CHAPTER 9

ELECTRICAL DISTRIBUTION SYSTEM COORDINATION STUDY - APPENDIX R REANALYSIS

SURRY POWER STATION - UNITS 1 AND 2

Prepared By

Virginia Electric and Power Company
and Stone & Webster Engineering Corporation

ELECTRICAL DISTRIBUTION SYSTEM COORDINATION STUDY - APPENDIX R REANALYSIS

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NOTE: Portions of this report marked by * were provided by The Company.

i. SUMMARY

In accordance with 10CFR50 Appendix R, each nuclear unit is required to identify two redundant trains of equipment necessary to shut the unit down safely in the event of a fire. At least one safe shutdown path must be available for any postulated fire.

The purpose of this study is to provide documentation to substantiate coordination of electrical protective devices necessary to comply with the requirements of Appendix R to 10CFR50. The circuits required to be coordinated were identified in the scope of work entitled "Proposed Engineer's Scope of Work Electrical Distribution System Coordination Study Appendix R Re-analysis North Anna and Surry Power Stations" transmitted to SWEC by Amendment 4 to Task Item 128 on March 27, 1984. The Appendix R required circuits are shown on station drawings 11448-FE-1AA for Unit 1 and 11548-FE-1AA for Unit 2. Additional circuits supplying power to the Remote Monitoring and the Emergency Communication systems resulting from plant modifications have been analyzed and included in the drawings.

Verification of 4160V switchgear and 480V load center coordination has been provided by The Company and is included in Section 4 of this chapter.

The SWEC coordination effort required short circuit current calculations and the development of coordination curves for the following equipment and associated feeder circuits:

- 480V Motor Control Centers
- 125V Batteries, DC Distribution Cabinets, and DC Fuses
- 120V AC Vital Buses, Inverters and Uninterruptible Power Supplies (UPS)

The methodology of proving coordination of the circuit breakers and fuses was to prepare coordination curves on log-log forms designed for the purpose of showing the time-current characteristics of fault current interrupting devices. The applicable curves of two or more interrupting devices were shown on the same form, showing graphically whether any possible combination of fault current magnitude and time might cause unnecessary operation of an interrupting device, thereby violating the requirements of Appendix R.

The investigation indicated the following changes in equipment were required:

- The 4160V and 480V switchgear control power circuits previously contained 30A Shawmut OT Class K-5 fuses. These circuits receive 125V DC power from the 125V DC distribution cabinets. Based on the Shawmut fuse curve, and calculations of fuse melting times, coordination cannot be obtained, for maximum fault currents, with

the 50A supply breaker in the 125V DC distribution cabinets feeding these circuits. The affected circuits are circuits 2 and 15 in 125V DC cabinet 1-A, circuits 4 and 11 in 125V DC cabinet 1-B, circuits 2 and 15 in 125V DC cabinet 2-A, and circuits 4 and 11 in 125V DC cabinet 2-B. Since the short circuit currents are greater than the minimum trip current of the magnetic trip devices, the time-current curves did not prove coordination of circuit breakers with 30 amp fuses in 4160V and 480V switchgear. It was necessary to calculate fuse melting times to document resolution of this coordination problem. Therefore, the existing 30 amp fuses were replaced by 15 amp fuses. The modifications were made by design change packages DC-84-85 and DC 84-86.

- In order to achieve coordination of 120V AC Vital Bus incoming circuit breakers (No. 35) and bus tie circuit breakers (No. 36), it would be necessary to replace the 60A incoming circuit breakers (No. 35) by 100A circuit breakers with 100A trip units. This modification has not been made since the bus tie circuit breakers remain open except when used as a maintenance tie.

  The maintenance ties between Train "B", Units 1 and 2, vital bus panels have been removed by DC 85-32-1 and DC 85-34-2, Vital Bus Upgrade. The remaining Train "A" ties will be removed with completion of those design changes during the 1988 outages. No further changes will be required.

- Since the maximum short circuit current at DC panels 1-2 and 2-2 is over 4300A, the coordination curves show that coordination of circuit breakers 12 and 6 at panel 1-2 and 21 and 6 at panel 2-2 is not possible using molded case circuit breakers. To resolve the problem of coordination, the redundant power supplies are from 125V DC distribution cabinets 1B and 2B instead of panels 1-2 and 2-2. The modifications were made by DC 84-08.

- Coordination exists between circuit breakers in motor control centers and circuit breakers in 480V load centers that supply power to the MCC's except for an area of overlap of the coordination curves of the largest MCC circuit breaker (175A) and the load center circuit breaker supplying the MCC. Therefore, the time setting of the eight circuit breakers supplying the safety-related MCC's have been changed in order to coordinate breakers.

1. INTRODUCTION

Appendix R postulates the occurrence of a single fire anywhere in a nuclear plant, and stipulates that such fire should not degrade the capability to achieve safe plant shutdown. Coordination of circuit protective devices to prevent unnecessary outages of power supplies needed for safe shutdown is required to conform to the requirements of Appendix R.

Circuits critical to safe shutdown have been identified and are shown on station drawings 11448-FE-1AA and 11548-FE-1AA, and are separately tabulated in Chapter 3 of this report (see Reference 5.g). The components involved in these critical circuits were investigated and data gathered to facilitate verification of the capabilities of the interrupting devices to operate selectively and to continue to supply power to all critical circuits not affected by the postulated fire. Coordination curves were developed for the circuits required for safe shutdown and are included in Section 6 of this chapter.

2. CONCLUSIONS

Conclusions resulting from the investigations are as follows:

- Circuit breakers in 480V motor control centers (MCC's) are coordinated with circuit breakers in 480V load centers that supply power to the MCC's, except for an area of overlap of the largest MCC circuit breaker (175A) coordination curve with that of the associated 480V switchgear breaker. The time setting of the circuit breakers have been changed to correct this problem. Reference coordination curves 14257.63-E-222, Sheets 1 and 2, and 14257.63-E-227, Sheets 1 and 2. A larger (225A) MCC breaker has been installed without loss of coordination, as shown on the curves.

- Coordination exists on the 125V DC systems, except the 30A fuses in 4160V and 480V switchgear control circuits, and the 20A circuit breakers (NO. 12) in DC panels 1-2 and 2-2 do not coordinate with their respective power supply circuit breakers in distribution cabinets 1A, 1B, 2A, and 2B. The power supplies were modified to correct this problem.

- Coordination exists on the 120V AC Train "A" vital bus system since the bus tie circuit breakers remain open except when required to be closed for maintenance.

  With the completion of the vital bus upgrade on Train "B", including removal of the bus ties, coordination exists on the 120V AC Train "B" vital bus system. The same upgrade will take place for Train "A" during the 1988 outages.

- *Coordination cannot be obtained in some cases between the 4160V switchgear supply breakers and the downstream 480V load center supply breakers. However, because the Unit 1 4160V emergency switchgear and 480V emergency load centers are located in Fire Area 3 and the Unit 2 4160V emergency switchgear and 480V emergency load centers are located in Fire Area 4, a fire in either of these two areas will result in loss of all the equipment located within it. Since the Surry 1 and 2 charging system and auxiliary feedwater system are cross tied between both units, separate studies have shown that either unit can be shut down utilizing the opposite unit's system.

- Coordination of the distribution panel circuit breakers supplying the Remote Monitoring Panel REM and the Emergency Communication System is not required. The Remote Monitoring Panel primary plant parameters can be monitored at the Auxiliary Shutdown Panel or the Control Room. The Emergency Communications system is arranged in two sections in separate fire areas so that one can be lost.

3. MODIFICATIONS

- All 30 amp fuses supplying 125V DC power to safety-related 4160V and 480V circuit breaker close and trip circuits should be replaced with 15 amp fuses, Shawmut OT-15 Class K-5 or equivalent. This change should include 4160V switchgear buses 1H, 1J, 2H, and 2J, and 480V load center buses 1H-1, 1J-1, 2H-1, and 2J-1. (Thirty amp AC fuses have been replaced by 15 amp AC Shawmut OT-15 Class K-5 fuses.)

- Bus tie circuit breakers (No. 36) in Train "A" vital bus panels 1-I and 1-III (Unit 1) and 2-I and 2-III (Unit 2) may be closed for maintenance purposes only. These bus tie breakers will be removed and no operating restrictions will be necessary following the completion of the Vital Bus Upgrade, DC 85-32-1 and DC 85-34-2, during the 1988 outages. The upgrade has been completed for Train "B" and no further modifications or restrictions are required.

- Power supplies to the ASC Remote Monitoring Panel should be from circuit breakers in 125V DC distribution cabinets 1-B and 2-B instead of from DC panels 1-2 and 2-2. This modification would involve two new power supply cables routed in accordance with Appendix "R" requirements from 20A circuit breakers in cabinets 1-B and 2-B to the ASC Remote Monitoring Panel. The modifications were made by DC 84-08.

- Change the time setting of the 480V switchgear circuit breaker supplying power to the safety-related MCC's from minimum to intermediate. This adjustment is applicable to circuit breakers 14H13 and 14H14 on Bus 1H-1; 14J14 and 14J16 on Bus 1J-1; 24H15 and 24H16 on Bus 2H-1; and 24J13 and 24J14 on Bus 2J-1. Resets have been made. A 225A MCC breaker has been installed without loss of coordination.

4. TECHNICAL

4.1 120/240V AC Vital Bus System

References: Calculation 14257.63-E-3, Coordination Curves 14257.63-E-223, Sheets 1 and 2, and 228, Sheets 1 and 2, and Drawings 11448-FE-1AA, 11548-FE-1AA.

Maximum fault currents were calculated both from the inverter, UPS and the regulating transformer inputs required for Appendix R circuits on the Unit 1 and Unit 2 120V AC vital bus panels.

These Appendix R circuits are as follows:

	Unit 1		Unit 2	
Train	Panel	Circuits	Panel	Circuits
A	1-I	35, 36	2-I	35, 36
A	1-III	5, 11, 22, 35, 36	2-III	11, 22, 35, 36
B	1-IIA	22, 30, 34	2-IIA	22, 30, 34
B	1-IVA	19, 34	2-IVA	19, 34

4.1.1 Train "A"

The inverters on the Surry Units 1 and 2 vital bus system are 10 kVA (1-III and 2-III) current limiting units. Based on manufacturer's data, the maximum fault current through these devices is 64 amps. The regulating transformers on the Surry Units 1 and 2 vital bus system are 10kVA current limiting units. The maximum fault current through these devices is 170 amps. The referenced coordination curves show the vital bus system coordination for Units 1 and 2 vital bus inverter and regulating transformer inputs to each bus.

The coordination curves show that coordination of circuit breakers does not exist if bus tie breakers No. 36 are closed. To assure coordination, bus tie circuit breakers (No. 36) should be closed for maintenance purposes only. This restriction and the tie breakers will be eliminated following the Vital Bus Upgrade, DC's 85-32-1 and 85-34-2, to be completed in the 1988 outages.

4.1.2 Train "B"

The inverters on the Surry Units 1 and 2 vital bus system are 15 kVA UPS (1B-1, 1B-2, 2B-1 and 2B-2) current limiting units. Based on manufacturer's data, the maximum fault current through these devices is 187.5 amps. The UPS regulating line conditioners on the Surry Units 1 and 2 vital bus system are 60 kVA current limiting units. The maximum fault current through these devices is 694 amps.

The referenced coordination curves show the vital bus system coordination for Units 1 and 2 vital bus UPS inverter and regulating transformer inputs to each bus.

Vital bus tie breakers Nos. 36 are eliminated by DC 85-32-1 and 85-34-2, thus resolving the Train "A" coordination problem mentioned above.

4.2 125V DC Distribution System

References: Calculations 14257.63-E-1 and 14937.16-E-1, Coordination Curves 14257.63-E-224, Sheets 1 and 2, and 229, Sheets 1 and 2, and Drawings 11448-FE-1AA, 11548-FE-1AA.

Maximum fault currents were calculated for each circuit on the Units 1 and 2 125V DC distribution system required for Appendix R.

These Appendix R circuits are as follows:

	Unit 1		Unit 2	
Train	125 VDC Cab.	Circuits	125 VDC Cab.	Circuits
A	1A	2, 15, 19, 20, 26	2A	2, 15, 19, 20, 26
B	1B	4, 11, 23, 24	2B	4, 6, 11, 23, 24

Circuit breaker No. 6 in 125V DC distribution cabinet 1-B supplies power to DC panel 1-2, and circuit breaker No. 6 in cabinet 2-B supplies power to DC panel 2-2. The short circuit current at panel 1-2 is 4522A, and at panel 2-2 is 4329A. Coordination curves show that 20A circuit breakers (No. 12) located in DC panels 1-2 and 2-2 do not coordinate with their power supply circuit breakers (No. 6) at these short circuit currents. At the present time, circuit breakers (No. 12) in panels 1-2 and 2-2 supply redundant feeders to the ASC remote monitoring panel. We recommend power supplies to the ASC Remote Monitoring Panel be from 20A circuit breakers in DC distribution cabinets 1-B and 2-B instead of from DC panels 1-2 and 2-2. The modifications were made by DC 84-08. The curves previously provided to show the miscoordination have been deleted.

The 30A fuses in the 4160V and 480V switchgear control power circuits do not coordinate with the 125V DC circuit breakers 2 and 15 (50A trip) in cabinet 1-A, circuit breakers 4 and 11 (50A trip) in cabinet 1-B, circuit breakers 2 and 15 (50A trip) in cabinet 2-A, and circuit breakers 4 and 11 (50A trip) in cabinet 2B.

To resolve the fuse coordination problem, we recommend replacing the 30 amp fuses by 15 amp fuses, Shawmut Type OT-15 or equivalent. (This modification was made by DC-84-85 and DC-84-86.)

4.3 480V Motor Control Centers (MCC's)

References: Calculations 14257.63-E-2, Coordination Curves 14257.63-E-222, Sheets 1 and 2, and 14257.63-E-227, Sheets 1 and 2, and Drawings 11448-FE-1AA, 11548-FE-1AA.

Maximum fault currents on the main bus of each 480V MCC required for Appendix R were calculated. These MCC's and associated fault currents are MCC 1H1-1, 15,918A; MCC 1H1-2, 14,144A; MCC 1J1-1, 16,631A; and MCC 1J1-2, 14838A in Unit 1 and MCC 2H1-1, 15,900A; MCC 2H1-2, 14,100A; MCC 2J1-1, 15,778A; and MCC 2J1-2, 14,414A in Unit 2. Fault current values are without breaker reactances included.

MCC's at Surry Units 1 and 2 are not provided with main circuit breakers and, therefore, coordination has to exist only between the MCC branch breakers and 480V switchgear breaker that supplies the MCC. For the purpose of proving coordination, therefore, the largest branch circuit breaker from any of the Appendix R required MCC's on Units 1 and 2 is 225 amp frame 175 amp trip. The referenced coordination curves show that the 175A circuit breaker does not coordinate with its associated 480V switchgear breaker in the area 700-1800 amperes (10-60 seconds). To resolve this coordination problem, we changed the time setting of the 480V switchgear circuit breakers supplying power to the MCC's in order to coordinate breakers.

A 225 amp frame 225 amp trip MCC breaker has been installed without loss of coordination as shown on the curves.

4.4* 4160V Switchgear and 480V Switchgear

References: Coordination Curves 14257.63-E-221 and 226, and Drawings 11448-FE-1AA, 11548-FE-1AA.

The Unit 1 4160V switchgear buses required for Appendix R are 1H and 1J. The Unit 2 4160V switchgear buses required for Appendix R are 2H and 2J. The Unit 1 480V load center buses required for Appendix R are 1H-1 and 1J-1. The Unit 2 480V load center buses required for Appendix R are 2H-1 and 2J-1.

On Unit 1, circuit breaker 15H7 from 4160V bus 1H simultaneously supplies 480V bus 1H via 4160V/480V transformer 1H through 480V circuit breaker 14H1 and 480V bus 1H-1 via 4160V/480V transformer 1H-1 through 480V circuit breaker 14H15. Unit 1 circuit breaker 15J7 from 416V bus 1J simultaneously supplies 480V bus 1J via 4160/480V transformer 1J through 480V circuit breaker 14J11, and 480V bus 1J-1 via 4160V/480V transformer 1J1-1 through 480V circuit breaker 14J11.

On Unit 2, circuit breaker 25H7 from 4160V bus 2H simultaneously supplies 480V bus 2H via 4160V/480V transformer 2H through 480V circuit breaker 24H1 and 480V bus 2H-1 via 4160V/480V transformer 2H1-1 through 480V circuit breaker 24H11. Unit 2 circuit breaker 25J7 from 4160V bus 2J simultaneously supplies 480V bus 2J via 4160V/480V transformer 2J through circuit breaker 24J-1, and 480V bus 2J-1 via 4160/480V transformer 2J-1 through circuit breaker 24J15.

The referenced coordination curves show that in each of the described cases, coordination cannot be obtained in all cases between the 4160V supply breakers and the input breakers to the associated 480V buses. However, since the Unit 1 4160V switchgear buses 1H and 1J and 480V load center buses 1H-1 and 1J-1 are all located in Fire Area 3 and the Unit 2 4160V switchgear buses 2H and 2J, and 480V load center buses 2H-1 and 2J-1 are all located in Fire Area 4, a fire in either Fire Area 3 or 4 could disable all the 4160V and 480V buses in that area. Also, since previous studies have shown that either unit at Surry can be safely shut down utilizing the opposite unit's 4160V and 480V power sources through the use of mechanically cross-connected charging system and auxiliary feedwater system, Surry Units 1 and 2 comply with Appendix R in this area.

The miscoordination results from restrictions placed on the relay and breaker settings. The 4160V relay time versus current characteristics cannot be increased or changed without causing miscoordination with up-line devices. The down-line equipment, 480V breakers, time versus current characteristics should not be decreased or changed due to motor start-up conditions. Coordination does exist for bolted phase fault conditions.

The incoming breakers on 4160V buses 1H, 1J, 2H, and 2J, coordinate with the emergency diesel generator main breakers and with the associated 4160V feeder breakers in all cases, and the incoming breakers on 480V load centers 1H-1, 1J-1, 2H-1, and 2J-1 coordinate with their respective feeder breakers in all cases.*

*These 4160V and 480V switchgear curves were provided by The Company.

4.5 Units 1 and 2 Feed to Remote Monitoring Panel

References: Drawings 11448-FE-1AA, 11548-FE-1AA.

LCS power supplies in the Remote Monitoring Panel REM located in the Cable Spreading Room are supplied from vital bus inverters 1-III and 2-III through 120V AC Appendix R distribution panels. Coordination is not required between Appendix R distribution panel feeder circuit breaker and the panel branch breakers since the primary plant parameters can be monitored at the auxiliary shutdown panel or the control room if the remote monitoring panel is lost. The specific parameters involved for Unit 1 and Unit 2 are:

Steam Generator Level
Reactor Coolant Cold Leg Temperature
Excore Neutron Flux Source Range
Excore Neutron Flux Wide Range

4.6 Emergency Communications System

References: Drawings 11448-FE-1AA, 11548-FE-1AA.

Four repeaters and associated power supplies have been replaced or added and arranged in two systems in separate fire areas (DC-84-63) to assure operability of the portable radios during and after a fire, as follows:

"A"	Fire Areas
1 Repeater A 1 Repeater AE	46 (Unit 2 Cable Spreading Room)

"B" System	Fire Areas
2 Repeater B 2 Repeater BE	17 (Auxiliary Building)

The loss of either the A or B system will leave the other functional to provide emergency communications without dependence on the normal telephone and paging systems.

Since the above arrangement assures that one portable radio system is available in the event of a fire, coordination is not required between the distribution panel (Unscheduled Communication Breaker Panel, HTP-2A3) main and branch circuit breakers. Motor Control Center coordination is required (MCC 1H1-1, MCC 2H1-1) and exists. Motor Control center faults are discussed in Section 4.4.

5. REFERENCES

a. Calculation 14257.63-E-1:	Short Circuit Currents, 125V DC Control System - Surry Units 1 and 2 Appendix R Evaluation (use for Train "A")
b. Calculation 14257.63-E-2:	Short Circuit Currents, 480V Auxiliary Power Distribution Systems - Surry Units 1 and 2 Appendix R Evaluation
c. Calculation 14257.63-E-3: Revision 1	Short Circuit Currents, 120V AC Vital Buses Surry Units 1 and 2 Appendix R Evaluation (use for Train "A", Train "B" values supplied by UPS manufacturer)
d. Calculation 14257.57-E-1:	Short Circuit Currents, 480V and 120V Systems
e. Drawing 11448-FE-1AA	Appendix R Evaluation Electrical One Line Diagram Unit 1
f. Drawing 11548-FE-1AA	Appendix R Evaluation Electrical One Line Diagram Unit 2
g. 10 CFR50 Appendix R Report, Tables 3-1.J and 3-2.J:	Electrical Distribution System, Component Operation Matrix
h. Calculation 14937.16-E-1	DC Vital Bus Short Circuit Current - Surry Units 1 and 2 (use for Train "B")

6. FIGURES

Coordination curves listed in the Table of Contents are enclosed.

4160V A.C. TIME-CURRENT CHARACTERISTIC CURVES

For SURRY UNIT 1 4160V, 4160V vs. 480V Fuse Links In STONE & WEBSTER ENGINEERING

BASIS FOR DATA Standards Dated No. 14257-63-E-221

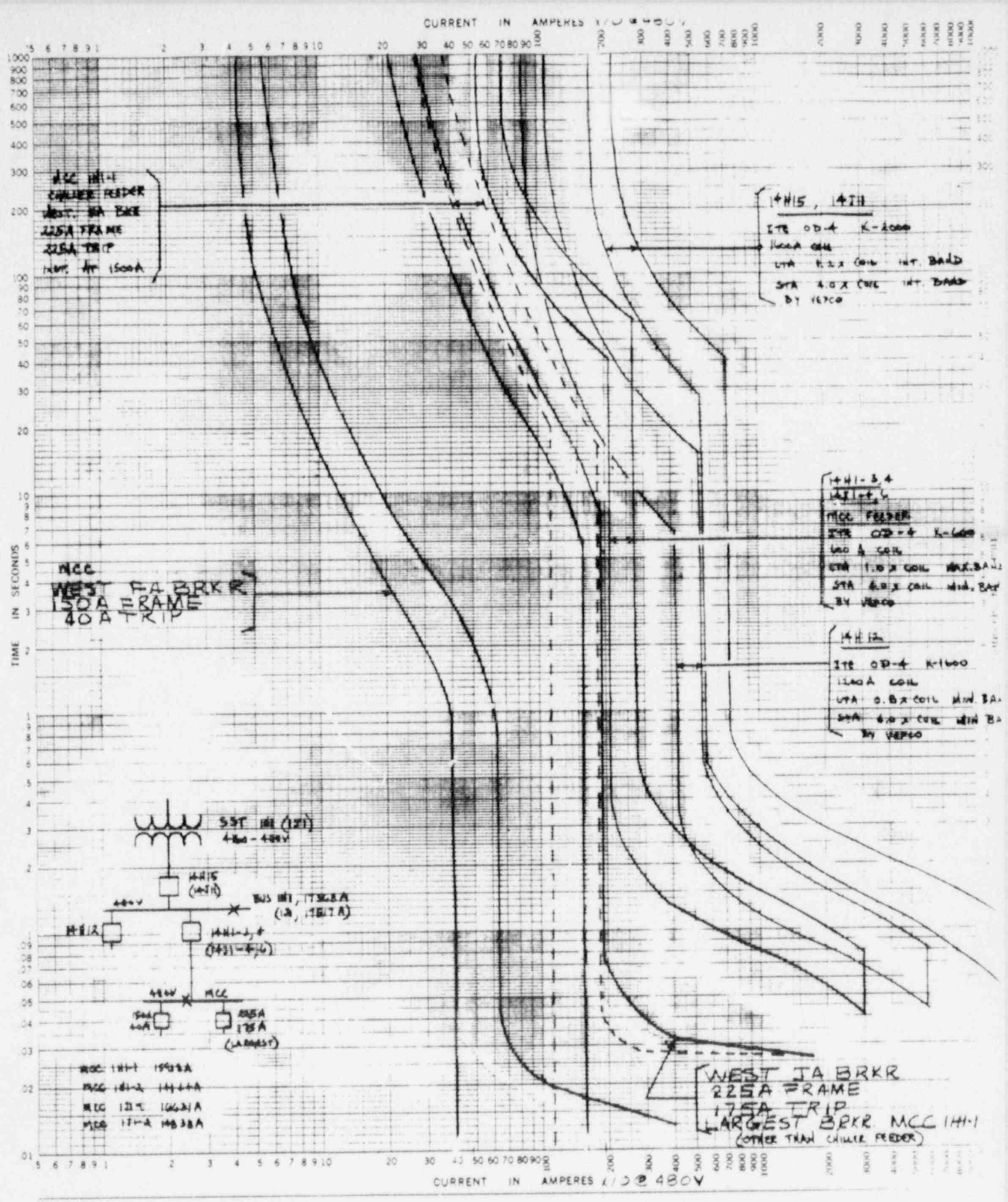
1. Tests made at Volts a.c. at p.f. starting at 25C with no initial load Date 6-1-84 JMB

2. Curves are plotted to IE Data Test points so variations should be

REV 1 7/2/84

REV 2 7-29-86 W.C.F.-VEPCo

K&E TIME-CURRENT CHARACTERISTIC KEUFFEL & ESSER CO. 48 5258



480 VAC

For BUSES 1H1 AND 1T1, 480V MCC's

TIME-CURRENT CHARACTERISTIC CURVES

Fuse Links In STONE & WEBSTER ENG'G. CORP.

Dated

BASIS FOR DATA Standards

1. Tests made at Volts A.C. p.f., starting at 25C with no initial load

2. Curves are plotted to I.E.E. TD 6.94. Test points so variations should be

(1) SC-343-70 (2) AD 29-160 sh. 63 (3) SC-3514-77

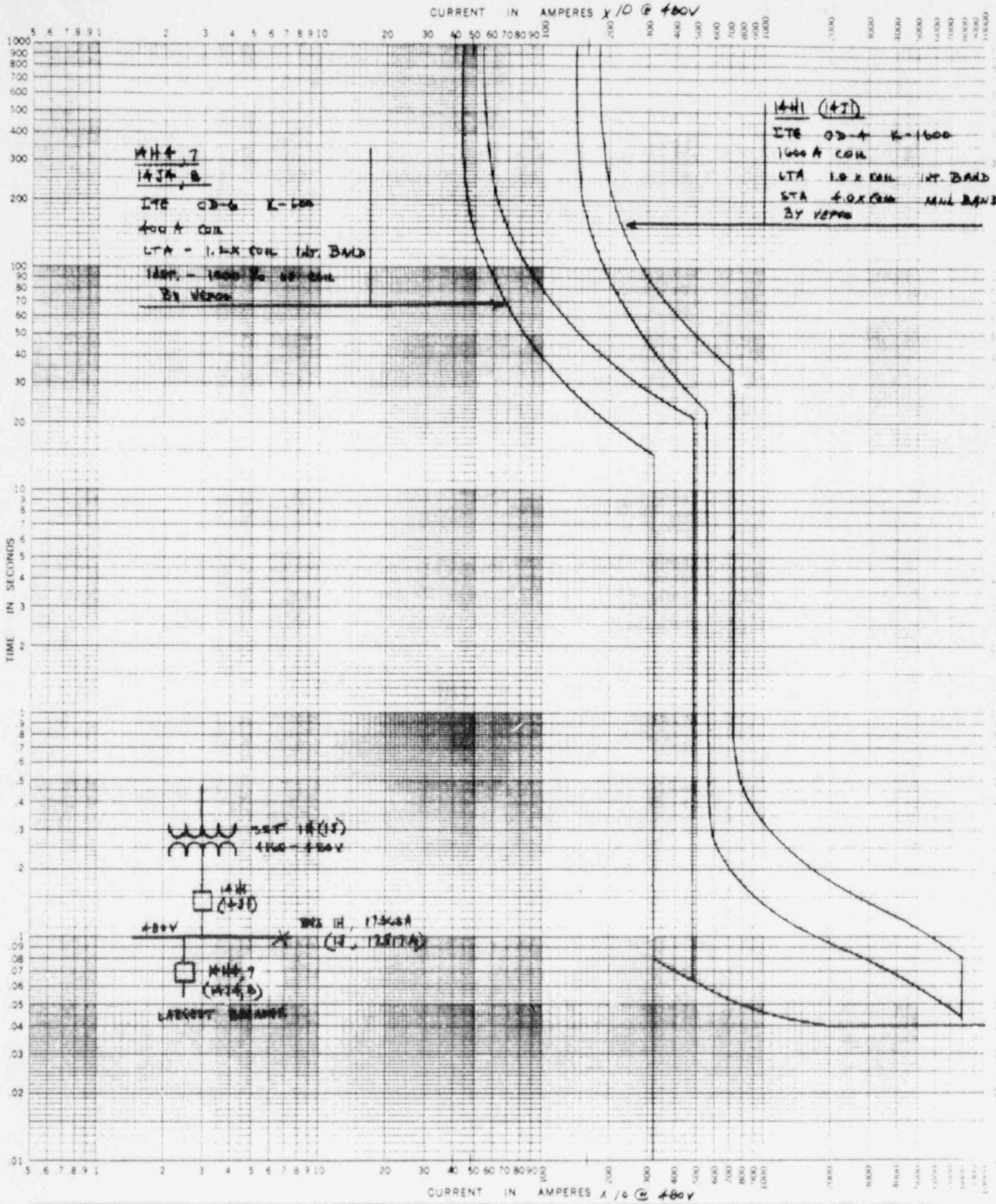
No. 14257 63-E-221 sh 1 of 2

Date 6-1-84 KTG KHK

2 DRAWINGS

K&E TIME-CURRENT CHARACTERISTIC 46 5258
KEUFFEL & ESSER CO. MADE IN U.S.A.

REV 2 1-2-87 JCP-KP



480 V A.C. Bus 1H, 1J TIME-CURRENT CHARACTERISTIC CURVES CH CATEGORY I

For ..... Fuse Links In

BASIS FOR DATA Standards ..... Dated .....

1. Tests made at ..... Volts a-c at ..... p.f., starting at 25C with no initial load

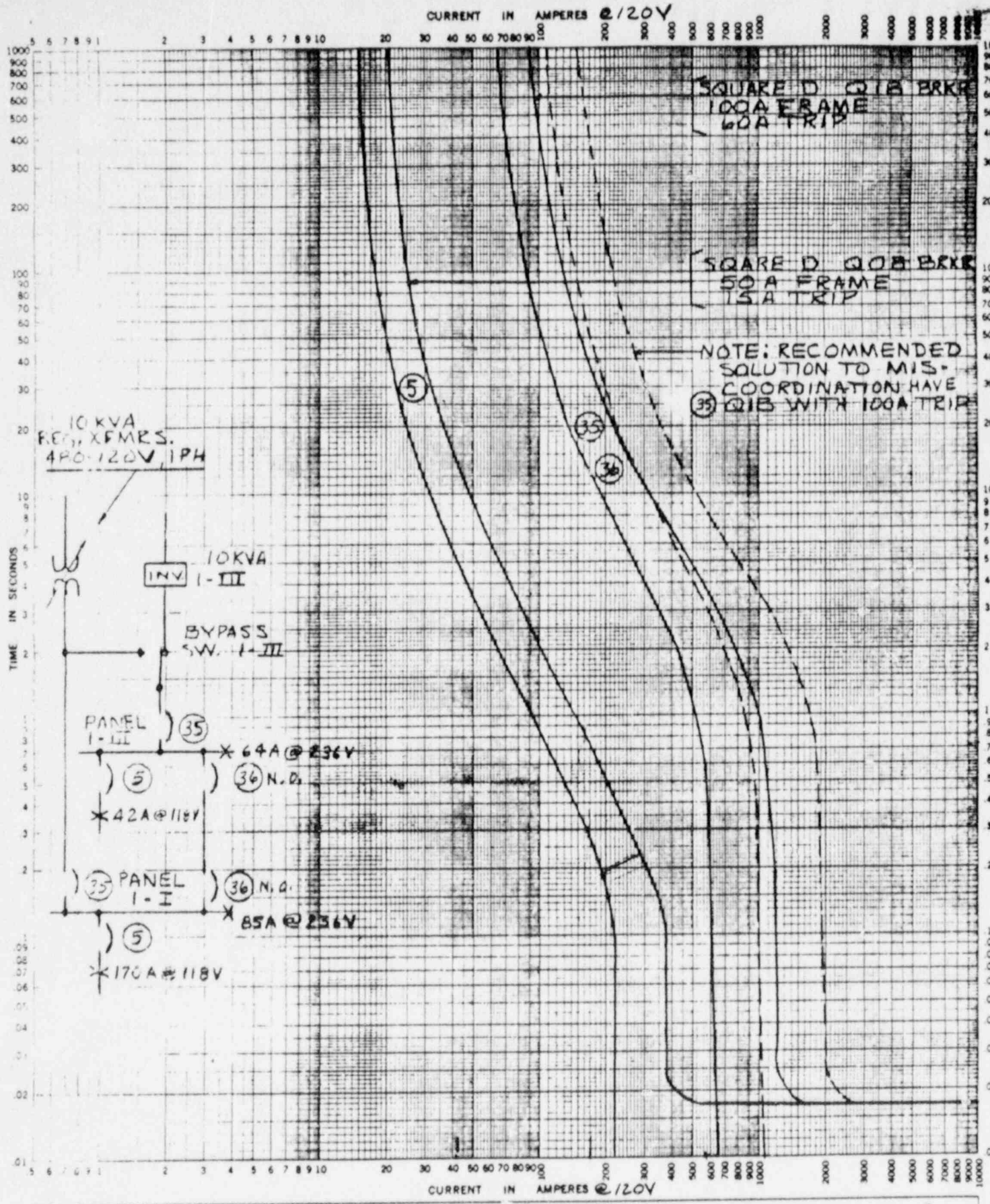
2. Curves are plotted to. ITE - TD 6694 - TD 6695 Test points so variations should be .....

No. 4257.63-E-222 sh. 2 of 2

Date 7-30-66 MCP-VEPCO

SURRY UNIT 1

NOTE TIME-CURRENT CHARACTERISTIC 48 5256



120 V A.C. DISTRIBUTION — TIME-CURRENT CHARACTERISTIC CURVES — QA CATEGORY I

For PANELS I-I & I-III — Fuse Links In STONE & WEBSTER ENG'G CORP.

BASIS FOR DATA Standards: ~~[illegible]~~ Dated

1. Tests made at ____ Volts a-c at ____ p-f., starting at 25C with no initial load

2. Curves are plotted to SQUARE D Test points so variations should be ____
653-9, 680-3

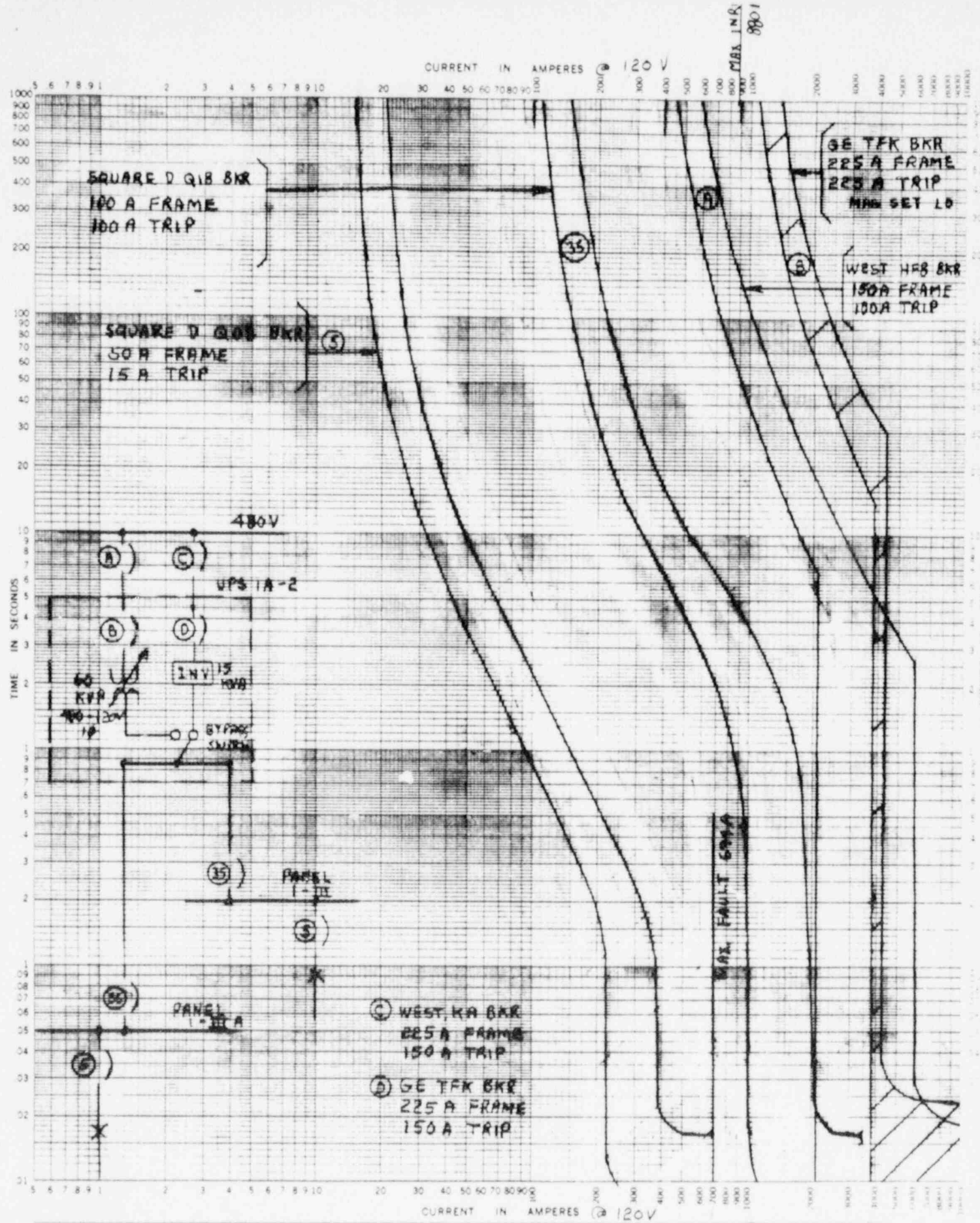
No. 14257.63-E-223 Sh. 1 of 2

Date 6-1-84 9/4/3 KWK

K&E TIME CURRENT CHARACTERISTIC 46 5258
KEUFFEL & ESSER CO. MADE IN U.S.A.

TRAIN "A"

SURRY 1
Rev. 1 7-11-14 GBZ
Rev. 2 8-1-84 GBZ



120 V AC DISTRIBUTION — TIME-CURRENT CHARACTERISTIC CURVES — 3A CATEGORY II

For PANELS 1-III & 1-III A — Fuse Links In — STONE & WEBSTER ENG. (CO.)

BASIS FOR DATA Standards OTHERS SIMILAR — Dated — No. 14257.63-E-225 sh. 2 of 2

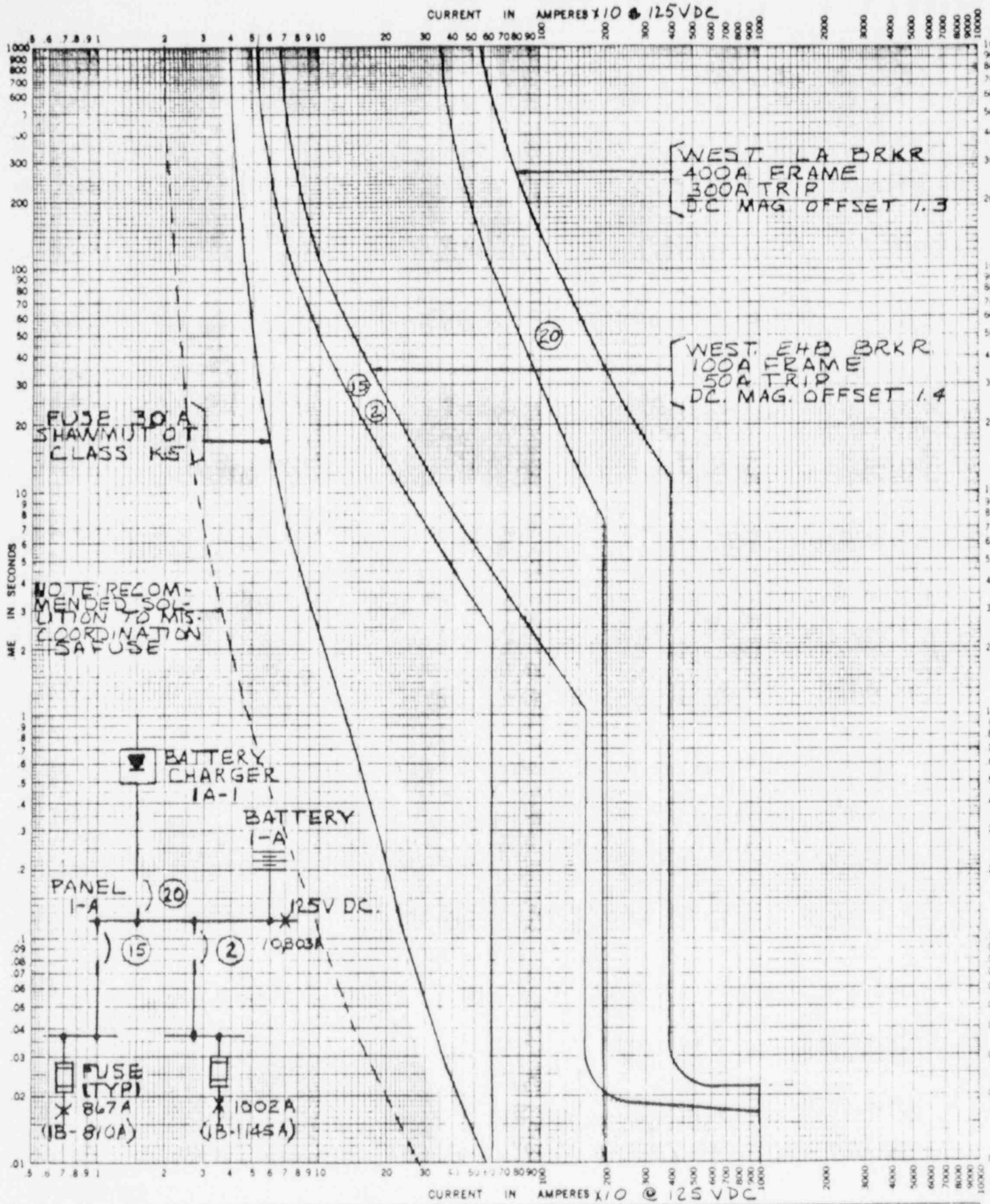
1. Tests made at — Volts a-c at — p.f., starting at 25C with no initial load — Date REPRAWN 4-30-86

2. Curves are plotted to — Test points so variations should be — SES-6103G, SQUARE D 630-3, SQUARE D 612-4, & SC-3511-77

K·E TIME-CURRENT CHARACTERISTIC KEUFFEL & ESSER CO. 48 5258

TRAIN "B"

SURRY 1



125 V D.C. DISTRIBUTION TIME-CURRENT CHARACTERISTIC CURVES QA CATEGORY I

For PANEL 1-A Fuse Links In STONE & WEBSTER ENG'G CORP.

BASIS FOR DATA Standards ~~FUSES 1 B SIMILAR~~ Dated

1 Tests made at Volts a-c at p-f., starting at 25C with no initial load

2 Curves are plotted (20) SC-3510-77 Test points so variations should be

(2) SC-3515-77, Chase Shawmut 957188 (07716)

No 14257.63-E-224 sh. 1 of 2

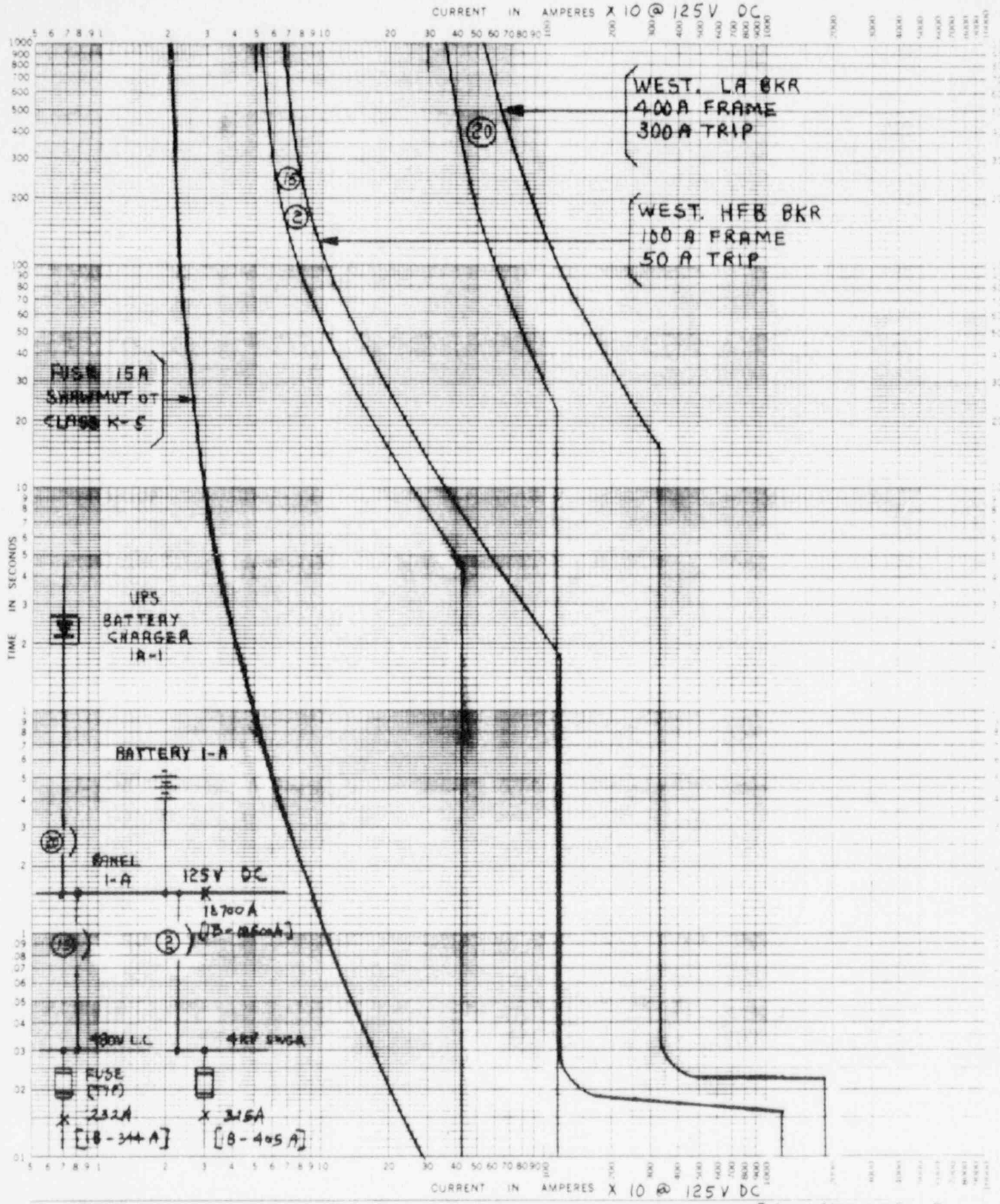
Date 6-1-84 GHB KAK

K·E TIME-CURRENT CHARACTERISTIC KEUFFEL & ESSER CO MADE IN U.S.A. 48 5258

TRAIN "A"

SURRY 1

REV 1, 7-11-84 GHB



125 V DC DISTRIBUTION — TIME-CURRENT CHARACTERISTIC CURVES

QA CATEGORY I

For PANEL 1-A — Fuse Links In

BASIS FOR DATA Standards FUSES ON 1-B SIMILAR — Dated

1. Tests made at ____ Volts a-c at ____ p.f., starting at 25C with no initial load

2. Curves are plotted to ____ Test points so variations should be

(W) SC-3515-77, (W) SC-3510-77, CHASE SWAWMUT OT (07716)

STONE & WEBSTER ENG. CORP.

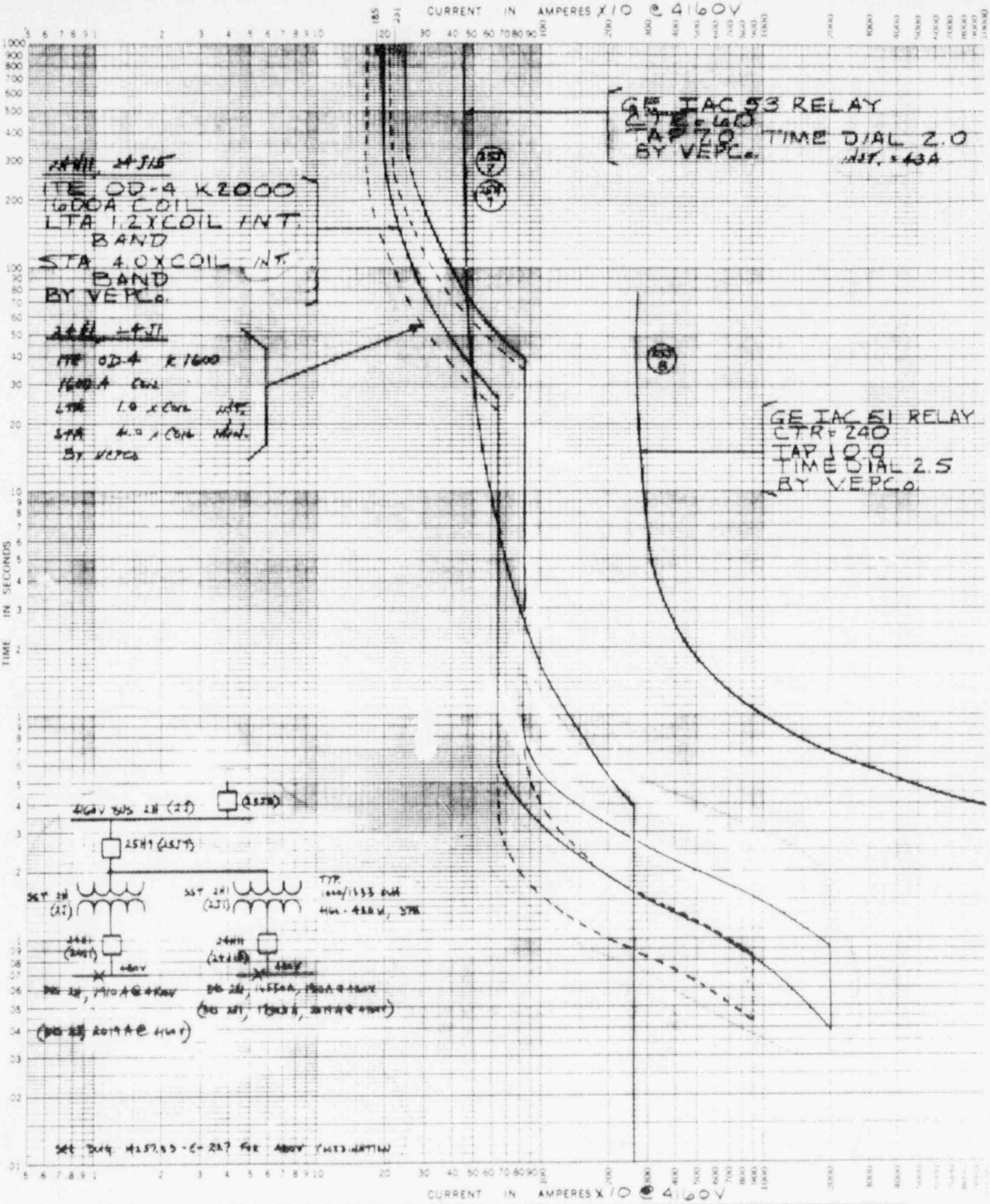
No. 14257.63-E-224 sh. 2 of

Date REDRAWN 4/16/86

TRAIN "B"

SURRY 1

K-E TIME-CURRENT CHARACTERISTIC 48 5258



4160V A.C. TIME-CURRENT CHARACTERISTIC CURVES

For SURRY UNIT 2 4160V, 4160V to 480V Fuse Links ... in ...

STONE & WEBSTER ENG'G CORP

BASIS FOR DATA Standards ... Dated ...

1. Tests made at ... Volts a.c. at ... p.f., starting at 25C with no initial load

2. Curves are plotted to ITE-TD6694 Test points so variations should be ...

GE ... VEPCo.

No. 14257.63-E-22

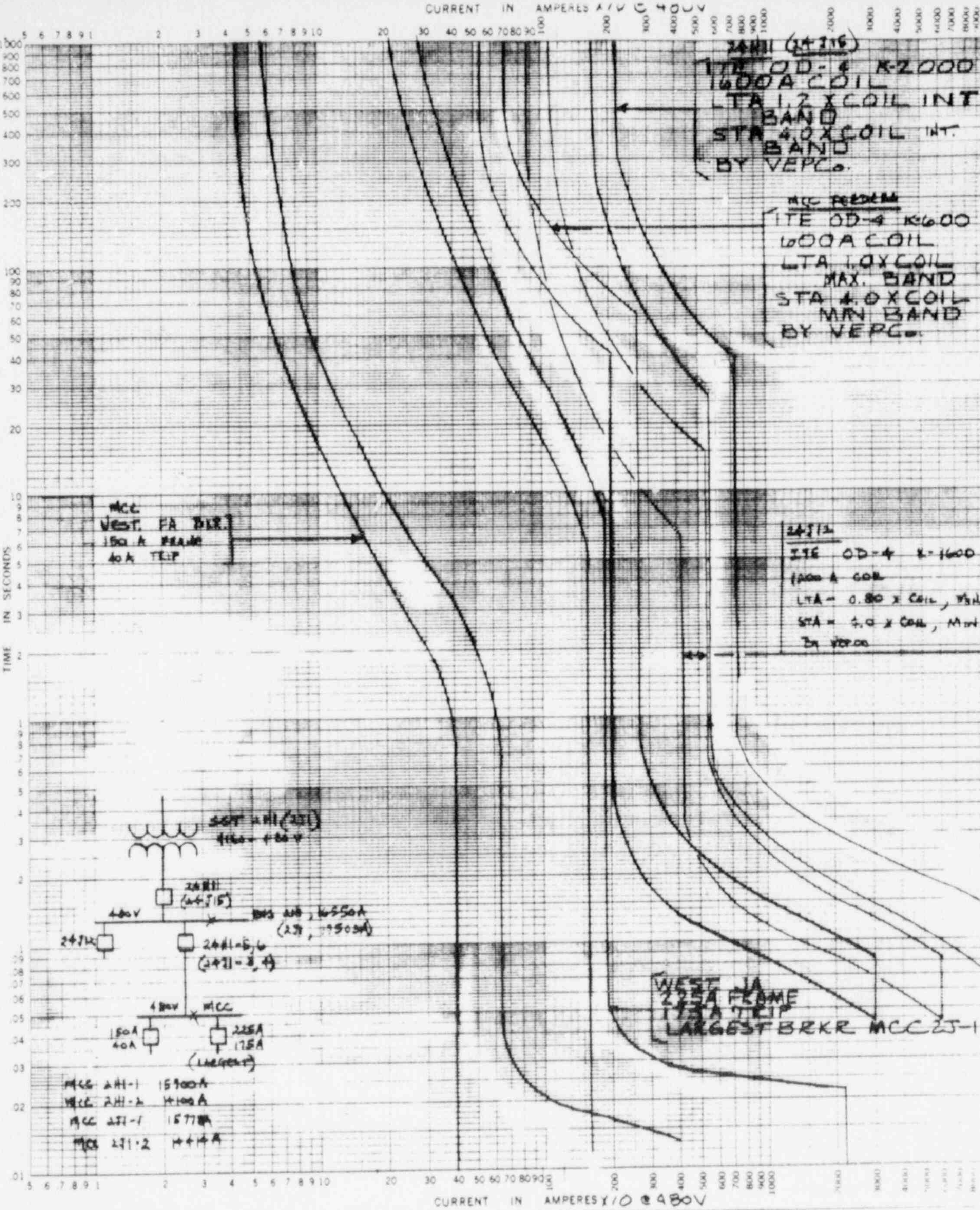
Date 6-1-84

SURRY 2

REV 1 7/2/84

REV 2 7-29-86

K+E TIME-CURRENT CHARACTERISTIC 48 5258
KEUFFEL & ESSER CO.



480V A.C. TIME-CURRENT CHARACTERISTIC CURVES

For BUSES 2H1 AND 2J1, 480V MCC'S Fuse Links. In

STONE & WEBSTER ENG'G CORP

BASIS FOR DATA Standards Dated

1. Tests made at .... Volts a-c at .... p-f., starting at 25C with no initial load

2. Curves are plotted to ITE-TD 6694 Test points so variations should be

SC-343-70 AD 29-160 pg. 63

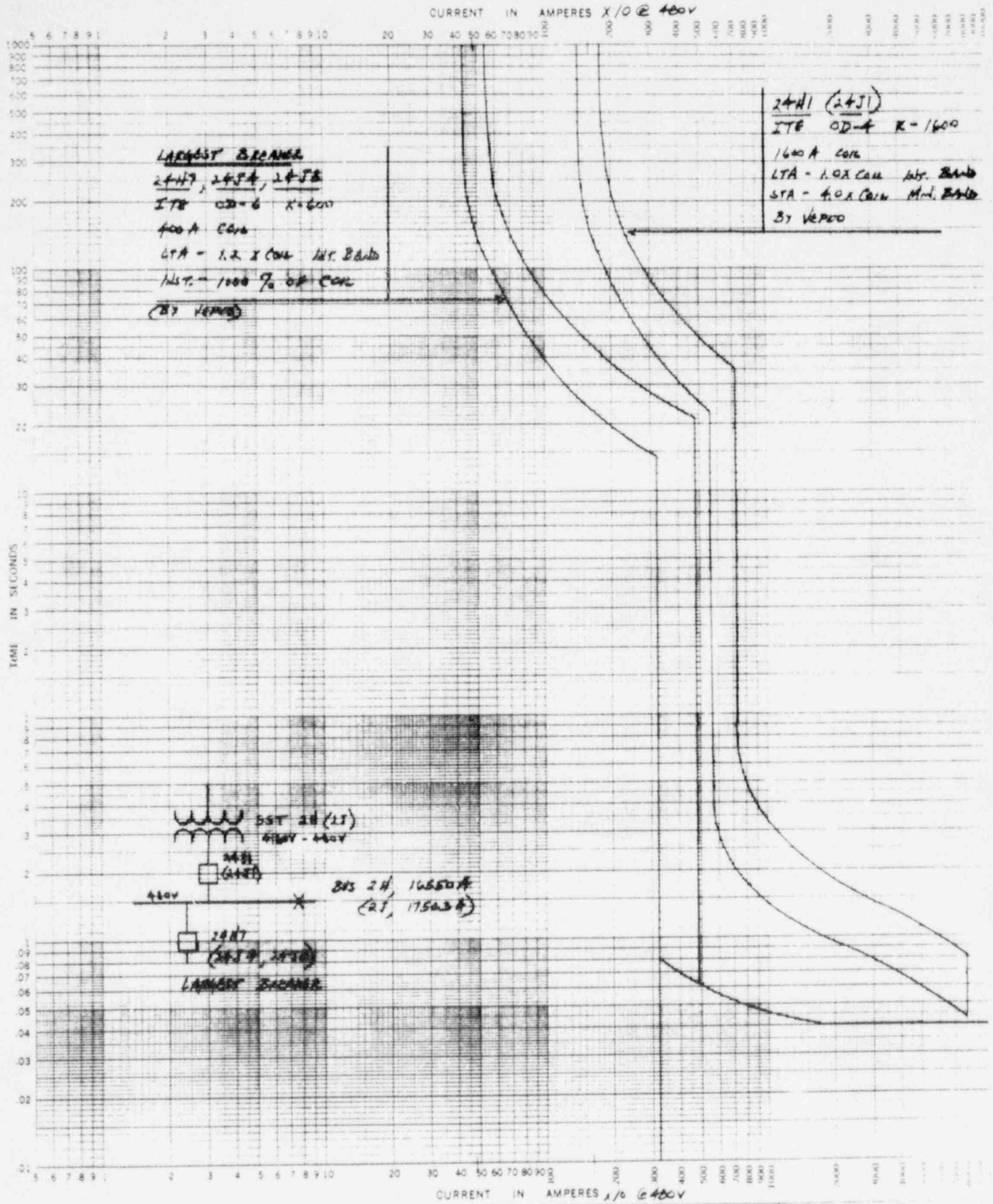
No. 42-763-E-227 sh. 2 of 2

Date 6-1-84

SJIC 2

K·E TIME-CURRENT CHARACTERISTIC 48 5258
KEUFFEL & ESSER CO.

REV. 2 7-30-86



480V A.C. BUS 2H, 2J TIME-CURRENT CHARACTERISTIC CURVES QA CATEGORY I

For Fuse Links In

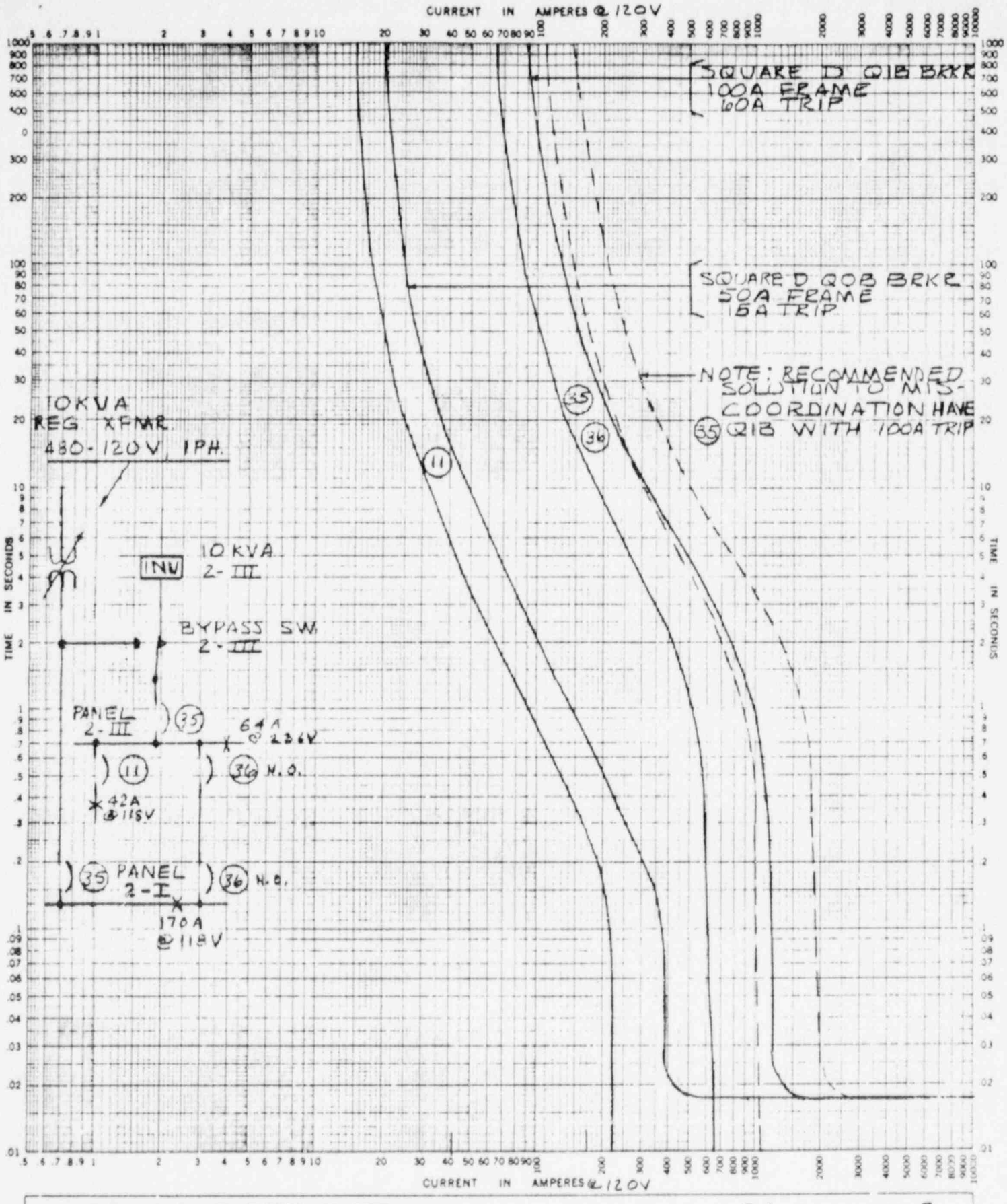
BASIS FOR DATA Standards Dated

1. Tests made at Volts a-c at p.f. starting at 25C with no initial load
2. Curves are plotted to ITE - TD6694 Test points so variations should be
- TD6695

No. 4257.63-E-227 Sh. 2 of
Date 7-30-86 M/CP-1570

SURRY UNIT 2

W-E TIME-CURRENT CHARACTERISTIC 48 5255
KEUFFEL & ESSER CO. PRINTED



120V A.C. DISTRIBUTION TIME-CURRENT CHARACTERISTIC CURVES QA CATEGORY I

For PANELS 2-I & 2-III Fuse Links: In STONE & WEBSTER ENGG CORP

BASIS FOR DATA Standards ~~K-II & K-III SIMILAR~~ Dated

1. Tests made at Volts a-c at p.f., starting at 25C with no initial load

2. Curves are plotted to SQUARE D Test points so variations should be 633-4, 630-3

No. 14257.63-E-228 Sh 1 of 2

Date 6-1-84 ~~2-1-83~~ K.J.K.

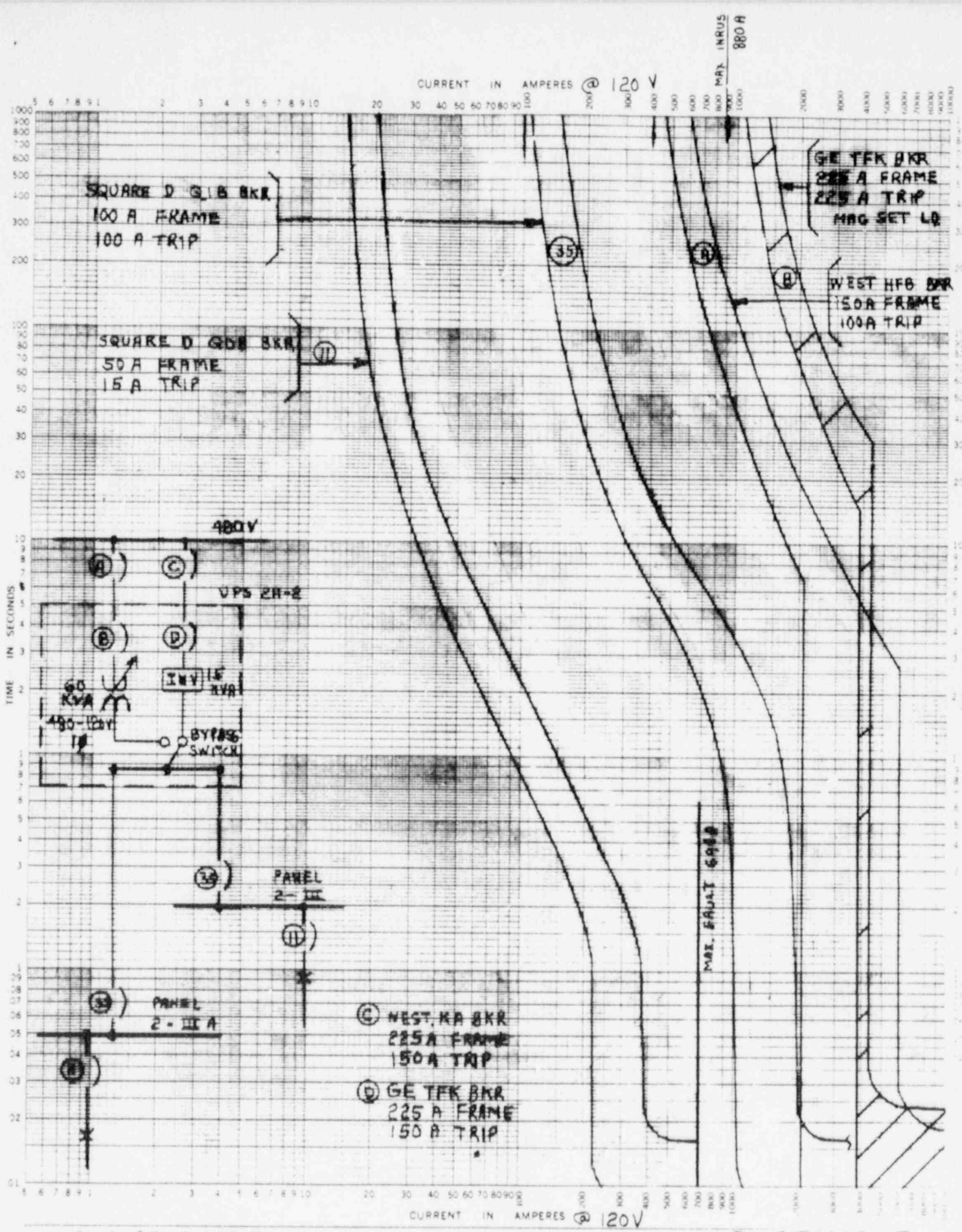
K·E TIME-CURRENT CHARACTERISTIC KEUFFEL & ESSER CO. 48 5258

TRAIN "A"

SURRY 2

REV. 1 7-11-84 K.J.Z.

REV. 2 8-1-84 K.J.Z.



120 V AC DISTRIBUTION — TIME-CURRENT CHARACTERISTIC CURVES

For PANELS 2-III & 2-IIIA — Fuse Links In

BASIS FOR DATA Standards OTHERS SIMILAR — Dated

1. Tests made at ____ Volts a-c at ____ p.f., starting at 25C with no initial load
2. Curves are plotted to ____ Test points so variations should be ____

GES-6103C, SQUARE D 630-3, SQUARE D 633-4

TRAIN "B"

(N) SC-3511-77

QA CATEGORY I

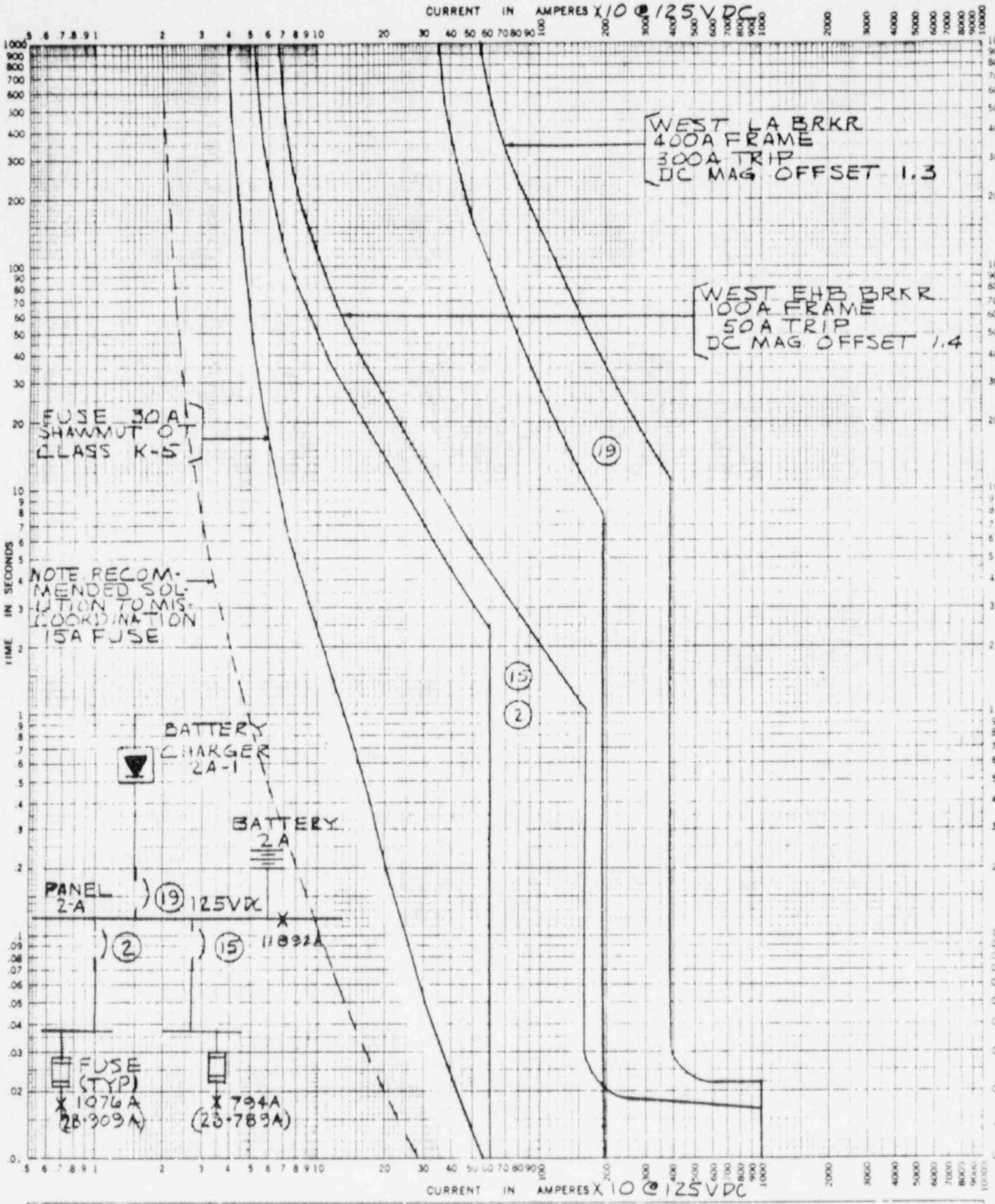
STONE & WEBSTER ENG. CORP.

No. 14257.63-E-228 sh. 2 of

Date REDRAWN 4-30-86

SURRY 2

W-E TIME-CURRENT CHARACTERISTIC 48 5259



125 V.D.C. DISTRIBUTION TIME-CURRENT CHARACTERISTIC CURVES 0A CATEGORY I

For PANEL 2-A Fuse Links In STONE & WEBSTER ENG. CORP.

BASIS FOR DATA Standards ~~FUSES ON 2 & SIMILAR~~ Dated

1. Tests made at Volts a-c at p.f., starting at 25C with no initial load

2. Curves are plotted to (1) SC-3510-77 Test points so variations should be

(2) SC-3515-77, Cable Shawmut 9578-B (07776)

No. 14257.62-E-229 sh. 1 of 2

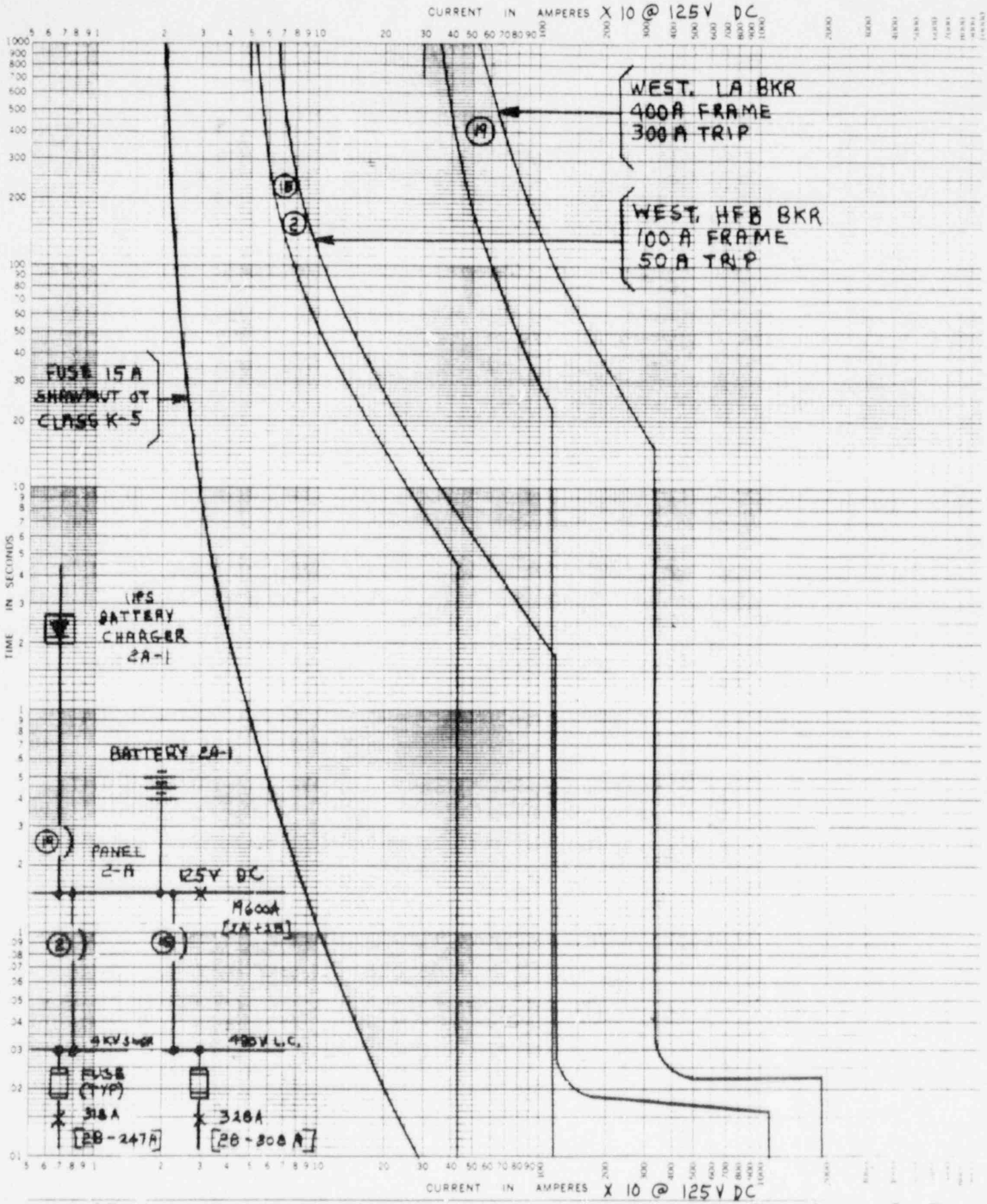
Date 6-1-84 ~~7-18~~ NIK

K·E TIME-CURRENT CHARACTERISTIC KEUFFEL & ESSER CO. MADE IN U.S.A. 48 5258

TRAIN "A"

SURRY 2

REV. 1 9-11-84 GBZ



125V DC DISTRIBUTION — TIME-CURRENT CHARACTERISTIC CURVES

For PANEL 2-A Fuse Links in

BASIS FOR DATA Standards FUSES ON 2-B SIMILAR Dated

1. Tests made at Volts a-c at p.f. starting at 25C with no initial load

2. Curves are plotted to Test points so variations should be

(4) SC-3515-77, (5) SC-3510-77, CHASE SHAWMUT QT (02716)

QA CATEGORY I

STONE & WEBSTER ENG. CORP.

No. 14257.63-E-229 sh. 2 of

Date REDRAWN 4/1/86

TRAIN "B"

SURRY 2

W-E TIME-CURRENT CHARACTERISTIC 48 5255

No. 97887290

RIS 05

VIRGINIA POWER
SURRY POWER STATION

FIRE CONTINGENCY ACTION

NUMBER	PROCEDURE TITLE	REVISION
FCA-1.00	SAFE SHUTDOWN AREA FIRE (WITH 18 ATTACHMENTS)	00.07 PAGE 1 of 2

PURPOSE

Provide guidance for operations personnel to respond to and mitigate the consequences of a fire in safe shutdown fire areas by assuring the ability to achieve and maintain HSD and CSD conditions, as required, with postulated loss of offsite ac power to the affected units.

USER

SPS Operations Personnel

ENTRY CONDITIONS

Any of the following exist:

1) Transition from AP-48, Fire Protection - Operations Response, on a fire in any safe shutdown area;

2) Loss or imminent loss of two redundant trains of safety related equipment resulting from fire or fire suppression equipment.

3) Inhabitability of safe shutdown fire area due to fire induced conditions.

4) Loss or imminent loss of function required for safe shutdown.

5) Shift Supervisor direction.

REVISION RECORD

REV.00.03	PAGE(S):	Entire Procedure	DATE: 03-19-86
REV.00.04	PAGE(S):	Attachment 10 - Part II - Page 6	DATE: 10-09-86
REV.00.05	PAGE(S):	Attachment 10 - pages 3 & 4	DATE: 02-13-87
REV.00.06	PAGE(S):	Attachments 2, 3, 4, 6, and 10	DATE: 04-30-87
REV.00.07	PAGE(S):	Entire Procedure	DATE: DEC 1 8 1987
REV.	PAGE(S):		DATE:
REV.	PAGE(S):		DATE:

APPROVAL RECOMMENDED	APPROVED	DATE
G.L. Bailey QC REVIEW Steve Logonale	CHAIRMAN STATION NUCLEAR SAFETY AND OPERATING COMMITTEE	12-18-87

NUMBER	PROCEDURE TITLE	REVISION
FCA-1.00	SAFE SHUTDOWN AREA FIRE	00.07
		PAGE 2 of 2

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
1	CHECK FIRE CONDITION DOES NOT THREATEN MCR HABITABILITY	Go to FCA-1.01.
2	CHECK FIRE CONDITION DOES NOT THREATEN EQUIPMENT IN THE FOLLOWING AREAS * ESGRs * Cable Vault * Cable Vault Tunnel * Containment	Go to FCA-1.02.
3	CHECK FIRE CONDITION DOES NOT THREATEN EQUIPMENT IN THE FOLLOWING AREAS * Auxiliary Building * Safeguards Building * Turbine Building * MER No. 3	Go to FCA-1.03.
4	CHECK FIRE CONDITION DOES NOT THREATEN EQUIPMENT AT THE LOW LEVEL INTAKE	Go to Attachment 16.

-END-

NUMBER	ATTACHMENT TITLE	REVISION
FCA-1.00	EQUIPMENT HATCH EMERGENCY ESCAPE LOCK	00.07
ATTACHMENT 1		PAGE 1 of 3

The purpose of this attachment is to provide guidance in entering or exiting the containment via the Equipment Hatch Escape Lock. Use of this attachment may be necessary if fire induced damage, loss of instrument air systems or power prevents operation of the Normal Personnel Access Hatch.

Part A Entering Containment Via Equipment Hatch Escape Lock

Part B Exiting Containment Via Equipment Hatch Escape Lock

NUMBER	ATTACHMENT TITLE	REVISION
FCA-1.00	EQUIPMENT HATCH EMERGENCY ESCAPE LOCK	00.07
ATTACHMENT 1		PAGE 2 of 3

PART A

Entering Containment Via Equipment Hatch Escape Lock

NOTE: If no pressure differential exists across the lock doors, the handwheel operation will continue uninterrupted. If a pressure differential does exist, wait until the rush of air ceases to come through the valve.

NOTE: If the interior door had been left open. Handwheel #1 will not operate because of the interlock system. Therefore, handwheel #5 is provided to remotely close the interior door prior to ingress. Then proceed to step 1.

1) Rotate wheel #1 approximately 3-3/4 revolutions to open the exterior door.

2) Enter the lock. Rotate wheel #2 approximately 3-3/4 revolutions to close the exterior door.

3) Rotate wheel #4 approximately 3-3/4 revolutions to open interior door.

NOTE: If no pressure differential exists across the lock doors, the handwheel operation will continue uninterrupted. If a pressure differential does exist, wait until the rush of air ceases to come through the valve.

4) Exit the lock. Rotate wheel #3 approximately 3-3/4 revolutions to close the interior door.

PART B

Leaving Containment Via Equipment Hatch Escape Lock

NOTE: If no pressure differential exists across the lock doors, the handwheel operation will continue uninterrupted. If a pressure differential does exist, wait until the rush of air ceases to come through the valve.

NOTE: If the exterior door had been left open. Handwheel #2 will not operate because of the interlock system. Therefore, handwheel #6 is provided to remotely close the exterior door prior to egress. Then proceed to step 1.

1) Rotate wheel #3 approximately 3-3/4 revolutions to open the interior door.

2) Enter the lock. Rotate wheel #4 approximately 3-3/4 revolutions to close the interior door.

3) Rotate wheel #2 approximately 3-3/4 revolutions to open exterior door.

NOTE: If no pressure differential exists across the lock doors, the handwheel operation will continue uninterrupted. If a pressure differential does exist, wait until the rush of air ceases to come through the valve.

NOTE: Exit the lock. Rotate wheel #1 approximately 3-3/4 revolutions to close the exterior door.

NUMBER	ATTACHMENT TITLE	REVISION
FCA-1.00	LOCAL OPERATION OF EDG 1 AND 2	00.07
ATTACHMENT 2		PAGE 1 of 4

The purpose of this attachment is to provide instructions to control, synchronize and load the emergency diesel generator from local Diesel Isolation Panel located in the Emergency Diesel Generator Room.

* *

*

* CAUTION: Personnel performing this operation should be using radio head sets to provide continuous communication. *

*

* *

NOTE: Auto Start Disable switch in the ESGR must be reset if any of the following have occurred:

* Overspeed
* Manual stop
* No voltage relay (failure to flash field)

NUMBER	ATTACHMENT TITLE	REVISION
FCA-1.00	LOCAL OPERATION OF EDG 1 AND 2	00.07
ATTACHMENT 2		PAGE 2 of 4

PART I

1 At the Diesel Isolation Panel in EDG room, verify the position of the following switches:

a) H8 Synchronizing switch - OFF

b) H3 Synchronizing switch - OFF

c) Emergency Diesel Isolation switch - OFF

d) H8 Normal Feed Control switch - AFTER TRIP

e) H3 Emergency Feed Control switch - AFTER TRIP

f) H Emergency Bus Voltmeter switch - OFF

g) Emergency Generator H Fast Start Defeat switch - OFF

h) Generator Field Flash switch - OFF

NOTE: Placing EDG isolation switch to ON trips EDG isolation lockout relays. Contacts from the lockout relays and the EDG isolation switch transfer the following to the local EDG pnl and activate an alarm in the MCR.

a) Control

b) Synchronizing

c) Metering

d) Undervoltage protection

2 Verify "auto/local" switch on Engine Control pnl in AUTO.

3 Transfer EDG to local control

a) Place EDG isolation switch to - ON

b) If off site power is available check H8 breaker closed THEN GO Part III of this attachment

c) If on site power is NOT available check H3 breaker close THEN GO TO Part III of this attachment

d) If H bus voltage is zero THEN continue with Part II of this attachment

NUMBER	ATTACHMENT TITLE	REVISION
FCA-1.00	LOCAL OPERATION OF EDG 1 AND 2	00.07
ATTACHMENT 2		PAGE 3 of 4

PART II

1 At the EDG Engine Control Panel, place the "auto/local" switch to local start position.

2 If the EDG is not running, depress "start" pushbutton.

3 Verify engine accelerates to 900 RPM. If NOT place Fast Start Reset switch to ON to gain governor control, then raise engine speed to 900 RPM (60 HZ) with the governor control switch.

NOTE: Emergency Diesel output breaker H3 will not close automatically until all the following conditions are met:

a) Diesel Generator voltage greater than 113 VOLTS (INCOMING)

b) H8 Breaker has tripped

c) Control switch for H3 - AFTER TRIP position

d) Diesel Generator Speed - greater than 870 RPM

4 Turn synchronizer switch for H3 - ON

5 If generator voltage is not established momentarily place the field flash switch to ON.

6 Using voltage control switch, match generator (incoming) voltage to emergency bus (running) voltage. If emergency bus is dead, raise incoming voltage to 120 V.

7 Using speed control switch (Governor Control) adjust speed until synchroscope is moving SLOWLY in the FAST direction. If emergency bus is dead, immediately close EDG output breaker H3.

8 Close generator output breaker when synchroscope passes 11 o'clock.

9 Turn OFF synchroscope.

10 Using speed control switch, raise load as required.

NUMBER	ATTACHMENT TITLE	REVISION
FCA-1.00		00.07
ATTACHMENT 2	LOCAL OPERATION OF EDG 1 AND 2	PAGE 4 of 4

11 Using the generator voltage control switch obtain equal to or greater than 4160 VAC on Emergency bus (Max 4400 VAC).

PART III

1 Close stub-bus tie breaker H9 as required.

2 Start equipment as desired.

3 Re-energize associated 480V emergency bus.

4 If desired, perform emergency start of EDG #3 IAW Attachment 3.

NUMBER	ATTACHMENT TITLE	REVISION
FCA-1.00	#3 EDG ALTERNATE FAST START	00.07
ATTACHMENT 3		PAGE 1 of 2

This attachment provides instructions for EDG operation when normal automatic and manual start sequences have failed. A false SI signal is provided direct to the EDG control circuits.

1 From either unit auxiliary shutdown panel obtain a prefabricated electrical jumper for each EDG requiring fast start.

2 In the EDG room for the EDG requiring start, locate terminal block B or C inside the Remote Excitation Cabinet (see attached figure).

NOTE: The following actions will occur when the electrical jumper is placed:

* Engine will fast start to 900 RPM (60 cps)
* Flashing of the generator field
* EDG will be available to accept load
* If an undervoltage condition exists on the associated ac emergency bus the EDG will automatically load.

3 Momentarily place the electrical jumper between terminal S1AX and S1PA of terminal block B.

4 Verify EDG start. If EDG did NOT start, momentarily place jumper between terminal S2AX and S2PA of terminal block C.

5 If ac emergency bus had undervoltage condition, verify EDG loading.

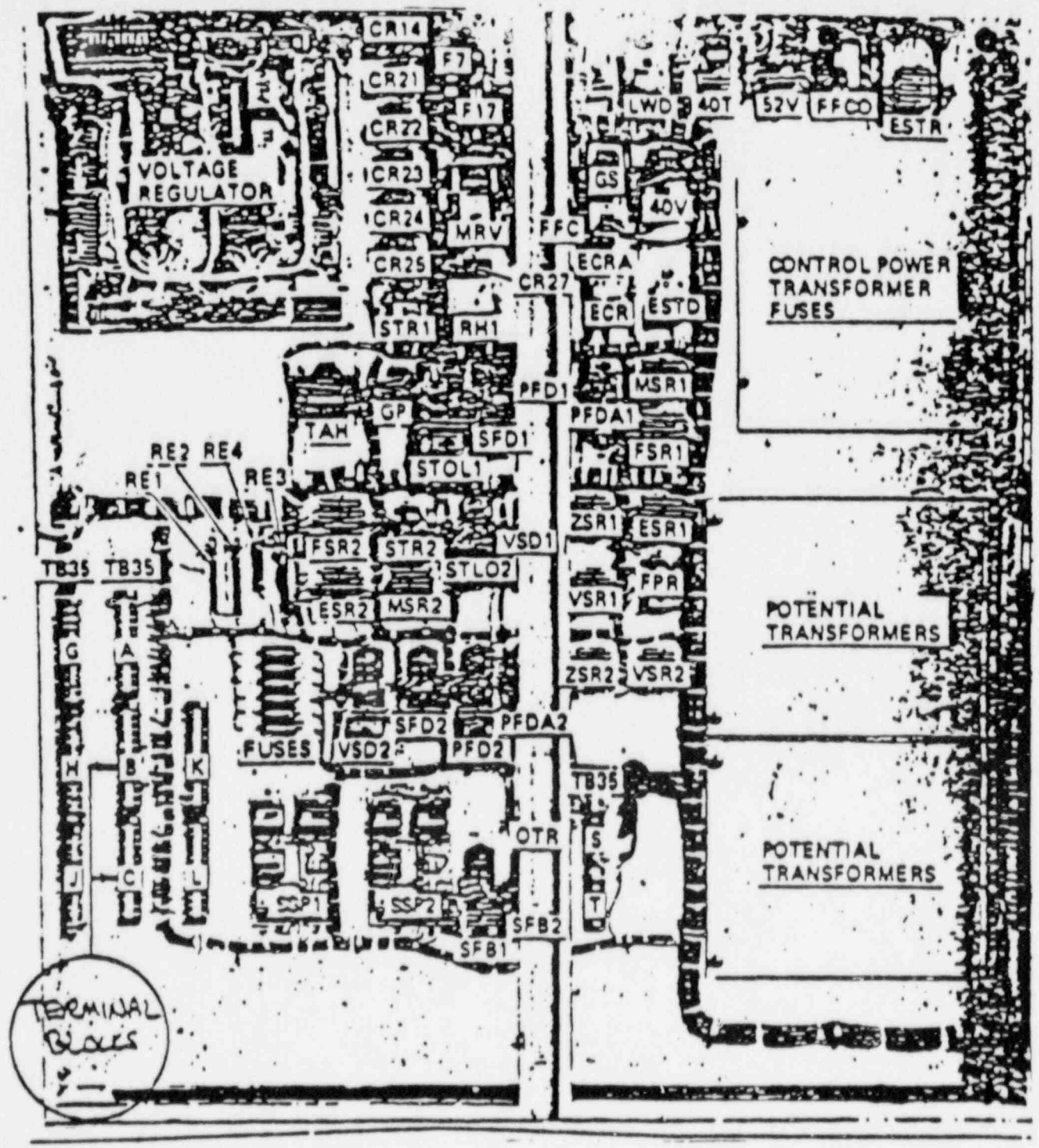
6 Close stub-bus tie breaker 15J9 as required.

7 Start equipment as desired.

- END -

No 97881220

NUMBER	ATTACHMENT TITLE	REVISION
FCA-1.00		00.07
ATTACHMENT	#3 EDC ALTERNATE FAST START	PAGE 2 of 2



REMOTE EXCITATION CABINET - FRONT INTERIOR VIEW

NUMBER	ATTACHMENT TITLE	REVISION
FCA-1.00	INDIVIDUAL TRANSFER OF COMPONENTS TO AUXILIARY SHUTDOWN PANELS	00.07
ATTACHMENT 4		PAGE 1 of 3

The purpose of this attachment is to provide guidance in completing the transfer of component control to the Auxiliary Shutdown Panel when the transfer fails on activation of the group transfer switch.

NOTE: Do not perform this attachment if the transfer failure is the result of the components emergency bus being de-energized.

Part A - Unit 1 Individual Component Transfer

Part B - Unit 2 Individual Component Transfer

NUMBER	ATTACHMENT TITLE	REVISION
FCA-1.00	INDIVIDUAL TRANSFER OF COMPONENTS TO AUXILIARY SHUTDOWN PANELS	00.07
ATTACHMENT 4		PAGE 2 of 3

PART A
UNIT 1

At the local control box, select OVERRIDE position on mode switch then rotate transfer switch to AUX PNL.

COMPONENTS	LOCATION
1-FW-P-3A	15H4
1-FW-P-3B	15J4
1-CH-P-1A	15H5
1-CH-P-1C	15H6
1-CH-P-1B	15J5
1-CH-P-1C	15J2 (alt)
MOV-1350	Transfer Relay Cabinet #4 (Cable Vault)
MOV-FW-151A	Transfer Relay Cabinet #1 (Cable Vault)
MOV-FW-151C	Transfer Relay Cabinet #1 (Cable Vault)
MOV-FW-151E	Transfer Relay Cabinet #1 (Cable Vault)
1-CH-P-2A	Transfer Relay Cabinet #1 (Cable Vault)
MOV-FW-151B	Transfer Relay Cabinet #2 (Cable Vault)
MOV-FW-151D	Transfer Relay Cabinet #2 (Cable Vault)
MOV-FW-151F	Transfer Relay Cabinet #2 (Cable Vault)
1-CH-P-2B	Transfer Relay Cabinet #2 (Cable Vault)
SOV-MS-102A	Transfer Relay Cabinet #5 (Left of Aux S/D Pnl
SOV-MS-102B	Transfer Relay Cabinet #3 (Left of Aux S/D Pnl

If breakers fail to operate go to FCA-1.00 Attachment 11.

NUMBER	ATTACHMENT TITLE	REVISION
FCA-1.00	INDIVIDUAL TRANSFER OF COMPONENTS TO AUXILIARY SHUTDOWN PANELS	00.07
ATTACHMENT 4		PAGE 3 of 3

PART B
UNIT 2

At the local control box, select OVERRIDE position on mode switch then rotate transfer switch to AUX PNL.

COMPONENTS	LOCATION
2-FW-P-3A	25H4
2-FW-P-3B	25J4
2-CH-P-1A	25H5
2-CH-P-1C	25H6
2-CH-P-1B	25J5
2-CH-P-1C	25J2 (alt)
MOV-2350	Transfer Relay Cabinet #4 (Cable Vault)
MOV-FW-251A	Transfer Relay Cabinet #1 (Cable Vault)
MOV-FW-251C	Transfer Relay Cabinet #1 (Cable Vault)
MOV-FW-251E	Transfer Relay Cabinet #1 (Cable Vault)
1-CH-P-2C	Transfer Relay Cabinet #1 (Cable Vault)
MOV-FW-251B	Transfer Relay Cabinet #2 (Cable Vault)
MOV-FW-251D	Transfer Relay Cabinet #2 (Cable Vault)
MOV-FW-251F	Transfer Relay Cabinet #2 (Cable Vault)
1-CH-P-2D	Transfer Relay Cabinet #2 (Cable Vault)
SOV-MS-202A	Transfer Relay Cabinet #5 (Left of Aux S/D Pnl
SOV-MS-202B	Transfer Relay Cabinet #3 (Left of Aux S/D Pnl

If breakers fail to operate go to FCA-1.00 Attachment 11.

NUMBER	ATTACHMENT TITLE	REVISION
FCA-1.00		00.07
ATTACHMENT 5	LOCAL OPERATION OF RHR & CCW PUMPS	PAGE 1 of 1

Control of Individual Components may be shifted to either the MCR or Local Panels by operating the components mode switches Locally.

At the local panel select LOCAL position on the mode switch to operate equipment using control switch.

COMPONENTS	LOCATION
1-RH-P-1A	15H11
1-RH-P-1B	15J11
1-CC-P-1A	15H10
1-CC-P-1B	15J10
2-RH-P-1A	25H11
2-RH-P-1B	25J11
1-CC-P-1C	25H10
1-CC-P-1D	25J10

- END -

NUMBER	ATTACHMENT TITLE	REVISION
FCA-1.00		00.07
ATTACHMENT 6	COMMUNICATIONS	PAGE 1 of 8

The purpose of this attachment is to provide guidance in establishing radio communication that may have been interrupted or threatened due to the location of a limiting fire condition.

NOTE: Radios are intended as the primary means of safe shutdown communication.

Power to the standby repeater is normally feed from the 1H Bus. Alternate feed is available from the 2J Bus.

The station PBX (3 digit) lines will be out of service during a loss of offsite power. The Emergency Communicator folder lists phones available to establish outside communication links.

Gaitronics is not required for safe shutdown communication.

Part A - Radio Console Operation from the MCR.

Part B - Radio Console Operation from the ESGR.

Part C - Standby Repeaters Link to the Containments.

Part D - Containment Standby Antenna Operation.

Part E - Portable Radio Operation.

Part F - Gaitronics Operation.

PART A
Radio Console Operation from the MCR

NOTE: Normal transmission from the SS console uses the main operations or Appendix R repeaters, located in Unit 1 cable spreading room.

Operation of the Standby repeaters will be required if limited fire conditions exist in either units cable vault/tunnel or Unit 2 ESGR.

1. If required due to fire location transfer to the standby repeaters.

   a) Momentarily depress the MAIN/STDBY buttons for the operations and Appendix R frequencies.

   b) Check the standby light on for both frequencies.

2. Momentarily depress the select/call button on the frequency desired.

3. Contact personnel using the console mike and transmit button.

4. If the standby repeaters were placed in service then Part C of this attachment must be completed prior to containment entry.

5. If radio equipment has been damaged within the containment refer to Part D of this attachment.

6. If fire damage has resulted in gaitronics system failure refer to Part F of this attachment.

NUMBER	ATTACHMENT TITLE	REVISION
FCA-1.00	COMMUNICATIONS	00.07
ATTACHMENT 6		PAGE 3 of 8

PART B
Radio Console Operation from the ESGR

NOTE: Transmission from the ESGR consoles uses the Standby repeaters located on the 45' level of the Auxiliary Building.

1. At the JB COMM 7 panel, located next to Unit 1 Auxiliary Shutdown Panel, place the repeater feed switches to the following positions.

   a) Console select switch (SW-1) - OFF
   b) Unit 1 select switch (SW-2) - ON
   c) Unit 2 select switch (SW-3) - ON

2. At the radio consoles located next to the Auxiliary Shutdown panels, turn the key switch to ON.

3. Verify the message display initially displays 8's.

4. Verify display "Page No" in the operator prompt window after the console completes a 30 second self check.

5. If an "Error 8 or 9" message is displayed

   a) Press the configure encoder twice
   b) Press 0 numeric key
   c) Press Page
   d) Check "Page No" prompt displayed

6. If recall of personnel using page beepers is desired perform the following.

   a) Press Channel 2
   b) Check Channel 2 light on
   c) Enter the page beeper number
   d) Enter "2" (Emergency Alert Call)
   e) Press PAGE
   f) Check "In Process" displayed
   g) When "Page No" displayed console is ready to accept additional page beeper numbers.

7. To contact personnel with portable radios using the operations frequency

   a) Press Channel 2
   b) Check Channel 2 light on
   c) Contact personnel by depressing the transmit bar at the microphone base.

8. To contact personnel with portable radios using the Appendix R frequency

   a) Press Channel 2
   b) Check Channel 2 light OFF
   c) Contact personnel by depressing the transmit bar at the microphone base.

9. Complete Part C of this attachment prior to containment entry.

NUMBER	ATTACHMENT TITLE	REVISION
FCA-1.00	COMMUNICATIONS	00.07
ATTACHMENT 6		PAGE 5 of 8

PART C
Standby Repeater Link To The Containments

1. Locate the emergency coax cables coiled in lockers on the 13' level of the Auxiliary Building.

2. Run the cables into each units cable vault.

3. Disconnect the main repeater feeds to the containment and connect the emergency coax cable in each units cable vault.

   * Unit 1 Penetration 4C

   * Unit 2 Penetration 3D

4. Connect the other end of each cable to the connections located in JB COMM 9 panel.

NUMBER	ATTACHMENT TITLE	REVISION
FCA-1.00	COMMUNICATIONS	00.07
ATTACHMENT 6		PAGE 6 of 8

PART D
Containment Standby Antenna Operation

1. Locate the emergency coax cable coiled inside a box on the 15' level of the containment near the electrical penetration area.

2. Disconnect the original antenna coax feed in the electrical penetration area.

   * Unit 1 Penetration 4C

   * Unit 2 Penetration 3D

3. Connect the emergency coax cable located in step 1 to the location in step 2.

NUMBER	ATTACHMENT TITLE	REVISION
FCA-1.00	COMMUNICATIONS	00.07
ATTACHMENT 6		PAGE 7 of 8

PART E
Portable Radio Operation

1. Turn on by rotating volume control clockwise approx 1/2 turn
2. Set frequency selector to channel three (3)
3. Place squelch switch to "0" position
4. Rotate squelch control until background noise just stops
5. To talk press the push-to-talk switch on side of radio
6. The radio is capable of 8 frequency selections as listed below:

USER	POSITION	CALL SIGN
OPERATIONS (RPTR.)	1	KZL-657
OPERATIONS (TALK-AROUND)	2	KZL-657
APPENDIX R (RPTR.)	3	KZL-657
APPENDIX R (TALK-AROUND)	4	KZL-657
SECURITY (RPTR.)	5	KZL-657
SECURITY (TALK-AROUND)	6	KZL-657
EMERGENCY (RPTR.)	7	KZ2786
EMERGENCY (TALK-AROUND)	8	KZ2786

NUMBER	ATTACHMENT TITLE	REVISION
FCA-1.00	COMMUNICATIONS	00.07
ATTACHMENT 6		PAGE 8 of 8

PART F
Gaitronics Operation

1. Gaitronics can be powered from Unit 1 SVB Bkr #15 or Unit 2 SVB Bkr #15.

2. If either of these power sources is available, that power supply source may be used for system operation by first opening the circuit breaker that is supplying the gaitronics then closing the power supply in the opposite SVB.

3. If desired and personnel available, Gaitronics may be isolated to affected fire areas to aid in restoration of service.

- END -

NUMBER	ATTACHMENT TITLE	REVISION
FCA-1.00	STABLE CHG/SEAL INJECTION FLOW PATHS	00.07
ATTACHMENT 7		PAGE 1 of 1

This attachment will provide guidance to ensure the charging and seal injection flow paths will not be interrupted due to a fire induced valve operation.

NOTE: Performance of this attachment will require coordination between one person located in the Auxiliary Building and the other located in the cable vault. Health Physics will provide high radiation area coverage.

NOTE: Cross connecting charging systems will be required only if a charging pump can not operate on each unit or fire conditions threaten continued charging pump operation.

Personnel dispatched to the Auxiliary Building must have the following:

* Portable Radio
* Copy of Attachments 7A and 7B
* Admin Key
* High Radiation Gate Keys:
  #14 - Non-Regenative HX Room
  #13 - Unit 1 A and B Charging Pump Cubicles
  #12 - Unit 1 C Charging Pump Cubicle
  #15 - Unit 2 A and B Charging Pump Cubicles
  #16 - Unit 2 C Charging Pump Cubicle

NOTE: Performance of Attachment 7C is not required for deenergized emergency buses on the fire affected unit.

NOTE: Fire conditions may delay completion of Attachment 7C.

Personnel dispatched to the cable vault must have the following:

* Portable radio
* Copy of Attachment 7C

NOTE: If charging flow can not be established due to spurious operation of HCV ( )310, a containment entry will be required to fail the valve open.

Attachment 7A - Stable CHG/Seal Injection Flow Paths

Attachment 7B - Establishing Charging Pump Cross-connect

Attachment 7C - MOV Breaker Power Supplies

NUMBER	ATTACHMENT TITLE	REVISION
FCA-1.00	STABLE CHG/SEAL INJECTION FLOW PATHS	00.07
ATTACHMENT 7A		PAGE 1 of 2

NOTE: Steps 2, 3, 4 and 5 are not required to be performed on a unit which does not have any running charging pumps.

MCR fire will require performance of this attachment on both units. Each step should be performed on each unit prior to proceeding to the next step.

1. When performing this attachment each MOV shall be positioned as follows:

   a) Locate the required valve.
   b) Check power has been removed from the valve.
   c) Check or position the valve as required.

2. Check charging pump suction to the RWST:

   * MOV-LCV-( )115B - OPEN
   * MOV-LCV-( )115D - OPEN

3. Check charging pump suction from the VCT:

   * MOV-LCV-( )115C - CLOSED
   * MOV-LCV-( )115E - CLOSED

4. Check charging pump common recirculation path:

   * MOV ( )373 - OPEN

5. Check seal injection flow path:

   * MOV ( )370 OPEN
   * HCV-( )186 - FAIL OPEN
   * Adjust seal injection flow - between 6 and 10 GPM per RCP

6. Check charging flow path:

   * MOV-( )289A - OPEN
   * MOV-( )289B - OPEN

7. Check high head SI valves:

   * MOV ( )867C - CLOSED
   * MOV ( )867D - CLOSED
   * MOV ( )842 - CLOSED
   * MOV ( )869A - CLOSED
   * MOV ( )869B - CLOSED

NUMBER	ATTACHMENT TITLE	REVISION
FCA-1.00	STABLE CHG/SEAL INJECTION FLOW PATHS	00.07
ATTACHMENT 7A		PAGE 2 of 2

8. Check each running charging pump:

   * Normal discharge - OPEN
   * Alternate discharge - OPEN
   * Normal suction - OPEN
   * Alternate suction - OPEN
   * Pump recirc - OPEN

9. Notify controlling SRO/RO that a stable seal injection flow path is established.

10. IF charging pump cross connect is required THEN GO TO Attachment 7B.

(END)

NUMBER	ATTACHMENT TITLE	REVISION
FCA-1.00	ESTABLISHING CHARGING PUMP CROSS CONNECT	00.07
ATTACHMENT 7B		PAGE 1 of 1

NOTE: MCR fire will require completion of step 1 on both units.

1. Request power removed from the affected units "C" charging pump discharge MOV's:

   * MOV-( )286C Normal Discharge
   * MOV-( )287C Alternate Discharge

2. Check position of both units "C" charging pump discharge valves:

   * MOV-( )286C Normal Discharge - OPEN
   * MOV-( )287C Alternate Discharge - OPEN

3. Verify the unaffected units charging pump suction is from the RWST.

4. Unlock manual charging cross connect valves:

   * 1-CH-728
   * 2-CH-447

5. Open the manual charging cross connect valve on the unit with a running charging pump.

UNIT 1	UNIT 2
1-CH-728	2-CH-447

6. Vent the cross-connect piping from :

   * 1-CH-729

7. Open the manual charging cross connect valve on the unit without a running charging pump.

UNIT 1	UNIT 2
1-CH-728	2-CH-447

8. Check seal injection flow path

   * MOV ( )370 deenergized
   * MOV ( )370 open
   * Fail open HCV-( )186
   * Adjust seal injection flow - between 6 and 10 gpm per RCP

9. Notify controlling SRO/RO that charging pump cross connect has been established.

(END)

NUMBER	ATTACHMENT TITLE	REVISION
FCA-1.00	MOV BREAKER POWER SUPPLIES	00.07
ATTACHMENT 7C		PAGE 1 of 3

NOTE: Steps 1, 2 and 3 may be performed prior to verification of valve positions by the Auxiliary Building operator.

MCR fire will require performance of this attachment on both units. Steps may be performed on one unit first then repeated on the second unit.

NUMBER	ATTACHMENT TITLE	REVISION
FCA-1.00	MOV BREAKER POWER SUPPLIES	00.07
ATTACHMENT 7C		PAGE 2 of 3

1. Determine from the controlling SRO/RO the operating charging pump(s).

2. Open the running charging pumps associated MOV breakers.

	UNIT 1	
1-CH-P-1A	1-CH-P-1B	1-CH-P-1C
MOV-1286A/1H1-251	MOV-1286B/1J1-243	MOV-1286C/1H1-262
MOV-1287A/1H1-253	MOV-1287B/1J1-252	MOV-1287C/1J1-271
MOV-1275A/1H1-222	MOV-1275B/1H1-272	MOV-1275C/1H1-233
MOV-1267A/1H1-271	MOV-1269A/1J1-213	MOV-1270A/1H1-241
MOV-1267B/1H1-282	MOV-1269B/1J1-223	MOV-1270B/1J1-233
	UNIT 2	
2-CH-P-1A	2-CH-P-1B	2-CH-P-1C
MOV-2286A/2H1-251	MOV-2286B/2J1-2143	MOV-2286C/2H1-262
MOV-2287A/2H1-253	MOV-2287B/2J1-2152	MOV-2287C/2J1-2171
MOV-2275A/2H1-211	MOV-2275B/2H1-272	MOV-2275C/2H1-233
MOV-2267A/2H1-271	MOV-2269A/2J1-2113	MOV-2270A/2H1-241
MOV-2267B/2H1-282	MOV-2269B/2J1-2123	MOV-2270B/2J1-2133

3. Open the following breakers:

	UNIT 1	UNIT 2
MOV-( )373	1J1-273	2J1-273
MOV-( )370	1H1-243	2H1-243
MOV-( )289A	1H1-253	2H1-253
MOV-( )289B	1J1-2153	2J1-253
MOV-( )867C	1H1-123	2H1-123
MOV-( )867D	1J1-183	2J1-183
MOV-( )842	1H1-242	2H1-242
MOV-( )869A	1H1-133	2H1-182
MOV-( )869B	1J1-191	2J1-191

4. When requested by the Auxiliary Building operator, open the following breakers:

	UNIT 1	UNIT 2
MOV-LCV-( )115B	1H1-213	2H1-213
MOV-LCV-( )115D	1J1-2151	2J1-251
MOV-LCV-( )115C	1H1-223	2H1-223
MOV-LCV-( )115E	1J1-2123	2J1-2203

NUMBER	ATTACHMENT TITLE	REVISION
FCA-1.00	MOV BREAKER POWER SUPPLIES	00.07
ATTACHMENT 7C		PAGE 3 of 3

NOTE: IF charging cross connect is required, THEN the following step will be completed.

5. When requested by the Auxiliary Building operator, open the following breakers:

	UNIT 1	UNIT 2
MOV-( )286C	1H1-262	2H1-262
MOV-( )287C	1J1-271	2J1-2171

(END)

NUMBER	ATTACHMENT TITLE	REVISION
FCA-1.00	ALTERNATE STEAM RELEASE	00.07
ATTACHMENT 8		PAGE 1 of 2

The purpose of this attachment is to provide guidance in establishing an alternate steam release path in the event normal methods of controlling RCS temperature have failed.

PART 1 - SAFEGUARDS

NOTE: If the SFGDs steamside door cannot be opened due to loss of power, then notify Security department to immediately open the door.

1 Take the following equipment:

* Portable radio

2 Proceed directly to the SFGDs.

3 Establish communication with the controlling RO/SRO:

NOTE: All MSTV bypass valves should be opened equally to equalize steam and feed rates of SGs.

SGs without level indication should NOT be steamed.

4 Open main steam trip valve bypass valves on affected unit(s) as directed by the controlling RO/SRO.

* ( )-MS-84

* ( )-MS-116

* ( )-MS-155

5 Notify controlling RO/SRO that Part 1 of Attachment 8 is complete.

NOTE: RCS temperature or SG secondary pressure should be monitored for excessive or unexpected cooldown and MSTV bypass valve position be controlled accordingly.

Fire induced spurious operation of downstream secondary isolation valves may cause an unexpected cooldown.

NUMBER	ATTACHMENT TITLE	REVISION
FCA-1.00	ALTERNATE STEAM RELEASE	00.07
ATTACHMENT 8		PAGE 2 of 2

PART 2 - TURBINE BUILDING

1 Take a portable radio

2 Verify steam isolated to flash evaporator.

* Manually or locally close MOV-AS-( )01

3 Verify closed or close auxiliary steam cross-tie valve.

* 1-AS-8

* 1-AS-1000 (bypass)

4 Open condenser hogger steam isolation valves on affected unit(s).

* ( )-AS-19

* ( )-AS-20

NOTE: If ( )-AS-3 is opened too far, excessive cooldown and/or lifting of the AS safety valve may occur.

5 Throttle open ( )-AS-3 reducer bypass as necessary to control RCS temperature.

6 Notify controlling RO/SRO that Part 2 of Attachment 8 is complete.

NOTE: RCS temperature or SG secondary pressure should be monitored for excessive or unexpected cooldown and PCV bypass controlled accordingly.

- END -

NUMBER	ATTACHMENT TITLE	REVISION
FCA-1.00	OPERATION OF ASC REM AND PNL REM	00.07
ATTACHMENT 9		PAGE 1 of 1

The purpose of this attachment is to provide guidance in the event normal process perameter indications are not observable or are expected to fail as a result of a limiting fire condition.

1. Take a portable radio.

2. Proceed to Unit 1 Cable Spreading Room and to the PNL REM and ASC RMP panels and establish radio communications with controlling RO(s)/SRO(s).

3 Verify ASC RMP power feed from a unit with an unaffected ESGR. Switch power supply as necessary.

NOTE: The limiting MCR fire may require alternating the UNIT/LOOP switch to monitor both units parameters.

4 Place UNIT/LOOP switch to the unit with affected process parameter indications.

5 Notify the controlling RO/SRO(s) for any of the following exist:

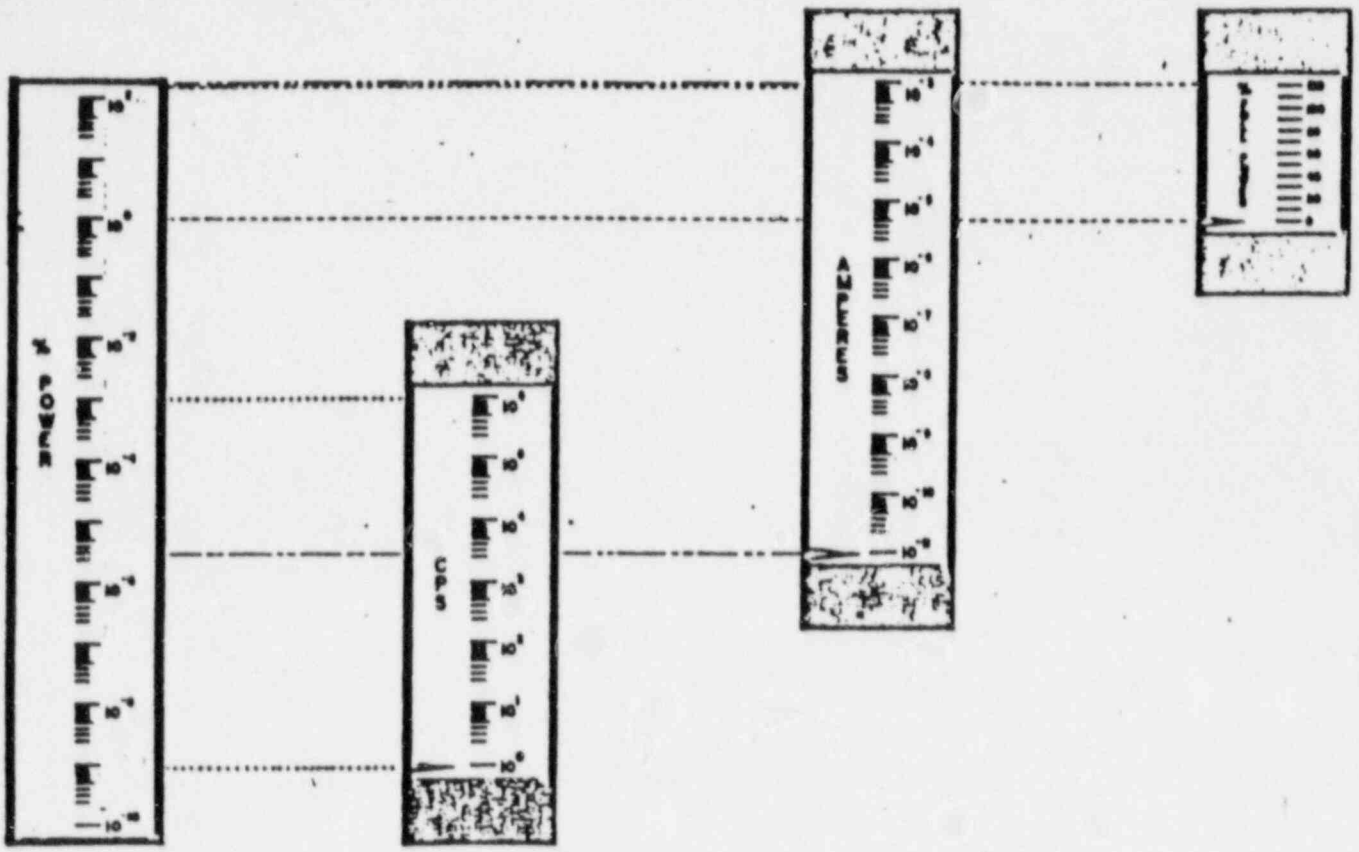
* Neutron flux - NOT decreasing (refer to Attachment 9A),
* SG wide range level - less than 70% or greater than 90%,
* SG pressure - decreasing rapidly,
* RCS hot leg temperature increasing,
* RCS pressure increasing or decreasing rapidly,
* PRZR level increasing or decreasing rapidly,
* RCS subcooling less than 50°F based on Th (See Attachment 9B).

6 Obtain and transmit process indications as required by controlling RO(s)/SRO(s).

- END -

NUMBER	ATTACHMENT TITLE	REVISION
FCA-1.00	NEUTRON FLUX DETECTOR SCALING	00.07
ATTACHMENT 9A		PAGE 1 of 1

NOTE: Source range indication on REM panel limited to 10^5 cps.



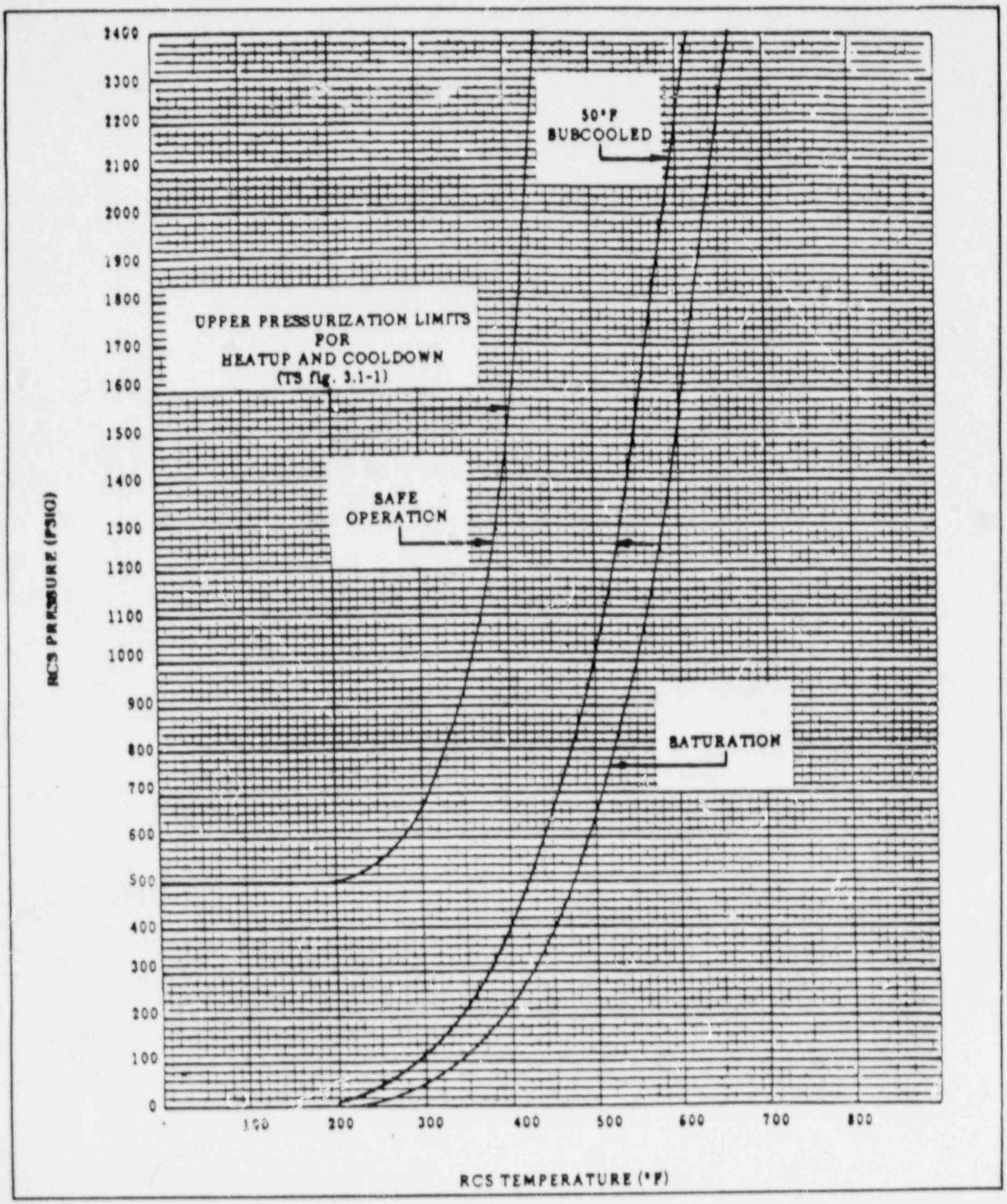
REM PANEL INDICATION

CORRESPONDING MCR INDICATION

NUCLEAR DETECTOR RANGE

No. 97887220

NUMBER	ATTACHMENT TITLE	REVISION
FCA-1.00	P/T AND SATURATION CURVE	00.07
ATTACHMENT 9B		PAGE 1 of 1



NUMBER	ATTACHMENT TITLE	REVISION
FCA-1.00		00.07
ATTACHMENT 10	VENTILATION	PAGE 1 of 4

The purpose of this attachment is to provide guidance in establishing alternate methods of ventilation in the event a limiting fire condition has caused the normal method to fail.

CAUTION: Ventilating areas involved in a fire may intensify the fire or cause a reflash.

CAUTION: If MCR is involved in a fire, establishing control of air handlers at the ESGR Appendix R panels may cause MCR air handlers to restart.

If normal ventilation and cooling has failed determine and perform the action steps listed in the table below to establish area ventilation.

FIRE AREA

AREA TO BE VENTILATED	MCR	U-1 ESGR CABLE VAULT TUNNEL	U-2 ESGR CABLE VAULT TUNNEL	AUX BLDG	MER #3	MSVH	CONTAINMENT	TURBINE BLDG
MCR		2,3	1,3		3			
U-1 ESGR	1,3		1,3		3			
U-2 ESGR	2,3	2,3			3			
CHARGING PUMPS	5	4 or 5	4 or 5	4 or 5				
CCW PUMPS	6	6	6	6				
MSVH	7	7	7	7		7	7	
MER #3					8			8
CONTAIN-MENT							9	

NUMBER	ATTACHMENT TITLE	REVISION
FCA-1.00	VENTILATION	00.07
ATTACHMENT 10		PAGE 2 of 4

1 At the Appendix R isolation panel in U1 ESGR establish local control of the following air handlers:

1-VS-AC-1 (U-1 MCR)
1-VS-AC-7 (U-1 ESGR)
2-VS-AC-9 (U-2 MCR)

* ON/OFF Operation of the air handled is controlled at the local switch

2 At the Appendix R isolation panel in U2 ESGR establish local control of the following components:

VS-E-4C
VS-P-1C
VS-P-2C 2-VS-AC-6 (U-2 ESGR)
1-PG-107C

* Operate the VS-E-4C chiller from the control switch in the Appendix R isolation panel.

* If VS-E-4C is not operable then refer to step 3 to establish chill water supply.

* ON/OFF operation of the air handler is controlled at the local switch.

3 Cross connect chilled water systems.

* In U1 cable spreading room open

1-VS-247
1-VS-251

* Operate 1-VS-E-3A and 1-VS-E-3B locally in MER #1

* If off site power is not available the operable chillers can be supplied from either the 1J or 2H emergency bus

a) Turn chiller unit control power switch - OFF

b) Open the chiller starter power switch

c) Shift the power feed cable to the desired source

d) Close the chiller starter power switch

e) Turn chiller unit control switch - ON

* Makeup for condenser units can be manually supplied by using 1-FP-477 in MER #1.

4 To ventilate the charging pumps with 1-VS-F-9A and F-9B:

a) Position the following dampers as indicated, locally if required: (MOD handwheel extension, ladder and safety harness located in Appendix R locker.)

AOD-VS-108	OPEN
MOD-VS-101A, B, C	Open for operating charging pumps; otherwise, closed.
MOD-VS-201A, B, C	Open for operating charging pumps; otherwise closed.

b) Start F-9A and F-9B

5 To ventilate the charging pumps with 1-VS-F-58A or F-58B:

a) Position the following dampers as indicated, locally if required:

MOD-VS-101 A, B, C	Open for operating charging pumps; otherwise closed
MOD-VS-201 A, B, C	Open for operating charging pumps; otherwise closed.

b) Open AOD-VS-107 A and B by isolating air to the ventilation system air supply flask and vent the flask by opening the drain valve.

c) Start F-58A or 58B from the control room, or F-58B from the Auxiliary Building as appropriate.

6 To ventilate the CCW pump area and the penetration areas:

a) Open rolling steel door at el 27 ft.

b) Place portable fans at door and route power cables.

c) Route flexible ducting.

7 To ventilate the main steam valve house:

a) Within 11 hours, prop open the door and manually open one fan supply damper and one exhaust damper.

NUMBER	ATTACHMENT TITLE	REVISION
FCA-1.00	VENTILATION	00.07
ATTACHMENT 10		PAGE 4 of 4

8 To ventilate MER #3:

a) Manually open fire dampers 18 and 30.

b) Check the room exhaust fan operating.

c) If normal room ventilation can not be established, then secure running chill water units and go to step 3 of this attachment.

9 To ventilate the containment:

a) Operate containment air recirc fans and CRDM fans as available.

b) IF containment temperature is high then shift to chilled CCW cooling.

c) Purge the containment in accordance with OP-21.1.1.

d) IF normal means of cooling the containment fail THEN containment spray may be used to cool the containment WITH chemical addition tank isolated.

NUMBER	ATTACHMENT TITLE	REVISION
FCA-1.00	LOCAL BREAKER OPERATION	00.07
ATTACHMENT 11		PAGE 1 of 7

The purpose of this attachment is to provide guidance in local breaker operation in the event control power has failed or the normal breaker control station is not functional.

NOTE: Breaker spring charging devices and rack out devices are located in the Appendix "R" cabinet located in the TSC HVAC Room.

Part 1 - 4160 VAC Breaker

Part 2 - 480 VAC Distribution Breaker

Part 3 - 480 VAC MCC Breaker

NUMBER	ATTACHMENT TITLE	REVISION
FCA-1.00	LOCAL BREAKER OPERATION	00.07
ATTACHMENT 11		PAGE 2 of 7

PART 1

4160 VAC BREAKER - LOCAL OPERATION

NOTE: When control fuses are pulled a breaker can be closed once - charging springs will discharge to close the breaker.

Refer to figure 1.

A) To close 4160 AC breaker locally.

1) Verify charging springs energized.

2) Pull manual close lever.

3) Verify breaker closed:

a) Breaker closed indication.

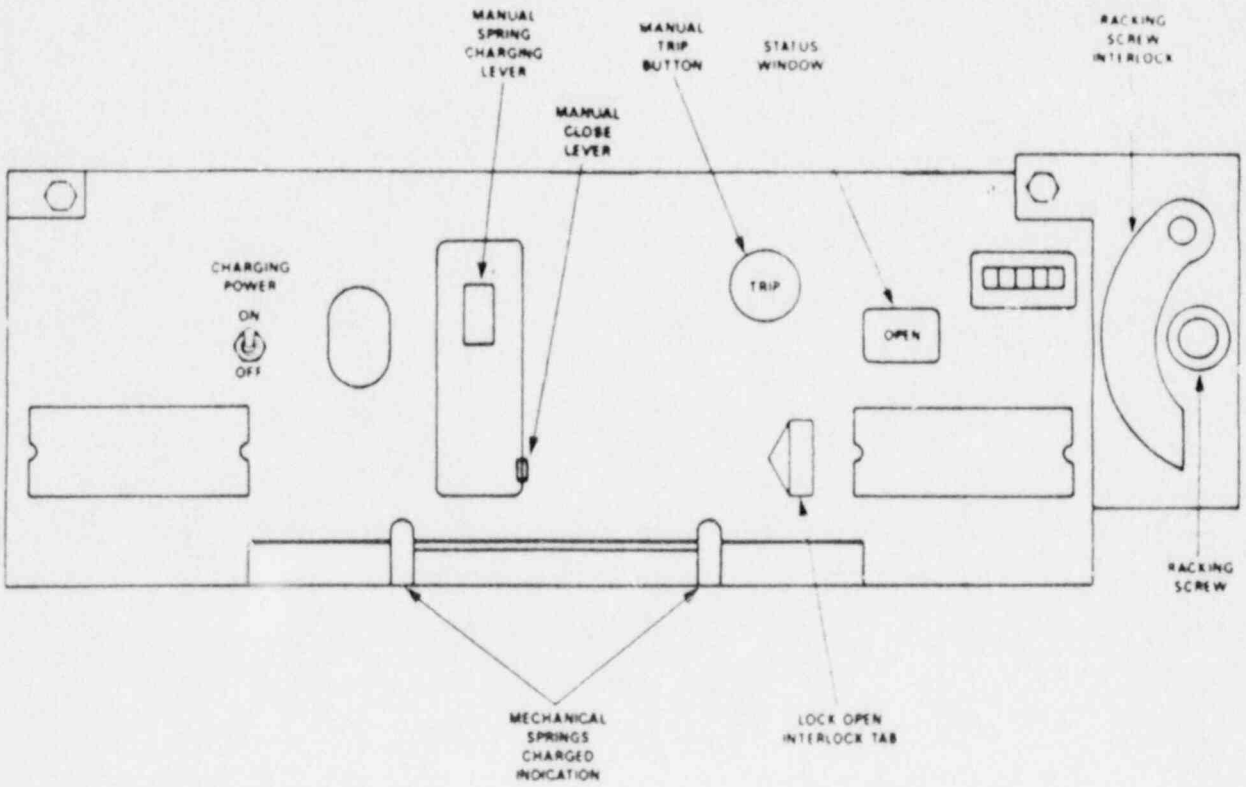
b) Springs discharged.

B) To open 4160 VAC breaker locally.

1) Push manual "trip" button - located at bottom of breaker.

NUMBER	ATTACHMENT TITLE	REVISION
FCA-1.00		00.07
ATTACHMENT 11	LOCAL BREAKER OPERATION	PAGE 3 of 7

FIGURE 1



NUMBER	ATTACHMENT TITLE	REVISION
FCA-1.00	LOCAL BREAKER OPERATION	00.07
ATTACHMENT 11		PAGE 4 of 7

PART 2

ITE 480V BREAKER - LOCAL OPERATION

A) To close breaker locally:

1) Charging spring "charged", GO TO Step 2) below. If not, THEN:

a) Secure a breaker racking bar (Located on side of 480V bus).

b) Open racking shutter and rack breaker to "Disconnect".

c) Secure charging spring maintenance handle (stored in APX R locker).

d) Open breaker door.

e) Insert the maintenance handle in two slots in pawl carrier (refer to figure 2 and 3).

f) Raise and lower the handle in a pumping motion until the pawl carrier no longer rotates the ratchet wheel.

g) Rack breaker to "connect" position.

h) Verify Automatic Trip Indicator - RESET (overcurrent reset only).

j) Using "manual", close lever close breaker.

2) If springs are charged:

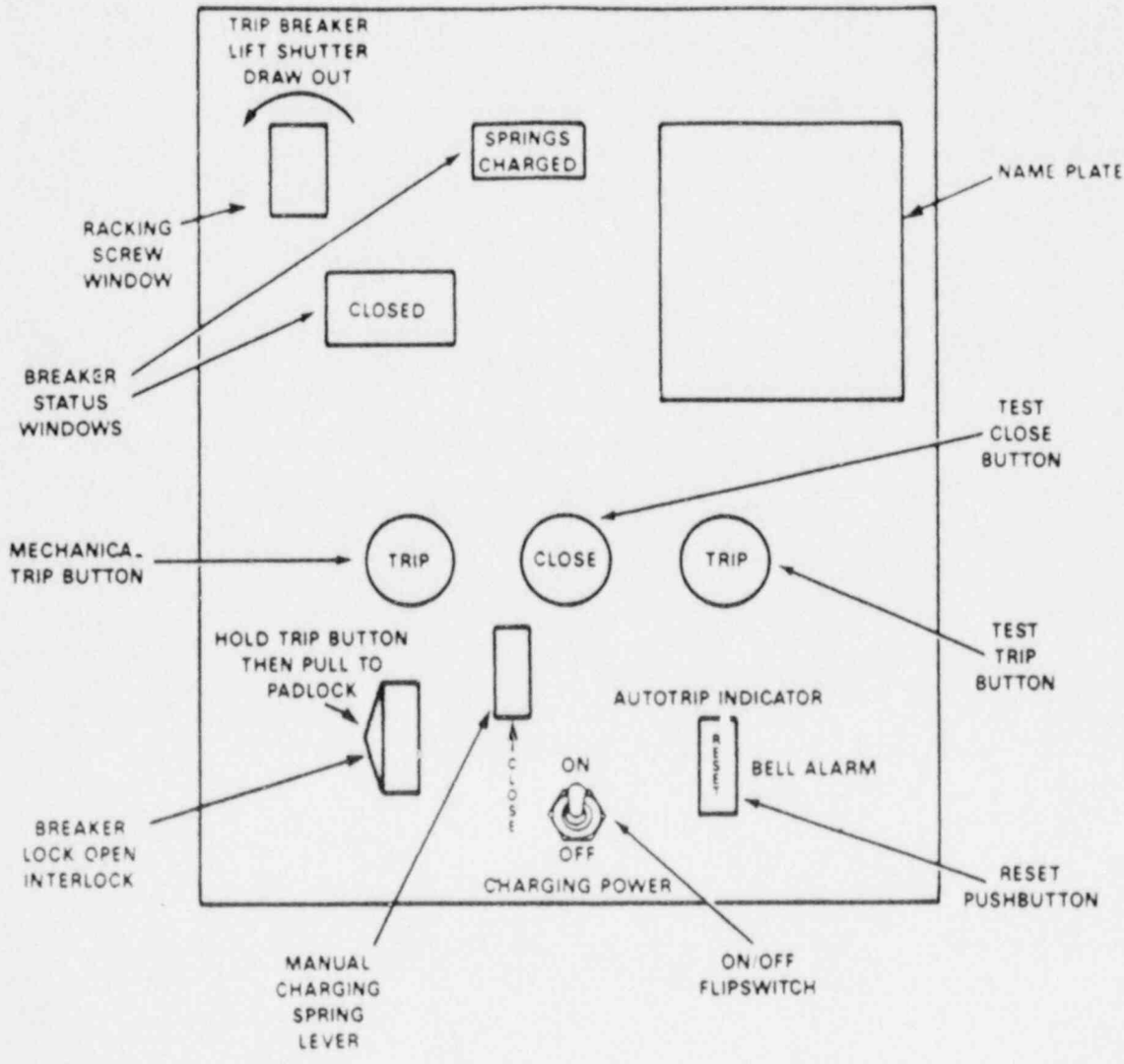
a) Verify automatic trip indicator - RESET.

b) Push "close" pushbutton.

c) Verify breaker - CLOSED.

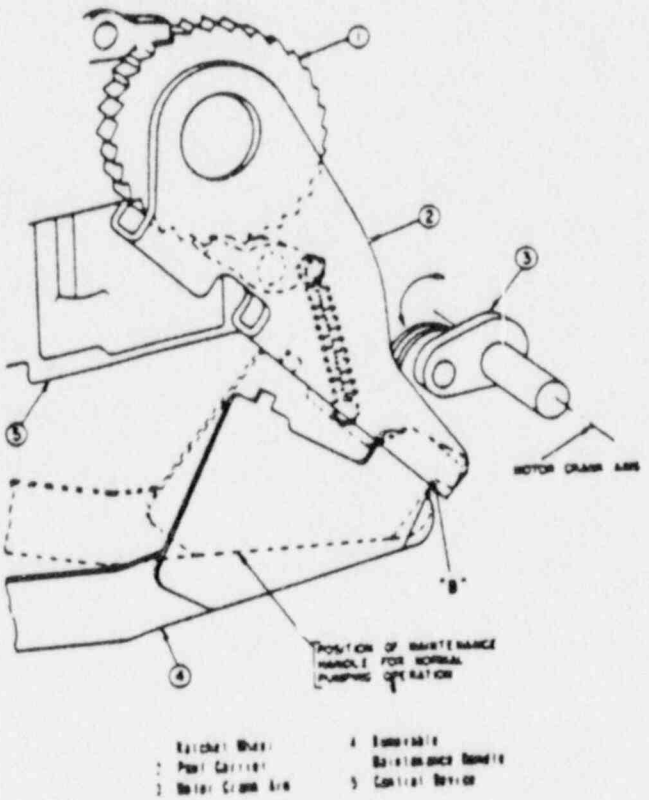
NUMBER	ATTACHMENT TITLE	REVISION
FCA-1.00		00.07
ATTACHMENT 11	LOCAL BREAKER OPERATION	PAGE 5 of 7

FIGURE 2 LOW VOLTAGE POWER CIRCUIT BREAKERS



NUMBER	ATTACHMENT TITLE	REVISION
FCA-1.00	LOCAL BREAKER OPERATION	00.07
ATTACHMENT 11		PAGE 6 of 7

FIGURE 3



METHOD OF APPLYING MAINTENANCE HANDLE
FOR CHARGING CLOSING SPRINGS

NUMBER	ATTACHMENT TITLE	REVISION
FCA-1.00		00.07
ATTACHMENT 11	LOCAL BREAKER OPERATION	PAGE 7 of 7

PART 3

480V MCC BREAKERS
(Cutler - Hammer)

A) To close breaker:

1) Rotate breaker handle to - ON

NOTE: To verify the associated equipment is energized/operating, assistance of the Electrical Department may be required.

B) To open breaker:

1) Rotate breaker handle to - OFF

NUMBER	ATTACHMENT TITLE	REVISION
FCA-1.00	ALTERNATE LETDOWN AND RHR OPERATION	00.07
ATTACHMENT 12		PAGE 1 of 1

This attachment includes the following:

* Attachment 12A Establishing RCS Letdown
* Attachment 12B Placing RHR system in Service
* Attachment 12C Establish CCW flow
* Attachment 12D Local Operation of Air Operated Valves.

NUMBER	ATTACHMENT TITLE	REVISION
FCA-1.00		00.07
ATTACHMENT 12A	ESTABLISHING RCS LETDOWN	PAGE 1 of 5

The purpose of this attachment is to establish a letdown flow path to allow RCS boration and inventory control.

This attachment consists of two parts:

Part "A" - Establishment of Normal Letdown

Part "B" - Establishment of Alternate Letdown

NOTE: Establishment of normal letdown is preferred. If attempts to establish normal letdown fail then Part "A" should be terminated and letdown established using Part "B".

NOTE: Access to the MCR is required to perform Part "A".

NOTE: Do not perform Part "A" if the charging cross connect is in service.

NOTE: An RCS cold leg temperature of less than 450°F must be achieved prior to performing Part "B".

NUMBER	ATTACHMENT TITLE	REVISION
FCA-1.00	ESTABLISHING RCS LETDOWN	00.07
ATTACHMENT 12A		PAGE 2 of 5

PART A
INITIAL CONDITIONS

1) Check power available

* LCV-( )460A
* LCV-( )460B
* TV-( )204
* LCV-( )115A
* TCV-CC-( )03
* PCV-( )145

2) Check power available to at least one letdown orifice isolation.

* HCV-( )200A
* HCV-( )200B
* HCV-( )200C

3) Check blender power available.

4) Check blender FCV's power available

* FCV-( )113A
* FCV-( )113B
* FCV-( )114A
* FCV-( )114B

5) Check PG water pump operating

6) Check containment and station instrument air available

7) Check charging cross connect NOT in service

8) Check CCW flow established to the non-regenative heat exchanger.

ESTABLISHING FLOW

1) Set blender controls to provide make up - between 2000 and 2200 PPM boron.

2) Check blender operation

* Perform manual make up
* Verify VCT level change
* Place blender control in automatic

NUMBER	ATTACHMENT TITLE	REVISION
FCA-1.00		00.07
ATTACHMENT 12A	ESTABLISHING RCS LETDOWN	PAGE 3 of 5

3) Cycle LCV-( )115A

* Verify valve movement to demand position
* Return control switch to automatic

4) Place in manual and open PCV ( )145

5) Open or check open TV-( )204

NOTE: Opening of LCV-( )460A may require reset of actions taken to isolate Hi/Lo interfaces.

6) Open or check open

* LCV-( )460A
* LCV-( )460B

NOTE: Power may need to be restored to VCT/RWST charging pump suctions if power was removed in accordance with Attachment 7C.

7) Open the charging pump suctions from the VCT.

* MOV-LCV-( )115C
* MOV-LCV-( )115E

8) Close the charging pump suctions from the RWST

* MOV-LCV-( )115B
* MOV-LCV-( )115D

9) Establish letdown line flow by opening any available letdown orifice isolation valve.

* HCV-( )200A
* HCV-( )200B
* HCV-( )200C

10) Verify letdown line flow established.

11) If available place additional letdown orifices in service as necessary.

12) Place PCV-( )145 in auto and adjust letdown pressure to the desired pressure.

NUMBER	ATTACHMENT TITLE	REVISION
FCA-1.00		00.07
ATTACHMENT 12A	ESTABLISHING RCS LETDOWN	PAGE 4 of 5

PART B

CAUTION: If charging cross-connect is in operation then RWST charging pump suction cross-connect must be established to prevent RWST overflow.

NOTE: If radio communication equipment has been damaged, alternate methods of establishing radio communication are provided in Attachment 6.

A containment entry will be required to perform this attachment. If the containment personnel access hatch is not operable, instructions for use of the emergency escape lock are provided in Attachment 1.

Cool suits are available for personnel entering the containment.

1 Personnel entering the containment shall have:

* Portable radio (1)
* Emergency lantern (2)
* Portable air tank, regulator and tubing (2)
* Adjustable wrenches (2)
* Adjustable AOV blocking devices (6)

CAUTION: To prevent overpressurization of the RHR and RHR to RWST piping, a downstream flow path must be established prior to opening a letdown orifice isolation valve.

2 Dispatch CRO to SFGDs Area to locally open MOV-RH-( )00. Admin. key required.

3 Proceed to affected unit(s) containment and establish radio communications with controlling RO/SRO.

4 Align RHR valves:

a) Alternate letdown flow path without RHR HXs.

1) Verify open or fail open HCV-( )758.

2) Verify closed or fail closed FCV-( )605.

b) If normal RCS sample points are not available, establish alternate letdown flow path via RHR HXs.

1) Verify close or close HCV-( )758. If required fail closed IAW Attachment 12D1 or 12D2.

2) Verify open or open FCV-( )605. If required fail open IAW Attachment 12D1 or 12D2.

NUMBER	ATTACHMENT TITLE	REVISION
FCA-1.00	ESTABLISHING RCS LETDOWN	00.07
ATTACHMENT 12A		PAGE 5 of 5

3) Control RHR cooling IAW Attachment 12C.

4) When alternate letdown flow is established, cooled RCS samples may be obtained from ( )-RH-44 - MOV-RH-( )00 leakage monitor.

5 Open HCV-( )142. If required, fail open IAW Attachment 12D1 or 12D2.

6 Verify open or open ( )-RH-25.

7 Open ( )-RH-29 (containment basement).

8 Verify HCV-( )200A, B and C closed.

NOTE: Opening of LCV-( )460A may require reset of actions taken to isolate HI/LO interfaces.

9 Open LCV-( )460A and B. If required, fail open IAW Attachment 12D1 or 12D2.

10 If charging cross connect is in service the RWST cross connect valves must be opened.

* * * * * * * * * * * * * * * * * * *

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* CAUTION: If charging flow through the regenerative HX is significantly less than letdown flow insufficient cooling of letdown will cause flashing at the orifice. *

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* * * * * * * * * * * * * * * * * * *

11 Establish charging flow through the regenerative HX immediately prior to placing alternate letdown in service.

12 Open HCV-( )200B or C (60 gpm) orifice.

13 Notify controlling RO/SRO that alternate letdown path is established. Makeup flow should be controlled to maintain PRZR level stable.

- END -

NUMBER	ATTACHMENT TITLE	REVISION
FCA-1.00	ESTABLISHING RHR	00.07
ATTACHMENT 12B		PAGE 1 of 4

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION: Perform this attachment only when the RCS is less than 350°F and 450 psig.

NOTE: If normal or alternate letdown has not been established, extended RHR heat up time or alternate methods of boron equalization may be required.

NOTE: If possible control and implementation of this attachment should be from the MCR. However, this attachment provides instructions to establish RHR cooling in the event of MCR inaccessibility.

NUMBER	ATTACHMENT TITLE	REVISION
FCA-1.00	ESTABLISHING RHR	00.07
ATTACHMENT 12B		PAGE 2 of 4

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
1.	CHECK CONTAINMENT CCW TRIP VALVES OPEN * TV-CC-( )09A * TV-CC-( )09B	Open the CCW trip valves from the MCR or locally IAW Attachment 12C * TV-CC-( )09A * TV-CC-( )09B
2.	CHECK UNIT CCW PUMP OPERATING	Start a CCW pump from the MCR or locally at the pump breaker. IF the units normal CCW pumps are not available THEN cross connect CCW systems.
3.	CHECK NORMAL LETDOWN IN SERVICE	Close ( )-RH-29
4.	CHECK OPEN ( )-RH-25	Open ( )-RH-25
	NOTE: Local verification of RHR AOV response will be required to ensure MCR control has not failed.	
5.	VERIFY VALVE RESPONSE BY CYCLING TO THE OPEN AND CLOSED POSITIONS * HCV-( )142 * HCV-( )758 * FCV-( )605	Valves failing to respond to MCR controls shall be position IAW Attachment 12C as follows: * HCV-( )142 - OPEN * HCV-( )758 - CLOSED * FCV-( )605 - OPEN Go to step 7
6.	POSITION RHR AOVS AS FOLLOWS: * HCV-( )142 - 10% OPEN * HCV-( )758 - CLOSED * FCV-( )605 - OPEN	
7.	VERIFY AT LEAST ONE RHR PUMP-OPERABLE	Initiate repairs to return at least one RHR pump to service.

NUMBER	ATTACHMENT TITLE	REVISION
FCA-1.00	ESTABLISHING RHR	00.07
ATTACHMENT 12B		PAGE 3 of 4

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
8.	START RHR PUMP FROM THE MCR	Start an RHR pump locally at the pump breaker.
9.	CHECK RHR SYSTEM FULL * Pump amps steady at 22 amps * Local discharge pressure steady between 120 and 140 psi differential	Vent the system from ( )-RH-42
10.	CHECK HCV-( )142 10% OPEN AND CONTROLLABLE FROM MCR	Throttle ( )-RH-25 one turn open
11.	OPEN RHR SUCTIONS * MOV-( )700 * MOV-( )701	Remotely position the valves by operating the breakers locally IAW Attachment 11 or locally at the valve
12.	CHECK NORMAL LETDOWN IN SERVICE	Locally open all available letdown orifice isolations IAW Attachment 12C.
CAUTION:	Maximum RHR heat up rate is 150°F/hr.	
13.	POSITION HCV-( )142 TO CONTROL RHR HEAT UP RATE	Throttle ( )-RH-25 to control RHR heat up rate
	NOTE: IF normal letdown is not in service, reverse flow through the letdown orifices will aid in RHR heatup.	

NUMBER	ATTACHMENT TITLE	REVISION
FCA-1.00	ESTABLISHING RHR	00.07
ATTACHMENT 12B		PAGE 4 of 4

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
14.	CHECK RCS HOT LEG AND RHR PUMP SUCTION TEMPERATURES EQUAL * MCR indication OR * Use portable temperature indicators	Operate one RHR pump for at least 3 hours
CAUTION:	If flow is initiated through ( )-RH-29 to achieve boron equalization, excessive flow may result in a loss of PRZR level.	
15.	CHECK RHR BORON CONCENTRATION EQUAL TO OR GREATER THAN RCS BORON CONCENTRATION	Raise the RHR boron concentration by continuing with the present method of RHR heat up flow OR Throttle ( )-RH-29
16.	CLOSE FCV-( )605 FROM THE MCR	Locally close FCV-( )605 IAW Attachment 12
17.	OPEN RHR DISCHARGES * MOV-( )720A * MOV-( )720B	Locally operate control breakers IAW Attachment 11 OR manually open * MOV-( )720A * MOV-( )720B
18.	ADJUST FCV-( )605 TO ESTABLISH 3500 GPM RHR FLOW	Maintain FCV-( )605 in the closed position
19.	ADJUST HCV-( )758 TO PROVIDE THE REQUIRED COOLDOWN RATE IAW ATTACHMENT 13	Fail open HCV-( )758 and throttle the RHR outlet from the HX in service to the cooldown rate IAW Attachment 13
	(END)	

NUMBER	ATTACHMENT TITLE	REVISION
FCA-1.00	ESTABLISH CCW FLOW	00.07
ATTACHMENT 12C		PAGE 1 of 1

1 Take the following equipment to the Aux Bldg:

* Portable radio
* Portable air tank with regulator and tubing.
* One AOV block per unit
* Adjustable wrenches (2)

NOTE: If this attachment is being used to establish CCW cooling of RHR HXs during RCS cooldown, at least one CCW pump must be operating for each unit being cooled down.

2 Proceed to Auxiliary Building basement.

3 Establish communications with controlling RO/SRO.

4 Verify open or open containment CCW header trip valves. If required open valves IAW Attachment 12D.

* TV-CC-( )09A
* TV-CC-( )09B

5 Locally control CCW flow IAW controlling RO/SRO direction.

* ( )-CC-104
* ( )-CC-100

6 Adjust SW flow to CCW HXs as required.

7 Monitor RCS cooldown if RHR system is in service.

- END -

NUMBER	ATTACHMENT TITLE	REVISION
FCA-1.00	MANUAL OPERATION OF AIR OPERATED VALVES	00.07
ATTACHMENT 12D		PAGE 1 of 4

VALVES WITHOUT QUICK DISCONNECTS

1 Isolate IA supply to affected valve.

2 Disconnect IA line at the bonnet of the affected valve.

3 Connect portable air tank to valve bonnet fitting disconnected in Step #2.

4 Pressurize valve diaphragm until valve opens.

5 Install block to maintain valve open.

6 Disconnect portable air tank.

NOTE: Air may be required if block removal is desired.

NUMBER	ATTACHMENT TITLE	REVISION
FCA-1.00	MANUAL OPERATION OF AIR OPERATED VALVES	00.07
ATTACHMENT 12D		PAGE 2 of 4

VALVES WITH QUICK DISCONNECTS

1 Close the air supply isolation valve between the SOV and affected valve.

2 Connect portable air tank to quick disconnect.

3 Pressurize valve diaphragm until valve opens.

4 Install block to maintain valve open.

5 Disconnect portable air tank.

NOTE: Air may be required if block removal is desired.

NUMBER	ATTACHMENT TITLE	REVISION
FCA-1.00		00.07
ATTACHMENT 12D	MANUAL OPERATION OF AIR OPERATED VALVES	PAGE 3 of 4

CCW TRIP VALVES

Refer to Figure 1

1 Close IA valves designated A on the drawing.

2 Connect portable air tanks to quick disconnects 1 and 2.

3 Pressurize Pneumatic Relay (quick disconnect 1).

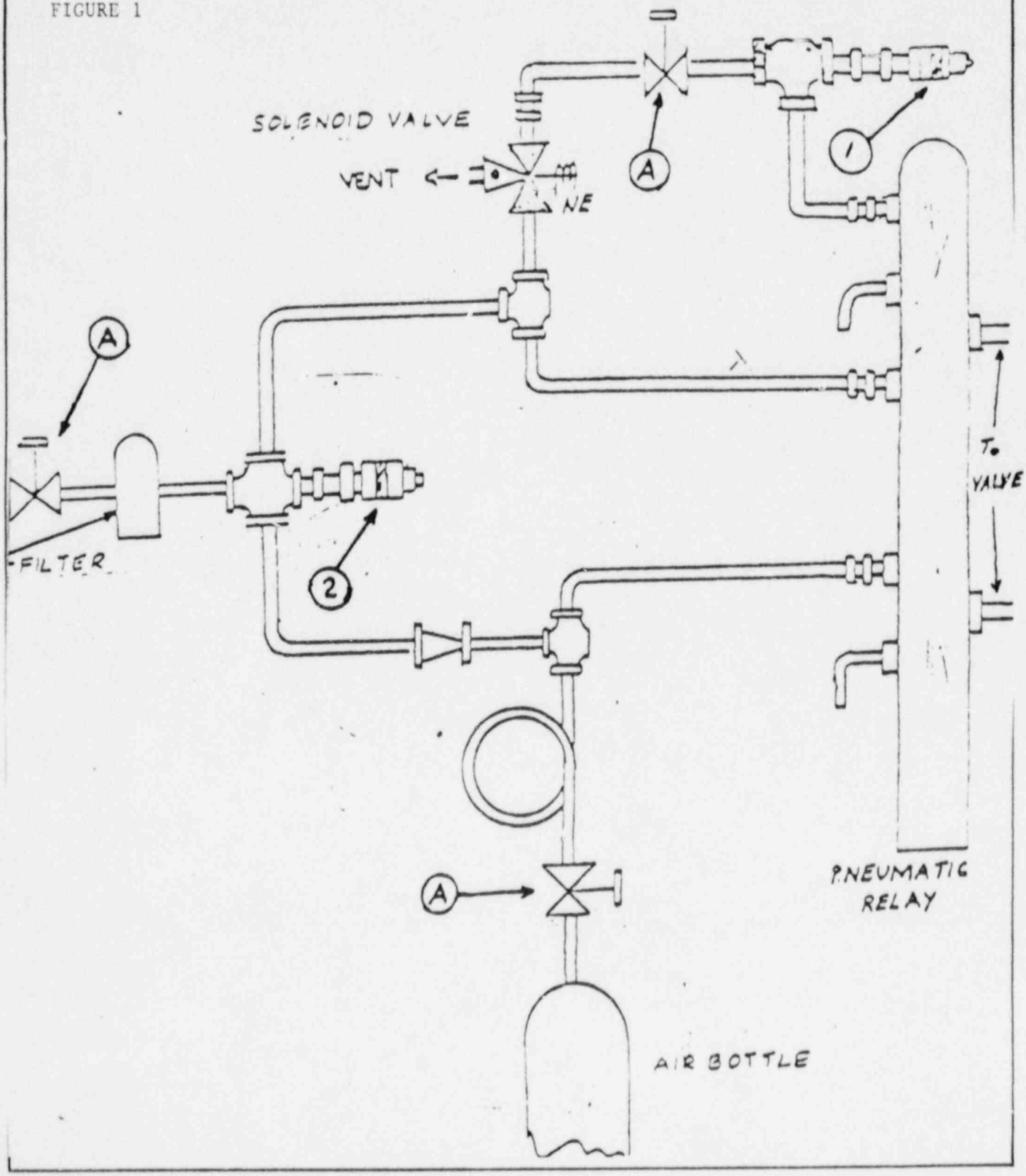
4 Pressurize to open valve (quick disconnect 2).

5 Install blocking device.

6 Disconnect portable air tanks.

NUMBER	ATTACHMENT TITLE	REVISION
FCA-1.00		00.07
ATTACHMENT 12D	MANUAL OPERATION OF AIR OPERATED VALVES	PAGE 4 of 4

FIGURE 1



NUMBER	ATTACHMENT TITLE	REVISION
FCA-1.00	RCS PRESSURE, TEMPERATURE AND COOLDOWN RATE LIMITS	00.07
ATTACHMENT 13		PAGE 1 of 1

The purpose of this attachment is to provide guidance to the cooldown rate limits and RCS pressure reduction methods for existing flow and pressure control equipment availability.

* Attachment 13A - RCP Operating

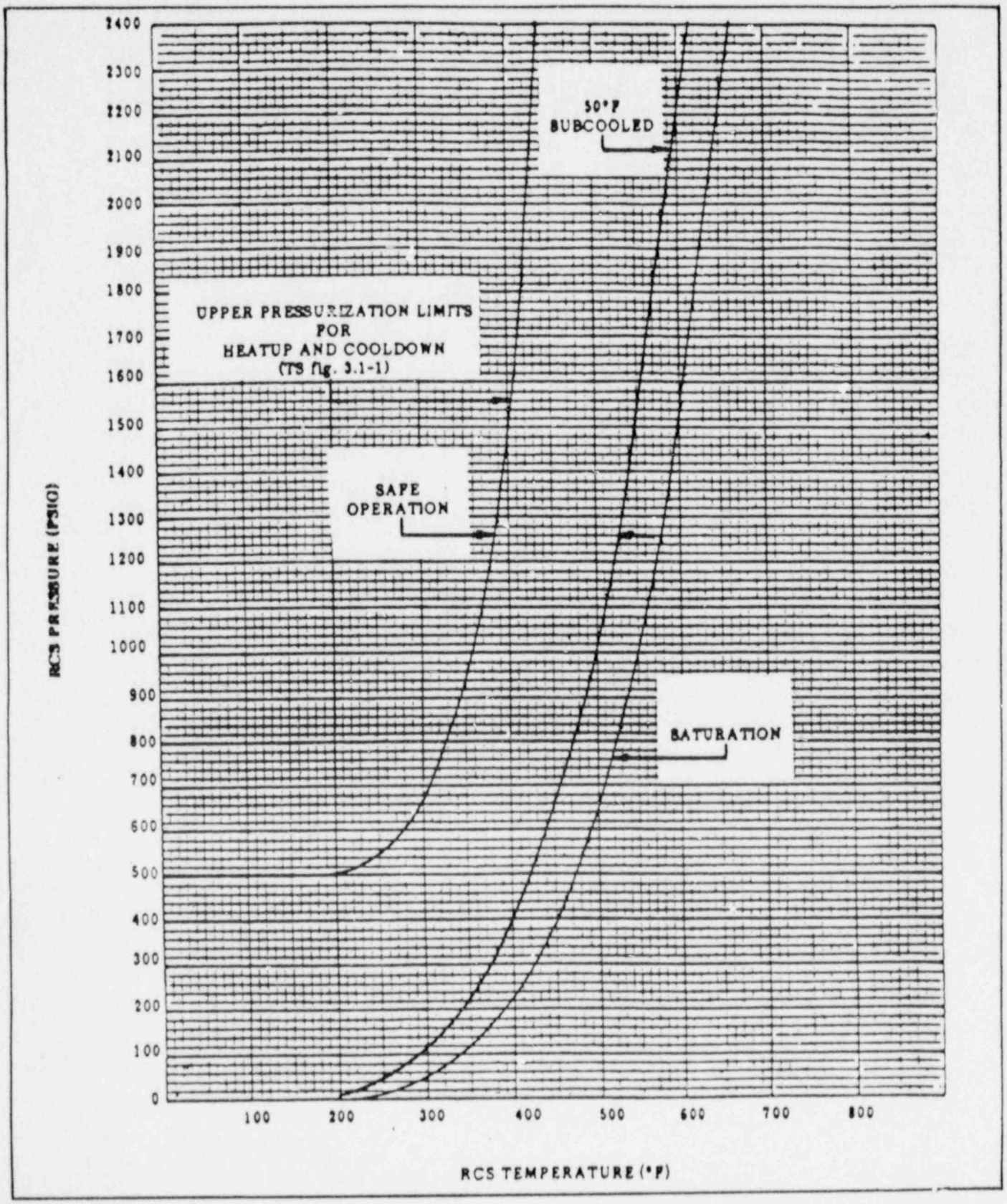
* Attachment 13B - Natural Circulation With Two or More CRDM Fans Operating

* Attachment 13C - Natural circulation With Less Than Two CRDM Fans Operating

NUMBER	ATTACHMENT TITLE	REVISION
FCA-1.00	FORCE FLOW RCS COOLDOWN RCP RUNNING	00.07
ATTACHMENT 13A		PAGE 1 of 2

- RCS cooldown rate is 50°F/hr
- Methods of depressurization in preferred order
  1) Normal spray - "A" or "C" RCP's operating.
  2) Auxiliary spray - Normal or alternate letdown in service.
  3) PRZR PORV's - PORV instrument air available and control circuits free of fire damage.
  4) Natural decay - PRZR heaters OFF.

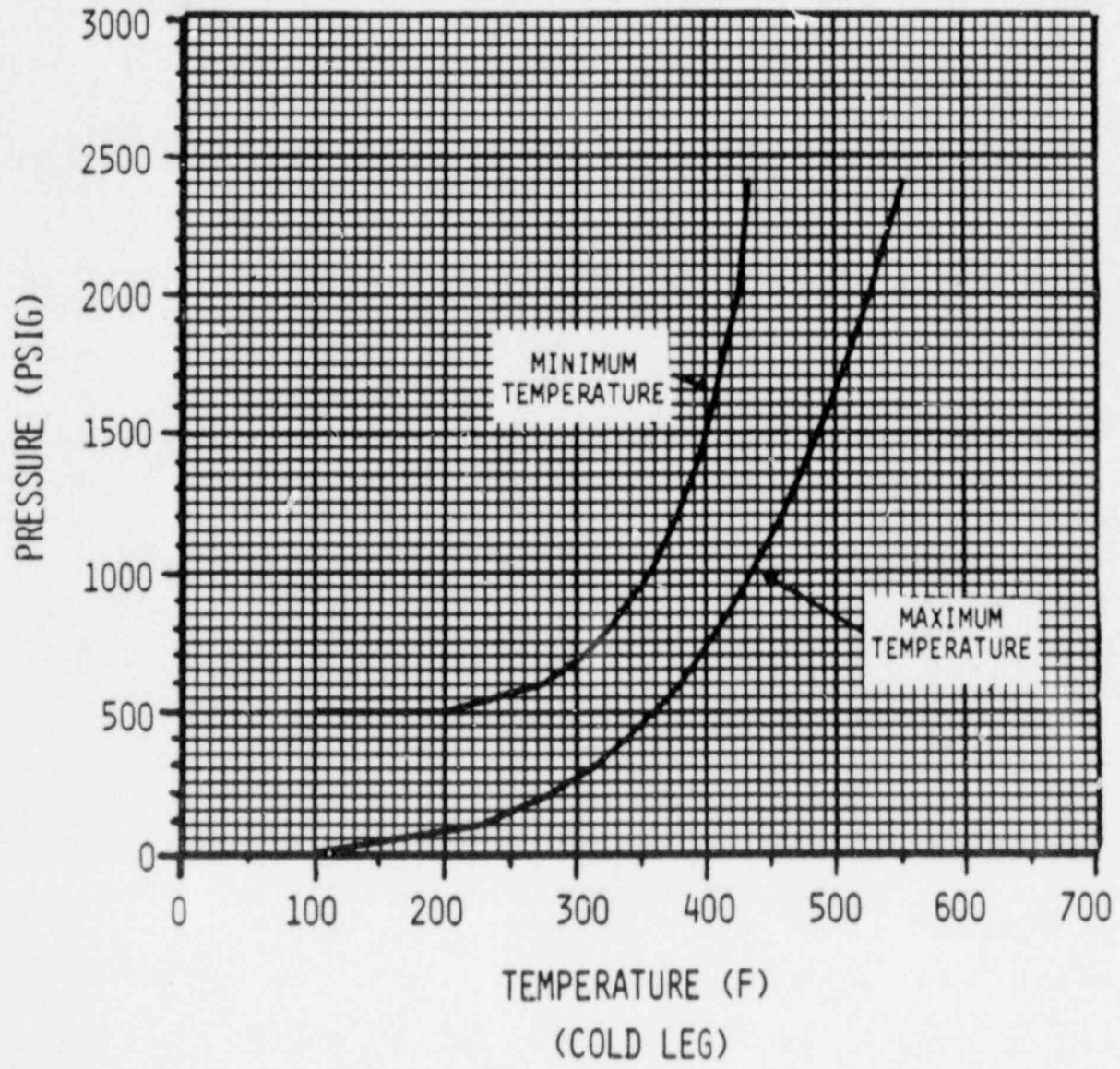
NUMBER	ATTACHMENT TITLE	REVISION
FCA-1.00	FORCE FLOW RCS COOLDOWN RCP RUNNING	00.07
ATTACHMENT 13A		PAGE 2 of 2



NUMBER	ATTACHMENT TITLE	REVISION
FCA-1.00	NATURAL CIRCULATION COOLDOWN WITH TWO OR MORE CRDM FANS IN OPERATION	00.07
ATTACHMENT 13B		PAGE 1 of 2

- RCS cooldown rate is 25°F/hr
- Methods of depressurization in preferred order.
  1) Auxiliary spray - Normal or alternate letdown in service.
  2) PRZR PORV's - PORV instrument air available and control circuits free of fire damage.
  3) Natural decay - PRZR Heaters off.

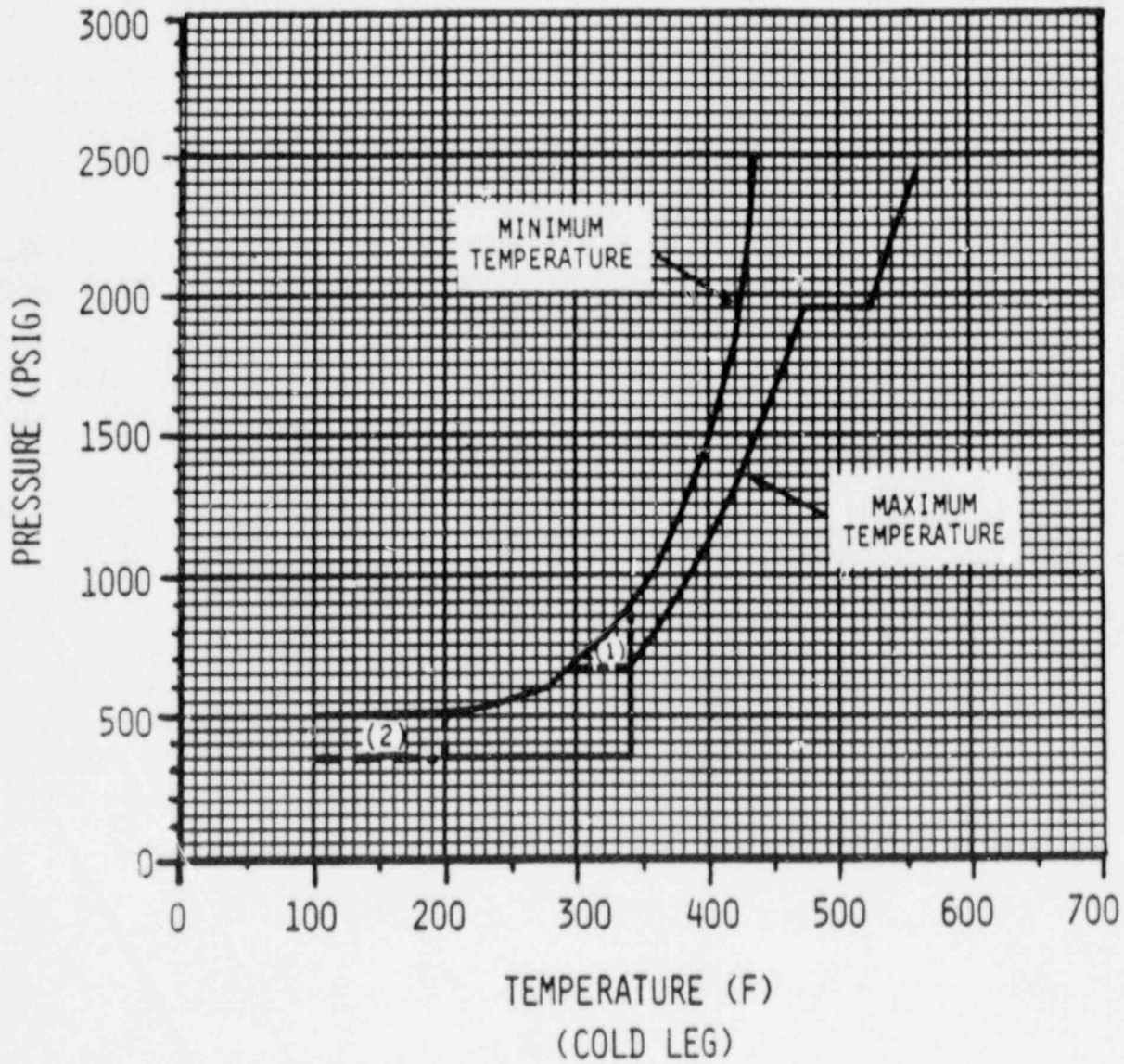
NUMBER	ATTACHMENT TITLE	REVISION
FCA-1.00	NATURAL CIRCULATION COOLDOWN WITH TWO OR MORE CRDM FANS IN OPERATION	00.07
ATTACHMENT 13B		PAGE 2 of 2



NUMBER	ATTACHMENT TITLE	REVISION
FCA-1.00	NATURAL CIRCULATION COOLDOWN WITH LESS THAN TWO CRDM FANS IN OPERATION	00.07
ATTACHMENT 13C		PAGE 1 of 2

- Cooldown rate is 25°F/hr to 470°F and 10°F/hr thereafter
- When temperature is decreased to 340°F, pressure must be maintained greater than 700 psig for 6 hours
- When temperature is decreased to 200°F, pressure must be maintained greater than 350 psig for 29 hours prior to depressurization.
- Method of depressurization in preferred order
  1) Auxiliary spray - Normal or alternate letdown in service.
  2) PRZR PORV's - PORV instrument air available and control circuits free of fire damage
  3) Natural decay - PRZR Heaters OFF

NUMBER	ATTACHMENT TITLE	REVISION
FCA-1.00	NATURAL CIRCULATION COOLDOWN WITH LESS THAN TWO CRDM FANS IN OPERATION	00.07
ATTACHMENT 13C		PAGE 2 of 2



(1) Hold for 6 Hours

(2) Hold for 29 Hours

NUMBER	ATTACHMENT TITLE	REVISION
FCA-1.00	SI BLOCK	00.07
ATTACHMENT 14		PAGE 1 of 2

The purpose of this attachment is to provide guidance block SI signals when the normal control switches located in the MCR are not accessible or operable.

1) Take the following equipment

   * Portable radio
   * Emergency lantern
   * Screwdriver (flathead)
   * Electrical tape

2) Proceed directly to the ESGR of the affected unit.

3) Open the rear door of safeguard train "A" channel I and III panel.

4) Locate the six (6) SI actuation relays

F1-A	F2-A	F3-A

ACTUAL CONFIGURATION

S1A-A	S1B1-A	S1B2-A

5) Remove and tape the J-67 lead from SI actuation relay S1A-A.

6) Proceed to the safeguard Train "B" channel I and III panel.

7) Open the rear door of safeguard Train "B" channel I and III.

NUMBER	ATTACHMENT TITLE	REVISION
FCA-1.00	SI BLOCK	00.07
ATTACHMENT 14		PAGE 2 of 2

8) Locate the six (6) SI Actuation Relays.

F1-B	F2-B	F3-B

ACTUAL CONFIGURATION

S1A-B	S1B1-B	S1B2-B

9) Remove and tape the J-67 lead from S1A-B SI actuation relay.

- END -

NUMBER	ATTACHMENT TITLE	REVISION
FCA-1.00	CROSS CONNECTING AFW SYSTEMS AND ALTERNATE METHOD OF SG LEVEL CONTROL	00.07
ATTACHMENT 15		PAGE 1 of 1

The purpose of this attachment is to provide guidance in cross connecting AFW systems and provide an alternative method of SG level control in the event AFW MOVs have failed in the open position.

Attachment 15A - Cross connecting the auxiliary feed water systems.

Attachment 15B - Alternate method of SG level control.

Attachment 15C - Spurious cross connect operation.

NUMBER	ATTACHMENT TITLE	REVISION
FCA-1.00	CROSS CONNECTING AFW SYSTEMS	00.07
ATTACHMENT 15A		PAGE 1 of 1

1. Start at least one AFW pump on the unaffected unit.

   NOTE: If normal MCR access is restricted local positioning of the cross connect MOVs will be required.

2. Open AFW cross connect MOVs

   a) Unit 1 affected - MOV-FW-160A and B

   b) Unit 2 affected - MOV-FW-260A and B

3. Start additional AFW pumps as required.

NUMBER	ATTACHMENT TITLE	REVISION
FCA-1.00	ALTERNATE METHOD OF SG LEVEL CONTROL	00.07
ATTACHMENT 15B		PAGE 1 of 1

1. If one emergency bus is deenergized isolate the auxiliary feed water header containing the respective MOV's.

	H Bus	J Bus
( )-FW-P-2	( )-FW-141	( )-FW-140
( )-FW-P-3A	( )-FW-156	( )-FW-155
( )-FW-P-3B	( )-FW-171	( )-FW-170

2. If both emergency buses are deenergized

   a) Operate available AFW pumps as necessary to maintain all SG wide range levels at least 70%

   b) Increase steaming rates from SGs with the highest levels to maintain SG wide range levels less than 90%.

3. If Auxiliary feedwater flow is established and SG wide range levels can not be maintained above 70% then isolate blowdown at the coolers by closing.

   ( )-BD-152 "A" Blowdown Cooler Isolation
   ( )-BD-162 "B" Blowdown Cooler Isolation
   ( )-BD-172 "C" Blowdown Cooler Isolation

NUMBER	ATTACHMENT TITLE	REVISION
FCA-1.00	SPURIOUS CROSS-CONNECT OPERATION	00.07
ATTACHMENT 15C		PAGE 1 of 1

1. On energized emergency buses only, open the supply breaker to the respective AFW cross-connect.

   MOV-FW-160A
   MOV-FW-160B
   MOV-FW-260A
   MOV-FW-260B

2. Locally check the AFW cross connects in the required position.

   AFW cross connect - required - open to affected unit

   AFW cross connect - not required - closed

NUMBER	ATTACHMENT TITLE	REVISION
FCA-1.00	LOW LEVEL INTAKE FIRE	00.07
ATTACHMENT 16		PAGE 1 of 1

NOTE: Both units are affected for the low level intake structure fire. Attachment steps apply to both units.

1. CHECK EMERGENCY SW PUMPS - NOT AFFECTED BY FIRE	Refer to TS 3.14 to determine if LCO conditions exist.
2. CHECK POWER TO EITHER 1G OR 2G - AVAILABLE	Manually trip the reactors and GO to Step 8.
3. CHECK CW PUMPS - NOT AFFECTED	Start any available CW pump and GO to Step 5.
4. RETURN TO AP-48	
5. CHECK AT LEAST ONE CW PUMP - RUNNING	Manually trip the reactors and GO to Step 8.

CAUTION: When throttling water box outlet valves do not exceed 4.5 inches mercury condenser back pressure.

6 THROTTLE WATER BOXES TO STABILIZE INTAKE CANAL LEVEL	Reduce load as necessary. When intake canal level is stable - stop load reduction.
7 RETURN TO AP-48	
8 START ANY AVAILABLE EMERGENCY SW PUMP	Reduce heat load to CCW and BC systems.
9 ESTABLISH STEAM RELEASE PATH * Decay heat release * SG PORV	Establish alternate steam release path IAW Attachment 8
10 CLOSE ALL CONDENSER OUTLET MOVs	
11 THROTTLE OR CLOSE SW OUTLET VALVE ON THE CCW AND BC HX	
12 GO TO EP-1	

NUMBER	ATTACHMENT TITLE	REVISION
FCA-1.00	CW/SW SPURIOUS VALVE OPERATION	00.07
ATTACHMENT 17		PAGE 1 of 4

The purpose of this attachment is to ensure that the intake canal level remains greater than 18 ft.

Perform the applicable portions of this attachment based on limiting fire location.

LOCATION	PART
MCR	A, B, C
ESGR 1	A, C
ESGR 2	B, C
CABLE VAULT/TUNNEL 1	A, C
CABLE VAULT/TUNNEL 2	B, C
CONTAINMENTS	C
AUXILIARY BUILDING	C
TURBINE BUILDING	C
MER #3	C
MSVH	C

NUMBER	ATTACHMENT TITLE	REVISION
FCA-1.00	CW/SW SPURIOUS VALVE OPERATION	00.07
ATTACHMENT 17		PAGE 2 of 4

PART A

NOTE: If emergency bus power is not available isolating power to individual CW/SW MOV's is not required.

1. Open the power supply breakers to the below listed MOV's:

1H	1J
MOV-CW-100B/1H1-181	MOV-CW-100A/1J1-123
MOV-CW-100D/1H1-171	MOV-CW-100C/1J1-151
MOV-CW-106A/1H1-173	MOV-CW-106B/1J1-133
MOV-CW-106C/1H1-162	MOV-CW-106D/1J1-171
MOV-SW-101A/1H1-122	MOV-SW-101B/1J1-111
MOV-SW-102A/1H1-131	MOV-SW-102B/1J1-124
MOV-SW-103A/1H1-163	MOV-SW-103B/1J1-181
MOV-SW-103D/1H1-172	MOV-SW-103C/1J1-173

2. Locally record the position of the CW/SW MOV's:

MOV-CW-100A _____	MOV-SW-101A _____
MOV-CW-100B _____	MOV-SW-101B _____
MOV-CW-100C _____	MOV-SW-102A _____
MOV-CW-100D _____	MOV-SW-102B _____
MOV-CW-106A _____	MOV-SW-103A _____
MOV-CW-106B _____	MOV-SW-103B _____
MOV-CW-106C _____	MOV-SW-103C _____
MOV-CW-106D _____	MOV-SW-103D _____

NUMBER	ATTACHMENT TITLE	REVISION
FCA-1.00	CW/SW SPURIOUS VALVE OPERATION	00.07
ATTACHMENT 17		PAGE 3 of 4

PART B

NOTE: If emergency bus power is not available isolating power to individual CW/SW MOV's is not required.

1. Open the power supply breakers to the below listed MOV's:

2H	2J
MOV-CW-200B/2H1-181	MOV-CW-200A/2J1-122
MOV-CW-200D/2H1-171	MOV-CW-200C/2J1-151
MOV-CW-206A/2H1-173	MOV-CW-206B/2J1-133
MOV-CW-206C/2H1-162	MOV-CW-206D/2J1-171
MOV-SW-201A/2H1-122	MOV-SW-201B/2J1-111
MOV-SW-202A/2H1-131	MOV-SW-202B/2J1-123
MOV-SW-203A/2H1-163	MOV-SW-203B/2J1-181
MOV-SW-203D/2H1-172	MOV-SW-203C/2J1-173

2. Locally record the position of the CW/SW MOV's:

MOV-CW-200A _____	MOV-SW-201A _____
MOV-CW-200B _____	MOV-SW-201B _____
MOV-CW-200C _____	MOV-SW-202A _____
MOV-CW-200D _____	MOV-SW-202B _____
MOV-CW-206A _____	MOV-SW-203A _____
MOV-CW-206B _____	MOV-SW-203B _____
MOV-CW-206C _____	MOV-SW-203C _____
MOV-CW-206D _____	MOV-SW-203D _____

NUMBER	ATTACHMENT TITLE	REVISION
FCA-1.00	CW/SW SPURIOUS VALVE OPERATION	00.07
ATTACHMENT 17		PAGE 4 of 4

PART C

Maintain intake canal greater than 18 ft. by positioning CW/SW MOV's as necessary.

NUMBER	ATTACHMENT TITLE	REVISION
FCA-1.00	CROSS CONNECTING EMERGENCY BUSES	00.07
ATTACHMENT 18		PAGE 1 of 6

The purpose of this attachment is to provide guidance to personnel for cross connecting emergency buses.

CAUTION: Emergency bus cross connect should only be accomplished if equipment vital to achieving safe cold shutdown conditions is not available on the energized emergency bus.

1. When stripping deenergized emergency bus, any of the following methods may be used:

   a) Control switch placed in pull-to-lock
   b) Control switch placed in off
   c) Breaker racked to disconnect
   d) MCC breaker open

2. Prepare for cross connecting emergency buses by stripping all loads as listed for the deenergized emergency bus.

   1H - Part A
   1J - Part B
   2H - Part C
   2J - Part D

3. Rack emergency bus cross-connect ( )5H1 to connect.

4. Close emergency bus cross-connect ( )5H1.

5. Verify emergency bus voltage restored.

CAUTION: Existing diesel loads must be considered prior to established additional loads.

NOTE: Emergency diesel maximum continuous output limited to 2.75 MWE.

6. Refer to Part E for listing of emergency bus loads.

7. Operate equipment as necessary.

NUMBER	ATTACHMENT TITLE	REVISION
FCA-1.00	CROSS CONNECTING EMERGENCY BUSES	00.07
ATTACHMENT 18		PAGE 2 of 6

PART A
1H BUS STRIPPING

4160V BUS LOADS

1-CH-P-1A/15H5
1-CH-P-1C/15H6 (Normal Supply)
1-FW-P-3A/15H4
Stub Bus/15H9
Normal Supply/15H8
Diesel Output/15H3

480V DISTRIBUTION

1-SI-P-1A/14H-3
1-CS-P-1A/14H-5
1-RS-P-1A/14H-4
1-RS-P-2A/14H-7
1-VS-F-1A/14H-8
E PRZR HTR BANK/14H-2
1-VS-F-58A/1H-1-14H11 (Normal Supply)

480V MCCS

1H1-1
1H1-2

NUMBER	ATTACHMENT TITLE	REVISION
FCA-1.00	CROSS CONNECTING EMERGENCY BUSES	00.07
ATTACHMENT 18		PAGE 3 of 6

PART B
1J BUS STRIPPING

4160V BUS LOADS

1-CH-P-1B/15J5
1-CH-P-1C/15J2 (Alternate Supply)
1-FW-P-3B/15J4
Stub Bus/15J9
Normal Supply/15J8
Diesel Output/15J3

480V DISTRIBUTION

1-SI-P-1B/14J-3
1-CS-P-1C/14J-5
1-RS-P-1B/14J-4
1-RS-P-2B/14J-8
1-VS-P-1B/14J-7
A PRZR HTR BANK/14J-9
1-VS-F-58B/1J1-14J13 (Alternate Supply)

480V MCCs

1J1-1
1J1-2

NUMBER	ATTACHMENT TITLE	REVISION
FCA-1.00	CROSS CONNECTING EMERGENCY BUSES	00.07
ATTACHMENT 18		PAGE 4 of 6

PART C
BUS STRIPPING

4160V BUS LOADS

2-CH-P-1A/25H5
2-CH-P-1C/25H6 (Normal Supply)
2-FW-P-3A/25H4
Stub Bus/25H9
Normal Supply/25H8
Diesel Output/25H3

480V DISTRIBUTION

2-SI-P-1A/24H-3
2-CS-P-1A/24H-5
2-RS-P-1A/24H-4
2-RS-P-2A/24H-7
2-VS-F-1A/24H-8
E PRZR HTR BANK/24H-2
1-VS-F-58B/2H1-24H17 (Normal Supply)

480V MCCs

2H1-1
2H1-2

NUMBER	ATTACHMENT TITLE	REVISION
FCA-1.00	CROSS CONNECTING EMERGENCY BUSES	00.07
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PART D
2J BUS STRIPPING

4160V BUS LOADS

2-CH-P-1B/25J5
2-CH-P-1C/25J2 (Alternate Supply)
2-FW-P-3B/25J4
Stub Bus/25J9
Normal Supply/25J8
Diesel Output/25J3

480V DISTRIBUTION

2-SI-P-1B/24J-3
2-CS-P-1B/24J-5
2-RS-P-1B/24J-4
2-RS-P-2B/24J-8
2-VS-P-1B/24J-7
A PRZR HTR BANK/24J-9
2-VS-F-58A/2J1-24J11 (Alternate Supply)

480V MCCs

2J1-1
2J1-2

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PART E
EMERGENCY BUS LOADS

4160V LOAD	KW RATING
Charging Pump	430 KW
Motor Driven Aux Feedwater Pump	310 KW
CCW Pump	450 KW
Residual Heat Removal Pump	215 KW
480V DISTRIBUTION	
PRZR Heater	
H Group	250 KW
J Group	200 KW
Containment Air Recirc Fan	100 KW
Containment Spray Pump	170 KW
Low Head SI Pump	190 KW
Inside Recirc Spray Pump	225 KW
Outside Recirc Spray Pump	245 KW
CAT 1 Filter Exhaust Fan	125 KW
480V MCC LOADS	
Turning Gear Motor	40 KW
Turning Gear Oil Pump	45 KW
Instrument Air Compressor	75 KW
Auxiliary Building Exhaust Fan	45 KW
Control Rod Cooling Fan	60 KW
Feed Water Booster Pump	40 KW
Control/Relay Room Chiller	75 KW
1-VS-E-3A or 3B Chiller	100 KW