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Sequoyah Nuclear Plant

MODIFICATION AND ADDITIONS INSTRUCTION

M&AI-7

ELECTRICAL PENETRATION AND CABLE SPLICING INSTRUCTIONS

10/31/79

Prepared By: Lynn Cowan

Revised By: N/A

Submitted By: C.R. Brimer
Supervisor

PORC Review: 11/8/79
Date

Approved By: John Valentine
Superintendent

Date Approved: 11/8/79

DISTRIBUTION

1C Plant Master File
___ Superintendent
___ Assistant Superintendent (Oper.)
1U Assistant Superintendent (Maint.)
___ Administrative Supervisor
___ Maintenance Supervisor (M)
1U Assistant Maintenance Supervisor (M)
1C Maintenance Supervisor (E)
___ Assistant Maintenance Supervisor (E)
___ Maintenance Supervisor (I)
___ Results Supervisor
___ Operations Supervisor
SIC Quality Assurance Supervisor
___ Health Physicist
___ Public Safety Services Supv.
___ Chief Storekeeper
___ Preop Test Program Coordinator
1C Outage Director
___ Chemical Engineer
___ Radiochem Laboratory
___ Instrument Shop
___ Reactor Engineer
___ Instrument Engineer
___ Mechanical Engineer
___ Staff Industrial Engineer
___ Training Center Coordinator
___ PCO - Chickamauga Engrg Unit - SNP
___ Public Safety Services - SNP
___ Shift Engineer Office
___ Unit Control Room
___ QA&A Rep. - SNP
___ Health Physics Laboratory
1U Chief, Nuclear Generation Branch
1U P Prod Central Office File
1U Superintendent, WBNP
___ Superintendent, BFNP
___ Superintendent, BBNP
1U EN DES - MEB NEC
___ Supv., NPHPS ROB, MS
___ NRC-IE:II
___ Power Security Officer, 604 PRB-C
___ Nuclear Materials Coordinator
___ Manager, OP-QA&A Staff
1U P Prod Plant Eng. Branch
1C NSRS 309 GBK
1C Asst. Outage Director
1U J.E. GIBBS, OUTAGE DIRECTOR, WBNP

Rev. No.	Date	Revised Pages	Rev. No.	Date	Revised Pages
9	11/8/79	All			

The last page of this instruction is Number 49.

1.0 PURPOSE

The purpose of this procedure is to provide a method of splicing cables on inboard and outboard sides of the electrical penetrations mounted in the reactor containment vessel walls and cables throughout the plant that are to be spliced.

2.0 SCOPE

This procedure includes splice details and requirements for non-CSSC splices to the electrical penetrations and other areas as well as CSSC.

3.0 REFERENCES

A. Manuals - Westinghouse Specification E2526 dated June 11, 1974.

B. Installation Instruction for Westinghouse Electronic Tube Division, Nuclear Reactor Containment Vessel, Electrical Penetrations; plant: Sequoyah Ø1 and Ø2, contract 72C61-75164 (TVA) (for 6.9-kV splicing only)

C. See appropriate TVA and Westinghouse drawings.
TVA 45A860 Series Electrical Penetration drawings
Westinghouse E2492 through E2506

D. G-38, "Installing Insulated Cables Rated Up to 15000 Volts Inclusive with Sequoyah Attachment"

E. Figures

1. Figure 1: Typical Butt Splice Preparation for Multiple Conductor Cable
2. Figure 2: Cable Splicing Dimensions
3. Figure 3: Multiple Conductor Cable Splice
4. Figure 4: Butt Splice Single Conductor Cable
5. Figure 5: Multiple Conductor/Single Conductor Cable
6. Figure 5A: Multiple Conductor/Single Conductor Cable (Cascading)
7. Figure 6: Multiple Conductor/Single Conductor Cable
8. Figure 7: Multiple Conductor Cable-Shielded without Drain Wires
9. Figure 8: Multiple Conductor Cable-Shielded without Drain Wires
10. Figure 9: RAYCHEM Thermofit Cable Breakout Table
11. Figure 10: Thermocoupling Wiring
12. Figure 11: Type E Triax Connectors
13. Figure 12: Type F Coax Connectors

F. Attachments

1. RAYCHEM WCSF In-Line Field Splice Installation Guide 1050
2. RAYCHEM WCSF In-Line Multiconductor Field Splice Installation Guide 1060
3. RAYCHEM Sleeve Selection Guide

4.0 DEFINITIONS

Cable Qualification - Cables shall be considered qualified when the continuity and megger tests have been completed in accordance with M&AI-12. These tests are to be accomplished after the cable penetration splices have been completed.

CATEGORY I STRUCTURES

The Category I structures other than the primary containment structures are listed as follows:

1. Auxiliary-Control Building
   a. Control Bay Portion
   b. Auxiliary Building Portion
   c. Waste Packaging Area
   d. Condensate Demineralizer Waste Evaporator Building Portion
2. Condenser Cooling Water Pumping Station and Retaining Walls
3. Auxiliary Essential Raw Cooling Water Structures
4. Diesel-Generator Building
5. CO_2 Storage Building
6. Refueling Water Tanks and Pipe Tunnels
7. Class IE Electrical Systems Structures
8. East Steam Valve Room
9. Essential Raw Cooling Water Pumping Station and Access Cells
10. ERCW Discharge Box

5.0 RESPONSIBILITIES

A. The cognizant engineer shall be responsible for all decisions concerning substitutions and deviations as outlined in this procedure. He shall be responsible for preparing the workplan and indicating the need for QA inspections.

B. The electricans shall be responsible for all installations and work performed.

C. QA inspectors shall be responsible for inspections on all CSSC equipment and where stated by the cognizant engineer in the workplan.

6.0 PROCEDURE (Cont.)

6. Prepare the individual conductor lengths so that the butt splices are staggered. Remove the insulation on each conductor to one-half the length of each butt splice sleeve.

7. Crimp the correct size butt sleeve to each of the conductors.

8. Slide the correct size RAYCHEM WCSF Type N sleeve over each of the conductors.

9. Crimp the mating conductor to each butt splice connector.

10. Center the RAYCHEM sleeve over the butt splice and shrink in accordance with the manufacturer's instructions.

11. Slide the copper braid tubing over the cables as shown on Figure 8.

12. Center the RAYCHEM jacket over the splice as shown on Figure 8 and shrink in accordance with the manufacturer's instructions.

7.0 INSPECTION AND DOCUMENTATION REQUIREMENTS

A. General

Inspections on all CSSC cable splices and all cables spliced in enclosures affixed to CSSC equipment shall be inspected by QA inspectors. All other splices may be inspected by the cognizant engineer or whomever be so designated in the workplan.

All splices will be inspected and documented per this instruction and the applicable workplan. Each splice shall be documented on Data Sheet 1 or an equvialent and contained in the applicable workplan. Also, the cable pull card for the applicable cable shall have the information as given below entered on the back of the card and included in the workplan at the time it is submitted to document control for documentation.

This cable has been spliced in accordance with M&AI-7 R ___.
Under workplan _____.

Work Performed By

_____
Electrician

_____
Electrician

_____
Foreman

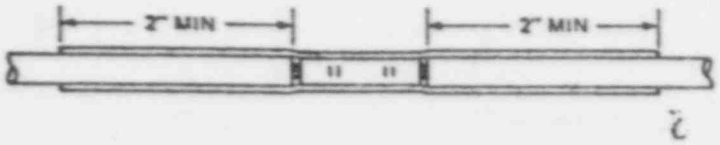
Location

_____
Box or Part/Col/Ele

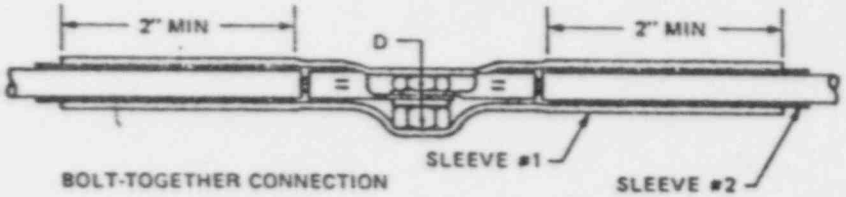
Inspected By

_____ / _____
Inspector Date

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED



STANDARD IN-LINE SPLICE



BOLT-TOGETHER CONNECTION

Part Number	Minimum Expanded ID As Supplied	Maximum Recovered ID After Heating	Expanded Wall Thickness ±20%	Nominal Recovered Wall Thickness	Standard Lengths	Application Diameter Range For In-Containment Applications	
						Minimum	Maximum
WCSF-070-N	.250	.070	.02	.08	6	.08	.14
WCSF-115-N	.350	.115	.03	.09	6	.13	.23
WCSF-200-N	.750	.200	.03	.11	6, 9, 12	.22	.40
WCSF-300-N	1.200	.300	.04	.17	6, 9, 12	.33	.60
WCSF-500-N	1.500	.500	.05	.17	6, 9, 12	.55	1.00
WCSF-650-N	2.000	.650	.05	.17	6, 9, 12	.72	1.30
WCSF-1000-N	3.000	1.000	.05	.17	12, 18	1.10	2.00
WCSF-1500N	4.500	1.500	.05	.17	12, 18	1.65	3.00

NOTES:

1. Select sleeve no. 1 with a maximum application diameter larger than the connection diameter "D".
2. Use additional sleeve(s) no. 2, if necessary, to build up the wire diameter to the minimum application diameter of the no. 1 sleeve selected.
3. Use of largest size sleeve that will fit a given wire is recommended to obtain maximum as installed wall thickness.
4. Splice sleeve length selected should allow for 2" minimum overlap onto wire insulation.

DASH NO.	MATL DESCRIPTION	RT SPEC

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NEXT ASSY

USED ON

DRAWN	Ken Tomsky	
CHECKED	E. Gracia	
DESIGN APPD	R. Kumar	
MFG APPD	J. S. Sidhu	
QC APPD	M. Gordon	
		11/1/77
PROJECT	47005-006	

Raychem

RAYCHEM CORPORATION, 300 CONSTITUTION DRIVE, MENLO PARK, CALIFORNIA

TITLE

Cable Splicing Sleeve Selection Guide
Nuclear Power Plant In-Containment Use

CODE IDENT. NO. 58000

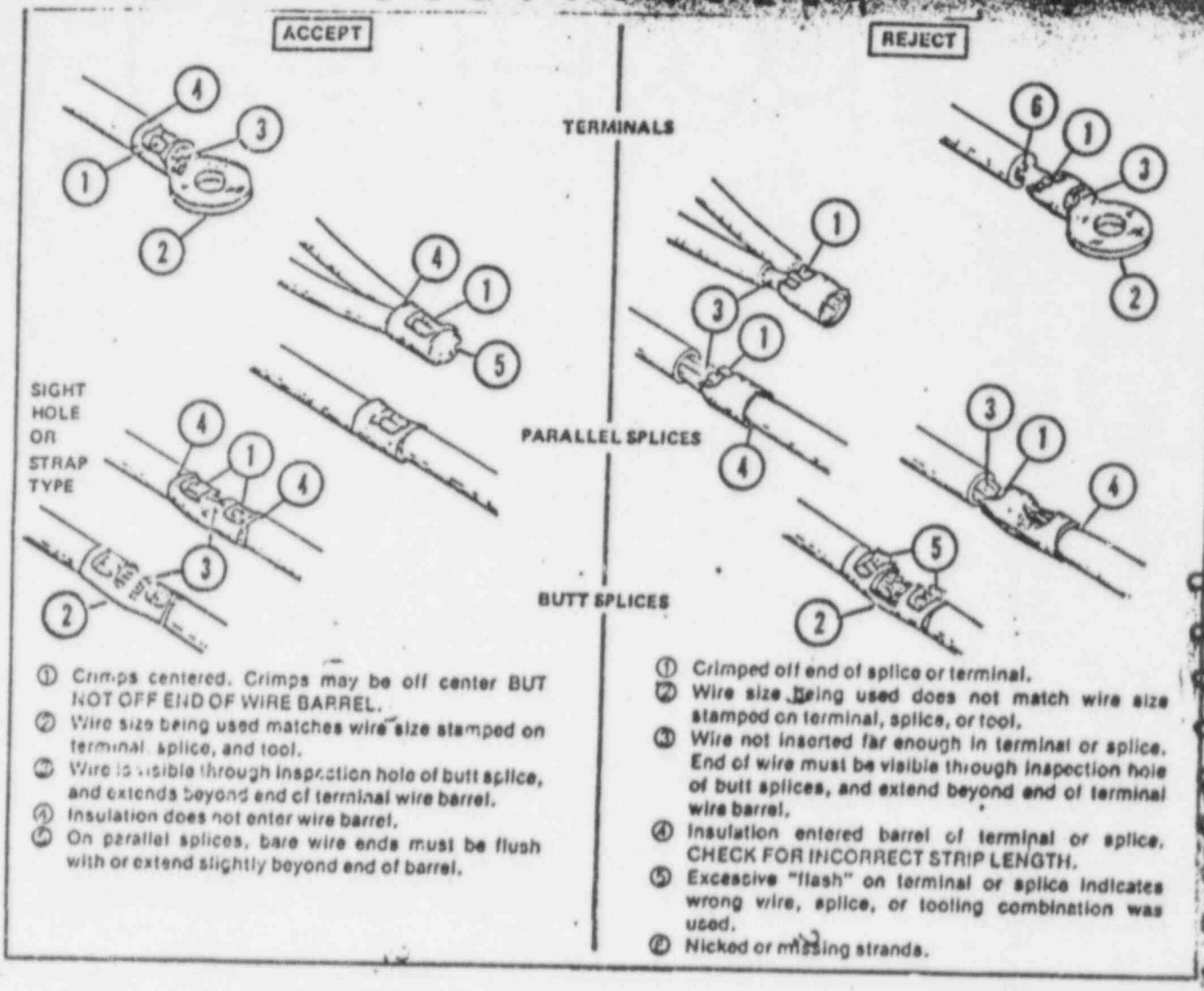
DWG. NO. 47005-006-03

SIZE B | SCALE — | SHEET 1 OF 1

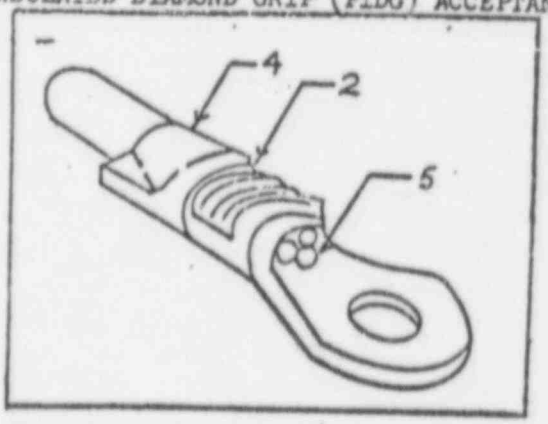
46

0 0 0 1 0 0 0 3 2 9 5

SOLISTRAND ACCEPTANCE CRITERIA



PRE-INSULATED DIAMOND GRIP (PIDG) ACCEPTANCE CRITERIA



1. Proper terminal for wire size (Example: AMP 22-18 for AWG 20)
2. Proper crimp die used on terminal (1 dot-red, 2 dots-blue, 1 dot-yellow)
3. Crimp properly placed on terminal
4. Insulation crimp holding - gripping not cutting
5. Wire flush with tongue end of wire barrel
6. Proper strip length - wire barrel + 1/32-inch minimum to 3/64-inch maximum

TVA 64 (05-9-65)

UNITED STATES GOVERNMENT

Memorandum

TENNESSEE VALLEY AUTHORITY

B43 '86 0626 931

TO : Those listed

FROM : W. S. Raughley, Chief Electrical Engineer, W8 C126 C-K

8607160840 (10)

DATE : June 23, 1986

SUBJECT: ELECTRICAL ISSUES - CABLE SIDEWALL PRESSURE (SWP)

PLEASE RESPOND BY JUNE 30, 1986

The purpose of this memorandum is to provide guidance for each Lead Engineer to determine the adequacy of the Class 1E cable installation with respect to cable SWP.

General construction specification G-38, presently defines the procedure for calculating the expected pulling force to ensure that cable sidewall pressure values are not exceeded (section 3.2.1.6). These requirements were incorporated into G-38 as outlined in Attachment A.

In July 1985, EEB-EP 22.29, "Procedure to Determine Acceptability of Sidewall Pressures Exerted on Class 1E Cables in Existing Conduit Installations at Watts Bar Nuclear Plant," was written to determine if the maximum allowable cable SWPs had been exceeded for Class 1E cables.

A design calculation to determine the acceptability of SWPs exerted on Class 1E cables in existing conduit installations at Watts Bar Nuclear Plant was initiated followed by a sampling program involving approximately 10,400 conduits. Screening calculations [Reference WBN Document "Sidewall Pressures of Class 1E Cables in Conduits" (B43 860310 936)] reduced the number of conduits to 1914 which were considered potential candidates for high sidewall bearing pressure. From these 1914 conduits, a field inspection team consisting of OE, OC, and QA/QC personnel conducted a walkdown of 778 conduits to determine the worst-cases and selected 82 conduits for analysis. The 82 conduits consisted of approximately 20 conduits each from voltage levels V2, V3, V4, and V5. Conduits from voltage level V1 were not considered as there are no Class 1E cables in voltage level V1.

Based on the isometric sketches furnished by OC for routing of these 82 conduits, tension and SWP calculations were performed analytically for the cables in each conduit to determine the worst-case SWP. The calculated SWPs were compared with the SWP limits recommended in the construction specification G-38. It was noted that 21 cables in 12 of the 82 conduits exceeded the SWP limits.

TVA cable SWP testing has just been completed at Central Labs, raising the cable SWP limits well above the present limits shown in G-38, which will eliminate the SWP violations at WBN. These results are applicable to the other projects provided you fall within the worst-case limits.

Each respective engineering project, with the exception of WBN, shall develop, issue, and implement a cable SWP sampling procedure using Attachment B as a guide consistent with your restart/fuel load schedules.

Those listed
June 23, 1986

ELECTRICAL ISSUES - CABLE SIDEWALL PRESSURE (SWP)

The fragnet for resolving the cable SWP issue is Attachment C. This effort should be started immediately to expedite completion of the cable SWP issue. Please submit your fragnet to me and the Project Engineer by June 23, 1986.

W. S. Raughley

J. D. Collins, P-205 SB-K*
G. T. Hall, DNE, DSC-A, Sequoyah
D. F. Faulkner, A7-BFN ENG
J. L. Springer, 9-111 SB-K

*Please proceed to revise the existing cable SWP calculation using the new cable SWP limits addressing each cable pull in each conduit and cable pulls through flexible conduit.

DLL:RB
DLL cc: RIMS, SL 26 C-K

Principally Prepared By: D. L. Leckie, Extension 2081.

046162.03

ATTACHMENT A

SQN (CP 5-27-70), WBN (CP 1-23-73), and BLN (CP 12-24-74)
Electrical Cable Issues

Issue: Cable Sidewall Pressure* In Conduit

Time Frame	DNE Document (Section)	DNE Requirement
7/25/73 to 10/22/75	G-38 R0 (Sect. 3.1.d)	Maximum force not to exceed 100 times the radius of curvature expressed in feet
10/22/75 to 9/15/85	G-38 R1 (Sect. 3.2.1.2.c) thru G-38 R5 (Sect. 3.2.1.3.a)	Specific instructions from vendor or 100 times bend radius in feet for small inst. cables and 300 times the bend radius in feet for shielded power cables
9-15-85 to 3/17/86	SRN-G-38-5, same as G-38 R6 (Sect. 3.2.1.6) thru G-38 R8 (Sect. 3.2.1.6)	NU CON required to calculate SWP; Use vendor's values, or 300 lb/ft for power and control and 100 lb/ft for signal cables

*Not specifically called cable sidewall pressure (SWP) until G-38 R6 (9-15-85).

066118.03

CRS: ~~4/28/86~~ 5/12/86

BFN (CONST Permit 5/10/67)
Electrical Cable Issues

Issue: Cable Sidewall Pressure* In Conduit

Time Frame	DNE Document (Section)	DNE Requirement
5/10/67 to 1/9/73	G-4, revised 12/15/69 and earlier revisions	No specific requirement
1/9/73 to 1/15/86	G-4, revision dated 1-9-73 (Sect. B.1.d)	Max. strain at a bend not in excess of 100 times radius of curvature in feet
1/15/86 to 3/17/86	G-38 R7 and R8 (Sect. 3.2.1.6)	NU CON required to calculate SWP Use vendor's values or 300 lb/ft for power and control cables and 100 lb/ft for signal cables

*Not specifically called cable sidewall pressure until G-38 R6 (9-15-85).

066118.03

CHS: 5/12/86 ~~4/28/86~~

ATTACHMENT B

PROCEDURE TO DETERMINE ACCEPTABILITY OF SIDEWALL PRESSURES EXERTED ON CLASS 1E CABLES IN EXISTING CONDUIT INSTALLATIONS AT _____ NUCLEAR PLANT

ISSUE DATE:

REVIEWED BY: _____

APPROVED BY: _____
Chief Electrical Engineer

1.0 PURPOSE AND SCOPE

1.1 Purpose

This procedure establishes a sampling program to determine whether maximum allowable cable sidewall pressures (SWP) have been exceeded for Class 1E cables in the environmental qualification program (10CFR50.49) at __NP. The procedure also provides the method for resolution of any SWP violations.

1.2 Scope

The sampling program will be limited to Class 1E cables included in the environmental qualification program (10CFR50.49) routed in conduits for all units. The sample shall include a minimum of 2 conduits per voltage level per unit.

2.0 PROCEDURE

2.1 DNE shall:

2.1.1 Obtain a listing of all Class 1E cables in the scope of the environmental qualification program for all units.

2.1.2 Develop a list of all conduits containing the cables identified in 2.1.1.

2.0 PROCEDURE (Continued)

2.1.3 By analysis of conduit lengths, conduit sizes, cable weights, number of cables, and maximum allowable pulling forces, and by use of G-38, Appendix F, reduce the conduit listing to a set defined as those conduits containing Class 1E cables whose maximum allowable SWPs have the potential of being exceeded.

2.1.4 Provide the defined set of conduits to a field inspection team consisting of personnel from ONP, DNE, and QA/QC, if possible.

2.2 Field inspection team shall:

2.2.1 Select the sample of conduits which meet the worst-case configurations as defined below. Conduit configurations having the following characteristics between pull points (boxes, condulets, termination points, etc.) should be considered for inclusion in the sample:

- o multiple bends - more than 360° between pullpoints.
- o long length - greater than lengths in G-38, Appendix F.
- o high percentage of cable fill - greater than 30% full.
- o elevation changes

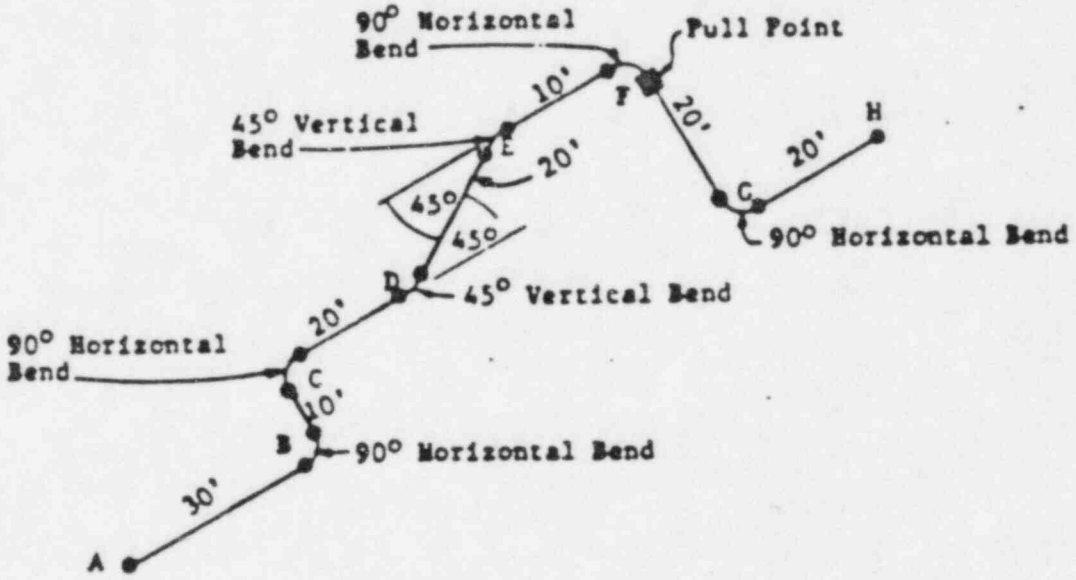
The field inspection team shall keep records on the number of conduits walked down, those with a potential of exceeding SWP, and those with the potential of exceeding SWP which did not meet the above criteria.

2.0 PROCEDURE (Continued)

2.2.2 Prepare isometric sketches (similar to figure 1) or provide a tabulation (attachment #1) showing the installed conduit configuration for each of the conduits selected for the sample:

NOTE

Field measurement tolerances shall be within the accuracy of standard measuring devices such as steel tapes, protractors, and slope indicators.



Conduit No: _____

Figure 1

2.0 PROCEDURE (Continued)

2.2.3 Obtain pull cards for all cables in the selected conduits.

2.2.4 Provide pull cards and each isometric sketch or tabulation to the Engineering Project as it is completed.

2.3 DNE shall:

2.3.1 Calculate expected pulling force (T) and SWP for each pull in each conduit. The pull shall be assumed to have been made in the direction which will result in the higher expected pulling force, unless the direction of the pull is known.

2.3.2 Compare the calculated SWPs to maximum SWPs obtained from the SWP testing program.

2.3.3 Document the sampling program as a calculations document, as in OEP-07.

3.0 CONCLUSION

3.1 If no violations of maximum sidewall pressure are found in the sample of worst-case examples then it will be concluded that existing installations are adequate and no further evaluation will be required.

3.2 If one or more violations of maximum sidewall pressure are found, they will be corrected by reworking the configuration of the conduit system and installing new cables and further sampling will be initiated to determine the extent of the problem.

4.0 REFERENCE

OEP-07, Calculations

ATTACHMENT #1

1 in. = 0.083 ft.
2 in. = 0.167 ft.
3 in. = 0.250 ft.
4 in. = 0.333 ft.
5 in. = 0.417 ft.
6 in. = 0.500 ft.
7 in. = 0.583 ft.
8 in. = 0.667 ft.
9 in. = 0.750 ft.
10 in. = 0.833 ft.
11 in. = 0.917 ft.
12 in. = 1.000 ft.

Workplan No. _____ ECN No. L_____ Conduit No. 3I-_____ F_{max} _____ (Total for cable(s))

Approved SWP Value _____ lbs/ft. Weight of Cable(s) _____ lbs/ft. Weight Correction Factor (W_c) _____ K or K_{bar} _____

Cable Identifier Number(s)	Cable O.B.	No. of Cond.	O.D. of Largest Conductor	I_{fac}	AWG or MCM	*WPR	*WTR	Node Value	Case No.	Length of Conduit	Angle from Horiz.	Angle of Bend	R-Radius of Bend (in ft.)	*T_{exp} or T_{act}
☐ (1)								T1	1	30	N/A	N/A	N/A	
☐ (2)								T2	4	N/A	N/A	90°	.96	
☐ (3)								T3	1	10'	N/A	N/A	N/A	
☐ (4)								T4	4	N/A	N/A	90	.96	
☐ (5)								T5	1	20				
☐ (6)								T6	8			45°	.96	
☐ (7)								T7	2	20	45°			
☐ (8)								T8	5			45°	.96	
☐ (9)								T9	1	10				
☐ (10)								T10	4			90°	.96	
☐ (11)								T						
☐ (12)								T						
☐ (13)								T						
☐ (14)								T						
☐ (15)								T						

*Calculated SWP Value _____ lbs/ft. *Maximum Allowable Pulling Tension _____ lbs.

From: RB Point A

To: Pull Point F

Cable O.B. and O.D. of largest conductor should be entered in inches. Length of conduit runs and bend radius should be entered in feet. All angles should be entered in degrees.

*This is the F_{max} value which is the total F_{max} value for a single or group cable installation.

*These values may be written in by user during program initiation if desired.

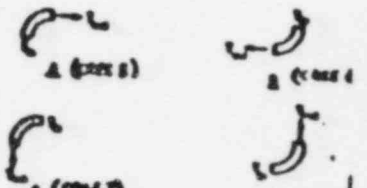
☐ Place "check" in block if cable is shielded.

☒ Place an "X" in block if cable is an instrumentation [illegible]

FOR A STRAIGHT RUN OVER .....: (4)
FOR AN INCLINED RUN (FROM:
(UPWARD SLOPE).....: (5)
(DOWNWARD SLOPE).....: (6)

FOR A BEND

FOR A HORIZONTAL BEND OVER .....: (8)
FOR A VERTICAL BEND OVER
FIGURE A .....: (9)
FIGURE B .....: (10)
FIGURE C .....: (11)
FIGURE D .....: (12)
FOR A THREE POINT SADDLE BEND...: (13)
FOR A DOUBLED SUBGROUP RUN.....: (14)



*Imported Pulling Forces for Vertical Bend

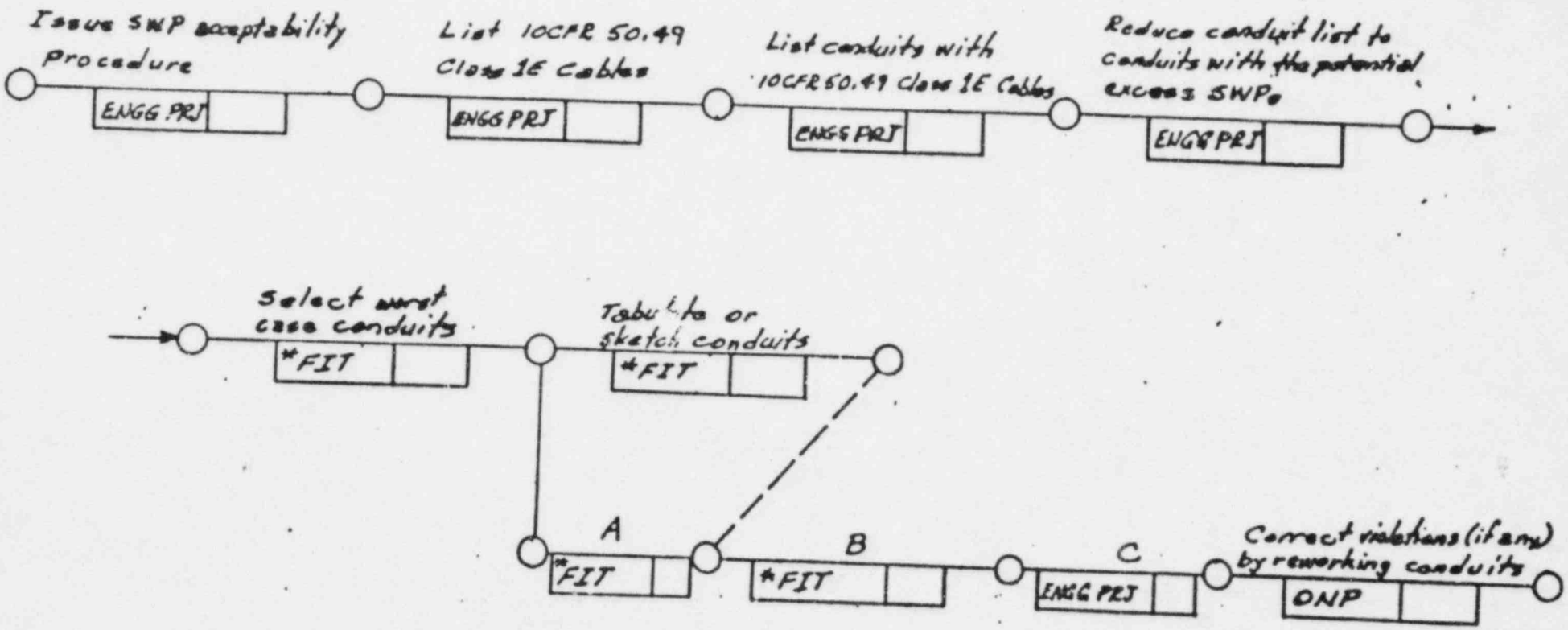
ROH

05/07/86 15:22 P. 3 TOTAL P. 3

ATTACHMENT C

CABLE SIDEWALL PRESSURE (SWP)

Sheet ___ of ___
Prepared by ___ date ___
Checked by ___ date ___
Reviewed by ___ date ___



* Field Inspection Team

A Obtain pull cards for all cables in conduits

B Provide pull cards and conduit tabulation or sketch to ENGG PRJ as completed.

C Calculate expected pulling force and SWP and compare SWPs with SWP limits from Testing Program. Document results

ITEM 3

If the worst-case conduits for tough pulls have not been established, determine the worst-case conduits and provide isometric drawings, pull cards, and work orders for the pulls. If isometric drawings are not available, the following may be provided in place of the drawings:

- a listing of the pull points and type of pull point (condulet [90° or straight], pull box, etc.)
- the number of turns between pull points in degrees
- the estimated distances between pull points
- a listing of any odd configurations in a pull such as flexible conduit
- type of cable, size of cable, voltage levels
- size of conduit
- a listing of any long vertical drops following 90° condulets pull-by information

RESPONSE

SQN is currently in the process of determining the final worst-case conduits. Isometric drawings and the associated and pertinent QA records will be provided in the near future. Two sample work orders are attached for your information. Work orders are not QA records; consequently, they are not readily retrievable for every cable pull. As discussed with your staff, we believe these work order samples are sufficient for the purpose of your review.

WORKPLAN INSTRUCTIONS

Workplan No. 10328
Page 7 of 23

Step Number	Description of Work, Inspections, or Tests

Scope

The purpose of this work plan package is to provide instructions for installing cables associated with the Post Accident Sampling Facility (PASF), outside the primary containment. Implementation of this work plan must be co-ordinated with other work plans listed below.

WP # 10144 - Install conduit & junction boxes for ECN 5200 (outside containment).

WP # 9977 - Install conduit & junction boxes for ECN 5200 (inside containment).

WP # 10031 - Install cables for ECN 5200 (inside containment).

Cable terminations will be included under another work plan number.

Cables to be installed by this instruction are listed on pages 12-1 thru 12-1 of 23.

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MARCH 1984

WORKPLAN INSTRUCTIONS

Workplan No. 10328
Page 10-1 of 23

Step Number	Description of Work, Inspections, or Tests
	Work Instructions
1.	Obtain breaching permits as required for pulling cable through conduit and cable tray firestops & pressure boundaries. For Physi-13 breaching permits, See Index page 9.
2.	Install All Cables per Applicable parts of M&AI-4. For M&AI-4 data sheets. ~~& cable installation single line sketches~~ Deleted per T.C. 83-475 See Index page 9 ~~(TCs Will Be Issued To Add Single Line Sketches)~~ QA inspection required when shown on data sheet
3.	Reseal Conduit/Cable Tray firestops and/or pressure boundaries per applicable parts of M&AI-13. For M&AI-13 data sheets See Index page 9. QA inspection required

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WORKPLAN INSTRUCTIONS

Workplan No. 10328
Page 10-2 of 23

Step Number	Description of Work, Inspections, or Tests
	Work Instructions (Cont)
4.	Repair damaged cable (if damage should occure during installation) per Applicable parts of M&AI-7. Notify the cognizant Engineer concerning this step before proceeding with cable repair instructions. For M&AI-7 data sheets, see index page 9. QA inspection required.
5.	Apply flamastic to cables in cable trays if applicable per M&AI-13. For M&AI-13 data sheets, see index page 9. QA inspection required.
6.	Replace all condulet covers after cable installation is complete. Electrical foreman to verify. Eric Fegg Elect. Foreman 12/12/84 Date

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Step Number	Description			Ref. Document
T.C.84-0355 7	Contact the Eng. Test Section or the Shift Technical Advisor (STA) for authorization to breach the ABSCE boundary for the conduit(s) listed below.			
	Conduit breaches	Authorization to breach ABSCE	Verification breach is closed	
	a) MC2775A	DPK / 3-4-84 DATE	DPK / 3-5-84 DATE	

3

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Temp Change 84-0541

Step Number	Description	Ref. Document
8.	Tag out 1-FCV-87-9 Battery Bd II-B20	45N687-2
	1-FCV-87-10 Battery Bd II-B37	
	1-FCV-87-11 Battery Bd II-A36	
9.	Lift cables 1V3442B, 1V3452B, 1V3462B at JB 2780 (Additional Equip. Bldg.). Cog. eng. to signoff below.	45N1630-51
	Eric Legg 3/23/84 COG. ENG. DATE	
10	Temporarily remove cables from conduit 1V3469B back to cable tray NZ-B.	
11.	Repull cables in conjunction with cables 1M3471B, 1M3472B, 1M3473B per M+AI 4. QA req'd.	

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WORKPLAN INSTRUCTIONS

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Step Number	Description of Work, Inspections, or Tests

Responsibilities

1. The Electrical foreman is responsible for all QA signoffs associated with this instruction.
2. The Electrical foreman is responsible for obtaining breaching permits for all cable installation. (Physi-13 Attachment F)
3. The Electrical foreman is responsible for verifying that all emdulet covers are installed after cable installation is complete. See Work Instructions step 6 for signoff
4. The Electrical foreman is responsible for obtaining all scaffold permits needed for cable installation.
5. The Electrical foreman is responsible for obtaining all cable card signoffs. Cognizant Engineer to verify Eric Jegg (Cog. Engr.) 19/12/84 date
6. The Electrical foreman is responsible for co-ordinating the removal from service and return to service of the CO_2 system in areas needed.

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1) IM 3180 •
2) IM 3182 •
3) IM 3183 •
4) IM 3184 •
5) IM 3185 •
6) IM 3186 •
7) IM 3187 •
8) IM 3188 •
9) IM 3189 •
10) IM 3190 •
11) IM 3191 •
12) IM 3192 •
13) IM 3193 •
14) IM 3194 •
15) IM 3195 •
16) IM 3196 •
17) IM 3197 •
18) IM 3198 •
19) IM 3199 •
20) IM 3200 •
21) IM 3201 •
22) IM 3315 •
23) IM 3380 A •
24) IM 3381 A •
25) IM 3382 A •
26) IM 3383 A •
27) IM 3384 A •
28) IM 3385 A •

29) IM 3389 A •
30) IM 3393 A •
31) IM 3397 A •
32) IM 3399 A •
33) IM 3401 A •
34) IM 3402 A •
35) IM 3403 A •
36) IM 3404 A •
37) IM 3405 B •
38) IM 3406 B •
39) IM 3407 B •
40) IM 3408 B •
41) IM 3409 B •
42) IM 3413 B •
43) IM 3417 B •
44) IM 3421 B •
45) IM 3423 B •
46) IM 3425 B •
47) IM 3426 B •
48) IM 3427 B •
49) IM 3428 B •
50) IM 3429 B •
51) IM 3430 •
52) IM 3431 •
53) IM 3432 •
54) IM 3433 •
55) IM 3434 •
56) IM 3435 •

57) IM 3438 •
58) IM 3439 •
59) IM 3441 •
60) IM 3442 •
61) IM 3443 •
62) IM 3444 •
63) IM 3445 •
64) IM 3446 •
65) IM 3447 •
66) IM 3448 •
~~67) IM 3449~~ •
68) IM 3450 •
~~69) IM 3451~~ •
70) IPL 2410 •
71) IPL 5500 •
72) IPL 5501 •
73) IPL 5502 •
74) IPL 5503 •
75) IPL 5504 •
76) IPL 5505 •
77) IPL 5506 •
78) IPL 5507 •
79) IPL 5508 •
80) IPL 5509 •
81) IPL 5510 •
82) IPL 5511 •
83) IPL 5515 •
84) IPL 5516 •

85) IPL 5517 •
86) IPL 5518 •
87) IPL 5522 •
88) IPL 5523 •
89) IPL 5524 •
~~90) IPL 5525~~ •
~~91) IPL 5526~~ •
92) IPL 5530 •
93) IPL 5531 •
94) IPL 5532 •
95) IPL 5533 •
96) IPL 5534 •
97) IPL 5535 •
98) IPL 5536 •
99) IPL 5537 •
100) IPL 5538 •
101) IPL 5539 •
102) IPL 5540 •
103) IPL 5541 •
~~104) RM 740~~ •
105) RM 741 •
106) IRM 610 •
107) ~~IRM 611~~ • deleted per SQ-FCR-1953
108) IRM 612 •
109) IRM 613 •
110) IRM 614 •
111) IT 103 •
112) IT 440 •

113) IT 442 •
114) IT 443 •
115) IT 931 •
116) K 301 •
117) IK 380 •
118) IK 381 •
~~119) ILT 425~~ •
120) ILT 472 •
121) ILT 473 •
122) ILT 476 •
123) ILT 477 •
~~124) ILT 474~~ •
125) A 2285 •
126) IM 3181 •
~~127) IM 3418~~ •
128) IPL5514 ← added per FCR 2033
129) IM 3414B
130) IM 3390A
TC 131) IM 3453
#84-0337 132) IM 3454
133) IM 3455A

134) IM 3456A
135) IM 3457B
136) IM 3458B
137) IM 3460A
138) IM 3461A

139) IM 3463A
140) IM 3464A
141) IM 3467A
142) IM 3470B
143) IM 3471B
144) IM 3472B
145) IM 3473B
146) IM 3474B
147) IM 3477B
148) IV 3442B
149) IV 3452B
150) IV 3462B
151) IM 3480
152) IM 3481
153) IM 3482
154)

EWP # 10328
Date 12-1-83

1M3241B

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M&AI-4
Attachment 1
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Rev. 5

ATTACHMENT 1
CABLE INSTALLATION DATA SHEET

UTS
10328 4/11/83

Conduit or Cable Number 1M3421B

Workplan Number ~~10144~~

1-M-10 Cu 2/8/84

From NC5

El. 732

SQ-FCR-2014

SQ-FCR-2059

SQ-FCR-1845

1M3241B, 1M3297B, ~~1M3298B~~, 1M3329B, 1M3330B, MC3535B, ~~MC2598B~~

Tray and Conduit Routing NZ-B, NX-B, LT-B, JA-B, JF-B, JE-B 1M3459B

FROM 745A0311Q019, 749A0300T022, 754A0300H00 TO CONDUIT 1M32418 [illegible] 011984

Cu 2/8/84

To 1-L-571 Pnl 9

XA5

El. 706

No. of Conductors	Size of Conductors	Type Insulation	Insulation Voltage
1-4C	#10	PXMJ	600

Cable Mark WFD-1 [illegible]

SQ-FCR-2014

Cable Length 226.0'

Conduit Length

QC Inspector Required: [X] Yes [ ] No

NOTE: Foreman to complete below if no inspector is required.

1. Cable released to pull as routed.

Reel Number or Contract Number HAB-2008

[signature] Signature

01 19 84 Date

2. Verification that cable is pulled as specified above.

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[signature] Signature

2/8/84 Date

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1M3241B

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ATTACHMENT 1
CABLE INSTALLATION DATA SHEET

UTS
10328 4/11/83

t or Number 1M3421B

Workplan Number ~~10144~~

1-M-10

From NC5

El. 732 SQ-FCR-1345

1M3241B, 1M3328B, 1M3329B, 1M3330B, ~~MC3535B~~

y and eduit outing NZ-B, NX-B, LT-B, JA-B, JF-B. MC3535B

1-L-571 Pnl 9

To XA5

El. 706

No. of Conductors	Size of Conductors	Type Insulation	Insulation Voltage
1-4C	#10		

Cable Mark WFD

able ength 226.0'

eduit ength

C Inspector Required: /X/ Yes / / No

OTE: Foreman to complete below if no inspector is required.

. Cable released to pull as routed.

Reel Number or Contract Number _____

Signature _____ Date _____

. Verification that cable is pulled as specified above.

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Signature _____ Date _____

ACC. NO._____, FOREMAN_____, DATE_____, ENGINEER_____

CONDUIT AND CABLE SCHEDULE SEQUOYAH NUCLEAR PLANT

CONDUIT OR CABLE NO.	CONDUIT SIZE	NO. COND.	MCM	TYPE CABLE	SCALED LENGTH	REVISION
1M 3413 B	CABLE	1-7C	10	WFG -1	226.0	R00

VOLTAGE LEVEL 11
FROM: 1-M-10,NC5,732
TO: 1-L-571,PNL 5,XA5,706
FOR: POST ACD SMPLG ECN L5200
CONDUIT ROUTING: 1M3297B,3298B,3241B,MC2598B,CONT CARD 2
TRAY ROUTING: NZ-B NX-B LT-B
REEL NO. SNP_____, SNP_____, SNP_____; FIELD CABLE LENGTH_____,

ACC. NO._____, FIELD CONDUIT LENGTH I_____, A_____, FL_____,

ACC. NO._____, FOREMAN_____, DATE_____, ENGINEER_____

SQ-FCR-2014

CONDUIT AND CABLE SCHEDULE SEQUOYAH NUCLEAR PLANT

CONDUIT OR CABLE NO.	CONDUIT SIZE	NO. COND.	MCM	TYPE CABLE	SCALED LENGTH	REVISION
1M 3417 B	CABLE	1-7C	10	WFG -1	226.0	R00

VOLTAGE LEVEL 11
FROM: 1-M-10,NC5,732
TO: 1-L-571,PNL 11,XA5,706
FOR: POST ACD SMPLG ECN L5200
CONDUIT ROUTING: 1M3332B,3331B,3329B,3328B,CONT CARD 2
TRAY ROUTING: NZ-B NX-B LT-B
REEL NO. SNP_____, SNP_____, SNP_____; FIELD CABLE LENGTH_____,

ACC. NO._____, FIELD CONDUIT LENGTH I_____, A_____, FL_____,

ACC. NO._____, FOREMAN_____, DATE_____, ENGINEER_____

3297B SQ-FCR-2014

VUID 10328

CONDUIT AND CABLE SCHEDULE SEQUOYAH NUCLEAR PLANT PAGE 18-79 OF 23

CONDUIT OR CABLE NO.	CONDUIT SIZE	NO. COND.	MCM	TYPE CABLE	SCALED LENGTH	REVISION
1M 3421 B	CABLE	1-4C	10	WFD -1	226.0	R00

VOLTAGE LEVEL 11
FROM: 1-M-10,NC5,732
TO: 1-L-571,PNL 9,XA5,706
FOR: POST ACD SMPLG ECN L5200
CONDUIT ROUTING: 1M3330B,3329B,3328B,3241B,CONT CARD 2
TRAY ROUTING: NZ-B NX-B LT-B
REEL NO. SNP_____, SNP_____, SNP_____; FIELD CABLE LENGTH_____,

ACC. NO._____, FIELD CONDUIT LENGTH I_____, A_____, FL_____,

ACC. NO._____, FOREMAN_____, DATE_____, ENGINEER_____

3297B SQ-FCR-2014

CONDUIT AND CABLE SCHEDULE SEQUOYAH NUCLEAR PLANT

CONDUIT OR CABLE NO.	CONDUIT SIZE	NO. COND.	MCM	TYPE CABLE	SCALED LENGTH	REVISION
1M 3423 B	CABLE	1-4C	10	WFD -1	226.0	R00

VOLTAGE LEVEL 11
FROM: 1-M-10,NC5,732
TO: 1-L-571,PNL 13,XA5,706
FOR: POST ACD SMPLG ECN L5200
CONDUIT ROUTING: 1M3333B,3331B,3329B,3328B,CONT CARD 2
TRAY ROUTING: NZ-B NX-B LT-B
REEL NO. SNP_____, SNP_____, SNP_____; FIELD CABLE LENGTH_____,

ACC. NO._____, FIELD CONDUIT LENGTH I_____, A_____, FL_____,

ACC. NO._____, FOREMAN_____, DATE_____, ENGINEER_____

3297B SQ-FCR 2014

CONDUIT OR CABLE NO.	CONDUIT SIZE	SYS-TEM	NUMBER CON-DUCTORS	MCM OR AWG	VOLTAGE LEVEL	TYPE OF CABLE	TOTAL LENGTH TRAY + CONDUIT	CABLE STATUS	ROUTING
1M 3416 B	CABLE	43	5-1C	12	11	WPB	0.0	R01	CONDUITS:
									CABLES:
MASTER FILE SEQUENCE NO. 97737									FROM:
									TO:
									FOR: DELETE ECN L5200
1M 3417 B	CABLE	43	1-7C	10	11	WFG	226.0	R01	CONDUITS: 1M3332B,3331B,3329B,3328B,CONT CARD 2
									CABLES: NZ-B NX-B LT-B
MASTER FILE SEQUENCE NO. 97352									FROM: 1-M-10,NC5,732
									TO: 1-L-571,PNL 11,XA5,706
									FOR: POST ACD SMPLG
1M 3417 B	CABLE	43	1-7C	10	11	WFG	142.0	R01	CONDUITS: 1M3241B,MC3535B 1M3459B FCR 1845
									CABLES: JA-B JF-B JE-B 59-FCR-2059
MASTER FILE SEQUENCE NO. 97353									FROM: CARD 2 OF 2
									TO: USE CARDS 1&2 FOR COMPLETE ROUTE
									FOR: PAS FCR 1845
1M 3418 B	CABLE	43	1-7C	12	11	WGG	150.0	R00	CONDUITS: 1M3332B,3331B,3329B,3328B,3282B,3301B
									CABLES:
MASTER FILE SEQUENCE NO. 92201									FROM: 1-L-571,PNL 11,XA5,706 VIA:1M3208B,3202B
									TO: 1-FSV-43-318,AZ288,699,VIA:1M3203B
									FOR: POST ACD SMPLG ECN L5200
1M 3419 B	CABLE	43	1-5C	12	11	WGE	291.0	R00	CONDUITS: 1M3332B,3331B,3329B,3328B,3282B,3204B
									CABLES: PF-B
MASTER FILE SEQUENCE NO. 92202									FROM: 1-L-571,PNL 11,XA5,706 VIA:1M3300B
									TO: PENT 37,AZ153,698
									FOR: POST ACD SMPLG ECN L5200
1M 3420 B	CABLE	43	5-1C	12	11	WPB	750.0	R00	CONDUITS: 1M3304B,3312B,3313B
									CABLES:
MASTER FILE SEQUENCE NO. 92203									FROM: PENT 37,AZ153,698
									TO: 1-FSV-43-319,AZ288,699
									FOR: POST ACD SMPLG ECN L5200
1M 3421 B	CABLE	43	1-4C	10	11	WFD	226.0	R01	CONDUITS: 1M3330B,3329B,3328B,3241B,CONT CARD 2
									CABLES: NZ-B NX-B LT-B
MASTER FILE SEQUENCE NO. 97354									FROM: 1-M-10,NC5,732
									TO: 1-L-571,PNL 9,XA5,706
									FOR: POST ACD SMPLG FCR 1845
1M 3421 B	CABLE	43	1-4C	10	11	WFD	142.0	R01	CONDUITS: MC3535B 1M3459B
									CABLES: JA-B ~~JF-B~~ JE-B 59-FCR-2059
MASTER FILE SEQUENCE NO. 97355									FROM: CARD 2 OF 2
									TO: USE CARDS 1&2 FOR COMPLETE ROUTE
									FOR: PAS FCR 1845
1M 3422 B	CABLE	43	1-5C	12	11	WGE	150.0	R00	CONDUITS: 1M3330B,3329B,3328B,3282B,3301B,3208B
									CABLES:
MASTER FILE SEQUENCE NO. 92206									FROM: 1-L-571,PNL 9,XA5,706 VIA:1M3202B,3209B
									TO: 1-FSV-43-341,AZ288,700
									FOR: POST ACD SMPLG ECN L5200
1M 3423 B	CABLE	43	1-4C	10	11	WFD	226.0	R01	CONDUITS: 1M3333B,3331B,3329B,3328B,CONT CARD 2
									CABLES: NZ-B NX-B LT-B
MASTER FILE SEQUENCE NO. 97356									FROM: 1-M-10,NC5,732
									TO: 1-L-571,PNL 13,XA5,706
									FOR: POST ACD SMPLG FCR 1845

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CONDUIT OR CABLE NO.	CONDUIT SIZE	NO. COND.	MCM	TYPE CABLE	SCALED LENGTH	REVISION
1M3459 B	3I	0		CON	0.0	R00

VOLTAGE LEVEL: 11

FROM: CABLE TRAY (JE-B) 706

TO: 1-M-10 RISER ,732

SQ-FCR-2088

FOR: 1M3413B, 3417B, 3421B, 3423B, 3425B, 3405B

CONDUIT ROUTING:

TRAY ROUTING:

REEL NO. SNP_____ SNP_____ FIELD CABLE LENGTH_____

FIELD CONDUIT LENGTH I_____ A_____ FI_____

FOREMAN_____ DATE_____

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Calculations complete for route specified per conduit and cable schedule, and field may begin installation.

Verified by: [signature] / 4/10/86
Cognizant Engineer Date

TO BE SPECIFIED BY COGNIZANT ENGINEER: Maximum allowable pulling force * lbs. (6.2)
Minimum pulling radius 13.4 inches. Minimum training radius 13.4 inches. (6.1.4)

1. Cable released to be pulled as routed. Verified by: [signature] / 04/7/86
Inspector Date

Reel or Contract No(s). SNPM-85-0175 / CONTR. 80K8-827337

COMMENTS: * SEE ATTACHED SHEETS FOR MAPF FOR SECTIONS OF ROUTE

*NOTE: FOREMAN TO FILL OUT FIELD CABLE LENGTH.

Cable No. 1PP562B
Type Cable or Mark No. WNB-1
No. of Conductors 3-1C
AWG/MCM 2/0
Voltage Level 15
Field Cable Length* 320' ft. [signature] / 3/25/86
Foreman Date

From: 6900 Volt SD BD 1B-B, PNL 18, TA12, EL 734
To: CENTRIFUGAL CHARGING PMP MTR 1B-B, UA4, EL 669
For: CENTRIFUGAL CHARGING PMP 1B-B
Tray and Conduit Routing: 1PP562B

PARTIAL SIGNOFFS (May be Continued on Back)

FROM	TO	INSPECTOR SIGNATURE	DATE
JB607 A5 & 5	1B-B (NOT IN FLEXIT. MTR) CENTRIFUGAL CHARGING PUMP	[signature]	04/7/86
JB607 To Shut Down Board Room PNL 18		[signature]	04/29/86

2. Verification that cable is pulled as specified above and meets the installation requirements of this procedure (6.5.1.5). [signature] / 5/4/86
Inspector Signature Date

3. Verification that all cable tray covers have been reinstalled, if applicable (6.5.1.6). QC inspections and signoffs required in Category I structures.

N/A /
Inspector Signature Date

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Step Number	Description	Ref. Document
III	WORK INSTRUCTIONS (CONT)	NOTE: ELECT FOREMAN WILL
	H.) TERMINATE NEW CABLE	COORDINATE WITH DPSO TO
	PER M+AI-7. QA I.S.	HI POT 6.9KV CENT CHARGING
	REQ'D TO INSPECT AND	PUMP CABLE AFTER TERMINALS
	SIGNOFF M+AI-7 DATA	ARE INSTALLED ON EACH END.
	SHEETS IN SECTION VIII-C.	DPSO TEST DATA WILL
		BE ADDED TO SECTION X-e
IV	ELECTRICAL FOREMAN SHALL	OF WORKPLAN. DPSO
	SIGN WORKPLAN THAT ALL	WILL PERFORM TEST
	WORK AREAS HAVE BEEN	PER SNP INSTRUCTION
	LEFT CLEAN.	II No. 11.
	[signature] / 5/19/86	
	ELECT FOREMAN / DATE	

☑ CHECK BLOCK BESIDE CABLE NO. IF QA INSPECTIONS & SIGNOFFS ARE REQUIRED

SNP M&AI-7
CABLE TERMINATION/SPLICE
DATA SHEET 1 - ATTACHMENT III

WP or NR NO. 11783

PAGE VII-c-2 OF VII-c-4

		☑	☐	☐
5.1.1	CABLE NO. or PANEL WIRE NOS.	1PP562B		
5.1.1	REFERENCE DWG(S) AND LOCATION(S)	END 1: 33-47035-D 463-2 S.De Bd. 1B-B Panel #18 END 2: 45N1724-2 Cent. Chrg. Pmp. 1B-B	END 1: END 2:	END 1: END 2:
5.1.4	METER NO./CALIB. DUE DATE	N/A		
5.1.4	CONTINUITY CHECKS ACCEPT.	* M. Beach / 5/15/86 (INSPECTOR / DATE)	INSPECTOR / DATE	INSPECTOR / DATE
5.1.5	MEGGER NO/CAL. DUE DATE	2/63112 8/6/86		
5.1.5	MEGGER CHECKS ACCEPTABLE	M Beach / 5/15/86 (INSPECTOR / DATE)	INSPECTOR / DATE	INSPECTOR / DATE
5.1.6	CRIMPING TOOL NO./ TOOL CALIB. DUE DATE	END 1: E01086 / 5-7-87 END 2: E01086 / 5-13-87	END 1: / / END 2: / /	END 1: / / END 2: / /
5.1.6	SOLDERING AND/OR CRIMPS ACCEPTABLE	END 1: A Buschbach / 5-8-86 (INSPECTOR / DATE) END 2: A Buschbach / 5-12-86	END 1: A END 2:	END 1: A END 2:
5.1.7	RAYCHEM AND/OR TAPPING ACCEPTABLE	END 1: A Buschbach / 5-8-86 (INSPECTOR / DATE) ** WDEgll / 5/16/86 END 2: A Buschbach / 5-12-86 (INSPECTOR / DATE)	END 1: END 2:	END 1: END 2:
5.1.8	CABLE OR PANEL WIRE(S) PROPERLY IDENTIFIED, SECURED AND TERMINATED	END 1: M Beach / 5/15/86 (INSPECTOR / DATE) END 2: WDEgll / 5/16/86 (INSPECTOR / DATE)	END 1: END 2:	END 1: END 2:

REMARKS: *Phones

** Verified installation of slice kit. Mte. Leads to field cable. WDE 5/16/86

NOTES: FOR SPLICE LIST NUMBER OF CONDUCTORS AND SIZE (AWG/MCM) BESIDE CABLE NO. OR PANEL WIRE(S) ARE [illegible] REQUIRED. PARTIAL SIGNOFFS WILL BE MADE IN "REMARKS" SECTION AND MAY BE CONTINUED ON BACK OF DATA SHEET.

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Step Number	Description	Ref. Document
III	WORK INSTRUCTIONS (CONT)	NOTE: SHOULD CONDUIT BEING REMOVED PASS THROUGH WALLS OR FLOORS SEAL/CAP SLEEVES PER M+AI-13 (4SN880-26).
	G) REMOVAL OF CABLE (CONT)	
	5) (CONT) M+AI-13, QA INSPECTION REQ'D AND SIGNOFFS ON M+AI-13 DATA SHEETS IN SECTION ~~VIII~~-f.	
	6) REMOVE CONDUIT (EXISTING) 4I-IPP 562 B PER DRAWING 4SN828-14 R 40. FOREMAN SHALL SIGN WORKPLAN VERIFYING CONDUIT HAS BEEN REMOVED.	NOTE: NEW CONDUIT IPP562B COMES IN BOTTOM OF 6900V SD BD 1B-B PNL 18. REF DRAWING 4SN828-2.
	[signature] / ELECT FOREMAN	5/19/86 / DATE

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Step Number	Description	Ref. Document
III	WORK INSTRUCTIONS (CONT)	NOTE: CRAFT SHALL VERIFY MOTOR PHASE MARKINGS (A, B+C) or (T_1, T_2 + T_3) are same as PNL MARKINGS FOR THE POWER CABLES. THIS SHOULD REASIONABLY ASSURE THAT WHEN NEW POWER CABLES ARE HOOKED UP THE ROTATION WILL BE CORRECT.
	G) REMOVAL OF CABLE (CONT)	
	3) CONT) NECESSARY WITH RTV FOAM. REFERENCE WP STEPS III E.3.a through III E.5.	
	4) REMOVE CABLE COMPLETLY IF POSSIBLE IF NOT, ABANDON THE EXISTING CABLES AS FAR BACK AS POSSIBLE ON BOTH ENDS AND TAG AS FOLLOWS: "WP11783", CABLE #, "ABANDON". PLACE RAYCHEM END CAP OVER BOTH ENDS OF ABANDON CABLE.	
	5) SEAL CONDUITS PER	

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Step Number	Description	Ref. Document
III	WORK INSTRUCTIONS (CONT)	
	F) INST OF TSI FIRE BARRIER (CONT)	
	6) ON CONDULETS THAT HAVE BEEN SEALED PLACE A TAG SAYING "SEALED WP 11783"	
	G) REMOVAL OF CABLE	REF FOLLOWING TVA AND VENDOR DRAWINGS
	1) LIFT EXISTING CABLES 1PP562B, 1PP564B, 1PL3011B AND 1PL3013B. NOTE: OBTAIN H.O. BEFORE LIFTING CABLES. ELECT FOREMAN SHALL VERIFY SE HAS SIGNED STEP XI ON PG I-2.	45N1760-1 45N1760-7 45N1724-2 CONTRACT 54499 33-47035-D 463
	2) OBTAIN PHYSI-13 PRIOR TO BREECHING FIRE BARRIER.	
	3) SEAL CONDUIT SEALS AS	

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Workplan No. 11783
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Step Number	Description	Ref. Document
III	WORK INSTRUCTIONS (CONT)	
	F) INST OF TSI FIRE BARRIER (CONT)	
	2) EN DES HANGER PERSONNEL ARE TO APPROVE THE ASSEMBLING OF FIRE BARRIER MATERIAL AROUND CONDUIT AND HANGERS PRIOR TO THE MATERIAL BEING APPLIED. EN DES SIGNOFFS ARE ON "SUPPORT EVALUATION BY EN DES" DATA SHEETS IN SECTION VII-h.	
	3) NELSON STUD SIGNOFFS TO BE ON M+AI-11 DATA SHEETS IN SECTION VII-e. QA INSPECTION IS REQ'D.	

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Step Number	Description	Ref. Document
III	WORK INSTRUCTIONS (CONT)	
	E) INSTALLATION OF CABLE (CONT)	
	6) SPLICE AND REPAIR CABLES AS NECESSARY PER M+AI-7. QA INSPECTION AND SIGNOFF ON M+AI-7 DATA SHEET IN SECTION VII-C IS REQUIRED.	
	F) INSTALLATION OF TSI FIRE BARRIER	
	1) INSTALL TSI FIREBARRIER MATERIAL ON CONDUITS PER CONDUIT AND GROUNDING DRAWINGS AND INTERACTION 68 SKETCHES IN THE AUX BUILDING. REF WP 11547.	Ref: INTERACTION 68 SKETCHES

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Step Number	Description	Ref. Document
III	WORK INSTRUCTIONS (CONT)	
	E) INSTALLTION OF CABLE (CONT)	
	3) d) (CONT) one at a time thru the conduit using a fishtape	
	4) AFTER CABLES ARE PULLED THRU THE CONDUIT, REINSTALL CERAFIBER AND RTV SEALANT PER M+AI-13. QA IS REQUIRED TO INSPECT AND SIGNOFF M+AI-13 DATA SHEETS IN SECTION ~~III~~ f.	
	5) CRAFT MAY REMOVE ENOUGH RTV FOAM TO ALLOW INSTALLATION OF CERAFIBER AND RTV SEALANT INTO CONDUIT.	

Workplan No. 11783
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Step Number	Description	Ref. Document
III	WORK INSTRUCTIONS (CONT)	
	E) INSTALLATION OF CABLE (CONT)	
	3) WHERE CONDUIT PENETRATES ABSCE BOUNDARY FOLLOW THE PROCEEDING STEPS:	
	a) Remove the silicone RTV sealant and cerafiber from one side of the conduit.	
	b) Seal the conduit with silicone RTV foam (Semkit). NO QA INSPECTION REQ'D.	
	c) After the RTV foam sets up, remove cerafiber + silicone RTV sealant from other side of sleeve.	
	d) Craft may then pull cable(s)	

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Step Number	Description	Ref. Document
III	WORK INSTRUCTIONS (CONT)	
	D)6) CORE DRILLING + BREACHING (CONT)	
	AND SEAL BOTH SIDES PER	
	M+AI-13. QA IS REQUIRED TO	
	INSPECT AND SIGNOFF M+AI-13	
	DATA SHEETS IN SECTION VII-f	
	E) INSTALLATION OF CABLE	Note: Cable #'s
	1) INSTALL CABLES AS REQ'D	to be installed
	PER M+AI-4. QA IS REQ'D	are as follows
	TO INSPECT AND SIGNOFF	1PP562B
	M+AI-4 DATA SHEETS IN	1PP564B
	SECTION VII-a.	1PL3011B
	2) OBTAIN A PHYSI-13 PRIOR	1PL3013B
	TO BREECHING FIRESTOP	
	PENETRATION FOR CABLE PULL	

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Step Number	Description	Ref. Document
III	WORK INSTRUCTIONS	
	A) INSTALLATION OF CONDUIT	See Section IV of WP. for Conduit and Grounding drawings.
	1) INSTALL CONDUITS LISTED BELOW PER M+AI-6. REFERENCE INTERACTION 68 SKETCHES (FOUND IN SECTION X-b of WP) AND CONDUIT + GROUNDING DRAWINGS. QA REQ'D TO INSPECT AND SIGNOFF WP IN SECTION VII-b	
	2) CONDUITS TO BE INSTALLED ARE LISTED BELOW.	
	1PP562B 1PL3013B	
	1PP564B 1PL3018B	
	1PP3011B	

Workplan No. 11783
Page II-2 of II-32

ep ber	Description	Ref. Document
C.	PURPOSE The purpose of this workplan is to reroute cables 1PP562B, 1PP564B, 1PL3011B and 1PL3013B in accordance with 10 CFR 50 Appendix R ECN 6235. This workplan will clear Appendix R interaction 68. The cables in this interaction are the power supply and control power to Centrifugal Charging Pump 1B-B and the Centrifugal Charging Pump 1B-B Room Cooler.	

WORKPLAN - 11783 ECN - L6235

CONDUIT NUMBER - 1PP562B

CABLE IDENTIFIER NUMBER(S)	CABLE SIZE (AWG) (MCM)	O.D. (in.)	LARGEST COND. OD (Inches)	NUMBER OF COND.	Fmax (lbs.)	MPR (Inches)	MTR (Inches)
1PP562B	2/0	1.117	1.117	3-1C	2555.52	13.404	13.404

THE CALCULATED MAXIMUM ALLOWABLE PULLING FORCE FOR
YOUR 3 POWER & CONTROL CABLE(S) IS: 2555.52 lbs.

WORKPLAN - 11783 ECN - L6235

CONDUIT SIZE-NUMBER - 4I-1PP562B

FOR THE FOLLOWING CABLE(S): FROM PULL POINT B TO PULL POINT A

1PP562B

CODE VALUE NO.	CASE	LENGTH, RADIUS, OR DEGREES	Texp	SWP
T(1)	1	3.83 ft.	2.92460715 lbs.	0 lbs./ft.
T(2)	8	20 deg. R=1.17 ft.	2.741178425737 lbs.	1.236587759826 lbs./ft.
T(3)	2	.67 ft. 20 deg.	3.710036541353 lbs.	0 lbs./ft.
T(4)	5	20 deg. R=1.17 ft.	4.70121305657 lbs.	2.120789536173 lbs./ft.
T(5)	1	3.33 ft.	7.24401770657 lbs.	0 lbs./ft.

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.6)	8	90 deg. R=1.17 ft.	14.30467068153 lbs.	6.453057016293 lbs./ft.
T(7)	2	6.92 ft. 90 deg.	29.04427068153 lbs.	0 lbs./ft.
T(8)	5	5 deg. R=1.17 ft.	30.05944788189 lbs.	13.56027939257 lbs./ft.
T(9)	2	2 ft. 85 deg.	34.43634241764 lbs.	0 lbs./ft.
T(10)	8	5 deg. R=1.17 ft.	35.05312464794 lbs.	15.81300380753 lbs./ft.
T(11)	2	7.83 ft. 90 deg.	51.73102464794 lbs.	0 lbs./ft.
T(12)	5	35 deg. R=1.17 ft.	65.49107594582 lbs.	29.54403191417 lbs./ft.
T(13)	2	5 ft. 55 deg.	76.4049743909 lbs.	0 lbs./ft.
T(14)	8	35 deg. R=1.17 ft.	94.63816586964 lbs.	42.69273259558 lbs./ft.
T(15)	2	2.5 ft. 90 deg.	99.96316586964 lbs.	0 lbs./ft.

Wc=1.195 , WEIGHT OF CABLE(S)= 2.13 , CONDUIT I.D.=4.03 , COEFF. OF FRICT.=.3585

YOUR SIDEWALL PRESSURE VALUE = 42.69273259558 lbs./ft.

MANUFACTURERS RECOMMENDED SWP=300 lbs./ft.

THE MAXIMUM ALLOWABLE PULLING TENSION FOR
THE 3 CABLE(S) IS = 664.6381658696 lbs.

"RKPLAN - 11783 ECN - L6235

CONDUIT SIZE-NUMBER - 4I-1PP562B

FOR THE FOLLOWING CABLE(S): FROM PULL POINT C TO PULL POINT B

1PP562B

NODE VALUE NO.	CASE	LENGTH, RADIUS, OR DEGREES	Texp	SWP
T(1)	1	6.67 ft.	5.09324535 lbs.	0 lbs./ft.
T(2)	4	90 deg. R=1.17 ft.	8.944561588579 lbs.	4.035029341248 lbs./ft.
T(3)	3	4.58 ft. 10 deg.	10.69473304518 lbs.	0 lbs./ft.
T(4)	7	35 deg. R=1.17 ft.	13.78575238848 lbs.	6.218964990942 lbs./ft.
T(5)	3	3.75 ft. 45 deg.	10.16255049993 lbs.	0 lbs./ft.
6)	4	90 deg. R=1.17 ft.	17.84708031858 lbs.	8.051092502179 lbs./ft.
T(7)	1	14 ft.	28.53755031858 lbs.	0 lbs./ft.

Wc=1.195 , WEIGHT OF CABLE(S)= 2.13 , CONDUIT I.D.=4.03 , COEFF. OF FRICT.=.3585

YOUR SIDEWALL PRESSURE VALUE = 8.051092502179 lbs./ft.

MANUFACTURERS RECOMMENDED SWP=300 lbs./ft.

THE MAXIMUM ALLOWABLE PULLING TENSION FOR
THE 3 CABLE(S) IS = 664.8470803186 lbs.

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WORKPLAN - 11783 ECN - L6235

CONDUIT SIZE-NUMBER - 4I-1PP562B

FOR THE FOLLOWING CABLE(S): FROM PULL POINT D TO PULL POINT C

1PP562B

NODE VALUE NO.	CASE	LENGTH, RADIUS, OR DEGREES	Texp	SWP
T(1)	1	10.33 ft.	7.88803965 lbs.	0 lbs./ft.
T(2)	4	[illegible] deg. R=1.17 ft.	10.45324948408 lbs.	4.71562166149 lbs./ft.
T(3)	2	2.8 ft. 30 deg.	15.28689320376 lbs.	0 lbs./ft.
T(4)	4	45 deg. R=1.17 ft.	20.25822835403 lbs.	9.138798475554 lbs./ft.
T(5)	1	17 ft.	33.23951335403 lbs.	0 lbs./ft.
T(6)	7	20 deg. R=1.17 ft.	38.24388068643 lbs.	17.25240294504 lbs./ft.
T(7)	3	2.58 ft. 20 deg.	38.21563246873 lbs.	0 lbs./ft.
T(8)	6	20 deg. R=1.17 ft.	42.81345061413 lbs.	19.31380624051 lbs./ft.
T(9)	1	3.83 ft.	45.73805776413 lbs.	0 lbs./ft.
T(10)	7	30 deg. R=1.17 ft.	55.71104567376 lbs.	25.13210979645 lbs./ft.
T(11)	3	1.75 ft. 30 deg.	55.00457299856 lbs.	0 lbs./ft.

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T(12)	6	30 deg. R=1.17 ft.	65.48784367325 lbs.	29.54257378629 lbs./ft.
T(13)	1	3.25 ft.	67.96955992325 lbs.	0 lbs./ft.
T(14)	8	30 deg. R=1.17 ft.	81.47535057831 lbs.	36.75478411281 lbs./ft.
T(15)	2	3.25 ft. 30 deg.	87.0858298958 lbs.	0 lbs./ft.
T(16)	5	30 deg. R=1.17 ft.	105.9419225248 lbs.	47.79203112666 lbs./ft.
T(17)	1	1.75 ft.	107.2782312748 lbs.	0 lbs./ft.
T(18)	7	30 deg. R=1.17 ft.	129.9582667515 lbs.	58.62617348954 lbs./ft.
T(19)	3	3.25 ft. 30 deg.	128.646246069 lbs.	0 lbs./ft.
T(20)	6	30 deg. R=1.17 ft.	154.3353276675 lbs.	69.62304070045 lbs./ft.
T(21)	1	2 ft.	155.8625376675 lbs.	0 lbs./ft.

Wc=1.195 , WEIGHT OF CABLE(S)= 2.13 , CONDUIT I.D.=4.03 , COEFF. OF FRICT.=.3585

YOUR SIDEWALL PRESSURE VALUE = 69.62304070045 lbs./ft.

MANUFACTURERS RECOMMENDED SWP=300 lbs./ft.

THE MAXIMUM ALLOWABLE PULLING TENSION FOR
THE 3 CABLE(S) IS = 664.3353276675 lbs.

WORKPLAN - 11783 ECN - L6235

CONDUIT SIZE-NUMBER - 4I-1PP562B

WORKPLAN - 11783 ECN - L6235

CONDUIT SIZE-NUMBER - 4I-1PP562B

FOR THE FOLLOWING CABLE(S): FROM PULL POINT E TO PULL POINT F

1PP562B

NODE VALUE NO.	CASE	LENGTH, RADIUS, OR DEGREES	Texp	SWP
T(1)	1	2 ft.	1.52721 lbs.	0 lbs./ft.
T(2)	7	10 deg. R=1.17 ft.	2.156091790939 lbs.	.9726461775353 lbs./ft.
T(3)	3	4.25 ft. 10 deg.	3.780159190624 lbs.	0 lbs./ft.
T(4)	7	80 deg. R=1.17 ft.	5.20437523157 lbs.	2.347773734272 lbs./ft.
T(5)	3	14 ft. 90 deg.	-24.61562476843 lbs.	0 lbs./ft.
T(6)	6	15 deg. R=1.17 ft.	-.3401885607395 lbs.	-.1534642934198 lbs./ft.
T(7)	3	2.33 ft. 75 deg.	-4.33330252883 lbs.	0 lbs./ft.
T(8)	7	15 deg. R=1.17 ft.	.5624311709223 lbs.	.2537213539903 lbs./ft.
T(9)	3	13.58 ft. 90 deg.	-28.36296882908 lbs.	0 lbs./ft.
T(10)	4	45 deg. R=1.17 ft.	0 lbs.	0 lbs./ft.
T(11)	3	3.33 ft.	-4.871229261503 lbs.	0 lbs./ft.

		60 deg.		
T(12)	4	45 deg. R=1.17 ft.	0 lbs.	0 lbs./ft.
T(13)	3	2 ft. 90 deg.	-4.26 lbs.	0 lbs./ft.

Wc=1.195 , WEIGHT OF CABLE(S)= 2.13 , CONDUIT I.D.=4.03 , COEFF. OF FRICT.=.3585

YOUR SIDEWALL PRESSURE VALUE = 0 lbs./ft.

MANUFACTURERS RECOMMENDED SWP=300 lbs./ft.

THE MAXIMUM ALLOWABLE PULLING TENSION FOR
THE 3 CABLE(S) IS = 665 lbs.

WORKPLAN - 11783 ECN - L6235

CONDUIT SIZE-NUMBER - 4I-1PP562B

FOR THE FOLLOWING CABLE(S): FROM PULL POINT F TO PULL POINT G

1PP562B

CODE VALUE NO.	CASE	LENGTH, RADIUS, OR DEGREES	Texp	SWP
T(1)	1	11.58 ft.	8.8425459 lbs.	0 lbs./ft.
T(2)	8	90 deg. R=1.17 ft.	17.11194441265 lbs.	7.719461385229 lbs./ft.
T(3)	2	2.83 ft. 90 deg.	23.13984441265 lbs.	0 lbs./ft.

Wc=1.195 , WEIGHT OF CABLE(S)= 2.13 , CONDUIT I.D.=4.03 , COEFF. OF FRICT.=.3585

YOUR SIDEWALL PRESSURE VALUE = 7.719461385229 lbs./ft.

MANUFACTURERS RECOMMENDED SWP=300 lbs./ft.

THE MAXIMUM ALLOWABLE PULLING TENSION FOR
THE 3 CABLE(S) IS = 664.1119444127 lbs.

COMMENTS

INITIAL CALCULATIONS DONE BY: [signature] 4/17/86
COGNIZANT ENGINEER DATE

VERIFIED BY: [signature] 4/17/86
SIGNATURE DATE

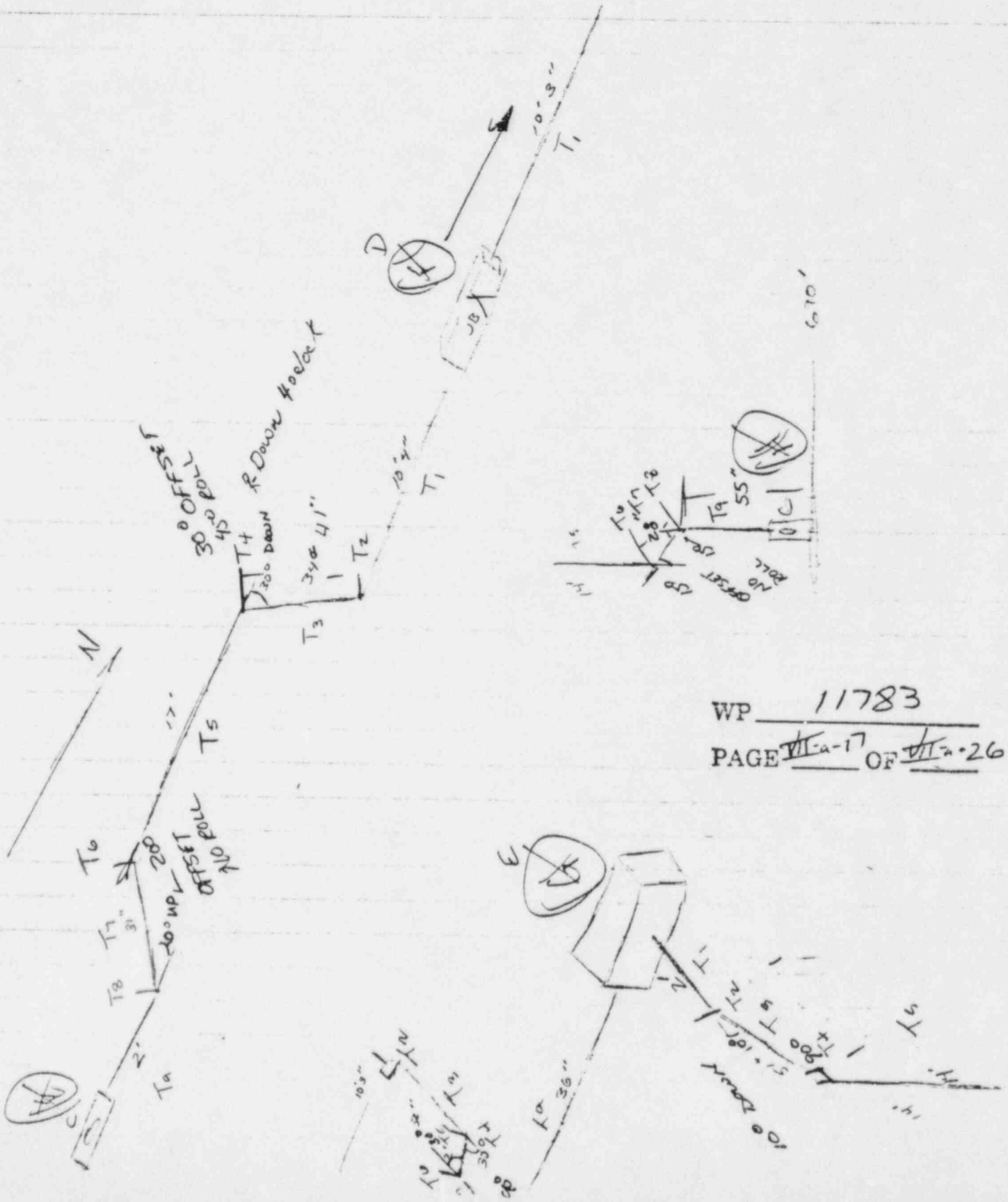
TVA 469H (EN DES-2-78)

TENNESSEE VALLEY AUTHORITY

SHEET OF

SUBJECT _____ PROJECT _____

COMPUTED BY DATE CHECKED BY DATE



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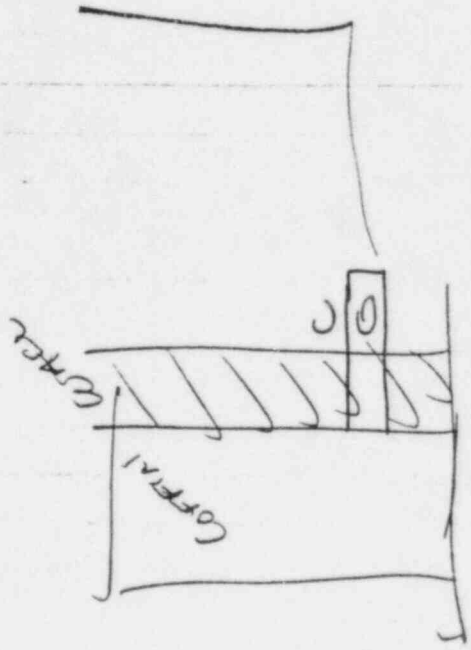
TVA 489H (EN DES-2-78)

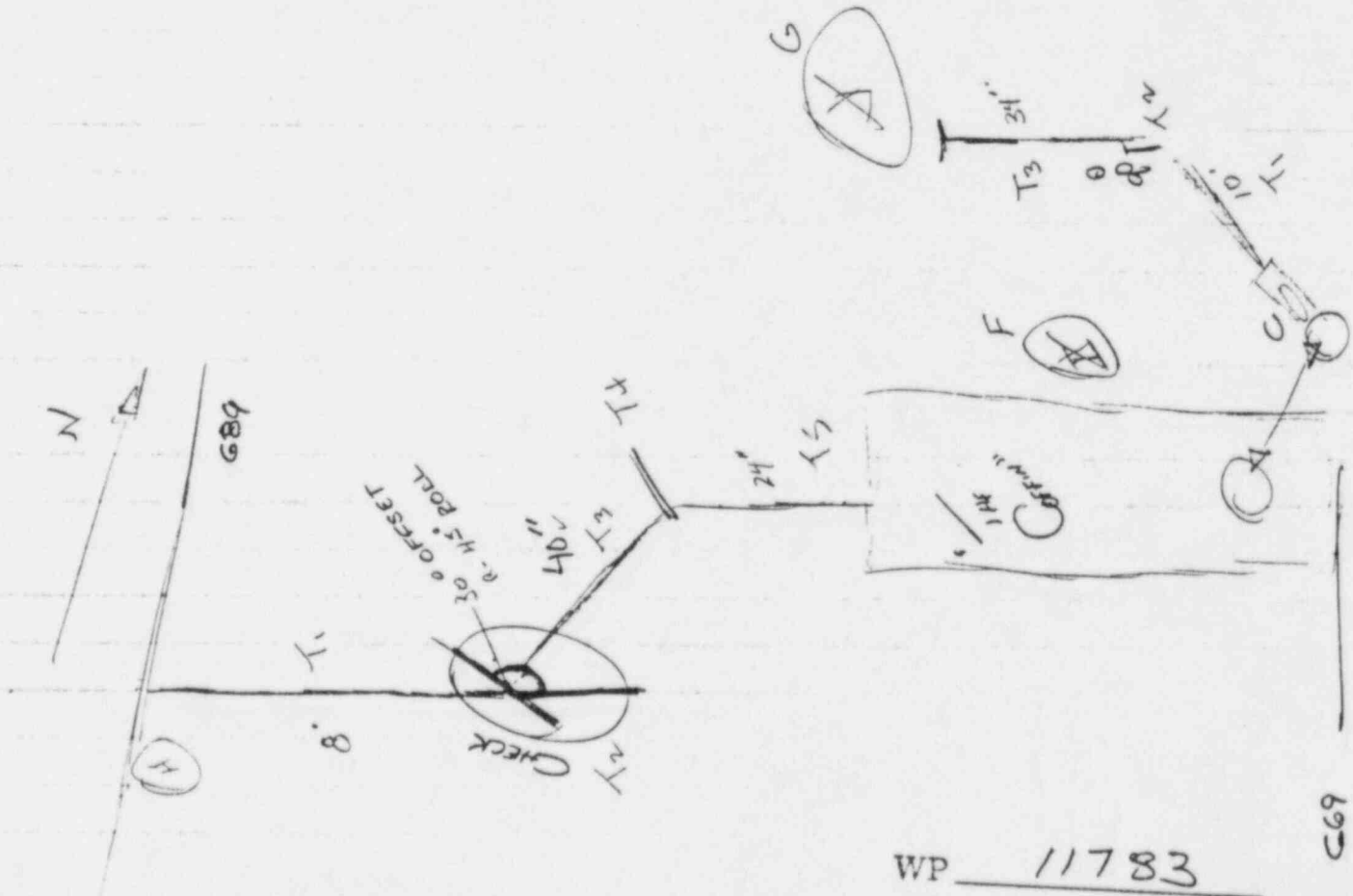
TENNESSEE VALLEY AUTHORITY

SHEET OF

SUBJECT _____ PROJECT _____

COMPUTED BY DATE CHECKED BY DATE





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C69

Workplan No. 11783 ECN No. L 6235 Conduit No. 4I-1PP562B #F_{max} _____ (Total for cable(s))

Approved SWP Value 100 lbs/ft. Weight of Cable(s) 2.13 lbs/ft. Weight Correction Factor (W_c) 1.195 K or K_{bar} 0.3585

Cable Identifier Number(s)	Cable O.D.	No. of Cond.	O.D. of Largest Conductor	I_{fac}	AWG or MCM	*MPR	*MTR	Node Value	Case No.	Length of Conduit	Angle from Horiz.	Angle of Bend	R=Radius of Bend (in ft.)	*T_{exp} or T_{out}
☐ (1) 1PP562B	1.117	3/1c	1.117	12	2/0			T1	1	3.83	0°	—	—	
☐ (2)								T2	8	—	—	20°	1.17	
☐ (3)								T3	2	.67'	20°	—	—	
☐ (4)								T4	5	—	—	20°	1.17	
☐ (5)								T5	1	3.33'	0°	—	—	
☐ (6)								T6	8	—	—	90°	1.17	
☐ (7)								T7	2	6.92'	90°	—	—	
☐ (8)								T8	5	—	—	5°	1.17	
☐ (9)								T9	2	2'	85°	—	—	
☐ (10)								T10	8	—	—	5°	1.17	
☐ (11)								T11	2	7.83'	90°	—	—	
☐ (12)								T12	5	—	—	35°	1.17	
☐ (13)								T13	2	5'	55°	—	—	
☐ (14)								T14	8	—	—	35°	1.17	
☐ (15)								T15	2	2.5'	90°	—	—	

alculated SWP Value _____ lbs/ft. *Maximum Allowable Pulling Tension _____ lbs.

m: B

: A

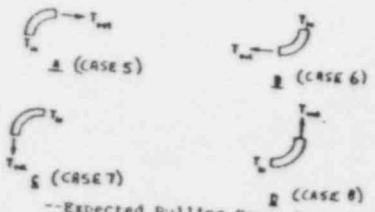
ble O.D. and O.D. of largest conductor should be entered in inches. Length of conduit runs and bend radius should be entered in feet. All angles should be entered in degrees.
his is the F_{max} value which is the total F_{max} value for a single or group cable installation.
hese values may be written in by user during program initiation if desired.

* Place "check" in block if cable is shielded.
* Place an "X" in block if cable is an instrumentation-type cable.

FOR A STRAIGHT RUN ENTER .....: (1)
FOR AN INCLINED RUN ENTER*
(UPWARD SLOPE).....: (2)
(DOWNWARD SLOPE).....: (3)

FOR A BEND*

FOR A HORIZONTAL BEND ENTER .....: (4)
FOR A VERTICAL BEND ENTER
FIGURE A .....: (5)
FIGURE B .....: (6)
FIGURE C .....: (7)
FIGURE D .....: (8)
FOR A THREE POINT SADDLE ENTER...: (9)
FOR A EMBEDDED CONDUIT RUN.....:(10)



--Expected Pulling Force Around a Vertical Bend

Page _____ of _____

Workplan No. 11783 ECN No. L 6235 Conduit No. 4I - 1PP562B #F_{max} _____ (Total for cable(s))

Approved SWP Value 100 lbs/ft. Weight of Cable(s) 2.13 lbs/ft. Weight Correction Factor (W_c) 1.195 K or K_{bar} 0.3585

	Cable Identifier Number(s)	Cable O.D.	No. of Cond.	O.D. of Largest Conductor	I_{fac}	AWG or MCM	*MPR	*MTR	Node Value	Case No.	Length of Conduit	Angle from Horiz.	Angle of Bend	R=Radius of Bend (in ft.)	*T_{exp} or T_{out}
☐ (1)	1PP562B	1.117	3/1c	1.117	12	2/0			T 1	1	6.67'	0°	—	—	
☐ (2)									T 2	4	—	—	90°	1.17	
☐ (3)									T 3	3	4.58'	10°	—	—	
☐ (4)									T 4	7	—	35°	35°	1.17	
☐ (5)									T 5	3	3.75'	45°	—	—	
☐ (6)									T 6	4	—	—	90°	1.17	
☐ (7)									T 7	1	14'	0°	—	—	
☐ (8)									T						
☐ (9)									T						
☐ (10)									T						
☐ (11)									T						
☐ (12)									T						
☐ (13)									T						
☐ (14)									T						
☐ (15)									T						

*Calculated SWP Value _____ lbs/ft. *Maximum Allowable Pulling Tension _____ lbs.

From: C

To: B

Cable O.D. and O.D. of largest conductor should be entered in inches. Length of conduit runs and bend radius should be entered in feet. All angles should be entered in degrees.

#This is the F_{max} value which is the total F_{max} value for a single or group cable installation.

*These values may be written in by user during program initiation if desired.

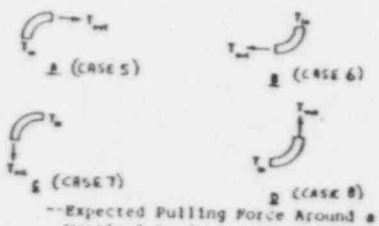
☑ Place "check" in block if cable is shielded.

☒ Place an "X" in block if cable is an instrumentation-type cable.

FOR A STRAIGHT RUN ENTER .....: (1)
FOR AN INCLINED RUN ENTER:
(UPWARD SLOPE).....: (2)
(DOWNWARD SLOPE).....: (3)

FOR A BEND:

FOR A HORIZONTAL BEND ENTER .....: (4)
FOR A VERTICAL BEND ENTER
FIGURE A .....: (5)
FIGURE B .....: (6)
FIGURE C .....: (7)
FIGURE D .....: (8)
FOR A THREE POINT SADDLE ENTER...: (9)
FOR A EMBEDDED CONDUIT RUN.....:(10)



--Expected Pulling Force Around a Vertical Bend

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Workplan No. 11783 ECN No. L 6235 Conduit No. 4I-1PP562B #F_{max} _____ (Total for cable(s))

Approved SWP Value 100 lbs/ft. Weight of Cable(s) 2.13 lbs/ft. Weight Correction Factor (W_c) 1.195 K or K_{bar} 0.3585

	Cable Identifier Number(s)	Cable O.D.	No. of Cond.	O.D. of Largest Conductor	I_{fac}	AWG or MCM	*MPR	*MTR	Node Value	Case No.	Length of Conduit	Angle from Horiz.	Angle of Bend	R=Radius of Bend (in ft.)	*T_{exp} or T_{out}
☑ (1)	1PP562B	1.117	3/1c	1.117	12	2/0			T 1	1	10.33'	0°	—	—	
☐ (2)									T 2	4	—	—	45°	1.177	
☐ (3)									T 3	2	2.8'	30°	—	—	
☐ (4)									T 4	4	—	—	45°	1.17	
☐ (5)									T 5	1	17'	0°	—	—	
☐ (6)									T 6	7	—	—	20°	1.17	
☐ (7)									T 7	3	2.58'	20°	—	—	
☐ (8)									T 8	6	—	—	20°	1.17	
☐ (9)									T 9	1	3.83'	0°	—	—	
☐ (10)									T 10	7	—	—	30°	1.17	
☐ (11)									T 11	3	1.75'	30°	—	—	
☐ (12)									T 12	6	—	—	30°	1.17	
☐ (13)									T 13	1	3.25'	0°	—	—	
☐ (14)									T 14	8	—	—	30°	1.17	
☐ (15)									T 15	2	3.25'	30°	—	—	

*Calculated SWP Value _____ lbs/ft. *Maximum Allowable Pulling Tension _____ lbs.

From: D

To: C

Cable O.D. and O.D. of largest conductor should be entered in inches. Length of conduit runs and bend radius should be entered in feet. All angles should be entered in degrees.

#This is the F_{max} value which is the total F_{max} value for a single or group cable installation.

*These values may be written in by user during program initiation if desired.

☑ Place "check" in block if cable is shielded.

☒ Place an "X" in block if cable is an instrumentation-type cable.

FOR A STRAIGHT RUN ENTER .....: (1)

FOR AN INCLINED RUN ENTER:

(UPWARD SLOPE).....: (2)

(DOWNWARD SLOPE).....: (3)

FOR A BEND:

FOR A HORIZONTAL BEND ENTER .....: (4)

FOR A VERTICAL BEND ENTER

FIGURE A .....: (5)

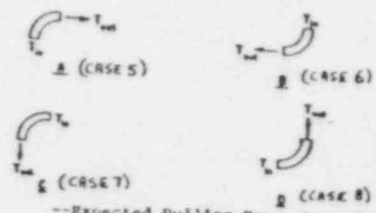
FIGURE B .....: (6)

FIGURE C .....: (7)

FIGURE D .....: (8)

FOR A THREE POINT SADDLE ENTER...: (9)

FOR A EMBEDDED CONDUIT RUN .....:(10)



--Expected Pulling Force Around a Vertical Bend

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Page _____ of _____

Workplan No. 11783 ECN No. L 6235 Conduit No. 4I-1PD562B #F_{max} _____ (Total for cable(s))

Approved SWP Value ___ lbs/ft. Weight of Cable(s) 2.13 lbs/ft. Weight Correction Factor (W_c) 1.195 K or K_{bar} 0.3585

	Cable Identifier Number(s)	Cable O.D.	No. of Cond.	O.D. of Largest Conductor	I_{fac}	AWG or MCM	*MPR	*MTR	Node Value	Case No.	Length of Conduit	Angle from Horiz.	Angle of Bend	R=Radius of Bend (in ft.)	*T_{exp} or T_{out}
☐ (1)	1PP562B	1.117	3/1C	1.117	12	2/0			T 16	5	—	—	30°	1.17	
☐ (2)									T 17	1	1.75'	0°	—	—	
☐ (3)									T 18	7	—	—	30°	1.17	
☐ (4)									T 19	3	3.25°	30°	—	—	
☐ (5)									T 20	6	—	—	30°	1.17	
☐ (6)									T 21	1	2'	0°	—	—	
☐ (7)									T						
☐ (8)									T						
☐ (9)									T						
☐ (10)									T						
☐ (11)									T						
☐ (12)									T						
☐ (13)									T						
☐ (14)									T						
☐ (15)									T						

Calculated SWP Value _____ lbs/ft. *Maximum Allowable Pulling Tension _____ lbs.

From: D

To: C

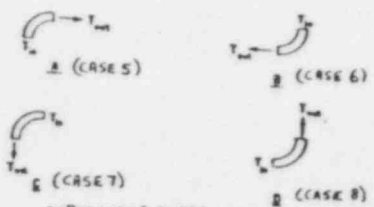
Cable O.D. and O.D. of largest conductor should be entered in inches. Length of conduit runs and bend radius should be entered in feet. All angles should be entered in degrees. This is the F_{max} value which is the total F_{max} value for a single or group cable installation. These values may be written in by user during program initiation if desired.

☑ Place "check" in block if cable is shielded.
☐ Place an "X" in block if cable is an instrumentation-type cable.

FOR A STRAIGHT RUN ENTER .....: (1)
FOR AN INCLINED RUN ENTER:
(UPWARD SLOPE).....: (2)
(DOWNWARD SLOPE).....: (3)

FOR A BEND:

FOR A HORIZONTAL BEND ENTER .....: (4)
FOR A VERTICAL BEND ENTER
FIGURE A .....: (5)
FIGURE B .....: (6)
FIGURE C .....: (7)
FIGURE D .....: (8)
FOR A THREE POINT SADDLE ENTER...: (9)
FOR A EMBEDDED CONDUIT RUN. .....:(10)



--Expected Pulling Force Around a Vertical Bend

WP 11783

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orkplan No. 11783 ECN No. L 6235 Conduit No. 4I-1PP562B #F_{max} _____ (Total for cable(s))

pproved SWP Value 100 lbs/ft. Weight of Cable(s) 2.13 lbs/ft. Weight Correction Factor (W_c) 1.195 K or K_{bar} 0.3585

	Cable Identifier Number(s)	Cable O.D.	No. of Cond.	O.D. of Largest Conductor	I_{fac}	AWG or MCM	*MPR	*MTR	Node Value	Case No.	Length of Conduit	Angle from Horiz.	Angle of Bend	R=Radius of Bend (in ft.)	*T_{exp} or T_{out}
7 (1)	1PP562B	1.117	3/c	1.117	12	2/0			T1	1	10.25	0°	—	—	
7 (2)									T2	4	—	—	90°	1.17	
7 (3)									T3	1	4.33'	0°	—	—	
7 (4)									T4	8	—	—	30°	1.17	
7 (5)									T5	2	2'	30°	—	—	
7 (6)									T6	5	—	—	30°	1.17	
7 (7)									T7	1	3.33'	0°	—	—	
7 (8)									T8	4	—	—	90°	1.17	
7 (9)									T9	1	3'	0°	—	—	
7 (10)									T						
7 (11)									T						
7 (12)									T						
7 (13)									T						
7 (14)									T						
7 (15)									T						

Calculated SWP Value _____ lbs/ft. *Maximum Allowable Pulling Tension _____ lbs.

om: D

): E

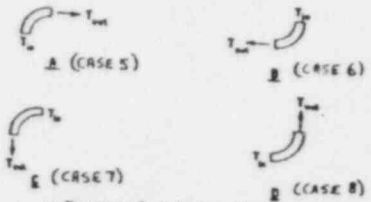
able O.D. and O.D. of largest conductor should be entered in inches. Length of conduit runs and bend radius should be entered in feet. All angles should be entered in degrees.
This is the F_{max} value which is the total F_{max} value for a single or group cable installation.
These values may be written in by user during program initiation if desired.

7 Place "check" in block if cable is shielded.
7 Place an "X" in block if cable is an instrumentation-type cable.

FOR A STRAIGHT RUN ENTER .....: (1)
FOR AN INCLINED RUN ENTER'
(UPWARD SLOPE).....: (2)
(DOWNWARD SLOPE).....: (3)

FOR A BEND'

FOR A HORIZONTAL BEND ENTER .....: (4)
FOR A VERTICAL BEND ENTER
FIGURE A .....: (5)
FIGURE B .....: (6)
FIGURE C .....: (7)
FIGURE D .....: (8)
FOR A THREE POINT SADDLE ENTER...: (9)
FOR A EMBEDDED CONDUIT RUN.....:(10)



--Expected Pulling Force Around a Vertical Bend

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Workplan No. 11783 ECN No. L 6235 Conduit No. 4T-1PP562B #F_{max} _____ (Total for cable(s))

Approved SWP Value 100 lbs/ft. Weight of Cable(s) 2.13 lbs/ft. Weight Correction Factor (W_c) 1.195 K or K_{bar} 0.3585

Cable Identifier Number(s)	Cable O.D.	No. of Cond.	O.D. of Largest Conductor	I_{fac}	AWG or MCM	*MPR	*MTR	Node Value	Case No.	Length of Conduit	Angle from Horiz.	Angle of Bend	R=Radius of Bend (in ft.)	*T_{exp} or T_{out}
☐ (1) 1PP562B	1.117	3/1c	1.117	12	2/0			T1	1	2	0°	—	—	
☐ (2)								T2	7	—	—	10°	1.17	
☐ (3)								T3	3	4.25'	10°	—	—	
☐ (4)								T4	~~8~~ 7	—	—	80°	1.17	
☐ (5)								T5	3	14'	90°	—	—	
☐ (6)								T6	6	—	—	15°	1.17	
☐ (7)								T7	3	2.33°	75°	—	—	
☐ (8)								T8	7	—	—	15°	1.17	
☐ (9)								T9	3	13.58'	90°	—	—	
☐ (10)								T10	4	—	—	45°	1.17	
☐ (11)								T11	3	3.33'	6 ~~80~~°	—	—	
☐ (12)								T12	4	—	—	45° ~~80~~°	1.17	
☐ (13)								T13	3	2'	90°	—	—	
☐ (14)								T						
☐ (15)								T						

*Calculated SWP Value _____ lbs/ft. *Maximum Allowable Pulling Tension _____ lbs.

From: E

To: F

Cable O.D. and O.D. of largest conductor should be entered in inches. Length of conduit runs and bend radius should be entered in feet. All angles should be entered in degrees.

#This is the F_{max} value which is the total F_{max} value for a single or group cable installation.

*These values may be written in by user during program initiation if desired.

☑ Place "check" in block if cable is shielded.

☒ Place an "X" in block if cable is an instrumentation-type cable.

FOR A STRAIGHT RUN ENTER .....: (1)

FOR AN INCLINED RUN ENTER'

(UPWARD SLOPE).....: (2)

(DOWNWARD SLOPE).....: (3)

FOR A BEND'

FOR A HORIZONTAL BEND ENTER .....: (4)

FOR A VERTICAL BEND ENTER

FIGURE A .....: (5)

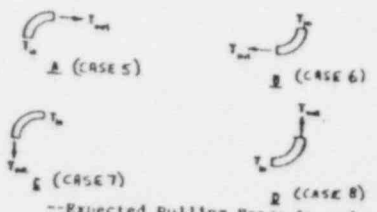
FIGURE B .....: (6)

FIGURE C .....: (7)

FIGURE D .....: (8)

FOR A THREE POINT SADDLE ENTER...: (9)

FOR A EMBEDDED CONDUIT RUN.....:(10)



--Expected Pulling Force Around a Vertical Bend

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Workplan No. 11783 ECN No. L 6235 Conduit No. 4I-1PD562B #F_{max} _____ (Total for cable(s))

Approved SWP Value 100 lbs/ft. Weight of Cable(s) 2.13 lbs/ft. Weight Correction Factor (W_c) 1.195 K or K_{bar} 0.3585

	Cable Identifier Number(s)	Cable O.D.	No. of Cond.	O.D. of Largest Conductor	I_{fac}	AWG or MCM	*MPR	*MTR	Node Value	Case No.	Length of Conduit	Angle from Horiz.	Angle of Bend	R=Radius of Bend (in ft.)	*T_{exp} or T_{out}
☐	(1) 1PD562B	1.117	3/1c	1.117	12	2/0			T 1	1	11.58' ~~2.42'~~	0°	—	—	
☐	(2)								T 2	8	—	—	90°	1.17	
☐	(3)								T 3	2	2.83'	90°	—	—	
☐	(4)								T						
☐	(5)								T						
☐	(6)								T						
☐	(7)								T						
☐	(8)								T						
☐	(9)								T						
☐	(10)								T						
☐	(11)								T						
☐	(12)								T						
☐	(13)								T						
☐	(14)								T						
☐	(15)								T						

*Calculated SWP Value _____ lbs/ft. *Maximum Allowable Pulling Tension _____ lbs.

From: F

To: G

Cable O.D. and O.D. of largest conductor should be entered in inches. Length of conduit runs and bend radius should be entered in feet. All angles should be entered in degrees.

#This is the F_{max} value which is the total F_{max} value for a single or group cable installation.

*These values may be written in by user during program initiation if desired.

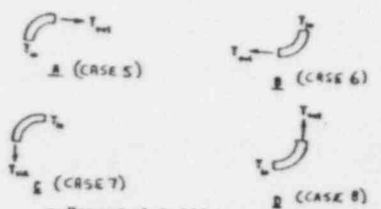
☑ Place "check" in block if cable is shielded.

☒ Place an "X" in block if cable is an instrumentation-type cable.

FOR A STRAIGHT RUN ENTER .....: (1)
FOR AN INCLINED RUN ENTER'
(UPWARD SLOPE).....: (2)
(DOWNWARD SLOPE).....: (3)

FOR A BEND'

FOR A HORIZONTAL BEND ENTER .....: (4)
FOR A VERTICAL BEND ENTER
FIGURE A .....: (5)
FIGURE B .....: (6)
FIGURE C .....: (7)
FIGURE D .....: (8)
FOR A THREE POINT SADDLE ENTER...: (9)
FOR A EMBEDDED CONDUIT RUN.....:(10)



--Expected Pulling Force Around a Vertical Bend

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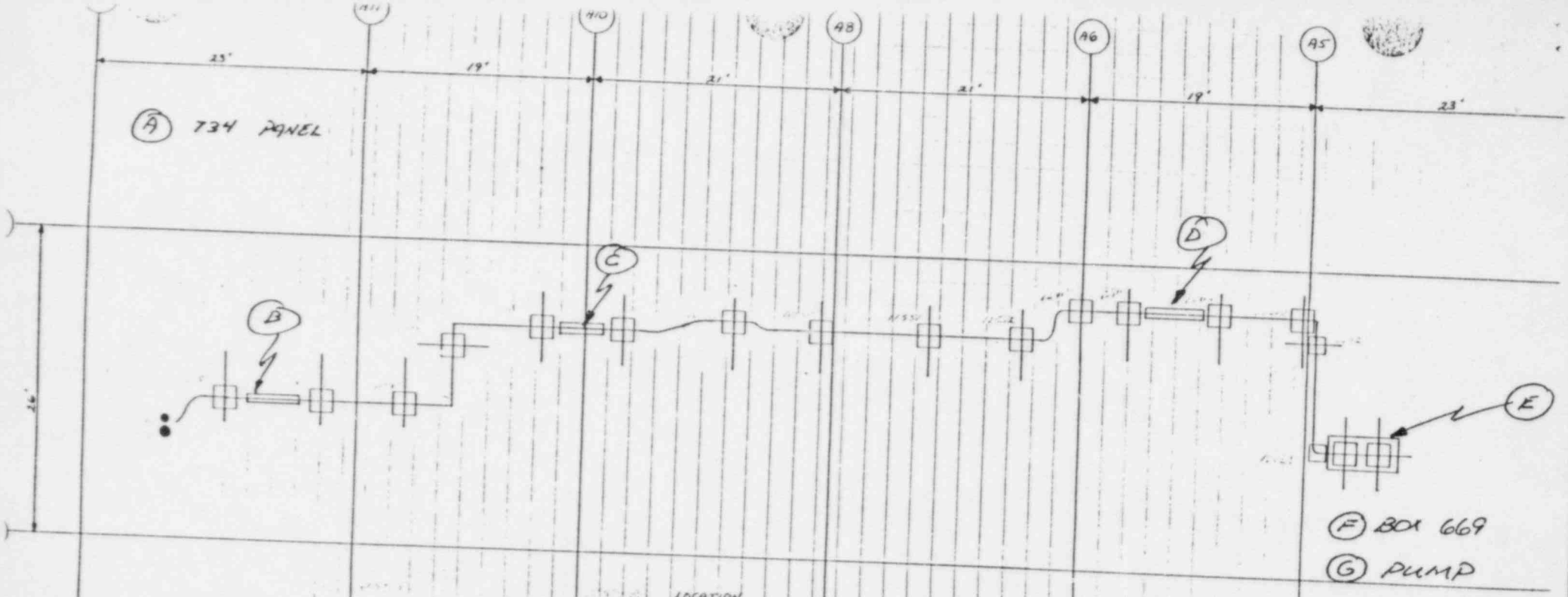

13'8" EAST OF S
12'10" NORTH OF A12
LENGTH - 38"
& CONDUIT - 32 1/2"

13'8" EAST OF S
3' SOUTH OF A11
LENGTH - 38"
& CONDUIT - 33"

13'8" EAST OF S
3'8" NORTH OF A11
LENGTH - 38"
& CONDUIT - 33"

LOCATION
9'1" EAST OF S
8'11" NORTH OF A11
LENGTH - 24 1/2"
& CONDUIT - 16 1/4"

LOCATION
7'2" EAST OF S
3'9" SOUTH OF A10
LENGTH - 24 1/2"
& CONDUIT - 17"

LOCATION
7'2" EAST OF S
3'6" NORTH OF A10
LENGTH - 24 1/2"
& CONDUIT - 20"

6' EAST OF S
8'7" SOUTH OF A8
LENGTH - 24 1/2"
& CONDUIT - 23"

LOCATION
6'8" EAST OF S
1' SOUTH OF A8
LENGTH - 24"
& CONDUIT - 11 1/4"

LOCATION
6'8" EAST OF S
8'6" NORTH OF A8
LENGTH - 24"
& CONDUIT - 11 1/2"

LOCATION
6'8" EAST OF S
5'8" SOUTH OF A6
LENGTH - 24"
& CONDUIT

6' EAST OF S
A6
LENGTH 42" ± 2"
& CONDUIT 37"

6' EAST OF S
3'11" NORTH OF A6
LENGTH 42" ± 2"
& CONDUIT 37"

6' EAST OF S
7'4 1/2 SOUTH OF A
LENGTH 42" ± 2"
& CONDUIT 37"

6 1/2" S OF A5
53 1/2" E OF S

6' EAST OF S
9" NORTH OF A5

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M&AI-13
Data Sheet 4
Page 1 of 1
Rev. 6

MR # _____

INSPECTION OF CONDUIT SEALS

WORKPLAN # _____

Conduit #, Column, Elev. and Building	EL. 690 Floor (Top side Conduiet) 1PP562B	EL 690 Ceiling (East side JB# 608) 1PP562B	EL. 690 Ceiling (South side JB# 608) 1PP562B
6.E.4.b Cleanliness acceptable	Clement / 041886	Clement / 041886	Clement / 041886
6.E.4.c or f Cerafiber installed for minimum of 1 inch	Clement / 041886	Clement / 041886	Clement / 041886
6.E.4.d or g Conduit sealed per 45W880-26	Clement / 041886	Clement / 041886	Clement / 041886

Conduit #, Column, Elev. and Building	Thermolagged EL. 690 Ceiling (North side JB# 607) 1PP562B	Thermolagged EL. 690 Ceiling (South side JB# 607) 1PP562	
6.E.4.b Cleanliness acceptable	Clement / 041886	Hallbambul / 4/25/86	A /
6.E.4.c or f Cerafiber installed for minimum of 1 inch	Clement / 041886	Hallbambul / 4/25/86	A /
6.E.4.d or g Conduit sealed per 45W880-26	Clement / 041886	Hallbambul / 4/25/86	/

Drawings: _____

NOTE: All signature blanks to be signed and dated by QA Inspector.

These are all Thermolag Condulet seals DRD 4/18/86

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PAGE 4 OF 4

SQNP
M&AI-13
Data Sheet 4
Page 1 of 1
Rev. 6

INSPECTION OF CONDUIT SEALS

MR # _____ WORKPLAN # _____

Conduit #, Column, Elev. and Building	5' south of A12, 2' west of T at 714 Conduit 1PP564B	10' west of T, 7' north of A12, at 714 Conduit 1PP564B	9' west of T, 7' north of A12, at 714 Conduit 1PP562B
6.E.4.b Cleanliness acceptable	BSK 10-11-85	H Barnett 12-12-86	H. Barnett 12-12-86
6.E.4.c or f Cerafiber installed for minimum of 1 inch	BSR 10-11-85	H. Barnett 12-12-86	H. Barnett 12-12-86
6.E.4.d or g Conduit sealed per 45W880-26	BSR 10-11-85	H. Barnett 12-12-86	H. Barnett 12-12-86

Conduit #, Column, Elev. and Building	2' south of A3, R line at 714 Conduit 1PL 3011B Branch# 2188	2' south of A3, 1' east of R, at 714 Conduit 1PL 3013B Branch# 2186	Made Spare 10' S of A4 2' W of T El 66' Floo. Deleted Conduit 1PP562B
6.E.4.b Cleanliness acceptable	H. Barnett 12-12-86	H Barnett 12-12-86	WDEgell 5/14/86
6.E.4.c or f Cerafiber installed for minimum of 1 inch	H. Barnett 12-12-86	H Barnett 12-12-86	NA /
6.E.4.d or g Conduit sealed per 45W880-26	H. Barnett 12-12-86	H Barnett 12-12-86	* WDEgell 5/14/86

Drawings: *Metal plug installed on both end of conduit per 45N822-2 Note 11 WDE 5/14/86

NOTE: All signature blanks to be signed and dated by QA Inspector.

WF 11783
PAGE III-2 C. III-17
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SQNP
M&AI-13
Data Sheet 4
Page 1 of 1
Rev. 6

INSPECTION OF CONDUIT SEALS

MR # _____ WORKPLAN # _____

Conduit #, Column, Elev. and Building	NEAR A3/Q LINE EL 734 FLOOR CONDUIT 1PL3011B	NEAR A3/Q LINE EL 734 FLOOR CONDUIT 1PL3013B	11' North of A5, 1' west of T line, el 670 Conduit 1PP562B
6.E.4.b Cleanliness acceptable	H. Beal / 10/17/85	H. Beal / 10/17/85	M Beach / 3/8/86
6.E.4.c or f Cerafiber installed for minimum of 1 inch	H. Beal / 10/17/85	H. Beal / 10/17/85	M Beach / 3/8/86
6.E.4.d or g Conduit sealed per 45W880-26	H. Beal / 10/17/85	H. Beal / 10/17/85	M Beach / 3/8/86

Conduit #, Column, Elev. and Building	NEAR A3/R LINE EL 714 FLOOR CONDUIT 1PL3011B	NEAR A3/R LINE EL 714 FLOOR CONDUIT 1DL3013B	5' North A12, 2' West T-Line EL 690 Ceiling side ONLY (Plug Removed) for Con. Inst. Conduit 1PP564B
6.E.4.b Cleanliness acceptable	/	N / A	H Barnett / 3-22-86
6.E.4.c or f Cerafiber installed for minimum of 1 inch	N / A /	/	H. Barnett / 3-22-86
6.E.4.d or g Conduit sealed per 45W880-26	/	/	H. Barnett / 3-22-86

Drawings: _____

NOTE: All signature blanks to be signed and dated by QA Inspector.

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SQNP
M&AI-17
Data Sheet
Attachment A
Page 1 of 2
Rev. 5

Date 10/9/85

To be filled in by cognizant engineer:

Workplan/MR No. 11783

*I.D. No. 4I-1PD562 B *For sleeve use mark number.

Location/Orientation: AUX BLDG EL 734 6' N of A12 + 5' W of T

Reference Drawings: 45N828-2, -7

NOTE: IN BACK SIDE OF BD 1B-B COMPT #18

To be filled in by Mechanical QC inspector.

Section 6.A.1, 6.A.2
1. Concrete surfaces roughened/free of dirt, dust, foreign matter, etc. [signature] Inspector 13-4-86 Date

Section 6.A.3
2. Surface wetting:
Start [signature] Inspector 13-4-86 Date 1630 Time Complete [signature] Inspector 030586 Date 0515 Time

Section 6.B.1 and Attachment A
3. Orientation and alignment of baseplate/sleeve acc.:
[signature] Inspector / 030586 Date

Section 6.C.2,7.B
4. Type of grout used: 5-STAR [signature] Inspector / 030586 Date

Section 6.C.6,6.C.7
5. Grout application completed: [signature] Inspector / 0400 Time / 030586 Date

Section 6.D.1
6. Forms removed: Side one EL 734 [signature] Inspector 0105 Time 13-6-86 Date

Side two 714 [signature] Inspector 10030 Time 13-6-86 Date

Section 7.G
7. No visible voids: Side one [signature] Inspector / 0615 Time / 030586 Date

Side two [signature] Inspector 10030 Time / 3-6-86 Date

WP 11783

Section 6.D.1 thru .8,7.D

8. Curing compound applied: Side one 734 [illegible] / 0635 / 030586
Inspector Time Date

and/or Side two 714' [illegible] / 0055 / 3-6-86
Inspector Time Date

Wet burlap applied: Side one N/A / /
Inspector Time Date

Side two N/A / /
Inspector Time Date

Removed: Side one N/A / /
Inspector Time Date

Side two N/A / /
Inspector Time Date

NOTE: Any blocks not applicable to inspection require entry of NA.

Remarks: * CURING COMPOUND APPLIED TO TWO SMALL AREAS COVERED BY UNISTRUT FORM FOR SLEEVE AFTER COSMETIC REPAIR.

Attachment F
Page 8 of 8

PENETRATION FIRE BARRIER AND/OR ABSCE BOUNDARY DOOR BREACHING PERMIT

Unit No. 2 Permit No. 2694 Date of Issue: 24 APR 86 Expiration Date 1 MAY 86 PRO No. _____

Extension Date _____ *Date and time breach was actually made 4/24/86 / 2:30 Rev. Expiration Date _____
Date Time

The precautions and procedures listed below must be followed. No fire barrier (including fire doors, fire dampers, cable penetration barriers, or thermal fire barrier) shall be breached except under the controls and restrictions of this procedure. No ABSCE boundary doors shall be breached except under the controls and restrictions of this procedure and TI-77. This single permit can serve to control breaching of doors which are fire doors, ABSCE doors, or both. Signature and acceptance of this permit implies a confirmation of knowledge of these requirements as outlined in Physi-13, Attachment F and those outlined in TI-77. The foreman or supervisor is to return the original copy of this permit to the shift engineer after the satisfactory performance of SI-233 or SI-261, as applicable, and/or after maintenance as per M&AI-13 has been complete. If a fire door or ABSCE door was breached to provide accessibility (i.e. movement of equipment, running welding leads, etc.) and no door maintenance was required, the permit may be closed by a visual inspection that the door was returned to functional status and verified by signature on Attachment F. The foreman or supervisor shall promptly initiate a PRO if any Tech Spec fire barrier is breached for over seven (7) days or ABSCE door is breached outside the constraints of TI-77.

Penetration barrier identification: Fire Door No. _____ Fire Damper No. _____ Penetration No. _____

Other ABSCE Conduit # 1PP542B ABSCE Door No. _____ Opposite Door No. Required Operable _____

Location (Building & Elevation) AB-EL 734 6' N of A12 5' W of T Purpose For Breach Wire Pull
Workplan or WR No.: 11783 Requested by: D. R. Dodd / Elec Mod / 6879 / 4/24/86
Foreman or Supervisor Section Phone No. Date

Check as Completed or as Appropriate:

1. Appropriate Entry Made in SE Log: ( )
2. Continuous ( ) or roving (✓) fire watch established as required by Tech Spec action statement 3.7.12.1.
3. PHYSI-12, Att. C is required if the door is in a CO_2 protected area. (LCO. 3/4.7.11.3)
4. Continuous door watch established: ( ) Radios provided and doors capable of closure within four minutes of notification: ( )
5. Authorized By: [signature] / 24 APR 86 / 0938c
   Shift Engineer or his Representative Date Time
6. Penetration repaired and restoration verified by performance of SI-233 ( ), M&AI-13 (✓), SI-261 ( ), or visual inspection ( ).
   Verified by: D. R. Dodd / 4-28-86 / 7:30
   Cognizant Maint. Representative Date Time
7. (✓) Fire watch released and supplemental protection no longer required: ( ) ABSCE door watch no longer required:
   M. Lynn Moore / 4-28-86 0635 CDT
   Shift Engineer or his Representative Date

NOTE: The responsible foreman, cognizant engineer, or supervisor shall place a copy of this permit, as provided by the shift engineer after restoration, in the files with the completed workplan or MR.

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PAGE VII-4

S. Matter QA 4-26-86

TI-77
Attachment 1
Page 1 of 1
Revision 2

WP/WR NO. 11783
PAGE VIII c 1

PENETRATION NO.	LOCATION	CONTROLLING INSTRUCTION	DATE/TIME BREACHED	QA INITIALS	DATE/TIME RETURN TO NORMAL	QA INITIALS	TOTAL BREACH AREA
1PL 3011B	A3Q 734EL	Physi 13	2/11/86 - 0200	H.R.C.	2-19-86 0500	H.R.C.	3" hole
1PL-3013B	A3Q 734EL	Physi 13	2/11/86 - 0200	H.R.C.	2-19-86 0500	H.R.C.	3" hole
1PP562B 6" Conduit	A-12 at T A8-734	Physi 13 + TI-77	2-27-86 - 0505	H.R.C.	3-5-86 0604	H.R.C.	6" hole
1PP563B 6" Conduit	A-12 at T A8-734	"	4-24-86 0610	Bmw	~~4-15-86~~ 4-28-86 0815	Bmw	6" hole
1PP564B	A12 at T A8-734	"	5-3-86 0830	SL	5-4-86 1530	Bmw	4" hole
1PL 3011B	A3Q 734 EL	Physi - 13	10/10/85 1006	Bmw	10-16-85 1400	Bmw	3" hole
1PL 3013B	A3Q 734 EL	Physi - 13	10/10/85 1006	Bmw	10-16-85 1400	Bmw	3" hole

Interaction Number: 68

Safety Function/Unit: RCS INV CONT/Unit One

Associated Interaction No(s): None

Associated Safety Function(s): None

Location: Auxiliary Building Elev 669, Common Area & Corridor A3-A6, S-T

Description: An interaction exists between Train A & Train B for centrifugal charging pumps. Train A: 1PP550A, 1PP552A, (CCP A-A); 1PL6145A, 1PL6149A (CCP Aux Lube Oil Pump A-A); 1PL3001A, 1PL3003A, 1PL3004A (CCP Cooler Fan A-A & FCV-67-168) Train B: 1PP562B, 1PP564B (CCP B-B); 1PL6152B, 1PL6156B (CCP Aux Lube Oil Pump B-B); 1PL3011B, 1PL3013B, 1PL3014B (CCP cooler fan B-B & FCV-67-170)

Corrective Action: A) Cables for CCP (1PP562B and 1PP564B) B-B and the CCP cooler fan B-B (1PL3011B and 1PL3013B) will be re-routed to provide adequate separation. Cable 1PL3014B does not require protection; it will be disconnected at junction box 1190.

B) Cables for FCV-67-168 (cable 1PL3004A) and FCV-67-170 (cable 1PL3014B) do not need protection. These valves will be permanently failed in the open position and the associated cables 1PL3004A and 1PL3014B will be disconnected at junction boxes JB1189 and JB1190 respectively.

C) Cables associated with the auxiliary lube oil pumps do not require protection. A bypass switch will be installed allowing the CCP's to be started without the auxiliary lube oil pumps running.

INTERACTIONS	
Date:	
Prepared	
Checked	
APPROVALS	
MEB	
NEB	
EEB	
NUC PWR FPE	
NUC PWR MOD	
NUC PWR R	

KEY 1

DTN-23-R2

SQN - Appendix R Project

INTERACTION IDENTIFICATION

WP 11783

PAGE X-a-2 OF ~~X~~

No. 68

DATE 10/22/84

UNIT ONE

Location: (1) A2 → A14/S → T LINE, ELEVATION 669, COMMON AREA & CORRIDOR

Discription of Interaction (list cables/conduit/equipment):

AN INTERACTION EXISTS AT THE ABOVE LOCATION BETWEEN PATH ONE AND PATH TWO FOR CENTRIFUGAL CHARGING PUMP. SEE ATTACHED SHEET FOR SPECIFIC CABLES THAT INTERFERE. This interaction continues up the open stairway to elevation ~~694~~ 690.

PRO No:

Compensatory Action:

A FIRE WATCH HAS ALREADY BEEN ESTABLISHED IN THIS AREA

Suggestive Corrective Action:

WRAP OR REROUTE CABLES FOR ONE PATH

DCR/FCR No: 2133

Signature

10 22 84
Date

ECN No: L6308 / L6235

Date ECN scheduled to be issued

Date ECN actually issued

Discription of Modification: REROUTED CABLES 1PP562E, 1PP564B, 1PL3011B + 1PL3013 AND ASSOCIATED CONDUIT. INSTALL TSI FIRE BARRIER MATERIAL. THIS COMPLETED WORK ON CCP 1B-B + CCP 1BB RM CLR FA.

Date field work scheduled to start 10/4/85

Date field work scheduled to complete 5/26/86

List Workplan No., FCRs etc. associated with this modification: WP 115-29 Completed installation of ALOP hand SWs on 6.9KV SD Bds for all CCPs. WP 11723 ECN 6235, FCR'S LISTED ON BACK.

Date field work actually complete 5-30-85 / 5/26/86.

Item closed,

Signature

6 19 86
Date

cc: H. B. Rankin, Sequoyah
R. W. Olsen (Attn: Don Maxwell), Sequoyah
J. P. Vineyard (Attn: Norm Black), Sequoyah

KEY 2

SQN - Appendix R Project

INTERACTION IDENTIFICATION

WP/WR NO. 11783
PAGE I a 3

No. 66
DATE 10/22/84
UNIT ONE
DTN No. 20-R2

Location: 6 SHV S/D BOARD ROOM A (EL 734)
Safety Function RCS INVENTORY CONTROL
Description of Interaction (list cables/conduit/equipment):
AN INTERACTION EXISTS AT THE ABOVE LOCATION FOR BOTH PATH FOR CHARGING PUMPS. SEE ATTACHED SHEET FOR SPECIFIC CABLES

PRO No:
Compensatory Action: A FIREWATCH HAS ALREADY BEEN ESTABLISHED IN THIS LOCATION.

Suggested Corrective Action: WRAP OR REROUTE CABLES FOR PATH TW (Train B cables) Evaluate possibility of using CCS pump 1B-B or relocating C-S pump transfer switch.

DCR/FCR No: 2133

Signature

10/22/84
Date

ECN No: L6308 / L 6235
Date ECN scheduled to be issued
Date ECN actually issued
Description of Modification: REROUTED CABLES 1PP642B 1PP644.B 1PL3011E + 1PL3012 AND ASSOCIATED CONDUIT INSTALL TSI FIRE BARRIER MATERIAL. THIS COMPLETES WORK ON CCP 1B-B + CCP 1B-B ROOM COOLER FAN.
Date field work scheduled to start 10/4/85
Date field work scheduled to complete 5/26/86
List Workplan No., FCRs etc. associated with this modification: WP11529 WP 11783 ECN 6235, FCR'S LISTED ON BACK.

Date field work actually complete 5-30-85
Comments: Completed installation of AL-OP hand Sws on 6.9KV SDBd Pnls for all CCPs.

Item closed, Signature

6/16/86
Date

cc: H. B. Rankin, NUC PR, Sequoyah (please distribute as you feel necessary)
R. W. Olson (Attn: Don Maxwell), Sequoyah (please evaluate feasibility of modifica
J. P. Vineyard (Attn: Norm Black), Sequoyah (please evaluate feasibility of design change)
P. R. Wallace, (Attn: Ed Craigge), Sequoyah (please provide transient fire load protection)

1-10-87

Interaction Number: 66

WP/WR NO. 11783
PAGE X.4

Safety Function/Unit: RCS Inventory Control/Unit 1

Associated Interaction No(s): 27

Associated Safety Function(s): ERCW Heat Sink

Location: Auxiliary Building, Elevation 734, 6.9 kV shutdown board room A (A3-A4/R-U).

Description: An interaction exists at the above location for both identified CCP paths. The path 2 (B-Train) cables are routed in trays at the north end of the room. The following cables interact..

Path 1: CCP A-A - 1PP550A, 1PP552A, 1PP53A, 1PP554A, 1PP556A, 1PP557A, 1PP555A, CCP Auxiliary lube oil pump A-A - 1PL6145A, 1PL6146A, 1PL6147A, PL6148A; CCP Cooler Fan A-A and FCV-67-168 - 1PL3002A, 1PL3003A; CCS pump A-A 1PL4729A; Instrument Loop L-70-63A - 1PM2236; FCV-67-146 - 1V2423A

Path 2: CCP B-B - 1PP564B; CCP Auxiliary lube oil pump B-B, 1PL6152B, 1PL6155B, 1PL6156B; CCP Cooler fan B-B and FCV-67-170 - 1PL3013B; Instrument Loop L-70-99A - 1PM2435; CCS pump C-S - 2PL4733B, 2PL4734B, 2PL4737B, 1PL4735S, 1PL4736S

INTERACTIONS	
Date: 1/10/85	
Prepared	EDU
Checked	MW
APPROVALS	
MEB	
NEB	
EEB	
NUC PWR FPE	
NUC PWR MOD	
NUC PWR R	

Corrective Action: 1. CCP B-B cables will be rerouted and wrapped as necessary to provide adequate separation.

2. Cables associated with CCP auxiliary lube oil pumps do not require protection. A bypass switch will be installed allowing the CCP's to be started without the auxiliary lube oil pumps running.

3. The cable 1PL3013B for CCP cooler fan B-B will be rerouted to provide adequate separation.

4. Cables 2PL4733B and 2PL4734B will be wrapped in a one-hour fire-rated barrier until 20-foot separation is achieved from redundant Train A associated components. CCP pump room cooler 1A-A cable 1PL3003A will be rerouted to provide adequate separation from cables and components associated with CCS pump C-S. Cable 1PL3002A is not required to operate the CCP 1A-A room cooler and does not require protection. Cable 2PL4737B is for an interlock function and will be disconnected at the shutdown board breaker. This cable does not require protection.

5. The shutdown logic has determined that loops L-70-63A and L-70-99A are not required.

6. Cables for FCV-67-168 and -170 do not require protection. These valves will be permanently failed in the open position and associated cables 1PL3004A and 1PL3014B will be disconnected at junction boxes JB1189 and JB1190 respectively.

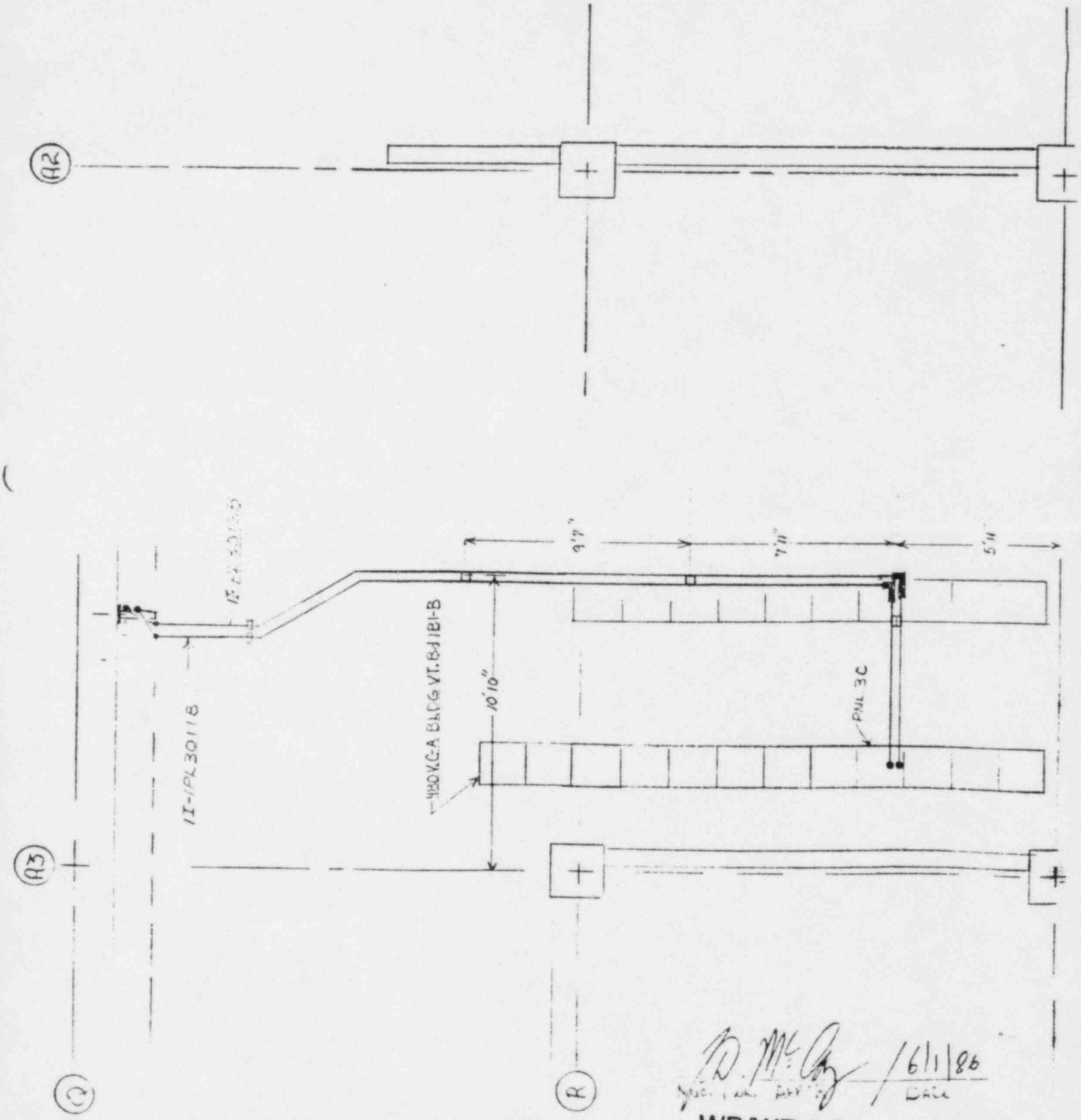
INTERACTIONS	
Date: 11/10/85	
Prepared	FDG
Checked	
APPROVALS	
MEB	
NEB	
EEB	
NUC PWR FPE	
NUC PWR MOD	
NUC PWR R	

TVA 489G (DES-1-63) **TENNESSEE VALLEY AUTHORITY** SHEET 1 OF 10

SUBJECT Appendix "R" Interaction 68 cont. Chrg. Pump 1B-B PROJECT Seq

Sh 734 Reroute For Cables 1PP542, 564B, 1PL30118, 30118

COMPUTED BY RI DATE 4-30-86 CHECKED BY RI DATE 5-28-86



D. McCoy 6/1/86
Spec. Eng. Div. Date

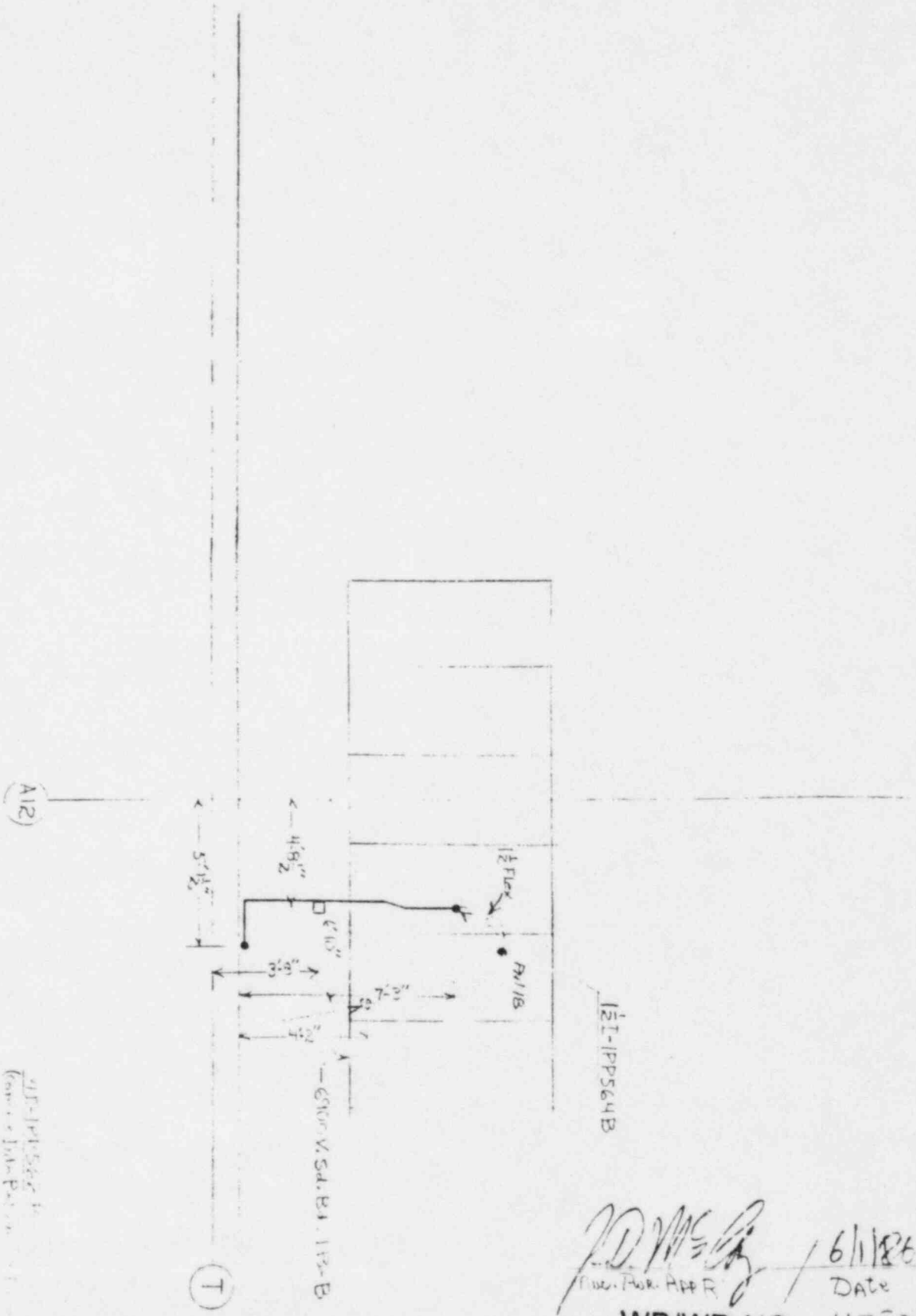
WP/WR NO. 11783
PAGE I-6

TVA 489G (DES-1-63) **TENNESSEE VALLEY AUTHORITY** SHEET 2 OF 10

SUBJECT Appendix F Interaction 68 Cont. Charg. Pump 1B-B PROJECT S-A

Eq 724 Reroute For Cables 1PP562B, 564B, 1PL3011B, 3013B

COMPUTED BY LEB DATE 4-30-86 CHECKED BY KEH DATE 5-28-86



Resp. Proj. Engr. 6/1/86 Date

WP/WR NO. 11783

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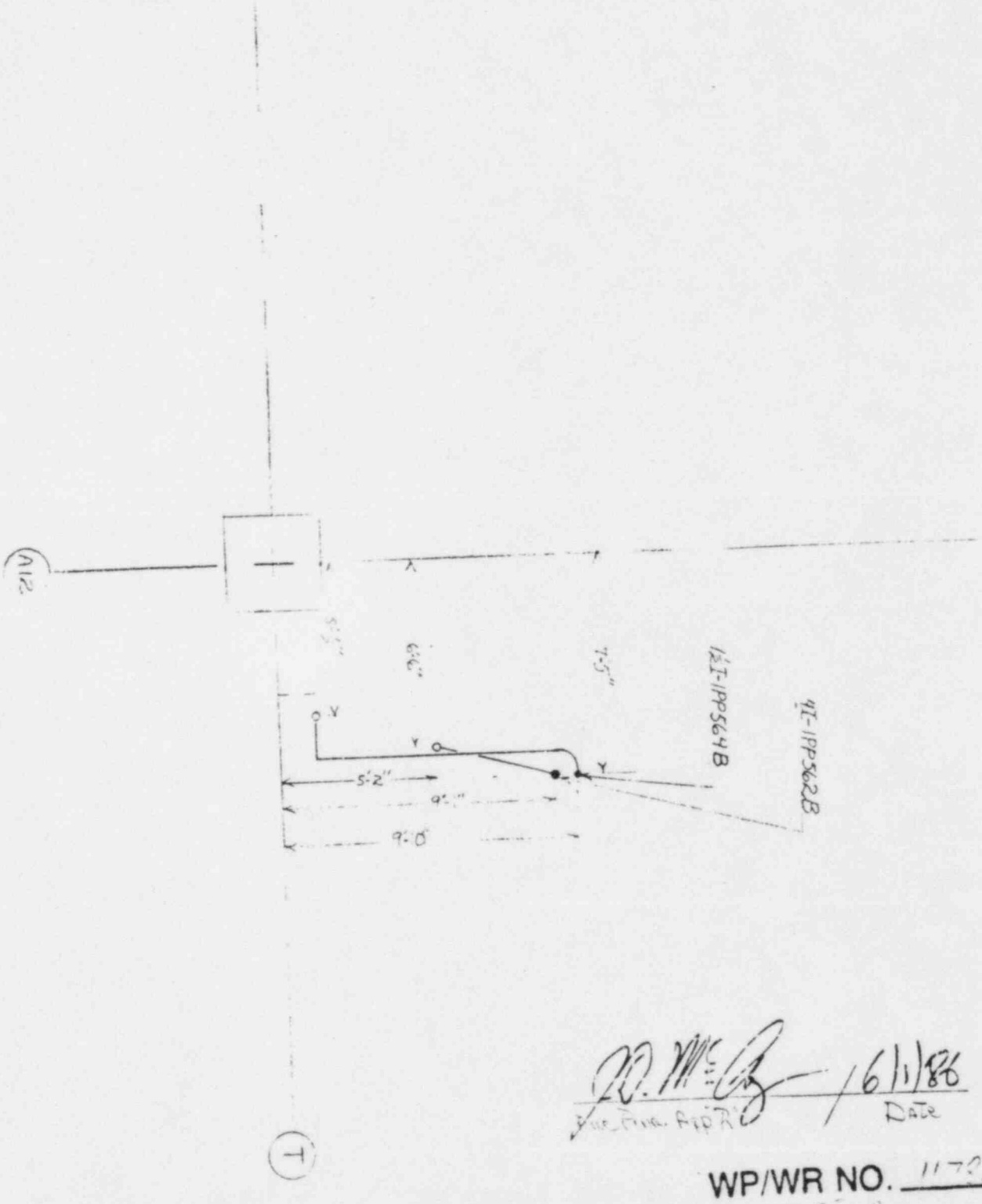
SUBJECT Appendix "R" Interaction # 68 Cont. Chgrg. Pump 1B-B PROJECT Seq

Elv 714 Reroute for Cables 1PP562B, 564B, 1PL301B, 3013B

COMPUTED BY [illegible] DATE 4-30-86 CHECKED BY [illegible] DATE 5-28-86

R1



[illegible] 6/1/86

Sup. Eng. App R Date

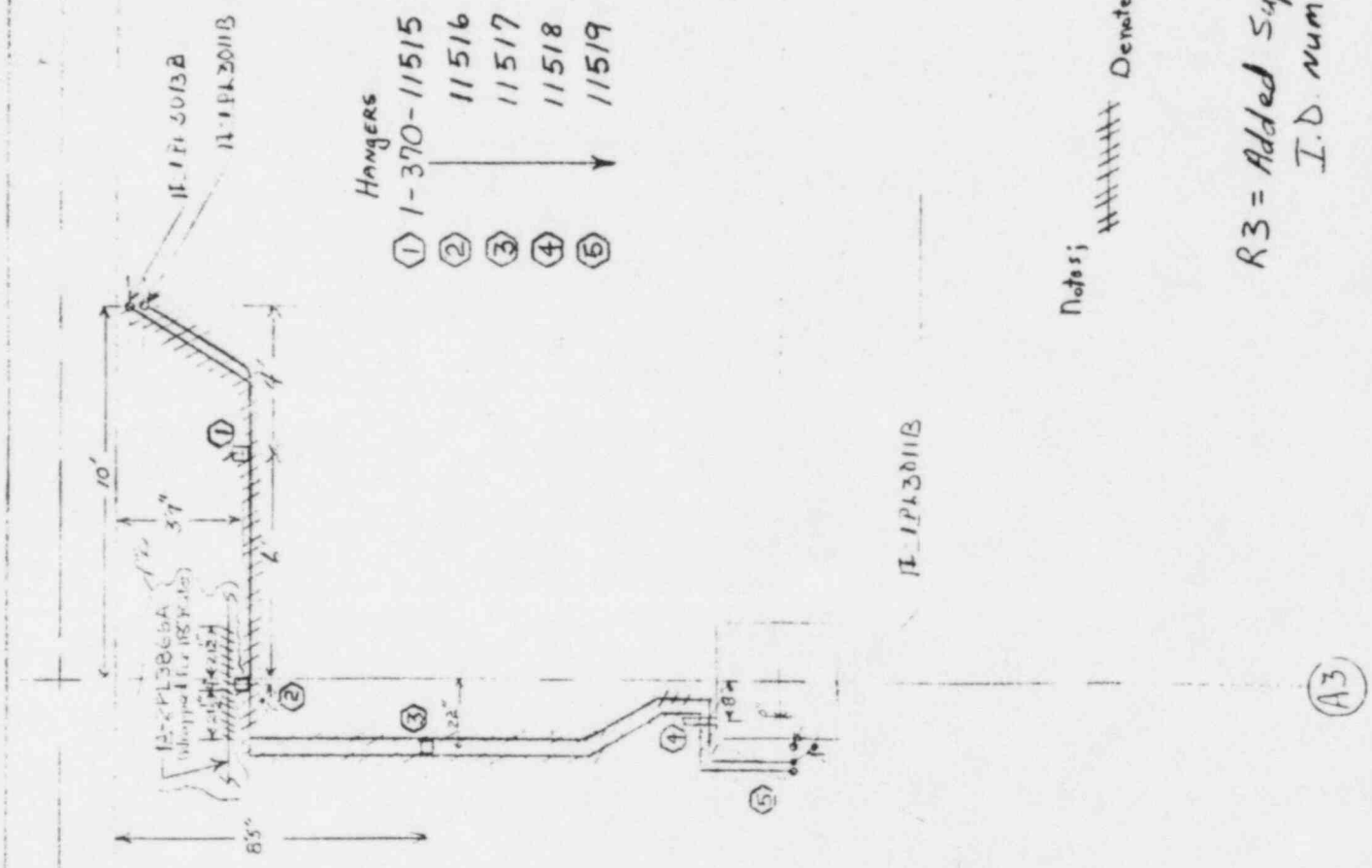
WP/WR NO. 11703

PAGE [illegible]

SUBJECT Appendix "R" Interaction 68 Chg. Pump 1B-B PROJECT Sqn

Elev 714 Reroute For Cables 1PPE672B, 564B, 1PL3011B, 3013B

COMPUTED BY	DATE	CHECKED BY	DATE
R1	4-30-86	R1	5-28-86
R2 KLH	6-7-86	R2 KLH	6-7-86
R3 JRH	6-11-86	R3 KLH	6-11-86



Notes: Denotes thermo lag wrapping

R3 = Added Support I.D. numbers

WP/WR NO. 11783
PAGE Xa 9

R1 [signature] 6/1/86
Mgr. Appr. Date

CAM 6/11/86 R3/ Date

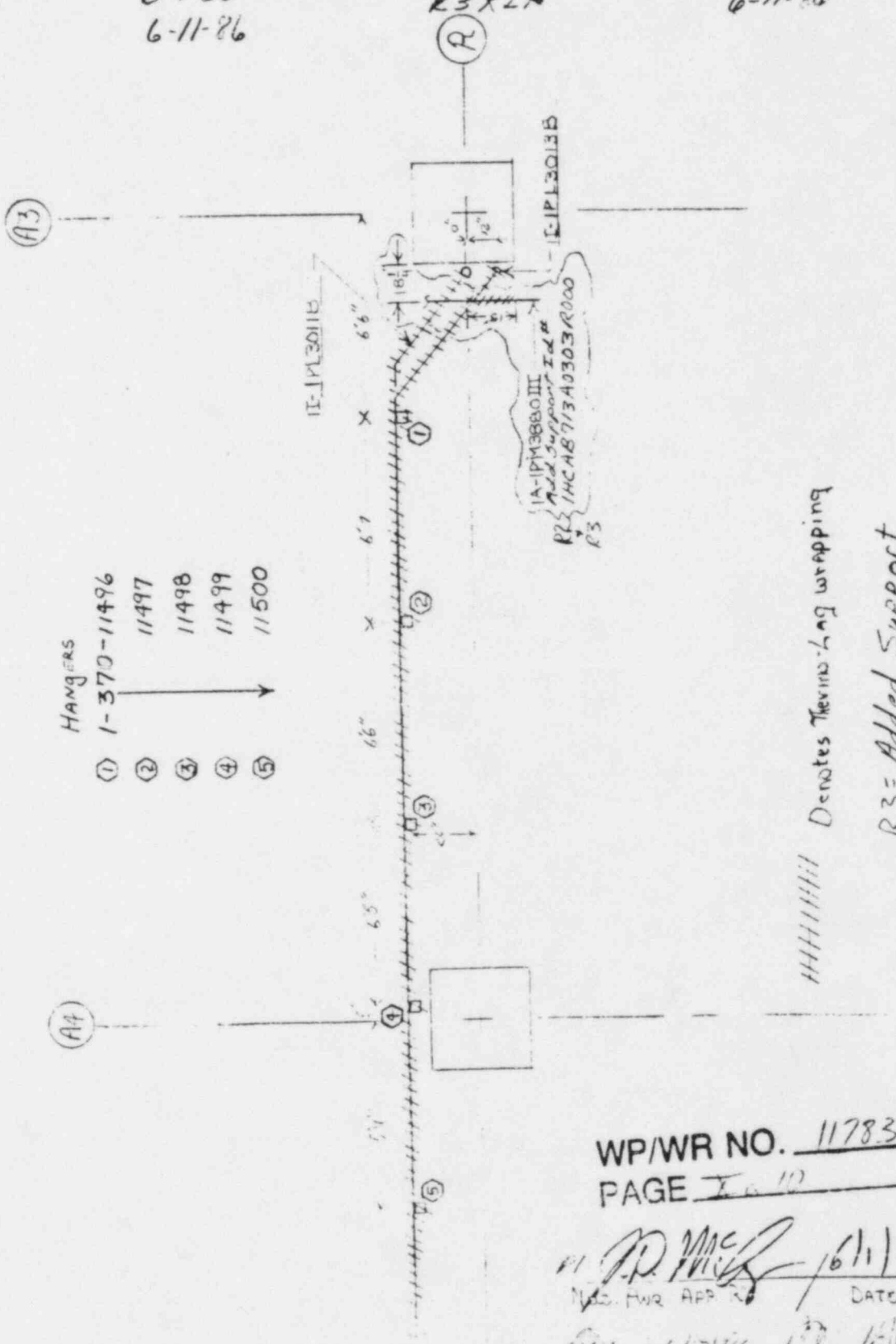
CAM 6/17/86 R2/ Date

TVA 489G (DES-1-63) **TENNESSEE VALLEY AUTHORITY** SHEET 5 OF 10

SUBJECT Appendix "R" Interaction #68 Cent. Charg. Pump 1B-B PROJECT SQN

Elv 690 Reroute For Cables 1PP562B, 562R, 1PL301B, 301RB

COMPUTED BY [illegible] R1 R2 KLH R3 JRH DATE 4-30-86 6-7-86 6-11-86 CHECKED BY KLH, R1 R2 KLH R3 KLH DATE 5-28-86 6-7-86 6-11-86



WP/WR NO. 11783

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[illegible] 6/1/86

NUCL. PWR APP. DATE

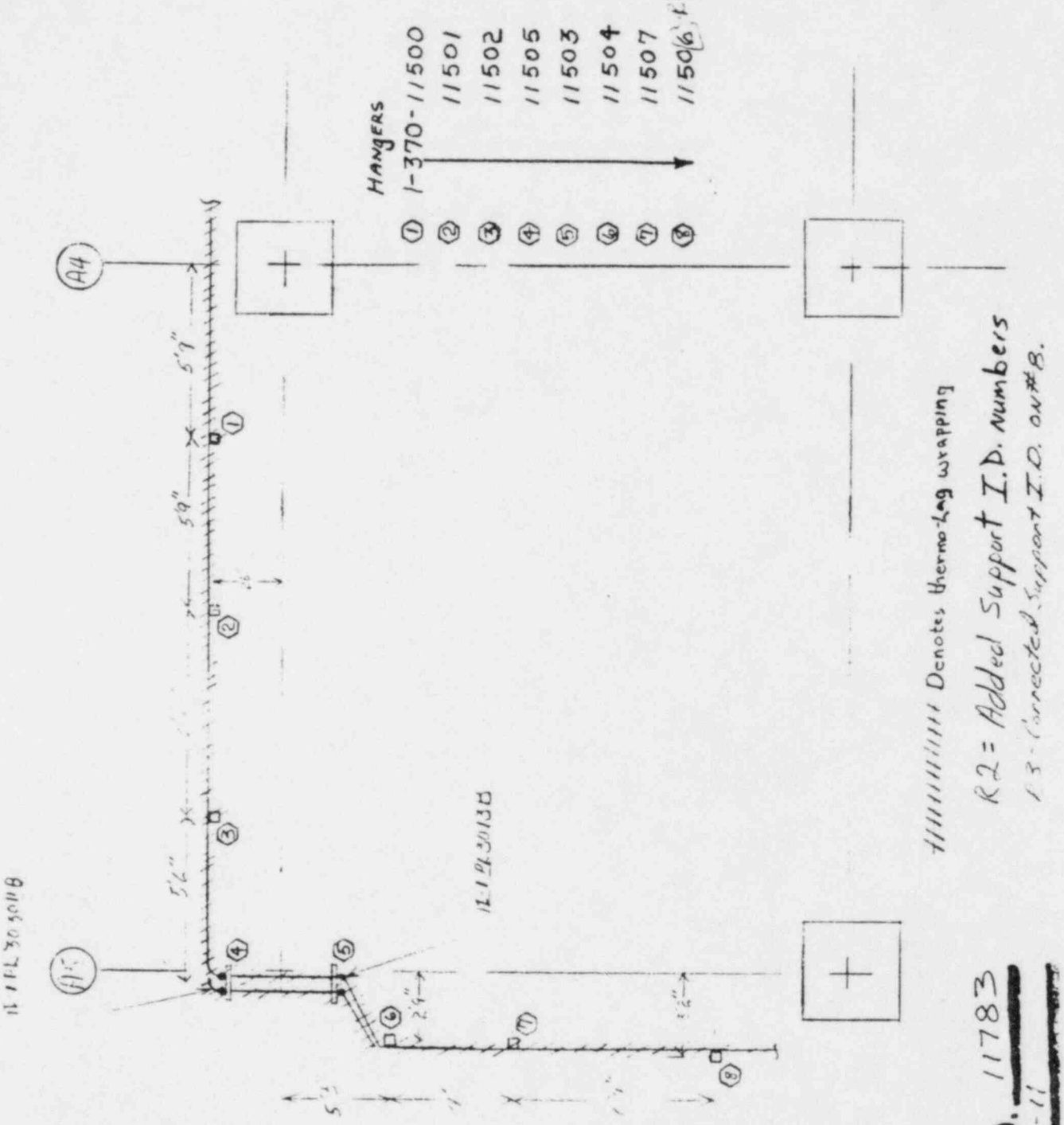
[illegible] 6/7/86 [illegible] 6/11/86

R2 Date R3 DATE

SUBJECT Appendix "R" Interaction #4E Cat Chng Pump 1B-B PROJECT Seq

Elv 690 Remove for Cables 1PP532B, 534B, 1PL301IB, 301JB

COMPUTED BY	DATE	CHECKED BY	DATE
ZEB	4-30-86	KLH	5-28-86
R1 R2 JRH	6-11-86	R2 KLH	6-11-86
R3 KLH	6-24-86	R3 KLH	6-24-86



R

Thermo-lag 6/11/86 (5)

R2 / DATE R2 / DATE

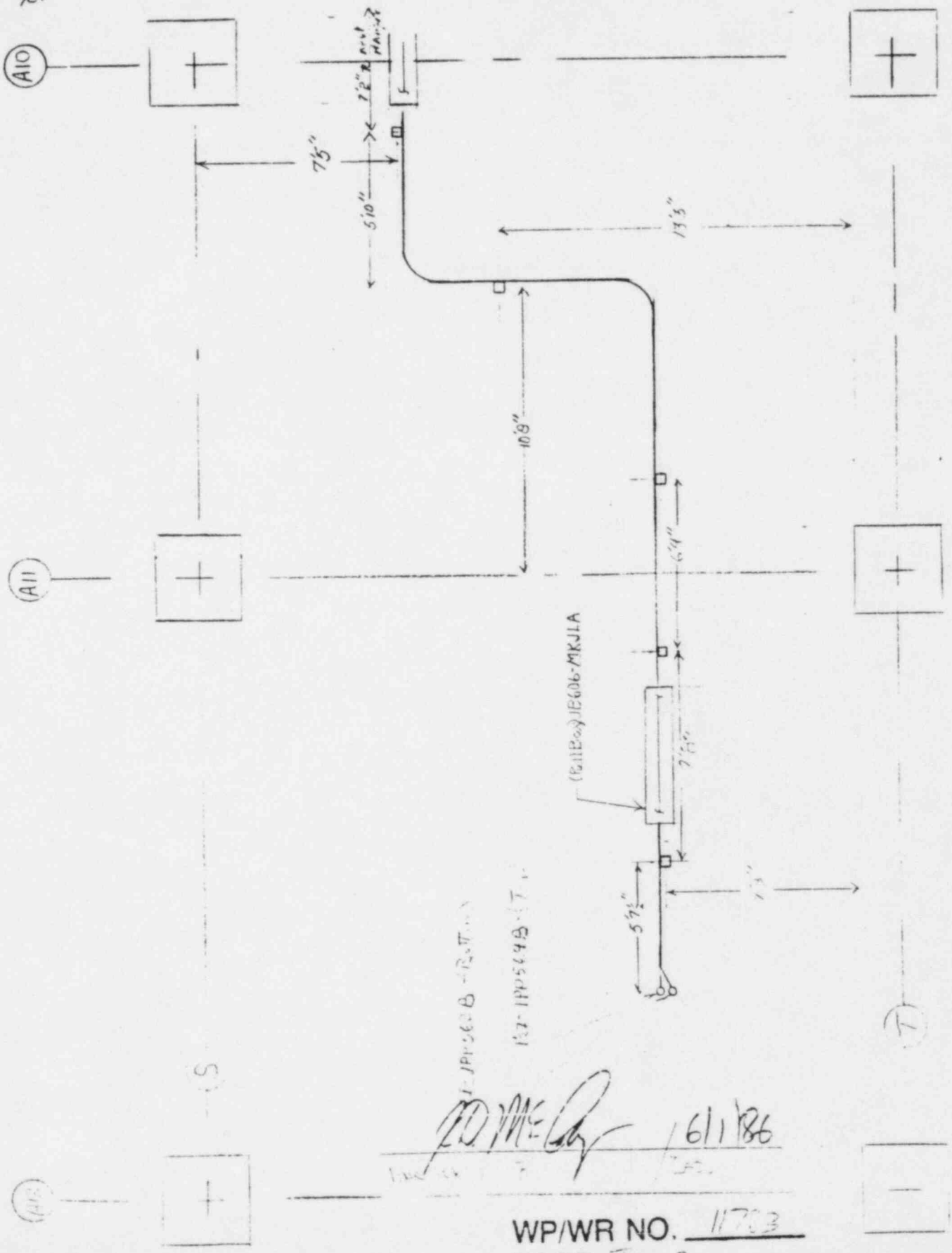
WP/WR NO. 11783

PAGE X-a-11

SUBJECT Appendix "R" Interaction #68 Cont. Chrg. Pump 1B-B PROJECT Seq

Ed. 690 Reroute For Cables 1PP562B, 564B, 1PL3011B, 3013B

COMPUTED BY LEA R1 DATE 4-30-86 CHECKED BY KLH R1 DATE 5-28-86



6/1/86

WP/WR NO. 11703

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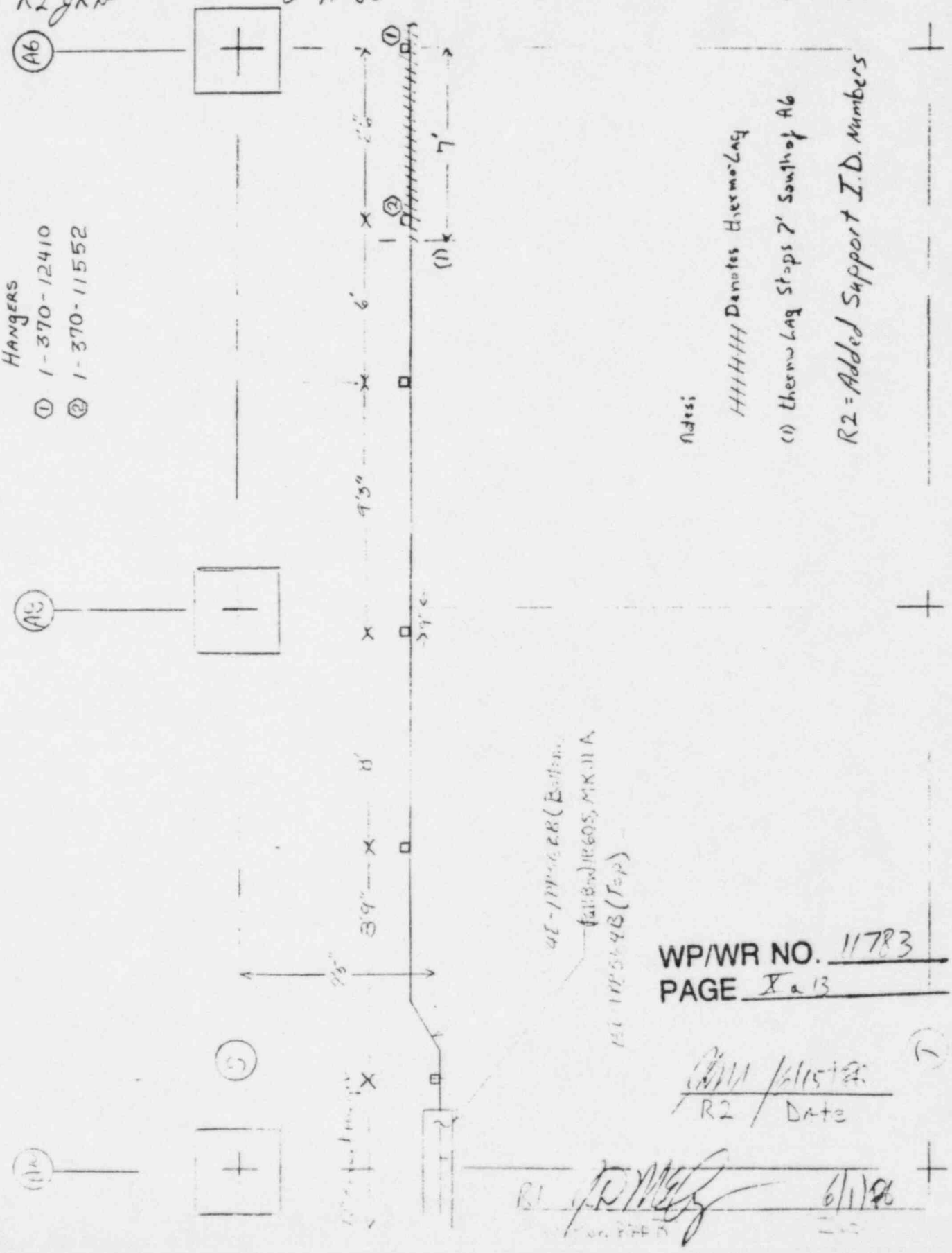
SUBJECT Appendix "R" Interaction #68 Cont Chang, Pump 1B-B PROJECT SQN

Eq. 690 Reroute For Cable: 1PL562B, 564B, 1PL3011B, 1PL3013B

COMPUTED BY FEB R1 R2 JRH DATE 4-30-86 6-11-86 CHECKED BY KLH R2 KLH DATE 5-28-86 6-11-86



TVA 489G (EN DES-3-77) **TENNESSEE VALLEY AUTHORITY** SHEET 9 OF 10

SUBJECT Appendix R Interaction #68 Cable Spreading Room 1R-2 PROJECT SQN

Form 690 Requests For Calcs 1-DA-QF-690.2, 1DA70, 1DA72

COMPUTED BY JE DATE 4-30-86 CHECKED BY KLH DATE 5-28-86

R1

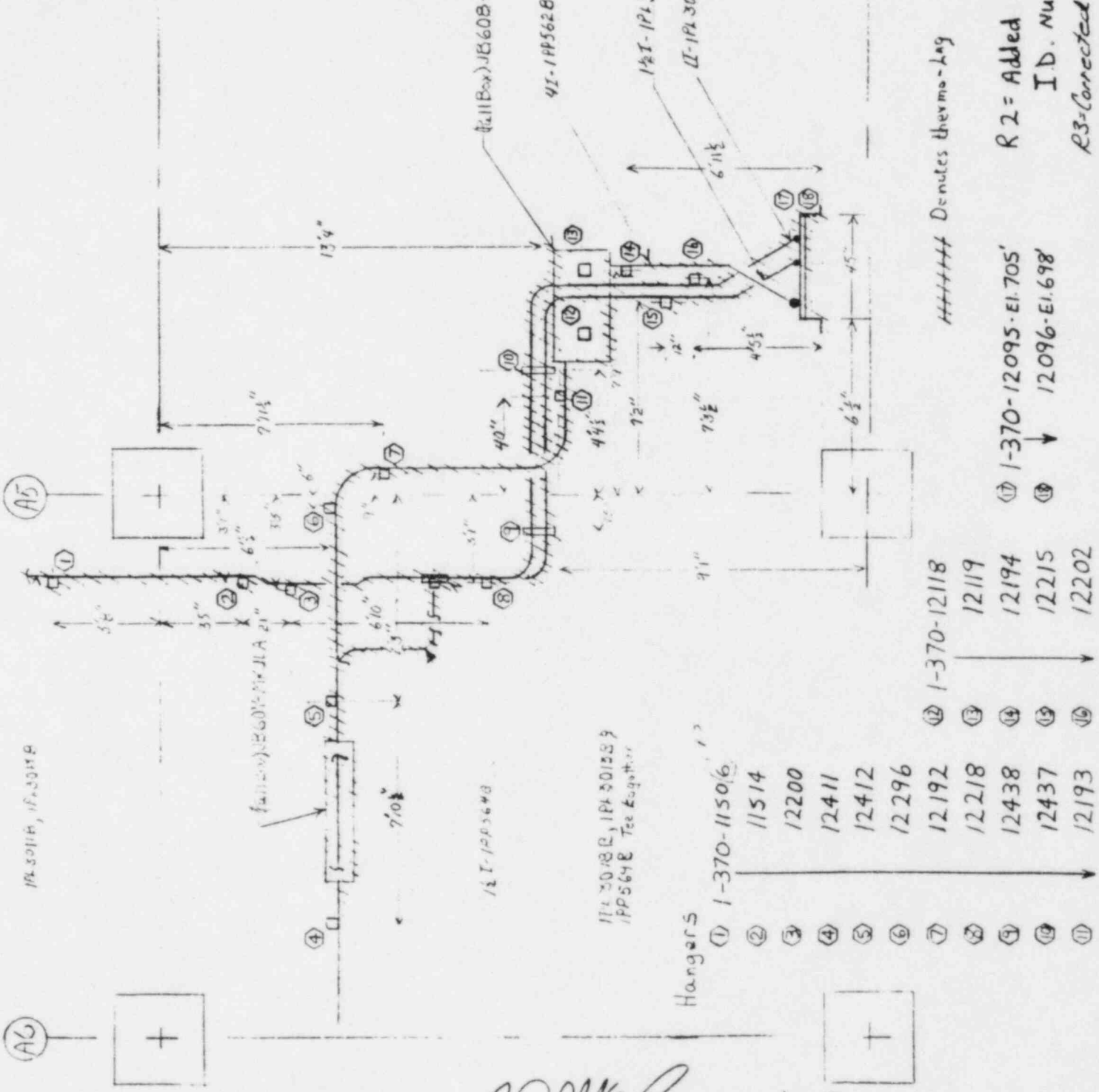
R2 JRH 6-11-86

(S) R3 KLH 6-24-86

R2 KLH 6-11-86

R3 KLH 6-24-86

(T)



J.P. McCoy 6/1/86

By Date

WP/WR NO. 11783

PAGE X-2-14

R2 Date

TVA 489G (EN DES-3-77)

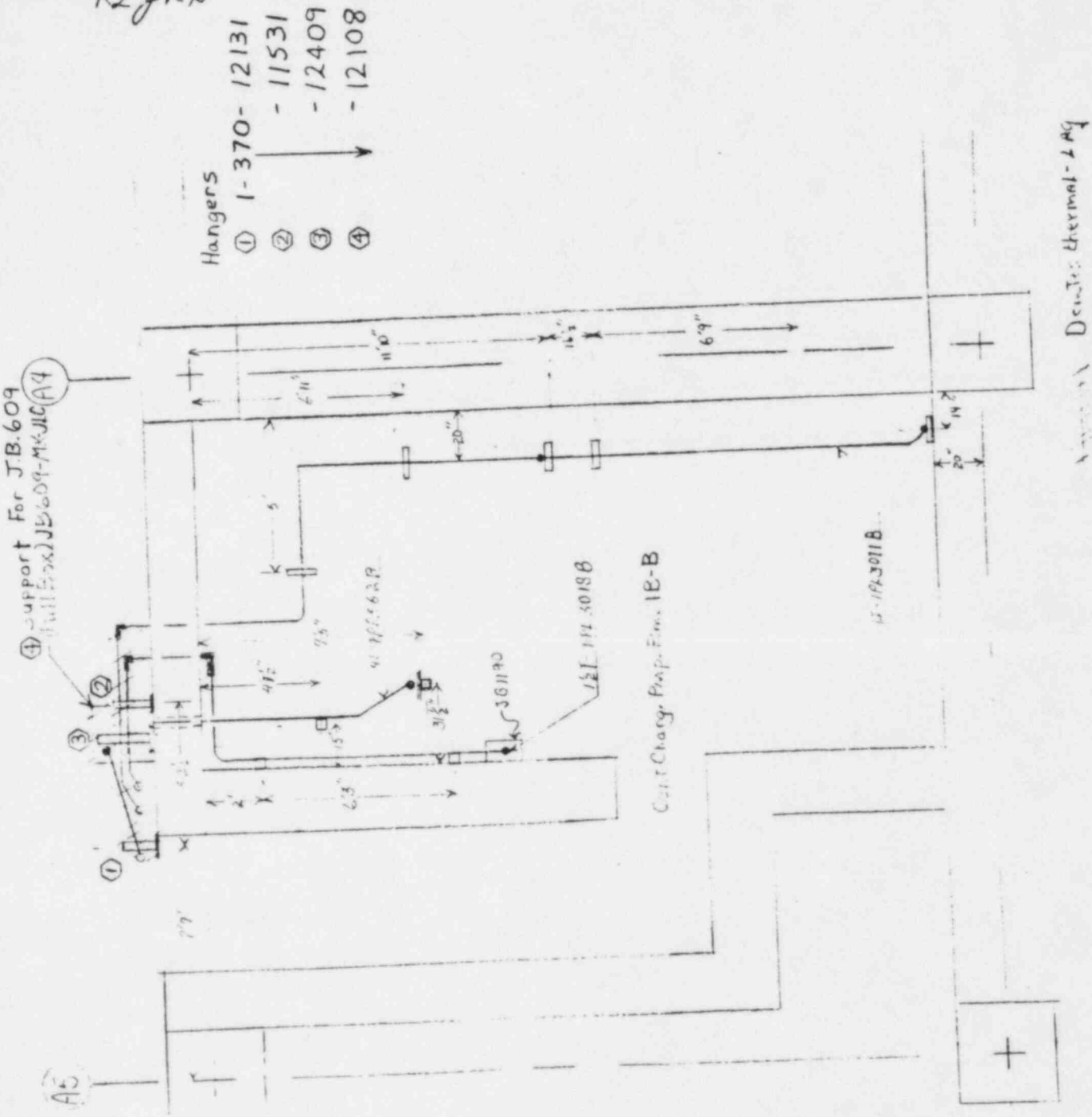
TENNESSEE VALLEY AUTHORITY

SUBJECT Appendix 'R' Interaction #22 Cor Chrg Pump 1B-B PROJECT SQN

Elv 669 Reroute Fire Cables 1B-B, Fire B, 1PD-011B, 3018B

COMPUTED BY JE DATE 4-30-86 CHECKED BY RLH DATE 5-29-86

R1 R2 JRH 6-11-86 R2 RLH 6-11-86



J.D. McCoy 6/1/86 (1)

R2 / Date

WP/WR NO. 11783

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INSPECTION DATA SHEET

Computer Identifier No. or Cable No. 1PP562B

TITLE: HIGH VOLTAGE INSULATION AND MEGGER INSPECTION

EQUIPMENT INSPECTED Cables for Centrifugal Charging Pump 1B-B

System Electrical Engineer Billy J Malone

Inspection Results

Phase	2500-V Megger Inspection: Accept. Criteria (Megohms)	2500-V Megger Inspection: Actual Value (Megohms)	Equipment Only D.C. High Potential Inspection: Applied Voltage (kV)	Leakage Current Reading: Initial	Leakage Current Reading: After 1 min.
A	6.9	4500		NA	
B	6.9	4500			
C	6.9	5000			

Cable or Penetration Only
D. C. HIGH POTENTIAL INSPECTION

Phase	Applied Voltage	Leakage Current vs. Time (Minutes): Initial	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
A																	
B	35 KV	25 ua	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
C																	

Test Equipment:

Description	TVA Tag No.	Model	Date Calib Due
Hi Pot Test Set	201192	Vin C-1	4-29-87
Megger	212703	Biddle	10-10-86
Timer	445740	Mylan 202	3-6-87

Remarks Workplan No 11783

PSC Report No. SNP-31-86

James B Hughes
PSC Engineer Reviewing the Inspection Data

5-16-86
Date

WP/WR NO. 11783
PAGE V 1 1

B43 '860903 904

QA Record

TO : Those listed

FROM : W. S. Raughley, Chief Electrical Engineer, W8 C126 C-K

DATE : September 2, 1986

SUBJECT: ALL NUCLEAR PLANTS - ELECTRICAL ISSUES - CLASS 1E CABLE BEND RADIUS

The purpose of this memorandum is to provide advance direction concerning the project specific actions which are necessary to resolve the outstanding concerns on the bend radius of Class 1E cables. Resolution of these concerns has been tied to plant restart/fuel load and should be scheduled for implementation accordingly.

The Electrical Engineering Branch has evaluated the adequacy of the bend radius to which Class 1E cables were installed. The basis for the evaluation was the comprehensive investigation conducted by the Nuclear Safety Review Staff on the same subject during February to April 1985. The measures specified herein are expected to comprise the majority of any project specific corrective actions resulting from this investigation. EEB's final report documenting the evaluation and providing conclusions and recommendations based upon an independent review of our evaluation will be issued in September 1986.

Each project should proceed immediately to perform the following inspections, as applicable, and to forward the results to the respective engineering projects.

1. The Watts Bar and Bellefonte projects shall inspect the installed bend radius of all Class 1E medium voltage power cable furnished by The Okonite Company. The cable shall be verified to be installed to a radius equal to 8 times its outside diameter. This inspection need not address the bend radius in standard conduit bends as this has been addressed generically in PIRGENEEB8605. The inspection of the bend radius in condulets is covered in item 2 below. Therefore, provided the project establishes that all cable tray fittings were procured with a radius equal to or greater than 8 times the outside diameter of the largest cable in question and that all conduit bends meet the minimum requirements of DS-E13.1.7, this inspection may be limited to cables in free air (transitions from raceway to raceway or raceway to equipment) and to the points of termination.

   All installations which do not conform to the specified 8 times factor shall be documented as a nonconformance and forwarded to the respective engineeering project for disposition. The documentation shall include the cable and, if applicable, the raceway number, the location of the violation, the actual installed bend radius and the results of a visual inspection noting any discernible stress on the cable jacket in the area of the bend or any cuts or ripples in the cable jacket which could indicate shield deformation.

Those listed
September 2, 1986

ALL NUCLEAR PLANTS - ELECTRICAL ISSUES - CLASS 1E CABLE BEND RADIUS

Effective immediately, the Watts Bar and Bellefonte projects shall take the steps necessary to ensure that all medium voltage power cable furnished by The Okonite Company is installed to a bend radius of 8 times its outside diameter as opposed to the previous direction of DS-E12.1.5. This design standard is being revised accordingly.

2. All projects shall perform a field inspection of all conduits containing Class 1E medium voltage power cables for the existence of any straight-thru pull box or condulet type (C, ELL, TEE, etc.) raceway fitting or any conduit raceway fitting other than a standard conduit bend around which a cable is bent. The existence of any such fittings, including the raceway number and size, the fitting description, manufacturer (if available) and size, and the location shall be documented as a nonconformance and forwarded to the respective engineering project for disposition.

3. All projects shall determine the minimum size conduit that the following coaxial, triaxial, and twinaxial cables, if utilized in Class 1E applications and routed in conduit, are installed in. If any of these cables are installed in Class 1E applications and in a conduit smaller than indicated below, the project shall perform a field inspection for the existence of condulets of any type (ELL, TEE, etc) in which the cable is bent. The existence of any such fittings, including the raceway number and size, the fitting description, manufacturer (if available) and size and the location shall be documented as a nonconformance and forwarded to the respective engineering project for disposition. In addition, each project shall verify that the following list includes all coaxial, triaxial, and twinaxial cables installed in Class 1E applications. A positive statement to this effect or a list of additional cable mark numbers shall be addressed to my attention.

Cable Mark No.	Description	Minimum Condulet Size (Inches)
WTJ	Coax RG6A/U	2
WTJ-S	1/c #21 Coax Solid Cu Clad Steel	2
WTK	#22 Coax RG59B/U	1-1/2
WTK-1	Coax RG59B/U XLP	1-1/2
WTL	Coax RG216/U Except 3 Shlds	3
WTL-4	Coax 55 ohm #22 AWG	1-1/2
WTM	Coax RG114A/U Except 3 Shlds & ST	3
WTM-6	1/c Coax #26, 7 Strands, LOCA	3
WTY-1	#21 AWG, Coax, RG58C/U	1-1/2
WTU	#20 Triax RG 11/U	3
WTN	Triax RG-59U #22, 2 Shlds LOCA	2
WTN-1	Triax Similar to RG11/U LOCA	3
WTN-2	Twinax RG22B/U	3
WWK	TP #22 W/SH TP #20 2/c #22 2-Coax	3

Those listed
September 2, 1986

ALL NUCLEAR PLANTS - ELECTRICAL ISSUES - CLASS 1E CABLE BEND RADIUS

4. The Watts Bar project shall perform a field inspection of all Class 1E coaxial, twinaxial, and triaxial cables which were installed or modified during the period of May 25, 1979 to May 18, 1981, under the guidance of Design Information Request (DIR) No. E-9. In addition, all projects shall inspect all Class 1E coaxial and twinaxial cables which were installed or modified during the period of September 20, 1983 to April 23, 1986, under the direction of DS-E12.1.5 Rev 0. The cable shall be verified to be installed to a bend radius equal to 8 times its outside diameter. This inspection need not address the bend radius in standard conduit bends as this has been addressed generically in PIRGENEEB8605. The inspection of the bend radius in condulets is covered in item 3 above. Therefore, provided the project establishes that all cable tray fittings were procured with a radius equal to or greater than 8 times the outside diameter of the largest cable in question or that the cable was restricted to use in conduit and that all conduit bends meet the minimum requirements of DS-E13.1.7, this inspection may be limited to cables in free air (transitions from raceway to raceway or raceway to equipment) and to the points of termination.

   All installations which do not conform to the specified 8 times factor shall be documented as a nonconformance and forwarded to the respective engineering project for disposition. The documentation shall include the cable and, if applicable, the raceway number, the location of the violation, the actual installed bend radius and the results of a visual inspection noting any discernible stress on the cable jacket in the area of the bend or any ripples in the cable jacket which could indicate shield deformation.

Each Lead Engineer should prepare a fragnet reflecting the individual project's approach and schedule for resolving these issues. Please submit a copy of this fragnet to me for my use and information.

W. S. Raughley

J. D. Collins, P-205 SB-K
G. T. Hall, DNE, DSC-A, Sequoyah
D. F. Faulkner, A7-BFN
J. L. Springer, 9-111 SB-K

TMS:TLT
cc: RIMS, SL 26 C-K
R. R. Hoesly, 9-113 SB-K
J. A. Kirkebo, W12 A8 C-K
M. L. Rayfield, P-104 SB-K
J. P. Stapleton, DNE, A10 Browns Ferry
D. W. Wilson, DNE, DSC-A, Sequoyah
Principally Prepared By: T. M. Shea, Extension 2672

DNE1 - 0594W

ITEM 10

Describe the extent to which different classes of cables were intermixed within a conduit (e.g., V5 with V4, etc.).

RESPONSE

The design maintains separation of the cables by voltage classification.

Design Input Memorandum DIM-SQN-DC-V-11.3-5, issued March 13, 1986, to SQN Design Criteria SQN-DC-V-11.3, "Power, Control, and Signal Cables For Use In Category I Structures," states that cables routed in conduit shall be separated by voltage levels with two exceptions.

1. Cables of different voltage levels may be routed together when a piece of equipment has only one conduit opening. These cables should be separated with respect to voltage levels as soon as possible. Generally, these are very short lengths (less than three feet).

2. When the circuit protective device in a radial feeder is capable of interrupting both power and control circuits for a piece of equipment, the associated power and control cables may be routed together in the same conduit.

This DIM was issued to formally document the requirements for separation of voltage levels in conduits which had been explicitly stated for cable trays. However, the design reflects that the same voltage level separation has been maintained in conduits as in cable trays since the May 1971 initial issue of the design criteria (SQN-DC-V-11.3).