TENNESSEE VALLEY AUTHORITY

CHATTANOOGA, TENNESSEE 37401
5N 157B Lookout Place

February 27, 1986

Director of Nuclear Reactor Regulation
Attention: Mr. B. Youngblood, Project Director
PWR Project Directorate No. 4
Division of Pressurized Water Reactors (PWR)
Licensing A
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Youngblood:

In the Matter of	)	Docket Nos. 50-327
Tennessee Valley Authority	)	50-328

NRC has expressed concerns with the electrical calculation program for the Sequoyah Nuclear Plant (SQN). NRC's concerns were expressed in a telephone discussion on January 8, 1986, and in a meeting at SQN on January 14-16, 1986. A response to NRC's questions regarding further testing, with respect to PSB-1, was previously submitted to NRC by my February 12, 1986 letter to you.

The enclosure provides a discussion of the electrical calculations program for SQN, formally documents our response to the remaining NRC questions, and discusses the problems identified by the analyses and the corrective action taken to date. Additionally, the enclosure addresses the employee concerns related to the electrical calculations program. An additional submittal will be provided at a later date to discuss additional corrective actions resulting from resolution of the significant condition reports (SCRs).

If you have any questions, please call Jerry Wills at FTS 858-2683.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

R Gridley

R. Gridley
Manager of Licensing

Sworn to and subscribed before me
this 27th day of Feb. 1986

Paulette H. White

Notary Public
My Commission Expires 8-24-88

Enclosure
cc: See page 2

A001 1/1 Limited Dist

8603040350 860227
PDR ADOCK 05000327
P PDR

Director of Nuclear Reactor Regulation February 27, 1986

cc (Enclosure):
U.S. Nuclear Regulatory Commission
Region II
Attn: Dr. J. Nelson Grace, Regional Administrator
101 Marietta Street, NW, Suite 2900
Atlanta, Georgia 30323

Mr. Carl Stahle
Sequoyah Project Manager
U.S. Nuclear Regulatory Commission
7920 Norfolk Avenue
Bethesda, Maryland 20814

ENCLOSURE 1

ELECTRICAL CALCULATIONS

PROGRAM

FOR

SEQUOYAH NUCLEAR PLANT

ELECTRICAL CALCULATIONS PROGRAM

The minimum set of electrical calculations necessary to ensure technical design adequacy and compliance with the plant design basis had not previously been formally identified by the Office of Engineering (OE) for TVA's nuclear plants. The basic design approach over past years had been to do whatever calculations were necessary to develop detailed designs and to support the design bases. This resulted in calculations being generated based on the design engineer's best judgment of what was required. Some calculations were not officially documented and controlled, and some of those that were officially documented were not kept up to date as design changes were made. These facts were identified by INPO in its review of both the Bellefonte and Watts Bar Nuclear Plants, in the Bellefonte Electrical Evaluation performed within OE, and in an OE QA audit deviation.

An OE Electrical Issues Program Manager was appointed as of November 25, 1985, to ensure that the electrical calculations effort is adequately managed. This manager is responsible for ensuring that the management of all activities associated with the technical objectives listed below is carried out; that all necessary work performed to ensure that the electrical systems now in place at TVA's nuclear plants can perform their intended safety functions; and that programs, procedures, etc., are established for future activities to ensure that TVA's commitment to excellence in its nuclear program is achieved.

The electrical issues program objectives are:

1. That all calculations required to support the electrical systems design basis for each nuclear plant are well defined.

2. That electrical calculations are adequate.
   a. Where necessary, action will be taken to ensure existing electrical calculations are adequate or require revision
   b. Where necessary, action will be taken to have electrical calculations made that do not exist.

3. That programs, procedures, etc., are in place for all future activities.

To resolve this problem, we have developed a three-phase program.

PHASE ONE

Phase one of this program involved a formal review effort by OE to establish the minimum set of electrical calculations required to support the electrical design basis for Bellefonte Nuclear Plant (BLN). Based on the BLN effort and information obtained from other architect/engineers (A/Es) and utilities, an index of required electrical calculations, to be performed prior to startup has been developed for the Sequoyah Nuclear Plant (SQN) for the following electrical systems and are listed as follows by system:

1. Auxiliary Power System (APS)

   a. Load Analysis

   b. Voltage Calculations

   c. Class 1E Motor Control Center (MCC)

      Control Circuit Cable Length Calculation

   d. Diesel Generator Load Analysis

2. Control Power System (CPS)

   a. 125V DC Vital Instrument Power System Voltage Calculations

   b. 120V AC Vital Instrument Power System Voltage Calculations

3. Instrumentation and Contr.. (I&C) Systems Demonstrated Instrument Accuracy Calculations - Seismic Effects

4. Raceway .ystems

   a. Justification for Use of TVA's Ampacity Tables

   b. Justification of TVA's Ampacity Tables as Related to Control Level Cable Trays, Grouped Conduits, Conduits with More than Three Cables and Duct Banks

Initially, nine scope-of-work documents for calculations required for restart were prepared and a schedule was established for completing these calculations to the extent that all problems could be identified by January 22, 1986. The calculations were completed as scheduled, with the final calculation packages being completed on January 31, 1986.

Since the issuance of these calculations, two areas have been identified that require additional review: the APS Diesel Generator Analysis and the CPS 125V DC Vital Instrument Power System Voltage Calculations.

The diesel generator analysis involved the development of three loading sequences by TVA and an analysis of these sequences by the vendor. This analysis identified no problems. In the generator portion of this analysis, the vendor assumed that a new type of voltage regulator, purchased by TVA in 1980, had been installed. Since this new component was not required to ensure the diesel generator's operation, it was not installed. However, in order to verify that the original voltage regulator is adequate for the present loading sequences, an additional analysis by the vendor is required. This additional vendor analysis is scheduled to be complete in March 1986, with a subsequent submittal to NRC by April 1986 following TVA's completion and evaluation of the revised analysis.

The initial CPS 125V DC Vital Instrument Power System Voltage Calculations have been revised to change the evaluation method for the 480V Shutdown Board Control circuits. Originally, these circuits were evaluated with the understanding that no automatic load shedding occurred upon loss of AC voltage; therefore, DC voltage drop was not a consideration. However, further review of these circuits has determined that load shedding does occur and that a reanalysis was necessary. This reanalysis was issued on February 10, 1986, with no additional problems identified and is included in this submittal.

A copy of each calculation (excluding the detailed numerical portion) performed in the restart effort is included by system in Appendices A, B, C, and D, with the exception of the I&C instrument accuracy calculations. Since this task involved performing the same type of calculation for approximately 75 instruments and was documented in 15 separate calculation packages, only a typical calculation is being provided. In addition, the APS load analysis has been included in the APS voltage calculation.

The restart calculations effort identified problems in the following areas:

1. APS - Voltage Calculations
2. CPS - 125V DC Voltage Calculations
3. CPS - 120V AC Voltage Calculations

The APS review concluded that deficiencies exist with respect to individual components' voltage in the class 1E APS for operation at the degraded voltage set points. These have been documented in OE significant condition report (SCR) SQNEEB8607 R0 (R indicates revision level). A review of this SCR is presently being performed within TVA to determine reportability and to determine if corrective action is required and, if so, whether the action is required prior to restart.

Unlike the APS voltage calculations that evaluated each class 1E APS circuit, the original CPS voltage calculations involved a representative sample analysis of the class 1E circuits powered from the 125V DC and 120V AC Vital

Control Power systems. Due to the number, complexity, and, most importantly, the similarity of the vital control power circuits under investigation, TVA chose to analyze a representative sample of typical circuit types/categories as opposed to analyzing each class 1E circuit. While such an approach cannot guarantee the adequacy of each individual circuit, the approach can, if the representative sample is chosen appropriately, identify recurring deficiencies and problem areas in circuit design. These problem areas may then be more thoroughly examined to yield confidence that, within each category, circuit deficiencies have been identified and corrected.

Following is a discussion of the circuit category selection process for both the 125V DC and the 120V AC Vital Control Power Systems (VCPS) which includes a discussion of the problem areas identified in the original analysis and the number of circuits analyzed in the "further" analysis. Two additional scope-of-work documents were prepared for the 125V DC and 120V AC "further" analyses. The 120V AC "further" analysis was issued on January 30, 1986, with the 125V DC "further" analysis issued on February 10, 1986. Each of these analyses is addressed in this submittal.

I. 125V DC VITAL CONTROL POWER SYSTEMS (125V DC VCPS)

Upon examination of the 125V DC VCPS loads, six unique circuit categories were identified for analysis as follows:

1. 6.9kV Shutdown Board Control Circuits
2. 480V Shutdown Board Control Circuits
3. Fuse Column Circuits (primarily solenoid valve circuits)
4. Auxiliary Relay Rack Circuits
5. Reactor Trip Switchgear Breaker Control Circuits
6. 120V AC Vital Inverter Feeder Circuits

To obtain a representative sample (in no case less than 10 percent of the total circuits) from each of these categories, circuits were selected and analyzed as follows:

1. 6.9kV Shutdown Board Circuits:

   The normal bus normal feeder and the backup bus normal feeder were analyzed for all four shutdown boards. Immediately upon loss of AC power, the majority of the 6.9kV shutdown board loads are shed to allow sequential diesel generator loading. This load shedding occurs with a battery board voltage of 120V DC (2.0 volts/cell); therefore, the voltage drop calculations for these circuits were performed at 120V DC rather than at the end of discharge level (105V DC).

Load current was determined by summing the contribution of those breakers tripping for automatic load shedding with the contribution for normal bus loading (e.g. auxiliary relays). Using this value, voltage drop from the battery board to the 6.9kV shutdown board was calculated. In all cases, the input voltage to the 6.9kV shutdown boards was greater than, or equal to, 113.8V DC. Since the undervoltage relays which initiate load shedding are located near the 6.9kV shutdown boards and since internal board wiring is considered negligible, additional circuit voltage drop is minimal -- given the control bus voltage of greater than, or equal to, 113.8 volts and the trip coil minimum operating voltage of 100 volts, it was determined by review that all breakers required to trip would do so.

Therefore, no "further" analysis of these circuits was performed.

2. 480V Shutdown Board Circuits:

As with the 6.9kV shutdown boards, immediately upon loss of AC power, automatic load shedding of selected loads occurs on the 480V shutdown board. Based upon the maximum number of load shed circuits, board 2A1-A was selected for analysis.

Load current was determined by summing the demand of those breakers tripping for automatic load shedding with the demand for normal bus loading. (Normal bus loading includes various auxiliary components, e.g., relays, etc.) Using this value, voltage drop from the battery board to the 480V shutdown board was calculated. Since the undervoltage relays initiating load shedding are located at the 6.9kV shutdown board logic relay panels, the voltage drop from the 480V board to the relay panel was calculated. From this information, the voltage at the breaker trip coil was determined -- in all cases this value exceeded the 90V minimum required operating voltage.

3. Fuse Assemblies Columns:

Five circuits from each of the four battery boards were analyzed, with each of the circuits having a different physical destination. This gave a representative range of voltage drops.

Only one of the 20 circuits analyzed initially was found to have inadequate voltage: 2-FSV-68-397. Three other circuits similar to this one were evaluated in the "further" AC analysis; only valve 2-FSV-68-396 was found to have inadequate voltage.

4. Auxiliary Relay Racks:

One of the four total auxiliary rack circuits was initially selected. This one circuit contains 24 solenoid valves in parallel. Excessive voltage drop was found in the circuit. Similar circuits involve each of the remaining three safety-related racks. An evaluation of the equipment powered from the four racks has determined that the solenoid valves are not required for safe shutdown; therefore, no "further" analysis is required.

4

5. Reactor Trip Switchgear Trip Breakers:

One of the four circuits and the reactor trip switchgear bypass breakers were analyzed with no problems identified.

6. 120V AC Vital Inverters

All eight vital inverters were analyzed.

All four of the unit 1 vital inverters were found to have terminal voltage below the required 105V minimum. This problem is documented in SCR SQNEEB8605. The unit 2 inverters arerated 100V minimum and were determined to have sufficient voltage at the terminals. Since all inverters were examined, no additional calculations are required.

For those categories in which no problems were discovered, additional examinations ("further" analyses) were not performed.

II. 120V AC VITAL CONTROL POWER SYSTEM (120V AC VCPS)

Upon examination of the 120V AC VCPS loads, four circuit categories were identified and subdivided for analysis as follows:

	Total Circuits	No. Initially Sampled	No. Problem Circuits	No. Sampled in Further Analysis
1. Radiation Monitors				
a. Rad Rate Meters	4	1	1	3
b. Misc Rad monitors	12	4	0	0
2. Solenoid Valves				
a. Post Accident Smpl.	4	4	4	0
b. Misc. Solenoids	18	4	0	0
3. Inst. and Control				
a. NIS	16	0	N/A	2
b. BOP	4	1	0	0
c. RVLIS	4	3	3	1
d. Process Prot Sets	8	1	0	0
e. Inst. Busses	4	0	N/A	1
f. Aux Bldg Inst Busses	4	1	0	0
g. AFPT Control	8	1	0	0
h. ABGTS Fan Control	2	0	N/A	1
i. Aux Dryers	2	0	N/A	1
j. Boric Acid Tank Htrs	6	1	0	0
4. Relay Circuits	48	5	0	0

The categories were defined and the circuits assigned based upon component and configurational similarities.

Within each category a representative sample of not less than ten percent of all circuits was selected for the initial analysis. When problem areas were identified within a subcategory, the remaining circuits within that subcategory were analyzed, yielding a one-hundred percent sample rate for all problem areas. If, in the initial analysis, no circuit deficiencies were identified, no "further" analysis of that category/subcategory was performed. A "further" analysis was performed on those subcategories which were not initially analyzed (items 3a, 3e, 3h and 3i).

By assigning each 120V AC and 125V DC VCPS circuit to a category based upon component and/or configuration similarities, and by evaluating a representative sample of each category, problem areas were identified in TVA's design. These problem areas were then completely analyzed to identify any and all further deficiencies. In this manner an acceptable degree of confidence in the adequacy of TVA's VCPSs has been achieved.

The problem areas identified in the original 125V DC and 120V AC VCPS analyses were documented in SCRs SQNEEB8605 R0 and SQNEEB8532 R0 and have been determined not to be reportable. Each SCR has been revised to reflect the problems found the 125V DC and 120V AC VCPS "further" analyses. Only the corrective action for the problems identified in SQNEEB8532 R0 have been determined. This corrective action involves the pulling of additional cables prior to restart. A review of SQNEEB8532 R1 and SQNEEB8605 R1 is being performed by TVA to determine if corrective action is required and, if so, whether the action is required prior to restart. These SCRs will be evaluated for reportability.

TVA has contracted with Sargent and Lundy Engineers to perform an independent assessment of the electrical calculation program for each nuclear plant. This assessment includes a review of those calculations deemed by TVA to be required prior to startup, the rationale and methodology for identifying these calculations, a review of FSAR commitments, and a sample review of selected electrical calculation documents. Sargent and Lundy is presently scheduled to complete their assessment of the SQN Electrical Calculations Program by March 7, 1986.

PHASE TWO

Phase two of the electrical calculations program involves an interim design change review program that has been in effect since February 12, 1986, and will remain in effect until the long-term program (phase three) is in place. This program has been developed to:

1. Ensure that those calculations performed for restart are maintained up to date.
2. Ensure that the design changes which were in progress and not reflected on the drawings used for the restart calculations have been adequately evaluated, and
3. Ensure that all design changes issued since January 22, 1986, are adequately evaluated with respect to the revision of an existing calculation or development of a new calculation.

The electrical calculations performed as part of this program prior to restart utilized design drawings which reflect the designed configuration as of November 1985.

Any design changes initiated since that time which may affect these calculations will be evaluated and resolved as part of Phase two.

PHASE THREE

The long-term electrical calculations program (phase three) is currently being evaluated. The present objective of this program is (1) to develop software programs and an electrical data base for all future calculations to establish consistency between nuclear projects, (2) to ensure that all future work is incorporated into the design change process, and (3) to be more responsive and timely in the performance of electrical calculations. In addition, training will be conducted to ensure that engineers and designers are both technically and procedurally competent.

EMPLOYEE CONCERNS

As of February 1, 1986, four employee concern issues have been identified from the Employee Concern Program that are related to the electrical calculations. These issues involve:

1. Loading on the AC and DC electrical systems, including diesel generator loads
2. Cable ampacity problems, with respect to cable derating, and
3. Potential equipment damage as a result of station overvoltage
4. Electrical circuit separation

Each of these issues will be addressed in this program.

APPENDIX A

AUXILIARY POWER SYSTEM

RESTART CALCULATIONS

FOR

SEQUOYAH NUCLEAR PLANT

0817A

APPENDIX A

AUXILIARY POWER SYSTEM

RESTART CALCULATIONS

FOR

SEQUOYAH NUCLEAR PLANT

TVA 10697 (OE 4-85) **QA Record** OE CALCULATIONS

TITLE: AC APS Voltage and Loading Analysis	PLANT/UNIT: Sequoyah U1 & U2
PREPARING ORGANIZATION: DETS-EEB	KEY NOUNS (Consult RIMS DESCRIPTORS LIST): Auxiliary Power, Voltage Analyses

BRANCH/PROJECT IDENTIFIERS: OE2-EEBCAL001

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
R0		B43 '86 0131 913
R_		
R_		
R_		

APPLICABLE DESIGN DOCUMENT(S): ANSI C84.1, IEEE 141, DG E.2.4.6

SAR SECTION(S): 8.0 — UNID SYSTEM(S): N/A

	Revision 0	R1	R2	R3
ECN No. (Indicate if Not Applicable)	N/A			
Prepared	Part 1: R.J. Moyer Part 2: L.G. Farrell Part 3: L.G. Farrell			
Checked GLH	Part 1: A.M. Frederick Part 2: R.J. Moyer Part 3: R.J. Moyer			
Reviewed	[signature]			
Approved	M.J. SCRUGGS/GNM			
Date	1-31-86			
List all pages added by this revision.				
List all pages deleted of this revision.				
List all pages changed by this revision.				

Use form TVA 10534 if more room required.

Statement of Problem

OQA Audit Deviation Report D51-A-84-0006-D01 identified a "failure to establish an adequate system to ensure that calculations/studies performed by EEB's Auxiliary Power Systems Section are updated and revised to support the design as changes are made after plant operation." Subsequent to this report, EEB reviewed existing calculations for all nuclear plants to determine their adequacy. Loading and voltage calculations were found to be outdated by numberous ECN changes.

Abstract

See Attached.

SEQUOYAH NUCLEAR PLANT
AC APS VOLTAGE AND LOADING ANALYSIS
OE2-EEB-CAL001

Abstract

Three sets of Auxiliary Power System (APS) calculations are contained in this study: (1) APS loading analysis, (2) medium-voltage voltage calculations, and (3) 480V Class 1E steady-state and transient voltage calculations.

The APS load analysis determines and documents power distribution equipment loading for the following plant operating modes: full-load operation, emergency shutdown, full-load rejection, and cold shutdown.

The medium-voltage plant/grid interface voltage calculation determines and documents the steady state voltages for 6.9kV unit and shutdown boards for full load rejection, emergency shutdown, and full load operation with maximum and minimum unit generator/offsite power supply voltages. Common and unit station service transformer voltage tap settings were reestablished to ensure medium voltage board voltages stay within range B of ANSI C84.1 (6560V-7260V) for previously established 161kV grid and main generator operating ranges.

The 6900V and 480V steady state and transient voltage calculations determines and documents the transient and steady state voltage profile at all class 1E auxiliary power system buses and safety related motor terminals for design basis conditions with the 6.9kV shutdown boards operated at a minimum steady-state voltage equal to the lower limit of ANSI C84.1, range B (degraded voltage setpoint). 6900/480V power transformer voltage tap settings were re-established to ensure adequate load operating voltages. Calculations were also performed to document compliance with the upper voltage limit of ANSI C84.1, range B during lightly loaded conditions.

These analyses replace the following analyses and studies:

1. Plant/Grid Interface Analysis (EEB 800214 940)
2. CSST C Addition Study (EEB 830302 911)
3. Auxiliary Power System Study (EEB 791101 915)
4. Supplementary Voltage Calculations for Equipment Qualification (B43 851023 912)
5. 480V Class 1E Final Design Review (EEB 831026 937)
6. Degraded Voltage Study (EEB 810205 908)
7. Re-evaluation of 480V C&A Building Vent Board's Common Power Supply (B43 50315953)

Summary of Conclusions

Conclusions for each of the three analyses performed are located on pages 14, 21, and 28 of volume 1. All deficiencies identified for Class 1E loads have been documented as conditions adverse to quality in SCR SQNEEB 8607.

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SEQUOYAH NP
OE2:EEBCALOO1 SHEET 1-A OF

VOLUME I
AC APS VOLTAGE and LOADING SUMMARY COMPUTED [illegible] DATE 1/31/86
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TABLE OF CONTENTS

TVA 11030 (WM 7.75)

Sequoyah Nuclear Plant
AC APS Voltage and Loading Analysis
OE2-EEB-CAL001

1.0 Purpose

The Auxiliary Power System (APS) load analysis was performed to determine and document the power distribution equipment loading profile for the following plant operating modes: full-load operation, full-load rejection, emergency shutdown (safety-injection (SI) with phase A containment isolation and B containment isolation), and cold shutdown.

2.0 Assumptions

2.1 Redundant equipment required to support normal full-power and full-load rejection modes of operation is assumed to be running on train A, but off on train B.

2.2 Redundant equipment is shown operating simultaneously in both Train A and Train B for the emergency shutdown (phase A and B containment isolation) mode of operation.

2.3 Intermittent loads are considered off for normal full power and full-load rejection modes of operation.

2.4 Summer seasonal loading is modeled.

2.5 Per SQN NUC PR personnel only one component and its supporting equipment (per train) will be tested concurrently. (This is an unverified assumption).

2.6 Hotwell pumps do not trip on safety injection or full-load rejection. (This is an unverified assumption.)

2.7 OE design drawings accurately reflect the plant as-built configuration. (This is an unverified assumption.)

2.8 The field cold-shutdown operational data is representative of loading during this mode of operation.

2.9 Full load rejection and normal operation loadings are the same except the following loads which start on a full load rejection:

Auxiliary feedwater pumps

Main feedwater isolation valves

Turbine Turning Gear Oil Pump (starts after a time delay)

3.0 Sources of Information

3.1 Miscellaneous TVA documents

3.1.1 TVA Pressurized Water Reactor Systems Manuals (Volumes 1 and 2), Sequoyah Nuclear Plant, Engineering Training Section, Power Operations Training Center.

3.1.2 Electrical Design Guide DG-E.2.4.6, AC Auxiliary Power System Design Equipment Typical Data, Revision 0, 3/15/85.

3.2 Single Line Drawings

The single line drawings, with their revision level, used are listed below. These drawings depict the design configuration of the electrical system as of November 25, 1985.

35W716-1, R10
35W716-2, R 8
35W716-3, R 2
45N721-1, R17
45N721-2, R 9
45N721-3, R 2
45N721-4, R 2
45N724-1, R21
45N724-2, R21
45N724-3, R19
45N724-4, R19
45N732-1, R19
45N732-2, R15
45N749-1, R20
45N749-2, R22
45N749-3, R19
45N749-4, R19
45N751-1, R21
45N751-2, R19
45N751-3, R18
45N751-4, R18
45N751-5, R22
45N751-6, R16
45N751-7, R17
45N751-8, R17
45N755-1, R16
45N755-2, R14
45N755-3, R15
45N755-4, R13
45N756-1, R21
45N756-2, R17
45N756-3, R19
45N756-4, R13
45N756-5, R19
45N756-6, R14
45N756-7, R19
45N756-8, R10

3.3 Schematic Drawings

The schematic drawings, with the revision level used in this study are listed as reference drawings on the following sheets:

Sources of Design Information
for: Power system Load Operational Modes

Description	Schmatic Dwg No.
6.9 kv Unit Aux	45N763-1 R-8
6.9 kv Unit Bd	-2 R-21
	-3 R-14
	-4 R-7
	-5 R-10
	-6 R-8
	45N763 -7 R-6

Sources of Design Information

sheet 1 of 2

for Power System Load Operational Modes

Description	Schmotic Dwg No.
480V shtdn Aux Pwr	45N779 - 1 R-14
• 480V shtdn Bds	-2 R-19
• 480V RMOV Bds	-3 R-12
• 480V C&A Bldg Vent Bds	-4 R-9
• 480V R Vent Bd	-5 R-24
	-6 R-10
	-7 R-12
	-8 R-23
	-9 R-20
	-10 R-17
	-11 R-17
	-12 R-24
	-13 R-25
	-14 R-20
	-15 R-21
	-16 R-18
	-17 R-17
	-18 R-16
	-19 R-18
	-20 R-24
	-21 R-21
	-22 R-25

SEQUOYAH N P
OE2-EEBCAL001

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Sheet 2 OF 2

for: Power System Load Operational Modes

45N779-24 R-19
-25 R-21
-26 R-15
-27 R-16
-28 R-9
-29 R-10
-30 R-15
-31 R-18
-32 R-12
-33 R-13
-34 R-10
-35 R-10
-36 R-11
-37 R-11
-38 R-8
-39 R-1
-40 R-3
-41 R-4
-42 R-1
-43 R-0
44 R-0

Turbo-Gen Aux 45N697-4 R-9

Sources of Design Information

for: Power System Load Operational Modes.

Description	Schmatic Dwg No.
6.9kv shutdown Aux Power	
• 6.9kv shutdown Bds.	45N765-1 R-13
	-2 R-15
	-3 R-17
	-4 R-11
	-5 R-13
	-6 R-15
	-7 R-14
	-8 R-12
	-9 R-10
	-10 R-12
	-11 R-13
	-12 R-7
	-13 R-13
	-14 R-13
	-15 R-15
	-16 R-13
	-17 R-9
	45N765-18 R-5

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Sources of Design Information

for: Power System Load Operational Modes

480V Dsl Aux Pwr	Schmatic Dwg No
. 480V Dsl Aux Bds	45N771-1 R-18
	45N771-2 R-14

Sources of Design Information

for: Power System Load Operational Modes

480V ERCW MCC

Schmatic Dwg No.

35W726-1 R-11

35W726-2 R-8

Sources of Design Information
(Vendor Drawings)
for: Power system Load Operational Modes

Description	Schmatic Dwg No.

4.0 Documentation of Assumptions

Assumption 2.1

This assumption is made to ensure that redundant loads are not considered twice in the total loading of the unit. By assuming all redundant loads are being powered by the same train, the worst-case voltage drop in the stations service transformer can be calculated.

Assumption 2.2

The computer program used in calculating the 480V system voltages, models the 6.9kV shutdown board as a constant voltage source. Therefore, the loading in any radial system (e.g. Train A) has no effect on any other radial system (e.g. Train B).

Assumption 2.3

Intermittent loads (e.g. valves, cranes, doors, elevators) operate infrequently or for short time periods, and are of small enough magnitude to be neglected.

Assumption 2.4

Waste heat from machinery is assumed to reduce environmental heating requirements when unit is operating.

Assumption 2.6

Per Sequoyah Engineering Project Site Personnel, Design Change Request (DCR) 1505, which removes the automatic trip for the hotwell pumps, and DCR 1503, which affects the condenser isolation valves on the main feed pump turbines to keep one condenser path always open for a vital trip, have been field implemented. This is an unverified assumption because the ECNs have not yet been implemented on design drawings.

Assumption 2.7

This field data was recorded 92 hours after a normal shutdown which represents loads operating during a cold shutdown.

5.0 CALCULATIONS

5.1 Requirements

N/A

5.2 Approach

5.2.1 Full-Load Operation, Full-Load Rejection and Emergency Shutdown

Loading for Class 1E boards and 6.9kV Unit Bds

Single lines drawings were reviewed to determine a list of the loads and their compartments on each board. The schematic drawing for each load was reviewed to determine the operation of the load for each operating mode considered by this study. Control and logic drawings and system functional descriptions (contained in reference

3.1.1) were used as supplemental information. SQN NUC PR personnel were consulted for information about the actual operation of the plant.

Loads on non-Class 1E 480V boards

The single line drawings were reviewed to determine a list of loads and their compartments. Intermittent loads were considered off. All other loads were evaluated for operation using system descriptions contained in reference 3.1.1. The loads considered operating for these non-Class 1E boards are shown in Appendix D.

5.2.2 Cold Shutdown

All loadings for the cold shutdown case were from measurements taken 92 hours after a normal shutdown. (See Appendix D)

5.3 Data

See Appendix D for recorded operational load data (92 hours after a normal shutdown.)

5.4 Computations

N/A

5.5 Summary of Results

The computer printouts in Volume 2 of this analysis show the modes of operation for the 6.9kV and 480V Class 1E loads and for the 6.9kV Unit Boards loads. The modes of operation identified are: normal operation, full load rejection, and emergency shutdown (phase A and B containment isolation). The loads are identified as being either off (-), running (R), starting (S), Delayed Starting (D), and Delayed Tripped (T) for each mode of operation.

The computer printout results for the 480V non-Class 1E board loadings are in Appendix D.

Conclusions

The results of the loading analyses are contained in Volume 2 for the 6.9kV unit boards and the 6.9kV and 480V Class 1E boards and in Appendix D for the remaining non-class 1E boards. These results are the basis for the board loading used for the steady-state and transient voltage calculations contained in volumes 3-7.

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1.0 Purpose

Auxiliary Power System voltage calculations were performed to determine and document the following:

1. Steady-State voltages at all medium voltage switchgear buses for cold shutdown, full load operation, normal shutdown, and emergency shutdown with maximum and minimum unit generator and offsite power supply voltages.

2. Transient and steady-state voltage profiles at medium-voltage Class 1E auxiliary power system buses and safety-related motor terminals for a design basis condition (Unit 2, SI with phase B containment isolation, and Unit 1, full-load rejection) and minimum offsite system voltages.

3. Optimum station service power transformer voltage tap settings.

4. Adequacy of present degraded voltage relay setpoints.

2.0 Assumptions

1. Safety injection signal with phase B containment isolation is worst case loading for 6.9 kV shutdown boards.

2. Bus impedance is negligible for calculations (Unverified assumption).

3. OE design drawings accurately reflect plant as-built configuration. (Unverified assumption)

4. Cable pull cards accurately reflect cable size, conductors per phase and actual length. (Unverified assumption)

3.0 Sources of Information

1. Loading for the 6900V and 480V boards are from the loading analysis section of this study.

2. Medium voltage motor parameters are from manufacturer data. (See Appendix B for motor data list)

3. Medium voltage cable information is from field verified cable data sheets. (See Appendix A)

4.0 Documentation of Assumptions

1. The worst system loading occurs on safety injection with phase B containment isolation signal because containment spray pumps start on a SI with phase B containment isolation, but not on phase A. All other medium voltage loading is the same.

5.0 Calculations

5.1 Requirements

The following areas were specifically addressed:

Plant/Grid Interface Voltage Calculation

This calculation determined and documented the steady state voltages for 6.9 kV unit and shutdown boards for cold shutdown, normal shutdown, emergency shutdown, and full load operation with maximum and minimum unit generator/offsite power supply voltages. Common and unit station service transformer voltage tap settings were established to ensure medium voltage board voltages stayed within range B of ANSI C84.1 (6560V-7260V) for 161 kV grid and main generator operating ranges.

Steady State and Transient Voltage Calculation

This calculation determined and documented the transient and steady-state voltage profile at the medium-voltage Class 1E auxiliary power system buses and safety-related motor terminals for design basis conditions with the 6.9kV shutdown boards operated at a minimum steady-state voltage equal to the lower limit of ANSI C84.1, range B (degraded voltage setpoint). Calculations were also performed to document compliance with the upper voltage limit of ANSI C84.1, range B during lightly loaded conditions.

5.2 Procedure

An in-house developed BASIC computer program, RADIAL (see Appendix E for program listing), was used for the plant/grid interface and steady state/transient voltage calculations. This program was run on personal computers. Hand calculations were performed for selected configurations to verify the adequacy of the computer code and model. RADIAL has also been checked by comparisons to calculations made with other computer programs. Specifically, the NRC PSB-1 test calculations performed for Watts Bar Nuclear Plant were made using computer program VNEW and checked using RADIAL (Auxiliary Power Test and Verification Study WBNP-2GDS77RP, EEB 840830 901).

Computer models were established for the following plant configurations:

A. With 2 CSST's available (offsite power connected):

1. CSST A and CSST C connected for Unit 1 with a full-load rejection and Unit 2 with a safety injection (phase B containment isolation)

2. CSST A and CSST C connected for Unit 1 with a full load rejection and Unit 2 with a safety-injection (phase A containment isolation)

3. CSST A and CSST C connected for a two unit full load rejection.

4. CSST A and CSST C connected for a unit in cold shutdown.

B. With one CSST available (offsite power connected):

1. CSST C connected for a two unit full-load rejection

2. CSST C connected for Unit 1 with a full-load rejection and Unit 2 with a safety-injection (phase B containment isolation)

C. USST connected (main generator connected):

1. USST 1A and 1B connected with Unit 1 full-power operation

2. USST 2A and 2B connected with Unit 2 full-power operation

For each of these models the loading for each bus was established by the following methods:

1. For medium voltage motors the motor and its associated cable were included in the computer network.

2. For 480V substations the constant kVA and constant impedance loading including transformer losses was obtained from 480V computer runs for each operating mode (See Appendix D) and was summed to the medium voltage buses.

3. Cables between buses were included in the computer model.

After the computer models were generated and checked, steady-state computer runs (t=10 sec) were made for configuration A.1, A.2, and A.3 to establish the minimum 161kV grid voltage that would be required to reset the degraded voltage relays following an initial DBA voltage transient. Loading for each configuration was compared. It was determined that the worst case was Unit 1 with a full load rejection and Unit 2 with a safety injection (phase B containment isolation).

For a CSST voltage tap setting of -2.5% the voltage established was 159kV. Using this voltage, computer runs at t=0 transient were run and a 6.9kV bus voltage was established for the 480V transient (t=0) voltage analysis.

Upper grid limits were also established from configuration A.4 (lightest loaded condition) computer runs at different CSST tap settings.

In addition, analyses of configurations B.1 and B.2 were performed for the case of one CSST out-of-service and a single failure of a second transformer. Because the automatic slow-bus transfer scheme is disabled on the 6.9kV shutdown boards, one train per unit will be transferred to the diesel generator. If operator action is taken to manually transfer the diesel powered shutdown boards to their alternate offsite power supply, this action would be taken after 10 minutes into the event. Therefore, these cases, B.1 and B.2, were modeled with the delayed motor trips on the 6.9kV unit boards having been accomplished and with all 6.9kV shutdown boards fed from CSST C.

Computer runs from configurations C.1 and C.2 were run to determine that the steady-state voltages at the 6.9kV shutdown boards for normal full-power operation are within the degraded voltage setpoints for minimum and maximum main generator operating voltages.

5.3 Summary of Results

	CSST C Connected		CSST A Connected	
	6.9 kV Shutdown Bds			
159kV, -2.5% tap w/2 CSSTs available	1A-A	2A-A	1B-B	2B-B
T=0				
U1-FLR, U2-SIØB	6575	6118	-	-
U1-FLR, U2-SIØA	6581	6212	6653	6269
T=10 sec (Steady State) U1-FLR, U2-SIØB	6692	6631	6752	6681
T= 2 min + U1-FLR, U2-SIØB	6718	6915	-	-
T = 0 sec U1-FLR, U2-FLR	6603	6553	6671	6640
T = 10 sec U1-FLR, U2-FLR	6692	6641	-	-
T = 10 min U1-FLR, U2-FLR	6707	6656	-	-

w/Only One CSST Available	CSST C Connected			
T = 2 min + UL-FLR, U2-FLR	6676	6620	6682	6626
T = 2 min + U1-FLR, U2-SIB	6683	6703	6689	6705

	6.9kV Shutdown Bds			
USST connected, Unit 1 U1-SIØB	USST 1A Connected 1A-A	USST 1B Connected 1B-B	USST 2A Connected 2A-A	USST 2B Connected 2B-B
t = 0, 22.8kV, +2.5 tap	6229	6239	6185	6146
Normal operation				
+2.5 to, 22.8kV	6620	6620	6630	6596
24kV	6990	6990	6999	6966
24.8kV	-	-	7245	7212
25.2kV	7355	7355	7368	7334

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U1-FLR, U2-SIØB - Summary of - Minimum allowable 161kV grid voltages W/2 CSSTs Available (Summary Based on CSST C being limiting case)

161 kV Grid (kV)	CSST Volt Tap	6.9 kV Shutdown BD Voltages 1A-A	2A-A
167	+2.5	6568	6111
163	Rated	6571	6114
159	-2.5	6575	6118
155	-5.0	6578	6121
151	-7.5	6582	6125

Cold Shutdown - Maximum Grid

161 kV Grid (kV)	CSST Volt Tap	6.9kV Shutdown Bd CSST C Connected 1A-A	CSST A Connected 1B-B
174	+2.5	-	7241
170	Rated	-	7251
166	-2.5	7245	7262
162	-5.0	-	7274
158	-7.5	-	7286

6.9kV Shutdown Bd Motor Voltages at U1-FLR, U2-SIØB, 159kV, -2.5 tap

Motor	Starting Terminal Voltage P.U. (T=0)	Required Starting Voltage P.U.	(T= Steady State) Running Voltage
Aux Feedwater Pump 1A	.951	.765*	.969
ERCW pump k-A	.858	"	.954
Aux Feedwater Pump 2A	.884	"	.960
Containment Spray 2A	.883	"	.960
RHR Pump 2A	.884	"	.961
Safety Injection Pump 2A	.884	"	.961
Centrifigal Charging Pump 2A	.883	"	.960
ERCW Pump Q-A	.857	-	.963
Centrifugal Charging Pump 1A	-	-	.969
Press HTR Group 1D	-	-	.97
ERCW Pump R-A	.857	.765	-

*80% rated

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7.0 Conclusions

Based on the results of the medium-voltage plant/grid interface voltage calculations, the following common and unit station service transformer voltage tap settings and 161kV grid and main generator limits should be maintained to ensure that 1) the 6.9kV shutdown boards stay within range B of ANSI C84.1 (degraded voltage setpoints) and 2) all 6.9kV Class 1E motors will have aequate starting and running voltages.

1. The acceptable ranges for the 161-kV grid for each CSST voltage tap setting are listed below.

CSST Voltage Tap	Minimum Grid (kV)	Maximum Grid (kV)
+2.5%	167	174
Rated	163	170
-2.5%	159	166
-5.0%	155	162
-7.5%	151	158

2. The main generator voltage should be limited to 24.8kV, to limit the 6.9kV shutdown board voltage to 7.26kV during normal operation. The USST voltage tap setting should remain at the 1.025 setting.

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1.0 PURPOSE

The 480V ac APS was analyzed to determine and document the following:

1. Steady-State voltages on all Class 1E 480V boards for full power operation, emergency shutdown (Safety Injection with phase A containment isolation and Safety Injection with phase B containment isolation), and full load rejection.

2. Transient and steady-steady voltage profiles at all 480V Class 1E auxiliary power system buses and safety-related motor terminals for design basis conditions (maximum Safety Injection load in unit two with a simultaneous full-load rejection in unit 1) and minimum offsite power system voltages.

3. Optimum power transformer voltage tap settings.

2.0 ASSUMPTIONS

1. Typical motor data from Design Guide DG-E2.4.6 Table 2.1 was used when actual data was not available. Assumed motor data was used entirely for the non-Class 1E balance of plant data files.

2. When vendor data was not available, minimum starting voltage of motors was assumed to be 85% of rated voltage, except for compressor motors which were assumed to start with 80% of rated voltage.

3. Motor operated valves were assumed to open at 80% of rated voltage. Motor operated valves without brakes were assumed to close at 63% of rated voltage. Motor operated valves with brakes were assumed to close at 80% of rated voltage.

4. Cable pull cards accurately reflect cable size, number of conductors per phase, and actual length. (This is an unverified assumption).

5. The power factor of heat trace and other heating loads is 100%. The power factor of lighting cabinets is 90%.

6. OE design drawings accurately reflect the plant as-built configuration. (This is an unverified assumption).

3.0 SOURCES OF INFORMATION

1. Loadings are from the Loading Analysis section of this study.

2. Transformer data is from manufacturer's tests. (See Appendix C)

3. Cable data is contained in Appendix A.

4. Motor and MOV data is contained in Appendix B.

5. The single line drawings with their revision level are listed in the loading analysis section of this study. These drawings depict the design configuration of the electrical system as of November 25, 1985.

6. Valve travel times indicated on the time sequence printouts located in Volume 8 were taken from the in-service testing inspection record for Surveillance Instruction (SI) 166. The results of SI 166 are contained in computer print-out MECH.TST T$0000, dated June 20, 1985.

7. Electrical Design Guide DG-E.2.4.6, AC Auxiliary Power System Design Equipment Typical Data, Revision 0, March 15, 1985.

8. ANSI C84.1-1982, American National Standard for Electrical Power Systems and Equipment Voltage Ratings (60Hz).

9. IEEE Std 141-1976, IEEE Recommended Practice for Electric Power Distribution for Industrial Plants.

4.0 DOCUMENTATION OF ASSUMPTIONS

Assumption 1

DG-E2.4.6 Table 2.1 gives motor data that is based on a comparison of the worst-case parameters of several vendors motors. This Design Guide has been approved for use with the Division of Engineering and Technical Services.

Assumption 2 and 3

See Appendix B for justification.

Assumption 4

Heating loads are resistive. High power factor ballasts are used in lighting circuits.

5.0 CALCULATIONS

A. Requirements

This calculation determined and documented the following:

1. Steady-State voltages on all Class 1E 480V boards for full power operation, emergency shutdown (Safety Injection with phase A containment isolation and Safety Injection with phase B containment isolation), and full load rejection.

2. Transient and steady-steady voltage profiles at all 480V Class 1E auxiliary power system buses and safety-related motor terminals for design basis conditions (maximum Safety Injection load in unit two with a simultaneous full-load rejection in unit 1) and minimum offsite power system voltages.

3. Optimum power transformer voltage tap settings.

B. Calculation Methods

1. General

Two in-house developed BASIC computer programs, VOLT and VOLT2, were used for the 480V steady-state and transient voltage calculations. These programs were run interactively on personal computers. An in-house developed BASIC data entry program, DATA, requested information from the user to prepare (1) data files that completely defined the 480V AC APS and its source of power and (2) loading files that defined starting or running losses for previously specified plant operating modes. The data files contained the following information for each Class 1E load:

Feeder board, compartment, English title, horsepower, full-load current, locked-roter current, starting power factor, running power factor and efficiency, and cable parameters (size, length, number of conductors)

The loading files contained the board and compartment numbers for starting and running loads as identified in the mode of operation printouts contained in the loading analysis (Volume 2) of this study.

Computer program VOLT was used to analyze the transient response of the 480V system and to sum the 480V system board loadings for use in the medium voltage system calculations. VOLT2 was used for steady state voltage calculations. It determined the starting and running voltage of every load for the condition of minimum source voltage and maximum board loading.

For each 6900/480 volt transformer, and it's associated boards, computer program VOLT, accessed the data and loading files and calculated the voltage at each 480V class 1E board and at the terminals of each starting and running load for a specified 6.9kV shutdown board voltage, transformer tap setting, and plant operating mode. The output of VOLT consists of voltage figures for equipment in the loading file for the mode of operation being studied.

For each 6900/480 volt transformer, and its associated boards, computer program VOLT2, accessed the data and loading files to establish base loadings for each board. It then calculated the running and starting voltage of every load in the data file. It recognized if the load was part of the base load and recalculated the board load to ensure that loads were not considered both running and starting simultaneously.

Results of both programs have been checked by accepted hand calculations as used to verify the original Sequoyah calculations study (480V Class 1E Final Design Review, EEB 831026 937). This was originally done in the Bellefonte Nuclear Plant 480V Auxiliary Power System Review -2GA0190RP (RIMS No. B43 851108 905). Reverification computer runs are contained in Appendix E.

II. Transient calculations

A. Condition: SI with phase B containment isolation

1. Time = 0 seconds

All loads that receive a SI or phase B isolation start signal, or receive a start signal as a direct result of either signal (such as main feedwater isolation and phase A containment isolation signals) are input as starting loads. Running loads were those required for normal operation. These starting and running load determinations were made in the loading analysis section of this study. The source voltage used was the minimum 6.9kV shutdown board voltage for the simultaneous start of SI and phase B containment isolation actuated loads as given in the medium-voltage calculation section of this study.*

Note: The medium-voltage calculations for a DBA showed a t=0 voltage of 6118V for CSST C, although the 480V calculations used 6125V as the voltage at the primary of the transformers. The reason for this was that CSST C is the only CSST that uses cable between its terminals and the start boards. The effect of these cables were not fully considered in the 480V analyses. The effect of these cables would lower the 480V voltages by a maximum of 0.5V or .1% of nominal and therefore considered negligable.

Addition computer runs were made to determine MCC pre-contactor actuation voltages at the initiation of the SI. These were modeled with only the switchgear loads starting. These runs are labeled with the extension (.Z00) contained in volume 4-7.

2. Time = approximately 5 cycles

   At this time closing valves that have at least 63 of rated voltage (80% of rated voltage for valves with brakes) are changed to running loads. The source voltage remains at its minimum value.

3. Time = 4 seconds and greater

   In preop test W-6.1F the duration of the transient in the medium-voltage system was measured to be 4 seconds. Calculations in the medium-voltage section of this analysis show that the 6.9kV shutdown board voltage will recover to an adequate value within 10 seconds to reset the degraded voltage relay. In these calculations the degraded voltage setpoint is used as the source voltage. This is done to determine 480V system adequacy for the minimum al'owable source voltage.

   The computer calculations that follow are "snapshots" of the power system at critical times in the transient. Acceleration times for motors and travel times for valves are evaluated to determine if the loads should be modeled as running, starting, or, in the case of MOVs, as seating or unseating. Loads that did not have adequate voltage were categorized as follows:

   1. Non-start due to insufficient voltage at all times.

   2. Non-start due to inadequate voltage to release brakes (MOVs).

   3. Non-start due to insufficient starting voltage before 16 second overload trip (MOV).

   4. Starts, but insufficient acceleration time before 12 second overload trip (motor).
   5. Starts, but inadequate operating time (MOV)

   6. Starts, but insufficient voltage to torque seat MOV closed.

   7. Unintentional start delay may jeopardize accident mitigation.

B. Condition: SI with phase A containment isolation

Time = 0 seconds

This condition was analyzed by the same method as the SI with phase B containment isolation, Time = 0 seconds condition. The resultant equipment voltages were compared as the results of the SI with phase B containment isolation. The comparison showed that the SI with phase B containment isolation gave the worst-case transient voltages. Therefore it was not necessary to perform a detailed transient analysis of this condition.

III. Steady state calculations

A. Condition: SI with phase A containment isolation

Steady-state, time = 2 hrs +

All SI and phase A containment isolation MOV operation have been completed. Motors that were started in the transient case have reached running speed. Loads required to be manually started after an accident are running. The medium-voltage system voltage is assumed at the degraded-voltage setpoint. This is the worst-case loading.

B. Condition: SI with phase B isolation

Steady-state, time = 2 hrs +

All SI and phase B containment isolation operation have been completed. Motors that were started in the transient case have reached running speed. Loads required to be manually started after an accident are running. This total load was compared with the loading for the SI and phase A containment isolation condition. The SI and phase A containment isolation condition loading is greater therefore no further calculations are necessary for this condition.

6.0 Results

The results of the class 1E 480V system voltage calculations are in volumes 4 through 7 of this analysis.

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7.0 Conclusions

A. Transient Voltage Starts

1. The transient (T=0) voltage calculations for a phase B safety injection actuation show that the following loads may have (1) a non-start due to insufficent starting voltage (fail code F1 or, (2) a non-start due to inadequate voltage to release the MOV brakes (fail code F2):

Component Cooling System Pumps 2A-A, 2B-B, C-S
1-FCV-62-63
1-LCV-62-135
1-LCV-62-136
Penetration Room EL 669 Cooler Fans 1A-A
Penetration Room EL 690 Cooler Fans 1A-A
Penetration Room EL 714 Cooler Fans 1B-B, 2A-A
RHR Pump Room Cooler Fans 1A-A, 2A-A
Containment Spray Pump Room Cooler Fans 1A-A, 2A-A
CCS & AFW Pump Space Cooler Fans A-A, B-B
Centrifugal Charging Pump Cooler Fans 1A-A
Spent Fuel Pit Pump Space Cooler Fans B-B
1, 2-FCV-3-33
1, 2-FCV-3-47
1, 2-FCV-3-87
1, 2-FCV-3-100

2. The transient (T=0) voltage calculations for a phase B safety injection actuation show that the following loads will have adequate voltage to start after a time delay, but may have insufficent acceleration time before its overload heater trips.

Auxiliary Gas Treatment System Fans A-A, B-B
Emergency Gas Treatment System Fans A-A, B-B
Diesel Generator and Electric Panel Vent Fans 1A-A, 1B-B, 2A-A, 2B-B
Diesel Generator Room Exhaust Fan 1A-A, 1B-B, 2A-A, 2B-B
Diesel Generator Muffler Room Exhaust Fan 1A-A, 1B-B, 2A-A, 2B-B
Control Building Emergency Pressuring Air Fan A-A, B-B
Control Building Emergency Air Clean Fan A-A, B-B
Pipe Chase Cooler Fans 1A-A, 1B-B

3. The transient (T=0) voltage calculations for a phase B safety injection actuation show the following MOVs may have an unintentional start delay of approximately four seconds due to inadequate starting voltage. This delay would cause the MOVs to exceed the maximum opening or closing time specified in FSAR table 6.3.2-1.

1, 2-FCV-74-12	1, 2-FCV-63-25
1, 2-FCV-63-26	1, 2-FCV-63-40
1, 2-FCV-63-39	1, 2-FCV-74-24

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4. The following valves also have an unintentional start delay of approximately four seconds. The status of these valves has not yet been determined.

   1, 2-FCV-72-39
   1, 2-FCV-72-2
   0-FCV-67-152

B. Individual Motor Starts

1. The following Class 1E loads failed the single motor start criteria; 80% of rated for MOV's, 80% of rated for compressor motors, 85% of rated for all motors where vendor data was not available.

Board	Load	Term Actual	Voltage % Required
Shutdown Bd 1A2-A	Fire Pump 1A-A	84.8	85
Reac MOV 1B1-B	Backflow Gate Hoist 1B-B	80.8	85
	Containment Sump Flow Vlv (1-FCV-63-73)	73.3	80
Shutdown Bd 1B2-B	Fire Pump 1B-B	79.6	85
Shutdown Bd 1A1-A	CCS Pump 2A-A	78.7	80
	Spent Fuel Pit Pmp C-S	82.1	85
Reac MOV 2A1-A	Component Cool Bstr Pmp AA	83.9	85
	Backflow Gate Hoist 1A-A	80.2	85
Shutdown Bd 2A2-A	Fire Pmp 2A-A	75.8	85
Shutdown Bd 2B1-B	CCS Pump 2B-B	78.9	80
Reac MOV 2B1-B	Refuel Purification Pmp B	84.6	85
	Backflow Gate Hoist 2B-B	82	85
Shutdown Bd 2B2-B	Fire Pump 2B-B	78.7	85
	CCS Pump C-S	71.5	80
Reac MOV Bd 2A2-A	2-FCV-3-87	71.9	80
	Stm Gen Isol Feedwater Isol Vlv		
Reac MOV 1A1-A	Backflow Gate Hoist 1A-A	80.2	85
C&A Vent Bd 1B2-B	E MN Stm Vault Fan	84.1	85

The preceeding A.1-A.3, and B items have been documented by SCR SQNEEB8607.

TVA 10697 (OE-4-85)

OE CALCULATIONS

TITLE Class IE Motor Control Center (MCC) Control Circuit Undervoltage Calculations	PLANT/UNIT SQN 1 & 2
PREPARING ORGANIZATION DETS-EEB-SQEP-E3	KEY NOUNS (Consult RIMS DESCRIPTORS LIST) MCC Control Circuit UV Study

BRANCH/PROJECT IDENTIFIERS

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
R0		B25 '86 0127 301
R __		
R __		
R __		

APPLICABLE DESIGN DOCUMENT(S)

SAR SECTION(S)

UNID SYSTEM(S)

Revision 0	R1	R2	R3
ECN No. (Indicate if Not Applicable)			
Prepared Peter F Bonman			
Checked J.E. Blandford			
Reviewed R.P. Reese			
Approved [illegible]			
Date 1-31-86			
List all pages added by this revision.			
List all pages deleted of this revision.			
List all pages changed by this revision.			

Use form TVA 10534 if more room required.

Statement of Problem

To determine the ability of the Class IE MCC control circuits to pickup the control devices (motor starters, relays, solenoids, etc.) under degraded voltage conditions.

Abstract

All Class IE circuits powered from Class IE motor control centers (MCC) were researched with regard to the control circuit being able to pickup the control device (motor starter, solenoid, relay, etc.) under degraded voltage conditions. Each circuits auto control path was reviewed with regard to the control power transformer, load parameters, cable length and wire sizes. This information was put into a computer data base for computation based on the ONCC bus degraded voltage provided by EEB calculation OE2 EEBCAL 001.

The computer calculation indentified thirty-eight (38) circuits whose control voltage was less than 93.5 volts (85% of 110 volts) and these are shown in the Summary of Results section. Investigation of these 38 circuits show that no adverse affect will result if these circuits are delayed from 15-30 seconds. This is documented in attachment 5. Should any of these starters "chatter" due to the low voltage, investigation revealed the type fuse protecting the circuits will not open for 180 seconds thus allowing ample time for the voltage to restore to a value that would energize the motor starter.

RIMS, SL26 C-K [Return original to R. P. Reese [illegible]]

CONTENTS

PURPOSE

To determine the control voltage applied to control devices for class IE MCC circuits under degraded voltage conditions.

ASSUMPTIONS

1. GE transformer curves were used.

2. Minimum pick-up voltage is 85 percent of operating voltage.

3. Magnitude correction factor was used for Allis-Chalmer starters.

4. Cable lengths were increased by 15 percent over designed length.

5. Loads controlled by A contacts were neglected.

REFERENCE

1. Characteristic cable impedance study (EEB 810723 912)

2. Transformer data from GE regulation curves (Attachment 1)

3. Minimum pickup voltage determined using NEMA standard ICS2-110.41

4. Starter information from Allis-Chalmer Bulletin ICD 1004-05
   (Contract No. 76K-85840) ICD 1005-03
   ICD 1006

5. MCC Control Circuit Max. Cable length (B25 860127 300)

   Arrow-Hart Contract #71C2-54752

   TVA Schematic Drawings
   35W726 series
   45N771 series
   45N779 series

   Schematic sheet number and revision level are noted for each load on the associated block diagram.

DESIGN INPUT DATA

Information collection:

All Class IE circuits fed from Class IE MCCs were identified. Circuits that have an automatic control mode were identified and information on their control power transformers and starters were documented. Also, any other components (relays, solenoid valves, heaters, etc.) that would be energized by the control transformer prior to or at the time the starter coil is energized were documented. Using the connection diagrams as a base, block diagrams were prepared that show the cable number and routing for all circuits involved. The SEQUOYAH Conduit and CABLE Summary Schedule was used to identify the length and wire size of each cable (see attachments 2).

Voltage calculations:

Information from above was input into an IBM-PC using Lotus 123 program. Formulas were derived to calculate the voltage at the starter based on cable length, primary voltage, auxilliary loads, transformer size and starter size (see computations).

The formulas were then input into the data base and both Voltage at Load, V_L, and phase angle was calculated. (See Attachment 3.)

DOCUMENTATION OF ASSUMPTIONS

Minimum pick-up voltage was determined by NEMA ICS2-110.41. Arrow-Hart starter calculations were made at 85 percent of 110 volts which is the minimum operation voltage based on ITE test data. Allis-Chalmer starters were 85 percent of 120 volts since no other test data was available.

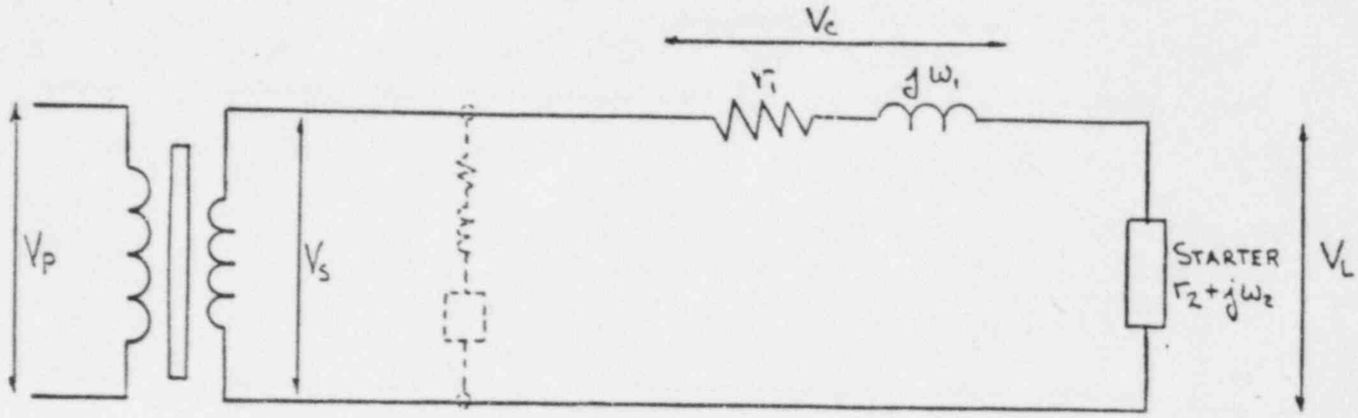
Magnitude correction factor was used for Allis-Chalmer starters since no other information was available other than inrush volt-amps.

Voltage calculation were done with a 15 percent increase in cable length to account for variances in designed lengths and pulled lengths. Watts Bar Nuclear Plant had done a survey and found a 7 percent difference . Our survey of approximately 100 cables of long lengths (over 200 feet) showed a percentage of plus or minus 11 percent.

Loads controlled by A contacts were neglected because A contact closure is after starter seal-in.

SUBJECT Formula Derivations - Computations PROJECT SQN 1 & 2

Peter T Bowman Jan 27, 1986 J. E. Blanchford Jan 30, 1986
COMPUTED BY DATE CHECKED BY DATE



V_P = bus voltage

V_S = secondary side source voltage $= \frac{V_P}{460} * \alpha * 115v$

$= V_S' \measuredangle 0°$

α = percent rated control power transformer (cpt) output voltage, is determined from:

a) Inrush current (I_{in}) is computed for size starter:

$$I_{in} = \text{Starter } VA_{in} \text{ @ } V_{L(min)} \div V_{L(min)}$$

(See RIMS B25860127300 MCC Control Circuit Max Cable length)
note: loads on transformer side of cable should be added to total current for finding α.

b) The total value of current is used on cpt regulation curves (attachment 1) to find the percent rated output voltage, α.
note: loads that are resistive (eg heaters), the 1.0 pf curve is used only for its own current.

SUBJECT Formula Derivations - Computations PROJECT SQN 1&2

Peter A Bowman Jan 27, 1986 COMPUTED BY DATE J.E. Blandford CHECKED BY Jan 30, 1986 DATE

The phase angle of V_s is considered zero since it is included in the CPT curve.

$r_1 = X \text{ ft} * (a\,\Omega / 1000\text{ft})$

$\omega_1 = X \text{ ft} * (b\,\Omega / 1100\text{ft})$

r_2 = starter watts

ω_2 = starter VARs

$V_S = V_C + V_L$

Using voltage division, voltage across the starter equals

$$V_L = V_S * \left| \frac{r_2 + j\omega_2}{r_2 + j\omega_2 + r_1 + j\omega_1} \right|$$

$$\text{Let } C = \left| \frac{r_2 + j\omega_2}{r_2 + j\omega_2 + r_1 + j\omega_1} \right| = \left| \frac{r_2 + j\omega_2}{r_1 + r_2 + j(\omega_1 + \omega_2)} \right| = R_T \angle \theta$$

$$V_L = V_S * C = (V_S \angle 0^\circ)(R_T \angle \theta) = V_S * R_T \angle \theta$$

PERSONNEL INVOLVED IN RESEARCH AND VERIFICATION PROCESS

JEB - Joseph E. Blandford
PTB - Peter T. Bowman
CTB - Charles T. Broughton
SJC - Seigfried J. Caruthers (JS)
PD - Paul Dimitrik (JS)
OLG - Orville L. Goodwin (JS)
WHI - William H. Ince (JS)
RPR - Robert P. Reese
PAS - Peter A. Saluteen (JS)
JRT - James R. Thomas (JS)
SW - Shoukat Waris (JS)

(JS) - Job Shop Personnel employed by TVA.

SUMMARY OF RESULTS

Thirty-eight (38) circuits failed to meet the 93.5 volt minimum at their respective starter. They are tabulated below:

Board	Cpt	Component	Voltage @ Starter
Diesel Aux 2B2	6A	D-G Ht Exch Vlv(2-fcv-67-67)	92.80
Reac Mov 1A1	15C	UHI Gag Motor	93.41
C & A Vent 1A1	4A	Pen Rm Clr Fan	91.22
	4B	Pen Rm Clr Fan	91.35
	4C	Pen Rm Clr Fan	91.90
	5A	RHR Rm Clr Fan	91.70
	5B	CS Rm Clr Fan	91.80
	5C	CCS & AFW Rm Clr Fan	91.87
	7D	Batt Rm Exh Fan	92.36
	10A	Batt Rm Exh Fan	92.36
	10B	SIP Rm Clr Fan	91.69
	11A	SFP Rm Clr Fan	91.66
	12A	Batt Rm Exh Fan	93.02
C & A Vent 1B1	3B	SIP Rm Clr Fan	92.17
	4A	Pen Rm Clr Fan	92.50
	4B	Pen Rm Clr Fan	92.56
	4C	Pen Rm Clr Fan	91.93
	5A	RHR Rm Clr Fan	92.15
	5B	CS Rm Clr Fan	92.39
	5C	CCS & AFW Rm Clr Fan	92.98
	9A	Batt Rm Exh Fan	93.25
	9C	SFP Rm Clr Fan	92.09
	12A	Batt Rm Exh Fan	93.25
C & A Vent 2A1	4A	Pen Rm Clr Fan	92.55
	4B	Pen Rm Clr Fan	92.50
	4C	Pen Rm Clr Fan	92.05
	5A	RHR Rm Clr Fan	91.96
	5B	CS Rm Clr Fan	92.17
	5D	EGTS Rm Clr Fan	92.62
	7D	Batt Rm Exh Fan	93.43
	10A	Batt Rm Exh Fan	93.43
	10B	SIP Rm Clr Fan	92.02
	11A	AFW & BA Rm Clr Fan	92.61
C & A Vent 2B1	3B	SIP Rm Clr Fan	92.94
	4A	Pen Rm Clr Fan	93.06
	4B	Pen Rm Clr Fan	93.23
	4C	Pen Rm Clr Fan	93.39
	5A	RHR Rm Clr Fan	93.41

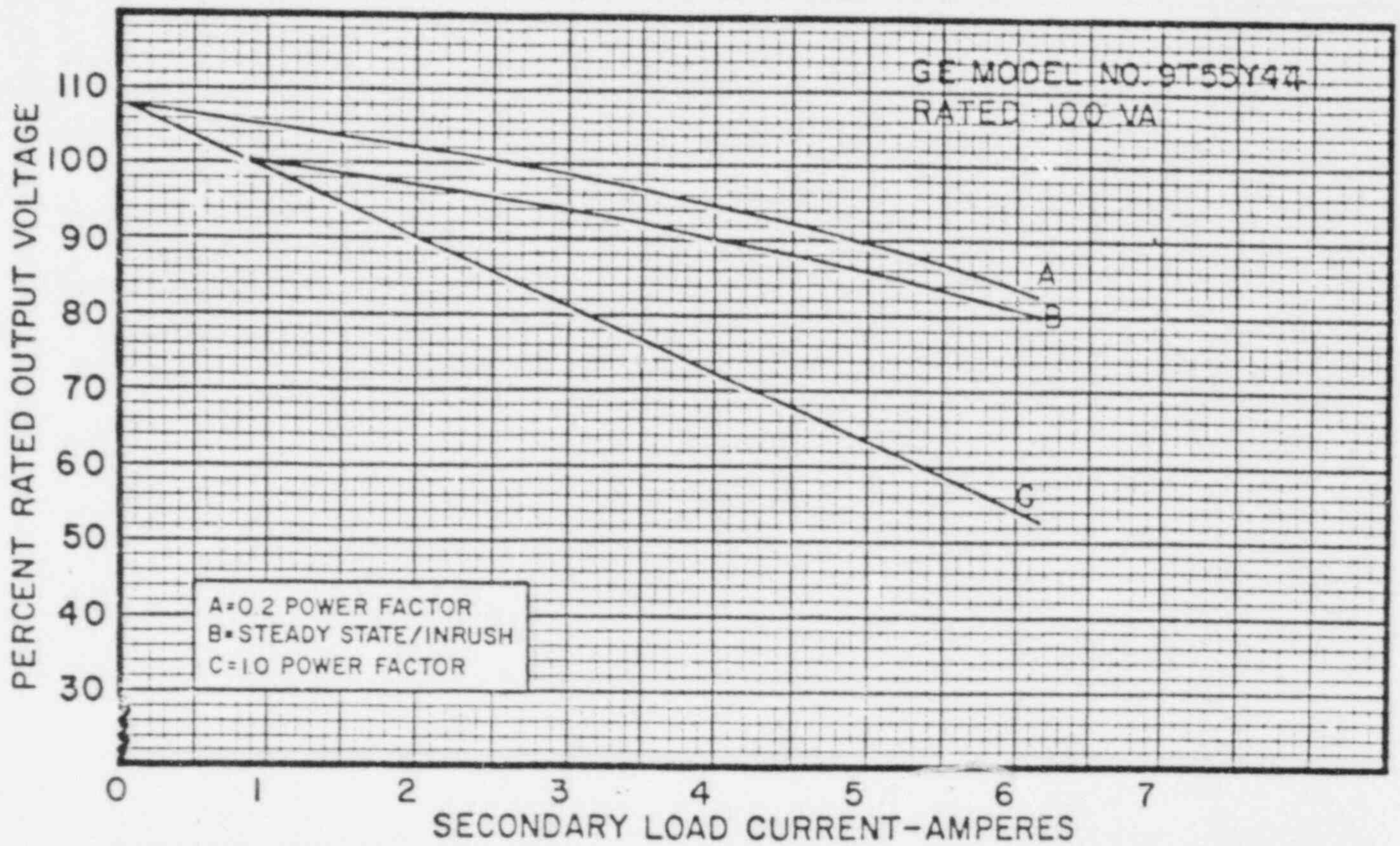
CONCLUSIONS

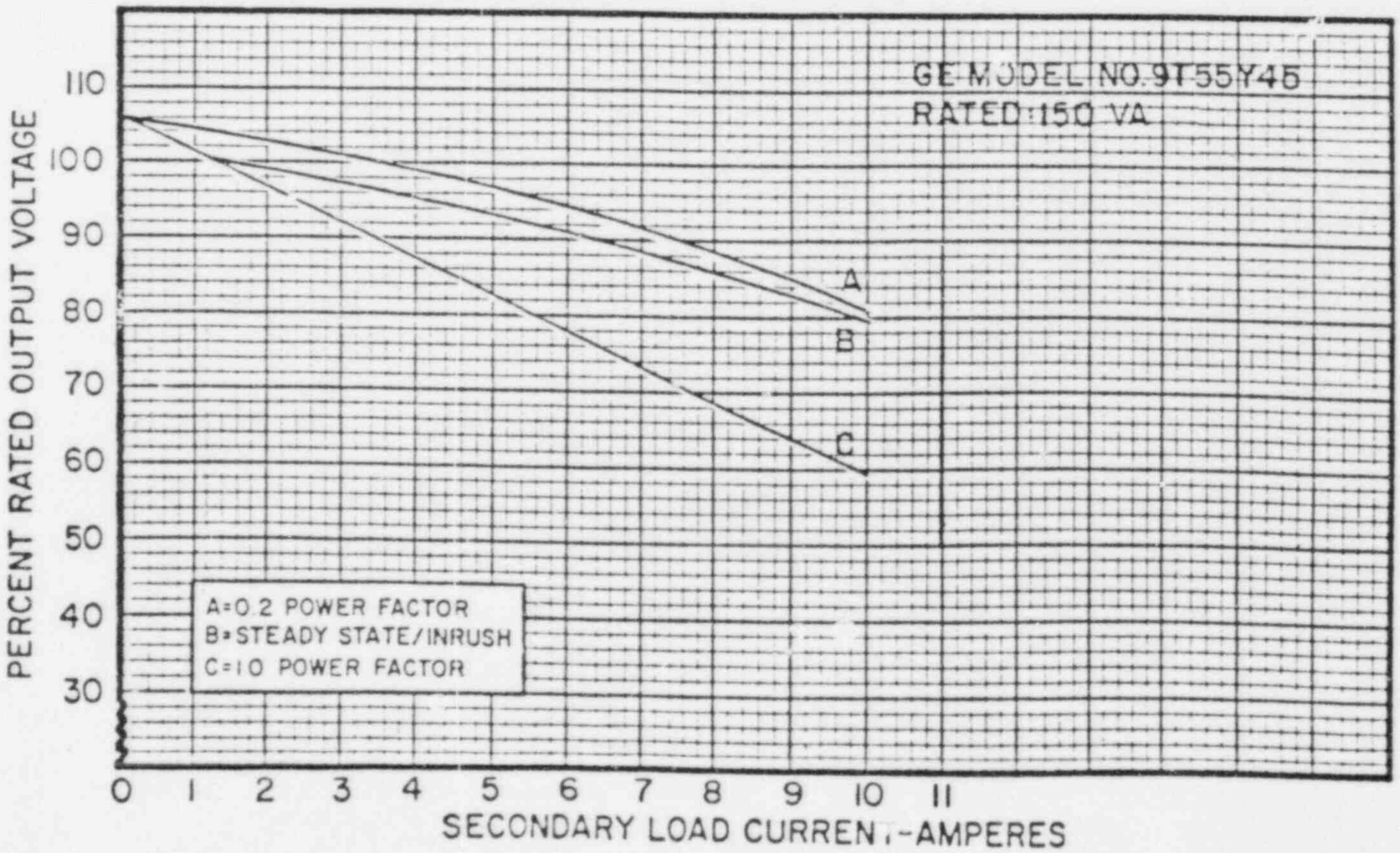
All thirty-eight (38) circuits which failed during the degraded voltage conditions were found to present no adverse affect if their pickup and seal-in were to be delayed due to the undervoltage condition. (See Attachment 5.)

In the event of starter chatter produced by failure to pick up during a period of degraded voltage the control circuits of the 38 circuits are fused by Bussman type FRN 1 and will not open circuit at a inrush current of 1.6 amp for 180 seconds.

MACHINE TOOL TRANSFORMERS

REGULATION CURVES* (cont'd)

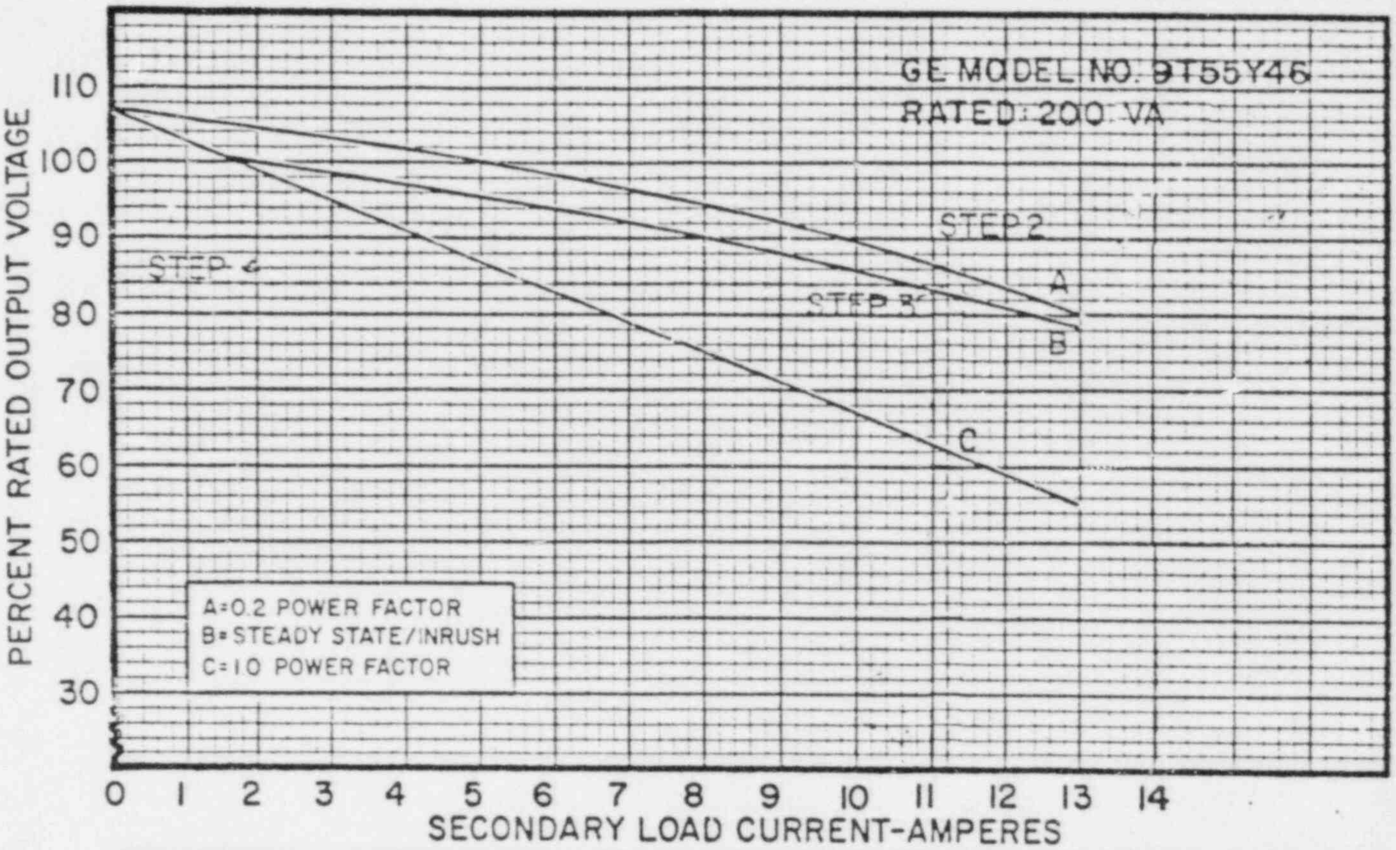


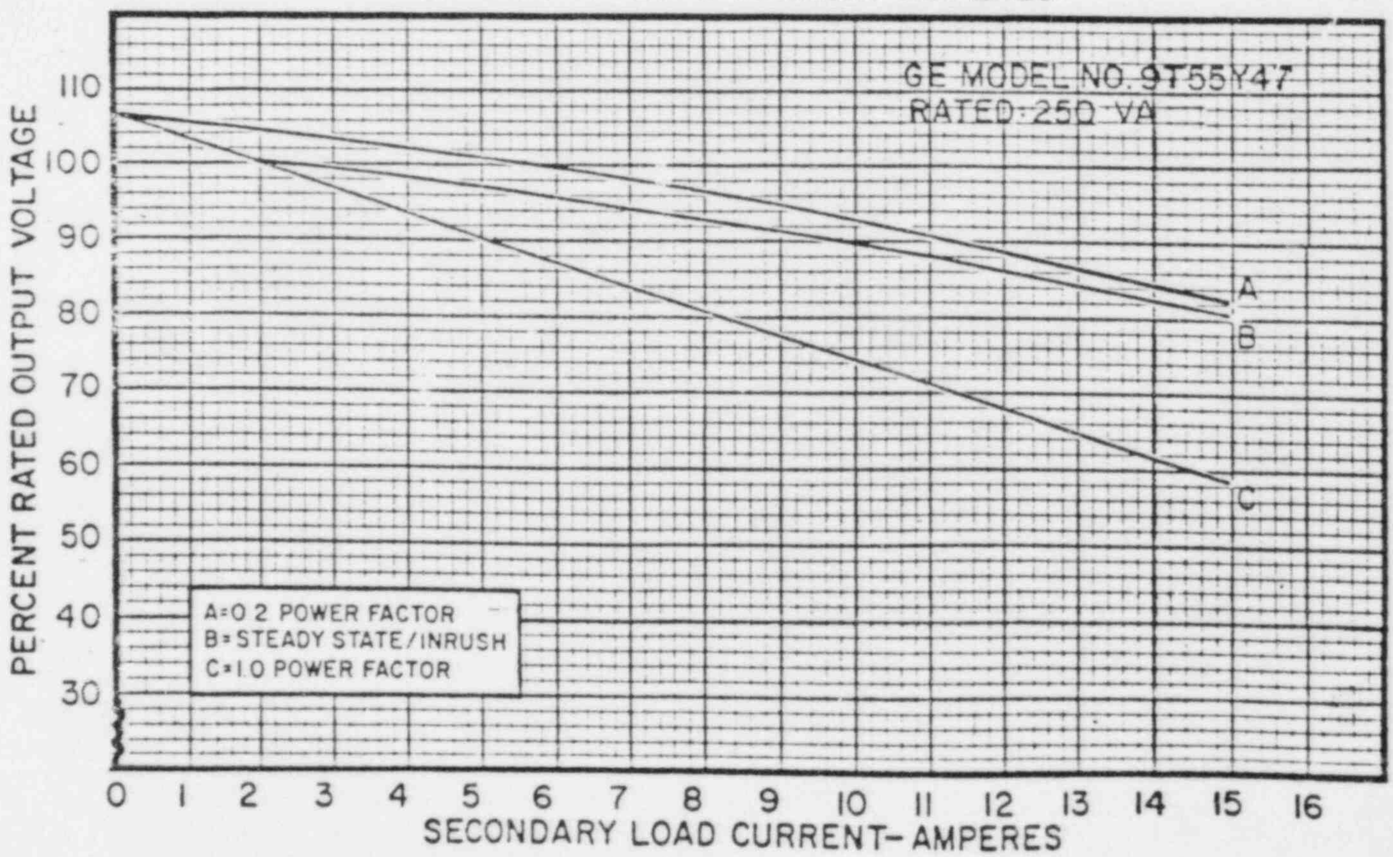


* See Page 8A for instructions on how to use regulation curves when selecting the proper transformer for your application.

MACHINE TOOL TRANSFORMERS

REGULATION CURVES* (cont'd)

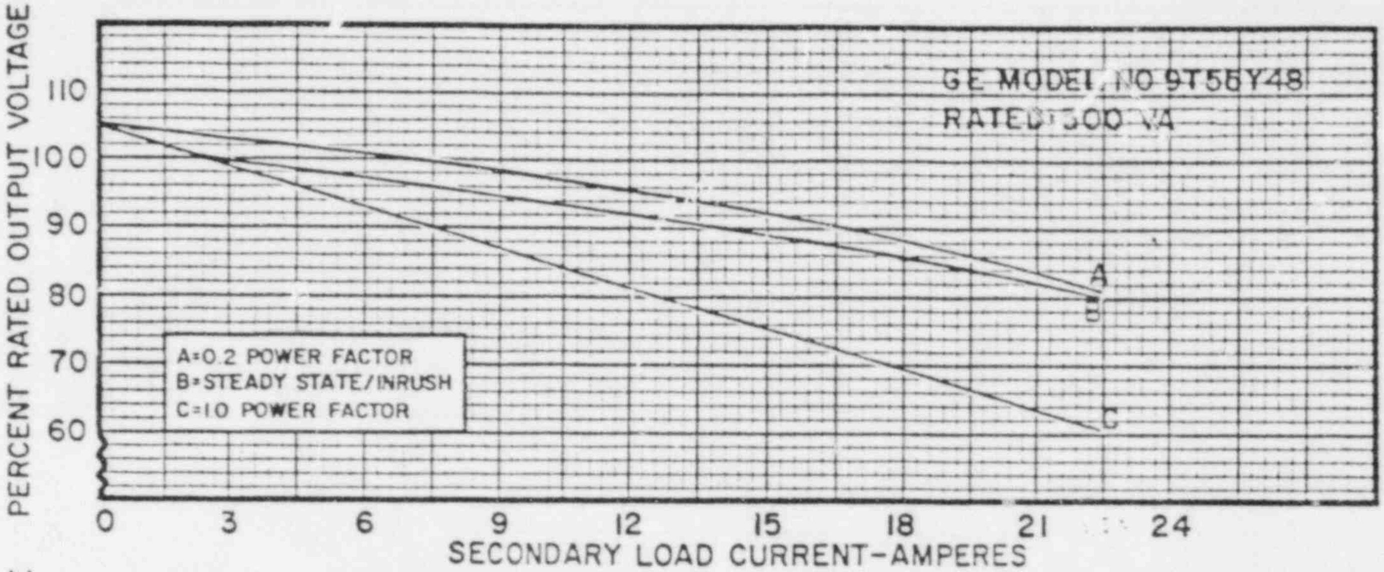


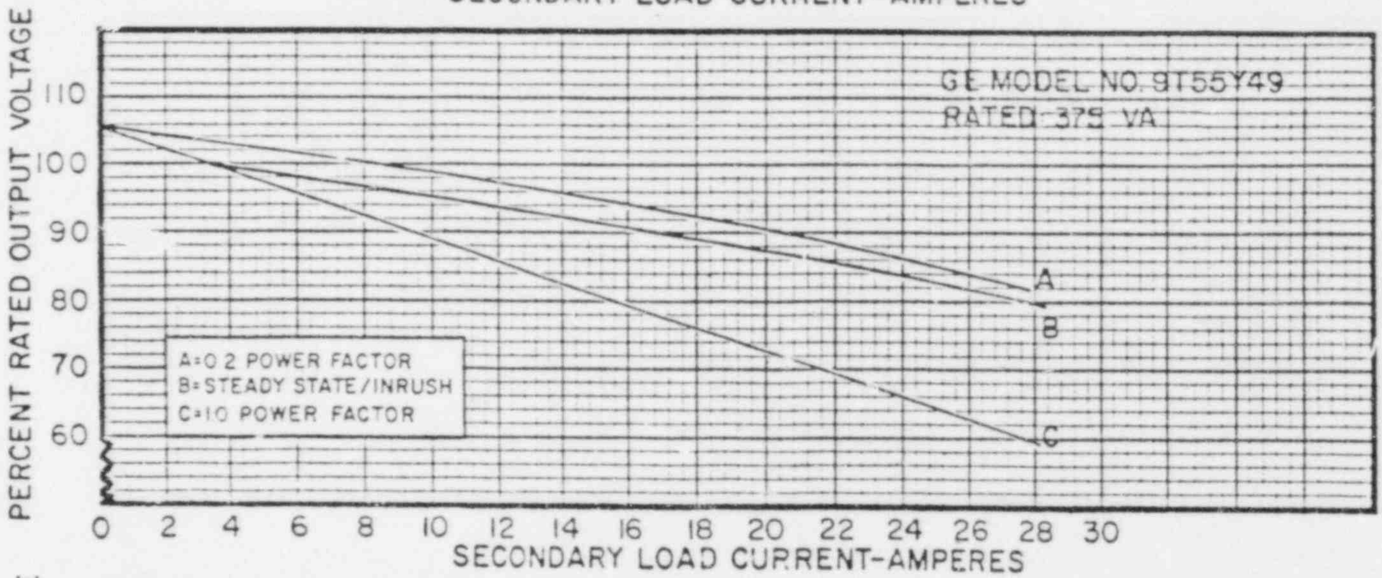


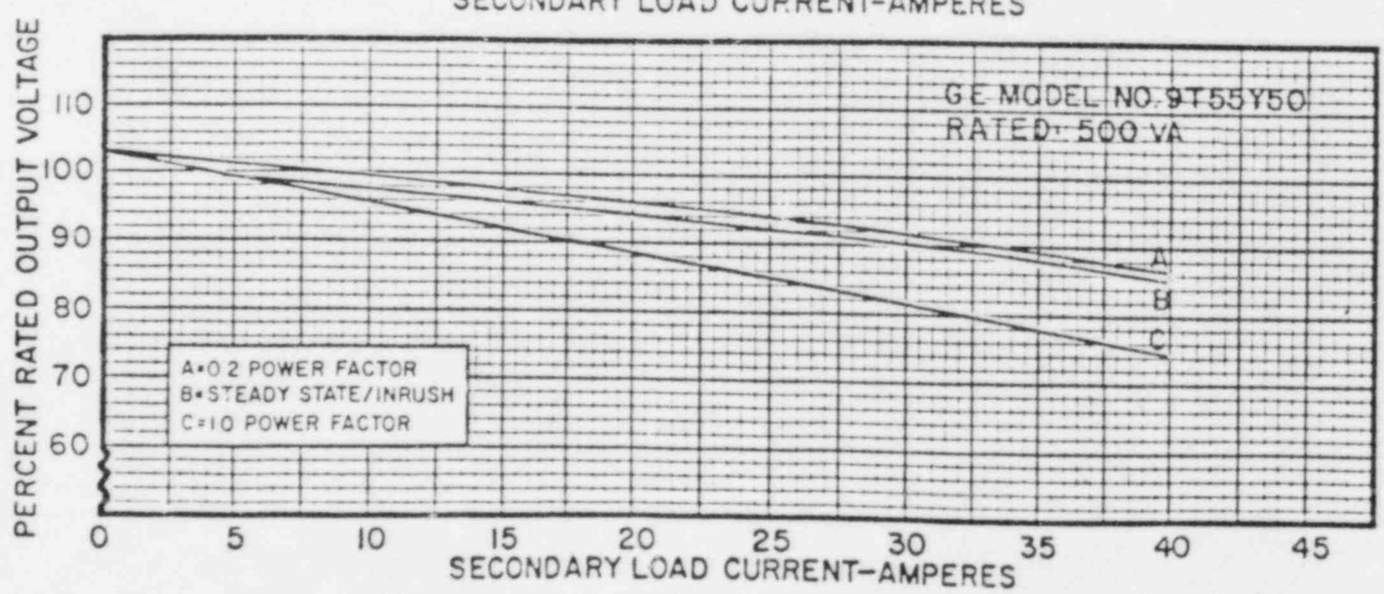
* See Page 8A for instructions on how to use regulation curves when selecting the proper transformer for your application.

MACHINE TOOL TRANSFORMERS

REGULATION CURVES* (cont'd)



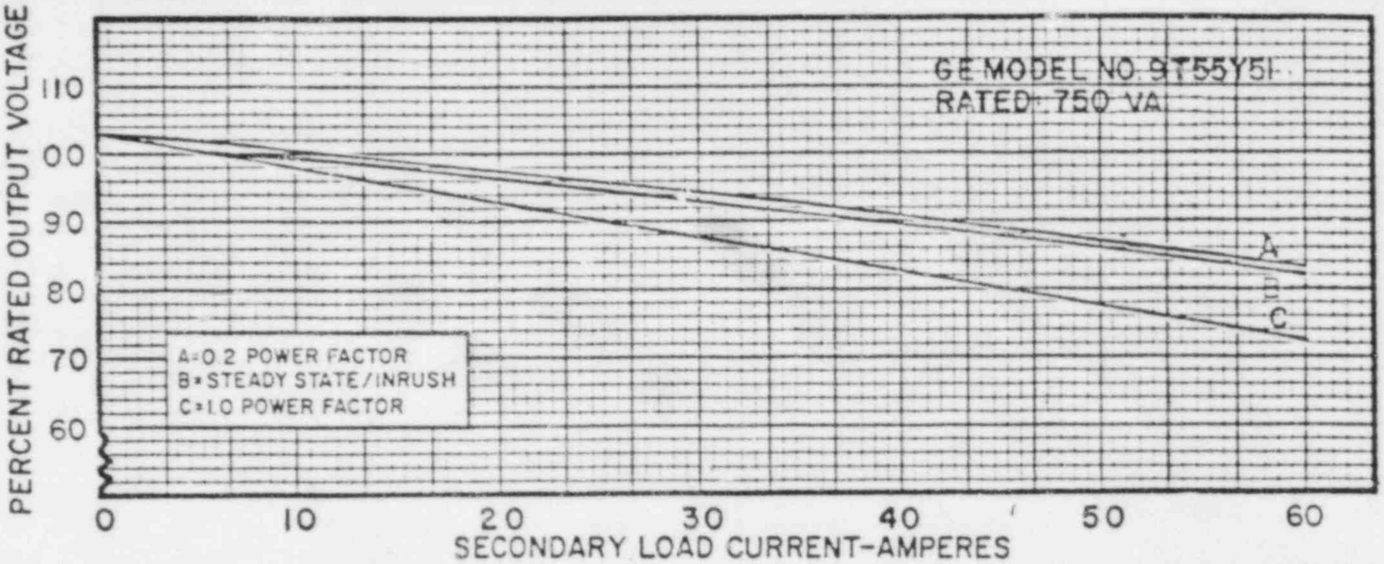


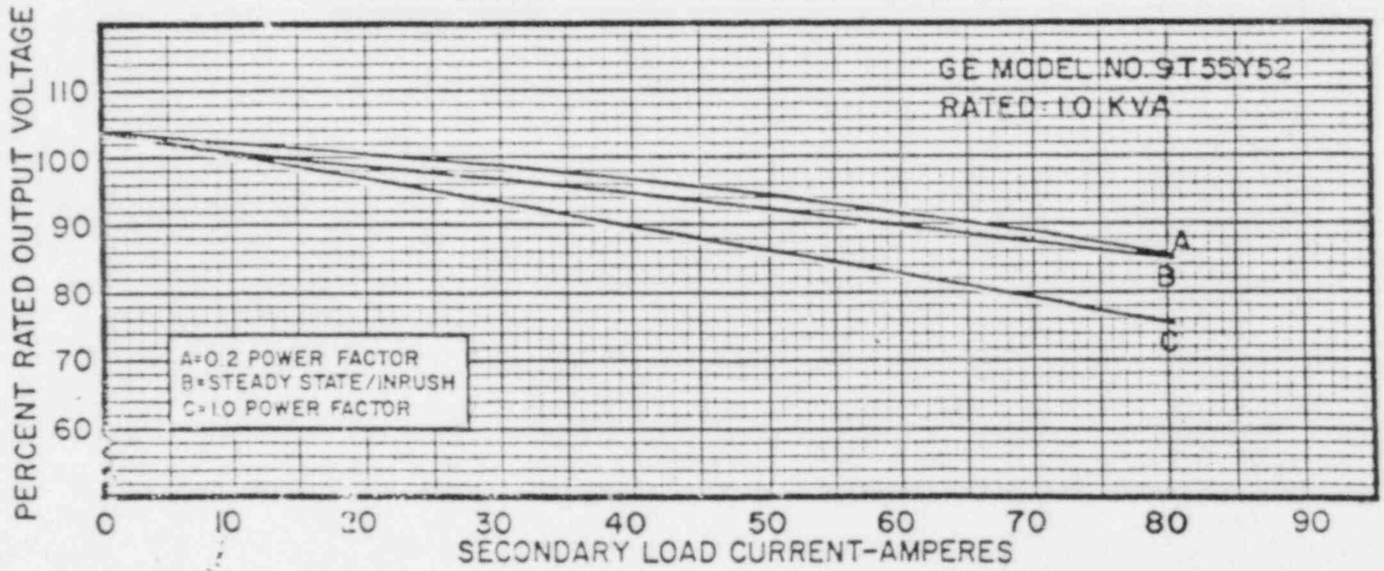


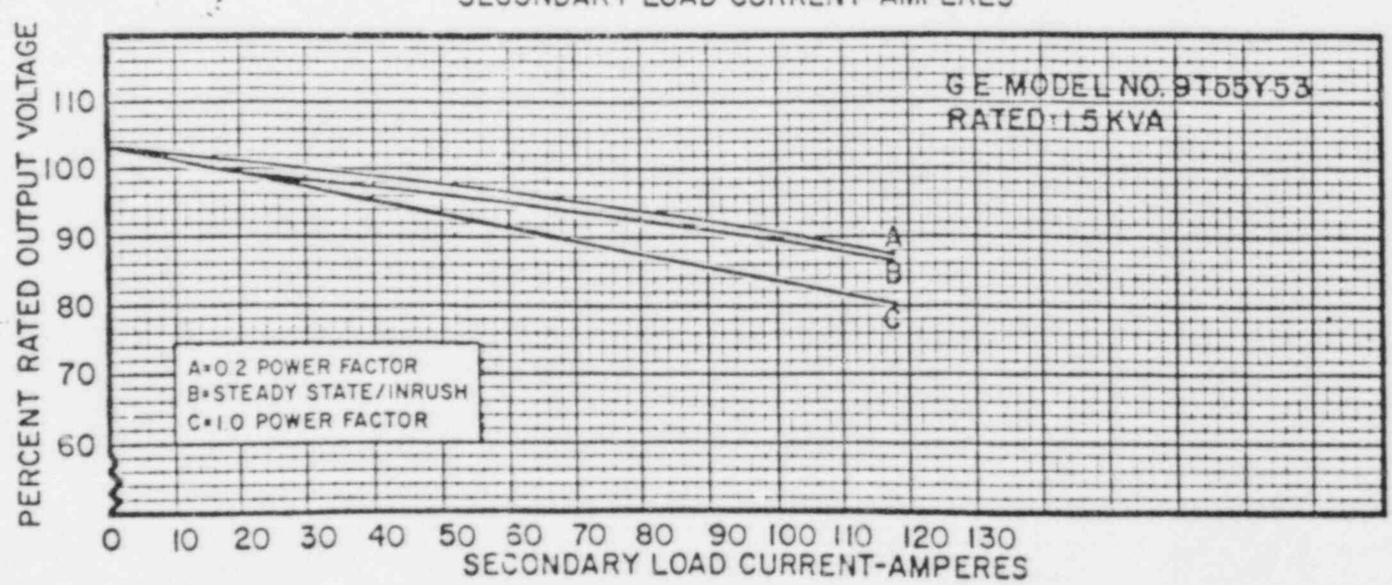
* See Page 8A for instructions on how to use regulation curves when selecting the proper transformer for your application.

MACHINE TOOL TRANSFORMERS

REGULATION CURVES* (cont'd)



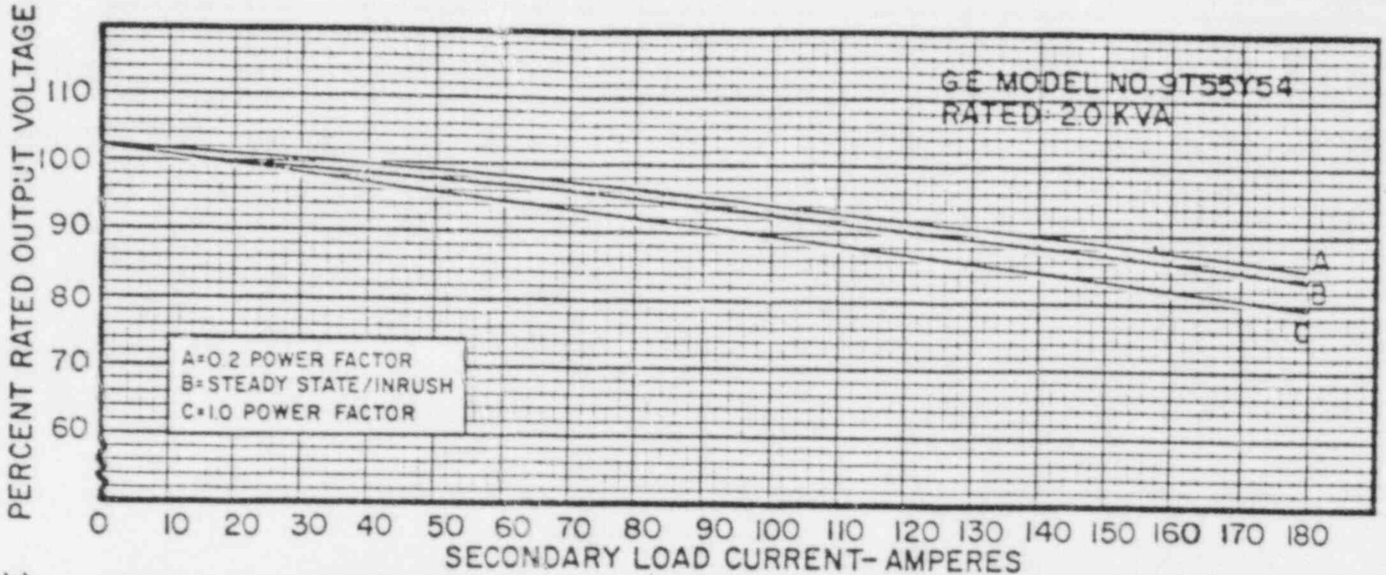


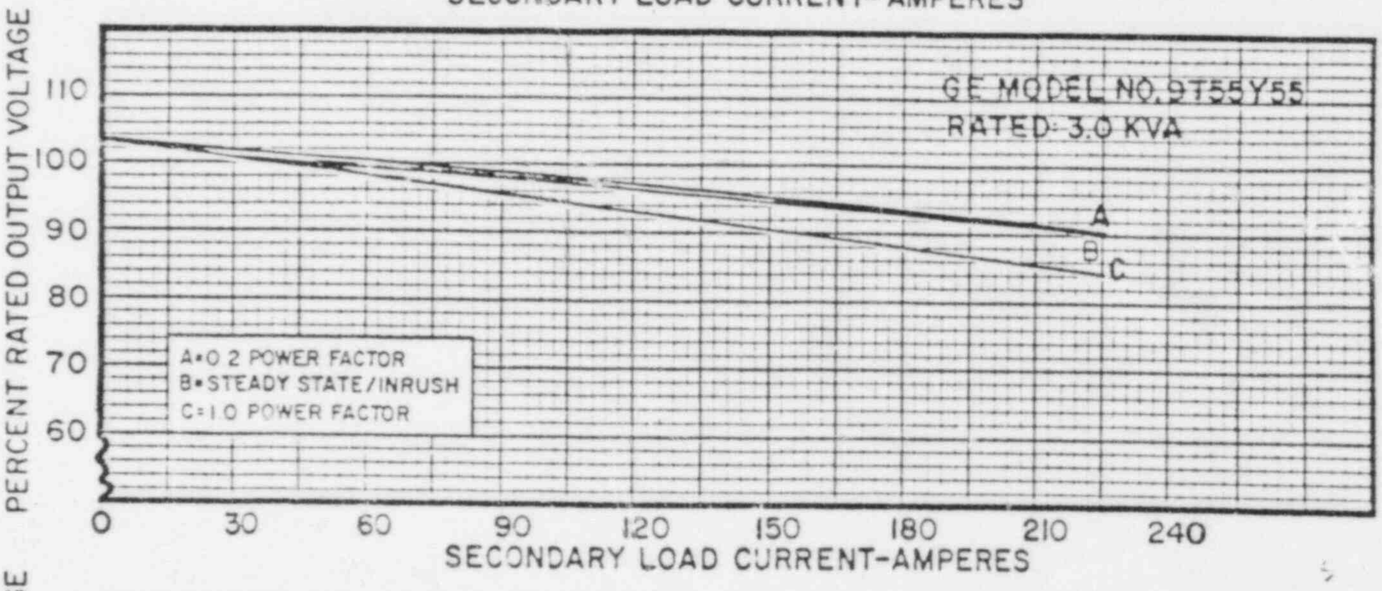


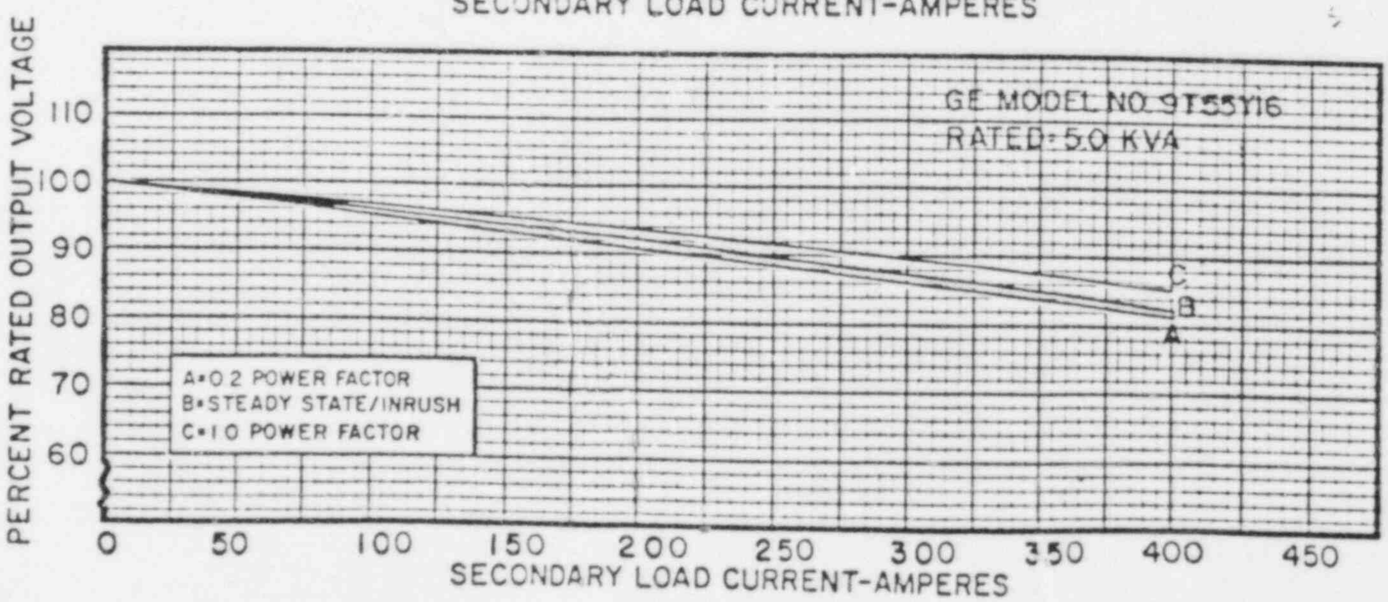
* See Page 8A for instructions on how to use regulation curves when selecting the proper transformer for your application.

MACHINE TOOL TRANSFORMERS

REGULATION CURVES* (cont'd)







* See Page 8A for instructions on how to use regulation curves when selecting the proper transformer for your application.

TVA 488 A (DES-3-39) TENNESSEE VALLEY AUTHORITY SHEET OF

BOARD 480 V. Cont. & Aux. Vent. Bd. 1A1-A COMPT 8C

CIRCUIT Cont. Bldg. Emerg. Air Cleanup Fan A-A.

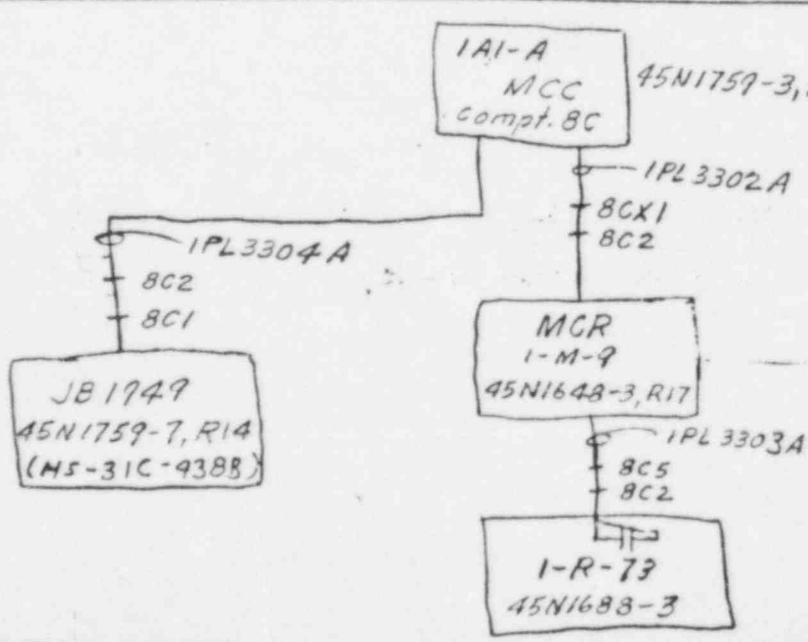
COMPUTED BY [illegible] DATE 12/20/85 CHECKED BY [illegible] DATE 12/20/85

CONT PWR XFMR: MANUF CKT FUSED OFF MAIN CONT XFMR MODEL VA 3000

STARTER : MANUF MODEL SIZE 2

PATH	COMPONENT	VA	CABLE NUMBER	CABLE TRIP	CABLE LENGTH	CABLE MARK#
AUT01	Starter		1PL3302A	2	319'	WHG #
			1PL3303A	2	205'	WHC
			1PL3304A	2	278'	-WHE ↓
					802	
					X2	
					1604	

BLOCK DIAGRAMS



EXTRA DWG'S 45N779-21 R21

BD-CA-16

Prepared RHB
Checked JEB
Reviewed RTR
Date 1-31-86

24-Jan-86

Sequoyah Nuclear Plant - 480V Cont & Aux Bldg Vent BDs

Primary Voltage= 378 volts

Trane	Compt No.	Size Starter	Size Transformer	Cable 1 Size	Cable 1 Length		Cable 2 Size	Cable 2 Length	Voltage @ Load	PHASE ANGLE
1A1-A	2A	2	3000	14	2004	FSV67-342	14	1234	95.67353	2.213228
1A1-A	2C	2	150	14	2726				95.35776	2.986716
1A1-A	3A	1	100	14	702				97.91272	0.786390
1A1-A	3B	1	100	14	702				97.91272	0.786390
1A1-A	3C	1	100	14	702				97.91272	0.786390
1A1-A	4A	1	100	14	1774	FSV67-346	14	992	91.21820	1.964170
1A1-A	4B	1	100	14	1642	FSV67-350	14	860	91.35278	1.820652
1A1-A	4C	1	100	14	1108	FSV67-354	14	316	91.89536	1.235736
1A1-A	5A	1	100	14	1304	FSV67-188	14	1118	91.69657	1.451229
1A1-A	5B	1	100	14	1198	FSV67-184	14	992	91.80413	1.334803
1A1-A	5C	2	100	14	1482	FSV67-162	14	690	91.86766	1.646123
1A1-A	7A	1	3000	14	1538				95.24871	1.707279
1A1-A	7B	1	3000	14	1532				95.25507	1.700730
1A1-A	7D	1	100	14	650	FSV31C446	14	650	92.35808	0.728549
1A1-A	8B	2	3000	14	574	FSV31C435	14	614	96.26506	0.643894
1A1-A	8C	2	3000	14	1604				95.17872	1.779257
1A1-A	8D	1	3000	14	2338				94.39741	2.572618
1A1-A	9E	1	150	14	2384				95.72898	2.621903
1A1-A	10A	1	100	14	650	FSV31C446	14	650	92.35808	0.728549
1A1-A	10B	1	100	14	1314	FSV67-176	14	1128	91.68642	1.462199
1A1-A	10D	1	100	14	1280				97.29246	1.424892
1A1-A	11A	1	100	14	1338	FSV67-213	14	696	91.66205	1.488515
1A1-A	11C	1	100	14	2430				96.04711	2.671136
1A1-A	12A	1	100	14	4450	FC031A33	14	1002	93.02476	4.782681
1A1-A	12D	2	150	14	1106				97.10614	1.233533

Prepared RHB
Checked JEG
Reviewed BBR
Date 1-31-86

24-Jan-86

Sequoyah Nuclear Plant - 480V Cont & Aux Bldg Vent BDs

Primary Voltage= 381 volts

Trane	Compt No.	Size Starter	Size Transformer	Cable 1 Size	Cable 1 Length		Cable 2 Size	Cable 2 Length	Voltage @ Load	PHASE ANGLE
1B1-B	3A	1	100	14	512				98.89434	0.574729
1B1-B	3B	1	100	14	512				98.89434	0.574729
1B1-B	3C	1	100	14	512				98.89434	0.574729
1B1-B	3B	1	100	14	1550	FSV67-182	14	910	92.17225	1.720374
1B1-B	3C	1	100	14	620				98.56252	0.917401
1B1-B	3E	2	1500	14	2184	FSV31C340	14	1032	95.76817	2.407248
1B1-B	4A	1	100	14	1226	FSV67-348	14	638	92.50411	1.365584
1B1-B	4B	1	100	14	1176	FSV67-352	14	638	92.55522	1.310605
1B1-B	4C	1	100	14	1786	FSV67-356	14	1208	91.92981	1.977196
1B1-B	5A	1	100	14	1570	FSV67-190	14	980	92.15172	1.742191
1B1-B	5B	1	100	14	1336	FSV67-186	14	696	92.39157	1.486323
1B1-B	5C	2	100	14	1112	FSV67-164	14	598	92.97683	1.240143
1B1-B	7C	1	1500	14	700				96.42318	0.784166
1B1-B	7E	1	100	14	1058				98.30525	1.180614
1B1-B	8B	2	1500	14	492	FSV31C453	14	492	97.58019	0.552398
1B1-B	8C	2	1500	14	1072				96.03055	1.196054
1B1-B	8E	2	1500	14	1634	FSV67-344	14	892	96.36076	1.811940
1B1-B	9A	1	100	14	490	FSV31C447	14	490	93.25338	0.550165
1B1-B	9C	1	100	14	1632	FSV67-215	14	1198	92.08808	1.809762
1B1-B	9D	1	100	14	966				98.40477	1.079031
1B1-B	9E	2	150	14	1328				97.63700	1.477552
1B1-B	10A	1	100	14	2296				96.95633	2.527574
1B1-B	11C	2	150	14	2108				96.78994	2.325424
1B1-B	11E	1	100	14	2542	FC031A34	14	722	95.85294	2.790795
1B1-B	12A	1	100	14	490	FSV31C473	14	490	93.25338	0.550165
1B1-B	13D2	2	150	14	890				98.10959	0.994959

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Checked [signature]
Reviewed [signature]
Date 1-31-86

24-Jan-86

Sequoyah Nuclear Plant - 480V Cont & Aux Bldg Vent BDs

Primary Voltage= 382 volts

Trane	Compt No.	Size Starter	Size Transformer	Cable 1 Size	Cable 1 Length		Cable 2 Size	Cable 2 Length	Voltage @ Load	PHASE ANGLE
2A1-A	2A	2	3000	14	1680	FSV67-342	14	862	97.13213	1.862011
2A1-A	2B	2	150	14	2508				96.60608	2.754502
2A1-A	3A	1	100	14	342				99.33697	0.384606
2A1-A	3B	1	100	14	342				99.33697	0.384606
2A1-A	3C	1	100	14	342				99.33697	0.384606
2A1-A	4A	1	100	14	1420	FSV67-346	14	722	92.54781	1.578326
2A1-A	4B	1	100	14	1462	FSV67-350	14	904	92.50466	1.624263
2A1-A	4C	1	100	14	1900	FSV67-354	14	1302	92.05348	2.100770
2A1-A	5A	1	100	14	1986	FSV67-188	14	1154	91.96467	2.193783
2A1-A	5B	1	100	14	1790	FSV67-184	14	1068	92.16697	1.981537
2A1-A	5D	1	100	14	1350	FSV67-366	14	642	92.61970	1.501669
2A1-A	7A	1	3000	14	1296				96.60970	1.442452
2A1-A	7D	1	100	14	554	FSV31C472	14	544	93.43309	0.621593
2A1-A	8B	2	3000	14	384	FSV31C485	14	366	98.52723	0.431643
2A1-A	8D	1	3000	14	1122				96.79561	1.251160
2A1-A	9E	1	100	14	1566				98.01034	1.737828
2A1-A	10A	1	100	14	554	FSV31C472	14	554	93.43309	0.621593
2A1-A	10B	1	100	14	1936	FSV67-176	14	1124	92.01631	2.139727
2A1-A	10D	1	100	14	1358				98.23711	1.510436
2A1-A	11A	1	100	14	1360	FSV67-217	14	732	92.60943	1.512627
2A1-A	11B	2	150	14	2406	FSV31C305	14	930	93 92795	2.645456
2A1-A	11C	1	100	14	2360				97.14046	2.596196

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Reviewed *[signature]*
Date 1-31-86

24-Jan-86

Sequoyah Nuclear Plant - 480V Cont & Aux Bldg Vent BDs

Primary Voltage= 385 volts

Trane	Compt No.	Size Starter	Size Transformer	Cable 1 Size	Cable 1 Length		Cable 2 Size	Cable 2 Length		Voltage @ Load	PHASE ANGLE
2B1-B	2A	1	100	14	544					99.89783	0.610439
2B1-B	2B	1	100	14	544					99.89783	0.610439
2B1-B	2C	1	100	14	544					99.89783	0.610439
2B1-B	3B	1	100	14	1740	FSV67-182	14	1504		92.94275	1.927243
2B1-B	3C	1	100	14	1444					98.91417	1.604581
2B1-B	4A	1	100	14	1630	FSV67-348	14	896		93.05695	1.807584
2B1-B	4B	1	100	14	1462	FSV67-352	14	688		93.23113	1.624263
2B1-B	4C	1	100	14	1310	FSV67-356	14	506		93.38845	1.457811
2B1-B	5A	1	100	14	1286	FSV67-190	14	1010		93.41327	1.431478
2B1-B	5B	1	100	14	1130	FSV67-186	14	824		93.57442	1.259971
2B1-B	5C	1	100	14	1068	FSV67-388	14	476		93.63839	1.191643
2B1-B	7C	1	1500	14	1640					96.71331	1.818474
2B1-B	8B	2	1500	14	618	FSV31C503	14	618		98.75914	0.692922
2B1-B	8E	2	1500	14	2160	FSV67-344	14	1138		97.08451	2.381424
2B1-B	9A	1	100	14	612	FSV31C497	14	612		94.10739	0.686239
2B1-B	9C	1	100	14	1162	FSV67-219	14	518		93.54139	1.275200
2B1-B	9D	1	100	14	1486					98.86802	1.650494
2B1-B	9E	2	150	14	1898					98.03719	2.098604
2B1-B	10A	1	100	14	2284					97.96753	2.514697
2B1-B	11B	1	100	14	612	FSV31C523	14	612		94.10739	0.686239
2B1-B	11E	1	100	14	1050	FCO31A35	14	524	TD RLY14	97.06226	1.171789
2B1-B	12D	2	150	14	1028					98.98941	1.147512

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Checked [signature]
Reviewed [signature]
Date 1-31-86

24-Jan-86

Sequoyah Nuclear Plant - 480v Diesel Aux BDs

Primary Voltage= 378 volts

Trane	Compt No.	Size Starter	Size Transformer	Cable 1 Size	Cable 1 Length	Added Load	Cable 2 Size	Cable 2 Length	Voltage @ Load	PHASE ANGLE
1A1-A	2D	1	250	14	224				99.55357	0.252226
1A1-A	5D	1	100	14	288				98.35424	0.324067
1A1-A	6A	2	150	14	294				97.97105	0.330798
1A1-A	7B	1	150	14	216				98.05365	0.243239

24-Jan-86

Sequoyah Nuclear Plant - 480v Diesel Aux BDs

Primary Voltage= 425 volts

Trane	Compt No.	Size Starter	Size Transformer	Cable 1 Size	Cable 1 Length	Added Load	Cable 2 Size	Cable 2 Length	Voltage @ Load	PHASE ANGLE
1A2-A	4A	1	250	14	190				111.9730	0.214020
1A2-A	6A	1	100	14	394	HTR 36W	14	212 TD RLY14	100.5113	0.442836
1A2-A	6D	2	150	14	288				110.1597	0.324067
1A2-A	7A	1	150	14	182				110.2859	0.205026

24-Jan-86

Sequoyah Nuclear Plant - 480v Diesel Aux BDs

Primary Voltage= 376 volts

Trane	Compt No.	Size Starter	Size Transformer	Cable 1 Size	Cable 1 Length	Added Load	Cable 2 Size	Cable 2 Length	Voltage @ Load	PHASE ANGLE
1B1-B	2D	1	250	14	214				99.03752	0.240992
1B1-B	5D	1	100	14	288				97.83385	0.324067
1B1-B	6A	2	150	14	318				97.42738	0.357709
1B1-B	7B	1	150	14	218				97.53274	0.245466

24-Jan-86

Sequoyah Nuclear Plant - 480v Diesel Aux BDs

Primary Voltage= 405 volts

Trane	Compt No.	Size Starter	Size Transformer	Cable 1 Size	Cable 1 Length	Added Load	Cable 2 Size	Cable 2 Length	Voltage @ Load	PHASE ANGLE
1B2-B	4A	1	250	14	190				106.7036	0.214020
1B2-B	6A	1	100	14	294	HTR 36W	14	214	100.9317	0.330798
1B2-B	6D	2	150	14	288				104.9757	0.324067
1B2-B	7A	1	150	14	282				104.9826	0.317337

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Date 1-31-86

24-Jan-86

Sequoyah Nuclear Plant - 480v Diesel Aux BDs

Primary Voltage= 383 volts

Trane	Compt No.	Size Starter	Size Transformer	Cable 1 Size	Cable 1 Length	Added Load	Cable 2 Size	Cable 2 Length	Voltage @ Load	PHASE ANGLE
2A1-A	2D	1	250	14	214				100.8813	0.240992
2A1-A	6A	2	150	14	366				99.18963	0.411490
2A1-A	7B	1	150	14	266				99.29701	0.299383

24-Jan-86

Sequoyah Nuclear Plant - 480v Diesel Aux BDs

Primary Voltage= 414 volts

Trane	Compt No.	Size Starter	Size Transformer	Cable 1 Size	Cable 1 Length	Added Load	Cable 2 Size	Cable 2 Length	Voltage @ Load	PHASE ANGLE
2A2-A	4A	1	250	14	260				108.9924	0.292649
2A2-A	6A	1	100	14	294	HTR 36W	14	214 TD RLY14	98.01591	0.330798
2A2-A	6D	2	150	14	288				107.3085	0.324067
2A2-A	7A	1	150	14	242				107.3619	0.272442

24-Jan-86

Sequoyah Nuclear Plant - 480v Diesel Aux BDs

Primary Voltage= 382 volts

Trane	Compt No.	Size Starter	Size Transformer	Cable 1 Size	Cable 1 Length	Added Load	Cable 2 Size	Cable 2 Length	Voltage @ Load	PHASE ANGLE
2B1-B	2D	1	250	14	214				100.6179	0.240992
2B1-B	6A	2	150	14	366				98.93065	0.411490
2B1-B	7B	1	150	14	266				99.03775	0.299383

24-Jan-86

Sequoyah Nuclear Plant - 480v Diesel Aux BDs

Primary Voltage= 392 volts

Trane	Compt No.	Size Starter	Size Transformer	Cable 1 Size	Cable 1 Length	Added Load	Cable 2 Size	Cable 2 Length	Voltage @ Load	PHASE ANGLE
2B2-B	4A	1	250	14	190				103.2786	0.214020
2B2-B	6A	1	100	14	294	HTR 36W	14	234 TD RLY14	92.80733	0.330798
2B2-B	6D	2	150	14	164				101.7423	0.184785
2B2-B	7A	1	150	14	342				101.5468	0.384606

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Date 1-31-82

28-Jan-86

Sequoyah Nuclear Plant - 480v ERCW BDs

Primary Voltage= 418 volts

Trans	Compt No.	Size Starter	Size Transformer	Cable 1 Size	Cable 1 Length	Cable 2 Size	Cable 2 Length	Cable 3 Size	Cable 3 Length	Cable 4 Size	Cable 4 Length	Voltage @ Load	PHASE ANGLE
1A-A	2A	1	1000	14	352 TD-1 RLY	14	410 HTR 18W	14	228 HTR 18W	14	238	106.7307	0.374491
1A-A	2B	1	150	14	170							109.0158	0.181398
1A-A	2C	1	150	14	446							108.7085	0.474042

28-Jan-86

Sequoyah Nuclear Plant - 480v ERCW BDs

Primary Voltage= 416 volts

Trans	Compt No.	Size Starter	Size Transformer	Cable 1 Size	Cable 1 Length	Cable 2 Size	Cable 2 Length	Cable 3 Size	Cable 3 Length	Cable 4 Size	Cable 4 Length	Voltage @ Load	PHASE ANGLE
1B-B	2A	1	1000	14	490 TD-1 RLY	14	250 HTR 18W	14	370 HTR 18W	14	360	106.0698	0.520575
1B-B	2B	1	150	14	240							108.4167	0.255626
1B-B	2C	1	150	14	182							108.4809	0.193764

28-Jan-86

Sequoyah Nuclear Plant - 480v ERCW BDs

Primary Voltage= 420 volts

Trans	Compt No.	Size Starter	Size Transformer	Cable 1 Size	Cable 1 Length	Cable 2 Size	Cable 2 Length	Cable 3 Size	Cable 3 Length	Cable 4 Size	Cable 4 Length	Voltage @ Load	PHASE ANGLE
2A-A	2A	1	1000	14	428 HTR 18W	14	294 HTR 18W	14	294			107.4715	0.454994
2A-A	2B	1	150	14	210							109.4927	0.223741

28-Jan-86

Sequoyah Nuclear Plant - 480v ERCW BDs

Primary Voltage= 420 volts

Trans	Compt No.	Size Starter	Size Transformer	Cable 1 Size	Cable 1 Length	Cable 2 Size	Cable 2 Length	Cable 3 Size	Cable 3 Length	Cable 4 Size	Cable 4 Length	Voltage @ Load	PHASE ANGLE
2B-B	2A	1	1000	14	606 HTR 18W	14	352 HTR 18W	14	352			107.2751	0.643050
2B-B	2B	1	150	14	200							109.5038	0.213509

24-Jan-86

Sequoyah Nucle-r Plant - 480V Reactor MOV BDs

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Date 1-31-86

Primary Voltage= 380 volts

Trane	Compt No.	Size Starter	Size Transformer	Cable 1 Size	Cable 1 Length		Cable 2 Size	Cable 2 Length	Voltage @ Load	PHASE ANGLE
1A1-A	3A	1	100	14	2086				96.93120	2.301712
1A1-A	3E	1	100	14	2542				96.43267	2.790795
1A1-A	4A	1	100	14	2222				96.78272	2.448107
1A1-A	5B	1	100	14	3408	TD RLY	14	396	93.56061	3.705755
1A1-A	5C	1	100	14	2928				96.00928	3.200859
1A1-A	6E	1	100	14	2398				96.59031	2.636892
1A1-A	7C2	1	100	14	2314	RLY 3	14	1676	94.45959	2.546884
1A1-A	10C	1	100	14	2106	HTR 50W	14	1744	93.66050	2.323269
1A1-A	12A	1	100	14	1912				97.12090	2.113759
1A1-A	12E	1	100	14	1722				97.32770	1.907683
1A1-A	13A	1	100	14	2518				96.46115	2.763044
1A1-A	14C	1	100	14	1678				97.37553	1.859835
1A1-A	14E	1	100	14	1638				97.41900	1.816296
1A1-A	15C	1	100	14	2338	HTR 50W	14	1978	93.41555	2.572618
1A1-A	16A	1	100	14	2204	HTR 50W	14	1244	93.55709	2.428757

Prepared RJB
Checked JGB
Reviewed RRR
Date 1-31-86

24-Jan-86

Sequoyah Nuclear Plant - 480V Reactor MOV BDs

Primary Voltage= 428 volts

Trane	Compt No.	Size Starter	Size Transformer	Cable 1 Size	Cable 1 Length		Cable 2 Size	Cable 2 Length	Voltage @ Load	PHASE ANGLE
1A2-A	2A	1	100	14	4050				106.7439	4.372362
1A2-A	2B	1	100	14	1982				109.3028	2.189461
1A2-A	2C	1	100	14	1982	2 RLYS	14	1084	103.9633	2.189461
1A2-A	2E	1	100	14	2366				108.8306	2.602624
1A2-A	3B	1	100	14	2426				108.7566	2.666857
1A2-A	4A	1	100	14	1680				109.6731	1.862011
1A2-A	4B	1	100	14	1782				109.5482	1.972854
1A2-A	4C	1	100	14	1860				109.4525	2.057446
1A2-A	5A	1	100	14	1908				109.3937	2.109430
1A2-A	5B	1	100	14	1980				109.3053	2.187300
1A2-A	5C	1	100	14	1700				109.6486	1.883765
1A2-A	7B	1	100	14	1972				109.3151	2.178654
1A2-A	7C	1	100	14	1972				109.3151	2.178654
1A2-A	7E	1	100	14	2112				109.1431	2.329734
1A2-A	8A	1	100	14	2112				109.1431	2.329734
1A2-A	10A	1	100	14	2584				108.5618	2.835588
1A2-A	10B	1	100	14	2564				108.5865	2.814263
1A2-A	10C	1	100	14	1078				110.4078	1.202670
1A2-A	14B	1	100	14	1572				109.8053	1.744372
1A2-A	14C	1	100	14	1850				109.4648	2.046609
1A2-A	15A	1	100	14	1824				109.4967	2.018422
1A2-A	15C	1	100	14	2210				109.0226	2.435208
1A2-A	15E	1	100	14	1516				109.8737	1.683262
1A2-A	16B	3	200	14	2244				108.2319	0.714614
1A2-A	17B	1	100	14	2482				108.6876	2.726730
1A2-A	17C	3	200	14	2060				108.2629	0.656203
1A2-A	18C	1	100	14	1696				109.6535	1.879415
1A2-A	19A	1	100	14	2282				108.9340	2.512550
1A2-A	19B	1	100	14	2152				109.0940	2.372813
1A2-A	19C	1	100	14	1694				109.6560	1.877240

24-Jan-86

Sequoyah Nuclear Plant - 480V Reactor MOV BDs

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Reviewed [handwritten initials]
Date 1-31-86

Primary Voltage= 384 volts

Trane	Compt No.	Size Starter	Size Transformer	Cable 1 Size	Cable 1 Length	Cable 2 Size	Cable 2 Length	Voltage @ Load	PHASE ANGLE
1B1-B	3E	1	100	14	1662			98.41811	1.842424
1B1-B	4E	1	100	14	1702			98.37417	1.885940
1B1-B	7C	1	100	14	2254			97.76615	2.482487
1B1-B	8B	1	100	14	2656			97.32152	2.912277
1B1-B	8C	1	100	14	2134			97.89859	2.353432
1B1-B	10B	1	100	14	1722			98.35220	1.907683
1B1-B	11A	1	100	14	2712			97.25947	2.971838
1B1-B	11C	1	150	14	2689			96.91222	2.947385
1B1-B	12C	1	100	14	2448 HTR 50W	14	2076	4.28134	2.690388
1B1-B	13A	1	100	14	3462			96.42614	3.762208
1B1-B	13B	1	100	14	3994 TD RLY	14	418	93.90514	4.314611
1B1-B	14C	1	100	14	2978			96.96439	3.253713
1B1-B	14E	1	100	14	2876 RLY 3	14	2034	94.84594	3.145828
1B1-B	15C	1	100	14	2448 HTR 50W	14	2076	94.28134	2.[illegible]90388

24-Jan-86

Sequoyah Nuclear Plant - 480V Reactor MOV BDs

Prepared QJB
Checked JCB
Reviewed RBG
Date 1-31-86

Primary Voltage= 410 volts

Trane	Compt No.	Size Starter	Size Transformer	Cable 1 Size	Cable 1 Length		Cable 2 Size	Cable 2 Length	Voltage @ Load	PHASE ANGLE
1B2-B	2A	1	100	14	3134				103.3446	3.418226
1B2-B	2B	1	100	14	2014				104.6684	2.224028
1B2-B	2C	1	100	14	2014	2 RLYS	14	1172	99.55528	2.224028
1B2-B	2E	1	100	14	2142				104.5177	2.362047
1B2-B	4A	1	100	14	1866				104.8424	2.063947
1B2-B	4B	1	100	14	2118				104.5459	2.336199
1B2-B	4C	1	100	14	2078				104.5930	2.293087
1B2-B	4E	1	100	14	2142				104.5177	2.362047
1B2-B	5A	1	100	14	2576				104.0055	2.827059
1B2-B	5B	1	100	14	1832				104.8823	2.027097
1B2-B	5C	1	100	14	2290				104.3432	2.521136
1B2-B	7A	1	100	14	1668				105.0748	1.848954
1B2-B	7B	1	100	14	1668				105.0748	1.848954
1B2-B	7C	1	100	14	1668				105.0748	1.848954
1B2-B	7E	1	100	14	2478				104.1213	2.722456
1B2-B	8B	1	100	14	1668				105.0748	1.848954
1B2-B	9B	1	100	14	2078				104.5930	2.293087
1B2-B	9C	1	100	14	2098				104.5695	2.314648
1B2-B	11B	1	100	14	2098				104.5695	2.314648
1B2-B	11E	1	100	14	2040				104.6378	2.252095
1B2-B	12E	1	100	14	4184				102.0948	4.510247
1B2-B	14C	1	100	14	2668				103.8968	2.925047
1B2-B	15A	1	100	14	2326				104.3008	2.559753
1B2-B	15B	1	100	14	2698				103.8613	2.956955
1B2-B	15C	1	100	14	3016				103.4846	3.293841
1B2-B	16C	3	200	14	2026				103.7153	0.645406
1B2-B	17A	3	200	14	1656				103.7746	0.527836

24-Jan-86

Sequoyah Nuclear Plant - 480V Reactor MOV BDs

Prepared
Checked
Reviewed
Date 1-31-86

Primary Voltage= 385 volts

Trane	Compt No.	Size Starter	Size Transformer	Cable 1 Size	Cable 1 Length	Cable 2 Size	Cable 2 Length	Voltage @ Load	PHASE ANGLE
2A1-A	3A	1	100	14	1808			98.51354	2.001068
2A1-A	3E	1	100	14	1922			98.38777	2.124581
2A1-A	4A	1	100	14	1614			98.72725	1.790154
2A1-A	5B	1	100	14	2520 TD RLY	14	602	95.76018	2.767314
2A1-A	5C	1	100	14	3354			96.79781	3.649232
2A1-A	6E	1	100	14	2792			97.42383	3.056792
2A1-A	7C2	1	100	14	2892 RLY 3	14	2234	95.07554	3.162767
2A1-A	10C	1	100	14	1788 HTR 50W	14	1414	95.23219	1.979367
2A1-A	12A	1	100	14	1902			98.40985	2.102935
2A1-A	12E	1	100	14	1912			98.39881	2.113759
2A1-A	13A	1	150	14	2252			97.64740	2.480339
2A1-A	13C	1	100	14	1870 HTR 50W	14	924	95.14479	2.068281
2A1-A	14D	1	100	14	1940			98.36790	2.144054
2A1-A	15C	1	100	14	1788 HTR 50W	14	1414	95.23219	1.979367

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Date 1-31-86

24-Jan-86

Sequoyah Nuclear Plant - 480V Reactor MOV BDs

Primary Voltage= 416 volts

Trane	Compt No.	Size Starter	Size Transformer	Cable 1 Size	Cable 1 Length		Cable 2 Size	Cable 2 Length	Voltage @ Load	PHASE ANGLE
2A2-A	2A	1	100	14	2682				105.4004	2.939940
2A2-A	2B	1	100	14	2120				106.0735	2.338353
2A2-A	2C	1	100	14	2186	2 RLYS	14	1060	100.8167	2.409399
2A2-A	2E	1	100	14	2658				105.4292	2.914406
2A2-A	3B	1	100	14	2506				105.6115	2.752366
2A2-A	4A	1	100	14	1944				106.2836	2.148380
2A2-A	4B	1	100	14	1842				106.4052	2.037928
2A2-A	4C	1	100	14	2196				105.9827	2.420154
2A2-A	5A	1	100	14	2008				106.2072	2.217548
2A2-A	5B	1	100	14	2316				105.8391	2.549029
2A2-A	5C	1	100	14	2062				106.1428	2.275832
2A2-A	7B	1	100	14	1838				106.4100	2.033602
2A2-A	7C	1	100	14	1838				106.4100	2.033602
2A2-A	7E	1	100	14	1868				106.3742	2.066114
2A2-A	8A	1	100	14	1908				106.3266	2.109430
2A2-A	10A	1	100	14	2352				105.7960	2.587623
2A2-A	10B	1	100	14	2352				105.7960	2.587623
2A2-A	13B	1	100	14	2290				105.8702	2.521136
2A2-A	14B	1	100	14	1806				106.4481	1.998898
2A2-A	14C	1	100	14	2146				106.0424	2.366354
2A2-A	15A	1	100	14	2016				106.1977	2.226187
2A2-A	15C	1	100	14	2864				105.1818	3.133119
2A2-A	15E	1	100	14	1914				106.3194	2.115924
2A2-A	16B	3	200	14	1624				105.2985	0.517662
2A2-A	17B	1	100	14	2310				105.8463	2.542594
2A2-A	17C	3	200	14	1984				105.2399	0.632067
2A2-A	18C	1	100	14	1864				106.3790	2.061780
2A2-A	19A	1	100	14	1650				106.6339	1.829362
2A2-A	19E	1	100	14	1914				106.3194	2.115924

Prepared RJB
Checked JEB
Reviewed BBR
Date 1-31-86

24-Jan-86

Sequoyah Nuclear Plant - 480V Reactor MOV BDs

Primary Voltage= 388 volts

Trane	Compt No.	Size Starter	Size Transformer	Cable 1 Size	Cable 1 Length	Cable 2 Size	Cable 2 Length	Voltage @ Load	PHASE ANGLE
2B1-B	4E	1	100	14	1662			99.44330	1.842424
2B1-B	7C	1	100	14	1980			99.08989	2.187300
2B1-B	8B	1	100	14	2218			97.70496	3.506566
2B1-B	8C	1	100	14	2354			98.67293	2.589767
2B1-B	10B	1	100	14	2366			98.65953	2.602624
2B1-B	11A	1	100	14	2116			98.93843	2.334044
2B1-B	11C	1	150	14	2593			98.02875	2.845181
2B1-B	12C	1	100	14	2232 HTR 50W	14	1832	95.49653	2.458854
2B1-B	13A	1	100	14	2514			98.49415	2.760909
2B1-B	13B	1	100	14	3054 TD RLY	14	256	95.92011	3.333934
2B1-B	14C	1	100	14	2788			98.18746	3.052548
2B1-B	14E	1	100	14	2574 RLY 3	14	1554	96.16435	2.824927
2B1-B	15C	1	100	14	2222 HTR 50W	14	1832	95.50731	2.448107

Prepared QHB
Checked JSB
Reviewed RPR
Date 1-31-86

24-Jan-86

Sequoyah Nuclear Plant - 480V Reactor MOV BDs

Primary Voltage= 396 volts

Trane	Compt No.	Size Starter	Size Transformer	Cable 1 Size	Cable 1 Length		Cable 2 Size	Cable 2 Length	Voltage @ Load	PHASE ANGLE
2B2-B	2A	1	100	14	2688				99.17974	3.997708
2B2-B	2B	1	100	14	1504				101.6724	1.670158
2B2-B	2C	1	100	14	1370	2 RLYS	14	536	96.84972	1.523583
2B2-B	2E	1	100	14	2042				101.0625	2.254253
2B2-B	4A	1	100	14	2020				101.0875	2.230506
2B2-B	4B	1	100	14	2382				100.6755	2.619761
2B2-B	4C	1	100	14	2382				100.6755	2.619761
2B2-B	4E	1	100	14	2042				101.0625	2.254253
2B2-B	5A	1	100	14	2278				100.7940	2.508257
2B2-B	5B	1	100	14	1998				101.1125	2.206747
2B2-B	5C	1	100	14	1864				101.2419	2.083445
2B2-B	7A	1	100	14	1966				101.1488	2.172168
2B2-B	7B	1	100	14	1966				101.1488	2.172168
2B2-B	7C	1	100	14	1966				101.1488	2.172168
2B2-B	7E	1	100	14	2132				100.9602	2.351278
2B2-B	8B	1	100	14	2094				101.0034	2.310336
2B2-B	8D	1	100	14	700	RLY 3	14	1456	100.2193	0.784166
2B2-B	9B	1	100	14	2136				100.9556	2.355586
2B2-B	9C	1	100	14	2178				100.9078	2.400793
2B2-B	11B	1	100	14	1780				101.3599	1.970683
2B2-B	11E	1	100	14	1816				101.3191	2.009746
2B2-B	14C	1	100	14	2978				99.99453	3.253713
2B2-B	15A	1	100	14	2480				100.5637	2.724593
2B2-B	15B	1	100	14	2222				100.8577	2.448107
2B2-B	15C	1	100	14	2280				100.7917	2.510403
2B2-B	16C	3	200	14	1928				100.1890	0.614279
2B2-B	17A	3	200	14	1438				100.2647	0.458503

Electrical Engineering Branch calculation OE2 EEBCAL 001 (B43 86 0131 913) show the degraded voltage condition for the class IE motor control centers bus to be as follows:

Reactor MOV Bd	Voltage
1A1-A	380
1A2-A	428
1B1-B	384
1B2-B	410
2A1-A	385
2A2-A	416
2B1-B	388
2B2-B	396

Control and Aux Bldg Vent Bd	Voltage
1A1-A	378
1B1-B	381
2A1-A	382
2B1-B	385

Diesel Aux Bd	Voltage
1A1-A	378
1A2-A	425
1B1-B	376
1B2-B	405
2A1-A	383
2A2-A	414
2B1-B	382
2B2-B	392

ERCW MCC	Voltage
1A-A	~~420~~ 418
1B-B	~~418~~ 416
2A-A	~~421~~ 420
2B-B	~~422~~ 420

Prepared	Date
[signature]	1/22/86

Checked	Date
S A Farrell	1/27/86

0759G

-INFORMAL-

TO : Bob Reese, SQEP, 5-133 SB-K

FROM : Norman E. Featherston, 4-122 SB-K

DATE : January 24, 1986

SUBJECT: SEQUOYAH NUCLEAR PLANT - UHI

The four Hydraulic Injection Valves (HIVs) on the Upperhead Injection System (UHI) are cocked to an open position during the normal operation of the RCS. The UHI system is designed to operate to mitigate a double ended large pipe break where the RCS pressure rapidly drops below 1250 psig. When the UHI injection is actuated, 950 cubic feet of water is injected which causes the UHI water accumulator level switch to operate the HIVs to the closed position in 4.0 seconds (valve stroke time).

A motor-driven gag is operated over each HIV to assure the valve is seated and retained in the seated position to prevent nitrogen entrained water from seeping into the RCS. The logic of the gag motor switch has an interlock to prevent gag motor operation until the HIV has been fully closed.

In the mitigating events of a major LOCA (this is the only condition UHI is used), the earliest possible time that an HIV would be fully closed could not occur until 15-20 seconds after initial LOCA start time (T=0) due to the UHI water injection time.

Prepared by Norman E Featherston 1-24-86
Norman E. Featherston (Date)

Checked by Calvin W. Burrell Jr. 1/24/86
Calvin W. Burrell, Jr. (Date)

DN43-1

R. P. Reese, 5-133 SB-K

L. J. Klaes, W10 D200 C-K

SEQUOYAH NUCLEAR PLANT - DELAYED STARTUP OF AUXILIARY BUILDING SAFETY RELATED ROOM COOLERS AND BATTERY ROOM EXHAUST FANS

This is to confirm that a delay in starting the following equipment room or area cooler fans of up to 30 seconds, due to degraded voltage conditions following an SI signal actuation, would not adversely affect the safety related equipment in the room :

Penetration Room or Area Cooling Fans
RHR Pump Room or Area Cooling Fans
CS Pump Room or Area Cooling Fans
CCS and AFW Pump Room or Area Cooling Fans
SI Pump Room or Area Cooling Fans
SFP Room or Area Cooling Fans
AFW and BA Pump Room or Area Cooling Fans
EGTS Room or Area Cooling Fans
Vital Battery Room Exhaust Fans

PREPARED Leo J. Klaes 1/23/86

CHECKED W. E. Rudacille 1/23/86

LJK:TR

Informal

R. P. Reese, 5-133 SB-K

W. R. Kistler, Jr., W7 C170 C-K

SEQUOYAH NUCLEAR PLANT - DIESEL-GENERATOR ENGINE HEAT EXCHANGER - INLET ERCW CONTROL VALVE

The diesel-generator engine is capable of starting and running from a standby condition for a period of 30 seconds without ERCW water flowing to the heat exchanger without the engine overheating. This is in response to your question concerning the possibility of not being able to energize the ERCW motor-operated valve due to degraded voltage conditions for a period of up to 30 seconds.

Prepared: William R Kistler Jr.

Reviewed: [illegible]

TVA 10697 (OE 4-85)

OE CALCULATIONS

TITLE		PLANT/UNIT
Diesel Generator Load Analysis		SQN 1 & 2

PREPARING ORGANIZATION	KEY NOUNS (Consult RIMS DESCRIPTORS LIST)		
DETS-EEB-SQEP-E3	Diesel Generator Load Study or Power Train Load Study		
BRANCH/PROJECT IDENTIFIERS	Each time these calculations are issued, preparers must ensure that the original (RO) RIMS accession number is filled in.		
B25 86 0204 300	Rev	(for RIMS' use)	RIMS accession number
	R0		B25 '86 0204 300
APPLICABLE DESIGN DOCUMENT(S)	R __		
	R __		
SAR SECTION(S): 8.3 / UNID SYSTEM(S):	R __		

Revision 0	R1	R2	R3
ECN No. (Indicate if Not Applicable) NA			
Prepared Peter F. Bowman			
Checked C. McIntosh			
Reviewed R. P. Reese			
Approved G. L. Hall, Jr.			
Date 2-4-86			
List all pages added by this revision.			
List all pages deleted of this revision.			
List all pages changed by this revision.			

Use form TVA 10534 if more room required.

Statement of Problem

Evaluate the load applied automatically to each D-G power train for the time of 0 to 120 seconds for the following conditions:

1. Blackout loss of offsite power (BO)
2. BO and Safety Injection Signal (SI) - Phase A
3. BO and SI - Phase B

Abstract

Each class 1E D-G power train was evaluated for the three conditions stated above. The loads on each board powered by the D-G of each power train were evaluated for operation sequence and operation time. The loads were then summed by HP and KW for each loading time beginning with 0 seconds to 120 seconds. From this summation the worst case sequential loading on any power train for each of the three conditions was determined to be power train 2B. This worst case loading was evaluated by the diesel generator contractor to determine capability to accept and carry sequenced and random loads within allowed voltage and frequency limits.

The contractor subsequently determined sufficient capability with a reduced random load.

This calculation contains unverified assumptions relative to: 1) increase in AFW pump brake horsepower from contractor analyzed 486 to 540; 2) EP Portec Inc. voltage regulators were used instead of Bassler voltage regulators now in service.

Return to R. P. Reese, 5-133 SB-K

cc: RIMS, SL26 C-K

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PURPOSE

To determine the sequential loading and capability of each Standby Diesel Generator to start each load at the time required and to do so with acceptable voltage and frequency drops. The fifth Standby Diesel Generator and support ancilliaries are excluded.

ASSUMPTIONS

1. No alternate feed connections were considered.
2. Unknown valve stroke time assumed 60 seconds.
3. Loads without a specific cutoff time are assumed to run continually.
4. Full load current was not verified and not used in this calculation.
5. All receptacles, crane, hoist, tank agitators, and evacuation alarms were conidered not in use for the three accident cases.
6. All space heaters, unit heaters, duct heaters were considered off.
7. All transformer loads are 100 percent demand at .85 power factor (pf).
8 No planned entrance inside containment was considered.
9. Fire accident was not considered for initial evaluation.
10. The increase of the Auxiliary Feedwater Pump brake horsepower from 486 (as analyzed by contractor) to 540 will have no impact on the diesel generator to accept and carry worst case load.
11. D-G contractor assumed EP Portec Inc. voltage regulators are installed on diesel generators.

DOCUMENTATION OF ASSUMPTIONS

1. No alternate feed connections were considered (e.g. Component Cooling Water Pump C-S, Vital Battery Chargers) as this would be a technical specification condition. Power system loads were assumed connected to their normal configuration.
2. Of all known valve stroke time, worst case (longest stroke time) was 60 seconds, therefore, all unknown stroke times were assumed 60 seconds.
3. For worst case condition, loads were considered to run continuously unless cycle times were known.
4. Full load currents were not needed for the initial calculation. When needed for loading AC APS Loading Analysis OE2EEBCAL001 was used.
5. During normal operation of the plant (not in a maintenance or refueling mode) cranes, hoist, receptacles, etc., would not be in use.

6. Summer seasonal loads exceed winter seasonal loads; therefore, all space heaters, unit heaters, duct heaters, etc., were considered off except for humidity control heaters.

7. Since no other information other than rating of transformers, nameplate data was used for transformer loading.

8. Since planned entrances into containment are isolated conditions and not considered normal operations.

9. A fire coupled with a Nuclear Accident which would initiate a Safety Injection signal is not a design base event, therefore, no fire accident was considered for the initial evaluations. The fire pump loads were added to the loading sequence (Attachment G) for worst cast loading of the diesel generators.

10. The AFW Pump will experience a loading of 540 brake horsepower seven seconds following a pump start under worst case steam generator conditions. (See Post Mod. Test PMT-53.) The increased loading will cease within two hours of the initiating accident. The load torque will vary as the square of shaft speed with ramp delay effect due to pump and pipeline fluid hydraulics. This delay should place the additional horsepower subsequent to the next load step.

11. Diesel Generator Contract issued drawing revisions and shipped new EP Portec Inc. voltage regulators to the plant site in 1982. They assumed this equipment was installed by TVA and modeled it as such. It has been discovered that this equipment has not been installed and the present voltage regulator has not been analyzed and has a potential of failure.

REFERENCES

Lotus 123 Lotus Development Corporation (IBM)
AC APS Loading Analysis OE2EEBCAL001

As-designed Single-Line Drawings:

Distr. Board	Dwg. No.	Revision
6.9KV Shtdn Bd 1A-A	45N724-1	R21
6.9KV Shtdn Bd 1B-B	45N724-2	R21
6.9KV Shtdn Bd 2A-A	45N724-3	R19
6.9KV Shtdn Bd 2B-B	45N724-4	R19
480V Shtdn Bd 1(2)A1-A	45N749-1	R20
480V Shtdn Bd 1(2)A2-A	45N749-2	R22
480V Shtdn Bd 1(2)B1-B	45N749-3	R19
480V Shtdn Bd 1(2)B2-B	45N749-4	R19
480V Reac Mov Bd 1(2)A1-A	45N751-1	R21
480V Reac Mov Bd 1(2)A1-A	45N751-2	R19
480V Reac Mov Bd 1(2)A2-A	45N751-3	R18
480V Reac Mov Bd 1(2)A2-A	45N751-4	R18
480V Reac Mov Bd 1(2)B1-B	45N751-5	R22
480V Reac Mov Bd 1(2)B1-B	45N751-6	R16

Distr Board	Dwg. No.	Revision
480V Reac Mov Bd 1(2)B2-B	45N751-7	R1
480V Reac Mov Bd 1(2)B2-B	45N751-8	R1
480V C&A Bldg Vent Bd 1(2)A1-A	45N756-1	R21
480V C&A Bldg Vent Bd 1(2)A1-A	45N756-2	R17
480V C&A Bldg Vent Bd 1(2)B1-B	45N756-5	R19
480V C&A Bldg Vent Bd 1(2)B1-B	45N756-6	R19
480V Dsl Aux Bd 1(2)A1-A,1(2)B1-B	45N732-1	R19
480V Dsl Aux Bd 1(2)A2-A,1(2)B2-B	45N732-2	R15
480V ERCW MCC 1(2)A-A	45N716-1	R10
480V ERCW MCC 1(2)B-B	45N716-2	R8
480V ERCW MCC 1(2)A-A,1(2)B-B	45N716-3	R2

As-designed Schematic Drawings Schematic Series	Dwg. No.	Revision
6.9KV Shtdn Aux Pwr	45N765-1	R13
	45N765-2	R15
	45N765-3	R17
	45N765-4	R11
	45N765-5	R13
	45N765-6	R15
	45N765-7	R14
	45N765-8	R12
	45N765-9	R10
	45N765-10	R12
	45N765-11	R13
	45N765-12	R7
	45N765-13	R13
	45N765-14	R13
	45N765-15	R15
	45N765-16	R13
	45N765-17	R9
	45N765-18	R5
480V Shtdn Aux Pwr (480V shtdn Bds 480V RMOV Bds 480V C&A Bld Vent Bds No. 1)	45N779-1	R14
	45N779-2	R19
	45N779-3	R12
	45N779-4	R9
	45N779-5	R24
	45N779-6	R10
	45N779-7	R12
	45N779-8	R23
	45N779-9	R20
	45N779-10	R17
	45N779-11	R17
	45N779-12	R24
	45N779-13	R25
	45N779-14	R20
	45N779-15	R21
	45N779-16	R18
	45N779-17	R17
	45N779-18	R16
	45N779-19	R18

Schematic Series	Dwg No.	Revision
480 V Shtdn Aux Pwr	45N779-20	R24
	45N779-21	R21
	45N779-22	R25
	45N779-23	R22
	45N779-24	R19
	45N779-25	R21
	45N779-26	R15
	45N779-27	R16
	45N779-28	R9
	45N779-29	R10
	45N779-30	R15
	45N779-31	R18
	45N779-32	R12
	45N779-33	R13
	45N779-34	R10
	45N779-35	R10
	45N779-36	R11
	45N779-37	R11
	45N779-38	R8
	45N779-39	R1
	45N779-40	R3
	45N779-41	R4
	45N779-42	R1
	45N779-43	R0
	45N779-44	R0
Turbo-Gen Aux	45N647-4	R9
480V Dsl Aux Pwr	45N771-1	R18
	45N771-2	R14
	45N771-3	R18
	45N771-4	R16
	45N771-5	R2
480V ERCW MCC	35W726-1	R11
	35W726-2	R8
Shtdn Bd Rm Chiller Compr	Contract No. 75K35-83709-1	
Schematic	C5-DGM1405(X1425)A/B	
Installation, Operation Manual	Form No. 6139A	
Cont Rm, Elec Rm A/C Compr	Contract No. 72C35-92693	
Installation, Operation Manual	Form No. 6143	

SPECIAL CONSIDERATIONS

The air conditioning system for the control room, electric board rooms, and shutdown boards require special explanation for understanding of their time and sequence of operation.

The equipment (hp) is arranged for power train assignment as is shown below:

	POWER TRAIN				
	1A	1B	2A	2B	Note
Cont Rm A/C Compr	125	125			A
Cont Rm AHU	60	60			B
Elec Bd Rm A/C Compr			125	125	A
Elec Bd Rm AHU			75	75	B
Shtdn Bd Rm Chiller Compr		250	250		C
Shtdn Bd Rm AHU	75	75	75	75	D

Note:

A. These A/C compressors drop out their motor starters on loss of power train voltage. When the D-G restores voltage the motor starter will reconnect the load when the corresponding AHU circuit breaker closes, the temperature switch closes and a 80-100 second anti-recycle plus a 120 second startup relay have timed out. Therefore, these loads were assigned to be started at 200 seconds minimum (see 45N779-7R12).

B. These AHUs use circuit breakers for load energization and do not automatically disconnect on loss of power train voltage. If one is running at the time of loss of power train voltage then it will be restarted at t=0 when the D-G restores voltage. If one is not running on loss of train voltage but high temperature or low air flow call for starting when the D-G restores voltage then the load will time on at t=45 seconds (see 45N779-7R12).

C. The circuit breakers for these chiller compressors automatically trip on loss of power train voltage (CWA relay-45N779-32R12). When the D-G restores voltage the circuit breakers will reclose after a 20 minute time delay (anti-recycle relay) plus a 60 second startup relay have time out. Thus these loads were assigned to be started at 21 minutes minimum.

D. These AHUs are tripped and restarted by the corresponding chiller compressor circuit breaker (see 45N779-33R13). Thus they were also assigned to be restarted in 21 minutes minimum.

COMPUTATIONS/ANALYSES

A computer data base was prepared showing all loads connected to power distribution boards that would be powered by the Diesel Generator following a loss of off-site power condition (Blackout-BO). These loads were arranged on a power train basis (1A, 1B, 2A or 2B) and then operation coded by applying the codes of Attachment A after interpretation of circuit operation from as-designed logic and schematic drawings.

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The time of start and/or stop, where known, was entered for each load.

Possible accident conditions are blackout only, blackout with safety injection signal phase A, blackout with safety injection signal phase B, and blackout with delayed safety injection signal phase A or B. A delayed safety injection signal blackout was not analyzed.

The data base was then sorted for the three remaining accident cases: Blackout, Blackout with Safety Injection Signal Phase A, and Blackout with Safety Injection Signal Phase B.

Initial sorts for the 3 system conditions were sorted using the load list data base (see Attachment B) as follows:

a. Blackout (see Attachment C.a.)

Sorted on Time BO column. Those non number or letter were deleted.

b. Blackout with Safety Injection Phase A Isolation (see Attachment C.b.)

Sorted on Time SI column. Those non number or letter were deleted. Sorted on number in SI time on Primary-Phase A and Secondary-Phase B. Those with only Phase B designation were deleted.

c. Blackout with Safety Injection Phase B Isolation (see Attachment C.c)

Sorted on Time SI column. Those non number or letter were deleted. Sorted on number in SI time on Primary-Phase B and Secondary-Phase A. Those with only Phase A designation were deleted. All items with 0 designation in Phase B column were deleted also.

The loads were summed in horsepower by time for each of the four power trains for the three (3) conditions listed below (see Attachment D). The worst case power train was selected for each condition and a load profile (see Attachment G) was established for evaluation by the D-G contractor (Morrison-Knudsen Company, Inc.) of voltage and frequency drop at each of ten (10) steps (0, 2, 5, 10, 15, 20, 25, 30, 90, and 120 seconds).

Condition	Worst Case Power Train
Blackout (BO)	2B
BO plus SI-A	2B
BO plus SI-B	2B

Loads determined to start and run randomly were coded as such, summed separately, and were to be applied at the worst step as determined by D-G contractor of D-G load application for a worst case scenario.

Totals of Kva for each accident condition were calculated using AC APS Loading Analysis Program OE2EEBCAL001 for each transformer reflected back to the 6900 Volt bus. Small 120 V ac loads were neglected for this calculation. The program required loads to be present for each board; therefore, dummy loads were used where possible (see Attachment E). Each transformer load and additional loads were then manually calculated to give total Kva for the random loads and time 0.00 second loads (see Attachment F).

SUMMARY OF RESULTS

Based on telecon with D-G contractor a problem with t=30 seconds occurred when all of the random load was placed at that time. The contractor determined that for the three different cases the generator 2B would be able to load at the required time and do so with acceptable voltage and frequency for all step except for t=30 seconds with Safety Injection signal Phase B case. The contractor determined generator 2B would be able to take a maximum of 170 horsepower of random loads at t=30 seconds. The random loads for BO with SI those B totaled 178.26 horsepower and 9kw. Further evaluation of the random loads was done to try to tie down a time of operation. It was found that the DG air compressors are only used for starting air. It was further found that a generator start lowers the tank pressure 44 to 50 psi on first start (SQN Pre-Op test TVA-14B). The compressor starts at 250 psi falling and stops at 300 psi rising and therefore, is safe to state the compressors start at t=0 or do not start at all due the their consumption rate and their only use is for Diesel Generator starting air. It was further found that the Boric Acid Transfer pump is a two speed motor (e.g. 7 1/2 hp and 15 hp). By evaluating the pumps operational mode it is found that the pump would restart at t=0 for a resumption of power at least at the 7.5 hp rating and that the additional 7.5 hp is random based on system functions.

The total random loads may, therefore, be reduced by 27.5 hp (e.g. 178.26 hp - 27.5 hp = 150.76 hp and 9kw which equals a total of 162.82 hp.)

CONCLUSIONS

Diesel Generator 2B passes loading for the three accident cases using the EP Portect Inc. voltage regulator. Therefore, the other three generators would pass since 2B is the worst case. See Attachment H for Diesel Generator contractor results.

PERSONNEL INVOLVED IN RESEARCH AND VERIFICATION PROCESS

PTB - Peter T. Bowman
RRF - Ralph R. Fernandez
CRM - C. Randall McIntosh
JAP - James A. Purser
RPR - Robert P. Reese

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ATTACHMENT

A

Definitions and Codes

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ATTACHMENT A

DEFINITIONS AND CODES

Definitions:

SI - Safety Injection Signal
BO - Blackout (Loss of off-site power)
SI-A - Safety Injection Signal - Phase A
SI-B - Safety Injection Signal - Phase B
CRI - Control Room Isolation
ABI - Auxiliary Building Isolation
CVI - Containment Ventilation Isolation
D-G - Diesel-Generator
A/C - Air Conditioner
AHU - Air Handling Unit

TIME BO - Time of energization once diesel generator breaker has closed on a blackout only (Letter designations are given under time codes).

TIME SI - Time of energization once diesel generator breaker has closed on a blackout with a safety-injection signal (letter designations are given under time codes).

CPT - Board compartment designation.

CONT COMB - Control Combination Code (code designations are given under cont comb codes).

PHASE A or B - Designates if load is energized or de-energized for a Phase A or Phase B Isolation (X-energize, O-de-energize).

OPER TIME - Cycle time of a device.

COMPONENT UNID - End device unique identifier.

KVA - Kilo-Volt-Amperes
HP - Horespower
KW - Kilo-Watts

Codes:

Time Codes

Random variables (may be energized at any time by automatic process control)

- T - temperature dependant
- P - pressure dependent
- L - level dependent
- S - special process dependant

Time is expressed in minutes, seconds.

Cont Comb Codes

TM - Force Tripped-Manual restart
TL - Force Tripped-Locked out
TA - Force Tripped-Auto restart permitted,
TAD - Force Tripped-Auto restart by diesel sequential timer
TAS - Force Tripped - Auto restart by S1, SI-A, SI-B, CRI, ABI, or CVI (Engineered Safeguard Signal)
TP - Force Tripped-Process restart
TPD - Force Tripped-Process restart after time delay
UMS - Untripped Manual-on-with seal-in contacts (AC Control)
UMW - Untripped-Manual-on-without seal-in contacts
UMO - Untripped-Manual-off
UAD - Untripped-Auto Diesel start
UA - Untripped-Auto process on
UAS - Untripped-Auto-process with run, standby and switchover
UAO - Untripped-Auto-process off
UAI - Untripped-Auto on by SI signal
OD - De-comissioned
OP - Power removed

ATTACHMENT

B

Load list (for D-G Powered Boards)

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TIME BO M.S	TIME SI M.S	BOARD	CPT	CONT COMB	PHASE A	PHASE B	OPER TIME	COMPONENT UNID	COMPONENT DESCRIPTION	KVA	HP	FULLOAD CURRENT	RATED LOAD	KW	MOTOR EFF	MOTOR PF	MOTOR %LRI
0.00	0.00	480V CONT & AUX BLDG VENT BD 1A1-A	1D1	UA					RAD MON & FIRE PROT DIST PNL	37.5		45.1		31.875			
0.00	0.00	480V CONT & AUX BLDG VENT BD 1A1-A	1D2	UA					CONT PWR XFMR	3							
T	0.00	480V CONT & AUX BLDG VENT BD 1A1-A	2A	UA	I	I			PIPE CHASE CLR FAN 1A-A		20	24.1					
	0.00	480V CONT & AUX BLDG VENT BD 1A1-A	2C	UA	I	I			EMER GAS TMT SYS FAN A-A		20	24.1					
	0.00	480V CONT & AUX BLDG VENT BD 1A1-A	2E	UAI					EMER GAS TMT SYS A-A HTR					16			
T	T	480V CONT & AUX BLDG VENT BD 1A1-A	3A	UA					SHTDN XFMR RM 1A EXH FAN 1A3-A		2.5	4.1					
T	T	480V CONT & AUX BLDG VENT BD 1A1-A	3B	UA					SHTDN XFMR RM 1A EXH FAN 1A1-A		2.5	4.1					
T	T	480V CONT & AUX BLDG VENT BD 1A1-A	3C	UA					SHTDN XFMR RM 1A EXH FAN 1A2-A		2.5	4.1					
0.00		480V CONT & AUX BLDG VENT BD 1A1-A	3D	UA	O				CNTMT ANN VACUUM FAN 1A		1.5	3.3					
T	0.00	480V CONT & AUX BLDG VENT BD 1A1-A	4A	UA	I	I			PEN RM EL 669 CLR FAN 1A-A		5	6.1					
T	0.00	480V CONT & AUX BLDG VENT BD 1A1-A	4B	UA	I	I			PEN RM EL 690 CLR FAN 1A-A		5	6.1					
T	0.00	480V CONT & AUX BLDG VENT BD 1A1-A	4C	UA	I	I			PEN RM EL 714 CLR FAN 1A-A		5	6.1					
0.00	0.00	480V CONT & AUX BLDG VENT BD 1A1-A	5A	UAI					RES HT REM PMP 1A-A CLR FAN		5	3.8					
0.00	0.00	480V CONT & AUX BLDG VENT BD 1A1-A	5B	UAI		I			CNTMT SPRAY PMP 1A-A RM CLR FAN		5	6.1					
0.20	0.20	480V CONT & AUX BLDG VENT BD 1A1-A	5C	UAI	I	I			CCS & AFW PMP SP CLR FAN A-A		20	18					
		480V CONT & AUX BLDG VENT BD 1A1-A	5E1	UMO					TORNADO GHCP CONT XFMR	3		3.6		2.55			
0.00	0.00	480V CONT & AUX BLDG VENT BD 1A1-A	5E2	UMW					SERV BLDG VENT MON		3	4.6					
0.00	0.00	480V CONT & AUX BLDG VENT BD 1A1-A	6C	UMW					CNTMT PURGE AIR EXH MON		0.75	1.4					
		480V CONT & AUX BLDG VENT BD 1A1-A	6D	UMW					PLANT EVAC ALM XFMR A	37.5		45.1		31.875			
L	L	480V CONT & AUX BLDG VENT BD 1A1-A	6E	UA					SP FUEL PIT CLR SUMP PMP A		0.33	0.88					
0.00	0.00	480V CONT & AUX BLDG VENT BD 1A1-A	7A	UAS					480V BD RM 1A PRESS FAN 1A1-A		3	4.6					
	0.00	480V CONT & AUX BLDG VENT BD 1A1-A	7B	UAI	I	I			CONT BLDG EMER PRESS FAN A-A		1	1.6					
0.00	0.00	480V CONT & AUX BLDG VENT BD 1A1-A	7C2	UMW					COND VAC PMP AIR EXH MON		0.75	1.4					
0.00	0.00	480V CONT & AUX BLDG VENT BD 1A1-A	7D	UAS					125V BATT RM II EXH FAN 1B1-A		0.5						
		480V CONT & AUX BLDG VENT BD 1A1-A	7E	UMO					AUX CHGR PMP 1A		1.5						
0.00	0.00	480V CONT & AUX BLDG VENT BD 1A1-A	8A	UA					PRIM WTR MAKEUP P/P 1A		20	24.5					
T	T	480V CONT & AUX BLDG VENT BD 1A1-A	8B	UA					480V BD RM 1A A/C COND 1A-A		20						
F	0.00	480V CONT & AUX BLDG VENT BD 1A1-A	8C	UAI	I	I			CONT BLDG EMERG AIR CL UP FAN A-A		10						
0.00	0.00	480V CONT & AUX BLDG VENT BD 1A1-A	8D	UAS					480V BD RM 1B PRESS FAN 1B1-A		3	4.6					
0.00	0.00	480V CONT & AUX BLDG VENT BD 1A1-A	9A	UMW					GAS EFF RAD MON		5	7.25					
0.00	0.00	480V CONT & AUX BLDG VENT BD 1A1-A	9B	UMW					SI SYS HT TRACE XFMR A			18.04		12.75			
T	T	480V CONT & AUX BLDG VENT BD 1A1-A	9E	UA					480V BD RM 1A A/C AHU 1A-A		10	12.4					
0.00	0.00	480V CONT & AUX BLDG VENT BD 1A1-A	10A	UAS					125V VIT BATT RM I EXH FAN 1A1-A		0.5						
0.00	0.00	480V CONT & AUX BLDG VENT BD 1A1-A	10B	UAI					SI PMP 1A-A RM CLR FAN		3	3.8					
		480V CONT & AUX BLDG VENT BD 1A1-A	10C	UMO					AUX CHRG BSTR PMP A		1.5						
0.02	0.02	480V CONT & AUX BLDG VENT BD 1A1-A	10D	UAI	I	I			CENT CHRG PMP 1A-A RM CLR FAN		5	6.1					
0.00	0.00	480V CONT & AUX BLDG VENT BD 1A1-A	10E2	UMW					AUX BLDG VENT MON		3	4.6					
T	0.00	480V CONT & AUX BLDG VENT BD 1A1-A	11A	UA	I	I			SP FUEL PIT PMP A-A CLR FAN		5	6.1					
0.00		480V CONT & AUX BLDG VENT BD 1A1-A	11C	UA	O	O			SHTDN BD RM A PRESS FAN 1A-A		1	2					
T	T	480V CONT & AUX BLDG VENT BD 1A1-A	11D	UA					480V BD RM 1A A/C CPRSR 1A-A		50	61					
0.00	0.00	480V CONT & AUX BLDG VENT BD 1A1-A	11E1	UMW					CNTMT LOWER COMPT AIR MON		3						
0.00	0.00	480V CONT & AUX BLDG VENT BD 1A1-A	11E2	UMW					SHIELD BLDG VENT RAD MON		3	4.6					
0.00	0.00	480V CONT & AUX BLDG VENT BD 1A1-A	12A	UA					BATT RM EL 669 EXH FAN A-A		2	3					
		480V CONT & AUX BLDG VENT BD 1A1-A	12C	UMO					PERM HYD MIT SYS					25.5			
0.00	0.00	480V CONT & AUX BLDG VENT BD 1A1-A	12D	UA					CONT BLDG PRESS FAN A-A		15	20					
0.00	0.00	480V DIESEL AUX BD 1A1-A	1D	UA					CONTROL POWER XFMR	3		3.6		2.55			
		480V DIESEL AUX BD 1A1-A	2B	UMO					LUB OIL STOR RM HTR			6		6.7			
0.00	0.00	480V DIESEL AUX BD 1A1-A	2C	UAO			1.00	1-FCV-67-68	EMG DSL ENG HT EXCH SUP VLV		0.125						
5.00	5.00	480V DIESEL AUX BD 1A1-A	2D	UAO					DG DAY TNK FUEL OIL XFER PMP		1	2					
		480V DIESEL AUX BD 1A1-A	3A2	OD					COOL TWR/AERCW HTTRC	6		9.6		5.1			
		480V DIESEL AUX BD 1A1-A	3C	UMS				0-FCV-67-363	ERCW COOL TWR D ISOL VLV		0.667						
0.00	0.00	480V DIESEL AUX BD 1A1-A	4A	UA					DG ELEC PNL VENT FAN		15						
0.00	0.00	480V DIESEL AUX BD 1A1-A	5A1	UA					DIESEL GEN LT CAB LCAS			54		38.25			
		480V DIESEL AUX BD 1A1-A	5A2	UA					DIESEL GEN 1A-A BATTERY CHGR(ALT FDR)					2.5			
L	L	480V DIESEL AUX BD 1A1-A	5D	UA					DG BLDG SUMP PMP A		3	4.6					

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Sequoyah Nuclear Plant - Load List

TIME BD M.S	TIME SI M.S	BOARD	CPT	CONT COMB	PHASE A	PHASE B	OPER TIME	COMPONENT UNID	COMPONENT DESCRIPTION	KVA	HP	FULLOAD CURRENT	RATED LOAD	KW	MOTOR EFF	MOTOR PF	MOTOR ZLRI
		480V DIESEL AUX BD 1A1-A	5E	UVJ					EL 722 CORRIDOR HTR			12.1		7.5			
0.00	0.00	480V DIESEL AUX BD 1A1-A	6A	UA					DG ROOM EXH FAN 1A1-A		15	19.5					
P	P	480V DIESEL AUX BD 1A1-A	6C	UA					DG 1A-A AIR COMPRESSOR 2		10	13					
0.00	0.00	480V DIESEL AUX BD 1A1-A	6D	UA					DG MUFFLER RM EXH FAN		1.5	2.8					
0.00	0.00	480V DIESEL AUX BD 1A1-A	7B	UA					DG BATT HOOD EXH FAN		0.33	0.965					
		480V DIESEL AUX BD 1A1-A	7D	UAO					DG ENG AUX LUBE OIL CIRC PMP		0.75	2					
		480V DIESEL AUX BD 1A1-A	7E1	UAO					DG ENG WTR HTR/LUBE OIL PMP		1	17.8		15			
		480V DIESEL AUX BD 1A2-A	1C1	UMO					POWER OUTLETS		0						
		480V DIESEL AUX BD 1A2-A	1C2	UAO					DIESEL GEN SPACE HTR			2.3		1.95			
0.00	0.00	480V DIESEL AUX BD 1A2-A	1D	UA					CONTROL POWER XFMR	3		3.6		2.55			
		480V DIESEL AUX BD 1A2-A	2B	UMS					LUB OIL STR RM EXH FAN		0.5	1					
		480V DIESEL AUX BD 1A2-A	3B	UAO					DIESEL GEN ELEC BD RM HTR			6		5			
		480V DIESEL AUX BD 1A2-A	3E	UAO					CO2 STR RM HTR			12		10			
5.00	5.00	480V DIESEL AUX BD 1A2-A	4A	UAO					DG DAY TNK FUEL OIL XFER PMP		1	2					
		480V DIESEL AUX BD 1A2-A	4B	OD				0-FCV-67-361	ERCW COOL TWR B ISOL VLV		0.667						
T	T	480V DIESEL AUX BD 1A2-A	5A1	UA					DGB CO2 REFRIG UNIT		2	3					
0.00	0.00	480V DIESEL AUX BD 1A2-A	5A2	UA					DIESEL GEN BATTERY CHGR			3		0.65			
		480V DIESEL AUX BD 1A2-A	5D	UAO					DIESEL GEN ROOM HTR B			6		5			
		480V DIESEL AUX BD 1A2-A	5E	UAO					DIESEL GEN ROOM HTR A			6		5			
0.00	0.00	480V DIESEL AUX BD 1A2-A	6A	UAO			1.00	1-FCV-67-66	EMG DSL ENG HT EXCH SUP VLV		0.125						
P	P	480V DIESEL AUX BD 1A2-A	6C	UA					DG 1A-A AIR COMPRESSOR 1		10	13					
0.00	0.30	480V DIESEL AUX BD 1A2-A	6D	UA					DG ROOM EXH FAN 1A2-A		15	19.5					
0.00	0.00	480V DIESEL AUX BD 1A2-A	7A	UA					DG BD ROOM EXH FAN		3	4.6					
		480V DIESEL AUX BD 1A2-A	7B	UMO					FALLOUT SHLTR HTR			6		5			
		480V DIESEL AUX BD 1A2-A	7C	UAO					DG ENG AUX LUBE OIL CIRC PMP		0.75						
		480V DIESEL AUX BD 1A2-A	7D	UAO					DG ENG WTR HTR/LUBE OIL PMP		1	17.8		15			
0.00	0.00	480V ERCW MCC 1A-A	2A	UA					ERCW STRAINER A1A-A		3	7					
		480V ERCW MCC 1A-A	2B	TL					TRAVELING SCREEN A-A		7.5	10					
L	L	480V ERCW MCC 1A-A	2C	UA					STATION DECK SUMP PUMP A		5	3.5					
		480V ERCW MCC 1A-A	2FL	TL					HEAT TRACE CABINET A-A					12.75			
		480V ERCW MCC 1A-A	3B	TL					SCREEN WASH PMP A-A		40	49.8					
		480V ERCW MCC 1A-A	3C	OP				1-FCV-67-492	HEADER 1A ISOL VLV		0.333						
		480V ERCW MCC 1A-A	4A	TL					DUPLEX SUMP PMP A		1.5	5.3					
		480V ERCW MCC 1A-A	4B	TL					DUPLEX SUMP PMP B		1.5	5.3					
		480V ERCW MCC 1A-A	4C	TL					ERCW PS ELEC EQP RM 1A SUP FAN		5	2.5					
		480V ERCW MCC 1A-A	4EL	TL					ERCW PUMPING STATION HTR A			12		10			
		480V ERCW MCC 1A-A	4ER	TL					ERCW PUMPING STATION HTR B			12		10			
		480V ERCW MCC 1A-A	4FL	TL					ERCW PUMPING STATION HTR C			9		7.5			
		480V ERCW MCC 1A-A	4FR	TL					ERCW PUMPING STATION HTR D			9		7.5			
		480V ERCW MCC 1A-A	5CL	TL					SKIMMER WALL INST HOUSE XFMR		1.5						
0.00	0.00	480V ERCW MCC 1A-A	5E	UA					ERCW STRAINER XFMR	1				0.85			
		480V REACTOR MOV BD 1A1-A	1C	UMS	O				INCORE INSTR RM COOL FAN 1A		5	7.2					
T	T	480V REACTOR MOV BD 1A1-A	1D	UA					480V BD XFMR 1A1-A COOL FAN		0.33						
		480V REACTOR MOV BD 1A1-A	1E	UMS					REAC CNTMT PIT SUMP EJECT PMP		0.75	2.4					
		480V REACTOR MOV BD 1A1-A	2C1	UMO					48V TELE BAT CHGR ALT FDR								
0.02	0.02	480V REACTOR MOV BD 1A1-A	2C2	UAI	I	I			CENT CHG PMP 1A AUX OIL PMP		2	3.1					
0.20	0.21	480V REACTOR MOV BD 1A1-A	2E	UA		O			CCS BOOST PMP 1A-A		15	18.4					
	0.00	480V REACTOR MOV BD 1A1-A	3A	UAI	I	I	0.07	1-FCV-62-63	SEAL FLOW ISOL VLV		0.67	2.1					
	0.00	480V REACTOR MOV BD 1A1-A	3B	UAI	I	I	0.09	1-FCV-62-90	CHR FLOW ISOL VLV		1.5	2.8					
		480V REACTOR MOV BD 1A1-A	3C	OP				1-FCV-62-98	CHG PMP MIN FLOW VLV		1.6	3.4					
	0.10	480V REACTOR MOV BD 1A1-A	3E	UAI	I	I	1.00	1-LCV-62-132	VOL CONT TK ISOL VLV		0.67	2.1					
	0.00	480V REACTOR MOV BD 1A1-A	4A	UAI	I	I	0.10	1-LCV-62-135	REF WTR STORAGE TK VLV		1	2.4					
		480V REACTOR MOV BD 1A1-A	4B	UMS				1-FCV-63-156	SIS PMP OUTLET RCS LOOP 1 & 3 HL		2.6	7					
	0.00	480V REACTOR MOV BD 1A1-A	4E	UAI	I	I	1.00	1-FCV-72-22	RWST SPRAY HDR 1A-A FLO CONT VLV		3.3	5.2					
		480V REACTOR MOV BD 1A1-A	5A	UMS			0.20	1-FCV-72-21	CNTMT SUMP SPY HDR 1A FLOW VLV		5.7						

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Date 1-15-86

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TIME BO M.S	TIME SI M.S	BOARD	CPT	CONT COMB	PHASE A	PHASE B	OPER TIME	COMPONENT UNID	COMPONENT DESCRIPTION	KVA	HP	FULLOAD CURRENT	RATED LOAD	KW	MOTOR EFF	MOTOR PF	MOTOR ILRI
	0.10	480V REACTOR MOV BD 1A1-A	5B	UAI		I	1.00	1-FCV-72-34	CNTMT PMP 1A-A RECIRC FL CONT VLV		0.125	0.39					
	0.00	480V REACTOR MOV BD 1A1-A	5C	UAI		I	1.00	1-FCV-72-39	CNTMT SPRAY HDR 1A ISOL VLV		3.3	5.2					
		480V REACTOR MOV BD 1A1-A	5E	UMS			0.10	1-FCV-72-40	RHR SP HDR 1A ISOL VLV (72-40)		5.2						
T		480V REACTOR MOV BD 1A1-A	6A	UA	D	D			SIS BORON INJ TK HTR 1A-A								
		480V REACTOR MOV BD 1A1-A	6B	UMS	D				INCORE INSTR RM CIRC PMP 1A					6			
		480V REACTOR MOV BD 1A1-A	6C2	UMO				1-FCV-74-1	RHR SYS ISOL VLV		1.5	2.2					
	120.00	480V REACTOR MOV BD 1A1-A	6E	UAI			2.00	1-FCV-74-3	RHR PMP 1A-A FLOW VLV		2.6	5.75					
		480V REACTOR MOV BD 1A1-A	7A1	UMO					48V SPARE BATT CHGR (NOR FDR)		1.6	4					
		480V REACTOR MOV BD 1A1-A	7B	UMS	D				INCORE INSTR RM CHILLER WTR COMP 1A			10.79		1.75			
		480V REACTOR MOV BD 1A1-A	7C1	OP					BACK FLOW GATE HOIST MTR 1A-A		10	18					
	0.00	480V REACTOR MOV BD 1A1-A	7C2	UAI			1.00	1-FCV-74-12	RHR PMP 1A-A MIN FLOW VLV		20						
		480V REACTOR MOV BD 1A1-A	7E	UMS				1-FCV-74-33	RHR HEAT EXCH A BYPASS VLV		1.6	3.4					
		480V REACTOR MOV BD 1A1-A	9C2	UMS				0-FCV-26-6	HPFP HDR 1 CONT VLV		3.2	5.2					
		480V REACTOR MOV BD 1A1-A	9E	UMS				1-FCV-68-333	RCS PRESS RELIEF CONT VLV (68-333)		0.33	0.6					
		480V REACTOR MOV BD 1A1-A	10C	UAI	I			1-MTR-87-21	UHI ACCUM ISOL VLV 6A6		1	2.8					
		480V REACTOR MOV BD 1A1-A	11A	UMS				1-FCV-63-1	RWST-RHR PMP FL CONT		0.33	2.3					
		480V REACTOR MOV BD 1A1-A	11B	UMS				1-FCV-63-3	SIS PMP DISCH-RWST SHUTOFF VLV		5.3	7.7					
		480V REACTOR MOV BD 1A1-A	11C	UMS				1-FCV-63-7	SIS PMP INLET CVCS CHRG PP V		1.6	3.4					
		480V REACTOR MOV BD 1A1-A	11E	UMS				1-FCV-63-8	RHR HT EXCH 1-CVCS CHGR V		0.66	2.1					
	0.00	480V REACTOR MOV BD 1A1-A	12A	UAI	I	I	0.10	1-FCV-63-26	SIS BORON INJ TK SH OFF VLV		3.2	5.2					
		480V REACTOR MOV BD 1A1-A	12B	UMS				1-FCV-63-152	SIS 1A-A OUTLET FL CONT VLV		2	3.5					
		480V REACTOR MOV BD 1A1-A	12C	UMS				1-FCV-63-47	SIS PMP 1A-A INLET VLV		1.6	3.4					
	0.00	480V REACTOR MOV BD 1A1-A	12E	UAI	I	I	0.11	1-FCV-63-39	SIS BORON INJ TK INLET SHT OFF VLV		1	1.9					
	120.00	480V REACTOR MOV BD 1A1-A	13A	UA			0.42	1-FCV-63-72	CNTMT SUMP FLOW VLV		2	3.5					
		480V REACTOR MOV BD 1A1-A	13B	UMS				1-FCV-63-93	SI-RCS LOOP 2 & 3 FL CONT VLV		10.5	13.8					
		480V REACTOR MOV BD 1A1-A	13C	UAI	I	I		1-FCV-63-80	SIS ACC TK 3 FL ISOL VLV		21	25					
	0.00	480V REACTOR MOV BD 1A1-A	13E	UAI	I	I	1.00	1-FCV-63-119	SIS ACC TK 1 FL ISOL VLV		21	29.6					
		480V REACTOR MOV BD 1A1-A	14B	UMO					BORIC ACID BATCH TK MTR 2		21	29.6					
T	T	480V REACTOR MOV BD 1A1-A	14C	UA					BORIC ACID TK A HTR A-A					22.5			
T	T	480V REACTOR MOV BD 1A1-A	14E	UA					BORIC ACID TK C HTR A-A			10.83		9			
		480V REACTOR MOV BD 1A1-A	15A1	OD					PART LNGTH CRD ASSY XFMR			10.83		9			
		480V REACTOR MOV BD 1A1-A	15B	UMO					BORIC ACID BATCH TK AGITATOR	30		36.08		25.5			
		480V REACTOR MOV BD 1A1-A	15C	UAI	I	I		1-MTR-87-23	UHI ACCUM ISOL VLV 6A6		1	1.4					
		480V REACTOR MOV BD 1A1-A	16A	UMS				1-FCV-87-17	UHI POS DISP PMP RECIR VLV		0.33	2.3					
S	S	480V REACTOR MOV BD 1A1-A	16D	UA					BORIC ACID XFER PMP 1A-A		0.7	2.3					
T	T	480V REACTOR MOV BD 1A2-A	1D	UA					480V SHDN BD XFMR 1A2-A COOL FAN		15	13					
		480V REACTOR MOV BD 1A2-A	2A	UMS				1-FCV-1-17	STEAM AFW TURB ISOL VLV		0.32						
	0.04	480V REACTOR MOV BD 1A2-A	2B	UAI			1.00	1-FCV-3-116B	ERCW HDR 1A ISOL VLV		1	2.6					
	0.04	480V REACTOR MOV BD 1A2-A	2C	UAI			1.00	1-FCV-3-116A	ERCW 1A ISOL VLV (3-116A)		0.333	0.9					
	0.06	480V REACTOR MOV BD 1A2-A	2E	UAI			1.00	1-FCV-3-136A	ERCW 1A ISOL VLV		0.333	0.9					
	0.06	480V REACTOR MOV BD 1A2-A	3B	UAI			1.00	1-FCV-3-136B	ERCW 1A ISOL VLV		0.7	2.3					
		480V REACTOR MOV BD 1A2-A	3C	OP			0.42	1-FCV-67-81	AB ERCW HDR 1A ISOL VLV		0.7	2.3					
	0.00	480V REACTOR MOV BD 1A2-A	4A	UAI		I	0.30	1-FCV-67-83	LWR CNTMT 1A COOL SUP ISOL VLV		0.67	0.9					
	0.00	480V REACTOR MOV BD 1A2-A	4B	UAI		I	0.36	1-FCV-67-87	LWR CNTMT 1A COOL DIS ISOL VLV		0.5	0.45					
	0.00	480V REACTOR MOV BD 1A2-A	4C	UAI		I	0.40	1-FCV-67-91	LWR CNTMT 1C COOL SUP ISOL VLV		0.125	0.45					
	0.00	480V REACTOR MOV BD 1A2-A	5A	UAI		I	0.35	1-FCV-67-95	LWR CNTMT 1C COOL DIS ISOL VLV		0.5	0.45					
	0.00	480V REACTOR MOV BD 1A2-A	5B	UAI		I	0.36	1-FCV-67-104	LWR CNTMT 1B COOL DIS ISOL VLV		0.125	0.45					
	0.00	480V REACTOR MOV BD 1A2-A	5C	UAI		I	0.30	1-FCV-67-112	LWR CNTMT 1D COOL DIS ISOL VLV		0.5	0.75					
		480V REACTOR MOV BD 1A2-A	6A2	UMW				1-FCV-67-146	CCS HT EXCH 1A DIS CT VLV		0.5	0.45					
		480V REACTOR MOV BD 1A2-A	6C	UMS			0.36	1-FCV-67-125	CNTMT SP HT EXC 1A SUP CT VLV		0.33	0.75					
		480V REACTOR MOV BD 1A2-A	6E	UMS			0.36	1-FCV-67-126	CNTMT SP HT EXC 1A DIS VLV		0.33	0.75					
		480V REACTOR MOV BD 1A2-A	7A	OP			0.24	1-FCV-67-127	AB SUPP HDR 1A ISOL VLV		0.33	0.75					
	0.00	480V REACTOR MOV BD 1A2-A	7B	UAI		I	0.16	1-FCV-67-130	UPPR CNTMT VENT COOL 1A SUP ISOL VLV		0.5	1.5					
	0.00	480V REACTOR MOV BD 1A2-A	7C	UAI		I	0.18	1-FCV-67-133	UPPR CNTMT VENT COOL 1C SUP ISOL VLV		0.13	0.6					
	0.00	480V REACTOR MOV BD 1A2-A	7E	UAI		I	0.18	1-FCV-67-139	UPPR CNTMT VENT COOL 1B DIS ISOL VLV		0.133	0.6					

Prepared SAD/GJB

Checked RCS/CRM

Reviewed [illegible]

Date 1-15-86

TIME BD M.S	TIME SI M.S	BOARD	CPT	CONT COMB	PHASE A	B	OPER TIME	COMPONENT UNID	COMPONENT DESCRIPTION	KVA	HP	FULLOAD CURRENT	RATED LOAD	KW	MOTOR EFF	MOTOR PF	MOTOR ILRI
	0.00	480V REACTOR MOV BD 1A2-A	8A	UAI		I	0.18	1-FCV-67-142	UPPR CNTMT VENT COOL 1D DIS ISOL VLV		0.133	0.6					
		480V REACTOR MOV BD 1A2-A	8B	OP			0.42	1-FCV-67-223	SUPP HDR 1B HDR 2A ISOL VLV		1	2.8					
		480V REACTOR MOV BD 1A2-A	8D	OP			0.42	0-FCV-67-151	COMPT COOL HT EXC C DIS VLV HDR A		0.33	0.75					
		480V REACTOR MOV BD 1A2-A	9A	OP			0.42	1-FCV-67-147	SUPP HDR 1A HDR 2B ISOL VLV		0.67	0.9					
		480V REACTOR MOV BD 1A2-A	9B	OP				1-FCV-67-424	ERCW CMP COOL HT EXCH 2A ISOL VLV		0.67	0.95					
		480V REACTOR MOV BD 1A2-A	9C	UMS				0-FCV-67-205	STA SERV & CONT A/C S HDR 1A VLV		0.5	0.9					
	0.00	480V REACTOR MOV BD 1A2-A	10A	UAI		I	0.16	1-FCV-67-295	UPPR CNTMT VENT COOL 1A DIS ISOL VLV		0.125	0.45					
	0.00	480V REACTOR MOV BD 1A2-A	10B	UAI		I	0.16	1-FCV-67-296	UPPR CNTMT VENT COOL 1C DIS ISOL VLV		0.125	0.45					
0.20	0.20	480V REACTOR MOV BD 1A2-A	10C	UA			1.00	0-FCV-70-208	CNDS DEMIN WST EVAP BLDG SUP VLV		0.125	0.45					
		480V REACTOR MOV BD 1A2-A	12A	OP			0.36	1-FCV-70-2	RHR HT EXCH 1A HDR INLET VLV		0.26	0.7					
		480V REACTOR MOV BD 1A2-A	12B	OP			0.36	1-FCV-70-4	MISC EQUIP HDR INLET VLV		0.26	0.7					
		480V REACTOR MOV BD 1A2-A	12C	OP			0.36	1-FCV-70-8	CCS HT EXCH A OUTLET VLV		0.26	0.7					
		480V REACTOR MOV BD 1A2-A	13A	OP			0.36	1-FCV-70-10	CCS HTX A & C OUTLET ISOL VLV		0.26	0.7					
		480V REACTOR MOV BD 1A2-A	13B	UMS			0.24	0-FCV-70-11	SFPCS HT EXCH A OUTLET VLV		0.13	0.7					
		480V REACTOR MOV BD 1A2-A	13C	OP			0.36	1-FCV-70-23	CCS HTX A & C INLET ISOL VLV		0.26	0.7					
		480V REACTOR MOV BD 1A2-A	13E	UMS			0.24	0-FCV-70-41	SFPCS HT EXCH B INLET VLV		0.13	1.1					
		480V REACTOR MOV BD 1A2-A	14A	OP			0.36	1-FCV-70-25	CCS HTX A & B INLET VLV		0.26	1					
	0.00	480V REACTOR MOV BD 1A2-A	14B	UAI	I	I	0.24	1-FCV-70-143	EXCESS LTDWN HTX CONT INLET VLV		0.13	0.45					
	0.00	480V REACTOR MOV BD 1A2-A	14C	UAI		I	0.15	1-FCV-70-90	RC PMP THER BAR RETN CONTMT ISOL VLV		1	2.8					
	0.00	480V REACTOR MOV BD 1A2-A	15A	UAI		I	0.24	1-FCV-70-92	RCP CNTMT ISOL VLV		0.13	0.45					
		480V REACTOR MOV BD 1A2-A	15B	UMS			0.24	0-FCV-70-111	AUX WASTE EVAP PKG OUTLET VLV		0.13	0.45					
	0.00	480V REACTOR MOV BD 1A2-A	15C	UAI		I	1.00	1-FCV-70-133	RCP THER BAR RETN CNTMT ISOL VLV		0.67	0.95					
	0.00	480V REACTOR MOV BD 1A2-A	15E	UAI	I	I	0.07	1-FCV-26-240	CNTMT STAND PIPE ISOL VLV		0.67	2.1					
	0.00	480V REACTOR MOV BD 1A2-A	16A	UAI		I	0.24	1-FCV-70-139	RCP CNTMT ISOL VLV		0.26	0.45					
	0.00	480V REACTOR MOV BD 1A2-A	16B	UAI	I	I	0.07	1-FCV-3-33	STEAM GEN FW ISOL VLV		33	43					
		480V REACTOR MOV BD 1A2-A	16E	UMS			0.36	1-FCV-70-156	RHR HT EXC 1A OUTLET VLV		0.33	0.75					
		480V REACTOR MOV BD 1A2-A	17A	UMS			0.24	1-FCV-70-168	B ACID AND GAS STRIP EVAP PKG 1A		0.26	0.7					
		480V REACTOR MOV BD 1A2-A	17B	UAO				1-FCV-1-16	AFP TURB STM-STM GEN 1 ISOL VLV		1	2.8					
	0.00	480V REACTOR MOV BD 1A2-A	17C	UAI	I	I	0.06	1-FCV-3-87	STEAM GEN FW ISOL VLV		33	43					
		480V REACTOR MOV BD 1A2-A	18A	UMS			0.36	1-FCV-70-183	SAMP HT EXCH HDR OUTLET VLV		0.67	0.95					
		480V REACTOR MOV BD 1A2-A	18B	UMS				1-FCV-3-191	LOOP 1 DEAERATION LINE VLV		1	2.8					
	0.00	480V REACTOR MOV BD 1A2-A	18C	UAI	I	I	1.00	1-FCV-26-242	ANNULUS STAND PIPE ISOL VLV		0.67	2.1					
		480V REACTOR MOV BD 1A2-A	18E	UMS				1-FCV-3-192	LOOP 2 DEAERATION LINE VLV		1	2.8					
		480V REACTOR MOV BD 1A2-A	19A	UAO				1-FCV-1-15	AFP TURB STM-STM GEN 4 ISOL VLV		1	2.8					
	0.00	480V REACTOR MOV BD 1A2-A	19B	UAI	I	I	0.06	1-FCV-26-243	RCP SPRAY ISOL VLV		0.67	2.1					
	0.00	480V REACTOR MOV BD 1A2-A	19C	UAI	I	I	1.00	1-FCV-26-245	ANNULUS SPRINK ISOL VLV SUP		0.67	2.1					
		480V REACTOR MOV BD 1A2-A	19E	UMS			0.36	0-FCV-70-197	SFPCS HTX SUP HDR VLV		0.33	0.75					
0.00	0.00	480V SHUTDOWN BD 1A1-A	2B	UA					CONT FM AHU A-A		60	77					
		480V SHUTDOWN BD 1A1-A	2C	TL					AUX BLDG GEN SUP FAN 1A		150	173					
		480V SHUTDOWN BD 1A1-A	3A	TM					SPENT FUEL PIT PUMP A-A		100	114					
0.00	0.00	480V SHUTDOWN BD 1A1-A	3B	UAI	I	O			CRDM COOL FAN 1A		75	83					
0.00	0.00	480V SHUTDOWN BD 1A1-A	3C	UMW		O			REAC LOWER COMPT COOL FAN 1A-A		50	59					
0.20	0.20	480V SHUTDOWN BD 1A1-A	4B	TAS	I	I			CCS PUMP 1A-A		350	404					
0.00	0.00	480V SHUTDOWN BD 1A1-A	10A	UA					NOR FDR 125V VITAL BATT CHGR I					7.44			
	10.00	480V SHUTDOWN BD 1A1-A	10C	UAI		I			CNTMT AIR RETURN FAN 1A-A		50	58					
		480V SHUTDOWN BD 1A1-A	11A	UMO					ALT FDR 250V VITAL BATT CHGR I					24.6			
21.00	21.00	480V SHUTDOWN BD 1A2-A	2B	UA					SHTDN BD RM AIR HAND UNIT 1A-A		75	88					
		480V SHUTDOWN BD 1A2-A	2C	TL					AUX BLDG GEN EXH FAN 1A		125	145					
0.00	0.00	480V SHUTDOWN BD 1A2-A	3B	UAI	I	O			CRDM COOL FAN 1C		75	83					
2.00		480V SHUTDOWN BD 1A2-A	3C	TA					FIRE PUMP 1A-A		200	257					
		480V SHUTDOWN BD 1A2-A	3D	TL					CONT & SERV AIR CPRSR A		125	150					
0.00	0.00	480V SHUTDOWN BD 1A2-A	4B	UMW		O			REACTOR LWR COMPT COOL FAN 1C-A		50	59					
		480V SHUTDOWN BD 1A2-A	4C	TAS	I	I			CCS PMP C-S(ALT FDR)		350	404					
3.20	3.20	480V SHUTDOWN BD 1A2-A	4D	UA					CONT RM A/C CPRSR A-A		125	148					
0.00	0.00	480V SHUTDOWN BD 1A2-A	9C	UA					STANDBY LTG CAB LS 4			54		[illegible]			

Prepared SAP/GAB
Checked RE/CRM
Reviewed RRR
Date 1-15-86

10-Jan-86

Sequoyah Nuclear Plant - Load List

TIME BD M.S	TIME SI M.S	BOARD	CPT	CONT COMB	PHASE A	PHASE B	OPER TIME	COMPONENT UNID	COMPONENT DESCRIPTION	KVA	HP	FULLOAD CURRENT	RATED LOAD	KW	MOTOR EFF	MOTOR PF	MOTOR %LRI
		480V SHUTDOWN BD 1A2-A	10A	UA					125V AC VITAL BAT II ALT FDR					7.44			
		480V SHUTDOWN BD 1A2-A	11A	UMO					SPARE 125V VITAL BAT CHGR 1-S			47		7.44			
0.00	0.00	6900V SHUTDOWN BD 1A-A	3	UA					480V SHDN XFMR 1A-A								
0.00	0.00	6900V SHUTDOWN BD 1A-A	4	UA					480V SHDN XFMR 1A2-A								
0.00	0.00	6900V SHUTDOWN BD 1A-A	5	UA					480V SHDN XFMR 1A-A								
0.15	0.15	6900V SHUTDOWN BD 1A-A	8	TAS	I	I			ESSENTIAL RCW PMP J-A		700						
		6900V SHUTDOWN BD 1A-A	9	TL					ESSENTIAL RCW PMP Q-A		700						
0.25	0.25	6900V SHUTDOWN BD 1A-A	10	TAD	I	I			AUX FEED WTR PMP 1A-A		486						
	0.30	6900V SHUTDOWN BD 1A-A	13	TAS		I			CNTMT SPRAY PMP 1A-A		690						
	0.10	6900V SHUTDOWN BD 1A-A	14	TAS	I	I			RESIDUAL HT REMOVAL PMP 1A-A		425						
	0.05	6900V SHUTDOWN BD 1A-A	15	TAS	I	I			SAFETY INJ PMP 1A-A		410						
0.02	0.02	6900V SHUTDOWN BD 1A-A	18	TAS	I	I			CENTRIFUGAL CHRG PMP 1A-A		680						
1.30		6900V SHUTDOWN BD 1A-A	20	TA	D				PRESS HEATER BKUP GR 1A-A					485			
		6900V SHUTDOWN BD 1A-A	21	TL	D				PRESS HEATER CONT GR 1D					415.44			
0.00	0.00	6900V SHUTDOWN BD 1A-A	22	UA					ERCW PMP STA XFMR 1A-A								

Prepared ____/____
Checked RRF/CRM
Reviewed ____
Date 1-15-86

TIME BD M.S	TIME SI M.S	BOARD	CPT	CONT COMB	PHASE A	PHASE B	OPER TIME	COMPONENT UNID	COMPONENT DESCRIPTION	KVA	HP	FULLOAD CURRENT	RATED LOAD	KW	MOTOR EFF	MOTOR PF	MOTOR ILRI
	0.00	480V CONT & AUX BLDG VENT BD 1B1-B	1D1	UAI					EMER GAS TRMT SYS B-B HTR			19.6		16			
0.00	0.00	480V CONT & AUX BLDG VENT BD 1B1-B	1D2	UA					CONT PWR XFMR		1.5						
T	T	480V CONT & AUX BLDG VENT BD 1B1-B	2A	UA					SHTDN XFMR RM 1B EXH FAN 1B3-B		2.5	4.1					
T	T	480V CONT & AUX BLDG VENT BD 1B1-B	2B	UA					SHTDN XFMR RM 1B EXH FAN 1B1-B		2.5	4.1					
T	T	480V CONT & AUX BLDG VENT BD 1B1-B	2C	UA					SHTDN XFMR RM 1B EXH FAN 1B2-B		2.5	4.1					
L	L	480V CONT & AUX BLDG VENT BD 1B1-B	2D	UA					SP FUEL PIT CLR SUMP PMP B		0.33	0.88					
		480V CONT & AUX BLDG VENT BD 1B1-B	2E	UMO					PERM HYDG MIT SYS 26B			25.5		25.5			
T	T	480V CONT & AUX BLDG VENT BD 1B1-B	3A	UA					RECIP CHG PMP RM CLR FAN		3	4.7					
0.00	0.00	480V CONT & AUX BLDG VENT BD 1B1-B	3B	UAI					SI PMP 1B-B RM CLR FAN		3	3.8					
0.02	0.02	480V CONT & AUX BLDG VENT BD 1B1-B	3C	UAI	I	I			CENT CHRG PMP 1B-B RM CLR FAN		5						
T	T	480V CONT & AUX BLDG VENT BD 1B1-B	3E	UA					SHDN BD RM A/C CIR PMP B-B		20						
T	0.00	480V CONT & AUX BLDG VENT BD 1B1-B	4A	UA	I	I			PEN RM EL 669 CLR FAN 1B-B		5	6.1					
T	0.00	480V CONT & AUX BLDG VENT BD 1B1-B	4B	UA	I	I			PEN RM EL 690 CLR FAN 1B-B		5	6.1					
T	0.00	480V CONT & AUX BLDG VENT BD 1B1-B	4C	UA	I	I			PEN RM EL 714 CLR FAN 1B-B		5	6.1					
0.00	0.00	480V CONT & AUX BLDG VENT BD 1B1-B	5A	UAI					RES HT REM PMP 1B-B CLR FAN		5						
0.00	0.00	480V CONT & AUX BLDG VENT BD 1B1-B	5B	UAI		I			CNTMT SPRAY PMP 1B-B CLR FAN		5	6.1					
0.20	0.20	480V CONT & AUX BLDG VENT BD 1B1-B	5C	UAI	I	7			CCS & AFW PMP SP CLR FAN B-B		20						
0.00		480V CONT & AUX BLDG VENT BD 1B1-B	5D	UA	0				CNTMT ANN VACUUM FAN 1B		1.5	3.3					
T	T	480V CONT & AUX BLDG VENT BD 1B1-B	5E	UA					480V BD RM 1B A/C CPRSR 1B-B		60	75					
0.00	0.00	480V CONT & AUX BLDG VENT BD 1B1-B	6C	UA					UNIT CONT ANN SYS	5		6		4.25			
0.00	0.00	480V CONT & AUX BLDG VENT BD 1B1-B	6D	UMW					CONT RM EMER INTAKE RAD MON		0.75	1.4					
		480V CONT & AUX BLDG VENT BD 1B1-B	6E1	UMO					PLANT EVAC ALMR XFMR B	37.5				31.875			
0.00	0.00	480V CONT & AUX BLDG VENT BD 1B1-B	6E2	UMW					SHTDN BD RM CHILLER B-B CON XFMR	3		38.5		2.55			
0.00	0.00	480V CONT & AUX BLDG VENT BD 1B1-B	7C	UAS					480V BD RM 1A PRESS FAN 1A2-B		3	4.6					
0.00	0.00	480V CONT & AUX BLDG VENT BD 1B1-B	7D2	UMW					CNTMT BLDG UP COMPT AIR MON		3	1.6					
	0.00	480V CONT & AUX BLDG VENT BD 1B1-B	7E	UAI	I	I			CONT BLDG EMRG PRESS FAN B-B		1	1.6					
0.00	0.00	480V CONT & AUX BLDG VENT BD 1B1-B	8A	UA					PRIM WTR MAKEUP PMP 1B		20						
T	T	480V CONT & AUX BLDG VENT BD 1B1-B	8B	UA					480V BD RM 1B A/C COND 1B-B		25	32					
F	0.00	480V CONT & AUX BLDG VENT BD 1B1-B	8C	UAI	I	I			CONT BLDG EMERG AIR CL UP FAN B-B		10	13.2					
0.00	0.00	480V CONT & AUX BLDG VENT BD 1B1-B	8D1	UMW					COND VAC PMP H2 RANGE AIR EXH MON		0.75	1.4					
0.00	0.00	480V CONT & AUX BLDG VENT BD 1B1-B	8D2	UMW					CNTMT PURGE AIR EXH MON		0.75	1.4					
T	0.00	480V CONT & AUX BLDG VENT BD 1B1-B	8E	UA	I	I			PIPE CHASE CLR FAN 1B-B		20	24.1					
0.00	0.00	480V CONT & AUX BLDG VENT BD 1B1-B	9A	UAS					125V BATT RM I EXH FAN 1A2-B		0.5						
T	0.00	480V CONT & AUX BLDG VENT BD 1B1-B	9C	UA	I	I			SP FUEL PIT PMP B-B CLR FAN		5	6.1					
0.00	0.00	480V CONT & AUX BLDG VENT BD 1B1-B	9D	UAS					480V BD RM 1B PRESS FAN 1B2-B		3	4.6					
T	T	480V CONT & AUX BLDG VENT BD 1B1-B	9E	UA					480V BD RM 1B A/C AHU 1B-B		25	32					
0.00		480V CONT & AUX BLDG VENT BD 1B1-B	10A	UA	0	0			SHTDN BD RM A PRESS FAN 1B-B		1	2					
		480V CONT & AUX BLDG VENT BD 1B1-B	10B	UMO					AUX CHGR PMP 1B		1.5	1.7					
	0.00	480V CONT & AUX BLDG VENT BD 1B1-B	11C	UA	I	I			EMER GAS TRMT SYS FAN B-B		20	24					
0.00	0.00	480V CONT & AUX BLDG VENT BD 1B1-B	11E	UA					BATT RM EL 669 EXH FAN B-B		2	3.1					
0.00	0.00	480V CONT & AUX BLDG VENT BD 1B1-B	12A	UAS					125V VIT BATT RM II EXH FAN 1B2-B		0.5						
0.00	0.00	480V CONT & AUX BLDG VENT BD 1B1-B	12E	UMW					SI SYS HT TRACE XFMR B			18		12.75			
		480V CONT & AUX BLDG VENT BD 1B1-B	13C	UMO					AUX CHGR BSTR PMP B		1.5	1.8					
		480V CONT & AUX BLDG VENT BD 1B1-B	13D1	UMO					TORNADO DMPR CONT XFMR	1.5		1.8		1.275			
0.00	0.00	480V CONT & AUX BLDG VENT BD 1B1-B	13D2	UA					CONT BLDG PRESS FAN B-B		15	20					
0.00	0.00	480V DIESEL AUX BD 1B1-B	1D	UA					CONTROL POWER XFMR	3				2.55			
		480V DIESEL AUX BD 1B1-B	2A	UMS					YARD FUEL OIL TRANS PMP		5	7					
0.00	0.00	480V DIESEL AUX BD 1B1-B	2C	UAD			1.00	1-FCV-67-65	EMG DSL ENG HT EXCH SUP VLV		0.125						
5.00	5.00	480V DIESEL AUX BD 1B1-B	2D	UAO					DG DAY TNK FUEL OIL XFER PMP		1	2					
		480V DIESEL AUX BD 1B1-B	3A2	OD					COOL TWR/AERCW HTTRC	6				5.1			
		480V DIESEL AUX BD 1B1-B	3C	UMS				0-FCV-67-360	ERCW DISCH ISOL VLV		0.667						
0.00	0.00	480V DIESEL AUX BD 1B1-B	4A	UA					DG ELEC PNL VENT FAN		15	20					
0.00	0.00	480V DIESEL AUX BD 1B1-B	5A1	UA					DIESEL GEN LT CAB LC47					38.25			
		480V DIESEL AUX BD 1B1-B	5A2	UMW					DIESEL GEN 1B-B BAT CHGR(ALT FDR)								
L	L	480V DIESEL AUX BD 1B1-B	5D	UA					DG BLDG SUMP PMP 2		3						

Prepared UC. / RHB

Checked RRP/ CRM

Reviewed RRR

Date 1-15-86

B25 '86 0204 300 p22

TIME BD M.S	TIME SI M.S	BOARD	CPT	CONT COMB	PHASE A	PHASE B	OPER TIME	COMPONENT UNID	COMPONENT DESCRIPTION	KVA	HP	FULLOAD CURRENT	RATED LOAD	KW	MOTOR EFF	MOTOR PF	MOTOR %LRI
		480V DIESEL AUX BD 1B1-B	5E	UAO					EL 722 CORRIDOR HTR					10			
0.00	0.00	480V DIESEL AUX BD 1B1-B	6A	UA					DG ROOM EXH FAN 1B1-B		15						
		480V DIESEL AUX BD 1B1-B	6B	UMO					AUX BOILER FUEL OIL PMP		5						
P	P	480V DIESEL AUX BD 1B1-B	6C	UA					DG 1B-B AIR COMPRESSOR 2		10						
0.00	0.00	480V DIESEL AUX BD 1B1-B	6D	UA					DG MUFFLER RM EXH FAN		1.5						
0.00	0.00	480V DIESEL AUX BD 1B1-B	7B	UA					DG BATT HOOD EXH FAN		0.33						
		480V DIESEL AUX BD 1B1-B	7D	UAO					DG ENG AUX LUBE OIL CIRC PMP		0.75						
		480V DIESEL AUX BD 1B1-B	7E1	UAO					DG ENG WTR HTR/LUBE OIL PMP		1			15			
		480V DIESEL AUX BD 1B2-B	1C1	UMO					POWER OUTLETS								
		480V DIESEL AUX BD 1B2-B	1C2	UAO					DIESEL GEN SPACE HTR			3.1		1.95			
0.00	0.00	480V DIESEL AUX BD 1B2-B	1D	UA					CONTROL POWER XFMR	3		6.3		2.55			
5.00	5.00	480V DIESEL AUX BD 1B2-B	4A	UAO					DG DAY TNK FUEL OIL XFER PMP		1	2					
		480V DIESEL AUX BD 1B2-B	4B	OD				0-FCV-67-362	ERCW RET DISCH CAN SHTOFF		0.667						
		480V DIESEL AUX BD 1B2-B	5A1	UAO					DIESEL GEN ELEC BD RM HTR			6		5			
0.00	0.00	480V DIESEL AUX BD 1B2-B	5A2	UA					DIESEL GEN BATTERY CHGR			3		0.65			
		480V DIESEL AUX BD 1B2-B	5D	UAO					DIESEL GEN ROOM HTR B			6		5			
		480V DIESEL AUX BD 1B2-B	5E	UAO					DIESEL GEN ROOM HTR A			6		5			
0.00	0.00	480V DIESEL AUX BD 1B2-B	6A	UAO			1.00	1-FCV-67-67	EMG DSL ENG HT EXCH SUP VLV		0.125						
P	P	480V DIESEL AUX BD 1B2-B	6C	UA					DG 1B-B AIR COMPRESSOR 1		10	13					
0.00	0.00	480V DIESEL AUX BD 1B2-B	6D	UA					DG ROOM EXH FAN 1B2-B		15	19.5					
0.00	0.00	480V DIESEL AUX BD 1B2-B	7A	UA					DG BD ROOM EXH FAN		3	4.6					
		480V DIESEL AUX BD 1B2-B	7C	UAO					DG ENG AUX LUBE OIL CIRC PMP		0.75	1.95					
		480V DIESEL AUX BD 1B2-B	7D	UAO					DG ENG WTR HTR/LUBE OIL PMP		1	17.8		15			
0.00	0.00	480V ERCW MCC 1B-B	2A	UA					ERCW STRAINER B1B-B		3	7					
		480V ERCW MCC 1B-B	2B	TL					TRAVELING SCREEN B-B		7.5	10					
L	L	480V ERCW MCC 1B-B	2C	UA					STATION DECK SUMP PMP B		5	3.5					
		480V ERCW MCC 1B-B	2FR	TL					HEAT TRACE CABINET B-B			7.2		12.75			
		480V ERCW MCC 1B-B	3B	TL					SCREEN WASH PMP B-B		40	49.8					
		480V ERCW MCC 1B-B	3C	OP				1-FCV-67-489	HEADER AB ISOL VLV		0.33	0.95					
		480V ERCW MCC 1B-B	4A	TL					DUPLEX SUMP PMP A		1.5	5.3					
		480V ERCW MCC 1B-B	4B	TL					DUPLEX SUMP PMP B		1.5	5.3					
		480V ERCW MCC 1B-B	4C	TL					ERCW PS ELEC EQP RM B SUP FAN		5	2.5					
		480V ERCW MCC 1B-B	4D	TL					ERCW PMP HTR CAB HC-3			9.6		38.25			
		480V ERCW MCC 1B-B	4ER	TL					LIGHTING CABINET LC34			48		38.25			
		480V ERCW MCC 1B-B	4FL	TL					ERCW PMP STATION HTR E			12		10			
		480V ERCW MCC 1B-B	4FR	TL					ERCW PMP STATION HTR F			18		15			
0.00	0.00	480V ERCW MCC 1B-B	5E	UA					ERCW STRAINER XFMR	1				0.85			
		480V REACTOR MOV BD 1B1-B	1D	UA					480V SHDN BD XFMR 1B2-B COOL FAN(ALT FDR)		0.33						
		480V REACTOR MOV BD 1B1-B	2A	UMS	0				INCORE INSTR RM COOL FAN 1B		5						
		480V REACTOR MOV BD 1B1-B	2B	UMS	0				INCORE INSTR RM CHILLER WTR COMP 1B		10						
		480V REACTOR MOV BD 1B1-B	2C	UMO					AUX BORON TK AGITATOR		1	1.7					
		480V REACTOR MOV BD 1B1-B	3A	UMS	0				INCORE INSTR RM CIRC PMP 1B		1.5						
T		480V REACTOR MOV BD 1B1-B	3B	UA	0	0			SIS BORON INJ TK HTR 1B-B					6			
T	T	480V REACTOR MOV BD 1B1-B	3D	UA					480V SHDN BD XFMR 1B1-B COOL FAN		0.33						
T	T	480V REACTOR MOV BD 1B1-B	3D	UA					480V SHDN BD XFMR 1B-B COOL FAN(NOR FDR)		0.33						
T	T	480V REACTOR MOV BD 1B1-B	3E	UA					BORIC ACID TK A HTR B-B					9			
S	S	480V REACTOR MOV BD 1B1-B	4A	UA					BORIC ACID XFER PMP 1B-B		15						
		480V REACTOR MOV BD 1B1-B	4C	UAO					BORIC ACID BATCH TK HTR 1					22.5			
T	T	480V REACTOR MOV BD 1B1-B	4E	UA					BORIC ACID TK C HTR B-B					9			
		480V REACTOR MOV BD 1B1-B	5B	UMO					48V SPARE BAT CHGR(ALT FDR)								
0.02	0.02	480V REACTOR MOV BD 1B1-B	5C2	UAI	I	I			CENT CHG PMP 1B AUX OIL PMP		2	3.1					
0.20	0.21	480V REACTOR MOV BD 1B1-B	5E	UA		0			CCS BOOST PMP 1B-B		15						
		480V REACTOR MOV BD 1B1-B	7A1	OP					BACK FLOW GATE HOIST 1B-B		20						
		480V REACTOR MOV BD 1B1-B	7A2	UMW					480V PLANT BATTERY CHGR(ALT FDR)								
	0.00	480V REACTOR MOV BD 1B1-B	7C	UAI	I	I	0.06	1-FCV-62-61	SEAL FLOW ISOL VLV		0.7						

Prepared RRF/[illegible]
Checked [illegible]/CRM
Reviewed [illegible]
Date 1-15-86

TIME BD M.S	TIME SI M.S	BOARD	CPT	CONT COMB	PHASE A	PHASE B	OPER TIME	COMPONENT UNID	COMPONENT DESCRIPTION	KVA	HP	FULLLOAD CURRENT	RATED LOAD	KW	MOTOR EFF	MOTOR PF	MOTOR %LRI
	0.00	480V REACTOR MOV BD 1B1-B	7E	UAI	I	I	0.09	1-FCV-62-91	CHR FLOW ISOL VLV		1						
		480V REACTOR MOV BD 1B1-B	8A	OP				1-FCV-62-99	CHG PMP MIN FLOW VLV		1.6						
	0.10	480V REACTOR MOV BD 1B1-B	8B	UAI	I	I	1.00	1-LCV-62-133	VOL CONT TK ISOL VLV		0.4						
	0.00	480V REACTOR MOV BD 1B1-B	8C	UAI	I	I	0.10	1-LCV-62-136	CHG PMP FLOW VLV		1.4						
		480V REACTOR MOV BD 1B1-B	8E	UMS				1-FCV-62-138	EMER BORON CONT VLV		1						
		480V REACTOR MOV BD 1B1-B	9A	UMS				1-FCV-63-175	SIS PMP B-B DISCH VLV		1.6						
		480V REACTOR MOV BD 1B1-B	9B	UMS				1-FCV-63-5	REF WTR STORAGE TK VLV		1.4						
		480V REACTOR MOV BD 1B1-B	9C	UMS				1-FCV-63-6	SIS PMP INLET PMP VLV		0.66						
		480V REACTOR MOV BD 1B1-B	9E	UMS				1-FCV-63-11	SIS PMP HT EXC B VLV		3.2						
		480V REACTOR MOV BD 1B1-B	10A	UMS				1-FCV-63-157	SIS PMP OUTLET RCS VLV		2.6						
	0.00	480V REACTOR MOV BD 1B1-B	10B	UAI	I	I	0.09	1-FCV-63-25	SIS BORON INJ TK VLV		2						
		480V REACTOR MOV BD 1B1-B	10C	UMS				1-FCV-63-153	SIS PMP B-B FLOW CONT VLV		1.6						
		480V REACTOR MOV BD 1B1-B	10E	UMS				1-FCV-63-48	SIS PMP B-B INLET VLV		1						
	0.00	480V REACTOR MOV BD 1B1-B	11A	UAI	I	I	0.10	1-FCV-63-40	SIS BORON INJ TK VLV		2						
		480V REACTOR MOV BD 1B1-B	11B	UAI	I	I		1-FCV-63-67	SIS ACC TK 4 ISOL VLV		21						
	120.00	480V REACTOR MOV BD 1B1-B	11C	UA			0.43	1-FCV-63-73	CNTMT SUMP FLOW VLV		10.5						
		480V REACTOR MOV BD 1B1-B	11E	UAI	I	I		1-FCV-63-98	SIS ACC TK 2 ISOL VLV		21						
		480V REACTOR MOV BD 1B1-B	12A	UMS				1-FCV-63-94	SI TO 1 & 4 CONT VLV(63-94)		21						
		480V REACTOR MOV BD 1B1-B	12B	UMS				1-FCV-63-172	RHR RECIRC VLV		5.2						
		480V REACTOR MOV BD 1B1-B	12C	UAI	I	I		1-MTR-87-22	UHI ACCUM ISOL VLV 6A6		0.7						
		480V REACTOR MOV BD 1B1-B	12E	UMS				1-FCV-68-332	RCS RELIEF CONT VLV (68-332)		1.6						
	0.00	480V REACTOR MOV BD 1B1-B	13A	UAI		I	1.00	1-FCV-72-2	SPRAY HDR 1B ISOL VLV		3.3						
	0.10	480V REACTOR MOV BD 1B1-B	13B	UAI		I	1.00	1-FCV-72-13	SPRAY PMP 1B RECIRC VLV		0.125						
		480V REACTOR MOV BD 1B1-B	13C	UMS			0.20	1-FCV-72-20	SPRAY HDR 1B CONT VLV (72-20)		5.3						
		480V REACTOR MOV BD 1B1-B	13E	UAI				1-FCV-72-21	SPRAY HDR 1B CONT VLV (72-21)		3.3						
		480V REACTOR MOV BD 1B1-B	14A	UMS			0.10	1-FCV-72-41	RHR SP HDR 1B ISOL VLV (72-41)		5.2						
		480V REACTOR MOV BD 1B1-B	14B	UMO				1-FCV-74-2	RHR SYS ISOL VLV		2.6						
	120.00	480V REACTOR MOV BD 1B1-B	14C	UAI			2.00	1-FCV-74-21	RHR PMP 1B-B CONT VLV		1.6						
	0.00	480V REACTOR MOV BD 1B1-B	14E	UAI			1.00	1-FCV-74-24	RHR PMP 1B FLOW VLV		1.6						
		480V REACTOR MOV BD 1B1-B	15A	UMS				1-FCV-74-35	RHR HEAT EXCH B VLV		3.2						
		480V REACTOR MOV BD 1B1-B	15B	UMS				1-FCV-63-22	SIS PMP SHUTOFF VLV		2						
		480V REACTOR MOV BD 1B1-B	15C	UAI	I	I		1-MTR-87-24	UHI ACCUM ISOL VLV 6A6		0.7						
		480V REACTOR MOV BD 1B1-B	15E	UMS				1-FCV-63-4	SIS PMP 1B-B SHUTOFF VLV		1.6						
T	T	480V REACTOR MOV BD 1B2-B	2A	UA				1-FCV-1-18	STEAM FW PMP ISOL VLV		1.6	3.4					
	0.04	480V REACTOR MOV BD 1B2-B	2B	UAI			1.00	1-FCV-3-126B	ERCW 1B ISOL VLV		0.333	0.9					
	0.04	480V REACTOR MOV BD 1B2-B	2C	UAI			1.00	1-FCV-3-126A	ERCW 1B ISOL VLV (3-126A)		0.333	0.9					
	0.00	480V REACTOR MOV BD 1B2-B	2E	UAI	I	I	1.00	1-FCV-26-241	ANN ISOL VLV (26-241)		0.67	2.1					
		480V REACTOR MOV BD 1B2-B	3C	OP			0.42	1-FCV-67-82	AB ERCW 1B ISOL VLV		0.67	2.3					
	0.00	480V REACTOR MOV BD 1B2-B	4A	UAI		I	0.36	1-FCV-67-88	LWR CNTMT 1A ISOL VLV		0.5	1.5					
	0.00	480V REACTOR MOV BD 1B2-B	4B	UAI		I	0.36	1-FCV-67-96	LWR CNTMT 1B ISOL VLV		0.5	1.5					
	0.00	480V REACTOR MOV BD 1B2-B	4C	UAI		I	0.30	1-FCV-67-99	LWR CNTMT 1B ISOL VLV		0.5	1.5					
	0.00	480V REACTOR MOV BD 1B2-B	4E	UAI	I	I	1.00	1-FCV-26-244	ANN ISOL VLV		0.67	2.1					
	0.00	480V REACTOR MOV BD 1B2-B	5A	UAI		I	0.54	1-FCV-67-103	LWR CNTMT 1B ISOL VLV		0.125	0.45					
	0.00	480V REACTOR MOV BD 1B2-B	5B	UAI		I	0.36	1-FCV-67-107	LWR CNTMT 1D ISOL VLV		0.5	1.5					
	0.00	480V REACTOR MOV BD 1B2-B	5C	UAI		I	0.54	1-FCV-67-111	LWR CNTMT 1D ISOL VLV		0.13	0.45					
		480V REACTOR MOV BD 1B2-B	6A	UMS			0.36	1-FCV-67-123	CNTMT SP HT EXC 1B VLV		0.33	0.75					
		480V REACTOR MOV BD 1B2-B	6B	UMS			0.36	1-FCV-67-124	CNTMT SP HT EXC 1B VLV		0.33	0.75					
		480V REACTOR MOV BD 1B2-B	6C	OP			0.24	1-FCV-67-128	AB SUPP HDR 1B ISOL VLV		0.5	1.5					
	0.00	480V REACTOR MOV BD 1B2-B	7A	UAI		I	0.18	1-FCV-67-131	UPPR CNTMT 1A ISOL VLV		0.133	0.6					
	0.00	480V REACTOR MOV BD 1B2-B	7B	UAI		I	0.18	1-FCV-67-134	UPPR CNTMT 1C ISOL VLV		0.133	0.6					
	0.00	480V REACTOR MOV BD 1B2-B	7C	UAI		I	0.18	1-FCV-67-138	UPPR CNTMT 2B ISOL VLV		0.133	0.6					
0.20	0.20	480V REACTOR MOV BD 1B2-B	7E	UA			1.00	1-FCV-70-207	CNDS DEMIN SUP VLV		0.125	0.45					
	0.00	480V REACTOR MOV BD 1B2-B	8B	UAI		I	0.18	1-FCV-67-141	UPPR CNTMT 1D ISOL VLV		0.133	0.6					
		480V REACTOR MOV BD 1B2-B	9A	UMS				1-FCV-67-208	SSCA HDR 1B ISOL VLV		0.5	1.5					
	0.00	480V REACTOR MOV BD 1B2-B	9B	UAI		I	0.17	1-FCV-67-297	UPPR CNTMT 1B ISOL VLV		0.125	0.45					

Prepared WEJ / RJB

Checked JWY CRM

Reviewed RBK

Date 1-15-86

TIME BD M.S	TIME SI M.S	BOARD	CPT	CONT COMB	PHASE A	PHASE B	OPER TIME	COMPONENT UNID	COMPONENT DESCRIPTION	KVA	K	FULLOAD CURRENT	RATED LOAD	KW	MOTOR EFF	MOTOR PF	MOTOR %LRI
	0.00	480V REACTOR MOV BD 1B2-B	9C	UAI		I	0.16	1-FCV-67-298	UPPR CNTMT 1D ISOL VLV		0.125	0.45					
		480V REACTOR MOV BD 1B2-B	10C	UMS				1-FCV-3-193	LOOP 3 LINE VLV (3-193)		1	2.8					
		480V REACTOR MOV BD 1B2-B	10E	OP			0.42	1-FCV-70-64	CCS PMP 1A-A & 1B-B VLV		0.43	1.5					
		480V REACTOR MOV BD 1B2-B	11A	OP			0.36	1-FCV-70-3	RHR HT EXCH B VLV		0.26	1.6					
	0.09	480V REACTOR MOV BD 1B2-B	11B	UAI			1.00	1-FCV-3-179B	ERCW 1B ISOL VLV		0.7	2.3					
		480V REACTOR MOV BD 1B2-B	11C	OP			0.[illegible]	0-FCV-70-34	CCS PMP A & B ISOL VLV		0.26	1.6					
	0.09	480V REACTOR MOV BD 1B2-B	11E	UAI			1.00	1-FCV-3-179A	ERCW 1B ISOL VLV		0.7	2.3					
		480V REACTOR MOV BD 1B2-B	12A	OP			0.36	1-FCV-70-9	CCS HT EXCH A & C VLV		0.26	1.6					
		480V REACTOR MOV BD 1B2-B	12B	OP			0.36	0-FCV-70-12	CCS HT EXCH C VLV		0.26	1.6					
		480V REACTOR MOV BD 1B2-B	12C	OP			0.36	1-FCV-70-13	CCS HT EXCH A-C VLV		0.26	1.6					
0.20	0.20	480V REACTOR MOV BD 1B2-B	12E	UA			1.00	0-FCV-70-206	CNDS DEMIN VLV		0.125	0.45					
		480V REACTOR MOV BD 1B2-B	13A	OP			0.36	0-FCV-70-22	CCS HT EXCH C		0.25	1.6					
		480V REACTOR MOV BD 1B2-B	13B	OP			0.36	1-FCV-70-26	CCS PMP 1A-A & 1B-B VLV		0.26	1.6					
		480V REACTOR MOV BD 1B2-B	13C	OP			0.36	1-FCV-70-27	CCS PMP 1A-A & 1B-B VLV		0.26	1.6					
		480V REACTOR MOV BD 1B2-B	14A	OP			0.42	1-FCV-70-74	CCS PMP 1A-A & 1B-B VLV		0.43	1.5					
		480V REACTOR MOV BD 1B2-B	14B	OP			0.36	1-FCV-70-75	RHR HT EXC B ISOL VLV		0.26	1.6					
	0.00	480V REACTOR MOV BD 1B2-B	14C	UAI		I	1.00	0-FCV-70-87	RCP CNTMT ISOL VLV		1	2.8					
		480V REACTOR MOV BD 1B2-B	14E	UMS				1-FCV-3-194	LOOP 4 LINE VLV (3-194)		1	2.8					
	0.00	480V REACTOR MOV BD 1B2-B	15A	UAI		I	0.54	1-FCV-70-89	RC PMP CONTMT ISOL VLV		0.125	45					
	0.00	480V REACTOR MOV BD 1B2-B	15B	UAI		I	1.00	1-FCV-70-134	RCP CNTMT ISOL VLV		0.125	0.39					
	0.00	480V REACTOR MOV BD 1B2-B	15C	UAI		I	0.24	1-FCV-70-140	RCP CNTMT ISOL VLV		0.13	0.45					
		480V REACTOR MOV BD 1B2-B	16A	OP				0-FCV-67-478	ERCW COOL HEX A		0.66	2.3					
		480V REACTOR MOV BD 1B2-B	16B	UMS			0.36	1-FCV-70-153	RHR HT EXC B OUT VLV		0.33	0.75					
	0.00	480V REACTOR MOV BD 1B2-B	16C	UAI	I	I	0.06	1-FCV-3-47	STEAM GEN FW ISOL VLV		33	43					
	0.00	480V REACTOR MOV BD 1B2-B	17A	UAI	I	I	0.06	1-FCV-3-100	STEAM GEN FW ISOL VLV		33	43					
		480V REACTOR MOV BD 1B2-B	17C	UMS			0.36	0-FCV-70-198	SFPCS HTX HDR ISOL VLV		0.33	75					
		480V SHUTDOWN BD 1B1-B	2C	TL					AUX BLDG GEN SUP FAN 1B		150	173					
0.00	0.00	480V SHUTDOWN BD 1B1-B	3B	UAI	I	0			CRDM COOL FAN 1B		75	83					
0.20	0.20	480V SHUTDOWN BD 1B1-B	3C	TAS	I	I			CCS PUMP 1B-B		350	404					
		480V SHUTDOWN BD 1B1-B	3D	TL					CONT & SERV AIR CPRSR B		125	150					
0.00	0.00	480V SHUTDOWN BD 1B1-B	4B	UMW		0			REAC LOWER COMPT COOL FAN 1B-B		50	59					
		480V SHUTDOWN BD 1B1-B	4D	TM					RECIP CHG PUMP		200	221					
0.00	0.00	480V SHUTDOWN BD 1B1-B	8D	UA					STANDBY LTG CAB LS 2			27		38.25			
		480V SHUTDOWN BD 1B1-B	10A	UMO					ALT FDR VITAL BATT CKGR I					7.44			
		480V SHUTDOWN BD 1B1-B	11A	UMO					ALT FDR SPARE 125V VITAL BATT CHGR I					7.44			
0.00	0.00	480V SHUTDOWN BD 1B2-B	1D	UA					CONT RM AHU B-B		60	77					
3.20	3.20	480V SHUTDOWN BD 1B2-B	2B	UA					CONT RM A/C CPRSR B-B		125	148					
		480V SHUTDOWN BD 1B2-B	2C	TL					AUX BLDG GEN EXH FAN 1B		125	145					
21.00	21.00	480V SHUTDOWN BD 1B2-B	3A	UA					SHTDN BD RM AIR HAND UNIT 1B-B		75	88					
0.00	0.00	480V SHUTDOWN BD 1B2-B	3B	UAI	I	0			CRDM COOL FAN 1D		75	83					
2.00		480V SHUTDOWN BD 1B2-B	3C	TA					FIRE PUMP 1B-B		200	257					
21.00	21.00	480V SHUTDOWN BD 1B2-B	3D	UA					SHDN BD RM CHILLER PKG B-B		250	275					
		480V SHUTDOWN BD 1B2-B	4C	UMO					UNIT 1 REACT BLDG CRANE		123						
0.00	0.00	480V SHUTDOWN BD 1B2-B	5D	UMW		0			REACTOR LWR COMPT COOL FAN 1D-B		50	59					
		480V SHUTDOWN BD 1B2-B	8A	TM					SPENT FUEL PIT PUMP C-S(ALT)		100						
	10.00	480V SHUTDOWN BD 1B2-B	9C	UAI		I			CNTMT AIR RETURN FAN 1B-B		50	58					
0.00	0.00	480V SHUTDOWN BD 1B2-B	10A	UMW					125V AC VITAL BATT CHGR II			47		7.44			
15.00	15.00	480V SHUTDOWN BD 1B2-B	10D	TPD					MN TURB TURN GEAR OIL PMP		75	91.5					
		480V SHUTDOWN BD 1B2-B	11A	UMO					ALT SUPP TO 250V SP BATT CHGR								
		480V SHUTDOWN BD 1B2-B	11C	TL					FUEL HDL EXH FAN B		100	120					
0.00	0.00	6900V SHUTDOWN BD 1B-B	3	UA					480V SHDN XFMR 1B-B								
0.00	0.00	6900V SHUTDOWN BD 1B-B	4	UA					480V SHDN XFMR 1B2-B								
0.00	0.00	6900V SHUTDOWN BD 1B-B	5	UA					480V SHDN XFMR 1B-B								
		6900V SHUTDOWN BD 1B-B	8	TL					ESSENTIAL RCW PMP L-B		700						
0.15	0.15	6900V SHUTDOWN BD 1B-B	9	TAS	I	I			ESSENTIAL RCW PMP N-B		[illegible]						

Prepared RCS/RJB

Checked JJP/CRM

Reviewed RDR

Date 1-15-86

B25 '86 0204 300 p25

TIME BD M.S	TIME SI M.S	BOARD	CPT	CONT COMB	PHASE A	PHASE B	OPER TIME	COMPONENT UNID	COMPONENT DESCRIPTION	KVA	HP	FULLOAD CURRENT	RATED LOAD	KW	MOTOR EFF	MOTOR PF	MOTOR %LRI
0.25	0.25	6900V SHUTDOWN BD 1B-B	10	TAD	X	X			AUX FEED WTR PMP 1B-B		486						
	0.30	6900V SHUTDOWN BD 1B-B	13	TAS		X			CNTMT SPRAY PMP 1B-B		690						
	0.10	6900V SHUTDOWN BD 1B-B	14	TAS	X	X			RESIDUAL HT REMOVAL PMP 1B-B		425						
	0.05	6900V SHUTDOWN BD 1B-B	15	TAS	X	X			SAFETY INJ PMP 1B-B		410						
0.02	0.02	6900V SHUTDOWN BD 1B-B	18	TAS	X	X			CENTRIFUGAL CHRG PMP 1B-B		680						
1.30		6900V SHUTDOWN BD 1B-B	20	TA	0				PRESS HEATER BKUP GR 1B-B					485			
		6900V SHUTDOWN BD 1B-B	21	TL	0				PRESS HEATER BKUP GR 1C					415.44			
0.00	0.00	6900V SHUTDOWN BD 1B-B	22	UA					480V XFMR 1B-B								

Prepared RC / QTB
Checked GRO / CRM
Reviewed RPR
Date 1-15-86

B25 '86 0204 300 p26

TIME BD M.S	TIME SI M.S	BOARD	CPT	CONT COMB	PHASE A	PHASE B	OPER TIME	COMPONENT UNID	COMPONENT DESCRIPTION	KVA	HP	FULLOAD CURRENT	RATED LOAD	KW	MOTOR EFF	MOTOR PF	MOTOR %LRI
0.00	0.00	480V CONT & AUX BLDG VENT BD 2A1-A	1D1	UA					RAD MON SAMP & FIRE PROT XFMR					30			
0.00	0.00	480V CONT & AUX BLDG VENT BD 2A1-A	1D2	UA					CONT PWR XFMR		3						
T	0.00	480V CONT & AUX BLDG VENT BD 2A1-A	2A	UA	X	X			PIPE CHASE CLR FAN 2A-A		20	24.1					
	0.00	480V CONT & AUX BLDG VENT BD 2A1-A	2B	UAI	X	X			AB GAS TMT SYS FAN A-A		20	24					
T	T	480V CONT & AUX BLDG VENT BD 2A1-A	3A	UA					SHTDN XFMR RM 2A EXH FAN 2A3-A		2.5	4.1					
T	T	480V CONT & AUX BLDG VENT BD 2A1-A	3B	UA					SHTDN XFMR RM 2A EXH FAN 2A1-A		2.5	4.1					
T	T	480V CONT & AUX BLDG VENT BD 2A1-A	3C	UA					SHTDN XFMR RM 2A EXH FAN 2A2-A		2.5	4.1					
0.00		480V CONT & AUX BLDG VENT BD 2A1-A	3D	UA	O				CNTMT ANN VACUUM FAN 2A		1.5	3.3					
T	0.00	480V CONT & AUX BLDG VENT BD 2A1-A	4A	UA	X	X			PEN RM EL 669 CLR FAN 2A-A		5	6.1					
T	0.00	480V CONT & AUX BLDG VENT BD 2A1-A	4B	UA	X	X			PEN RM EL 690 CLR FAN 2A-A		5	6.1					
T	0.00	480V CONT & AUX BLDG VENT BD 2A1-A	4C	UA	X	X			PEN RM EL 714 CLR FAN 2A-A		5	6.1					
0.00	0.00	480V CONT & AUX BLDG VENT BD 2A1-A	5A	UAI					RES HT REM PMP 2A-A CLR FAN		5	3.8					
0.00	0.00	480V CONT & AUX BLDG VENT BD 2A1-A	5B	UAI		X			CNTMT SPRAY PMP 2A-A CLR FAN		5	6.1					
		480V CONT & AUX BLDG VENT BD 2A1-A	5C	UMO					PERM HYD MIT SYS 26B			62.5		25.5			
T	0.00	480V CONT & AUX BLDG VENT BD 2A1-A	5D	UA	X	X			EMER GAS TMT RM CLR A-A		3	3.8					
P	P	480V CONT & AUX BLDG VENT BD 2A1-A	6C	UAS					AUX CONT AIR COMPRSR A-A		20	25.7					
0.00	0.00	480V CONT & AUX BLDG VENT BD 2A1-A	6E1	UMW					CNTMT PURGE AIR EXH RAD MON		0.75						
0.00	0.00	480V CONT & AUX BLDG VENT BD 2A1-A	6E2	UMW				RE-90-125	CONT RM INTAKE MON		0.75	1.4					
0.00	0.00	480V CONT & AUX BLDG VENT BD 2A1-A	7A	UAS					480V BD RM 2A PRESS FAN 2A1-A		3	4.6					
0.00	0.00	480V CONT & AUX BLDG VENT BD 2A1-A	7C1	UMW					SHTDN BD RM CHILLER A-A CON XFMR	3		6.3		2.55			
0.00	0.00	480V CONT & AUX BLDG VENT BD 2A1-A	7C2	UMW				RE-90-119	COND VAC PMP AIR EXH MON		0.75	1.4					
0.00	0.00	480V CONT & AUX BLDG VENT BD 2A1-A	7D	UAS					125V BATT RM III EXH FAN 2B1-A		0.5						
		480V CONT & AUX BLDG VENT BD 2A1-A	7E	UMO					AUX CHGR PMP 2A		1.5						
0.00	0.00	480V CONT & AUX BLDG VENT BD 2A1-A	8A	UA					PRIM WTR MAKEUP PMP 2A		20	24.5					
T	T	480V CONT & AUX BLDG VENT BD 2A1-A	8B	UA					480V BD RM 2A A/C COND 2A-A		20	21					
0.00	0.00	480V CONT & AUX BLDG VENT BD 2A1-A	8D	UAS					480V BD RM 2B PRESS FAN 2B1-A		3	4.6					
0.00	0.00	480V CONT & AUX BLDG VENT BD 2A1-A	9A	UMW					GAS EFF RAD MON		5	7.25					
T	T	480V CONT & AUX BLDG VENT BD 2A1-A	9E	UA					480V BD RM 2A A/C AHU 2A-A		10	12.4					
0.00	0.00	480V CONT & AUX BLDG VENT BD 2A1-A	10A	UAS					125V VIT BATT RM IV FAN 2A1-A		0.5						
0.00	0.00	480V CONT & AUX BLDG VENT BD 2A1-A	10B	UAI					SI PMP 2A-A RM CLR FAN		3	3.8					
0.02	0.02	480V CONT & AUX BLDG VENT BD 2A1-A	10D	UAI	X	X			CENT CHRG PMP 2A-A RM CLR FAN		5	6.1					
T	0.02	480V CONT & AUX BLDG VENT BD 2A1-A	10E1	UA	X	X			AB GAS TMT SYS HUM HTR A-A			66.7		32			
0.00	0.00	480V CONT & AUX BLDG VENT BD 2A1-A	10E2	UMW				RE-90-205	MAIN CONT RM EMER INTAKE RAD MON		0.75	1.4					
0.00	0.00	480V CONT & AUX BLDG VENT BD 2A1-A	11A	UAI	X	X			AUX FDWTR & BA TRANS PMP SP CLR FAN A-A		5	6.1					
T	T	480V CONT & AUX BLDG VENT BD 2A1-A	11B	UA					SHDN BD RM A/C CIR PMP A-A		20	23.4					
0.00		480V CONT & AUX BLDG VENT BD 2A1-A	11C	UA					SHTDN BD RM & PRESS FAN 2A-A		1	[illegible]					
T	T	480V CONT & AUX BLDG VENT BD 2A1-A	11D	UA					480V BD RM 2A A/C CPRSR 2A-A		50	61					
0.00	0.00	480V CONT & AUX BLDG VENT BD 2A1-A	11E1	UMW				RE-90-106	CNTMT BLDG LWR COMPT AIR MON		3	4.6					
0.00	0.00	480V CONT & AUX BLDG VENT BD 2A1-A	11E2	UMW				RE-90-100	SHIELD BLDG VENT RAD MON		3	4.6					
0.00	0.00	480V DIESEL AUX BD 2A1-A	1D	UA					CONTROL POWER XFMR	3		6.3		2.55			
0.00	0.00	480V DIESEL AUX BD 2A1-A	2C	UAO			1.00	2-FCV-67-68	EMG DSL ENG HT EXCH SUP VLV		0.125						
5.00	5.00	480V DIESEL AUX BD 2A1-A	2D	UAO					DG DAY TNK FUEL OIL XFER PMP		1	2					
		480V DIESEL AUX BD 2A1-A	3A2	OD					COOL TWR/AERCW PMP STA HTR DIST	6				5.1			
		480V DIESEL AUX BD 2A1-A	3C	UMS				0-FCV-67-366	ERCW DISCH ISOL VLV		0.667						
		480V DIESEL AUX BD 2A1-A	3D	OD					AUX ERCW TRAVELING SCREEN		1	1.5					
0.00	0.00	480V DIESEL AUX BD 2A1-A	4A	UA					DG ELEC PNL VENT FAN		15						
0.00	0.00	480V DIESEL AUX BD 2A1-A	5A1	UA					DIESEL GEN LT CAB LC46			93.8		38.25			
		480V DIESEL AUX BD 2A1-A	5A2	UMO					DIESEL GEN 2A-A BATTERY CHGR(ALT FDR)								
		480V DIESEL AUX BD 2A1-A	5E	UAO					EL 722 CORRIDOR HTR			8.3		7.5			
0.00	0.00	480V DIESEL AUX BD 2A1-A	6A	UA					DG ROOM EXH FAN 2A1-A		15	19.5					
P	P	480V DIESEL AUX BD 2A1-A	6C	UA					DG 2A-A AIR COMPRESSOR 2		10	13					
0.00	0.00	480V DIESEL AUX BD 2A1-A	6D	UA					DG MUFFLER RM EXH FAN		1.5	2.8					
0.00	0.00	480V DIESEL AUX BD 2A1-A	7B	UA					DG BATT HOOD EXH FAN		0.33	0.96					
		480V DIESEL AUX BD 2A1-A	7D	UAO					DG ENG AUX LUBE OIL CIRC PMP		0.75	1.4					
		480V DIESEL AUX BD 2A1-A	7E1	UAO					DG ENG WTR HTR/LUBE OIL PMP		1	19.6		15			

Prepared GAP/GTB
Checked RRG/CRM
Reviewed [illegible]
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TIME BD M.S	TIME SI M.S	BOARD	CPT	CONT COMB	PHASE A	PHASE B	OPER TIME	COMPONENT UNID	COMPONENT DESCRIPTION	KVA	HP	FULLOAD CURRENT	RATED LOAD	KW	MOTOR EFF	MOTOR PF	MOTOR %LRI
		480V DIESEL AUX BD 2A2-A	1C2	UAO					DIESEL GEN SPACE HTR			2.3		1.95			
0.00	0.00	480V DIESEL AUX BD 2A2-A	1D	UA					CONTROL POWER XFMR	3		6.3		2.55			
		480V DIESEL AUX BD 2A2-A	3A2	UMO					POWER OUTLETS								
		480V DIESEL AUX BD 2A2-A	3B	UAO					DIESEL GEN ELEC BD RM HTR			6		5			
		480V DIESEL AUX BD 2A2-A	3C	UMS				0-FCV-67-12	ERCW DISCH SHTOFF VLV		0.667						
		480V DIESEL AUX BD 2A2-A	3D	OD					AUX ERCW SCREEN WASH PMP		10	13.4					
5.00	5.00	480V DIESEL AUX BD 2A2-A	4A	UAO					DG DAY TNK FUEL OIL XFER PMP		1	2					
		480V DIESEL AUX BD 2A2-A	4B	OD				0-FCV-67-365	ERCW RET DISCH CAN SHTOFF VLV		0.667						
0.00	0.00	480V DIESEL AUX BD 2A2-A	5A2	UA					DIESEL GEN BATTERY CHGR			3		0.65			
		480V DIESEL AUX BD 2A2-A	5D	UAO					DIESEL GEN ROOM HTR B			6		5			
		480V DIESEL AUX BD 2A2-A	5E	UAO					DIESEL GEN ROOM HTR A			6		5			
0.00	0.00	480V DIESEL AUX BD 2A2-A	6A	UAO			1.00	2-FCV-67-66	EMG DSL ENG HT EXCH SUP VLV		0.125						
P	P	480V DIESEL AUX BD 2A2-A	6C	UA					DG 2A-A AIR COMPRESSOR 1		10	13					
0.00	0.00	480V DIESEL AUX BD 2A2-A	6D	UA					DG ROOM EXH FAN 2A2-A		15	19.5					
0.00	0.00	480V DIESEL AUX BD 2A2-A	7A	UA					DG BD ROOM EXH FAN		3	4.6					
		480V DIESEL AUX BD 2A2-A	7C	UAO					DG ENG AUX LUBE OIL CIRC PMP		0.75						
		480V DIESEL AUX BD 2A2-A	7D	UAO					DG ENG WTR HTR/LUBE OIL PMP		1	17.8		15			
0.00	0.00	480V ERCW MCC 2A-A	2A	UA					ERCW STRAINER A2A-A		3	7					
		480V ERCW MCC 2A-A	2B	TL					TRAVELING SCREEN D-A		7.5	10					
		480V ERCW MCC 2A-A	3B	TL					SCREEN WASH PMP D-A		40	49.8					
		480V ERCW MCC 2A-A	3C	OP				2-FCV-67-492	HEADER 2A ISOL VLV		0.7						
		480V ERCW MCC 2A-A	4A	TL					DUPLEX SUMP PMP A		1.5	5.3					
		480V ERCW MCC 2A-A	4B	TL					DUPLEX SUMP PMP B		1.5	5.3					
		480V ERCW MCC 2A-A	4C	TL					ERCW PS ELEC EQUIP RM 2A FAN		5	2.5					
		480V ERCW MCC 2A-A	4EL	TL					ERCW PUMPING STATION HTR G			13		10			
		480V ERCW MCC 2A-A	4ER	TL					ERCW PUMPING STATION HTR H			12		10			
		480V ERCW MCC 2A-A	4FL	TL					ERCW PUMPING STATION HTR J			9		7.5			
		480V ERCW MCC 2A-A	4FR	TL					ERCW PUMPING STATION HTR K			9		7.5			
0.00	0.00	480V ERCW MCC 2A-A	5D	UA					ERCW STRAINER XFMR	1				0.85			
		480V REACTOR MOV BD 2A1-A	1C	UMS	0				INCORE INSTR RM COOL FAN 2A		5	7.2					
		480V REACTOR MOV BD 2A1-A	1D	UMS					REFUEL WATER PURIFICATION PMP A		15						
T	T	480V REACTOR MOV BD 2A1-A	1E	UA					480V SHDN BD XFMR 2A1-A COOL FAN		0.33						
		480V REACTOR MOV BD 2A1-A	2B	UMS					REAC CNTMT PIT SUMP EJECT PMP		0.75						
		480V REACTOR MOV BD 2A1-A	2C1	UMO					24V MICROWAVE HAT CHGR #1(ALT FDR)								
0.02	0.02	480V REACTOR MOV BD 2A1-A	2C2	UAI	I	I			CENT CHG PMP 2A AUX OIL PMP		2						
0.20	0.21	480V REACTOR MOV BD 2A1-A	2E	UA		0			CCS BOOST PMP 2A-A		15	18.4					
	0.00	480V REACTOR MOV BD 2A1-A	3A	UAI	I	I	0.07	2-FCV-62-63	SEAL FLOW ISOL VLV		0.5						
	0.00	480V REACTOR MOV BD 2A1-A	3B	UAI	I	I	0.09	2-FCV-62-90	CHR FLOW ISOL VLV		1.6						
		480V REACTOR MOV BD 2A1-A	3C	OP				2-FCV-62-98	CHG PMP MIN FLOW VLV		1	2.8					
	0.10	480V REACTOR MOV BD 2A1-A	3E	UAI	I	I	1.00	2-LCV-62-132	VOL CONT TK ISOL VLV		0.67	0.7					
	0.00	480V REACTOR MOV BD 2A1-A	4A	UAI	I	I	0.10	2-LCV-62-135	REFUEL WTR STG TK VLV		1	2.4					
		480V REACTOR MOV BD 2A1-A	4B	UMS				2-FCV-63-156	SIS PMP OUTLET RCS VLV		2.6	7					
	0.00	480V REACTOR MOV BD 2A1-A	4E	UAI	I	I	1.00	2-FCV-72-22	SPRAY HDR 2A CONT VLV		3.3	5.2					
		480V REACTOR MOV BD 2A1-A	5A	UMS			0.15	2-FCV-72-23	CNTMTSPRAY HDR 1A CONT VLV		5.2	8.41					
	0.10	480V REACTOR MOV BD 2A1-A	5B	UAI		I	1.00	2-FCV-72-34	SPRAY PMP 1B RECIRC VLV		0.13	0.45					
	0.00	480V REACTOR MOV BD 2A1-A	5C	UAI		I	1.00	2-FCV-72-39	CNTMT SPRAY HDR 2A ISOL VLV		3.3	5.2					
		480V REACTOR MOV BD 2A1-A	5E	UMS			0.10	2-FCV-72-40	RHR SP HDR 2A ISOL VLV		5.3	7.5					
T		480V REACTOR MOV BD 2A1-A	6A	UA	0	0			SIS BORON INJ TK HTR 2A-A			7.2		6			
		480V REACTOR MOV BD 2A1-A	6B	UMS	0				INCORE INSTR RM CIRC PMP 2A		1.5	2.2					
		480V REACTOR MOV BD 2A1-A	6C1	OD					PART LENGTH CRD XFMR	30		36.1		25.5			
		480V REACTOR MOV BD 2A1-A	6C2	UMO				2-FCV-74-1	RHR SYS ISOL VLV		4	0.9					
	120.00	480V REACTOR MOV BD 2A1-A	6E	UAI			2.00	2-FCV-74-3	RHR PMP 2A-A FLOW VLV		1.6	4					
		480V REACTOR MOV BD 2A1-A	7B	UMS	0				INCORE INSTR RM CHILLER WTR COMP 2A		10	18					
		480V REACTOR MOV BD 2A1-A	7C1	OP					BACK FLOW GATE HOIST 2A-A		20						
	0.00	480V REACTOR MOV BD 2A1-A	7C2	UAI			1.00	2-FCV-74-12	RHR PMP 2A-A FLOW VLV		1.6	3.4					

Prepared JAP/RJB

Checked RRS/CRM

Reviewed [illegible]

Date 1-15-86

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TIME BD M.S	TIME SI M.S	BOARD	CPT	CONT COMB	PHASE A	PHASE B	OPER TIME	COMPONENT UNID	COMPONENT DESCRIPTION	KVA	HP	FULLOAD CURRENT	RATED LOAD	KW	MOTOR EFF	MOTOR PF	MOTOR %LRI
		480V REACTOR MOV BD 2A1-A	7E	UMS				2-FCV-74-33	RHR HEAT EXCH BP VLV		3.2	5.2					
		480V REACTOR MOV BD 2A1-A	9D	UMS				2-FCV-68-333	RCS RELIEF FLOW CONT VLV		1.6	2.3					
		480V REACTOR MOV BD 2A1-A	10C	UAI	I	I		2-MTR-87-21	UHI ACCUM ISOL VLV 6A6		0.33	1					
		480V REACTOR MOV BD 2A1-A	11A	UMS				2-FCV-63-1	RWST-RHR FL CONT VLV		5.3	7.7					
		480V REACTOR MOV BD 2A1-A	11B	UMS				2-FCV-63-3	SIS PMP 2A-A SHUTOFF VLV		1.6	3.4					
		480V REACTOR MOV BD 2A1-A	11C	UMS				2-FCV-63-7	SIS PMP INLET PMP VLV		0.66	2.1					
		480V REACTOR MOV BD 2A1-A	11E	UMS				2-FCV-63-8	RHR HT EXCH 1 VLV		3.2	5.2					
	0.00	480V REACTOR MOV BD 2A1-A	12A	UAI	I	I	1.00	2-FCV-63-26	SIS BORON INJ TK VLV		2	3.5					
		480V REACTOR MOV BD 2A1-A	12B	UMS				2-FCV-63-152	SIS PMP 1A-A FLOW CONT VLV		1.5	3.4					
		480V REACTOR MOV BD 2A1-A	12C	UMS				2-FCV-63-47	SIS PMP A-A INLET VLV		1	1.9					
	0.00	480V REACTOR MOV BD 2A1-A	12E	UAI	I	I	0.11	2-FCV-63-39	SIS BORON INJ TK SHUTOFF VLV		2	3.5					
	120.00	480V REACTOR MOV BD 2A1-A	13A	UA			0.42	2-FCV-63-72	CNTMT SUMP FLOW VLV		10.5	13.6					
		480V REACTOR MOV BD 2A1-A	13B	UMS				2-FCV-63-93	SI TO LOOP 2 & 3 FLOW CONT VLV		21	20.5					
		480V REACTOR MOV BD 2A1-A	13C	UMS				2-FCV-87-17	UHI POS DISP PMP RECIR VLV		1	2.8					
S	S	480V REACTOR MOV BD 2A1-A	14A	UA					BORIC ACID XFER PMP 2A-A		15	26					
		480V REACTOR MOV BD 2A1-A	14C	UAO					BORIC ACID BATCH TK HTR 4			27.1		22.5			
T	T	480V REACTOR MOV BD 2A1-A	14D	UA					BORIC ACID TK B HTR A-A			10.8		9			
		480V REACTOR MOV BD 2A1-A	15A	UAI	I	I		2-FCV-63-80	SIS ACC TK 3 ISOL VLV		21	25					
	0.00	480V REACTOR MOV BD 2A1-A	15B	UAI	I	I	1.00	2-FCV-63-118	SIS TK 1 ISOL VLV		21	25					
		480V REACTOR MOV BD 2A1-A	15C	UAI	I	I		2-MTR-87-23	UHI ACCUM ISOL VLV 6A6		0.33	1					
0.00	0.00	480V REACTOR MOV BD 2A2-A	1D	UMW					480V SHDN XFMR 2A1-A COOL FAN		0.332						
		480V REACTOR MOV BD 2A2-A	2A	UMS				2-FCV-1-17	STEAM AFW PMP ISOL VLV		1	2.6					
	0.04	480V REACTOR MOV BD 2A2-A	2B	UAI			1.00	2-FCV-3-116B	ERCW 2A ISOL VLV		0.333	0.9					
	0.04	480V REACTOR MOV BD 2A2-A	2C	UAI			1.00	2-FCV-3-116A	ERCW 2A ISOL VLV		0.333	0.9					
	0.06	480V REACTOR MOV BD 2A2-A	2E	UAI			1.00	2-FCV-3-136A	ERCW 2A ISOL VLV		0.7	2.3					
	0.06	480V REACTOR MOV BD 2A2-A	3B	UAI			1.00	2-FCV-3-136B	ERCW 2A ISOL VLV		0.7	2.3					
		480V REACTOR MOV BD 2A2-A	3C	OP			0.42	2-FCV-67-81	AB ERCW SUP HDR 2A ISOL VLV		0.67	2.3					
	0.00	480V REACTOR MOV BD 2A2-A	4A	UAI		I	0.30	2-FCV-67-83	LWR CNTMT 2A CLR SUP ISOL VLV		0.13	1.5					
	0.00	480V REACTOR MOV BD 2A2-A	4B	UAI		I	0.56	2-FCV-67-87	LWR CONT 2A COOL DISCH ISOL VLV		0.125						
	0.00	480V REACTOR MOV BD 2A2-A	4C	UAI		I	0.30	2-FCV-67-91	LWR CNTMT 2C CLR SUP ISOL VLV		0.13	1.5					
	0.00	480V REACTOR MOV BD 2A2-A	5A	UAI		I	0.56	2-FCV-67-95	LWR CNTMT 2C CLR DISCH ISOL VLV		0.125	0.6					
	0.00	480V REACTOR MOV BD 2A2-A	5B	UAI		I	0.36	2-FCV-67-104	LWR CNTMT 2B CLR DISCH ISOL VLV		0.33	1.5					
	0.00	480V REACTOR MOV BD 2A2-A	5C	UAI		I	0.30	2-FCV-67-112	LWR CNTMT 2D CLR DISCH ISOL VLV		0.13	1.5					
		480V REACTOR MOV BD 2A2-A	5E	UMS				0-FCV-70-193	SFPCS HT EXC ISOL VLV		0.33	0.75					
		480V REACTOR MOV BD 2A2-A	6C	UMS				2-FCV-67-125	CNTMT SP HT EXC 2A VLV		0.33	0.75					
		480V REACTOR MOV BD 2A2-A	6E	UMS			0.36	2-FCV-67-126	CNTMT SP HT EXC 2A VLV		0.33	0.75					
		480V REACTOR MOV BD 2A2-A	7A	OP			0.24	2-FCV-67-127	AB SUPP HDR 2A ISOL VLV		0.5	1.5					
	0.00	480V REACTOR MOV BD 2A2-A	7B	UAI		I	0.18	2-FCV-67-130	UPPR CNTMT 2A ISOL VLV		0.133	1.5					
	0.00	480V REACTOR MOV BD 2A2-A	7C	UAI		I	0.18	2-FCV-67-133	UPPR CNTMT 2C ISOL VLV		0.133	0.6					
	0.00	480V REACTOR MOV BD 2A2-A	7E	UAI		I	0.18	2-FCV-67-139	UPPR CNTMT 2B ISOL VLV		0.13	0.6					
	0.00	480V REACTOR MOV BD 2A2-A	8A	UAI		I	0.18	2-FCV-67-142	UPPR CNTMT 2D ISOL VLV		0.133	0.6					
		480V REACTOR MOV BD 2A2-A	8B	OP			0.42	2-FCV-67-223	HDR 2A HDR 1B ISOL VLV		1	2.8					
		480V REACTOR MOV BD 2A2-A	9D	UMW				2-FCV-67-146	CCS HT EXCH 2B DIS CT VLV		0.33	0.75					
	0.00	480V REACTOR MOV BD 2A2-A	10A	UAI		I	0.16	2-FCV-67-295	UPPR CNTMT 2A ISOL VLV		0.125	0.6					
	0.00	480V REACTOR MOV BD 2A2-A	10B	UAI		I	0.16	2-FCV-67-296	UPPR CNTMT 2C ISOL VLV		0.125	0.6					
		480V REACTOR MOV BD 2A2-A	12A	OP			0.36	2-FCV-70-2	RHR HT EXCH 2A VLV		0.26	1.6					
		480V REACTOR MOV BD 2A2-A	12B	OP			0.36	2-FCV-70-4	MISC EQPT INLET VLV		0.26	0.6					
		480V REACTOR MOV BD 2A2-A	12C	OP			0.36	2-FCV-70-15	CCS HT EXCH B VLV		0.26	1.6					
		480V REACTOR MOV BD 2A2-A	13A	OP			0.36	2-FCV-70-195	CCS HT EXCH B & C VLV		0.33	1.6					
	0.00	480V REACTOR MOV BD 2A2-A	13B	UAI	I	I	0.06	2-FCV-26-243	RCP SPRAY ISOL VLV		0.67	2.1					
		480V REACTOR MOV BD 2A2-A	13C	OP			0.36	2-FCV-70-18	CCS HTX B & C ISOL VLV		0.26	1.6					
		480V REACTOR MOV BD 2A2-A	14A	OP			0.36	2-FCV-70-16	CCS HTX B INLET VLV		0.26	1.6					
	0.00	480V REACTOR MOV BD 2A2-A	14B	UAI	I	I	0.24	2-FCV-70-143	EXCESS LETDN INLET CONT/ISOL VLV		0.13	0.45					
	0.00	480V REACTOR MOV BD 2A2-A	14C	UAI		I	0.15	2-FCV-70-90	RC PMP CONTMT ISOL VLV		1	2.8					
	0.00	480V REACTOR MOV BD 2A2-A	15A	UAI		I	0.24	2-FCV-70-92	RCP CNTMT ISOL VLV		0.13	0.45					

Prepared 92P / RTB

Checked RRE / CRM

Reviewed RBR

Date 1-15-86

TIME BD M.S	TIME SI M.S	BOARD	CPT	CONT COMB	PHASE A	PHASE B	OPER TIME	COMPONENT UNID	COMPONENT DESCRIPTION	KVA	HP	FULLOAD CURRENT	RATED LOAD	KW	MOTOR EFF	MOTOR PF	MOTOR %LRI
	0.00	480V REACTOR MOV BD 2A2-A	15C	UAI		I		2-FCV-70-133	RCP THER BARK ISOL VLV		0.67	0.95					
	0.00	480V REACTOR MOV BD 2A2-A	15E	UAI	I	I	0.07	2-FCV-26-240	CNTMT STAND PIPE ISOL VLV		0.67	2.1					
	0.00	480V REACTOR MOV BD 2A2-A	16A	UAI		I	0.24	2-FCV-70-139	RCP CNTMT ISOL VLV		0.13	1.6					
	0.00	480V REACTOR MOV BD 2A2-A	16B	UAI	I	I	0.07	2-FCV-3-33	STEAM GEN FW ISOL VLV		33	43					
		480V REACTOR MOV BD 2A2-A	16E	UMS			0.36	2-FCV-70-156	RHR HT EXC 2A OUTLET VLV		0.33	75					
		480V REACTOR MOV BD 2A2-A	17A	UMS			0.24	2-FCV-70-168	BA & GS EVAP PKG VLV		0.26	1.6					
		480V REACTOR MOV BD 2A2-A	17B	UAO				2-FCV-1-16	AFP TURB-SG 1 ISOL VLV		1						
	0.00	480V REACTOR MOV BD 2A2-A	17C	UAI	I	I	0.06	2-FCV-3-87	STEAM GEN FW ISOL VLV		33	43					
		480V REACTOR MOV BD 2A2-A	18A	UMS			0.36	2-FCV-70-183	SAMP HTX OUTLET VLV		0.67	0.6					
		480V REACTOR MOV BD 2A2-A	18B	UMS				2-FCV-3-191	LOOP 1 LINE VLV		1	2.8					
	0.00	480V REACTOR MOV BD 2A2-A	18C	UAI	I	I	1.00	2-FCV-26-242	ANN STD PIPE ISOL VLV		0.67	2.1					
		480V REACTOR MOV BD 2A2-A	18E	UMS				2-FCV-3-192	LOOP 2 LINE VLV		1	2.8					
		480V REACTOR MOV BD 2A2-A	19A	UAO				2-FCV-1-15	AFP TURB-SG 4 ISOL VLV		1.6	3.4					
	0.00	480V REACTOR MOV BD 2A2-A	19E	UAI	I	I	1.00	2-FCV-26-245	ANN ISOL VLV		0.67	2.1					
0.00	0.00	480V SHUTDOWN BD 2A1-A	2B	UAS					ELEC BD RM AHU A-A		75	96					
		480V SHUTDOWN BD 2A1-A	2C	TL					AUX BLDG GEN SUP FAN 2A		150	173					
0.00	0.00	480V SHUTDOWN BD 2A1-A	3B	UAI	I	0			CRDM COOL FAN 2A		75	83					
0.00	0.00	480V SHUTDOWN BD 2A1-A	3C	UMW		0			REAC LOWER COMPT COOL FAN 2A-A		50	59					
0.20	0.20	480V SHUTDOWN BD 2A1-A	4B	TAS	I	I			CCS PUMP 2A-A		350	404					
		480V SHUTDOWN BD 2A1-A	4D	OD					COOL TWR FAN A-A		100	120					
		480V SHUTDOWN BD 2A1-A	8A	TM					SPENT FUEL PIT PUMP C-S(NOR)		100	114					
0.00	0.00	480V SHUTDOWN BD 2A1-A	8C	UA					HT TR-CVC PNL A1 XFMR			54		38.25			
0.00	0.00	480V SHUTDOWN BD 2A1-A	10A	UA					NOR FDR VITAL BATT CKGR III					7.44			
	10.00	480V SHUTDOWN BD 2A1-A	10C	UAI		I			CNTMT AIR RETURN FAN 2A-A		50	58					
		480V SHUTDOWN BD 2A1-A	11A	UMO					ALT FDR 250V BATT CHGR No.2					58			
21.00	21.00	480V SHUTDOWN BD 2A2-A	2B	UA					SHTDN BD RM AIR HAND UNIT 2A-A		75	88					
		480V SHUTDOWN BD 2A2-A	2C	TL					AUX BLDG GEN EXH FAN 2A		125	145					
0.00	0.00	480V SHUTDOWN BD 2A2-A	3B	UAI	I	0			CRDM COOL FAN 2C		75	83					
2.00		490V SHUTDOWN BD 2A2-A	3C	TA					FIRE PUMP 2A-A		200	257					
		480V SHUTDOWN BD 2A2-A	3D	OD					COOL TOWER FAN B-S		100	120					
0.00	0.00	480V SHUTDOWN BD 2A2-A	4B	UMW		0			REACTOR LWR COMPT COOL FAN 2C-A		50	59					
		480V SHUTDOWN BD 2A2-A	4C	OD					ALT SUP COOL TWR FAN C-S		100						
3.20	3.20	480V SHUTDOWN BD 2A2-A	4D	UA					ELEC BD RM A." COMPR A-A		125	148					
21.00	21.00	490V SHUTDOWN BD 2A2-A	5D	UA					SHDN BD RM CHILLER PKG A-A		250	275					
0.00	0.00	480V SHUTDOWN BD 2A2-A	8C	UMW					CVS SYS HT TR XFMR B3			54		38.25			
0.00	0.00	480V SHUTDOWN BD 2A2-A	9C	UA					STANDBY LTG CAB LS 1			27		19.1			
		480V SHUTDOWN BD 2A2-A	10A	UMO					ALT FD VITAL BAT CHGR IV					7.44			
		480V SHUTDOWN BD 2A2-A	11A	UMO					NOR FD SP VITAL BAT CHGR 2-S								
		480V SHUTDOWN BD 2A2-A	11B	TL					FUEL HAND EXH FAN A		100	120					
0.00	0.00	6900V SHUTDOWN BD 2A-A	3	UA					480V SHDN XFMR 2A1-A								
0.00	0.00	6900V SHUTDOWN BD 2A-A	4	UA					480V SHDN XFMR 2A2-A								
0.00	0.00	6900V SHUTDOWN BD 2A-A	5	UA					480V SHDN XFMR 2A-A								
		6900V SHUTDOWN BD 2A-A	8	TL					ESSENTIAL RCW PMP R-A		700						
0.15	0.15	6900V SHUTDOWN BD 2A-A	9	TAS	I	I			ESSENTIAL RCW PMP K-A		700						
0.25	0.25	6900V SHUTDOWN BD 2A-A	10	TAD	I	I			AUX FEED WTR PMP 2A-A		486						
	0.30	6900V SHUTDOWN BD 2A-A	13	TAS		I			CNTMT SPRAY PMP 2A-A		690						
	0.10	6900V SHUTDOWN BD 2A-A	14	TAS	I	I			RESIDUAL HT REMOVAL PMP 2A-A		425						
	0.05	6900V SHUTDOWN BD 2A-A	15	TAS	I	I			SAFETY INJ PMP 2A-A		410						
0.02	0.02	6900V SHUTDOWN BD 2A-A	18	TAS	I	I			CENTRIFUGAL CHRG PMP 2A-A		680						
		6900V SHUTDOWN BD 2A-A	19	OD					AUX ESSENTIAL RCW PMP A-A		500						
1.30		6900V SHUTDOWN BD 2A-A	20	TA	0				PRESS HEATER BKUP GR 2A-A					485			
		6900V SHUTDOWN BD 2A-A	21	TL	0				PRESS HEATER CONT GR 2D					415.44			
0.00	0.00	6900V SHUTDOWN BD 2A-A	22	UA					ERCW PMP STA XFMR 2A-A								

Prepared GAP/ GJB

Checked CCS/ CRM

Reviewed R.P.R.

Date 1-15-86

TIME BD M.S	TIME SI M.S	BOARD	CPT	CONT COMB	PHASE A	PHASE B	OPER TIME	COMPONENT UNID	COMPONENT DESCRIPTION	KVA	HP	FULLOAD CURRENT	RATED LOAD	KW	MOTOR EFF	MOTOR PF	MOTOR %LRI
0.00	0.00	480V CONT & AUX BLDG VENT BD 2B1-B	1D2	UA					CONT PWR XFMR		1.5						
T	T	480V CONT & AUX BLDG VENT BD 2B1-B	2A	UA					SHTDN XFMR RM 2B EXH FAN 2B3-B		2.5	4.1					
T	T	480V CONT & AUX BLDG VENT BD 2B1-B	2B	UA					SHTDN XFMR RM 2B EXH FAN 2B1-B		2.5	4.1					
T	T	480V CONT & AUX BLDG VENT BD 2B1-B	2C	UA					SHTDN XFMR RM 2B EXH FAN 2B2-B		3						
P	P	480V CONT & AUX BLDG VENT BD 2B1-B	2E	UAS					AUX CONT AIR COMPRSR B-B		20	25.7					
T	T	480V CONT & AUX BLDG VENT BD 2B1-B	3A	UA					RECIP CHG PMP RM CLR FAN		3	4.7					
0.00	0.00	480V CONT & AUX BLDG VENT BD 2B1-B	3B	UAI					SI PMP 2B-B RM CLR FAN		3	4.7					
0.02	0.02	480V CONT & AUX BLDG VENT BD 2B1-B	3C	UAI	I	I			CENT CHG PMP 2B-B RM CLR FAN		5	6.1					
T	0.00	480V CONT & AUX BLDG VENT BD 2B1-B	4A	UA	I	I			PEN RM EL 669 CLR FAN 2B-B		5	6.1					
T	0.00	480V CONT & AUX BLDG VENT BD 2B1-B	4B	UA	I	I			PEN RM EL 690 CLR FAN 2B-B		5	6.1					
T	0.00	480V CONT & AUX BLDG VENT BD 2B1-B	4C	UA	I	I			PEN RM EL 714 CLR FAN 2B-B		5	6.1					
0.00	0.00	480V CONT & AUX BLDG VENT BD 2B1-B	5A	UAI					RES HT REM PMP 2B-B CLR FAN		5	3.8					
0.00	0.00	480V CONT & AUX BLDG VENT BD 2B1-B	5B	UAI		I			CNTMT SPRAY PMP 2B-B CLR FAN		5						
T	0.00	480V CONT & AUX BLDG VENT BD 2B1-B	5C	UA	I	I			EMER GAS TMT RM CLR B-B		3	6.1					
0.00		480V CONT & AUX BLDG VENT BD 2B1-B	5D	UA	O				CNTMT ANN VACUUM FAN 2B		1.5	3.3					
T	T	480V CONT & AUX BLDG VENT BD 2B1-B	5E	UA					480V BD RM 2B A/C CPRSR 2B-B		60	75					
0.00	0.00	480V CONT & AUX BLDG VENT BD 2B1-B	6C	UA					UNIT CONT ANN SYS	3		6		2.55			
0.00	0.00	480V CONT & AUX BLDG VENT BD 2B1-B	6D	UMW				RE-90-126	CONT RM INTAKE RAD MON		0.75	1.4					
T	0.02	480V CONT & AUX BLDG VENT BD 2B1-B	6E2	UA	I	I			AB GAS TMT SYS HUM HTR B-B					32			
0.00	0.00	480V CONT & AUX BLDG VENT BD 2B1-B	7C	UAS					480V BD RM 2A PRESS FAN 2A2-B		3	4.6					
0.00	0.00	480V CONT & AUX BL[illegible]T BD 2B1-B	7D2	UMW				RE-90-~~11~~ 112	CNTMT BLDG UP COMPT AIR MON		3	4.6					
0.00	0.00	480V CONT & AUX [illegible] VENT BD 2B1-B	8A	UA					PRIM WTR MAKEUP PMP 2B		20	23.4					
T	T	480V CONT & AUX BL[illegible] 2B1-B	8B	UA					480V BD RM 2B A/C COND 2B-B		25	32					
0.00	0.00	480V CONT & AUX BLDG VENT BD 2B1-B	8D1	UMW				crm 1-13-86 RE-90-99	COND VAC PMP AIR EXH MON		0.75	1.4					
0.00	0.00	480V CONT & AUX BLDG VENT BD 2B1-B	8D2	UMW				RE-90-131	CNTMT PURGE AIR EXH MON		0.75	1.4					
T	0.00	480V CONT & AUX BLDG VENT BD 2B1-B	8E	UA	I	I			PIPE CHASE CLR FAN 2B-B		20	24.1					
0.00	0.00	480V CONT & AUX BLDG VENT BD 2B1-B	9A	UAS					125V BATT RM IV EXH FAN 2A2-B		0.5						
		480V CONT & AUX BLDG VENT BD 2B1-B	9B	UMO					PERM HYD MIT SYS 2B8			25.3		21			
0.00	0.00	480V CONT & AUX BLDG VENT BD 2B1-B	9C	UAI	I	I			AUX FDWTR & BA TRANS PMP SP CLR FAN B-B		5	6.1					
0.00	0.00	480V CONT & AUX BLDG VENT BD 2B1-B	9D	UAS					480V BD RM 2B FAN PRESS 2B2-B		3	4.6					
T	T	480V CONT & AUX BLDG VENT BD 2B1-B	9E	UA					480V BD RM 2B A/C AHU 2B-B		25	32					
0.00		480V CONT & AUX BLDG VENT BD 2B1-B	10A	UA	O	O			SHTDN BD RM B PRESS FAN 2B-B		1	2					
		480V CONT & AUX BLDG VENT BD 2B1-B	10B	UMO					AUX CHGR PMP 2B		1.5	1.7					
0.00	0.00	480V CONT & AUX BLDG VENT BD 2B1-B	11B	UAS					125V VIT BATT RM III FAN 2B2-B		0.5						
		480V CONT & AUX BLDG VENT BD 2B1-B	11E	UAS					BATT RM EL 669 EXH FAN C-B		2	3.1					
0.00	0.00	480V CONT & AUX BLDG VENT BD 2B1-B	12C	UMW					GAS EFF RAD MON		5	7.25					
	0.00	480V CONT & AUX BLDG VENT BD 2B1-B	12D	UAI	I	I			AB GAS TMT SYS FAN B-B		20	24					
0.00	0.00	480V DIESEL AUX BD 2B1-B	1D	UA					CONTROL POWER XFMR	3				2.55			
0.00	0.00	480V DIESEL AUX BD 2B1-B	2C	UAD			1.00	2-FCV-67-65	EMG DSL ENG HT EXCH SUP VLV		0.125						
5.00	5.00	480V DIESEL AUX BD 2B1-B	2D	UAD					DG DAY TNK FUEL OIL XFER PMP		1	2					
		480V DIESEL AUX BD 2B1-B	3A2	DD					COOL TWR/AERCW HTTRC					5.1			
		480V DIESEL AUX BD 2B1-B	3C	UMS				0-FCV-67-367	ERCW DISCH ISOL VLV		0.667						
		480V DIESEL AUX BD 2B1-B	3D	DD					AUX ERCW TRAVELING SCREEN		1	1.5					
0.00	0.00	480V DIESEL AUX BD 2B1-B	4A	UA					DG ELEC PNL VENT FAN		15	20					
0.00	0.00	480V DIESEL AUX BD 2B1-B	5A1	UA					DIESEL GEN LT CAB LC48					38.25			
		480V DIESEL AUX BD 2B1-B	5A2	UMO					DIESEL GEN 2B-B BATT CHGR (ALT FDR)								
		480V DIESEL AUX BD 2B1-B	5E	UAD					EL 722 CORRIDOR HTR			9		10			
0.00	0.00	480V DIESEL AUX BD 2B1-B	6A	UA					DG ROOM EXH FAN 2B1-B		15	19.5					
		480V DIESEL AUX BD 2B1-B	6B	UMO					AUX BOILER FUEL OIL PMP		5	7.9					
P	P	480V DIESEL AUX BD 2B1-B	6C	UA					DG 2B-B AIR COMPRESSOR 2		10	13					
0.00	0.00	480V DIESEL AUX BD 2B1-B	6D	UA					DG MUFFLER RM EXH FAN		1.5	2.8					
0.00	0.00	480V DIESEL AUX BD 2B1-B	7B	UA					DG BATT HOOD EXH FAN		0.33	0.9					
		480V DIESEL AUX BD 2B1-B	7D	UAD					DG ENG AUX LUBE OIL CIRC PMP		0.75	1.95					
		480V DIESEL AUX BD 2B1-B	7E1	UAD					DG ENG WTR HTR/LUBE OIL PMP		1	17.8		15			
		480V DIESEL AUX BD 2B2-B	1C2	UAD					DIESEL GEN SPACE HTR					1.95			

Prepared RC / RJB

Checked [illegible] / CRM

Reviewed RBR

Date 1-15-86

TIME BD M.S	TIME SI M.S	BOARD	CPT	CONT COMB	PHASE A	PHASE B	OPER TIME	COMPONENT UNID	COMPONENT DESCRIPTION	KVA	HP	FULLOAD CURRENT	RATED LOAD	KW	MOTOR EFF	MOTOR PF	MOTOR ZLRI
0.00	0.00	480V DIESEL AUX BD 2B2-B	1D	UA					CONTROL POWER XFMR	3				2.55			
		480V DIESEL AUX BD 2B2-B	3A2	UMO					POWER OUTLETS								
		480V DIESEL AUX BD 2B2-B	3B	UAO					DIESEL GEN ELEC BD RM HTR					5			
		480V DIESEL AUX BD 2B2-B	3C	UMS				0-FCV-67-14	ERCW DISCH SHTOFF VLV		0.667						
		480V DIESEL AUX BD 2B2-B	3D	OD					AUX ERCW SCREEN WASH PMP		10						
5.00	5.00	480V DIESEL AUX BD 2B2-B	4A	UAO					DG DAY TNK FUEL OIL XFER PMP		1						
		480V DIESEL AUX BD 2B2-B	4B	UMS				0-FCV-67-364	ERCW RET DISCH CAN SHTOFF		0.667						
0.00	0.00	480V DIESEL AUX BD 2B2-B	5A2	UA					DIESEL GEN BATTERY CHGR					0.65			
		480V DIESEL AUX BD 2B2-B	5C	UMO					DIESEL GEN B FUEL OIL XFER PMP		7.5						
		480V DIESEL AUX BD 2B2-B	5D	UAO					DIESEL GEN ROOM HTR B					10			
		480V DIESEL AUX BD 2B2-B	5E	UAO					DIESEL GEN ROOM HTR A					10			
0.00	0.00	480V DIESEL AUX BD 2B2-B	6A	UAO			1.00	2-FCV-67-67	EMG DSL ENG HT EXCH SUP VLV		0.125						
P	P	480V DIESEL AUX BD 2B2-B	6C	UA					DG 2B-B AIR COMPRESSOR 1		10						
0.00	0.00	480V DIESEL AUX BD 2B2-B	6D	UA					DG ROOM EXH FAN 2B2-B		15						
0.00	0.00	480V DIESEL AUX BD 2B2-B	7A	UA					DG BD ROOM EXH FAN		3						
		480V DIESEL AUX BD 2B2-B	7C	UAO					DG ENG AUX LUBE OIL CIRC PMP		0.75						
		480V DIESEL AUX BD 2B2-B	7D	UAO					DG ENG WTR HTR/LUBE OIL PMP		1			15			
0.00	0.00	480V ERCW MCC 2B-B	2A	UA					ERCW STRAINER B2B-B		3	7					
		480V ERCW MCC 2B-B	2B	TL					TRAVELING SCREEN C-B		7.5	10					
		480V ERCW MCC 2B-B	3B	TL					SCREEN WASH PMP C-B		40	49.8					
		480V ERCW MCC 2B-B	3C	OP				2-FCV-67-489	HEADER 2B ISOL VLV		0.33	0.95					
		480V ERCW MCC 2B-B	4A	TL					PEDESTAL CRANE		100	118					
		480V ERCW MCC 2B-B	4B	TL					DUPLEX SUMP PMP A		1.5	5.3					
		480V ERCW MCC 2B-B	4C	TL					DUPLEX SUMP PMP B		1.5	5.3					
		480V ERCW MCC 2B-B	4EL	TL					ERCW PUMPING STATION HTR L			9		7.5			
		480V ERCW MCC 2B-B	4ER	TL					ERCW PUMPING STATION HTR M			12		10			
0.00	0.00	480V ERCW MCC 2B-B	5D	UA					ERCW STRAINER XFMR	1				0.85			
		480V REACTOR MOV BD 2B1-B	2A	UMS	O				INCORE INSTR RM COOL FAN 2B		5	7.2					
		480V REACTOR MOV BD 2B1-B	2B	UMS	O				INCORE INSTR RM CHILLER WTR COMP 2B		10	18					
		480V REACTOR MOV BD 2B1-B	3A	UMS	O				INCORE INSTR RM CIRC PMP 2B		1.5	2.2					
T		480V REACTOR MOV BD 2B1-B	3B	UA	O	O			SIS BORON INJ TK HTR 2B-B			7.2		6			
		480V REACTOR MOV BD 2B1-B	3C	UMS					REFUEL WATER PURIFICATION PMP B		15	20					
T	T	480V REACTOR MOV BD 2B1-B	3D	UA					480V SHDN BD XFMR 2B1-B COOL FAN		0.33						
S	S	480V REACTOR MOV BD 2B1-B	4A	UA					BORIC ACID XFER PMP 2B-B		15	13					
		480V REACTOR MOV BD 2B1-B	4C	UAO					BORIC ACID BATCH TK HTR 3			20		22.5			
T	T	480V REACTOR MOV BD 2B1-B	4E	UA					BORIC ACID TK B HTR B-B			8		9			
		480V REACTOR MOV BD 2B1-B	5A1	UMO					RB 480 V RECPT								
		480V REACTOR MOV BD 2B1-B	5A2	UMO					FB 480 V RECPT								
0.02	0.02	480V REACTOR MOV BD 2B1-B	5C2	UAI	I	I			CENT CHG PMP 2B AUX OIL PMP		2	3.1					
0.20	0.21	480V REACTOR MOV BD 2B1-B	5E	UA		O			CCS BOOST PMP 2B-B		15	18.4					
		480V REACTOR MOV BD 2B1-B	7A1	OP					BACK FLOW GATE HOIST 2B-B		20	26					
		480V REACTOR MOV BD 2B1-B	7A2	UA					24V BATT CHGR (ALT FDR)					8			
	0.00	480V REACTOR MOV BD 2B1-B	7C	UAI	I	I	0.06	2-FCV-62-61	SEAL FLOW ISOL VLV		0.7						
	0.00	480V REACTOR MOV BD 2B1-B	7E	UAI	I	I	0.09	2-FCV-62-91	CHR FLOW ISOL VLV		1.6						
		480V REACTOR MOV BD 2B1-B	8A	OP				2-FCV-62-99	CHG PMP MIN FLOW VLV		1						
	0.10	480V REACTOR MOV BD 2B1-B	8B	UAI	I	I	1.00	2-LCV-62-133	VOL CONT TK ISOL VLV		0.4						
	0.00	480V REACTOR MOV BD 2B1-B	8C	UAI	I	I	0.10	2-LCV-62-136	CHG PMP FLOW VLV		1.4						
		480V REACTOR MOV BD 2B1-B	8E	UMS				2-FCV-62-138	EMER BORON CONT VLV		1.6						
		480V REACTOR MOV BD 2B1-B	9A	UMS				2-FCV-63-175	SIS PMP B-B DISCH VLV		1.6						
		480V REACTOR MOV BD 2B1-B	9B	UMS				2-FCV-63-5	REF WTR STORAGE TK VLV		1.4						
		480V REACTOR MOV BD 2B1-B	9C	UMS				2-FCV-63-6	SIS PMP INLET PMP VLV		0.67						
		480V REACTOR MOV BD 2B1-B	9E	UMS				2-FCV-63-11	SIS PMP HT EXC B VLV		3.2						
		480V REACTOR MOV BD 2B1-B	10A	UMS				2-FCV-63-157	SIS PMP OUTLET RCS VLV		2.6						
	0.00	480V REACTOR MOV BD 2B1-B	10B	UAI	I	I	1.00	2-FCV-63-25	SIS BORON INJ TK VLV		2						
		480V REACTOR MOV BD 2B1-B	10C	UMS				2-FCV-63-153	SIS PMP B-B FLOW CONT VLV		1.6						

Prepared WC/RB
Checked [illegible] CRM
Reviewed [illegible]
Date 1-15-86

TIME BD M.S	TIME SI M.S	BOARD	CPT	CONT COMB	PHASE A	PHASE B	OPER TIME	COMPONENT UNID	COMPONENT DESCRIPTION	KVA	HP	FULLOAD CURRENT	RATED LOAD	KW	MOTOR EFF	MOTOR PF	MOTOR %LRI
		480V REACTOR MOV BD 2B1-B	10E	UMS				2-FCV-63-48	SIS PMP B-B INLET VLV		1						
	0.00	480V REACTOR MOV BD 2B1-B	11A	UAI	X	X	0.10	2-FCV-63-40	SIS BORON INJ TK VLV		2						
		480V REACTOR MOV BD 2B1-B	11B	UAI	X	X		2-FCV-63-67	SIS ACC TK 4 ISOL VLV		21						
	120.00	480V REACTOR MOV BD 2B1-B	11C	UA			0.43	2-FCV-63-73	CNTMT SUMP FLOW VLV		10.5						
		480V REACTOR MOV BD 2B1-B	11E	UAI	X	X		2-FCV-63-98	SIS ACC TK 2 ISOL VLV		21						
		480V REACTOR MOV BD 2B1-B	12A	UMS				2-FCV-63-94	SI TO 1 & 4 CONT VLV(63-94)		21						
		480V REACTOR MOV BD 2B1-B	12B	UMS				2-FCV-63-172	RHR RECIRC VLV		5.2						
		480V REACTOR MOV BD 2B1-B	12C	UAI	X	X		2-MTR-87-22	UHI ACCUM ISOL VLV 6A6		0.7						
		480V REACTOR MOV BD 2B1-B	12E	UMS				2-FCV-68-332	RCS RELIEF CONT VLV (68-332)		1.6						
	0.00	480V REACTOR MOV BD 2B1-B	13A	UAI			1.00	2-FCV-72-2	SPRAY HDR 1B ISOL VLV		3.3						
	0.10	480V REACTOR MOV BD 2B1-B	13B	UAI		X	1.00	2-FCV-72-13	SPRAY PMP 1B RECIRC VLV		0.125						
		480V REACTOR MOV BD 2B1-B	13C	UMS			0.15	2-FCV-72-20	SPRAY HDR 2B CONT VLV (72-20)		5.2						
	0.00	480V REACTOR MOV BD 2B1-B	13E	UAI	X	X	1.00	2-FCV-72-21	SPRAY HDR 2B CONT VLV (72-21)		3.3						
		480V REACTOR MOV BD 2B1-B	14A	UMS			0.10	2-FCV-72-41	RHR SP HDR 2B ISOL VLV (72-41)		5.2						
		480V REACTOR MOV BD 2B1-B	14B	UMS				2-FCV-74-2	RHR SYS ISOL VLV		4						
	120.00	480V REACTOR MOV BD 2B1-B	14C	UAI			2.00	2-FCV-74-21	RHR PMP 2B-B CONT VLV		1.6						
	0.00	480V REACTOR MOV BD 2B1-B	14E	UAI			1.00	2-FCV-74-24	RHR PMP 1B FLOW VLV		1.6						
		480V REACTOR MOV BD 2B1-B	15A	UMS				2-FCV-74-35	RHR HEAT EXCH B VLV		3.2						
		480V REACTOR MOV BD 2B1-B	15B	UMS				2-FCV-63-22	SIS PMP SHUTOFF VLV		2						
		480V REACTOR MOV BD 2B1-B	15C	UAI	X	X		2-MTR-87-24	UHI ACCUM ISOL VLV 6A6		0.7						
		480V REACTOR MOV BD 2B1-B	15E	UMS				2-FCV-63-4	SIS PMP 2B-B SHUTOFF VLV		1.6						
		480V REACTOR MOV BD 2B2-B	1D	UA					480V SHDN BD XFMR 2B2-B COOL FAN(ALT FDR)		0.33						
T	T	480V REACTOR MOV BD 2B2-B	2A	UA				2-FCV-1-18	STEAM FW PMP ISOL VLV		1.6						
	0.04	480V REACTOR MOV BD 2B2-B	2B	UAI			1.00	2-FCV-3-126B	ERCW 2B ISOL VLV		0.333						
	0.04	480V REACTOR MOV BD 2B2-B	2C	UAI			1.00	2-FCV-3-126A	ERCW 2B ISOL VLV (3-126A)		0.333						
	0.00	480V REACTOR MOV BD 2B2-B	2E	UAI	X	X	1.00	2-FCV-26-241	ANN ISOL VLV (26-241)		0.67						
		480V REACTOR MOV BD 2B2-B	3B	OP			0.42	2-FCV-67-147	SUPP HDR 2B ISOL VLV		0.67						
		480V REACTOR MOV BD 2B2-B	3C	OP			0.42	2-FCV-67-82	AB ERCW WB ISOL VLV		0.67						
T	T	480V REACTOR MOV BD 2B2-B	3D	UA					480V SHDN BD XFMR 2B-B COOL FAN(NOR FDR)		0.33						
	0.00	480V REACTOR MOV BD 2B2-B	4A	UAI		X	0.36	2-FCV-67-88	LWR CNTMT 2A ISOL VLV		0.33						
	0.00	480V REACTOR MOV BD 2B2-B	4B	UAI		X	0.36	2-FCV-67-96	LWR CNTMT 2B ISOL VLV		0.33						
	0.00	480V REACTOR MOV BD 2B2-B	4C	UAI		X	0.30	2-FCV-67-99	LWR CNTMT 2B ISOL VLV		0.13						
	0.00	480V REACTOR MOV BD 2B2-B	4E	UAI	X	X	1.00	2-FCV-26-244	ANN ISOL VLV		0.67						
	0.00	480V REACTOR MOV BD 2B2-B	5A	UAI		X	0.54	2-FCV-67-103	LWR CNTMT 2B ISOL VLV		0.125						
	0.00	480V REACTOR MOV BD 2B2-B	5B	UAI		X	0.36	2-FCV-67-107	LWR CNTMT 2D ISOL VLV		0.33						
	0.00	480V REACTOR MOV BD 2B2-B	5C	UAI		X	0.54	2-FCV-67-111	LWR CNTMT 2D ISOL VLV		0.125						
		480V REACTOR MOV BD 2B2-B	6A	UMS				2-FCV-67-123	CNTMT SP HT EXC 2B VLV		0.33						
		480V REACTOR MOV BD 2B2-B	6B	UMS			0.36	2-FCV-67-124	CNTMT SP HT EXC 2B VLV		0.33						
		480V REACTOR MOV BD 2B2-B	6C	OP			0.24	2-FCV-67-128	AB SUPP HDR 2B ISOL VLV		0.5						
	0.00	480V REACTOR MOV BD 2B2-B	7A	UAI		X	0.18	2-FCV-67-131	UPPR CNTMT 2A ISOL VLV		0.133						
	0.00	480V REACTOR MOV BD 2B2-B	7B	UAI		X	0.18	2-FCV-67-134	UPPR CNTMT 2C ISOL VLV		0.133						
	0.00	480V REACTOR MOV BD 2B2-B	7C	UAI		X	0.18	2-FCV-67-138	UPPR CNTMT 2B ISOL VLV		0.133						
0.20	0.20	480V REACTOR MOV BD 2B2-B	7E	UA			1.00	2-FCV-70-207	CNDS DEMIN SUP VLV		0.125						
	0.00	480V REACTOR MOV BD 2B2-B	8B	UAI		X	0.18	2-FCV-67-141	UPPR CNTMT 2D ISOL VLV		0.133						
	0.00	480V REACTOR MOV BD 2B2-B	8D	UAI	X	X	0.42	0-FCV-67-152	COMPT HT EXC C VLV (67-152)		0.67						
	0.00	480V REACTOR MOV BD 2B2-B	9B	UAI		X	0.17	2-FCV-67-297	UPPR CNTMT 2? ISOL VLV		0.125						
	0.00	480V REACTOR MOV BD 2B2-B	9C	UAI		X	0.16	2-FCV-67-298	UPPR CNTMT 2D ISOL VLV		0.125						
		480V REACTOR MOV BD 2B2-B	10C	UMS				2-FCV-3-193	LOOP 3 LINE VLV (3-193)		1						
		480V REACTOR MOV BD 2B2-B	10E	OP			0.42	2-FCV-70-78	CCS PMP 1A-A & 1B-B VLV		0.43						
		480V REACTOR MOV BD 2B2-B	11A	OP			0.36	2-FCV-70-3	RHR HT EXCH B VLV		0.26						
	0.09	480V REACTOR MOV BD 2B2-B	11B	UAI			1.00	2-FCV-3-179B	ERCW 1B ISOL VLV		0.7						
		480V REACTOR MOV BD 2B2-B	11C	OP			0.42	0-FCV-70-39	CCS PMP A & B ISOL VLV		0.33						
	0.09	480V REACTOR MOV BD 2B2-B	11E	UAI			1.00	2-FCV-3-179A	ERCW 1B ISOL VLV		0.7						
		480V REACTOR MOV BD 2B2-B	12A	OP			0.36	2-FCV-70-196	CCS HT EXCH A & C VLV		0.33						
		480V REACTOR MOV BD 2B2-B	12C	OP			0.36	2-FCV-70-14	CCS HT EXCH A-C VLV		0.26						

Prepared RRC / RMB
Checked [illegible] / CRM
Reviewed RBR
Date 1-15-86

TIME BD M.S	TIME SI M.S	BOARD	CPT	CONT COMB	PHASE A	PHASE B	OPER TIME	COMPONENT UNID	COMPONENT DESCRIPTION	KVA	HP	FULLOAD CURRENT	RATED LOAD	KW	MOTOR EFF	MOTOR PF	MOTOR %LRI
		480V REACTOR MOV BD 2B2-B	12E	UMS			0.24	0-FCV-70-40	SFPCS HT EXCH A VLV		0.13						
		480V REACTOR MOV BD 2B2-B	13A	UMS				0-FCV-26-13	HPFP HDR 2 CONT VLV		0.13						
		480V REACTOR MOV BD 2B2-B	13B	OP			0.36	2-FCV-70-28	CCS PMP 2A-A & 2B-B VLV		0.33						
		480V REACTOR MOV BD 2B2-B	13C	OP			0.36	2-FCV-70-29	CCS PMP 2A-A & 2B-B VLV		0.26						
		480V REACTOR MOV BD 2B2-B	13E	UMS			0.24	0-FCV-70-1	SFPCS HT EXCH B VLV		0.13						
		480V REACTOR MOV BD 2B2-B	14A	OP			0.42	2-FCV-70-76	CCS PMP 2A-A & 2B-B VLV		0.43						
		480V REACTOR MOV BD 2B2-B	14B	OP			0.36	2-FCV-70-75	RHR HT EXC B ISOL VLV		0.26						
	0.00	480V REACTOR MOV BD 2B2-B	14C	UAI		I	0.15	2-FCV-70-87	RCP CNTMT ISOL VLV		0.7						
		480V REACTOR MOV BD 2B2-B	14E	UMS				2-FCV-3-194	LOOP 4 LINE VLV (3-194)		1						
	0.00	480V REACTOR MOV BD 2B2-B	15A	UAI		I	0.54	2-FCV-70-89	RC PMP CONTMT ISOL VLV		0.125						
	0.00	480V REACTOR MOV BD 2B2-B	15B	UAI		I		2-FCV-70-134	RCOP ISOL VLV		0.125						
	0.00	480V REACTOR MOV BD 2B2-B	15C	UAI		I	0.24	2-FCV-70-140	RCP CNTMT ISOL VLV		0.13						
		480V REACTOR MOV BD 2B2-B	15E	UMS			0.36	0-FCV-70-194	HT EXC ISOL VLV		0.33						
		480V REACTOR MOV BD 2B2-B	16B	UMS			0.36	2-FCV-70-153	RHR HT EXC B OUT VLV		0.33						
	0.00	480V REACTOR MOV BD 2B2-B	16C	UAI	I	I	0.06	2-FCV-3-47	STEAM GEN FW ISOL VLV		33						
	0.00	480V REACTOR MOV BD 2B2-B	17A	UAI	I	I	0.06	2-FCV-3-100	STEAM GEN FW ISOL VLV		33						
		480V SHUTDOWN BD 2B1-B	2B	OD					COOL TWR FAN B-S (ALT-FD)		100	120					
		480V SHUTDOWN BD 2B1-B	2C	TL					AUX BLDG GEN SUP FAN 1B		150	173					
		480V SHUTDOWN BD 2B1-B	2D	TM					SPENT FUEL PIT PUMP B-B		100	114					
0.00	0.00	480V SHUTDOWN BD 2B1-B	3A	UAS					ELEC BD RM AHU B-B		75	96					
0.00	0.00	480V SHUTDOWN BD 2B1-B	3B	UAI	I	O			CRDM COOL FAN 2B		75	83					
0.20	0.20	480V SHUTDOWN BD 2B1-B	3C	TAS	I	I			CCS PUMP 2B-B		350	404					
0.00	0.00	480V SHUTDOWN BD 2B1-B	4B	UMW		O			REAC LOWER COMPT COOL FAN 2B-B		50	59					
		480V SHUTDOWN BD 2B1-B	4C	OD					COOL TWR FAN C-S XFR SW		100	120					
		480V SHUTDOWN BD 2B1-B	4D	TM					RECIP CHG PUMP		200	221					
0.00	0.00	480V SHUTDOWN BD 2B1-B	8C	UA					HT TR-CVC PNL B1 & B2 XFMR			54		38.25			
0.[illegible]	0.00	480V SHUTDOWN BD 2B1-B	8D	UA					STANDBY LTG CAB LS 3		40	27		19.1			
		480V SHUTDOWN BD 2B1-B	10A	UMO					ALT FDR VITAL BATT CHGR III		40			140			
		480V SHUTDOWN BD 2B1-B	11A	UMO					ALT FDR SPARE VITAL BATT CHGR					58			
3.20	3.20	480V SHUTDOWN BD 2B2-B	2B	UA					ELEC BD RM A/C COMPR B-B		125	148					
		480V SHUTDOWN BD 2B2-B	2C	TL					AUX BLDG GEN EXH FAN 2B		125	145					
0.20	0.20	480V SHUTDOWN BD 2B2-B	2D	TAS	I	I			CCS PMP C-S(NOR FDR)		350	404					
21.00	21.00	480V SHUTDOWN BD 2B2-B	3A	UA					SHTDN BD RM AIR HAND UNIT 2B-B		75	88					
0.00	0.00	480V SHUTDOWN BD 2B2-B	3B	UAI	I	O			CRDM COOL FAN 2D		75	83					
2.00		480V SHUTDOWN BD 2B2-B	3C	TA					FIRE PUMP 2B-B		200	257					
		480V SHUTDOWN BD 2B2-B	4B	OD					COOL TOWER FAN D-B		100	120					
		480V SHUTDOWN BD 2B2-B	4C	UMO					UNIT 2 REACT BLDG CRANE		123	32.3					
0.00	0.00	480V SHUTDOWN BD 2B2-B	5D	UMW		O			REACTOR LWR COMPT COOL FAN 2D-B		50	59					
0.00	0.00	480V SHUTDOWN BD 2B2-B	8C	UMW					CVS SYS HT TR XFMR B3			54		38.25			
	10.00	480V SHUTDOWN BD 2B2-B	9C	UAI		I			CNTMT AIR RETURN FAN 2B-B		50	58					
0.00	0.00	480V SHUTDOWN BD 2B2-B	10A	UMW					125V VITAL BATT CHGR IV			47		7.44			
15.00	15.00	480V SHUTDOWN BD 2B2-B	10D	TPD					MN TURB TURN GEAR OIL PMP		75	130					
0.00	0.00	6900V SHUTDOWN BD 2B-B	3	UA					480V SHDN XFMR 2B1-B								
0.00	0.00	6900V SHUTDOWN BD 2B-B	4	UA					480V SHDN XFMR 2B2-B								
0.00	0.00	6900V SHUTDOWN BD 2B-B	5	UA					480V SHDN XFMR 2B-B								
0.15	0.15	6900V SHUTDOWN BD 2B-B	8	TAS	I	I			ESSENTIAL RCW PMP P-B		700						
		6900V SHUTDOWN BD 2B-B	9	TL					ESSENTIAL RCW PMP M-B		700						
0.25	0.25	6900V SHUTDOWN BD 2B-B	10	TAD	I	I			AUX FEED WTR PMP 2B-B		486						
	0.30	6900V SHUTDOWN BD 2B-B	13	TAS		I			CNTMT SPRAY PMP 2B-B		690						
	0.10	6900V SHUTDOWN BD 2B-B	14	TAS	I	I			RESIDUAL HT REMOVAL PMP 2B-B		425						
	0.05	6900V SHUTDOWN BD 2B-B	15	TAS	I	I			SAFETY INJ PMP 2B-B		410						
0.02	0.02	6900V SHUTDOWN BD 2B-B	18	TAS	I	I			CENTRIFUGAL CHRG PMP 2B-B		680						
		6900V SHUTDOWN BD 2B-B	19	OD					AUX ESSENTIAL RCW PMP B-B		600						
1.30		6900V SHUTDOWN BD 2B-B	20	TA	O				PRESS HEATER BKUP GR 2B-B					485			
		6900V SHUTDOWN BD 2B-B	21	TL	O				PRESS HEATER BKUP GR 2C					415.44			

Prepared RCS / RJB
Checked GAP / CRM
Reviewed RPR
Date 1-15-86

TIME BD M.S	TIME SI M.S	BOARD	CPT	CONT COMB	PHASE A B	OPER TIME	COMPONENT UNID	COMPONENT DESCRIPTION	KVA	HP	FULLOAD CURRENT	RATED LOAD	KW	MOTOR EFF	MOTOR PF	MOTOR ILRI
0.00	0.00	6900V SHUTDOWN BD 2B-B	22	UA				480V XFMR 2B-B								

Prepared RC/ RJB
Checked 2/2/01 CRM
Reviewed RJB
Date 1-15-86

ATTACHMENT

C

Diesel Generator Loading at:
a. Blackout (BO)
b. BO with Phase A Isolation
c. BO with Phase B Isolation

B25 '86 0204 300 p36

TIME BD M.S	BOARD	CPT	CONT COMB	PHASE A	B	OPER TIME	COMPONENT UNID	COMPONENT DESCRIPTION	KVA	HP	FULLOAD CURRENT	RATED LOAD	KW	MOTOR EFF	MOTOR PF	MOTOR %LRI
T	480V CONT & AUX BLDG VENT BD 1A1-A	2A	UA	I	I			PIPE CHASE CLR FAN 1A-A		20	24.1					
T	480V CONT & AUX BLDG VENT BD 1A1-A	3A	UA					SHTDN XFMR RM 1A EXH FAN 1A3-A		2.5	4.1					
T	480V CONT & AUX BLDG VENT BD 1A1-A	3B	UA					SHTDN XFMR RM 1A EXH FAN 1A1-A		2.5	4.1					
T	480V CONT & AUX BLDG VENT BD 1A1-A	3C	UA					SHTDN XFMR RM 1A EXH FAN 1A2-A		2.5	4.1					
T	480V CONT & AUX BLDG VENT BD 1A1-A	4A	UA	I	I			PEN RM EL 669 CLR FAN 1A-A		5	6.1					
T	480V CONT & AUX BLDG VENT BD 1A1-A	4B	UA	I	I			PEN RM EL 690 CLR FAN 1A-A		5	6.1					
T	480V CONT & AUX BLDG VENT BD 1A1-A	4C	UA	I	I			PEN RM EL 714 CLR FAN 1A-A		5	6.1					
L	480V CONT & AUX BLDG VENT BD 1A1-A	6E	UA					SP FUEL PIT CLR SUMP PMP A		0.33	0.88					
T	480V CONT & AUX BLDG VENT BD 1A1-A	8B	UA					480V BD RM 1A A/C COND 1A-A		20						
F	480V CONT & AUX BLDG VENT BD 1A1-A	8C	UAI	I	I			CONT BLDG EMERG AIR CL UP FAN A-A		10						
T	480V CONT & AUX BLDG VENT BD 1A1-A	9E	UA	.				480V BD RM 1A A/C AHU 1A-A		10	12.4					
T	480V CONT & AUX BLDG VENT BD 1A1-A	11A	UA	I	I			SP FUEL PIT PMP A-A CLR FAN		5	6.1					
T	480V CONT & AUX BLDG VENT BD 1A1-A	11D	UA					480V BD RM 1A A/C CPRSR 1A-A		50	61					
L	480V DIESEL AUX BD 1A1-A	5D	UA					DG BLDG SUMP PMP A		3	4.6					
P	480V DIESEL AUX BD 1A1-A	6C	UA					DG 1A-A AIR COMPRESSOR 2		10	13					
T	480V DIESEL AUX BD 1A2-A	5A1	UA					DGB CO2 REFRIG UNIT		2	3					
P	480V DIESEL AUX BD 1A2-A	6C	UA					DG 1A-A AIR COMPRESSOR 1		10	13					
L	480V ERCW MCC 1A-A	2C	UA					STATION DECK SUMP PUMP A		5	3.5					
T	480V REACTOR MOV BD 1A1-A	1D	UA					480V BD XFMR 1A1-A COOL FAN		0.33						
T	480V REACTOR MOV BD 1A1-A	6A	UA	0	0			SIS BORON INJ TK HTR 1A-A								
T	480V REACTOR MOV BD 1A1-A	14C	UA					BORIC ACID TK A HTR A-A					6			
T	480V REACTOR MOV BD 1A1-A	14E	UA					BORIC ACID TK C HTR A-A			10.83		9			
S	480V REACTOR MOV BD 1A1-A	16D	UA					BORIC ACID XFER PMP 1A-A			10.83		9			
T	480V REACTOR MOV BD 1A2-A	1D	UA							15	13					
								480V SHDN BD XFMR 1A2-A COOL FAN		0.32						
								Total		183.48			24			
0.00	480V CONT & AUX BLDG VENT BD 1A1-A	5A	UAI					RES HT REM PMP 1A-A CLR FAN		5	3 8					
0.00	480V CONT & AUX BLDG VENT BD 1A1-A	11E2	UMW					SHIELD BLDG VENT RAD MON		3	'.6					
0.00	480V CONT & AUX BLDG VENT BD 1A1-A	12A	UA					BATT RM EL 669 EXH FAN A-A		2	3					
0.00	480V CONT & AUX BLDG VENT BD 1A1-A	5E2	UMW					SERV BLDG VENT MON		3	4.6					
0.00	480V CONT & AUX BLDG VENT BD 1A1-A	12D	UA					CONT BLDG PRESS FAN A-A		15	20					
0.00	480V CONT & AUX BLDG VENT BD 1A1-A	6C	UMW					CNTMT PURGE AIR EXH MON		0.75	1.4					
0.00	480V CONT & AUX BLDG VENT BD 1A1-A	11E1	UMW					CNTMT LOWER COMPT AIR MON		3						
0.00	480V CONT & AUX BLDG VENT BD 1A1-A	10A	UAS					125V VIT BATT RM I EXH FAN 1A1-A		0.5						
0.00	480V CONT & AUX BLDG VENT BD 1A1-A	1D2	UA					CONT PWR XFMR	3				2.55			
0.00	480V CONT & AUX BLDG VENT BD 1A1-A	9B	UMW					SI SYS HT TRACE XFMR A			18.04		12.75			
0.00	480V CONT & AUX BLDG VENT BD 1A1-A	8A	UA					PRIM WTR MAKEUP PMP 1A		20	24.5					
0.00	480V CONT & AUX BLDG VENT BD 1A1-A	9A	UMW					GAS EFF RAD MON		5	7.25					
0.00	480V CONT & AUX BLDG VENT BD 1A1-A	10B	UAI					SI PMP 1A-A RM CLR FAN		3	3.8					
0.00	480V CONT & AUX BLDG VENT BD 1A1-A	7A	UAS					480V BD RM 1A PRESS FAN 1A1-A		3	4.6					
0.00	480V CONT & AUX BLDG VENT BD 1A1-A	11C	UA	0	0			SHTDN BD RM A PRESS FAN 1A-A		1	2					
0.00	480V CONT & AUX BLDG VENT BD 1A1-A	7C2	UMW					COND VAC PMP AIR EXH MON		0.75	1.4					
0.00	480V CONT & AUX BLDG VENT BD 1A1-A	3D	UA	0				CNTMT ANN VACUUM FAN 1A		1.5	3.3					
0.00	480V CONT & AUX BLDG VENT BD 1A1-A	8D	UAS					480V BD RM 1B PRESS FAN 1B1-A		3	4.6					
0.00	480V CONT & AUX BLDG VENT BD 1A1-A	1D1	UA					RAD MON & FIRE PROT DIST PNL	37.5		45.1		31.875			
0.00	480V CONT & AUX BLDG VENT BD 1A1-A	5B	UAI		I			CNTMT SPRAY PMP 1A-A RM CLR FAN		5	6.1					
0.00	480V CONT & AUX BLDG VENT BD 1A1-A	10E2	UMW					AUX BLDG VENT MON		3	4.6					
0.00	480V CONT & AUX BLDG VENT BD 1A1-A	7D	UAS					125V BATT RM II EXH FAN 1B1-A		0.5						
0.00	480V DIESEL AUX BD 1A1-A	7B	UA					DG BATT HOOD EXH FAN		0.33	0.965					
0.00	480V DIESEL AUX BD 1A1-A	4A	UA					DG ELEC PNL VENT FAN		15						

Prepared [illegible]
Checked CRM
Reviewed [illegible]

Sequoyah Nuclear Plant - Diesel Generator Loading at Blackout

TIME BD M.S	BOARD	CPT	CONT COMB	PHASE A	PHASE B	OPER TIME	COMPONENT UNID	COMPONENT DESCRIPTION	KVA	HP	FULLOAD CURRENT	RATED LOAD	KW	MOTOR EFF	MOTOR PF	MOTOR %LRI
0.00	480V DIESEL AUX BD 1A1-A	5A1	UA					DIESEL GEN LT CAB LC45			54		38.25			
0.00	480V DIESEL AUX BD 1A1-A	6D	UA					DG MUFFLER RM EXH FAN		1.5	2.8					
0.00	480V DIESEL AUX BD 1A1-A	2C	UAD			1.00	1-FCV-67-68	EMG DSL ENG HT EXCH SUP VLV		0.125						
0.00	480V DIESEL AUX BD 1A1-A	1D	UA					CONTROL POWER XFMR	3		3.6		2.55			
0.00	480V DIESEL AUX BD 1A1-A	6A	UA					DG ROOM EXH FAN 1A1-A		15	19.5					
0.00	480V DIESEL AUX BD 1A2-A	5A2	UA					DIESEL GEN BATTERY CHGR			3		0.65			
0.00	480V DIESEL AUX BD 1A2-A	7A	UA					DG BD ROOM EXH FAN		3	4.6					
0.00	480V DIESEL AUX BD 1A2-A	1D	UA					CONTROL POWER XFMR	3		3.6		2.55			
0.00	480V DIESEL AUX BD 1A2-A	6D	UA					DG ROOM EXH FAN 1A2-A		15	19.5					
0.00	480V DIESEL AUX BD 1A2-A	6A	UAD			1.00	1-FCV-67-66	EMG DSL ENG HT EXCH SUP VLV		0.125						
0.00	480V ERCW MCC 1A-A	5E	UA					ERCW STRAINER XFMR	1				0.85			
0.00	480V ERCW MCC 1A-A	2A	UA					ERCW STRAINER A1A-A		3	7					
0.00	480V SHUTDOWN BD 1A1-A	3B	UAI	I	O			CRDM COOL FAN 1A		75	83					
0.00	480V SHUTDOWN BD 1A1-A	10A	UA					NOR FDR 125V VITAL BATT CHGR I					7.44			
0.00	480V SHUTDOWN BD 1A1-A	3C	UMW		O			REAC LOWER COMPT COOL FAN 1A-A		50	59					
0.00	480V SHUTDOWN BD 1A1-A	[illegible]	UA					CONT RM AHU A-A		60	77					
0.00	480V SHUTDOWN BD 1A2-A	9C	UA					STANDBY LTG CAB LS 4			54		38.25			
0.00	480V SHUTDOWN BD 1A2-A	4B	UMW		O			REACTOR LWR COMPT COOL FAN 1C-A		50	59					
0.00	480V SHUTDOWN BD 1A2-A	3B	UAI	I	O			CRDM COOL FAN 1C		75	83					
0.00	6900V SHUTDOWN BD 1A-A	3	UA					480V SHDN XFMR 1A-A								
0.00	6900V SHUTDOWN BD 1A-A	5	UA					480V SHDN XFMR 1A-A								
0.00	6900V SHUTDOWN BD 1A-A	4	UA					480V SHDN XFMR 1A2-A								
0.00	6900V SHUTDOWN BD 1A-A	22	UA					ERCW PMP STA XFMR 1A-A								
								Total		441.08			137.715			
0.02	480V CONT & AUX BLDG VENT BD 1A1-A	10D	UAI	I	I			CENT CHRG PMP 1A-A RM CLR FAN		5	6.1					
0.02	480V REACTOR MOV BD 1A1-A	2C2	UAI	I	I			CENT CHG PMP 1A AUX OIL PMP		2	3.1					
0.02	6900V SHUTDOWN BD 1A-A	1B	TAS	I	I			CENTRIFUGAL CHRG PMP 1A-A		680						
								Total		687						
0.15	6900V SHUTDOWN BD 1A-A	8	TAS	I	I			ESSENTIAL RCW PMP J-A		700						
								Total		700						
0.20	480V CONT & AUX BLDG VENT BD 1A1-A	5C	UAI	I	I			CCS & AFW PMP SP CLR FAN A-A		20	18					
0.20	480V REACTOR MOV BD 1A1-A	2E	UA		O			CCS BOOST PMP 1A-A		15	18.4					
0.20	480V REACTOR MOV BD 1A2-A	10C	UA			1.00	0-FCV-70-208	CNDS DEMIN WST EVAC BLDG SUP VLV		0.125	0.45					
0.20	480V SHUTDOWN BD 1A1-A	4B	TAS	I	I			CCS PUMP 1A-A		350	404					
								Total		385.125						
0.25	6900V SHUTDOWN BD 1A-A	10	TAD	I	I			AUX FEED WTR PMP 1A-A		486						

Prepared QHB
Checked CRM
Reviewed RER
Date 1-15-86

Sequoyah Nuclear Plant - Diesel Generator Loading at Blackout

TIME BD M.S	BOARD	CPT	CONT COMB	PHASE A	PHASE B	OPER TIME	COMPONENT UNID	COMPONENT DESCRIPTION	KVA	HP	FULLOAD CURRENT	RATED LOAD	KW	MOTOR EFF	MOTOR PF	MOTOR ZLRI
								Total		486						
1.30	6900V SHUTDOWN BD 1A-A	20	TA	0				PRESS HEATER BKUP GR 1A-A					485			
								Total					485			
2.00	480V SHUTDOWN BD 1A2-A	3C	TA					FIRE PUMP 1A-A		200	257					
								Total		200						
3.20	480V SHUTDOWN BD 1A2-A	4D	UA					CONT RM A/C CPRSR A-A		125	148					
								Total		125						
5.00	480V DIESEL AUX BD 1A1-A	2D	UAD					DG DAY TNK FUEL OIL XFER PMP		1	2					
5.00	480V DIESEL AUX BD 1A2-A	4A	UAD					DG DAY TNK FUEL OIL XFER PMP		1	2					
								Total		2						
21.00	480V SHUTDOWN BD 1A[illegible]-A	2B	UA					SHTDN BD RM AIR HAND UNIT 1A-A		75	88					
								Total		75						

Prepared RWB
Checked CRM
Reviewed RBR
Date 1-15-86

Sequoyah Nuclear Plant - Diesel Generator Loading at Blackout

TIME BD M.S	BOARD	CPT	CONT COMB	PHASE A	PHASE B	OPER TIME	COMPONENT UNID	COMPONENT DESCRIPTION	KVA	HP	FULLOAD CURRENT	RATED LOAD	KW	MOTOR EFF	MOTOR PF	MOTOR %LRI
T	480V CONT & AUX BLDG VENT BD 1B1-B	2A	UA					SHTDN XFMR RM 1B EXH FAN 1B3-B		2.5	4.1					
T	480V CONT & AUX BLDG VENT BD 1B1-B	2B	UA					SHTDN XFMR RM 1B EXH FAN 1B1-B		2.5	4.1					
T	480V CONT & AUX BLDG VENT BD 1B1-B	2C	UA					SHTDN XFMR RM 1B EXH FAN 1B2-B		2.5	4.1					
L	480V CONT & AUX BLDG VENT BD 1B1-B	2D	UA					SP FUEL PIT CLR SUMP PMP B		0.33	0.88					
T	480V CONT & AUX BLDG VENT BD 1B1-B	3A	UA					RECIP CHG PMP RM CLR FAN		3	4.7					
T	480V CONT & AUX BLDG VENT BD 1B1-B	3E	UA					SHDN BD RM A/C CIR PMP B-B		20						
T	480V CONT & AUX BLDG VENT BD 1B1-B	4A	UA	I	I			PEN RM EL 669 CLR FAN 1B-B		5	6.1					
T	480V CONT & AUX BLDG VENT BD 1B1-B	4B	UA	I	I			PEN RM EL 690 CLR FAN 1B-B		5	6.1					
T	480V CONT & AUX BLDG VENT BD 1B1-B	4C	UA	I	I			PEN RM EL 714 CLR FAN 1B-B		5	6.1					
T	480V CONT & AUX BLDG VENT BD 1B1-B	5E	UA					480V BD RM 1B A/C CPRSR 1B-B		60	75					
T	480V CONT & AUX BLDG VENT BD 1B1-B	6B	UA					480V BD RM 1B A/C COND 1B-B		25	32					
F	480V CONT & AUX BLDG VENT BD 1B1-B	8C	UAI	I	I			CONT BLDG EMERG CL UP FAN B-B		10						
T	480V CONT & AUX BLDG VENT BD 1B1-B	8E	UA	I	I			PIPE CHASE CLR FAN 1B-B		20	24.1					
T	480V CONT & AUX BLDG VENT BD 1B1-B	9C	UA	I	I			SP FUEL PIT PMP B-B CLR FAN		5	6.1					
T	480V CONT & AUX BLDG VENT BD 1B1-B	9E	UA					480V BD RM 1B A/C AHU 1B-B		25	32					
L	480V DIESEL AUX BD 1B1-B	5D	UA					DG BLDG SUMP PMP B		3						
P	480V DIESEL AUX BD 1B1-B	6C	UA					DG 1B-B AIR COMPRESSOR 2		10						
P	480V DIESEL AUX BD 1B2-B	6C	UA					DG 1B-B AIR COMPRESSOR 1		10	13					
L	480V ERCW MCC 1B-B	2C	UA					STATION DECK SUMP PMP B		5	3.5					
T	480V REACTOR MOV BD 1B1-B	3B	UA	O	O			SIS BORON INJ TK HTR 1B-B					6			
T	480V REACTOR MOV BD 1B1-B	3D	UA					480V SHDN BD XFMR 1B1-B COOL FAN		0.32						
T	480V REACTOR MOV BD 1B1-B	3D	UA					480V SHDN BD XFMR 1B-B COOL FAN(NOR FDR)		0.33						
T	480V REACTOR MOV BD 1B1-B	3E	UA					BORIC ACID TK A HTR B-B					9			
S	480V REACTOR MOV BD 1B1-B	4A	UA					BORIC ACID XFER PMP 1B-B		15						
T	480V REACTOR MOV BD 1B1-B	4E	UA					BORIC ACID TK C HTR B-B					9			
T	480V REACTOR MOV BD 1B2-B	2A	UA				1-FCV-1-18	STEAM FW PMP ISOL VLV		1.6	3.4					
								Total		236.08			24			
0.00	480V CONT & AUX BLDG VENT BD 1B1-B	11E	UA					BATT RM EL 669 EXH FAN B-B		2	3.1					
0.00	480V CONT & AUX BLDG VENT BD 1B1-B	12E	UMW					SI SYS HT TRACE XFMR B			18		12.75			
0.00	480V CONT & AUX BLDG VENT BD 1B1-B	6E2	UMW					SHTDN BD RM CHILLER B-B CON XFMR	3		38.5		2.55			
0.00	480V CONT & AUX BLDG VENT BD 1B1-B	8A	UA					PRIM WTR MAKEUP PMP 1B		20						
0.00	480V CONT & AUX BLDG VENT BD 1B1-B	13D2	UA					CONT BLDG PRESS FAN B-B		15	20					
0.00	480V CONT & AUX BLDG VENT BD 1B1-B	5D	UA	O				CNTMT ANN VACUUM FAN 1B		1.5	3.3					
0.00	480V CONT & AUX BLDG VENT BD 1B1-B	9A	UAS					125V BATT RM I EXH FAN 1A2-B		0.5						
0.00	480V CONT & AUX BLDG VENT BD 1B1-B	12A	UAS					125V VIT BATT RM II EXH FAN 1B2-B		0.5						
0.00	480V CONT & AUX BLDG VENT BD 1B1-B	5B	UAI		I			CNTMT SPRAY PMP 1B-B CLR FAN		5	6.1					
0.00	480V CONT & AUX BLDG VENT BD 1B1-B	1D2	UA					CONT PWR XFMR		1.5						
0.00	480V CONT & AUX BLDG VENT BD 1B1-B	8D2	UMW					CNTMT PURGE AIR EXH MON		0.75	1.4					
0.00	480V CONT & AUX BLDG VENT BD 1B1-B	6C	UA					UNIT CONT ANN SYS	5		5		4.25			
0.00	480V CONT & AUX BLDG VENT BD 1B1-B	10A	UA	O	O			SHTDN BD RM A PRESS FAN 1B-B		1	2					
0.00	480V CONT & AUX BLDG VENT BD 1B1-B	7D2	UMW					CNTMT BLDG UP COMPT AIR MON		3	1.6					
0.00	480V CONT & AUX BLDG VENT BD 1B1-B	5A	UAI					RES HT REM PMP 1B-B CLR FAN		5						
0.00	480V CONT & AUX BLDG VENT BD 1B1-B	7C	UAS					480V BD RM 1A PRESS FAN 1A2-B		3	4.6					
0.00	480V CONT & AUX BLDG VENT BD 1B1-B	8D1	UMW					COND VAC PMP H2 RANGE AIR EXH MON		0.75	1.4					
0.00	480V CONT & AUX BLDG VENT BD 1B1-B	9D	UAS					480V BD RM 1B PRESS FAN 1B2-B		3	4.6					
0.00	480V CONT & AUX BLDG VENT BD 1B1-B	3B	UAI					SI PMP 1B-B RM CLR FAN		3	3.8					
0.00	480V CONT & AUX BLDG VENT BD 1B1-B	6D	UMW					CONT RM EMER INTAKE RAD MON		0.75	1.4					
0.00	480V DIESEL AUX BD 1B1-B	7B	UA					DG BATT HOOD EXH FAN		0.33						
0.00	480V DIESEL AUX BD 1B1-B	6D	UA					DG MUFFLER RM EXH FAN		1.5						

Prepared RZB
Checked CRM
Reviewed [illegible]R
Date 1-15-86

B25 '86 0204 300 p40

TIME BD M.S	BOARD	CPT	CONT COMB	PHASE A	PHASE B	OPER TIME	COMPONENT UNID	COMPONENT DESCRIPTION	KVA	HP	FULLOAD CURRENT	RATED LOAD	KW	MOTOR EFF	MOTOR PF	MOTOR ILRI
0.00	480V DIESEL AUX BD 1B1-B	4A	UA					DG ELEC PNL VENT FAN		15	20					
0.00	480V DIESEL AUX BD 1B1-B	1D	UA					CONTROL POWER XFMR	3				2.55			
0.00	480V DIESEL AUX BD 1B1-B	5A1	UA					DIESEL GEN LT CAB LC47					38.25			
0.00	480V DIESEL AUX BD 1B1-B	2C	UAD			1.00	1-FCV-67-65	EMG DSL ENG HT EXCH SUP VLV		0.125						
0.00	480V DIESEL AUX BD 1B1-B	6A	UA					DG ROOM EXH FAN 1B1-B		15						
0.00	480V DIESEL AUX BD 1B2-B	1D	UA					CONTROL POWER XFMR	3		6.3		2.55			
0.00	480V DIESEL AUX BD 1B2-B	5A2	UA					DIESEL GEN BATTERY CHGR			3		0.65			
0.00	480V DIESEL AUX BD 1B2-B	6D	UA					DG ROOM EXH FAN 1B2-B		15	19.5					
0.00	480V DIESEL AUX BD 1B2-B	5A	UAD			1.00	1-FCV-67-67	EMG DSL ENG HT EXCH SUP VLV		0.125						
0.00	480V DIESEL AUX BD 1B2-B	7A	UA					DG BD ROOM EXH FAN		3	4.6					
0.00	480V ERCW MCC 1B-B	[illegible]	UA					ERCW STRAINER B1B-B		3	7					
0.00	480V ERCW MCC 1B-B	5E	UA					ERCW STRAINER XFMR	1				0.85			
0.00	480V SHUTDOWN BD 1B1-B	8D	UA					STANDBY LTG CAB LS 2			27		38.25			
0.00	480V SHUTDOWN BD 1B1-B	4B	UMW		0			REAC LOWER COMPT COOL FAN 1B-B		50	59					
0.00	480V SHUTDOWN BD 1B1-B	3A	UAI	X	0			CRDM COOL FAN 1B		75	83					
0.00	480V SHUTDOWN BD 1B2-B	10A	UMW					125V AC VITAL BATT CHGR II			47		7.44			
0.00	480V SHUTDOWN BD 1B2-B	5D	UMW		0			REACTOR LWR COMPT COOL FAN 1D-B		50	59					
0.00	480V SHUTDOWN BD 1B2-B	1D	UA					CONT RM AHU B-B		60	77					
0.00	480V SHUTDOWN BD 1B2-B	3B	UAI	X	0			CRDM COOL FAN 1D		75	93					
0.00	6900V SHUTDOWN BD 1B-B	5	UA					480V SHDN XFMR 1B-B								
0.00	6900V SHUTDOWN BD 1B-B	4	UA					480V SHDN XFMR 1B2-B								
0.00	6900V SHUTDOWN BD 1B-B	3	UA					480V SHDN XFMR 1B-B								
0.00	6900V SHUTDOWN BD 1B-B	22	UA					480V XFMR 1B-B								
								Total		429.33			110.09			
0.02	480V CONT & AUX BLDG VENT BD 1B1-B	3C	UAI	I	I			CENT CHRG PMP 1B-B RM CLR FAN		5						
0.02	480V REACTOR MOV BD 1B1-B	5C2	UAI	I	I			CENT CHG PMP 1B AUX OIL PMP		2	3.4					
0.02	6900V SHUTDOWN BD 1B-B	1B	TAS	I	I			CENTRIFUGAL CHRG PMP 1B-B		680						
								Total		687						
0.15	6900V SHUTDOWN BD 1B-B	9	TAS	I	I			ESSENTIAL RCW PMP N-B		700						
								Total		700						
0.20	480V CONT & AUX BLDG VENT BD 1B1-B	5C	UAI	I	I			CCS & AFW PMP SP CLR FAN B-B		20						
0.20	480V REACTOR MOV BD 1B1-B	5E	UA		0			CCS BOOST PMP 1B-B		15						
0.20	480V REACTOR MOV BD 1B2-B	12E	UA			1.00	0-FCV-70-206	CNDS DEMIN VLV		0.125	0.45					
0.20	480V REACTOR MOV BD 1B2-B	7E	UA			1.00	1-FCV-70-207	CNDS DEMIN SUP VLV		0.125	0.45					
0.20	480V SHUTDOWN BD 1B1-B	3C	TAS	I	I			CCS PUMP 1B-B		350	404					
								Total		385.25						
0.25	6900V SHUTDOWN BD 1B-B	10	TAD	I	I			AUX FEED WTR PMP 1B-B		4.6						

Prepared QZB
Checked CRM
Reviewed [illegible]
Date 1-15-86

TIME	BOARD BD M.S	CPT	CONT COMB	PHASE A	PHASE B	OPER TIME	COMPONENT UNID	COMPONENT DESCRIPTION	KVA	HP	FULLOAD CURRENT	RATED LOAD	KW	MOTOR EFF	MOTOR PF	MOTOR ILRI
								Total		486						
1.30	6900V SHUTDOWN BD 1B-B	20	TA	D				PRESS HEATER BKUP GR 1B-B					495			
								Total					495			
2.00	480V SHUTDOWN BD 1B2-B	3C	TA					FIRE PUMP 1B-B		200	257					
								Total		200						
3.20	480V SHUTDOWN BD 1B2-B	2B	UA					CONT RM A/C CPRSR B-P		125	146					
								Total		125						
5.00	480V DIESEL AUX BD 1B1-B	2D	UAD					DG DAY TNK FUEL OIL XFER PMP		1	2					
5.00	480V DIESEL AUX BD 1B2-B	4A	UAD					DG DAY TNK FUEL OIL XFER PMP		1	2					
								Total		2						
15.00	480V SHUTDOWN BD 1B2-B	10D	TPD					MN TURB TURN GEAR OIL PMP		75	91.5					
								Total		75						
21.00	480V SHUTDOWN BD 1B1-B	3D	UA					SHDN BD RM CHILLER PKG B-B		250	275					
21.00	480V SHUTDOWN BD 1B2-B	3A	UA					SHDN BD RM AIR HAND UNIT 1B-B		75	88					
								Total		325						

Prepared: BBB

Checked: CRM

Reviewed: BBR

Date: 1-15-86

TIME BD N.S	BOARD	CPT	CONT COMB	PHASE A	PHASE B	OPER TIME	COMPONENT UNID	COMPONENT DESCRIPTION	KVA	HP	FULLOAD CURRENT	RATED LOAD	KW	MOTOR EFF	MOTOR PF	MOTOR ILRI
T	480V CONT & AUX BLDG VENT BD 2A1-A	2A	UA	I	I			PIPE CHASE CLR FAN 2A-A		[illegible]	24.1					
T	480V CONT & AUX BLDG VENT BD 2A1-A	3A	UA					SHTDN XFMR RM 2A EXH FAN 2A3-A		2.5	4.1					
T	480V CONT & AUX BLDG VENT BD 2A1-A	3B	UA					SHTDN XFMR RM 2A EXH FAN 2A1-A		2.5	4.1					
T	480V CONT & AUX BLDG VENT BD 2A1-A	3C	UA					SHTDN XFMR RM 2A EXH FAN 2A2-A		2.5	4.1					
T	480V CONT & AUX BLDG VENT BD 2A1-A	4A	UA	I	I			PEN RM EL 669 CLR FAN 2A-A		5	6.1					
T	480V CONT & AUX BLDG VENT BD 2A1-A	4B	UA	I	I			PEN RM EL 690 CLR FAN 2A-A		5	6.1					
T	480V CONT & AUX BLDG VENT BD 2A1-A	4C	UA	I	I			PEN RM EL 714 CLR FAN 2A-A		5	6.1					
T	480V CONT & AUX BLDG VENT BD 2A1-A	5D	UA	I	I			EMER GAS TMT RM CLR A-A		3	3.8					
P	480V CONT & AUX BLDG VENT BD 2A1-A	6C	UAS					AUX CONT AIR COMPRSR A-A		20	25.7					
T	480V CONT & AUX BLDG VENT BD 2A1-A	8B	UA					480V BD RM 2A A/C COND 2A-A		20	21					
T	480V CONT & AUX BLDG VENT BD 2A1-A	9E	UA					480V BD RM 2A A/C AHU 2A-A		10	12.4					
T	480V CONT & AUX BLDG VENT BD 2A1-A	10E1	UA	I	I			AB GAS TMT SYS HUM HTR A-A			66.7		32			
T	480V CONT & AUX BLDG VENT BD 2A1-A	11B	UA					SHDN BD RM A/C CIR PMP A-A		20	23.4					
T	480V CONT & AUX BLDG VENT BD 2A1-A	11D	UA					480V BD RM 2A A/C CPRSR 2A-A		50	61					
P	480V DIESEL AUX BD 2A1-A	6C	UA					DG 2A-A AIR COMPRESSOR 2		10	13					
P	480V DIESEL AUX BD 2A2-A	6C	UA					DG 2A-A AIR COMPRESSOR 1		10	13					
T	480V REACTOR MOV BD 2A1-A	1E	UA					480V SHDN BD XFMR 2A1-A COOL FAN		0.33						
T	480V REACTOR MOV BD 2A1-A	6A	UA	O	O			SIS BORON INJ TK HTR 2A-A			7.2		6			
S	480V REACTOR MOV BD 2A1-A	14A	UA					BORIC ACID XFER PMP 2A-A		15	26					
T	480V REACTOR MOV BD 2A1-A	14D	UA					BORIC ACID TK B HTR A-A			10.8		9			
								Total		200.83			47			
0.00	480V CONT & AUX BLDG VENT BD 2A1-A	9A	UMW					GAS EFF RAD MON		5	7.25					
0.00	480V CONT & AUX BLDG VENT BD 2A1-A	7C2	UMW				RE-90-119	COND VAC PMP AIR EXH MON		0.75	1.4					
0.00	480V CONT & AUX BLDG VENT BD 2A1-A	11E1	UMW				RE-90-106	CNTMT BLDG LWR COMPT AIR MON		3	4.6					
0.00	480V CONT & AUX BLDG VENT BD 2A1-A	7D	UAS					125V BATT RM III EXH FAN 2B1-A		0.5						
0.00	480V CONT & AUX BLDG VENT BD 2A1-A	10B	UAI					SI PMP 2A-A RM CLR FAN		3	3.8					
0.00	480V CONT & AUX BLDG VENT BD 2A1-A	7A	UAS					480V BD RM 2A PRESS FAN 2A1-A		3	4.6					
0.00	480V CONT & AUX BLDG VENT BD 2A1-A	7C1	UMW					SHTDN BD RM CHILLER A-A CON XFMR	3		6.3		2.55			
0.00	480V CONT & AUX BLDG VENT BD 2A1-A	3D	UA	O				CNTMT ANN VACUUM FAN 2A		1.5	3.3					
0.00	480V CONT & AUX BLDG VENT BD 2A1-A	5A	UAI					RES HT REM PMP 2A-A CLR FAN		3	3.8					
0.00	480V CONT & AUX BLDG VENT BD 2A1-A	1D1	UA					RAD MON SAMP & FIRE PROT XFMR					30			
0.00	480V CONT & AUX BLDG VENT BD 2A1-A	5B	UAI		I			CNTMT SPRAY PMP 2A-A CLR FAN		5	6.1					
0.00	480V CONT & AUX BLDG VENT BD 2A1-A	11E2	UMW				RE-90-100	SHIELD BLDG VENT RAD MON		3	4.6					
0.00	480V CONT & AUX BLDG VENT BD 2A1-A	1D2	UA					CONT PWR XFMR		3						
0.00	480V CONT & AUX BLDG VENT BD 2A1-A	10E2	UMW				RE-90-205	MAIN CONT RM EMER INTAKE RAD MON		0.75	1.4					
0.00	480V CONT & AUX BLDG VENT BD 2A1-A	8A	UA					PRIM WTR MAKEUP PMP 2A		20	24.5					
0.00	480V CONT & AUX BLDG VENT BD 2A1-A	11C	UA	O	O			SHTDN BD RM B PRESS FAN 2A-A		1	2					
0.00	480V CONT & AUX BLDG VENT BD 2A1-A	11A	UAI	I	I			AUX FDWTR & BA TRANS PMP SP CLR FAN A-A		5	6.1					
0.00	480V CONT & AUX BLDG VENT BD 2A1-A	6E2	UMW				RE-90-125	CONT RM INTAKE MON		0.75	1.4					
0.00	480V CONT & AUX BLDG VENT BD 2A1-A	6E1	UMW					CNTMT PURGE AIR EXH RAD MON		0.75						
0.00	480V CONT & AUX BLDG VENT BD 2A1-A	10A	UAS					125V VIT BATT RM IV FAN 2A1-A		0.5						
0.00	480V CONT & AUX BLDG VENT BD 2A1-A	8D	UAS					480V BD RM 2B PRESS FAN 2B1-A		3	4.6					
0.00	480V DIESEL AUX BD 2A1-A	1D	UA					CONTROL POWER XFMR	3		6.3		2.55			
0.00	480V DIESEL AUX BD 2A1-A	2C	UAD			1.00	2-FCV-67-68	EMG DSL ENG HT EXCH SUP VLV		0.125						
0.00	480V DIESEL AUX BD 2A1-A	5A1	UA					DIESEL GEN LT CAB LC46			93.8		38.25			
0.00	480V DIESEL AUX BD 2A1-A	6A	UA					DG ROOM EXH FAN 2A1-A		15	19.5					
0.00	480V DIESEL AUX BD 2A1-A	6D	UA					DG MUFFLER RM EXH FAN		1.5	2.8					
0.00	480V DIESEL AUX BD 2A1-A	7B	UA					DG BATT HOOD EXH FAN		0.33	0.96					
0.00	480V DIESEL AUX BD 2A1-A	4A	UA					DG ELEC PNL VENT FAN		15						

Prepared QBB
Checked CRM
Reviewed RFR
Date 1-15-86

10-Jan-86

Sequoyah Nuclear Plant - Diesel Generator Loading at Blackout

TIME BD M.S BOARD	CPT	CONT COMB	PHASE A	PHASE B	OPER COMPONENT TIME UNID	COMPONENT DESCRIPTION	KVA	HP	FULLOAD CURRENT	RATED LOAD	KW	MOTOR EFF	MOTOR PF	MOTOR ILRI
0.00 480V DIESEL AUX BD 2A2-A	1D	UA				CONTROL POWER XFMR	3		6.3		2.55			
0.00 480V DIESEL AUX BD 2A2-A	6D	UA				DG ROOM EXH FAN 2A2-A		15	19.5					
0.00 480V DIESEL AUX BD 2A2-A	6A	UAD			1.00 2-FCV-67-66	EMG DSL ENG HT EXCH SUP VLV		0.025						
0.00 480V DIESEL AUX BD 2A2-A	5A2	UA				DIESEL GEN BATTERY CHGR			3		0.65			
0.00 480V DIESEL AUX BD 2A2-A	7A	UA				DG BD ROOM EXH FAN		3	4.6					
0.00 480V ERCW MCC 2A-A	5D	UA				ERCW STRAINER XFMR	1				0.85			
0.00 480V ERCW MCC 2A-A	2A	UA				ERCW STRAINER A2A-A		3	7					
0.00 480V REACTOR MOV BD 2A2-A	1D	UMW				480V SHDN XFMR 2A1-A COOL FAN		0.332						
0.00 480V SHUTDOWN BD 2A1-A	8C	UA				HT TR-CVC PNL A1 XFMR			54		38.25			
0.00 480V SHUTDOWN BD 2A1-A	2B	UAS				ELEC BD RM AHU A-A		75	96					
0.00 480V SHUTDOWN BD 2A1-A	10A	UA				NOR FDR VITAL BATT CHGR III					7.44			
0.00 480V SHUTDOWN BD 2A1-A	3C	UMW		0		REAC LOWER COMPT COOL FAN 2A-A		50	59					
0.00 480V SHUTDOWN BD 2A1-A	3B	UAI	I	0		CRDM COOL FAN 2A		75	83					
0.00 480V SHUTDOWN BD 2A2-A	4B	UMW		0		REACTOR LWR COMPT COOL FAN 2C-A		50	59					
0.00 480V SHUTDOWN BD 2A2-A	8C	UMW				CVS SYS HT TR XFMR B3			54		38.25			
0.00 480V SHUTDOWN BD 2A2-A	3B	UAI	I	0		CRDM COOL FAN 2C		75	87					
0.00 480V SHUTDOWN BD 2A2-A	9C	UA				STANDBY LTG CAB LS I			27		19.1			
0.00 6900V SHUTDOWN BD 2A-A	3	UA				480V SHDN XFMR 2A1-A								
0.00 6900V SHUTDOWN BD 2A-A	4	UA				480V SHDN XFMR 2A2-A								
0.00 6900V SHUTDOWN BD 2A-A	5	UA				480V SHDN XFMR 2A-A								
0.00 6900V SHUTDOWN BD 2A-A	22	UA				ERCW PMP STG XFMR 2A-A								
						Total		442.912			180.44			
0.02 480V CONT & AUX BLDG VENT BD 2A1-A	10D	UAI	I	I		CENT CHRG PMP 2A-A RM CLR FAN		5	6.1					
0.02 480V REACTOR MOV BD 2A1-A	2C2	UAI	I	I		CENT CHG PMP 2A AUX OIL PMP		2						
0.02 6900V SHUTDOWN BD 2A-A	18	TAS	I	I		CENTRIFUGAL CHRG PMP 2A-A		680						
						Total		687						
0.15 6900V SHUTDOWN BD 2A-A	9	TAS	I	I		ESSENTIAL RCW PMP K-A		700						
						Total		700						
0.20 480V REACTOR MOV BD 2A1-A	2E	UA		0		CCS BOOST PMP 2A-A		15	18.4					
0.20 480V SHUTDOWN BD 2A1-A	4B	TAS	I	I		CCS PUMP 2A-A		350	404					
						Total		365						
0.25 6900V SHUTDOWN BD 2A-A	10	TAD	I	I		AUX FEED WTR PMP 2A-A		486						
						Total		486						

Prepared QAB
Checked CRM
Reviewed [illegible]
Date 1-15-86

10-Jan-86

Sequoyah Nuclear Plant - Diesel Generator Loading at Blackout

TIME BOARD BD M.S	CPT	CONT PHASE COMB A B	OPER COMPONENT TIME UNID	COMPONENT DESCRIPTION	KVA	HP	FULLOAD CURRENT	RATED LOAD	KW	MOTOR EFF	MOTOR PF	MOTOR %LRT
1.30 6900V SHUTDOWN BD 2A-A	20	TA D		PRESS HEATER BKUP GR 2A-A					485			
				Total					485			
2.00 480V SHUTDOWN BD 2A2-A	3C	TA		FIRE PUMP 2A-A		200	257					
				Total		200						
3.20 480V SHUTDOWN BD 2A2-A	4D	UA		ELEC BD RM A/C COMPR A-A		125	148					
				Total		125						
5.00 480V DIESEL AUX BD 2A1-A	2D	UAO		DG DAY TNK FUEL OIL XFER PMP		1	2					
5.00 480V DIESEL AUX BD 2A2-A	4A	UAO		DG DAY TNK FUEL OIL XFER PMP		1	2					
				Total		2						
21.00 480V SHUTDOWN BD 2A2-A	5D	UA		SHDN BD RM CHILLER PKG A-A		250	275					
21.00 480V SHUTDOWN BD 2A2-A	2B	UA		SHDN BD RM AIR HAND UNIT 2A-A		75	88					
				Total		325						

Prepared QRB
Checked CRM
Reviewed RPR
Date 1-15-86

TIME BD M.S	BOARD	CPT	CONT COMB	PHASE A	PHASE B	OPER TIME	COMPONENT UNID	COMPONENT DESCRIPTION	KVA	HP	FULLOAD CURRENT	RATED LOAD	KW	MOTOR EFF	MOTOR PF	MOTOR ILRI
T	480V CONT & AUX BLDG VENT BD 2B1-B	2A	UA					SHTDN XFMR RM 2B EXH FAN 2B3-B		2.5	4.1					
T	480V CONT & AUX BLDG VENT BD 2B1-B	2B	UA					SHTDN XFMR RM 2B EXH FAN 2B1-B		2.5	4.1					
T	480V CONT & AUX BLDG VENT BD 2B1-B	2C	UA					SHTDN XFMR RM 2B EXH FAN 2B2-B		3						
P	480V CONT & AUX BLDG VENT BD 2B1-B	2E	UAS					AUX CONT AIR COMPRSR B-B		20	25.7					
T	480V CONT & AUX BLDG VENT BD 2B1-B	3A	UA					RECIP CHG PMP RM CLR FAN		3	4.7					
T	480V CONT & AUX BLDG VENT BD 2B1-B	4A	UA	I	I			PEN RM EL 669 CLR FAN 2B-B		5	6.1					
T	480V CONT & AUX BLDG VENT BD 2B1-B	4B	UA	I	I			PEN RM EL 690 CLR FAN 2B-B		5	6.1					
T	480V CONT & AUX BLDG VENT BD 2B1-B	4C	UA	I	I			PEN RM EL 714 CLR FAN 2B-B		5	6.1					
T	480V CONT & AUX BLDG VENT BD 2B1-B	5C	UA	I	I			EMER GAS TMT RM CLR B-B		5	6.1					
T	480V CONT & AUX BLDG VENT BD 2B1-B	5E	UA					480V BD RM 2B A/C CHLR 2B-B		60	75					
T	480V CONT & AUX BLDG VENT BD 2B1-B	6E2	UA	I	I			AB GAS TMT SYS HUM HTR B-B					32			
T	480V CONT & AUX BLDG VENT BD 2B1-B	8B	UA					480V BD RM 2B A/C COND 2B-B		25	32					
T	480V CONT & AUX BLDG VENT BD 2B1-B	8E	UA	I	I			PIPE CHASE CLR FAN 2B-B		20	24.1					
T	480V CONT & AUX BLDG VENT BD 2B1-B	9C	UA					480V BD RM 2B A/C AHU 2B-B		25	32					
P	480V DIESEL AUX BD 2B1-B	6C	UA					DG 2B-B AIR COMPRESSOR 2		10	13					
P	480V DIESEL AUX BD 2B2-B	6C	UA					DG 2B-B AIR COMPRESSOR 1		10						
T	480V REACTOR MOV BD 2B1-B	3B	UA	O	O			SIS BORON INJ TK HTR 2B-B			7.2		6			
T	480V REACTOR MOV BD 2B1-B	3D	UA					480V SHDN BD XFMR 2B1-B COOL FAN		0.33						
S	480V REACTOR MOV BD 2B1-B	4A	UA					BORIC ACID XFER PMP 2B-B		15	13					
T	480V REACTOR MOV BD 2B1-B	4E	UA					BORIC ACID TK B HTR B-B			8		9			
T	480V REACTOR MOV BD 2B2-B	2A	UA				2-FCV-1-18	STEAM FW PMP ISOL VLV		1.6						
T	480V REACTOR MOV BD 2B2-B	3D	UA					480V SHDN BD XFMR 2B-B COOL FAN(NOR FDR)		0.33						
								Total		216.26			47			
0.00	480V CONT & AUX BLDG VENT BD 2B1-B	11B	UAS					125V VIT BATT RM III FAN 2B2-B		0.5						
0.00	480V CONT & AUX BLDG VENT BD 2B1-B	8A	UA					PRIM WTR MAKEUP PMP 2B		20	23.4					
0.00	480V CONT & AUX BLDG VENT BD 2B1-B	6C	UA					UNIT CONT ANN SYS	3		6		2.55			
0.00	480V CONT & AUX BLDG VENT BD 2B1-B	7D2	UMW				RE-90-12	CNTMT BLDG UP COMPT AIR MON		3	4.6					
0.00	480V CONT & AUX BLDG VENT BD 2B1-B	1D2	UA					CONT PWR XFMR		1.5						
0.00	480V CONT & AUX BLDG VENT BD 2B1-B	7C	UAS					480V BD RM 2A PRESS FAN 2A2-B		3	4.6					
C.00	480V CONT & AUX BLDG VENT BD 2B1-B	9D	UAS					480V BD RM 2B FAN PRESS 2B2-B		3	4.6					
0.00	480V CONT & AUX BLDG VENT BD 2B1-B	5A	UAI					RES HT REM PMP 2B-B CLR FAN		5	3.8					
0.00	480V CONT & AUX BLDG VENT BD 2B1-B	3B	UAI					SI PMP 2B-B RM CLR FAN		3	4.7					
0.00	480V CONT & AUX BLDG VENT BD 2B1-B	5B	UAI		I			CNTMT SPRAY PMP 2B-B CLR FAN		5						
0.00	480V CONT & AUX BLDG VENT BD 2B1-B	9C	UAI	I	I			AUX FDWTR & BA TRANS PMP SP CLR FAN B-B		5	6.1					
0.00	480V CONT & AUX BLDG VENT BD 2B1-B	6D	UMW				RE-90-126	CONT RM INTAKE RAD MON		0.75	1.4					
0.00	480V CONT & AUX BLDG VENT BD 2B1-B	12C	UMW					GAS EFF RAD MON		5	7.25					
0.00	480V CONT & AUX BLDG VENT BD 2B1-B	5D	UA	O				CNTMT ANN VACUUM FAN 2B		1.5	3.3					
0.00	480V CONT & AUX BLDG VENT BD 2B1-B	9A	UAS					125V BATT RM IV EXH FAN 2A2-B		0.5						
0.00	480V CONT & AUX BLDG VENT BD 2B1-B	8D2	UMW				RE-90-131	CNTMT PURGE AIR EXH MON		0.75	1.4					
0.00	480V CONT & AUX BLDG VENT BD 2B1-B	10A	UA	O	O			SHTDN BD RM B PRESS FAN 2B-B		1	2					
0.00	480V CONT & AUX BLDG VENT BD 2B1-B	8D1	UMW				RE-90-99	COND VAC PMP AIR EXH MON		0.75	1.4					
0.00	480V DIESEL AUX BD 2B1-B	2C	UAD			1.00	2-FCV-67-65	EMG DSL ENG HT EXCH SUP VLV		0.125						
0.00	480V DIESEL AUX BD 2B1-B	1D	UA					CONTROL POWER XFMR	3				2.55			
0.00	480V DIESEL AUX BD 2B1-B	5A1	UA					DIESEL GEN LT CAB LC4B					38.25			
0.00	480V DIESEL AUX BD 2B1-B	4A	UA					DG ELEC PNL VENT FAN		15	20					
0.00	480V DIESEL AUX BD 2B1-B	6D	UA					DG MUFFLER RM EXH FAN		1.5	2.8					
0.00	480V DIESEL AUX BD 2B1-B	6A	UA					DG ROOM EXH FAN 2B1-B		15	19.5					
0.00	480V DIESEL AUX BD 2B1-B	7B	UA					DG BATT HOOD EXH FAN		0.33	0.9					
0.00	480V DIESEL AUX BD 2B2-B	5A2	UA					DIESEL GEN BATTERY CHGR					0.65			

Prepared RWB

Checked CRM

Reviewed RCR

Date 1-15-81

B25 '86 0204 300 p46

TIME BD M.S	BOARD	CPT	CONT COMB	PHASE A	PHASE B	OPER TIME	COMPONENT UNID	COMPONENT DESCRIPTION	KVA	HP	FULLOAD CURRENT	RATED LOAD	KW	MOTOR EFF	MOTOR PF	MOTOR %LRI
0.00	480V DIESEL AUX BD 2B2-B	6D	UA					DG ROOM EXH FAN 2B2-B		15						
0.00	480V DIESEL AUX BD 2B2-B	6A	UAD			1.00	2-FCV-67-67	EMG DSL ENG HT EXCH SUP VLV		0.125						
0.00	480V DIESEL AUX BD 2B2-B	7A	UA					DG BD ROOM EXH FAN		3						
0.00	480V DIESEL AUX BD 2B2-B	1D	UA					CONTROL POWER XFMR	3				2.55			
0.00	480V ERCW MCC 2B-B	2A	UA					ERCW STRAINER B2B-B		3	7					
0.00	480V ERCW MCC 2B-B	5D	UA					ERCW STRAINER XFMR	1				0.85			
0.00	480V SHUTDOWN BD 2B1-B	8C	UA					HT TR-CVC PNL B1 & B2 XFMR			54		38.25			
0.00	480V SHUTDOWN BD 2B1-B	8D	UA					STANDBY LTG CAB LS 3		40	27		19.1			
0.00	480V SHUTDOWN BD 2B1-B	3B	UAI	I	O			CRDM COOL FAN 2B		75	83					
0.00	480V SHUTDOWN BD 2B1-B	3A	UAS					ELEC BD RM AHU B-B		75	96					
0.00	480V SHUTDOWN BD 2B1-B	4B	UMW		O			REAC LOWER COMPT COOL FAN 2B-B		50	59					
0.00	480V SHUTDOWN BD 2B2-B	5D	UMW		O			REACTOR LWR COMPT COOL FAN 2D-B		50	59					
0.00	480V SHUTDOWN BD 2B2-B	8C	UMW					CVS SYS HT TR XFMR B3			54		36.75			
0.00	480V SHUTDOWN BD 2B2-B	3B	UAI	I	O			CRDM COOL FAN 2D		75	83					
0.00	480V SHUTDOWN BD 2B2-B	10A	UMW					125V VITAL BATT CHGR IV			47		7.44			
0.00	6900V SHUTDOWN BD 2B-B	3	UA					480V SHDN XFMR 2B1-B								
0.00	6900V SHUTDOWN BD 2B-B	22	UA					480V XFMR 2B-B								
0.00	6900V SHUTDOWN BD 2B-B	4	UA					480V SHDN XFMR 2B2-B								
0.00	6900V SHUTDOWN BD 2B-B	5	UA					480V SHDN XFMR 2B-B								
								Total		477.33			150.44			
0.02	480V CONT & AUX BLDG VENT BD 2B1-B	3C	UAI	I	I			CENT CHRG PMP 2B-B RM CLR FAN		5	6.1					
0.02	480V REACTOR MOV BD 2B1-B	5C2	UAI	I	I			CENT CHG PMP 2B AUX OIL PMP		2	3.1					
0.02	6900V SHUTDOWN BD 2B-B	18	TAS	I	I			CENTRIFUGAL CHRG PMP 2B-B		680						
								Total		687						
0.15	6900V SHUTDOWN BD 2B-B	8	TAS	I	I			ESSENTIAL RCW PMP P-B		700						
								Total		700						
0.20	480V REACTOR MOV BD 2B1-B	5E	UA		O			CCS BOOST PMP 2B-B		15	18.4					
0.20	480V REACTOR MOV BD 2B2-B	7E	UA			1.00	2-FCV-70-207	CNDS DEMIN SUP VLV		0.125						
0.20	480V SHUTDOWN BD 2B1-B	3C	TAS	I	I			CCS PUMP 2B-B		350	404					
0.20	480V SHUTDOWN BD 2B2-B	2D	TAS	I	I			CCS PMP C-S(NOR FDR)		350	404					
								Total		715.125						
0.25	6900V SHUTDOWN BD 2B-B	10	TAD	I	I			AUX FEED WTR PMP 2B-B		486						
								Total		486						

Prepared RJB
Checked CRM
Reviewed BBR
Date 1-15-86

TIME BD M.S	BOARD	CPT	CONT COMB	PHASE A	PHASE B	OPER TIME	COMPONENT UNID	COMPONENT DESCRIPTION	KVA	HP	FULLOAD CURRENT	RATED LOAD	KW	MOTOR EFF	MOTOR PF	MOTOR %LRI
1.30	6900V SHUTDOWN BD 2B-B	20	TA	0				PRESS HEATER BKUP GR 2B-B					485			
								Total					485			
2.00	480V SHUTDOWN BD 2B2-B	3C	TA					FIRE PUMP 2B-B		200	257					
								Total		200						
3.20	480V SHUTDOWN BD 2B2-B	2B	UA					ELEC BD RM A/C COMPR B-B		125	149					
								Total		125						
5.00	480V DIESEL AUX BD 2B1-B	2D	LAO					DG DAY TNK FUEL OIL XFER PMP		1	2					
5.00	480V DIESEL AUX BD 2B2-B	4A	UAO					DE DAY TNK FUEL OIL XFER PMP		1						
								Total		2						
15.00	480V SHUTDOWN BD 2B2-B	10D	TPD					MN TURB TURN GEAR OIL PMP		75	130					
								Total		75						
21.00	480V SHUTDOWN BD 2B2-B	3A	UA					SHTDN BD RM AIR HAND UNIT 2B-B		75	88					
								Total		75						

Prepared BB
Checked CRM
Reviewed BBR
Date 1-15-86

B25 '86 0204 300 p48

TIME SI M.S	BOARD	CPT	CONT COMB	PHASE A	PHASE B	OPER TIME	COMPONENT UNID	COMPONENT DESCRIPTION	KVA	HP	FULLOAD CURRENT	RATED LOAD	KW	MOTOR EFF	MOTOR PF	MOTOR ILRI
T	480V CONT & AUX BLDG VENT BD 1A1-A	3A	UA					SHTDN XFMR RM 1A EXH FAN 1A3-A		2.5	4.1					
T	480V CONT & AUX BLDG VENT BD 1A1-A	3B	UA					SHTDN XFMR RM 1A EXH FAN 1A1-A		2.5	4.1					
T	480V CONT & AUX BLDG VENT BD 1A1-A	3C	UA					SHTDN XFMR RM 1A EXH FAN 1A2-A		2.5	4.1					
L	480V CONT & AUX BLDG VENT BD 1A1-A	6E	UA					SP FUEL PIT CLR SUMP PMP A		0.33	0.88					
T	480V CONT & AUX BLDG VENT BD 1A1-A	8B	UA					480V BD RM 1A A/C COND 1A-A		20						
T	480V CONT & AUX BLDG VENT BD 1A1-A	9E	UA					480V BD RM 1A A/C AHU 1A-A		10	12.4					
T	480V CONT & AUX BLDG VENT BD 1A1-A	11D	UA					480V BD RM 1A A/C CPRSR 1A-A		50	61					
L	480V DIESEL AUX BD 1A1-A	5D	UA					DG BLDG SUMP PMP A		3	4.6					
P	480V DIESEL AUX BD 1A1-A	6C	UA					DG 1A-A AIR COMPRESSOR 2		10	13					
T	480V DIESEL AUX BD 1A2-A	5A1	UA					DGB CO2 REFRIG UNIT		2	3					
P	480V DIESEL AUX BD 1A2-A	6C	UA					DG 1A-A AIR COMPRESSOR 1		10	13					
L	480V ERCW MCC 1A-A	2C	UA					STATION DCFX SUMP PUMP A		5	3.5					
T	480V REACTOR MOV BD 1A1-A	1D	UA					480V BD XFMR 1A1-A COOL FAN		0.33						
T	480V REACTOR MOV BD 1A1-A	14C	UA					BORIC ACID TK A HTR A-A			10.83		9			
T	480V REACTOR MOV BD 1A1-A	14E	UA					BORIC ACID TK C HTR A-A			10.83		9			
S	480V REACTOR MOV BD 1A1-A	16D	UA					BORIC ACID XFER PMP 1A-A		15	13					
T	480V REACTOR MOV BD 1A2-A	1D	UA					480V SHDN BD XFMR 1A2-A COOL FAN		0.32						
								Total		133.48			18			
0.00	480V CONT & AUX BLDG VENT BD 1A1-A	1D1	UA					RAD MON & FIRE PROT DIST PNL	37.5		45.1		31.875			
0.00	480V CONT & AUX BLDG VENT BD 1A1-A	1D2	UA					CONT PWR XFMR	3							
0.00	480V CONT & AUX BLDG VENT BD 1A1-A	2A	UA	I	I			PIPE CHASE CLR FAN 1A-A		20	24.1					
0.00	480V CONT & AUX BLDG VENT BD 1A1-A	2C	UA	I	I			EMER GAS TMT SYS FAN A-A		20	24.1					
0.00	480V CONT & AUX BLDG VENT BD 1A1-A	2E	UAI					EMER GAS TMT SYS A-A HTR					16			
0.00	480V CONT & AUX BLDG VENT BD 1A1-A	4A	UA	I	I			PEN RM EL 669 CLR FAN 1A-A		5	6.1					
0.00	480V CONT & AUX BLDG VENT BD 1A1-A	4B	UA	I	I			PEN RM EL 690 CLR FAN 1A-A		5	6.1					
0.00	480V CONT & AUX BLDG VENT BD 1A1-A	4C	UA	I	I			PEN RM EL 714 CLR FAN 1A-A		5	6.1					
0.00	480V CONT & AUX BLDG VENT BD 1A1-A	5A	UAI					RES HT REM PMP 1A-A CLR FAN		5	3.8					
0.00	480V CONT & AUX BLDG VENT BD 1A1-A	5E2	UMW					SERV BLDG VENT MON		3	4.6					
0.00	480V CONT & AUX BLDG VENT BD 1A1-A	6C	UMW					CNTMT PURGE AIR EXH MON		0.75	1.4					
0.00	480V CONT & AUX BLDG VENT BD 1A1-A	7A	UAS					480V BD RM 1A PRESS FAN 1A1-A		3	4.6					
0.00	480V CONT & AUX BLDG VENT BD 1A1-A	7B	UAI	I	I			CONT BLDG EMER PRESS FAN A-A		1	1.6					
0.00	480V CONT & AUX BLDG VENT BD 1A1-A	7C2	UMW					COND VAC PMP AIR EXH MON		0.75	1.4					
0.00	480V CONT & AUX BLDG VENT BD 1A1-A	7D	UAS					125V BATT RM II EXH FAN 1B1-A		0.5						
0.00	480V CONT & AUX BLDG VENT BD 1A1-A	8A	UA					PRIM WTR MAKEUP PMP 1A		20	24.5					
0.00	480V CONT & AUX BLDG VENT BD 1A1-A	8C	UAI	I	I			CONT BLDG EMERG AIR CL UP FAN A-A		10						
0.00	480V CONT & AUX BLDG VENT BD 1A1-A	8D	[illegible]					480V BD RM 1B PRESS FAN 1B1-A		3	4.6					
0.00	480V CONT & AUX BLDG VENT BD 1A1-A	9A	UMW					GAS EFF RAD MON		5	7.25					
0.00	480V CONT & AUX BLDG VENT BD 1A1-A	9B	UMW					SI SYS HT TRACE XFMR A			18.04		12.75			
0.00	480V CONT & AUX BLDG VENT BD 1A1-A	10A	UAS					125V VIT BATT RM I EXH FAN 1A1-A		0.5						
0.00	480V CONT & AUX BLDG VENT BD 1A1-A	10B	UAI					SI PMP 1A-A RM CLR FAN		3	3.8					
0.00	480V CONT & AUX BLDG VENT BD 1A1-A	10E2	UMW					AUX BLDG VENT MON		3	4.6					
0.00	480V CONT & AUX BLDG VENT BD 1A1-A	11A	UA	I	I			SP FUEL PIT PMP A-A CLR FAN		5	6.1					
0.00	480V CONT & AUX BLDG VENT BD 1A1-A	11E1	UMW					CNTMT LOWER COMPT AIR MON		3						
0.00	480V CONT & AUX BLDG VENT BD 1A1-A	11E2	UMW					SHIELD BLDG VENT RAD MON		3	4.6					
0.00	480V CONT & AUX BLDG VENT BD 1A1-A	12A	UA					BATT RM EL 669 EXH FAN A-A		2	3					
0.00	480V CONT & AUX BLDG VENT BD 1A1-A	12D	UA					CONT BLDG PRESS FAN A-A		15	20					
0.00	480V DIESEL AUX BD 1A1-A	1D	UA					CONTROL POWER XFMR	3		3.6		2.55			
0.00	480V DIESEL AUX BD 1A1-A	2C	UAD			1.00	1-FCV-67-68	EMG DSL ENG HT EXCH SUP VLV		0.125						
0.00	480V DIESEL AUX BD 1A1-A	4A	UA					DG ELEC PNL VENT FAN		15						

Prepared QZB

Checked CRM

Reviewed RBR

Date 1-15-86

TIME SI K.S	BOARD	CPT	CONT COMB	PHASE A	PHASE B	OPER TIME	COMPONENT UNID	COMPONENT DESCRIPTION	KVA	HP	FULLOAD CURRENT	RATED LOAD	KW	MOTOR EFF	MOTOR PF	MOTOR %LRI
0.00	480V DIESEL AUX BD 1A1-A	5A1	UA					DIESEL GEN LT CAB LC45			54		38.25			
0.00	480V DIESEL AUX BD 1A1-A	6A	UA					DG ROOM EXH FAN 1A1-A		15	19.5					
0.00	480V DIESEL AUX BD 1A1-A	6D	UA					DG MUFFLER RM EXH FAN		1.5	2.8					
0.00	480V DIESEL AUX BD 1A1-A	7B	UA					DG BATT HOOD EXH FAN		0.33	0.965					
0.00	480V DIESEL AUX BD 1A2-A	1D	UA					CONTROL POWER XFMR	3		3.6		2.55			
0.00	480V DIESEL AUX BD 1A2-A	5A2	UA					DIESEL GEN BATTERY CHGR			3		0.65			
0.00	480V DIESEL AUX BD 1A2-A	6A	UAD			1.00	1-FCV-67-66	EMG DSL ENG HT EXCH SUP VLV		0.125						
0.00	480V DIESEL AUX BD 1A2-A	6D	UA					DG ROOM EXH FAN 1A2-A		15	19.5					
0.00	480V DIESEL AUX BD 1A2-A	7A	UA					DG DD ROOM EXH FAN		3	4.6					
0.00	480V ERCW MCC 1A-A	2A	UA					ERCW STRAINER A1A-A		3	7					
0.00	480V ERCW MCC 1A-A	5E	UA					ERCW STRAINER XFMR	1				0.85			
0.00	480V REACTOR MOV BD 1A1-A	3A	UAI	X	X	0.07	1-FCV-62-63	SEAL FLOW ISOL VLV		0.67	2.1					
0.00	480V REACTOR MOV BD 1A1-A	3B	UAI	X	X	0.09	1-FCV-62-90	CHR FLOW ISOL VLV		1.5	2.8					
0.00	480V REACTOR MOV BD 1A1-A	4A	UAI	X	X	0.10	1-LCV-62-135	REF WTR STORAGE TK VLV		1	2.4					
0.00	480V REACTOR MOV BD 1A1-A	4E	UAI	X	X	1.00	1-FCV-72-22	RWST SPRAY HDR 1A-A FLO CONT VLV		3.3	5.2					
0.00	480V REACTOR MOV BD 1A1-A	7C2	UAI			1.00	1-FCV-74-12	RHR PMP 1A-A MIN FLOW VLV		1.6	3.4					
0.00	480V REACTOR MOV BD 1A1-A	12A	UAI	X	X	0.10	1-FCV-63-26	SIS BORON INJ TK SH OFF VLV		2	3.5					
0.00	480V REACTOR MOV BD 1A1-A	12E	UAI	X	X	0.11	1-FCV-63-39	SIS BORON INJ TK INLET SHT OFF VLV		2	3.5					
0.00	480V REACTOR MOV BD 1A1-A	13E	UAI	X	X	1.00	1-FCV-63-118	SIS ACC TK 1 FL ISOL VLV		21	29.6					
0.00	480V REACTOR MOV BD 1A2-A	14B	UAI	X	X	0.24	1-FCV-70-143	EXCELS LTDWN HTX CONT INLET VLV		0.13	0.45					
0.00	480V REACTOR MOV BD 1A2-A	15E	UAI	X	X	0.07	1-FCV-26-240	CNTMT STAND PIPE ISOL VLV		0.67	2.1					
0.00	480V REACTOR MOV BD 1A2-A	16B	UAI	X	X	0.07	1-FCV-3-33	STEAM GEN FW ISOL VLV		33	43					
0.00	480V REACTOR MOV BD 1A2-A	17C	UAI	X	X	0.06	1-FCV-3-87	STEAM GEN FW ISOL VLV		33	43					
0.00	480V REACTOR MOV BD 1A2-A	18C	UAI	X	X	1.00	1-FCV-26-242	ANNULUS STAND PIPE ISOL VLV		0.67	2.1					
0.00	480V REACTOR MOV BD 1A2-A	19B	UAI	X	X	0.06	1-FCV-26-243	RCP SPRAY ISOL VLV		0.67	2.1					
0.00	480V REACTOR MOV BD 1A2-A	19C	UAI	X	X	1.00	1-FCV-26-245	ANNULUS SPRINK ISOL VLV SUP		0.67	2.1					
0.00	480V SHUTDOWN BD 1A1-A	2B	UA					CONT RM AHU A-A		60	77					
0.00	480V SHUTDOWN BD 1A1-A	3B	UAI	X	O			CRDM COOL FAN 1A		75	83					
0.00	480V SHUTDOWN BD 1A1-A	3C	UMW		O			REAC LOWER COMPT COOL FAN 1A-A		50	59					
0.00	480V SHUTDOWN BD 1A1-A	10A	UA					NOR FDR 125V VITAL BATT CHGR I					7.44			
0.00	480V SHUTDOWN BD 1A2-A	3B	UAI	X	O			CRDM COOL FAN 1C		75	83					
0.00	480V SHUTDOWN BD 1A2-A	4B	UMW		O			REACTOR LWR COMPT COOL FAN 1C-A		50	59					
0.00	480V SHUTDOWN BD 1A2-A	[illegible]C	UA					STANDBY LTG CAB LG 4			54		38.25			
0.00	6900V SHUTDOWN BD 1A-A	3	UA					480V SHDN XFMR 1A-A								
0.00	6900V SHUTDOWN BD 1A-A	4	UA					480V SHDN XFMR 1A2-A								
0.00	6900V SHUTDOWN BD 1A-A	5	UA					480V SHDN XFMR 1A-A								
0.00	6900V SHUTDOWN BD 1A-A	22	UA					ERCW PMP STA XFMR 1A-A								
								Total		606.46			151.165			
0.02	480V CONT & AUX BLDG VENT BD 1A1-A	10D	UAI	X	X			CENT CHRG PMP 1A-A RM CLR FAN		5	6.1					
0.02	480V REACTOR MOV BD 1A1-A	2C2	UAI	X	X			CENT CHG PMP 1A AUX OIL PMP		2	3.1					
0.02	6900V SHUTDOWN BD 1A-A	1B	TAS	X	X			CENTRIFUGAL CHRG PMP 1A-A		680						
								Total		687						
0.04	480V REACTOR MOV BD 1A2-A	2B	UAI			1.00	1-FCV-3-116B	ERCW HDR 1A ISOL VLV		0.333	0.9					
0.04	480V REACTOR MOV BD 1A2-A	2C	UAI			1.00	1-FCV-3-116A	ERCW 1A ISOL VLV (3-116A)		0.333	0.9					

Prepared RJB
Checked CRM
Reviewed RFR
Date 1-15-86

Sequoyah Nuclear Plant - Diesel Generator Loading at Blackout with Phase A Isolation

TIME SI M.S	BOARD	CPT	CONT COMB	PHASE A	PHASE B	OPER TIME	COMPONENT UNID	COMPONENT DESCRIPTION	KVA	HP	FULLOAD CURRENT	RATED LOAD	KW	MOTOR EFF	MOTOR PF	MOTOR %LRI
								Total		0.666						
0.05	6900V SHUTDOWN BD 1A-A	15	TAS	I	I			SAFETY INJ PMP 1A-A		410						
								Total		410						
0.06	480V REACTOR MOV BD 1A2-A	2E	UAI			1.00	1-FCV-3-136A	ERCW 1A ISOL VLV		0.7	2.3					
0.06	480V REACTOR MOV BD 1A2-A	3B	UAI			1.00	1-FCV-3-136B	ERCW 1A ISOL VLV		0.7	2.3					
								Total		1.4						
0.10	480V REACTOR MOV BD 1A1-A	3E	UAI	I	I	1.00	1-LCV-62-132	VOL CONT TK ISOL VLV		0.67	2.1					
0.10	6900V SHUTDOWN BD 1A-A	14	TAS	I	I			RESIDUAL HT REMOVAL PMP 1A-A		425						
								Total		425.67						
0.15	6900V SHUTDOWN BD 1A-A	8	TAS	I	I			ESSENTIAL RCW PMP J-A		700						
								Total		700						
0.20	480V CONT & AUX BLDG VENT BD 1A1-A	5C	UAI	I	I			CCS & AFW PMP SP CLR FAN A-A		20	18					
0.20	480V REACTOR MOV BD 1A2-A	10C	UA			1.00	0-FCV-70-208	CNDS DEMIN WST EVAP BLDG SUP VLV		0.125	0.45					
0.20	480V SHUTDOWN BD 1A1-A	4B	TAS	I	I			CCS PUMP 1A-A		350	404					
								Total		370.125						
0.21	480V REACTOR MOV BD 1A1-A	2E	UA		0			CCS BOOST PMP 1A-A		15	18.4					
								Total		15						
0.25	6900V SHUTDOWN BD 1A-A	10	TAD	I	I			AUX FEED WTR PMP 1A-A		486						
								Total		486						
3.70	480V SHUTDOWN BD 1A2-A	4D	UA					CONT RM A/C CPRSR A-A		125	148					
								Total		125						

Prepared RAB

Checked CRM

Reviewed RDR

Date 1-15-86

TIME SI M.S	BOARD	CPT	CONT PHASE COMB A B	OPER TIME	COMPONENT UNID	COMPONENT DESCRIPTION	KVA	HP	FULLOAD CURRENT	RATED LOAD	KW	MOTOR EFF	MOTOR PF	MOTOR %LRI
* 5.00	480V DIESEL AUX BD 1A1-A	2D	UAO			DG DAY TNK FUEL OIL XFER PMP		1	2					
5.0^	480V DIESEL AUX JD 1A2-A	4A	UAO			DG DAY TNK FUEL OIL XFER PMP		1	2					
						Total		2						
21.00	480V SHUTDOWN BD 1A2-A	2B	UA			SHTDN BD RM AIR HAND UNIT 1A-A		75	88					
						Total		75						
120.00	480V REACTOR MOV BD 1A1-A	6E	UAI	2.00	1-FCV-74-3	RHR PMP 1A-A FLOW VLV		1.6						
120.00	480V REACTOR MOV BD 1A1-A	13A	UA	0.42	1-FCV-63-72	CNTMT SUMP FLOW VLV		10.5	13.8					
						Total		12.1						

Prepared RJB
Checked CRM
Reviewed RBR
Date 1-15-86

B25 '86 0204 300 p52

TIME SI M.S	BOARD	CPT	CONT COMB	PHASE A	PHASE B	OPER TIME	COMPONENT UNID	COMPONENT DESCRIPTION	KVA	HP	FULLOAD CURRENT	RATED LOAD	KW	MOTOR EFF	MOTOR PF	MOTOR %LRI
T	480V CONT & AUX BLDG VENT BD 1B1-B	2A	UA					SHTDN XFMR RM 1B EXH FAN 1B3-B		2.5	4.1					
T	480V CONT & AUX BLDG VENT BD 1B1-B	2B	UA					SHTDN XFMR RM 1B EXH FAN 1B1-B		2.5	4.1					
T	480V CONT & AUX BLDG VENT BD 1B1-B	2C	UA					SHTDN XFMR RM 1B EXH FAN 1B2-B		2.5	4.1					
L	480V CONT & AUX BLDG VENT BD 1B1-B	2D	UA					SP FUEL PIT CLR SUMP PMP B		0.33	0.88					
T	480V CONT & AUX BLDG VENT BD 1B1-B	3A	UA					RECIP CHG PMP RM CLR FAN		3	4.7					
T	480V CONT & AUX BLDG VENT BD 1B1-B	3E	UA					SHDN BD RM A/C CIR PMP B-B		20						
T	480V CONT & AUX BLDG VENT BD 1B1-B	5E	UA					480V BD RM 1B A/C CPRSR 1B-B		60	75					
T	480V CONT & AUX BLDG VENT BD 1B1-B	8B	UA					480V BD RM 1B A/C COND 1B-B		25	32					
T	480V CONT & AUX BLDG VENT BD 1B1-B	9E	UA					480V BD RM 1B A/C AHU 1B-B		25	32					
L	480V DIESEL AUX BD 1B1-B	5D	UA					DG BLDG SUMP PMP B		3						
P	480V DIESEL AUX BD 1B1-B	6C	UA					DG 1B-B AIR COMPRESSOR 2		10						
P	480V DIESEL AUX BD 1B2-B	6C	UA					DG 1B-B AIR COMPRESSOR 1		10	13					
L	480V ERCW MCC 1B-B	2C	UA					STATION DECK SUMP PMP B		5	3.5					
T	480V REACTOR MOV BD 1B1-B	3D	UA					480V SHDN BD XFMR 1B-B COOL FAN		0.32						
T	480V REACTOR MOV BD 1B1-B	3D	UA					480V SHDN BD XFMR 1B-B COOL FAN(NOR FDR)		0.33						
T	480V REACTOR MOV BD 1B1-B	3E	UA					BORIC ACID TK A HTR B-B					9			
S	480V REACTOR MOV BD 1B1-B	4A	UA					BORIC ACID XFER PMP 1B-B		15						
T	480V REACTOR MOV BD 1B1-B	4E	UA					BORIC ACID TK C HTR B-B					9			
T	480V REACTOR MOV BD 1B2-B	2A	UA				1-FCV-1-18	STEAM FW PMP ISOL VLV		1.6	3.4					
								Total		186.08			18			
0.00	480V CONT & AUX BLDG VENT BD 1B1-B	1D1	UAI					EMER GAS TRMT SYS B-B HTR			19.6		16			
0.00	480V CONT & AUX BLDG VENT BD 1B1-B	1D2	UA					CONT PWR XFMR		1.5						
0.00	480V CONT & AUX BLDG VENT BD 1B1-B	3B	UAI					SI PMP 1B-B RM CLR FAN		3	3.8					
0.00	480V CONT & AUX BLDG VENT BD 1B1-B	4A	UA	I	I			PEN RM EL 669 CLR FAN 1B-B		5	6.1					
0.00	480V CONT & AUX BLDG VENT BD 1B1-B	4B	UA	I	I			PEN RM EL 690 CLR FAN 1B-B		5	6.1					
0.00	480V CONT & AUX BLDG VENT BD 1B1-B	4C	UA	I	I			PEN RM EL 714 CLR FAN 1B-B		5	6.1					
0.00	480V CONT & AUX BLDG VENT BD 1B1-B	5A	UAI					RES HT REM PMP 1B-B CLR FAN		5						
0.00	480V CONT & AUX BLDG VENT BD 1B1-B	6C	UA					UNIT CONT ANN SYS	5		6		4.25			
0.00	480V CONT & AUX BLDG VENT BD 1B1-B	6D	UMW					CONT RM EMER INTAKE RAD MON		0.75	1.4					
0.00	480V CONT & AUX BLDG VENT BD 1B1-B	6E2	UMW					SHTDN BD RM CHILLER B-B CON XFMR	3		38.5		2.55			
0.00	480V CONT & AUX BLDG VENT BD 1B1-B	7C	UAS					480V BD RM 1A PRESS FAN 1A2-B		3	4.6					
0.00	480V CONT & AUX BLDG VENT BD 1B1-B	7D2	UMW					CNTMT BLDG UP COMPT AIR MON		3	1.6					
0.00	480V CONT & AUX BLDG VENT BD 1B1-B	7E	UAI	I	I			CONT BLDG EMRG PRESS FAN B-B		1	1.6					
0.00	480V CONT & AUX BLDG VENT BD 1B1-B	8A	UA					PRIM WTR MAKEUP PMP 1B		20						
0.00	480V CONT & AUX BLDG VENT BD 1B1-B	8C	UAI	I	I			CONT BLDG EMERG AIR CL UP FAN B-B		10						
0.00	480V CONT & AUX BLDG VENT BD 1B1-B	8D1	UMW					COND VAC PMP H2 RANGE AIR EXH MON		0.75	1.4					
0.00	480V CONT & AUX BLDG VENT BD 1B1-B	8D2	UMW					CNTMT PURGE AIR EXH MON		0.75	1.4					
0.00	480V CONT & AUX BLDG VENT BD 1B1-B	8E	UA	I	I			PIPE CHASE CLR FAN 1B-B		20	24.1					
0.00	480V CONT & AUX BLDG VENT BD 1B1-B	9A	[illegible]S					125V BATT RM I EXH FAN 1A2-B		0.5						
0.00	480V CONT & AUX BLDG VENT BD 1B1-B	9C	UA	I	I			SP FUEL PIT PMP B-B CLR FAN		5	6.1					
0.00	480V CONT & AUX BLDG VENT BD 1B1-B	9D	UAS					480V BD RM 1B PRESS FAN 1B2-B		3	4.6					
0.00	480V CONT & AUX BLDG VENT BD 1B1-B	11C	UA	I	I			EMER GAS TRMT SYS FAN B-B		20	24					
0.00	480V CONT & AUX BLDG VENT BD 1B1-B	11E	UA					BATT RM EL 669 EXH FAN B-B		2	3.1					
0.00	480V CONT & AUX BLDG VENT BD 1B1-B	12A	UAS					125V VIT BATT RM II EXH FAN 1B2-B		0.5						
[illegible]	480V CONT & AUX BLDG VENT BD 1B1-B	12E	UMW					SI SYS HT TRACE XFMR B			18		12.75			
[illegible]	480V CONT & AUX BLDG VENT BD 1B1-B	13D2	UA					CONT BLDG PRESS FAN B-B		15	20					
0.00	480V DIESEL AUX BD 1B1-B	1D	UA					CONTROL POWER XFMR	3				2.55			
0.00	480V DIESEL AUX BD 1B1-B	2C	UAD			1.00	1-FCV-67-65	EMG DSL ENG HT EXCH SUP VLV		0.125						
0.00	480V DIESEL AUX BD 1B1-B	4A	UA					DG ELEC PNL VENT FAN		15	20					

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TIME SI M.S	BOARD	CPT	CONT COMB	PHASE A	PHASE B	OPER TIME	COMPONENT UNID	COMPONENT DESCRIPTION	KVA	HP	FULLOAD CURRENT	RATED LOAD	KW	MOTOR EFF	MOTOR PF	MOTOR %LRI
0.00	480V DIESEL AUX BD 1B1-B	5A1	UA					DIESEL GEN LT CAB LC47					38.25			
0.00	480V DIESEL AUX BD 1B1-B	6A	UA					DG ROOM EXH FAN 1B1-B		15						
0.00	480V DIESEL AUX BD 1B1-B	6D	UA					DG MUFFLER RM EXH FAN		1.5						
0.00	480V DIESEL AUX BD 1B1-B	7B	UA					DG BATT HOOD EXH FAN		0.33						
0.00	480V DIESEL AUX BD 1B2-B	1D	UA					CONTROL POWER XFMR	3		6.3		2.55			
0.00	480V DIESEL AUX BD 1B2-B	5A2	UA					DIESEL GEN BATTERY CHGR			3		0.65			
0.00	480V DIESEL AUX BD 1B2-B	6A	UAD			1.00	1-FCV-67-67	EMG DSL ENG HT EXCH SUP VLV		0.125						
0.00	480V DIESEL AUX BD 1B2-B	6D	UA					DG ROOM EXH FAN 1B2-B		15	19.5					
0.00	480V DIESEL AUX BD 1B2-B	7A	UA					DG BD ROOM EXH FAN		3	4.6					
0.00	480V ERCW MCC 1B-B	2A	UA					ERCW STRAINER B1B-B		3	7					
0.00	480V ERCW MCC 1B-B	5E	UA					ERCW STRAINER XFMR	1				0.85			
0.00	480V REACTOR MOV BD 1B1-B	7C	UAI	I	I	0.06	1-FCV-62-61	SEAL FLOW ISOL VLV		0.7						
0.00	480V REACTOR MOV BD 1B1-B	7E	UAI	I	I	0.09	1-FCV-62-91	CHR FLOW ISOL VLV		1						
0.00	480V REACTOR MOV BD 1B1-B	8C	UAI	I	I	0.10	1-LCV-62-136	CHG PMP FLOW VLV		1.4						
0.00	480V REACTOR MOV BD 1B1-B	10B	UAI	I	I	0.09	1-FCV-63-25	SIS BORON INJ TK VLV		2						
0.00	480V REACTOR MOV BD 1B1-B	11A	UAI	I	I	0.10	1-FCV-63-40	SIS BORON INJ TK VLV		2						
0.00	480V REACTOR MOV BD 1B1-B	14E	UAI			1.00	1-FCV-74-24	RHR PMP 1B FLOW VLV		1.6						
0.00	480V REACTOR MOV BD 1B2-B	2E	UAI	I	I	1.00	1-FCV-26-241	ANN ISOL VLV (26-241)		0.67	2.1					
0.00	480V REACTOR MOV BD 1B2-B	4E	UAI	I	I	1.00	1-FCV-26-244	ANN ISOL VLV		0.67	2.1					
0.00	480V REACTOR MOV BD 1B2-B	16C	UAI	I	I	0.06	1-FCV-3-47	STEAM GEN FW ISOL VLV		33	43					
0.00	480V REACTOR MOV BD 1B2-B	17A	UAI	I	I	0.06	1-FCV-3-100	STEAM GEN FW ISOL VLV		33	43					
0.00	480V SHUTDOWN BD 1B1-B	3B	UAI	I	O			CRDM COOL FAN 1B		75	83					
0.00	480V SHUTDOWN BD 1B1-B	4B	UMW		O			REAC LOWER COMPT COOL FAN 1B-B		50	59					
0.00	480V SHUTDOWN BD 1B1-B	8D	UA					STANDBY LTG CAB LS 2			27		38.25			
0.00	480V SHUTDOWN BD 1B2-B	1D	UA					CONT RM AHU B-B		60	77					
0.00	480V SHUTDOWN BD 1B2-B	3B	UAI	I	O			CRDM COOL FAN 1D		75	83					
0.00	480V SHUTDOWN BD 1B2-B	5D	UMW		O			REACTOR LWR COMPT COOL FAN 1D-B		50	59					
0.00	480V SHUTDOWN BD 1B2-B	10A	UMW					125V AC VITAL BATT CHGR II			47		7.44			
0.00	6900V SHUTDOWN BD 1B-B	3	UA					480V SHDN XFMR 1B-B								
0.00	6900V SHUTDOWN BD 1B-B	4	UA					480V SHDN XFMR 1B2-B								
0.00	6900V SHUTDOWN BD 1B-B	5	UA					480V SHDN XFMR 1B-B								
0.00	6900V SHUTDOWN BD 1B-B	22	UA					480V XFMR 1B-B								
								Total		568.87			126.09			
0.02	480V CONT & AUX BLDG VENT BD 1B1-B	3C	UAI	I	I			CENT CHRG PMP 1B-B RM CLR FAN		5						
0.02	480V REACTOR MOV BD 1B1-B	5C2	UAI	I	I			CENT CHG PMP 1B AUX OIL PMP		2	3.1					
0.02	6900V SHUTDOWN BD 1B-B	1B	TAS	I	I			CENTRIFUGAL CHRG PMP 1B-B		680						
								Total		687						
0.04	480V REACTOR MOV BD 1B2-B	2C	UAI			1.00	1-FCV-3-126A	ERCW 1B ISOL VLV (3-126A)		0.333	0.9					
0.04	480V REACTOR MOV BD 1B2-B	2B	UAI			1.00	1-FCV-3-126B	ERCW 1B ISOL VLV		0.333	0.9					
								Total		0.666						
0.05	6900V SHUTDOWN BD 1B-B	15	TAS	I	I			SAFETY INJ PMP 1B-B		410						

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TIME SI M.S	BOARD	CPT	CONT COMB	PHASE A	PHASE B	OPER TIME	COMPONENT UNID	COMPONENT DESCRIPTION	KVA	HP	FULLOAD CURRENT	RATED LOAD	KW	MOTOR EFF	MOTOR PF	MOTOR %LRI
								Total		410						
0.09	480V REACTOR MOV BD 1B2-B	11B	UAI			1.00	1-FCV-3-179B	ERCW 1B ISOL VLV		0.7	2.3					
0.09	480V REACTOR MOV BD 1B2-B	11E	UAI			1.00	1-FCV-3-179A	ERCW 1B ISOL VLV		0.7	2.3					
								Total		1.4						
0.10	480V REACTOR MOV BD 1B1-B	8B	UAI	I	I	1.00	1-LCV-62-133	VOL CONT TK ISOL VLV		0.4						
0.10	6900V SHUTDOWN BD 1B-B	14	TAS	I	I			RESIDUAL HT REMOVAL PMP 1B-B		425						
								Total		425.4						
0.15	6900V SHUTDOWN BD 1B-B	9	TAS	I	I			ESSENTIAL RCW PMP N-B		700						
								Total		700						
0.20	480V CONT & AUX BLDG VENT BD 1B1-B	5C	UAI	I	I			CCS & AFW PMP SP CLR FAN B-B		20						
0.20	480V REACTOR MOV BD 1B2-B	12E	UA			1.00	0-FCV-70-206	CNDS DEMIN VLV		0.125	0.45					
0.20	480V REACTOR MOV BD 1B2-B	7E	UA			1.00	1-FCV-70-207	CNDS DEMIN SUP VLV		0.125	0.45					
0.20	480V SHUTDOWN BD 1B1-B	3C	TAS	I	I			CCS PUMP 1B-B		350	404					
								Total		370.25						
0.21	480V REACTOR MOV BD 1B1-B	5E	UA		0			CCS BOOST PMP 1B-B		15						
								Total		15						
0.25	6900V SHUTDOWN BD 1B-B	10	TAD	I	I			AUX FEED WTR PMP 1B-B		486						
								Total		486						
3.20	480V SHUTDOWN BD 1B2-B	2B	UA					CONT RM A/C CPRSR B-B		125	148					
								Total		125						
5.00	480V DIESEL AUX BD 1B1-B	2D	UAD					DG DAY TNK FUEL OIL XFER PMP		1	2					

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TIME SI M.S	BOARD	CPT	CONT COMB	PHASE A	PHASE B	OPER TIME	COMPONENT UNID	COMPONENT DESCRIPTION	KVA	HP	FULLOAD CURRENT	RATED LOAD	KW	MOTOR EFF	MOTOR PF	MOTOR %LRI
5.00	480V DIESEL AUX BD 1B2-B	4A	UAD					DG DAY TNK FUEL OIL XFER PMP		1	2					
								Total		2						
15.00	480V SHUTDOWN BD 1B2-B	10D	TPD					MN TURB TURN GEAR OIL PMP		75	91.5					
								Total		75						
21.[illegible]	480V SHUTDOWN BD 1B2-B	3A	UA					SHTDN BD RM AIR HAND UNIT 1B-B		75	88					
21.00	480V SHUTDOWN BD 1B2-B	3D	UA					SHDN BD RM CHILLER PKG B-B		250	275					
								Total		325						
120.00	480V REACTOR MOV BD 1B1-B	11C	UA			0.43	1-FCV-63-73	CNTMT SUMP FLOW VLV		10.5						
120.00	480V REACTOR MOV BD 1B1-B	14C	UAI			2.00	1-FCV-74-21	RHR PMP 1B-B CONT VLV		1.6						
								Total		12.1						

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TIME SI M.S	BOARD	CPT	CONT COMB	PHASE A	PHASE B	OPER TIME	COMPONENT UNID	COMPONENT DESCRIPTION	KVA	HP	FULLOAD CURRENT	RATED LOAD	KW	MOTOR EFF	MOTOR PF	MOTOR %LRI
T	480V CONT & AUX BLDG VENT BD 2A1-A	3A	UA					SHTDN XFMR RM 2A EXH FAN 2A3-A		2.5	4.1					
T	480V CONT & AUX BLDG VENT BD 2A1-A	3B	UA					SHTDN XFMR RM 2A EXH FAN 2A1-A		2.5	4.1					
T	480V CONT & AUX BLDG VENT BD 2A1-A	3C	UA					SHTDN XFMR RM 2A EXH FAN 2A2-A		2.5	4.1					
P	480V CONT & AUX BLDG VENT BD 2A1-A	6C	UAS					AUX CONT AIR COMPRSR A-A		20	25.7					
T	480V CONT & AUX BLDG VENT BD 2A1-A	8B	UA					480V BD RM 2A A/C COND 2A-A		20	21					
T	480V CONT & AUX BLDG VENT BD 2A1-A	9E	UA					480V BD RM 2A A/C AHU 2A-A		10	12.4					
T	480V CONT & AUX BLDG VENT BD 2A1-A	11B	UA					SHDN BD RM A/C CIR PMP A-A		20	23.4					
T	480V CONT & AUX BLDG VENT BD 2A1-A	11D	UA					480V BD RM 2A A/C CPRSR 2A-A		50	61					
P	480V DIESEL AUX BD 2A1-A	6C	UA					DG 2A-A AIR COMPRESSOR 2		10	13					
P	480V DIESEL AUX BD 2A2-A	6C	UA					DG 2A-A AIR COMPRESSOR 1		10	13					
T	480V REACTOR MOV BD 2A1-A	1E	UA					480V SHDN BD XFMR 2A1-A COOL FAN		0.33						
S	480V REACTOR MOV BD 2A1-A	14A	UA					BORIC ACID XFER PMP 2A-A		15	26					
T	480V REACTOR MOV BD 2A1-A	14D	UA					BORIC ACID TK B HTR A-A			10.8		9			
								Total		162.83			9			
0.00	480V CONT & AUX BLDG VENT BD 2A1-A	1D1	UA					RAD MON SAMP & FIRE PROT XFMR					30			
0.00	480V CONT & AUX BLDG VENT BD 2A1-A	1D2	UA					CONT PWR XFMR		3						
0.00	480V CONT & AUX BLDG VENT BD 2A1-A	2A	UA	I	I			PIPE CHASE CLR FAN 2A-A		20	24.1					
0.00	480V CONT & AUX BLDG VENT BD 2A1-A	2B	UAI	I	I			AB GAS TMT SYS FAN A-A		20	24					
0.00	480V CONT & AUX BLDG VENT BD 2A1-A	4A	UA	I	I			PEN RM EL 669 CLR FAN 2A-A		5	6.1					
0.00	480V CONT & AUX BLDG VENT BD 2A1-A	4B	UA	I	I			PEN RM EL 690 CLR FAN 2A-A		5	6.1					
0.00	480V CONT & AUX BLDG VENT BD 2A1-A	4C	UA	I	I			PEN RM EL 714 CLR FAN 2A-A		5	6.1					
0.00	480V CONT & AUX BLDG VENT BD 2A1-A	5A	UAI					RES HT REM PMP 2A-A CLR FAN		5	3.8					
0.00	480V CONT & AUX BLDG VENT BD 2A1-A	5D	UA	I	I			EMER GAS TMT RM CLR A-A		3	3.8					
0.00	480V CONT & AUX BLDG VENT BD 2A1-A	6E1	UMW					CNTMT PURGE AIR EXH RAD MON		0.75						
0.00	480V CONT & AUX BLDG VENT BD 2A1-A	6E2	UMW				RE-90-125	CONT RM INTAKE MON		0.75	1.4					
0.00	480V CONT & AUX BLDG VENT BD 2A1-A	7A	UAS					480V BD RM 2A PRESS FAN 2A1-A		3	4.6					
0.00	480V CONT & AUX BLDG VENT BD 2A1-A	7C1	UMW					SHTDN BD RM CHILLER A-A CON XFMR	3		6.3		2.55			
0.00	480V CONT & AUX BLDG VENT BD 2A1-A	7C2	UMW				RE-90-119	COND VAC PMP AIR EXH MON		0.75	1.4					
0.00	480V CONT & AUX BLDG VENT BD 2A1-A	7D	UAS					125V BATT RM III EXH FAN 2B1-A		0.5						
0.00	480V CONT & AUX BLDG VENT BD 2A1-A	8A	UA					PRIM WTR MAKEUP PMP 2A		20	24.5					
0.00	480V CONT & AUX BLDG VENT BD 2A1-A	8D	UAS					480V BD RM 2B PRESS FAN 2B1-A		3	4.6					
0.00	480V CONT & AUX BLDG VENT BD 2A1-A	9A	UMW					GAS EFF RAD MON		5	7.25					
0.00	480V CONT & AUX BLDG VENT BD 2A1-A	10A	UAS					125V VIT BATT RM IV FAN 2A1-A		0.5						
0.00	480V CONT & AUX BLDG VENT BD 2A1-A	10B	UAI					SI PMP 2A-A RM CLR FAN		3	3.8					
0.00	480V CONT & AUX BLDG VENT BD 2A1-A	10E2	UMW				RE-90-205	MAIN CONT RM EMER INTAKE RAD MON		0.75	1.4					
0.00	480V CONT & AUX BLDG VENT BD 2A1-A	11A	UAI	I	I			AUX FDWTR & BA TRANS PMP SP CLR FAN A-A		5	6.1					
0.00	480V CONT & AUX BLDG VENT BD 2A1-A	11E1	UMW				RE-90-106	CNTMT BLDG LWR COMPT AIR MON		3	4.6					
0.00	480V CONT & AUX BLDG VENT BD 2A1-A	11E2	UMW				RE-90-100	SHIELD BLDG VENT RAD MON		3	4.6					
0.00	480V DIESEL AUX BD 2A1-A	1D	UA					CONTROL POWER XFMR	3		6.3		2.55			
0.00	480V DIESEL AUX BD 2A1-A	2C	UAD			1.00	2-FCV-67-68	EMG DSL ENG HT EXCH SUP VLV		0.125						
0.00	480V DIESEL AUX BD 2A1-A	4A	UA					DG ELEC PNL VENT FAN		15						
0.00	480V DIESEL AUX BD 2A1-A	5A1	UA					DIESEL GEN LT CAB LC46			93.8		38.25			
0.00	480V DIESEL AUX BD 2A1-A	6A	UA					DG ROOM EXH FAN 2A1-A		15	19.5					
0.00	480V DIESEL AUX BD 2A1-A	6D	UA					DG MUFFLER RM EXH FAN		1.5	2.8					
0.00	480V DIESEL AUX BD 2A1-A	7B	UA					DG BATT HOOD EXH FAN		0.33	0.96					
0.00	480V DIESEL AUX BD 2A2-A	1D	UA					CONTROL POWER XFMR	3		6.3		2.55			
0.00	480V DIESEL AUX BD 2A2-A	5A2	UA					DIESEL GEN BATTERY CHGR			3		0.65			
0.00	480V DIESEL AUX BD 2A2-A	6A	UAD			1.00	2-FCV-67-66	EMG DSL ENG HT EXCH SUP VLV		0.125						
0.00	480V DIESEL AUX BD 2A2-A	6D	UA					DG ROOM EXH FAN 2A2-A		15	19.5					

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TIME SI M.S	BOARD	CPT	CONT COMB	PHASE A	PHASE B	OPER TIME	COMPONENT UNID	COMPONENT DESCRIPTION	KVA	HP	FULLOAD CURRENT	RATED LOAD	KW	MOTOR EFF	MOTOR PF	MOTOR %LRI
0.00	480V DIESEL AUX BD 2A2-A	7A	UA					DG BD ROOM EXH FAN		3	4.6					
0.00	480V ERCW MCC 2A-A	2A	UA					ERCW STRAINER A2A-A		3	7					
0.00	480V ERCW MCC 2A-A	5D	UA					ERCW STRAINER XFMR	1				0.85			
0.00	480V REACTOR MOV BD 2A1-A	3A	UAI	I	I	0.07	2-FCV-62-63	SEAL FLOW ISOL VLV		0.5						
0.00	480V REACTOR MOV BD 2A1-A	3B	UAI	I	I	0.09	2-FCV-62-90	CHR FLOW ISOL VLV		1.6						
0.00	480V REACTOR MOV BD 2A1-A	4A	UAI	I	I	0.10	2-LCV-62-135	REFUEL WTR STG TK VLV		1	2.4					
0.00	480V REACTOR MOV BD 2A1-A	4E	UAI	I	I	1.00	2-FCV-72-22	SPRAY HDR 2A CONT VLV		3.3	5.2					
0.00	480V REACTOR MOV BD 2A1-A	7C2	UAI			1.00	2-FCV-74-12	RHR PMP 2A-A FLOW VLV		1.6	3.4					
0.00	480V REACTOR MOV BD 2A1-A	12A	UAI	I	I	1.00	2-FCV-63-26	SIS BORON INJ TK VLV		2	3.5					
0.00	480V REACTOR MOV BD 2A1-A	12E	UAI	I	I	0.11	2-FCV-63-39	SIS BORON INJ TK SHUTOFF VLV		2	3.5					
0.00	480V REACTOR MOV BD 2A1-A	15B	UAI	I	I	1.00	2-FCV-63-118	SIS TK 1 ISOL VLV		21	25					
0.00	480V REACTOR MOV BD 2A2-A	1D	UMW					480V SHDN XFMR 2A1-A COOL FAN		0.332						
0.00	480V REACTOR MOV BD 2A2-A	13B	UAI	I	I	0.06	2-FCV-26-243	RCP SPRAY ISOL VLV		0.67	2.1					
0.00	480V REACTOR MOV BD 2A2-A	14B	UAI	I	I	0.24	2-FCV-70-143	EXCESS LETDN INLET CONT/ISOL VLV		0.13	0.45					
0.00	480V REACTOR MOV BD 2A2-A	15E	UAI	I	I	0.07	2-FCV-26-240	CNTMT STAND PIPE ISOL VLV		0.67	2.1					
0.00	480V REACTOR MOV BD 2A2-A	16B	UAI	I	I	0.07	2-FCV-3-33	STEAM GEN FW ISOL VLV		33	43					
0.00	480V REACTOR MOV BD 2A2-A	17C	UAI	I	I	0.06	2-FCV-3-87	STEAM GEN FW ISOL VLV		33	43					
0.00	480V REACTOR MOV BD 2A2-A	18C	UAI	I	I	1.00	2-FCV-26-242	ANN STD PIPE ISOL VLV		0.67	2.1					
0.00	480V REACTOR MOV BD 2A2-A	19E	UAI	I	I	1.00	2-FCV-26-245	ANN ISOL VLV		0.67	2.1					
0.00	480V SHUTDOWN BD 2A1-A	2B	UAS					ELEC BD RM AHU A-A		75	96					
0.00	480V SHUTDOWN BD 2A1-A	3B	UAI	I	O			CRDM COOL FAN 2A		75	83					
0.00	480V SHUTDOWN BD 2A1-A	3C	UMW		O			REAC LOWER COMPT COOL FAN 2A-A		50	59					
0.00	480V SHUTDOWN BD 2A1-A	8C	UA					HT TR-CVC PNL A1 XFMR			54		38.25			
0.00	480V SHUTDOWN BD 2A1-A	10A	UA					NOR FDR VITAL BATT CHGR III					7.44			
0.00	480V SHUTDOWN BD 2A2-A	3B	UAI	I	O			CRDM COOL FAN 2C		75	83					
0.00	480V SHUTDOWN BD 2A2-A	4B	UMW		O			REACTOR LWR COMPT COOL FAN 2C-A		50	59					
0.00	480V SHUTDOWN BD 2A2-A	8C	UMW					CVS SYS HT TR XFMR B3			54		38.25			
0.00	480V SHUTDOWN BD 2A2-A	9C	UA					STANDBY LTG CAB LS 1			27		19.1			
0.00	6900V SHUTDOWN BD 2A-A	3	UA					480V SHDN XFMR 2A1-A								
0.00	6900V SHUTDOWN BD 2A-A	4	UA					480V SHDN XFMR 2A2-A								
0.00	6900V SHUTDOWN BD 2A-A	5	UA					480V SHDN XFMR 2A-A								
0.00	6900V SHUTDOWN BD 2A-A	22	UA					ERCW PMP STA XFMR 2A-A								
								Total		595.222			180.44			
0.02	480V CONT & AUX BLDG VENT BD 2A1-A	10E1	UA	I	I			AB GAS TMT SYS HUM HTR A-A			66.7		32			
0.02	480V CONT & AUX BLDG VENT BD 2A1-A	10D	UAI	I	I			CENT CHRG PMP 2A-A RM CLR FAN		5	6.1					
0.02	480V REACTOR MOV BD 2A1-A	2C2	UAI	I	I			CENT CHG PMP 2A AUX OIL PMP		2						
0.02	6900V SHUTDOWN BD 2A-A	18	TAS	I	I			CENTRIFUGAL CHRG PMP 2A-A		680						
								Total		687			32			
0.04	480V REACTOR MOV BD 2A2-A	2C	UAI			1.00	2-FCV-3-116A	ERCW 2A ISOL VLV		0.333	0.9					
0.04	480V REACTOR MOV BD 2A2-A	2B	UAI			1.00	2-FCV-3-116B	ERCW 2A ISOL VLV		0.333	0.9					
								Total		0.666						

Prepared RJB

Checked CRM

Reviewed RBR

Date 1-15-86

TIME SI M.S	BOARD	CPT	CONT COMB	PHASE A	PHASE B	OPER TIME	COMPONENT UNID	COMPONENT DESCRIPTION	KVA	HP	FULLOAD CURRENT	RATED LOAD	KW	MOTOR EFF	MOTOR PF	MOTOR %LRI
0.05	6900V SHUTDOWN BD 2A-A	15	TAS	I	I			SAFETY INJ PMP 2A-A		410						
								Total		410						
0.06	480V REACTOR MOV BD 2A2-A	3B	UAI			1.00	2-FCV-3-136B	ERCW 2A ISOL VLV		0.7	2.3					
0.06	480V REACTOR MOV BD 2A2-A	2E	UAI			1.00	2-FCV-3-136A	ERCW 2A ISOL VLV		0.7	2.3					
								Total		1.4						
0.10	480V REACTOR MOV BD 2A1-A	5B	UAI			1.00	2-FCV-72-34	SPRAY PMP 1B RECIRC VLV		0.13	0.45					
0.10	480V REACTOR MOV BD 2A1-A	3E	UAI	I	I	1.00	2-LCV-62-132	VOL CONT TK ISOL VLV		0.67	0.7					
0.10	6900V SHUTDOWN BD 2A-A	14	TAS	I	I			RESIDUAL HT REMOVAL PMP 2A-A		425						
								Total		425.8						
0.15	6900V SHUTDOWN BD 2A-A	9	TAS	I	I			ESSENTIAL RCW PMP K-A		700						
								Total		700						
0.20	480V SHUTDOWN BD 2A1-A	4B	TAS	I	I			CCS PUMP 2A-A		350	404					
								Total		350						
0.21	480V REACTOR MOV BD 2A1-A	2E	UA		0			CCS BOOST PMP 2A-A		15	18.4					
								Total		15						
0.25	6900V SHUTDOWN BD 2A-A	10	TAD	I	I			AUX FEED WTR PMP 2A-A		486						
								Total		486						
3.20	480V SHUTDOWN BD 2A2-A	4D	UA					ELEC BD RM A/C COMPR A-A		125	148					
								Total		125						
5.00	480V DIESEL AUX BD 2A1-A	2D	UAO					DG DAY TNK FUEL OIL XFER PMP		1	2					
5.00	480V DIESEL AUX BD 2A2-A	4A	UAO					DG DAY TNK FUEL OIL XFER PMP		1	2					

Prepared
Checked
Reviewed
Date

B25 '86 0204 300 p59

TIME SI M.S	BOARD	CPT	CONT PHASE COMB A B	OPER TIME	COMPONENT UNID	COMPONENT DESCRIPTION	KVA	HP	FULLOAD CURRENT	RATED LOAD	KW	MOTOR EFF	MOTOR PF	MOTOR %LRI
						Total		2						
21.00	480V SHUTDOWN BD 2A2-A	2B	UA			SHTDN BD RM AIR HAND UNIT 2A-A		75	88					
21.00	480V SHUTDOWN BD 2A2-A	5D	UA			SHDN BD RM CHILLER PKS A-A		250	275					
						Total		325						
120.00	480V REACTOR MOV BD 2A1-A	6E	UAI	2.00	2-FCV-74-3	RHR PMP 2A-A FLOW VLV		1.6						
120.00	480V REACTOR MOV BD 2A1-A	13A	UA	0.42	2-FCV-63-72	CNTMT SUMP FLOW VLV		10.5	13.8					
						Total		12.1						

Prepared RJB
Checked CRM
Reviewed RFR
Date 1-15-86

TIME SI M.S	BOARD	CPT	CONT COMB	PHASE A	PHASE B	OPER TIME	COMPONENT UNID	COMPONENT DESCRIPTION	KVA	HP	FULLOAD CURRENT	RATED LOAD	KW	MOTOR EFF	MOTOR PF	MOTOR %LRI
T	480V CONT & AUX BLDG VENT BD 2B1-B	2A	UA					SHTDN XFMR RM 2B EXH FAN 2B3-B		2.5	4.1					
T	480V CONT & AUX BLDG VENT BD 2B1-B	2B	UA					SHTDN XFMR RM 2B EXH FAN 2B1-B		2.5	4.1					
T	480V CONT & AUX BLDG VENT BD 2B1-B	2C	UA					SHTDN XFMR RM 2B EXH FAN 2B2-B		3						
P	480V CONT & AUX BLDG VENT BD 2B1-B	2E	UAS					AUX CONT AIR COMPRSR B-B		20	25.7					
T	480V CONT & AUX BLDG VENT BD 2B1-B	3A	UA					RECIP CHG PMP RM CLR FAN		3	4.7					
T	480V CONT & AUX BLDG VENT BD 2B1-B	5E	UA					480V BD RM 2B A/C CPRSR 2B-B		60	75					
T	480V CONT & AUX BLDG VENT BD 2B1-B	8B	UA					480V BD RM 2B A/C COND 2B-B		25	32					
T	480V CONT & AUX BLDG VENT BD 2B1-B	9E	UA					480V BD RM 2B A/C AHU 2B-B		25	32					
P	480V DIESEL AUX BD 2B1-B	6C	UA					DG 2B-B AIR COMPRESSOR 2		10	13					
P	480V DIESEL AUX BD 2B2-B	6C	UA					DG 2B-B AIR COMPRESSOR 1		10						
T	480V REACTOR MOV BD 2B1-B	3D	UA					480V SHDN BD XFMR 2B1-B COOL FAN		0.33						
S	480V REACTOR MOV BD 2B1-B	4A	UA					BORIC ACID XFER PMP 2B-B		15	13					
T	480V REACTOR MOV BD 2B1-B	4E	UA					BORIC ACID TK B HTR B-B			8		9			
T	480V REACTOR MOV BD 2B2-B	2A	UA				2-FCV-1-18	STEAM FW PMP ISOL VLV		1.6						
T	480V REACTOR MOV BD 2B2-B	3D	UA					480V SHDN BD XFMR 2B-B COOL FAN(NOR FDR)		0.33						
								Total		178.26			9			
0.00	480V CONT & AUX BLDG VENT BD 2B1-B	1D2	UA					CONT PWR XFMR		1.5						
0.00	480V CONT & AUX BLDG VENT BD 2B1-B	7B	UAI					SI PMP 2B-B RM CLR FAN		3	4.7					
0.00	480V CONT & AUX BLDG VENT BD 2B1-B	4A	UA	I	I			PEN RM EL 669 CLR FAN 2B-B		5	6.1					
0.00	480V CONT & AUX BLDG VENT BD 2B1-B	4B	UA	I	I			PEN RM EL 690 CLR FAN 2B-B		5	6.1					
0.00	480V CONT & AUX BLDG VENT BD 2B1-B	4C	UA	I	I			PEN RM EL 714 CLR FAN 2B-B		5	6.1					
0.00	480V CONT & AUX BLDG VENT BD 2B1-B	5A	UAI					RES HT REM PMP 2B-B CLR FAN		5	3.8					
0.00	480V CONT & AUX BLDG VENT BD 2B1-B	5C	UA	I	I			EMER GAS TMT RM CLR B-B		3	6.1					
0.00	480V CONT & AUX BLDG VENT BD 2B1-B	6C	UA					UNIT CONT ANN SYS	3		6		2.55			
0.00	480V CONT & AUX BLDG VENT BD 2B1-B	6D	UMW				RE-90-126	CONT RM INTAKE RAD MON		0.75	1.4					
0.00	480V CONT & AUX BLDG VENT BD 2B1-B	7C	UAS					480V BD RM 2A PRESS FAN 2A2-B		3	4.6					
0.00	480V CONT & AUX BLDG VENT BD 2B1-B	7D2	UMW				RE-90-12	CNTMT BLDG UP COMPT AIR MON		3	4.6					
0.00	480V CONT & AUX BLDG VENT BD 2B1-B	8A	UA					PRIM WTR MAKEUP PMP 2B		20	23.4					
0.00	480V CONT & AUX BLDG VENT BD 2B1-B	8D1	UMW				RE-90-99	COND VAC PMP AIR EXH MON		0.75	1.4					
0.00	480V CONT & AUX BLDG VENT BD 2B1-B	8D2	UMW				RE-90-131	CNTMT PURGE AIR EXH MON		0.75	1.4					
0.00	480V CONT & AUX BLDG VENT BD 2B1-B	9E	UA	I	I			PIPE CHASE CLR FAN 2B-B		20	24.1					
0.00	480V CONT & AUX BLDG VENT BD 2B1-B	9A	UAS					125V BATT RM IV EXH FAN 2A2-B		0.5						
0.00	480V CONT & AUX BLDG VENT BD 2B1-B	9C	UAI	I	I			AUX FDWTR & BA TRANS PMP SP CLR FAN B-B		5	6.1					
0.00	480V CONT & AUX BLDG VENT BD 2B1-B	9D	UAS					480V BD RM 2B FAN PRESS 2B2-B		3	4.6					
0.00	480V CONT & AUX BLDG VENT BD 2B1-B	11B	UAS					125V VIT BATT RM III FAN 2B2-B		0.5						
0.00	480V CONT & AUX BLDG VENT BD 2B1-B	12C	UMW					GAS EFF RAD MON		5	7.25					
0.00	480V CONT & AUX BLDG VENT BD 2B1-B	12D	UAI	I	I			AB GAS TMT SYS FAN B-B		20	24					
0.00	480V DIESEL AUX BD 2B1-B	1D	UA					CONTROL POWER XFMR	3				2.55			
0.00	480V DIESEL AUX BD 2B1-B	2C	UAD			1.00	2-FCV-67-65	EMG DSL ENG HT EXCH SUP VLV		0.125						
0.00	480V DIESEL AUX BD 2B1-B	4A	UA					DG ELEC PNL VENT FAN		15	20					
0.00	480V DIESEL AUX BD 2B1-B	5A1	UA					DIESEL GEN LT CAB LC4B					38.25			
0.00	480V DIESEL AUX BD 2B1-B	6A	UA					DG ROOM EXH FAN 2B1-B		15	19.5					
0.00	480V DIESEL AUX BD 2B1-B	6D	UA					DG MUFFLER RM EXH FAN		1.5	2.8					
0.00	480V DIESEL AUX BD 2B1-B	7B	UA					DG BATT HOOD EXH FAN		0.33	0.9					
0.00	480V DIESEL AUX BD 2B2-B	1D	UA					CONTROL POWER XFMR	3				2.55			
0.00	480V DIESEL AUX BD 2B2-B	5A2	UA					DIESEL GEN BATTERY CHGR					0.65			
0.00	480V DIESEL AUX BD 2B2-B	6A	UAD			1.00	2-FCV-67-67	EMG DSL ENG HT EXCH SUP VLV		0.125						
0.00	480V DIESEL AUX BD 2B2-B	6D	UA					DG ROOM EXH FAN 2B2-B		15						
0.00	480V DIESEL AUX BD 2B2-B	7A	UA					DG BD ROOM EXH FAN		3						

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Date 1-15-86

10-Jan-86

Sequoyah Nuclear Plant - Diesel Generator Loading at Blackout with Phase A Isolation

TIME SI M.S	BOARD	CPT	CONT COMB	PHASE A	PHASE B	OPER TIME	COMPONENT UNID	COMPONENT DESCRIPTION	KVA	HP	FULLOAD CURRENT	RATED LOAD	KW	MOTOR EFF	MOTOR PF	MOTOR %LRI
0.00	480V ERCW MCC 2B-B	2A	UA					ERCW STRAINER B2B-B		3	7					
0.00	480V ERCW MCC 2B-B	5D	UA					ERCW STRAINER XFMR	1				0.85			
0.00	480V REACTOR MOV BD 2B1-B	7C	UAI	I	I	0.06	2-FCV-62-61	SEAL FLOW ISOL VLV		0.7						
0.00	480V REACTOR MOV BD 2B1-B	7E	UAI	I	I	0.09	2-FCV-62-91	CHR FLOW ISOL VLV		1.6						
0.00	480V REACTOR MOV BD 2B1-B	8C	UAI	I	I	0.10	2-LCV-62-136	CHG PMP FLOW VLV		1.4						
0.00	480V REACTOR MOV BD 2B1-B	10B	UAI	I	I	1.00	2-FCV-63-25	SIS BORON INJ T? VLV		2						
0.00	480V REACTOR MOV BD 2B1-B	11A	UAI	I	I	0.10	2-FC?-63-40	SIS BORON INJ TK VLV		2						
0.00	480V REACTOR MOV BD 2B1-B	13A	UAI			1.00	2-FCV-72-2	SPRAY HDR 1B ISOL VLV		3.3						
0.00	480V REACTOR MOV BD 2B1-B	13E	UAI	I	I	1.00	2-FCV-72-21	SPRAY HDR 2B CONT VLV (72-21)		3.3						
0.00	480V REACTOR MOV BD 2B1-B	14E	UAI			1.00	2-FCV-74-24	RHR PMP 1B FLOW VLV		1.6						
0.00	480V REACTOR MOV BD 2B2-B	2E	UAI	I	I	1.00	2-FCV-26-241	ANN ISOL VLV (26-241)		0.67						
0.00	480V REACTOR MOV BD 2B2-B	4E	UAI	I	I	1.00	2-FCV-26-244	ANN ISOL VLV		0.67						
0.00	480V REACTOR MOV BD 2B2-B	8D	UAI	I	I	0.42	0-FCV-67-152	COMPT HT EXC C VLV (67-152)		0.67						
0.00	480V REACTOR MOV BD 2B2-B	16C	UAI	I	I	0.06	2-FCV-3-47	STEAM GEN FW ISOL VLV		33						
0.00	480V REACTOR MOV BD 2B2-B	17A	UAI	I	I	0.06	2-FCV-3-100	STEAM GEN FW ISOL VLV		33						
0.00	480V SHUTDOWN BD 2B1-B	3A	UAS					ELEC BD RM AHU B-B		75	96					
0.00	480V SHUTDOWN BD 2B1-B	3B	UAI	I	O			CRDM COOL FAN 2B		75	83					
0.00	480V SHUTDOWN BD 2B1-B	4B	UMW		O			REAC LOWER COMPT COOL FAN 2B-B		50	59					
0.00	480V SHUTDOWN BD 2B1-B	8C	UA					HT TR-CVC PNL B1 & B2 XFMR			54		38.25			
0.00	480V SHUTDOWN BD 2B1-B	8D	UA					STANDBY LTG CAB LS 3		40	27		19.1			
0.00	480V SHUTDOWN BD 2B2-B	3B	UAI	I	O			CRDM COOL FAN 2D		75	83					
0.00	480V SHUTDOWN BD 2B2-B	5D	UMW		O			REACTOR LWR COMPT COOL FAN 2D-B		50	59					
0.00	480V SHUTDOWN BD 2B2-B	8C	UMW					CVS SYS HT TR XFMR B3			54		38.25			
0.00	480V SHUTDOWN BD 2B2-.	10A	UMW					125V VITAL BATT CHGR IV			47		7.44			
0.00	6900V SHUTDOWN BD 2B-B	3	UA					480V SHDN XFMR 2B1-B								
0.00	6900V SHUTDOWN BD 2B-B	4	UA					480V SHDN XFMR 2B2-B								
0.00	6900V SHUTDOWN BD 2B-B	5	UA					480V SHDN XFMR 2B-B								
0.00	6900V SHUTDOWN BD 2B-B	22	UA					480V XFMR 2B-B								
								Total		611.74			150.44			
0.02	480V CONT & AUX BLDG VENT BD 2B1-B	3C	UAI	I	I			CENT CHRG PMP 2B-B RM CLR FAN		5	6.1					
0.02	480V CONT & AUX BLDG VENT BD 2B1-B	6E2	UA	I	I			AB GAS TMT SYS HUM .?? B-B					32			
0.02	480V REACTOR MOV BD 2B1-B	5C2	UAI	I	I			CENT CHG PMP 2B AUX OIL PMP		2	3.1					
0.02	6900V SHUTDOWN BD 2B-B	18	TAS	I	I			CENTRIFUGAL CHRG PMP 2B-B		680						
								Total		687			32			
0.04	480V REACTOR MOV BD 2B2-B	2B	UAI			1.00	2-FCV-3-126B	ERCW 2B ISOL VLV		0.333						
0.04	480V REACTOR MOV BD 2B2-B	2C	UAI			1.00	2-FCV-3-126A	ERCW 2B ISOL VLV (3-126A)		0.333						
								Total		0.666						
0.05	6900V SHUTDOWN BD 2B-B	15	TAS	I	I			SAFETY INJ PMP 2B-B		410						
								Total		410						

Prepared RJB

Checked CRM

Reviewed RBR

Date 1-15-86

B25 '86 0204 300 p62

TIME SI M.S	BOARD	CPT	CONT COMB	PHASE A	PHASE B	OPER TIME	COMPONENT UNID	COMPONENT DESCRIPTION	KVA	HP	FULLOAD CURRENT	RATED LOAD	KW	MOTOR EFF	MOTOR PF	MOTOR %LRI
0.09	480V REACTOR MOV BD 2B2-B	11B	UAI			1.00	2-FCV-3-179B	ERCW 1B ISOL VLV		0.7						
0.09	480V REACTOR MOV BD 2B2-B	11E	UAI			1.00	2-FCV-3-179A	ERCW 1B ISOL VLV		0.7						
								Total		1.4						
0.10	480V REACTOR MOV BD 2B1-B	8B	UAI	I	I	1.00	2-LCV-62-133	VOL CONT TK ISOL VLV		0.4						
0.10	480V REACTOR MOV BD 2B1-B	13B	UAI			1.00	2-FCV-72-13	SPRAY PMP 1B RECIRC VLV		0.125						
0.10	6900V SHUTDOWN BD 2B-B	14	TAS	I	I			RESIDUAL HT REMOVAL PMP 2B-B		425						
								Total		425.525						
0.15	6900V SHUTDOWN BD 2B-B	8	TAS	I	I			ESSENTIAL RCW PMP P-B		700						
								Total		700						
0.20	480V REACTOR MOV BD 2B2-B	7E	UA			1.00	2-FCV-70-2?7	CNDS DEMIN SUP VLV		0.125						
0.20	480V SHUTDOWN BD 2B1-B	3C	TAS	I	I			CCS PUMP 2B-B		350	404					
0.20	480V SHUTDOWN BD 2B2-B	2D	TAS	I	I			CCS PMP C-S(NOR FDR)		350	404					
								Total		700.125						
0.21	480V REACTOR MOV BD 2B1-B	5E	UA		0			CCS BOOST PMP 2B-B		15	18.4					
								Total		15						
0.25	6900V SHUTDOWN BD 2B-B	10	TAD	I	I			AUX FEED WTR PMP 2B-B		486						
								Total		486						
3.20	480V SHUTDOWN BD 2B2-B	2B	UA					ELEC BD RM A/C COMPR B-B		125	148					
								Total		125						
5.00	480V DIESEL AUX BD 2B1-B	2D	UAD					DG DAY TNK FUEL OIL XFER PMP		1	2					
5.00	480V DIESEL AUX BD 2B2-B	4A	UAD					DG DAY TNK FUEL OIL XFER PMP		1						
								Total		2						

Prepared RJB
Checked CRM
Reviewed RBR
Date 1-15-86

B25 '86 0204 300 p63

TIME SI M.S	BOARD	CPT	CONT PHASE COMB A B	OPER TIME	COMPONENT UNID	COMPONENT DESCRIPTION	KVA	HP	FULLOAD CURRENT	RATED LOAD	KW	MOTOR EFF	MOTOR PF	MOTOR ILRI
15.00	480V SHUTDOWN BD 2B2-B	10D	TPD			MN TURB TURN GEAR OIL PMP		75	130					
						Total		75						
21.00	480V SHUTDOWN BD 2B2-B	3A	UA			SHTDN BD RM AIR HAND UNIT 2B-B		75	88					
						Total		75						
120.00	480V REACTOR MOV BD 2B1-B	11C	UA	0.43	2-FCV-63-73	CNTMT SUMP FLOW VLV		10.5						
120.00	480V REACTOR MOV BD 2B1-B	14C	UAI	2.00	2-FCV-74-21	RHR PMP 2B-B CONT VLV		1.6						
						Total		12.1						

Prepared RJB
Checked CRM
Reviewed RPP
Date 1-15-86

Sequoyah Nuclear Plant - Diesel Generator Loading at Blackout with Phase B Isolation

TIME SI M.S	BOARD	CPT	CONT COMB	PHASE A	PHASE B	OPER TIME	COMPONENT UNID	COMPONENT DESCRIPTION	KVA	HP	FULLOAD CURRENT	RATED LOAD	KW	MOTOR EFF	MOTOR PF	MOTOR %LRI
T	480V CONT & AUX BLDG VENT BD 1A1-A	3A	UA					SHTDN XFMR RM 1A EXH FAN 1A3-A		2.5	4.1					
T	480V CONT & AUX BLDG VENT BD 1A1-A	3B	UA					SHTDN XFMR RM 1A EXH FAN 1A1-A		2.5	4.1					
T	480V CONT & AUX BLDG VENT BD 1A1-A	3C	UA					SHTDN XFMR RM 1A EXH FAN 1A2-A		2.5	4.1					
L	480V CONT & AUX BLDG VENT BD 1A1-A	6E	UA					SP FUEL PIT CLR SUMP PMP A		0.33	0.88					
T	480V CONT & AUX BLDG VENT BD 1A1-A	8B	UA					480V BD RM 1A A/C COND 1A-A		20						
T	480V CONT & AUX BLDG VENT BD 1A1-A	9E	UA					480V BD RM 1A A/C AHU 1A-A		10	12.4					
T	480V CONT & AUX BLDG VENT BD 1A1-A	11D	UA					480V BD RM 1A A/C CPRSR 1A-A		50	61					
L	480V DIESEL AUX BD 1A1-A	5D	UA					DG BLDG SUMP PMP A		3	4.6					
P	480V DIESEL AUX BD 1A1-A	6C	UA					DG 1A-A AIR COMPRESSOR 2		10	13					
T	480V DIESEL AUX BD 1A2-A	5A1	UA					DGB CO2 REFRIG UNIT		2	3					
P	480V DIESEL AUX BD 1A2-A	6C	UA					DG 1A-A AIR COMPRESSOR 1		10	13					
L	480V ERCW MCC 1A-A	2C	UA					STATION DECK SUMP PUMP A		5	3.5					
T	480V REACTOR MOV BD 1A1-A	1D	UA					480V BD XFMR 1A1-A COOL FAN		0.33						
T	480V REACTOR MOV BD 1A1-A	14C	UA					BORIC ACID TK A HTR '-A			10.83		9			
T	480V REACTOR MOV BD 1A1-A	14E	UA					BORIC ACID TK C HTR A-A			10.83		9			
S	480V REACTOR MOV BD 1A1-A	16D	UA					BORIC ACID XFER PMP 1A-A		15	13					
T	480V REACTOR MOV BD 1A2-A	1D	UA					480V SHDN BD XFMR 1A2-A COOL FAN		0.32						
								Total		133.48			18			
0.00	480V CONT & AUX BLDG VENT BD 1A1-A	1D1	UA					RAD MON & FIRE PROT DIST PNL	37.5		45.1		31.875			
0.00	480V CONT & AUX BLDG VENT BD 1A1-A	1D2	UA					CONT PWR XFMR	3							
0.00	480V CONT & AUX BLDG VENT BD 1A1-A	2A	UA	I	I			PIPE CHASE CLR FAN 1A-A		20	24.1					
0.00	480V CONT & AUX BLDG VENT BD 1A1-A	2C	UA	I	I			EMER GAS TMT SYS FAN A-A		20	24.1					
0.00	480V CONT & AUX BLDG VENT BD 1A1-A	2E	UAI					EMER GAS TMT SYS A-A HTR					16			
0.00	480V CONT & AUX BLDG VENT BD 1A1-A	4A	UA	I	I			PEN RM EL 669 CLR FAN 1A-A		5	6.1					
0.00	480V CONT & AUX BLDG VENT BD 1A1-A	4B	UA	I	I			PEN RM EL 690 CLR FAN 1A-A		5	6.1					
0.00	480V CONT & AUX BLDG VENT BD 1A1-A	4C	UA	I	I			PEN RM EL 714 CLR FAN 1A-A		5	6.1					
0.00	480V CONT & AUX BLDG VENT BD 1A1-A	5A	UAI					RES HT REM PMP 1A-A CLR FAN		5	3.8					
0.00	480V CONT & AUX BLDG VENT BD 1A1-A	5B	UAI		I			CNTMT SPRAY PMP 1A-A RM CLR FAN		5	6.1					
0.00	480V CONT & AUX BLDG VENT BD 1A1-A	5E2	UMW					SERV BLDG VENT MON		3	4.6					
0.00	480V CONT & AUX BLDG VENT BD 1A1-A	6C	UMW					CNTMT PURGE AIR EXH MON		0.75	1.4					
0.00	480V CONT & AUX BLDG VENT BD 1A1-A	7A	UAS					480V BD RM 1A PRESS FAN 1A1-A		3	4.6					
0.00	480V CONT & AUX BLDG VENT BD 1A1-A	7B	UAI	I	I			CONT BLDG EMER PRESS FAN A-A		1	1.6					
0.00	480V CONT & AUX BLDG VENT BD 1A1-A	7C2	UMW					COND VAC PMP AIR EXH MON		0.75	1.4					
0.00	480V CONT & AUX BLDG VENT BD 1A1-A	7D	UAS					125V BATT RM II EXH FAN 1B1-A		0.5						
0.00	480V CONT & AUX BLDG VENT BD 1A1-A	8A	UA					PRIM WTR MAKEUP PMP 1A		20	24.5					
0.00	480V CONT & AUX BLDG VENT BD 1A1-A	8C	UAI	I	I			CONT BLDG EMERG AIR CL UP FAN A-A		10						
0.00	480V CONT & AUX BLDG VENT BD 1A1-A	8D	UAS					480V BD RM 1B PRESS FAN 1B1-A		3	4.6					
0.00	480V CONT & AUX BLDG VENT BD 1A1-A	9A	UMW					GAS EFF RAD MON		5	7.25					
0.00	480V CONT & AUX BLDG VENT BD 1A1-A	9B	UMW					SI SYS HT TRACE XFMR A			18.04		12.75			
0.00	480V CONT & AUX BLDG VENT BD 1A1-A	10A	UAS					125V VIT BATT RM I EXH FAN 1A1-A		0.5						
0.00	480V CONT & AUX BLDG VENT BD 1A1-A	10B	UAI					SI PMP 1A-A RM CLR FAN		3	3.8					
0.00	480V CONT & AUX BLDG VENT BD 1A1-A	10E2	UMW					AUX BLDG VENT MON		3	4.6					
0.00	480V CONT & AUX BLDG VENT BD 1A1-A	11A	UA	I	I			SP FUEL PIT PMP A-A CLR FAN		5	6.1					
0.00	480V CONT & AUX BLDG VENT BD 1A1-A	11E1	UMW					CNTMT LOWER COMPT AIR MON		3						
0.00	480V CONT & AUX BLDG VENT BD 1A1-A	11E2	UMW					SHIELD BLDG VENT RAD MON		3	4.6					
0.00	480V CONT & AUX BLDG VENT BD 1A1-A	12A	UA					BATT RM EL 669 EXH FAN A-A		2	3					
0.00	480V CONT & AUX BLDG VENT BD 1A1-A	12D	UA					CONT BLDG PRESS FAN A-A		15	20					
0.00	480V DIESEL AUX BD 1A1-A	1D	UA					CONTROL POWER XFMR	3		3.6		2.55			
0.00	480V DIESEL AUX BD 1A1-A	2C	UAD			1.00	1-FCV-67-68	EMG DSL ENG HT EXCH SUP VLV		0.125						
0.00	480V DIESEL AUX BD 1A1-A	4A	UA					DG ELEC PNL VENT FAN		15						
0.00	480V DIESEL AUX BD 1A1-A	5A1	UA					DIESEL GEN LT CAB LC45			54		38.25			

Prepared RJB

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Reviewed RER

Date 1-15-86

B25 '86 0204 300 p65

TIME SI M.S	BOARD	CPT	CONT COMB	PHASE A	PHASE B	OPER TIME	COMPONENT UNID	COMPONENT DESCRIPTION	KVA	HP	FULLOAD CURRENT	RATED LOAD	KW	MOTOR EFF	MOTOR PF	MOTOR %LRI
0.00	480V DIESEL AUX BD 1A1-A	6A	UA					DG ROOM EXH FAN 1A1-A		15	19.5					
0.00	480V DIESEL AUX BD 1A1-A	6D	UA					DG MUFFLER RM EXH FAN		1.5	2.8					
0.00	480V DIESEL AUX BD 1A1-A	7B	UA					DG BATT HOOD EXH FAN		0.33	0.965					
0.00	480V DIESEL AUX BD 1A2-A	1D	UA					CONTROL POWER XFMR	3		3.6		2.55			
0.00	480V DIESEL AUX BD 1A2-A	5A2	UA					DIESEL GEN BATTERY CHGR			3		0.65			
0.00	480V DIESEL AUX BD 1A2-A	6A	UAD			1.00	1-FCV-67-66	EMG DSL ENG HT EXCH SUP VLV		0.125						
0.00	480V DIESEL AUX BD 1A2-A	6D	UA					DG ROOM EXH FAN 1A2-A		15	19.5					
0.00	480V DIESEL AUX BD 1A2-A	7A	UA					DG BD ROOM EXH FAN		3	4.6					
0.00	480V ERCW MCC 1A-A	2A	UA					ERCW STRAINER A1A-A		3	7					
0.00	480V ERCW MCC 1A-A	5E	UA					ERCW STRAINER XFMR	1				0.85			
0.30	480V REACTOR MOV BD 1A1-A	3A	UAI	I	I	0.07	1-FCV-62-63	SEAL FLOW ISOL VLV		0.67	2.1					
0.00	480V REACTOR MOV BD 1A1-A	3B	UAI	I	I	0.09	1-FCV-62-90	CHR FLOW ISOL VLV		1.5	2.8					
0.00	480V REACTOR MOV BD 1A1-A	4A	UAI	I	I	0.10	1-LCV-62-135	REF WTR STORAGE TK VLV		1	2.4					
0.00	480V REACTOR MOV BD 1A1-A	4E	UAI	I	I	1.00	1-FCV-72-22	RWST SPRAY HDR 1A-A FLO CONT VLV		3.3	5.2					
0.00	480V REACTOR MOV BD 1A1-A	5C	UAI		I	1.00	1-FCV-72-39	CNTMT SPRAY HDR 1A ISOL VLV		3.3	5.2					
0.00	480V REACTOR MOV BD 1A1-A	7C2	UAI			1.00	1-FCV-74-12	RHR PMP 1A-A MIN FLOW VLV		1.6	3.4					
0.00	480V REACTOR MOV BD 1A1-A	12A	UAI	I	I	0.10	1-FCV-63-26	SIS BORON INJ TK SH OFF VLV		2	3.5					
0.00	480V REACTOR MOV BD 1A1-A	12E	UAI	I	I	0.11	1-FCV-63-39	SIS BORON INJ TK INLET SHT OFF VLV		2	3.5					
0.00	480V REACTOR MOV BD 1A1-A	13E	UAI	I	I	1.00	1-FCV-63-118	SIS ACC TK I FL ISOL VLV		21	29.6					
0.00	480V REACTOR MOV BD 1A2-A	4A	UAI		I	0.30	1-FCV-67-83	LWR CNTMT 1A COOL SUP ISOL VLV		0.5	0.45					
0.00	480V REACTOR MOV BD 1A2-A	4B	UAI		I	0.56	1-FCV-67-87	LWR CNTMT 1A COOL DIS ISOL VLV		0.125	0.45					
0.00	480V REACTOR MOV BD 1A2-A	4C	UAI		I	0.30	1-FCV-67-91	LWR CNTMT 1C COOL SUP ISOL VLV		0.5	0.45					
0.00	480V REACTOR MOV BD 1A2-A	5A	UAI		I	0.55	1-FCV-67-95	LWR CNTMT 1C COOL DIS ISOL VLV		0.125	0.45					
0.00	480V REACTOR MOV BD 1A2-A	5B	UAI		I	0.36	1-FCV-67-104	LWR CNTMT 1B COOL DIS ISOL VLV		0.5	0.75					
0.00	480V REACTOR MOV BD 1A2-A	5C	UAI		I	0.30	1-FCV-67-112	LWR CNTMT 1D COOL DIS ISOL VLV		0.5	0.45					
0.00	480V REACTOR MOV BD 1A2-A	7B	UAI		I	0.18	1-FCV-67-130	UPPR CNTMT VENT COOL 1A SUP ISOL VLV		0.13	0.6					
0.00	480V REACTOR MOV BD 1A2-A	7C	UAI		I	0.18	1-FCV-67-133	UPPR CNTMT VENT COOL 1C SUP ISOL VLV		0.133	0.6					
0.00	480V REACTOR MOV BD 1A2-A	7E	UAI		I	0.18	1-FCV-67-139	UPPR CNTMT VENT COOL 1B DIS ISOL VLV		0.133	0.45					
0.00	480V REACTOR MOV BD 1A2-A	8A	UAI		I	0.18	1-FCV-67-142	UPPR CNTMT VENT COOL 1D DIS ISOL VLV		0.133	0.6					
0.00	480V REACTOR MOV BD 1A2-A	10A	UAI		I	0.16	1-FCV-67-295	UPPR CNTMT VENT COOL 1A DIS ISOL VLV		0.125	0.45					
0.00	480V REACTOR MOV BD 1A2-A	10B	UAI		I	0.16	1-FCV-67-296	UPPR CNTMT VENT COOL 1C DIS ISOL VLV		0.125	0.45					
0.00	480V REACTOR MOV BD 1A2-A	14B	UAI	I	I	0.24	1-FCV-70-143	EXCESS LTDWN HTX CONT INLET VLV		0.13	0.45					
0.00	480V REACTOR MOV BD 1A2-A	14C	UAI		I	0.15	1-FCV-70-90	RC PMP THER BAR RETN CONTMT ISOL VLV		1	2.8					
0.00	480V REACTOR MOV BD 1A2-A	15A	UAI		I	0.24	1-FCV-70-92	RCP CNTMT ISOL VLV		0.13	0.45					
0.00	480V REACTOR MOV BD 1A2-A	15C	UAI		I	1.00	1-FCV-70-133	RCP THER BAR RETN CNTMT ISOL VLV		0.67	0.95					
0.00	480V REACTOR MOV BD 1A2-A	15E	UAI	I	I	0.07	1-FCV-26-240	CNTMT STAND PIPE ISOL VLV		0.67	2.1					
0.00	480V REACTOR MOV BD 1A2-A	16A	UAI		I	0.24	1-FCV-70-139	RCP CNTMT ISOL VLV		0.26	0.45					
0.00	480V REACTOR MOV BD 1A2-A	16B	UAI	I	I	0.07	1-FCV-3-33	STEAM GEN FW ISOL VLV		33	43					
0.00	480V REACTOR MOV BD 1A2-A	17C	UAI	I	I	0.06	1-FCV-3-87	STEAM GEN FW ISOL VLV		33	43					
0.00	480V REACTOR MOV BD 1A2-A	18C	UAI	I	I	1.00	1-FCV-26-242	ANNULUS STAND PIPE ISOL VLV		0.67	2.1					
0.00	480V REACTOR MOV BD 1A2-A	19B	UAI	I	I	0.06	1-FCV-26-243	RCP SPRAY ISOL VLV		0.67	2.1					
0.00	480V REACTOR MOV BD 1A2-A	19C	UAI	I	I	1.00	1-FCV-26-245	ANNULUS SPRINK ISOL VLV SUP		0.67	2.1					
0.00	480V SHUTDOWN BD 1A1-A	2B	UA					CONT RM AHU A-A		60	77					
0.00	480V SHUTDOWN BD 1A1-A	10A	UA					NOR FDR 125V VITAL BATT CKGR I					7.44			
0.00	480V SHUTDOWN BD 1A2-A	9C	UA					STANDBY LTG CAB LS 4			54		38.25			
0.00	6900V SHUTDOWN BD 1A-A	3	UA					480V SHDN XFMR 1A-A								
0.00	6900V SHUTDOWN BD 1A-A	4	UA					480V SHDN XFMR 1A2-A								
0.00	6900V SHUTDOWN BD 1A-A	5	UA					480V SHDN XFMR 1A-A								
0.00	6900V SHUTDOWN BD 1A-A	22	UA					ERCW PMP STA XFMR 1A-A								
								Total		369.849			151.165			
0.02	480V CONT & AUX BLDG VENT BD 1A1-A	10D	UAI	I	I			CENT CHRG PMP 1A-A RM CLR FAN		5	6.1					

Prepared RJB
Checked CRM
Reviewed BBR
Date 1-15-86

TIME SI M.S	BOARD	CPT	CONT COMB	PHASE A	PHASE B	OPER TIME	COMPONENT UNID	COMPONENT DESCRIPTION	KVA	HP	FULLOAD CURRENT	RATED LOAD	KW	MOTOR EFF	MOTOR PF	MOTOR ILRI
0.02	480V REACTOR MOV BD 1A1-A	2C2	UAI	I	I			CENT CHG PMP 1A AUX OIL PMP		2	3.1					
0.02	6900V SHUTDOWN BD 1A-A	1B	TAS	I	I			CENTRIFUGAL CHRG PMP 1A-A		680						
								Total		687						
0.04	480V REACTOR MOV BD 1A2-A	2C	UAI			1.00	1-FCV-3-116A	ERCW 1A ISOL VLV (3-116A)		0.333	0.9					
0.04	480V REACTOR MOV BD 1A2-A	2B	UAI			1.00	1-FCV-3-116B	ERCW HDR 1A ISOL VLV		0.333	0.9					
								Total		0.666						
0.05	6900V SHUTDOWN BD 1A-A	15	TAS	I	I			SAFETY INJ PMP 1A-A		410						
								Total		410						
0.06	480V REACTOR MOV BD 1A2-A	2E	UAI			1.00	1-FCV-3-136A	ERCW 1A ISOL VLV		0.7	2.3					
0.06	480V REACTOR MOV BD 1A2-A	3B	UAI			1.00	1-FCV-3-136B	ERCW 1A ISOL VLV		0.7	2.3					
								Total		1.4						
0.10	480V REACTOR MOV BD 1A1-A	3E	UAI	I	I	1.00	1-LCV-62-132	VOL CONT TK ISOL VLV		0.67	2.1					
0.10	480V REACTOR MOV BD 1A1-A	5B	UAI		I	1.00	1-FCV-72-34	CNTMT PMP 1A-A RECIRC FL CONT VLV		0.125	0.39					
0.10	6900V SHUTDOWN BD 1A-A	14	TAS	I	I			RESIDUAL HT REMOVAL PMP 1A-A		425						
								Total		425.795						
0.15	6900V SHUTDOWN BD 1A-A	8	AS	I	I			ESSENTIAL RCW PMP J-A		700						
								Total		700						
0.20	480V CONT & AUX BLDG VENT BD 1A1-A	5C	UAI	I	I			CCS & AFW PMP SP CLR FAN A-A		20	18					
0.20	480V REACTOR MOV BD 1A2-A	10C	UA			1.00	0-FCV-70-208	CNDS DEMIN WST EVAP BLDG SUP VLV		0.125	0.45					
0.20	480V SHUTDOWN BD 1A1-A	4B	TAS	I	I			CCS PUMP 1A-A		350	404					
								Total		370.125						
0.25	6900V SHUTDOWN BD 1A-A	10	TAD	I	I			AUX FEED WTR PMP 1A-A		486						
								Total		486						

Prepared RJB
Checked CRM
Reviewed BPR
Date 1-15-86

Sequoyah Nuclear Plant - Diesel Generator Loading at Blackout with Phase B Isolation

TIME SI M.S	BOARD	CPT	CONT COMB	PHASE A	PHASE B	OPER TIME	COMPONENT UNID	COMPONENT DESCRIPTION	KVA	HP	FULLOAD CURRENT	RATED LOAD	KW	MOTOR EFF	MOTOR PF	MOTOR %LRI
0.30	6900V SHUTDOWN BD 1A-A	13	TAS		I			CNTMT SPRAY PMP 1A-A		690						
								Total		690						
1.20	480V SHUTDOWN BD 1A2-A	4D	UA					CONT RM A/C CPRSR A-A		125	148					
								Total		125						
5.00	480V DIESEL AUX BD 1A1-A	2D	UAD					DG DAY TNK FUEL OIL XFER PMP		1	2					
5.00	480V DIESEL AUX BD 1A2-A	4A	UAD					DG DAY TNK FUEL OIL XFER PMP		1	2					
								Total		2						
10.00	480V SHUTDOWN BD 1A1-A	10C	UAI		I			CNTMT AIR RETURN FAN 1A-A		50	58					
								Total		50						
21.00	480V SHUTDOWN BD 1A2-A	2B	UA					SHTDN BD RM AIR HAND UNIT 1A-A		75	88					
								Total		75						
120.00	480V REACTOR MOV BD 1A1-A	6E	UAI			2.00	1-FCV-74-3	RHR PMP 1A-A FLOW VLV		1.6						
120.00	480V REACTOR MOV BD 1A1-A	13A	UA			0.42	1-FCV-63-72	CNTMT SUMP FLOW VLV		10.5	13.8					
								Total		12.1						

Prepared RJB

Checked CRM

Reviewed RFR

Date 1-15-86

TIME SI M.S	BOARD	CPT	CONT PHASE COMB	A	B	OPER TIME	COMPONENT UNID	COMPONENT DESCRIPTION	KVA	HP	FULLOAD CURRENT	RATED LOAD	KW	MOTOR EFF	MOTOR PF	MOTOR ILRI
T	480V CONT & AUX BLDG VENT BD 1B1-B	2A	UA					SHTDN XFMR RM 1B EXH FAN 1B3-B		2.5	4.1					
T	480V CONT & AUX BLDG VENT BD 1B1-B	2B	UA					SHTDN XFMR RM 1B EXH FAN 1B1-B		2.5	4.1					
T	480V CONT & AUX BLDG VENT BD 1B1-B	2C	UA					SHTDN XFMR RM 1B EXH FAN 1B2-B		2.5	4.1					
L	480V CONT & AUX BLDG VENT BD 1B1-B	2D	UA					SP FUEL PIT CLR SUMP PMP B		0.33	0.88					
T	480V CONT & AUX BLDG VENT BD 1B1-B	3A	UA					RECIP CHG PMP RM CLR FAN		3	4.7					
T	480V CONT & AUX BLDG VENT BD 1B1-B	3E	UA					SHDN BD RM A/C CIR PMP B-B		20						
T	480V CONT & AUX BLDG VENT BD 1B1-B	5E	UA					480V BD RM 1B A/C CPRSR 1B-B		60	75					
T	480V CONT & AUX BLDG VENT BD 1B1-B	8B	UA					480V BD RM 1B A/C COND 1B-B		25	32					
T	480V CONT & AUX BLDG VENT BD 1B1-B	9E	UA					480V BD RM 1B A/C AHU 1B-B		25	32					
L	480V DIESEL AUX BD 1B1-B	5D	UA					DG BLDG SUMP PMP B		3						
P	480V DIESEL AUX BD 1B1-B	6C	UA					DG 1B-B AIR COMPRESSOR 2		10						
P	480V DIESEL AUX BD 1B2-B	6C	UA					DG 1B-B AIR COMPRESSOR 1		10	13					
L	480V ERCW MCC 1B-B	2C	UA					STATION DECK SUMP PMP B		3	3.5					
T	480V REACTOR MOV BD 1B1-B	3D	UA					480V SHDN BD XFMR 1B1-B COOL FAN		0.32						
T	480V REACTOR MOV BD 1B1-B	3D	UA					480V SHDN BD XFMR 1B-B COOL FAN(NOR FDR)		0.33						
T	480V REACTOR MOV BD 1B1-B	3E	UA					BORIC ACID TK A HTR B-B					9			
S	480V REACTOR MOV BD 1B1-B	4A	UA					BORIC ACID XFER PMP 1B-B		13						
T	480V REACTOR MOV BD 1B1-B	4E	UA					BORIC ACID TK C HTR B-B					9			
T	480V REACTOR MOV BD 1B2-B	2A	UA				1-FCV-1-18	STEAM FW PMP ISOL VLV		1.6	3.4					
								Total		186.08			18			
0.00	480V CONT & AUX BLDG VENT BD 1B1-B	1D1	UAT					EMER GAS TRMT SYS B-B HTR			19.6		16			
0.00	480V CONT & AUX BLDG VENT BD 1B1-B	1D2	UA					CONT PWR XFMR		1.5						
0.00	480V CONT & AUX BLDG VENT BD 1B1-B	3B	UAI					SI PMP 1B-B RM CLR FAN		3	3.8					
0.00	480V CONT & AUX BLDG VENT BD 1B1-B	4A	UA	I	I			PEN RM EL 669 CLR FAN 1B-B		[illegible]	6.1					
0.00	480V CONT & AUX BLDG VENT BD 1B1-B	4B	UA	I	I			PEN RM EL 690 CLR FAN 1B-B		5	6.1					
0.00	480V CONT & AUX BLDG VENT BD 1B1-B	4C	UA	I	I			PEN RM EL 714 CLR FAN 1B-B		5	6.1					
0.00	480V CONT & AUX BLDG VENT BD 1B1-B	5A	UAI					RES HT REM PMP 1B-B CLR FAN		5						
0.00	480V CONT & AUX BLDG VENT BD 1B1-B	5B	UAI		I			CNTMT SPRAY PMP 1B-B CLR FAN		5	6.1					
0.00	480V CONT & AUX BLDG VENT BD 1B1-B	6C	UA					UNIT CONT ANN SYS	5		6		4.25			
0.00	480V CONT & AUX BLDG VENT BD 1B1-B	6D	UMW					CONT RM EMER INTAKE RAD MON		0.75	1.4					
0.00	480V CONT & AUX BLDG VENT BD 1B1-B	6E2	UMW					SHTDN BD RM CHILLER B-B CON XFMR	3		38.5		2.55			
0.00	480V CONT & AUX BLDG VENT BD 1B1-B	7C	UAS					480V BD RM 1A PRESS FAN 1A2-B		3	4.6					
0.00	480V CONT & AUX BLDG VENT BD 1B1-B	7D2	UMW					CNTMT BLDG UP COMPT AIR MON		3	1.6					
0.00	480V CONT & AUX BLDG VENT BD 1B1-B	7E	UAI	I	I			CONT BLDG EMRG PRESS FAN B-B		1	1.6					
0.00	480V CONT & AUX BLDG VENT BD 1B1-B	8A	UA					PRIM WTR MAKEUP PMP 1B		20						
0.00	480V CONT & AUX BLDG VENT BD 1B1-B	8C	UAI	I	I			CONT BLDG EMERG AIR CL UP FAN B-B		10						
0.00	480V CONT & AUX BLDG VENT BD 1B1-B	8D1	UMW					COND VAC PMP HI RANGE AIR EXH MON		0.75	1.4					
0.00	480V CONT & AUX BLDG VENT BD 1B1-B	8D2	UMW					CNTMT PURGE AIR EXH MON		0.75	1.4					
0.00	480V CONT & AUX BLDG VENT BD 1B1-B	8E	UA	I	I			PIPE CHASE CLR FAN 1B-B		20	24.1					
0.00	480V CONT & AUX BLDG VENT BD 1B1-B	9A	UAS					125V BATT RM I EXH FAN 1A2-B		0.5						
0.00	480V CONT & AUX BLDG VENT BD 1B1-B	9C	UA	I	I			SP FUEL PIT PMP B-B CLR FAN		5	6.1					
0.00	480V CONT & AUX BLDG VENT BD 1B1-B	9D	UAS					480V BD RM 1B PRESS FAN 1B2-B		3	4.6					
0.00	480V CONT & AUX BLDG VENT BD 1B1-B	11C	UA	I	I			EMER GAS TRMT SYS FAN B-B		20	24					
0.00	480V CONT & AUX BLDG VENT BD 1B1-B	11E	UA					BATT RM EL 669 EXH FAN B-B		2	3.1					
0.00	480V CONT & AUX BLDG VENT BD 1B1-B	12A	UAS					125V VIT BATT RM II EXH FAN 1B2-B		0.5						
0.00	480V CONT & AUX BLDG VENT BD 1B1-B	12E	UMW					SI SYS HT TRACE XFMR B			18		12.75			
0.00	480V CONT & AUX BLDG VENT BD 1B1-B	13D2	UA					CONT BLDG PRESS FAN B-B		15	20					
0.00	480V DIESEL AUX BD 1B1-B	1D	UA					CONTROL POWER XFMR	3				2.55			
0.00	480V DIESEL AUX BD 1B1-B	2C	UAD			1.00	1-FCV-67-65	EMG DSL ENG HT EXCH SUP VLV		0.125						
0.00	480V DIESEL AUX BD 1B1-B	4A	UA					DG ELEC PNL VENT FAN		15	20					
0.00	480V DIESEL AUX BD 1B1-B	5A1	UA					DIESEL GEN LT CAB LC47					38.25			

Prepared RJB

Checked CRM

Reviewed RGR

Date 1-15-86

10-Jan-86

Sequoyah Nuclear Plant - Diesel Generator Loading at Blackout with Phase B Isolation

TIME SI M.S	BOARD	CPT	CONT COMB	PHASE A	PHASE B	OPER TIME	COMPONENT UNID	COMPONENT DESCRIPTION	KVA	HP	FULLOAD CURRENT	RATED LOAD	KW	MOTOR EFF	MOTOR PF	MOTOR ILRI
0.00	480V DIESEL AUX BD 1B1-B	6A	UA					DG ROOM EXH FAN 1B1-B		15						
0.00	480V DIESEL AUX BD 1B1-B	6D	UA					DG MUFFLER RM EXH FAN		1.5						
0.00	480V DIESEL AUX BD 1B1-B	7B	UA					DG BATT HOOD EXH FAN		0.33						
0.00	480V DIESEL AUX BD 1B2-B	1D	UA					CONTROL POWER XFMR	3		6.3		2.55			
0.00	480V DIESEL AUX BD 1B2-B	5A2	UA					DIESEL GEN BATTERY CHGR			3		0.65			
0.00	480V DIESEL AUX BD 1B2-B	6A	UAD			1.00	1-FCV-67-67	EMG ISL ENG HT EXCH SUP VLV		0.125						
0.00	480V DIESEL AUX BD 1B2-B	6D	UA					DG ROOM EXH FAN 1B2-B		15	19.5					
0.00	480V DIESEL AUX BD 1B2-B	7A	UA					DG BD ROOM EXH FAN		3	4.6					
0.00	480V ERCW MCC 1B-B	2A	UA					ERCW STRAINER B1B-B		3	7					
0.00	480V ERCW MCC 1B-B	5E	UA					ERCW STRAINER XFMR	1				0.85			
0.00	480V REACTOR MOV BD 1B1-B	7C	UAI	I	I	0.05	1-FCV-62-61	SEAL FLOW ISOL VLV		0.7						
0.00	480V REACTOR MOV BD 1B1-B	7E	UAI	I	I	0.09	1-FCV-62-91	CHR FLOW ISOL VLV		1						
0.00	480V REACTOR MOV BD 1B1-B	8C	UAI	I	I	0.10	1-LCV-62-136	CHG PMP FLOW VLV		1.4						
0.00	480V REACTOR MOV BD 1B1-B	10B	UAI	I	I	0.09	1-FCV-63-25	SIS BORON INJ TK VLV		2						
0.00	480V REACTOR MOV BD 1B1-B	11A	UAI	I	I	0.10	1-FCV-63-40	SIS BORON INJ TK VLV		2						
0.00	480V REACTOR MOV BD 1B1-B	17A	UAI		I	1.00	1-FCV-72-2	SPRAY HDR 1B ISOL VLV		3.3						
0.00	480V REACTOR MOV BD 1B1-B	14E	UAI			1.00	1-FCV-74-24	RHR PMP 1B FLOW VLV		1.6						
0.00	480V REACTOR MOV BD 1B2-B	3E	UAI	I	I	1.00	1-FCV-26-241	ANN ISOL VLV (26-241)		0.67	2.1					
0.00	480V REACTOR MOV BD 1B2-B	4A	UAI		I	0.36	1-FCV-67-88	LWR CNTMT 1A ISOL VLV		0.5	1.5					
0.00	480V REACTOR MOV BD 1B2-B	4B	UAI		I	0.36	1-FCV-67-96	LWR CNTMT 1B ISOL VLV		0.5	1.5					
0.00	480V REACTOR MOV BD 1B2-B	4C	UAI		I	0.30	1-FCV-67-99	LWR CNTMT 1B ISOL VLV		0.5	1.5					
0.00	480V REACTOR MOV BD 1B2-B	4E	UAI	I	I	1.00	1-FCV-26-244	ANN ISOL VLV		0.67	2.1					
0.00	480V REACTOR MOV BD 1B2-B	5A	UAI		I	0.54	1-FCV-67-103	LWR CNTMT 1B ISOL VLV		0.125	0.45					
0.00	480V REACTOR MOV BD 1B2-B	5B	UAI		I	0.36	1-FCV-67-107	LWR CNTMT 1D ISOL VLV		0.5	1.5					
0.00	480V REACTOR MOV BD 1B2-B	5C	UAI		I	0.54	1-FCV-67-111	LWR CNTMT 1D ISOL VLV		0.13	0.45					
0.00	480V REACTOR MOV BD 1B2-B	7A	UAI		I	0.18	1-FCV-67-131	UPPR CNTMT 1A ISOL VLV		0.133	0.6					
0.00	480V REACTOR MOV BD 1B2-B	7B	UAI		I	0.18	1-FCV-67-134	UPPR CNTMT 1C ISOL VLV		0.133	0.6					
0.00	480V REACTOR MOV BD 1B2-B	7C	UAI		I	0.18	1-FCV-67-138	UPPR CNTMT 2B ISOL VLV		0.133	0.6					
0.00	480V REACTOR MOV BD 1B2-B	8B	UAI		I	0.18	1-FCV-67-141	UPPR CNTMT 1D ISOL VLV		0.133	0.6					
0.00	480V REACTOR MOV BD 1B2-B	9B	UAI		I	0.17	1-FCV-67-297	UPPR CNTMT 1B ISOL VLV		0.125	0.45					
0.00	480V REACTOR MOV BD 1B2-B	9C	UAI		I	0.16	1-FCV-67-298	UPPR CNTMT 1D ISOL VLV		0.125	0.45					
0.00	480V REACTOR MOV BD 1B2-B	14C	UAI		I	1.00	0-FCV-70-87	RCP CNTMT ISOL VLV		1	2.8					
0.00	480V REACTOR MOV BD 1B2-B	15A	UAI		I	0.54	1-FCV-70-89	RC PMP CONTMT ISOL VLV		0.125	45					
0.00	480V REACTOR MOV BD 1B2-B	15B	UAI		I	1.00	1-FCV-70-134	RCP CNTMT ISOL VLV		0.125	0.37					
0.00	480V REACTOR MOV BD 1B2-B	15C	UAI		I	0.24	1-FCV-70-140	RCP CNTMT ISOL VLV		0.13	0.45					
0.00	480V REACTOR MOV BD 1B2-B	16C	UAI	I	I	0.06	1-FCV-3-47	STEAM GEN FW ISOL VLV		33	43					
0.00	480V REACTOR MOV BD 1B2-B	17A	UAI	I	I	0.06	1-FCV-3-100	STEAM GEN FW ISOL VLV		33	43					
0.00	480V SHUTDOWN BD 1B1-B	8B	UA					STANDBY LTG CAB 1 S 2			27		38.73			
0.00	480V SHUTDOWN BD 1B2-B	10	UA					CONT RM AHU B-B		60	77					
0.00	480V SHUTDOWN BD 1B2-B	10A	UAW					125V AC VITAL BATT CHGR II			47		7.44			
0.00	6900V SHUTDOWN BD 1B-B	3	UA					480V SHDN XFMR 1B-B								
0.00	6900V SHUTDOWN BD 1B-B	4	UA					480V SHDN XFMR 1B2-B								
0.00	6900V SHUTDOWN BD 1B-B	5	UA					480V SHDN XFMR 1B-B								
0.00	6900V SHUTDOWN BD 1B-B	22	UA					480V XFMR 1B-B								
								Total		311.587			126.09			
0.02	480V CONT & AUX BLDG VENT BD 1B1-B	3C	UAI	I	I			CENT CHRG PMP 1B-B RM CLR FAN		3						
0.02	480V REACTOR MOV BD 1B1-B	5C2	UAI	I	I			CENT CHG PMP 1B AUX OIL PMP		2	3.1					
0.02	6900V SHUTDOWN BD 1B-B	18	TAS	I	I			CENTRIFUGAL CHRG PMP 1B-B		480						
								Total		487						

Prepared RJB

Checked CRM

Reviewed RBB

Date 1-15-86

TIME SI M.S	BOARD	CPT	CONT COMB	PHASE A	PHASE B	OPER TIME	COMPONENT UNID	COMPONENT DESCRIPTION	KVA	HP	FULLOAD CURRENT	RATED LOAD	KW	MOTOR EFF	MOTOR PF	MOTOR %LRI
0.04	480V REACTOR MOV BD 1B2-B	2C	UAI			1.00	1-FCV-3-126A	ERCW 1B ISOL VLV (3-126A)		0.333	0.9					
0.04	480V REACTOR MOV BD 1B2-B	2B	UAI			1.00	1-FCV-3-126B	ERCW 1B ISOL VLV		0.333	0.9					
								Total		0.666						
0.05	6900V SHUTDOWN BD 1B-B	15	TAS	I	I			SAFETY INJ PMP 1B-B		410						
								Total		410						
0.09	480V REACTOR MOV BD 1B2-B	11E	UAI			1.00	1-FCV-3-179A	ERCW 1B ISOL VLV		0.7	2.3					
0.09	480V REACTOR MOV BD 1B2-B	11B	UAI			1.00	1-FCV-3-179B	ERCW 1B ISOL VLV		0.7	2.3					
								Total		1.4						
0.10	480V REACTOR MOV BD 1B1-B	13B	UAI		I	1.00	1-FCV-72-13	SPRAY PMP 1B RECIRC VLV		0.125						
0.10	480V REACTOR MOV BD 1B1-B	8B	UAI	I	I	1.00	1-LCV-62-133	VOL CONT TK ISOL VLV		0.4						
0.10	6900V SHUTDOWN BD 1B-B	14	TAS	I	I			RESIDUAL HT REMOVAL PMP 1B-B		425						
								Total		425.525						
0.15	6900V SHUTDOWN BD 1B-B	9	TAS	I	I			ESSENTIAL RCW PMP N-B		700						
								Total		700						
0.20	480V CONT & AUX BLDG VENT BD 1B1-B	5C	UAI	I	I			CCS & AFW PMP SP CLR FAN B-B		20						
0.20	480V REACTOR MOV BD 1B2-B	12E	UA			1.00	0-FCV-70-206	CNDS DEMIN VLV		0.125	0.45					
0.20	480V REACTOR MOV BD 1B2-B	7E	UA			1.00	1-FCV-70-207	CNDS DEMIN SUP VLV		0.125	0.45					
0.20	480V SHUTDOWN BD 1B1-B	3C	TAS	I	I			CCS PUMP 1B-B		350	404					
								Total		370.25						
0.25	6900V SHUTDOWN BD 1B-B	10	TAD	I	I			AUX FEED WTR PMP 1B-B		486						
								Total		486						
0.30	6900V SHUTDOWN BD 1B-B	13	TAS		I			CNTMT SPRAY PMP 1B-B		690						
								Total		690						

Prepared QJB
Checked CRM
Reviewed WGR
Date 1-15-86

TIME SI M.S	BOARD	CPT	CONT COMB A	PHASE B	OPER TIME	COMPONENT UNID	COMPONENT DESCRIPTION	KVA	HP	FULLOAD CURRENT	RATED LOAD	KW	MOTOR EFF	MOTOR PF	MOTOR %LRI
3.20	480V SHUTDOWN BD 1B2-B	2B	UA				CONT RM A/C CPRSR B-B		125	148					
							Total		125						
5.00	480V DIESEL AUX BD 1B1-B	2D	UAD				DG DAY TNK FUEL OIL XFER PMP		1	2					
5.00	480V DIESEL AUX BD 1B2-B	4A	UAD				DG DAY TNK FUEL OIL XFER PMP		1	2					
							Total		2						
10.00	480V SHUTDOWN BD 1B2-B	9C	UAI	I			CNTMT AIR RETURN FAN 1B-B		50	58					
							Total		50						
15.00	480V SHUTDOWN BD 1B2-B	10D	TPD				MN TURB TURN GEAR OIL PMP		75	91.5					
							Total		75						
21.00	480V SHUTDOWN BD 1B2-B	3D	UA				SHDN BD RM CHILLER PKG B-B		250	275					
21.00	480V SHUTDOWN BD 1B2-B	3A	UA				SHTDN BD RM AIR HAND UNIT 1B-B		75	88					
							Total		325						
120.00	480V REACTOR MOV BD 1B1-B	11C	UA		0.43	1-FCV-63-73	CNTMT SUMP FLOW VLV		10.5						
120.00	480V REACTOR MOV BD 1B1-B	14C	UAI		2.00	1-FCV-74-21	RHR PMP 1B-B CONT VLV		1.6						
							Total		12.1						

Prepared RJB
Checked CRM
Reviewed RFR
Date 1-15-86

TIME SI M.S	BOARD	CPT	CONT COMB	PHASE A	PHASE B	OPER TIME	COMPONENT UNID	COMPONENT DESCRIPTION	KVA	HP	FULLOAD CURRENT	RATED LOAD	KW	MOTOR EFF	MOTOR PF	MOTOR %LRI
T	480V CONT & AUX BLDG VENT BD 2A1-A	3A	UA					SHTDN XFMR RM 2A EXH FAN 2A3-A		2.5	4.1					
T	480V CONT & AUX BLDG VENT BD 2A1-A	3B	UA					SHTDN XFMR RM 2A EXH FAN 2A1-A		2.5	4.1					
T	480V CONT & AUX BLDG VENT BD 2A1-A	3C	UA					SHTDN XFMR RM 2A EXH FAN 2A2-A		2.5	4.1					
P	480V CONT & AUX BLDG VENT BD 2A1-A	6C	UAS					AUX CONT AIR COMPRSR A-A		20	25.7					
T	480V CONT & AUX BLDG VENT BD 2A1-A	8B	UA					480V BD RM 2A A/C COND 2A-A		20	21					
T	480V CONT & AUX BLDG VENT BD 2A1-A	9E	UA					480V BD RM 2A A/C AHU 2A-A		10	12.4					
T	480V CONT & AUX BLDG VENT BD 2A1-A	11B	UA					SHDN BD RM A/C CIR PMP A-A		20	23.4					
T	480V CONT & AUX BLDG VENT BD 2A1-A	11D	UA					480V BD RM 2A A/C CPRSR 2A-A		50	61					
P	480V DIESEL AUX BD 2A1-A	6C	UA					DG 2A-A AIR COMPRESSOR 2		10	13					
P	480V DIESEL AUX BD 2A2-A	6C	UA					DG 2A-A AIR COMPRESSOR 1		10	13					
T	480V REACTOR MOV BD 2A1-A	1E	UA					480V SHDN BD XFMR 2A1-A COOL FAN		0.33						
S	480V REACTOR MOV BD 2A1-A	14A	UA					BORIC ACID XFER PMP 2A-A		15	26					
T	480V REACTOR MOV BD 2A1-A	14D	UA					BORIC ACID TK B HTR A-A			10.8		9			
								Total		162.83			9			
0.00	480V CONT & AUX BLDG VENT BD 2A1-A	1D1	UA					RAD MON SAMP & FIRE PROT XFMR					30			
0.00	480V CONT & AUX BLDG VENT BD 2A1-A	1D2	UA					CONT PWR XFMR		3						
0.00	480V CONT & AUX BLDG VENT BD 2A1-A	2A	UA	I	I			PIPE CHASE CLR FAN 2A-A		20	24.1					
0.00	480V CONT & AUX BLDG VENT BD 2A1-A	2B	UAI	I	I			AB GAS TMT SYS FAN A-A		20	24					
0.00	480V CONT & AUX BLDG VENT BD 2A1-A	4A	UA	I	I			PEN RM EL 669 CLR FAN 2A-A		5	6.1					
0.00	480V CONT & AUX BLDG VENT BD 2A1-A	4B	UA	I	I			PEN RM EL 690 CLR FAN 2A-A		5	6.1					
0.00	480V CONT & AUX BLDG VENT BD 2A1-A	4C	UA	I	I			PEN RM EL 714 CLR FAN 2A-A		5	6.1					
0.00	480V CONT & AUX BLDG VENT BD 2A1-A	5A	UAI					RES HT REM PMP 2A-A CLR FAN		5	3.8					
0.00	480V CONT & AUX BLDG VENT BD 2A1-A	5B	UAI		I			CNTMT SPRAY PMP 2A-A CLR FAN		5	6.1					
0.00	480V CONT & AUX BLDG VENT BD 2A1-A	5D	UA	I	I			EMER GAS TMT RM CLR A-A		3	3.8					
0.00	480V CONT & AUX BLDG VENT BD 2A1-A	6E1	UMW					CNTMT PURGE AIR EXH RAD MON		0.75						
0.00	480V CONT & AUX BLDG VENT BD 2A1-A	6E2	UMW				RE-90-125	CONT RM INTAKE MON		0.75	1.4					
0.00	480V CONT & AUX BLDG VENT BD 2A1-A	7A	UAS					480V BD RM 2A PRESS FAN 2A1-A		3	4.6					
0.00	480V CONT & AUX BLDG VENT BD 2A1-A	7C1	UMW					SHTDN BD RM CHILLER A-A CON XFMR	3		6.3		2.55			
0.00	480V CONT & AUX BLDG VENT BD 2A1-A	7C2	UMW				RE-90-119	COND VAC PMP AIR EXH MON		0.75	1.4					
0.00	480V CONT & AUX BLDG VENT BD 2A1-A	7D	UAS					125V BATT RM III EXH FAN 2B1-A		0.5						
0.00	480V CONT & AUX BLDG VENT BD 2A1-A	8A	UA					PRIM WTR MAKEUP PMP 2A		20	24.5					
0.00	480V CONT & AUX BLDG VENT BD 2A1-A	8D	UAS					480V BD RM 2B PRESS FAN 2B1-A		3	4.6					
0.00	480V CONT & AUX BLDG VENT BD 2A1-A	9A	UMW					GAS EFF RAD MON		5	7.25					
0.00	480V CONT & AUX BLDG VENT BD 2A1-A	10A	UAS					125V VIT BATT RM IV FAN 2A1-A		0.5						
0.00	480V CONT & AUX BLDG VENT BD 2A1-A	10B	UAI					SI PMP 2A-A RM CLR FAN		3	3.8					
0.00	480V CONT & AUX BLDG VENT BD 2A1-A	10E2	UMW				RE-90-205	MAIN CONT RM EMER INTAKE RAD MON		0.75	1.4					
0.00	480V CONT & AUX BLDG VENT BD 2A1-A	11A	UAI	I	I			AUX FDWTR & BA TRANS PMP SP CLR FAN A-A		5	6.1					
0.00	480V CONT & AUX BLDG VENT BD 2A1-A	11E1	UMW				RE-90-106	CNTMT BLDG LWR COMPT AIR MON		3	4.6					
0.00	480V CONT & AUX BLDG VENT BD 2A1-A	11E2	UMW				RE-90-100	SHIELD BLDG VENT RAD MON		3	4.6					
0.00	480V DIESEL AUX BD 2A1-A	1D	UA					CONTROL POWER XFMR	3		6.3		2.55			
0.00	480V DIESEL AUX BD 2A1-A	2C	UAD			1.00	2-FCV-67-68	EMG DSL ENG HT EXCH SUP VLV		0.125						
0.00	480V DIESEL AUX BD 2A1-A	4A	UA					DG ELEC PNL VENT FAN		15						
0.00	480V DIESEL AUX BD 2A1-A	5A1	UA					DIESEL GEN LT CAB LC46			93.8		38.25			
0.00	480V DIESEL AUX BD 2A1-A	6A	UA					DG ROOM EXH FAN 2A1-A		15	19.5					
0.00	480V DIESEL AUX BD 2A1-A	6D	UA					DG MUFFLER RM EXH FAN		1.5	2.8					
0.00	480V DIESEL AUX BD 2A1-A	7B	UA					DG BATT HOOD EXH FAN		0.33	0.96					
0.00	480V DIESEL AUX BD 2A2-A	1D	UA					CONTROL POWER XFMR	3		6.3		2.55			
0.00	480V DIESEL AUX BD 2A2-A	5A2	UA					DIESEL GEN BATTERY CHGR			3		0.65			
0.00	480V DIESEL AUX BD 2A2-A	6A	UAD			1.00	2-FCV-67-66	EMG DSL ENG HT EXCH SUP VLV		0.125						
0.00	480V DIESEL AUX BD 2A2-A	6D	UA					DG ROOM EXH FAN 2A2-A		15	19.5					
0.00	480V DIESEL AUX BD 2A2-A	7A	UA					DG BD ROOM EXH FAN		3	4.6					

Prepared RJB
Checked CRM
Reviewed RBR
Date 1-15-86

B25 '86 0204 300 p73

TIME SI M.S	BOARD	CPT	CONT COMB	PHASE A	PHASE B	OPER TIME	COMPONENT UNID	COMPONENT DESCRIPTION	KVA	HP	FULLOAD CURRENT	RATED LOAD	KW	MOTOR EFF	MOTOR PF	MOTOR ILRI
0.00	480V ERCW MCC 2A-A	2A	UA					ERCW STRAINER A2A-A		3	7					
0.00	480V ERCW MCC 2A-A	5D	UA					ERCW STRAINER XFMR	1				0.85			
0.00	480V REACTOR MOV BD 2A1-A	3A	UAI	I	I	0.07	2-FCV-62-63	SEAL FLOW ISOL VLV		0.5						
0.00	480V REACTOR MOV BD 2A1-A	3B	UAI	I	I	0.09	2-FCV-62-90	CHR FLOW ISOL VLV		1.6						
0.00	480V REACTOR MOV BD 2A1-A	4A	UAI	I	I	0.10	2-LCV-62-135	REFUEL WTR STG TK VLV		1	2.4					
0.00	480V REACTOR MOV BD 2A1-A	4E	UAI	I	I	1.00	2-FCV-72-22	SPRAY HDR 2A CONT VLV		3.3	5.2					
0.00	480V REACTOR MOV BD 2A1-A	5C	UAI		I	1.00	2-FCV-72-39	CNTMT SPRAY HDR 2A ISOL VLV		3.3	5.2					
0.00	480V REACTOR MOV BD 2A1-A	7C2	UAI			1.00	2-FCV-74-12	RHR PMP 2A-A FLOW VLV		1.6	3.4					
0.00	480V REACTOR MOV BD 2A1-A	12A	UAI	I	I	1.00	2-FCV-63-26	SIS BORON INJ TK VLV		2	3.5					
0.00	480V REACTOR MOV BD 2A1-A	12E	UAI	I	I	0.11	2-FCV-63-39	SIS BORON INJ TK SHUTOFF VLV		2	3.5					
0.00	480V REACTOR MOV BD 2A1-A	15B	UAI	I	I	1.00	2-FCV-63-118	SIS TK 1 ISOL VLV		21	25					
0.00	480V REACTOR MOV BD 2A2-A	1D	UMW					480V SHDN XFMR 2A1-A COOL FAN		0.332						
0.00	480V REACTOR MOV BD 2A2-A	4A	UAI		I	0.30	2-FCV-67-83	LWR CNTMT 2A CLR SUP ISOL VLV		0.13	1.5					
0.00	480V REACTOR MOV BD 2A2-A	4B	UAI		I	0.56	2-FCV-67-87	LWR CONT 2A COOL DISCH ISOL VLV		0.125						
0.00	480V REACTOR MOV BD 2A2-A	4C	UAI		I	0.30	2-FCV-67-91	LWR CNTMT 2C CLR SUP ISOL VLV		0.13	1.5					
0.00	480V REACTOR MOV BD 2A2-A	5A	UAI		I	0.56	2-FCV-67-95	LWR CNTMT 2C CLR DISCH ISOL VLV		0.125	0.6					
0.00	480V REACTOR MOV BD 2A2-A	5B	UAI		I	0.36	2-FCV-67-104	LWR CNTMT 2B CLR DISCH ISOL VLV		0.33	1.5					
0.00	480V REACTOR MOV BD 2A2-A	5C	UAI		I	0.30	2-FCV-67-112	LWR CNTMT 2D CLR DISCH ISOL VLV		0.13	1.5					
0.00	480V REACTOR MOV BD 2A2-A	7B	UAI		I	0.18	2-FCV-67-130	UPPR CNTMT 2A ISOL VLV		0.133	1.5					
0.00	480V REACTOR MOV BD 2A2-A	7C	UAI		I	0.18	2-FCV-67-133	UPPR CNTMT 2C ISOL VLV		0.133	0.6					
0.00	480V REACTOR MOV BD 2A2-A	7E	UAI		I	0.18	2-FCV-67-139	UPPR CNTMT 2B ISOL VLV		0.13	0.6					
0.00	480V REACTOR MOV BD 2A2-A	8A	UAI		I	0.18	2-FCV-67-142	UPPR CNTMT 2D ISOL VLV		0.133	0.6					
0.00	480V REACTOR MOV BD 2A2-A	10A	UAI		I	0.16	2-FCV-67-295	UPPR CNTMT 2A ISOL VLV		0.125	0.6					
0.00	480V REACTOR MOV BD 2A2-A	10B	UAI		I	0.16	2-FCV-67-296	UPPR CNTMT 2C ISOL VLV		0.125	0.6					
0.00	480V REACTOR MOV BD 2A2-A	13B	UAI	I	I	0.06	2-FCV-26-243	RCP SPRAY ISOL VLV		0.67	2.1					
0.00	480V REACTOR MOV BD 2A2-A	14B	UAI	I	I	0.24	2-FCV-70-143	EXCESS LETDN INLET CONT/ISOL VLV		0.13	0.45					
0.00	480V REACTOR MOV BD 2A2-A	14C	UAI		I	0.15	2-FCV-70-90	RC PMP CONTMT ISOL VLV		1	2.8					
0.00	480V REACTOR MOV BD 2A2-A	15A	UAI		I	0.24	2-FCV-70-92	RCP CNTMT ISOL VLV		0.13	0.45					
0.00	480V REACTOR MOV BD 2A2-A	15C	UAI		I		2-FCV-70-133	RCP THER BARR ISOL VLV		0.67	0.95					
0.00	480V REACTOR MOV BD 2A2-A	15E	UAI	I	I	0.07	2-FCV-26-240	CNTMT STAND PIPE ISOL VLV		0.67	2.1					
0.00	480V REACTOR MOV BD 2A2-A	16A	UAI		I	0.24	2-FCV-70-139	RCP CNTMT ISOL VLV		0.13	1.6					
0.00	480V REACTOR MOV BD 2A2-A	16B	UAI	I	I	0.07	2-FCV-3-33	STEAM GEN FW ISOL VLV		33	43					
0.00	480V REACTOR MOV BD 2A2-A	17C	UAI	I	I	0.06	2-FCV-3-87	STEAM GEN FW ISOL VLV		33	43					
0.00	480V REACTOR MOV BD 2A2-A	18C	UAI	I	I	1.00	2-FCV-26-242	ANN STD PIPE ISOL VLV		0.67	2.1					
0.00	480V REACTOR MOV BD 2A2-A	19E	UAI	I	I	1.00	2-FCV-26-245	ANN ISOL VLV		0.67	2.1					
0.00	480V SHUTDOWN BD 2A1-A	2B	UAS					ELEC BD RM AHU A-A		75	96					
0.00	480V SHUTDOWN BD 2A1-A	8C	UA					HT TR-CVC PNL A1 XFMR			54		38.25			
0.00	480V SHUTDOWN BD 2A1-A	10A	UA					NOR FDR VITAL BATT CKGR III					7.44			
0.00	480V SHUTDOWN BD 2A2-A	8C	UMW					CVS SYS HT TR XFMR B3			54		38.25			
0.00	480V SHUTDOWN BD 2A2-A	9C	UA					STANDBY LTG CAB LS 1			27		19.1			
0.00	6900V SHUTDOWN BD 2A-A	3	UA					480V SHDN XFMR 2A1-A								
0.00	6900V SHUTDOWN BD 2A-A	4	UA					480V SHDN XFMR 2A2-A								
0.00	6900V SHUTDOWN BD 2A-A	5	UA					480V SHDN XFMR 2A-A								
0.00	6900V SHUTDOWN BD 2A-A	22	UA					ERCW PMP STA XFMR 2A-A								
								Total		357.201			180.44			
0.02	480V CONT & AUX BLDG VENT BD 2A1-A	10E1	UA	I	I			AB GAS TMT SYS HUM HTR A-A			66.7		32			
0.02	480V CONT & AUX BLDG VENT BD 2A1-A	10D	UAI	I	I			CENT CHRG PMP 2A-A RM CLR FAN		5	6.1					
0.02	480V REACTOR MOV BD 2A1-A	2C2	UAI	I	I			CENT CHG PMP 2A AUX OIL PMP		2						
0.02	6900V SHUTDOWN BD 2A-A	1B	TAS	I	I			CENTRIFUGAL CHRG PMP 2A-A		680						
								Total		687						

Prepared RJB
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TIME SI M.S	BOARD	CPT	CONT COMB	PHASE A	PHASE B	OPER TIME	COMPONENT UNID	COMPONENT DESCRIPTION	KVA	HP	FULLOAD CURRENT	RATED LOAD	KW	MOTOR EFF	MOTOR PF	MOTOR %LRI
0.04	480V REACTOR MOV BD 2A2-A	2C	UAI			1.00	2-FCV-3-116A	ERCW 2A ISOL VLV		0.333	0.9					
0.04	480V REACTOR MOV BD 2A2-A	2B	UAI			1.00	2-FCV-3-116B	ERCW 2A ISOL VLV		0.333	0.9					
								Total		0.666						
0.05	6900V SHUTDOWN BD 2A-A	15	TAS	I	I			SAFETY INJ PMP 2A-A		410						
								Total		410						
0.06	480V REACTOR MOV BD 2A2-A	2E	UAI			1.00	2-FCV-3-136A	ERCW 2A ISOL VLV		0.7	2.3					
0.06	480V REACTOR MOV BD 2A2-A	3B	UAI			1.00	2-FCV-3-136B	ERCW 2A ISOL VLV		0.7	2.3					
								Total		1.4						
0.10	480V REACTOR MOV BD 2A1-A	5B	UAI			1.00	2-FCV-72-34	SPRAY PMP 1B RECIRC VLV		0.13	0.45					
0.10	480V REACTOR MOV BD 2A1-A	3E	UAI	I	I	1.00	2-LCV-62-132	VOL CONT TK ISOL VLV		0.67	0.7					
0.10	6900V SHUTDOWN BD 2A-A	14	TAS	I	I			RESIDUAL HT REMOVAL PMP 2A-A		425						
								Total		425.8						
0.15	6900V SHUTDOWN BD 2A-A	9	TAS	I	I			ESSENTIAL RCW PMP K-A		700						
								Total		700						
0.20	480V SHUTDOWN BD 2A1-A	4B	TAS	I	I			CCS PUMP 2A-A		350	404					
								Total		350						
0.25	6900V SHUTDOWN BD 2A-A	10	TAD	I	I			AUX FEED WTR PMP 2A-A		486						
								Total		486						
0.30	6900V SHUTDOWN BD 2A-A	13	TAS		I			CNTMT SPRAY PMP 2A A		690						
								Total		690						

Prepared QRB
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Date 1-15-86

TIME SI M.S	BOARD	CPT	CONT COMB	PHASE A	B	OPER TIME	COMPONENT UNID	COMPONENT DESCRIPTION	KVA	HP	FULLOAD CURRENT	RATED LOAD	KW	MOTOR EFF	MOTOR PF	MOTOR %LRI
3.20	480V SHUTDOWN BD 2A2-A	4D	UA					ELEC BD RM A/C COMPR A-A		125	148					
								Total		125						
5.00	480V DIESEL AUX BD 2A1-A	2D	UAD					DG DAY TNK FUEL OIL XFER PMP		1	2					
5.00	480V DIE... AUX BD 2A2-A	4A	UAD					DG DAY TNK FUEL OIL XFER PMP		1	2					
								Total		2						
10.00	480V SHUTDOWN BD 2A1-A	10C	UAI		I			CNTMT AIR RETURN FAN 2A-A		50	58					
								Total		50						
21.00	480V SHUTDOWN BD 2A2-A	2B	UA					SHTDN BD RM AIR HAND UNIT 2A-A		75	88					
21.00	480V SHUTDOWN BD 2A2-A	5D	UA					SHDN BD RM CHILLER PKG A-A		250	275					
								Total		325						
120.00	480V REACTOR MOV BD 2A1-A	6E	UAI			2.00	2-FCV-74-3	RHR PMP 2A-A FLOW VLV		1.6						
120.00	480V REACTOR MOV BD 2A1-A	13A	UA			0.42	2-FCV-63-72	CNTMT SUMP FLOW VLV		10.5	13.8					
								Total		12.1						

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TIME SI M.S	BOARD	CPT	CONT COMB	PHASE A	PHASE B	OPER TIME	COMPONENT UNID	COMPONENT DESCRIPTION	KVA	HP	FULLOAD CURRENT	RATED LOAD	KW	MOTOR EFF	MOTOR PF	MOTOR %LRI
T	480V CONT & AUX BLDG VENT BD 2B1-B	2A	UA					SHTDN XFMR RM 2B EXH FAN 2B3-B		2.5	4.1					
T	480V CONT & AUX BLDG VENT BD 2B1-B	2B	UA					SHTDN XFMR RM 2B EXH FAN 2B1-B		2.5	4.1					
T	480V CONT & AUX BLDG VENT BD 2B1-B	2C	UA					SHTDN XFMR RM 2B EXH FAN 2B2-B		3						
P	480V CONT & AUX BLDG VENT BD 2B1-B	2E	UAS					AUX CONT AIR COMPRSR B-B		20	25.7					
T	480V CONT & AUX BLDG VENT BD 2B1-B	3A	UA					RECIP CHG PMP RM CLR FAN		3	4.7					
T	480V CONT & AUX BLDG VENT BD 2B1-B	5E	UA					480V BD RM 2B A/C CPRSR 2B-B		60	75					
T	480V CONT & AUX BLDG VENT BD 2B1-B	8B	UA					480V BD RM 2B A/C COND 2B-B		25	32					
T	480V CONT & AUX BLDG VENT BD 2B1-B	9E	UA					480V BD RM 2B A/C AHU 2B-B		25	32					
P	480V DIESEL AUX BD 2B1-B	6C	UA					DG 2B-B AIR COMPRESSOR 2		10	13					
P	480V DIESEL AUX BD 2B2-B	6C	UA					DG 2B-B AIR COMPRESSOR 1		10						
T	480V REACTOR MOV BD 2B1-B	3D	UA					480V SHDN BD XFMR 2B1-B COOL FAN		0.33						
S	480V REACTOR MOV BD 2B1-B	4A	UA					BORIC ACID XFER PMP 2B-B		15	13					
T	480V REACTOR MOV BD 2B1-B	4E	UA					BORIC ACID TK B HTR B-B			8		9			
T	480V REACTOR MOV BD 2B2-B	2A	UA				2-FCV-1-18	STEAM FW PMP ISOL VLV		1.6						
T	480V REACTOR MOV BD 2B2-B	3D	UA					480V SHDN BD XFMR 2B-B COOL FAN(NOR FDR)		0.33						
								Total		178.26			9			
0.00	480V CONT & AUX BLDG VENT BD 2B1-B	1D2	UA					CONT PWR XFMR		1.5						
0.00	480V CONT & AUX BLDG VENT BD 2B1-B	3B	UAI					SI PMP 2B-B RM CLR FAN		3	4.7					
0.00	480V CONT & AUX BLDG VENT BD 2B1-B	4A	UA	I	I			PEN RM EL 669 CLR FAN 2B-B		5	6.1					
0.00	480V CONT & AUX BLDG VENT BD 2B1-B	4B	UA	I	I			PEN RM EL 690 CLR FAN 2B-B		5	6.1					
0.00	480V CONT & AUX BLDG VENT BD 2B1-B	4C	UA	I	I			PEN RM EL 714 CLR FAN 2B-B		5	6.1					
0.00	480V CONT & AUX BLDG VENT BD 2B1-B	5A	UAI					RES HT REM PMP 2B-B CLR FAN		5	3.8					
0.00	480V CONT & AUX BLDG VENT BD 2B1-B	5B	UAI		I			CNTMT SPRAY PMP 2B-B CLR FAN		5						
0.00	480V CONT & AUX BLDG VENT BD 2B1-B	5C	UA	I	I			EMER GAS TMT RM CLR B-B		3	6.1					
0.00	480V CONT & AUX BLDG VENT BD 2B1-B	6C	UA					UNIT CONT ANN SYS	3		6		2.55			
0.00	480V CONT & AUX BLDG VENT BD 2B1-B	6D	UMW				RE-90-126	CONT RM INTAKE RAD MON		0.75	1.4					
0.00	480V CONT & AUX BLDG VENT BD 2B1-B	7C	UAS					480V BD RM 2A PRESS FAN 2A2-B		3	4.6					
0.00	480V CONT & AUX BLDG VENT BD 2B1-B	7D2	UMW				RE-90-12	CNTMT BLDG UP COMPT AIR MON		3	4.6					
0.00	480V CONT & AUX BLDG VENT BD 2B1-B	8A	UA					PRIM WTR MAKEUP PMP 2B		20	23.4					
0.00	480V CONT & AUX BLDG VENT BD 2B1-B	8D1	UMW				RE-90-99	COND VAC PMP AIR EXH MON		0.75	1.4					
0.00	480V CONT & AUX BLDG VENT BD 2B1-B	8D2	UMW				RE-90-131	CNTMT PURGE AIR EXH MON		0.75	1.4					
0.00	480V CONT & AUX BLDG VENT BD 2B1-B	8E	UA	I	I			PIPE CHASE CLR FAN 2B-B		20	24.1					
0.00	480V CONT & AUX BLDG VENT BD 2B1-B	9A	UAS					125V BATT RM IV EXH FAN 2A2-B		0.5						
0.00	480V CONT & AUX BLDG VENT BD 2B1-B	9C	UAI	I	I			AUX FDWTR & BA TRANS PMP SP CLR FAN B-B		5	6.1					
0.00	480V CONT & AUX BLDG VENT BD 2B1-B	9D	UAS					480V BD RM 2B FAN PRESS 2B2-B		3	4.6					
0.00	480V CONT & AUX BLDG VENT BD 2B1-B	11B	UAS					125V VIT BATT RM III FAN 2B2-B		0.5						
0.00	480V CONT & AUX BLDG VENT BD 2B1-B	12C	UMW					GAS EFF RAD MON		5	7.25					
0.00	480V CONT & AUX BLDG VENT BD 2B1-B	12D	UAI	I	I			AB GAS TMT SYS FAN B-B		20	24					
0.00	480V DIESEL AUX BD 2B1-B	1D	UA					CONTROL POWER XFMR	3				2.55			
0.00	480V DIESEL AUX BD 2B1-B	2C	UAD			1.00	2-FCV-67-65	EMG DSL ENG HT EXCH SUP VLV		0.125						
0.00	480V DIESEL AUX BD 2B1-B	4A	UA					DG ELEC PNL VENT FAN		15	20					
0.00	480V DIESEL AUX BD 2B1-B	5A1	UA					DIESEL GEN LT CAB LC48					38.25			
0.00	480V DIESEL AUX BD 2B1-B	6A	UA					DG ROOM EXH FAN 2B1-B		15	19.5					
0.00	480V DIESEL AUX BD 2B1-B	6D	UA					DG MUFFLER RM EXH FAN		1.5	2.8					
0.00	480V DIESEL AUX BD 2B1-B	7B	UA					DG BATT HOOD EXH FAN		0.33	0.9					
0.00	480V DIESEL AUX BD 2B2-B	1D	UA					CONTROL POWER XFMR	3				2.55			
0.00	480V DIESEL AUX BD 2B2-B	5A2	UA					DIESEL GEN BATTERY CHGR					0.65			
0.00	480V DIESEL AUX BD 2B2-B	6A	UAD			1.00	2-FCV-67-67	EMG DSL ENG HT EXCH SUP VLV		0.125						
0.00	480V DIESEL AUX BD 2B2-B	6D	UA					DG ROOM EXH FAN 2B2-B		15						
0.00	480V DIESEL AUX BD 2B2-B	7A	UA					DG BD ROOM EXH FAN		3						
0.00	480V ERCW MCC 2B-B	2A	UA					ERCW STRAINER B2B-B		3	7					

Prepared QJB

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TIME SI M.S	BOARD	CPT	CONT COMB	PHASE A	PHASE B	OPER TIME	COMPONENT UNID	COMPONENT DESCRIPTION	KVA	HP	FULLLOAD CURRENT	RATED LOAD	KW	MOTOR EFF	MOTOR PF	MOTOR %LRI
0.00	480V ERCW MCC 2B-B	5D	UA					ERCW STRAINER XFMR	1				0.85			
0.00	480V REACTOR MOV BD 2B1-B	7C	UAI	I	I	0.06	2-FCV-62-61	SEAL FLOW ISOL VLV		0.7						
0.00	480V REACTOR MOV BD 2B1-B	7E	UAI	I	I	0.09	2-FCV-62-91	CHR FLOW ISOL VLV		1.6						
0.00	480V REACTOR MOV BD 2B1-B	8C	UAI	I	I	0.10	2-LCV-62-136	CHG PMP FLOW VLV		1.4						
0.00	480V REACTOR MOV BD 2B1-B	10B	UAI	I	I	1.00	2-FCV-63-25	SIS BORON INJ TK VLV		2						
0.00	480V REACTOR MOV BD 2B1-B	11A	UAI	I	I	0.10	2-FCV-63-40	SIS BORON INJ TK VLV		2						
0.00	480V REACTOR MOV BD 2B1-B	13A	UAI			1.00	2-FCV-72-2	SPRAY HDR 1B ISOL VLV		3.3						
0.00	480V REACTOR MOV BD 2B1-B	13E	UAI	I	I	1.00	2-FCV-72-21	SPRAY HDR 2B CONT VLV (72-21)		3.3						
0.00	480V REACTOR MOV BD 2B1-B	14E	UAI			1.00	2-FCV-74-24	RHR PMP 1B FLOW VLV		1.6						
0.00	480V REACTOR MOV BD 2B2-B	2E	UAI	I	I	1.00	2-FCV-26-241	ANN ISOL VLV (26-241)		0.67						
0.00	480V REACTOR MOV BD 2B2-B	4A	UAI		I	0.36	2-FCV-67-88	LWR CNTMT 2A ISOL VLV		0.33						
0.00	480V REACTOR MOV BD 2B2-B	4B	UAI		I	0.36	2-FCV-67-96	LWR CNTMT 2B ISOL VLV		0.33						
0.00	480V REACTOR MOV BD 2B2-B	4C	UAI		I	0.30	2-FCV-67-99	LWR CNTMT 2B ISOL VLV		0.13						
0.00	480V REACTOR MOV BD 2B2-B	4E	UAI	I	I	1.00	2-FCV-26-244	ANN ISOL VLV		0.67						
0.00	480V REACTOR MOV BD 2B2-B	5A	UAI		I	0.54	2-FCV-67-103	LWR CNTMT 2B ISOL VLV		0.125						
0.00	480V REACTOR MOV BD 2B2-B	5B	UAI		I	0.36	2-FCV-67-107	LWR CNTMT 2D ISOL VLV		0.33						
0.00	480V REACTOR MOV BD 2B2-B	5C	UAI		I	0.54	2-FCV-67-111	LWR CNTMT 2D ISOL VLV		0.125						
0.00	480V REACTOR MOV BD 2B2-B	7A	UAI		I	0.18	2-FCV-67-131	UPPR CNTMT 2A ISOL VLV		0.133						
0.00	480V REACTOR MOV BD 2B2-B	7B	UAI		I	0.18	2-FCV-67-134	UPPR CNTMT 2C ISOL VLV		0.133						
0.00	480V REACTOR MOV BD 2B2-B	7C	UAI		I	0.18	2-FCV-67-138	UPPR CNTMT 2B ISOL VLV		0.133						
0.00	480V REACTOR MOV BD 2B2-B	8B	UAI		I	0.18	2-FCV-67-141	UPPR CNTMT 2D ISOL VLV		0.133						
0.00	480V REACTOR MOV BD 2B2-B	8D	UAI	I	I	0.42	0-FCV-67-152	COMPT HT EXC C VLV (67-152)		0.67						
0.00	480V REACTOR MOV BD 2B2-B	9B	UAI		I	0.17	2-FCV-67-297	UPPR CNTMT 2B ISOL VLV		0.125						
0.00	480V REACTOR MOV BD 2B2-B	9C	UAI		I	0.16	2-FCV-67-298	UPPR CNTMT 2D ISOL VLV		0.125						
0.00	480V REACTOR MOV BD 2B2-B	14C	UAI		I	0.15	2-FCV-70-87	RCP CNTMT ISOL VLV		0.7						
0.00	480V REACTOR MOV BD 2B2-B	15A	UAI		I	0.54	2-FCV-70-89	RC PMP CONTMT ISOL VLV		0.125						
0.00	480V REACTOR MOV BD 2B2-B	15B	UAI		I		2-FCV-70-134	RCOP ISOL VLV		0.125						
0.00	480V REACTOR MOV BD 2B2-B	15C	UAI		I	0.24	2-FCV-70-140	RCP CNTMT ISOL VLV		0.13						
0.00	480V REACTOR MOV BD 2B2-B	16C	UAI	I	I	0.06	2-FCV-3-47	STEAM GEN FW ISOL VLV		33						
0.00	480V REACTOR MOV BD 2B2-B	17A	UAI	I	I	0.06	2-FCV-3-100	STEAM GEN FW ISOL VLV		33						
0.00	480V SHUTDOWN BD 2B1-B	3A	UAS					ELEC BD RM AHU B-B		75	96					
0.00	480V SHUTDOWN BD 2B1-B	8C	UA					HT TR-CVC PNL B1 & B2 XFMR			54		38.25			
0.00	480V SHUTDOWN BD 2B1-B	8D	UA					STANDBY LTG CAB LS 3		40	27		19.1			
0.00	480V SHUTDOWN BD 2B2-B	8C	UMW					CVS SYS HT TR XFMR B3			54		38.25			
0.00	480V SHUTDOWN BD 2B2-B	10A	UMW					125V VITAL BATT CHGR IV			47		7.44			
0.00	6900V SHUTDOWN BD 2B-B	3	UA					480V SHDN XFMR 2B1-B								
0.00	6900V SHUTDOWN BD 2B-B	4	UA					480V SHDN XFMR 2B2-B								
0.00	6900V SHUTDOWN BD 2B-B	5	UA					480V SHDN XFMR 2B-B								
0.00	6900V SHUTDOWN BD 2B-B	22	UA					480V XFMR 2B-B								
								Total		369.972			150.44			
0.02	480V CONT & AUX BLDG VENT BD 2B1-B	6E2	UA	I	I			AB GAS TMT SYS HUM HTR B-B					32			
0.02	480V CONT & AUX BLDG VENT BD 2B1-B	3C	UAI	I	I			CENT CHRG PMP 2B-B RM CLR FAN		5	6.1					
0.02	480V REACTOR MOV BD 2B1-B	5C2	UAI	I	I			CENT CHG PMP 2B AUX OIL PMP		2	3.1					
0.02	6900V SHUTDOWN BD 2B-B	1B	TAS	I	I			CENTRIFUGAL CHRG PMP 2B-B		680						
								Total		687						
0.04	480V REACTOR MOV BD 2B2-B	2C	UAI			1.00	2-FCV-3-126A	ERCW 2B ISOL VLV (3-126A)		0.333						
0.04	480V REACTOR MOV BD 2B2-B	2B	UAI			1.00	2-FCV-3-126B	ERCW 2B ISOL VLV		0.333						

Prepared RJB

Checked CRM

Reviewed BDK

TIME SI M.S	BOARD	CPT	CONT COMB	PHASE A	PHASE B	OPER TIME	COMPONENT UNID	COMPONENT DESCRIPTION	KVA	HP	FULLOAD CURRENT	RATED LOAD	KW	MOTOR EFF	MOTOR PF	MOTOR ILRI
								Total		0.666						
0.05	6900V SHUTDOWN BD 2B-B	15	TAS	I	I			SAFETY INJ PMP 2B-B		410						
								Total		410						
0.09	480V REACTOR MOV BD 2B2-B	11B	UAI			1.00	2-FCV-3-179B	ERCW 1B ISOL VLV		0.7						
0.09	480V REACTOR MOV BD 2B2-B	11E	UAI			1.00	2-FCV-3-179A	ERCW 1B ISOL VLV		0.7						
								Total		1.4						
0.10	480V REACTOR MOV BD 2B1-B	13B	UAI			1.00	2-FCV-72-13	SPRAY PMP 1B RECIRC VLV		0.125						
0.10	480V REACTOR MOV BD 2B1-B	8B	UAI	I	I	1.00	2-LCV-62-133	VOL CONT TK ISOL VLV		0.4						
0.10	6900V SHUTDOWN BD 2B-B	14	TAS	I	I			RESIDUAL HT REMOVAL PMP 2B-B		425						
								Total		425.525						
0.15	6900V SHUTDOWN BD 2B-B	8	TAS	I	I			ESSENTIAL RCW PMP P-B		700						
								Total		700						
0.20	480V REACTOR MOV BD 2B2-B	7E	UA			1.00	2-FCV-70-207	CNDS DEMIN SUP VLV		0.125						
0.20	480V SHUTDOWN BD 2B1-B	3C	TAS	I	I			CCS PUMP 2B-B		350	404					
0.20	480V SHUTDOWN BD 2B2-B	2D	TAS	I	I			CCS PMP C-S(NOR FDR)		350	404					
								Total		700.125						
0.25	6900V SHUTDOWN BD 2B-B	10	TAS	I	I			AUX FEED WTR PMP 2B-B		486						
								Total		486						
0.30	6900V SHUTDOWN BD 2B-B	13	TAS		I			CNTMT SPRAY PMP 2B-B		690						
								Total		690						
3.20	480V SHUTDOWN BD 2B2-B	2B	UA					ELEC BD RM A/C COMPR B-B		125	148					
								Total		125						

Prepared RJB
Checked CRM
Reviewed BBR
Date 1-15-86

TIME SI M.S	BOARD	CPT	CONT COMB	PHASE A	PHASE B	OPER TIME	COMPONENT UNID	COMPONENT DESCRIPTION	KVA	HP	FULLOAD CURRENT	RATED LOAD	KW	MOTOR EFF	MOTOR PF	MOTOR %LRI
5.00	480V DIESEL AUX BD 2B1-B	2D	UAD					DG DAY TNK FUEL OIL XFER PMP		1	2					
5.00	480V DIESEL AUX BD 2B2-B	4A	UAD					DG DAY TNK FUEL OIL XFER PMP		1						
								Total		2						
10.00	480V SHUTDOWN BD 2B2-B	9C	UAI		I			CNTMT AIR RETURN FAN 2B-B		50	58					
								Total		50						
15.00	480V SHUTDOWN BD 2B2-B	10D	TPD					MN TURB TURN GEAR OIL PMP		75	130					
								Total		75						
21.00	480V SHUTDOWN BD 2B2-B	3A	UA					SHTDN BD RM AIR HAND UNIT 2B-B		75	88					
								Total		75						
120.00	480V REACTOR MOV BD 2B1-B	11C	UA			0.43	2-FCV-63-73	CNTMT SUMP FLOW VLV		10.5						
120.50	480V REACTOR MOV BD 2B1-B	14C	UAI			2.00	2-FCV-74-21	RHR PMP 2B-B CONT VLV		1.6						
								Total		12.1						

Prepared GAB

Checked CRM

Reviewed BBR

Date 1-15-86

ATTACHMENT

D

Diesel Generator Loading Total HP (Summary) at:
a. BO (Summary)
b. BO with Phase A Isolation (Summary)
c. BO with Phase B Isolation (Summary)

B25 '86 0204 300 p81

TIME	TRAIN 1A	SUM	RANDOM SUM	TRAIN 1B	SUM	RANDOM SUM	TRAIN 2A	SUM	RANDOM SUM	TRAIN 2B	SUM	RANDOM SUM
0 sec	626	626	841	577	577	845	685	685	949	679	679	958
2 sec	687	1313	1528	687	1264	1532	687	1372	1636	687	1366	1645
15 sec	700	2013	2228	700	1964	2232	700	2072	2336	700	2066	2345
20 sec	385	2398	2613	385	2349	2617	365	2437	2701	715	2781	3060
25 sec	486	2884	3099	486	2835	3103	486	2923	3187	486	3267	3546
90 sec	650	3534	3750	650	3485	3754	650	3573	3837	650	3917	4197
120 sec	200	3734	3950	200	3685	3954	200	3773	4037	200	4117	4397
200 sec	125	3859	4075	125	3810	4079	125	3898	4162	125	4242	4522
5 min	2	3861	4077	2	3812	4081	2	3900	4164	2	4244	4524
15 min		3861	4077	75	3887	4156		3900	4164	75	4319	4599
21 min	75	3936	4152	325	4212	4481	325	4225	4489	75	4394	4674
RANDOM	216			268			264			279		

Prepared RJB
Checked CRM
Reviewed
Date

Sequoyah Nuclear Plant - Diesel Generator Loading at Blackout with Phase A Isolation

TIME	TRAIN 1A	SUM	RANDOM SUM	TRAIN 1B	SUM	RANDOM SUM	TRAIN 2A	SUM	RANDOM SUM	TRAIN 2B	SUM	RANDOM SUM
0 sec	809	809	967	738	738	948	837	837	1012	813	813	1004
2 sec	687	1496	1654	687	1425	1635	730	1567	1742	730	1543	1734
4 sec	1	1497	1654	1	1426	1636	1	1568	1743	1	1544	1734
5 sec	410	1907	2064	410	1836	2046	410	1978	2153	410	1954	2144
6 sec	1	1908	2066		1836	2046	1	1979	2154		1954	2144
9 sec		1908	2066	1	1837	2047		1979	2154	1	1955	2146
10 sec	426	2334	2491	425	2262	2473	426	2405	2580	426	2381	2571
15 sec	700	3034	3191	700	2962	3173	700	3105	3280	700	3081	3271
20 sec	370	3404	3562	370	3333	3543	350	3455	3630	700	3781	3971
21 sec	15	3419	3577	15	3348	3558	15	3470	3645	15	3796	3986
25 sec	486	3905	4063	486	3834	4044	486	3956	4131	486	4282	4472
200 sec	125	4030	4188	125	3959	4169	125	4081	4256	125	4407	4597
5 min	2	4032	4190	2	3961	4171	2	4083	4258	2	4409	4599
15 min		4032	4190	75	4036	4246		4083	4258	75	4484	4674
21 min	75	4107	4265	325	4361	4571	325	4408	4583	75	4559	4749
RANDOM	158			210			175			190		

Prepared RJB
Checked CRM
Reviewed
Date

Sequoyah Nuclear Plant - Diesel Generator Loading at Blackout with Phase B Isolation

TIME	TRAIN 1A	SUM	RANDOM SUM	TRAIN 1B	SUM	RANDOM SUM	TRAIN 2A	SUM	RANDOM SUM	TRAIN 2B	SUM	RANDOM SUM
0 sec	572	572	730	501	501	711	599	599	774	572	572	762
2 sec	687	1259	1417	687	1188	1398	687	1286	1461	687	1259	1449
4 sec	1	1260	1418	1	1188	1398	1	1287	1462	1	1259	1450
5 sec	410	1670	1828	410	1598	1808	410	1697	1872	410	1669	1860
6 sec	1	1672	1829		1598	1808	1	1698	1873		1669	1860
9 sec		1672	1829	1	1600	1810		1698	1873	1	1671	1861
10 sec	426	2097	2255	426	2025	2235	426	2124	2299	426	2096	2287
15 sec	700	2797	2955	700	2725	2935	700	2824	2999	700	2796	2987
20 sec	370	3167	3325	370	3095	3306	350	3174	3349	700	3496	3687
25 sec	486	3653	3811	486	3581	3792	486	3660	3835	486	3982	4173
30 sec	690	4343	4501	690	4271	4482	690	4350	4525	690	4672	4863
200 sec	125	4468	4626	125	4396	4607	125	4475	4650	125	4797	4988
5 min	2	4470	4628	2	4398	4609	2	4477	4652	2	4799	4990
10 min	50	4520	4678	50	4448	4659	50	4527	4702	50	4849	5040
15 min		4520	4678	75	4523	4734		4527	4702	75	4924	5115
21 min	75	4595	4753	325	4848	5059	325	4852	5027	75	4999	5190
RANDOM	158			210			175			190		

Prepared RJB

Checked CRM

Reviewed

Date

ATTACHMENT

E

Kva Total for BO:
a. Random Loads Starting Kva for 2B1 Boards (File=B:RANBO)
b. Random Loads Starting Kva for 2B2 Boards (File=B:RANBO2)
c. T=O Loads Starting Kva for 2B1 Boards (File=B:BOUT)
d. T=O Loads Starting Kva for 2B2 Boards (File=B:BOUT2)

Kva Total for BO & SI-PhA:
a. Random Loads Starting Kva for 2B1 Boards (File=B:RANPHA)
b. Random Loads Starting Kva for 2B2 Boards (File=B:RANPHA2)
c. T=O Loads Starting Kva for 2B1 Boards File=B:PHASEA)
d. T=O Loads Starting Kva for 2B2 Boards (File=B:PHASEA2)

Kva Total for BO & SI-PhB:
a. Random Loads Starting Kva for 2B1 Boards (File=B:RANPHB)
b. Random Loads Starting Kva for 2B2 Boards (File=B:RANPHB2)
c. T=O Loads Starting Kva for 2B1 Boards (File=B:PHASEB)
d. T=O Loads Starting Kva for 2B2 Boards

DATA FILE = B:N2S2B1-B.DAT PREPARED BY : QIB DATE 1/13/86

LOADING FILE = B:RANBO CHECKED BY : CRM DATE 1-13-86

This run was made on 01-09-1986 at 10:08:18

SOURCE and TRANSFORMER DATA

SOURCE VOLTAGE = 6900 Volts

SOURCE IMPEDANCE = 0+j 0 %/%

TRANSFORMER TAP = .975

TOTAL LOAD = 1201 kVA @ 58.73°
TOTAL CURRENT = 1408 Amps

480V SHUTDOWN BD 2B1-B

BOARD LOAD(except MCCs) = 0 kVA @@ 0.00°
CONSTANT Z LOAD @ CALCULATED V(except MCCs) = 0 kVA @@ 0.00°
CONSTANT kVA LOAD (except MCCs) = 0 kVA @@ 0.00°
BOARD VOLTAGE = 464 VOLTS

STARTING MOTORS — TERMINAL VOLTAGES

RUNNING LOADS — TERMINAL VOLTAGES

A1	DUMMY LOAD	0 HP	464 V

DATA FILE = B:N2S2B1-B.DAT PREPARED BY : RJB DATE 1/13/86

LOADING FILE = B:RANBO CHECKED BY : CRM DATE 1-13-86

This run was made on 01-09-1986 at 10:08:27

480V REACTOR MOV BD 2B1-B

BOARD LOAD = 83 kVA @@ 49.63^
CONSTANT Z LOAD @ CALCULATED V (except MCCs)= 82.72058 kVA @@ 49.77^
CONSTANT kVA LOAD (except MCCs)= 0 kVA @@ 0.00^
BOARD CURRENT = 104 Amps
BOARD VOLTAGE = 461 Volts

STARTING MOTORS				TERMINAL VOLTAGES
C1		BORIC ACID XFER PMP 2B-B	15 HP	442 V

RUNNING LOADS				TERMINAL VOLTAGES
B4	6 KW	SIS BOARD INJ TK HTR 2B-B	0 HP	445 V
C3	9 KW	BORIC ACID TK B HTR B-B	0 HP	439 V

DATA FILE = B:N2S2B1-B.DAT PREPARED BY : CHB DATE 1/13/86

LOADING FILE = B:RANBO CHECKED BY : CRM DATE 1-13-86

This run was made on 01-09-1986 at 10:08:42

480V CONT & AUX BLDG VENT BD 2B1-B

BOARD LOAD = 944 kVA θ@ 58.13+
CONSTANT Z LOAD @ CALCULATED V (except MCCs)= 943.9046 kVA θ@ 58.12+
CONSTANT kVA LOAD (except MCCs)= 0 kVA θ@ 0.00+
BOARD CURRENT = 1226 Amps
BOARD VOLTAGE = 445 Volts

STARTING MOTORS			TERMINAL VOLTAGES
B1	SHTDN XFMR RM 2B EXH FAN 2B3-B	2.5 HP	435 V
B2	SHTDN XFMR RM 2B EXH FAN 2B1-B	2.5 HP	435 V
B3	SHTDN XFMR RM 2B EXH FAN 2B2-B	2.5 HP	436 V
B4	AUX CONT AIR CMPRSR B-B	20 HP	413 V
B5	RECIP CHG PMP RM CLR FAN	3 HP	431 V
C2	PEN RM EL 669 CLR FAN 2B-B	5 HP	418 V
C3	PEN RM EL 690 CLR FAN 2B-B	5 HP	427 V
C4	PEN RM EL 714 CLR FAN 2B-B	5 HP	433 V
D1	EMER GAS TMT RM CLR B-B	3 HP	440 V
D3	480V BD RM 2B A/C 2B-B	60 HP	425 V
E4	480V BD RM 2B A/C 2B-B	25 HP	416 V
E6	PIPE CHASE CLR FAN 2B-B	20 HP	395 V
F5	480V BD RM 2B A/C 2B-B	25 HP	432 V

RUNNING LOADS			TERMINAL VOLTAGES
D6R 32 KW	AUX BLDG GAS TMT HTR B-B	0 HP	434 V

DATA FILE = B:N2S2B1-B.DAT

PREPARED BY : QJB DATE 1/13/86

LOADING FILE = B:RANBO

CHECKED BY : CRM DATE 1-13-86

This run was made on 01-09-1986 at 10:09:18

430V REACTOR VENT BD 2B-B

BOARD LOAD = 1 kVA θ@ 45.97+
CONSTANT Z LOAD @ CALCULATED V (except MCCs)= 0 kVA θ@ 0.00+
CONSTANT kVA LOAD (except MCCs)= 1 kVA θ@ 0.00+
BOARD CURRENT = 1 Amps
BOARD VOLTAGE = 464 Volts

STARTING MOTORS			TERMINAL VOLTAGES

RUNNING LOADS			TERMINAL VOLTAGES
C2	INCORE INSTR RM SUP FAN	.75 HP	461 V

DATA FILE = B:N2S2B1-B.DAT PREPARED BY : GZB DATE 1/13/86

LOADING FILE = B:RANBO CHECKED BY : CRM DATE 1-13-86

This run was made on 01-09-1986 at 10:09:27

480V DIESEL AUX BD 2B1-B

BOARD LOAD = 62 kVA θ@ 56.57°
CONSTANT Z LOAD @ CALCULATED V (except MCCs)= 62.00001 kVA θ@ 56.57°
CONSTANT kVA LOAD (except MCCs)= 0 kVA θ@ 0.00°
BOARD CURRENT = 79 Amps
BOARD VOLTAGE = 455 Volts

STARTING MOTORS			TERMINAL VOLTAGES
E6	DG 2B-B AIR COMPRESSOR 2	10 HP	446 V

RUNNING LOADS	TERMINAL VOLTAGES

DATA FILE = B:N2S2B2-B.DAT PREPARED BY : QJB DATE 1/13/86

LOADING FILE = B:RANBO2 CHECKED BY : CRM DATE 1-13-86

This run was made on 01-09-1986 at 15:05:07

SOURCE and TRANSFORMER DATA

SOURCE VOLTAGE = 6900 Volts

SOURCE IMPEDANCE = 0+j 0 %

TRANSFORMER TAP = .975

TOTAL LOAD = 93 kVA @ 54.72°
TOTAL CURRENT = 109 Amps

480V SHUTDOWN BD 2B2-B

BOARD LOAD(except MCCs) = 0 kVA @@ 0.00°
CONSTANT Z LOAD @ CALCULATED V(except MCCs) = 0 kVA @@ 0.00°
CONSTANT kVA LOAD (except MCCs) = 0 kVA @@ 0.00°
BOARD VOLTAGE = 490 VOLTS

STARTING MOTORS		TERMINAL VOLTAGES

RUNNING LOADS		TERMINAL VOLTAGES
A1	0 HP	490 V

DATA FILE = B:N2S2B2-B.DAT PREPARED BY : RJB DATE 1/13/86

LOADING FILE = B:RANBO2 CHECKED BY : CRm DATE 1-13-86

This run was made on 01-09-1986 at 15:05:16

480V REACTOR MOV BD 2B2-B

BOARD LOAD = 21 kVA @@ 48.89+
CONSTANT Z LOAD @ CALCULATED V (except MCCs)= 21 kVA @@ 48.89+
CONSTANT kVA LOAD (except MCCs)= 0 kVA @@ 0.00+
BOARD CURRENT = 25 Amps
BOARD VOLTAGE = 489 Volts

STARTING MOTORS			TERMINAL VOLTAGES
B3 2-FCV-1-18	STEAM FW PMP ISOL VLV	1.6 HP	459 V

RUNNING LOADS	TERMINAL VOLTAGES

DATA FILE = B:N2S2B2-B.DAT

PREPARED BY : QJB DATE 1/13/86

LOADING FILE = B:RANBO2

CHECKED BY : CRM DATE 1-13-86

This run was made on 01-09-1986 at 15:05:26

480V CONT & AUX BLDG VENT BD 2B2-B

BOARD LOAD = 0 kVA @@ 0.00+
CONSTANT Z LOAD @ CALCULATED V (except MCCs)= 0 kVA @@ 0.00+
CONSTANT kVA LOAD (except MCCs)= 0 kVA @@ 0.00+
BOARD CURRENT = 0 Amps
BOARD VOLTAGE = 490 Volts

	STARTING MOTORS		TERMINAL VOLTAGES

	RUNNING LOADS		TERMINAL VOLTAGES
A1	DUMMY LOAD	0 HP	490 V

DATA FILE = B:N2S2B2-B.DAT PREPARED BY : RJB DATE 1/13/86

LOADING FILE = B:RANB02 CHECKED BY : CRM DATE 1-13-86

This run was made on 01-09-1986 at 15:05:33

480V DIESEL AUX BD 2B2-B

BOARD LOAD = 70 kVA @@ 57.13
CONSTANT Z LOAD @ CALCULATED V (except MCCs)= 70 kVA @@ 57.13
CONSTANT kVA LOAD (except MCCs)= 0 kVA @@ 0.00
BOARD CURRENT = 84 Amps
BOARD VOLTAGE = 480 Volts

	STARTING MOTORS		TERMINAL VOLTAGES
D2	DG AIR COMPRESSOR	10 HP	475 V

RUNNING LOADS	TERMINAL VOLTAGES

DATA FILE = B:N2S2B2-B.DAT

LOADING FILE = B:RANBO2

PREPARED BY : QJB DATE 1/13/86

CHECKED BY : CRM DATE 1-13-86

This run was made on 01-09-1986 at 15:05:42

I & C VITAL POWER

BOARD LOAD = 0 kVA θ@ 0.00+
CONSTANT Z LOAD @ CALCULATED V (except MCCs)= 0 kVA θ@ 0.00+
CONSTANT kVA LOAD (except MCCs)= 0 kVA θ@ 0.00+
BOARD CURRENT = 0 Amps
BOARD VOLTAGE = 490 Volts

STARTING MOTORS			TERMINAL VOLTAGES

RUNNING LOADS			TERMINAL VOLTAGES
A1	DUMMY LOAD	0 HP	490 V

DATA FILE = B:N2S2B1-B.DAT PREPARED BY : QJB DATE 1/13/86

LOADING FILE = B:BOUT CHECKED BY : CRM DATE 1-13-86

This run was made on 01-09-1986 at 10:14:18

SOURCE and TRANSFORMER DATA

SOURCE VOLTAGE = 6900 Volts

SOURCE IMPEDANCE = 0+j 0 %

TRANSFORMER TAP = .975

TOTAL LOAD = 1755 kVA θ 60.39°
TOTAL CURRENT = 2058 Amps

480V SHUTDOWN BD 2B1-B

BOARD LOAD(except MCCs) = 1021 kVA θ@ 62.84°
CONSTANT Z LOAD @ CALCULATED V(except MCCs) = 1020.009 kVA θ@ 62.86°

CONSTANT kVA LOAD (except MCCs) = 0 kVA θ@ 0.00°
BOARD VOLTAGE = 450 VOLTS

STARTING MOTORS			TERMINAL VOLTAGES
B4	ELEC BD RM AHU B-B	75 HP	407 V
B5	CRDM COOL FAN 2B	75 HP	399 V
C2	RLCC FAN 2B-B	50 HP	417 V

RUNNING LOADS			TERMINAL VOLTAGES
C5 45 KVA	HT TR-CVC B1 XFMR	0 HP	449 V
C6 20 KVA	STANDBY LTG CAB LS3 XFMR	0 HP	437 V

DATA FILE = B:N2S2B1-B.DAT

PREPARED BY : RJB DATE 1/13/86

LOADING FILE = B:BOUT

CHECKED BY : CRM DATE 1-13-86

This run was made on 01-09-1986 at 10:14:38

480V REACTOR MOV BD 2B1-B

BOARD LOAD = 2 kVA θ@ 53.13°
CONSTANT Z LOAD @ CALCULATED V (except MCCs)= 0 kVA θ@ 0.00°
CONSTANT kVA LOAD (except MCCs)= 2 kVA θ@ 0.00°
BOARD CURRENT = 3 Amps
BOARD VOLTAGE = 450 Volts

STARTING MOTORS				TERMINAL VOLTAGES

RUNNING LOADS				TERMINAL VOLTAGES
F1	2-FCV-63-6	SIS PMP INLET PMP VLV	.67 HP	447 V

DATA FILE = B:N2S2B1-B.DAT

PREPARED BY : QJB DATE 1/13/86

LOADING FILE = B:BOUT

CHECKED BY : CRM DATE 1-13-86

This run was made on 01-09-1986 at 10:14:47

480V CONT & AUX BLDG VENT BD 2B1-B

BOARD LOAD = 395 kVA θ@ 51.97+
CONSTANT Z LOAD @ CALCULATED V (except MCCs)= 395.8431 kVA θ@ 51.91+
CONSTANT kVA LOAD (except MCCs)= 0 kVA θ@ 0.00+
BOARD CURRENT = 516 Amps
BOARD VOLTAGE = 442 Volts

STARTING MOTORS				TERMINAL VOLTAGES
B6		SI PMP 2B-B RM CLR FAN	3 HP	422 V
C5		RES HT REM PMP 2B-B FAN	3 HP	420 V
C6		CONT SPRAY PMP 2B-B CLR FAN	5 HP	415 V
D2		CNTMT ANN VACUUM FAN 2B	1.5 HP	431 V
D5	RE-90-126	CONT RM INTAKE RAD MON	.75 HP	434 V
E1		480V BD RM 2A FAN 2A2-B	3 HP	433 V
E2R	RE-90-112	CNTMT BLDG UP COMPT AIR MON	3 HP	431 V
E3		PRIM WTR MAKEUP PMP 2B	20 HP	412 V
E5L	RE-90-99	COND VAC PMP AIR EXH MON	.75 HP	430 V
E5R	RE-90-131	CNT PURGE AIR EXH MON	.75 HP	434 V
F1		125V BATT RM IV EXH FAN 2A2-B	2 HP	429 V
F3		AUX FDWTR & BA CLR FAN B-B	5 HP	426 V
F4		480V BD RM 2B FAN 2B2-B	3 HP	427 V
F6		SHTDN BD RM B FAN 2B-B	1 HP	439 V
G2		125V VIT BATT RM III FAN 2B2-B	2 HP	429 V
G4		GAS EFF RAD MON	5 HP	416 V

RUNNING LOADS				TERMINAL VOLTAGES
D4	3 KVA	UNIT CONT ANN SYS	0 HP	441 V

DATA FILE = B:N2S2B1-B.DAT PREPARED BY : QJB DATE 1/13/86

LOADING FILE = B:BOUT CHECKED BY : CRm DATE 1-13-86

This run was made on 01-09-1986 at 10:15:34

480V REACTOR VENT BD 2B-B

BOARD LOAD = 1 kVA θ@ 45.97∠
CONSTANT Z LOAD @ CALCULATED V (except MCCs)= 0 kVA θ@ 0.00∠
CONSTANT kVA LOAD (except MCCs)= 1 kVA θ@ 0.00∠
BOARD CURRENT = 1 Amps
BOARD VOLTAGE = 450 Volts

STARTING MOTORS			TERMINAL VOLTAGES
RUNNING LOADS			TERMINAL VOLTAGES
C2	INCORE INSTR RM SUP FAN	.75 HP	447 V

DATA FILE = B:N2S2B1-B.DAT PREPARED BY : BJB DATE 1/13/86

LOADING FILE = B:BOUT CHECKED BY : CRM DATE 1-13-86

This run was made on 01-09-1986 at 10:15:44

480V DIESEL AUX BD 2B1-B

BOARD LOAD = 177 kVA θ@ 46.76∸
CONSTANT Z LOAD @ CALCULATED V (except MCCs)= 177.2845 kVA θ@ 46.65∸
CONSTANT kVA LOAD (except MCCs)= 0 kVA θ@ 0.00∸
BOARD CURRENT = 242 Amps
BOARD VOLTAGE = 422 Volts

STARTING MOTORS				TERMINAL VOLTAGES
B2	2-FCV-67-65	DSL ENG HT EXCH SUP VLV	.125 HP	421 V
D6		DG ELECT PNL VENTILATION FAN	15 HP	414 V
E4		DG ROOM EXH FAN 2-B	15 HP	416 V
F1		DG MUFFLER RM EXH FAN	1.5 HP	420 V
F2		DG BATT HOOD EXH FAN	.33 HP	421 V

RUNNING LOADS				TERMINAL VOLTAGES
E2L	45 KVA	DG B LIGHTING CAB LC 48	0 HP	419 V

DATA FILE = B:N2S2B2-B.DAT PREPARED BY : QJB DATE 1/13/86

LOADING FILE = B:BOUT2 CHECKED BY : CRm DATE 1-13-86

This run was made on 01-09-1986 at 15:55:48

SOURCE and TRANSFORMER DATA

SOURCE VOLTAGE = 6900 Volts

SOURCE IMPEDANCE = 0+j 0 %/%

TRANSFORMER TAP = .975

TOTAL LOAD = 916 kVA θ 63.10°
TOTAL CURRENT = 1074 Amps

480V SHUTDOWN BD 2B2-B

BOARD LOAD(except MCCs) = 750 kVA θ@ 63.26°
CONSTANT Z LOAD @ CALCULATED V(except MCCs) = 750.2521 kVA θ@ 63.26°

CONSTANT kVA LOAD (except MCCs) = 0 kVA θ@ 0.00°
BOARD VOLTAGE = 470 VOLTS

STARTING MOTORS			TERMINAL VOLTAGES
B5	CRD MECH COOL FAN 2D	75 HP	427 V
C3	REACT LWR COMPT COOL FAN 2D-B	50 HP	438 V

RUNNING LOADS			TERMINAL VOLTAGES
C4 45 kVA	CVC SYS HT TR XFMR B3	0 HP	469 V

DATA FILE = B:N2S2B2-B.DAT

PREPARED BY : RTB DATE 1/13/86

LOADING FILE = B:BOUT2

CHECKED BY : CRM DATE 1-13-86

This run was made on 01-09-1986 at 15:56:03

480V REACTOR MOV BD 2B2-B

BOARD LOAD = 2 kVA θ@ 53.13°
CONSTANT Z LOAD @ CALCULATED V (except MCCs)= 0 kVA θ@ 0.00°
CONSTANT kVA LOAD (except MCCs)= 2 kVA θ@ 0.00°
BOARD CURRENT = 2 Amps
BOARD VOLTAGE = 470 Volts

STARTING MOTORS — TERMINAL VOLTAGES

RUNNING LOADS — TERMINAL VOLTAGES

J4	2-FCV-70-87	RCP CNTMT ISOL VLV	.7 HP	469 V

DATA FILE = B:N2S2B2-B.DAT PREPARED BY : QTB DATE 1/13/86

LOADING FILE = B:BOUT2 CHECKED BY : CRm DATE 1-13-86

This run was made on 01-09-1986 at 15:56:10

480V CONT & AUX BLDG VENT BD 2B2-B

BOARD LOAD = 0 kVA θ@ 0.00+
CONSTANT Z LOAD @ CALCULATED V (except MCCs)= 0 kVA θ@ 0.00+
CONSTANT kVA LOAD (except MCCs)= 0 kVA θ@ 0.00+
BOARD CURRENT = 0 Amps
BOARD VOLTAGE = 470 Volts

STARTING MOTORS — TERMINAL VOLTAGES

RUNNING LOADS — TERMINAL VOLTAGES

A1	DUMMY LOAD	0 HP	470 V

DATA FILE = B:N2S2B2-B.DAT

LOADING FILE = B:BOUT2

PREPARED BY : QJB DATE 1/13/86

CHECKED BY : CRm DATE 1-13-86

This run was made on 01-09-1986 at 15:56:17

480V DIESEL AUX BD 2B2-B

BOARD LOAD = 118 kVA θ@ 56.10+
CONSTANT Z LOAD @ CALCULATED V (except MCCs)= 113 kVA θ@ 56.44+
CONSTANT kVA LOAD (except MCCs)= 6 kVA θ@ 0.00+
BOARD CURRENT = 151 Amps
BOARD VOLTAGE = 452 Volts

STARTING MOTORS				TERMINAL VOLTAGES
D1	2-FCV-67-67	EMG DSL ENG HT EXCH SUP VLV	.125 HP	452 V
D3		DG ROOM EXH FAN	15 HP	445 V
D4		DG BD ROOM EXH FAN	3 HP	446 V

RUNNING LOADS				TERMINAL VOLTAGES
C3R	2.5 KW	DG BATTERY CHGR	0 HP	451 V

DATA FILE = B:N2S2B2-B.DAT PREPARED BY : QJB DATE 1/13/86

LOADING FILE = B:BOUT2 CHECKED BY : CRM DATE 1-13-86

This run was made on 01-09-1986 at 15:56:33

I & C VITAL POWER

BOARD LOAD = 0 kVA θ@ 0.00°
CONSTANT Z LOAD @ CALCULATED V (except MCCs)= 0 kVA θ@ 0.00°
CONSTANT kVA LOAD (except MCCs)= 0 kVA θ@ 0.00°
BOARD CURRENT = 0 Amps
BOARD VOLTAGE = 470 Volts

			TERMINAL VOLTAGES
STARTING MOTORS			

			TERMINAL VOLTAGES
RUNNING LOADS			
A1	DUMMY LOAD	0 HP	470 V

DATA FILE = B:N2S2B1-B.DAT

PREPARED BY : RJB DATE 1/13/86

LOADING FILE = B:RANPHA

CHECKED BY : CRM DATE 1-13-86

This run was made on 01-10-1986 at 09:02:24

SOURCE and TRANSFORMER DATA

SOURCE VOLTAGE = 6900 Volts

SOURCE IMPEDANCE = 0+j 0 %

TRANSFORMER TAP = .975

TOTAL LOAD = 960 kVA θ 60.75°
TOTAL CURRENT = 1126 Amps

480V SHUTDOWN BD 2B1-B

BOARD LOAD(except MCCs) = 0 kVA θ@ 0.00°
CONSTANT Z LOAD @ CALCULATED V(except MCCs) = 0 kVA θ@ 0.00°
CONSTANT kVA LOAD (except MCCs) = 0 kVA θ@ 0.00°
BOARD VOLTAGE = 469 VOLTS

STARTING MOTORS			TERMINAL VOLTAGES

RUNNING LOADS			TERMINAL VOLTAGES
A1	DUMMY LOAD	0 HP	469 V

DATA FILE = B:N2S2B1-B.DAT PREPARED BY : QJB DATE 1/13/86

LOADING FILE = B:RANPHA CHECKED BY : CRm DATE 1-13-86

This run was made on 01-10-1986 at 09:02:33

480V REACTOR MOV BD 2B1-B

BOARD LOAD = 81 kVA θ@ 52.57∸
CONSTANT Z LOAD @ CALCULATED V (except MCCs)= 81.58045 kVA θ@ 52.64∸
CONSTANT kVA LOAD (except MCCs)= 0 kVA θ@ 0.00∸
BOARD CURRENT = 100 Amps
BOARD VOLTAGE = 466 Volts

STARTING MOTORS				TERMINAL VOLTAGES
C1		BORIC ACID XFER PMP 2B-B	15 HP	447 V

RUNNING LOADS				TERMINAL VOLTAGES
C3	9 KW	BORIC ACID TK B HTR B-B	0 HP	444 V

DATA FILE = B:N2S2B1-B.DAT PREPARED BY : QJB DATE 1/13/86

LOADING FILE = B:RANFHA CHECKED BY : CRm DATE 1-13-86

This run was made on 01-10-1986 at 09:02:45

480V CONT & AUX BLDG VENT BD 2B1-B

BOARD LOAD = 735 kVA θ@ 61.10⁺
CONSTANT Z LOAD @ CALCULATED V (except MCCs)= 735 kVA θ@ 61.10⁺
CONSTANT kVA LOAD (except MCCs)= 0 kVA θ@ 0.00⁺
BOARD CURRENT = 934 Amps
BOARD VOLTAGE = 455 Volts

	STARTING MOTORS		TERMINAL VOLTAGES
B1	SHTDN XFMR RM 2B EXH FAN 2B3-B	2.5 HP	445 V
B2	SHTDN XFMR RM 2B EXH FAN 2B1-B	2.5 HP	445 V
B3	SHTDN XFMR RM 2B EXH FAN 2B2-B	2.5 HP	445 V
B4	AUX CONT AIR CMPRSR B-B	20 HP	422 V
B5	RECIP CHG PMP RM CLR FAN	3 HP	441 V
D3	480V BD RM 2B A/C 2B-B	60 HP	435 V
E4	480V BD RM 2B A/C 2B-B	25 HP	426 V
F5	480V BD RM 2B A/C 2B-B	25 HP	442 V

RUNNING LOADS TERMINAL VOLTAGES

B20 00 0204 300 p108

DATA FILE = B:N2S2B1-B.DAT

PREPARED BY : QJB DATE 1/13/86

LOADING FILE = B:RANPHA

CHECKED BY : CRM DATE 1-13-86

This run was made on 01-10-1986 at 09:03:07

480V REACTOR VENT BD 2B-B

BOARD LOAD = 10 kVA @@ 48.43-
CONSTANT Z LOAD @ CALCULATED V (except MCCs)= 10 kVA @@ 48.43-
CONSTANT kVA LOAD (except MCCs)= 0 kVA @@ 0.00-
BOARD CURRENT = 12 Amps
BOARD VOLTAGE = 469 Volts

STARTING MOTORS			TERMINAL VOLTAGES
C2	INCORE INSTR RM SUP FAN	.75 HP	446 V

RUNNING LOADS	TERMINAL VOLTAGES

DATA FILE = B:N2S2B1-B.DAT PREPARED BY : QJB DATE 1/13/86

LOADING FILE = B:RANPHA CHECKED BY : CRM DATE 1-13-86

This run was made on 01-10-1986 at 09:03:17

480V DIESEL AUX BD 2B1-B

BOARD LOAD = 63 kVA @@ 56.57+
CONSTANT Z LOAD @ CALCULATED V (except MCCs)= 63 kVA @@ 56.57+
CONSTANT kVA LOAD (except MCCs)= 0 kVA @@ 0.00+
BOARD CURRENT = 79 Amps
BOARD VOLTAGE = 460 Volts

	STARTING MOTORS		TERMINAL VOLTAGES
E6	DG 2B-B AIR COMPRESSOR 2	10 HP	452 V

RUNNING LOADS	TERMINAL VOLTAGES

DATA FILE = B:N2S2B2-B.DAT

LOADING FILE = B:RANPHA2

PREPARED BY : QIB DATE 1/13/86

CHECKED BY : CRM DATE 1-13-86

This run was made on 01-10-1986 at 08:53:02

SOURCE and TRANSFORMER DATA

SOURCE VOLTAGE = 6900 Volts

SOURCE IMPEDANCE = 0+j 0 %/%

TRANSFORMER TAP = .975

TOTAL LOAD = 109 kVA θ 53.63°
TOTAL CURRENT = 128 Amps

480V SHUTDOWN BD 2B2-B

BOARD LOAD(except MCCs) = 0 kVA θ@ 0.00°
CONSTANT Z LOAD @ CALCULATED V(except MCCs) = 0 kVA θ@ 0.00°
CONSTANT kVA LOAD (except MCCs) = 0 kVA θ@ 0.00°
BOARD VOLTAGE = 490 VOLTS

STARTING MOTORS		TERMINAL VOLTAGES
RUNNING LOADS		TERMINAL VOLTAGES
A1	0 HP	490 V

DATA FILE = B:N2S2B2-B.DAT PREPARED BY : QJB DATE 1/13/86

LOADING FILE = B:RANFHA2 CHECKED BY : CRm DATE 1-13-86

This run was made on 01-10-1986 at 08:53:11

480V REACTOR MOV BD 2B2-B

BOARD LOAD = 21 kVA θ@ 48.89+
CONSTANT Z LOAD @ CALCULATED V (except MCCs)= 21 kVA θ@ 48.89+
CONSTANT kVA LOAD (except MCCs)= 0 kVA θ@ 0.00+
BOARD CURRENT = 25 Amps
BOARD VOLTAGE = 489 Volts

STARTING MOTORS				TERMINAL VOLTAGES
B3	2-FCV-1-18	STEAM FW PMP ISOL VLV	1.6 HP	458 V

RUNNING LOADS TERMINAL VOLTAGES

DATA FILE = B:N2S2B2-B.DAT PREPARED BY : RTB DATE 1/13/86

LOADING FILE = B:RANPHA2 CHECKED BY : CRM DATE 1-13-86

This run was made on 01-10-1986 at 08:53:21

480V CONT & AUX BLDG VENT BD 2B2-B

BOARD LOAD = 16 kVA @@ 45.85+
CONSTANT Z LOAD @ CALCULATED V (except MCCs)= 16 kVA @@ 45.85+
CONSTANT kVA LOAD (except MCCs)= 0 kVA @@ 0.00+
BOARD CURRENT = 19 Amps
BOARD VOLTAGE = 490 Volts

	STARTING MOTORS		TERMINAL VOLTAGES
D1	SAMP RM EXH FAN 2B	1.5 HP	472 V

RUNNING LOADS TERMINAL VOLTAGES

DATA FILE = B:N2S2B2-B.DAT PREPARED BY : RSB DATE 1/13/86

LOADING FILE = B:RANPHA2 CHECKED BY : CRM DATE 1-13-86

This run was made on 01-10-1986 at 08:53:30

480V DIESEL AUX BD 2B2-B

BOARD LOAD = 69 kVA θ@ 57.13°
CONSTANT Z LOAD @ CALCULATED V (except MCCs)= 69 kVA θ@ 57.13°
CONSTANT kVA LOAD (except MCCs)= 0 kVA θ@ 0.00°
BOARD CURRENT = 83 Amps
BOARD VOLTAGE = 480 Volts

STARTING MOTORS			TERMINAL VOLTAGES
D2	DG AIR COMPRESSOR	10 HP	475 V

RUNNING LOADS	TERMINAL VOLTAGES

DATA FILE = B:N2S2B2-B.DAT PREPARED BY : QIB DATE 1/13/86

LOADING FILE = B:RANPHA2 CHECKED BY : CRM DATE 1-13-86

This run was made on 01-10-1986 at 08:53:40

I & C VITAL POWER

BOARD LOAD = 0 kVA θ@ 0.00+
CONSTANT Z LOAD @ CALCULATED V (except MCCs)= 0 kVA θ@ 0.00+
CONSTANT kVA LOAD (except MCCs)= 0 kVA θ@ 0.00+
BOARD CURRENT = 0 Amps
BOARD VOLTAGE = 490 Volts

STARTING MOTORS			TERMINAL VOLTAGES

RUNNING LOADS			TERMINAL VOLTAGES
A1	DUMMY LOAD	0 HP	490 V

DATA FILE = B:N2S2B1-B.DAT PREPARED BY : CAB DATE 1/13/86

LOADING FILE = B:PHASEA CHECKED BY : CRM DATE 1-13-86

This run was made on 01-10-1986 at 08:58:56

SOURCE and TRANSFORMER DATA

SOURCE VOLTAGE = 6900 Volts

SOURCE IMPEDANCE = 0+j 0 %/L

TRANSFORMER TAP = .975

TOTAL LOAD = 2155 kVA θ 60.09°
TOTAL CURRENT = 2527 Amps

480V SHUTDOWN BD 2B1-B

BOARD LOAD(except MCCs) = 979 kVA θ@ 62.84°
CONSTANT Z LOAD @ CALCULATED V(except MCCs) = 978.3965 kVA θ@ 62.84°

CONSTANT kVA LOAD (except MCCs) = 0 kVA θ@ 0.00°
BOARD VOLTAGE = 441 VOLTS

	STARTING MOTORS		TERMINAL VOLTAGES
B4	ELEC BD RM AHU B-B	75 HP	398 V
B5	CRDM COOL FAN 2B	75 HP	390 V
C2	RLCC FAN 2B-B	50 HP	408 V

	RUNNING LOADS		TERMINAL VOLTAGES
C5 45 KVA	HT TR-CVC B1 XFMR	0 HP	440 V
C6 20 KVA	STANDBY LTG CAB LS3 XFMR	0 HP	428 V

DATA FILE = B:N2S2B1-B.DAT

LOADING FILE = B:PHASEA

PREPARED BY : QTB DATE 1/13/86

CHECKED BY : CRM DATE 1-13-86

This run was made on 01-10-1986 at 08:59:16

480V REACTOR MOV BD 2B1-B

BOARD LOAD = 123 kVA θ@ 49.78°
CONSTANT Z LOAD @ CALCULATED V (except MCCs)= 123 kVA θ@ 49.78°
CONSTANT kVA LOAD (except MCCs)= 0 kVA θ@ 0.00°
BOARD CURRENT = 163 Amps
BOARD VOLTAGE = 436 Volts

STARTING MOTORS				TERMINAL VOLTAGES
D5	2-FCV-62-61	SEAL FLOW IRON VLV	.7 HP	424 V
D6	2-FCV-62-91	CHR FLOW ISOL VLV	1.6 HP	418 V
E3	2-LCV-62-136	CHG PMP FLOW VLV	1 HP	435 V
F4	2-FCV-63-25	SIS BORON INJ TK VLV	2 HP	412 V
G1	2-FCV-63-40	SIS BORON INJ TK VLV	2 HP	413 V
H3	2-FCV-72-2	SPRAY HDR 2B ISOL VLV	3.3 HP	410 V
H6	2-FCV-72-21	SPRAY HDR 2B CONT VLV	3.3 HP	410 V
J4	2-FCV-74-24	RHR PMP 1B FLOW VLV	1.6 HP	412 V

RUNNING LOADS	TERMINAL VOLTAGES

DATA FILE = B:N2S2B1-B.DAT

PREPARED BY : RJB DATE 1/13/86

LOADING FILE = B:PHASEA

CHECKED BY : CRM DATE 1-13-86

This run was made on 01-10-1986 at 08:59:40

480V CONT & AUX BLDG VENT BD 2B1-B

BOARD LOAD = 628 kVA θ@ 53.76+
CONSTANT Z LOAD @ CALCULATED V (except MCCs)= 627.1792 kVA θ@ 53.79+
CONSTANT kVA LOAD (except MCCs)= 0 kVA θ@ 0.00+
BOARD CURRENT = 848 Amps
BOARD VOLTAGE = 428 Volts

STARTING MOTORS				TERMINAL VOLTAGES
B6		SI PMP 2B-B RM CLR FAN	3 HP	409 V
C2		PEN RM EL 669 CLR FAN 2B-B	5 HP	402 V
C3		PEN RM EL 690 CLR FAN 2B-B	5 HP	411 V
C4		PEN RM EL 714 CLR FAN 2B-B	5 HP	417 V
C5		RES HT REM PMP 2B-B FAN	3 HP	406 V
D1		EMER GAS TMT RM CLR B-B	3 HP	423 V
D5	RE-90-126	CONT RM INTAKE RAD MON	.75 HP	420 V
E1		480V BD RM 2A FAN 2A2-B	3 HP	419 V
E2R	RE-90-112	CNTMT BLDG UP COMPT AIR MON	3 HP	417 V
E3		PRIM WTR MAKEUP PMP 2B	20 HP	398 V
E5L	RE-90-99	COND VAC PMP AIR EXH MON	.75 HP	416 V
E5R	RE-90-131	CNTMT PURGE AIR EXH MON	.75 HP	419 V
E6		PIPE CHASE CLR FAN 2B-B	20 HP	380 V
F1		125V BATT RM IV EXH FAN 2A2-B	2 HP	415 V
F3		AUX FDWTR & BA CLR FAN B-B	5 HP	412 V
F4		480V BD RM 2B FAN 2B2-B	3 HP	413 V
G2		125V VIT BATT RM III FAN 2B2-B	2 HP	415 V
G4		GAS EFF RAD MON	5 HP	402 V
G5		AB GAS TMT SYS FAN B-B	20 HP	389 V

RUNNING LOADS				TERMINAL VOLTAGES
D4	3 KVA	UNIT CONT ANN SYS	0 HP	426 V

DATA FILE = B:N2S2B1-B.DAT PREPARED BY : QJB DATE 1/13/86

LOADING FILE = B:PHASEA CHECKED BY : CRM DATE 1-13-86

This run was made on 01-10-1986 at 09:00:34

480V REACTOR VENT BD 2B-B

BOARD LOAD = 9 kVA θ@ 48.43⁻
CONSTANT Z LOAD @ CALCULATED V (except MCCs)= 9 kVA θ@ 48.43⁻
CONSTANT kVA LOAD (except MCCs)= 0 kVA θ@ 0.00⁻
BOARD CURRENT = 12 Amps
BOARD VOLTAGE = 441 Volts

	STARTING MOTORS		TERMINAL VOLTAGES
C2	INCORE INSTR RM SUP FAN	.75 HP	419 V

RUNNING LOADS TERMINAL VOLTAGES

DATA FILE = B:N2S2B1-B.DAT PREPARED BY : GMB DATE 1/13/86

LOADING FILE = B:PHASEA CHECKED BY : CRM DATE 1-13-86

This run was made on 01-10-1986 at 09:00:44

480V DIESEL AUX BD 2B1-B

BOARD LOAD = 170 kVA @@ 46.76°
CONSTANT Z LOAD @ CALCULATED V (except MCCs)= 169.8163 kVA @@ 46.83°
CONSTANT kVA LOAD (except MCCs)= 0 kVA @@ 0.00°
BOARD CURRENT = 237 Amps
BOARD VOLTAGE = 413 Volts

STARTING MOTORS				TERMINAL VOLTAGES
B2	2-FCV-67-65	DSL ENG HT EXCH SUP VLV	.125 HP	413 V
D6		DG ELECT PNL VENTILATION FAN	15 HP	406 V
E4		DG ROOM EXH FAN 2-B	15 HP	407 V
F1		DG MUFFLER RM EXH FAN	1.5 HP	412 V
F2		DG BATT HOOD EXH FAN	.33 HP	412 V

RUNNING LOADS				TERMINAL VOLTAGES
E2L	45 KVA	DG B LIGHTING CAB LC 48	0 HP	411 V

DATA FILE = B:N2S2B2-B.DAT PREPARED BY : QTB DATE 1/13/86

LOADING FILE = B:PHASEA2 CHECKED BY : CRM DATE 1-13-86

This run was made on 01-10-1986 at 08:55:19

SOURCE and TRANSFORMER DATA

SOURCE VOLTAGE = 6900 Volts

SOURCE IMPEDANCE = 0+j 0 %

TRANSFORMER TAP = .975

TOTAL LOAD = 1459 kVA @ 60.83°
TOTAL CURRENT = 1711 Amps

480V SHUTDOWN BD 2B2-B

BOARD LOAD(except MCCs) = 711 kVA @@ 63.26°
CONSTANT Z LOAD @ CALCULATED V(except MCCs) = 711.4086 kVA @@ 63.24°

CONSTANT kVA LOAD (except MCCs) = 0 kVA @@ 0.00°
BOARD VOLTAGE = 458 VOLTS

	STARTING MOTORS			TERMINAL VOLTAGES
B5		CRD MECH COOL FAN 2D	75 HP	415 V
C3		REACT LWR COMPT COOL FAN 2D-B	50 HP	427 V

	RUNNING LOADS			TERMINAL VOLTAGES
C4	45 kVA	CVC SYS HT TR XFMR B3	0 HP	456 V

DATA FILE = B:N2S2B2-B.DAT

LOADING FILE = B:PHASEA2

PREPARED BY : RJB DATE 1/13/86

CHECKED BY : CRm DATE 1-13-86

This run was made on 01-10-1986 at 08:55:34

480V REACTOR MOV BD 2B2-B

BOARD LOAD = 490 kVA θ@ 54.98°
CONSTANT Z LOAD @ CALCULATED V (except MCCs)= 490 kVA θ@ 54.98°
CONSTANT kVA LOAD (except MCCs)= 0 kVA θ@ 0.00°
BOARD CURRENT = 653 Amps
BOARD VOLTAGE = 433 Volts

STARTING MOTORS				TERMINAL VOLTAGES
B6	2-FCV-26-241	ANNULUS ISOL VLV	.67 HP	425 V
C6	2-FCV-26-244	ANNULUS ISOL VLV	.67 HP	425 V
E6	0-FCV-67-152	COMPT HEAT EXCH C VLV	.67 HP	424 V
K1	2-FCV-3-47	STEAM GEN FW ISOL VLV	33 HP	373 V
K2	2-FCV-3-100	STM GEN FW ISOL VLV	33 HP	372 V

RUNNING LOADS TERMINAL VOLTAGES

DATA FILE = B:N2S2B2-B.DAT

PREPARED BY : QTB DATE 1/13/86

LOADING FILE = B:PHASEA2

CHECKED BY : CRM DATE 1-13-86

This run was made on 01-10-1986 at 08:55:53

480V CONT & AUX BLDG VENT BD 2B2-B

BOARD LOAD = 14 kVA θ@ 45.85∸
CONSTANT Z LOAD @ CALCULATED V (except MCCs)= 14 kVA θ@ 45.85∸
CONSTANT kVA LOAD (except MCCs)= 0 kVA θ@ 0.00∸
BOARD CURRENT = 18 Amps
BOARD VOLTAGE = 458 Volts

	STARTING MOTORS		TERMINAL VOLTAGES
D1	SAMP RM EXH FAN 2B	1.5 HP	441 V

RUNNING LOADS — TERMINAL VOLTAGES

DATA FILE = B:N2S2B2-B.DAT PREPARED BY : QTB DATE 1/13/86

LOADING FILE = B:PHASEA2 CHECKED BY : CRM DATE 1-13-86

This run was made on 01-10-1986 at 08:56:03

480V DIESEL AUX BD 2B2-B

BOARD LOAD = 112 kVA θ@ 56.08*
CONSTANT Z LOAD @ CALCULATED V (except MCCs)= 107 kVA θ@ 56.44*
CONSTANT kVA LOAD (except MCCs)= 6 kVA θ@ 0.00*
BOARD CURRENT = 147 Amps
BOARD VOLTAGE = 440 Volts

STARTING MOTORS				TERMINAL VOLTAGES
D1	2-FCV-67-67	EMG DSL ENG HT EXCH SUP VLV	.125 HP	439 V
D3		DG ROOM EXH FAN	15 HP	433 V
D4		DG BD ROOM EXH FAN	3 HP	434 V

RUNNING LOADS			TERMINAL VOLTAGES
C3R 2.5 KW	DG BATTERY CHGR	0 HP	439 V

DATA FILE = B:N2S2B2-B.DAT PREPARED BY : RJB DATE 1/13/86

LOADING FILE = B:PHASEA2 CHECKED BY : CRM DATE 1-13-86

This run was made on 01-10-1986 at 08:56:19

I & C VITAL POWER

BOARD LOAD = 0 kVA θ@ 0.00⁻
CONSTANT Z LOAD @ CALCULATED V (except MCCs)= 0 kVA θ@ 0.00⁻
CONSTANT kVA LOAD (except MCCs)= 0 kVA θ@ 0.00⁻
BOARD CURRENT = 0 Amps
BOARD VOLTAGE = 458 Volts

			TERMINAL VOLTAGES
STARTING MOTORS			

			TERMINAL VOLTAGES
RUNNING LOADS			
A1	DUMMY LOAD	0 HP	458 V

DATA FILE = B:N2S2B1-B.DAT

PREPARED BY : QJB DATE 1/13/86

LOADING FILE = B:RANPHB

CHECKED BY : CRM DATE 1-13-86

This run was made on 01-10-1986 at 10:37:28

SOURCE and TRANSFORMER DATA

SOURCE VOLTAGE = 6900 Volts

SOURCE IMPEDANCE = 0+j 0 %

TRANSFORMER TAP = .975

TOTAL LOAD = 951 kVA θ 60.84°
TOTAL CURRENT = 1115 Amps

480V SHUTDOWN BD 2B1-B

BOARD LOAD(except MCCs) = 0 kVA θ@ 0.00°
CONSTANT Z LOAD @ CALCULATED V(except MCCs) = 0 kVA θ@ 0.00°
CONSTANT kVA LOAD (except MCCs) = 0 kVA θ@ 0.00°
BOARD VOLTAGE = 469 VOLTS

STARTING MOTORS			TERMINAL VOLTAGES

RUNNING LOADS			TERMINAL VOLTAGES
A1	DUMMY LOAD	0 HP	469 V

DATA FILE = B:N2S2B1-B.DAT

PREPARED BY : QJB DATE 1/13/86

LOADING FILE = B:RANPHB

CHECKED BY : CRM DATE 1-13-86

This run was made on 01-10-1986 at 10:37:37

480V REACTOR MOV BD 2B1-B

BOARD LOAD = 81 kVA @ 52.57°
CONSTANT Z LOAD @ CALCULATED V (except MCCs)= 81.58045 kVA @ 52.64°
CONSTANT kVA LOAD (except MCCs)= 0 kVA @ 0.00°
BOARD CURRENT = 100 Amps
BOARD VOLTAGE = 466 Volts

	STARTING MOTORS			TERMINAL VOLTAGES
C1		BORIC ACID XFER PMP 2B-B	15 HP	447 V

	RUNNING LOADS			TERMINAL VOLTAGES
C3	9 KW	BORIC ACID TK B HTR B-B	0 HP	445 V

DATA FILE = B:N2S2B1-B.DAT PREPARED BY : QJB DATE 1/13/86

LOADING FILE = B:RANPHB CHECKED BY : CRM DATE 1-13-86

This run was made on 01-10-1986 at 10:37:49

480V CONT & AUX BLDG VENT BD 2B1-B

BOARD LOAD = 736 kVA θ@ 61.10∠
CONSTANT Z LOAD @ CALCULATED V (except MCCs)= 736 kVA θ@ 61.10∠
CONSTANT kVA LOAD (except MCCs)= 0 kVA θ@ 0.00∠
BOARD CURRENT = 934 Amps
BOARD VOLTAGE = 455 Volts

STARTING MOTORS			TERMINAL VOLTAGES
B1	SHTDN XFMR RM 2B EXH FAN 2B3-B	2.5 HP	445 V
B2	SHTDN XFMR RM 2B EXH FAN 2B1-B	2.5 HP	445 V
B3	SHTDN XFMR RM 2B EXH FAN 2B2-B	2.5 HP	446 V
B4	AUX CONT AIR CMPRSR B-B	20 HP	422 V
B5	RECIP CHG PMP RM CLR FAN	3 HP	441 V
D3	480V BD RM 2B A/C 2B-B	60 HP	435 V
E4	480V BD RM 2B A/C 2B-B	25 HP	426 V
F5	480V BD RM 2B A/C 2B-B	25 HP	442 V

RUNNING LOADS | TERMINAL VOLTAGES

DATA FILE = B:N2S2B1-B.DAT

PREPARED BY : QJB DATE 1/13/86

LOADING FILE = B:RANPHB

CHECKED BY : CRM DATE 1-13-86

This run was made on 01-10-1986 at 10:38:11

480V REACTOR VENT BD 2B-B

BOARD LOAD = 1 kVA θ@ 45.97°
CONSTANT Z LOAD @ CALCULATED V (except MCCs)= 0 kVA θ@ 0.00°
CONSTANT kVA LOAD (except MCCs)= 1 kVA θ@ 0.00°
BOARD CURRENT = 1 Amps
BOARD VOLTAGE = 469 Volts

STARTING MOTORS — TERMINAL VOLTAGES

RUNNING LOADS — TERMINAL VOLTAGES

C2	INCORE INSTR RM SUP FAN	.75 HP	467 V

DATA FILE = B:N2S2B1-B.DAT PREPARED BY : QJB DATE 1/13/86

LOADING FILE = B:RANFHB CHECKED BY : CRM DATE 1-13-86

This run was made on 01-10-1986 at 10:38:21

480V DIESEL AUX BD 2B1-B

BOARD LOAD = 63 kVA θ@ 56.57∸
CONSTANT Z LOAD @ CALCULATED V (except MCCs)= 63 kVA θ@ 56.57∸
CONSTANT kVA LOAD (except MCCs)= 0 kVA θ@ 0.00∸
BOARD CURRENT = 79 Amps
BOARD VOLTAGE = 460 Volts

STARTING MOTORS			TERMINAL VOLTAGES
E6	DG 2B-B AIR COMPRESSOR 2	10 HP	452 V

RUNNING LOADS — TERMINAL VOLTAGES

DATA FILE = B:N2S2B2-B.DAT PREPARED BY : RTB DATE 1/13/86

LOADING FILE = B:RANPHB2 CHECKED BY : CRM DATE 1-13-86

This run was made on 01-10-1986 at 11:39:34

SOURCE and TRANSFORMER DATA

SOURCE VOLTAGE = 6900 Volts

SOURCE IMPEDANCE = 0+j 0 %

TRANSFORMER TAP = .975

TOTAL LOAD = 96 kVA θ 54.79°
TOTAL CURRENT = 113 Amps

480V SHUTDOWN BD 2B2-B

BOARD LOAD(except MCCs) = 0 kVA θ@ 0.00°
CONSTANT Z LOAD @ CALCULATED V(except MCCs) = 0 kVA θ@ 0.00°
CONSTANT kVA LOAD (except MCCs) = 0 kVA θ@ 0.00°
BOARD VOLTAGE = 490 VOLTS

STARTING MOTORS		TERMINAL VOLTAGES

RUNNING LOADS		TERMINAL VOLTAGES
A1	0 HP	490 V

DATA FILE = B:N2S2B2-B.DAT PREPARED BY : QJB DATE 1/13/86

LOADING FILE = B:RANPHB2 CHECKED BY : CRM DATE 1-13-86

This run was made on 01-10-1986 at 11:39:42

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

480V REACTOR MOV BD 2B2-B

BOARD LOAD = 22 kVA θ@ 49.01°
CONSTANT Z LOAD @ CALCULATED V (except MCCs)= 21 kVA θ@ 48.89°
CONSTANT kVA LOAD (except MCCs)= 1 kVA θ@ 0.00°
BOARD CURRENT = 26 Amps
BOARD VOLTAGE = 489 Volts

STARTING MOTORS				TERMINAL VOLTAGES
B3	2-FCV-1-18	STEAM FW PMP ISOL VLV	1.6 HP	459 V

RUNNING LOADS				TERMINAL VOLTAGES
H1	2-FCV-70-28	CCS PMP 2A-A & 2B-B VLV	.33 HP	489 V

DATA FILE = B:N2S2B2-B.DAT　　PREPARED BY : QJB　　DATE 1/13/86

LOADING FILE = B:RANFHB2　　CHECKED BY : CRm　　DATE 1-13-86

This run was made on 01-10-1986 at 11:39:55

480V CONT & AUX BLDG VENT BD 2B2-B

BOARD LOAD = 2 kVA θ@ 48.70+
CONSTANT Z LOAD @ CALCULATED V (except MCCs)= 0 kVA θ@ 0.00+
CONSTANT kVA LOAD (except MCCs)= 2 kVA θ@ 0.00+
BOARD CURRENT = 2 Amps
BOARD VOLTAGE = 490 Volts

			TERMINAL VOLTAGES
STARTING MOTORS			

			TERMINAL VOLTAGES
RUNNING LOADS			
D1	SAMP RM EXH FAN 2B	1.5 HP	488 V

DATA FILE = B:N2S2B2-B.DAT

LOADING FILE = B:RANFHB2

PREPARED BY : RJB DATE 1/13/86

CHECKED BY : CRM DATE 1-13-86

This run was made on 01-10-1986 at 11:40:04

480V DIESEL AUX BD 2B2-B

BOARD LOAD = 70 kVA θ@ 57.13∸
CONSTANT Z LOAD @ CALCULATED V (except MCCs)= 70 kVA θ@ 57.13∸
CONSTANT kVA LOAD (except MCCs)= 0 kVA θ@ 0.00∸
BOARD CURRENT = 84 Amps
BOARD VOLTAGE = 480 Volts

STARTING MOTORS			TERMINAL VOLTAGES
D2	DG AIR COMPRESSOR	10 HP	475 V

RUNNING LOADS	TERMINAL VOLTAGES

DATA FILE = B:N2S2B2-B.DAT PREPARED BY : BJB DATE 1/13/86

LOADING FILE = B:RANPHB2 CHECKED BY : CRM DATE 1-13-86

This run was made on 01-10-1986 at 11:40:14

I & C VITAL POWER

BOARD LOAD = 0 kVA θ@ 0.00°
CONSTANT Z LOAD @ CALCULATED V (except MCCs)= 0 kVA θ@ 0.00°
CONSTANT kVA LOAD (except MCCs)= 0 kVA θ@ 0.00°
BOARD CURRENT = 0 Amps
BOARD VOLTAGE = 490 Volts

STARTING MOTORS			TERMINAL VOLTAGES

RUNNING LOADS			TERMINAL VOLTAGES
A1	DUMMY LOAD	0 HP	490 V

DATA FILE = B:N2S2B1-B.DAT

LOADING FILE = B:PHASEB

PREPARED BY : QJB DATE 1/10/86

CHECKED BY : CRM DATE 1-13-86

This run was made on 01-10-1986 at 13:04:46

SOURCE and TRANSFORMER DATA

SOURCE VOLTAGE = 6900 Volts

SOURCE IMPEDANCE = 0+j 0 %

TRANSFORMER TAP = .975

TOTAL LOAD = 1537 kVA θ 55.71°
TOTAL CURRENT = 1803 Amps

480V SHUTDOWN BD 2B1-B

BOARD LOAD(except MCCs) = 374 kVA θ@ 58.16°
CONSTANT Z LOAD @ CALCULATED V(except MCCs) = 373.5307 kVA θ@ 58.14°

CONSTANT kVA LOAD (except MCCs) = 0 kVA θ@ 0.00°
BOARD VOLTAGE = 457 VOLTS

STARTING MOTORS			TERMINAL VOLTAGES
B4	ELEC BD RM AHU B-B	75 HP	413 V

RUNNING LOADS			TERMINAL VOLTAGES
C5 45 KVA	HT TR-CVC B1 XFMR	0 HP	456 V
C6 20 KVA	STANDBY LTG CAB LS3 XFMR	0 HP	443 V

DATA FILE = B:N2S2B1-B.DAT — PREPARED BY : RJB — DATE 1/13/86

LOADING FILE = B:PHASEB — CHECKED BY : CRM — DATE 1-13-86

This run was made on 01-10-1986 at 13:05:04

480V REACTOR MOV BD 2B1-B

BOARD LOAD = 132 kVA θ@ 49.78∸
CONSTANT Z LOAD @ CALCULATED V (except MCCs)= 132 kVA θ@ 49.78∸
CONSTANT kVA LOAD (except MCCs)= 0 kVA θ@ 0.00∸
BOARD CURRENT = 169 Amps
BOARD VOLTAGE = 452 Volts

STARTING MOTORS				TERMINAL VOLTAGES
D5	2-FCV-62-61	SEAL FLOW IRON VLV	.7 HP	440 V
D6	2-FCV-62-91	CHR FLOW ISOL VLV	1.6 HP	434 V
E3	2-LCV-62-136	CHG PMP FLOW VLV	1 HP	451 V
F4	2-FCV-63-25	SIS BORON INJ TK VLV	2 HP	427 V
G1	2-FCV-63-40	SIS BORON INJ TK VLV	2 HP	428 V
H3	2-FCV-72-2	SPRAY HDR 2B ISOL VLV	3.3 HP	424 V
H6	2-FCV-72-21	SPRAY HDR 2B CONT VLV	3.3 HP	425 V
J4	2-FCV-74-24	RHR PMP 1B FLOW VLV	1.6 HP	427 V

RUNNING LOADS — TERMINAL VOLTAGES

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DATA FILE = B:N2S2B1-B.DAT PREPARED BY : QHB DATE 1/13/86

LOADING FILE = B:PHASEB CHECKED BY : CRM DATE 1-13-86

This run was made on 01-10-1986 at 13:05:28

480V CONT & AUX BLDG VENT BD 2B1-B

BOARD LOAD = 703 kVA @@ 53.50∠
CONSTANT Z LOAD @ CALCULATED V (except MCCs)= 702.7814 kVA @@ 53.47∠
CONSTANT kVA LOAD (except MCCs)= 0 kVA @@ 0.00∠
BOARD CURRENT = 917 Amps
BOARD VOLTAGE = 442 Volts

STARTING MOTORS				TERMINAL VOLTAGES
B6		SI PMP 2B-B RM CLR FAN	3 HP	423 V
C2		PEN RM EL 669 CLR FAN 2B-B	5 HP	416 V
C3		PEN RM EL 690 CLR FAN 2B-B	5 HP	425 V
C4		PEN RM EL 714 CLR FAN 2B-B	5 HP	431 V
C5		RES HT REM PMP 2B-B FAN	3 HP	420 V
C6		CONT SPRAY PMP 2B-B CLR FAN	5 HP	415 V
D1		EMER GAS TMT RM CLR B-B	3 HP	438 V
D5	RE-90-126	CONT RM INTAKE RAD MON	.75 HP	435 V
E1		480V BD RM 2A FAN 2A2-B	3 HP	433 V
E2R	RE-90-112	CNTMT BLDG UP COMPT AIR MON	3 HP	432 V
E3		PRIM WTR MAKEUP PMP 2B	20 HP	412 V
E5L	RE-90-99	COND VAC PMP AIR EXH MON	.75 HP	430 V
E5R	RE-90-131	CNTMT PURGE AIR EXH MON	.75 HP	434 V
F1		125V BATT RM IV EXH FAN 2A2-B	2 HP	430 V
F3		AUX FDWTR & BA CLR FAN B-B	5 HP	427 V
F4		480V BD RM 2B FAN 2B2-B	3 HP	427 V
G2		125V VIT BATT RM III FAN 2B2-B	2 HP	429 V
G4		GAS EFF RAD MON	5 HP	416 V
G5		AB GAS TMT SYS FAN B-B	20 HP	403 V
E6		PIPE CHASE CLR FAN 2B-B	20 HP	393 V

RUNNING LOADS				TERMINAL VOLTAGES
D4	3 KVA	UNIT CONT ANN SYS	0 HP	441 V

DATA FILE = B:N2S2B1-B.DAT PREPARED BY : RJB DATE 1/13/86

LOADING FILE = B:PHASEB CHECKED BY : CRm DATE 1-13-86

This run was made on 01-10-1986 at 13:06:24

480V REACTOR VENT BD 2B-B

BOARD LOAD = 1 kVA θ@ 45.97⁺
CONSTANT Z LOAD @ CALCULATED V (except MCCs)= 0 kVA θ@ 0.00⁺
CONSTANT kVA LOAD (except MCCs)= 1 kVA θ@ 0.00⁺
BOARD CURRENT = 1 Amps
BOARD VOLTAGE = 457 Volts

STARTING MOTORS			TERMINAL VOLTAGES

RUNNING LOADS			TERMINAL VOLTAGES
C2	INCORE INSTR RM SUP FAN	.75 HP	454 V

DATA FILE = B:N2S2B1-B.DAT

LOADING FILE = B:PHASEB

PREPARED BY : [illegible] DATE 1/13/86

CHECKED BY : CRM DATE 1-13-86

This run was made on 01-10-1986 at 13:06:34

480V DIESEL AUX BD 2B1-B

BOARD LOAD = 182 kVA θ@ 46.76°
CONSTANT Z LOAD @ CALCULATED V (except MCCs)= 182.4899 kVA θ@ 46.66°
CONSTANT kVA LOAD (except MCCs)= 0 kVA θ@ 0.00°
BOARD CURRENT = 245 Amps
BOARD VOLTAGE = 428 Volts

STARTING MOTORS				TERMINAL VOLTAGES
B2	2-FCV-67-65	DSL ENG HT EXCH SUP VLV	.125 HP	428 V
D6		DG ELECT PNL VENTILATION FAN	15 HP	420 V
E4		DG ROOM EXH FAN 2-B	15 HP	422 V
F1		DG MUFFLER RM EXH FAN	1.5 HP	426 V
F2		DG BATT HOOD EXH FAN	.33 HP	427 V

RUNNING LOADS				TERMINAL VOLTAGES
E2L	45 KVA	DG B LIGHTING CAB LC 48	0 HP	426 V

DATA FILE = B:N2S2B2-B.DAT PREPARED BY : RJB DATE 1/13/86

LOADING FILE = B:PHASEB2 CHECKED BY : CRM DATE 1-13-86

This run was made on 01-10-1986 at 13:08:57

SOURCE and TRANSFORMER DATA

SOURCE VOLTAGE = 6900 Volts

SOURCE IMPEDANCE = 0+j 0 %

TRANSFORMER TAP = .975

TOTAL LOAD = 785 kVA θ 53.24°
TOTAL CURRENT = 921 Amps

480V SHUTDOWN BD 2B2-B

BOARD LOAD(except MCCs) = 44 kVA θ@ -0.13°
CONSTANT Z LOAD @ CALCULATED V(except MCCs) = 44.00001 kVA θ@ -0.13°

CONSTANT kVA LOAD (except MCCs) = 0 kVA θ@ 0.00°
BOARD VOLTAGE = 475 VOLTS

STARTING MOTORS			TERMINAL VOLTAGES

RUNNING LOADS			TERMINAL VOLTAGES
C4 45 kVA	CVC SYS HT TR XFMR B3	0 HP	473 V

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DATA FILE = B:N2S2B2-B.DAT PREPARED BY : BB DATE 1/13/86

LOADING FILE = B:PHASEB2 CHECKED BY : CRM DATE 1-13-86

This run was made on 01-10-1986 at 13:09:09

480V REACTOR MOV BD 2B2-B

BOARD LOAD = 568 kVA @ 54.89°
CONSTANT Z LOAD @ CALCULATED V (except MCCs)= 568 kVA @ 54.89°
CONSTANT kVA LOAD (except MCCs)= 0 kVA @ 0.00°
BOARD CURRENT = 733 Amps
BOARD VOLTAGE = 447 Volts

STARTING MOTORS				TERMINAL VOLTAGES
B6	2-FCV-26-241	ANNULUS ISOL VLV	.67 HP	439 V
C3	2-FCV-67-88	LWR CNTMT 2A ISOL VLV	.33 HP	443 V
C4	2-FCV-67-96	LWR CNTMT 2B ISOL VLV	.33 HP	442 V
C5	2-FCV-67-99	LWR CNTMT 2B ISOL VLV	.133 HP	444 V
C6	2-FCV-26-244	ANNULUS ISOL VLV	.67 HP	439 V
D1	2-FCV-67-103	LWR CNTMT 2B ISOL VLV	.125 HP	445 V
D2	2-FCV-67-107	LWR CNTMT 2D ISOL VLV	.33 HP	443 V
D3	2-FCV-67-111	LWR CNTMT 2D ISOL VLV	.125 HP	445 V
E1	2-FCV-67-131	UPPR CNTMT 2A ISOL VLV	.133 HP	445 V
E2	2-FCV-67-134	UPPR CNTMT 2C ISOL VLV	.133 HP	445 V
E3	2-FCV-67-138	UPPR CNTMT 2B ISOL VLV	.123 HP	446 V
E5	2-FCV-67-141	UPPR CNTMT 2D ISOL VLV	.133 HP	445 V
E6	0-FCV-67-152	COMPT HEAT EXCH C VLV	.67 HP	438 V
F1	2-FCV-67-297	UPPR CNTMT 2B ISOL VLV	.125 HP	446 V
F2	2-FCV-67-298	UPPR CNTMT 2D ISOL VLV	.125 HP	444 V
J1	2-FCV-70-89	RC PMP CNTMT ISOL VLV	.125 HP	444 V
J2	2-FCV-70-140	RCP CNTMT ISOL VLV	.13 HP	442 V
J4	2-FCV-70-87	RCP CNTMT ISOL VLV	.7 HP	439 V
J5	2-FCV-70-134	RCP ISOL VLV	.125 HP	445 V
K1	2-FCV-3-47	STEAM GEN FW ISOL VLV	33 HP	385 V
K2	2-FCV-3-100	STM GEN FW ISOL VLV	33 HP	384 V

RUNNING LOADS TERMINAL VOLTAGES

-----------------------B23 CO 0204 200 p142-----------------

DATA FILE = B:N2S2B2-B.DAT PREPARED BY : RJB DATE 1/13/86

LOADING FILE = B:PHASEB2 CHECKED BY : CRM DATE 1-13-86

This run was made on 01-10-1986 at 13:10:00

480V CONT & AUX BLDG VENT BD 2B2-B

BOARD LOAD = 2 kVA θ@ 48.70°
CONSTANT Z LOAD @ CALCULATED V (except MCCs)= 0 kVA θ@ 0.00°
CONSTANT kVA LOAD (except MCCs)= 2 kVA θ@ 0.00°
BOARD CURRENT = 2 Amps
BOARD VOLTAGE = 475 Volts

STARTING MOTORS			TERMINAL VOLTAGES

RUNNING LOADS			TERMINAL VOLTAGES
D1	SAMP RM EXH FAN 2B	1.5 HP	472 V

DATA FILE = B:N2S2B2-B.DAT

LOADING FILE = B:PHASEB2

PREPARED BY : QBB DATE 1/13/86

CHECKED BY : CRM DATE 1-13-86

This run was made on 01-10-1986 at 13:10:10

480V DIESEL AUX BD 2B2-B

BOARD LOAD = 121 kVA θ@ 56.10°
CONSTANT Z LOAD @ CALCULATED V (except MCCs)= 115 kVA θ@ 56.44°
CONSTANT kVA LOAD (except MCCs)= 6 kVA θ@ 0.00°
BOARD CURRENT = 153 Amps
BOARD VOLTAGE = 457 Volts

STARTING MOTORS				TERMINAL VOLTAGES
D1	2-FCV-67-67	EMG DSL ENG HT EXCH SUP VLV	.125 HP	456 V
D3		DG ROOM EXH FAN	15 HP	449 V
D4		DG BD ROOM EXH FAN	3 HP	451 V

RUNNING LOADS			TERMINAL VOLTAGES
CJR 2.5 KW	DG BATTERY CHGR	0 HP	456 V

DATA FILE = B:N2S2B2-B.DAT

PREPARED BY : RJB DATE 1/13/86

LOADING FILE = B:PHASEB2

CHECKED BY : CRM DATE 1-13-86

This run was made on 01-10-1986 at 13:10:26

I & C VITAL POWER

BOARD LOAD = 0 kVA θ@ 0.00-
CONSTANT Z LOAD @ CALCULATED V (except MCCs)= 0 kVA θ@ 0.00-
CONSTANT kVA LOAD (except MCCs)= 0 kVA θ@ 0.00-
BOARD CURRENT = 0 Amps
BOARD VOLTAGE = 475 Volts

STARTING MOTORS			TERMINAL VOLTAGES

RUNNING LOADS			TERMINAL VOLTAGES
A1	DUMMY LOAD	0 HP	475 V

B25 '86 0204 300 p 145

ATTACHMENT

F

Total Kva Phase Angle Calculations (Random + T=0 Loads) for:
a. BO on Power Train 2B
b. BO & SI-PhA on Power Train 2B
c. BO & SI-PhB on Power Train 2B

0712G

SUBJECT: TOTAL kVA & θ CALCULATIONS FOR RANDOM AND T=0 LOADS
PROJECT: SQN

COMPUTED BY: Peter Bowman DATE: 1/13/86
CHECKED BY: C. R. McIntosh DATE: 1-13-86

MOST LIKELY TO FAIL - 2B BLACKOUT

x kVA @ $\theta°$ KW = $x \cos\theta$ KVAR = $x \sin\theta$

BLACKOUT

RANDOM LOADS

			kW	kVAR
TRAN 2B2	93 kVA	θ = 54.72	53.71	75.92
TRAN 2B1	1201 kVA	θ = 58.73	623.41	1026.53
		TOTAL	677.12	1102.45

$x = \sqrt{kW^2 + kVAR^2} = \sqrt{(677.12)^2 + (1102.45)^2} = 1293.79$

$\theta = \cos^{-1} \frac{677.12}{1293.79} = 58.44°$ p.f. .523

T=0 LOADS

			kW	kVAR
TRAN 2B2	916 kVA	θ = 63.10	414.43	816.89
TRAN 2B1	1755 kVA	θ = 60.39	867.13	1525.81
BATT CHGR # IV	7.44 kVA	θ = 0	7.44	
ERCW Cpt 2A	25.50 kVA	θ = 51.68	15.81	20.00
		TOTAL	1304.81	2362.70

$x = \sqrt{kW^2 + kVAR^2} = \sqrt{(1304.81)^2 + (2362.70)^2} = 2699.14$

$\theta = \cos^{-1} \frac{1304.81}{2699.14} = 61.09°$ pf. .483

SUBJECT Total kVA & θ Calculations for Random and T=0 Loads PROJECT SQN

COMPUTED BY Peter Bowman DATE 1/13/86 CHECKED BY R McIntosh DATE 1-13-86

Most Likely to Fail-2B Blackout with SI Ph A Is

x kVA @ θ° kW = x cos θ kVAR = x sin θ

		kW	kVAR
Blackout with Ph A Isol			
Random Loads			
Tran 2B1	960 kVA θ = 60.75	469.08	837.60
Tran 2B2	109 kVA θ = 53.63	64.64	87.77
	Total	533.72	925.37

$x = \sqrt{kW^2 + kVAR^2} = \sqrt{(533.72)^2 + (925.37)^2} = 1068.25$

$\theta = \cos^{-1} \frac{533.72}{1068.25} = 60.03°$ pf .500

		kW	kVAR
T=0 Loads			
Tran 2B1	2155 kVA θ = 60.09	1074.57	1867.98
Tran 2B2	1459 kVA θ = 60.83	711.12	1273.97
Batt Chgr #IV	7.44 kVA θ = 0	7.44	
ERCW Cpt 2A	25.50 kVA θ = 51.68	15.81	20.00
	Total	1808.94	3161.95

$x = \sqrt{kW^2 + kVAR^2} = \sqrt{(1808.94)^2 + (3161.95)^2} = 3642.83$

$\theta = \cos^{-1} \frac{1808.94}{3642.83} = 60.23°$ pf .497

SUBJECT: Total kVA & θ Calculations for Random and T=0 Loads PROJECT: SQN

COMPUTED BY: [signature] DATE: 1/13/81 CHECKED BY: CRMcIntosh DATE: 1-13-81

Most Likely to Fail - 2B Blackout with SI Ph B I

x kVA @ θ° $kW = x \cos\theta$ $kVAR = x \sin\theta$

		kW	kVAR

Blackout with Ph B Isol

Random Loads

		kW	kVAR
Tran 2B1	951 kVA θ = 60.84	463.38	830.47
Tran 2B2	96 kVA θ = 54.79	55.35	78.44
	Total	518.73	908.91

$x = \sqrt{kW^2 + kVAR^2} = \sqrt{(518.73)^2 + (908.91)^2} = 1046.52$

$\theta = \cos^{-1} \frac{518.73}{1046.52} = 60.29°$ pf .496

T=0 Loads

		kW	kVAR
Tran 2B1	1537 kVA θ = 55.71	865.92	1269.86
Tran 2B2	785 kVA θ = 53.24	469.80	628.90
Batt Chgr I-IV	7.44 kVA θ = 0	7.44	
ERCW Cpt 2A	25.5 kVA θ = 51.68	15.81	20.00
	Total	1358.97	1918.76

$x = \sqrt{kW^2 + kVAR^2} = \sqrt{(1358.97)^2 + (1918.76)^2} = 2351.26$

$\theta = \cos^{-1} \frac{1358.97}{2351.26} = 54.69°$ pf .578

ATTACHMENT

G

D-G Loading Sequence for:
a. BO on Power Train 2B
b. BO & SI-PhA on Power Train 2B
c. BO & SI-PhB on Power Train 2B

B25 '86 0204 300 p150

SEQUOYAH NUCLEAR DIESEL GENERATOR LOADING SEQUENCE

FOR BO (LOSS OF OFF-SITE POWER) ON POWER TRAIN 2B

Component	Load Rating	Time (Sec)	Starting P.F.	Acc Time (Sec)	Remarks	Running P.F.	Running Eff.
Random Loads	279 HP	-	0.523	5 Max. @** Min. Volts	1294 Kva Starting	.85**	.9**
6.9kV to 480V transformers	2 @ 1500 kVA, 1 @ 300 kVA	0	0.483	5 Max @** Minimum Volts	679 HP 2699 Kva Starting	.85**	.9**
Centrifugal Charging Pump	600 hp rated 680 hp actual	2	.28	4.5 @ 100% Volt, 11.5 @ 80% Volt	4079 kVA Starting	.929	.939
Essential Raw Cooling Water Pump	700 hp	15	.25	1.4 @ 100% Volt, 1.98 @ 90% Volt	3788 kVA Starting	.856	.925
Component Cooling Pump	2 @ 350 hp rated 355 hp actual	20	.3	3.6 @ 100% Volt 7.5 @ 80% Volt	3740 kVA Starting	.90	.928
Auxiliary Feedwater Pump	500 hp rated 486 hp actual	25	.2	5 Max @** Minimum Voltage	2586 kVA Starting	.915	.93
Pressurizer Heaters	485 kw	90	-	-	-	-	-
Fire Pumps	200 hp rated	120	.3	5 Max @** Minimum Volt	865 kVA Starting	.815	.895

*Time is measured from closing of circuit breaker connecting the diesel generator to the power train.
**Assumed values

Prepared Peter J Bowman 1-10-86
Checked C. R. McIntosh 1-10-86
Reviewed R.P. Reore
Date 1-10-86

0671A

SEQUOYAH NUCLEAR DIESEL GENERATOR LOADING SEQUENCE

FOR BO AND SI-PHASE A ON POWER TRAIN 2B

Component	Load Rating	Time (Sec)	Starting P.F.	Acc Time (Sec)	Remarks	Running P.F.	Running Eff.
Random Loads	175 HP	-	.500	5 Max @** Minimum Volts	1068 Kva Starting	0.85**	0.9**
6.9kV to 480V transformers	2 @ 1500 kVA, 1 @ 300 kVA	0	.497	5 Max @** Minimum Volts	837 HP 3643 Kva Starting	.85**	.9**
Centrifugal Charging Pump	600 hp rated 680 hp actual	2	.28	4.5 @ 100% Volt, 11.5 @ 80% Volt	4079 kVA Starting	.929	.939
Safety Injection Pump	400 hp rated 410 hp actual	5	.25	2.7 @ 100% Volt, 6.8 @ 80% Volt	2632 kVA Starting	.906	.925
Residual Heat Removal Pump	400 hp rated 425 hp 300 hp actual	10	.297	1.6 @ 100% Volt, 3.8 @ 80% Volt	2499 kVA Starting	.937	.938
Essential Raw Cooling Water Pump	700 hp	15	.25	1.4 @ 100% Volt, 1.98 @ 90% Volt	3788 kVA Starting	.856	.925
Component Cooling Pump	2 @ 350 hp rated 355 hp actual	20	.3	3.6 @ 100% Volt 7.5 @ 80% Volt	3740 kVA Starting	.90	.928
Auxiliary Feedwater Pump	500 hp rated 486 hp actual	25	.2	5 Max @** Minimum Voltage	2586 kVA Starting	.915	.93
~~Containment Spray Pump~~	~~700 hp rated 690 hp actual~~	~~30~~	~~.25~~	~~3.1 @ 100% Volt, 11 @ 80% Volt~~	~~3572 kVA Starting~~	~~.934~~	~~.949~~

RB 1-16-86

Prepared Peter J Bowman 1-10-86
Checked C. R. McIntosh 1-10-86
Reviewed R. P. Pearce
Date 1-10-86

FOR BO AND SI-PHASE A ON POWER TRAIN 2B

Component	Load Rating	Time (Sec)	Starting P F.	Acc Time (Sec)	Remarks	Running P.F.	Running Eff.
Fire Pumps	200 hp rated	120	.3	5 Max @** Minimum Volt	865 kVA Starting	.815	.895

*Time is measured from closing of circuit breaker connecting the diesel generator to the power train.
**Assumed values

Prepared Peter F Bowman 1-10-86
Checked R McIntosh 1-10-86
Reviewed R.P. Reeve
Date 1-10-86

SEQUOYAH NUCLEAR DIESEL GENERATOR LOADING SEQUENCE

FOR BO AND SI-PHASE B ON POWER TRAIN 2B

Component	Load Rating	Time (Sec)	Starting P.F.	Acc Time (Sec)	Remarks	Running P.F.	Running Eff.
Random Loads	190 HP	—	.496	5 Max. @** Min. Volt	1047 Kva Starting	0.85**	0.9**
6.9kV to 480V transformers	2 @ 1500 kVA, 1 @ 300 kVA	0	.578	5 Max @** Minimum Volts	572 Conn. HP 2351 Kva Starting	.85**	.9**
Centrifugal Charging Pump	600 hp rated 680 hp actual	2	.28	4.5 @ 100% Volt, 11.5 @ 80% Volt	4079 kVA Starting	.929	.939
Safety Injection Pump	400 hp rated 410 hp actual	5	.25	2.7 @ 100% Volt, 6.8 @ 80% Volt	2632 kVA Starting	.906	.925
Residual Heat Removal Pump	400 hp rated 425 hp actual	10	.297	1.6 @ 100% Volt, 3.8 @ 80% Volt	2499 kVA Starting	.937	.938
Essential Raw Cooling Water Pump	700 hp	15	.25	1.4 @ 100% Volt, 1.98 @ 90% Volt	3788 kVA Starting	.856	.925
Component Cooling Pump	2 @ 350 hp rated 355 hp actual	20	.3	3.6 @ 100% Volt 7.5 @ 80% Volt	3740 kVA Starting	.90	.928
Auxiliary Feedwater Pump	500 hp rated 486 hp actual	25	.2	5 Max @** Minimum Voltage	2586 kVA Starting	.915	.93
Containment Spray Pump	700 hp rated 690 hp actual	30	.25	3.1 @ 100% Volt, 11 @ 80% Volt	3572 kVA Starting	.934	.949

0672A

Prepared [signature] 1-10-86
Checked [signature]
Reviewed R. P. Reeve
Date 1-10-86

B25 '86 0204 300 p154

FOR BO AND SI-PHASE B IN POWER TRAIN 2B

Component	Load Rating	Time (Sec)	Starting P.F.	Acc Time (Sec)	Remarks	Running P.F.	Running Eff.
Fire Pumps	200 hp rated	120	.3	5 Max @** Minimum Volt	865 kVA Starting	.815	.895

*Time is measured from closing of circuit breaker connecting the diesel generator to the power train.
**Assumed values

0672A

Prepared Peter A. Brown 1-10-86
Checked C.R. McIntosh 1-10-86
Reviewed R.P. Reese
Date 1-10-86

B25 '86 0204 300 p155 Attachment H p 1/4

B44 '860130 701

INTERNATIONAL POWER SYSTEMS, INC.
A MORRISON-KNUDSEN COMPANY

101 GELO ROAD / POST OFFICE BOX 1928
ROCKY MOUNT, NORTH CAROLINA 27802-1928 / U.S.A.
PHONE (919) 977-2720 / TWX (510) 929-0725
TELEX 802507 PSD-RYMO

REPORT NO. 6957R

REVISION 0

JANUARY 23, 1986

APPROVED
This approval does not relieve the Contractor from any part of his responsibility for the correctness of design, details, and dimensions.
TENNESSEE VALLEY AUTHORITY
Date JAN 30 1986
(MECH. ENGR BR) BY C. A. CHANDLEY
Ans'd By Ltr. #42G-048

IPS IWO 6957

TVA CONTRACT 71C61-92652

SEQUOYAH NUCLEAR DIESEL

GENERATOR LOAD SEQUENCE

PROJECT SQN
CONTRACT 71C61-92652
DRAWING # 6957R
SHEET
REVISION 0
UNIT 1 & 2

N2M-52

Engine Capability to Accept and Carry Sequenced Loads with Random Loads Applied at any Point during the Load Sequence

CONCLUSION:

The worst case load for the engine is in the sequence for BO & SI-Phase B on Power Train 2B at the 30 second load step.

The application of the random load during the random load motor starting will cause the frequency to drop to exceed the 5% frequency drop limitation.

The random load was modified by TVA (correspondence dated 1/16/86) to consider only a 110 HP motor with stated characteristic as the random load to be applied at the 30 second step. This random load, in addition to the original 700 HP containment spray pump motor, is acceptable.

Further, in addition to the 110 HP random load, either a 60 HP motor (based upon the original random load characteristics) or a 150 KW may also be applied.

The ability of the generator and exciter to accept the load steps with random loads is the subject of another report.

NORTH CAROLINA PROFESSIONAL ENGINEER 7033 HARRY WILLIAM FALTER

Harry W. Falter
Harry W. Falter, P.E.

7033
N. C. License Number

B25 '86 0204 300 Attachment H p3/4
P157

MORRISON-KNUDSEN COMPANY, INC.
POWER SYSTEMS DIVISION

POST OFFICE BOX 1928
ROCKY MOUNT, NORTH CAROLINA 27802-1928
PHONE: (919) 977-2720 / TWX: (510) 929-0725
TELEX 802507 PED-RYMO

SENT/REC. BY TELECOPY
SENT:
REC'D.:
DATE:
TIME:

TELECOPY

DATE: January 29, 1986

COMPANY: Tennessee Valley Authority

ADDRESS:

CITY & STATE: Knoxville, TN

ATTENTION: Mr. Bill Kistler

REFERENCE: TVA Contract 71C61-92652, C.O. 30, 31

TELECOPY NO.: 615/632-6836, Verify X3334

MESSAGE

S/N 6957C-0-0012

As discussed, attached is a copy of the telecopy we received today from Electric Products. Please note last page, Para. E -'Results'. Last sentence of this paragraph has been evaluated. Please refer to M-K/PSD Report 6957R, Load Sequence Analysis, submitted to TVA on January 28, 1986.

FROM: Susan Woolard for Ed Martin Susan Woolard

TRANSMITTED HEREWITH ARE 7 PAGES
(INCLUDING THE COVER SHEET)

IF YOU DO NOT RECEIVE ALL PAGES LISTED, PLEASE CALL: 919/977-2720, EXT.212, FOR VERIFICATION.

RKVA	=	rated KVA base of the "per unit" system, KVA
RPF	=	rated Power Factor, P.U.
RPM	=	rated synchronous speed, revolutions/minute
RF	=	rated frequency, Hertz
DO	=	outside diameter of stator core, in.
D	=	inside (bore) diameter of stator core, in.
KCG	=	effective air gap, in.
DS1	=	depth of stator slot, in.
XD	=	direct axis synchronous reactance, P.U.
XQ	=	quadrature axis synchronous reactance, P.U.
XAL	=	armature leakage reactance, P.U.
RA	=	armature resistance at 75°C, P.U.
XPD	=	effective positive sequence reactance, P.U.
TPDO	=	transient open-circuit direct axis time constant, sec.
HPB	=	effective magnetic pole length, in.
LY	=	effective magnetic yoke length, in.
BG	=	magnetic flux density, air gap, kilolines/in.^{2}
BT3	=	magnetic flux density, tooth, kilolines/in.^{2}
BC	=	magnetic flux density, core, kilolines/in.^{2}
BPO	=	magnetic flux density, pole at no load, kilolines/in.^{2}
BYO	=	magnetic flux density, yoke at no load, kilolines/in.^{2}
EXC	=	ceiling excitation, P.U. rated voltage on air gap line
TXC	=	excitation system buildup time constant, sec.
H	=	voltage regulator time lag, sec.
LAMNL	=	field leakage coefficient at no load, P.U.
(032, #DIPS, IPLOT, SCALEX, SCALEY, PRINTEST) operator's commands		
OKVAL	=	generator output prior to load switching, KVA
OPFL	=	output power factor prior to load switching, P.U.
TKVAL	=	generator output after load switching, KVA
TPFL	=	output power factor after load switching, P.U.

E. Results:

The results of this study indicate that the specified random loads can be applied simultaneously with any automatically sequenced load block without exceeding the capability of the electrical system to maintain the transient voltage within the specified limits and to recover to the steady state voltage band within the specified time. However, transient overloading of the engines may occur with certain large motor load blocks and should be evaluated.

<u>APPENDIX B</u>

CONTROL POWER SYSTEM

RESTART CALCULATIONS

FOR

SEQUOYAH NUCLEAR PLANT

0817A

TVA 10697 (OE-4-85) OE CALCULATIONS QA Record 898

TITLE 125V DC Vital Instrument Power System Design Verification - Preliminary				PLANT/UNIT SQNP 1&2
PREPARING ORGANIZATION EEB-SPR&CPS	KEY NOUNS (Consult RIMS DESCRIPTORS LIST) 125V DC Vital Instrument Power System Voltage Drop Study			
BRANCH/PROJECT IDENTIFIERS SQN-VD-VDC-1	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
	R0	860207E0159 (898)		B43 '86 0130 914
APPLICABLE DESIGN DOCUMENT(S)	R1			B43 '86 0210 924
	R __			
SAR SECTION(S) / UNID SYSTEM(S)	R __			

Revision 0	R1	R2	R3	Statement of Problem
ECN No. (Indicate if Not Applicable) —				Evaluate a representative sample of the safety-related 125V dc loads powered from the 125V dc vital power system to determine if the minimum input voltage to each load is provided during a loss of ac power.
Prepared James D. Hines	J.D. Reed			
Checked Mario G. Aguirre	J.J. Cunther			
Reviewed [signature]	[signature] 2-10-86			
Approved M.J. Schwegs / GH	M.S. Schwegs			
Date 1-30-86	2-10-86			
List all pages added by this revision.	593A thru 593E			
List all pages deleted of this revision.				
List all pages changed by this revision.	1 thru 6			

Use form TVA 10534 if more room required.

Abstract

A representative sample of Class 1E loads connected to the 125V vital battery boards were analyzed. This analysis consisted of calculating the voltage available at the terminals of the loads, and comparing this voltage with manufacturer's minimum voltage rating. Six circuits were found in which the available voltage at the load was not adequate, see section 5.5. These circuits are also identified for corrective action in SCRSQNEEB8605.

This calculation contains unverified assumptions. (See sections 3.3, 3.5 3.9, and 3.10)

This calculation consist of ~~806~~ 811 pages numbered sequentially.

This revision (R1) adds pages 593A thru 593E

066015.02

Microfilm and return calculation to: C.H. Gilliland, W8B73 C-K

cc: RIMS, SL26 C-K

TVA

Title: 125V DC Vital Instrument Power System
Design Verification - Preliminary

REVISION LOG

Revision No.	DESCRIPTION OF REVISION	Date Approved
1	Revise the analysis of the 480V shutdown boards (as indicated with revision bar).	

TVA 10834 (EN DES-4-78)

Sequoyah Nuclear Plant Units 1 and 2
125V DC Vital Instrument Power System
Design Verification - Preliminary
SQN-VD-VDC-1

R0:
Prepared By J. D. Hines Date 1-24-86
Checked By M. A. Aguirre Date 1-24-86
R1:
Prepared By J.O. Reed Date 2-10-86
Checked By I.J. Coulter Date 2-10-86

Table of Contents

Sequoyah Nuclear Plant Units 1 and 2
125V DC Vital Instrument Power System
Design Verification - Preliminary
SQN-VD-VDC-1

R0:
Prepared By J. D. Hines Date 1-24-86
Checked By M. A. Aguirre Date 1-24-86
R1:
Prepared By J.D. Reed Date 2-10-86
Checked By A.J. Cauthen Date 2-10-86

1.0 PURPOSE

The purpose of this calculation is to determine if there is adequate voltage during a loss of ac power at the terminals of the selected components for proper operation.

2.0 REFERENCES

2.1 TVA drawings

45N703-1 R22	45N703-5 R19	45N749-1 R21	R1
45N703-2 R18	45N703-6 R22	45N749-2 R23	
45N703-3 R21	45N703-7 R14	45N749-3 R20	
45N703-4 R18	45N703-8 R16	45N749-4 R20	

2.2 Sequoyah Nuclear Plant Vital Instrument Power Voltage Drop Study No. SQNSWD8507.

2.3 Electrical Design Guide DG-E2.4.6 (90°C impedance values)

2.4 Sequoyah Nuclear Plant Final Safety Analysis Report chapter 8, paragraph 8.3.2.1.1

2.5 Sequoyah Design Criteria SQN-DC-V-11.2 (B42 850605 503)

2.6 SCR SQNEEB8514 (B43 850619 916)

2.7 Class 1E SQN Equipment List Outside Containment (B25 850911 800) and Inside Containment (B25 850911 801) In a Harsh Environment

3.0 ASSUMPTIONS

3.1 The contact resistance of handswitches, limit switches, and flow switches is assumed to be negligible. This also applies to circuit breakers and fuses.

3.2 Resistance from internal board wiring was assumed negligible.

3.3 Cable lengths used are the construction pull lengths and are assumed to be actual except for 12 cables listed in Appendix 3 which had no listing of pull lengths. See appendixes 2 and 3 for these lengths. (For the cables in Appendix 3, design length plus 30 percent was used for analytical purposes. This assumption is unverified.)

3.4 Cable resistance values are maximum resistance (90°C) from reference 2.3.

Sequoyah Nuclear Plant Units 1 and 2
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R0:
Prepared By J. D. Hines. Date 1-24-86
Checked By M. A. Aguirre Date 1-24-86
R1:
Prepared By J.D. Reed Date 2-10-86
Checked By A.J. Carothers Date 2-10-86

3.5 All design drawings used in this analysis are the latest available revision of the schematic and connection drawings for Sequoyah and are assumed to be as installed. (This assumption is unverified.) The specific drawings used are referenced on the individual circuit block diagrams.

3.6 While indicating light resistance was included in applicable circuit models, the lights were not evaluated for undervoltage failure: reduced voltage is considered to merely reduce the brilliance of the light.

3.7 The 6.9kV and 480V shutdown board circuits were analyzed with a board voltage of 120V dc. R1

3.8 The fuse assemblies column circuits, auxiliary relay rack circuits, reactor trip switchgear trip breaker circuits, and the 120V ac vital instrument inverter circuits were analyzed with a board voltage of 105V dc.

3.9 Preliminary test results (performed by SQN Nuclear Power Electrical Maintenance T. Smith) indicate that the minimum pickup voltage for Westinghouse AR series relays (120V dc coil) is approximately 85V dc. This value is assumed as the minimum operating voltage and will be verified by further testing or by vendor documentation. (This assumption is unverified.)

3.10 The current drawn by the solid-state crydom relay [which is protected by a 1/16 amp fuse] is insignificant to the current drawn by the other components of concern (solenoid valves and electromechanical relays). (This assumption is unverified.)

4.0 DOCUMENTATION OF ASSUMPTIONS

4.1 Assumptions 3.1 and 3.2

For certain complex circuits (typically solenoid valves), a simplified approach in determining circuit can be used by neglecting the resistance of handswitches, limit switches, temperature switches, flow switches, circuit breakers, fuses, and small lengths of internal board wiring. While realizing that these small additional resistances will produce a small voltage drop, they are insignificant compared to the voltage drops being analyzed.

Sequoyah Nuclear Plant Units 1 and 2
125V DC Vital Instrument Power System
Design Verification - Preliminary
SQN-VD-VDC-1

R0:
Prepared By J. D. Hines Date 1-24-86
Checked By M. A. Aguirre Date 1-24-86
R1:
Prepared By J.D. Reed Date 2-10-86
Checked By L.J. Cauthern Date 2-10-86

4.2 Assumption 3.4

The maximum cable resistance is used to determine a maximum voltage drop for a worst case analysis.

4.3 Assumption 3.6

Since indicating lights do not affect the proper operation of the circuits analyzed, voltage drop to the lights is not considered.

4.4 Assumption 3.7

Per reference 2.5, the voltage shall be 120V dc which is the initial battery voltage upon loss of ac power. Due to the automatic under-voltage load shedding feature, the critical operational period (for the scope of this analysis) for the 6.9kV and 480V shutdown boards is immediately upon loss of ac power, i.e., battery voltage of 120V dc. | R1

4.5 Assumption 3.8

Per reference 2.4, the vital battery two hour discharge minimum terminal voltage is 105V dc. This is worst case voltage.

5.0 CALCULATIONS

5.1 Background

This voltage calculation is made for a representative sample of the safety-related loads powered from the 125V dc vital battery boards. The need for this calculation was identified as a part of the OE response to the Potential Generic Condition Evaluation of WBNEEB8515R1.

5.2 Procedure

Initially the 125V vital battery board drawings (45N703-1, -2, -3, and -4) were reviewed to identify the following representative categories of safety-related circuits:

(1) 6.9kV Shutdown Board Circuits

(2) 480V Shutdown Board Circuits

(3) Fuse Columns (primarily Solenoid Valve Circuits)

Sequoyah Nuclear Plant Units 1 and 2
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R0:
Prepared By J. D. Hines Date 1-24-86
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R1:
Prepared By J.D Reed Date 2-10-86
Checked By J.J. Carruthers Date 2-10-86

(4) Auxiliary Relay Rack Circuit

(5) Reactor Trip Switchgear Breakers

(6) 120V AC Vital Instrument Inverters

To obtain a representative sample, circuits from each of the above types were analyzed.

(1) 6.9kV Shutdown Board Circuits:

The normal bus normal feeder and the backup bus normal feeder were analyzed for all four battery boards. Immediately upon loss of ac power, the majority of the 6.9kV shutdown board loads are shed to allow sequential diesel generator loading. This load shedding occurs with a battery board voltage of 120V dc (2.0 volts/cell); therefore, the voltage drop calculations for these circuits were performed at 120V dc rather than at the end of discharge condition (105V dc).

Load current was determined by summing the contribution of those breakers tripping for automatic load shedding with the contribution for normal bus loading (e.g. auxiliary relays). Using this value, voltage drop from the battery board to the 6.9kV shutdown board was calculated. In all cases, the input voltage to the 6.9kV shutdown boards was 113.8V dc. Since the minimum operating voltage of the breaker trip coils is 100V dc and since voltage drop in the internal board wiring is negligible, it was determined by inspection that all breakers required to trip would do so. Therefore, no further analysis of these circuits was performed.

(2) 480V Shutdown Board Circuits:

The TVA single lines and schematics for the selected 480V shutdown boards were analyzed for the purpose of determining the worst case dc control loading for any of the shutdown boards. The dc feeder cables were reviewed in order to determine the circuit with the highest cable impedance. The undervoltage trip circuit cables were reviewed in order to determine the worst case trip circuit impedance. All of these were then combined to define a worst case circuit, thereby allowing a generic evaluation which is valid for all of the 480V shutdown boards. The worst case dc control bus loading for these boards occurs following a loss of ac power R1 when several breakers are automatically tripped (load shedding), and this condition is the basis for the evaluation. The results of this analysis show that the voltage at the trip coils of interest is above 109 volts. Since the minimum manufacturer's rating is 90V, no further analysis is necessary. R1

(3) Fuse Assemblies Columns:

Five circuits from each of the four battery boards were analyzed, with each of the circuits having a different physical destination, thus resulting in a representative range of voltage drops.

(4) Auxiliary Relay Racks:

This one circuit contains 24 solenoid valves in parallel.

(5) Reactor Trip Switchgear Trip Breaker:

This circuit and the reactor trip switchgear bypass breakers were analyzed.

Each circuit was modeled from the power source to the load identifying all pertinent cable and component data (cable length, size, component electrical parameters). Using this model, the voltage at the terminals of each componenet was calculated (with the exception of the 6.9kV and 480V shutdown board circuits, as previously noted) and compared with the manufacturer's minimum voltage rating.

If a component could be energized via alternate paths, or if several identical components were connected in parallel to a local panel, the path that produced the largest voltage drop was used in the calculation.

The calculations were checked by (1) doing an alternate calculation, or (2) checking the designer's approach and method.

5.3 Data

See Appendices 2 and 3.

5.4 Computations

See Appendix 1.

5.5 Summary

All of the 125V dc Class 1E circuits that were analyzed maintain adequate terminal voltage except the following:

(1) 120V ac Vital Instrument Inverters
1-I, 1-II, 1-III, and 1-IV (pages 211 thru 249)

(2) 2-FSV-68-397 (pages 128 thru 141)

(3) Aux Relay Rack 1-R-55 that powers the following solenoid valve circuits.

1-FSV-1-103 B&D	1-FSV-1-109 B&D
1-FSV-1-104 B&D	1-FSV-1-110 B&D
1-FSV-1-105 B&D	1-FSV-1-111 B&D
1-FSV-1-106 B&D	1-FSV-1-112 B&D
1-FSV-1-107 B&D	1-FSV-1-113 B&D
1-FSV-1-108 B&D	1-FSV-1-114 B&D
(pages 258 thru 309)	

The above circuits will be documented in SCR SQNEEB8605 for corrective action.

(4) FCV-1-22 Main Steam Isolation Valves

These solenoid valves are manufactured by Gould Allied and have a minimum operating voltage of 109V dc per Wylie Test Report No. 17514-1. However per Attachment I, these solenoid valves not having adequate terminal voltage would not pose a safety concern with the operation of the solenoid valves.

6.0 CONCLUSION

Due to problems discovered in this preliminary design verification analysis, further calculations are necessary. The circuits selected for this further analysis must include (as a minimum) auxiliary relay racks 1-R-54, 2-R-54, and 2-R-55 and an additional sample of solenoid valve circuits fed from the vital battery board fuse columns. The further analysis will be done in OE Calculation SQN-VD-VDC-1. R1

NOTE:

**For multiple, single conductor cables (e.g., 2/1C), footage is determined as circuit length divided by number of conductors.

EXAMPLE CALCULATION PACKAGE

FOR ONE CIRCUIT

=

SHEET — OF

Sequoyah N.P.

125 VDC BATT BD. I BKR 213

CKT. D1

COMPUTED J. D. [illegible] 12-11-85

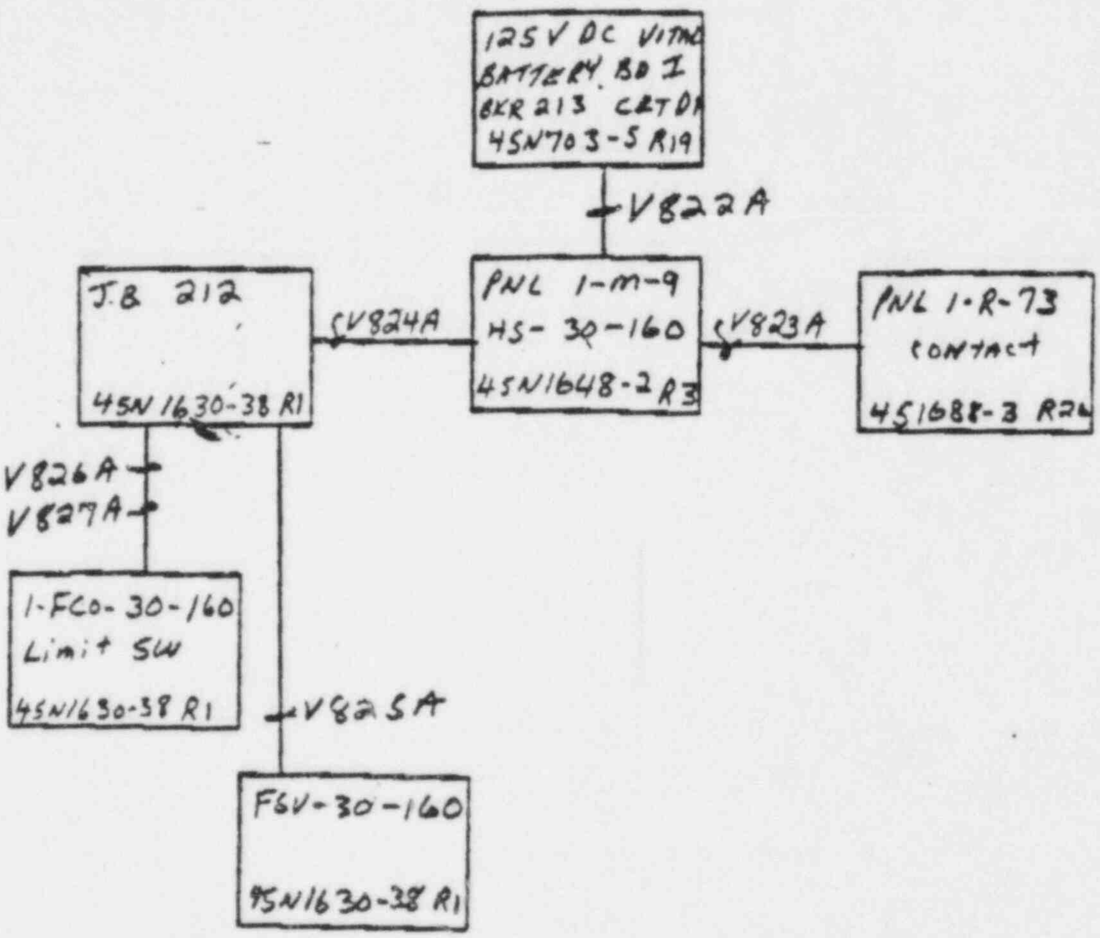
CHECKED [illegible] DATE 12-22-85

FCO-30-160

CABLE V822A

45N1648-2 R3

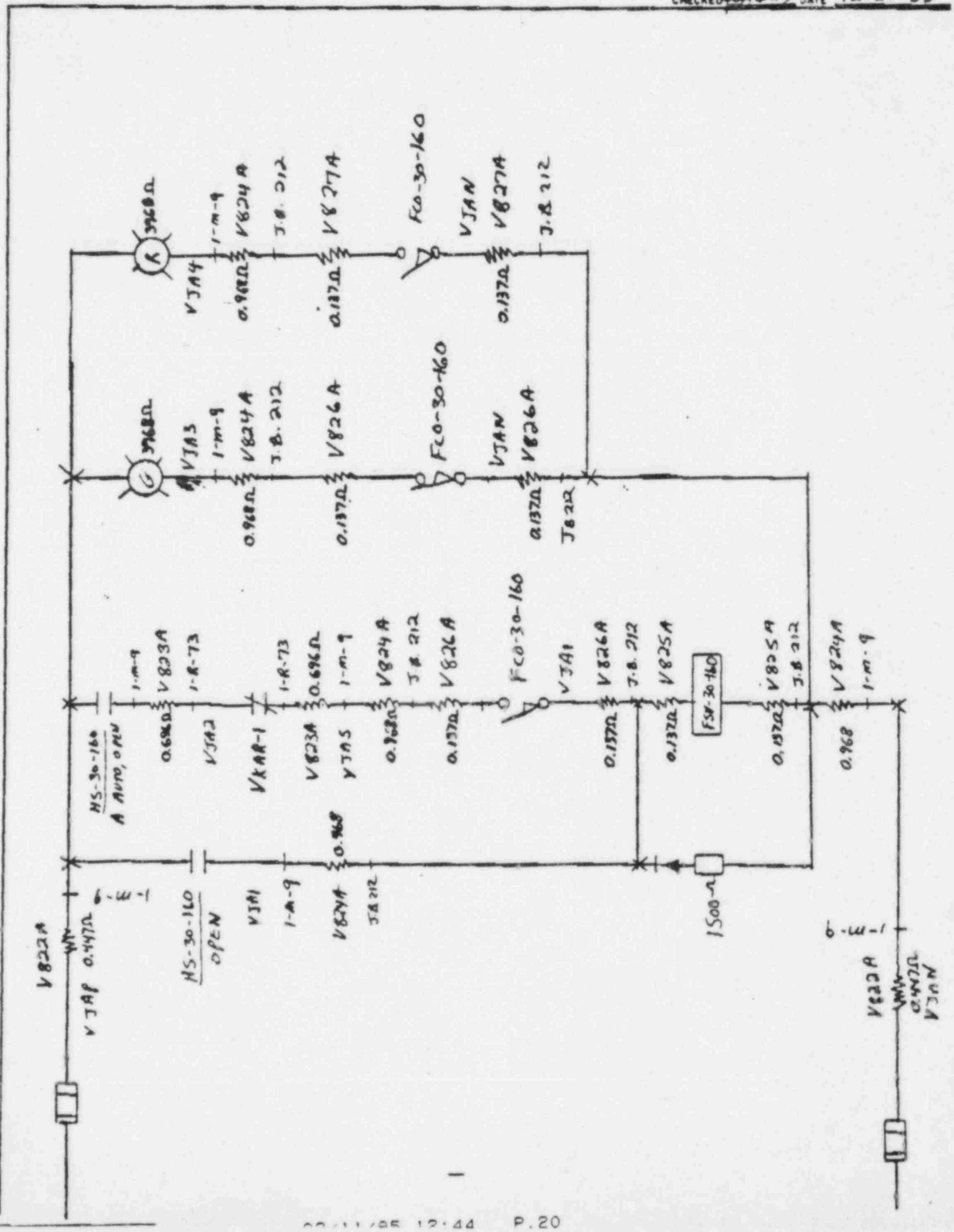
45N630-8 R3



TVA 11030 (WM-7-75)

Sequoyah N.P.
125 V DC BATT BD. I
BKR 213 CKT D1

COMPUTED J. D. [illegible] 12-11-85
CHECKED [illegible] DATE 12-22-85



TVA 11030 (WM-7-75)

BKR 213, FREK COL. D, CKT 1 — SEQUOYAH N.P.

FSV-30-160 VOLTAGE DROP BRANCH ANAL

COMPUTED PS DATE 1-7-86

* CHECKED MAR DATE 1-9-86

1A 11030 (WM-7-75)

TOTAL CURRENT

BRANCH R1 (MAN)

$\frac{105VDC}{448.304\Omega} = 0.234A$ (+)

COMPONENT CURRENT

$\frac{105VDC}{445.2\Omega} = 0.236A$

CALCU. CABLE VOLTAGE DROP

$0.236A(3.109\Omega) = 0.733V$

AVAL. COMPONENT VOLTAGE

$105VDC - 0.733V = 104.27VDC$

VB22A r1 0.447Ω

VB24A r2 0.968Ω

VB25A r3 0.137Ω

FSV-30-60 r4 446.2Ω

VB25A r5 0.137Ω

VB24A r6 0.968Ω

VB22A r7 0.447Ω

$\frac{(0.234A)(1316')(14.09\Omega)}{6530CM} = 0.662V$

$\frac{(0.234A)(80')(14.02\Omega)}{4107CM} = 0.064V$

0.726VDC

BRANCH R2 (AUTO)

$\frac{105VDC}{449.47\Omega} = 0.233A$ (+)

COMPONENT CURRENT

$\frac{105VDC}{445.2\Omega} = 0.236A$

CALCU. CABLE VOLTAGE DROP

$0.236A(4.77\Omega) = 1.126V$

AVAL. COMPONENT VOLTAGE

$105VDC - 1.126V = 103.87VDC$

MAR 1/12/86 (NOT VERIFIED) SEE R2

VB22A r1 0.447Ω

VB23A r8 0.696Ω

VB23A r9 0.696Ω

VB24A r10 0.968Ω

VB16A r11 0.137Ω

VB16A r12 0.137Ω

VB15A r3 0.137Ω

FSV-30-60 r4 445.2Ω

VB25A r5 0.137Ω

VB24A r6 0.968Ω

VB22A r7 0.447Ω

$\frac{(0.233A)(1316')(14.09\Omega)}{6530CM} = 0.66V$

$\frac{(0.233A)(568')(14.02\Omega)}{4107CM} = 0.452V$

1.112VDC

BRANCH R3

$\frac{105VDC}{3971.104\Omega} = .027A$ (+)

COMPONENT CURRENT

$\frac{105VDC}{3968\Omega} = 0.027A$

CALCU. CABLE VOLTAGE DROP

$0.027A(3.104\Omega) = 0.084V$

AVAL. COMPONENT VOLTAGE

$105VDC - 0.084V = 104.92VDC$

MAR 1/12/86 (~~NOT VERIFIED~~) ~~SEE R1~~

VB22A r1 0.447Ω

VJA4 r13 3968Ω

VB24A r14 0.968Ω

VB27A r15 0.137Ω

VB27A r16 0.137Ω

VB24A r6 0.968Ω

VB22A r7 0.447Ω

$\frac{(0.27A)(1316')(14.09\Omega)}{6530CM} = 0.764$

$\frac{(0.27A)(80')(14.02\Omega)}{4107CM} = 0.064V$

0.828VDC

SERIES $R = r_x + r_y$ etc

PARALLEL $R = \frac{1}{\frac{1}{r_x} + \frac{1}{r_y}}$

CABLE VOLT DROP $E_{dc} = \frac{IR}{CM}$

CM = CIRCULAR MILS

CALCULATED CABLE VOLTAGE DROP $E = IR$

COMPONENT CURRENT $I = E/R$

AVAILABLE COMPONENT VOLTAGE $E' - E = E_{dy}$

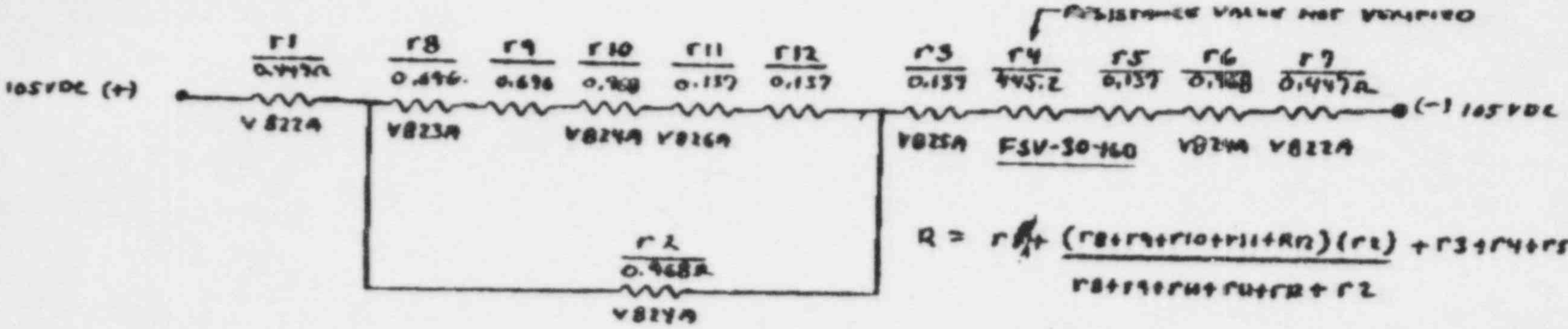
Nº 12 AWG = 6530 CM

Nº 14 AWG = 4107 CM

* see attached alternate calculation

02/11/85 12:44 P.21

TA 11030 (WM-7-75)



$$R = r1 + \frac{(r8+r9+r10+r11+r12)(r2)}{r8+r9+r10+r11+r12+r2} + r3+r4+r5+r6+r7$$

Parallel $R = 0.449\Omega + \frac{(2.634\Omega)(0.968\Omega)}{2.634\Omega + 0.968\Omega} + 446.889\Omega = 448.044\Omega$

Total Current $\frac{105VDC}{448.044\Omega} = 0.234A$

Component Current $\frac{105VDC}{495.2\Omega} = 0.236A$

Calcd. Cable Voltage Drop $0.236A(2.844) = 0.671V$

Available Component Voltage $105VDC - 0.671V = 104.33VDC$

★ see attached alternate calculation

125V VITAL BATT BD I

BKR 213

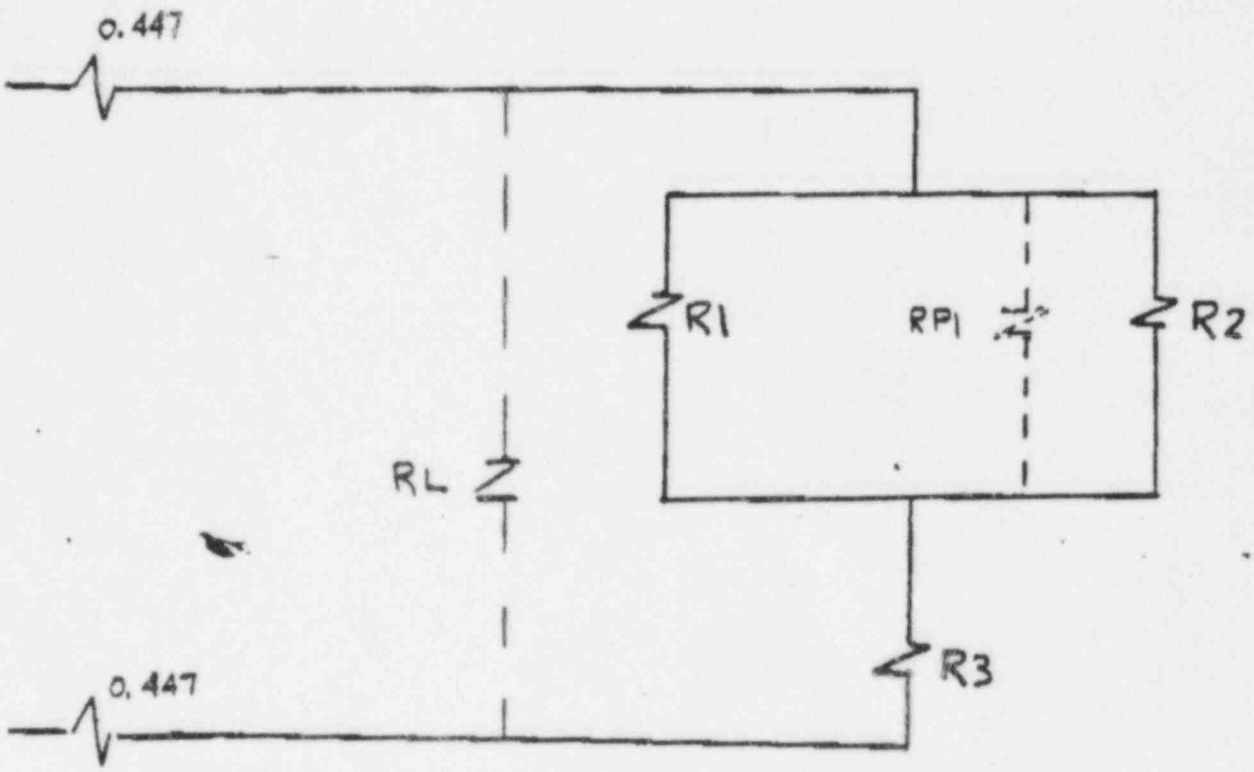
CKT D1 (FCO-30-160)

SHEET TWO OF

COMPUTED MAA DATE 1-9-86

CHECKED DATE

(ALTERNATE CALCULATION) sheet D1 1 of 2



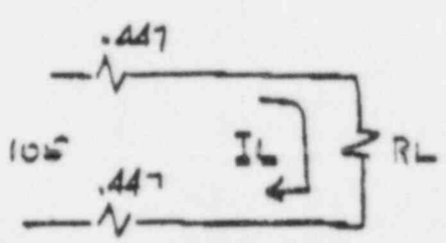
$R1 = 2(0.696) + 0.968 + 4(0.137) + 445.2 = 448.11$

$R2 = 3968 + 0.968 + 2(0.137) = 3969.4$

$RP1 = R1 // R2 = 448.11 // 3969.4 = 402.65$

$R3 = 0.968$

$RL = RP1 + R3 = 402.65 + 0.968 = 403.62$

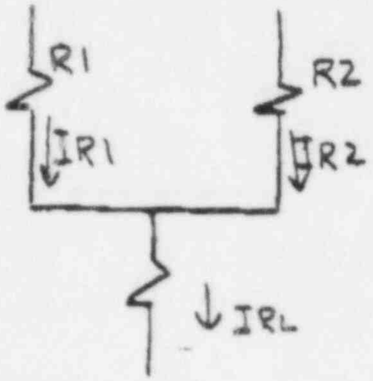


$VL = 105 \left(\frac{RL}{2(.447) + RL} \right) = 104.77$

$IL = VL/RL = 104.77/403.62 = 0.26$

TVA 11030 (WM-*-75)

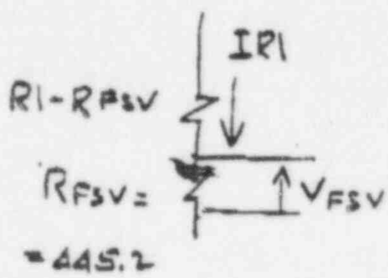
(ALTERNATE CALCULATION, CONT.)



$$I_{R1} = I_{RL}\left(\frac{R2}{R1+R2}\right)$$

$$= 0.26\left(\frac{3969.4}{3969.4+448.11}\right)$$

$$= 0.23$$



$$V_{FSV} = (I_{R1})(R_{FSV}) = (0.23)(445.2)$$

$$= \underline{\underline{104.01}}$$

Sequoyah N.P. 125 VDC SQN-VD-VDC-1 SHEET 48 OF

BATT. BD I BKR 213 CKT D1

COLUMNS 1-6

PREPARED BY: ELG DATE: 12-30-85

CHECKED BY: SKB DATE: 1/3/86

COLUMNS

PREPARED BY: DATE:

CHECKED BY: DATE:

1 CABLE No.	2 CABLE SIZE	3 No. OF CONDUCTORS	4 FOOTAGE (FT)	5 TYPE	6 CABLE IMPEDANCE (R FOR DC)
V822A	#12	1-2C	208	WGB	.447
V823A	#14	1-2C	204	WHB	.696
V824A	#12	1-5C	450	WGE	.968
V825A	#14	1-2C	40	WHB	.137
V826A	#14	1-4C	40	WHD	.137
V827A	#14	1-2C	40	WHB	.137

SEQUOYAH NUCLEAR PLANT

Power Source: 125V DC VITAL BATT BD. I

Breaker No. and/or Circuit Name: BKR 213 CKT 01.

Component Location Symbols:
* Unit Control Bd
‡ 6900V Swgr
[Local Control Station
Ø 6900V Shtdn Log Rly Pnl
● NSSS Rack in Aux Inst Rm
□ Aux Rly Rack in Aux Instr Rm

Columns 1-10

Prepared By M A Aguirre Date 1/17/86

Checked By J.D. Haines Date 1/18/86

Columns ______

Prepared By ______ Date ______

Checked By ______ Date ______

1 Component I.D.	2 Contract No.	3 Manufacture Model/Type	4 Component Location	5 Nominal Volt. (V.)	6 Min. Volt.	7 Watt @ V.	8 Amps @ V.	9 Ω	10 Calc. Volt.
FSV-30-160	827551	ASCO HV-206-381-2RVU	LA6 EL763	125	90	35	.2808	445.2	103.87
IND. LIGHT GREEN	—	—	—	125VDC	—	—	—	3968Ω	—
IND. LIGHT RED	—	—	—	125VDC	—	—	—	3968Ω	—

Item	[illegible]			Design data	Drawing No / Set points, etc.	Contract No	Purchase No / Log No	Rem / PO	
HS-30-153A	AUX BLDG GEN EXH FAN 1A	1	C	1-M-9	47W605-32	(1)			
HS-30-154B	AUX BLDG GEN EXH FAN 1A	1		(2)		(1)		NO	C
FCO-30-160	AUX BLDG GEN EXH FAN 1A SUCT DMPR	1		(2) MARK NO 47A381-117	47W920-10	34C35-83620-1		NO	
FSV-30-160	AUX BLDG GEN EXH FAN 1A SUCT DMPR	1		(2) XFR WBN 827551	47W920-10	SPEC	1FSV00-1103		
HS-30-160	AUX BLDG GEN EXH FAN 1A SUCT DMPR	1	C	1-M-9	47W605-32	(1)		IR-A	
FCO-30-161	AUX BLDG GEN EXH FAN 1A SUCT DMPR	1		(2) MARK NO 47A381-117	47W920-10	34C35-83620-1		IR-A	
FSV-30-161	AUX BLDG GEN EXH FAN 1A SUCT DMPR	1		(2) XFR WBN 827551	47W920-10	SPEC	2FSV00-1103		M
HS-30-161	AUX BLDG GEN EXH FAN 1A SUCT DMPR	1	C	1-M-9	47W605-32	(1)		IR-B	C
FCO-30-162	AUX BLDG GEN EXH FAN 1B	1		(2) MARK NO.47A370-66.	47W920-10	32C35-92740		IR-A	C
FS-30-162	AUX BLDG GEN EXH FAN 1B FLOW ALM	1	C	(2) SET POINT: 0.20"WC		25K34-86321		NO	C
FSV-30-162	AUX BLDG GEN EXH FAN 1B	1		(2)	47W920-10	36K13-86760		NO	C
ZS-30-162	AUX BLDG GEN EXH FAN 1B POS SW	1		(2)		36K13-86760		NO	C
HS-30-162A	AUX BLDG GEN EXH FAN 1B	1	C	1-M-9	47W605-32	(1)		NO	C
HS-30-162B	AUX BLDG GEN EXH FAN 1B	1		(2)		(1)		NO	C
FC-30-164	AUX BLDG GEN EXH FAN 1A FLOW CNTLR	1	D	0-L-426 RANGE:0-1"WC:OUTPUT:0-16VDC;SP:3.25"WC	47W600-227	87245	47W920-5410	NO	C
FCO-30-164	AUX BLDG GEN EXH FAN 1A FLOW CNTLR	1		(2) JOHNSON NO.5 PISTON OPERATOR.MARK NO.47A370-66.	47W920-10	32C35-92740		NO	
FM-30-164	AUX BLDG GEN EXH FAN 1A FLOW CNTLR:I/P	1	D	0-L-426 INPUT:10-50 MADC.OUTPUT:3-15 PSIG.	47W600-227	72C38-83522-2		NO	

SQN-VD-VDC-1

SQN-VD-VDC-1

Sheet 50

SNP 47B601-30-41 R49

LEINART'S, INC.

PHONE AREA 615 525-0363 • P. O. BOX 508 • 1400 FIFTH AVENUE N. E. • KNOXVILLE, TENNESSEE 37901

CONTRACT NO. 80KJ3-827551
WATTS BAR NUCLEAR PLANT

ITEM NO. 3 HV-206-381-2RVU

THE FOLLOWING INSTRUMENT NUMBERS APPLIES TO DRAWING NO. JVA-206-381 AND INSTRUCTION BULLETIN NO. 206-381, FORM V6001:

1-FSV-00-1100
1-FSV-00-1101
1-FSV-00-1102
1-FSV-00-1103
1-FSV-00-1104
1-FSV-00-1105
1-FSV-00-1106
1-FSV-00-1107
1-FSV-00-1108
1-FSV-00-1109
1-FSV-00-1110
1-FSV-00-1111
1-FSV-00-1112
1-FSV-00-1113
1-FSV-00-1114
1-FSV-00-1115
1-FSV-00-1116
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1-FSV-00-1119
1-FSV-00-1120
1-FSV-00-1121
1-FSV-00-1122
1-FSV-00-1123
1-FSV-00-1124
1-FSV-00-1125
1-FSV-00-1126
1-FSV-00-1127
1-FSV-00-1128
1-FSV-00-1129
1-FSV-00-1130
1-FSV-00-1131
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2-FSV-00-1147
1-FSV-00-1148
2-FSV-00-1148
1-FSV-00-1149
2-FSV-00-1149

80KJ3-827551

Sheet ___ of ___

29A	END CAP (M.O.)	1
29B	BODY (M.O.)	1
29C	GASKET (M.O.)	1
29D	STUFFING BOX	1
29E	PIN,	1
29F	STEM STOP	1
29G	O-RING SEAL	1
29H	STEM	1
29J	OPERATOR KNOB	1
29K	SPRING (M.O.)	1
29L	ROLL PIN,	1
29M	TAG (NOT SHOWN)	1

-210-109

FV-210-106

FV-210-103

FV-210-106

FV-210-103

FV-210-100

FV-210-097

FV-210-094

FV-210-097

FV-210-094

SQN-VD-VDC-II

SQN-VD-VDC-II

FILE

APPROVED
This approval does not relieve the Contractor from any part of the responsibility for the correctness of design, details and dimensions.
TENNESSEE VALLEY AUTHORITY
Date DEC 30 1980
F. W. CHANDLER

TVA Date NOV 21 1980
PROJECT WATTS BAR NP
CONTRACT 80-827551
TITLE Solenoid Valves
UNIT 1 & 2
CHECKED

"A" JVW 12-12-80

UNIVERSAL

NET WEIGHT

BERS

Item No. 3

-381 — 3 WAY SOLENOID VALVE

(SEE TABLE) — BODY MAT'L BRASS

SEE TABLE) — SEATING (SEE TABLE)

IV. FOR NUCLEAR POWER PLANT SERVICE

MA TYPE 4(WATERTIGHT)7C AND 7D(EXPLOSION-
OOF)AND 9E, 9F AND 9G(DUST-IGNITION-PROOF).

C. (BATTERY) ✓

E.R. NO	BY	DATE	APPR.	DATE
F 93233	RWY	7-2-80	G.V.	7-16-80
	ADDED TAG TO VIEWS, ETC.			
E 89066	DM.	12-23-79	J.V.C.	12-27-79
	ADDED NOTE 3			
D 87244	MMW	11-16-78	G.V.	11-27-78
	REVISED BODY & ADDED STRAINER VIEW			
C 85637	OCW	6-25-78	G.V.	6-2-78
	FLOW DIAGRAM "UNIV." PRESS. CHANGE.			
B 84503	OCW	3-8-78		
	SPARE PART KIT NO'S CHG'D			
A 64162	OCW	1-30-78	G.V.	2-14-78
	BODY CHANGE, ADDED M.O., ETC.			

BY	DATE
KER	1-30-78
DAS	2-14-78
	2/14/78
	5/3/
	7.7.79

FULL SCALE — ASSY REF NO

DEW ☒ CONT ☒ AL ☒ AM ☒ KA ☒
CH ☐ AA ☒ AR ☒ AV ☒ PS ☐

Automatic Switch Co.© FLORHAM PARK, N. J. PRINTED IN U.S.A.

FILE JVA-206-381

CHG LTR A B C D E F

SQN-VD-VDC-1

SQN-VD-VDC-1

Mark: Watts Bar Nuclear Plant
Attn: Chief Storekeeper
Contract 80KJ3-827551

F	G	H	J	NORMALLY CLOSED	NORMALLY OPEN	UNIVERSAL	NET WEIGHT
[54] 2 1/8	[24] 15/16	[48] 1 7/8	[47] 1 27/32	FV-210-107	FV-210-108	FV-210-109	53
	[18] 23/32	[37] 1 7/16	[48] 1 29/32	FV-210-104	FV-210-105	FV-210-106	
				FV-210-101	FV-210-102	FV-210-103	
				FV-210-104	FV-210-105	FV-210-106	
				FV-210-101	FV-210-102	FV-210-103	[ ]
[54] 2 1/8	[24] 15/16	[48] 1 7/8	[47] 1 27/32	FV-210-098	FV-210-099	FV-210-100	
	[18] 23/32	[37] 1 7/16	[48] 1 29/32	FV-210-095	FV-210-096	FV-210-097	
				FV-210-092	FV-210-093	FV-210-094	
				FV-210-095	FV-210-096	FV-210-097	
				FV-210-092	FV-210-093	FV-210-094	
				SPARE PARTS KIT NUMBERS			

APPR...
This approval do...
Contractor from any...
bility for the correct...
and dimensions.
TENNESSEE VA...
Date DEC

BULLETIN 206-381 3

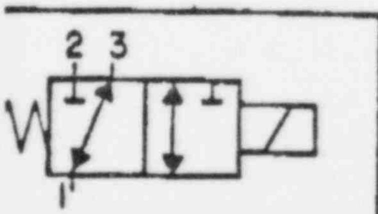
PIPE-PORT CONN. (SEE TABLE) Bo

ORIFICE DIA (SEE TABLE) Se

N.C., N.O., UNIV. FOR NUCLEAR POWER PL

ENCLOSURE NEMA TYPE 4(WATERTIGHT)7C A
PROOF)AND 9E, 9F AND 9G(DUST

WATTS 35.1 D.C. (BATTERY) ✓



...VERSAL (SUFFIX 'U')
...S. AT 2 OR 3 ONLY

✓

VALVE MUST BE MOUNTED WITH SOLENOID VERTICAL AND UPRIGHT.

[mm]
INCHES

THIRD ANGLE PROJECTION

	BY	DATE
DRAWN	WALKER	1-30-78
TRACED		
CHECKED	VADAS	2-14-78
DFTG.APVD	JMR	2/14/78
ENGRD	RWO	5/2/78
APPVL	EKP	4/5/79

Automatic Switc...

Sheet 1 of 719

TVA 10697 (OE-4-85)

OE CALCULATIONS

TITLE 120V AC Vital Control Power System Design Verification - Preliminary		PLANT/UNIT SQNP 1&2
PREPARING ORGANIZATION EEB-SPR&CPS	KEY NOUNS (Consult RIMS DESCRIPTORS LIST) 120V AC Vital Control Power System Voltage Analysis	
BRANCH/PROJECT IDENTIFIERS SQN-VD-VAC-2	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
R0		B43 '851230 901
R __		
R __		
R __		

APPLICABLE DESIGN DOCUMENT(S)

SAR SECTION(S) | UNID SYSTEM(S)

Revision 0	R1	R2	R3
ECN No. (Indicate if Not Applicable)			
Prepared Ramiro G. Aguirre			
Checked J Roop			
Reviewed G Neal			
Approved M.J. Scruggs / GHW			
Date 12/27/85			
List all pages added by this revision.			
List all pages deleted of this revision.			
List all pages changed by this revision.			

Use form TVA 10534 if more room required.

Statement of Problem

Evaluate a representative sample of the safety-related 120V ac loads powered from the units 1 and 2, 120V vital ac system to determine if the minimum input voltage to each load is provided during system worst-case voltage conditions.

Abstract

Twenty-six Class 1E loads connected to the units 1 and 2 120V ac vital instrument power boards were analyzed. This analysis consisted of calculating the voltage available at the terminals of the loads, and comparing this voltage with manufacturer's minimum voltage rating. Eight circuits were found in which the available voltage at the load was not adequate, see Attachment 1. These circuits are also identified for corrective action in SCR SQNEEB 8532.

This calculation contains unverified assumptions. (See 3.2, 3.6, 3.8, 3.10, 3.11, and 3.15.)

065354.06

Microfilm and return to : C.H. Gilliland, W8B79 C-K

Sequoyah Nuclear Plant Units 1 and 2
120V AC Vital Control Power System
Design Verification - Preliminary
SQN-VD-VAC-2

Prepared By V. A. Aquino
Checked By J. Roop

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Sequoyah Nuclear Plant Units 1 and 2
120V AC Vital Control Power System
Design Verification - Preliminary
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Prepared By [signature]
Checked By [signature]

1.0 PURPOSE

The purpose of this calculation is to determine if there is adequate voltage during steady-state (except, as noted) conditions, at the terminals of the selected components for proper operation.

2.0 REFERENCES

2.1 TVA drawings 45N706-1 R22, -2 R22, -3 R23, and -4 R19, "Wiring Diagram/120V AC Vital Instrument Power Boards"

2.2 Sequoyah Nuclear Plant Proposed Plan for 120V AC Vital Instrument Power System Voltage Drop Study (scope of work document No. SQNSQD8508)

2.3 Electrical Design Guide DG-E2.4.6 (90 C impedance values)

2.4 J. P. Vineyard's memorandum to H. B. Rankin dated November 15, 1985 (B25 851118 003)

2.5 W. L. Elliott to M. J. Scruggs dated December 9, 1985, Flow Control Operators - Voltage Study

3.0 ASSUMPTIONS

3.1 The inverter is assumed to be operating at full load with a maximum output current of 125 amps, minimum voltage 117.6V (i.e.,120-2%), and a phase angle of 41°:

3.2 Cable lengths used are the construction pull lengths and are assumed to be actual except for 14 cables listed in Appendix 4 which had no listing of pull lengths. See appendixes 3 and 4 for these lengths. (For the cables in Appendix 3, design length plus 30 percent was used for analytical purposes. This assumption is unverified.)

3.3 The impedance of the Westinghouse EZC minalite was used as a typical value of indicating lights where specific data was not readily available. The power factor of the indicating lights is assumed to be unity.

3.4 The contact resistance of handswitches, limit switches, and flow switches is assumed to be negligible. This also applies to circuit breakers and fuses.

3.5 Resistance from internal board wiring was assumed negligible.

3.6 Phase angle of miscellaneous relays and instruments which could not be readily obtained was assumed to be 60°. (This assumption is unverified.)

3.7 Inrush currents were assumed negligible except where the circuit contained solenoid valves or a significant number of relays (i.e.relay rack).

3.8 Loads were assumed to have constant impedance. (This assumption is unverified.)

3.9 Cable impedance values are maximum impedance (90°C) from reference 2.3.

3.10 All design drawings used in this analysis are the latest available revision of the schematic and connection drawings for Sequoyah and are assumed to be as installed. (This assumption is unverified.) The specific drawings used are referenced on the individual circuit block diagrams.

3.11 While indicating light impedance was included in applicable circuit models, the lights were not evaluated for undervoltage failure: reduced voltage is considered to merely reduce the brilliance of the light. (This assumption is unverified.)

3.12 Transient Suppression Networks were not included in the circuit models because they produced no voltage drop to components required to operate.

3.13 All relays on each relay rack were assumed simultaneously energized, thus placing the rack under maximum inrush conditions.

3.14 All radiation monitors were assumed energized.

3.15 Preliminary test results indicate that the minimum pickup voltage for Westinghouse AR series relays (120V ac coil) is approximately 60V ac. This value is assumed as the minimum operating voltage for relay rack analysis and will be verified by further testing or by vendor documentation. (This assumption is unverified.)

Note: Assumptions 3.13 and 3.14 represent worse case conditions.

4.0 DOCUMENTATION OF ASSUMPTIONS

4.1 Assumption 3.1

Practical engineering experience indicates that when the inverter is fully loaded it supplies its maximum output current at its minimum voltage. Using a phase angle of 41° allows an evaluation of a worst case condition simulating field conditions and simplifies the calculations.

4.2 Assumption 3.3

The impedance of indicating lights is nearly pure resistive and very large compared to other circuit components. Using a unity power factor simplifies computations and network reduction without significantly affecting the results.

4.3 Assumptions 3.4 and 3.5

For certain complex circuits (typically solenoid valves) a simplified approach in determining circuit impedances can be used by neglecting the resistance of handswitches, limit switches, temperature switches, flow switches, circuit breakers, fuses, and small lengths of internal board wiring. While realizing that this small additional impedances will produce a small voltage drop, it is insignificant compared to the voltage drops being analyzed.

4.4 Assumption 3.7

For components other than solenoid valves and significant quantities of relays (i.e. relay rack), such as miscellaneous relays and various instrumentation loads the inrush current is only a few cycles duration and is considered insignificant for this analysis.

4.5 Assumption 3.9

The maximum cable impedance is used to derive a maximum of cable voltage drop for the worst case analysis.

5.0 CALCULATIONS

5.1 Background

This voltage calculation is a representative sample (26 circuits) of the safety-related loads powered from the units 1 and 2 120V ac vital instrument power boards as identified in WBNEEB8539 RO. The need for this calculation was identified as a part of the OE response to the Potential Generic Condition Evaluation of WBNEEB8539 RO and J. P. Vineyard's memorandum to H. B. Rankin dated November 15, 1985 (B25 851118 003).

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5.2 Procedure

Initially the 120V ac vital instrument power board single line drawings (45N706-1, -2, -3, and -4) were reviewed to identify all units 1 and 2 safety-related loads.

From the above drawings a total of 166 safety-related circuits were identified. These circuits were separated into four groups as follows based in the type of load connected to them:

(1) - relay circuits	48
(2) - valve circuits	22
(3) - radiation monitoring circuits	16
(4) - instrumentation and control circuits	80
	166

Of these 166 circuits, 26 were chosen for analysis explained below:

The target was to analyze not less than 10 percent of each of the four groups identified above.

Five relay circuits and eight valve circuits were analyzed which represents approximately 10 percent and 36 percent respectively of the circuits in these two groups. The circuits were selected based on the number of components were chosen as evenly as possible between the two units and among the eight boards.

Five radiation monitor circuits were analyzed which is approximately 31 percent of the number of circuits in this group.

It was noted that these circuits could be subdivided in five subgroups as follows:

(1) ERCW and containment radiation monitors (0-RE-90-133)

(2) Radiation rate meters and radiation rate indicators (0-RI-90-112)

(3) Containment purge air and exhaust radiation monitors (2-RE-90-131)

(4) Radiation intake monitors (0-RE-90-205)

(5) Radiation intake monitors (0-RE-90-126)

One circuit of each group was selected. The circuits were selected as evenly as possible from each unit and each "trained board."

Eight instrument and control circuits were analyzed, which is 10 percent of the number of circuits in this group. It was noted that the instrument and control group could be divided into four subgroups as follows:

(1) Large instrument racks

(2) Local panels with several instruments

(3) Electro-mechanical controls

(4) Circuits with one instrument

Five circuits were selected from the large instrument rack subgroup five circuits were selected, two circuits from the local panels with several instruments subgroups, and one from the electro-mechanical control subgroup. No circuits were selected from the subgroup of circuits with one instrument because it was judged to have the lowest probability of failure. Three circuits were selected from the large instrument subgroup because similar circuits were analyzed for Watts Bar Nuclear Plant, and were found to have excessive cable voltage drop (i.e., the voltage available at the terminals of the equipment was less than the equipment minimum operating voltage requirement).

The other five circuits from the instrument and control circuit group were selected as evenly as possible from the two units and the eight boards.

Each circuit was modeled from the power source to the load identifying all pertinent cable and component data (cable length, size, component electrical parameters). Using this model, the voltage at the terminals of each component was calculated and compared with the manufacturer's minimum voltage rating.

If a component could be energized via alternate paths, or if several identical components were connected in parallel to a

Prepared By Y.C. Aquino
Checked By JRopp

local panel, the path that produced the largest voltage drop was used in the calculation.

The initial voltage drop calculation was performed using the computer program "MCALC" (Attachment 2). From the model, each component's impedance was input into the computer for a network reduction to determine the total circuit's equivalent impedance. The ratio of each component's impedance to the total network impedance was obtained and multiplied by the component's source voltage, to determine the voltage available at each component.

Since the MCALC program was not qualified, the calculations were checked by hand using programs for the HP41C programable calculator (see Attachment 2). In some of the alternate calculations, the programs shown in Appendix 1 were used for series and parallel combination of impedances.

5.3 Data

See Appendices 3, 4 and Attachment 2.

5.4 Computations

See Appendix 1.

5.5 Summary

All of the 120V ac Class 1E circuits that were analyzed maintain adequate terminal voltage at the load devices except as noted in Attachment 1. These circuits have excessive voltage drop and are documented in SCR SQNEEB8532 for corrective action.

6.0 CONCLUSIONS

6.1 All remaining 120V ac circuits powered from the vital ac (units 1&2) should be evaluated for voltage drop.

6.2 The failed circuits' cables (as a minimum) should be "walked down" in the field to determine the actual cable length is correct.

7.0 ATTACHMENTS

Attachment 1 - Components with Inadequate Terminal Voltage
Attachment 2 - Field Test Data

8.0 APPENDIXES

Appendix 1 - Calculations

Sequoyah Nuclear Plant Units 1 and 2
120V AC Vital Control Power System
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Prepared By H.C. Aquino
Checked By [illegible]

Appendix 2 - MCALC Program and HP41C Alternate Calculation Programs

Appendix 3 - Cable Length (Construction Pull)

Appendix 4 - Cable Length (Design Length + 30%)

ATTACHMENT I

pg 1 of 3

1-R-148 REACTOR VESSEL LEVEL INSTRUMENTATION ; BD 1-II, BKR 29
CABLE 1PM4983II
MIN VOLT. 112.1 ; CALC. VOLT 109.066

2-R-148 REACTOR VESSEL LEVEL INSTRUMENTATION ; BD 2-I, BKR 11
CABLE 2PM4943I (REAR RIGHT BAY PROTECTION SET I)
MIN VOLT. 112.1 ; CALC. VOLT 103.382

2-R-148 REACTOR VESSEL LEVEL INSTRUMENTATION; BD 2-II, BKR 11
CABLE 2PM4983II (REAR LEFT BAY PROTECTION SET II)
MIN VOLT. 112.1; CALC. VOLT 103.665

2-RR-90-253 RADIATION RATE METER ; BD 2-IV, BKR 12
CABLE 2RM604B
MIN VOLT 105.3 ; CALC VOLT 102.49

2-RI-90-275B RADIATION RATE INDICATOR ; BD 2-IV, BKR 12
CABLE 2RM644B
MIN VOLT 105.3 ; CALC VOLT 102.02

2-RI-90-277B RADIATION RATE INDICATOR; BD 2-IV, BKR 12
CABLE 2RM654B
MIN VOLT 105.3 ; CALC VOLT. 101.07

2-RI-90-293B RADIATION RATE INDICATOR ; BD 2-IV, BKR 12
CABLE 2RM498B
MIN VOLT 105.3; CALC VOLT 97.46

COMPONENTS WITH INADEQUATE TERMINAL VOLTAGE
(CONT.)

COMPUTED RLE DATE 12-23-85
CHECKED JWS DATE 12-24-85

Pg 2 of 3

2-RI-90-292B RADIATION RATE INDICATOR ; BD 2-IV, BKR 12
CABLE 2RM494B
MIN VOLT 105.3 ; CALC VOLT 97.37

2-RM-90-293
2-RM-90-292
2-RM-90-277
2-RM-90-275
2-RM-90-274
2-RM-90-272
RADIATION MONITOR ; BD 2-IV, BKR 12
INTERNAL PNL 2-M-30
MIN VOLT 105.3 ; CALC VOLT 102.52

K293
K292
K277
K275
K274
K272
KMFB
RELAYS ON 2-M-30 ; BD 2-IV, BKR 12
INTERNAL PNL 2-M-30
MIN VOLT 103.5 ; CALC VOLT 102.52

2-FSV-31-475 POST ACCIDENT SAMPLING VALVE ; BD 2-III, BKR 17
CABLE 2M3402A (2-FCO-31-475)
MIN VOLT 102 ; CALC VOLT 96.822

1-FSV-31-475 POST ACCIDENT SAMPLING VALVE ; BD 1-I, BKR 17
CABLE 1M3402A (1-FCO-31-475)
MIN VOLT 102 ; CALC VOLT 98.75

0-FSV-31-480 POST ACCIDENT SAMPLING VALVE, BD 1-I, BKR 17
CABLE 1M3461A (0-FCO-31-480)
MIN VOLT 102 ; CALC VOLT 97.91

COMPONENTS WITH INADEQUATE TERMINAL VOLTAGE
(CONT.)

COMPUTED RLE DATE 12-24-85
CHECKED JWS DATE 12-24-85

Pg 3 of 3

1-FSV-31-476 POST ACCIDENT SAMPLING VALVE; BD 1-II, BKR 17
CABLE 1M3427B (1-FCO-31-476)
MIN VOLT 102; CALC VOLT 98.75

0-FSV-31-481 POST ACCIDENT SAMPLING VALVE; BD 1-II, BKR 17
CABLE 1M3471B (0-FCO-31-481)
MIN VOLT 102; CALC VOLT 97.91

2-FSV-31-476 POST ACCIDENT SAMPLING VALVE; BD 2-IV, BKR 17
CABLE 2M3427B (2-FCO-31-476)
MIN VOLT 102; CALC VOLT 98.75

EXAMPLE CALCULATION PACKAGE

FOR ONE CIRCUIT

SQN-VD-VAC-2

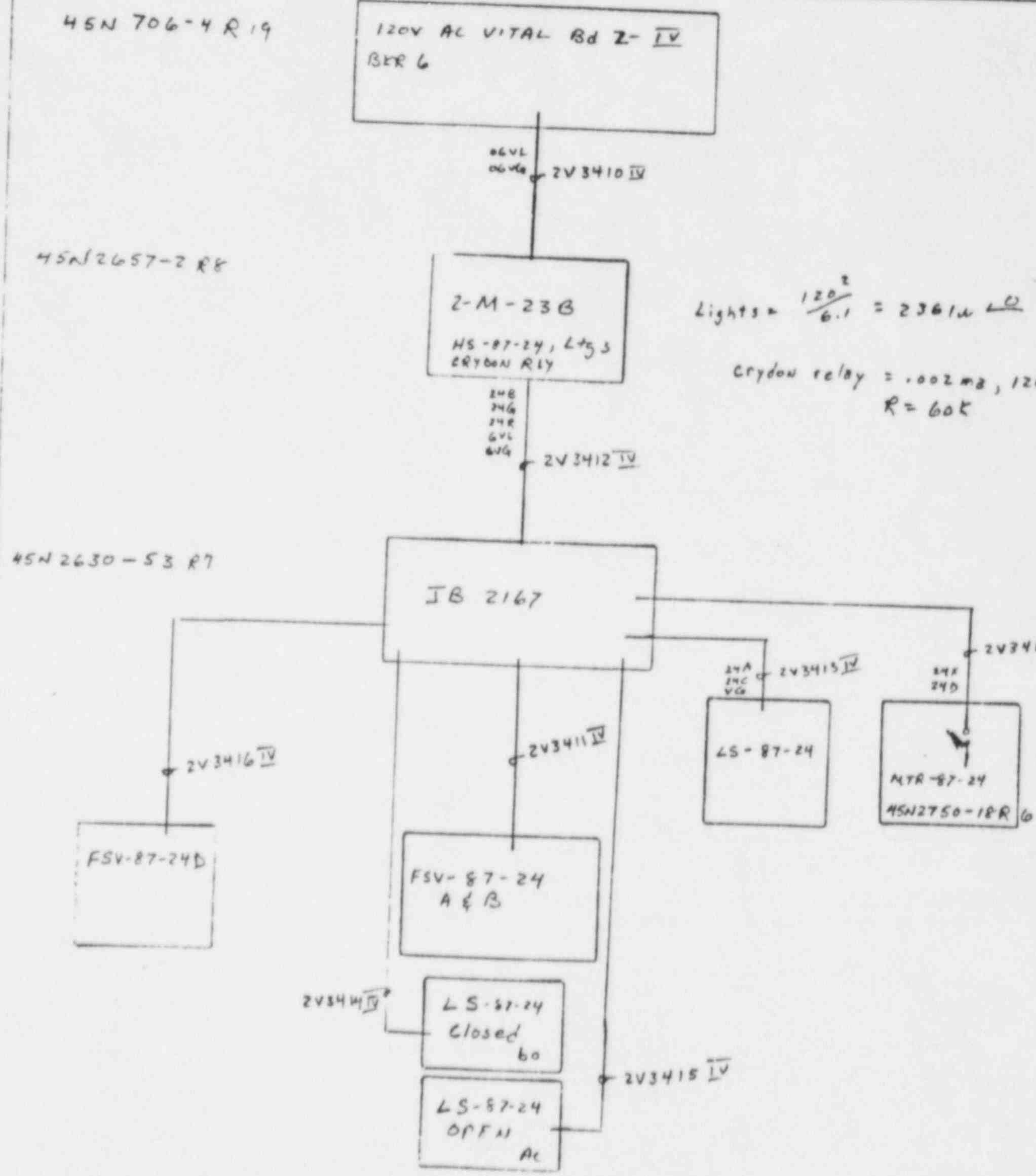
BKR 6, 120v AC VITAL Instr Pwr Bd 2-IV SHEET 335 OF 719

FCV-87-24 UHI Accumulator Iso Vlv SQN

COMPUTED JWf DATE 11-19-85

CHECKED DDW DATE 12-19-85

Schematic : 45N687-1 R9



Lights = $\frac{120^2}{6.1}$ = 2361$\angle 0$

crydon relay = .002 ma, 120v

R = 60K

FSV-87-24A Energ to close

FSV-87-24B " " close

FSV-87-24D Energ to close

Asco type 206-380

steady state: 20W, 41.5VA, $\frac{V^2}{W}$(p.f.) : R = 347$\angle$61.2 pf = $\frac{20}{41.5}$ = .482 or 61.2°

Inrush 195VA pf .42

R 273.85 $\angle$65.2

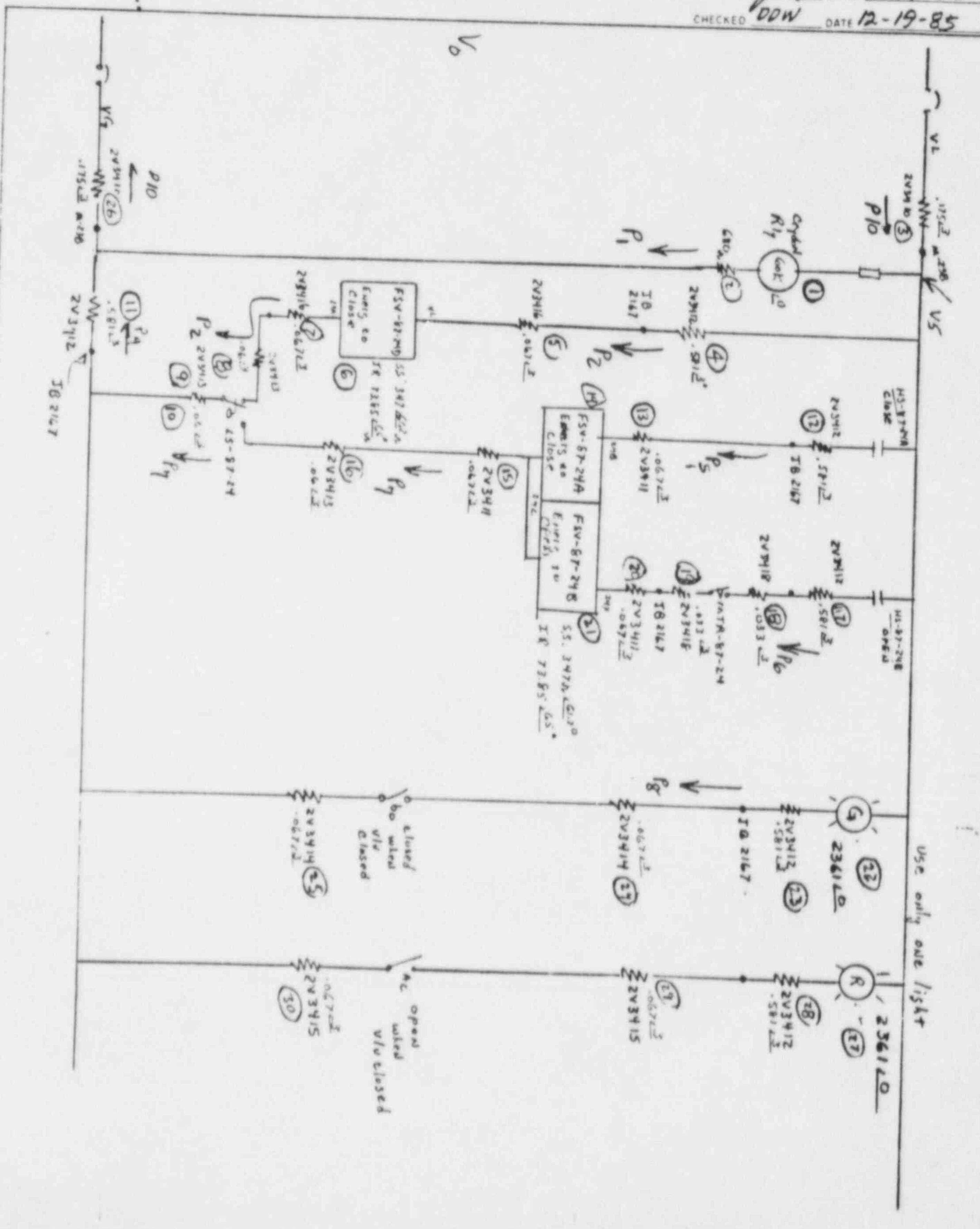
SQN·VD·VAC·2

BKR 6 , 120v AC VITAL INST Pwr 2-IV SHEET 936 OF 719

FCV- 87-24 SQN

COMPUTED JWd DATE 11-19-85

CHECKED DDW DATE 12-19-85



SQN·VD·VAC·2

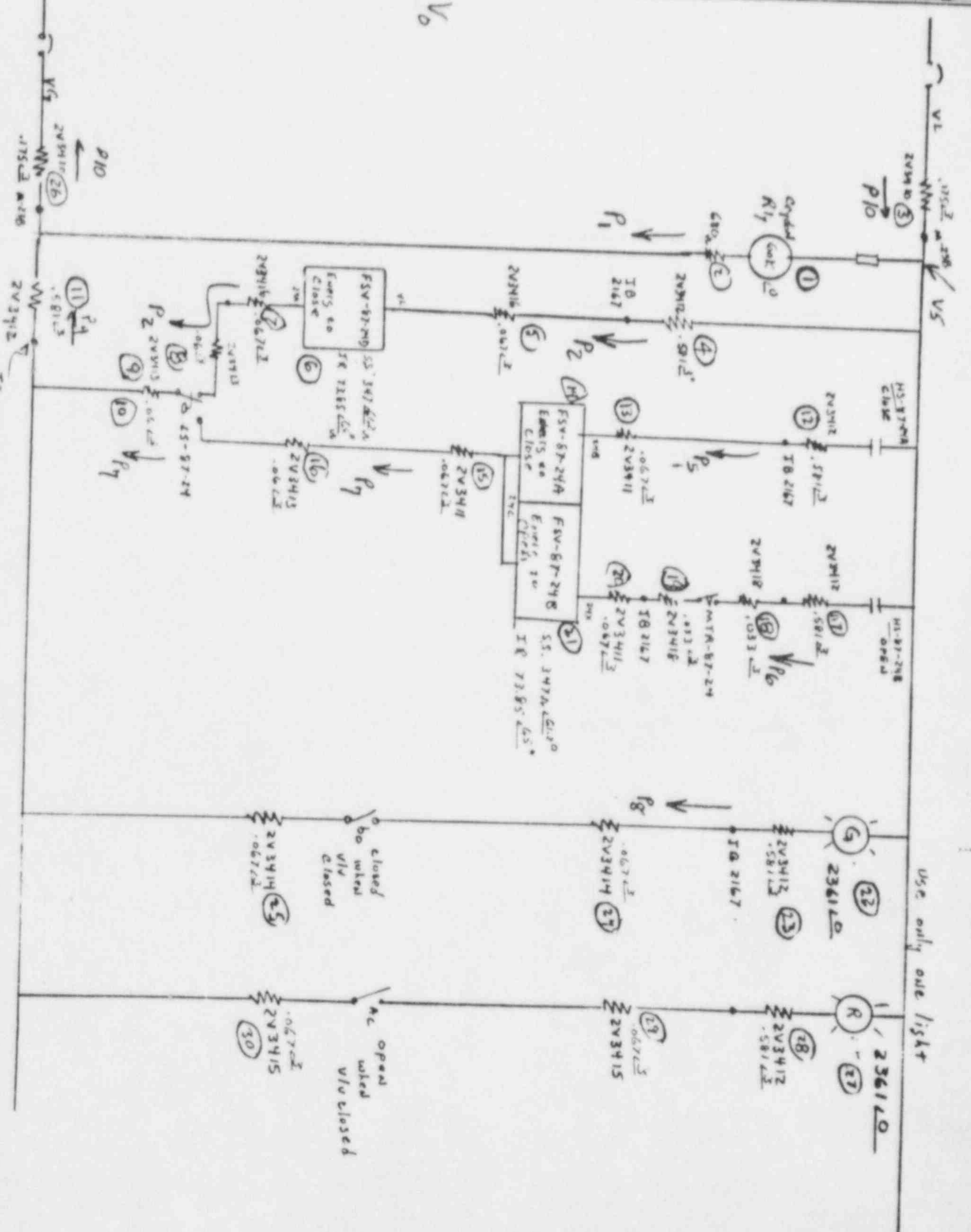
BKR 6 , 120v AC VITAL INST Pwr 2-IV SHEET 936 OF 719

FCV - 87- 24

SQN

COMPUTED JWJ DATE 11-19-85

CHECKED DDW DATE 12-19-85



SQN-VD-VAC-2

BKR 6, 120v AC VITAL Bd 2 - IV

FCV-87-24

SHEET 337 OF 719

SQN

Columns 1

Prepared By: JWF Date: 11-19-85

Checked By: DDW Date: 12-19-85

Columns 2, 3, 4, 5, 6

Prepared By: RLE Date: 11-21-85

Checked By: DDW Date: 12-19-85

1 Cable No.	2 Cable Size	3 No. Of Conductors	4 Footage (FT)	5 Type	6 Cable Impedance
2V3410 IV	#10	1-2C	130	WLN	.175 ∠3°
2V3411 IV	#10	1-3C	50	WLO	.067 ∠3°
2V3412 IV	#10	1-7C	430	WLS	.581 ∠3°
2V3413 IV	#10	1-3C	45	WLO	.060 ∠3°
2V3414 IV	#10	1-2C	50	WLN	.067 ∠3°
2V3415 IV	#10	1-2C	50	WLN	.067 ∠3°
2V3416 IV	#10	1-2C	50	WLN	.067 ∠3°
2V3418 IV	#10	1-2C	25	WLN	.033 ∠3°

SEQUOYAH NUCLEAR PLANT

JWS | MAA

Columns 2-7

Prepared By R.P. Ernst Date 11-22-85

Checked By D.D. Wright Date 12-19-85

Columns 1 | 6

Prepared By JWS Date 11-22-85

Checked By M A Aguirre Date 12/22/85

BKR 6, 120v AC VITAL Pwr Bd 2-IV

1 Component I.D.	2 Contract No.	3 Manufacture	4 Max. Volt.	5 Min. Volt.	6 INRUSH Calc. Volt.	Amps	W	VA	PF	7 STEADY STATE Calc. Volt.	Amps	W	VA	PF
2-FSV-87-24A	827551	ASCO 206-380-2RVU	132VAC	102VAC	114.7		—	195	65.17° .42	115.4		20	41.5	61.2° .482
2-FSV-87-24B	827551	ASCO 206-380-2RVU	132VAC	102VAC	114.7		—	195	.42	115.4	—	20	41.5	.482
2-FSV-87-24D	827551	ASCO 206-380-2RVU	132VAC	102VAC	114.7		—	195	.42	115.4	—	20	41.6	.482
Ind. Lights on M-23B		CUTLER HAMMER 10250T181C	132VAC	108VAC	N/A					N/A			6.1	1
120v CRYDOU RELAY		CRYDOU 60KA	280	90VAC	N/A					N/A	.002		.24	*.5

*Assumed value

SQN-VD-VAC-2

Sheet 33B of 19

065262.08

21V6

MCALC

COMPUTED BY J.W. Lemore DATE- 12-19-1985 18:13:27
CHECKED BY M. A. Aguirre DATE 12-22-85

CIRCUIT--2V3410
COMPONENT MATRIX

Inrush
FSV-87-24A
-24B
-24D

COMPONENT	MAGNITUDE	ANGLE	PATH
1	60000.000	0.000	1
2	680.000	0.000	1
3	0.175	3.000	10
4	0.581	3.000	2
5	0.067	3.000	2
6	73.850	65.000	2
7	0.067	3.000	2
8	0.060	3.000	2
9	0.060	3.000	2
10	0.060	3.000	7
11	0.581	3.000	4
12	0.581	3.000	5
13	0.067	3.000	5
14	73.850	65.000	5
15	0.067	3.000	7
16	0.060	3.000	7
17	0.581	3.000	6
18	0.033	3.000	6
19	0.033	3.000	6
20	0.067	3.000	6
21	73.850	65.000	6
22	2361.000	0.000	8
23	0.581	3.000	8
24	0.067	3.000	8
25	0.067	3.000	8
26	0.175	3.000	10
50	115.660	0.000	0

:

==

Z1V6 MCALC

COMPUTED BY JW Scoruro DATE-12-19-1985 18:13:27

CIRCUIT-2V3410

Inrush
FSV-87-24A
-24B
-24D

OPERATION AND ANSWER LIST

CIRCUIT INPUT VOLTAGE (VO)= 115.66 VOLTS

LINE	VAR A	OPER	VAR B	RESULT MAG	ANGLE	RATIO	VOLTAGE
1	P2	P	P8	73.223	62.828	0.000	0.000
2	A1	S	C11	73.517	62.437	0.996	0.000
3	A2	P	P1	73.476	62.375	0.000	0.000
4	A3	S	P10	73.655	62.141	0.998	0.000
5	R4	*	VO	0.000	0.000	0.000	115.379
6	C6	/	P2	0.000	0.000	0.995	0.000
7	R6	*	V5	0.000	0.000	0.000	FSV-87-24D 114.764
8	P6	S	P7	74.277	64.386	0.999	0.000
9	P5	S	P7	74.246	64.431	0.999	0.000
10	P8	P	A9	73.223	62.828	0.000	0.000
11	A10	S	C11	73.517	62.437	0.996	0.000
12	A11	P	P1	73.476	62.375	0.000	0.000
13	A12	S	P10	73.654	62.141	0.998	0.000
14	R13	*	VO	0.000	0.000	0.000	115.379
15	C14	/	A9	0.000	0.000	0.995	0.000
16	R15	*	V14	0.000	0.000	0.000	FSV-87-24D 114.764
17	P8	P	A8	73.252	62.784	0.000	0.000

19	A18 :	P	P1	73.505	62.331	0.000	0.000
20	A19	S	P10	73.684	62.097	0.998	0.000
21	R20	*	V0	0.000	0.000	0.000	115.379
22	C21	/	A8	0.000	0.000	0.994	0.000
23	R22	*	V21	0.000	0.000	0.000	FSV-87-240 114.715
24				0.000	0.000	0.000	0.000

computed by J W Lemore 12-19-85

COMPUTER MATH CHECKED BY N.A Aguirre on 12/22/85 (SEE ALTERNATE CALCULATION).

STEADY STATE WAS NOT CHECKED SINCE THE CIRCUIT WAS CHECKED FOR INRUSH CONDITION AND VOLTAGE DROP WAS WITHIN THE ACCEPTABLE LIMITS.

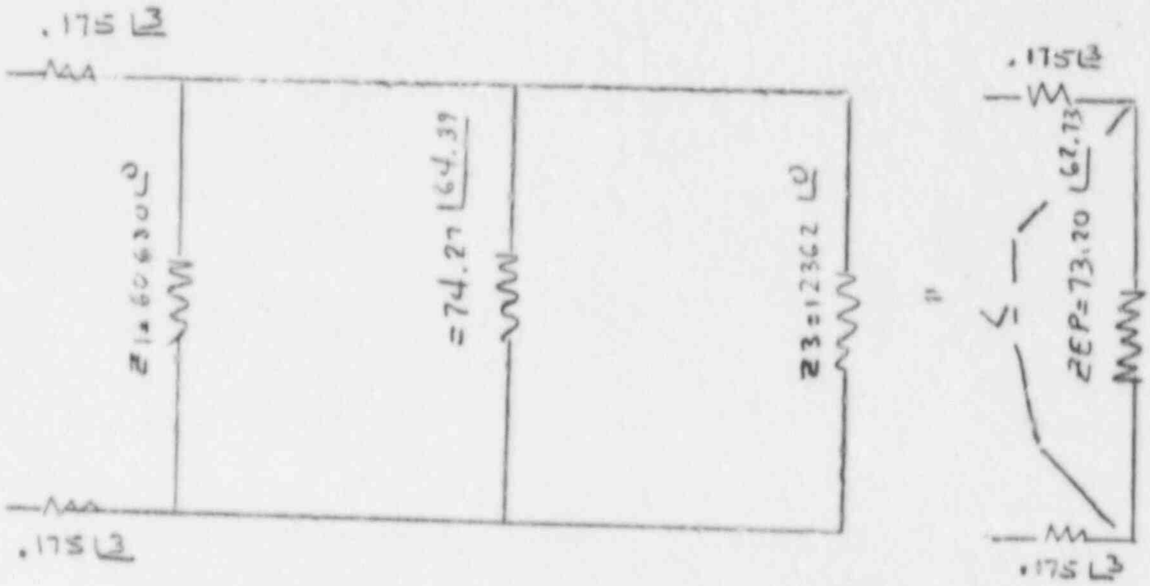
2-III, 6

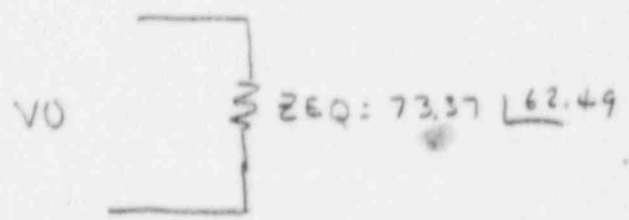
COMPUTED MAA DATE 12/22-85
CHECKED ____ DATE ____

sheet 2

Alternate calculation

② FSV-87-24B





$$V1 = VO\left(\frac{ZEP}{ZEQ}\right) = 115.66\left(\frac{73.20}{73.37}\right) = 115.39$$

$$V21 = 115.39\left(\frac{73.85}{74.27}\right) = \underline{114.74}$$

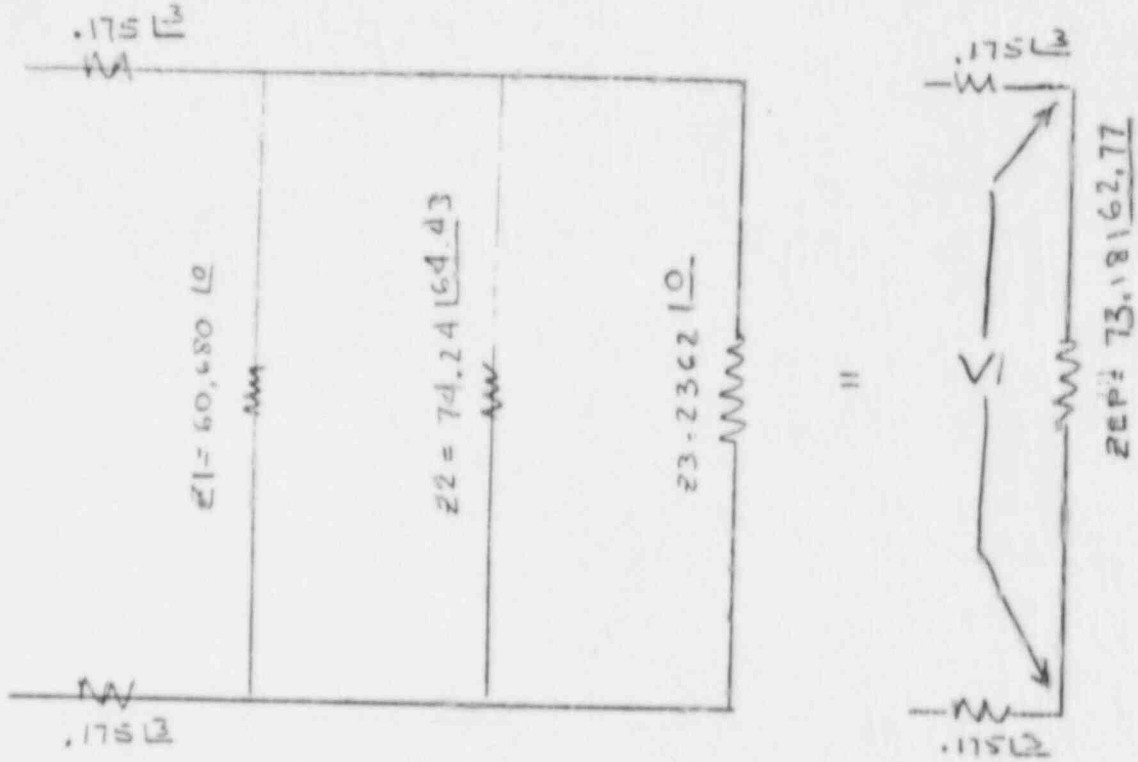
2-IV, 6

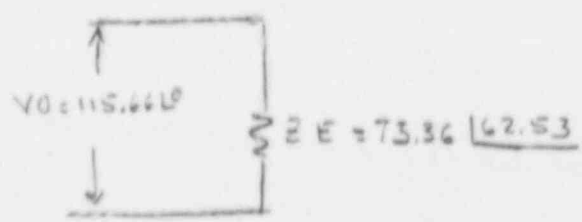
COMPUTED MAA DATE 12/22
CHECKED DATE

sheet 1

Alternate calculation

① FSV-87-24D





$V1 = V0\left(\frac{ZEP}{ZE}\right)$

$= 115.66\angle 0\left(\underbrace{\frac{73.18}{73.36}}_{.9975}\right)$

$V_1 = 115.38$

$V6 = \left(\frac{73.85}{74.24}\right) 115.38 = 114.77$ (VOLTAGE ACCROS ⑥)

ZIV6

MCALC

COMPUTED BY J W Lemmis DATE- 12-19-1985 18:16:44 steady State
FSV-87-24A
-24B
-24D

CIRCUIT--2V3410
COMPONENT MATRIX

COMPONENT	MAGNITUDE	ANGLE	PATH
1	60000.000	0.000	1
2	680.000	0.000	1
3	0.175	3.000	10
4	0.581	3.000	2
5	0.067	3.000	2
6	347.000	61.200	2
7	0.067	3.000	2
8	0.060	3.000	2
9	0.060	3.000	2
10	0.060	3.000	2
11	0.581	3.000	7
12	0.581	3.000	4
13	0.067	3.000	5
14	347.000	61.200	5
15	0.067	3.000	5
16	0.060	3.000	7
17	0.581	3.000	7
18	0.033	3.000	6
19	0.033	3.000	6
20	0.067	3.000	6
21	347.000	61.200	6
22	2361.000	0.000	6
23	0.581	3.000	8
24	0.067	3.000	8
25	0.067	3.000	8
26	0.175	3.000	8
50	115.660	0.000	10
			0

2 IVG

MCALC

COMPUTED BY JW Seymour DATE-12-19-1985 18:16:44

CIRCUIT-2V3410 Steady State

OPERATION AND ANSWER LIST

FSV-87-24A
-24B
-24D

CIRCUIT INPUT VOLTAGE (VO)= 115.66 VOLTS

LINE	VAR A	OPER	VAR B	RESULT MAG	ANGLE	RATIO	VOLTAGE
1	P2	P	P8	322.047	54.228	0.000	0.000
2	A1	S	C11	322.411	54.147	0.999	0.000
3	A2	P	P1	321.408	53.901	0.000	0.000
4	A3	S	P10	321.629	53.853	0.999	0.000
5	R4	*	VO	0.000	0.000	0.000	115.581
6	C6	/	P2	0.000	0.000	0.999	0.000
7	R6	*	V5	0.000	0.000	0.000	FSV-87-24D 115.434
8	P6	S	P7	347.476	61.074	1.000	0.000
9	P5	S	P7	347.441	61.083	1.000	0.000
10	P8	P	A9	322.047	54.228	0.000	0.000
11	A10	S	C11	322.411	54.147	0.999	0.000
12	A11	P	P1	321.408	53.901	0.000	0.000
13	A12	S	P10	321.629	53.853	0.999	0.000
14	R13	*	VO	0.000	0.000	0.000	115.581
15	C14	/	A9	0.000	0.000	0.999	0.000
16	R15	*	V14	0.000	0.000	0.000	FSV-87-24B 115.434
17	P8	P	A8	322.071	54.219	0.000	0.000

19	A18	P	P1	321.432	53.892	0.000	0.000
20	A19	S	P10	321.653	53.844	0.999	0.000
21	R20	*	V0	0.000	0.000	0.000	115.581
22	C21	/	A8	0.000	0.000	0.999	0.000
23	R22	*	V21	0.000	0.000	0.000	FSV-87-24A 115.422
24				0.000	0.000	0.000	0.000

Computed by J W Seemore 12-19-85

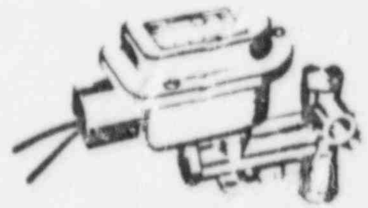
SQN-VD-VAC-2 Sheet 347 of 719

Moderate Flow

3 WAY SOLENOID VALVES

For (oil free) Instrument Air
1/8", 1/4", 3/8" and 1/2" N.P.T.

ASCO
Red-Hat
BULLETINS
206-380 208-448
206-381 208-266
206-832 210-036



General Description

These rugged forged brass, steel and stainless steel body valves are especially suited for heavy duty industrial applications.

Important: No minimum operating pressure is required.

Applications

They are primarily used as pilot operators on larger control valves in nuclear power plants.

These valves also may be used on:
- air vises
- machine tools
- compressors
- turbines

Specifications

Operation: Three types are available:
(a) Normally Closed
(b) Normally Open
(c) Universal

Pipe Sizes: 1/8", 1/4", 3/8" and 1/2" N.P.T.

Valve Parts in Contact with Media:
Body — Brass, Steel or 304 s.s., as listed

Disc — 303 s.s.

Core Tube — 305 s.s.

Core and Plugnut — 430F s.s.

Springs — 302 s.s. and 17-7 PH s.s.

Shading Coil — Copper for brass and steel valves; Silver for stainless steel valves.

Seats — Ethylene propylene or 303 s.s.

Gaskets — Ethylene Propylene

No aluminum parts.

Solenoid Enclosures: Two types are available:
(a) Watertight (NEMA 4 and 6).
(b) Explosion-Proof and Watertight (NEMA 7C, 7D and 4).

Electrical: Standard Voltages:
24, 120, 240, 480 volts, A-C, 60 Hz (or 50 Hz in 110 volt multiples).

6, 12, 24, 125, 250 volts, D-C (battery voltages).

Other voltages available when required.

Coils: Continuous Duty Class H.

Temperature: Fluid: To 180°F.

Ambient: Nominal Range, 32°F. to 140°F.

Installation: Valves must be mounted with solenoid vertical and upright.

Coarse Filter: Integral in valve inlet.

Optional Features:

- Junction box enclosure (AC watertight solenoid only)
- Manual operator
- 1/2" threaded conduit hub
- Screw terminal coils (AC watertight solenoid only)
- Viton elastomers

Specifications

NORMALLY CLOSED — NORMALLY OPEN — UNIVERSAL

Pipe Size (Ins.)	Orifice Size (Ins.)	Maximum Operating Pressure Differential P.S.I. — Normally Closed (1) or Normally Open (2)	Universal (3)	Safe Working Pressure (P.S.I.)	Max. (4) Fluid Temp. °F	Cv (5) Flow Factor	Watertight Solenoid Enclosure Catalog Number	Explosion Proof — Watertight Solenoid Enclosure Catalog Number	Body Material	Watt Rating AC	Watt Rating DC	Approx. Shipping Weight (Lbs.)
AC Construction												
(6) 1/8	3/32	200	100	600	180	.35	206-380-1	206-832-1	Brass	20	—	4
(6) 1/4	3/32	200	100	600	180	.35	206-380-2	206-832-2	Brass	20	—	4
(6) 1/4	1/8	150	75	600	180	.45	206-380-3	206-832-3	Brass	20	—	4
(6) 3/8	3/32	200	100	600	180	.35	206-380-4	206-832-4	Brass	20	—	4
(6) 3/8	1/8	150	75	600	180	.45	206-380-5	206-832-5	Brass	20	—	4
(6) 3/8	5/32	100	50	600	180	.75	206-380-6	206-832-6	Brass	20	—	4
(6) 1/2	5/32	100	50	600	180	.75	206-380-7	206-832-7	Brass	20	—	4
3/8	3/32	200	100	1500	180	.35	208-266-1	210-036-1	Steel	20	—	6
3/8	1/8	150	75	1500	180	.45	208-266-2	210-036-2	Steel	20	—	6
3/8	5/32	100	50	1500	180	.75	208-266-3	210-036-3	Steel	20	—	6
1/2	5/32	100	50	1500	180	.75	208-266-4	210-036-4	Steel	20	—	6
1/2	5/32	100	50	1500	180	.75	208-266-5	210-036-5	Stainless Steel	20	—	7
DC Construction												
(6) 1/8	3/32	200	100	600	180	.35	—	206-381-1	Brass	—	35.1	7
(6) 1/4	3/32	200	100	600	180	.35	—	206-381-2	Brass	—	35.1	7
(6) 1/4	1/8	150	75	600	180	.45	—	206-381-3	Brass	—	35.1	7
(6) 3/8	3/32	200	100	600	180	.35	—	206-381-4	Brass	—	35.1	7
(6) 3/8	1/8	150	75	600	180	.45	—	206-381-5	Brass	—	35.1	7
(6) 3/8	5/32	125	60	600	180	.75	—	206-381-6	Brass	—	35.1	7
(6) 1/2	5/32	125	60	600	180	.75	—	206-381-7	Brass	—	35.1	7
3/8	3/32	200	100	1500	180	.35	—	208-448-1	Steel	—	35.1	10
3/8	1/8	150	75	1500	180	.45	—	208-448-2	Steel	—	35.1	10
3/8	5/32	125	60	1500	180	.75	—	208-448-3	Steel	—	35.1	10
1/2	5/32	125	60	1500	180	.75	—	208-448-4	Steel	—	35.1	10
1/2	5/32	125	60	1500	180	.75	—	208-448-5	Stainless Steel	—	35.1	10

Notes
(1) For normally closed operation use catalog number Suffix "F"
(2) For normally open operation use catalog number Suffix "G"
(3) For universal operation use catalog number Suffix "U"
(4) Maximum AC/DC continuous ambient 140°F
(5) Resilient seats (Suffix "R") available — 3/32" orifice Cv = .25, 1/8" orifice Cv = .39, 5/32" orifice Cv = .53
(6) Coarse filter supplied at pressure connection 2 and 3 only

VII. Safe Working Pressure

Line or system working pressure to which the valve may be safely subjected. The proof pressure for any valve is five times the safe working pressure.

VIII. Ambient Temperature Limitations

Minimum Ambient Temperature

The nominal limitation of 32°F is advisable for any valve. The actual minimum ambient temperature permissible can be greatly affected by both application and valve construction.

Maximum Ambient Temperature

The nominal maximum ambient temperatures listed are based primarily on test conditions used by Underwriters' Laboratories in determining safe limits for coil insulation. They are determined under continuously energized conditions and with maximum fluid temperatures existing in the valve. In many applications, the specific conditions existing will permit use at considerably higher ambient temperatures. In addition, modifications to standard constructions are also available, which can extend the maximum ambient temperature limitation to 180°F or more. Consult Factory with your specific needs.

IX. Solenoid Coils

ASCO valves listed in this catalog are equipped with continuous duty, Class H coils. These can be energized continuously without danger of over heating or failure. Coils are provided with two coil leads which can be connected to any controlling device. For three-phase power systems, the two leads can be connected to any two of the three phases. All coils are constructed in accordance with Underwriters' Laboratories, NEMA, AIEE, and other industry standards. The coil insulation system and temperature limitations are shown below.

Coil Operating Voltage Ranges

All coils are designed for industrial operating voltages and can be used on the following voltage ranges:

A-C		D-C	
Voltage Rating	Normal Operating Range	Battery Voltage Rating	Normal Operating Range
24	22-24	6	5.1-6.3
120	110-120	12	10.2-12.6
		24	20-25
240	220-240	125	90-140
480	440-480	250	180-280

All ASCO valves are tested to operate at 15% under the nominal voltage and at maximum operating pressure differential, and are capable of operating for short periods at 10% over the nominal voltage. For wider voltage ranges than shown above, a different coil or insulation system must be used.

Power Consumption

Power consumption of solenoid valves may be determined from the rating in ASCO bulletins. For valves on A-C service, the watt rating, the volt-ampere "inrush" and the volt-ampere "holding" are given.

The volt-amp (VA) "inrush" is the high momentary surge of current which occurs at the moment an A-C solenoid is energized.

The volt-amp (VA) "holding" is the continuous rating after the initial "inrush."

The current rating for the "inrush" and "holding" may be determined by dividing the voltage into the volt-amp rating.

$$\text{AMPS (INRUSH)} = \frac{\text{volt-amp "inrush"}}{\text{voltage}}$$

$$\text{AMPS (HOLDING)} = \frac{\text{volt-amp "holding"}}{\text{voltage}}$$

Valves supplied for D-C service have no "inrush" current, as in the case of A-C service. The amp rating can be determined by dividing the voltage into the D-C watt rating.

$$\text{AMPS} = \frac{\text{watts (D-C)}}{\text{voltage}}$$

Note: (1) When a valve has been energized for a long period the solenoid enclosure becomes hot and cannot be touched by hand except for an instant. This is a perfectly safe operating temperature. Any excessive heating will be indicated by the smoking and burning odor of the coil insulation.

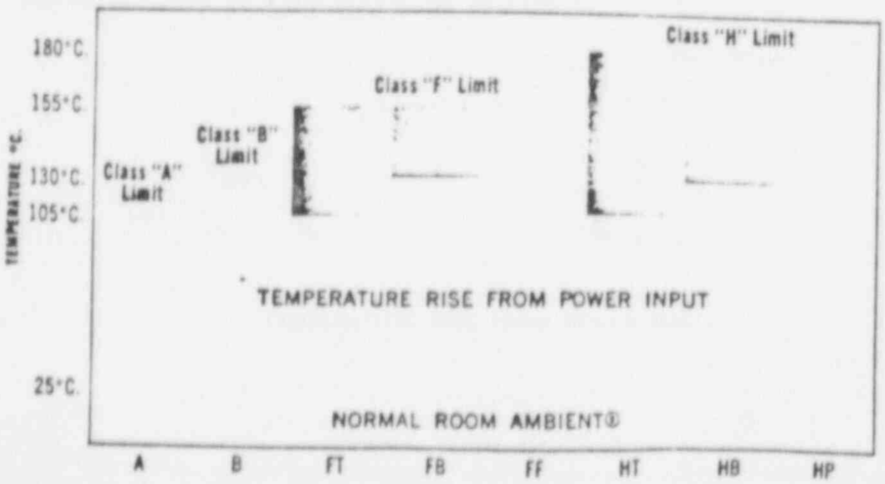
(2) Valves for A-C service can be converted for use on other A-C voltages simply by changing the coil; similarly, D-C valves can be converted for other D-C voltages. When converting from A-C to D-C or vice versa, consult ASCO for instructions.

CLASS H (180°C.)
NON-MOLDED COILS

• INTERLAYER CONSTRUCTION
• FUNGUS PROOF
• RADIATION RESISTANT
• WIDE OPERATING RANGE

The following table illustrates the temperature parameters of ASCO Coils:

INDUSTRIAL TEMPERATURE LIMITATIONS① AND THERMAL CHARACTERISTICS OF ASCO SOLENOIDS AND COILS



CLASS OF COIL INSULATION

Normal 25°C. Room Ambient.

Temperature Rise Due to Power Input.

Excess Margin for Higher Fluid or Ambient Temperatures.③

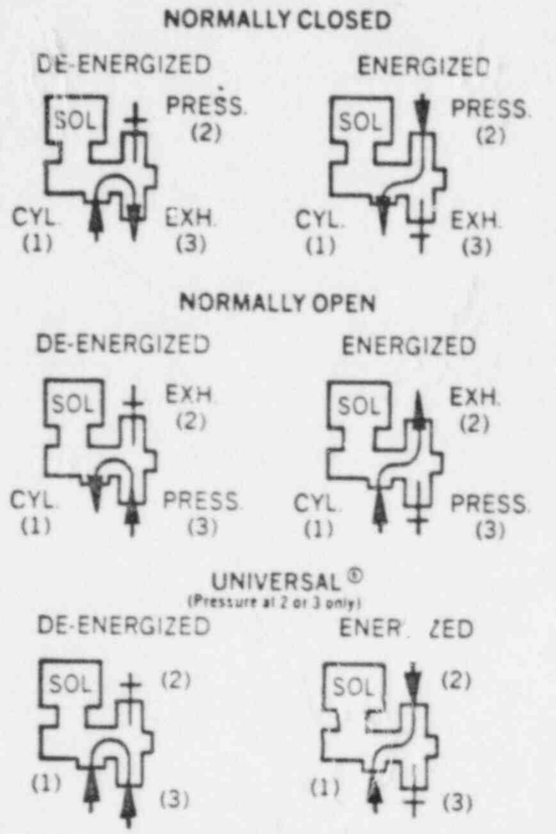
Notes:

① As measured by the "Resistance Method."

② Equipment rated at an ambient temperature of 25°C. can be employed in areas where the ambient temperature reaches 40°C. occasionally.

③ Ambient temperatures are directly additive to coil rise — fluid temperatures are not.

Flow Diagrams



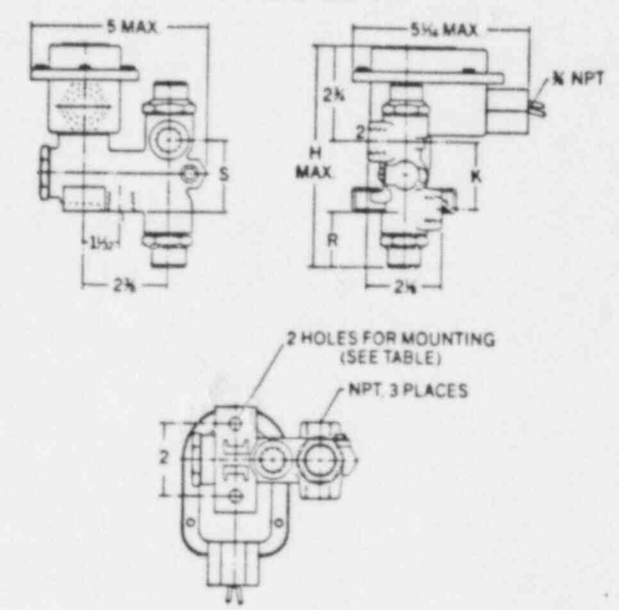
Electrical Information

Standard Coil and Class of Insulation	Watt Rating and Power Consumption				Spare Coil Part No	
	D-C Watts	A-C Watts	A-C VA Holding	A-C VA Inrush	A-C	D-C
H	35.1	20	41.5	195	102-005	209-492

Dimensions (in inches)

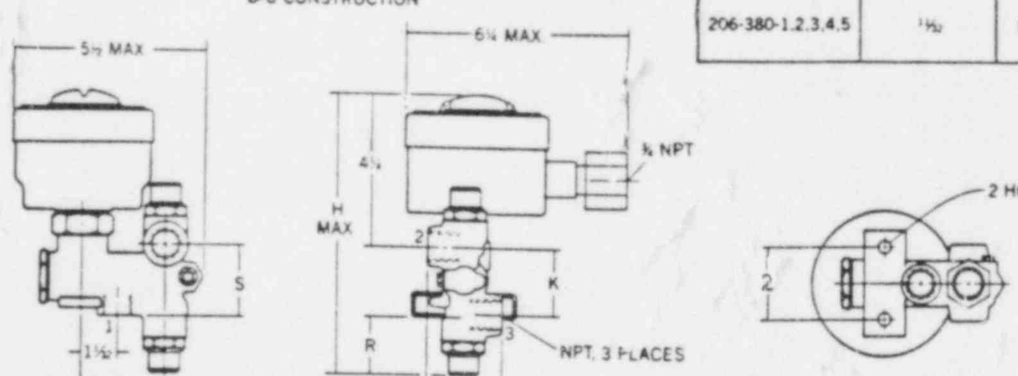
Watertight Solenoid Shown. WP-EP Details On Request.

A-C CONSTRUCTION



CATALOG NUMBER	MOUNTING HOLE DIA	H	K	R	S
208-266-1,2,3,4,5	3/8	6 1/4	1 3/8	1 1/2	2
206-380-6,7	11/32				
206-380-1,2,3,4,5	11/32	5 1/4	1 7/16	15/16	1 19/32

D-C CONSTRUCTION



CATALOG NUMBER	MOUNTING HOLE DIA	H	K	R	S
206-381-6,7	3/8	7 13/16	1 3/8	1 3/4	2
208-448-1,2,3,4,5					
206-381-1,2,3,4,5	11/32	6 13/16	1 7/16	1 1/16	1 19/32

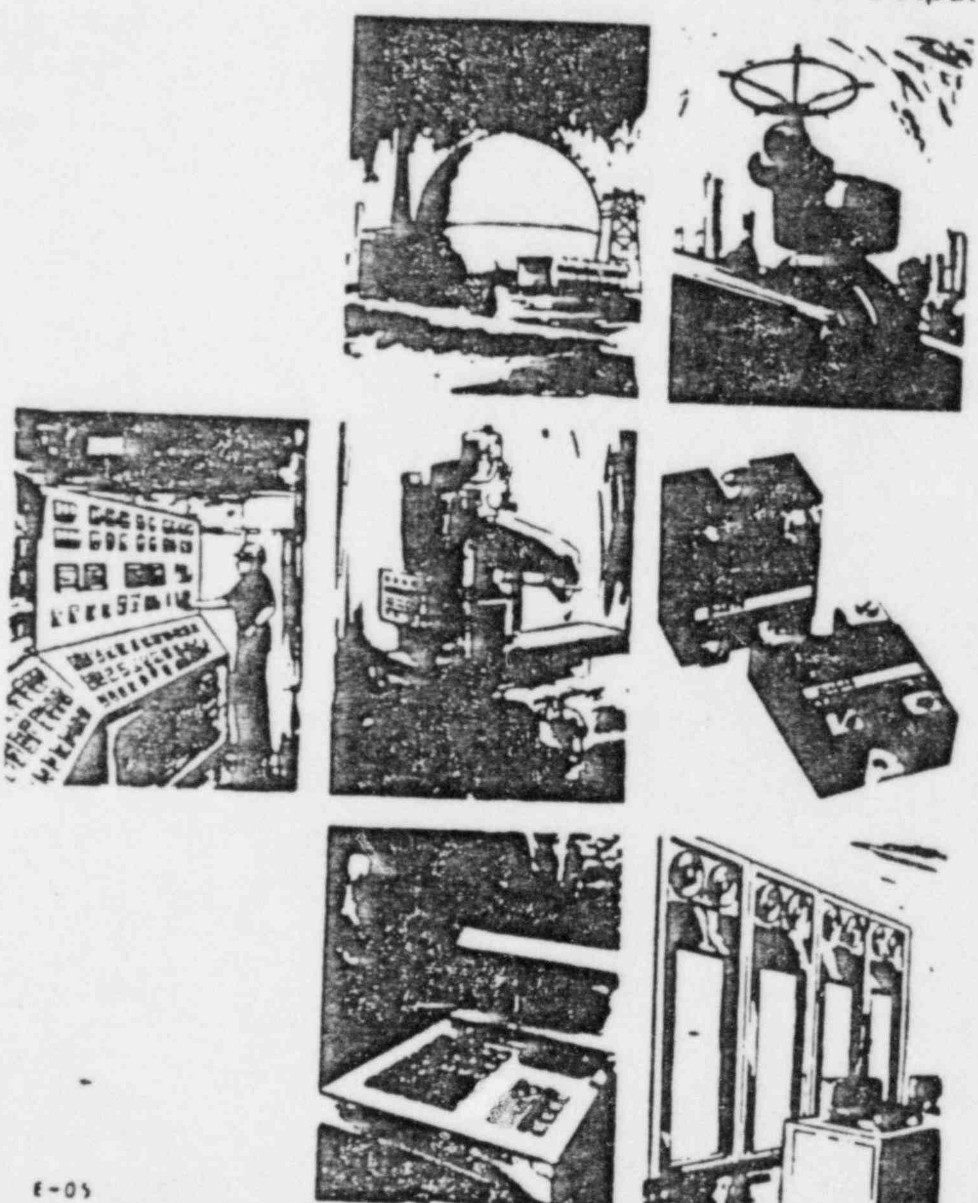
4855463 INTERNATIONAL RECTIFIER 40C 00418 D A-24-11

INTERNATIONAL RECTIFIER IOR **CRYDOM**

BULLETIN 604D

SERIES 1
SCR Output Solid-State Relay

2.5 Thru 75 Amp
AC Output



5/02 E-05

4855463 INTERNATIONAL RECTIFIER

40C 00420 D A-84-15

SQN-VD-VAC-2

Electrical Specifications (25 C unless otherwise specified)

All models are UL recognized and CSA certified (see note 1) except A2475, A4840 and A4875 which are pending

OUTPUT CHARACTERISTICS	120 VAC				240 VAC					480 VAC					
MODEL NUMBERS — AC Control	A1202	A1210	A1225	A1240	A2402	A2410	A2425	A2440	A2475	A4808	A4812	A4825	A4840	A4875	
MODEL NUMBERS — DC Control	D1202	D1210	D1225	D1240	D2402	D2410	D2425	D2440	D2475	D4808	D4812	D4825	D4840	D4875	Units
Operating Voltage Range 47-63 Hz ⊙	24-140				48-280					80-530					Vrms
Max Load Current (See derating curves) ⊙	2.5	10	25	40	2.5	10	25	40	75	8	12	25	40	75	Arms
Min Load Current	50				50					50					mArms
Transient Overvoltage ⊙	300				500					800					Vpeak
Max Surge Current (Non-Repetitive) 16.6 ms (See surge curves)	22.5	120	250	625	22.5	120	250	625	1000	72	140	250	400	1000	Apeak
Max Over Current (Non-Repetitive) 1 sec	5	22	40	80	5	22	40	80	150	17	24	40	64	150	Arms
Max On-State Voltage Drop @ Rated Current	3.6	1.6	1.6	1.6	3.5	1.6	1.6	1.6	1.6	1.8	1.8	2.0	2.1	2.1	Vpeak
Max I²T for Fusing (8.3 ms)	2.1	80	260	1620	2.1	60	260	1620	4150	22	81	260	660	4150	A²sec
Thermal Resistance, Junction-to-Case, $R_{\theta JC}$ (T, Max = 115 C)	8.5	1.48	1.02	0.83	8.5	1.48	1.02	0.83	0.3	1.48	1.48	1.02	0.63	0.3	C/W
Power Dissipation @ Max Current (See dissipation curves)	6.3	12	29	46	6.3	12	29	46	90	9.3	14	34	60	90	Watts
Max Zero Voltage Turn-on ⊙	15				30					75					Vpeak
Max Peak Repetitive Turn-on Voltage	10				12					35					Vpeak
Max Off-State Leakage Current @ Rated Voltage (-30 C ≤ TA ≤ 80 C)	8				10					10					mArms
Min Off-State dv/dt (Static) @ Max Rated Voltage ⊙	200				200					200					V/µs

INPUT CHARACTERISTICS — ALL MODELS	DC INPUT MODELS (with "D" Prefix)	AC INPUT MODELS (with "A" Prefix)
Control Voltage Range	3 to 32 VDC	90 to 280 Vrms (60Hz) X
Max Reverse Voltage	-32 VDC	—
Max Turn-On Voltage (-30°C ≤ TA ≤ 80°C)	3.0 VDC	90 Vrms
Min Turn-Off Voltage (-30°C ≤ TA ≤ 80°C)	1.0 VDC	10 Vrms
Min Input Impedance	1500 Ohms	60K Ohms *
Max Input Current	4mA (@5 VDC)	2mA (@ 120 VAC) *
	20mA (@28 VDC)	4mA (@ 240 VAC)
Max Turn-On Time (60 Hz)	8.3 msec	10 msec
Max Turn-Off Time (60 Hz)	8.3 msec	40 msec

GENERAL CHARACTERISTICS — ALL MODELS

Dielectric Strength ⊙⊙ 50/60 Hz		2500 Vrms
Insulation Resistance @ 500 VDC ⊙		10^{10} Ohms
Max Capacitance Input/Output		8 pf
Ambient Temperature Range	Operating	-30°C to 80°C
	Storage	-40°C to 120°C

SPECIAL NOTE: The -10 version of DC input Series 1 relays are "non-zero voltage turn-on" types, and are optimized for operation from a phase-controlled signal applied at each half of the line cycle. All Series 1 data applies except as noted on the right. (Caution: Without zero crossing, inductive loads may give rise to "ringing" and voltage "overshoot" that could exceed the relay's peak transient rating. If this occurs, consideration might be given to the use of an MOV transient suppressor to protect the relay.)

Control Voltage Range	3.5 to 25Vdc
Max Turn-On Voltage	3.5Vdc
Min Input Impedance	1K Ohms
Max Input Current	5mA (at 5Vdc), 30mA (at 30Vdc)
Max Turn-On Time	20µsec
Min Pulse Width	0.5msec

1204 E-07

PUSHBUTTONS AND MASTER SWITCHES

ype T — Heavy Duty Oiltight Control Units and Master Stations

OPERATORS (Continued)

LAMPS FOR INDICATING LIGHTS — STANDARD AND PRESTEST

Indicating Light Voltage	Transformer Type			Full Voltage Type			Neon Type	
	Lamp Rating		Lamp Number	Watts		Lamp Number	Rated Watts	Lamp Number
	Volts	VA						
4-6	—	—	—	—	6	6S6-6V.	—	—
14-17	—	—	—	—	6	6S6-18V.	—	—
18-23	—	—	—	—	6	6S6-24V.	—	—
24-30	—	—	—	—	6	6S6-30V.	—	—
31-40	—	—	—	—	6	6S6-40V.	—	—
40-48	—	—	—	—	6	6S6-60V.	—	—
* 120	6	6.1	255	—	*4.4	6S6-120V.	0.25	B7A
240	6	6.7	255	—	*6.7	10S6-250V.	0.25	B7A
380	6	7.6	255	—	—	—	0.25	B7A
480	6	6.7	255	—	—	—	0.25	B7A
600	6	6.6	255	—	—	—	0.25	B7A
Dc Only								
440	—	—	—	—	—	—	0.25	B7A
500	—	—	—	—	—	—	0.25	B7A

* These devices employ a series resistor.

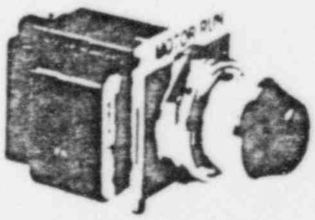
Neon type indicating lights have the advantage of exceptionally long life regardless of the severity of operating conditions. The level of illumination, however, is much less than the transformer or resistor types. The lamp used in neon units emits a low intensity light which is strong in the red spectrum. Because of this, they should be used with clear or amber plastic or glass lenses only. An internal leak resistor connected across the lamp prevents nuisance lighting by the capacitive effect of long lines.

The above table lists the voltages available for each of the three types along with the power rating and the lamp number used in each.

Indicating lights can be supplied with either a plastic or a glass lens. The glass lens holder is copper-nickel-chrome plated brass. Both types of lenses are available in red, green, amber, blue, clear and white.

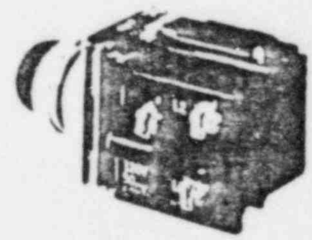
All three types of indicating lights are available for either one-hole or base mounting. Terminals are serrated pressure type with screw and captive saddle clamp.

A Buna N synthetic rubber lens gasket prevents oil and other contaminants from entering the lamp unit. This gasket is in addition to the standard gasket between operator and panel.



TRANSFORMER TYPE PRETEST INDICATING LIGHT WITH GLASS LENS

FULL VOLTAGE OR RESISTOR TYPE PRETEST WITH PLASTIC LENS



Prestest Indicating Lights — NEMA 13

Prestest indicating lights take the guesswork out of indicating lamp operation. They provide a positive, quick means of checking the lamp without removing the lens. Depressing the lens disconnects the lamp from the control circuit and reconnects it to a continuously energized testing circuit for immediate indication of a faulty lamp. A single pole, double throw, momentary contact switch within the lamp disconnects the light from the control circuit to prevent feedback during the test operation. The prestest testing circuit is NO and the indicating light circuit is NC.

Two types of prestest indicating lights are available:

- a transformer type for ac operation only
- a resistor type for ac/dc operation

Both types can be supplied with either a plastic or a glass lens in six colors: red, green, amber, blue, clear or white. The lens holder is corrosion resistant nickel-chrome plated brass.

The transformer type is equipped with a #755 6 volt, vibration resistant bayonet base lamp and is available for 120, 240, 380, 480 or 600 volt, 50/60 hertz operation (a #44 lamp can be used as an alternate). The transformer which supplies reduced voltage to the lamp is designed to protect the lamp from burnout by transients and short duration overvoltage. Low heat radiation increases the number that can be mounted in a small space. They are available for one-hole or base mounting and occupy a space equivalent to one contact block pushbutton depth.

See note on installation and use of this product at bottom of page 1.

TVA 10697 (OE-4-85)

OE CALCULATIONS

QA Record

TITLE 125V DC Vital Instrument Power System Design Verification - Further Analysis				PLANT/UNIT SQN Units 1 and 2
PREPARING ORGANIZATION EEB-SPR&CPS	KEY NOUNS (Consult RIMS DESCRIPTORS LIST) 125 Vital Batteries, DC Voltage Drop			
BRANCH/PROJECT IDENTIFIERS SQN-VD-VDC-2	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	
	R0		B43 '86 0210 925	
APPLICABLE DESIGN DOCUMENT(S)	R _			
	R _			
SAR SECTION(S) / UNID SYSTEM(S)	R _			

Revision 0	R1	R2	R3	Statement of Problem
ECN No (Indicate if Not Applicable)				Evaluate the following components identified in OE Calc. SQN-VD-VDC-1: Relay Racks 1-R-54, 2-R-54, 2-R-55 and all Reactor Head Vent Isolation Valves.
Prepared J.D. Reed				
Checked John A. Roop				
Reviewed [illegible] 2-10-86				
Approved M.S. Scruggs/a.m				
Date 2-10-86				
List all pages added by this revision.				
List all pages deleted of this revision.				
List all pages changed by this revision.				

Use form TVA 10534 if more room is required.

Abstract

The problem areas identified by OE calculation SQN-VD-VDC-1 (B43 860130 914) were evaluated in this calculation. Circuit models for voltage drop calculations were made for the Reactor Head Vent Isolation Valves that were not evaluated in the referenced OE calculation. The steam dump system (valves) supplied from relay racks, 1-R-54, 2-R-54, and 2-R-55 were analyzed. One circuit was found with inadequate voltage and will be identified for corrective action in COR [illegible] R1.

This calculation contains unverified assumptions (see paragraphs 3.3 and 3.5)

This calculation comprises 41 pages numbered sequentially.

Microfilm and return to: C. H. Gilliland, W8 B73 C-K.

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Table of Contents

Sequoyah Nuclear Plant Units 1 and 2
125V DC Vital Instrument Power System
Design Verification - Further Analysis
SQN-VD-VDC-2

Prepared By J.D.Reed Date 2-10-86
Checked By J.A.Roop Date 2-10-86

1.0 PURPOSE

The purpose of this calculation is to determine if adequate voltage exists at the terminals of the selected 125V dc components following a loss of ac power (station blackout). This calculation constitutes the further analysis required in paragraph 6.0, "Conclusion" of OE calculation SQN-VD-VDC-1 (B43 860130 914). The circuits selected for analysis include auxiliary relay racks 1-R-54, 2-R-54, and 2-R-55 and additional solenoid valves.

2.0 REFERENCES

2.1 TVA Drawings - See Appendix E (Drawings and revision numbers are also listed on the block diagrams and analysis as appropriate.)

2.2 TVA Contract No. 68C60-91934
Target Rock Inc. Dwg. No. 79AB-001
Target Rock Inc. Dwg. No. 79AB-003

2.3 Attachment A: Design Study "Effect of Loss of All ac Power on Main Steam Cooldown Dump valves," Prepared by SQEP.

2.4 Sequoyah Nuclear Plant FSAR Chapter 8, paragraph 8.3.2.1.1

2.6 SCR SQNEEB8605 (B43 860124 929) R0

2.7 OE Calculation SQN-VD-VDC-1 (B43 860130 914) "125V DC Vital Instrument Power System Design Verification - Preliminary."

2.8 Electrical Design Guide DG-E2.4.6 (90°C Impedance values)

3.0 ASSUMPTIONS

3.1 The contact resistance of handswitches, limit switches, and flow switches is assumed to be negligible. This also applies to circuit breakers and fuses.

3.2 Resistance from internal board wiring was assumed negligible.

3.3 Cable lengths used are the construction pull lengths and are assumed to be actual except for 5 cables listed in Appendix C which had no listing of pull lengths. See Appendix D for these lengths. (For the cables in Appendix D, design length plus 30 percent was used for analytical purposes. This assumption is unverified.)

Sequoyah Nuclear Plant Units 1 and 2
125V DC Vital Instrument Power System
Design Verification - Further Analysis
SQN-VD-VDC-2

Prepared By J.O. Reed Date 2-10-86
Checked By J.A. Roop Date 2-10-86

3.4 Cable resistance values are maximum resistance (90°C) from reference 2.8.

3.5 All design drawings used in this analysis are the latest available revision of the schematic and connection drawings for Sequoyah and are assumed to be as installed. (This assumption is unverified.) The specific drawings used are referenced on the individual circuit block diagrams.

3.6 While indicating light resistance was included in applicable circuit models, the lights were not evaluated for undervoltage failure; reduced voltage is considered to merely reduce the brilliance of the light.

4.0 DOCUMENTATION OF ASSUMPTIONS

4.1 Assumptions 3.1 and 3.2

For certain complex circuits (typically solenoid valves), a simplified approach in determining an equivalent circuit can be used by neglecting the resistance of handswitches, limit switches, temperature switches, flow switches, circuit breakers, fuses, and small lengths of internal board wiring. While these small additional resistances will produce small voltage drops, they are insignificant compared to the voltage drops being analyzed.

4.2 Assumption 3.4

The maximum cable resistance is used to determine a maximum voltage drop for a worst case analysis.

4.3 Assumption 3.6

Since indicating lights do not affect the proper operation of the circuits analyzed, voltage drop to the lights is not considered. Also, the indicating light current is negligible compared to other circuit parameters.

5.0 CALCULATIONS

5.1 Background

These voltage calculations and analyses are made for those particular types of components that were found to have inadequate terminal voltage during an OE calculation, reference 2.7, and documented in SCR SQNEEB8605 R0.

5.2 Procedure for Calculations

5.2.1 Solenoid valves

The circuits supplied by Vital Battery Bds I, Ckt B14; Bd II, Ckt A30; and Bd IV, Ckt A30 were modeled from the power source to the load identifying all pertinent cable and component data (cable length, size, component electrical parameters). Using this model, the voltage at the terminals of each component was calculated and compared with the manufacturer's minimum voltage rating.

If a component could be energized via alternate paths, the path that produced the largest voltage drop was used in the calculation. These calculations were performed using a minimum battery terminal voltage of 105 Vdc. This is the minimum system voltage per commitment. See Reference 2.4.

The calculations were checked by independent review of the designer's approach and method.

5.2.2 Auxiliary Relay Racks Analysis

The apparent inadequacies associated with Auxiliary Relay Rack 1-R-55 and documented in reference 2.7 were associated with the steam dump system. The additional loads analyzed and the associated relay racks are listed below. This system is not required for safe shutdown and would not be used when the battery is approaching its end voltage (105 volts). See Appendix A for a complete analysis.

1-R-54	2-R-54	2-R-55
1-FSV-103A thru 114A	2-FSV-103A thru 114A	2-FSV-103B and D thru 114B and D

The schematics for these valves are shown on 45N601-2 R9.

5.3 Calculations

See Appendix B.

5.4 Summary

All of the Class 1E circuits that were analyzed received adequate voltage to the terminals of the associated components, except for valve 2-FSV-68-396. A special manufacturer's control loop voltage drop requirement for this valve was exceeded. This circuit is supplied from 125V Vital DC Battery Bd IV, breaker 210, circuit A30. The control loop voltage drop must be less than 2.5 volts for all voltage conditions; 6.6+ was calculated.

6.0 CONCLUSION

This calculation completes the requirement for further analysis identified in reference 2.7. Significant Condition Report SCR SQNEEB8605 R0 will be revised to include 2-FSV-68-396. All other components were acceptable as to voltage drop.

TVA 10697 (OE-4-85) OE CALCULATIONS **QA Record**

TITLE 120V AC Vital Control Power System Design Verification - Further Analysis	PLANT/UNIT SQNP 1 & 2
PREPARING ORGANIZATION EEB - SPR&CP	KEY NOUNS (Consult RIMS DESCRIPTORS LIST) 120V AC Vital Control Power System Voltage Analysis

BRANCH/PROJECT IDENTIFIERS: SQN-VD-VAC-3

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
R0		B43 '86 0130 915
R _		
R _		
R _		

APPLICABLE DESIGN DOCUMENT(S):

SAR SECTION(S): | UNID SYSTEM(S):

	Revision 0	R1	R2	R3
ECN No. (Indicate if Not Applicable)				
Prepared	John A. Roop			
Checked	W. D. Webb			
Reviewed	[illegible signature]			
Approved	M.S. Scruggs / [illegible]			
Date	1-30-86			
List all pages added by this revision.				
List all pages deleted of this revision.				
List all pages changed by this revision.				

Use form TVA 10534 if more room required.

Statement of Problem

Given the results of SQN-VD-VAC-2, evaluate a further sample of the Units 1 and 2 120VAC Vital Control Power System circuits for excessive voltage drop.

Abstract

Due to circuit design deficiencies identified in OE Calculation SQN-VD-VAC-2, it was necessary to perform a further voltage drop analysis on selected 120V AC Vital Control Power System loads. The circuits included in this analysis were selected based upon the following data:

Category	Total Ckts	No. Calculated in SQN-VD-VAC-2	No. Problem CKTS	No. CKTS in SQN-VD-VAC-3
Radiation Monitors				
a. Rad Rate Meters	4	1	1	3
b. Misc Rad Monitors	12	4	0	0
Solenoid Valves				
a. Post Accident Samp.	4	4	4	0
b. Misc Solenoid Valves	18	4	0	0
Instrumentation & Control				
a. NIS	16	0	N/A	2
b. BOP	4	1	0	0
c. RVLIS	4	3	3	1
d. Process Protection Sets	8	1	0	0
e. Inst. Busses	4	0	N/A	1
f. Aux. Bldg Inst. Busses	4	1	0	0
g. AFPT Control	8	1	0	0
h. ABGTS Fan Control	2	0	N/A	1
i. Aux. Dryers	2	0	N/A	1
j. Boric Acid Tank Htrs.	6	1	0	0

Abstract (Continued)

By completely examining those categories in which problems were previously identified, and by including a representative sample of those categories not previously analyzed, this analysis verifies the adequacy of circuit design on the 120V AC Vital Control Power System.

Four problem circuits were identified (as anticipated from the results of SQN-VD-VAC-2) and shall be documented and corrected under SCR SQNEEB8532 R1.

This calculation contains unverified assumptions (3.2, 3.5, 3.7, and 3.9).

Microfilm and return calculation to: C.H. Gilliland , W8B13 C-K

Sequoyah Nuclear Plant Units 1 and 2
120V AC Vital Control Power System
Design Verification - Further analysis
SQN-VD-VAC-3

Prepared by: John A. Roop

Checked by: W. D. Webb

Table of Contents

Sequoyah Nuclear Plant Units 1 and 2
120V AC Vital Control Power System
Design Verification - Further analysis
SQN-VD-VAC-3

Prepared by: John A. Roop

Checked by: W. D. Webb

1.0 PURPOSE

OE Calculation SQN-VD-VAC-2, 120V AC Vital Control Power System Design Verification - Preliminary, evaluated a representative sample of the safety-related 120V AC loads powered from the units 1 and 2 120V AC Vital Control Power System to verify that each circuit component is supplied with adequate operating voltage under worst case system conditions (i.e., V = 120 - 2%). Circuits were identified in which the maximum allowable voltage drop from source to load was exceeded: these were identified for corrective action in SCR SQNEEB8532. Due to the problems discovered, further analysis of circuits similar in configuration to those in SCR SQNEEB8532 was deemed necessary.

2.0 REFERENCES

2.1 TVA drawings as listed in Attachment 4.

2.2 Sequoyah Nuclear Plant Proposed Plan for 120V AC Vital Instrument Power System Voltage Drop Study (scope of work document No. SQNSQD8508).

2.3 Electrical Design Guide DG-E2.4.6 (90° C impedance values).

2.4 J. P. Vineyard's memorandum to H. B. Rankin dated November 15, 1985 (B25 851118 003).

2.5 OE Calculation SQN-VD-VAC-2, 120V AC Vital Control Power System Design Verification - Preliminary (B43 851230 901).

2.6 Sequoyah Nuclear Plant Units 1 and 2 Significant Condition Report SCR SQNEEB8532 (B43 851231 917).

2.7 120V AC Vital Control Power System Design Verification - Further Analysis Scope of Work Document, SQNSWD8601.

3.0 ASSUMPTIONS

3.1 Vital Instrument Power Board voltage (115.4V AC) is the worst case value taken from OE Calculation SQN-VD-VAC-2.

3.2 Cable lengths used are the construction pull lengths (where available) and are assumed to be actual. (This assumption is unverified.) For those cables where pull lengths were unavailable, design length plus 30 percent was employed.

Sequoyah Nuclear Plant Units 1 and 2
120V AC Vital Control Power System
Design Verification - Further analysis
SQN-VD-VAC-3

Prepared by: John A. Roop

Checked by: W. A. Webb

3.3 The contact resistance of handswitches, limit switches, and flow switches is assumed to be negligible. This also applies to circuit breakers and fuses.

3.4 Resistance from internal board wiring was assumed negligible.

3.5 Phase angle of miscellaneous relays and instruments which could not be readily obtained was assumed to be 60°. (This assumption is unverified.)

3.6 Inrush currents were assumed negligible except where the circuit contained solenoid valves or a significant number of relays (i.e., relay rack).

3.7 Loads were assumed to have constant impedance. (This assumption is unverified.)

3.8 Cable impedance values are maximum impedance (90°C) from reference 2.3.

3.9 All design drawings used in this analysis are the latest available revision of the schematic and connection drawings for Sequoyah and are assumed to be as installed. (This assumption is unverified.) The specific drawings used are referenced on the individual circuit block diagrams.

3.10 All radiation monitors were assumed energized.

4.0 DOCUMENTATION OF ASSUMPTIONS

4.1 Assumption 3.1

Practical engineering experience indicates that when the inverter is fully loaded it supplies its maximum output current at its minimum voltage. Using a phase angle of 41° allows an evaluation of a worst case condition simulating field conditions and simplifies the calculations.

4.2 Assumptions 3.3 and 3.4

For certain complex circuits a simplified approach in determining circuit impedances can be used by neglecting the resistance of handswitches, limit switches, temperature switches, flow switches, circuit breakers, fuses, and small lengths of internal board wiring. While realizing that these small additional impedances will produce small voltage drops, they are insignificant compared to the voltage drops being analyzed.

Sequoyah Nuclear Plant Units 1 and 2
120V AC Vital Control Power System
Design Verification - Further analysis
SQN-VD-VAC-3

Prepared by: John A. Roop

Checked by: D. D. Webb

4.3 Assumption 3.6

For components other than solenoid valves and significant quantities of relays (i.e., relay rack), such as miscellaneous relays and various instrumentation loads the inrush current is only a few cycles duration and is considered insignificant for this analysis.

4.4 Assumption 3.8

The maximum cable impedance is used to derive a maximum of cable voltage drop for the worst case analysis.

5.0 CALCULATIONS

5.1 Background

This voltage calculation is a further sample (nine circuits) of the safety-related loads powered from the units 1 and 2 120V AC vital instrument power boards whose need was identified as a part of the OE Calculation SQN-VD-VAC-2.

5.2 Procedure

Upon analysis of the problem circuits identified in SCR SQNEEB8532 if became possible to identify categories of circuits likely to experience excessive voltage drop; these include (1) radiation rate meters, (2) post accident sampling valves, and (3) reactor vessel level instrumentation system (RVLIS) circuits. All circuits in categories 1, 2, and 3 not evaluated in OE Calculation SQN-VD-VAC-2 were identified and included in this analysis (five circuits).

In addition, it was identified that the following types of circuits were not evaluated in the preliminary calculation: (1) Nuclear Instrumentation System (NIS), (2) Instrument Busses, and (3) Auxiliary Dryer Control. Circuits of these types were identified and included in this analysis with a sample rate as indicated:

(1) NIS	12.5 percent sample	(2 circuits)
(2) Inst Bus	25.0 percent sample	(1 circuit)
(3) Aux Dryer	50.0 sample	(1 circuit)

Sequoyah Nuclear Plant Units 1 and 2
120V AC Vital Control Power System
Design Verification - Further analysis
SQN-VD-VAC-3

Prepared by: John A. Roop

Checked by: W. D. Webb

Each circuit was modeled from the power source to the load identifying all pertinent cable and component data (cable length, size, component electrical parameters). Using this model, the voltage of the terminals of each component was calculated and compared with the manufacturer's minimum voltage rating. (Due to similarities in the three radiation rate meter circuits only one was calculated: the results are valid for the remaining two.)

If a component could be energized via alternate paths, or if several identical components were connected in parallel to a local panel, the path that produced the largest voltage drop was used in the calculation.

5.3 Data

Applicable vendor and/or test data is included with each calculation package. Cable data is included in Attachment 2.

5.4 Computations

See Attachment 1.

5.5 Summary

All of the 120V AC Class 1E circuits that were analyzed maintain adequate terminal voltage at the load devices except as noted in Attachment 3. These circuits have excessive voltage drop and shall be documented in SCR SQNEEB8532 R1 for corrective action.

6.0 CONCLUSIONS

For the circuit categories identified as problematic in OE Calculation SQN-VD-VAC-2 a complete analysis (100-percent sample) was performed: additional circuit inadequacies were found and shall be documented and corrected under SCR SQNEEB8532 R1.

For the additional circuit categories identified and analyzed in this calculation, no problems were discovered.

Since all problem categories identified by OE Calculation SQN-VD-VAC-2 were addressed in this analysis and since no new problem areas were identified, no further voltage drop analysis of the SQN 120V AC Vital Control Power System is required.

Sequoyah Nuclear Plant Units 1 and 2
120V AC Vital Control Power System
Design Verification - Further analysis
SQN-VD-VAC-3

Prepared by: John A. Roop

Checked by: W. D. Webb

7.0 ATTACHMENTS

Attachment 1 - Calculations
Attachment 2 - Cable Data
Attachment 3 - Components with Inadequate Terminal Voltage
Attachment 4 - Drawing List

ATTACHMENT 3

BD 1-I, BKR 12

1-RI-90-106D RADIATION RATE INDICATOR, CABLE 1PV24A,
MIN VOLT. 105.3 ; CALC VOLT. 103.65

1-RM-90-271
1-RM-90-273
1-RM-90-276
1-RM-90-278
1-RM-90-290
1-RM-90-291
RADIATION MONITOR, CABLE INTERNAL PNL 1-M-30
MIN VOLT. 105.3 ; CALC VOLT. 101.61

1-RR-90-254 RADIATION RATE METER, CABLE 1RM603A
MIN VOLT. 105.3 ; CALC VOLT. 101.56

1-RI-90-291B RADIATION RATE INDICATOR, CABLE 1RM488A
MIN VOLT. 105.3 ; CALC VOLT. 99.8

1-RI-90-276B RADIATION RATE INDICATOR, CABLE 1RM634A
MIN VOLT. 105.3 ; CALC VOLT. 101.1

1-RI-90-278B RADIATION RATE INDICATOR, CABLE 1RM624A
MIN VOLT. 105.3 ; CALC VOLT. 101.1

K271
K273
K276
K278
K290
K291
KMFA
RELAYS ON PNL 1-M-30
MIN VOLT. 105.3 ; CALC VOLT. 101.61

BD 1-II, BKR 12 & BD 2-III, BKR 12

INADEQUATE TERMINAL VOLTAGES ON BD 1-I (BKR 12) ARE TYPICAL FOR BD 1-II (BKR 12) AND BD 2-III (BKR 12) (SEE NOTE BELOW)

BD 1-I, BKR 29

1-R-148 REACTOR VESSEL LEVEL INSTRUMENTATION
CABLE 1PM4943I
MIN VOLT. 112.1 ; CALC VOLT. 108.38

NOTE:
THESE CIRCUITS WERE NOT CALCULATED. INSPECTION OF CIRCUIT PARAMETERS INDICATES THAT FAILURES ON CIRCUITS ASSOCIATED WITH 120V AC VITAL POWER BD 1-I, BKR 12, WILL ALSO OCCUR ON THESE BDS. A DETAILED CALCULATION FOR THESE CIRCUITS MUST BE PERFORMED TO DETERMINE CORRECTIVE ACTION.

EXAMPLE CALCULATION PACKAGE

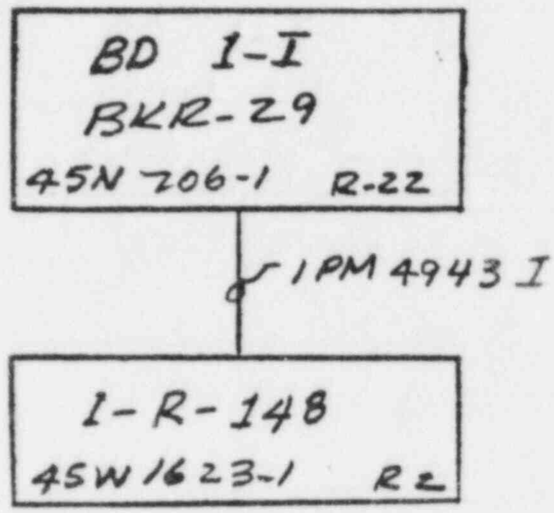
FOR ONE CIRCUIT

TVA 489G (EN DES-3-77) TENNESSEE VALLEY AUTHORITY SHEET 45 OF 136

SUBJECT 120V AC VITAL INST BD 1-I BLOCK DIAGRAM PROJECT SEQUOYAH

COMPUTED BY	DATE	CHECKED BY	DATE
Ralph R. Fernandez	1-8-86	CTB	1/9/86

REACTOR VESSEL LEVEL INSTRUMENTATION

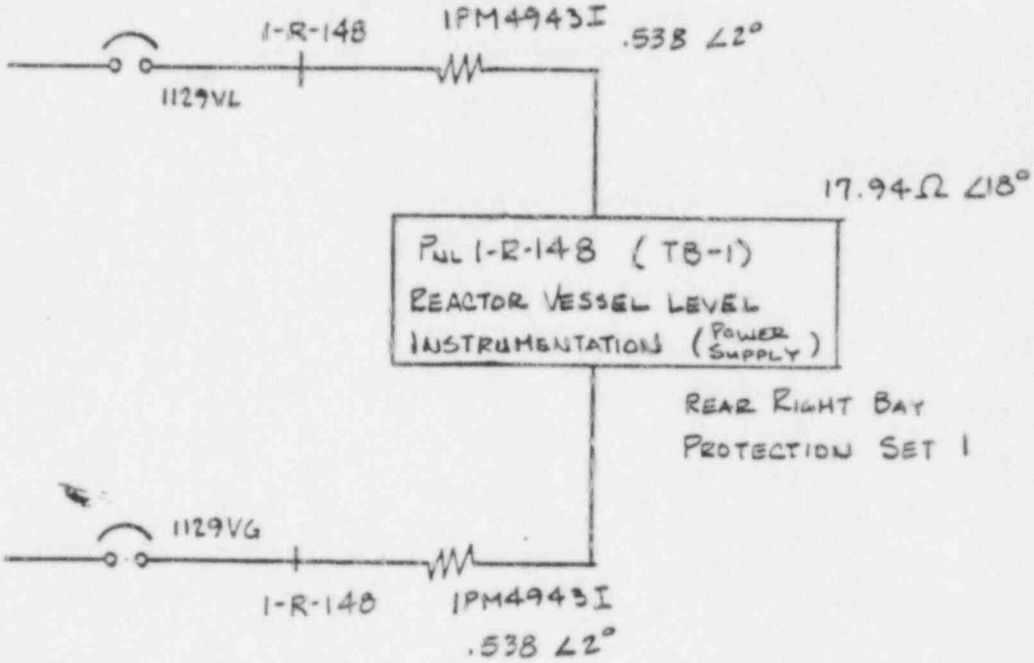


120V AC VITAL INST BD 1-I — SHEET 46 OF 136

BKR 29

COMPUTED RLE DATE 1-13-86

CHECKED DDW DATE 1-18-86



118V ± 5%

$V_{MIN} = 112.1V$

TEST RESULTS

6.52 AMPS @ 117VAC

$R = V/I = \frac{117}{6.52} = 17.94\Omega$

$\boxed{17.94\Omega \angle 18^\circ}$

P.F. .95*

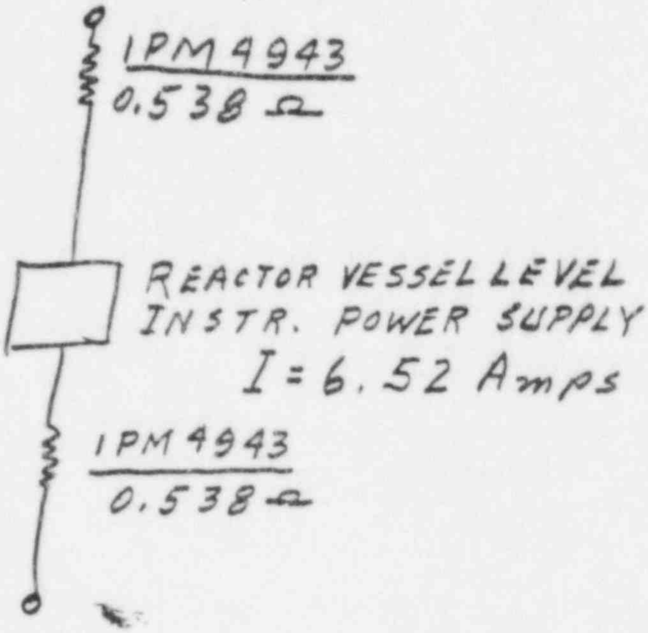
$\cos^{-1} .95 = 18^\circ$

*TAKEN FROM FIELD MEASURED DATA, ATTACHMENT 2, DE CALCULATION B43 851230 901

120VAC VITAL INST BD 1-I
BKR 29

COMPUTED DDW DATE 1-18-86
CHECKED [illegible] DATE 1-18-86

$V_i = 115.4$ Volts



Voltage at Power Suppy $= V_i - IR$ of cable

$= 115.4 - 6.52\,(2 \times 0.538) = \underline{108.38 \text{ volts}}$ *

*This is less than specified minimum of

$118 - 5\% = 112.1$

120V AC VITAL INST BD 1-I

BKR 29

COLUMNS 1-6 | COLUMNS

PREPARED BY: RLE DATE: 1-13-86 | PREPARED BY: DATE:

CHECKED BY: DDW DATE: 1-18-86 | CHECKED BY: DATE:

1 CABLE No.	2 CABLE SIZE	3 No. OF CONDUCTORS	4 FOOTAGE (FT)	5 TYPE	6 CABLE IMPEDANCE
1PM4943I	#12	1-2C	250	WGB	.538 ∠2°

(⌢)

SEQUOYAH NUCLEAR PLANT

Columns ______

Prepared By E.P. Emert Date 1-13-86

Checked By D D Wright Date 1-18-86

Columns ______

Prepared By ______ Date ______

Checked By ______ Date ______

Component I.D.	Contract No.	Manufacture	Max. Volt.	Min. Volt.	INRUSH Calc. Volt.	Amps	W	VA	PF	STEADY STATE Calc. Volt.	Amps	W	VA	PF
POWER SUPPLY	68C60-91934	WESTINGHOUSE	123.9VAC 21.5A	112.1VAC						108.38				
TEST RESULTS			117 VAC								6.52		762.84	.95 *

* TAKEN FROM FIELD MEASURED DATA, ATTACHMENT 2, OE CALCULATION B43 851230 901.

065262.08

NEB 830309 354

Westinghouse Electric Corporation
Industry Systems Division • Pittsburgh, Pa. 15238

VI

MEDS 100 UB-K

FOR INFORMATION ONLY
DATE JUL 29 1982
T.V.A. NUCLEAR ENGR BRANCH
by: CHIEF NUCLEAR ENGINEER
Ans'd by Ltr# 7322

PROJECT SQN DATE 3/19/81
CONTRACT 6[illegible] FILE N2M-2-25
DRAWING NO. D-2095
SHEET - REV 0 UNIT 1

Reactor Vessel Water Level
Reactor Vessel Head Vent Temperature

Westinghouse NES Purchase Order:
546-CLL-416261/41-BN
Westinghouse ISD Contract: D2095 (TVA)

General Test Section
Test Procedures

TABLE OF CONTENTS

CABINET ELAPSED TIME RECORD AND POWER LOG

TEST SECTION 1 CABINET NO. 01

(REF: STANDARD TEST PROCEDURE #16)

1. CABINET TOTAL "POWER ON" TIME WHILE IN MANUFACTURERS PLANT

   HOURS N/A

2. POWER SUPPLY LOAD READINGS

   A. PRIMARY POWER SUPPLY
   (WITH SECONDARY SUPPLY SHUT OFF)

   VOLTAGE – 26.272 VOLTS D.C.

   CURRENT – 16 AMPS D.C.

   B. SECONDARY POWER SUPPLY
   (WITH PRIMARY SUPPLY SHUT OFF)

   VOLTAGE – N/A VOLTS D.C.

   CURRENT – N/A AMPS D.C.

3. POWER SUPPLY – A.C. INPUT VOLTAGE 117 VOLTS A.C.

   A.C. DEMAND CURRENT 6.52 AMPS A.C.

4. SYSTEM OPERATING HOUR METER READING AT TIME OF SHIPMENT N/A
   (CABINET 01 ONLY)

TEST COMPLETED BY R. Wiley 713 DATE 2-28-80

DATA REVIEWED BY ______ DATE ______

DATA APPROVED BY ______ DATE ______

REV. 0

TEST SHEET 01-57

Instruction Book

For

CONTROL AND PROTECTION INSTRUMENTATION SYSTEM

TENNESSEE VALLEY AUTHORITY
SEQUOYAH NUCLEAR POWER STATION

Units 1 and 2

RVWL/RVHVT

Equipment Reference Manual

MANUFACTURER
WESTINGHOUSE ELECTRIC CORPORATION
INDUSTRY SYSTEMS DIVISION
PITTSBURGH, PENNSYLVANIA

AU
BRH

AWR

CONTRACTOR
WESTINGHOUSE ELECTRIC CORPORATION
PRESSURIZED WATER REACTOR SYSTEMS DIVISION
PITTSBURGH, PENNSYLVANIA

7300 SERIES POWER SUPPLY

(Style 6005D54G01 through G04)

GENERAL DESCRIPTION

The 7300 Series Power Supply converts the 118 Vac, single phase, 50 or 60 Hz input voltage to a 26 Vdc, 23.4 Vdc, or 24.2 Vdc output voltage.

Four power supply groups (designated G01 through G04) are available, as follows:

- Group 1 (G01): 118 Vac, 60 Hz input; 26 Vdc output
- Group 2 (G02): 118 Vac, 60 Hz input; 23.4 Vdc output
- Group 3 (G03): 118 Vac, 50 Hz input; 26 Vdc output
- Group 4 (G04): 118 Vac, 50 Hz input; 24.2 Vdc output

The power supply is designed to mount in a standard 19-in. rack and takes 10.47 in. of vertical cabinet space. However, when the power supply is delivering full load, adequate vertical space must be left about the supply for cooling, or forced air cooling or shielding must be provided.

CIRCUIT SPECIFICATIONS

INPUT REQUIREMENTS

- Voltage: 118 Vac ±5 percent, single phase
- Current: steady state – 21.5 A maximum at full output load

  inrush – 10 times steady state

  fuse – 30 A
- Frequency: 60 Hz ±1 percent (G01 and G02)

  50 Hz ±1 percent (G03 and G04)

  harmonic content – 5 percent maximum

OUTPUT CAPABILITIES

- Voltage: steady state – 26.0 Vdc nominal (G01 and G03)

  23.4 Vdc nominal (G02)

  24.2 Vdc nominal (G04)

  Turn on/off transient – less than 1 percent overshoot
- Current: 65 A maximum operating (G01 and G02)

  50 A maximum operating (G03 and G04)

  breaker rating – 70 A

  supply limited (breaker shorted) – 120 percent of maximum operating current
- Regulation and ripple: output measured at minimum and maximum ripple peaks stays within ±4 percent of nominal voltage for worst-case combination of 10 percent line change and 20 percent load change
- Alarms: undervoltage – form C contacts activated at approximately 5 Vdc undervoltage

  overcurrent – form C contacts activated at breaker trip

ENVIRONMENTAL

- Operating temperature range: -5°C to +65°C ambient air temperature
- Cooling technique: natural convection only
- Seismic (Vibration): See Figure 1

APPENDIX C

SUMMARY

OF

INSTRUMENTATION AND CONTROL SYSTEMS

FOR

SEQUOYAH NUCLEAR PLANT

0817A

TVA 10697 (OE-4-85)

OE CALCULATIONS

TITLE	PLANT/UNIT
INSTRUMENT ACCURACY CALCULATIONS 1,2-PT-30-310	SEQUOYAH/1 AND 2

PREPARING ORGANIZATION	KEY NOUNS (Consult RIMS DESCRIPTORS LIST)
EEB - I&C	INSTRUMENT ACCURACY, CHANNEL ACCURACY, LOOP ACCURACY, PAM

BRANCH/PROJECT IDENTIFIERS: 1,2-PT-30-310

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
R0	8511260054	B43 '851029 920
R _		
R _		
R _		

APPLICABLE DESIGN DOCUMENT(S):

SAR SECTION(S)	UNID SYSTEM(S)

	Revision 0	R1	R2	R3
ECN No. (Indicate if Not Applicable)	N/A			
Prepared	[signature]			
Checked	Richard F Bellew			
Reviewed	M R Belew			
Approved	A. F Pagano/MRB			
Date	10-29-85			
List all pages added by this revision.				
List all pages deleted of this revision.				
List all pages changed by this revision				

Use form TVA 10534 if more room required.

Statement of Problem

Determine the accuracy of PAM instruments

1,2-PT-30-310

1,2-PT-30-311

Abstract

Calculations were performed to derive the demonstrated accuracy of PAM instrument loops.

R0 of THIS CALCULATION CONSISTS OF 18 PAGES (SH 1-18) EIGHT ATTACHMENTS

Return originals to: R. A. JARRETT (W8A56C-K)

cc: RIMS, SL26 C-K

TABLE OF CONTENTS

ASSUMPTIONS:

1.) THE RATIO OF THE ACCURACY OF THE FIELD CALIBRATION EQUIPMENT TO THE ACCURACY OF THE DEVICES BEING CALIBRATED IS SUFFIENTLY SMALL THAT THE CALIBRATION EQUIPMENT ERROR IS CONSIDERED NEGLIGIBLE AND IS NOT CONSIDERED IN THIS CALCULATION.

2.) ALL INACCURACIES IDENTIFIED AS RANDOM INACCURACIES WILL BE COMBINED BY THE SQUARE ROOT OF THE SUM OF THE SQUARES METHOD. ALL SYSTEMATIC ERRORS WILL BE COMBINED BY ALGEBRAIC SUMMATION.

3.) THE ACCIDENT ACCURACY CALCULATIONS (A_a & A_s) ARE BOUNDING FOR ALL ACCIDENTS. SEPERATE CALCULATIONS FOR SPECIFIC ACCIDENTS ARE NOT NEEDED.

4.) THE TRANSMITTERS AND INDICATORS ARE CALIBRATED TO OR BETTER THAN THE ACCURACY STATED IN THOR SETPOINT AND SCALING DOCUMENT TI-41-30.

DESIGNED PAJ 10/1/85 CHECKED RLB 10/24/85	INSTRUMENT DEMONSTRATED ACCURACY CALCULATION	1,2-PT-30-310 SH 2 CONT ON 3 REV 0

DEFINITIONS AND ABBREVIATIONS:

A_a - ACCIDENT ACCURACY - ACCURACY OF A DEVICE IN A HARSH ENVIRONMENT CAUSED BY AN ACCIDENT.

A_n - NORMAL ACCURACY - ACCURACY OF A DEVICE LOCATED IN AN ENVIRONMENT NOT EFFECTED BY AN ACCIDENT; OR PRIOR TO AN ACCIDENT.

A_s - POST SEISMIC ACCURACY - ACCURACY OF A DEVICE FOLLOWING A SEISMIC EVENT IN ITS NORMAL ENVIRONMENT.

A_b - ACCEPTABLE BAND - THE RANGE OF VALUES AROUND THE CORRECT VALUE DETERMINED TO BE ACCEPTABLE WITHOUT RECALIBRATION.

SP - SET POINT - A PREDETERMINED LEVEL AT WHICH A BISTABLE DEVICE CHANGES STATE TO INDICATE THAT THE PARAMETER BEING MONITORED HAS REACHED A SELECTED VALUE.

R_e - INACCURACY RESULTING FROM DEVICE REPEATABILITY ERROR.

D_e - INACCURACY RESULTING FROM DRIFT ERROR.

TN_e - INACCURACY RESULTING FROM TEMPERATURE EFFECTS AT MAX. ABNORMAL NON-ACCIDENT CONDITIONS.

TA_e - INACCURACY RESULTING FROM TEMPERATURE EFFECTS DURING ACCIDENT CONDITIONS.

RAD_e - INACCURACY RESULTING FROM EXPOSURE TO RADIATION.

S_e - INACCURACY RESULTING FROM A SEISMIC EVENT WITHOUT REGARD TO ENVIRONMENT.

WL_e - INACCURACY DUE TO WATERLEG UNCERTAINTY DURING AN ACCIDENT.

LR_e - INACCURACY DUE TO LOAD RESISTANCE EFFECT

BP_e - INACCURACY DUE TO BAROMETRIC PRESSURE ERROR

PSE_e - INACCURACY DUE TO POWER SUPPLY EFFECT

A_e - ACCIDENT ERROR - ERROR OF A DEVICE IN A HARSH ENVIROMENT CAUSED BY AN ACCIDENT (TA_e+RAD_e).

$INDR_e$ - INACCURACY DUE TO READING ERROR.

URL - UPPER RANGE LIMIT

CS - CALIBRATED SPAN

FS - FULL SCALE

LA_N - NORMAL LOOP ACCURACY

LA_a - ACCIDENT LOOP ACCURACY

LA_s - SEISMIC LOOP ACCURACY

DESIGNED RAJ 10/1/85 CHECKED RLB 10/24/85	INSTRUMENT DEMONSTRATED ACCURACY CALCULATION	1,2-PT-30-310 SH 3 CONT ON 4 REV 0

LOOP COMPONENT LIST:

1PT-30-310	1 PI-30-310
2PT-30-310	2 PI-30-310
1PT-30-311	1 PI-30-311
2PT-30-311	2 PI-30-311

DESIGNED RAJ 10/1/85	INSTRUMENT DEMONSTRATED ACCURACY CALCULATION	1,2-PT-30-310
CHECKED ELB 10/24/85		SH 4 CONT ON 5 REV 0

ACCURACY:

ACCURACY PARAMETERS:

DEVICE 1-PT-30-310 * RANGE/UNITS: 0-100PSIA SPAN/UNITS: -5 TO 60PSIG

PARAMETER:	VALUE	SOURCE	NOTE
REPEATABILITY:	± 0.195 PSI	VENDOR	1
DRIFT:	± 1.5 PSI	VENDOR	2, 3, 12
TEMPERATURE NORMAL:	± 0.276 PSI	VENDOR	4
ACCIDENT:	SEE Ae	VENDOR	5
RADIATION:	SEE Ae	VENDOR	5
ACCEPTANCE BAND:	± 0.325 PSI	ENGRG. JUDGEMENT	6
SEISMIC:	± 0.65 PSI	VENDOR	7
WATERLEG:	NA		
LR_e :	± 0.4 PSI	ENGRG. JUDGEMENT	8, 12
PSE_e :	0	VENDOR	11
BP_e :	± 0.5 PSI	ENGRG. JUDGEMENT	10
Ae : 0-5 MIN.	± 7.15 PSI	VENDOR	9
Ae : 5 MIN. - 4 MONTHS	± 10.4 PSI	VENDOR	13

* THIS SHEET IS APPLICABLE TO 2-PT-30-310, 1-PT-30-311, 2-PT-30-311

DESIGNED RAJ 10/1/85	INSTRUMENT DEMONSTRATED ACCURACY CALCULATION	1,2-PT-30-310
CHECKED RCB 10/24/85		SH 5 CONT ON 6 REV 0

ACCURACY CONT'D

ACCURACY PARAMETERS CONT'D:

NOTES:

1 THE REPEATABILITY IS INCLUDED IN THE DEVICE'S ACCURACY WHICH IS ± 0.3% OF CS PER ATTACHMENT 1, SHEET 1.

2 THE DRIFT OF ±0.5% OF URL/6MONTHS WAS OBTAINED FROM TOBAR LETTER (ATTACHMENT 4), ITEM 3, WHICH ADDRESSED ALL UNITS/RANGES OF THE TOBAR MODEL 32PA1. THE TOBAR LETTER WAS ADDRESSING 32PA1 MODELS PURCHASED FOR BROWN FERRY NUCLEAR PLANT, BUT IT IS APPLICABLE TO SQNP'S 32PA1 MODELS.

3 THE CALIBRATION PERIOD IS EVERY 18 MONTHS PER SQNP'S INSTRUMENT MAINTENANCE INSTRUCTIONS, IMI-30, R18.

4 THE TEMPERATURE EFFECT IS ±0.5% OF CS PER 28°C/82.4°F AMBIENT TEMPERATURE CHANGE DUE TO NON-ACCIDENT CONDITIONS AT A MAXIMUM TURNDOWN RATIO OF 3:1 PER ATTACHMENT 1, SHEET 3. THE CALCULATED VALUE IS CONSERVATIVE BECAUSE THE ACTUAL TURNDOWN RATIO IS 1.5:1.

- THE MINIMUM NORMAL TEMPERATURE OF 50°F (PER 47E235-47, R1) WILL BE THE CALIBRATING TEMPERATURE FOR CALCS.
- THE MAXIMUM ABNORMAL TEMPERATURE OF 120°F (PER 47E235-47, R1) WILL BE THE MAXIMUM NORMAL TEMPERATURE FOR CALCS.

ACCURACY CONT'D

ACCURACY PARAMETERS CONT'D:

NOTES:

5 RADIATION INACCURACIES ARE INCLUDED IN THE TOTAL ACCIDENT ACCURACY (Aa).

6 PER ENGINEERING JUDGEMENT, THE ACCEPTANCE BAND IS ±0.5% OF CS WHICH IS THE CALIBRATION TOLERANCE (TVA's TI-41-30,R9).

7 THE POST SEISMIC ACCURACY IS ±1.0% OF CS PER ATTACHMENT 8, SHEET 4.

8 PER ENGINEERING JUDGEMENT, THE LOAD RESISTANCE EFFECT ERROR IS A WORST CASE VALUE BASED ON VENDOR DATA (ATTACHMENT 1, SHEET 3) OF ±0.1% OF URL/100Ω. THE MAXIMUM LOAD CAPABILITY OF 400Ω FOR A 24Vdc SUPPLY WAS USED FOR LOADING VALUE.

9 INCLUDES BOTH ACCIDENT TEMPERATURE AND RADIATION INACCURACIES. THE ACCIDENT ACCURACY IS ±11% OF CS FOR FIRST 5MIN. PER ATTACHMENT 8, SHEET 4.

10 THE TRANSMITTER IS AN ABSOLUTE PRESSURE TRANSMITTER WITH A CS OF 65 PSIG. THE APPLICATION OF USING AN ABSOLUTE PRESSURE TRANSMITTER, WHICH IS REFERENCED TO 14.7 PSIA, TO MEASURE GAUGE PRESSURE MAY CAUSE AN ERROR

ACCURACY CONT'D

ACCURACY PARAMETERS CONT'D:

NOTES:

OF ±0.5PSIG DUE TO ATMOSPHERIC FLUCUATIONS FROM 14.7 PSIA.

11 THE POWER SUPPLY EFFECT IS ±0.02% OF CS / VOLT DEVIATION. DUE TO THIS SMALL EFFECT AND A REGULATED POWER SUPPLY, THE PSe WILL BE NEGLIGIBLE.

12 THIS DEVICE HAS AN OPERATING RANGE OF 0-100PSIA, BUT AN URL OF 0-100PSIG IS BEING USED IN THIS CALCULATION.

13 INCLUDES BOTH ACCIDENT TEMPERATURE AND RADIATION INACCURACIES. THE ACCIDENT ACCURACY ±16% OF CS DURING A POST ACCIDENT PERIOD OF 5 MIN. TO 4 MONTHS PER ATTACHMENT 8, SHEET 4.

DESIGNED RAJ 10/1/85 CHECKED RLB 10/24/85	INSTRUMENT DEMONSTRATED ACCURACY CALCULATION	1,2-PT-30-310 SH 8 CONT ON 9 REV 0

ACCURACY CONT'D 1.0 DEVICE: 1-PT-30-310 *

CALCULATIONS:

PARAMETER	VALUE	SOURCE
LOCATION	- EL 701.5/ANNULUS	- ATTACHMENT 3
CALIBRATION TEMP.	- 50°F	- 47E235-47,R1
MAX. NORMAL TEMP.	- 120°F	- 47E235-47,R1
RANGE (URL)	- (0-100) PSIA	- ATTACHMENT 3
CALIBRATED SPAN (CS)	- (-5-60) PSIG	- 47B601-30-63,R47

1.1 $R_e = \pm 0.3\%$ OF CS(65) $R_e = \pm 0.195$ PSI ✓

1.2 $D_e = \pm 0.5\%$ OF URL(100)/6MONTHS

• CALIBRATION CYCLE IS EVERY 18 MONTHS

$D_e = \pm 0.5\% \times 100 \times 18/6 = \pm 1.5$ PSI ✓

1.3 $TN_e = \pm 0.5\%$ OF CS(65)/82.4°F AMBIENT TEMP. CHANGE

• Δt = MAX. TEMP. − CAL. TEMP

= 120 − 50 = 70°F

$TN_e = \pm 0.5\% \times 65 \times 70/82.4 = \pm 0.276$ PSI ✓

1.4 $LR_e = \pm 0.1\%$ OF URL (100)/100Ω

• MAX. LOAD FOR A 24vdc TRANSMITTER IS 400Ω

$LR_e = \pm 0.1\% \times 100 \times 400/100 = \pm 0.4$ PSI ✓

1.5 $A_{e\,(0\text{-}5MIN)} = \pm 11\%$ OF CS (65) $A_{e\,(0\text{-}5MIN)} = \pm 7.15$ PSI ✓

1.6 $A_b = \pm 0.5\%$ OF CS(65) $A_b = \pm 0.325$ PSI ✓

1.7 $S_e = \pm 1\%$ OF CS (65) $S_e = \pm 0.65$ PSI ✓

1.8 $A_{e\,(5MIN\text{-}4MOS.)} = \pm 16\%$ OF CS(65) $A_{e\,(5MIN\text{-}4MOS)} = \pm 10.4$ PSI ✓

* THESE CALCULATIONS ARE APPLICABLE TO 2-PT-30-310, 1-PT-30-311, 2-PT-30-311

DESIGNED RAJ 10/L/85 CHECKED RLB 10/24/85	INSTRUMENT DEMONSTRATED ACCURACY CALCULATION	1,2-PT-30-310 SH 9 CONT ON 10 REV 0

ACCURACY CONT'D

CALCULATIONS:

1.9 $\underline{A_N} = [Re^2 + De^2 + TNe^2 + LRe^2 + A_b^2 + BP_e^2]^{1/2}$

$= [0.195^2 + 1.5^2 + 0.276^2 + 0.325^2 + 0.4^2 + 0.5^2]^{1/2}$

$= [2.88]^{1/2}$

$\underline{A_N = \pm 1.7 \text{ PSI}}$ ✓

1.10 $\underset{0-5min}{\underline{A_a}} = [\underset{0-5min}{Ae^2} + A_N^2 - TNe^2]^{1/2}$

$= [7.15^2 + 1.7^2 - 0.276^2]^{1/2}$

$= [53.94]^{1/2}$

$\underset{0-5min}{\underline{A_a = \pm 7.34 \text{ PSI}}}$ ✓

1.11 $\underset{5min-4mos}{\underline{A_a}} = [\underset{5min-4mos}{Ae^2} + A_N^2 - TNe^2]^{1/2}$

$= [10.4^2 + 1.7^2 - 0.276^2]^{1/2}$

$= [110.97]^{1/2}$

$\underset{5min-4mos}{\underline{A_a = \pm 10.53 \text{ PSI}}}$ ✓

1.12 $\underline{A_s} = [A_N^2 + Se^2]^{1/2}$

$= [1.7^2 + 0.65^2]^{1/2}$

$= [3.3]^{1/2}$

$\underline{A_s = \pm 1.8 \text{ PSI}}$ ✓

ACCURACY:

ACCURACY PARAMETERS:

DEVICE 1-PI-30-310 * RANGE/UNITS: 65 UNITS SPAN/UNITS: -5 TO 60 PSIG

PARAMETER:	VALUE	SOURCE	NOTE
REPEATABILITY:	± 0.975 PSI	VENDOR	1
DRIFT:	± 1.95 PSI	ENGRG. JUDGEMENT	2
TEMPERATURE NORMAL:	0	ENGRG. JUDGEMENT	3
ACCIDENT:	NA		
RADIATION:	NA		
ACCEPTANCE BAND:	± 0.65 PSI	ENGRG. JUDGEMENT	4
SEISMIC:	± 0.35 PSI	VENDOR	5
WATERLEG:	NA		
INDRc:	± 0.5 PSI	ENGRG. JUDGEMENT	6

* THIS SHEET IS APPLICABLE TO 2-PI-30-310, 1-PI-30-311, 2-PI-30-311

DESIGNED RAJ 10/4/85 CHECKED RLB 10/24/85	INSTRUMENT DEMONSTRATED ACCURACY CALCULATION	1,2-PI-30-310 SH 11 CONT ON 12 REV 0

ACCURACY CONT'D

ACCURACY PARAMETERS CONT'D:

NOTES:

1 THE REPEATABILITY IS INCLUDED IN THE DEVICE'S ACCURACY WHICH IS ± 1.5% OF FS PER WESTINGHOUSE PRODUCT DATA SHEETS (ATTACHMENT 5, SHEET 6).

2 PER ENGINEERING JUDGEMENT, A DRIFT OF 3% OF FS PER 18 MONTHS IS ASSUMED AND WILL BE VERIFIED BY CALIBRATION PROCEDURES. THE CALIBRATION CYCLE IS EVERY 18 MONTHS PER INSTRUMENT MAINTENANCE INSTRUCTION, IMI-30, R18.

3 THE REPEATABILITY ACCURACY IS ASSUMED TO INCLUDE THOSE INACCURACIES CAUSED BY TEMPERATURE DEVIATIONS LARGER THAN THOSE ANTICIPATED IN THE CONTROL ROOM (60/104°F WORST CASE FOR 8 HOUR PERIOD WITH NORMAL MIN/MAX TEMPERATURE OF 75°F PER 47E235-16, R1).

4 PER ENGINEERING JUDGEMENT, THE ACCEPTANCE BAND IS ± 1.0% OF FS WHICH IS THE CALIBRATION TOLERANCE (TVA'S TI-41-30, R9).

5 THE POST SEISMIC ACCURACY IS ±0.53% OF FS PER WESTINGHOUSE DOCUMENT I.L. 43-252F (ATTACHMENT 6).

DESIGNED RAJ 10/1/85 CHECKED RHB 10/24/85	INSTRUMENT DEMONSTRATED ACCURACY CALCULATION	1,2-PT-30-310 SH 12 CONT ON 13 REV 0

ACCURACY CONT'D

ACCURACY PARAMETERS CONT'D:

NOTES:

6 PER ENGINEERING JUDGEMENT, THE INDICATOR READING ERROR IS ASSUMED TO BE ± 1/2 OF THE SMALLEST DIVISION. THE INDICATOR HAS 65 - 1 PSIG DIVISIONS (VERIFIED BY M-9 PANEL PHOTOGRAPHS).

ACCURACY CONT'D

CALCULATIONS:

2.0 DEVICE: 1-PI-30-310 *

2.1 $Re = \pm 1.5\%$ OF FS (65) $Re = \pm 0.975$ PSI

2.2 $De = 3.0\%$ OF FS(65) / 18 MONTHS

• CALIBRATION CYCLE EVERY 18 MONTHS

$De = \pm 3.0\% \times 65 = 1.95$ PSI

2.3 $A_b = \pm 1.0\%$ OF FS (65) $A_b = \pm 0.65$ PSI

2.4 $INDRe = \pm 1/2$ OF 1 DIVISION

• 1 PSIG / DIVISION

$INDRe = \pm 1/2$ DIV. × 1PSIG/DIV. $= \pm 0.5$ PSI

2.5 $A_N = [Re^2 + De^2 + A_b^2 + INDRe^2]^{1/2}$

$= [0.975^2 + 1.95^2 + 0.65^2 + 0.5^2]^{1/2}$

$= [5.45]^{1/2}$

$A_N = \pm 2.3$ PSI

2.6 $Se = \pm 0.53\%$ OF FS (65) $Se = \pm 0.35$ PSI

2.7 $A_s = [A_N^2 + Se^2]^{1/2}$

$= [2.3^2 + 0.35^2]^{1/2}$

$= [5.4]^{1/2}$

$A_s = \pm 2.3$ PSI

*THESE CALCULATIONS ARE APPLICABLE TO 2-PI-30-310, 1-PI-30-311, 2-PI-30-311

DESIGNED BAJ 10/1/85 CHECKED RLB 10/24/85	INSTRUMENT DEMONSTRATED ACCURACY CALCULATION	1,2-PT-30-310 SH 14 CONT ON 15 REV 0

ACCURACY CONT'D

CALCULATIONS:

3.0 LOOP ACCURACIES INDICATOR - (1P-30-310)*

: NOTE: LOOP ACCURACY $X = [PTX^2 + PIX^2]^{1/2}$

WHERE $X = A_N, A_a,$ OR A_S

3.1 $\underline{LA_N} = [PTA_N^2 + PIA_N^2]^{1/2}$

$= [1.7^2 + 2.3^2]^{1/2} = [8.18]^{1/2} = 2.86$

$\underline{LA_N = \pm 2.9 \text{ PSI}}$

3.2 FROM 0-5 MINUTES AFTER THE ACCIDENT

$\underset{0-5MIN}{\underline{LA_a}} = [\underset{0-5MIN}{PTA_a^2} + PIA_N^2]^{1/2}$

$= [7.15^2 + 2.3^2]^{1/2} = [56.41]^{1/2} = 7.51$

$\underset{0-5MIN}{\underline{LA_a = \pm 7.5 \text{ PSI}}}$

3.3 FROM 5 MINUTES TO 4 MONTH AFTER THE ACCIDENT

$\underset{5MIN-4MOS}{\underline{LA_a}} = [\underset{5MIN-4MOS}{PTA_a^2} + PIA_N^2]^{1/2}$

$= [10.4^2 + 2.3^2]^{1/2} = [113.45]^{1/2} = 10.65$

$\underset{5MIN-4MOS}{\underline{LA_a = \pm 10.7 \text{ PSI}}}$

3.4 $LA_S = [PTA_S^2 + PIA_S^2]^{1/2}$

$= [1.8^2 + 2.3^2]^{1/2} = [8.53]^{1/2} = 2.92$

$\underline{LA_S = \pm 2.9 \text{ PSI}}$

* THESE CALCULATIONS ARE APPLICABLE TO LOOPS 2P-30-310, 1P-30-311, AND 2P-30-311

DESIGNED RAJ 10/1/85	INSTRUMENT DEMONSTRATED ACCURACY CALCULATION	L2-PT-30-310
CHECKED RLA 10/04/85		SH 15 CONT ON 16 REV 0

SUMMARY OF RESULTS:

1.) NORMAL LOOP (1P-30-310)* ACCURACY

$LA_N = \pm 2.9$ PSI

2.) ACCIDENT LOOP ACCURACY FOR FIRST 5 MINUTES

$LA_{a_{0-5min}} = \pm 7.5$ PSI

3.) ACCIDENT LOOP ACCURACY FROM 5 MIN. TO 4 MONTHS

$LA_{a_{5min-4mos}} = \pm 10.7$ PSI

4.) SEISMIC LOOP ACCURACY

$LA_S = \pm 2.9$ PSI

* THESE VALUES ARE APPLICABLE TO LOOPS 2P-30-310, 1P-30-311, 2P-30-311

DESIGNED RAJ 10/1/85 CHECKED DLB 10/24/85	INSTRUMENT DEMONSTRATED ACCURACY CALCULATION	1,2-PT 30-310 SH 16 CONT ON 17 REV 0

CONCLUSIONS:

1.) FOR NORMAL OPERATION, THE WIDE RANGE CONTAINMENT PRESSURE INDICATION COULD HAVE MAXIMUM INACCURACIES OF ± 2.9 PSI.

2.) DURING THE FIRST 5 MINUTES OF THE WORST CASE ACCIDENT POSTULATED FOR THE TRANSMITTER, THE INDICATION COULD HAVE MAXIMUM INACCURACIES OF ± 7.5 PSI.

3.) AFTER THE FIRST 5 MINUTES UP TO 4 MONTHS, THE INDICATION COULD HAVE MAXIMUM INACCURACIES OF ± 10.7 PSI.

4.) THE POST-SEISMIC INACCURACIES ARE APPROXIMATELY EQUAL TO THE NORMAL OPERATING INACCURACIES. A SEISMIC EVENT WOULD HAVE NEGLIGIBLE LASTING EFFECTS ON THESE PRESSURE LOOPS.

DESIGNED BAT 10/1/85 CHECKED RVB 10/24/85	INSTRUMENT DEMONSTRATED ACCURACY CALCULATION	1,2-PT-30-310 SH 27 CONT ON 28 REV 0

REFERENCES:

TVA DRAWINGS

1.) 47E235-47, R1
2.) 47B601-30-63, R47
3.) 47E235-16, R1
4.) 47W610-30-1, R28

TVA DOCUMENTS

1.) SQNP IMI-30, R18
2.) SQNP 0588 EQUIPMENT TABS, R3
3.) SQNP TI-41-30, R9
4.) TVA DESIGN STANDARD, DS-E18.1.10, R0, INSTRUMENT SETPOINTS AND LIMITS

VENDOR DOCUMENTS

1.) TOBAR LETTER TO TVA, 8/28/1984
2.) WESTINGHOUSE I.L. 43-252F
3.) TOBAR TRANSMITTER PRODUCT SPECIFICATIONS
4.) WESTINGHOUSE LETTER TO TVA, 10/4/85 -(TVA-85-193)

DESIGNED RAJ 10/1/85 CHECKED RSB 10/24/85	INSTRUMENT DEMONSTRATED ACCURACY CALCULATION	L2-PI-30-30 SH 18 CONT ON — REV 0

TVA 488 (EN DES-3-77)

INSTRUMENT DATA SHEET FOR DEMONSTRATED ACCURACY CALCULATION FOR SEQUOYAH NUCLEAR PLANT — SHEET 1 OF 2

CONTAINMENT WR PRESSURE — COMPUTED ____ DATE ____ CHECKED ____ DATE ____

I. INSTRUMENT DATA

		SOURCE
INSTRUMENT NO.	– 1-PT-30-310	47W610-30-1 R.27
CONTRACT NO.	– 827684	47B601-30-R47
MANUFACTURER	– WESTINGHOUSE ELECTRIC CORP.	SQN CONTRACT
MODEL NO.	– 32PA1	827684
RANGE	– 0-100 PSIA	
* ACCURACY	– ±0.3% of CALIB SPAN	TOSPR
* REPEATABILITY	– INCLUDED IN ACCURACY	SPECIFICATIONS
* DRIFT	– NOT AVAILABLE	BULLETINS
AMBIENT TEMP. EFFECTS	– 0.5% of CALIB. SPAN/...	SEE ATTACHMENT
STATIC PRESS. EFFECTS	– NA	1

*NOTE: UNIT #2 IS SAME INSTRUMENT RAJ 10/1/85

* AS DEFINED IN ELECTRICAL DESIGN STANDARD DS-E18.1.10

AMBIENT TEMP EFFECTS – THE EFFECT ON ACCURACY AS A RESULT OF THE DIFFERENCE BETWEEN THE NORMAL OPERATING TEMP AND THE CALIBRATION TEMP.

STATIC PRESS EFFECTS – THE EFFECT ON ACCURACY AS A RESULT OF THE NORMAL OPERATING PRESSURE BEING GREATER THAN THE CALIBRATION PRESSURE (APPLIES TO ΔP MEASURES).

II. ACCIDENT EFFECTS ON INSTRUMENT ACCURACY

PARAMETER	VALUE	SOURCE
TEMPERATURE		
RADIATION		
SEISMIC		

Attachment No. 1 Sheet 1 of 6
Loop #/Identifier 1P-30-310

I. PREPARED – [signature] 9-20-85
CHECKED – M. J. Duncan 9/20/85

II. PREPARED –
CHECKED –

TVA 488 (EN DES-3-77)

INSTRUMENT DATA SHEET FOR DEMONSTRATED ACCURACY
CALCULATION FOR SEQUOYAH NUCLEAR PLANT

COMPUTED ______ DATE ______

CONTAINMENT [illegible] PRESSURE

CHECKED ______ DATE ______

I. INSTRUMENT DATA

		SOURCE
INSTRUMENT NO.	- 1-PI-30-310	47W610-30-1 R27
CONTRACT NO.	- 827684	47B601-30-R47
MANUFACTURER	- WESTINGHOUSE ELECTRIC CORP	SQN 827684
MODEL NO.	- VX-252	VENDOR DOC 410C100
RANGE	- -5 TO 60	
* ACCURACY	- 1.5%, FULL SCALE	WESTINGHOUSE ITEM 1-3
* REPEATABILITY	- 0%	837[illegible]
* DRIFT	- NA	
AMBIENT TEMP. EFFECTS	- NA	
STATIC PRESS. EFFECTS	- NA	

*NOTE: UNIT #2 IS SAME MODEL RAJ 10/1/85

* AS DEFINED IN ELECTRICAL DESIGN STANDARD DS-E18.1.10

AMBIENT TEMP EFFECTS - THE EFFECT ON ACCURACY AS A RESULT OF THE DIFFERENCE BETWEEN THE NORMAL OPERATING TEMP AND THE CALIBRATION TEMP.

STATIC PRESS EFFECTS - THE EFFECT ON ACCURACY AS A RESULT OF THE NORMAL OPERATING PRESSURE BEING GREATER THAN THE CALIBRATION PRESSURE (APPLIES TO ΔP MEASURES).

II. ACCIDENT EFFECTS ON INSTRUMENT ACCURACY

PARAMETER	VALUE	SOURCE
TEMPERATURE		
RADIATION		
SEISMIC		

Attachment No. 1 Sheet 2 of 6
Loop #/Identifier 1P-30-310

I. PREPARED - [illegible] 9-20-85
CHECKED - M. L. Duncan 9/20/85

II. PREPARED -
CHECKED -

(ATTACHMENT 1)

SPECIFICATIONS - NUCLEAR TRANSMITTERS
HIGH LEVEL/MODERATE LEVEL

	32DP1/32DP2 DIFFERENTIAL PRESSURE	32PG1/32PG2 GAUGE PRESSURE	32PA1/32PA2 ABSOLUTE PRESSURE
RANGE INPUT: (OUTPUT: 4-20 mAdc)	0-40 IN WC 0-100 IN WC 0-250 IN WC 0-800 IN WC*	0-100 PSIG 0-250 PSIG 0-600 PSIG	0- 100 PSIA 0- 250 PSIA 0- 600 PSIA 0-1500 PSIA 0-2500 PSIA 0-6000 PSIA
FUNCTIONAL Span Elevated Zero Range Suppressed Zero Range Max. Working Pressure Load Capability Output Impedance Action Reference Accuracy Frequency Response Step Response (5-95%) & 45-55 input step) Damping Action Burst Pressure	40% - 100% (30%-100%)* 100% 60% 3375 @ 25°C(Std Rating 1500) 0-400 Ω @ 24 Vdc 0-1200Ω @ 40 Vdc >1 Megohm Direct or Reverse ±0.3% of Calibrated Span 2 Hz Nominal 0.4 Sec. Max. to reach 50% point Fixed 5500 PSI at 25°C	40% - 100% 100% 60% 1.5 X U.R.L. 0-400 Ω @ 24Vdc 0-1200Ω @ 40 Vdc >1 Megohm Direct or Reverse ±0.3% of Calibrated Span 2 Hz Nominal 0.2 Sec. Max. to reach 50% point Fixed 3 times upper range limit	40% - 100% 100% 60% 1.5 X U.R.L. 0-400 Ω @ 24 Vdc 0-1200Ω @ 40 Vdc >41 Megohm Direct or Reverse ±0.3% of Calibrated Span 2 Hz Nominal 0.2 Sec. Max. to reach 50% point Fixed 3 times upper range limit
MATERIALS Amplifier Housing — High Level Moderate Level Body Process Diaphragm Diaphragm Weld Ring Process Flange Fill Fluid Silicone DC550, 125cs Flange Bolts Mounting Hardware — High Level Moderate Level Manifold Adapters	Exp. Proof 300 Series SS Exp. Proof 300 Series SS or Cast Aluminum or Weatherproof Polyester 300 Series SS Hastelloy C or 17-7 PH 40 250 100 800 316 SS or Hastelloy C Hastelloy C Silicone DC550, 125cs High Tensile Steel 300 Series SS Carbon Steel or 300 Series SS 316 SS or Hastelloy C	Exp. Proof 300 Series SS Exp. Proof 300 Series SS or Cast Aluminum or Weatherproof Polyester 300 Series SS Hastelloy C 276 N/A 316 SS or Hastelloy C Silicone DC550, 125cs N/A 300 Series SS Carbon Steel or 300 Series SS 316 SS or Hastelloy C	Exp. Proof 300 Series SS Exp. Proof 300 Series SS or Cast Aluminum or Weatherproof Polyester 300 Series SS Hastelloy C or 13-8 Mo 100 PSIA 1500 PSIA 250 PSIA 2500 PSIA 600 PSIA 6000 PSIA N/A 316 SS or Hastelloy C None N/A 300 Series SS Carbon Steel or 300 Series SS 316 SS or Hastelloy C 316 SS or Hastelloy C
PHYSICAL Volume Displacement Weight — High Level xProof 300 SS Cast Aluminum — Moderate Level WP Polyester Process Flange Conn Manifold Adaptor Conn Electrical Connections Mounting	1.0 cc @ Maximum Range 22 lbs. (approx.) 19 lbs 17 lbs 16 lbs ¼"NPT Int. 2⅛" centers ½"NPT Int. 2⅛" ± ³⁄₆₄" ctrs. 16 AWG-96" pigtails thru sealed ½" NPT Ext. Cond. or Navy Bronze Terminal Box Bolted to Flat Surface	Less than 0.1cc 10 lbs. (approx.) 8.5 lbs 6.1 lbs 5.7 lbs ¼" NPT Int ½"NPT Int 16 AWG-96" pigtails thru sealed ½" NPT Ext. Cond. or Navy Bronze Terminal Box Bolted to Flat Surface	Less than 0.1 cc 10 lbs. (approx.) 8.5 lbs 6.1 lbs 5.7 lbs ¼" NPT Int ½" NPT Int 16 AWG-96" pigtails thru sealed ½" NPT Ext. Cond. or Navy Bronze Terminal Box Bolted to Flat Surface
POWER REQUIREMENTS Reference Operation Volts Normal Operating Volts Extreme Operating Currents (Pwr Req) P.A.R.D.	24 or 40 ± 1Vdc 20-28 or 36-45 Vdc 20-50 Vdc 22 ma min 500 mv pk-pk	24 or 40 ± 1 Vdc 20-28 or 36-45 Vdc 20-50 Vdc 22 ma min 500 mv pk-pk	24 or 40 ± 1Vdc 20-28 or 36-45 Vdc 20-50 Vdc 22 ma min 500 mv pk-pk
TEMP. & RH Ref. Operating Temp. 25 ± 2°C Operative Limits: Temp Storage Limits Ref. Operating RH Normal Operating RH Storage RH	25 ± 2°C 0-80°C (-20°C) with slower response time (-) 50°C to +120°C 50% or less 5-95% to 95%	25 ± 2°C 0-80°C (-20°C) with slower response time (-)50°C to +120°C 50% or less 5-95% to 95%	25 [illegible] 0-8[illegible] C) with slo[illegible]se time (-)[illegible]20°C 50[illegible] 5-9[illegible] to 9[illegible]
ENVIRONMENTAL EFFECT Static Pressure Effect Voltage Excitation Effect Load R. Effect Output Noise Effect Temperature Effect Overrange Effect Seismic Aging Radiation — High Level Moderate Level H.E.L.B. Max. Qualified Temp. — High Level Moderate Level Specification — High Level	0.5% of U.R.L. 1000 p.s.i. 0.02% of Span Volt 0.1% of Span 100 Ohms 20 mv pk-pk. max 0.5% of Calib. Span 28°C at Max (3:1) turndown 1% of U.R.L. 1000 PSI 10G ± 5% Error 10 years qualified life Gamma - 50 MR. Beta 900 MR (30 MR equivalent for a total Gamma equi- valent of 80 MR) 10 Megarad (2.5mr/hr) 10% of calibration range for test envelope 420°F (216°C) 265°F (129°C) 5518A59	N/A 0.02% of Span Volt 0.1% of Span 100 Ohms 20 mv pk-pk. max 0.5% of Calib. Span 28°C at Max (3:1) turndown 0.5% U.R.L. @ 1.5 x U.R.L. 10G ± 5% Error 10 years qualified life Gamma - 50 MR. Beta 900 MR (30 MR equivalent for a total Gamma equi- valent of 30 MR) 10 Megarad (2.5mr/hr) 10% of calibrated range for test envelope 420°F (216°C) 265°F (129°C) 5518A58	N/A 0.02% of Span Volt 0.1% of Span 100 Ohms 20 mv pk-pk. max 0.5% of Calib. Span 28°C at Max (3:1) turndown 0.5% U.R.L. @ 1.5 X U.R.L. 10G ± 5% Error 10 years qualified life Gamma - 50 MR. Beta 900 MR (30 MR equivalent for a total Gamma equi- valent of 80 MR 10 Megarad (2.5/hr) 10% of calibrated range for test envelope 420°F (216°C) 265°F (129°C) 5518A57

Attachment No. 4 Sheet 3 of 6
Loop #/Identifier LP-BQ-310

TVA 488 (EN DES-3-77)

SHEET 1 OF 2

INSTRUMENT DATA SHEET FOR DEMONSTRATED ACCURACY CALCULATION FOR SEQUOYAH NUCLEAR PLANT

COMPUTED ______ DATE ______

CONTAINMENT WR PRESSURE

CHECKED ______ DATE ______

I. INSTRUMENT DATA

		SOURCE
INSTRUMENT NO.	– 1-PT-30-311	47W610-30-1 R27
CONTRACT NO.	– 827684	47B601-?0-R4?
MANUFACTURER	– WESTINGHOUSE ELECTRIC CORP	SQN CONTRACT
MODEL NO.	– 3??A1	827684
RANGE	– 0-100 PSIA	
* ACCURACY	– ± 0.3% OF CALIB SPAN	[illegible]
* REPEATABILITY	– [illegible] CY	SPECIFICATIONS
* DRIFT	– NOT AVAILABLE	[illegible]
AMBIENT TEMP EFFECTS	– 0.5% OF CALIB. SPAN/27°C	(SEE ATTACHMENT
STATIC PRESS. EFFECTS	– NA	1)

* NOTE: UNIT #2 IS SAME INSTRUMENT PAJ 10/1/85

* AS DEFINED IN ELECTRICAL DESIGN STANDARD DS-E18.1.10

AMBIENT TEMP EFFECTS – THE EFFECT ON ACCURACY AS A RESULT OF THE DIFFERENCE BETWEEN THE NORMAL OPERATING TEMP AND THE CALIBRATION TEMP.

STATIC PRESS EFFECTS – THE EFFECT ON ACCURACY AS A RESULT OF THE NORMAL OPERATING PRESSURE BEING GREATER THAN THE CALIBRATION PRESSURE (APPLIES TO ΔP MEASURES).

II. ACCIDENT EFFECTS ON INSTRUMENT ACCURACY

PARAMETER	VALUE	SOURCE
TEMPERATURE		
RADIATION		
SEISMIC		

Attachment No. 1 Sheet 4 of 6
Loop #/Identifier 1P-30-311

I. PREPARED – [illegible]
CHECKED – M. J. Duncan 9/20/85

II. PREPARED –
CHECKED –

TVA 488 (EN DES-3-77)

SHEET 2 OF 2

INSTRUMENT DATA SHEET FOR DEMONSTRATED ACCURACY CALCULATION FOR SEQUOYAH NUCLEAR PLANT

COMPUTED ______ DATE ______

CONTAINMENT WR PRESSURE

CHECKED ______ DATE ______

I. INSTRUMENT DATA

		SOURCE
INSTRUMENT NO.	– 1-PT-30-311	47W610-30-1 R21
CONTRACT NO.	– 827684	47B601-30-R47
MANUFACTURER	– WESTINGHOUSE ELECTRIC CORP	(SQN 827684
MODEL NO.	– VX-252	VENDOR DOC 410C100
RANGE	– -5 TO 60	
* ACCURACY	– 1.5 % FULL SCA.	
* REPEATABILITY	– 0	
* DRIFT	– "	
AMBIENT TEMP. EFFECTS	– "	
STATIC PRESS. EFFECTS	– NA	

*NOTE: UNIT # 2 IS SAME MODEL RA 10/1/85

* AS DEFINED IN ELECTRICAL DESIGN STANDARD DS-E18.1.10

AMBIENT TEMP EFFECTS – THE EFFECT ON ACCURACY AS A RESULT OF THE DIFFERENCE BETWEEN THE NORMAL OPERATING TEMP AND THE CALIBRATION TEMP.

STATIC PRESS EFFECTS – THE EFFECT ON ACCURACY AS A RESULT OF THE NORMAL OPERATING PRESSURE BEING GREATER THAN THE CALIBRATION PRESSURE (APPLIES TO ΔP MEASURES).

II. ACCIDENT EFFECTS ON INSTRUMENT ACCURACY

PARAMETER	VALUE	SOURCE
TEMPERATURE		
RADIATION		
SEISMIC		

Attachment No. 1 Sheet 5 of 6
Loop #/Identifier 1P-30-311

I. PREPARED –
CHECKED – W. L. Duncan 9/26/85

II. PREPARED –
CHECKED –

(ATTACHMENT 1)

SPECIFICATIONS - NUCLEAR TRANSMITTERS
HIGH LEVEL/MODERATE LEVEL

	32DP1/32DP2 DIFFERENTIAL PRESSURE	32PG1/32PG2 GAUGE PRESSURE	32PA1/32PA2 ABSOLUTE PRESSURE
RANGE			
INPUT:	0-40 IN WC	0-100 PSIG	0- 100 PSIA
	0-100 IN WC	0-250 PSIG	0- 250 PSIA
	0-250 IN WC	0-600 PSIG	0- 600 PSIA
(OUTPUT: 4-20 mAdc)			0-1500 PSIA
			0-2500 PSIA
	0-800 IN WC*		0-6000 PSIA
FUNCTIONAL			
Span	40% - 100% (30%-100%)*	40% - 100%	40% - 100%
Elevated Zero Range	100%	100%	100%
Suppressed Zero Range	60%	60%	60%
Max. Working Pressure	3375 @ 25°C(Std Rating 1500)	1.5 X U.R.L.	1.5 X U.R.L.
Load Capability	0-400 Ω @ 24 Vdc	0-400 Ω @ 24Vdc	0-400 Ω @ 24 Vdc
	0-1200Ω @ 40 Vdc	0-1200Ω @ 40 Vdc	0-1200Ω @ 40 Vdc
Output Impedance	>1 Megohm	>1 Megohm	>41 Megohm
Action	Direct or Reverse	Direct or Reverse	Direct or Reverse
Reference Accuracy	± 0.3% of Calibrated Span	± 0.3% of Calibrated Span	± 0.3% of Calibrated Span
Frequency Response	2 Hz Nominal	2 Hz Nominal	2 Hz Nominal
Step Response (5-95%) & 45-55 input step)	0.4 Sec. Max. to reach 50% point	0.2 Sec. Max. to reach 50% point	0.2 Sec. Max. to reach 50% point
Damping Action	Fixed	Fixed	Fixed
Burst Pressure	5500 PSI at 25°C	3 times upper range limit	3 times upper range limit
MATERIALS			
Amplifier Housing — High Level	Exp. Proof 300 Series SS	Exp. Proof 300 Series SS	Exp. Proof 300 Series SS
Moderate Level	Exp. Proof 300 Series SS or Cast Aluminum or Weatherproof Polyester	Exp. Proof 300 Series SS or Cast Aluminum or Weatherproof Polyester	Exp. Proof 300 Series SS or Cast Aluminum or Weatherproof Polyester
Body	300 Series SS	300 Series SS	300 Series SS
Process Diaphragm	Hastelloy C or 17-7 PH	Hastelloy C 276	Hastelloy C or 13-8 Mo
	40" 250"		100 PSIA 1500 PSIA
	100" 800"		250 PSIA 2500 PSIA
			600 PSIA 6000 PSIA
Diaphragm Weld Ring		N/A	N/A
Process Flange	316 SS or Hastelloy C	316 SS or Hastelloy C	316 SS or Hastelloy C
Fill Fluid	Hastelloy C		None
Silicone DC550, 125cs	Silicone DC550, 125cs	Silicone DC550, 125cs	N/A
Flange Bolts	High Tensile Steel	N/A	300 Series SS
Mounting Hardware — High Level	300 Series SS	300 Series SS	Carbon Steel or
Moderate Level	Carbon Steel or 300 Series SS	Carbon Steel or 300 Series SS	300 Series SS
			316 SS or Hastelloy C
Manifold Adapters	316 SS or Hastelloy C	316 SS or Hastelloy C	316 SS or Hastelloy C
PHYSICAL			
Volume Displacement	1.0 cc @ Maximum Range	Less than 0.1cc	Less than 0.1 cc
Weight — High Level	22 lbs. (approx.)	10 lbs. (approx.)	10 lbs. (approx.)
xProof 300 SS	19 lbs.	8.5 lbs.	8.5 lbs.
Cast Aluminum — Moderate Level	17 lbs.	6.1 lbs.	6.1 lbs.
WP Polyester	16 lbs.	5.7 lbs.	5.7 lbs.
Process Flange Conn.	¼"NPT Int. 2⅛" centers	¼" NPT Int.	¼" NPT Int.
Manifold Adaptor Conn.	½"NPT Int. 2⅛" ± 3/64" ctrs.	½"NPT Int.	½" NPT Int.
Electrical Connections	16 AWG-96" pigtails thru sealed ½" NPT Ext. Cond. or Navy Bronze Terminal Box	16 AWG-96" pigtails thru sealed ½" NPT Ext. Cond. or Navy Bronze Terminal Box	16 AWG-96" pigtails thru sealed ½" NPT Ext. Cond. or Navy Bronze Terminal Box
Mounting	Bolted to Flat Surface	Bolted to Flat Surface	Bolted to Flat Surface
POWER REQUIREMENTS			
Reference Operation Volts	24 or 40 ± 1Vdc	24 or 40 ± 1 Vdc	24 or 40 ± 1Vdc
Normal Operating Volts	20-28 or 36-45 Vdc	20-28 or 36-45 Vdc	20-28 or 36-45 Vdc
Extreme Operating	20-50 Vdc	20-50 Vdc	20-50 Vdc
Currents (Pwr Req)	22 ma min.	22 ma min.	22 ma min.
P.A.R.D.	500 mv pk-pk	500 mv pk-pk	500 mv pk-pk
TEMP. & RH			
Ref. Operating Temp. 25 ± 2°C	25 ± 2°C	25 ± 2°C	25 ±
Operative Limits, Temp.	0-80°C (-20°C) with slower response time	0-80°C (-20°C) with slower response time	0-80 °C) with slow se time
Storage Limits	(-) 50°C to +120°C	(-)50°C to +120°C	(-) 5 120°C
Ref. Operating RH	50% or less	50% or less	50°
Normal Operating RH	5-95%	5-95%	5-95
Storage RH	to 95%	to 95%	to 95
ENVIRONMENTAL EFFECT			
Static Pressure Effect	0.5% of U.R.L. 1000 p.s.i.	N/A	N/A
Voltage Excitation Effect	0.02% of Span/Volt	0.02% of Span/Volt	0.02% of Span/Volt
Load R. Effect	0.1% of Span/100 Ohms	0.1% of Span/100 Ohms	0.1% of Span/100 Ohms
Output Noise Effect	20 mv pk-pk. max	20 mv pk-pk. max	20 mv pk-pk. max
Temperature Effect	0.5% of Calib. Span/28°C at Max (3:1) turndown	0.5% of Calib. Span/28°C at Max (3:1) turndown	0.5% of Calib. Span/28°C at Max (3:1) turndown
Overrange Effect	1% of U.R.L. 1000 PSI	0.5% U.R.L. @ 1.5 x U.R.L.	0.5% U.R.L. @ 1.5 X U.R.L.
Seismic	10G ± 5% Error	10G ± 5% Error	10G ± 5% Error
Aging	10 years qualified life	10 years qualified life	10 years qualified life
Radiation — High Level	Gamma - 50 MR, Beta 900 MR (30 MR equivalent for a total Gamma equivalent of 80 MR)	Gamma - 50 MR, Beta 900 MR (30 MR equivalent for a total Gamma equivalent of 80 MR)	Gamma - 50 MR, Beta 900 MR (30 MR equivalent for a total Gamma equivalent of 80 MR
Moderate Level	10 Megarad (2.5mr/hr)	10 Megarad (2.5mr/hr)	10 Megarad (2.5 hr)
H.E.L.B.	10% of calibrated range for test envelope	10% of calibrated range for test envelope	10% of calibrated range for test envelope
Max. Qualified Temp. — High Level	420°F (216°C)	420°F (216°C)	420°F (216°C)
Moderate Level	265°F (129°C)	265°F (129°C)	265°F (129°C)
Specification — High Level	5518A59	5518A58	5518A57

Attachment No. 1 Sheet 6 of 6
Loop #/Identifier 1P-30-311

RUN DATE 05/29/85

IDEN.SYS.LOOP	SECOND LINE THIRD LINE	U'S	TAG	PANEL DESIGN DATA, RNGE, SET POINTS, ETC.	DEI	DRAWING NO	CONTRACT NO	PURCHASE NO	LOG NO	REMARKS POWER	EC
FSV - 30- 299	INTERIM ISOL DAMPERS CONDENSATE DEMIN	1		YFR WBN 827551		47W920-39	SPEC	FSV-00-1145		TR-A	C
HS - 30- 299	INTERIM ISOL DAMPERS CONTROL	1		(5)			(1)			TR-A	E
HS - 30- 300	CASK DECONTAMINATION ROOM EXHAUST FAN CNTL	0		(5)			(1)			ND	E
PDS - 30- 300	CASK DECONTAMINATION ROOM EXHAUST FAN	0		(5) SP:0.2"WC		47W886-2	74C35-83600			ND	C
HS - 30- 301	MAIN STEAM VAULT EXHAUST:WEST	1,2		(2)		47W920-10	(1)			ND	E
TS - 30- 301	MAIN STEAM VAULT WEST EXHAUST FAN CONTROL	1,2		(2) SP:91F INCR & 80F DECR		47W920-10				ND	E
HS - 30- 302	MAIN STEAM VAULT EXHAUST:EAST	1,2		(2)		47W920-10	(1)			ND	E
TS - 30- 302	MAIN STEAM VAULT EAST EXHAUST FAN CONTROL	1,2		(2) SP:91F INCR & 80F DECR		47W920-10				ND	E
PT - 30- 310	CONT PRESS INDICATOR	1,2	F	M-9 RANGE: -5 TO 0 TO 60 PSIG			827684			PAM-1 TR-A	E
PM - 30- 310	CONT PRESS MODIFIER	1,2		R-163 0-100 MV IN/OUT			831326			TR-A	E
PR - 30- 310	CONT PRESS RECORDER	1,2	F	M-9 RANGE: -5 TO 0 TO 60 PSIG			827684			PAM-1	E
PT - 30- 310	CONT PRESS TRANSMITTER	1,2	C	L-188 RANGE: -5 TO 0 TO 60 PSIG			827684			TSC P1121 TR-A	C
PI - 30- 311	CONT PRESS INDICATOR	1,2	F	M-9 RANGE: -5 TO 0 TO 60 PSIG			827684			TSC P1122 (P2) TR-B	E
PM - 30- 311	CONT PRESS MODIFIER	1,2		R-164 0-100 MV IN/OUT			831326			TR-B	E
PR - 30- 311	CONT PRESS RECORDER	1,2	F	M-9 RANGE: -5 TO 0 TO 60 PSIG			827684			PAM-2	E
PT - 30- 311	CONT PRESS TRANSMITTER	1,2	C	L-189 RANGE: -5 TO 0 TO 60 PSIG			827684			TSC P1122 TR-B	C
FCO - 30- 312	EAST MAIN STEAM VAULT EXH FANS	1,2				47W866-10	822493				M

Attachment No. 2 Sheet 1 of 1
Loop #/Identifier P-30-310/311

B70 '850930 698

SNP FIELD VERIFICATION
10CFR50.49

* INSTALLATION DATE: 7/19/80
* Initial Criticality

TVA ID. NO. 1-PT-30-310 *WP/ECN NONE

MFGR. WESTINGHOUSE CONTRACT/ITEM#

MODEL or CATALOG NO. 32PA1212/33002/1 SERIAL NO. A311000Z

LOCATION RB1 ANNULUS (BLDG) 300° (COL LINE or AZ) 704' (ELEV) 61'6" (RADIUS)

OTHER NAMEPLATE INFO or REMARKS SAFE PRESSURE 12 PSIG
P.O. 82K69827684 SCH.1; ITEM 1
Ass'y # 1505D01G07
RANGE 100 PSIA
WETTED PARTS HAST C 316SST

COMPLETED BY: Mike Woodward (SIGNATURE) / 9-27-85 (DATE)

VERIFIED BY: [signature] (SIGNATURE) / 9-27-85 (DATE)

*NAMPLATE DATA ENTERED INTO EQIS: Steven A. Carson (SIGNATURE) / 9/29/85 (DATE)

*DATA ENTERED CORRECTLY INTO EQIS: [signature] (SIGNATURE) / 9/29/85 (DATE)

* DRAWING SERIES	DRAWING NUMBERS
CONDUIT & GROUNDING	45N864-5
SCHEMATIC	
CONNECTION	45N1635-66
FLOW & LOGIC	
INSTR. TABS	
OTHER	

* This information is for site use only and is not required for environmental qualification package field verification data.

Attachment No. 3 Sheet 1 of 6
Loop #/Identifier 1-PI-30-310

B70 '850929 825

SNP FIELD VERIFICATION
10CFR50.49

*INSTALLATION DATE: 11/5/81
*Initial Criticality

TVA ID. NO. 2-PT-30-310 *WP/ECN None

MFGR. WESTINGHOUSE CONTRACT/ITEM#

MODEL or CATALOG NO. 32 PA 1212/33002/1 SERIAL NO. A3110001

LOCATION RB2 ANNULUS 300° 710' 61'6"
BLDG COL LINE or AZ ELEV RADIUS

OTHER NAMEPLATE INFO or REMARKS
SAFE PRESSURE 12 PSIG
2 WIRE, 20-45 VDC
OUTPUT - 4-20 Ma
P.O. 82K69-827684
SCH. I, ITEM I
Assy#1505001G07 RANGE 100 PSIA
WETTED PARTS HAST C 316SST

COMPLETED BY: Mike Woodward / 9-27-85
SIGNATURE DATE

VERIFIED BY: [signature] / 9-27-85
SIGNATURE DATE

*NAMPLATE DATA ENTERED INTO EQIS: Sharon A. Carson / 9/29/85
SIGNATURE DATE

*DATA ENTERED CORRECTLY INTO EQIS: H. Ingrid Jones / 9/29/85
SIGNATURE DATE

* DRAWING SERIES	DRAWING NUMBERS
CONDUIT & GROUNDING	45N874-4
SCHEMATIC	
CONNECTION	45N2635-~~66~~ 80 RAS 9/27/85
FLOW & LOGIC	
INSTR. TABS	
OTHER	

* This information is for site use only and is not required for environmental qualification package field verification data.

Attachment No. 3 Sheet 2 of 6
Loop #/Identifier 2-PI-30-310

B70 '850930 699

SNP FIELD VERIFICATION
10CFR50.49

* INSTALLATION DATE: 7/19/80 *Initial Criticality

TVA ID. NO. 1-PT-30-311 *WP/ECN None

MFGR. WESTINGHOUSE CONTRACT/ITEM#

MODEL or CATALOG NO. 32PA1212/33002/1 SERIAL NO. A3110003

LOCATION RB1 ANNULUS (BLDG) 300° (COL LINE or AZ) 700' (ELEV) 61'6" (RADIUS)

OTHER NAMEPLATE INFO or REMARKS SAFE PRESSURE 12 PSIG
Assy # 1505D01G07
PO 82K69-827684 Sch. 1, Item 1

COMPLETED BY: M.L. Woodward (SIGNATURE) / 9-27-85 (DATE)

VERIFIED BY: [signature] (SIGNATURE) / 9-27-85 (DATE)

*NAMPLATE DATA ENTERED INTO EQIS: Sharon A. Cannon (SIGNATURE) / 9/27/85 (DATE)

*DATA ENTERED CORRECTLY INTO EQIS: V. Ingrid Ives (SIGNATURE) / 9/29/85 (DATE)

* DRAWING SERIES	DRAWING NUMBERS
CONDUIT & GROUNDING	45N864-5
SCHEMATIC	
CONNECTION	45N1635-66
FLOW & LOGIC	
INSTR. TABS	
OTHER	

* This information is for site use only and is not required for environmental qualification package field verification data.

Attachment No. 3 Sheet 3 of 6
Loop #/Identifier 1-PI-30-311

B70 '850929 826

SNP FIELD VERIFICATION
10CFR50.49

*INSTALLATION DATE: 11/5/81
*Initial Criticality

TVA ID. NO. 2-PT-30-311 *WP/ECN NONE

MFGR. WESTINGHOUSE CONTRACT/ITEM#

MODEL or CATALOG NO. 32 PA1212/33002/1 SERIAL NO. A3110004

LOCATION RB2 ANNULUS (BLDG) 305° (COL LINE or AZ) 712 (ELEV) 61'6" (RADIUS)

OTHER NAMEPLATE INFO or REMARKS SAFE PRESSURE 12 PSIG
2 WIRE 20-45 VDC
OUTPUT 4-20 mA
P.O. 82K69-827684 Sch: 1 Item: 1
Ass'y # 150500 1 GO 7 RANGE 100 PSIA
WETTED PARTS HAST C 316 SST

COMPLETED BY: [signature] (SIGNATURE), 9-27-85 (DATE)

VERIFIED BY: Mike Woodward (SIGNATURE), 9-27-85 (DATE)

*NAMPLATE DATA ENTERED INTO EQIS: Sharon A. Carra (SIGNATURE), 9/29/85 (DATE)

*DATA ENTERED CORRECTLY INTO EQIS: H. Ingrid Ives (SIGNATURE), 9/29/85 (DATE)

*DRAWING SERIES	DRAWING NUMBERS
CONDUIT & GROUNDING	45N874-4
SCHEMATIC	
CONNECTION	45N2635-80
FLOW & LOGIC	
INSTR. TABS	
OTHER	

* This information is for site use only and is not required for environmental qualification package field verification data.

Attachment No. 3 Sheet 4 of 6
Loop #/Identifier 2-PI-30-311

COMPONENT	FUNCTION	CONTRACT NO.	MFG & MODEL	LOCATION COL	RM	CAT	OP TIME	ACCURACY REQUIRED	HELB MODE	LOCATION (ICR, GS, ANN) CONT (u)(L)
*2- TS - 30- 202	PIPE CHASE CLRS FAN B-B	833871-1	STATIC "O" RING 201TA-B125-JJTTX6	UA11/669	A24				17	ICR
*2- FS - 30- 207	EMER GAS TMT SYS CLRS FAN B-B	825025	FLUID COMPONENTS INC 12-64-3/5	WA11/734	A16				N/A	ICR
2- HS - 30- 207	EMERG GAS TMT SYS CLRS FAN B-B	FURNISHED BY EEB	CUTLER HAMMER TYPE 10250T	VA11/734 (BOX #2762)	A16				N/A	ICR
*2- MTR - 30- 207	EMERG GAS TMT SYS CLRS FAN B-B	829093	RELIANCE SN1YF-882998A6QH	WA11/734	A16				N/A	GS
2- TS - 30- 207	EMERG GAS TMT SYS CLRS FAN B-B	83679	PENN A19BBC-2	WA11/734	A16				N/A	ICR
1- HS - 30- 214	TO AUX FW PMP VT FAN 125 V DC	FURNISHED BY EEB	CUTLER HAMMER TYPE 10250T	TA1/669 (BOX #3112)	A6				5	GS
2- HS - 30- 214	TO AUX FW PMP VT FAN 125 V DC	FURNISHED BY EEB	CUTLER HAMMER TYPE 10250T	TA15/669 (BOX #3113)	A26				5	GS
1- MTR - 30- 214	TDAFP RM 125V DC VENT FAN MTR		GE FR-56 #BBCC56EB4B	UA1/669	A6				5	GS
2- MTR - 30- 214	TDAFT RM 125V DC VENT FAN MTR		GE FR-56 #BBCC56EB4B	UA15/669	A26				5	GS
1- STR - 30- 214	TDAFP RM 125V DC VENT FAN STARTER	87268-3	ITE #P202C12	UA1/669	A6				5	GS
2- STR - 30- 214	TDAFP RM 125V DC VENT FAN STARTER	87268-3	ITE #P202C12	UA15/669	A26				5	GS
1- TS - 30- 214	TD AUX FW PMP RM THERMOSTAT	86835	FENWAL CAT # 18003-7	TA1/669	A6				5	GS
2- TS - 30- 214	TD AUX FW PMP RM THERMOSTAT	86835	FENWAL CAT # 18003-7	TA15/669	A26				5	GS
*1- PT - 30- 310(P+AM)	CONT PRESS TRANSMITTER	827684	WESTINGHOUSE 32PA1	AZ297/701.5 (L-188)	ANN				ANN	ANN
*2- PT - 30- 310(P+AM)	CONT PRESS TRANSMITTER	827684	WESTINGHOUSE 32PA1	AZ297/701.5 (L-188)	ANN				ANN	ANN

Attachment No. 3 Sheet 5 of 6
Loop #/Identifier 2-PT-30-310

COMPONENT	FUNCTION	CONTRACT NO.	MFG & MODEL	LOCATION COL	RM	CAT	OP TIME	ACCURACY REQUIRED	HELB MODE	LOCATION (ICR, CS, ANN) CONT (u)(L)
*1- PT - 30- 311	CONT PRESS TRANSMITTER	827684	WESTINGHOUSE 32PA1	AZ303/701.5 (L-189)	ANN				ANN	ANN
*2- PT - 30- 311	CONT PRESS TRANSMITTER	827684	WESTINGHOUSE 32PA1	AZ303/701.5 (L-189)	ANN				ANN	ANN
#0- ME - 30- 319	ABGT HUM CONT HTR A-A MOISTURE	834657	HYCAL CT-822H-H-0-100X/HS-3552-B-8-120-H5	C_{LRB}/714	A5				14	ICR
#0- MC - 30- 319	ABGT HUM CONT HTR A-A MOISTURE	834657	HYCAL CT-822H-H-0-100X/HS-3552-B-8-120-H5	C_{LRB}/714	A5				14	ICR
#0- MM - 30- 319	ABGT HUM CONT HTR A-A MOISTURE	834657	ROCHESTER 1218	C_{LRB}/714	A5				14	ICR
#0- MS - 30- 319	ABGT HUM CONT HTR A-A MOISTURE	834657	ROCHESTER 1218	C_{LRB}/714	A5				14	ICR
#0- ME - 30- 320	ABGT HUM CONT HTR TR B-B MOISTURE	834657	HYCAL CT-822H-H-0-100X/HS-3552-B-8-120-H5	C_{LRB}/714	A9				14	ICR
#0- MC - 30- 320	ABGT HUM CONT HTR TR B-B MOISTURE	834657	HYCAL CT-822H-H-0-100X/HS-3552-B-8-120-H5	C_{LRB}/714	A9				14	ICR
#0- MM - 30- 320	ABGT HUM CONT HTR TR B-B MOISTURE	834657	ROCHESTER 1218	C_{LRB}/714	A9				14	ICR
#0- MS - 30- 320	ABGT HUM CONT HTR TR B-B MOISTURE	834657	ROCHESTER 1218	C_{LRB}/714	A9				14	ICR

Attachment No. 3 Sheet 6 of 6
Loop #/Identifier 2-PT-30-311

	Revision 0	R1	R2	R3	R4
	4-10-84	10-3-84	7-1-85	9-5-85	
Preparer/Date	Ralph R. Fernandez	RRF	RRF	[illegible]	
		10-15-84	7-19-85	9-10-85	
Reviewer/Date	Stanley R. Parsons	SRP	LLE	[illegible]	

TOBAR

QUOTATION NO. 4145-84
Revision 001
August 28, 1984

TOBAR, INC.
1441 West Alameda Drive
Tempe, Arizona 85282
(602) 968-3171

TENNESSEE VALLEY AUTHORITY
Division of Purchasing
Chattanooga, Tennessee 37401

ATTENTION: Michael W. Sanford

REFERENCE: TVA J2-836101
Response to call for "Best and Final" offer dated August 17, 1984

We are pleased to respond to your notice of TOBAR DEFICIENCIES and submit this revision to our quotation.

RESPONSE TO ORIGINAL DEFICIENCIES

1) "The delivery of 14 weeks after award is unacceptable. TVA's delivery dates as amended in the addendum changes are October 15, 1984 for Unit 2 and December 8, 1984 for units 1 and 3. Please address the new required delivery dates."

Ten (10) transmitters requested for October 15, 1984 will be ready for shipment three (3) to four (4) weeks after receipt of order and release to manufacture.

Twenty (20) transmitters requested for December 8, 1984 will be ready for shipment six (6) to eight (8) weeks after receipt of order and release to manufacture.

2) "Supply voltage effect is ±0.2 percent in lieu of ± 0.1 percent as required for Item 1."

The published specification of 0.02 percent per volt is a very conservative number that all production amplifiers can easily meet without requiring production testing of each unit. TOBAR can supply units to the required 0.01 percent per volt, so this exception is removed.

ITem 6
[illegible]
AP1

3) "Drift for 6 months is ± 0.5 percent in lieu of ± 0.25 percent as required for Item 1."

The published specification is based on performance of 100% of all units manufactured, not requiring acceptance testing or burn-in of units. TOBAR can supply units to the required ±0.25 percent per 6 months by test and selection of units to meet this requirement. This exception is therefore removed.

Attachment No. 4 Sheet 1 of 6
Loop #/Identifier PT-30-310/311

Attachment No. 12 Sheet 1 of 5
Loop #/Identifier 2-PT-3-74B

10

4) "Accuracy is ± 0.3 percent in lieu of the required ± 0.25 percent as required for Item 1."

The published specification is conservative. Since acceptance tests are performed on all units prior to release for shipment, TOBAR can accept only those units meeting the desired ± 0.25 percent requirement. This exception is therefore removed.

5) "The overrange effect of ± 0.5 percent exceeds the required ± 0.25 percent required for Item 1."

The published specification of 0.5 percent of upper range limit is for overpressure of 1.5 times the upper range limit of the capsule. The transmitter range that TOBAR has quoted for Item 1 is a 1500 PSIA capsule turned down to the required calibrated range. The specification for Item 1 ("overranged with variations and spikes to 1500 psig...") will not in fact be an overrange effect applicable to these units; that is no shift in calibration will occur even if the 1500 psig is applied and maintained for indefinite periods.

6) "TOBAR quotes an absolute pressure transmitter for Item 1 in lieu of a gauge pressure transmitter as required."

TOBAR will supply a sealed pressure transmitter that has been calibrated to the 0 to 1200 psig and 0-500 psig requirements. As atmospheric pressure changes occur only small inaccuracies will occur, well within the over all accuracy as required in Item 7 below. The worst case would occur on the 500 psig calibration where barometric changes of ± 1 inch of mercury would cause a ±0.1 percent shift in calibration. This is normal procedure for the supply of transmitters requiring LOCA or HELB conditions.

7) "Test data or calculations must be supplied with the quote that demonstrate the transmitters can operate within the required accuracies during and after the overpressure conditions and under the stated environmental conditions for Item 1."

Each range of transmitter required in Item 1 will be considered separately, since the model numbers quoted and the specification requirements are different.

ITEM 1A: PT-3-22AA, PT-3-22BB, PT-3-22C AND PT-3-22D

a) Accuracy at 70 degrees Fahrenheit

The specified accuracy of units supplied is ±0.25% of calibrated span. This gives a deviation of ±3 psig.

b) Temperature Effect

Normal temperature is specified as 60 to 90 degrees Fahrenheit for a maximum deviation of +20 degrees Fahrenheit

Attachment No. 4 Sheet 2 of 6
Loop #/Identifier PT-30-3'0/3'1

Attachment No. 17 Sheet 2 of 5
Loop #/Identifier 2-PT-3-74B

from reference conditions. TOBAR specified temperature effect is ±0.5%/50 degrees Fahrenheit of calibrated span. This gives a maximum deviation of ±0.5% x 20/50 of calibrated span or ±2.4 psig.

c) Power Supply Effect

Specified supply effect is 0.01% per volt of calibrated range. Assuming a worst case power supply variation of ±20% about nominal voltage (±4.8 volts), the maximum deviation is ±0.58 psig.

d) Overpressure Effect

There is no overpressure effect. See Item 5 above.

e) Drift for Six Months

Assuming the time since last calibration is 6 months and the specification of 0.25% of URL is used, the drift is ±0.25% x 1500 = ±3.75 psig

f) Radiation

The TID of these units is 2×10^4 rads. At that level, no allowance needs to be made for effect of radiation. This is based on extrapolation from the radiation tests performed during the qualification program as described in TOBAR Report 5519A32.

g) Summary of Effects on Calibration

Accuracy	±3.0 psig
Temperature	±2.4 psig
Power Supply Effect	±0.6 psig
Over Pressure	0.0 psig
Drift	±3.8 psig
Radiation	0.0 psig
TOTAL	±9.8 psig

This is well within the required ±12 psig specificied.

ITEM 1b: PT-3-74A, PT-3-74B, PT-68-95, PT-68-96

a) Accuracy at 70 Degrees Fahrenheit

The specified accuracy of units supplied is ±0.25% of calibrated span. This gives a deviation of ±1.25 psig.

b) Temperature Effect

Normal temperature is specified as 60 to 90 degrees Fahrenheit for a maximum deviation of + 20 degrees Fahrenheit from reference conditions. TOBAR specified temperature effect is ±0.5%/50 degrees Fahrenheit of calibrated span. This gives a maximum deviation of ±0.5% x

Attachment No. 4 Sheet 3 of 6
Loop #/Identifier PT-30-310/311

Attachment No. 12 Sheet 3 of 5
Loop #/Identifier 2-PT-3-74B

20/50 of calibrated span or ±1 psig.

The worst case one day accident condition is the HELB case of 183 degrees Fahrenheit. This is 113 degrees Fahrenheit greater than reference conditions. The temperature coefficient of 0.5%/28 degrees Centigrade at calibrated span multiplied by the temperature shift of 113 degrees Fahrenheit (62.8 degrees Centigrade) gives a worst case deviation of 1.12% or ±5.6 psig.

c) Power Supply Effect

Specified supply effect is 0.01% per volt of calibrated range. Assuming a worst case power supply variation of ±20% about nominal voltage (±4.8 volts) the maximum deviation is ±0.24 psig.

d) Overpressure Effect

There is no overpressure effect. See Item 5 above.

e) Drift for Six Months

Assuming the time since last calibration is 6 months and the specification of 0.25% of URL is used, the drift is ±0.25% x 1500 = ±3.75 psig

f) Radiation

The normal radiation of 1×10^5 rads TID and the maximum accident dose of 5×10^4 rads TID (LOCA case) give a value of 1.5×10^5 rads for the one day case. From the qualification report WCAP-8687 Supplement 2 - E01B, Table 7, the worst case error due to radiation at 5 minutes at a minimum dose rate of 2×10^6 rads/hr was ±1.2% at a minimum turndown ratio of 2:1. The turndown for for the specified unit is 3:1. The dose at 5 minutes was 3.33×10^5 rads. The maximum deviation for radiation efect at one day can be determined by taking the 1.2% worst case, multiplying by the difference in turndowns (3/2), the ratio of specified dose to actual dose (1.5×10^5 /3.3×10^5) and the calibrated range (500 psig) to get ± 4.09 psig.

The 100 day accident requirement for radiation is 2.1×10^7 rads TID. From the qualification report cited above the worst case radiation effect at 6.8×10^7 rads TID was ±3%, again at minimum turndown of 2:1. The maximum deviation can be calculated as above except in the long-term case no correctioin will be used for the required dosage versus the tested dosage since in the long-term case the radiation effects are not linear with time. This calculation gives 3% x (3/2) x 500 = 22.5 psig.

g) Summary of Effects on Calibration

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Loop #/Identifier PT-30-310/311

Attachment No. 12 Sheet 4 of 5
Loop #/Identifier 2-PT-3-74B

One Day Case

Accuracy	±1.3 psig
Temperature Effect	±5.6 psig
Power Supply Effect	±0.2 psig
Overpressure effect	0.0 psig
Drift	±3.8 psig
Radiation	±4.1 psig
TOTAL	±15.0 psig

100 Day Case

Accuracy	±1.3 psig
Temperature Effect	±1.0 psig
Power Supply Effect	±0.2 psig
Overpressure Effect	0.0 psig
Drift	±3.8 psig
Radiation	±22.5 psig
TOTAL	±28.8 psig

Both of these figures meet or exceed the design requirements based on worst case additive factors. Since each of the parameters considered can in fact have either algebraic sign, the probability of actual drift equalling the worst case drift is remote, thus actual performance should be far better than the design requirements.

In addition to the above we are extending a five percent (5%) discount to the quoted prices, revising the total to $113,846.

This quotation is valid through October 10, 1984.

All other terms and conditions are as stated in the original proposal.

Please contact this office for any additional information you require.

Regards,
TOBAR, INC.

HERMAN A. BLAKE, MANAGER
APPLICATIONS ENGINEERING

HB:ch

CC:Control Equipment Co.
1206 Rambling Court
Greeneville, TN 37743
Gilbert Stewart
(615) 639-6503

~~Attachment No. 12 Sheet 5 of 5~~
~~Loop #/Identifier 2-PT-3-74B~~

Attachment No. 4 Sheet 5 of 6
Loop #/Identifier PT-30-310/311

02/13/85 BROWNS FERRY NUCLEAR POWER PLANT

INSTRUMENT TABULATION

MASTER FILE PRINT

U-FUNC-SYS-LOOP NO	SERVICE & NAMETAG ENGRAVING SECOND LINE CONTRACT PURCHASE NO	THIRD LINE VENDOR NO REMARKS	S	INSTRUMENT LOCATION PANEL DIV QUA C T VR RM	DRAWING	DETDWG ELEV COORD	INSTRUMENT RANGE & SETPTS	RV COMPUTR PNT NOS
1-PS -003-074B	REACTOR PRESSURE B 826606	INTLK	C	9-82 II 1E Y 34	47W605-28	 593.00 N-R5	4-20 MA (0-500 PSIG) 11.36 MA DEC (230 PSIG)	28
2-PS -003-074B	REACTOR PRESSURE B 826606	INTLK	C	9-82 II 1E Y 34	47W605-28	 593.00 N-R8	4-20 MA (0-500 PSIG) 11.36 MA DEC (230 PSIG)	28
3-PS -003-074B	REACTOR PRESSURE B 826606	INTLK	C	9-82 II 1E Y 34	47W605-28	 593.00 N-R17	4-20 MA (0-500 PSIG) 11.36 MA DEC (230 PSIG)	28
1-PT -003-074B	REACTOR PRESSURE B 836101	INTLK TOBAR 32PA1	C	25-6A II 1E Y 9	47W600-57	 593.00 P-R5	0-500 PSIG	28
2-PT -003-074B	REACTOR PRESSURE B 836101	INTLK TOBAR 32PA1	C	25-6A II 1E Y 9	47W600-57	 593.00 P-R12	0-500 PSIG	28
3-PT -003-074B	REACTOR PRESSURE B 836101	INTLK TOBAR 32PA1	C	25-6A II 1E Y 9	47W600-57	 593.00 P-R19	0-500 PSIG	28
1-FCV -003-075	RFW FROM HTR 91062 MK 47W415-3	A1 ISOL VLV	J		47W415-3			04
2-FCV -003-075	RFW FROM HTR 91062 MK 47W415-3	A1 ISOL VLV	J		47W415-3			04
3-FCV -003-075	RFW FROM HTR 91062 MK 47W415-3	A1 ISOL VLV	J		47W415-3			04

Attachment No. 4 Sheet 6 of 6

Loop #/Identifier PT-3-0 - 3 10/311

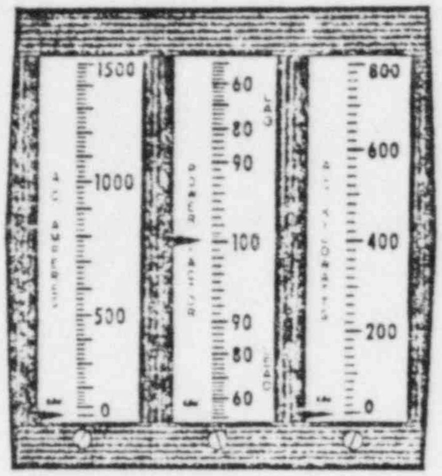
To Be updated by TLC

Attachment No. 1 Sheet 2 of 2

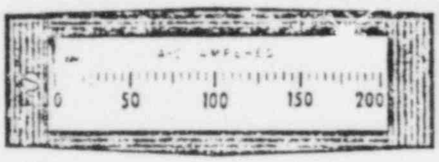
Loop #/Identifier 2-PT-3-74B

Westinghouse

Switchboard Instruments
Types H-252 and V-252



Vertical Type (Grouped)



Horizontal Type

Parts Common to All H-252 and V-252 tbs Instruments

Description of Part	Style Number of Part	
	Non-Illuminated	Illuminated
Case Assembly – black – clear window	606B015G01	606B015G01
Case assembly – black – non-glare window	606B015G03	606B015G03
Case assembly – silver grey – clear window	606B015G02	606B015G02
Case assembly – silver grey – non-glare window	606B015G04	606B015G04
Zero adjuster button – black	629A710H01	629A710H01
Zero adjuster button – silver grey	629A710H02	629A710H02
Collar to retain adjuster button	1098 423	1098 423
Trim strip for black cover (2 used)	629A669H01	629A669H01
Trim strip for silver grey cover (2 used)	629A669H02	629A669H02
Gasket for base	606B784H01	606B784H01
Material for mounting – two terminal instrument	606B019G01	606B019G05
Material for mounting – three terminal instrument	606B019G02	606B019G06
Material for mounting – four terminal instrument	606B019G03	606B019G07
Material for mounting – five terminal instrument	606B019G04	606B019G08
Mounting bracket with screw and stopnut (2 used)	293B474G01	293B474G01
Terminal stud	185A985H02	185A985H02
Nut, .250-28 for terminal stud	1267 649	1267 649
Molded drawer assembly – single range	876A387G09	876A387G10
Molded drawer assembly – single range①	876A387G11	876A387G12
Molded drawer assembly – single range②	....	876A387G15
Molded drawer assembly – double range	876A387G13	876A387G14
Molded drawer assembly – for frequency meters only	641D862H05	....
Lamp socket	....	1725 142
★ Lamp bulb, 6.3 volt	....	1001 663
Dial retaining clips (4 required)	....	849A454H01
Zero adjuster lever arm assembly	293B493G01	293B493G01
Pointer stop	186A415H01	186A415H01
Spring to hold pointer stop	186A414H01	186A414H01
Scale plate, blank③	293B473H01	293B473H03
Title plate ④	293B473H02	293B473H04
Scale and title plate (one piece)③④	4809D84H01	4809D84H02
★ Anti-static solution to treat drawer	606B534G01	606B534G01
Screw to hold resistor spool to drawer	1728 426	1728 426
Repair tool kit for Taut-Band suspension	290B855G09	290B855G09

Parts indented are included in the parts under which they are indented.

★ Recommended for stock.

① For instruments using rheostat.

② For instruments with rear external illumination.

③ If scale is to be marked, send old scale or tracing locating scale divisions and order "similar to style number ________" new scale required and instrument type.

④ If title is to be marked order "similar to style number________" specifying instrument title, type and other data required.

Order items for repair of taut band suspension mechanisms only if proper tools and instructions for this type of unit are available. We recommend that all tbs instruments in need of mechanism servicing be returned to the factory. Contact the nearest sales office for repair procedure.

Ordering Information

- Give style number and name of part.
- Give the complete nameplate reading.
- State method of shipment desired.
- Send all orders or correspondence to nearest sales office of the company.

Attachment No. 5 Sheet 1 of 1
Loop #/Identifier PI-30-310/311

January, 1974
Supersedes R.P.D. 43-252, Pages 1-4, dated February, 1969
E. D. C/2801/PL. DB

Westinghouse

Parts for VC-252 and HC-252 tbs Instruments

Description of Part	Style Number of Part	
	All C-252 Except Electrically Suppressed Voltmeter	Electrically Suppressed Voltmeter
Mechanism complete with black pointer	876A408G09	See table
Moving element with pointer and suspension ribbons①	644B593G09	See table
Suspension ribbons (2 required)①	629A510H02	629A510H02
Black pointer and target assembly	629A749G01	629A749G01
Permanent magnet assembly	629A726G01	629A726G01
Ring	629A683H01	629A683H01
Upper (front) frame assembly	411C028H01	629A737G01
Torsion head screw	629A709H01	629A709H01
Lower (rear) frame assembly	186A403G06	186A403G06
Torsion head screw	186A267H01	186A267H01
Torsion head nut	05D1354H16	05D1354H16
Upper (front) zero adjuster	186A408H01	186A408H01
Lower (rear) zero adjuster	187A081H01	187A081H01
Tension springs (matched pair)	542D915G03	542D915G03
Spring retaining clips (2 required)	409C459H01	409C459H01
Micarta panel, rectangular	....	837A018H01
Transformer (when used)	See table	See table
Silicon rectifier – milliammeters②	837A692H03	....
Silicon rectifier – ammeters②	837A692H03	....
Silicon rectifier – voltmeters, 5 to 300 V②	837A692H03	....
Silicon rectifier – voltmeters, 600 V②	183A790H11	....
Silicon rectifier – electrically suppressed voltmeters②	....	837A692H03
Capacitor – milliammeters	22D1658H22	....
Capacitor – ammeters②	22D1658H22	....
Capacitor – voltmeters – 5 to 20 volt	22D1658H22	....
Capacitor – voltmeters – 50 to 600 volt	22D1658H24	....
Capacitor – electrically suppressed voltmeters	....	27D5476H09
Zener diode – electrically suppressed voltmeters	....	186A797H11

① Order these items for repair of taut band suspension mechanisms only if proper tools and instructions for this type of unit are available. We recommend that all tbs instruments in need of mechanism servicing be returned to the factory. Contact the nearest sales office for repair procedure.

② Four required.

Transformers

Rating	Style Number
Milliammeters	
10 ma	410C062G02
20 ma	410C062G03
50 ma	410C062G04
100 ma	410C062G05
200 ma	410C062G06
500 ma	410C062G07
800 ma	410C062G08
Ammeters	
1 amp	410C062G09
1.5 amp	410C062G10
2 amp	410C062G11
3 amp	410C062G12
5 amp	410C062G01
8 amp	410C062G13
10 amp	410C062G14
15 amp	410C062G15
20 amp	410C062G16

Mechanisms, Moving Elements, Resistors

Rating	Style Number of Part				
	Mechanism Complete	Moving Element	Resistors		
Milliammeters					
10 to 800 ma	....	....	762A683G01	762A683G02	1205 293
Ammeters					
1 to 20 amp	....	....	762A683G03	762A683G02	1205 293
Voltmeters					
5 volt	....	....	762A683G08	762A683G02	....
10 volt	....	....	1333 406	762A683G11	....
20 volt	....	....	762A683G10	930 189	....
50 volt	....	....	463 614	762A683G13	....
100 volt	....	....	762A683G12	762A683G15	....
150 volt	....	....	762A683G14	11D9529G15	....
300 volt	....	....	11D9529G14	11D9529G17	....
600 volt	....	....	11D9529G16	11D9529G18	....
Voltmeters – Suppressed Zero①					
90-130 V	876A408G09	644B593G09	09D8040G18	762A683G18	1269 756
100-140 V	876A408G09	644B593G09	1206 316	762A683G19	1269 756
105-135 V	876A408G22	644B593G22	1276 371	496 555	1269 756
110-130 V	876A408G14	644B593G14	1276 371	496 555	1269 756
115-125 V	876A408G15	644B593G15	1206 316	762A683G19	1269 756

① Electrically suppressed voltmeters have two additional calibrating resistors, order ohms as required.

Resistors Used

Style Number	Resistance, Ohms
463 614	15,000
496 555	8,000
930 189	13,500
937 620	16,000
1205 293	15,000
1206 316	14,000
1269 756	1,000
1276 371	16,000
1333 406	2,750
09D8040G18	13,000
11D9529G14	91,000
11D9529G15	105,100
11D9529G16	183,000
11D9529G17	211,140
11D9529G18	420,900
762A683G01	2,988
762A683G02	3,680
762A683G03	8,464
762A683G08	1,235
762A683G09	2,840
762A683G10	5,880
762A683G11	6,348
762A683G12	30,350
762A683G13	34,615
762A683G14	45,700
762A683G15	69,805
762A683G18	6,500
762A683G19	7,000

Attachment No. 5 Sheet 2 of 7
Loop #/Identifier PI-30-310/311

Switchboard Instruments
Types H-252 and V-252

Parts for VX-252 and HX-252 *tbs* Instruments

Description of Part	Style Number
Mechanism complete with black pointer	See table
Moving element with black pointer①	See table
Suspension ribbons – 20 and 50 microamps①	629A510H01
Suspension ribbons – voltmeters	629A510H03
Suspension ribbons – all other instruments	629A510H02
Black pointer and target	629A749G01
Permanent magnet	629A726G01
Ring	629A683H01
Upper (front) frame	411C028H01
Torsion head screw for front frame	629A709H01
Lower (rear) frame	186A403G06
Torsion head screw	186A267H01
Torsion head nut	05D1354H16
Upper (front) zero adjuster	186A408H01
Tension springs – 20 and 50 microamp (matched pair)	542D915G01
Tension springs – all other instruments (matched pair)	542D915G03
Spring retaining clips (2 required)	409C459H01
Shunt and stud assembly – 1 amp	1729 957
Shunt and stud assembly – 2 amp	1729 959
Shunt and stud assembly – 5 amp	1729 961
Shunt and stud assembly – 10 amp	1729 963
Shunt and stud assembly – 15 amp	1729 964
Shunt and stud assembly – 20 amp	1729 966
Shunt and stud assembly – 30 amp	1729 965
Shunt and stud assembly – 50 amp	1729 967

Parts indented are included in the part under which they are indented.

Mechanisms and Moving Elements

Rating	Style Number of Part	
	Mechanism Complete	Moving Element①
Milliammeters		
1 ma	876A408G09	644B593G09
2 ma	876A408G10	644B593G10
3 ma	876A408G11	644B593G11
5 ma	876A408G12	644B593G12
8 to 800 ma	876A408G09	644B593G09
4-20 ma②	876A408G09	644B593G09
10-50 ma②	876A408G09	644B593G09
1-0-1 ma	876A408G10	644B593G10
Microammeters		
20 ua	876A408G18	644B593G18
50 ua	876A408G17	644B593G17
100 ua	876A408G16	644B593G16
200 ua	876A408G15	644B593G15
500 ua	876A408G14	644B593G14
800 ua	876A408G13	644B593G13
Ammeters		
1 to 50 amp	876A408G09	644B593G09
Ammeters with External Shunt③		
50 to 500 mv	876A408G09	644B593G09
Voltmeters		
1 to 800 V	876A408G09	644B593G09

① Order these items for repair of taut band suspension mechanisms only if proper tools and instructions for this type of unit are available. We recommend that all tbs instruments in need of mechanism servicing be returned to the factory. Contact the nearest sales office for repair procedure.

② Suppressed zero.

③ With or without lead compensation.

Resistors

Rating	Style Number of Resistor		
	Shunt	Swamp	Spool
Milliammeters			
1 to 5 ma	None	None	None
8 ma	None	08D3621G10	836A858G09
10 ma	None	08D3621G10	08D3621G14
15 ma	None	08D3621G10	08D3621G13
20 ma	None	08D3621G10	08D3621G12
30 ma	None	08D3621G10	08D3621G11
50 ma	None	08D3621G10	08D3621G02
80 ma	None	08D3621G10	818 886
100 ma	None	08D3621G10	08D3621G03
200 ma	563 064	08D3621G10	None
300 ma	563 065	08D3621G10	None
400 ma	564 448	08D3621G10	None
500 ma	424 091	08D3621G10	None
800 ma	1729 953	08D3621G10	None
4-20 ma④	None	08D3621G10	836A858G03
10-50 ma④	22D1829G11	22D1829G11	1542 839
1-0-1 ma	None	None	None
Microammeter			
	None	None	None
Ammeter			
1 to 50 amp	None	306 312	None
Ammeter with External Shunt⑤			
50 mv	None	548 419	None
100 mv		1334 555	
200 mv		763A044G17	
500 mv		08D3621G18	
Voltmeters			
1	None	None	26D1129G05
2	None	None	26D1129G08
5	None	None	1275 088
8	None	None	496 555
10	None	None	463 613
15	None	None	463 614
30	None	None	495 938
50	None	None	530 913
80	None	None	1001 007
100	None	None	876 455
150	None	None	876 456
300	None	None	876 460
600	None	None	876 460⑥
800	None	None	876 457 876 460

④ Suppressed zero.

⑤ With or without lead compensation.

⑥ Two required.

Attachment No. 5 Sheet 3 of 7
Loop #/Identifier PI-30-310/311

Switchboard Instruments
Types H-252 and V-252

Parts for VX-252 and HX-252 tbs Frequency Meters and Power Factor Meters

Description of Part	Style Number
Mechanism Complete	876A408G09
Moving Element①	644B593G09
Suspension Ribbons (2 required)①	629A510H03
Tension Springs (matched pair)	542D915G03
Other parts of mechanism	See page 3
Transducers	See table

Transducers②

Rating	Style Number
Frequency Meter with External Transducer	
44-55 H	291B970G17
48-52 H	291B970G17
50-70 H	291B970G13
55-65 H	291B970G13
58-62 H	291B970G13
59-61 H	291B970G13
350-450 H	291B970G10
380-420 H	291B970G10
390-410 H	291B970G10
Single Phase Power Factor Meters	
50-100-50 120 V	691B998A09
50-100-50 240 V	691B998A10
Three Phase Power Factor Meters	
50-100-50 120 V	671B998A11
50-100-50 208 V	671B998A12
50-100-50 240 V	671B998A13

① Order these items for repair of taut band suspension mechanisms only if proper tools and instructions for this type of unit are available. We recommend that all tbs instruments in need of mechanism servicing be returned to the factory. Contact the nearest sales office for repair procedure.

② If transducer fails, we recommend sending both transducer and matching instrument to Relay-Instrument, Newark, N. J. for repair and calibration. Contact nearest Westinghouse sales office for procedure.

⑤ Specify ohms required to properly calibrate.

Parts for VR3-252 and HR3-252 tbs Frequency Meters

Description of Part	Style Number
External resistor (240 volt only) 3500 ohm 16 watt	762A679H20
Plate to mount external resistor (240 V only)	837A427H01
Mechanism complete	See table
Moving element①	See table
Suspension ribbons (2 required)①	629A510H02
Tension springs (matched pair)	542D915G03
Other parts of mechanism	See page 3
Printed circuit assembly	See table
Resistor internal⑤	9D7890

Mechanism, Printed Circuit, Rheostat

Rating, Hertz	Style Number of Part: Mechanism Complete	Moving Element①	Printed Circuit	Rheostat
45-55	876A408G14	644B593G14	202C379G01	187A774H07
48-52	876A408G15	644B593G15	202C379G05	187A774H06
45-65	876A408G09	644B593G09	202C379G01	187A774H07
50-70	876A408G09	644B593G09	202C379G02	187A774H07
55-65	876A408G14	644B593G14	202C379G02	187A774H07
58-62	876A408G15	644B593G15	202C379G04	187A774H06
59-61	876A408G16	644B593G16	202C379G04	187A774H06
350-450	876A408G14	644B593G14	202C379G03	187A774H07
380-420	876A408G15	644B593G15	202C379G06	187A774H06
390-410	876A408G16	644B593G16	202C379G06	187A774H06

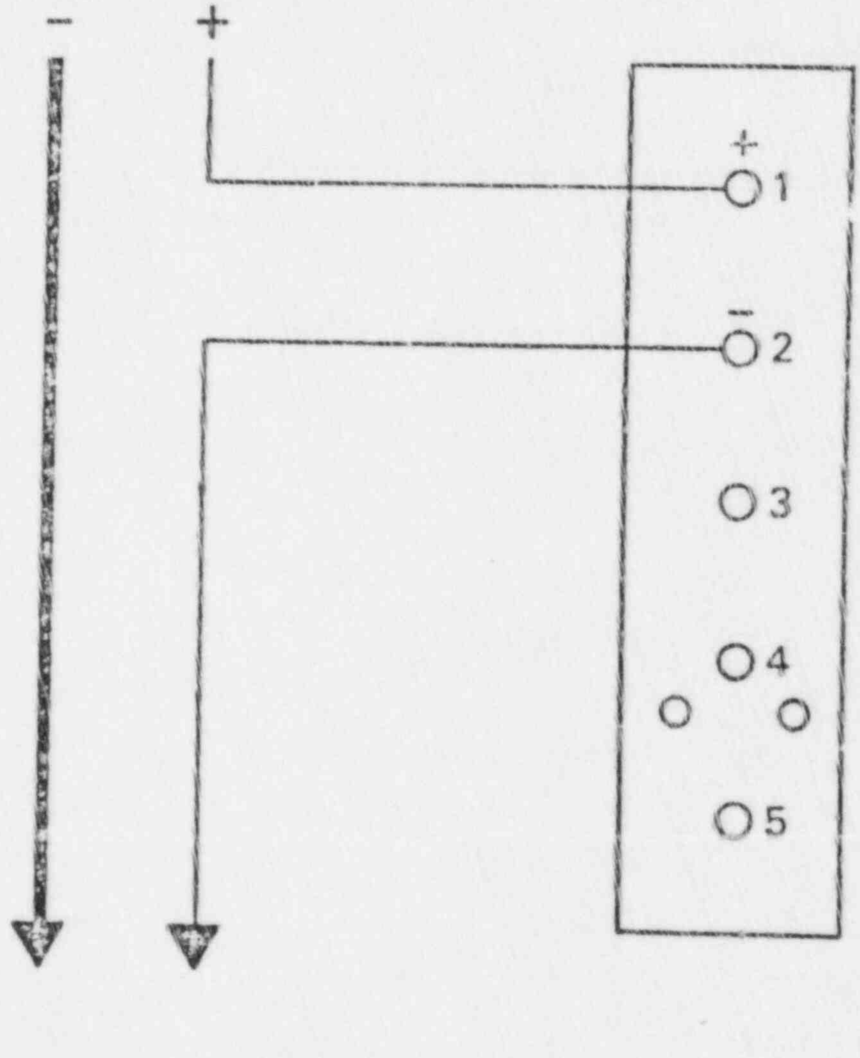
Attachment No. 5 Sheet 4 of 7
Loop #/Identifier PI-20-310/311

Westinghouse Electric Corporation
Relay-Instrument Division: Newark Plant, Newark, N. J.
Printed in USA

WESCHLER ELECTRIC

HUGHES CORPORATION

Ac and Dc Microammeter, Milliammeter, Ammeter



Edgewise External Connections (Rear View)
(V-252 Vertical, H-252 Horizontal)

Attachment No. 5 Sheet 5 of 7
Loop #/Identifier PI-30-310/311

TVA CONTRACT NO. RD-837965				
ITEM NO: 1-3			TVA 10775 (ENDES 4-81)	
DATE	REV	DATE	REV	DATE

Type 252, 4½" Scale Length, 1½% Accuracy

Application

Type 252 edgewise instruments were designed specifically for the nuclear power industry for use on control panels. However, they are well suited to any use where high reliability and efficient use of space are important considerations.

These instruments incorporate into edgewise instruments the same taut-band suspension system which is used in the highest quality Westinghouse portable and switchboard instruments.

They are available in types for direct measurement of standard electrical quantities, or in combination with transducers for measuring any other electrical or mechanical quantity capable of being converted into a proportional electrical quantity.

Standards

There is no published requirement in ANSI C39.1-1972 for instruments of this type, however they specifically meet the switchboard instrument requirements therein. The type 252 instruments meet the flamability requirements of IEEE Standard 420-1973 and they pass the seismic qualification tests under IEEE Standard 344-(1975)

Specifications

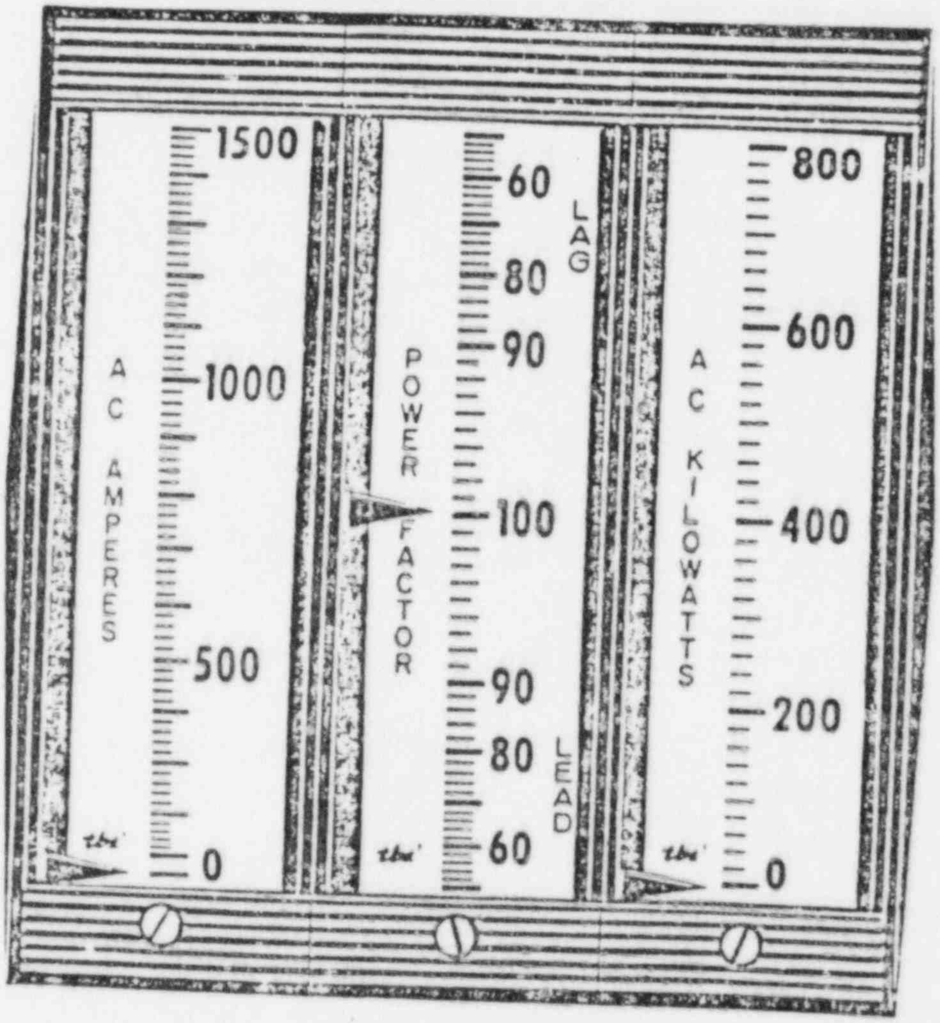
Accuracy	1½% of full scale deflection, horizontal or vertical; ±1% on special order
Waveform Compensation	To 15% of third harmonic content
Instantaneous Overload Capacity	Ac – 35 Times Rating Dc – 100 Times Rating
Working Voltage to Ground	1200 volts dc, 800 volts ac
Shielding	Magnetically shielded
Scale Length	4.5 inches (11.43 cm)
Net Weight	1½ pounds
Shipping Weight	2½ pounds

Ratings (Self-Contained)

Dc: 20 microamperes to 50 amperes
50 millivolts to 800 volts

Ac: 10 milliamperes to 20 amperes
5 volts to 600 volts

Transducer-type frequency meters, varmeters, wattmetters.



Vertical Type (Grouped)

Horizontal Type

Attachment No. 5 Sheet 6 of 7
Loop #/Identifier PI-30-310/311

Edgewise *tbs*® Switchboard Instrument

Construction
All components are mounted on a plastic drawer which slides into a plastic case with a clear, curved window. The entire assembly is treated to be static free. The plastic is polycarbonate (ASTM D635) for impact strength and flame retardance.

Mechanism
The dc instrument is of the permanent-magnet moving-coil type in a core magnet construction.

For ac measurement the same mechanism is used, but rectifiers and an rms network are added. This design permits the ac instrument to have a linear scale, to compensate for wave form distortion, and to be practically immune to the effects of magnetic fields from adjacent conductors regardless of their orientation.

Suspension
All type 252 instruments use the Westinghouse perfected taut-band suspensions. Instruments incorporating this feature are identified by the trademark *tbs*. The absence of friction in taut-band instruments creates the advantages of perfect repeatability, reduced maintenance, and lower electrical burdens. The inherent ruggedness of the design makes it a top performer under adverse conditions of shock or vibration.

Dials
Pointer edge and dial markings are on the same arc that there is no parallax error.

Mounting
Instruments may be stacked horizontally or vertically. Eight edgewise vertical instruments will occupy the same panel width as three conventional instruments. Trim strips, furnished with each instrument, finish off the edge of each instrument or array. Dial cards may be interchanged to adapt from horizontal to vertical mounting or to change scales.

Modifications Available
Internal illumination with low-voltage lamp and translucent dial.

External rear illumination with clear-case and translucent dial.

Non-glare window

Dual scale or rating

Straight fine tubular pointer

Offset, center, or suppressed zero

Gasketed construction

Further Information

Instructions: Instruction Leaflet 43-252

Transducers: Descriptive Bulletin 43-861

Burden Characteristics at 60 Hertz

Burdens on Current Transformers at 5 Amps

Instrument Rating	Impedance: Ohms	Resistance: Ohms	Reactance: Ohms	Volt Amperes	Percent Power Factor
5 amp	.024	.013	.020	.6	54

Burden on Potential Transformers at 120 Volts

Instrument Rating	Volt-Amperes	Watts	Vars	Percent Power Factor
150 volts	.096	.096	0	100

Lamps

Lamp Type	Volts	Amps
46	6.3	0.25

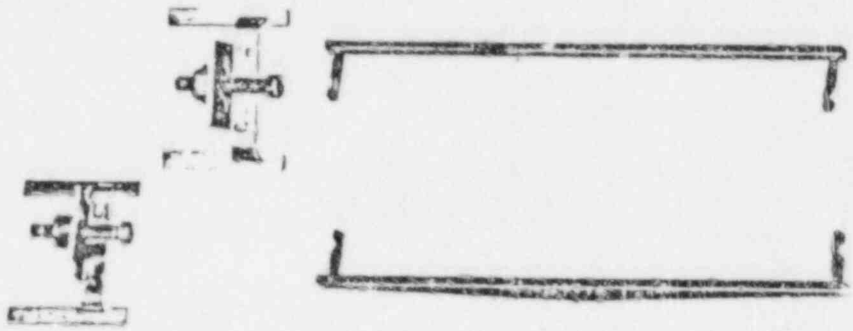


Figure 1

Outline and Panel Cutout Dimensions, In Inches (Millimeters)

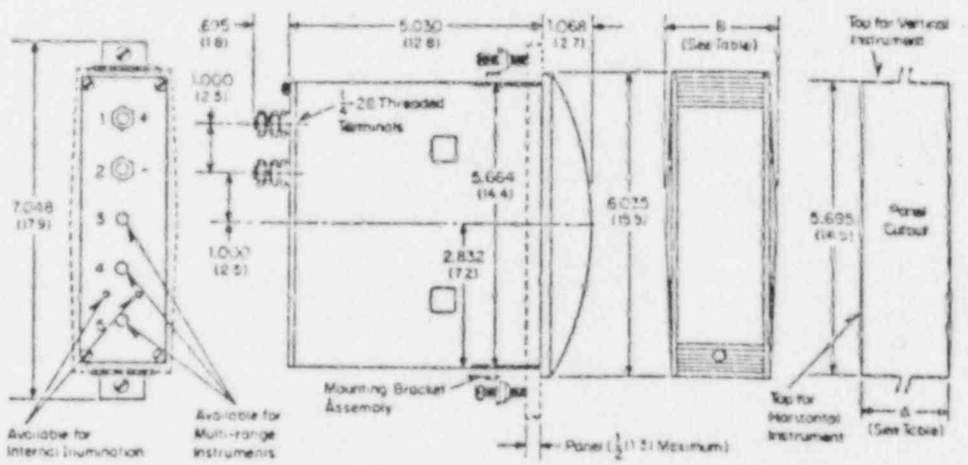


Figure 2

410C100

Mounting
Figure 1 shows the two bracket assemblies and two trim strips which are supplied with each 252 instrument. Figure 2 illustrates how these parts are used.

Two trim strips are needed to trim either a single instrument or a stacked array.

No. of Instruments	Dimensions A	Dimensions B
1	1.770 (43)	2.166 (55)
2	3.510 (89)	3.896 (99)
3	5.250 (133)	5.620 (143)
4	6.990 (178)	7.356 (187)
5	8.730 (222)	9.086 (231)
6	10.470 (266)	10.816 (275)
7	12.210 (310)	12.546 (319)
8	13.950 (354)	14.276 (363)

Attachment No. 5 Sheet 7 of 7
Loop #/Identifier PI-30-310/311

INSTALLATION • OPERATION • MAINTENANCE

INSTRUCTIONS

252 LINE
SWITCHBOARD EDGEWISE INSTRUMENTS
FIVE INCH CLASSIFICATION

GENERAL

Type 252 instruments are designed and built to meet or exceed the requirements of American Standard C39.1 for electrical indicating switchboard instruments. The rated accuracy class is one and one half per cent.

TYPE DESIGNATION

The first letter in the Type designation indicates the type of mounting.

V = Vertically mounted.
H = Horizontally mounted.

The second letter in the type designation indicates the principle of operation.

X = Permanent magnet moving coil
C = Rectifier + X

DESCRIPTION OF TAUT BAND SUSPENSION INSTRUMENTS

The X-252 is a pivotless, bearingless d.c. instrument of the permanent magnet moving coil type. A suspension system is employed which replaces the conventional pivots, jewels, and control spring. At each end of one side of the moving coil is attached a thin metallic band. At the top and bottom bridges these bands are connected to tension springs. The tension springs exert axial forces which keep the metallic bands taut and the moving element from sagging. The taut bands serve to carry current to the moving coil, and also provide the necessary deflection counter-torque.

The C-252 ammeters and voltmeters employ the same permanent magnet moving coil mechanism with the addition of a full wave rectifier and circuitry to make them read true R.M.S. quantities.

The taut band design eliminates pivot friction and allows the instrument to withstand severe conditions of shock and vibration. The suspension system assures longer life with reduced maintenance costs.

CAUTION: When the instrument mechanism is exposed, avoid contact with the tension springs. These springs are precisely made and positioned, and any pressures inadvertently applied to them may cause misalignment of the moving element.

DIAL NOTES

Reference to type style number, use of external components if required, coil ratings, calibration data, etc., are made on the dial.

INSTALLATION

Unpack instruments carefully. Terminal and mounting hardware, and any external components may be in separate packages.

Drill panels and mount instruments as shown on the drawings in this leaflet.

Before energizing the instrument, adjust the pointer to zero by means of the zero adjuster at the front of the instrument.

CARE OF PLASTIC CASE

CLEANING

Wash surfaces to be treated with a wet chamois or non abrasive tissue using a mild detergent and water solution. Wipe or blot dry. Avoid use of a dry cloth since it may scratch or mar the surface and possibly produce a static charge.

Do not use solvents, window sprays or cleaning solutions containing acetone, bezene, carbon tetrachloride, etc. These solvents may attack and ruin the cover surfaces. Apply antistatic solution after cleaning.

All possible contingencies which may arise during installation, operation, or maintenance, and all details and variations of this equipment do not purport to be covered by these instructions. If further information is desired by purchaser regarding his particular installation, operation or maintenance of his equipment, the local Westinghouse Electric Corporation representative should be contacted.

Attachment No. 6 Sheet 1 of 2
Loop #/Identifier PI-30-310/311

SUPERSEDES I.L. 43-252E, DATED AUGUST 1976
EFFECTIVE NOVEMBER 1977
O Denotes Change from Previous Issue.

Seismic Test Results
Westinghouse Switchboard Instruments and Transducers
Test Spec IEEE Std 344 (1971)

	Switchboard Instrument (Type)				Transducers (Type)			
	KA 241	KX 241	KP 241	HX, VX 252 HC, VC 252	VP4 846 VV4 846	VF4 841 VI4 841	V 2 840	V 2 841
Resonance Search Test (1)								
Discernible Resonance, Hz	None	None	None	29 30 5	None	None	None	None
Condition after test	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal
Seismic Vibration Test (2)								
Average Calibration change %	+0 2	0	+0 2	+ 14	–	–	–	–
Maximum Calibration change %	+0 4	0	+0 2	+ 53	0 24	0 1	0 1	0 7
Condition after test	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal
Accuracy Class of device %	±1 0	±1 0	±1 0	±1 5	±0 5	±0 5	±1 0	±1 0

(1) Sine wave sweep 3.2 – 35 Hz
Acceleration level 0.2g and 0 4g

(2) Sine beat 3.2, 4 26, 5 9, 8 0, 11 1, 15 4, 21 25, 29 4 and 35 Hz
Acceleration 5 0g

CONCLUSION These devices will not suffer a loss of function when tested in accordance with IEEE Standard 344 1971 (Rev. 5, 9 23 74) entitled "IEEE Standard Seismic Qualification of Class 1E Equipment for Nuclear Power Generating Stations".

Westinghouse Electric Corporation
Newark, New Jersey 6/30/76

Attachment No. 6 Sheet 2 of 2
Loop #/Identifier PI-30-310/311

SCALING DATA SHEET
TVA Tag: PT-30-310
Vendor Tag:

Function: LOWER CONTAINMENT PRESSURE

Settings	Reference	Accuracy	Reference
(-5)-(60) PSIG = 4-20 mA	INSTR. TABS	± .5%	W Validated manual

Process Range: (-5) to (60) PSIG	Action: DIRECT
Input 1: -5 → 60 PSIG	Output 1: 4-20 mA
Input 2:	Output 2:

Setpoint/Equation:

$$OUTPUT(mA) = \frac{16}{65}\left[INPUT(PSIG) + 5\ PSIG\right] + 4mA$$

Special Notes/Calculations: PANEL K-L-188

$$\frac{OUTPUT(mA) - 4(mA)}{16\ mA} = \frac{INPUT(PSIG) - (-5\ PSIG)}{65\ PSIG}$$

$$OUTPUT(mA) = \frac{16}{65}\left[INPUT(PSIG) + 5\ PSIG\right] + 4mA$$

Attachment No. 7 Sheet 1 of 2
Loop #/Identifier PT-30-310/311

K.W. FENN | H.D. Elkins | [illegible] | 3

SCALING DATA SHEET

TVA Tag: PI-30-310

Vendor Tag: ——

Function: LOWER CONTAINMENT PRESSURE

Settings	Reference	Accuracy	Reference
4-20mA = -5 → 60 PSIG	INSTR. TABS	± 1.0%	

Process Range: -5 → 60 PSIG	Action: DIRECT
Input 1: 4-20 mA	Output 1: -5 → 60 PSIG INDICATI[ON]
Input 2:	Output 2:

Setpoint/Equation:

$$OUTPUT\,(PSIG) = \frac{65}{16}\left[INPUT\,(mA) - 4\,mA\right]$$

Special Notes/Calculations: PANEL X-M-9

$$\frac{OUTPUT\,(PSIG)}{65\,PSIG} = \frac{INPUT\,(mA) - 4\,mA}{16\,mA}$$

$$OUTPUT\,(PSIA) = \frac{65}{16}\left[INPUT\,(mA) - 4\,mA\right]$$

Attachment No. 7 Sheet 2 of 2
Loop #/Identifier PI-30-310/311

Prepared by: K.W. Frum	Approved: HDS 0 [illegible]	Date: 10/5/83	Sheet 4 of 5

Westinghouse
Electric Corporation

Water Reactor
Divisions

Nuclear Services
Integration Division

Box 2728
Pittsburgh Pennsylvania 15230-2728

TVA-85-193

October 4, 1985

Mr. R. A. Sessoms
Tennessee Valley Authority
400 West Summit Hill Drive
Mail Stop W11A5
Knoxville, TN 37902

Reference:
W Order #CO-41494
TVA RD #987400

Tennessee Valley Authority
Sequoyah Units 1 and 2
EQ Task Force

Dear Mr. Sessoms.

Attached please find a document "Qualification Verification for Sequoyah's Veritrak Model 32 Pressure Transmitters".

This document completes our responsibility under Task 9: Traceability of Veritrak Transmitters, troque allowances and requirements for the cover and mounting bolt (RD #987400-AWL-007 and AWL-008), of my letter TVA-85-178.

If you have any questions, please do not hesitate to call.

Very truly yours,

WESTINGHOUSE ELECTRIC CORPORATION

Lynette Williams

L. Williams, Manager
NSID Projects
Mid South Area

cc: E. Daughtery, Knoxville
D. Ackerle, Knoxville
D. Kitchell, Knoxville
A. Lewis, Knoxville
J. H. Sullivan, Sequoyah
D. Smith, TVA Purchasing

Attachment No. 8 Sheet 1 of 4
Loop #/Identifier 1,2-PT-30-310/311

3706e:12

QUALIFICATION VERIFICATION FOR SEQUOYAH'S VERITRAK MODEL 32 PRESSURE TRANSMITTERS

Prepared By: J J Shubert
J. J. Shubert
Class 1E Instrumentation

Approved By: T N Miller
T. N. Miller, Manager
Class 1E Instrumentation

SEPTEMBER 1985

Reference:

TVA General Order # C041494
Westinghouse Marketing # 8529168

Attachment No. 8 Sheet 2 of 4
Loop #/Identifier 1,2-PT-30-310/311

STATEMENT OF COMPLIANCE

CUSTOMER: Tennessee Valley Authority

PLANT: Sequoyah Units 1 and 2

CUSTOMER CONTRACT NO: 82K69-827684

WCCD SALES ORDER NO: 52611-901

EQUIPMENT MODEL NO: Veritrak 32PA1212-33002-1

EQUIPMENT SERIAL NOS: A3110001, A3110002, A3110003, A3110004

A review of Westinghouse Combustion Control Division records at Tobar, Inc., indicates that the pressure transmitters listed above are traceable to and have been built in strict accordance with the parts and procedures documented in the Baseline Configuration Documents ETR-216, ETR-245, and ETR-245A.

Qualification analysis and testing which applies to the hardware listed above is documented in the following Westinghouse documents:

WCAP-8587, Supplement 1, EQDP-ESE-1B
WCAP-8687, Supplement 2, EQTR-E01B
WCAP-8687, Supplement 2, EQTR-E01B Addendum
WCAP-8587, Supplement 1, EQDP-ESE-1C
WCAP-8687, Supplement 2, EQAR-E01C

Attachment No. E	Sheet 3 of 4
Loop #/Identifier 1,2-PT-30-310/311	

In addition to the Statement of Compliance on page 2 of this document, here is the additional information which TVA requested for the subject equipment:

DEMONSTRATED ACCURACY (WIDE RANGE PRESSURE APPLICATION)

Normal/Abnormal Environment:	± 1.0%
Seismic:	± 11%
Accident:	± 11%
Post Seismic:	± 1.0%
Post Accident (5 min-4 mos):	± 16%

Mounting Bolt Torque

As is documented in the qualification test report (WCAP-8687, Supplement 2, EQTR-E01B), the torque on the mounting bolts should be 240 in-lb.

Housing Cover Torque

The housing cover should be torqued to a minimum of 40 ft-lbs in order to maintain qualification.

Attachment No. 8 Sheet 4 of 4
Loop #/Identifier 1,2-PT-30-310/311

APPENDIX D

RACEWAY SYSTEMS

RESTART CALCULATIONS

FOR

SEQUOYAH NUCLEAR PLANT

0817A

TVA 10697 (OE 4-85)

OE CALCULATIONS

TITLE	PLANT/UNIT
JUSTIFICATION FOR USE OF TVA'S AMPACITY TABLES	SQN Units 1 and 2

PREPARING ORGANIZATION	KEY NOUNS (Consult RIMS DESCRIPTORS LIST)
EEB	Cable Ampacity

BRANCH/PROJECT IDENTIFIERS

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
R0		B43 '86 0117 924
R __		
R __		
R __		

APPLICABLE DESIGN DOCUMENT(S): OEP-07

SAR SECTION(S) | UNID SYSTEM(S)

	Revision 0	R1	R2	R3
ECN No. (Indicate if Not Applicable)	N/A			
Prepared	B. Ator			
Checked	GW Underwood			
~~Reviewed~~	Frank B Rosenzweig BAF			
Approved	E. Chitwood DRT			
Date	1/16/86			
List all pages added by this revision.				
List all pages deleted of this revision.				
List all pages changed by this revision.				

Use form TVA 10534 if more room required.

Statement of Problem

Based on a BEE Team finding, TVA's electrical design standards for cable current carrying ampacities were judged as not correct for all voltage levels.

Abstract

This analysis will attempt to verify the adequacy of the existing TVA standards covering cable ampacity.

Unverified Assumption

For 600-volt cables in tray it is assumed that the ampacity values for Voltage Level 4 (VL-4) 30-percent tray fill (NV-4, NV-12, NV-13) are also applicable to Voltage Level 3 (VL-3) (NV-3, NV-10, NV-11) cables in tray as well. VL-3 cable trays can be filled to 60 percent of the cross-sectional area. Additional analysis is required to substantiate that the VL-3 cables in tray do not produce sufficient heat to warrant further derating.

RIMS SL 02 C K

TABLE OF CONTENTS

1.0 PURPOSE

The purpose of this analysis is to establish the adequacy of TVA's existing ampacity tables which are found in TVA's Electrical Design Standards (references 3.1 to 3.4).

2.0 DESCRIPTION

TVA's cable sizing is done in accordance with the current carrying capacities and guidelines provided in four Electrical Design Standards applied in combination with each plant's design criteria which specifies unusual or special conditions of cable installation. These standards are listed in references 3.1 through 3.4. BEE Team finding BEE 5 stated that TVA Electrical Design Standards for cable current carrying ampacities are not correct for all voltage levels.

The recommendation made by BEE was to provide adequate documentation to justify the revised standards currently in use or to delete the standards and adopt ICEA or other industry standards.

Furthermore, BEE recommended that all nuclear plant applications be evaluated against the new or corrected tables and to establish the acceptability of previous designs.

This document will attempt to verify the adequacy of the existing TVA standards by establishing the basis of the tables, correlating what has been done with existing standards, and the commitments made in the plant FSAR.

3.0 REFERENCES

3.1 TVA Design Standard DS-E12.1.1, Cable-Conductor Current Carrying Capacity Polyethylene Insulated (0-8000V) dated September 28, 1976.

3.2 TVA Design Standard DS-E12.1.2, Cable-Conductor Current Carrying Capacity Cross-Linked Polyethylene Insulated Cable (0-15,000V), dated September 28, 1976.

3.3 TVA Design Standard DS-E12.1.3, Cable-Current Carrying Capacity Silicone Rubber Insulated (0-600V), dated March 21, 1977.

3.4 TVA Design Standard DS-E12.1.4, Cable-Conductor Current Carrying Capacity Ethylene-Propylene Rubber Insulated Cable (0-15,000V), dated March 27, 1977.

3.5 IPCEA Publication No. P-46-426, Power Cable Ampacities, dated 1962, including cumulative errata of September 1, 1966.

3.6 NFPA 70, National Electrical Code (NEC), dated 1984.

3.7 ICEA-NEMA Standards Publication No. P-54-440, Ampacities Cables in Open-Top Cable Trays, Second Edition dated August 1979.

3.0 REFERENCES (Continued)

3.8 IEEE Transactions on Power Apparatus and Systems, Volume 90/1971, Ampacities for Cables in Randomly Filled Trays, by J. Stolpe, January - June 1971 (IEEE paper 70 TP557 PWR).

3.9 IPCEA Publication No. P-29-226, Current Carrying Capacity of Impregnated Paper, Rubber, and Varnished Cambric Insulated Cables, dated December 1943.

3.10 Sequoyah Nuclear Plant Detailed Design Criteria for Power, Control, and Signal Cables for use in Category I Structures, Revision 4, dated July 30, 1984 (SQN-DC-V-11.3).

3.11 Sequoyah Nuclear Plant Final Safety Analysis Report (FSAR), Section 8.3.1.4.1, Cable Derating and Cable Tray Fill.

4.0 DATA

The basis for TVA's ampacity tables can be traced to IEEE, ICEA, NEC, NEMA, and other recognized industry standards. Each TVA Design Standard listed as References 3.1, 3.2, 3.3, and 3.4 will be analyzed below.

4.1 Electrical Design Standard DS-E12.1.1 Cable-Conductor Current Carrying Capacity Polyethylene Insulated (0-8000V).

75°C cable is used only in VL-3 applications (less than 30 A, 0-600 volts). This table provides ampacity values for single conductors with a 75°C maximum copper temperature, 100-percent load factor in 40°C ambient air temperature. Class 1E and non-Class 1E cables are sized according to this table for installations outside primary containment only.

Conductor sizes in this table include the following:

Nos. 14, 12, 10, 8, 6, 4, 2, 1, 1/0, 2/0, 3/0, 4/0 AWG, 250, 300, 350, 400, 500, 750, 1000, 1250, 1500, 1750, and 2000 kcmil.

DS-E12.1.1 provides ampacity values for cable in conduit and cables in still air. The ampacity values for cable in conduit were derived from Reference 3.9, Table No. 24, covering rubber insulated cables in conduit at a copper temperature of 75°C. This applies to either 1, 2, or 3 conductors in conduit at voltage levels of 0-5000 volts and 5001-8000 volts. In fact, the voltage ranges appearing in DS-E12.1.1 were taken directly from Table 24 of Reference 3.9.

Regarding cable in still air, Table No. 27 of Reference 3.9 covers ampacities of rubber insulated cables in air at a copper temperature of 75°C. These ampacity values are identical to those appearing in DS-E12.1.1. Voltage ranges in the TVA standard and Table No. 27 are 0-5000 volts and 5001 to 8000 volts.

4.0 DATA (Continued)

Tables I, II, III, and IV are comparisons of TVA ampacities found in DS-E12.1.1, IPCEA Publication P-46-426, and the NEC. It should be noted that Section 8.3.1.4.1 of the FSAR states that selection of conductor sizes are based on ampacities published in IPCEA P-46-426.

It is evident from inspection of Tables I and II covering three single insulated conductors in conduit that both the ICEA and NEC ampacities exceed those found in DS-E12.1.1. Only the three conductor case was included in the tables, but the same relationship holds true for either one or two insulated conductors in conduit.

Also, inspection of Tables III and IV indicates that for single conductors in still air, both the ICEA and NEC ampacities exceed those of DS-E12.1.1.

4.2 Electrical Design Standard DS-E12.1.2 Cable-Conductor Current Carrying Capacity Cross-Linked Polyethylene Insulated Cable (0-15,000V).

Electrical Design Standard DS-E12.1.4 Cable-Conductor Current Carrying Capacity Ethylene-Propylene Rubber Insulated Cable (0-15,000V).

These two standards provide identical values of cable ampacity and for the purposes of this analysis, will be evaluated simultaneously. IPCEA P-46-426 and the NEC makes no distinction with respect to ampacity between cross-linked polyethylene (XLPE) or ethylene-propylene rubber (EPR) insulated cables.

The standards provide ampacity values for insulated conductors with a 90°C maximum copper temperature, 100-percent load factor in 40°C ambient air temperature. Class 1E and non-Class 1E cables are sized according to these tables.

Conductor sizes in these tables include the following:

Nos. 14, 12, 10, 8, 6, 4, 2, 1, 1/0, 2/0, 3/0, 4/0 AWG, 250, 300, 350, 400, 500, 750, and 1000 kcmil. Voltage ranges in the standard are 0-5000V, 5001-8000V, and 8001-15,000V for cable in conduit. For cable in trays, voltages are 0-600 and 601-15,000V. NEC voltage ranges are typically 0-2000V while ICEA voltage ranges are 1 kV, 8 kV, and 15 kV. TVA ampacities can be defined in terms of both the NEC and ICEA voltage ranges.

Tables V and VI are comparisons of TVA ampacities found in DS-E12.1.2 and DS-E12.1.4, IPCEA Publication P-46-426, and the NEC.

It is apparent from inspection of Table V that the NEC and ICEA given ampacities exceed or meet those found in the standards except for 1000 kcmil cables. For this conductor size the TVA standards give an ampacity of 698 amperes; whereas, IPCEA P-46-426 and the NEC give a value of 689 amperes. This was probably a typographical error in the TVA standards. The percent difference is 1.3 percent which is not considered significant.

With respect to 8-kV and 15-kV cables in conduit, from inspection of Table VI it is apparent in comparing the values given in IPCEA P-46-426 and the TVA standards that a one-to-one correspondence exists.

For cables in tray, Section 8.3.1.4.1 of the Sequoyah FSAR is cited. It states that conductor sizes shall be based on IPCEA P-46-426, "Power Cable Ampacities."

Section 6.2.2.2 of SQN-DC-V-11.3 (reference 3.10) states that trays containing 480V ac power cables carrying 30 amperes or more shall have a maximum loading of 30 percent of the useable cross-sectional area of the tray based on nominal cable O.D. except when a single layer of cables is used. For Sequoyah Nuclear Plant, these cables are designated voltage levels NV-4, NV-12, and NV-13.

Besides IPCEA P-46-426, DS-E12.1.2, and DS-E12.1.4 both reference IEEE paper 70 TP557 as a basis (reference 3.8 of this calculation). Stolpe's paper provides ampacities for copper conductors based on percent fill of a 3-inch tray. Sequoyah trays are 4 inches in depth. Appendix Sheets 1 and 2 derive the relationship between percent fill of a tray and tray depth, including calculation of the equivalent percentage fill of a 3-inch tray in terms of a 4-inch tray. It turns out that a 40-percent fill of a 3-inch tray is equivalent to 30-percent fill of a 4-inch tray. This will be used to compare the Stolpe ampacities to TVA's ampacities in DS-E12.1.2 and DS-E12.1.4. Stolpe provides different ampacities for EPR rubber and XLPE insulation materials. This assumes that XLPE has thinner insulation and therefore must be derated further than EPR rubber. DS-E12.1.2 and DS-E12.1.4 both use the same O.D. for cable and have identical ampacities. Therefore, no difference between ampacity values of cable with EPR and XLPE insulations will be considered.

Table VII compares Stolpe ampacities for rubber insulated copper conductors with the TVA ampacities in DS-E12.1.2 and DS-E12.1.4 for 30-percent fill of a 4-inch tray. As can be seen there is close correlation with the exception of 4/0 cable which differs by approximately 10 percent. It should also be noted that the Stölpe ampacities are much more conservative than those found in IPCEA P-46-426. In general, TVA's ampacities are quite close to the Stolpe ampacities and are conservative.

4.0 DATA (Continued)

(The following paragraph contains an assumption that requires verification.) These same values of ampacity would also apply to VL-3 or control cables. Section 6.2.2.2 of SQN-DC-V-11.3 (reference 3.10) states that VL-3 cables shall be designed for a 60-percent fill of the cross-sectional area of the tray. A 60-percent tray fill would seem to require further derating of the ampacities. However, TVA's VL-3 cables are used for control functions that convey information or intermittantly operate devices controlling power switching or conversion equipment. Therefore, conductor heating is insignificant and is not a variable of tray fill. <u>Further study of actual loads and diversification of loading is required to substantiate the above.</u>

Table VIII compares ICEA ampacities for 8 kV and 15 kV cables with those of DS-E12.1.2 and DS-E12.1.4 for cables in tray. IPCEA P-46-426 suggests that appropriate derating factors be applied to ampacities of cables in air as given by the ampacity tables. For cables with maintained spacing of the sizes given in the TVA tables, Table VII of IPCEA P-46-426, suggest derating factors of 1.00 to 0.82 for a single layer of cables. In comparing the percent difference (D) between the TVA and ICEA ampacities it is evident that the percent D falls in this range.

4.3 <u>Electrical Design Standard DS-E12.1.3 Cable-Current Carrying Capacity Silicone Rubber Insulated (0-600V).</u>

This standard provides ampacity values for insulated single conductor and three conductor cables with a 125°C maximum copper temperature, 100-percent load factor, in 40°C ambient air temperature installed in conduit and on VL-4 power and VL-3 control cable trays. Class 1E and non-Class 1E cables are sized according to this standard.

Conductor sizes in the standard include the following:

Nos. 14, 12, 10, 8, 6, 4, 2, 1, 1/0, 2/0, 3/0, 4/0 AWG, 250, 300, 350, 400, 500 kcmil.

Tables IX and X are comparisons between TVA ampacities in DS-E12.1.3 and ampacities in the NEC and ICEA-NEMA P-54-440.

Inspection of Table IX indicates that for three 600V single conductor cables in conduit, the NEC ampacity values exceed those found in DS-E12.1.3. This agrees with statement 1.1 in the standard indicating that the values shown are based on NEC ampacities.

4.0 DATA (Continued)

For 600V cables in tray, Table X compares the TVA values to those found in ICEA-NEMA P-54-440 for a 1-inch depth in a 3-inch deep tray. Inspection here reveals an extremely close correlation of ampacity values. Furthermore, DS-E12.1.3 directs design personnel to P-54-440 for determining ampacities in open top cable trays. This indicates that appropriate derating factors per this standard should be applied.

5.0 Analysis

5.1 Analysis of the data presented in Section 4.1 indicates that the values of ampacity for polyethylene insulated conductors for both applications of cable in conduit and in free air found in DS-E12.1.1 are conservative, acceptable, and establish a satisfactory basis for this TVA Electrical Design Standard.

5.2 The following is an analysis of data presented in Section 4.2 covering ampacity values found in DS-E12.1.2 and DS-E12.1.4 for XLPE and EPR insulated conductors.

For cable in conduit, the values of ampacity given in the TVA standards meet or exceed those found in the NEC and IPCEA P-46-426. The typographical error for the case of 1000 kcmil is on the order of 1.3 percent and is insignificant.

For 600V cable in trays, the values of ampacity in the TVA standards are generally in acccordance with Stolpe ampacities given in IEEE paper 70 TP557 (for 30-percent fill).

Some discrepancy exists in the larger size cables; Stolpe ampacity values are generally more conservative than IPCEA P-46-426 values (which TVA stated was the basis for the plant design in the FSAR). Therefore, the TVA values are deemed acceptable.

For 8-kV and 15-kV cables in tray, the TVA ampacities are in line with those found in IPCEA P-46-426 considering the derating factors given therein.

5.3 Analysis of data presented in Section 4.3 shows that the TVA values of ampacity for silicone rubber-insulated conductors per DS-E12.1.3 used in conduit and on cable trays (for a 1-inch fill) closely correlate with values found in the NEC and ICEA-NEMA Publication P-54-440; design personnel are directed to go to ICEA-NEMA P-54-440 for determining ampacities of cables in open top cable tray.

6.0 CONCLUSION

It is concluded that the cable current carrying ampacities presented in TVA electrical design standards DS-E12.1.1, DS-E12.1.2, DS-E12.1.3, and DS-E12.1.4 are acceptable for all previous designs in determining satisfactory conductor sizes for ICEA voltage ratings up to 15 kV, if applied correctly.

7.0 RECOMMENDATIONS

The following items are based on the NEC and ICEA standards and have not been addressed in the existing TVA ampacity standards. These items will be addressed in detailed calculation to be issued.

1. For 600 volt cables in tray, it was assumed that the ampacity values for a 30-percent tray fill with VL-4 cables could be used for VL-3 cables as well. VL-3 cable trays can be filled to 60 percent of the cross-sectional area.

2. Presently, the TVA standards provide cable ampacity values for up to three cables in a conduit. If more than three cables were used, additional derating should be applied.

3. No derating factors are given in the TVA tables for cables in conduits that are grouped.

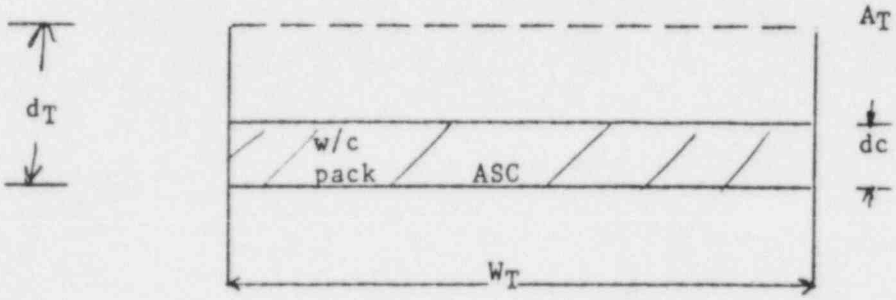
4. TVA ampacity tables do not include values for cables run in underground duct bank.

8.0 APPENDIX

The attached appendix, Tables I-X and Derivation for Percent Fill of Cable Trays found on Sheets 1 and 2 are part of this calculation.

APPENDIX SHEET 1

DERIVATION OF FORMULA FOR PERCENT FILL OF CABLE TRAY



Representative Cable Tray

Where: A_T = Cross-sectional area of tray

Asc = Area occupied by square cable pack

Acc = Actual area occupied by cables (circular)

dc = Nominal depth of cable pack

d_T = Depth of tray

w/c = wire cable pack

$$Asc \simeq n_1 d_1^2 + n_2 d_2^2 + \ldots + n_n d_n^2 = \quad (nd^2)$$

Where: d_1 = Diameter of one size of cable in tray
n_1 = Number of cables with diameter d_1 in tray
$dc = \frac{Asc}{W_T}$ by definition from reference 3.7

$$Acc = n_1 \left(\frac{\pi}{4}\right) d_1^2 + n_2 \left(\frac{\pi}{4}\right) d_2^2 + \ldots + n_n \left(\frac{\pi}{4}\right) nd^2$$

$$= \frac{\pi}{4} \times \quad (nd^2) = \frac{\pi}{4} \; Asc$$

% Fill of tray $= \%F = \frac{Acc}{A_T} \times 100\%$

$$\%F = \frac{Acc}{d_T \times w_T} \times 100\%$$

APPENDIX SHEET 2

DERIVATION OF FORMULA FOR PERCENT FILL OF CABLE TRAY (Continued)

$$\%F = \frac{\frac{\pi}{4} \; Asc}{d_T \times W_T} \times 100\% = \frac{\frac{\pi}{4} \; (dc \times \cancel{W_T})}{d_T \times \cancel{W_T}} \times 100\%$$

$$\%F = \frac{\pi}{4} \; \frac{dc}{d_T} \times 100\%$$

1. Calculate Depth of Cable Pack for 30-Percent Fill in 4-Inch Tray:

$\%F = .3$
$d_T = 4"$
$dc = ?$

$$\%F = \frac{\pi}{4} \; \frac{dc}{d_T} \times 100\%$$

$$dc = \frac{\%F \times d_T}{\frac{\pi}{4}} = \frac{(.3)(4")}{\frac{\pi}{4}}$$

$dc = 1.53"$

2. Calculate Equivalent Percent of 1.53-Inch Depth in 3-Inch Tray

$\%F = ?$
$d_T = 3"$
$dc = 1.53"$

$$\%F = \frac{\pi}{4} \; \frac{(1.53)}{3"} \times 100\%$$

$\%F = 40\%$

TABLE I

COMPARISON OF
AMPACITIES FOUND IN DS-E12.1.1, VS IPCEA PUBLICATION P-46-426, AND THE NEC

Ampacities of Three Single Conductor Polyethylene Insulated Cables
In Isolated Conduit in Free Air
Based on 75°C Conductor Temperature and 40°C Ambient Air

Conductor Size AWG or kcmil	DS-E12.1.1 Table 1 0-5000V	IPCEA P-46-426 Page 263 (1 kV)	NEC Table 310-23 0-2000V
**14	19	*	22
**12	24	*	28
**10	33	*	37
8	43	47	48
6	57	64	64
4	76	83	83
2	101	112	112
1	115	134	134
1/0	133	153	153
2/0	152	175	175
3/0	175	207	207
4/0	203	238	238
250	225	271	271
300	251	*	300
350	274	328	328
400	296	*	354
500	336	407	407
750	418	509	509
1000	478	585	585

*Not given
**75°C cable is only used in VL-3 applications (less than 30 A, 0-600V).

TABLE II

COMPARISON OF
AMPACITIES FOUND IN DS-E12.1.1 VS IPCEA PUBLICATION P-46-426

Ampacities of Three Single Conductor Polyethylene Insulated Cables
in Isolated Conduit in Free Air
Based on 75°C Conductor Temperature and 40°C Ambient Air

Conductor Size AWG or kcmil	DS-E12.1.1 Table 1 5001-8000V	IPCEA P-46-426 Page 263 (8 kV)
**14	23	*
**12	28	*
**10	37	*
8	46	*
6	65	71
4	85	92
2	111	123
1	127	141
1/0	145	161
2/0	165	189
3/0	187	215
4/0	213	245
250	235	269
300	263	*
350	288	330
400	312	*
500	352	403
750	432	491

*Not given
**75°C cable is used only in VL-3 applications (less than 30 A, 0-600V).

TABLE III

COMPARISON OF
AMPACITIES FOUND IN DS-E12.1.1, VS. IPCEA PUBLICATION P-46-426, AND THE NEC

Ampacities of Single Conductor Polyethylene Insulated Cables
In Free Air
Based on 75°C Conductor Temperature and 40°C Ambient Air

Conductor Size AWG or kcmil	DS-E12.1.1 Table 1 0-5000V	IPCEA P-46-426 Page 214 (1 kV)	NEC Table 310-21 0-2000V
**14	26	*	30
**12	33	*	39
10	44	*	51
8	61	71	71
6	83	94	94
4	110	124	124
2	150	165	165
1	172	191	191
1/0	202	221	221
2/0	235	255	255
3/0	273	295	295
4/0	315	343	343
250	352	381	381
300	393	*	427
350	443	473	473
400	481	*	514
500	546	595	595
750	691	768	768
1000	824	920	920
1250	938	1048	1048
1500	1032	1166	1166
1750	1130	1271	1271
2000	1220	1367	1367

*Not given
**75°C cable is used only in VL-3 applications (less than 30 A, 0-600V).

TABLE IV

COMPARISON OF
AMPACITIES FOUND IN DS-E12.1.1 VS IPCEA PUBLICATION P-46-426

Ampacities of Single Conductor Polyethylene Insulated Cables
In Free Air
Based on 75°C Conductor Temperature and 40°C Ambient Air

Conductor Size AWG or kcmil	DS-E12.1.1 Table 1 5001-8000V	IPCEA P-46-426 Page 214 (8 kV)
14	*	*
12	*	*
10	*	*
8	*	*
6	*	96
4	*	127
2	*	167
1	*	193
1/0	214	222
2/0	245	256
3/0	284	296
4/0	329	343
250	362	380
300	403	*
350	445	470
400	486	*
500	554	589
750	716	760
1000	852	906
1250	980	1033
1500	1084	1148
1750	1187	1249
2000	1290	1338

*Not given

NOTE: 75°C cable is used only in VL-3 applications (less than 30 A, 0-600V).

TABLE V

COMPARISON OF
AMPACITIES FOUND IN DS-E12.1.2 AND DS-E12.1.4 VS. IPCEA PUBLICATION
P-46-426 AND THE NEC

Ampacities of Three Single Conductor Cables in Isolated Conduit
In Free Air
Based on Conductor Temperature of 90°C and 40°C Ambient Air

Conductor Size AWG or kcmil	DS-E12.1.2 and DS-E12.1.4 Table 1 0-5000V	IPCEA P-46-426 Page 264 (1 kV)	NEC Table 310-23 0-2000V
14	23	*	25
12	31	*	32
10	41	*	42
8	55	55	55
6	75	75	75
4	97	97	97
2	130	130	130
1	156	156	156
1/0	179	179	179
2/0	204	204	204
3/0	242	242	242
4/0	278	278	278
250	317	317	317
300	350	*	351
350	384	384	384
400	410	*	415
500	477	477	477
750	598	598	598
1000	689	689	689

*Not given

TABLE VI

COMPARISON OF
AMPACITIES FOUND IN DS-E12.1.2 AND DS-12.1.4 VS. IPCEA PUBLICATION P-46-426

Ampacities of Three Single Conductor Cables in Isolated Conduit
In Free Air
Based on Conductor Temperature of 90°C and 40°C Ambient Air

Conductor Size	DS-E12.1.2 & DS-E12.1.4 Table 1		IPCEA P-46-426 (Page 264)	
AWG or kcmil	5001-8000V	8001-15,000V	8 kV	15 kV
14	*	*	*	*
12	*	*	*	*
10	*	*	*	*
8	*	*	*	*
6	*	*	83	*
4	*	*	108	*
2	*	*	144	150
1	*	*	165	171
1/0	188	195	188	195
2/0	221	227	221	227
3/0	252	259	252	259
4/0	287	295	287	295
250	314	329	314	329
300	350	362	*	*
350	387	394	387	394
400	405	426	*	*
500	473	481	473	481
750	579	588	579	588
1000	657	677	657	677

*Not given

TABLE VII

COMPARISON OF STOLPE AMPACITIES (RUBBER) VS. DS-E12.1.2 (XLPE)
AND DS-E12.1.4 (EPR)
0-600V CABLE IN TRAYS

Ampacities of 3/C and 1/C Cables in 4-Inch Deep Trays
Conductor Temperature of 90°C and 40°C Ambient Air Rubber Insulation

Conductor Size AWG or kcmil	Stolpe Ampacities 30% Fill of 4" Tray **	DS-E12.1.2 and DS-E12.1.4 Table 1 0-600V	% D ***
14	11	*	-
12	15	15	0
10	21	22	4.7%
8	36	36	0
6	48	50	4.1%
4	69	71	2.8%
2	97	101	4.1%
1	*	108	-
1/0	108	114	5.5%
2/0	130	140	7.7%
3/0	*	170	-
4/0	188	207	10.1%
250	234	242	3.4%
300	*	280	-
350	310	315	1.1%
400	*	350	-
500	419	426	1.6%
750	610	582	ok
1000	*	738	-

*Not given
**Equivalent to 40 percent fill of 3-inch tray
***% D computed only if TVA's ampacity is greater than Stolpe ampacity

NOTE: Conductor sizes 14 AWG to 2 AWG are for 3/C cable. Conductor sizes larger than 2 AWG are for 1/C cable.

TABLE VIII

COMPARISON OF AMPACITIES PER DS-E12.1.2 AND DS-E12.1.4 VS. IPCEA PUBLICATION P-46-426

Ampacities of 8-kV and 15-kV Single Conductor Cables in Tray Based on Conductor Temperature of 90°C and 40°C Ambient Air

Conductor Size AWG or kcmil	IPCEA P-46-426 8-kV	(Page 260) 15 kV	DS-E12.1.2 & DS-E12.1.4 Table 1 601 - 15,000V
8	*	*	*
6	97	*	*
4	127	*	*
2	167	173	*
1	194	199	*
1/0	223	229	188
2/0	257	263	216
3/0	296	303	244
4/0	342	349	274
250	379	385	312
300	*	*	350
350	467	472	385
400	*	*	418
500	578	583	476
750	728	734	618
1000	847	851	730

% D Between TVA and IPCEA Ampacities

	8-kV	15 kV
1/0	15.7%	17.9%
2/0	15.9%	17.8%
3/0	17.6%	19.5%
4/0	19.8%	21.5%
250	17.6%	19.0%
300	*	*
350	17.6%	18.4%
400	*	*
500	17.6%	18.3%
750	15.1%	15.8%
1000	13.8%	14.2%

*Not given

TABLE IX

COMPARISON OF AMPACITIES FOR SILICONE RUBBER INSULATED CABLES (0-600V)
DS-E12.1.3 VS. NEC

Ampacities of Cables Rated 0-600V, 125°C Conductor Temperature in 40°C Ambient, Three Single Conductor Cables in Conduit

Conductor Size AWG or kcmil	Table 310-23 NEC 0-2000V**	DS-E12.1.3 Table 1 0-600V
14	31	28
12	48	38
10	52	48
8	68	62
6	93	81
4	120	109
2	161	138
1	193	160
1/0	226	190
2/0	253	218
3/0	300	256
4/0	345	294
250	393	318
300	435	360
350	476	393
400	514	427
500	591	475

**Values in NEC multiplied by 1.24 to account for 125°C conductor temperature.

TABLE X

COMPARISON OF AMPACITIES FOR SILICONE RUBBER INSULATED CABLES (0-600V)
ICEA PUBLICATION NO. P-54-440 VS. DS-E12.1.3

Ampacities of Copper Conductors in Open-Top Trays 0-600V, 125°C Conductor Temperature 40°C Ambient, One 3/C Jacketed Cable With Jacketed Conductors

Conductor Size AWG or kcmil	ICEA P-54-440 Table 6/1" Depth 0-600V**	DS-E12.1.3 Table 1 0-600V
14	13.64	13
12	18.6	18
10	27.28	27
8	42.16	42
6	68.2	68
4	95.48	95
2	135.16	135
1	159.96	160
1/0	184.76	185
2/0	213.28	213
3/0	246.76	246
4/0	283.96	284
250	317.44	321
300	*	356
350	390.6	390
400	*	436
500	483.6	483

*Not given
**Values in ICEA multiplied by 1.24 to account for 125°C conductor temperature

TVA 10697 (OE-4-85)

OE CALCULATIONS

TITLE	Justification of TVA's Ampacity Tables As Related to NV-3, NV-10 and NV-11 Cable Trays, Conduits With More Than Three Cables, Grouped Conduits, and Underground Conduit Banks	PLANT/UNIT	SQN Units 1 and 2
PREPARING ORGANIZATION		KEY NOUNS (Consult RIMS DESCRIPTORS LIST)	Cable Ampacity, Conduit Banks, Grouped Conduits

BRANCH/PROJECT IDENTIFIERS	Each time these calculations are issued, preparers must ansure that the original (RO) RIMS accession number is filled in.		
	Rev	(for RIMS' use)	RIMS accession number
	R0		B43 '86 0131 925
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List all pages added by this revision.			
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Use form TVA 10534 if more room required.

Statement of Problem

Based on a BEE Team finding, TVA's electrical design standards for cable current carrying ampacities were judged as not correct for all voltage levels.

Based on OE CALCULATIONS "Justification For Use of TVA's Ampacity Tables" (B43 860117 924), further analysis regarding cable trays, conduits with more than three cables, grouped conduits, and underground conduit banks is required.

QA Record

Abstract

This analysis will justify the adequacy of existing TVA Electrical Design Standard ampacity tables for Sequoyah Nuclear Plant for the problem areas described above in the following manner:

1. Justification through the use of actual installation information that NV-3, NV-10, and NV-11 cable trays can be filled to 60 percent of the cross-sectional area using existing TVA Electrical Design Standard ampacity tables.

2. Justification through the use of actual installation information that TVA's practice of sizing cables when there are more than three cables in a conduit is acceptable for Sequoyah Nuclear Plant.

3. Justification through the use of actual installation information that TVA's practice of sizing cables in conduits that are grouped in air is acceptable for Sequoyah Nuclear Plant.

4. Justification of existing ampacity tables for cables run in underground conduit banks (three conductors and six conductors in a conduit) for Sequoyah Nuclear Plant.

Microfilm and return calculation to D. L. Leckie, W8 B107 C-K.

cc: RIMS, SL26 C-K

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1.0 Purpose

The purpose of this analysis is to provide the following:

1.1 Justification through the use of actual installation information that NV-3, NV-10, and NV-11 cable trays can be filled to 60 percent of the cross-sectional area using the existing TVA Electrical Design Standard ampacity tables.

1.2 Justification through the use of actual installation information that TVA's practice of sizing cables when there are more than three cables in a conduit is acceptable for Sequoyah Nuclear Plant.

1.3 Justification through the use of actual installation information that TVA's practice of sizing cables in conduits that are grouped in air is acceptable for Sequoyah Nuclear Plant.

1.4 Justification of existing ampacity tables for cables run in underground conduit banks (three conductors and six conductors in a conduit) for Sequoyah Nuclear Plant.

2.0 Background

TVA's cable sizing is done in accordance with the current carrying capacities and guidelines provided in four Electrical Design Standards applied in combination with Sequoyah Nuclear Plant Detailed Design Criteria for Power, Control, and Signal Cables for Use in Category I Structures, Revision 5, dated September 30, 1985 (SQN-DC-V-11.3, Reference 4.8) which specifies unusual or special conditions of cable installation.

OE CALCULATIONS (B43 860117 924, Justification For Use of TVA's Ampacity Tables) were assembled to establish the adequacy of the ampacity tables in TVA's Electrical Design Standards DS-E12.1.1, DS-E12.1.2, DS-E12.1.3, and DS-E12.1.4 (References 4.1 through 4.4). This resulted in TVA's ampacity tables being acceptable with further analysis required for the items listed in 1.0 above.

3.0 Assumptions

Any assumptions made in the analyses will be detailed in each respective section as described in 1.1 through 1.4.

4.0 References

4.1 TVA Electrical Design Standard DS-E12.1.1, CABLE - Conductor Current Carrying Capacity Polyethylene Insulated (0-8000V), dated September 28, 1976.

4.2 TVA Electrical Design Standard DS-E12.1.2, CABLE - Conductor Current Carrying Capacity Cross-Linked Polyethylene Insulated Cable (0-15000V), dated September 28, 1976.

4.0 References (Continued)

4.3 TVA Electrical Design Standard DS-E12.1.3, CABLE - Current Carrying Capacity Silicone Rubber Insulated (0-600V), dated March 21, 1977.

4.4 TVA Electrical Design Standard DS-E12.1.4, CABLE - Conductor Current Carrying Capacity Ethylene-Propylene Rubber Insulated Cable (0-15000V), dated June 27, 1977.

4.5 IPCEA Publication No. P-46-426, Power Cable Ampacities, dated 1962, including cumulative errata of September 1, 1966.

4.6 NFPA 70, National Electrical Code (NEC), dated 1984.

4.7 IPCEA Publication No. P-29-226, Current Carrying Capacity of Impregnated Paper, Rubber, and Varnished Cambric Insulated Cables, dated December 1943.

4.8 Sequoyah Nuclear Plant Detailed Design Criteria for Power, Control, and Signal Cables for Use in Category I Structures, Revision 5, dated September 30, 1985 (SQN-DC-V-11.3).

5.0 Analyses and Conclusions

5.1 Justification through the use of actual installation information that NV-3, NV-10, and NV-11 cable trays can be filled to 60 percent of the cross-sectional area using the existing TVA Electrical Design Standard ampacity tables

In performing this analysis, five representative NV-3 cable tray segments known to be loaded to 60% of the cross-sectional area (43.2 square inches based on 60% of an 18 inch x 4 inch cable tray) were selected. The five representative segments analyzed are tray JAH (node 991 to 1030), tray MX (node 631 to 632), tray NX (node 696 to 722), tray OT (node 940 to 1016), and tray OW (node 1009 to 1010). A computer printout of each segment was obtained which listed cable identification numbers for cables in the segment, cable type, cable cross-sectional area, cable "from", cable "to", and cable "for". The printouts were analyzed to determine which segment contained the highest quantity of NV-3 power cables. (Tray JAH, node 991 to 1030, 29 power cables; tray MX, node 631 to 632, 10 power cables; tray NX, node 696 to 722, 60 power cables; tray OT, node 940 to 1016, 63 power cables; tray OW, node 1009 to 1010, 29 power cables.) Cable tray OT (node 940 to 1016) was chosen for the analysis (Attachment 1). Each cable load was investigated and placed in one of the following categories: (a) intermittent operation, (b) current less than or equal to 1.0 amp, (c) current greater than 1.0 amp and less than or equal to 5.0 amps, or (d) current greater than 5.0 amps. The cable cross-sectional areas resulting from breakdown into these four categories are as follows:

5.1 Justification through the use of actual installation information that NV-3, NV-10, and NV-11 cable trays can be filled to 60 percent of the cross-sectional area using the existing TVA Electrical Design Standard ampacity tables (Continued)

Intermittent operation	17.621 sq in.
Current less than or equal to 1.0 amp	5.801 sq in.
Current greater than 1.0 amp and less than or equal to 5.0 amps	10.209 sq. in.
Current greater than 5.0 amps	10.669 sq in.
Total cable cross-sectional area in segment	44.300 sq in.

Circuits are considered to be intermittent if their operation is for alternate intervals of "load and no load," "load and rest," or "load, no load, and rest." Due to near negligible currents and extremely short duration of operation, intermittent circuits are not considered as producing any significant heat contribution to adjacent cables in the cable tray.

Cables for circuits carrying currents less than or equal to 1.0 amp are not considered as producing any significant heat contribution to adjacent cables in the cable tray.

Due to the non-heat producing characteristics of cables associated with intermittent circuits and cables carrying currents less than or equal to 1.0 amp, they will not be considered as contributing to cable tray fill in this analysis.

Cables carrying currents greater than 1.0 amp and less than or equal to 5.0 amps are also not considered as producing any significant heat contribution to adjacent cables in the cable tray; however, they are considered in this analysis as contributing to cable tray fill.

After reducing the total cable cross-sectional area in this cable tray segment (44.300 sq. in.) by the total cross-sectional area of cables associated with intermittent circuits (17.621 sq. in.) and the total cross-sectional area of cables associated with currents less than or equal to 1.0 amp (5.801 sq. in.), the total tray fill for potential heat producing cables in this segment is 20.878 sq. in. or 29.0 percent of the cross-sectional area.

Since the TVA ampacities for NV-4 cable tray filled to 30% of the total cross-sectional area are consistent with ICEA ampacities and are considered acceptable for use, the analysis described above shows that ampacities for NV-3, NV-10, and NV-11 cable tray are also acceptable. This is based on the fact that even though the NV-3, NV-10, and NV-11 cable trays are filled to 60% of the total cross-sectional area, more than 50% of the allowable cable fill cross-sectional area is occupied by cables which will not contribute to heating of the cable tray, but the conductors do contribute to the transfer of heat away from the energized cables in the cable tray.

5.2 Justification through the use of actual installation information that TVA's practice of sizing cables when there are more than three cables in a conduit is acceptable for Sequoyah Nuclear Plant

In performing this analysis, twelve representative power conduits containing more than three cables (NV-12, NV-13; 480V power) were selected. The twelve representative conduits analyzed were 1PL1062A, 1PL1082B, 1PL4966B, 1PL5018B, 1PL6051B, 1PLW310B, 2PL1062A, 2PL1082B, 2PL5018B, 2PL6051A, 2PL5180A, and 2PL5189B. A computer printout (Attachment 2) of each cable was obtained which listed cable identification number, the conduit in which the cable was routed, cable size and type, voltage level, cable "from", cable "to", and cable "for". Each cable load was evaluated to determine the load current associated with the equipment being supplied. Actual load currents were obtained from AC Auxiliary Power System Loading Analysis, Study No. OE2-EEB-CAL 001 RO. The ampacity of each cable was identified per TVA Electrical Design Standard DS-E12.1.1 (three cables in one conduit). The allowable ampacity of each cable was derated in acordance with tables in IPCEA P-46-426 and NEC depending upon the number of conductors in the conduit being analyzed as follows:

4 to 6 power conductors in conduit, multiply cable ampacity by 0.80

7 to 24 power conductors in conduit, multiply cable ampacity by 0.70

Table I was developed tabulating all information required for the analysis. Review of this table taking into consideration appropriate cable derating factors, TVA's not loading cables to 100% (TVA's practice of over sizing of cables if the current exceeds 80% of the protective device rating), and voltage drop considerations indicates that TVA's cable sizing methods for more than three conductors in a conduit are acceptable for use.

A comparison of TVA Electrical Design Standard DS-E12.1.2 with IPCEA P-46-426 ampacity table on page 264 for three single conductor cables in conduit in air shows that the ampacity values are identical.

This comparison is illustrated in Table II. For more than three single conductor cables in a conduit, equal derating factors are applied to the ampacities in both DS-E12.1.2 and IPCEA P-46-426. The derated ampacity comparisons are illustrated in Tables III and IV. Further analysis reveals that while DS-E12.1.2 does not include ampacities for more than three cables in a conduit or a derating factor to obtain them, TVA cable sizing practices do consider voltage drop calculations, sizing of motor circuit cables to 125% of the motor rating, and TVA does not load cables to 100%. The IPCEA ampacity tables are based on cables being loaded to 100%, and voltage drop is not considered. Actual load currents for cables in twelve representative power conduits were

5.2 Justification through the use of actual installation information that TVA's practice of sizing cables when there are more than three cables in a conduit is acceptable for Sequoyah Nuclear Plant (Continued)

compared with derated ampacities as illustrated in Table I. The derated cable ampacity margins are shown to illustrate conservatism in cable sizing.

It is concluded that using DS-E12.1.2 in conjunction with voltage drop calculations, the sizing of motor circuit cables to 125% of motor rating, and the practice of not loading cables to 100% is acceptable for sizing cables in conduits. The ampacity derating factors for more than three single conductor cables in a conduit should be added to TVA Electrical Design Standard DS-E12.1.2 to identify this potential concern.

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TABLE I
Representative Examples of Conduits Containing More Than Three Power Cables
Showing Derated Ampacity Margin

Conduit Number	Cable Number	Cable Size and Type	Voltage Level	Load Current (Amps)	Cable Ampacity (Amps)	Derated Cable Ampacity (Per IPCEA P-46-426) (Amps)	Derated Ampacity Margin (Amps)
1PL1062A	1PL1062A	4-1/C #2, WPH-1	NV-12	90.2	164	0.8 x 164 = 131.2	41
1PL1082B	1PL1082B	4-1/C #2, WPH-1	NV-13	90.2	164	0.8 x 164 = 131.2	41
1PL4966B	2PL4966B	6-1/C #300, WDN (2/C per phase)	NV-13	92	350 (700)	0.8 x 700 = 560	468
1PL5018B	1PL5018B	6-1/C #4/0, WDK (2/C per phase)	NV-13	257	278 (556)	0.8 x 556 = 444.8	187.8
1PL6051B	1PL6051B	6-1/C #2/0, WDJ (2/C per phase)	NV-13	150	204 (408)	0.8 x 408 = 326.4	176.4
1PLW310B	1PLW310B	4-1/C #2/0, WDJ	NV-13	18	204	0.8 x 204 = 163.2	145.2
2PL1062A	2PL1062A	4-1/C #2, WPH-1	NV-12	90.2	164	0.8 x 164 = 131.2	41
2PL1082B	2PL1082B	4-1/C #2, WPH-1	NV-12	90.2	164	0.8 x 164 = 131.2	41
2PL5018B	2PL5018B	6-1/C #4/0, WDK (2/C per phase)	NV-13	257	278 (556)	0.8 x 556 = 444.8	187.8
2PL6051A	2PL6051A	6-1/C #2/0, WDJ (2/C per phase)	NV-12	275	204 (408)	0.8 x 408 = 326.4	51.4
2PL5180A	2PL4635A 2PL4636A 2PL4637A	3-1/C #2, WPH-1 3-1/C #2, WPH-1 3-1/C #2, WPH-1	NV-12 NV-12 NV-12	90.2 90.2 90.2	164 164 164	0.7 x 164 = 114.8 0.7 x 164 = 114.8 0.7 x 164 = 114.8	24.6 24.6 24.6
2PL5189B	2PL4687B 2PL4688B 2PL4689B 2PL4690B	3-1/C #2, WPH-1 3-1/C #2, WPH-1 3-1/C #2, WPH-1 3-1/C #2, WPH-1	NV-13 NV-13 NV-13 NV-13	90.2 90.2 90.2 90.2	164 164 164 164	0.7 x 164 = 114.8 0.7 x 164 = 114.8 0.7 x 164 = 114.8 0.7 x 164 = 114.8	24.6 24.6 24.6 24.6

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TABLE II

Ampacities of Three Single Conductor Cross-Linked Polyethylene Insulated Power Cables in Conduit in Air - Based on 90°C Conductor Temperature and 40°C Ambient Temperature

Conductor Size (AWG or kcmil)	DS-E12.1.2 - Table 1		IPCEA P-46-426 Page 264	
	0-5000V	5001-8000V	1KV	8KV
14	23	**	*	*
12	31	**	*	*
10	41	**	*	*
8	55	**	55	*
6	75	**	75	83
4	97	**	97	108
2	130	**	130	144
1	156	**	156	165
1/0	179	188	179	188
2/0	204	221	204	221
3/0	242	252	242	252
4/0	278	287	278	287
250	317	314	317	314
300	350	350	*	*
350	384	387	384	387
400	410	405	*	*
500	477	473	477	473
750	598	579	598	579
1000	689	657	689	657

* Not Given
** Not Used By TVA

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TABLE III

Ampacities of Four to Six Single Conductor Cross-Linked Polyethylene Insulated Power Cables in Conduit in Air - Based on 90°C Conductor Temperature and 40°C Ambient Temperature

0.8 Derating Factor

Conductor Size (AWG or kcmil)	DS-E12.1.2 - Table 1		IPCEA P-46-426	
	0-5000V	5001-8000V	1KV	8KV
14	18	**	*	*
12	25	**	*	*
10	33	**	*	*
8	44	**	44	*
6	60	**	60	66
4	78	**	78	86
2	104	**	104	115
1	125	**	125	132
1/0	143	150	143	150
2/0	163	177	163	177
3/0	194	202	194	202
4/0	222	230	222	230
250	254	251	254	251
300	280	280	*	*
350	307	310	307	310
400	328	324	*	*
500	382	378	382	378
750	478	463	478	463
1000	551	526	551	526

* Not Given
** Not Used By TVA

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TABLE IV

Ampacities of Seven to Twenty-four Single Conductor Cross-Linked Polyethylene Insulated Power Cables in Conduit in Air - Based on 90°C Conductor Temperature and 40°C Ambient Temperature

0.7 Derating Factor

Conductor Size (AWG or kcmil)	DS-E12.1.2 - Table 1		IPCEA P-46-426	
	0-5000V	5001-8000V	1KV	8KV
14	16	**	*	*
12	22	**	*	*
10	29	**	*	*
8	39	**	39	*
6	53	**	53	58
4	68	**	68	[illegible]
2	91	**	91	101
1	109	**	109	116
1/0	125	132	125	132
2/0	143	155	143	155
3/0	169	176	169	176
4/0	195	201	195	201
250	222	220	222	220
300	245	245	*	*
350	269	271	269	271
400	287	284	*	*
500	334	331	334	331
750	419	405	419	405
1000	482	460	482	460

* Not Given
** Not Used By TVA

5.3 <u>Justification through the use of actual installation information that TVA's practice of sizing power cables in conduits that are grouped in air is acceptable for Sequoyah Nuclear Plant</u>

In performing this analysis, five representative examples of conduits that are grouped in air were selected. Of the five representative examples, conduit arrangements consisting of 3 vertical by 4 horizontal and 4 vertical by 4 horizontal were determined as representative worst case arrangements due to conduit matrix size and actual current loading values. The remaining three examples exhibited no problems with respect to cable derating for the following reasons: (a) sufficient ampacity margins were present with existing cable sizes to adequately provide for derated cable ampacities, (b) the presence of spare conduits containing no cables, conduits containing only NV-3 control cables, and conduits containing cables loaded to less than 50% of the derated cable ampacity reduced the overall conduit group to an array of smaller matrices. The exclusion of non-heat producing cables and their respective conduits reduced the magnitude of the derating factor. (The derating factors were obtained from IPCEA P-46-426.)

Computer printouts listing cable numbers and pertinent information were obtained (Attachments 3 and 4) for use in this analysis. Actual load currents were obtained from AC Auxiliary Power System Loading Analysis, Study No. OE2-EEB-CAL 001 RO.

The two examples to be analyzed are labeled GR CND EX-1 and GR CND EX-2. GR CND EX-1 and GR CND EX-2 are similar conduit groups with respect to vertical and horizontal matrix size, conduit sizes, cable sizes and types, actual load currents, and voltage levels. They will be discussed simultaneously.

In both examples (GR CND EX-1 and GR CND EX-2), spare conduits containing no cables and conduits containing cables loaded to less than 50% of the derated power cable ampacity (non-heat producing cables) reduced the conduit matrices under consideration to arrangements of 2 vertical by 3 horizontal. Per IPCEA P-46-426 the derating factor for ampacities for cables in conduits grouped in air in a 2 vertical by 3 horizontal configuration is 0.84 (derating of cable ampacity by 16%). After derating the respective cable ampacities by this factor, all cables in the representative examples maintained sufficient cable ampacity margins to remain acceptable for operation even though some cables in both examples were loaded to near full derated ampacity.

Based on the above analysis, the ampacities and sizes of cables routed in grouped conduits in air are acceptable at Sequoyah Nuclear Plant.

GR CND EX-1

Power Cables In Conduits That Are Grouped In Air

Analysis Using 2 Vertical By 3 Horizontal

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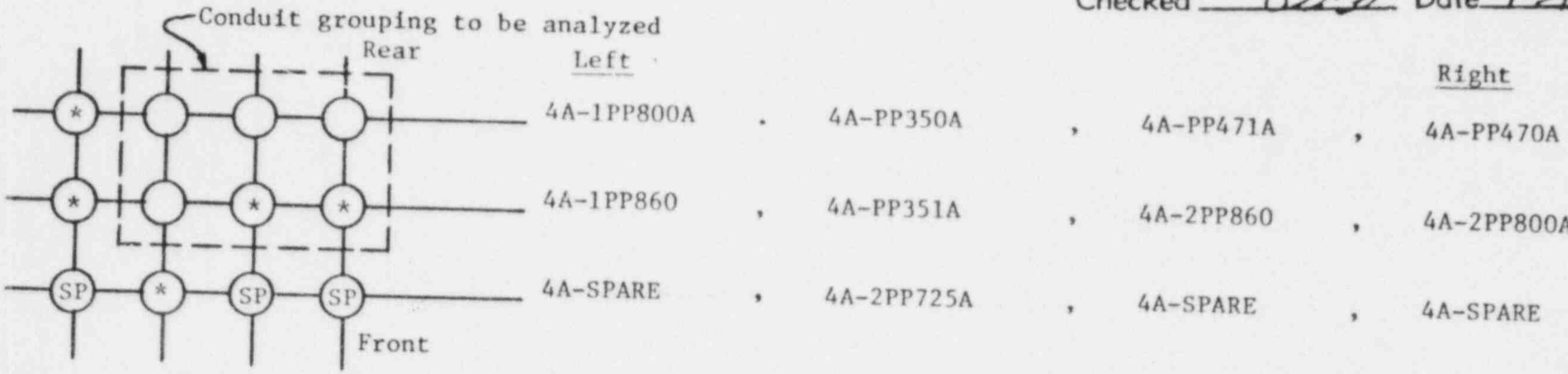

Conduit Number	Cable Number	Cable Size and Type	Voltage Level	Load Current (Amps)	Cable Ampacity (Amps)	Derated Cable Ampacity (Per IPCEA P-46-426) (Amps)	Derated Ampacity Margin (Amps)
2PP725A	2PP725A	3-1/C #2/0, WNB	NV-14	55.8*	221	0.84 x 221 = 185.6	129.8
2PP800A	2PP800A	3-1/C #2/0, WNB	NV-14	40.6*	221	0.84 x 221 = 185.6	145
2PP860	2PP860	3-1/C #2/0, WNB	NV-14	34.7*	221	0.84 x 221 = 185.6	150.9
PP351A	PP351A	3-1/C #4/0, WNC	NV-14	230**	287	0.84 x 287 = 241	11
1PP860	1PP860	3-1/C #2/0, WNB	NV-14	34.7*	221	0.84 x 221 = 185.6	150.9
PP470A	PP470A	3-1/C #4/0, WNC	NV-14	230**	287	0.84 x 287 = 241	11
PP471A	PP471A	3-1/C #4/0, WNC	NV-14	230**	287	0.84 x 287 = 241	11
PP350A	PP350A	3-1/C #4/0, WNC	NV-14	230**	287	0.84 x 287 = 241	11
1PP800A	1PP800A	3-1/C #2/0, WNB	NV-14	40.6*	221	0.84 x 221 = 185.6	145

* Loaded less than 50% of derated cable ampacity

** Diesel Generator emergency feed; 460 amps for 2 out of 24 hours, 420 amps for remaining 22 hours.
Cable numbers PP470A and PP350A comprise Group 1 totaling 482 amps (derated value).
Cable numbers PP351A and PP471A comprise Group 2 totaling 482 amps (derated value).

Power Cables In Conduits That Are Grouped In Air
Analysis Using 2 Vertical By 3 Horizontal

Prepared JRB Date 1-30-86
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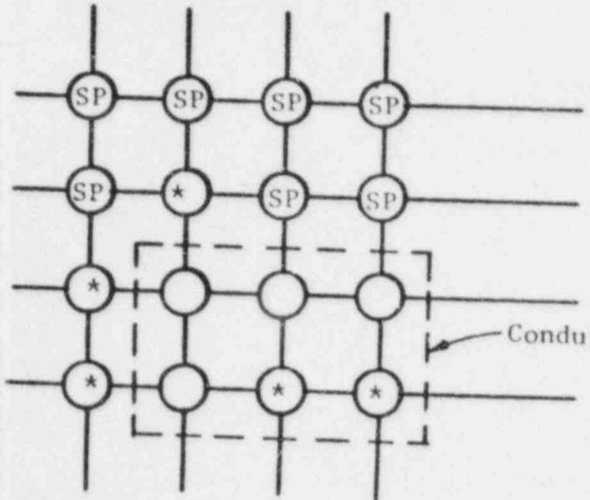

Left			Right
4A-SPARE	4A-SPARE	4A-SPARE	4A-SPARE
4A-SPARE	4A-2PP735B	4A-SPARE	4A-SPARE
4A-1PP840	4A-PP711B	4A-PP590B	4A-PP591B
4A-1PP820B	4A-PP710B	4A-2PP840	4A-2PP820B

Conduit Number	Cable Number	Cable Size and Type	Voltage Level	Load Current (Amps)	Cable Ampacity (Amps)	Derated Cable Ampacity (Per IPCEA P-46-426) (Amps)	Derated Ampacity Margin (Amps)
1PP840	1PP840	3-1/C #2/0, WNB	NV-15	34.7*	221	0.84 x 221 = 185.6	150.9
1PP820B	1PP820B	3-1/C #2/0, WNB	NV-15	40.6*	221	0.84 x 221 = 185.6	145
2PP735B	2PP735B	3-1/C #2/0, WNB	NV-15	55.8*	221	0.84 x 221 = 185.6	129.8
PP711B	PP711B	3-1/C #4/0, WNC	NV-15	230**	287	0.84 x 287 = 241	11
PP710B	PP710B	3-1/C #4/0, WNC	NV-15	230**	287	0.84 x 287 = 241	11
PP590B	2P590B	3-1/C #4/0, WNC	NV-15	230**	287	0.84 x 287 = 241	11
2PP840	2PP840	3-1/C #2/0, WNB	NV-15	34.7*	221	0.84 x 221 = 185.6	150.9
PP591B	PP591B	3-1/C #4/0, WNC	NV-15	230**	287	0.84 x 287 = 241	11
2PP820B	2PP820B	3-1/C #2/0, WNB	NV-15	40.6*	221	0.84 x 221 = 185.6	145

* Loaded less than 50% of derated cable ampacity
** Diesel Generator emergency feed; 460 amps for 2 out of 24 hours, 420 amps for remaining 22 hours.
Cable numbers PP710B and PP590B comprise Group 1 totaling 482 amps (derated value).
Cable numbers PP711B and PP591B comprise Group 2 totaling 482 amps (derated value).

5.4 Justification of existing ampacity tables for cables run in underground conduit banks (three conductors and six conductors in a conduit) for Sequoyah Nuclear Plant

The results of the analyses below are of no real consequence to derating of cable ampacities for cables run in underground conduit banks due to the following: (a) all cables will be routed outside the duct bank in 40°C or higher ambient air temperatures, (b) cables will enter manholes (and be routed on cable trays in air) or handholes (and be routed in air) thus necessitating the use of 40°C or higher ambient temperature ampacities rather than 20°C ambient temperature ampacities as used below.

5.4.1 Ampacities of three single conductor polyethylene insulated cables per conduit in conduit bank - Based on 75°C conductor temperature and 20°C ambient temperature

In comparing ampacities calculated at 20°C ambient temperature from TVA Electrical Design Standard DS-E12.1.1 - Table 1 with ampacities from appropriate tables furnished in IPCEA P-46-426 it was determined that TVA ampacity values are less than IPCEA values in all cases. TVA cable sizing techniques involve voltage drop calculations and the fact that cables are not loaded to 100% (TVA's practice of over sizing of cables if the current exceeds 80% of the protective device rating). IPCEA P-46-426 ampacity tables do not consider voltage drop and they are based on cables being loaded to 100%. In comparing cable ampacities between TVA tables and IPCEA tables plus considering voltage drop and of loading cables to 100%, TVA's approach proves to be conservative as compared to IPCEA ampacity values. It is concluded that using TVA Electrical Design Standard DS-E12.1.1 - Table 1 in conjunction with voltage drop considerations and the TVA standard practice of not loading cables to 100% is acceptable for use in sizing cables run in underground conduit banks and no further ampacity derating is necessary. (Note: Per Electrical Standard DS-E12.1.1, 75°C cable shall not be used on power cable trays without permission from technical supervisor.)

See Table V for ampacity comparison.

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TABLE V

Ampacities of Three Single Conductor Polyethylene Insulated Cables Per Conduit in Conduit Bank - Based on 75°C Conductor Temperature and 20°C Ambient Temperature

Conductor Size (AWG or kcmil)	DS-E12.1.1 - Table 1 See Note 1		IPCEA P-46-426	
	0-5000V	5001-8000V	Page 169 1KV	Page 170 8KV
14	24	29	*	*
12	30	35	*	*
10	41	46	*	*
8	54	58	72	*
6	71	81	94	96
4	95	106	123	125
2	126	139	160	162
1	144	159	183	185
1/0	166	181	210	211
2/0	190	206	239	240
3/0	219	234	273	274
4/0	254	266	313	313
250	281	294	344	344
300	314	329	*	*
350	343	360	418	417
400	370	390	*	*
500	420	440	511	509
750	523	540	640	636
1000	598	**	745	738
1250	**	**	832	825
1500	**	**	907	898
1750	**	**	970	959
2000	**	**	1027	1013

* Not Given
** Not Used By TVA

Note 1: Ampacities in DS-E12.1.1 - Table 1 are for 40°C ambient temperature. Ampacities in this table have been multiplied by a factor of 1.25 to convert values from 40°C ambient temperature to 20°C ambient temperature.

5.4.2 Ampacities of six single conductor polyethylene insulated cables per conduit in conduit bank - Based on 75°C conductor temperature and 20°C ambient temperature

TVA Electrical Design Standard DS-E12.1.1 does not list ampacities for six single conductor cables in a conduit. In order to obtain these values, the ampacities for three single conductor cables were multiplied by a factor of 0.80 as specified in by the National Electrical Code, section 310-15. In comparing these adjusted ampacities calculated at 20°C ambient temperature with ampacities from appropriate tables furnished in IPCEA P-46-426 it was determined that TVA ampacity values are less than IPCEA values in all cases. TVA cable sizing techniques involve voltage drop calculations and the fact that cables are not loaded to 100% (TVA's practice of over sizing of cables if the current exceeds 80% of the protective device rating). IPCEA P-46-426 ampacity tables do not consider voltage drop and they are based on cables being loaded to 100%. In comparing cable ampacities between TVA tables and IPCEA tables plus considering voltage drop and not loading cables to 100%, TVA's approach proves to be conservative as compared to IPCEA ampacity values. It is concluded that using TVA Electrical Design Standard DS-E12.1.1 - Table 1 and the derating factor for 4 thru 6 conductors in a conduit in conjunction with voltage drop considerations and the TVA standard practice of not loading cables to 100% is acceptable for use in sizing cables run in underground conduit banks and no further ampacity derating is necessary. (Note: Per Electrical Design Standard DS-E12.1.1, 75°C cable shall not be used on power cable trays without permission from technical supervisor.)

See Table VI for ampacity comparison.

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TABLE VI

Ampacities of Six Single Conductor Polyethylene Insulated Cables Per Conduit in Conduit Bank - Based on 75 C Conductor Temperature and 20 C Ambient Temperature

Conductor Size (AWG or kcmil)	DS-E12.1.1 - Table 1 See Notes 1 and 2		IPCEA P-46-426	
	0-5000V	5001-8000V	Page 169 1KV	Page 170 8KV
14	19	23	*	*
12	24	28	*	*
10	33	37	*	*
8	43	46	65	*
6	57	65	84	85
4	76	85	109	110
2	101	111	140	141
1	115	127	160	161
1/0	133	145	182	183
2/0	152	165	207	208
3/0	175	187	236	236
4/0	203	213	269	268
250	225	235	295	294
300	251	263	*	*
350	274	288	355	353
400	296	312	*	*
500	336	352	431	428
750	418	432	534	529
1000	478	**	617	611
1250	**	**	686	679
1500	**	**	744	736
1750	**	**	793	783
2000	**	**	836	824

* Not Given
** Not Used By TVA

Note 1: Ampacities in DS-E12.1.1 - Table 1 are for 40°C ambient temperature. Ampacities in this table have been multiplied by a factor of 1.25 to convert values from 40°C ambient temperature to 20°C ambient temperature.

Note 2: Ampacities in this table have been multiplied by a factor of 0.80 to achieve values for six single conductor cables per conduit per table in NEC Section 310-15.

5.4.3 Ampacities of three single conductor cross-linked polyethylene or ethylene-propylene rubber insulated power cables per conduit in conduit bank - Based on 90°C conductor temperature and 20°C ambient temperature

In comparing ampacities calculated at 20°C ambient temperature from TVA Electrical Design Standard DS-E12.1.2 - Table 1 or DS-E12.1.4 - Table 1 with ampacities from appropriate tables furnished in IPCEA P-46-426 it was determined that TVA ampacity values are less than IPCEA values in all cases. TVA cable sizing techniques involve voltage drop considerations and the fact that cables are not loaded to 100% (TVA's practice of over sizing of cables if the current exceeds 80% of the protective device rating). IPCEA P-46-426 ampacity tables do not consider voltage drop and they are based on cables being loaded to 100%. In comparing cable ampacity between TVA tables and IPCEA tables plus considering voltage drop and not loading cables to 100%, TVA's approach proves to be conservative as compared to IPCEA ampacity values. It is concluded that using TVA Electrical Design Standard DS-E12.1.2 - Table 1 or DS-E12.1.4 - Table 1 in conjunction with voltage drop calculations and the TVA standard practice of not loading cables to 100% is acceptable for use in sizing cables run in underground conduit banks and no further ampacity derating is necessary.

See Table VII for ampacity comparison.

TABLE VII

Ampacities of Three Single Conductor Cross-Linked Polyethylene or Ethylene-Propylene Rubber Insulated Power Cables Per Conduit in Conduit Bank - Based on 90°C Conductor Temperature and 20°C Ambient Temperature

Conductor Size (AWG or kcmil)	DS-E12.1.2 - Table 1 DS-E12.1.4 - Table 1 See Note 1		IPCEA P-46-426	
	0-5000V	5001-8000V	Page 180 1KV	Page 181 8KV
14	27	**	*	*
12	37	**	*	*
10	48	**	*	*
8	65	**	80	*
6	89	**	104	*
4	114	**	135	106
2	153	**	176	137
1	184	**	202	178
1/0	211	222	231	204
2/0	241	261	264	233
3/0	286	297	301	265
4/0	328	339	345	302
250	374	371	379	345
300	413	413	*	379
350	453	457	461	*
400	484	478	*	460
500	563	558	564	*
750	706	683	706	561
1000	813	775	823	702
				816

* Not Given
** Not Used By TVA

Note 1: Ampacities in DS-E12.1.2 - Table 1 or DS-E12.1.4 - Table 1 are for 40°C ambient temperature. Ampacities in these tables have been multiplied by a factor of 1.18 to convert values from 40°C ambient temperature to 20°C ambient temperature.

5.4.4 Ampacities of six single conductor cross-linked polyethylene or ethylene-propylene rubber insulated power cables per conduit in conduit bank - Based on 90°C conductor temperature and 20°C ambient temperature

TVA Electrical Design Standard DS-E12.1.2 or DS-E12.1.4 does not list ampacities for six single conductor cables in a conduit. In order to obtain these values, the ampacities for three single conductor cables were multiplied by a factor of 0.80 as required by the National Electrical Code, Section 310-15. In comparing these adjusted ampacities calculated at 20°C ambient temperature with ampacities from appropriate tables furnished in IPCEA P-46-426, it was determined that TVA ampacity values are less than IPCEA values in all cases. TVA cable sizing techniques involve voltage drop considerations and the fact that cables are not loaded to 100% (TVA's practice of over sizing of cables if the current exceeds 80% of the protective device rating). IPCEA P-46-426 ampacity tables do not consider voltage drop, and they are based on cables being loaded to 100%. In comparing cable ampacity between TVA tables and IPCEA tables plus considering voltage drop and not loading cables to 100%, TVA's proves to be conservative as compared to IPCEA ampacity values. It is concluded that using TVA Electrical Design Standard DS-E12.1.2 -Table 1 or DS-E12.1.4 - Table 1 in conjunction with loading cables to 100% is acceptable for use in sizing cables run in underground conduit banks and no further ampacity derating is necessary.

See Table VIII for ampacity comparison.

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TABLE VIII

Ampacities of Six Single Conductor Cross-Linked Polyethylene or Ethylene - Propylene Rubber Insulated Power Cables Per Conduit in Conduit Bank - Based on 90°C Conductor Temperature and 20°C Ambient Temperature

Conductor Size (AWG or kcmil)	DS-E12.1.4 - Table 1 See Notes 1 and 2		IPCEA P-46-426	
	0-5000V	5001-8000V	Page 180 1KV	Page 181 8KV
14	22	**	*	*
12	30	**	*	*
10	38	**	*	*
8	52	**	71	*
6	71	**	93	94
4	91	**	120	121
2	122	**	155	156
1	147	**	176	177
1/0	169	178	201	202
2/0	193	209	228	229
3/0	229	238	260	260
4/0	262	271	296	296
250	299	297	325	324
300	330	330	*	*
350	362	366	391	390
400	387	382	*	*
500	450	446	475	472
750	565	546	589	585
1000	650	620	682	676

* Not Given
** Not Used By TVA

Note 1: Ampacities in DS-E12.1.2 - Table 1 or DS-E12.1.4 - Table 1 are for 40°C ambient temperature. Ampacities in these tables have been multiplied by a factor of 1.18 to convert values from 40°C ambient temperature to 20°C ambient temperature.

Note 2: Ampacities in this table have been multiplied by a factor of 0.80 to achieve values for six single conductor cables per conduit per table in NEC Section 310-15.

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6.0 Attachments

6.1 Attachment 1 (18 pages), Computer printout showing cables in cable tray OT (NV-3), node 940 to 1016

6.2 Attachment 2 (11 pages), Computer printout showing conduits containing more than three cables

6.3 Attachment 3 (3 pages), Computer printout showing conduits grouped in air (for GR CND EX-1)

6.4 Attachment 4, (3 pages), Computer printout showing conduits grouped in air (for GR CND EX-2)