



TENNESSEE VALLEY AUTHORITY  
Division of Nuclear Engineering



BROWNS FERRY NUCLEAR PLANT

CABLE ISSUES SUPPLEMENTAL REPORT

CABLE TESTING

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September, 1988

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## 1.0 INTRODUCTION

### 1.1 Background

During the summer of 1986, the U.S. Nuclear Regulatory Commission (NRC) began a review of concerns relating to the adequacy of construction practices at the Tennessee Valley Authority's (TVA) Watts Bar Nuclear Plant (WBN). The review identified that many of the concerns centered on potential damage to electrical cables due to alleged improper or inadequate cable installation practices. Accordingly, the NRC performed a comprehensive review to determine if significant damage had occurred to cables during their installation at WBN. Since TVA's Sequoyah Nuclear Plant (SQN) and WBN are based on the same overall design, the NRC extended the evaluation of the cable installation concerns to the SQN plant. The Technical Evaluation Report (TER) describing the NRC's evaluation, conclusions, and recommendations regarding the concerns relating to potential abuse of electrical cable from installation practices at SQN was provided to TVA via reference 1.

TVA performed an extensive and comprehensive evaluation of those SQN issues for which the TER determined implementation was required prior to startup of that plant (reference 2). These issues were successfully resolved at SQN and its cable installation practices in these areas were demonstrated to have resulted in adequate cable installation (reference 3).

As a result of generic reviews of the Condition Adverse to Quality Reports (CAQRs) issued to document the potential conditions at SQN, these same cable installations concerns have been identified at Browns Ferry Nuclear Plant (BFN).

In order to evaluate the extent to which these concerns applied to BFN and to determine whether significant damage had occurred to cables during their installation, TVA implemented an individual indepth review on BFN. The review was structured to address the following:

- Determine if significant differences existed between the cable installation practices and procedures utilized in the construction of BFN and those utilized in the industry during the time period of BFN's construction.
- Perform plant walkdowns to review specific installation practices and assess the overall quality of the cable installation.
- Determine the extent to which the installed cables at BFN are enveloped by the SQN cable issue resolution program.
- Establish, as necessary, a BFN corrective action program for resolution of the cable installation concerns.

## 1.0 INTRODUCTION (Cont'd)

### 1.1 Background (Cont'd)

The result of this review was the issuance of four reports (references 4 through 7) addressing the above listed actions. The summary report (reference 4) was transmitted to the NRC via reference 8 on July 18, 1988.

A meeting was held with the NRC on July 21, 1988 to discuss TVA's approach to resolution of the cable issues at BFN and the summary report recommendations. At this meeting, the NRC indicated that a testing program similar to that of SQN was preferred over the approach proposed by TVA in the cable issues summary report.

During a subsequent meeting with the NRC on September 12, 1988, TVA presented preliminary information on testing of cables performed at BFN for Environment Qualification (EQ) and routine maintenance. TVA proposed that review of the test data, when combined with the previous walkdown (reference 7) and corrective actions of the summary report, would provide a sound basis for resolution of the BFN cable issues.

This report provides the evaluations and conclusions from the review of previous BFN cable test data.

### 1.2 Purpose

The purpose of this evaluation is to determine the scope of BFN cable testing to date, analyze the types of testing performed and the cables tested for applicability to resolution of the cable issues, review actual test data, and establish conclusions from the review to facilitate resolution of the BFN specific cable installation concerns.

### 1.3 Approach

The approach utilized in the evaluation of historical cable test data at BFN is summarized as follows:

1. Research BFN historical records to establish scope of cable testing to date, with emphasis on dc high potential testing.
2. Research BFN historical records and compile cable test data/documentation.
3. Analyze data to assess cable failure rate, failure cause, and categorize findings.
4. Determine applicability of test data to electrical cable issues.
5. Make conclusions and recommendations.

## 1.0 INTRODUCTION (Cont'd)

### 1.3 Approach (Cont'd)

For the purposes of this report, it was decided to limit review of cable test data to dc high potential ("withstand" and "time-leakage current") tests and EQ testing. This data is more likely to detect cable damage caused by installation practices than insulation resistance (IR) test data. In addition, medium voltage shielded cable, to which dc high potential testing solely applies, is considered more susceptible to damage due to jamming, bend radius, sidewall pressure (SWP) and vertical support concerns, than the majority of other cable types used at BFN.

All of the BFN cable test instructions/procedures referenced in this report require IR testing using a 500V insulation resistance tester for various durations (dependent upon test purpose and associated equipment) on low voltage power and control cable/equipment. For 4kV equipment and cables, a 2500V insulation resistance tester is used. The IR tests are performed for both initial acceptance and maintenance testing. Review of the cable test data indicates that IR test documentation exists in great abundance at BFN. Samples of IR test data were pulled and reviewed to determine the extent and application of IR testing, however a detailed review of IR test results was not performed.

To date, dc high potential testing of low voltage cable (cable rated at 600V and less) has not been performed at BFN.

Maintenance procedure EPI-0-000-TST-002, Electrical Preventive Instruction, "Surge Comparison Testing of Electrical Equipment" test data was not reviewed as part of this report effort. EPI-0-000-TST-002 was implemented on May 10, 1988 to supersede EMI-71. Considering the limited amount of test data that could be generated in the short time frame since implementation, it was decided not worthwhile to retrieve EPI-0-000-TST-002 test data for this evaluation.

Test records for temporary cables, cables not associated with the permanent plant (warehouse/office feeds, etc.), and pre-installation (cable on the reel) tests were not included in this evaluation.

## 2.0 DESCRIPTION OF BFN CABLE TESTING PRACTICES

### 2.1 Installation, Modification and Maintenance Cable Testing

The cable installation practices report (reference 5) was issued to establish the application of TVA cable installation, testing, and maintenance specifications, procedures, and instructions, both past and present, to BFN cable practices. The main focus of the report is cable installation requirements. Although testing is addressed by reference 5, it is not covered in great detail.

TVA documents identified in reference 5 that contain cable test requirements are BF-17, MAI-13, MAI-45, and EMI-71 (See Attachment A for titles). The cable test data research performed for this report indicates the following additional BFN documents contain cable test requirements:

PSO Field Test Manual	Division of Power System Operation (PSO) Field Test Manual, Section D3, "High-Voltage Cables", and Section G3, "High-Potential Testing"
BF-14	Document not retrievable. Preceded BF-17. Test records exist which reference this document. The records are similar in format to BF-17 test records.
EMSIL - 50	Electrical Maintenance Section Instruction Letter 50, "Megger, Bridge, and High Potential Testing of Electrical Equipment".
EMI-58	Electrical Maintenance Instruction 58, "Splicing of Medium and Low Voltage Signal, Low and Medium Voltage Power, and Control Cables - Critical and Non-critical".
EPI-0-000-TST-002	Electrical Preventive Instruction, "Surge Comparison Testing of Electrical Equipment"

Attachment A lists all BFN specifications/procedures containing cable test requirements and describes their scope, application to each phase of installation, modification, or maintenance, and effective dates.

It should be noted that all BFN procedures/instructions which require initial acceptance dc high potential tests refer to the Division of Power System Operation (PSO) Field Test Manual which establishes test voltages, durations, and actual test procedure. This document is a common thread which provides consistency to past cable test practices at BFN. This is evidenced by the consistency of documentation produced in accordance with several different procedures/instructions spanning the years from the early 1970s to the present.

## 2.0 DESCRIPTION OF BFN CABLE TESTING PRACTICES (Cont'd)

### 2.2 Environmental Qualification (EQ) Testing

Other cable testing performed at BFN, but not covered in Attachment A, is the EQ testing performed in accordance with IEEE 323 (reference 9) as part of resolution of EQ concerns which are addressed by the Browns Ferry Nuclear Performance Plan (BFNPP) Volume 3, Section 1.0 (reference 10) and documented by Wyle Laboratories Nuclear Equipment Qualification Test Report No. 17745-1 (reference 11).

### 2.3 Test Methodologies and Basis

The various BFN cable tests considered by this report, and described in paragraphs 2.1 and 2.2 above, can be summarized into three basic categories. The categories are discussed below:

#### Category 1 - Installation and Modification DC High Potential Testing

This category includes dc high potential "time-leakage current tests" performed for acceptance and proof testing. Acceptance tests were performed after initial cable installation (including splices and terminations) by application of 25kV dc for 15 minutes. Acceptance criteria was a decreasing, or not increasing, leakage current with respect to time. Proof tests were performed when a cable required testing after the initial acceptance test. Situations requiring proof tests include disconnection/reconnection of splices or terminations, partial cable replacement, etc. Proof tests were performed at 18.7kV or 17.6kV dc for 5 minutes. Acceptance criteria is the same as for initial acceptance tests.

As depicted in Attachment A, BFN procedures/instructions which require(d) tests as defined by this category are BF-14, BF-17, MAI-13, MAI-45 and EMI-58 (See Attachment A for titles).

The basis for the Category 1 test methodology is Table D3-1 of the PSO Field Test Manual. The "after installation" values provided in the table are derived from NEMA WC-3 (reference 12) for rubber-insulated cables and NEMA WC-5 (reference 13), and NEMA WC-7 (reference 14) for polyethylene and cross-linked polyethylene insulated cables. The test values in the PSO Field Test Manual Table D3-1 are also consistent with the test values recommended by IEEE 400 (reference 12) which establishes current industry practice.

Category 1 test records are summarized in Attachment E.



## 2.0 DESCRIPTION OF BFN CABLE TESTING PRACTICES (Cont'd)

### 2.3 Test Methodologies and Basis(cont'd)

#### Category 2 - Maintenance DC High Potential Testing

This category includes dc high potential "withstand" tests, performed periodically to assess the condition of 4kV motor windings. The tests were applied to the feeder cables and motor windings simultaneously and are therefore useful in assessing age related cable degradation resulting from, or enhanced by, cable installation practices. These tests are performed in 1kV increments of three (3) minutes in duration up to 8kV dc. The test voltage is limited to 8kV to preclude detrimental effects of high voltage stress on the motor winding insulation. The tests are performed periodically, usually during each outage, or following a circuit trip. Acceptance criteria is a linear versus non-linear incremental increase in leakage current.

As depicted in Attachment A, BFN procedures/instructions which required tests as defined by this category are EMSIL-50 and EMI-71 (See Attachment A for titles). The basis for the Category 2 test methodology is TVA document N75M5 (See Attachment for title) which specifies an 8kV upper limit, stepped dc high potential test for 4kV motors and associated feeder cables. The industry basis for the test methodology and limiting the test voltage is ANSI/IEEE 43 (reference 17). Maintenance testing guidelines for cables are provided by ANSI/IEEE 400 (reference 12) Appendix A.1.2.

Category 2 test records are summarized in Attachment D.

#### Category 3 - EQ Testing

This category of tests encompasses cable samples representative of the various cable types, configurations, and manufacturers that have been EQ tested in accordance with IEEE 323 by an independent test agency. For the purposes of this report, only cable samples that were obtained by removal from actual service and routed at least partially in conduit are considered. The EQ test sequence, methodology and parameters are as specified in IEEE 323 (reference 9) and documented by reference 11. In addition to the test requirements of IEEE 323, the test samples were subjected to a 2.2kV ac high potential test after exposure to a Loss of Coolant Accident (LOCA) environment.

### 3.0 RESULTS OF CABLE TEST DATA REVIEW AND APPLICATION TO CABLE ISSUES

Category 1 test results are applicable to the TER cable issues with the exception of pullbys and use of condulets. As recommended by reference 4, corrective action walkdowns have been performed on BFN Unit 2 4kV Class IE cables to determine the extent and severity of bend radius and cable support violations. The Category 1 test data applies to the same group of cables addressed by the corrective action walkdown (i.e. 4kV circuits). A review of test records for cables addressed by the corrective action walkdown shows that Category 1 test records were available for 93% of the cables. This is a substantial sample. Review of conduit configuration data produced by these walkdowns shows that condulets were not used in conduits containing 4kV cable. Pullbys do not typically occur in power feed conduits.

Although this report does not cite specific examples of Category 1 conduits that have conduit/cable configurations applicable to the issues of jamming, SWP, and bend radius, the Category 1 test review results have application to these issues in that existence of a "testing program" is demonstrated. It can be concluded that existence of a "test program" which is consistent with current practice would have detected significant cable damage resulting from jamming, excessive SWP, or bend radius violations.

Five hundred fifty-seven (557) Category 1 cable test records were produced as part of the data research which included four-hundred eighty-eight (488) individual cables. Refer to Attachment E for a detailed summary. Records retrieved do not document 100% of the safety-related cables at BFN, however the records found and reviewed are in sufficient quantity to demonstrate that an initial acceptance test program was in place and was effective in evaluating cable quality prior to placement in service.

Category 1 test records, although not complete, are considered a very comprehensive sample. Review of Category 1 test records indicate zero (0) cable insulation failures resulting from cable acceptance testing. The records document five (5) splice and termination failures (cable nos. 3ES4090-II, PP1154, PP1169, PP65, and PP66 which had terminations/splices repaired and retested). The acceptance test records also document new cable installation to replace previous cable for various reasons, including in-service failures. Test records for cables PP1150, (7/17/78), PP1151 (7/19/78), and PP1173 (6/16/78) indicate that in-service failures occurred on the previously installed cables. Further research was performed, but the specific cause of the in-service failures for these three (3) cables could not be determined. All three (3) cables are feeds from the 4kV cooling tower switchgear A and C to various 480V cooling tower unit substations. Although the purpose of this report is not to investigate in-service failures, the research into these three (3) cables revealed that the majority of documented cable, splice, and termination failures at BFN have occurred in circuits associated with the cooling towers.

### 3.0 RESULTS OF CABLE TEST DATA REVIEW AND APPLICATION TO CABLE ISSUES (Cont'd)

Documented cooling tower cable failures have included overheating of aluminum to copper splices/terminations, insulation failure due to electro-chemical treeing, insulation damage resulting from collateral work activities and unexplained failures. No documented failures attributable to insulation damage caused by installation were found. Cables PP1150, PP1151, and PP1173 have approximately 80% of their installed lengths in cable trench with removable covers and the remaining 20% in embedded conduits/ductbank. Conclusions regarding the specific failure mechanisms for cables PP1150, PP1151, and PP1173 cannot be drawn, however it is evident from the review of documented BFN cable failures that materials and practices used in the installation of cooling tower cables/terminations do not seem representative of the balance of BFN cable work.

Test records for cables 1PP1000, 1PP1001, 1PP1002, 1PP1050, 1PP1051, and 1PP1052 (12/22/78) indicate the previous cables were replaced due to "stress basket damage". These cables are reactor recirculation pump feeds from the Unit #1 Motor-Generator (MG) set generators to the Recirculation Pump Trip Boards, and are routed entirely in cable tray. The cables are supported from the MG set terminal boxes by wire baskets grips. Damage resulting from these cable supports are considered not applicable to the cable issues discussed in the SQN TER as they are not in conduit and are designed cable supports (as opposed to no design).

It is known that several medium voltage shielded power cables for the 6 conductor per phase circuit between the 4kV Bus Tie Board and the 4KV Cooling Tower Switchgear failed dc high potential tests (See Reference 18). The research for this report did not recover these test records. The cable failures were attributable to damage from collateral work activities and electro-chemical treeing and therefore are not related to the SQN TER cable issues.

Category 2 test records apply to the same cable issues, cable types, and voltage class as Category 1 with the exception of jamming and SWP. With respect to SWP, walkdowns of conduit configuration and performance of SWP calculations were not attempted to show application of test results to specific cable/conduits. The basis for this decision are References 4 and 7 and the TVA Cable Sidewall Bearing Pressure Test Report (reference 16) which show that SWP violations are highly unlikely considering BFN conduit installation practices (high SWP limits and high population of pull points). The Category 2 test data applies to the same group of cables addressed by the corrective action walkdown. Attachment C depicts how fourteen (14) walkdown conduits with cable tested under this category apply to the cable issues. Review of the Category 2 dc high potential test records for all BFN Units, both safety and non-safety related, produced five-hundred seventeen (517) records which applied to one-hundred eighteen (118) individual cables. One-hundred sixteen (116) of the Category 2 records apply to twenty-four (24) Unit 2 and Common Unit safety related cables.

3.0 RESULTS OF CABLE TEST DATA REVIEW AND APPLICATION TO CABLE ISSUES (Cont'd)

Detailed review of the available BFN Category 2 test records revealed zero (0) cable insulation failures. Five (5) failures of motor windings were documented. The results of this review are tabulated in Attachment D.

Category 3 test results are contained in reference 11. Of the forty-six (46) cable samples tested for EQ, eleven (11) with at least partial routing in conduit, were obtained by removal from service. Below is a listing of the cables removed from service, their corresponding specimen number in reference 11, and the EQ test result.

<u>Cable No.</u>	<u>Specimen No.</u>	<u>Test Result</u>
L36	40 (A & B)	Passed
M935	30 (A & B)	Passed
1NM1256	33 (A & B)	Passed
2ES2726-II	29 (A & B)	Passed
2V42	28 (A & B)	Passed
2V1200	26 (A & B)	Passed
2V1218	23 (A & B)	Passed
3ES2501	32 (A & B)	Passed
3PL575	25 (A & B)	Passed
3PL800	31 (A & B)	Passed
3V1255	27 (A & B)	Passed

Cables removed from service were receipt inspected by the independent test agency. Damage is described in Notice of Anomaly No. 1 to reference 11, but was judged not to affect qualification.

The applicability of EQ cable test record review results to each cable issue is summarized in Attachment B. Category 3 test data results can be applied to the "use of conduit" cable issue.

#### 4.0 CONCLUSIONS AND SUMMARY

The review results of the Category 1 test data (initial acceptance and proof tests) provides substantial evidence that medium voltage (4kV) cables were handled and installed in such a manner to preclude cable damage. Review of five-hundred fifty-seven (557) Category 1 test records revealed zero (0) cable insulation failures. From these results it can be concluded that BFN medium voltage cable installation practices relating to the issues of jamming, SWP, and bend radius, were adequate in the prevention of significant cable insulation damage. This conclusion can be extended to the remaining low voltage and instrumentation cables at BFN, as medium voltage shielded cables are more susceptible to damage resulting from the cable issues of jamming, SWP, and bend radius.

Age or environment related deterioration could result from, or be accelerated by, cable abuse during installation. However, the review results of Categories 2 and 3 test data (maintenance testing and EQ testing) provide evidence that medium voltage (4kV) and EQ test sample cables have not shown age or environment related deterioration.

This finding is especially noteworthy in consideration of bend radius and vertical support concerns. Bend radius violations severe enough to result in shield distortions may result in failure over time due to corona discharge between the shield and insulation. Vertical support violations, especially those with cable weight bearing on a surface with a small radius (such as conduit bushing, or inside radius of a conduit), may show failures due to insulation creep caused by time and high temperature. Although the results to date of the corrective action walkdown indicate a substantial amount of bend radius and vertical support violations, the review of Category 2 test records indicates zero (0) cable insulation failures from a total test sample of five-hundred seventeen (517).

#### 4.0 CONCLUSIONS AND SUMMARY (Cont'd)

The data reviewed in this evaluation, although substantial, cannot be considered comprehensive. It cannot be established that all BFN cable test documentation was reviewed. The data is however, a significant statistical sample which allows credible conclusions. The size of the data sample also supports the argument that any failures that may result from cable installation practices would be random occurrences.

In summary, it can be concluded from a review of BFN historical cable test data that:

1. Cable tests were performed; and the type of testing was adequate to detect cable installation abuse initially and over time.
2. Cable test results have application to the cable issues of jamming, SWP, bend radius, vertical supports, and use of condulets.
3. Cable test data allows conclusion that installation practices have not resulted in significant cable insulation damage.

A significant finding of the BFN cable test data review is that programmatic acceptance testing was performed at the time of initial cable installation, and that the testing methodology used is consistent with current practices. Of equal importance is that periodic dc high potential maintenance testing and EQ testing of in-service cable samples have not detected cable insulation failures resulting from age or operating environment influences.

These conclusions, evidenced by documented tests, when combined with the comprehensive walkdown effort described in references 4 and 7, demonstrates the integrity of cable installed at BFN.

Implementation of the recommendations provided in reference 4, along with the upgraded installation/maintenance procedures recently issued and trending of any cable failures, will ensure that integrity is maintained.

## 5.0 REFERENCES

1. Letter from B. J. Youngblood (NRC) to S. A. White (TVA), dated March 9, 1987 (A02 870312 023).
2. Letter from R. L. Gridley (TVA) to NRC, dated July 31, 1987 (L44 870731 803).
3. Letter from R. L. Gridley (TVA) to NRC, dated November 20, 1987 (L44 871120 803).
4. Evaluation of Browns Ferry Nuclear Plant Cable Installation Concerns - Summary Report, dated June 17, 1988 (B22 880617 016).
5. Project Topical Report Cable Installation Requirements, dated June 17, 1988 (E22 880617 015).
6. Materials Evaluation and Comparison of Safety-Related Cable and Conduit Materials Used at Sequoyah and Browns Ferry Nuclear Plants, Revision 1, dated June 1988 (B22 880617 017).
7. Cable Issues Walkdown Report, Revision 1, dated June 1988 (B22 880617 018).
8. Letter from R. L. Gridley (TVA) to NRC, dated July 18, 1988 (L44 880718 819).
9. ANSI/IEEE 323-1983, Qualifying Class 1E Equipment for Nuclear Generating Stations.
10. Browns Ferry Nuclear Performance Plan (BFNPP) Volume 3, Revision 1, dated July 1, 1987 (L44 870701 802).
11. Wyle Laboratories Inc., Nuclear Equipment Qualification Test Report No. 17745-1, dated February 26, 1987 (B01 870302 251).
12. ANSI/IEEE 400-1980, Guide for Making High-Direct-Voltage Tests on Power Cable Systems in the Field.
13. NEMA WC-3-80 - Rubber-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy (ICEA S-19-81, Sixth Edition); Revision 1-January 1983, Revision 2-March 1985, and Revision 3-March 1987.
14. NEMA WC-5-73 - Thermoplastic-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy (ICEA S-61-402) (R 1985); Rev. 1-74, Rev. 2-77, Rev. 3-79, Rev. 4-79, Rev. 5-80, Rev. 6-82, Rev. 7-82, Rev. 8-82, Rev. 9-82, Rev. 10-83, Rev. 11-84, and Rev. 12-86.

5.0 REFERENCES (Cont'd)

15. NEMA WC-7-82 Cross-Linked-Thermosetting-Polyethylene-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy; Revision 1-December 1984, Revision 2-March 1985, and Revision 3-August 1986.
16. TVA Cable Sidewall Bearing Pressure Test Report, dated 5/30/86.
17. ANSI/IEEE 43-1974, Testing Insulation Resistance of Rotating Machinery.
18. TVA report - Evaluation of the Adequacy of Installed Class iE Cables, dated February 18, 1986. (B43 860331 916).



6.0 ATTACHMENTS

- Attachment A - TVA/BFN Procedures/Instructions with Cable Test Requirements - Construction Through Present
- Attachment B - EQ Cable Test Samples - Application to Cable Issues
- Attachment C - BFN Unit 2 Walkdown Cables/Conduits That Have Been Maintenance Hi-Pot Tested - Application to Cable Issues
- Attachment D - Summary of TVA BFN 8kV dc Hi-Pot Test Reports
- Attachment E - TVA BFN Cable Acceptance Test Records Summary
- Attachment F - BFN Unit 2 Class 1E, 4kV Walkdown Data
- Attachment G - Supporting Calculations/Basis for Applicability to Cable Issues

ATTACHMENT A

TVA/BFN Procedures/Instructions with Cable Test Requirements - Construction  
through Present

## TVA/BFN PROCEDURES/INSTRUCTIONS WITH CABLE TEST REQUIREMENTS CONSTRUCTION THROUGH PRESENT

INITIAL INSTALLATION	MODIFICATION	MAINTENANCE
<p>1. BF-14: DOCUMENT NOT RETRIEVABLE. PRECEDED BY BF-17 R4. TESTS RECORDS HAVE SIMILAR FORMAT TO BF-17 RECORDS. TEST RECORDS DOCUMENT 25 kV DC FOR 15 MIN.</p> <p>2. BF-17: "QA PROGRAM FOR CONTROL, POWER, AND SIGNAL CABLES." R0 (2/24/89) THROUGH R8 (8/30/76). R4 (4/11/73) STARTED STANDARD CABLE TEST No. 4. (25 kV DC FOR 15 MIN.)</p>	<p>1. MAI-13: "CONTROL POWER AND SIGNAL CABLES." R0 (6/2/83) THROUGH R7 (11/14/86). REPLACED BY MAI-44/45. SPECIFIES STANDARD CABLE TEST No. 3 (25 kV DC - 15 MIN.). DOCUMENTATION INCORPORATED INTO WORK PLAN.</p> <p>2. MAI-45: "CABLE TERMINATING AND SPLICING FOR INSULATED CABLES RATED UP TO 15,000 VOLTS." R0 (9/30/86) THROUGH R5 (5/27/88). STANDARD CABLE TEST No. 3 (25 kV DC - 15 MIN.). ACCEPTANCE DOCUMENTED ON ATTACHMENT #8, ITEM 6.0. PSO DOCUMENT FILED WITH WORK PLAN. SUPERCEDED MAI-13.</p>	<p>1. EMSL 50 - ELECTRICAL MAINTENANCE INSTRUCTION LETTER 50: "MEGGER, BRIDGE, AND HIGH POTENTIAL TESTING OF ELECTRICAL EQUIPMENT." CANCELLED 9/7/80. SPECIFIES 8 kV DC STEP DC HIGH POTENTIAL TESTS.</p> <p>2. EMI 58: "SPLICING OF MEDIUM AND LOW LEVEL SIGNAL, LOW AND MEDIUM VOLTAGE POWER AND CONTROL CABLES - CRITICAL AND NON-CRITICAL." 11/23/83 - R1 (9/11/86). CONTAINS TABLE WHICH SPECIFIES 25 kV DC NEW, 18.7 kV DC IN SERVICE. REQUIRES PSO ACCEPTANCE SIGN OFF ON EMI-58 DOCUMENTATION.</p> <p>3. EMI-71: "MEGGER, BRIDGE, AND HIGH POTENTIAL TESTING OF ELECTRICAL EQUIPMENT." 9/11/83 THROUGH R2 (12/19/88); SPECIFIES BRIDGE, PI, AND 8 kV DC STEP HI-POT.</p> <p>4. EPI-0-000-TST002 R0 (5/10/88): "ELECTRICAL PREVENTIVE INSTRUCTION SURGE COMPARISON TESTING OF ELECTRICAL EQUIPMENT." USES "BAKER SURGE COMPARISON TESTER" IN LIEU OF BRIDGE, PI AND 8 kV DC STEPPED HP. SUPERCEDED EMI-71.</p>

### UPPER TIER DOCUMENTS

**N75M5:** "400, 4000, 8600, AND 13,200 V MOTORS - ROUTINE MAINTENANCE TESTS AND TEST PROCEDURE AFTER TRIP/OUT BY PROTECTIVE RELAYS OR DEVICES." REVISION DATES 8/5/75 THROUGH 4/22/83. EMSL-50 AND EMI-71 REQUIREMENTS ARE BASED ON THIS DOCUMENT.

**PSO FIELD TEST MANUAL:** DIVISION OF POWER SYSTEM OPERATION (PSO) FIELD TEST MANUAL, SECTION D3, "HIGH-VOLTAGE CABLES," AND SECTION G3, "HIGH POTENTIAL TESTING." BF-14, BF-17, MAI-13, MAI-45, AND EMI-58 REQUIREMENTS ARE BASED ON THIS DOCUMENT.

ATTACHMENT B

EQ Cable Test Samples - Application to Cable Issues

ATTACHMENT B

LEGEND

Abbreviations: A - Aluminum Conduit  
COND - Conduit  
IR - Intermediate Rigid Steel Conduit  
NO - Number

Data Codes: I - Indeterminate (see below)  
N - No Application to Cable Issue  
Y - Yes - Applicable to Cable Issue  
N/A - Not Applicable - Cable Not Installed in Conduit

Cable Data: Cable data codes are in accordance with TVA Design Standard DS-E12.1.13.

See Attachment G for supporting calculations for data in this table. Bend radius is indeterminant at this point considering the cables have been removed from service for testing. The nature of BFN documentation on conduit/cable installation (i.e. workplans) makes determination of application to pullbys extremely difficult. This research was not pursued.

## EQ CABLE TEST SAMPLES-APPLICATION TO CABLE ISSUES

CABLE DATA				CABLE ISSUE CRITERIA						
CABLE NO	CABLE DATA	CONDUIT NO	COND SIZE	BEND RADIUS	VERTICAL SUPPORT	JAMMING	PULLBY	SIDEWALL PRESSURE	MID-RUN FLEX	CONDULET
L36	WCH	L39	2A	I	N	N	I	N	N	N
M935	WDD-2	MC1910	2IR	I	N	N	I	N	N	N
1NM1256	WDF-1	1NM1256	1A	I	N	N	I	N	N	N
		1NM1263	1-1/2A	I	N	N	I	N	N	N
2ES2726 II	WVA	2ES2731-II	1-1/2IR	I	N	N	I	N	N	Y
2V42	WGG	2PL3715	3A	I	N	N	I	N	N	N
2V1200	WLC	2PL3709	3A	I	N	N	I	N	N	N
		2V1200	1-1/2A	I	N	N	I	N	N	N
2V1218	WGI	2PL3710	3A	I	N	N	I	N	N	N
		2V1218	1-1/2A	I	N	N	I	N	N	N
3ES2501	WCA	3ES2573-II	2-1/2A	I	N	N	I	N	N	N
3PL575	WDG	3PL3700	3A	I	N	N	I	N	N	N
3PL800	WDF	3PL800	1-1/2A	I	N	N	I	N	N	Y
3V1225	WLC	3PL3700	3A	I	N	N	I	N	N	N

ATTACHMENT C

BFN Unit 2, Walkdown Cables/Conduits That Have Been Maintenance Hi-Pot Tested  
- Application to Cable Issues

ATTACHMENT C

LEGEND

Abbreviations:    A -    Aluminum Conduit  
                  COND - Conduit  
                  IR -    Intermediate Rigid Steel Conduit  
                  NO -    Number

Data Codes:       I -    Indeterminate (see below)  
                  N -    No Application to Cable Issue  
                  Y -    Yes - Applicable to Cable Issue  
                  N/A-   Not Applicable - Cable Not Installed in Conduit

Cable Data: Cable data codes are in accordance with TVA Design Standard  
DS-E12.1.13.

See Attachments F and G for supporting evaluations/calculations for information in this table. The nature of BFN documentation on conduit/cable installation (i.e. workplans) makes determination of application to pullbys extremely difficult. This research was not pursued. See Paragraph 3.0 for discussion of SWP application.



BFN UNIT 2 WALKDOWN CABLES/CONDUIT THAT HAVE BEEN MAINTENANCE HI-POT TESTED- APPLICATION TO CABLE ISSUES

CABLE DATA				CABLE ISSUE CRITERIA						
CABLE NO	CABLE DATA	CONDUIT NO	COND SIZE	BEND RADIUS	VERTICAL SUPPORT	JAMMING	PULLPY	SIDEWALL PRESSURE	MID-RUN FLEX	CONDULET
ES13-I	WNB	ES13-I	3A	Y	Y	N	I	N	N	N
		ES21-I	4A	Y	Y	N	I	N	N	N
ES50-I	WNB	ES50-I	3A	Y	Y	N	I	N	N	N
		ES50-I	4A	Y	Y	N	I	N	N	N
ES75-I	WNB	ES75-I	3A	Y	N	N	I	N	N	N
ES88-I	WNB	ES88-I	3A	Y	N	N	I	N	N	N
ES100-I	WNB	ES100-I	3A	Y	N	N	I	N	N	N
ES113-I	WNB	ES113-I	3A	Y	N	N	I	N	N	N
ES141-I	WNE-1	ES138-I	4A	Y	Y	N	I	N	N	N
ES189-I	WNE-1	ES190-I	4A	Y	Y	N	I	N	N	N
ES2513-I	WNB	ES2513-II	3A	Y	Y	N	I	N	N	N
		ES2513-II	4A	Y	Y	N	I	N	N	N
ES2550-I	WNB	ES2550-II	3A	Y	Y	N	I	N	N	N
ES2589-I	WNB	ES2588-II	3A	Y	N	N	I	N	N	N
ES2641-I	WNE	ES2641-II	4A	N	Y	N	I	N	N	N
ES2575-I	WNB	ES2575-II	3A	Y	Y	N	I	N	N	N
ES2689-I	WNE	ES2689-II	4A	Y	Y	N	I	N	N	N

ATTACHMENT D

Summary of TVA PFT 8kV dc Hi-Pot Test Reports

## ATTACHMENT D

## LEGEND

Abbreviations:

APH -	A Phase
AUX -	Auxiliary
BIOTHRM -	Biothermal
BOOST -	Booster
BPH -	B Phase
CCW -	Condenser Circulating Water
COND -	Condensate
CPH -	C Phase
CRD -	Control Rod Drive
CT -	Cooling Tower
DOC -	Documentation
HP -	High Potential
HTC -	High temperature circulating
LTC -	Low temperature circulating
MG -	Motor Generator Set
MTR -	Motor
RCW -	Raw Cooling Water
RECIRC -	Recirculation
RHR -	Residual Heat Removal
RHRSW -	Residual Heat Removal Service Water
RSIS -	Resistance

Data Codes: MOTOR - Abbreviated description of motor tested. A question mark (?) indicates missing descriptive data on test records.

UNIT - 0 - Common equipment to all Units.  
 1 - Unit 1 equipment  
 2 - Unit 2 equipment  
 3 - Unit 3 equipment

DATE - Date test was performed

CSSC - Y - Indicates that motor is a "critical structure, system, or component" i.e. safety related. See note below.  
 N - Indicates that motor is not a "critical structure, system, or component" i.e. not safety related. See note below.

BRIDGE - Y - Indicates bridge resistances for each phase are within one percent.  
 N - Indicates bridge resistance differences are greater than one percent.  
 Blank - Missing data sheet or bridge reading not performed.  
 NR - Data not readable (illegible).

PI - Polarization index value

Note: The term "CSSC - critical structure, system, or component", is no longer used at BFN to identify safety related equipment. The term is used in this summary because it is part of data retrieved from historical records.

ATTACHMENT D (cont'd)

LEGEND

- DCHP - Y - Indicates 8kV dc high potential maintenance test results are satisfactory.  
N - Unsatisfactory test results  
Blank - Missing data sheet or high pot test not performed.
- DATA - E50 - Data retrieved from test documentation prepared in accordance with BFN procedure EMSIL-50.  
E71 - Data retrieved from test documentation prepared in accordance with BFN instruction EMI-71.

SUMMARY OF TVA BFN 8KV HI-POT TEST REPORTS

MOTOR	UNIT	DATE	CSSC	BRIDGE	PI	DCHP	DATA	CABLE	REMARKS
AUX RCWA	0	12/13/85	N	Y	3.1	Y	E 71		
AUX RCWA	0	1/31/86	N	Y	4.2	Y	E 71		
AUX RCWA	0	8/6/87	N	Y	2.4	Y	E 71		
AUX PCWA	0	1/14/88	N	Y	3.3	Y	E 71		
AUX RCWB	0	1/31/86	N	Y	3.2	Y	E 71		
AUX RCWB	0	11/24/86	N	Y	2.0	Y	E 71		
AUX RCWB	0	7/31/87	N	Y	2.2	Y	E 71		
CT LIFT 1A	0	2/17/79	N	NR	7.0	Y	E 50		
CT LIFT 1A	0	1/9/80	N	NR	3.3	Y	E 50		
CT LIFT 1A	0	3/18/80	N			Y	E 50		
CT LIFT 1A	0	4/2/81	N	Y	3.7	Y	E 71		
CT LIFT 1A	0	10/24/81	N	Y	4.0	Y	E 71		
CT LIFT 1A	0	3/1/82	N	Y	3.7	Y	E 71		
CT LIFT 1A	0	2/4/83	N	N	3.3	Y	E 71		
CT LIFT 1A	0	2/4/83	N			Y	E 71		BR & PI NOT INCLU
CT LIFT 1A	0	1/25/84	N	Y	2.0	Y	E 71		
CT LIFT 1A	0	7/13/84	N	N	2.6	Y	E 71		
CT LIFT 1A	0	1/17/85	N	Y	3.3	Y	E 71		
CT LIFT 1A	0	4/10/85	N	Y	4.3	Y	E 71		
CT LIFT 1A	0	8/14/86	N	N	1.7	Y	E 71		
CT LIFT 1A	0	9/3/87	N	Y	2.9	Y	E 71		
CT LIFT 1A	0	9/8/87	N	Y	2.9	Y	E 71		
CT LIFT 1B	0	2/19/79	N	NR	5.0	Y	E 50		
CT LIFT 1B	0	1/9/80	N	NR	5.5	Y	E 50		
CT LIFT 1B	0	3/11/80	N	NR	4.5	Y	E 50		
CT LIFT 1B	0	3/9/81	N	N	5.4	Y	E 71		
CT LIFT 1B	0	3/3/82	N	Y	2.0	Y	E 71		
CT LIFT 1B	0	2/4/83	N	Y	2.2	Y	E 71		
CT LIFT 1B	0	1/26/84	N	Y	2.1	Y	E 71		
CT LIFT 1B	0	7/13/84	N	Y	3.3	Y	E 71		
CT LIFT 1B	0	1/18/85	N	Y	3.2	Y	E 71		
CT LIFT 1B	0	4/10/85	N	Y	3.8	Y	E 71		
CT LIFT 1B	0	9/30/87	N		2.0	Y	E 71		
CT LIFT 2A	0	2/17/79	N	NR	8.9	Y	E 50		
CT LIFT 2A	0	3/11/80	N	NR	5.2	Y	E 50		

SUMMARY OF TVA BFN 8KV HI-POT TEST REPORTS

MOTOR	UNIT	DATE	CSSC	BRIDGE	PI	DCHP	DATA	CABLE	REMARKS
CT LIFT 2A	0	6/20/81	N	N	4.2	Y	E 71		
CT LIFT 2A	0	3/15/82	N	Y	3.0	Y	E 71		ERROR IN BRIDGE
CT LIFT 2A	0	2/3/83	N	Y	2.2	Y	E 71		
CT LIFT 2A	0	1/30/84	N	Y	3.1	Y	E 71		
CT LIFT 2A	0	1/18/85	N	Y	2.5	Y	E 71		
CT LIFT 2A	0	4/17/85	N	Y	2.7	Y	E 71		
CT LIFT 2A	0	9/4/87	N	M	3.6	Y	E 71		
CT LIFT 2A	0	7/15/80	N		3.3	N	E 71		
CT LIFT 2A APH	0	7/14/80	N	Y	2.0		E 71		MOTOR FAILED
CT LIFT 2A BPH	0	7/14/80	N	Y	2.3		E 71		MOTOR FAILED
CT LIFT 2A CPH	0	7/14/80	N	Y	1.0		E 71		MOTOR FAILED
CT LIFT 2B	0	3/26/79	N	NR	6.1	Y	E 50		
CT LIFT 2B	0	4/10/79	N	NR	5.0	Y	E 50		
CT LIFT 2B	0	3/11/80	N	NR	5.6	Y	E 50		
CT LIFT 2B	0	6/23/81	N	N	4.7	Y	E 71		
CT LIFT 2B	0	3/15/82	N	N	3.1	Y	E 71		
CT LIFT 2B	0	2/3/83	N	Y	2.7	Y	E 71		
CT LIFT 2B	0	1/31/84	N	Y	3.6	Y	E 71		
CT LIFT 2B	0	7/16/84	N	Y	3.1	Y	E 71		
CT LIFT 2B	0	1/18/85	N	Y	3.7	Y	E 71		
CT LIFT 2B	0	4/18/85	N	Y	3.1	Y	E 71		
CT LIFT 2B	0	9/11/86	N	N	1.4	Y	E 71		
CT LIFT 2B	0	9/28/87	N		2.8	Y	E 71		
CT LIFT 3A	0	3/11/80	N	NR	5.6	Y	E 50		
CT LIFT 3A	0	4/25/81	N	Y	7.0	Y	E 71		
CT LIFT 3A	0	3/4/82	N	Y	6.0	Y	E 71		
CT LIFT 3A	0	2/4/83	N	Y	2.4	Y	E 71		
CT LIFT 3A	0	2/1/84	N	Y	4.3	Y	E 71		
CT LIFT 3A	0	7/17/84	N	Y	2.7	Y	E 71		
CT LIFT 3A	0	1/23/85	N	Y	2.5	Y	E 71		
CT LIFT 3A	0	5/15/85	N	Y	2.5	Y	E 71		
CT LIFT 3A	0	9/18/86	N	Y	1.6	Y	E 71		
CT LIFT 3A	0	9/8/87	N	N	3.0	Y	E 71		
CT LIFT 3B	0	2/17/79	N	NR	7.0	Y	E 50		
CT LIFT 3B	0	3/11/80	N	NR	5.8	Y	E 50		

SUMMARY OF TVA BFN 8KV HI-POT TEST REPORTS

MOTOR	UNIT	DATE	CSSC	BRIDGE	PI	DCHP	DATA	CABLE	REMARKS
CT LIFT 3B	0	4/26/81	N	Y	5.1	Y	E 71		
CT LIFT 3B	0	3/4/82	N	Y	4.0	Y	E 71		
CT LIFT 3B	0	2/4/83	N	N	2.0	Y	E 71		
CT LIFT 3B	0	1/31/84	N	Y	5.1	Y	E 71		
CT LIFT 3B	0	7/17/84	N	Y	2.1	Y	E 71		
CT LIFT 3B	0	1/23/85	N	Y	2.0	Y	E 71		
CT LIFT 3B	0	10/1/87	N		4.4	Y	E 71		
CT LIFT 4A	0	2/17/79	N	NR	6.4	Y	E 50	PP1293/4	
CT LIFT 4A	0	3/11/80	N	NR	3.5	Y	E 50	PP1293/4	
CT LIFT 4A	0	12/7/81	N	Y	4.5	Y	E 71	PP1293/4	
CT LIFT 4A	0	3/4/82	N	Y	2.5	Y	E 71	PP1293/4	
CT LIFT 4A	0	2/15/83	N	Y	2.0	Y	E 71	PP1293/4	
CT LIFT 4A	0	2/6/84	N	Y	2.1	Y	E 71	PP1293/4	
CT LIFT 4A	0	7/18/84	N	Y	1.3	Y	E 71	PP1293/4	
CT LIFT 4A	0	9/22/86	N	Y	1.1	Y	E 71	PP1293/4	
CT LIFT 4A	0	9/14/87	N	Y	2.2	Y	E 71	PP1293/4	
CT LIFT 4B	0	2/17/79	N	NR	8.0	Y	E 50	PP1303/4	
CT LIFT 4B	0	3/11/80	N	NR	5.2	Y	E 50	PP1303/4	
CT LIFT 4B	0	3/4/82	N	Y	3.2	Y	E 71	PP1303/4	
CT LIFT 4B	0	2/14/83	N	Y	3.5	Y	E 71	PP1303/4	
CT LIFT 4B	0	2/2/84	N	Y	2.3	Y	E 71	PP1303/4	
CT LIFT 4B	0	7/18/84	N	Y	2.1	Y	E 71	PP1303/4	
CT LIFT 4B	0	2/1/85	N	Y	3.0	Y	E 71	PP1303/4	
CT LIFT 4B	0	4/16/85	N	Y	2.8	Y	E 71	PP1303/4	
CT LIFT 4B	0	9/22/86	N	Y	1.5	Y	E 71	PP1303/4	
CT LIFT 4B	0	9/15/87	N	Y	4.7	Y	E 71	PP1303/4	
CT LIFT 5A	0	2/17/79	N	NR	7.3	Y	E 50		
CT LIFT 5A	0	3/11/80	N	NR	4.8	Y	E 50		
CT LIFT 5A	0	2/2/82	N	Y	3.3	Y	E 71		
CT LIFT 5A	0	2/15/83	N	Y	6.0	Y	E 71		
CT LIFT 5A	0	3/23/84	N	Y	5.5	Y	E 71		
CT LIFT 5A	0	7/19/84	N	Y	2.2	Y	E 71		
CT LIFT 5A	0	2/6/85	N	Y	2.4	Y	E 71		
CT LIFT 5A	0	4/11/85	N	Y	4.0	Y	E 71		
CT LIFT 5A	0	10/2/86	N	N	1.6	Y	E 71		

SUMMARY OF TVA BFN 8KV HI-POT TEST REPORTS

MOTOR	UNIT	DATE	CSSC	BRIDGE	PI	DCHP	DATA	CABLE	REMARKS
CT LIFT 5A	0	9/10/87	N	N	3.3	Y	E 71		
CT LIFT 5B	0	2/17/79	N	NR	7.0	Y	E 50		
CT LIFT 5B	0	3/11/80	N	NR	4.2	Y	E 50		
CT LIFT 5B	0	4/8/81	N	N	4.7	Y	E 71		
CT LIFT 5B	0	2/2/82	N	N	5.1	Y	E 71		
CT LIFT 5B	0	2/11/83	N	Y	3.7	Y	E 71		
CT LIFT 5B	0	2/2/84	N	Y	2.3	Y	E 71		
CT LIFT 5B	0	7/19/84	N	Y	2.1	Y	E 71		
CT LIFT 5B	0	2/6/85	N	Y	2.3	Y	E 71		
CT LIFT 5B	0	4/11/85	N	Y	3.4	Y	E 71		
CT LIFT 5B	0	10/6/86	N	Y	2.5	Y	E 71		
CT LIFT 6A	0	2/19/79	N	NR	8.2	Y	E 50		
CT LIFT 6A	0	3/11/80	N	NR	5.1	Y	E 50		
CT LIFT 6A	0	2/26/81	N	N	5.0	Y	E 71		
CT LIFT 6A	0	3/4/81	N	Y	1.2	Y	E 71		
CT LIFT 6A	0	3/12/82	N	Y	2.5	Y	E 71		
CT LIFT 6A	0	2/15/83	N	Y	6.0	Y	E 71		
CT LIFT 6A	0	2/6/84	N	Y	4.3	Y	E 71		
CT LIFT 6A	0	7/20/84	N	Y	1.7	Y	E 71		
CT LIFT 6A	0	2/7/85	N	Y	6.3	Y	E 71		
CT LIFT 6A	0	4/9/85	N	Y	3.5	Y	E 71		
CT LIFT 6A	0	10/14/86	N	Y	2.7	Y	E 71		
CT LIFT 6A	0	9/17/87	N		1.9	Y	E 71		
CT LIFT 6B	0	2/19/79	N	NR	11.4	Y	E 50		
CT LIFT 6B	0	3/11/80	N	NR	5.2	Y	E 50		
CT LIFT 6B	0	2/9/81	N	Y	5.8	Y	E 71		
CT LIFT 6B	0	6/21/81	N	N	2.3	Y	E 71		
CT LIFT 6B	0	3/11/82	N	Y	4.5	Y	E 71		
CT LIFT 6B	0	2/7/84	N	Y	5.1	Y	E 71		
CT LIFT 6B	0	7/20/84	N	Y	2.7	Y	E 71		
CT LIFT 6B	0	2/7/85	N	N	4.3	Y	E 71		
CT LIFT 6B	0	4/8/85	N	Y	4.1	Y	E 71		
CT LIFT 6B	0	10/16/86	N	Y	2.3	Y	E 71		
CT LIFT ?A	0	2/17/79	N			Y	E 50		
FIRE PUMP A	0	7/15/81	Y	Y	1.5	Y	E 71	PP500	



SUMMARY OF TVA BFN 8KV HI-POT TEST REPORTS

MOTOR	UNIT	DATE	CSSC	BRIDGE	PI	DCHP	DATA	CABLE	REMARKS
FIRE PUMP A	0	7/29/83	Y	N	2.1	Y	E 71	PP500	
FIRE PUMP A	0	3/19/85	Y	Y	3.1	Y	E 71	PP500	
FIRE PUMP A	0	9/30/85	Y	Y	1.2	Y	E 71	PP500	
FIRE PUMP A	0	10/22/86	Y	Y	2.7	Y	E 71	PP500	
FIRE PUMP A	0	11/26/86	Y	Y	9.1	Y	E 71	PP500	FLUCT READINGS
FIRE PUMP A	0	12/10/86	Y			Y	E 71	PP500	
FIRE PUMP B	0	11/5/85	Y	Y	1.9	Y	E 71		
FIRE PUMP B	0	10/17/86	Y	Y	3.2	Y	E 71		
FIRE PUMP C	0	7/16/81	Y	Y	1.7	Y	E 71	PP550	
FIRE PUMP C	0	7/29/83	Y	N	1.8	Y	E 71	PP550	
FIRE PUMP C	0	1/16/85	Y	Y	2.3	Y	E 71	PP550	
FIRE PUMP C	0	5/9/85	Y	Y	1.8	Y	E 71	PP550	
FIRE PUMP C	0	12/24/85	Y		2.9	Y	E 71	PP550	
FIRE PUMP C	0	1/27/87	Y	Y	3.4	Y	E 71	PP550	
RHRWS A1	0	7/19/83	Y	Y	3.7	Y	E 71	ES75-I	
RHRWS A1	0	5/24/85	Y	Y	2.1	Y	E 71	ES75-I	
RHRWS A1	0	5/14/86	Y	Y	3.0	Y	E 71	ES75-I	
RHRWS A2	0	7/20/83	Y	Y	2.6	Y	E 71	ES88-I	
RHRWS A2	0	5/21/85	Y	Y	1.3	Y	E 71	ES88-I	
RHRWS A2	0	9/25/85	Y	Y	3.5	Y	E 71	ES88-I	
RHRWS A2	0	6/9/86	Y	Y	1.7	Y	E 71	ES88-I	
RHRWS A3	0	6/5/80	Y	Y	2.0	Y	E 71	3ES1580-I	
RHRWS A3	0	12/8/80	Y	Y	3.7	Y	E 71	3ES1580-I	
RHRWS A3	0	5/15/84	Y	Y	3.7	Y	E 71	3ES1580-I	
RHRWS A3	0	1/15/86	Y	Y	3.6	Y	E 71	3ES1580-I	
RHRWS A3	0	5/15/86	Y	Y	1.8	Y	E 71	3ES1580-I	
RHRWS A3	0	4/30/87	Y	Y	2.0	Y	E 71	3ES1580-I	
RHRWS B1	0	12/17/80	Y	Y	3.0	Y	E 71	3ES4080-II	
RHRWS B1	0	5/16/85	Y	Y	2.8	Y	E 71	3ES4080-II	
RHRWS B1	0	5/19/86	Y	Y	3.6	Y	E 71	3ES4080-II	
RHRWS B2	0	6/30/81	Y	Y	1.5	Y	E 71	ES2588-II	
RHRWS B2	0	8/15/85	Y	Y	2.0	Y	E 71	ES2588-II	
RHRWS B2	0	12/19/85	Y	Y	2.6	Y	E 71	ES2588-II	
RHRWS B2	0	5/20/86	Y	Y	2.6	Y	E 71	ES2588-II	
RHRWS B3	0	7/16/85	Y	N	1.1	Y	E 71	ES2575-II	

SUMMARY OF TVA BFN 8KV HI-POT TEST REPORTS

MOTOR	UNIT	DATE	CSSC	BRIDGE	PI	DCHP	DATA	CABLE	REMARKS
RHRSW B3	0	5/16/86	Y	Y	1.6	Y	E 71	ES2575-II	
RHRSW B3	0	4/27/87	Y	Y	2.1	Y	E 71	ES2575-II	
RHRSW B3	0	6/27/87	Y	Y	2.1	Y	E 71	ES2575-II	
RHRSW B3	0	7/19/87	Y	Y	4.6	Y	E 71	ES2575-II	
RHRSW C1	0	7/21/83	Y	Y	3.7	Y	E 71	ES100-I	
RHRSW C1	0	5/21/85	Y	Y	2.4	Y	E 71	ES100-I	
RHRSW C1	0	11/22/85	Y	Y	2.0	Y	E 71	ES100-I	
RHRSW C1	0	5/21/86	Y	Y	1.7	Y	E 71	ES100-I	
RHRSW C2	0	5/1/81	Y	Y	1.9	Y	E 71	ES113-I	
RHRSW C2	0	7/22/83	Y	Y	1.5	Y	E 71	ES113-I	
RHRSW C2	0	1/16/86	Y	Y	3.7	Y	E 71	ES113-I	
RHRSW C2	0	5/22/86	Y	Y	2.1	Y	E 71	ES113-I	
RHRSW C2	0	4/3/87	Y	Y	2.5	Y	E 71	ES113-I	
RHRSW C3	0	12/9/80	Y	Y	3.6	Y	E 71	3ES1590-I	
RHRSW C3	0	5/18/84	Y	Y	5.2	Y	E 71	3ES1590-I	
RHRSW C3	0	9/14/85	Y	Y	4.1	Y	E 71	3ES1590-I	
RHRSW C3	0	5/23/86	Y	Y	2.1	Y	E 71	3ES1590-I	
RHRSW C3	0	12/23/87	Y	Y	5.0	Y	E 71	3ES1590-I	
RHRSW D1	0	12/12/80	Y	Y	5.1	Y	E 71		
RHRSW D1	0	6/14/84	Y	Y	4.7	Y	E 71		
RHRSW D1	0	10/17/85	Y	Y	2.3	Y	E 71		
RHRSW D2	0	6/18/81	Y	Y	1.5	Y	E 71		
RHRSW D3	0	5/7/81	Y	Y	3.4	Y	E 71		
RHRSW D3	0	9/11/86	Y	Y	1.2	Y	E 71		
AUX RCW 1A	1	4/27/81	N	Y	3.3	Y	E 71		
AUX RCW 1B	1	4/28/81	N	Y	3.0	Y	E 71		
CCW 1A	1	6/24/86	N	Y	1.8	Y	E 71		
CCW 1B	1	5/29/81	N	Y	2.7	Y	E 71		
CCW 1B	1	6/30/86	N	Y	2.0	Y	E 71		
CCW 1C	1	2/3/86	N	Y	3.6	Y	E 71		
CCW 1C	1	7/3/86	N	Y	1.6	Y	E 71		
CCW 2A	1	2/24/85	Y	Y	5.7	Y	E 71	ES2673-II	CABLE & MOTOR
COND 1C	1	4/11/86	N	Y	3.4	Y	E 71		
COND BOOST 1B	1	4/16/81	N	Y	3.1	Y	E 71		
COND BOOST 1C	1	7/2/81	N	Y	2.3	Y	E 71		

SUMMARY OF TVA BFN 8KV HI-POT TEST REPORTS

MOTOR	UNIT	DATE	CSSC	BRIDGE	P I	DCHP	DATA	CABLE	REMARKS
CORE SPRAY 1A	1	5/23/83	Y	Y	2.9	Y	E 71	ES1	
CORE SPRAY 1B	1	5/14/81	Y	Y	2.9	Y	E 71	ES2501	
CORE SPRAY 1B	1	6/2/83	Y	Y	3.0	Y	E 71	ES2501	
CORE SPRAY 1C	1	6/2/83	Y	Y	2.9	Y	E 71	ES38	
CORE SPRAY 1D	1	5/14/81	Y	Y	2.8	Y	E 71	ES2538	
CORE SPRAY 1D	1	6/3/83	Y	N	2.9	Y	E 71	ES2538	
CRD 1A	1	6/2/81	Y	Y	1.8	Y	E 71		
CRD 1A	1	5/22/83	Y	Y	2.9	Y	E 71		
CRD 1B	1	6/2/81	Y	Y	3.1	Y	E 71		
CRD 1B	1	5/2/83	Y	Y	2.5	Y	E 71		
RCW 1A	1	4/22/81	N	Y	2.9	Y	E 71		
RCW 1B	1	5/4/81	N	Y	3.5	Y	E 71		
RCW 1B	1	6/6/83	N	N	2.7	Y	E 71		
RCW 1C	1	7/1/81	N	Y	2.3	Y	E 71		
RCW 1C	1	7/20/83	N		2.2	Y	E 71		
RCW 1D	1	5/1/81	N	Y	1.7	Y	E 71		
RCW 1D	1	7/19/83	N	N	2.4	Y	E 71		
RECIRC 1A	1	9/3/79	N	NR	3.2	Y	E 50		
RECIRC 1A	1	9/3/79	N	NR	3.3	Y	E 50		RETEST-LOWER ma
RECIRC 1B	1	3/13/80	N	NR	4.2	Y	E 50		
RECIRC 1B	1	8/24/84	N	N	2.7	Y	E 71		
RECIRC MG 1A-?	1	3/14/80	N	NR	3.3	Y	E 50		
RECIRC MG 1A-?	1	1/24/83	N	Y	5.2	Y	E 71		
RECIRC MG 1A-?	1	12/14/84	N	Y	2.9	Y	E 71		
RECIRC MG 1A-G	1	1/24/83	N	N	4.6	Y	E 71		
RECIRC MG 1B-G	1	4/20/80	N	Y	3.5	Y	E 71		
RECIRC MG 1B-G	1	4/21/80	N	Y	5.1	Y	E 71		
RECIRC MG 1B-G	1	8/24/84	N		3.8	N	E 71		GEN WNDG FAILED AFTER REPAIR
RHR 1A	1	8/30/84	N	Y	2.9	Y	E 71		
RHR 1B	1	6/3/81	Y	Y	3.8	Y	E 71		
RHR 1B	1	7/25/83	Y	Y	4.0	Y	E 71		
RHR 1C	1	7/12/84	Y	Y	3.0	Y	E 71		
RHR 1D	1	6/4/81	Y	Y	5.9	Y	E 71	ES2673-II	
RHR 1D	1	12/15/83	Y	Y	INF	Y	E 71		
RHR 1D	1	7/12/84	Y	Y	5.6	Y	E 71	ES2673-II	

SUMMARY OF TVA BFN 8KV HI-POT TEST REPORTS

MOTOR	UNIT	DATE	CSSC	BRIDGE	PI	DCHP	DATA	CABLE	REMARKS
RHR 1D	1	2/19/85	Y	Y	6.9	Y	E 71	ES2673-II	MARGINAL-RETEST
RHR 1D	1	2/19/85	Y	Y	4.9	Y	E 71	ES2673-II	CABLE ONLY
CCW 2A	2	4/29/79	N		3.8	Y	E 50		
CCW 2A	2	9/16/80	N	Y	2.0	Y	E 71		
CCW 2A	2	7/12/85	N	Y	1.9	Y	E 71		
CCW 2B	2	5/1/79	N		5.7	Y	E 50		
CCW 2B	2	10/10/80	N	Y	2.5	Y	E 71		
CCW 2B	2	8/8/82	N	Y	2.2	Y	E 71		
CCW 2B	2	7/9/85	N	Y	2.1	Y	E 71		
CCW 2B	2	3/13/87	N	Y	4.0	Y	E 71		
CCW 2C	2	5/2/79	N	Y	3.7	Y	E 50		
CCW 2C	2	9/17/80	N	Y	1.9	Y	E 71		
CCW 2C	2	8/5/82	N	Y	2.2	Y	E 71		
COND 2A	2	4/28/79	N	Y	6.0	Y	E 50		
COND 2A	2	9/9/80	N	Y	2.5	Y	E 71		
COND 2A	2	9/7/82	N	Y	2.3	Y	E 71		
COND 2A	2	11/1/82	N	Y	2.5	Y	E 71		
COND 2A	2	4/29/85	N	Y	2.2	Y	E 71		
COND 2A	2	11/19/86	N	Y	4.4	Y	E 71		
COND 2A	2	3/4/87	N	Y	1.8	Y	E 71		
COND 2B	2	5/1/79	N	Y	6.0	Y	E 50		
COND 2B	2	9/12/80	N	Y	1.6	Y	E 71		
COND 2B	2	10/20/82	N	Y	2.7	Y	E 71		
COND 2B	2	8/2/85	N	Y	1.7	Y	E 71		
COND 2B	2	7/15/86	N	Y	1.7	Y	E 71		
COND 2B	2	6/11/87	N	Y	3.6	Y	E 71		
COND 2B	2	7/15/87	N	Y	4.0	Y	E 71		
COND 2C	2	4/28/79	N	Y	4.3	Y	E 50		
COND 2C	2	9/11/80	N	Y	2.3	Y	E 71		
COND 2C	2	10/22/82	N	Y	2.9	Y	E 71		
COND 2C	2	6/26/83	N	N	5.0	Y	E 71		
COND 2C	2	4/1/85	N	N		N	E 71		MOTOR GROUNDED
COND 2C	2	11/19/86	N	Y	5.3	Y	E 71		
COND 2C	2	7/17/87	N	Y	1.8	Y	E 71		
COND BOOST 2A	2	4/28/79	N		3.7	Y	E 50		

SUMMARY OF TVA BFN 8KV HI-POT TEST REPORTS

MOTOR	UNIT	DATE	CSSC	BRIDGE	PI	DCHP	DATA	CABLE	REMARKS
COND BOOST 2A	2	9/11/80	N	Y	2.0	Y	E 71		
COND BOOST 2A	2	1/26/83	N	Y	4.0	Y	E 71		
COND BOOST 2A	2	4/3/85	N	Y	3.4	Y	E 71		
COND BOOST 2A	2	7/14/87	N	Y	3.9	Y	E 71		
COND BOOST 2B	2	3/27/78	N		2.4	Y	E 50		
COND BOOST 2B	2	5/1/79	N		5.6	Y	E 50		
COND BOOST 2B	2	9/17/80	N	Y	2.1	Y	E 71		
COND BOOST 2B	2	8/4/82	N	Y	2.4	Y	E 71		
COND BOOST 2B	2	8/1/85	N	Y	2.2	Y	E 71		
COND BOOST 2B	2	6/24/87	N	Y	2.1	Y	E 71		
COND BOOST 2C	2	3/25/78	N		3.5	Y	E 50		
COND BOOST 2C	2	3/29/78	N		6.2	Y	E 50		
COND BOOST 2C	2	4/30/79	N		5.3	Y	E 50		
COND BOOST 2C	2	9/16/80	N	Y	2.0	Y	E 71		
COND BOOST 2C	2	1/12/83	N	N	3.9	Y	E 71		
COND BOOST 2C	2	3/26/85	N	Y	4.0	Y	E 71		
COND BOOST 2C	2	4/11/86	N	Y	2.5	Y	E 71		
COND BOOST 2C	2	6/25/87	N	Y	1.5	Y	E 71		
COND BOOST 2C	2	12/11/87	N	Y	2.4	Y	E 71		
CORE SPRAY 2A	2	9/30/80	Y	Y	3.4	Y	E 71	ES13-I	
CORE SPRAY 2A	2	8/10/82	Y	Y	2.5	Y	E 71	ES13-I	
CORE SPRAY 2A	2	11/13/84	Y	Y	4.5	Y	E 71	ES13-I	
CORE SPRAY 2A	2	10/10/87	Y			Y	E 71	ES13-I	HIPOT CABLES ONLY
CORE SPRAY 2A	2	10/11/87	Y	Y	3.3	Y	E 71	ES13-I	
CORE SPRAY 2A	2	1/12/88	Y	Y	4.5	Y	E 71	ES13-I	
CORE SPRAY 2B	2	5/2/79	Y	Y	5.8	Y	E 50	ES2513-II	
CORE SPRAY 2B	2	9/8/80	Y	Y	2.8	Y	E 71	ES2513-II	
CORE SPRAY 2B	2	8/11/82	Y	Y	2.8	Y	E 71	ES2513-II	
CORE SPRAY 2B	2	11/28/84	Y	Y	4.1	Y	E 71	ES2513-II	
CORE SPRAY 2C	2	9/30/80	Y	Y	3.1	Y	E 71	ES50-I	
CORE SPRAY 2C	2	8/12/82	Y	Y	2.6	Y	E 71	ES50-I	
CORE SPRAY 2C	2	11/28/84	Y	Y	3.9	Y	E 71	ES50-I	
CORE SPRAY 2C	2	9/14/87	Y		1.0	Y	E 71	ES2513-II	CABLE TEST ONLY
CORE SPRAY 2D	2	3/27/78	Y		4.2	Y	E 50	ES2550-II	
CORE SPRAY 2D	2	5/2/79	Y	Y	5.4	Y	E 50	ES2550-II	

SUMMARY OF TVA BFN 8KV HI-POT TEST REPORTS

MOTOR	UNIT	DATE	CSSC	BRIDGE	PI	DCHP	DATA	CABLE	REMARKS
CORE SPRAY 2D	2	9/9/80	Y	Y	2.8	Y	E 71	ES2550-II	
CORE SPRAY 2D	2	8/12/82	Y	Y	2.6	Y	E 71	ES2550-II	
CORE SPRAY 2D	2	11/29/84	Y	Y	4.3	Y	E 71	ES2550-II	
CORE SPRAY 2D	2	9/20/87	Y			Y	E 71	ES2550-II	HIPOT C ES ONLY
CORE SPRAY 2D	2	10/3/87	Y			Y	E 71	ES50-I	HIP ES ONLY
CRD 2A	2	5/2/79	Y	Y	3.3	Y	E 50	2PP275	
CRD 2A	2	10/8/80	Y	Y	2.7	Y	E 71	2PP275	
CRD 2A	2	8/17/82	Y	Y	2.4	Y	E 71	2PP275	
CRD 2A	2	7/11/85	Y	Y	1.0	Y	E 71	2PP275	
CRD 2A	2	1/7/87	Y	Y	4.4	Y	E 71	2PP275	
CRD 2A	2	9/23/87	Y	Y	2.5	Y	E 71	ES2550-II	
CRD 2A	2	10/21/87	Y	Y	5.1	Y	E 71	2PP275	
CRD 2A-APH	2	4/10/88	Y	Y	2.5	Y	E 71	2PP275	
CRD 2A-BPH	2	7/8/85	Y			Y	E 71	2PP275	CABLE TEST ONLY
CRD 2A-CPH	2	6/26/85	Y			Y	E 71	2PP275	
RCW 2A	2	5/3/79	N			Y	E 50		
RCW 2A	2	9/12/80	N	Y	1.8	Y	E 71		
RCW 2A	2	8/17/82	N	Y	2.3	Y	E 71		
RCW 2A	2	1/3/85	N	Y	3.1	Y	E 71		
RCW 2B	2	3/31/78	N	Y	3.1	Y	E 50		
RCW 2B	2	5/1/79	N	Y	1.6	Y	E 50		
RCW 2B	2	9/24/80	N	Y	2.0	Y	E 71		
RCW 2B	2	8/16/82	N	Y	2.1	Y	E 71		
RCW 2B	2	7/14/86	N	Y	3.8	Y	E 71		
RCW 2C	2	3/29/78	N		3.1	Y	E 50		
RCW 2C	2	4/30/79	N			Y	E 50		
RCW 2C	2	9/24/80	N	Y	1.3	Y	E 71		
RCW 2C	2	8/18/82	N	Y	2.5	Y	E 71		
RCW 2C	2	12/27/84	N	Y	2.9	Y	E 71		
RCW 2C	2	1/23/85	N	Y	2.4	Y	E 71		
RECIRC 2A	2	4/30/79	N	Y	5.8	Y	E 50		
RECIRC 2A	2	5/4/79	N	Y	4.5	Y	E 50		
RECIRC 2A	2	9/1/79	N	NR	4.0	Y	E 50		
RECIRC 2A	2	9/12/80	N	Y	3.9	Y	E 71		
RECIRC 2A	2	9/18/83	N	Y	3.2	Y	E 71		

SUMMARY OF TVA BFN 8KV HI-POT TEST REPORTS

MOTOR	UNIT	DATE	CSSC	BRIDGE	PI	DCHP	DATA	CABLE	REMARKS
RECIRC 2A	2	9/18/84	N	Y	3.7	Y	E 71		
RECIRC 2A	2	9/18/84	N	Y	3.7	Y	E 71		
RECIRC 2A	2	7/15/86	N	Y	2.1	Y	E 71		
RECIRC 2A	2	5/18/87	N	Y	4.1	Y	E 71		
RECIRC 2A	2	5/18/87	N	Y	4.5	Y	E 71		
RECIRC 2B	2	5/7/79	N	Y	2.6	Y	E 50		
RECIRC 2B	2	9/12/80	N	Y	4.2	Y	E 71		
RECIRC 2B	2	9/17/84	N	Y	4.4	Y	E 71		
RECIRC 2B	2	4/3/88	N	Y	3.2	Y	E 71		
RECIRC MG 2A-?	2	5/16/81	N	N	4.7	Y	E 71		
RECIRC MG 2A-?	2	5/15/87	N	Y	2.1	Y	E 71		
RECIRC MG 2A-?	2	5/18/87	N	Y	2.1	Y	E 71		
RECIRC MG 2A-G	2	4/30/79	N	Y	4.4	Y	E 50		
RECIRC MG 2A-G	2	9/10/80	N	Y	3.6	Y	E 71		
RECIRC MG 2A-G	2	8/19/82	N	Y	2.5	Y	E 71		
RECIRC MG 2A-G	2	6/2/83	N	Y	5.0	Y	E 71		
RECIRC MG 2A-G	2	10/26/84	N	Y	4.5	Y	E 71		
RECIRC MG 2A-G	2	4/10/88	N	Y	5.0	Y	E 71		
RECIRC MG 2A-M	2	9/10/80	N	Y	3.8	Y	E 71		
RECIRC MG 2A-M	2	9/11/80	N	Y	6.7	Y	E 71		
RECIRC MG 2A-M	2	9/28/82	N	Y	2.0	Y	E 71		
RECIRC MG 2A-M	2	10/25/84	N	Y	4.4	Y	E 71		
RECIRC MG 2A-M	2	5/18/87	N	Y	2.1	Y	E 71		
RECIRC MG 2A-M	2	4/9/88	N	Y	4.4	Y	E 71		
RECIRC MG 2B-?	2	2/3/80	N	NR	3.9	Y	E 50		
RECIRC MG 2B-G	2	4/29/79	N	Y	4.5	Y	E 50		
RECIRC MG 2B-G	2	9/9/80	N	Y	2.8	Y	E 71		
RECIRC MG 2B-G	2	6/2/83	N	Y	3.1	Y	E 71		
RECIRC MG 2B-G	2	10/26/84	N	Y	2.5	Y	E 71		
RECIRC MG 2B-G	2	5/18/87	N	Y	2.0	Y	E 71		
RECIRC MG 2B-G	2	4/9/88	N	Y	2.9	Y	E 71		
RECIRC MG 2B-M	2	10/29/84	N	Y	3.3	Y	E 71		
RECIRC MG 2B-M	2	4/9/88	N	Y	4.4	Y	E 71		
RHR 2A	2	4/28/79	Y	Y	1.9	Y	E 50	ES141-I	
RHR 2A	2	10/9/80	Y	Y		Y	E 71	ES141-I	NO PI

SUMMARY OF TVA BFN 8KV HI-POT TEST REPORTS

MOTOR		DATE	CSSC	BRIDGE	PI	DCHP	DATA	CABLE	REMARKS
RHR 2A	2	9/16/82	Y	Y	3.8	Y	E 71	ES141-I	
RHR 2A	2	4/16/86	Y	Y	4.2	Y	E 71	ES141-I	
RHR 2A	2	6/28/87	Y	Y	2.7	Y	E 71	ES141-I	
RHR 2A	2	2/11/88	Y			Y	E 71	ES141-I	CABLES ONLY
RHR 2B	2	5/3/79	Y	Y	7.0	Y	E 50	ES2641-II	
RHR 2B	2	9/16/80	Y	Y	3.8	Y	E 71	ES2641-II	
RHR 2B	2	9/11/82	Y	Y	3.8	Y	E 71	ES2641-II	
RHR 2B	2	3/10/85	Y	Y	5.4	Y	E 71	ES2641-II	
RHR 2B	2	5/14/87	Y	Y	3.2	Y	E 71	ES2641-II	
RHR 2B	2	2/13/88	Y	Y	6.1	Y	E 71	ES141-I	
RHR 2C	2	4/29/79	Y	Y	8.2	Y	E 50	ES189-I	
RHR 2C	2	10/9/80	Y	Y	5.5	Y	E 71	ES189-I	
RHR 2C	2	9/17/82	Y	Y	4.3	Y	E 71	ES189-I	
RHR 2C	2	3/8/85	Y	Y	6.5	Y	E 71	ES189-I	
RHR 2C	2	5/7/86	Y	Y	4.2	Y	E 71	ES189-I	
RHR 2C	2	6/30/87	Y	Y	2.6	Y	E 71	ES189-I	
RHR 2C	2	1/27/88	Y			Y	E 71	ES2641-II	HIPOT CABLES ONLY
RHR 2C	2	2/24/88	Y	Y	7.0	Y	E 71	ES189-I	
RHR 2D	2	5/2/79	Y	Y	4.0	Y	E 50	ES2689-II	
RHR 2D	2	9/18/80	Y	Y	5.4	Y	E 71	ES2689-II	
RHR 2D	2	9/10/82	Y	Y	4.0	Y	E 71	ES2689-II	
RHR 2D	2	10/6/84	Y	Y	5.3	Y	E 71	ES2689-II	
RHR 2D	2	12/19/85	Y	Y	5.7	Y	E 71	ES2689-II	
RHR 2D	2	3/24/86	Y	Y	6.5	Y	E 71	ES2689-II	
BIOTHRM HTC A	3	11/30/80	N	Y	4.3	Y	E 71	PP150	
BIOTHRM HTC A	3	11/21/81	N	Y	3.9	Y	E 71	PP150	
BIOTHRM HTC A	3	6/25/87	Y	Y	2.6	Y	E 71	ES2689-II	
BIOTHRM HTC B	3	12/1/80	N	Y	4.6	Y	E 71	PP155	
BIOTHRM HTC B	3	5/16/84	N	Y	4.1	Y	E 71	PP150	
BIOTHRM HTC B	3	6/17/84	N	Y	2.7	Y	E 71	PP155	
BIOTHRM LTC A	3	8/22/79	N	NR	2.8	Y	E 50		
BIOTHRM LTC A	3	11/30/80	N	Y	4.6	Y	E 71		
BIOTHRM LTC B	3	12/4/80	N	Y	3.5	Y	E 71		
BIOTHRM LTC B	3	11/22/81	N	Y	4.7	Y	E 71		
BIOTHRM LTC B	3	6/15/84	N	Y	2.7	Y	E 71		



SUMMARY OF TVA BFN 8KV HI-POT TEST REPORTS

MOTOR	UNIT	DATE	CSSC	BRIDGE	PI	DCHP	DATA	CABLE	REMARKS
BIOTHRMI 3CB	3	6/15/84	N	Y	1.0	Y	E 71		
CCW 3A	3	12/14/80	N	Y	2.3	Y	E 71		
CCW 3A	3	11/20/81	N	Y	1.1	N	E 71		MOTOR FAILED @ 8kV
CCW 3A	3	5/5/84	N	N	2.5	Y	E 71		
CCW 3A	3	6/20/86	N	Y	2.5	Y	E 71		
CCW 3A	3	9/29/86	N	Y	1.2	Y	E 71		
CCW 3B	3	12/13/80	N	Y	3.3	Y	E 71		
CCW 3B	3	5/5/84	N	N	1.6	Y	E 71		
CCW 3B	3	5/5/84	N	N	1.6	Y	E 71		
CCW 3B	3	6/23/80	N	Y	1.7	Y	E 71		
CCW 3C	3	12/14/80	N	Y	6.0	Y	E 71		
CCW 3C	3	6/24/86	N	Y	2.7	Y	E 71		
COND 3A	3	11/27/80	N	Y	2.0	Y	E 71		
COND 3A	3	11/7/81	N	Y	1.7	Y	E 71		
COND 3A	3	1/17/84	N	Y	3.0	Y	E 71		
COND 3B	3	12/4/80	N	Y	3.6	N	E 71		MTR FALD@ 7kV
COND 3B	3	11/8/81	N	Y	4.0	Y	E 71		
COND 3B	3	1/17/84	N	Y	3.0	Y	E 71		
COND 3B	3	1/18/84	N	Y	3.7	Y	E 71		
COND 3C	3	11/30/80	N	Y	3.5	Y	E 71		
COND 3C	3	11/4/81	N	Y	2.5	Y	71		
COND 3C	3	1/18/84	N	Y	3.2	Y	E 71		
COND BOOST 3A	3	11/27/80	N	Y	3.2	Y	E 71		
COND BOOST 3A	3	11/7/81	N	Y	4.0	Y	E 71		
COND BOOST 3A	3	1/11/84	N	Y	4.2	Y	E 71		
COND BOOST 3A	3	1/17/84	N	Y	3.5	Y	E 71		
COND BOOST 3B	3	12/3/80	N	Y	3.9	Y	E 71		
COND BOOST 3B	3	11/5/81	N	Y	2.1	Y	E 71		
COND BOOST 3B	3	1/11/84	N	Y	4.3	Y	E 71		
COND BOOST 3B	3	12/31/86	N	Y	4.1	Y	E 71		
COND BOOST 3B	3	11/10/87	N	Y	3.6	Y	E 71		
COND BOOST 3C	3	11/30/80	N	Y	3.6	Y	E 71		
COND BOOST 3C	3	11/5/81	N	Y	3.6	Y	E 71		
COND BOOST 3C	3	1/11/84	N	Y	3.0	Y	E 71		
CORE SPRAY 3A	3	12/17/80	Y	Y	4.0	Y	E 71	3ES1540	

SUMMARY OF TVA BFN 8KV HI-POT TEST REPORTS

MOTOR	UNIT	DATE	CSSC	BRIDGE	PI	DCHP	DATA	CABLE	REMARKS
CORE SPRAY 3A	3	5/2/84	Y	Y	3.3	Y	E 71	3ES1540	
CORE SPRAY 3A	3	1/13/87	N	Y	3.3	Y	E 71		
CORE SPRAY 3B	3	11/26/80	Y	Y	3.2	Y	E 71	3ES4040	
CORE SPRAY 3B	3	5/2/84	Y	Y	2.8	Y	E 71	3ES4040	
CORE SPRAY 3B	3	6/18/85	Y	Y	2.2	Y	E 71	3ES1540	
CORE SPRAY 3C	3	12/17/80	Y	Y	4.2	Y	E 71	3ES1550	
CORE SPRAY 3C	3	5/2/84	Y	Y	3.5	Y	E 71	3ES1550	
CORE SPRAY 3C	3	6/11/85	Y	Y	2.1	Y	E 71	3ES4040	
CORE SPRAY 3D	3	11/26/80	Y	Y	3.8	Y	E 71	3ES4050	
CORE SPRAY 3D	3	5/3/84	Y	Y	3.3	Y	E 71	3ES4050	
CORE SPRAY 3D	3	6/18/85	Y	Y	2.1	Y	E 71	3ES1550	
CRD 3A	3	12/5/80	Y	Y	1.9	Y	E 71		
CRD 3A	3	1/16/84	Y	Y		Y	E 71		
CRD 3A	3	6/11/85	Y	Y	2.4	Y	E 71	3ES4050	
CRD 3B	3	11/28/80	Y	Y	4.0	Y	E 71		
CRD 3B	3	5/11/87	Y	Y	2.6	Y	E 71		
RCW 3A	3	12/13/80	N	Y	2.6	Y	E 71		
RCW 3A	3	11/11/81	N	Y	1.3	Y	E 71		
RCW 3A	3	1/20/84	N	Y	1.8	Y	E 71		
RCW 3A	3	4/29/87	Y	Y	2.6	Y	E 71		
RCW 3B	3	12/12/80	N	Y	4.0	Y	E 71		
RCW 3B	3	11/10/81	N	Y	3.1	Y	E 71		
RCW 3C	3	12/1/80	N	Y	4.6	Y	E 71		
RCW 3C	3	11/19/81	N	Y	2.7	Y	E 71		
RCW 3C	3	5/4/84	N	Y	2.9	Y	E 71		
RCW 3D	3	12/11/80	N	Y	3.0	Y	E 71		
RCW 3D	3	5/4/84	N	Y	3.3	Y	E 71		
RCW 3E	3	11/6/81	N	Y	3.3	Y	E 71		
RECIRC 3A	3	11/25/80	N	Y	3.1	Y	E 71		
RECIRC 3A	3	12/7/83	N	Y	5.0	Y	E 71		
RECIRC 3A	3	5/12/87	N	Y	2.4	Y	E 71		
RECIRC 3B	3	11/28/80	N	N	4.2	Y	E 71		
RECIRC 3B	3	11/17/81	N	Y	3.8	Y	E 71		
RECIRC 3B	3	6/6/87	N	Y	4.8	Y	E 71		
RECIRC MG 3A-?	3	8/9/82	N	N	3.2	Y	E 71		

SUMMARY OF TVA BFN 8KV HI-POT TEST REPORTS

MOTOR	UNIT	DATE	CSSC	BRIDGE	PI	DCHP	DATA	CABLE	REMARKS
RECIRC MG 3A-G	3	11/25/80	N	Y	4.6	Y	E 71		
RECIRC MG 3A-G	3	1/9/84	N	Y	4.5	Y	E 71		
RECIRC MG 3A-M	3	11/25/80	N	Y	6.4	Y	E 71		
RECIRC MC 3A-M	3	11/3/81	N	Y	3.3	Y	E 71		
RECIRC MG 3A-M	3	12/1/81	N	Y	4.2	Y	E 71		
RECIRC MG 3A-M	3	1/9/84	N	Y	5.3	Y	E 71		
RECIRC MG 3B-G	3	11/25/80	N	Y	5.6	Y	E 71		
RECIRC MG 3B-G	3	12/1/81	N	Y	5.0	Y	E 71		
RECIRC MG 3B-G	3	1/9/84	N	Y	4.6	Y	E 71		
RECIRC MG 3B-M	3	11/25/80	N	Y	5.7	Y	E 71		
RECIRC MG 3B-M	3	1/9/84	N	Y	5.6	Y	E 71		
RHR 3A	3	12/19/80	Y	Y	6.1	Y	E 71	3ES1560-I	
RHR 3A	3	4/18/84	Y	Y	7.0	Y	E 71	3ES1560-I	
RHR 3B	3	11/26/80	Y	Y	7.7	Y	E 71	3ES4060-II	
RHR 3B	3	1/10/84	Y	Y	6.2	Y	E 71	3ES4060-II	
RHR 3B	3	5/24/85	Y	Y	4.7	Y	E 71	3ES1560-I	
RHR 3C	3	12/18/80	Y	Y	5.8	Y	E 71	3ES1570-I	
RHR 3C	3	7/14/81	Y	N	2.2	Y	E 71	3ES1570-I	MOTOR REPLACED
RHR 3C	3	10/31/81	Y	Y	3.1	Y	E 71	3ES1570-I	
RHR 3C	3	4/18/84	Y	Y	1.5	Y	E 71	3ES1570-I	
RHR 3C	3	6/5/85	Y	Y	3.0	Y	E 71	3ES4060-II	
RHR 3D	3	7/14/80	Y	Y	3.0	Y	E 71	3ES4070-II	
RHR 3D	3	11/14/80	Y	Y	6.2	Y	E 71	3ES4070-II	
RHR 3D	3	11/26/80	Y	Y	7.5	Y	E 71	3ES4070-II	
RHR 3D	3	1/10/84	Y	Y	6.2	Y	E 71	3ES4070-II	
RHR 3D	3	5/24/85	Y	Y	2.9	Y	E 71	3ES1570-I	
?	?	4/29/79	N	Y	5.4	Y	E 50		

ATTACHMENT E

TVA BFN Cable Acceptance Test Records Summary

ATTACHMENT E

LEGEND

Abbreviations: AFT - After  
AUX - Auxiliary  
CT - Cooling Tower  
DMGE - Damage  
kV - Kilovolt  
MIN - Minute  
NO - Number  
PH - Phase  
PRO - Procedure  
RCW - Raw Cooling Water  
REP - Repair  
RPLCD - Replaced  
SRVC - In-service

Data Codes: CABLE NO - Cable number from test record.  
DATE - Date test was performed.  
DOCUMENT - Test record document number.  
PRO - Referenced procedure on test record or  
documentation to which test record is attached.  
Blank indicates no procedure referenced.  
kV - Test voltage as recorded  
1 MIN - Microampere reading at one (1) minute.  
5 MIN - Microampere reading at five (5) minutes.  
15 Min - Microampere reading at fifteen (15) minutes.

For microampere readings-"A", "B", and "C" suffixes indicate that readings were taken for each phase. A simple numerical entry indicates all phases were tied together for test. A "T" suffix indicates the cable was tied to another cable for the test.

TVA BFN CABLE ACCEPTANCE TEST RECORDS SUMMARY

CABLE NO	DATE	DOCUMENT	PRO	kV	1 MIN	5 MIN	15 MIN	REMARKS
1PP1000	12/22/78	TGR-78017-D1	E 7	25.0	9T	8T	7T	RPLCD-STRESS BASKET DMGE
1PP1001	12/22/78	TGR-78017-D1	B17	25.0	9T	8T	7T	RPLCD-STRESS BASKET DMGE
1PP1002	12/22/78	TGR-78017-D1	B17	25.0	9T	8T	7T	RPLCD-STRESS BASKET DMGE
1PP1003	11/17/78	TGR-78017-D1	B17	25.0	12T	12T	11T	
1PP1004	11/17/78	TGR-78017-D1	B17	25.0	12T	12T	11T	
1PP1005	11/17/78	TGR-78017-D1	B17	25.0	12T	12T	11T	
1PP1006	12/3/78	TGR-78017-D1	B17	17.6	20T	15T	12T	
1PP1007	12/3/78	TGR-78017-D1	B17	17.6	20T	15T	12T	
1PP1008	12/3/78	TGR-78017-D1	B17	17.6	20T	15T	12T	
1PP105	10/21/71	BJH26-D1	B14	17.6	3			ONE MINUTE TEST ONLY
1PP1050	12/22/78	TGR-78017-D1	B17	25.0	12T	10T	9T	RPLCD-STRESS BASKET DMGE
1PP1051	12/22/78	TGR-78017-D1	B17	25.0	12T	10T	9T	RPLCD-STRESS BASKET DMGE
1PP1052	12/22/78	TGR-78017-D1	B17	25.0	12T	10T	9T	RPLCD-STRESS BASKET DMGE
1PP1053	12/21/78	TGR-78017-D1	B17	25.0	4T	4T	3T	
1PP1054	12/21/78	TGR-78017-D1	B17	25.0	4T	4T	3T	
1PP1055	12/21/78	TGR-78017-D1	B17	25.0	4T	4T	3T	
1PP1056	12/21/78	TGR-78017-D1	B17	17.6	4T	4T	4T	
1PP1057	12/21/78	TGR-78017-D1	B17	17.6	4T	4T	4T	
1PP1058	12/21/78	TGR-78017-D1	B17	17.6	4T	4T	4T	
1PP110	7/17/71	BJH17-D2	B14	17.6	1A3B2C			ONE MINUTE TEST ONLY
1PP1125	6/17/79	TNM-79-6	B17	17.6	3	2	2	
1PP1127	6/17/79	TNM-79-6	B17	17.6	3	3	3	
1PP1129	6/17/79	TNM-79-6	B17	17.6	2	2	2	
1PP115	7/17/71	BJH17-D2	B14	17.6	4A6B2C			ONE MINUTE TEST ONLY
1PP115	9/14/72	BJH47-D1	B14	25.0			2A4B4C	DID NOT RECORD BY MINUTE
1PP125	10/7/71	BJH26-D1	B14	17.6	3			ONE MINUTE TEST ONLY
1PP140	10/7/71	BJH26-D1	B14	17.6	0.2			ONE MINUTE TEST ONLY
1PP155	10/7/71	BJH26-D1	B14	17.6	2			ONE MINUTE TEST ONLY
1PP170	5/15/71	BJH17-D2	B14	17.6	18			ONE MINUTE TEST ONLY
1PP181	5/15/71	BJH17-D2	B14	17.6	10			ONE MINUTE TEST ONLY
1PP192	5/15/71	BJH17-D2	B14	17.6		18		DID NOT RECORD BY MINUTE
1PP203	5/15/71	BJH17-D2	B14	17.6	1			ONE MINUTE TEST ONLY
1PP213	5/15/71	BJH17-D2	B14	17.6	1			ONE MINUTE TEST ONLY
1PP223	5/15/71	BJH17-D2	B14	17.6		18		DID NOT RECORD BY MINUTE
1PP235	4/9/71	BJH52-D1	B14	17.6	1A1B1C			ONE MINUTE TEST ONLY

## TVA BFN CABLE ACCEPTANCE TEST RECORDS SUMMARY

CABLE NO	DATE	DOCUMENT	PRO	kV	1 MIN	5 MIN	15 MIN	REMARKS
1PP265	4/24/71	BJH17-D1	B14	17.6	1A1B1C			ONE MINUTE TEST ONLY
1PP275	5/28/71	BRA61-72-D1	B14	17.6		4		DID NOT RECORD BY MINUTE
1PP285	3/28/72	BJH43-D1	B14	25.0			2	DID NOT RECORD BY MINUTE
1PP285	1/2/76	GAB-39	B17	25.0	10	10	8	
1PP400	7/1/71	BJH17-D2	B14	17.6	10A12B10CT			ONE MINUTE TEST ONLY
1PP401	7/1/71	BJH17-D2	B14	17.6	10A12B10CT			ONE MINUTE TEST ONLY
1PP402	7/1/71	BJH17-D2	B14	17.6	10A12B10CT			ONE MINUTE TEST ONLY
1PP404	4/7/72	BJH33-D1	B14	25.0			8T	DID NOT RECORD BY MINUTE
1PP405	11/17/71	BJH26-D1 R	B14	17.6		18T		DID NOT RECORD BY MINUTE
1PP406	11/17/71	BJH26-D1 R	B14	17.6		18T		DID NOT RECORD BY MINUTE
1PP406	4/7/72	BJH33-D1	B14	25.0			8T	DID NOT RECORD BY MINUTE
1PP407	11/17/71	BJH26-D1 R	B14	17.6		18T		DID NOT RECORD BY MINUTE
1PP408	11/17/71	BJH26-D1 R	B14	17.6		18T		DID NOT RECORD BY MINUTE
1PP409	11/17/71	BJH26-D1 R	B14	17.6		18T		DID NOT RECORD BY MINUTE
1PP410	11/17/71	BJH26-D1 R	B14	17.6		18T		DID NOT RECORD BY MINUTE
1PP415	11/17/71	BJH26-D1 R	B14	17.6		1T		DID NOT RECORD BY MINUTE
1PP415	11/20/78	TGR-78017-D1	B17	17.6	4T	3T	3T	
1PP415	12/22/78	TGR-78017-D1	B17	25.0	9T	8T	7T	
1PP421	11/17/71	BJH26-D1 R	B14	17.6		1T		DID NOT RECORD BY MINUTE
1PP421	11/20/78	TGR-78017-D1	B17	17.6	4T	3T	3T	
1PP457	7/31/71	BRA61-72-D1	B14	17.6		2A2B2C		DID NOT RECORD BY MINUTE
1PP493	2/17/72	BJH31-D1	B14	17.6	4			ONE MINUTE TEST ONLY
1PP500	7/31/71	BRA61-72-D1	B14	17.6		2A2B2C		DID NOT RECORD BY MINUTE
1PP525	7/1/71	BJH17-D2	B14	17.6	18A12B18CT			ONE MINUTE TEST ONLY
1PP526	7/1/71	BJH17-D2	B14	17.6	18A12B18CT			ONE MINUTE TEST ONLY
1PP527	7/1/71	BJH17-D2	B14	17.6	18A12B18CT			ONE MINUTE TEST ONLY
1PP530	11/17/71	BJH26-D1 R	B14	17.6		60T		DID NOT RECORD BY MINUTE
1PP531	11/17/71	BJH26-D1 R	B14	17.6		60T		DID NOT RECORD BY MINUTE
1PP532	11/17/71	BJH26-D1 R	B14	17.6		60T		DID NOT RECORD BY MINUTE
1PP533	11/17/71	BJH26-D1 R	B14	17.6		60T		DID NOT RECORD BY MINUTE
1PP534	11/17/71	BJH26-D1 R	B14	17.6		60T		DID NOT RECORD BY MINUTE
1PP535	11/17/71	BJH26-D1 R	B14	17.6		60T		DID NOT RECORD BY MINUTE
1PP540	11/17/71	BJH26-D1 R	B14	17.6		1T		DID NOT RECORD BY MINUTE
1PP540	12/22/78	TGR-78017-D1	B17	25.0	12T	10T	9T	
1PP546	11/17/71	BJH26-D1 R	B14	17.6		1T		DID NOT RECORD BY MINUTE

TVA BFN CABLE ACCEPTANCE TEST RECORDS SUMMARY

CABLE NO	DATE	DOCUMENT	PRO	kV	1 MIN	5 MIN	15 MIN	REMARKS
1PP85	7/31/71	BRA61-72-D1	B14	17.6		4A6B4CT		DID NOT RECORD BY MINUTE
1PP86	7/31/71	BRA61-72-D1	B14	17.6		4A6B4CT		DID NOT RECORD BY MINUTE
1PP87	7/31/71	BRA61-72-D1	B14	17.6		4A6B4CT		DID NOT RECORD BY MINUTE
1PP96	5/28/71	BRA61-72-D1	B14	17.6		2		DID NOT RECORD BY MINUTE
2PP1000	5/25/78	BRA227-78-D1	B17	25.0	10T	7T	6T	
2PP1001	5/25/78	BRA227-78-D1	B17	25.0	10T	7T	6T	
2PP1002	5/25/78	BRA227-78-D1	B17	25.0	10T	7T	6T	
2PP1003	5/19/78	BRA227-78-D1	B17	25.0	3T	2T	2T	
2PP1004	5/19/78	BRA227-78-D1	B17	25.0	3T	2T	2T	
2PP1005	5/19/78	BRA227-78-D1	B17	25.0	3T	2T	2T	
2PP1006	5/25/78	BRA227-78-D1	B17	25.0	20T	16T	12T	
2PP1007	5/25/78	BRA227-78-D1	B17	25.0	20T	16T	12T	
2PP1008	5/25/78	BRA227-78-D1	B17	25.0	20T	16T	12T	
2PP105	6/10/72	BJH43-D1	B14	25.0			4	DID NOT RECORD BY MINUTE
2PP1050	5/25/78	BRA227-78-D1	B17	25.0	20T	18T	17T	
2PP1051	5/25/78	BRA227-78-D1	B17	25.0	20T	18T	17T	
2PP1052	5/25/78	BRA227-78-D1	B17	25.0	20T	18T	17T	
2PP1053	5/20/78	BRA227-78-D1	B17	25.0	4T	4T	4T	
2PP1054	5/20/78	BRA227-78-D1	B17	25.0	4T	4T	4T	
2PP1055	5/20/78	BRA227-78-D1	B17	25.0	4T	4T	4T	
2PP1056	5/26/78	BRA227-78-D1	B17	25.0	28T	20T	17T	
2PP1057	5/26/78	BRA227-78-D1	B17	25.0	28T	20T	17T	
2PP1058	5/26/78	BRA227-78-D1	B17	25.0	28T	20T	17T	
2PP110	10/21/71	BJH26-D1	B14	17.6	2			ONE MINUTE TEST ONLY
2PP1125	6/15/79	TNM-79-6	B17	17.6	5	5	5	
2PP1127	6/16/79	TNM-79-6	B17	17.6	3	3	3	
2PP1129	6/17/79	TNM-79-6	B17	17.6	3	3	2	
2PP115	10/21/71	BJH26-D1	B14	17.6	2			ONE MINUTE TEST ONLY
2PP125	4/29/72	BJH43-D1	B14	25.0			1	DID NOT RECORD BY MINUTE
2PP140	4/29/72	BJH43-D1	B14	25.0			1	DID NOT RECORD BY MINUTE
2PP155	4/29/72	BJH43-D1	B14	25.0			1	DID NOT RECORD BY MINUTE
2PP170	4/29/72	BJH43-D1	B14	25.0			2	DID NOT RECORD BY MINUTE
2PP181	11/9/72	BJH58-D1	B14	25.0			1	DID NOT RECORD BY MINUTE
2PP192	4/29/72	BJH43-D1	B14	25.0			2	DID NOT RECORD BY MINUTE
2PP203	6/10/72	BJH43-D1	B14	25.0			1	DID NOT RECORD BY MINUTE



## TVA BFN CABLE ACCEPTANCE TEST RECORDS SUMMARY

CABLE NO	DATE	DOCUMENT	PRO	kV	1 MIN	5 MIN	15 MIN	REMARKS
2PP213	6/10/72	BJH43-D1	B14	25.0			1	DID NOT RECORD BY MINUTE
2PP223	6/10/72	BJH43-D1	B14	25.0			1	DID NOT RECORD BY MINUTE
2PP235	4/29/72	BJH43-D1	B14	25.0			2	DID NOT RECORD BY MINUTE
2PP245	11/9/72	BJH58-D1	B14	25.0			1	DID NOT RECORD BY MINUTE
2PP255	4/29/72	BJH43-D1	B14	25.0			2	DID NOT RECORD BY MINUTE
2PP400	6/20/72	BJH43-D1	B14	25.0			20T	DID NOT RECORD BY MINUTE
2PP401	6/20/72	BJH43-D1	B14	25.0			20T	DID NOT RECORD BY MINUTE
2PP402	6/20/72	BJH43-D1	B14	25.0			20T	DID NOT RECORD BY MINUTE
2PP405	5/30/73	BRA106-73-D1	B14	25.0			15T	DID NOT RECORD BY MINUTE
2PP406	5/30/73	BRA106-73-D1	B14	25.0			15T	DID NOT RECORD BY MINUTE
2PP407	5/30/73	BRA106-73-D1	B14	25.0			15T	DID NOT RECORD BY MINUTE
2PP408	5/30/73	BRA106-73-D1	B14	25.0			15T	DID NOT RECORD BY MINUTE
2PP409	5/30/73	BRA106-73-D1	B14	25.0			15T	DID NOT RECORD BY MINUTE
2PP410	5/30/73	BRA106-73-D1	B14	25.0			15T	DID NOT RECORD BY MINUTE
2PP415	5/30/73	BRA106-73-D1	B14	25.0			5	DID NOT RECORD BY MINUTE
2PP421	5/30/73	BRA106-73-D1	B14	25.0			15	DID NOT RECORD BY MINUTE
2PP525	6/10/72	BJH43-D1	B14	25.0			6T	DID NOT RECORD BY MINUTE
2PP526	6/10/72	BJH43-D1	B14	25.0			6T	DID NOT RECORD BY MINUTE
2PP527	6/10/72	BJH43-D1	B14	25.0			6T	DID NOT RECORD BY MINUTE
2PP530	5/30/73	BRA106-73-D1	B14	25.0			82T	DID NOT RECORD BY MINUTE
2PP531	5/30/73	BRA106-73-D1	B14	25.0			82T	DID NOT RECORD BY MINUTE
2PP532	5/30/73	BRA106-73-D1	B14	25.0			82T	DID NOT RECORD BY MINUTE
2PP533	5/30/73	BRA106-73-D1	B14	25.0			82T	DID NOT RECORD BY MINUTE
2PP534	5/30/73	BRA106-73-D1	B14	25.0			82T	DID NOT RECORD BY MINUTE
2PP535	5/30/73	BRA106-73-D1	B14	25.0			82T	DID NOT RECORD BY MINUTE
2PP540	5/30/73	BRA106-73-D1	B14	25.0			1	DID NOT RECORD BY MINUTE
2PP540	2/6/86	SHM-181		25.0	0.25	0	0	
2PP546	5/30/73	BRA106-73-D1	B14	25.0			82	DID NOT RECORD BY MINUTE
2PP85	11/15/71	BJH26-D1	B14	17.6	10T			ONE MINUTE TEST ONLY
2PP86	11/15/71	BJH26-D1	B14	17.6	10T			ONE MINUTE TEST ONLY
2PP87	11/15/71	BJH26-D1	B14	17.6	10T			ONE MINUTE TEST ONLY
2PP95	11/13/81	BJH26-D1	B14	17.6	6T			ONE MINUTE TEST ONLY
2PP96	11/13/81	BJH26-D1	B14	17.6	6T			ONE MINUTE TEST ONLY
2PP97	11/13/81	BJH26-D1	B14	17.6	6T			ONE MINUTE TEST ONLY
2PP97	1/16/86	SHM-176		18.7	1A8B4C	0A7B2C		FIVE MIN ONLY

TVA BFN CABLE ACCEPTANCE TEST RECORDS SUMMARY

CABLE NO	DATE	DOCUMENT	PRO	kV	1 MIN	5 MIN	15 MIN	REMARKS
2PP97	1/19/86	SHM-178		18.7	12	10	8	
3ES1540-I	10/14/74	TGR-74003-D1	B17	25.0	8	8	8	
3ES1550-I	10/14/74	TGR-74003-D2	B17	25.0	18	22	29	
3ES1560-I	10/19/74	TGR-74003-D1	B17	25.0	1	1	1	
3ES1560-I	2/25/76	BRA186-76-D1	B17	25.0	2	1	1	
3ES1560-I	2/25/76	TGR-76005-D1	B17	25.0	2	1	1	DOUBLE DOCUMENTATION
3ES1570-I	10/29/74	TGR-74003-D2	B17	25.0	2	2	2	
3ES1570-I	2/25/76	BRA186-76-D1	B17	25.0	10	5	9	
3ES1570-I	2/25/76	TGR-76005-D1	B17	25.0	10	5	9	DOUBLE DOCUMENTATION
3ES1570-I	7/9/81	ALH-118		17.6	11.5A13B14C	11.5A12B14C	12A12B14C	
3ES158C	9/15/75	BRA164-75-D1	B17	25.0	1	1	1	
3ES1590	6/7/77	TGR-77006-D1	B17	25.0	2	2	2	
3ES1590-I	8/4/77	LWB-332-D1	B17	25.0	30	34	29	
3ES1600-1A	2/11/75	BRA150-75-D1	B17	25.0	4T	5T	7T	
3ES1601-1A	2/11/75	BRA150-75-D1	B17	25.0	4T	5T	7T	
3ES1602-1A	2/11/75	BRA150-75-D1	B17	25.0	4T	5T	7T	
3ES1604-1A	2/11/75	BRA150-75-D1	B17	25.0	4T	5T	7T	
3ES1640-IB	2/12/75	BRA150-75-D1	B17	25.0	12T	12T	13T	
3ES1641-IB	2/12/75	BRA150-75-D1	B17	25.0	12T	12T	13T	
3ES1642-IN	2/13/75	BRA150-75-D1	B17	25.0	12T	12T	13T	
3ES1644-IN	2/12/75	BRA150-75-D1	B17	25.0	12T	12T	13T	
3ES1950-II	10/2/75	GAB-34	B17	25.0	12	12	11	
3ES4040-II	11/6/74	TGR-74003-D3	B17	25.0	1	1	1	
3ES4050-II	11/6/74	TGR-74003-D4	B17	25.0	1	1	1	
3ES4060-II	10/19/74	TGR-74003-D3	B17	25.0	4	3	8	
3ES4060-II	2/18/76	TGR-76005-D1	B17	25.0	3	3	3	
3ES4070-II	10/14/74	TGR-74003-D4	B17	25.0	3	4	3	
3ES4070-II	2/17/76	TGR-76005-D1	B17	25.0	4	3	3	
3ES4080-II	12/12/74	BRA150-75-D3	B17	25.0	1	1	1	
3ES4080-II	6/30/77	TGR-77007-D1	M13	25.0	5	4	4	
3ES4090-II	12/12/74	BRA150-75-D3	B17	25.0	3	3	3	
3ES4090-II	8/22/77	TGR-77009-D1	B17	25.0	12	12	12	A PH SPLICE REWORKED
3ES4100-II	2/13/75	BRA150-75-D1	B17	25.0	16T	12T	11T	
3ES4101-II	2/13/75	BRA150-75-D1	B17	25.0	16T	12T	11T	
3ES4101-IIC	2/6/86	SHM-181		25.0	0.25	0.25	0	

## TVA BFN CABLE ACCEPTANCE TEST RECORDS SUMMARY

CABLE NO	DATE	DOCUMENT	PRO	kV	1 MIN	5 MIN	15 MIN	REMARKS
3ES4102-II	2/13/75	BRA150-75-D1	B17	25.0	16T	12T	11T	
3ES4104-II	2/13/75	BRA150-75-D1	B17	25.0	16T	12T	11T	
3ES4140-IIID	2/14/75	BRA150-75-D1	B17	25.0	30T	28T	26T	
3ES4141-IIID	2/14/75	BRA150-75-D1	B17	25.0	30T	28T	26T	
3ES4142-IIID	2/14/75	BRA150-75-D1	B17	25.0	30T	28T	26T	
3ES4144-IIID	2/14/75	BRA150-75-D1	B17	25.0	30T	28T	26T	
3PP1000	10/15/78	TNM-78-2	B17	25.0	2	2	2	
3PP1001	10/15/78	TNM-78-2	B17	25.0	2	2	2	
3PP1002	10/15/78	TNM-78-2	B17	25.0	3	3	3	
3PP1003	9/27/78	TNM-78-2	B17	25.0	2T	1T	1T	
3PP1004	9/27/78	TNM-78-2	B17	25.0	2T	1T	1T	
3PP1005	9/27/78	TNM-78-2	B17	25.0	2T	1T	1T	
3PP1006	10/15/78	TNM-78-2	B17	17.6	4	4	4	
3PP1007	10/15/78	TNM-78-2	B17	17.6	6	6	6	
3PP1008	10/15/78	TNM-78-2	B17	17.6	2	2	2	
3PP1025	7/28/81	CEB-18		25.0	7.5A5B9C	8.5A4.5B9C	8.5A4.5B8.5C	
3PP105	3/25/74	BRA129-74-D1	B14	25.0			1A1B1C	DID NOT RECORD BY MINUTE
3PP1050	10/15/78	TNM-78-2	B17	25.0	5	8	8	
3PP1051	10/14/78	TNM-78-2	B17	17.6	1	1	1	
3PP1052	10/15/78	TNM-78-2	B17	25.0	7	6	5	
3PP1053	9/27/78	TNM-78-2	B17	25.0	1T	1T	1T	
3PP1054	9/27/78	TNM-78-2	B17	25.0	1T	1T	1T	
3PP1055	9/27/78	TNM-78-2	B17	25.0	1T	1T	1T	
3PP1056	10/14/78	TNM-78-2	B17	17.6	1	1	1	
3PP1057	10/14/78	TNM-78-2	B17	17.6	1	1	1	
3PP1058	10/14/78	TNM-78-2	B17	17.6	1	1	1	
3PP110	3/27/74	BRA129-74-D1	B14	25.0			1	DID NOT RECORD BY MINUTE
3PP1140	6/16/79	TNM-79-6	B17	17.6	2	2	2	
3PP1142	6/17/79	TNM-79-6	B17	17.6	4	4	3	
3PP1144	6/17/79	TNM-79-6	B17	17.6	4	3	3	
3PP115	3/27/74	BRA129-74-D1	B14	25.0			4	DID NOT RECORD BY MINUTE
3PP125	4/23/74	BJH99-D1	B14	25.0	2	2	1	
3PP140	9/14/72	BJH58-D1	B14	25.0			5	DID NOT RECORD BY MINUTE
3PP140	4/23/74	BJH99-D1	B14	25.0	4	4	5	
3PP155	4/23/74	BJH99-D1	B14	25.0	20	2	2	

## TVA BFN CABLE ACCEPTANCE TEST RECORDS SUMMARY

CABLE NO	DATE	DOCUMENT	PRO	kV	1 MIN	5 MIN	15 MIN	REMARKS
3PP170	4/23/74	BJH99-D1	B14	25.0	1	1	1	
3PP181	3/27/74	BRA129-74-D1	B14	25.0			1	DID NOT RECORD BY MINUTE
3PP192	3/26/74	BRA129-74-D1	B14	25.0			8	DID NOT RECORD BY MINUTE
3PP203	3/26/74	BRA129-74-D1	B14	25.0			1	DID NOT RECORD BY MINUTE
3PP213	3/27/74	BRA129-74-D1	B14	25.0			1	DID NOT RECORD BY MINUTE
3PP223	3/26/74	BRA129-74-D1	B14	25.0			1	DID NOT RECCRD BY MINUTE
3PP235	3/26/74	BRA129-74-D1	B14	25.0			1	DID NOT RECORD BY MINUTE
3PP245	3/27/74	BRA129-74-D1	B14	25.0			2	DID NOT RECORD BY MINUTE
3PP255	3/26/74	BRA129-74-D1	B14	25.0			6	DID NOT RECORD BY MINUTE
3PP265	10/19/74	TGR-74003-D3	B17	25.0	3	3	3	
3PP275	10/29/74	TGR-74003-D5	B17	25.0	1	1	1	
3PP285	10/14/74	TGR-74003-D1	B17	25.0	5	5	5	
3PP353	3/6/75	BRA150-75-D3	B17	25.0	2T	1T	1T	
3PP354	3/6/75	BRA150-75-D3	B17	25.0	2T	1T	1T	
3PP400	10/16/73	BJH97-D1	B14	25.0			6T	DID NOT RECORD BY MINUTE
3PP401	10/16/73	BJH97-D1	B14	25.0			6T	DID NOT RECORD BY MINUTE
3PP402	10/16/73	BJH97-D1	B14	25.0			6T	DID NOT RECORD BY MINUTE
3PP405	12/12/74	BRA142-74-D1	B17	25.0	10T	9T	9T	
3PP406	12/12/74	BRA142-74-D1	B17	25.0	10T	9T	9T	
3PP407	12/12/74	BRA142-74-D1	B17	25.0	10T	9T	9T	
3PP415	12/12/74	BRA142-74-D1	B17	25.0	10T	9T	9T	
3PP421	12/12/74	BRA142-74-D1	B17	25.0	10T	9T	9T	
3PP459	10/25/74	TGR-74003-D1	B17	25.0	36T	21T	18T	
3PP460	10/25/74	TGR-74003-D1	B17	25.0	36T	21T	18T	
3PP471	10/25/74	TGR-74003-D3	B17	25.0	1T	1T	1T	
3PP472	10/25/74	TGR-74003-D3	B17	25.0	1T	1T	1T	
3PP525	10/16/73	BJH97-D1	B14	25.0			24T	DID NOT RECORD BY MINUTE
3PP526	10/16/73	BJH97-D1	B14	25.0			24T	DID NOT RECORD BY MINUTE
3PP527	10/16/73	BJH97-D1	B14	25.0			24T	DID NOT RECORD BY MINUTE
3PP530	11/25/74	BRA142-74-D1	B17	25.0	6T	4T	4T	
3PP531	11/25/74	BRA142-74-D1	B17	25.0	6T	4T	4T	
3PP532	11/25/74	BRA142-74-D1	B17	25.0	6T	4T	4T	
3PP546	11/25/74	BRA142-74-D1	B17	25.0	6T	4T	4T	
3PP680-IE	2/11/75	BRA150-75-D1	B17	25.0	4T	5T	7T	
3PP681-IE	2/11/75	BRA150-75-D1	B17	25.0	4T	5T	7T	

## TVA BFN CABLE ACCEPTANCE TEST RECORDS SUMMARY

CABLE NO	DATE	DOCUMENT	PRO	kV	1 MIN	5 MIN	15 MIN	REMARKS
3PP683-IE	2/12/75	BRA150-75-D1	B17	25.0	12T	12T	13T	
3PP684-IE	2/12/75	BRA150-75-D1	B17	25.0	12T	12T	13T	
3PP686	2/13/75	BRA150-75-D1	B17	25.0	16T	12T	11T	
3PP687	2/13/75	BRA150-75-D1	B17	25.0	16T	12T	11T	
3PP689-IE	2/14/75	BRA150-75-D1	B17	25.0	30T	28T	26T	
3PP690-IE	2/14/75	BRA150-75-D1	B17	25.0	30T	28T	26T	
3PP692	10/31/74	TGR-74003-D1	B17	25.0	4T	4T	4T	
3PP693	10/31/74	TGR-74003-D1	B17	25.0	4T	4T	4T	
3PP694	10/31/74	TGR-74003-D1	B17	25.0	4T	4T	4T	
3PP696	11/1/74	TGR-74003-D1	B17	25.0	1T	1T	1T	
3PP697	11/1/74	TGR-74003-D1	B17	25.0	1T	1T	1T	
3PP698	11/1/74	TGR-74003-D1	B17	25.0	1T	1T	1T	
3PP700	11/6/74	TGR-74003-D3	B17	25.0	4T	4T	4T	
3PP701	11/6/74	TGR-74003-D3	B17	25.0	4T	4T	4T	
3PP702	11/6/74	TGR-74003-D3	B17	25.0	4T	4T	4T	
3PP704	10/29/74	TGR-74003-D3	B17	25.0	6T	6T	6T	
3PP705	10/29/74	TGR-74003-D3	B17	25.0	6T	6T	6T	
3PP706	10/29/74	TGR-74003-D3	B17	25.0	6T	6T	6T	
3PP732	2/27/75	BRA150-75-D3	B17	25.0	1	0.5	0.5	
3PP733 I	1/29/76	BRA174-76-D1	B17	25.0	1	1	1	
3PP734	3/19/75	TGR-75012-D1	B17	25.0	8	8	3	
3PP900	10/19/74	TGR-74003-D1	B17	25.0	.11T	.12T	.13T	
3PP901	10/19/74	TGR-74003-D1	B17	25.0	.11T	.12T	.13T	
3PP902	10/19/74	TGR-74003-D1	B17	25.0	.11T	.12T	.13T	
3PP910	10/19/74	TGR-74003-D1	B17	25.0	1T	1T	1T	
3PP911	10/19/74	TGR-74003-D1	B17	25.0	1T	1T	1T	
3PP912	10/19/74	TGR-74003-D1	B17	25.0	1T	1T	1T	
3PP920	10/25/74	TGR-74003-D3	B17	25.0	4T	3T	2T	
3PP921	10/25/74	TGR-74003-D3	B17	25.0	4T	3T	2T	
3PP922	10/25/74	TGR-74003-D3	B17	25.0	4T	3T	2T	
3PP930	10/25/74	TGR-74003-D3	B17	25.0	9T	9T	9T	
3PP931	10/25/74	TGR-74003-D3	B17	25.0	9T	9T	9T	
3PP932	10/25/74	TGR-74003-D3	B17	25.0	9T	9T	9T	
ES1-I	4/24/71	BJH17-D1	B14	17.6	1A1B1C			ONE MINUTE TEST ONLY
ES100-I	4/24/71	BJH17-D1	B14	17.6	1A1B2C			ONE MINUTE TEST ONLY

## TVA BFN CABLE ACCEPTANCE TEST RECORDS SUMMARY

CABLE NO	DATE	DOCUMENT	PRO	kV	1 MIN	5 MIN	15 MIN	REMARKS
ES100-I	4/4/73	BJH77-D1	B14	25.0			1	DID NOT RECORD BY MINUTE
ES100-I	10/2/75	GAB-34	B17	25.0	3	2	2	
ES100-I	8/4/77	LWB-332-D1	B17	25.0	5	2	2	
ES113-I	4/24/71	BJH17-D1	B14	17.6	1A1B1C			ONE MINUTE TEST ONLY
ES113-I	4/4/73	BJH77-D1	B14	25.0			1	DID NOT RECORD BY MINUTE
ES125-I	4/24/71	BJH17-D1	B14	17.6	1A4B1C			ONE MINUTE TEST ONLY
ES13-1	2/7/76	BPA174-76-D1	B17	25.0	3	3	3	
ES13-I	6/15/72	BJH43-D1	B14	25.0			3	DID NOT RECORD BY MINUTE
ES141-I	6/16/72	BJH43-D1	B14	25.0			3	DID NOT RECORD BY MINUTE
ES141-I	1/11/76	BPA174-76-D1	B17	25.0	3	3	2	
ES173	8/22/72	BJH47-D1	B14	25.0			3	DID NOT RECORD BY MINUTE
ES173-I	4/24/71	BJH17-D1	B14	17.6	1A1B1C			ONE MINUTE TEST ONLY
ES1875-IA	4/3/72	BJH34-D1	B14	25.0			16T	DID NOT RECORD BY MINUTE
ES1876-IA	4/3/72	BJH34-D1	B14	25.0			16T	DID NOT RECORD BY MINUTE
ES1877-IA	4/3/72	BJH34-D1	B14	25.0			16T	DID NOT RECORD BY MINUTE
ES1879-IA	5/4/72	BJH34-D1	B14	25.0			1	DID NOT RECORD BY MINUTE
ES189	6/15/72	BJH43-D1	B14	25.0			2	DID NOT RECORD BY MINUTE
ES189	8/22/72	BJH47-D1	B14	25.0			3	DID NOT RECORD BY MINUTE
ES189	12/27/75	TGR-76001-D1	B17	25.0	5	3	3	
ES1900-IB	4/3/72	BJH34-D1	B14	25.0			6T	DID NOT RECORD BY MINUTE
ES1901-IB	4/3/72	BJH34-D1	B14	25.0			6T	DID NOT RECORD BY MINUTE
ES1902-IB	4/3/72	BJH34-D1	B14	25.0			6T	DID NOT RECORD BY MINUTE
ES1904-IB	5/4/72	BJH34-D1	B14	25.0			1	DID NOT RECORD BY MINUTE
ES2501-II	4/28/71	BJH17-D1	B14	17.6	1			ONE MINUTE TEST ONLY
ES2501-II	2/26/76	GAB-58	B17	25.0	2	2	2	
ES2513-II	6/15/72	BJH43-D1	B14	25.0			2	DID NOT RECORD BY MINUTE
ES2538-II	4/24/71	BJH17-D1	B14	17.6	1A1B1C			ONE MINUTE TEST ONLY
ES2538-II	12/14/75	TGR-76001-D1	B17	25.0	4	4	4	
ES2550-II	6/16/72	BJH43-D1	B14	25.0			2	DID NOT RECORD BY MINUTE
ES2575	6/30/77	TGR-77007-D1	M13	25.0	6	6	6	
ES2575-II	1/31/72	BJH31-D1	B14	17.6	2			ONE MINUTE TEST ONLY
ES2588-II	1/31/72	BJH31-D1	B14	17.6	1			ONE MINUTE TEST ONLY
ES2600-II	1/31/72	BJH31-D1	B14	17.6	4			ONE MINUTE TEST ONLY
ES2600-II	8/19/77	TGR-77009-D1	B17	25.0	7	7	7	
ES2613-II	1/31/72	BJH31-D1	B14	17.6	2			ONE MINUTE TEST ONLY

TVA BFN CABLE ACCEPTANCE TEST RECORDS SUMMARY

CABLE NO	DATE	DOCUMENT	PRO	kV	1 MIN	5 MIN	15 MIN	REMARKS
ES2625	2/6/76	BRA174-76-D1	B17	25.0	2	2	2	
ES2625-II	11/17/71	BJH26-D1	B14	17.6	1			ONE MINUTE TEST ONLY
ES2641-II	6/15/72	BJH43-D1	B14	25.0			4	DID NOT RECORD BY MINUTE
ES2673-II	4/24/71	BJH17-D1	B14	17.6	1A1B1C			ONE MINUTE TEST ONLY
ES2673-II	2/12/76	BRA174-76-D1	B17	25.0	2	1	1	
ES2689-II	6/20/72	BJH43-D1	B14	25.0			3	DID NOT RECORD BY MINUTE
ES38-I	4/24/71	BJH17-D1	B14	17.6	8A1B1C			ONE MINUTE TEST ONLY
ES4375-IIC	4/3/72	BJH34-D1	B14	25.0			6T	DID NOT RECORD BY MINUTE
ES4376-IIC	4/3/72	BJH34-D1	B14	25.0			6T	DID NOT RECORD BY MINUTE
ES4377-IIC	4/3/72	BJH34-D1	B14	25.0			6T	DID NOT RECORD BY MINUTE
ES4379-IIC	5/4/72	BJH34-D1	B14	25.0			1	DID NOT RECORD BY MINUTE
ES4400-IID	4/3/72	BJH34-D1	B14	25.0			1T	DID NOT RECORD BY MINUTE
ES4401-IID	4/3/72	BJH34-D1	B14	25.0			1T	DID NOT RECORD BY MINUTE
ES4402-IID	4/3/72	BJH34-D1	B14	25.0			1T	DID NOT RECORD BY MINUTE
ES4404-IID	5/4/72	BJH34-D1	B14	25.0			1	DID NOT RECORD BY MINUTE
ES50-I	6/15/72	BJH43-D1	B14	25.0			2	DID NOT RECORD BY MINUTE
ES50-I	2/7/76	BRA174-76-D1	B17	25.0	3	2	3	
ES75-I	4/24/71	BJH17-D1	B14	17.6	1A2B1C			ONE MINUTE TEST ONLY
ES75-I	2/1/72	BJH31-D1	B14	17.6	1			ONE MINUTE TEST ONLY
ES75-I	3/29/73	BJH77-D1	B14	25.0			1	DID NOT RECORD BY MINUTE
ES75-I	9/15/75	BRA164-75-D1	B17	25.0	2	1	1	
ES75-I	6/7/77	TGR-77006-D1	B17	25.0	5	4	4	
ES88-I	4/24/71	BJH17-D1	B14	17.6	1A1B2C			ONE MINUTE TEST ONLY
ES88-I	3/29/73	BJH77-D1	B14	25.0			4	DID NOT RECORD BY MINUTE
MC6205	6/29/76	BRA186-76-D1	B17	25.0	38T	24T	20T	
MC6206	6/29/76	BRA186-76-D1	B17	25.0	38T	24T	20T	
PP1023	11/20/75	BRA169-76-D1	B17	25.0	3	2	2	
PP110	5/21/75	TGR-75012-D1	B17	25.0	20	20	19	
PP1100	5/11/76	TGR-76009-D1	B17	25.0	9	5	4	AUX RCW A FEED
PP1100	5/11/76	TGR-76009-D1	B17	25.0	9	7	7	AUX RCW B FEED
PP1150	2/23/75	BRA150-75-D2	B17	25.0	55T	10T	10T	
PP1150	7/17/78	TGR-78007-D1	B17	18.7	1A8B16C	1A6B12C	1A4B10C	AFT RPR- SRVC FAILURE(CT)
PP1151	2/23/75	BRA150-75-D2	B17	25.0	55T	10T	10T	
PP1151	7/19/78	TGR-78007-D1	B17	18.7	2A23B3C	2A19B3C	2A14B3C	AFT RPR- SRVC FAILURE(CT)
PP1152	2/23/75	BRA150-75-D2	B17	25.0	55T	10T	10T	

## TVA BFN CABLE ACCEPTANCE TEST RECORDS SUMMARY

CABLE NO	DATE	DOCUMENT	PRO	kV	1 MIN	5 MIN	15 MIN	REMARKS
PP1153	2/23/75	BRA150-75-D2	B17	25.0	55T	10T	10T	
PP1154	2/23/75	BRA150-75-D2	B17	25.0	5T	5T	5T	
PP1154	8/22/77	TGR-77010-D1	B17	25.0	29	21	20	B PH STRESS CONE DAMAGED
PP1154	8/22/77	TGR-77010-D1	B17	25.0	2	2	2	AFTER REPAIR
PP1155	2/23/75	BRA150-75-D2	B17	25.0	5T	5T	5T	
PP1159	2/23/75	BRA150-75-D2	B17	25.0	6T	6T	6T	
PP1160	2/23/75	BRA150-75-D2	B17	25.0	6T	6T	6T	
PP1161	4/7/75	TGR-75012-D1	B17	25.0	24T	5T	4T	
PP1162	4/7/75	TGR-75012-D1	B17	25.0	24T	5T	4T	
PP1164	4/7/75	TGR-75012-D1	B17	25.0	24T	5T	4T	
PP1165	4/7/75	TGR-75012-D1	B17	25.0	24T	5T	4T	
PP1169	4/3/76	TGR-76009-D1	B17	25.0	2	2	FAIL	SPLICE FAILED-REWORKED
PP1169	4/3/76	TGR-76009-D1	B17	25.0	2	1	1	AFTER REPAIR
PP1170	4/1/76	TGR-76009-D1	B17	25.0	4	2	2	
PP1171	3/2/76	TGR-76009-D1	B17	25.0	9T	4T	3T	
PP1172	3/2/76	TGR-76009-D1	B17	25.0	9T	4T	3T	
PP1173	2/3/76	BRA174-76-D1	B17	25.0	1T	1T	1T	
PP1173	6/16/78	BRA232-78	B17	25.0	5	4	3	AFT RPR- SRVC FAILURE(CT)
PP1174	2/3/76	BRA174-76-D1	B17	25.0	1T	1T	1T	
PP1175	2/3/76	BRA174-76-D1	B17	25.0	1T	1T	1T	
PP1176	2/3/76	BRA174-76-D1	B17	25.0	1T	1T	1T	
PP1177	8/6/75	BRA158-75-D1	B17	25.0	13T	5T	5T	
PP1178	8/6/75	BRA158-75-D1	B17	25.0	13T	5T	5T	
PP1178	6/15/80	LWB-372	E58	18.7	6	5	5	
PP1179	8/6/75	BRA158-75-D1	B17	25.0	12T	3T	3T	
PP1179	6/15/80	LWB-372	B17	18.7	3	3	3	
PP1180	8/6/75	BRA158-75-D1	B17	25.0	12T	3T	3T	
PP1235	2/23/75	BRA150-75-D2	B17	25.0	35T	6T	6T	
PP1236	2/23/75	BRA150-75-D2	B17	25.0	35T	6T	6T	
PP1245	2/23/75	BRA150-75-D2	B17	25.0	35T	6T	6T	
PP1246	2/23/75	BRA150-75-D2	B17	25.0	35T	6T	6T	
PP1254	2/23/75	BRA150-75-D2	B17	25.0	26T	24T	24T	
PP1255	2/23/75	BRA150-75-D2	B17	25.0	26T	24T	24T	
PP1263	2/23/75	BRA150-75-D2	B17	25.0	9.5T	8T	8T	
PP1264	2/23/75	BRA150-75-D2	B17	25.0	9.5T	8T	8T	



## TVA BFN CABLE ACCEPTANCE TEST RECORDS SUMMARY

CABLE NO	DATE	DOCUMENT	PRO	kV	1 MIN	5 MIN	15 MIN	REMARKS
PP1275	4/10/75	TGR-75012-D1	B17	25.0	8T	3T	2T	
PP1276	4/10/75	TGR-75012-D1	B17	25.0	8T	3T	2T	
PP1284	4/10/75	TGR-75012-D1	B17	25.0	8T	3T	2T	
PP1285	4/10/75	TGR-75012-D1	B17	25.0	8T	3T	2T	
PP1293	8/1/75	BRA158-75-D1	B17	25.0	12T	5T	5T	
PP1294	8/1/75	BRA158-75-D1	B17	25.0	12T	5T	5T	
PP1303	8/1/75	BRA158-75-D1	B17	25.0	12T	5T	5T	
PP1304	8/1/75	BRA158-75-D1	B17	25.0	12T	5T	5T	
PP1312	10/31/75	TGR-76001-D1	B17	25.0	7T	6T	5T	
PP1313	10/31/75	TGR-76001-D1	B17	25.0	7T	6T	5T	
PP1322	11/3/75	TGR-76001-D1	B17	25.0	4	4	5	
PP1322	11/3/75	TGR-76001-D1	B17	25.0	3T	4T	8T	
PP1323	11/3/75	TGR-76001-D1	B17	25.0	4	4	4	
PP1323	11/3/75	TGR-76001-D1	B17	25.0	3T	4T	8T	
PP1331	4/22/76	TGR-76009-D1	B17	25.0	48T	30T	28T	
PP1332	4/22/76	TGR-76009-D1	B17	25.0	48T	30T	28T	
PP1350	6/9/79	TGR-79001-D1	M13	25.0	9	8	7	
PP1352	6/8/79	TGR-79001-D1	M13	25.0	8	7	7	
PP1354	6/9/79	TGR-79001-D1	M13	25.0	8	7	5	
PP1356	6/9/79	TGR-79001-D1	M13	25.0	4	4	3	
PP1358	6/9/79	TGR-79001-D1	M13	25.0	25	18	15	
PP1360	6/9/79	TGR-79001-D1	M13	25.0	13	13	11	
PP1362	6/9/79	TGR-79001-D1	M13	25.0	18	18	16	
PP1364	6/8/79	TGR-79001-D1	M13	25.0	7	7	7	
PP1366	6/9/79	TGR-79001-D1	M13	25.0	24	16	11	
PP1368	6/9/79	TGR-79001-D1	M13	25.0	22	22	21	
PP1370	6/9/79	TGR-79001-D1	M13	25.0	10	8	7	
PP1372	6/9/79	TGR-79001-D1	M13	25.0	6	6	5	
PP1375	6/2/79	TGR-79001-D1	M13	25.0	4	3	3	
PP1377	6/5/79	TGR-79001-D1	M13	25.0	8	8	8	
PP1379	6/3/79	TGR-79001-D1	M13	25.0	5	3	3	
PP1381	6/4/79	TGR-79001-D1	M13	25.0	12	12	12	
PP1383	6/4/79	TGR-79001-D1	M13	25.0	16	15	15	
PP1385	6/4/79	TGR-79001-D1	M13	25.0	18	18	18	
PP1387	6/4/79	TGR-79001-D1	M13	25.0	8	8	7	

TVA BFN CABLE ACCEPTANCE TEST RECORDS SUMMARY

CABLE NO	DATE	DOCUMENT	PRO	kV	1 MIN	5 MIN	15 MIN	REMARKS
PP1389	6/4/79	TGR-7S001-D1	M13	25.0	15	14	13	
PP1391	6/3/79	TGR-79001-D1	M13	25.0	16	16	16	
PP1393	6/4/79	TGR-79001-D1	M13	25.0	16	16	15	
PP1395	6/3/79	TGR-79001-D1	M13	25.0	10	8	7	
PP1397	6/5/79	TGR-79001-D1	M13	25.0	13	12	12	
PP150	1/18/77	TGR-77003-D1	B17	25.0	3	3	3	
PP155	1/18/77	TGR-77003-D1	B17	25.0	1	1	1	
PP1600	6/5/78	BRA228-78-D1	B17	25.0	220A260B330C	105A125B215C	90A98B180C	TESTED SIX CONDUCTS/PHASE
PP1601	6/11/78	BRA228-78-D1	B17	25.0	210A200B220C	100A115B125C	81A91B96C	TESTED SIX CONDUCTS/PHASE
PP1602	6/1/78	BRA228-78-D1	B17	25.0	90A160B80C	74A120B54C	65A110B44C	TESTED SIX CONDUCTS/PHASE
PP1607	5/20/86			18.7	14T	5T	5T	
PP1608	5/20/86			18.7	15T	6T	6T	
PP1609	5/20/86			18.7	11T	6T	5T	
PP1610	5/20/86			18.7	14T	5T	5T	
PP1611	5/20/86			18.7	15T	6T	6T	
PP1612	5/20/86			18.7	11T	6T	5T	
PP1616	5/20/86			18.7	14T	5T	5T	
PP1617	5/20/86			18.7	14T	5T	5T	
PP1618	5/20/86			18.7	15T	6T	6T	
PP1619	5/20/86			18.7	15T	6T	6T	
PP1620	5/20/86			18.7	11T	6T	5T	
PP1621	5/20/86			18.7	11T	6T	5T	
PP1634	5/20/86			18.7	14T	5T	5T	
PP1635	5/20/86			18.7	15T	6T	6T	
PP1636	5/20/86			18.7	11T	6T	5T	
PP17	12/11/73	BJH79-D1	B14	25.0			1	DID NOT RECORD BY MINUTE
PP18	12/11/73	BJH79-D1	B14	25.0			1	DID NOT RECORD BY MINUTE
PP18	3/30/76	TGR-76009-D1	B17	25.0	7	5	5	NEW CABLE ADDED BY SPLICE
PP275	7/18/72	BJH43-D1	B14	25.0			9	DID NOT RECORD BY MINUTE
PP33	3/23/72	BJH43-D1	B14	25.0			2	DID NOT RECORD BY MINUTE
PP33	2/16/86	MRA637512GTB		18.7	0A4B0C	0A4B0C	0A4B0C	
PP34	3/23/72	BJH43-D1	B14	25.0			2	DID NOT RECORD BY MINUTE
PP36	10/29/70	BJH52-D1	B14	17.6	6A4B6C			ONE MINUTE TEST ONLY
PP37	9/14/71	BRA61-72-D1	B14	17.6		1		DID NOT RECORD BY MINUTE
PP39	3/31/71	BJH52-D1	B14	17.6	1A1B1C			ONE MINUTE TEST ONLY

TVA BFN CABLE ACCEPTANCE TEST RECORDS SUMMARY

CABLE NO	DATE	DOCUMENT	PRO	kV	1 MIN	5 MIN	15 MIN	REMARKS
PP40	9/14/71	BRA61-72-D1	B14	17.6		1		DID NOT RECORD BY MINUTE
PP42	4/9/71	BJH52-D1	B14	17.6	1A2B1C			ONE MINUTE TEST ONLY
PP425	7/2/71	BJH17-D1	B14	17.6	10A4B2CT			ONE MINUTE TEST ONLY
PP426	7/2/71	BJH17-D1	B14	17.6	10A4B2CT			ONE MINUTE TEST ONLY
PP427	7/2/71	BJH17-D1	B14	17.6	10A4B2CT			ONE MINUTE TEST ONLY
PP429	7/2/71	BJH17-D1	B14	17.6	2A6B8CT			ONE MINUTE TEST ONLY
PP429-IE	12/24/75	TGR-76001-D1	B17	25.0	10T	10T	10T	
PP43	9/14/71	BRA61-72-D1	B14	17.6		0.1		DID NOT RECORD BY MINUTE
PP430	7/2/71	BJH17-D1	B14	17.6	2A6B8CT			ONE MINUTE TEST ONLY
PP430-IE	12/24/75	TGR-76001-D1	B17	25.0	10T	10T	10T	
PP431	7/2/71	BJH17-D1	B14	17.6	2A6B8CT			ONE MINUTE TEST ONLY
PP431-IE	12/24/75	TGR-76001-D1	B17	25.0	10T	10T	10T	
PP433	7/2/71	BJH17-D1	B14	17.6	6A4B2CT			ONE MINUTE TEST ONLY
PP434	7/2/71	BJH17-D1	B14	17.6	6A4B2CT			ONE MINUTE TEST ONLY
PP435	7/2/71	BJH17-D1	B14	17.6	6A4B2CT			ONE MINUTE TEST ONLY
PP438	7/2/71	BJH17-D1	B14	17.6	2A2B4CT			ONE MINUTE TEST ONLY
PP439	7/2/71	BJH17-D1	B14	17.6	2A2B4CT			ONE MINUTE TEST ONLY
PP440	7/2/71	BJH17-D1	B14	17.6	2A2B4CT			ONE MINUTE TEST ONLY
PP442	7/2/71	BJH17-D1	B14	17.6	3A5B10CT			ONE MINUTE TEST ONLY
PP443	7/2/71	BJH17-D1	B14	17.6	3A5B10CT			ONE MINUTE TEST ONLY
PP444	7/2/71	BJH17-D1	B14	17.6	3A5B10CT			ONE MINUTE TEST ONLY
PP446	4/29/71	BJH17-D1	B14	17.6	.5A.5B.5CT			ONE MINUTE TEST ONLY
PP447	4/29/71	BJH17-D1	B14	17.6	.5A.5B.5CT			ONE MINUTE TEST ONLY
PP448	4/29/71	BJH17-D1	B14	17.6	.5A.5B.5CT			ONE MINUTE TEST ONLY
PP45	3/29/71	BJH52-D1	B14	17.6	5A4B3C			ONE MINUTE TEST ONLY
PP450	3/1/72	BJH29-D1	B14	17.6	6T			ONE MINUTE TEST ONLY
PP451	3/1/72	BJH29-D1	B14	17.6	6T			ONE MINUTE TEST ONLY
PP453	3/1/72	BJH29-D1	B14	17.6	6T			ONE MINUTE TEST ONLY
PP453-IE	1/26/76	BRA174-76-D1	B17	25.0	2T	2T	2T	
PP454	3/1/72	BJH29-D1	B14	17.6	6T			ONE MINUTE TEST ONLY
PP454-IE	1/26/76	BRA174-76-D1	B17	25.0	2T	2T	2T	
PP456	3/1/72	BJH29-D1	B14	17.6	4T			ONE MINUTE TEST ONLY
PP457	3/1/72	BJH29-D1	B14	17.6	4T			ONE MINUTE TEST ONLY
PP459	3/1/72	BJH29-D1	B14	17.6	2T			ONE MINUTE TEST ONLY
PP459-IA	1/15/76	BRA174-76-D1	B17	25.0	3T	2T	2T	

## TVA BFN CABLE ACCEPTANCE TEST RECORDS SUMMARY

CABLE NO	DATE	DOCUMENT	PRO	kV	1 MIN	5 MIN	15 MIN	REMARKS
PP46	4/9/71	BJH52-D1	B14	17.6	1A1B1C			ONE MINUTE TEST ONLY
PP460	3/1/72	BJH29-D1	B14	17.6	2T			ONE MINUTE TEST ONLY
PP460-IA	1/15/76	BRA174-76-D1	B17	25.0	3T	2T	2T	
PP462	3/1/72	BJH29-D1	B14	17.6	4T			ONE MINUTE TEST ONLY
PP462-IE	1/6/76	BRA168-76-D1	B17	25.0	2T	2T	2T	
PP463	3/1/72	BJH29-D1	B14	17.6	4T			ONE MINUTE TEST ONLY
PP463-IE	1/6/76	BRA168-76-D1	B17	25.0	2T	2T	2T	
PP465	3/1/72	BJH29-D1	B14	17.6	4T			ONE MINUTE TEST ONLY
PP465	1/25/73	BJH69-D1	B14	25.0			2	DID NOT RECORD BY MINUTE
PP465	10/25/74	TGR-74003-D2	B17	25.0	10T	9T	8T	
PP465	2/16/76	BRA174-76-D1	B17	25.0	3T	2T	2T	
PP466	3/1/72	BJH29-D1	B14	17.6	4T			ONE MINUTE TEST ONLY
PP466	1/25/73	BJH69-D1	B14	25.0			2	DID NOT RECORD BY MINUTE
PP466	10/25/74	TGR-74003-D2	B17	25.0	10T	9T	8T	
PP466	2/16/76	BRA174-76-D1	B17	25.0	3T	2T	2T	
PP468	3/1/72	BJH29-D1	B14	17.6	18T			ONE MINUTE TEST ONLY
PP469	3/1/72	BJH29-D1	B14	17.6	18T			ONE MINUTE TEST ONLY
PP47	7/18/72	BJH43-D1	B14	25.0			1	DID NOT RECORD BY MINUTE
PP471	3/1/72	BJH29-D1	B14	17.6	18T			ONE MINUTE TEST ONLY
PP472	3/1/72	BJH29-D1	B14	17.6	18T			ONE MINUTE TEST ONLY
PP475	10/16/75	TGR-76001-D1	B17	25.0	8T	3T	2T	
PP476	10/16/75	TGR-76001-D1	B17	25.0	8T	3T	2T	
PP477	10/16/75	TGR-76001-D1	B17	25.0	8T	3T	2T	
PP478	10/16/75	TGR-76001-D1	B17	25.0	10T	3T	2T	
PP479	10/16/75	TGR-76001-D1	B17	25.0	10T	3T	2T	
PP480	10/16/75	TGR-76001-D1	B17	25.0	10T	3T	2T	
PP481	10/17/75	TGR-76001-D1	B17	25.0	28T	8T	4T	
PP482	10/17/75	TGR-76001-D1	B17	25.0	28T	8T	4T	
PP483	10/17/75	TGR-76001-D1	B17	25.0	28T	8T	4T	
PP484	10/17/75	TGR-76001-D1	B17	25.0	15T	8T	8T	
PP486	10/17/75	TGR-76001-D1	B17	25.0	15T	8T	8T	
PP493-II	2/6/76	BRA174-76-D1	B17	25.0	2	1	1	
PP495	7/3/71	BRA61-72-D1	B14	17.6		1A1B1C		DID NOT RECORD BY MINUTE
PP495-I	2/9/76	BRA174-76-D1	B17	25.0	1	1	1	
PP497	2/9/76	GAB-49	B17	25.0	2	1	1	

TVA BFN CABLE ACCEPTANCE TEST RECORDS SUMMARY

CABLE NO	DATE	DOCUMENT	PRO	kV	1 MIN	5 MIN	15 MIN	REMARKS
PP50	7/18/72	BJH43-D1	B14	25.0			4	DID NOT RECORD BY MINUTE
PP525	7/31/71	BRA61-72-D1	B14	17.6		2		DID NOT RECORD BY MINUTE
PP55	9/7/71	BRA61-72-D1	B14	17.6		1		DID NOT RECORD BY MINUTE
PP550	11/2/71	BJH26-D1	B14	17.6	6			ONE MINUTE TEST ONLY
PP550	9/5/72	BJH47-D1	B14	25.0			8	DID NOT RECORD BY MINUTE
PP550	11/21/72	BJH58-D1	B14	25.0			4	DID NOT RECORD BY MINUTE
PP60	9/7/71	BRA61-72-D1	B14	17.6		2		DID NOT RECORD BY MINUTE
PP625	4/24/71	BJH17-D1	B14	17.6	1A1B1C			ONE MINUTE TEST ONLY
PP629	4/29/71	BJH17-D1	B14	17.6	2			ONE MINUTE TEST ONLY
PP629-II	2/29/76	GAB-59	B17	25.0	16	15	15	
PP633	4/24/71	BJH17-D1	B14	17.6	1A1B1C			ONE MINUTE TEST ONLY
PP633	7/21/88	DNS-88-008		18.7	2	1	1	
PP633-IE	8/22/72	BJH47-D1	B14	25.0			6	DID NOT RECORD BY MINUTE
PP633-IE	5/6/75	BRA152-75-D1	B17	25.0	3	3	3	
PP633-IE	1/3/76	TGR-76001-D1	B17	25.0	2	2	2	
PP634	7/31/71	BRA61-72-D1	B14	17.6		2A2B2C		DID NOT RECORD BY MINUTE
PP637	7/31/71	BRA61-72-D1	B14	17.6		1A1B1C		DID NOT RECORD BY MINUTE
PP637	3/25/88	DNS-88-002		18.7	1	1		FIVE MIN ONLY
PP641	9/29/72	BRA77-72-D1	B14	26.0			4	DID NOT RECORD BY MINUTE
PP642	9/29/72	BRA77-72-D1	B14	26.0			2	DID NOT RECORD BY MINUTE
PP643	9/29/72	BRA77-72-D1	B14	26.0			4	DID NOT RECORD BY MINUTE
PP65	12/22/70	BJH10-D1	B14	17.6				SPLICES FAILED-REWORKED
PP65	1/31/71	BJH10-D1	B14	17.6	40A34C38CT	25A28B30CT		
PP66	12/22/70	BJH10-D1	B14	17.6				SPLICES FAILED-REWORKED
PP66	1/31/71	BJH10-D1	B14	17.6	40A34C38CT	25A28B30CT		
PP75	9/5/75	TGR-75020-D1	B17	25.0	4	4	3	
PP75	4/24/80	LWB-371	B17	18.7	4	2	2	
PP83	9/5/75	TGR-75020-D1	B17	25.0	7	5	6	
PP91	9/4/75	TGR-75020-D1	B17	25.0	18	15	15	
PP91	5/21/80	LWB-371	B17	18.7	17	12	10	
PP99	9/5/75	TGR-75020-D1	B17	25.0	43	27	15	
T-PP629	5/18/75	TGR-75012-D1	B17	25.0	3	1	1	
	1/19/86	SHM-179		18.7	13	11	10	NO CABLE NO ON TEST RECORD

ATTACHMENT F

BFN Unit 2, Class 1E, 4kV Walkdown Data

ATTACHMENT F

This attachment contains walkdown data for the following Unit 2, Class 1E 4kV circuits:

ES13-I  
ES50-I  
ES75-I  
ES88-I  
ES100-I  
ES113-I  
ES141-I  
ES189-I  
ES2513-I  
ES2550-I  
ES2588-I  
ES2641-I  
ES2575-I  
ES2689-I

DATE September 10, 1971 FILE REF.

TO J Simmons OFFICE LOCATION Ebasco Elec.

FROM B Wier *jam*  
*Bolk* OFFICE LOCATION Ebasco Elec.

SUBJECT CABLE ISSUES EVALUATION

Attached are the advance evaluations for the fourteen cables you requested. This evaluation consisted of 1) determining the cables are in compliance with the bend radius criteria of Design Standards DS-E12.1.5/E12.1.13 as specified by General Construction Specification G-38 and 2) determining the requirement for vertical support as required by Design Guide DG-E13.1.1 and construction specification C38.

This information will be contained in the final report with the remaining cables evaluated being prepared for transmittal to TVA.

Attachment: Cable Evaluation (Copies)  
Walkdown Packages (Copies)

*js*  
BW:sb



BEND RADIUS ANALYSIS

<u>Cable Number</u>	<u>Bend Radius (12 X OD) (Pass/Fail)</u>	<u>Vertical Support (Pass/Fail)</u>
ES13-I	Fail	Fail
ES50-I	Fail	Fail
ES75-I	Fail	Fail
ES88-I	Fail	Pass
ES100-I	Fail	Pass
ES113-I	Fail	Pass
ES141-I	Fail	Pass
ES189-I	Fail	Fail
ES2513-I	Fail	Fail
ES2550-II	Fail	Fail
ES2575-I	Fail	Fail
ES2588-II	Fail	Fail
ES2641-I	Pass	Pass
ES2689-II	Fail	Fail

ATTACHMENT G

Supporting Calculations/Basis For Applicability To Cable Issues

TITLE <b>SIDEWALL PRESSURE &amp; JAM RATIO</b>		PLANT/UNIT <b>BFNP/TU2</b>	
PREPARING ORGANIZATION <b>EEB/BFNP</b>	KEY NOUNS (Consult RIMS DESCRIPTORS LIST) <b>CABLE PULL, CONDUIT FILL</b>		
BRANCH/PROJECT IDENTIFIERS <b>ED-Q2999-880544</b>	Each time these calculations are issued, preparers must ensure that the original (RO) RIMS accession number is filled in. Rev (for RIMS' use) RIMS accession number <b>B22 '880923 140</b>		
APPLICABLE DESIGN DOCUMENT(S) <b>N/A</b>	R _		
SAR SECTION(S) <b>N/A</b>	UNID SYSTEM(S) <b>N/A</b>	R _	
Revision 0	R1	R2	R3
ECN No. (or indicate Not Applicable) <b>N/A</b>			
Prepared <i>Unit Manager 9-23-88</i>			
Checked <i>William B. ... 9-23-88</i>			
Reviewed <i>[Signature] 9-23-88</i>			
Approved <i>[Signature]</i>			
Date <b>9/23/88</b>			
Use form TVA 10534 if more space required.	List all pages added by this revision.		
	List all pages deleted by this revision.		
	List all pages changed by this revision.		
Safety-related? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>			Statement of Problem  <b>THIS CALCULATION IS ISSUED TO SUPPORT EXISTING CABLE / CONDUIT INSTALLATION AT BFN SIMILAR TO THAT DISCUSSED IN THE SQN TECHNICAL EVALUATION REPORT (A02 870312 023)</b>
<b>ORIGINAL</b>			

**Abstract**

These calculations contain an unverified assumption(s) that must be verified later. Yes  No

**FSAR COMPLIANCE** *9/23/88*

(1) THIS CALCULATION PROVES THAT NEITHER MAXIMUM ALLOWABLE PULL FORCE NOR MAXIMUM SIDEWALL PRESSURE COULD HAVE BEEN EXCEEDED DURING THE INSTALLATION OF EXISTING CABLE (INM1256) AND CONDUIT (INM1263)

(2) THIS CALCULATION PROVES THAT THE JAM RATIO FOR THE CABLES WALKED DOWN IS IN THE ACCEPTABLE RANGE.

(3) THIS CALCULATION DETERMINES JAM RATIO FOR SOME CABLES WHERE THE INPUT DATA IS NOT ADEQUATE FOR QA PURPOSES. THIS IS ACCEPTABLE BECAUSE THE DETERMINATION IS FOR INFORMATION ONLY AND WILL NOT BE USED. THESE CABLES ARE DENOTED \*

Microfilm and store calculations in RIMS Service Center. **CALCULATION LIBRARY** Microfilm and destroy.   
 Microfilm and return calculations to: **EDS P3 BFN** Address:

Title: **SIDEWALL PRESSURE & JAM RATIO** **REVISION LOG**  
ED-Q2999-580544

Revision No.	DESCRIPTION OF REVISION	Date Approved
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CALCULATION DESIGN VERIFICATION (INDEPENDENT REVIEW) FORM

ED-Q2999-880544

Calculation No.

R 00

Revision

Method of design verification (independent review) used (check method used):

- 1. Design Review
- 2. Alternate Calculation
- 3. Qualification Test

Justification (explain below):

Method 1: In the design review method, justify the technical adequacy of the calculation and explain how the adequacy was verified (calculation is similar to another, based on accepted handbook methods, appropriate sensitivity studies included for confidence, etc.).

Method 2: In the alternate calculation method, identify the pages where the alternate calculation has been included in the calculation package and explain why this method is adequate.

Method 3: In the qualification test method, identify the QA documented source(s) where testing adequately demonstrates the adequacy of this calculation and explain.

This Calculation is technically adequate based on the use of proper design input and mathematical computation methods as required by Browns Ferry Design Criteria BFN-50-958, and accepted handbook methodology found in Construction Specification C-38

J. Ball  
 Design Verifier  
 (Independent Reviewer)

9/23/88  
 Date

SHEET llll

PREPARER TW DATE 9-23-88CHECKER WPK DATE 9-23-88BFN - FSAR COMPLIANCE

CHAPTER 8. OF THE BFN FSAR WAS REVIEWED FOR COMPLIANCE BY THIS CALCULATION FOR CONDUIT / CABLE INSTALLATION. THIS CALCULATION COMPLIES WITH THE BFN - FSAR

## TABLE OF CONTENTS

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DRAWN: TMB  
CHECKED: WJC9-19-88  
9-23-881. PURPOSE

TO DETERMINE THE JAM RATIO FOR THE WALKDOWN CABLES AND CONDUITS, AND SIDEWALL PRESSURE OF CABLE INM1256 / CONDUIT INM1263

2. ASSUMPTIONS (NONE. SEE EXPLANATION BELOW)

THE INFORMATION FOR CABLES WITH \* IS UNVERIFIED. CABLE MARK LETTER NOT GIVEN IN WALKDOWN PACKAGES. MARK LETTER TAKEN FROM AS-DESIGN CABLE SCHEDULE. THIS IS ACCEPTABLE SINCE THESE ARE USED FOR INFORMATION ONLY AND DO NOT REQUIRE QA LEVEL DATA.

3. REFERENCES

- 3.1 ELECTRICAL DESIGN STANDARD DS-E12.1.13 R2. "CLASS 1E CABLE ODS AND WEIGHTS"
- 3.2 ELECTRICAL DESIGN STANDARD. DS-E13.1.4 R1. "MAXIMUM CABLE DIAMETER FOR VARIOUS RIGID STEEL"
- 3.3 ELECTRICAL DESIGN STANDARD DS-E13.1.7 R2. "DIMENSION OF RIGID AND FLEXIBLE METAL CONDUIT BENDS."



ED-Q 2999-880544

COMPUTED *TMI* DATE 9-23-88

CHECKED *WR* DATE 9-23-88

3.4 GENERAL CONSTRUCTION SPECIFICATION G-38, R8

"INSTALLING INSULATED CABLES RATED UP TO  
15000 VOLTS", SRN-G38-26

3.5 TVA DRAWINGS 45 C800 SERIES, "CONDUIT  
CABLE SCHEDULE"

3.6 QIRBFNEEB8601D R2 (B 22880728 001)

4. DESIGN INPUT DATA

4.1 CONDUIT NUMBER AND CONDUIT SIZE :  
WALKDOWN PACKAGE

4.2 MARK LETTER (REF. # 3.5), AVERAGE CABLE OD  
(REF. # 3.1) CONDUIT INSIDE DIAMETER (REF. # 3.2) :  
SEE TABLE 5.1

4.3 WD-3335 , TSD-E036 CABLE ISSUES

4.4 WD-3341 , TSD-E036 CABLE ISSUES

4.5 WD-3343 , TSD-E036 CABLE ISSUES

4.6 WD-3344 , TSD-E036 CABLE ISSUES

TVA 11030 (WM-7-75)

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COMPUTED T.M. DATE 7-13-88  
CHECKED W DATE 9-23-884. DESIGN INPUT DATA (CONTINUED)

4.7 WD-3345, TSD-E036 CABLE ISSUES  
4.8 WD-3342, TSD-E036 CABLE ISSUES  
4.9 WD-3338, TSD-E036 CABLE ISSUES  
4.10 WD-3346, TSD-E036 CABLE ISSUES  
4.11 WD-3340, TSD-E036 CABLE ISSUES  
4.12 WD-3064, TSD-E036 CABLE ISSUES  
4.13 WD-3336, TSD-E036 CABLE ISSUES  
4.14 WD-3334, TSD-E036 CABLE ISSUES  
4.15 WD-3339, TSD-E036 CABLE ISSUES  
4.16 WD-3337 TSD-E036 CABLE ISSUES

## 5.0 CALCULATIONS

## 5.1 JAM RATIO

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COMPUTED TMM DATE 9-23-88

CHECKED WJL DATE 9-23-88

## 5. CALCULATION (continued)

JAM RATIO IS DETERMINED BY RATIO BETWEEN THE  
CONDUIT INSIDE DIAMETER (D) AND A CABLE OVERALL  
DIAMETER (d)

$$\text{JAM RATIO} = \frac{D}{d} \quad (\text{REF. \# 3.4})$$

e.g. 1NM1256

$$\text{JAM RATIO} = \frac{D}{d} = \frac{1.61}{.405} = 3.98$$

THE JAM RATIO FOR OTHER CABLES :

SEE TABLE 5.1 (REF 3.1, 3.2, 3.6)

ED-Q 2999-880544

COMPUTED *DM* DATE 4-23-88  
CHECKED *WJL* DATE 9-23-88

TABLE 5.1

CABLE	MARK LETTER	CABLE AVG. OD (IN)	CONDUIT SIZE	CONDUIT INSIDE DIAMETER (IN)	JAM RATIO	JAM RATIO FAILURE RANG 2.80 — 3.1
L 36 *	WDH	.599	2A - L 37	2.07	3.46	NO
M 935 *	WDD	.304	2I - MC 1910	2.07	6.81	NO
1NM1256 *	WDF	.405	1½ A - INM1263	1.61	3.98	NO
1NM1256 *	WDF	.405	1A - INM1256	1.05	2.59	NO
2ES 2726-II *	WVA	.345	1½ I - 2ES 2731-II	1.61	4.67	NO
2V42 *	WGG	.606	3A - 2PL 3715	3.07	5.01	NO
2V1200 *	WGC-1	.455	3A - 2PL 3709	3.07	6.74	NO
2V1200 *	WGC-1	.455	1½ A - 2V1200	1.61	3.54	NO
2V1218 *	WGH-1	0.722	3A - 2PL 3710	3.07	4.25	NO
2V1218 *	WGH-1	0.722	1½ A - 2V1218	1.61	2.30	NO
3ES 2501 *	WCA	.152	2½ A - 3ES 2573-II	2.47	16.125	NO

TABLE 5.1

COMPUTED TJB

9-23-88

CHECKED JX

9-23-88

CABLE	MARK LETTER	CABLE AVG. OD (IN)	CONDUIT SIZE	CONDUIT INSIDE DIAMETER (IN)	JAM RATIO	JAM RATIO FAILURE RANGE 2.80 — 3.1
3PL 575 *	WDG	.472	3A-3PL 3700	3.07	6.50	NO
3PL 800 *	WDF	.405	1½ A-3PL 800	1.61	3.98	NO
3V 1225 *	WLC	.496	3A-3PL 3700	3.07	6.19	NO
ES 50-I	WNB	.950	3A-ES 50-I	3.07	3.23	NO
ES 50-I	WNB	.950	4I-ES 50-I	4.03	3.23	NO
ES 13-I	WNB	.950	3A-ES 13-I	3.07	3.23	NO
ES 13-I	WNB	.950	4A-ES 21-I	4.03	3.23	NO
ES 113-I	WNB	.950	3A-ES 113-I	3.07	3.23	NO
ES 100-I	WNB	.950	3A-ES 100-I	3.07	3.23	NO
ES 88-I	WNB	.950	3A-ES 88-I	3.07	3.23	NO
ES 75-I	WNB	.950	3A-ES 75-I	3.07	3.23	NO

DATE 4-23-88  
 CHECKED *WJ*

TABLE 5.1

CABLE	MARK LETTER	CABLE AVG. OD (IN)	CONDUIT SIZE	CONDUIT INSIDE DIAMETER (IN)	JAM RATIO	JAM RATIO FAILURE RANGE 2.80 — 3.1
ES 2575-II	WNB	.950	3A-ES2575-II	3.07	3.23	NO
ES 141-I	WNE-I	1.236	4A-ES138-I	4.03	3.26	NO
ES 189-I	WNE-I	1.236	4A-ES190-I	4.03	3.26	NO
ES 2513-I	WNB	.950	3A-ES2513-II	3.07	3.23	NO
ES 2513-II	WNB	.950	4I-ES2513-II	4.03	3.23	NO
ES 2641-II	WNE	1.236	4A-ES2641-II	4.03	3.26	NO
ES 2689-II	WNE	1.236	4A-ES2689-II	4.03	3.26	NO
ES 2550-II	WNB	.950	3A-ES2550-II	3.07	3.23	NO
ES-2588-II	WNB	.950	3A,I-ES2588-II	3.07	3.23	NO

5.2 SIDEWALL PRESSURE CALCULATION


5.2.1 THE CABLES REQUIRE SIDEWALL PRESSURE  
CALCULATION :

THE CABLES THAT DO NOT SATISFY APPENDIX F  
OF REF # 3.4 REQUIRE SIDEWALL PRESSURE  
CALCULATION. SEE TABLE 5.2.

TABLE 5.2

CONDUIT NO. SIZE	COND. LENG. b/w FULL POINTS	EQUIVALENT DEGREE BENDS b/w FULL POINTS	PASS G-3B, APPENDIX F
1½ I - INH 1263	23.04 FT	405°	NO
1½ I - 2ES2731-II	40.33 FT	17.11°	YES
	25 FT	120°	YES
2½ A - 3ES2573	9.75 FT	225°	YES
1½ A - 3PL800	12.08 FT	118°	YES
3A - 2PL3715			NO INFORMATION

TABLE 5.2 (continued)

CONDUIT NO. SIZE	COND. LENG. b/w FULL POINTS	EQUIVALENT DEGREE BENDS b/w PULL POINTS	PASS G-38, APPENDIX F
3A-2PL 3715			<p>NO INFORMATION:</p> <p>(CONDUIT LENGTH AND DEGREE OF BENDS NOT GIVEN IN WALKDOWN PACKAGE)</p> 
3A-2PL 3709			
3A-2PL 3710			
3A-2PL 3700			
3A-ES 50-I			
4A-ES 50-I			
3A-ES 13-I			
4A-ES 21-I			
3A-ES 113-I			
3A-ES 100-I			
3A-ES 88-I			
3A-ES 75-I			
3A-ES 2575-II			
2A-L 37			
3A-ES 2588-II			
2I-MC 1910			

TVA 11030 (WM-7-75)



ED-Q2999-880544

COMPUTED TJB DATE 9-23-88

CHECKED JML DATE 9-23-88

### 5.3 SIDEWALL PRESSURE CALCULATION FOR INM1256 CABLE / INM1263 CONDUIT

#### DESIGN INPUTS:

CABLE SIZE : 2 - 1C , # 4 (Ref. # 3.5)

CABLE MAX. OD :  $OD_{max} = 0.42$  (Ref. # 3.1)

CABLE WEIGHT  $_{max}$  :  $W = 0.18$  lb/ft (Ref. # 3.1)

CABLE BUNDLE WEIGHT :  $W_b = 2 \times 0.18 = 0.36$  lb/ft

$D/d = 3.98$  (See table 5.1)

WEIGHT CORRECTION FACTOR :  $W_c = 1.06$  (Ref. # 3.4)

$K = W_c \times K = 1.06 \times 0.3 = 0.32$  (Ref. # 3.4)

INNER RADIUS OF BEND :  $R = .75$  (Ref. # 3.3)

PULL TENSION FOR (Ref # 3.4) :

5.79 FT VERTICAL RUN UPWARD

$T_{in} = W_c L + \text{PRIOR TENSION}$

$= 0.36 \times 5.79 \text{ ft}$

$T_{out} = 2.08 \text{ lbs}$

ED-Q2999-880544

COMPUTED TM DATE 9-23-88CHECKED WJ DATE 9-23-8890° VERTICAL BEND UPWARD:

$$b = 90^\circ = 1.57 \text{ Radian}$$

$$T_{OUT} = T_{IN} e^{kb} + \frac{WR}{1+k^2} \left[ 2ke^{kb} \sin b + (1+k^2)(1-e^{kb} \cos b) \right]$$

$$= 208 e^{(0.32)(1.57)} + \frac{(0.36)(7.45)}{1+(0.32)^2} \left[ 2 \cdot 0.32 e^{(0.32)(1.57)} \sin 90^\circ \right.$$

$$\left. (1+(0.32)^2)(1 - e^{(0.32)(1.57)} \cos 90^\circ) \right]$$

$$= 3.44 + 2.43 [1.06 + 1.01]$$

$$T_{OUT} = 8.47 \text{ lbs}$$

4.25 FT HORIZONTAL RUN :

$$T_{OUT} = k L W_c + \text{PRIOR TENTION}$$

$$= 0.32 \times 4.25 \text{ ft} \times 0.36 \frac{\text{lb}}{\text{ft}} + 8.47$$

$$T_{OUT} = 8.96 \text{ lbs}$$

45° HORIZONTAL BEND :

$$T_{OUT} = T_{IN} e^{kb} ; \quad T_{IN} = T_{OUT} = 8.96 \text{ lbs}$$

$$= 8.96 e^{(0.32)(0.79)} ; \quad 45^\circ \approx 0.79 \text{ Rad}$$

TWP DATE 9-23-88  
 WPC 9-23-88

$$T_{out} = 11.54 \text{ lbs}$$

2.06 FT HORIZONTAL RUN :

$$\begin{aligned} T_{out} &= k L W e + \text{Prior tension} \\ &= 0.32 \times 2.06'' \times 0.36 \frac{1}{4} + 11.54 \text{ lbs} \end{aligned}$$

$$T_{out} = 11.78 \text{ lbs}$$

90° VERTICAL BEND UPWARD :

$$T_{out} = T_{in} e^{kb} - \frac{WR}{1+k^2} \left[ 2k \sin b - (1-k^2)(e^{kb} - \cos b) \right]$$

$$= 11.78 e^{0.32(1.57)} - \frac{0.36 \times 7.45}{1 + (0.32)^2} \left[ 2(0.32) \sin 90^\circ - \right.$$

$$\left. (1 - (0.32)^2)(e^{0.32 \cdot 1.57} - \cos 90^\circ) \right]$$

$$= 19.47 - 2.43 [0.64 - 1.48]$$

$$= 19.47 + 2.04$$

$$T_{out} = 21.51 \text{ lbs}$$

TH  
2309-25-88  
9-23-882.67 FT VERTICAL RUN UPWARD :

$$\begin{aligned}
 T_{out} &= L W_t + \text{PRIOR TENSION} \\
 &= 2.67 \times 0.36 \text{ lb/ft} + 21.51 \\
 T_{out} &= 22.47 \text{ lbs}
 \end{aligned}$$

90° VERTICAL BEND :

$$\begin{aligned}
 T_{out} &= T_{in} e^{kb} + \frac{MR}{1+k^2} \left[ 2k e^{kb} \sin b + (1-k^2)(1-e^{kb} \cos b) \right] \\
 &= 22.47 e^{0.32(1.77)} + \frac{0.36 \times 7.45}{1+(0.32)^2} \left[ 2(0.32) e^{0.32(1.77)} \sin 90^\circ \right. \\
 &\quad \left. (1-(0.32)^2)(1-e^{0.32(1.77)} \cos 90^\circ) \right] \\
 &= 37.14 + 2.43 [1.06 + 0.90] \\
 &= 41.90 \text{ lbs}
 \end{aligned}$$

4.92 FT HORIZONTAL RUN

$$T_{out} = k L W_t + \text{PRIOR TENSION}$$

TIN  
2604-25-88  
9-23-88

$$T_{OUT} = 0.32 \times 4.92 \text{ ft} \cdot 0.36 \frac{\text{lb}}{\text{ft}} + 41.90$$

$$= 42.47 \text{ lbs}$$

90° VERTICAL BEID DOWNWARD

$$T_{OUT} = T_{IN} e^{kb} + \frac{WR}{1+k^2} \left[ 2k \sin 90^\circ - (1-k^2)(e^{kb} - \cos 90^\circ) \right]$$

$$= 42.47 e^{0.32(1.57)} + \frac{0.36 \cdot 7.45}{1+(0.32)^2} \left[ 2(0.32) - \right.$$

$$\left. (1-(0.32)^2) e^{0.32(1.57)} \right]$$

$$= 70.19 + 2.43 [0.64 - 1.48]$$

$$= 68.15 \text{ lbs}$$

3.33 FT VERTICAL RUN DOWNWARD

$$T_{OUT} = -W_b L + \text{Prior tension}$$

$$= -0.36 \frac{\text{lb}}{\text{ft}} \times 3.33 \text{ ft} + 68.15$$

$$\underline{\underline{T_{OUT} = 66.95 \text{ lbs}}} \quad \therefore \underline{\underline{\text{EXPECTED PULL TENSION}}}$$

TJH  
2/29-23-88  
9-23-88MAXIMUM ALLOWABLE PULLING FORCE  $F_m$ :

$$F_m = 0.008 \times n \times emil \times 0.8$$

$$F_m = 0.008 \times 2 \times 41740 \times 0.8$$

$$F_m = \underline{534.27 \text{ lbs}}$$

MAXIMUM SIDEWALL PRESSURE FOR INM1256:

$$SWP_{max} = \frac{W_c T}{2R}$$

$$= \frac{1.06 \times 68.15 \text{ lbs}}{2 \times 0.63}$$

$$\underline{SWP_{max} = 57.33 \text{ lbs}}$$

CALCULATION WAS DONE PULLING THE CABLE UP, THE  
WORST CASE DIRECTION.

ED-Q2999-880544

COMPUTED DMJ DATE 9-23-88CHECKED ZBC DATE 9-23-88

## 6. CONCLUSIONS :

6.1 EXPECTED PULL TENSION OF 68.15 lbs FOR

INM 1256 DOES NOT EXCEED MAXIMUM ALLOWABLE

PULLING FORCE

6.2. MAXIMUM SIDEWALL PRESSURE 57.33 lbs FOR

INM 1256 DOES NOT EXCEED 1000 lbs ALLOWABLE

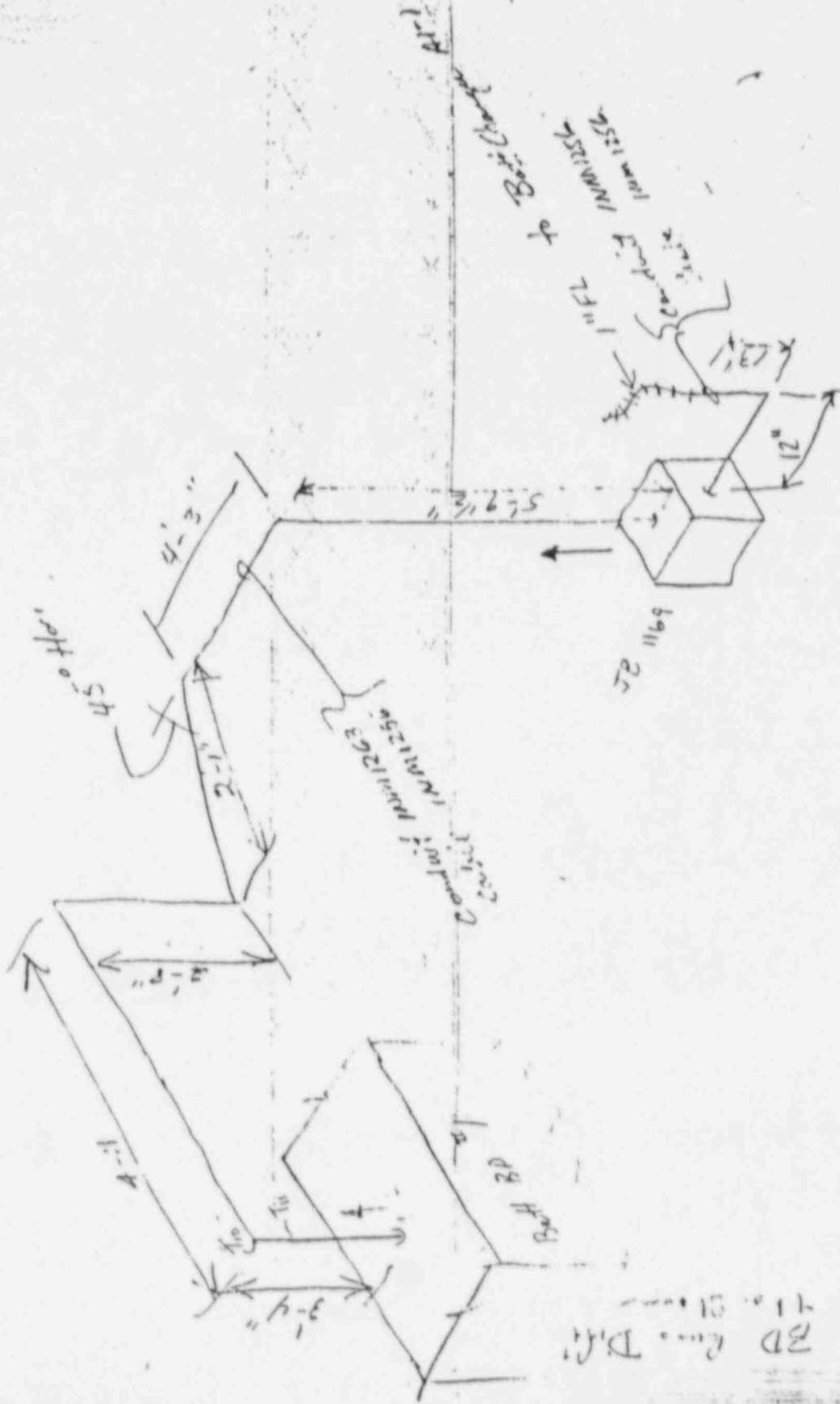
FOR POWER CABLES

UNID  
ED  
ED DIM

PREPARER TUN  
CHECKER  
DATE 9-23-86  
DATE

SHEET 17 OF 17

ED-02999-880544 7 SUPPORTING GRAPHIC  
FOR CONDUIT INM1263



2D PERS. DIM  
41.0 01.000