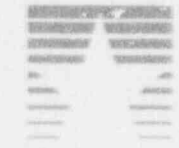

TU ELECTRIC

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Ref. # 10CFR50.48

William J. Cahill, Jr.
Group Vice President

March 23, 1993

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

SUBJECT: COMANCHE PEAK STEAM ELECTRIC STATION (CPSES)
DOCKET NOS. 50-445 AND 50-446
AMPACITY TEST RESULTS AND THERMO-LAG
BOX DESIGN CONFIGURATIONS

REF:
1) TU Electric letter logged TXX-93023 from Mr. William J. Cahill, Jr., to the USNRC dated January 19, 1993
2) TU Electric letter logged TXX-93061 from Mr. William J. Cahill, Jr., to the USNRC dated January 28, 1993
3) TU Electric letter logged TXX-93101 from Mr. William J. Cahill, Jr., to the USNRC dated February 26, 1993
4) TU Electric letter logged TXX-93125 from Mr. William J. Cahill, Jr., to the USNRC dated March 10, 1993

Gentlemen:

TU Electric has completed the ampacity testing of upgraded Thermo-Lag installations, which were described in Reference 3. In addition, TU Electric is responding to the information requested by your staff, regarding TU Electric's Engineering Report (ER-ME-082, R/0) which was docketed via TXX-93023 (Reference 1). Specifically, NRC Staff requested information on "box configurations" which was addressed on Page 5 of 8 of the aforementioned Engineering Report as 93% complete. Each of these subjects are summarized below:

Ampacity Derate Tests

TU Electric has completed the testing to establish ampacity derate factors for cables/raceways protected by the upgraded Thermo-Lag fire barrier configurations qualified during TU Electric's fire endurance test program. The derate factors determined by testing are as follows:

D029 1/1

Raceway Type & Size	Cable Type & Size and Section	Thermo-Lag Type - Thickness	Percent Derate Test Value Document	Minimum Design Margin available (Note 1)
3/4" Conduit	3/c# 10 AWG	1/2" 330-1 - 1/4" overlay	9.1	35-9.1 = 25.9
2" Conduit	3/c# 6 AWG	1/2" 330-1 - 1/4" overlay	6.5	35-6.5 = 28.5
5" Conduit	4-1/c# 750 MCM	1/2" 330-1	10.7	23-10.7 = 12.3
24" Tray	126-3/c# 6 AWG	1/2" 330-1 panels	31.4	38-31.4 = 6.6
Air Drop	3/c# 6 AWG	3 layers 1/4" 330-660 wrap	23	35-23 = 12
Air Drop	3-1/c# 750 MCM	3 layers 1/4" 330-660 wrap	31.7	35-31.7 = 3.3

TU Electric had previously utilized derate factors which are described in Design Basis Document (DBD)-EE-052 "Cable Philosophy and Sizing Criteria" as:

- 7.5 % for cables in conduit
- 31 % for cables in trays
- TU Electric had evaluated the adequacy of air drops protected with Thermo-Lag by assuring that the cable ampacity for air drops under Thermo-Lag is equal to or greater than the cable ampacity for a tray or conduit protected with Thermo-Lag. This evaluation was done by developing a mathematical model for air drop cables covered by Thermo-Lag per calculation # 16345-EE(B)-140.

Based on the results of testing described in the table above TU Electric is changing its DBD-EE-052 to reflect the following derate factors:

Note 1: Minimum design margin is obtained by subtracting the percent derate value obtained by the most limiting cable derate equivalent percent obtained by the calculation performed, which are listed below. This minimum design margin is for the effects of Thermo-Lag only, and is in addition to the 25% design margin provided in the sizing of all power cables.

- 11% for cables in conduits

- 32% for cables in trays and air drops

Based on the test results and the evaluations discussed below, TU Electric has concluded that the Unit 2 cable design envelopes the derate factors obtained by testing, and the Unit 2 cable design is acceptable. This conclusion is based on the following calculations:

- Calculation #2-EE-053, R/0, was reviewed for all cables covered by the upgraded Thermo-Lag (except for 6.9kV and 480V Switchgear cables as discussed below) and it was concluded that the cable design at CPSES has ampacity margin available for cable derate equivalent to 40% for cables in tray, and a cable derate equivalent to 35% (Note [2]) for cables in conduits.

- Calculation #2-EE-CA-0008-3038, R/5, was reviewed for cables fed from 480V switchgear and it was concluded that the cable design at CPSES has ampacity margin available for a cable derate equivalent to 3[illegible]% (Note [2]) for cables in tray and a cable derate equivalent to 23% (Note [2]) for cables in conduit.

- Calculation #EE-CA-0008-3097, R/1, CCN 001, was reviewed for cables which are fed from 6.9kV switchgear and it was concluded that the cable design of CPSES has ampacity margin available for a cable derate equivalent to 40% (Note [2]) for cables in both tray and conduit.

The above mentioned calculations are available at CPSES for your review. Additionally, Revision 4 of the Ampacity Test Procedure is also available at CPSES for your review.

The acceptability of cable design adequacy for cable air drops protected by Thermo-Lag was evaluated by establishing that the allowable ampacity for cable in air drops covered in Thermo-Lag is equal to or greater than the allowable ampacity for the same cable within either conduit or tray covered by Thermo-Lag, therefore the limiting condition is the allowable ampacity with cable tray or conduit. Preliminary evaluation has established that for cable air drops from conduit, CPSES cable design has ampacity margin available to accept a derate of 35% (Note [2]). For cable drops from trays, the CPSES cable design can accept a derate of 39% (see Attachment 1) based on the aforementioned calculations.

As delineated above, a review of CPSES calculations has established the design margin for cable ampacity derating. These margins have been compared to the derate factors for Thermo-Lag established by our confirmatory testing program; and are in addition to the cable design requirements, which

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Note 2: These values represent most limiting conditions for the described cables with respect to plant configuration.

utilizes 1.25 times the devices current requirements when sizing power cables. TU Electric concludes that CPSES cable design has sufficient margin to accommodate the derating obtain by testing. TU Electric is updating the CPSES Design Basis Document (DBD)-EE-52, and associated documents to incorporate the tested cable derate factors.

Box Design Configurations

To address NRC Staff concerns that specific "box design" configurations were more representative of junction box enclosures rather than direct extensions of cable tray envelopes. TU Electric committed to modify thirteen (13) specific Unit 2 Thermo-Lag box design configurations. The scope of these modifications consisted of 13 fire barrier configurations in which portions of cable trays and associated cable air drops were enclosed in "box design" assemblies. Twelve (12) of these configurations were modified to include a second layer of Thermo-Lag 330-1 panel coverage consistent with a design qualified for junction box configurations. The remaining configuration was reworked utilizing Thermo-Lag 330-660 "flexi-blanket" material on essential air drop cables which enter the tray protective envelope consistent with the air drop design qualified by test.

TU Electric has previously informed the NRC staff, in Reference 4, that these modifications are complete and compensatory measures are no longer required.

TU Electric docketed copies of Omega Point Laboratories (OPL) fire endurance test reports utilized in the acceptance basis for Unit 2 Thermo-Lag fire barrier configurations via TXX-93023 (Reference 1). Reference 1 also included Engineering Report ER-ME-082, Rev. 0, "Evaluation of Unit 2 Thermo-Lag Configurations", which provided justification for installed Thermo-Lag fire barriers not specifically tested or where variations from specific test configurations were installed based on plant conditions such as interferences. Subsequent to submittal of the engineering and fire test reports, TU Electric issued TXX-93061 (Reference 2) clarifying that the results of Test Scheme 9-3 (OPL Report No. 12340-94367J) was not utilized in the acceptance basis for Unit 2 fire barrier configurations. TU Electric committed to revise the engineering report to delete reference to this test. Accordingly, Revision 1 of ER-ME-082 is currently in process to incorporate the following changes:

- Revision of the justification for the thirteen "box design" configurations described above.

- Deletion of the results of Test Scheme 9-3 as described above.

- Inclusion of the results of the fire test recently performed at OPL for a Thermo-Lag protective envelope installed on a 36 inch wide cable tray (Scheme 15-1) as described via Reference 4.

- Revision of the justification for the seven Thermo-Lag configurations identified for further upgrade during TU Electric's review of ER-ME-082, Revision 0. This issue has been dispositioned by ONE Form 93-184 and field work was complete prior to issuance of TXX-93125 (Reference 4). The Thermo-Lag coverage on these configurations was modified to assure that they are bounded by tested configurations (e.g., additional panel material added).

- Inclusion of the evaluations associated with Thermo-Lag configurations for which installation had not been completed when Revision 0 was issued (Thermo-Lag installation was approximately 93% complete at that time). Installation of all Unit 2 Thermo-Lag fire barriers is now complete and will be included within the scope of ER-ME-082, Revision 1.

Attachment 2 to this correspondence provides draft evaluations associated with those "box design" configurations for which the Staff identified concerns in CPSES Supplemental Safety Evaluation Report 26. These revised evaluations are representative of the changes identified above to be included in ER-ME-082, Revision 1, which is available at CPSES for your review.

Should you need additional information, please contact Obaid Bhatty at (817) 897-5839.

Sincerely,

William J. Cahill, Jr.

William J. Cahill, Jr.

OB/grp
Attachments

c - Mr. J. L. Milhoan, Region IV
Mr. L. A. Yandell, Region IV
Resident Inspectors, CPSES (2)
Mr. B. E. Holian, NRR
Mr. T. A. Bergman, NRR

EVALUATION FOR THERMOLAGGED CABLE AIR DROPS DERATE FACTOR

1) All cables are routed in trays and conduits except for small transition points, which are generally limited to 3'-6" in length, where cables are in air. The cable sizing calculations evaluate the acceptability of cable sizing for cables with Thermolagged raceways as required. If the cable allowable ampacity for Thermolagged air drop is larger than the cable ampacity with Thermolagged tray's or conduit, than Thermolagged air drop cables are acceptable.

2) Attached tables evaluates cable allowable derate factors for Thermolagged air drops which will provide cable ampacities in Thermolagged air drop at least equal to the cable ampacities in Thermolagged trays or conduits.

3) Table 1 shows a minimum allowable derate factor of 35% which is greater than tested derate factor of 31.7%. Therefore Thermolagged air drops from conduits will have adequate cable ampacities.

4) Table 2 shows a minimum allowable derate factor of 39% which is greater than tested derate factor of 31.7%. Therefore Thermolagged air drops from trays will have adequate cable ampacities.

TABLE 1

AIR DROP THERMO-LAG DERATE FACTORS FOR CABLE DROPS FROM CONDUITS

CABLE TYPE & SIZE	AMPACITY IN AIR ICEA P46-426	AMPACITY IN AIR FOR 3/C OR 3-1/C	AMPACITY IN CONDUIT 3/C OR 3-1/C ICEA P46-426	REDUCTION FACTOR AIR TO CONDUIT	ALLOWABLE MARGIN IN CONDUIT CABLE DESIGN NOTE 2 & 3	ALLOWABLE CABLE DROP TL DERATE
3/C-#10	55	55	40	.727	35%/.65	53%/.473
3/C-#8	59	59	52	.881	35%/.65	43%/.573
3/C-#6	79	79	69	.873	35%/.65	43%/.567
3/C-#4	104	104	91	.875	35%/.65	43%/.569
3/C-#2	138	138	123	.891	35%/.65	42%/.579
3/C-#2/0	215	215	190	.884	35%/.65	43%/.575
3/C-#4/0	287	287	255	.889	35%/.65	42%/.578
1/C-#2	192	163 NOTE 1	123	.755	14%/.86	35%/.649
1/C-#2/0	298	253 NOTE 1	190	.751	14%/.86	35%/.646
1/C-#4/0	400	340 NOTE 1	255	.750	14%/.86	35%/.645
1/C-250 MCM	445	378 NOTE 1	282	.746	14%/.86	35%/.642
1/C-350 MCM	552	469 NOTE 1	348	.742	14%/.86	36%/.638
1/C-500 MCM	695	590 NOTE 1	425	.720	14%/.86	38%/.619
1/C-756 MCM	898	763 NOTE 1	524	.687	14%/.86	40%/.599

NOTES

1. IC -426 does not define a cable derate factor for 3-1/C in air. However for conservatism a derate factor of 15% is used to arrive at ampacity values for 3-1/C in air. This assumption is supported by test data for 750 MCM air drop, where base line current were greater than 763 Amps.

2. Switchgear cable sizing calculation, which utilizes only 1/C cables, has established a minimum allowable derate factor of 14% for Thermolagged conduit.

3. Calculation for evaluaition of Ampacity of Thermolagged raceways for cables from MCC's and panels have established an acceptable Thermolagged conduit derate factor of 35%.

TABLE 2

AIR DROP THERMO-LAG DERATE FACTORS FOR CABLE DROPS FROM TRAYS

CABLE TYPE & SIZE	AMPACITY IN AIR ICEA P46-426	AMPACITY IN RANDOM FILLE TRAY	REDUCTION FACTOR AIR TO TRAY	CABLE TRAY DERATE FACTOR NOTE 2	ALLOWABLE CABLE DROP TL DERATE
3/C-#10	55	20	.36	31.4/.686	75%/.27
3/C-#8	59	32	.54	31.4/.686	62%/.37
3/C-#6	79	51	.65	31.4/.686	55%/.44
3/C-#4	104	71	.68	31.4/.686	53%/.46
3/C-#2	138	120 2/C	.87	31.4/.686	40%/.60
3/C-#2/0	215	161 TR	.75	31.1/.686	48%/.51
3/C-#4/0	287	253 TR	.88	31.4/.686	39%/.6
1/C-#2	192	NOT USED	N/A	N/A	N/A
1/C-#2/0	298	141	.47	31.4/.686	67%/.32
1/C-#4/0	400	209	.52	31.4/.686	64%/.35
1/C-250 MCM	445	NOT USED	N/A	N/A	N/A
1/C-350 MCM	552	345	.625	31.4/.686	57%/.42
1/C-500 MCM	695	468	.67	31.4/.686	54%/.45
1/C-756 MCM	898	675	.75	31.4/.686	48%/.51

NOTES:

1. Ampacity in random filled trays are from calculation EE-78 "600V power cable ampacities for variou tray fills) for different cables highest cable ampacities are used for this evaluation.

2. Thermolagged tray cable derate factor of 31.4% is per CPSES test data. Adequacy of this derate factor is evaluated for all cables in Thermo-Lag trays.

DCA NO./REV	BLD G	ELEV	ROOM	FIRE AREA/ FIRE ZONE	SUPP. (Y/N)	DET. (Y/N)	DESCRIPTION/ISSUE OF CONCERN/RESOLUTION	SUPPORT TEST SCHEMES	BASIS/NOTES (PAGES B37-B55)
102471/3	AB	790'	X-174 X-180	AA/21a AA/21a	N Y	Y Y	ISSUE: 18" AND 24" WIDE CABLE TRAYS RUN PARALLEL BUT ARE TOO CLOSE FOR SEPARATE ENVELOPES. RESOLUTION: CONSTRUCT COMMON TRAY ENVELOPE "PARTITIONED" BETWEEN THE TRAYS. PREBAND THE TWO TRAYS TO PREVENT TOP PANEL SAG.	1-2, 12-1, 12-2, 13-1, 14-1, 15-1	1-5, 7
101282/1	SG	832'	2-096	2SE/16	Y	Y	ISSUE: CONSTRUCTION REQUIRES DETAILS FOR CONSTRUCTION OF REMOVABLE COVER JUNCTION BOX ASSEMBLY. RESOLUTION: UTILIZE 2 LAYERS OF FLAT PANEL MATERIAL AROUND THE J-BOX SIDES AND FOR THE LIP SUPPORTING THE SEPARATE COVER ASSEMBLY. THEN ADD A LAYER OF V-RIBBED MATERIAL. CONSTRUCT THE COVER WITH 2 LAYERS OF FLAT PANELS WITH A 4" (MIN.) OVERLAP INTO THE LIP. MAXIMUM GAP BETWEEN COVER AND LIP IS 3/32". ALL JOINTS TO BE SECURED WITH THE TIE WIRE STITCHING AND STRESS SKIN. TURNBUCKLES SHALL BE USED FOR SECURING THE COVER IN PLACE.	10-1	1-6, 8

DCA NO./REV	BLD G	ELEV	ROOM	FIRE AREA/ FIRE ZONE	SUPP. (Y/N)	DET. (Y/N)	DESCRIPTION/ISSUE OF CONCERN/RESOLUTION	SUPPORT TEST SCHEMES	BASIS/NOTES (PAGES B37-B55)
103472/1 AND 103489/1 BOTH AS MODIFIED BY DCN 5745 REV. 1 (MINOR MODIFICATION 93-123)	AB	810'	X-207	AA/21b	Y	Y	ISSUE: CONSTRUCTION REQUESTS DIRECTION FOR MULTIPLE CABLE AIR DROPS THROUGH EMBEDDED CONDUITS (SLEEVES) WHICH ENTER HORIZONTALLY STACKED CABLE TRAYS ROUTED IMMEDIATELY IN FRONT OF THE SLEEVES. RESOLUTION: CONSTRUCT THERMO-LAG 330-1 PANEL "BOX" ENCLOSURES TO ENVELOPE THE EMBEDDED SLEEVE BANK, ALL CABLE AIR DROPS AND THE PORTIONS OF THE STACKED CABLE TRAYS IMMEDIATELY IN FRONT OF THE SLEEVE BANK. ADD A SECOND LAYER OF THERMO-LAG TO THE "BOX" UTILIZING "V"-RIBBED PANELS. UPGRADE JOINTS PER TYP. J-BOX REQUIREMENTS. BUTT COVERAGE TO TUBE STEEL AND SPRINKLER PIPE INTERFERENCES SEALING OFF OPENINGS IN COVERAGE WITH TROWEL GRADE.	1-2, 10-1, 12-1, 12-2, 13-1, 14-1, 15-1	1-6, 12
103634/2	SG	810'	2-083	2SD/9	Y	N	ISSUE: EXISTING CONFIGURATION OF 2 LARGE ADJACENT J-BOXES DOES NOT ALLOW BANDING TO BE WRAPPED CIRCUMFERENTIALLY AROUND BOXES FOR ADDITION OF SECOND LAYER OF 330-1 PANELS. RESOLUTION: ATTACH BANDING TO STEEL ANGLE WHICH SHALL BE BOLTED TO THE WALL ABOVE AND BELOW THE J-BOXES.	10-1, 10-2,1-2, 14-1	1-6, 13

DCA NO./REV	BLD G	ELEV	ROOM	FIRE AREA/ FIRE ZONE	SUPP. (Y/N)	DET. (Y/N)	DESCRIPTION/ISSUE OF CONCERN/RESOLUTION	SUPPORT TEST SCHEMES	BASIS/NOTES (PAGES B37-B55)
							PROBLEMS 3 AND 4: REMOVE THE UNIT 1 THERMO-LAG AS NECESSARY TO GET STANDARD COVERAGE ON THE UNIT 2 COMMODITY THEN REINSTALL UNIT 1 THERMO-LAG . INSTALL COVERAGE ON THE SUPPORT STEEL AS CLOSE TO THE FW LINE AS POSSIBLE REDUCING THICKNESS AS NECESSARY TO ACHIEVE AN AIR GAP. INSTALL A SECOND LAYER OF THERMO-LAG IN THIS AREA TO COMPENSATE FOR THE REDUCED THICKNESS.		
101986/1 103034/1 104124/0 AS MODIFIED BY DCN 5742 REV. 1 (MINOR MODIFICATION 93-125)	SG	810'	2-083	2SD/9	Y	Y	ISSUE: ALL CABLE AIR DROPS FROM TWO CABLE TRAYS TO THROUGH WALL SLEEVES (TWS), AS WELL AS THE CABLE TRAYS, REQUIRE PROTECTIVE ENVELOPE. RESOLUTION: PROTECT ALL COMMODITIES WITH A COMMON ENCLOSURE AND INSTALL 2 LAYERS WHERE CABLES AIR DROP FROM THE END OF THE TRAYS TO THE WALL SLEEVES IN ACCORDANCE WITH THE REQUIREMENTS FOR JBs.	1-2, 10-1, 12-1, 12-2, 13-1, 14-1, 15-1	1-5, 36

NOTE	ACCEPTANCE BASIS/NOTES	DCA/REV
1.	CONTINUITY OF THE MATERIAL IS CONSISTENT WITH TESTED CONFIGURATIONS.	GENERIC
2.	EFFECTIVE THICKNESS OF THE MATERIAL IS CONSISTENT WITH TESTED CONFIGURATIONS.	GENERIC
3.	THE NATURE AND EFFECTIVENESS OF THE SUPPORT ASSEMBLY (IF APPLICABLE) IS CONSISTENT WITH TESTED CONFIGURATIONS.	GENERIC
4.	THE APPLICATION OR END USE OF THE MATERIAL IS CONSISTENT WITH TESTED CONFIGURATIONS.	GENERIC
5.	THE CONFIGURATION WAS REVIEWED BY A QUALIFIED FIRE PROTECTION ENGINEER AND DETERMINED TO PROVIDE AN EQUIVALENT LEVEL OF PROTECTION.	GENERIC
6.	SPECIFIC AND UNIQUE DIFFERENCES FROM TESTED CONFIGURATIONS EXIST FOR THE PLANT CONFIGURATION WHICH WOULD ENHANCE THE EFFECTIVENESS OF THE PROTECTIVE ENVELOPE (E.G., SPACIAL ORIENTATION, SURFACES NOT DIRECTLY EXPOSED TO A POTENTIAL FIRE DUE TO SHIELDING EFFECTS, TORTUROUS PATH, ETC.).	GENERIC
7.	THE EFFECTIVE WIDTH OF THE 2 TRAYS ACT AS A SINGLE 36" WIDE TRAY WHICH HAS BEEN TESTED (15-1). THE TESTED CONFIGURATION HAS STRESS SKIN AND TROWEL GRADE REINFORCEMENT OF LONGITUDINAL JOINTS AND BOTTOM BUTT JOINTS. THE INSTALLED CONFIGURATION HAS THE SAME JOINT REINFORCEMENT PLUS TIE WIRING OF BOTTOM BUTT JOINTS AND THE BOTTOM PANEL IS SECURED WITH TIE WIRES TO EVERY OTHER RUNG OF EACH TRAY. ADDITIONAL MATERIAL INSIDE THE ENVELOPE (AT THE SIDERAILS BETWEEN THE TRAYS) AIDS IN STRUCTURAL INTEGRITY AND THERMAL PROTECTION.	102471/3
8.	THE EFFECTIVENESS OF 2 LAYERS OF 330-1 PANELS ON A JUNCTION BOX HAS BEEN DEMONSTRATED VIA SCHEME 10-1. THE J-BOX IS MOUNTED TO A STRUCTURAL COLUMN WHICH REDUCES POTENTIAL EXPOSURE SURFACES AND WILL ACT AS A HEAT SINK. ALL JOINTS HAVE BEEN REINFORCED WITH QUALIFIED TECHNIQUES (STITCHING AND STRESS SKIN). ADDITIONAL TIE WIRES WERE USED TO SECURE PIECES TOGETHER FOR THE COVER ASSEMBLY. THE COVER FITS TIGHT AT NORMAL TEMPERATURES (3/32" MAX. GAP) AND DUE TO EXPANSION OF THE MATERIAL DURING SUBLIMATION AND CHAR LAYER FORMATION AT ELEVATED TEMPERATURES, WILL COMPLETELY SEAL. THE CONFIGURATION HAS MORE ENCLOSED AIR VOLUME THAN A TYPICAL J BOX ENVELOPE WHICH WILL RESULT IN LOWER INTERNAL TEMPERATURES. THEREFORE, SINCE STRUCTURAL INTEGRITY AND THERMAL CONCERNS ARE ADDRESSED, THE CONFIGURATION IS ACCEPTABLE.	101282/1
9.	ALL JOINTS UTILIZED IN THE "BOX" CONFIGURATION BOTH LAYERS UTILIZE EITHER THE SCORE AND FOLD METHODS WITH TROWEL GRADE BUILDUP OR TIE WIRED TOGETHER AND REINFORCED WITH STRESS SKIN. THE AIR DROP CABLES DO NOT CONTACT THERMO-LAG PANEL BACK SIDE SURFACES AND ARE WRAPPED WITH SILTEMP. THE LARGE ENCLOSED AIR VOLUME AND THERMAL MASS OF THE CABLES IN CONJUNCTION WITH THE DEMONSTRATED PERFORMANCE OF 2 LAYERS OF THERMO-LAG 330-1 PANELS ON JUNCTION BOXES WILL MAINTAIN SUFFICIENTLY LOW CABLE TEMPERATURES. THEREFORE, THE THERMAL AND STRUCTURAL INTEGRITY ASPECTS OF THE CONFIGURATION HAVE BEEN ADEQUATELY ADDRESSED. THE REDUCTION IN COVERAGE ON DCA 102160 AT THE 10" SW PIPE IS COMPENSATED BY THE SHADOWING EFFECT RESTRICTING DIRECT FLAME IMPINGEMENT AND THE HEAT SINK PROVIDED BY THE PIPE.	102160/0 MODIFIED BY DCN 5742/0 104217/2 103589/0 102265/0

NOTE	ACCEPTANCE BASIS/NOTES	DCA/REV
12	DUE TO THE LARGE AIR VOLUME AND ENCLOSED THERMAL MASS OF THE PROTECTED COMMODITIES (PROTRUDING PORTIONS OF THE EMBEDDED SLEEVES, CABLE BUNDLE MASS, AND THE MASS OF THE CABLE TRAYS) AND THE ADDITION OF THE SECOND LAYER OF PANELS CONSISTENT WITH JB COVERAGE TESTED IN SCHEME 10-1 THE THERMAL PROTECTION AFFORDED BY THE "BOX" DESIGN IS ADEQUATE. IN ADDITION, THE LARGEST SURFACE OF THE PROTECTIVE ENVELOPES IS ACTUALLY THE CONCRETE WALL WHICH PREVENTS EXPOSURE FROM THAT SIDE AND ACTS AS A HEAT SINK. THEREFORE, THE CRITICAL ATTRIBUTE OF THESE DESIGNS IS THE STRUCTURAL INTEGRITY OF THE "BOX". THIS HAS BEEN CONSERVATIVELY ADDRESSED VIA MECHANICALLY ATTACHING THE ENCLOSURES TO THE CONCRETE WALL WITH HILTI BOLT FASTENERS. ADDITIONALLY, SINCE THE ENCLOSURE ASSOCIATED WITH DCA 103472 INVOLVED ENVELOPMENT OF A LARGE BANK OF SLEEVES (40), THE OVERALL LENGTH OF THE ENCLOSURE IS APPROXIMATELY 5'- 6". TO COMPENSATE FOR THIS LARGE SPAN, UNISTRUT MEMBERS WERE WELDED ACROSS TWO SUPPORTS FOR THE MIDDLE TRAY IN THE STACK OF THREE TRAYS. THE UNISTRUT SPANS THE ENTIRE LENGTH OF THE SIDE OF THE ENCLOSURE FURTHEST FROM THE WALL AND IS USED TO SUPPORT THE PANELS WITH TIE WIRES. THE THERMO-LAG PANELS ARE SECURED TO THE CABLE TRAY ON THE BOTTOM OF BOTH BOX CONFIGURATIONS VIA TIE WIRES ATTACHED TO THE RUNGS OF THE CABLE TRAYS. ALL JOINTS ASSOCIATED WITH THESE ENCLOSURES HAVE BEEN REINFORCED WITH QUALIFIED TECHNIQUES (TIE WIRED TOGETHER OR SCORE AND FOLD, AND STRESS SKIN REINFORCEMENT). THEREFORE, DUE TO THESE CONSERVATIVE MECHANICAL ATTACHMENT TECHNIQUES AND THE ADDITION OF THE SECOND LAYER, THE ENCLOSURES ADEQUATELY ACCOUNT FOR THE STRUCTURAL INTEGRITY LIMITATIONS OF THERMO-LAG MATERIAL AT ELEVATED TEMPERATURES. BUTTING THE SECOND LAYER COVERAGE TO THE TUBE STEEL AND SPRINKLER PIPE IS ACCEPTABLE BECAUSE THEY DO NOT PENETRATE THE FIRST LAYER COVERAGE AND THEREFORE AFFORD NO DIRECT HEAT PATH INTO THE PROTECTED ENCLOSURE. THEY ALSO PROVIDE A SHADOWING AFFECT AGAINST DIRECT FLAME IMPINGEMENT AND ACT AS A HEAT SINK TO COMPENSATE FOR THE REDUCED COVERAGE.	103472/1 AND 103489/1 AS MODIFIED BY DCN 5745/1

NOTE	ACCEPTANCE BASIS/NOTES	DCA/REV
36.	DUE TO THE LARGE AIR VOLUME AND ENCLOSED THERMAL MASS OF THE PROTECTED COMMODITIES (PROTRUDING PORTIONS OF THE EMBEDDED SLEEVES, CABLE BUNDLE MASS AND THE MASS OF THE CABLE TRAYS) THE THERMAL PROTECTION AFFORDED BY THE 2 LAYER BOX "BOX" DESIGN IS ADEQUATE. IN ADDITION, THE LARGEST SURFACE OF THE PROTECTIVE ENVELOPES IS ACTUALLY THE CONCRETE WALL WHICH PREVENTS EXPOSURE FROM THAT SIDE AND ACTS AS A HEAT SINK. THEREFORE, THE CRITICAL ATTRIBUTE OF THESE DESIGNS IS THE STRUCTURAL INTEGRITY OF THE "BOX". THIS HAS BEEN CONSERVATIVELY ADDRESSED VIA MECHANICALLY ATTACHING THE ENCLOSURES TO THE CONCRETE WALL WITH HILTI BOLT FASTENERS AND TO EMBED PLATE VIA 1/4" SELF TAPPING SCREWS. ADDITIONALLY, SINCE THE ENCLOSURE ASSOCIATED WITH THE DCA(S) INVOLVED ENVELOPMENT OF SEVERAL SLEEVES, THE OVERALL LENGTH (TOP TO BOTTOM) OF THE ENCLOSURE IS APPROXIMATELY 7'- 6". THE THERMO-LAG PANELS ARE SECURED TO THE CABLE TRAY ON THE FRONT OF THE BOX CONFIGURATIONS VIA BANDING ATTACHED TO THE BACK OF THE CABLE TRAYS. THE BOTTOM PORTION OF THE ENCLOSURE IS SUPPORTED VIA HORIZONTAL (THROUGH BACK OF CABLE TRAYS) BANDING AND VERTICAL BANDING (AROUND CONDUITS ATTACHED TO WALL). ALL JOINTS ASSOCIATED WITH THESE ENCLOSURES HAVE BEEN REINFORCED WITH QUALIFIED TECHNIQUES (SCORE AND FOLD OR TIE WIRING TOGETHER AND STRESS SKIN REINFORCEMENT). HOWEVER, THE STRESS SKIN WAS NOT TIE WIRED TOGETHER. THEREFORE, DUE TO THESE CONSERVATIVE MECHANICAL ATTACHMENT TECHNIQUES, AND THE 2 LAYER INSTALLATION OVER THE AIR DROP, THE ENCLOSURES ADEQUATELY ACCOUNT FOR THE STRUCTURAL INTEGRITY LIMITATIONS OF THERMO-LAG MATERIAL AT ELEVATED TEMPERATURES.	101986/1 103034/1 104124/0 AS MODIFIED IN DCN 5742/1
37.	THIS CONFIGURATION IS ACTUALLY A COMBINATION OF TWO TYPICAL DETAILS (1-5 AND 13-2) WHICH ARE EVALUATED SEPARATELY IN ATTACHMENT A. THE USE OF HILTI BOLTS TO SECURE PORTIONS OF THE PROTECTIVE ENVELOPE FLARED OUT ONTO THE CONCRETE WALL PROVIDES POSITIVE MECHANICAL ATTACHMENT AND IS AN ENHANCEMENT. THE JOINT UPGRADE TESTS FOR ALL CABLE TRAYS AS WELL AS QUALIFICATION OF THE 9" CONDUCTIVE HEAT PATH PROTECTION IS BOUNDED BY THE TEST SCHEMES INDICATED. ADDITIONALLY, THE CONCRETE WALL PREVENTS EXPOSURE ON ONE OF THE TWO LARGEST SURFACES AND HAS HEAT SINK EFFECTS. THEREFORE, BASED ON THE THERMAL AND STRUCTURAL INTEGRITY ASPECTS DISCUSSED ABOVE, THIS CONFIGURATION IS ACCEPTABLE.	103487/0