermo-Lag 330 Fire Barrier System Installation Procedures Manual - Power Generating Plant Applications." The latest version is Revision V, November 1985. This document, and its predecessors, were approved for insurance purposes by ANI. TSI stated that the document has not been revised since ANI suspended its approval activities. However, as a result of discussions with the NRC a new revision is scheduled for issue by January 31, 1992. Examples of planned additions cited by TSI were specifying curing time, redefining how to seal joints and cut the stress skin, and adding a note to wear goggles.

TSI personnel characterized Technical Note 20684 as a generic document, and frequently referred to it as an application guide. TSI stated that architect-engineers or licensees provided the plant-specific installation manuals. TSI might be asked to comment on a plant-specific manual, and would comment on whether a

configuration had been tested. TSI stressed that this would be an opinion, not a responsibility; even if a similar configuration had been tested, analysis would be required. TSI considers Technical Note 20684 to be accurate, and as complete as necessary when supplemented by training of competent crafts personnel.

The NRC had previously informed TSI that Technical Note 20684 did not cover certain important installation characteristics, such as which side of a panel should be scored or V-grooved for bending, when pre-buttering would be necessary for joints, and the maximum allowable thickness of material. TSI responded that these matters were all covered in hands-on training. During this inspection the inspectors noted a deficiency in Technical Note 20684. The second and third paragraphs of Section 1.0, page II-2, specifies that scored corners and joints of Thermo-Lag panel sections are to be filled with trowel grade material after the panel sections are tied or banded around a cable tray. However, at that stage it would be impossible to fill the seams with trowel-grade material. These types of deficiencies allow plant installation configurations that may not be represented by qualification type test specimens.

3.6.2 PO Requirements for On-Site Responsibilities

The NRC inspectors' review of files for the six plant sites generally supported the position presented by TSI personnel. POs were non-safety related and contained no QA or QC requirements for on-site work; often the PO specified that site procedures would govern. Certain POs for Comanche Peak were particularly limiting, containing statements such as "neither TSI nor the TSI loaned employees were providing engineering services in connection with the work of the loaned employees, and TSI had no responsibility or liability for the installation or design of Thermo-Lag material." Some POs specified additional requirements for on-site assistance by TSI, as described below.

For Comanche Peak, TU PO No. CPF 1557-S, dated April 19, 1982, and its supplements specified both materials and technical assistance. The PO specified compliance with Gibbs and Hill Co. Specification 2323-MS-38H, "Cable Raceway Fire Barriers," Non-Nuclear Safety Related, Revision 1, dated April 2, 1982, and any subsequent revisions. Paragraph 3.3.1 required the vendor to guarantee satisfactory material performance and installation instructions and procedures for all cable raceway fire barrier materials. Paragraph 3.10.4 required the vendor to submit drawings, documents, and procedures with its proposal, for approval.

For WNP-2, PO No. 37115 dated July 28, 1982, specified training services. It also required that the TSI technical service representatives "shall assure the raceways coated with Thermo-Lag meet the requirements as previously tested (sample articles) by TSI Inc." It also specified TSI support of the owner's commitments

to ANI with respect to the use of Thermo-Lag materials, and that daily working direction would be provided by the owner's construction manager. There were no QA or QC requirements.

Also for WNP-2, Contract No. C20610, as proposed to TSI in 1986, required TSI "corporate approval of specific configurations of Thermo-Lag application to steel penetrating the fire barrier to assure compliance with tested configurations" and to "perform regular inspections of installation and provide Certificates of Conformance to 'three-hour' fire protection requirements at the completion of installation." TSI's June 10, 1986, letter to WPPSS took the following exceptions: "TSI is not an approving authority for Nuclear Power Generating Plants. TSI will provide, however, a Certificate of Conformance, when required, with regard to compliance of the installed configurations with those previously tested" and "Regular inspections of the installation can be provided by our field service engineer while onsite at WPPSS. A Certificate of Conformance can also be provided to the test configurations following procedures delineated in TSI's Quality Assurance/Quality Control Operating Procedures Manual. After the completion of the installation, additional inspections can also be arranged in accordance with a mutually agreeable schedule and at our standard Field Service Engineering rates." WPPSS's letter to TSI dated June 13, 1986, transmitted an executed original of the contract, and stated that the TSI exceptions were acceptable and TSI's letter would be retained in the contract file along with the unmodified contract. These WNP-2 provisions, if implemented, appear to comprise limited exceptions to TSI's general policy limiting on-site support.

For Susquehanna, Contract No. 8856-F-56718, dated October 15, 1981, specified that a TSI field service representative would be required on-site for approximately 12 weeks. Schedule A to Technical Services Agreement 8856-FTSA-22, dated November 12, 1981, specified that TSI must "provide all necessary technical and professional services required to support and document the installation of" TSI's Thermo-Lag 330 subliming coating system on electrical raceways in accordance with Bechtel Technical Specification 8856-E-E61, Revision 1, dated November 12, 1981. Schedule A also required TSI to furnish "all personnel and test equipment necessary to document and monitor the application of T.S.I., Inc.'s QA/QC program and application procedures." The NRC inspectors noted that Section D.1.(b) of Schedule A identified TSI's QA program manual as the "application procedures." The only QA requirements were for TSI's program.

TSI's QA manager stated that TSI did not supervise or perform any quality control functions or installation at Susquehanna. The NRC inspectors found only one invoice, Number FS-104 dated November 16, 1981, for field services; the span was 12 days. Although the invoice did not indicate what services were provided, TSI's QA manager stated that the service was limited to training on

setting up spray equipment and on the proper method of spraying Thermo-Lag on stress skin. The contract also stated under the warranty clause that the buyer assumed all responsibility and risks for proper application, safety, and use of the material. Based on this information, the NRC inspectors concluded that TSI's role at the Susquehanna site appeared to be limited to non-safety related training services.

For Callaway, PO No. 7186-NS-87593, dated February 7, 1984, from Daniel International Corp. specified field services, with no QA or QC requirements. Daniel was the construction contractor, although documents indicated that Thermo-Lag installation was actually performed by Owen-Corning Fiberglas Corp., Power and Process Contracting Services. TSI furnished an installation procedure, TSI Technical Note 11266 titled "Installation Procedures for the 'Ready Access Designs' of the Thermo-Lag 330-1 Subliming Fire Barrier Systems" to Union Electric Co. (the licensee) as a guide for use in installing Thermo-Lag materials at the Callaway plant. Bechtel (the architect-engineer) personnel changed the TSI Technical Note number from 11266 to C-1001 and made numerous pen and ink changes in the procedure. Daniel Field Change Request (FCR) No. 2FC-3247-E, incorporated a marked copy of the technical note which had been reviewed and signed by TSI's QA manager on March 19, 1984. Bechtel indicated their review and approval on March 20, 1984, by initialing the changes in the application guide and the approval block of the FCR. TSI's QA manager stated that TSI's role in producing this plant-specific installation manual remained advisory, and TSI did not assume responsibility for the manual's application, as described above.

Based on the file reviews and discussions with TSI personnel reported above, the NRC inspectors concluded that TSI appeared to satisfy its contractual requirements for on-site support at the commercial nuclear power plants reviewed during the inspection. However, the support actually provided, as described by TSI, essentially placed full installation responsibility on the licensee and its contractors. TSI clearly resisted customer attempts to increase TSI's role.

TSI's installation guide lacked considerable detail necessary for installation; TSI stated that it accepted only an advisory role in applying qualification tests to plant installations; the content of training provided by TSI was not documented; TSI had no prerequisites for the selection of installation or site inspection personnel; and TSI did not appear to be involved in determining if the inspection personnel received any training. Thus, TSI did not appear to exercise control over installed Thermo-Lag 330 fire protection systems except for the material itself.

3.7 Qualification Type Testing

ASTM E 119 fire endurance qualification type tests have been performed on several Thermo-Lag 330 installation designs at TSI and elsewhere. This inspection only addressed testing at TSI, which is performed under the observation of Industrial Testing Laboratories, Inc. (ITL) as addressed in Section 3.8 of this inspection report. The NRC inspectors did not witness any qualification testing. TSI personnel described test preparations as follows.

Either the customer (licensee or architect-engineer) or TSI prepares the test plan. TSI and the customer also determine the general design of the test specimen and the location of thermocouples. The test plan does not give full details of the test specimen construction; as-built information may be sketched in the daily work sheets for the test. TSI personnel stated that prior to 1986 ANI approved the test plans, witnessed the test specimen construction and installation, witnessed performance of the tests, and approved the test report for insurance purposes. Customers have also witnessed testing.

The test specimen is assembled by a TSI crew of manufacturing personnel assigned to the test, using materials selected from the QA-approved inventory (which normally is quite small, since materials are basically mixed and fabricated to order). No attempt is made to select worst-case or other specific characteristics. TSI builds the test specimens in a small area near the test furnace. TSI maintains current calibrations of data logging instruments, as described in the QA program section of this inspection report (section 3.4). TSI has two furnaces. Usually the larger and better-instrumented furnace is used for nuclear tests.

Section 3.8 of this inspection report describes the NRC inspector's review of two qualification test reports, dated 1987 and 1990. Neither test plan fully described the design of the test specimen. For example, only a few dimensions were specified, and filling of joints was not described in detail. Some, but not all, of the omitted information was provided in as-built specimen descriptions in the daily record sheets appended to the test report. Criterion V of 10 CFR Part 50, Appendix B requires that activities affecting quality be prescribed by documented instructions or procedures. For safety-related procurements, TSI's failure to adequately specify specimen construction in the qualification test plans forms a portion of Nonconformance 91-01-02.

TSI also has performed ampacity derating tests. The customers designed the tests and supplied the cable samples. TSI has not performed ampacity derating calculations, but under a present contract from Gulf States Utilities is arranging for a local university to perform them.

TSI maintains a complete set of qualification type test reports, both ITL and others, arranged chronologically in a file cabinet.

3.8 Industrial Testing Laboratory Role

TSI has stated that several ASTM E 119 type qualification tests of Thermo-Lag installation design specimens have been conducted under the independent auspices of Industrial Testing Laboratories, Inc. (ITL) of St. Louis. For example, a TSI document titled "Synopsis on the Thermo-Lag 330 Fire Barrier System for Power Generating Plant Applications, 10 February 1987," summarizes and references various tests. It makes the following statement regarding fire endurance tests on page two: "The above tests were performed under the supervision and total control of an ANI accepted third party, independent testing laboratory, Industrial Testing Laboratories, Inc., who also published the test results."

In order to assess the scope of ITL's efforts, the NRC inspector interviewed an ITL representative (a professional engineer) together with TSI's president. Although it has not performed fire barrier endurance tests, ITL has conducted numerous tests, including flame tests, for a wide variety of customers. ITL first tested Thermo-Lag material for aerospace applications in the late 1950s. ITL is listed on TSI's Approved Vendor List based on performance history, with no record of an audit. Criterion V of 10 CFR Part 50, Appendix B requires that activities affecting quality be prescribed by documented instructions or procedures. For safety-related procurements, TSI's failure to audit ITL forms a portion of Nonconformance 91-01-02.

The TSI president stated that TSI has an oral agreement with ITL that specifies rates but not work scope. Criterion V of 10 CFR Part 50, Appendix B requires that activities affecting quality be prescribed by documented instructions or procedures. For safety-related procurements, TSI's failure to contractually specify ITL's role in fire endurance qualification tests forms a portion of Nonconformance 91-01-02.

ITL does not participate in preparation or approval of the test plan, the design of the test specimen, or the location of thermocouples. ITL does not witness the construction of the test specimens, and at TSI's option may or may not witness installation of the specimen into the furnace. The ITL representative stated that he does not compare the test specimen dimensions with the test plan or daily work sheets. ITL also does not review calibration records for the test instrumentation.

ITL's role is observing the actual performance of the test. The ITL representative stated that he reviews the criteria documents including the test plan, discusses the text with the test supervisor to ensure understanding, witnesses performance of the test,

signs the daily work sheets, and collects and issues the raw data to ITL, TSI, and TSI's customer. The ITL representative stated that his role in the test ended with issuing the raw data; his function was to witness the test and verify that it was conducted as it was supposed to be, according to the test plan and other criteria documents. He was never involved in issuing a test report. TSI's president stated that TSI writes the test report text, types the report including the raw data, and obtains its customer's approval. The report is then given to ITL for what was described as a minimal review, and issued by ITL.

The NRC inspector questioned the ITL representative and TSI's president concerning a 1990 fire endurance test that had been observed by the ITL representative interviewed. The inspector noted that the raw data package highlighted an out-of-limit temperature that was not correspondingly emphasized in the draft test report (the actual number was included in the typed data, but its significance was not noted there). The ITL representative stated that his activities would not include such a comparison. TSI's president stated that the discrepancy would be identified in TSI's review of the draft report and corrected before issue.

In reviewing a typical fire endurance test report, ITL Report No. 87-5-76 dated June 1987, the NRC inspector commented that the report's appearance suggested that ITL's role may have been greater than it really was. For example, the cover sheet bears ITL's name and logo, but not TSI's. The title page is similar, except that it does identify TSI by name and address as the "test location." It also bears an ITL disclaimer concerning the use of the report, and the only approval signature is that of ITL's director. A reader would not know that the report had actually been written and typed by TSI, or that ITL's role in the test was essentially limited to witnessing data acquisition. The ITL representative and TSI president did not dispute these comments.

The inspectors found only one requirement for test laboratory independence in the files reviewed during the inspection. TU PO No. CPF 1557-S invoked Gibbs & Hill Specification 2323-MS-38H, Revision 1, which stated in section 3.7.2.1 that "fire and hose stream tests shall be performed and documented by a recognized independent testing laboratory." The specification in section 3.4.1.4(b) also invoked NRC Branch Technical Position APCSP 9.5.1, which defines a fire barrier rating in hours as established by a nationally recognized testing laboratory. The NRC inspectors were unable to determine an NRC requirement was actually violated in this regard. However, the inspectors believe that the appearance of the test reports and the representation of them as ITL reports could be misunderstood by users.

3.9 Conclusions

Section 3.3 of this report cites Nonconformance 91-01-01 concerning TSI's failure to procedurally require minimum thickness and maximum weight measurements for prefabricated, safety-related panels and conduit sections. Sections 3.5, 3.7, and 3.8 provide a basis for Nonconformance 91-01-02 involving TSI's failure to adequately control qualification testing for NRC licensees such as Texas Utilities, as identified in section 3.5.2.

Based on the file reviews and discussions with TSI personnel reported above, the inspectors found no other violations of NRC requirements for supplying materials and qualification documentation to commercial nuclear power plants. However, the inspectors were also concerned by the limited scope of installation support that TSI provides to its customers, as discussed in Section 3.6.

4 PERSONNEL CONTACTED

Thermal Science, Inc.:

*	+	R. Feldman, President
*	+	R. A. Lohman, Manager, Quality Assurance
*	+	B. E. Evans, Manager, Quality Control
*	+	M. G. Murphy, Administrator

Industrial Testing Laboratories, Inc.:

D. Wylan, Staff Consultant

US NRC:

+	C. A. VanDenburgh, Section Chief
+	L. R. Plisco, Section Chief
+	K. S. West, Senior Project Manager

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* Attended the entrance meeting on December 16, 1991
\+ Attended the exit meeting on December 20, 1991