NORTHEAST UTILITIES
THE CONNECTICUT LIGHT AND POWER COMPANY
WESTERN MASSACHUSETTS ELECTRIC COMPANY
HOLYOKE WATER POWER COMPANY
NORTHEAST UTILITIES SERVICE COMPANY
NORTHEAST NUCLEAR ENERGY COMPANY

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April 6, 1989

Docket No. 50-423
B13064
Re: Millstone Unit No. 3
Operating License
Condition 2.C(10)

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

References: (1) J. F. Opeka letter to Dr. T. E. Murley, Changes to the Initial Test Program, dated May 2, 1986.

(2) S. D. Ebneter letter to J. F. Opeka, Inspection Report No. 50-423/86-11, dated May 6, 1986.

(3) S. D. Ebneter letter to J. F. Opeka, Inspection Report No. 50-423/86-14, dated May 30, 1986.

Gentlemen:

Millstone Nuclear Power Station, Unit No. 3
Changes to the Initial Test Program
Start-Up Test No. 26--Station Blackout

In accordance with the Millstone Unit No. 3 Operating License Condition 2.C(10), Northeast Nuclear Energy Company (NNECO) submitted a report containing a brief description of a change to the Initial Test Program including a summary of the safety evaluation (Reference (1)). Specifically, the change deleted the requirement to have all plant loads supplied by the Millstone Unit No. 3 Turbine-Generator as a prerequisite to the Loss of Power Test (Start-Up Test No. 26--Station Blackout).

During a telephone conference call on September 26, 1988, the NRC Staff expressed their concern regarding the subject start-up test as implemented. The Staff indicated that Millstone Unit No. 3's Start-Up Test No. 3-INT-8000, Appendix 8030, "Loss of Power (20 percent power)," as performed, did not meet the guideline of Regulatory Guide (R.G.) 1.68, "Initial Test Programs for Water-Cooled Nuclear Power Plants," paragraph 5JJ. This paragraph provides that during plant start-up at approximately 10-20 percent reactor power, a main generator trip be initiated coincident with a loss of offsite power (LOP). The NRC Staff's interpretation of this paragraph is that this test would demonstrate the operability of Millstone Unit No. 3's electrical control/protection scheme to transfer the Class 1E distribution system from the unit's power supply to the unit's standby power supply (emergency diesel

A050
1/1

generators) and the operability of Class 1E equipment when connected to the main generator during a main generator coastdown. The generator coastdown is caused by the tripping of the turbine coincident with an LOP. The main generator breaker remains closed during this event.

NNECO acknowledges the NRC Staff's concerns on Start-Up Test No. 3-INT-8000, Appendix 8030. The test, as performed, for an LOP demonstrated the operability of the electrical control/protection scheme to de-energize the Class 1E buses, the autostart of the emergency diesel generators, the reenergization of the Class 1E buses, and the automatic sequenced reconnection of the shutdown loads through the load sequencer. For this start-up test, the plant was safely brought to a hot standby condition with the emergency diesel generators supplying power to the Class 1E system for a period of 2 hours until offsite power was restored. However, the plant electrical system was not in its normal configuration when the start-up test was initiated. The 4.16-kV system was aligned to the reserve station service transformer (RSST) rather than the normal station service transformer (NSST). In addition, since the start-up test as performed did not have a turbine trip, the start-up test did not demonstrate the operability of Class 1E equipment when exposed to the electrical system transients caused by a main generator coastdown.

The start-up test procedure was reviewed, and the test as changed was witnessed by the NRC Region I Staff (References (2) and (3)). The start-up test procedure was revised to eliminate the turbine generator trip because, due to a previous start-up test, the main generator would already be tripped. However, this procedure change would have no impact on the objective of the test to meet R.G. 1.68, paragraph 5JJ.

NNECO concludes that an additional test as proposed by the Staff is not necessary because NNECO believes that the Staff' concerns regarding the R.G. 1.68 test can best be satisfied through a combination of analysis and other tests performed rather than performing the actual test. On February 22, 1989, NNECO representatives met with the NRC Staff at the Millstone Station to discuss the NRC's concerns regarding Millstone Unit No. 3's initial Start-Up Test No. 26 (LOP). At the meeting, the following topics were included in presentation to resolve the Staff's concerns regarding the subject start-up test:

o Initial Start-Up Test No. 3-INT-8000 enveloped by other tests.

o Other start-up tests which demonstrated electrical transfer schemes.

o Engineering analysis to demonstrate capability of Class 1E equipment during generator coastdown.

o Discussion of two recent licensee event reports (LERs) and their relationship with the initial start-up test.

o Design modifications.

A copy of the hardouts used at the meeting is attached herewith (Attachment 1). The purpose of this submittal is to provide information presented at the February 22, 1989 meeting and to address the Staff's questions raised during that meeting so that the Staff may utilize it in finalizing the safety evaluation on License Condition 2.C(10). We believe that the information contained herein will enable the Staff to close the subject license condition.

At the February 22, 1989, meeting, NNECO described the tests that were performed as a part of the Millstone Unit No. 3 start-up program (e.g., Start-Up Test No. 8030, Loss of Power, Pre-Op Test No. 3447BA, Start-Up Test Nos. 2003, 2004, and 8032) and the Technical Specification Surveillance tests (ESF Testing, SP3446) performed at each refueling outage. The details of these tests are included in Attachment 1. These various tests demonstrate the ability of the Millstone Unit No. 3 electrical protection system to transfer the Class 1E electrical equipment from the unit's power supply to the emergency diesel generators. The tests were conducted under a variety of plant operating conditions and electrical configurations. These tests verify the de-energization of the emergency buses, autostart of the emergency diesels, reenergization of the emergency buses either through the transfer to the RSST or the emergency diesel generators, and automatic sequenced reconnection of shutdown loads through the load sequencer. Several of the test procedures and the test results were provided to the Staff for review subsequent to the February 22, 1989, meeting. These test results are expected to satisfy the Staff's concern that Millstone Unit No. 3's electrical control/protection scheme can adequately detect an LOP, and transfer the Class 1E distribution system from the unit's power supply to the emergency diesel generators.

In order to demonstrate the capability of the Class 1E electrical equipment during the generator coastdown, NNECO developed a computer model of the Millstone Unit No. 3 electrical system to predict the electrical transients caused by a turbine trip coincident with an LOP. Some of the details of the computer model are provided in Attachment 1. The additional information regarding the computer model and the predicted electrical transients are included in a report. This report is available for the Staff's review.

The computer model shows that the electrical transient caused by a 100 percent full load rejection is not an overly severe electrical event. The computer model shows that a full load rejection at 20 percent power (power level required by R.G. 1.68, paragraph 5JJ) causes no initial transient (overvoltage or overspeed), but only a slow decay. NNECO has performed an analysis of the Class 1E equipment when exposed to the electrical system transient produced by a full load rejection at 100 percent power coincident with an LOP. The review showed that the Class 1E equipment would be able to perform their safety function and bring the plant to a safe shutdown condition. The basis for this conclusion is provided in the aforementioned report. NNECO believes this analysis adequately demonstrates the continued operability of the Class 1E equipment when exposed to a coastdown scenario.

At the February 22, 1989, meeting, an explanation of LERs 3-88-26 and 28 were provided (see attached slides for details). LER 3-88-26 was a result of our study of the electrical protection scheme on the impact of the turbine generator coastdown on the plant's equipment. To avoid the scenario described in LER 3-88-26, the plant's electrical system was realigned to be powered from the RSST. In this plant lineup, when the diesel generator surveillance was performed, the electrical protective system tripped the 4-kV tie breaker between the normal and emergency 4-kV bus as designed causing the 4-kV normal bus to lose power. The loss of the 4-kV normal bus led to a plant trip (LER 3-88-028). It was noted at the meeting that a test performed to meet the R.G. 1.68, paragraph 5JJ, would not have revealed the design deficiencies noted in LERs 3-88-26 and 28.

At the meeting, a design modification based on NNECO's preliminary review of the electrical schematics to resolve the safety concerns described in LER 3-88-26 was presented. It would block the fast transfer when initiated by a nonvital undervoltage condition. Marked-up schematics for one train showing the design changes required are provided in Attachment 1. Other design changes may be made as the conceptual design is reviewed through the multidisciplined review process.

We believe that the above information should satisfy the Staff's concerns regarding the ability to safely shutdown the plant in the event of a turbine trip coincident with an LOP. Of course, should the Staff have any questions concerning information presented at the meeting or described in this submittal, NNECO will be available to address the Staff's questions.

Very truly yours,

NORTHEAST NUCLEAR ENERGY COMPANY

E. J. Mroczka

E. J. Mroczka
Senior Vice President

CFSears

By: C. F. Sears
Vice President

cc: W. T. Russell, Region I Administrator
D. H. Jaffe, NRC Project Manager, Millstone Unit No. 3
W. J. Raymond, Senior Resident Inspector, Millstone Unit Nos. 1, 2, and 3

Docket No. 50-423
B13064

Attachment 1

Millstone Unit No. 3

Changes to the Initial Test Program
Start-Up Test No. 26--Station Blackout

April 1989

Millstone Unit No. 3
NNECO/NRC MEETING
ON INITIAL START-UP TEST
LOSS OF OFF-SITE POWER TEST

DATE AND TIME: Wednesday, February 22, 1989
8:30 a.m. - 3:00 p.m.

LOCATION: CONFERENCE ROOM #5
Millstone Unit No. 3

PURPOSE: To resolve the Staff's concerns regarding the initial start-up test #26 (Loss-of-offsite Power).

Agenda:

- o Introduction
- o Test Definitions
- o Sequence of the Actual Loop Test Performed
- o NRC Staff Concerns
- o Northeast Utilities Efforts to Resolve Staff Concerns
  - \- a. Enveloped by other tests
  - \- b. Covered by analysis
  - \- c. Discussion of LERs and their relationship with the initial start-up test.
  - \- d. Design Modifications

AGENDA

TEST DEFINITIONS

SEQUENCE OF THE ACTUAL LOP TEST PERFORMED

NRC STAFF CONCERNS

NORTHEAST UTILITIES EFFORTS TO RESOLVE STAFF CONCERNS

a. Enveloped by other Tests

b. Covered by Analysis

c. Relationship to recent LERs

d. Design Changes

Test Definitions

REG Guide 1.68, Appendix 5 jj

Demonstrate that the dynamic response of the plant is in accordance with the design for a condition of loss of turbine-generator coincident with loss of all sources of offsite power (i.e.: station blackout*).
(In the 10 to 20% power range)

* Not the REG Guide 1.155 Station Blackout

FSAR Test 26 (Original)

The plant is in the 10 to 20 percent power range with all plant loads being supplied by the Millstone 3 generator.

FSAR Test 26 (After the change)

The plant is in the 10 to 20 percent power range.

NORMAL SWITCHYARD LINEUP

YARD BREAKERS CLOSED (13T AND 14T)

GENERATOR OUTPUT BREAKER CLOSED (15G-3U-2)

SUPPLY BREAKERS FROM NSST A AND B TO 4.16 AND 6.9 KV BUSES CLOSED

SUPPLY BREAKERS FROM RSST A AND B TO 4.16 AND 6.9 KV OPEN TRANSFORMERS ARE ENERGIZED AND AVAILABLE

BUS TIE BREAKERS BETWEEN THE STATION NORMAL BUSES (34A AND B) AND STATION EMERGENCY BUSES (34C AND D) ARE CLOSED

EMERGENCY DIESEL GENERATOR IN STANDBY

MILLSTONE 3 RESPONSE TO A " NORMAL " REACTOR / TURBINE TRIP

REACTOR TRIPS FROM REACTOR PROTECTION SYSTEM SIGNAL

REACTOR TRIP BREAKERS OPENING CAUSE A TURBINE TRIP

THIRTY SECONDS AFTER THE TURBINE TRIP THE GENERATOR OUTPUT BREAKER OPENS ON REVERSE POWER

NO OTHER REALIGNMENT OF THE PLANT ELECTRICAL SYSTEMS TAKE PLACE

6

GENERATOR OUTPUT BREAKER TRIPS

ON A TURBINE TRIP AFTER A 2.5 SECOND TIME DELAY ON REVERSE POWER THE BREAKER AUTOMATICALLY OPENS ON TURBINE DESTRUCTIVE TRIPS

i.e. OVERSPEED

THRUST BEARING WEAR

HIGH VIBRATION

LOW OIL PRESSURE

ELECTRICAL TRIPS

THE BREAKER OPENS ON ELECTRICAL FAULTS BETWEEN THE GENERATOR BREAKER AND THE SWITCHYARD

i.e.: MAIN GENERATOR PILOT WIRE

PHASE DISAGREEMENT

UNIT PROTECTION

GENERATOR LOCKOUT (GENERATOR DIFF, EXCITER DIFF, VOLTS/HZ)

MAIN OR NSST TRANSFORMER LOCKOUT

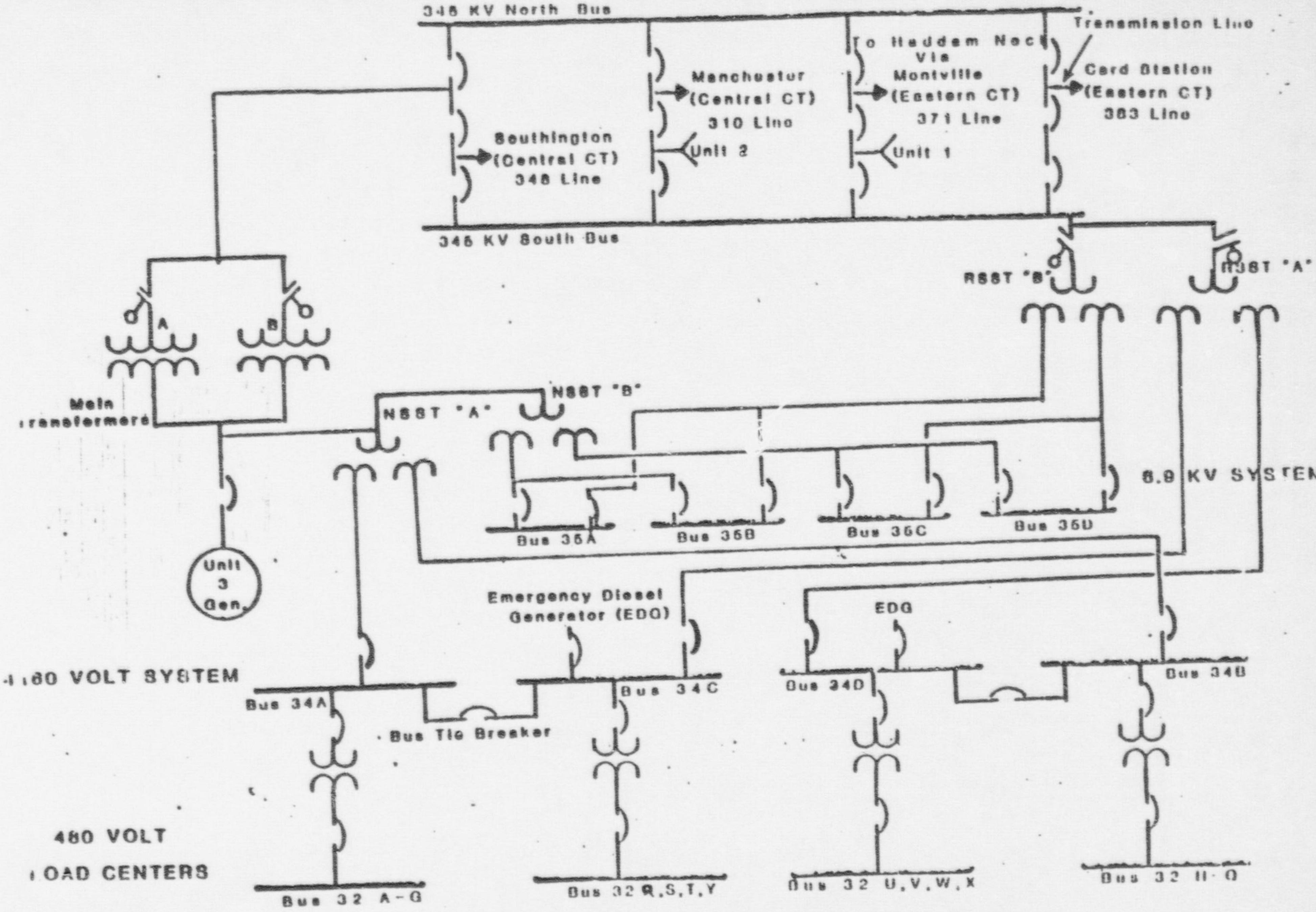


Figure 1. ELECTRICAL DISTRIBUTION SYSTEM

BASIC MILLSTONE 3 ELECTRICAL TRANSFER SCHEMES

WITH THE PLANT IN THE NORMAL ELECTRICAL LINEUP

FAST TRANSFER NSST SUPPLY TO 4.16 KV OPEN
IF > 95.0% VOLTAGE IS ON THE RSST, RSST SUPPLY
BREAKERS CLOSE IN 6 CYCLES

70% VOLTAGE UNDER VOLTAGE SLOW TRANSFER ON EMERGENCY BUS

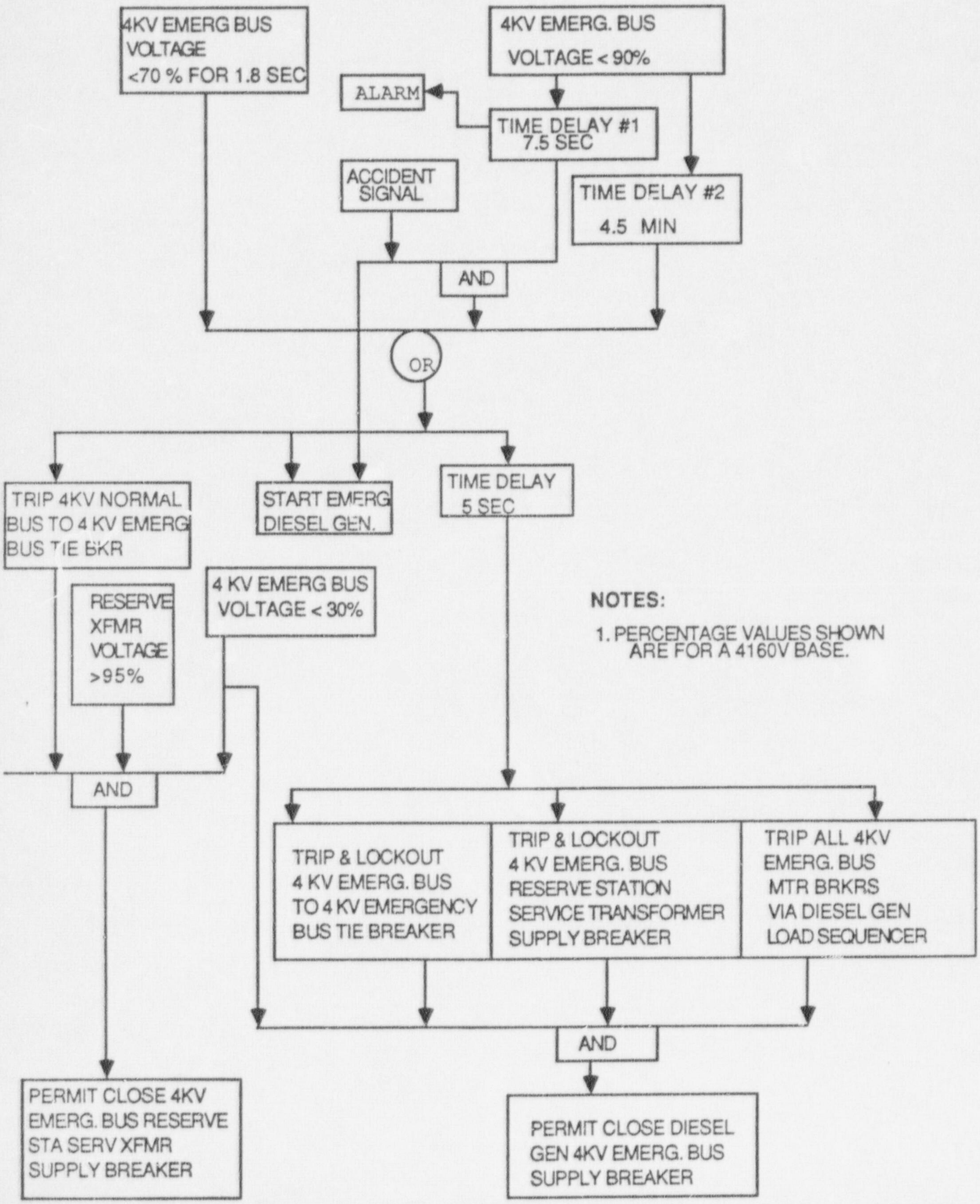
1. BUS TIE BREAKER OPENS AND DIESEL GENERATOR STARTS
2. IF 95% VOLTAGE ON THE RSST AND 4.16 KV < 30%, THE RSST SUPPLY WILL CLOSE.
3. IF THE RSST DOES NOT CLOSE AND ALL SUPPLY TO THE 4.16 KV BUS ARE OPEN AND NO FAULT EXISTS, THE DIESEL GENERATOR BREAKER WILL CLOSE

90% DEGRADED VOLTAGE

1. 90% VOLTAGE FOR 4.5 MIN CUASES A TRANSFER TO THE RSST
2. 90% VOLTAGE FOR 7.5 SEC WITH AN ESF SIGNAL PRESENT CAUSES A TRANSFER TO THE RSST

IF THE RSST IS NOT AVAILABLE, A TRANSFER TO THE DIESEL OCCURS.

UNDERVOLTAGE AND DEGRADED VOLTAGE TRANSFER SCHEMES



NOTES:

1. PERCENTAGE VALUES SHOWN ARE FOR A 4160V BASE.

STARTUP TEST 8030 - LOSS OF POWER

THE ORIGINAL TEST SEQUENCE PRIOR TO CHANGING THE TEST WAS:

1. REACTOR AT APPROXIMATELY 20% POWER
2. TURBINE AT APPROXIMATELY 20% POWER
3. NORMAL ELECTRICAL LINEUP
4. 4.16 KV SYSTEM MANUALLY ALIGNED TO THE RESERVE TRANSFORMERS TO PREVENT A SUBSEQUENT UNNECESSARY TRANSFER FURING THE TEST
5. RSST BREAKERS TO THE 6.9 KV DISABLED THROUGH THE REMOVAL OF CONTROL POWER FUSES
6. 120 VOLT VITAL AC INVERTERS PLACED ON BATTERIES
7. MOTOR DRIVEN AUXILIARY FEED WATER PUMPS BLOCKED FROM OPERATION
8. MANUAL REACTOR
9. TURBINE TRIP
10. MANUAL TRIP OF RSST SUPPLY BREAKERS TO 4.16 KV SYSTEM
11. MANUAL TRIP OF NSST SUPPLY BREAKERS TO 6.9 KV SYSTEM
12. LOP ON EMERGENCY BUSES CAUSES DIESEL TO START AND LOP LOADS TO SEQUENCE ON
13. PLANT OPERATION ON NATURAL CIRCULATION WITH ONLY THE TERRY DRIVEN AFW PUMP IN OPERATION (NO VENTILATION) AND 120 VAC VITAL INVERTERS BEING POWERED FROM THE BATTERIES VERIFIED FOR TWO HOURS

THE FSAR CHANGE IN QUESTION DELETED STEP 2 AND STEP 9 ABOVE
THE FSAR TEST CHANGE IN QUESTION DID NOT ALTER THE INTENT OR RESULTS OF THE ORIGINAL TEST AS WRITTEN

NRC STAFF CONCERNS

The test as performed did not demonstrate the Dynamic response of the in house plant electrical system with the turbine generator coasting down as the only source of AC power. Electrical transfer schemes and safety related equipment response needs to be demonstrated.

Northeast Utilities Original Test Interpretation

The word dynamic applied to the plant response for a normal turbine trip with loss of offsite power. The word dynamic did not imply turbine coastdown, but implied plant response to turbine trip with LOP followed by natural circulation.

Northeast Utilities agrees with the staff. A reading of the FSAR and Reg. Guide 1.69 indicates that a turbine coastdown should have been included as part of startup test 26.

Northeast Utilities proposes to show that the required testing was in fact demonstrated through a combination of overlapping testing and analysis.

ELECTRICAL SYSTEM TRANSFER TESTS

VERIFIES THE FOLLOWING:

- Deenergization of the Class IE Busses
- Autostart of the D/G's
- Reenergization of the Class IE Busses
- Automatic Sequenced Reconnection of Shutdown Loads

TESTING PREVIOUSLY PERFORMED AT MILLSTONE 3

PRE OP TEST 3447BA

This test initially energized the Normal Station Service Transformers and tested the fast and slow transfer schemes

High Speed Transfer Test

Buses on 4.16 kv from the NSST

Diesel Generator is blocked from starting
UV Relay on normal Bus tripped
Verify NSST supply Breaker Opens
Verify RSST supply Breaker Closes in 6 cycles

Slow Speed Transfer Test

Buses on 4.16 kv from NSST
Jumper installed to block high speed transfer
UV Relay on normal bus tripped
Verify Normal Supply and Tie Breakers Open
Verify RSST supply breaker closes

Startup Test 2003 ESF With Out Loss of Power

This test, tested basic sequencer functions with normal power available

Startup Test 2004 ESF With Loss of Power

This test, tersted basic sequencer functions and electrical system transfer schemes with a loss of power

Testing Sequence Was:

a Station in a normal electrical lineup
b Control Power Fuses to RSST Breakers removed to prevent breakers from closing
c Normal Bus UV relay Tripped to simulate a LOP
d Following relay trip , NSST supply breakers open and the Tie breaker opens
e RSST supply breakers try to close but cannot
f Diesel Starts and Diesel Generator Output Breaker closes on to the emergency bus

Startup Test 8032 Generator Trip Test

This test demonstrated the ability of the turbine generator aand the reactor to handle a full load rejection

Testing Sequence was:

a 100% Turbine and Reactor Power
b Normal Electrical lineup
c Generator Output Breaker Opened from the Control Room

Refueling Technical Specification Surveillance Testing

ESF Actuation Testing SP 3446 A.15 through A.18

This test has been perfromed successfully 3 times

a Normal Electrical Lineup
b Control Power fuses removed from RSST breakers to prevent closure
c Bus Tie Breaker opened to simulate LOP
d Diesel Generator Starts and LOP/ESF loads sequenced on to the bus
e Testing is done on a train basis

Offsite Power Transfer Test SP 3446 A.5

Unit is shutdown - Generator offline
4.16 KV load is on the NSST
Switchyard Breakers 13T and 14T and The NSST supply breakers are opened
Immediate Transfer to the RSST is verified

Startup Tests and Subsequent Technical Specification Surveillance Tests prove that electrical transfer schemes work

Electrical System Characteristics Following A Full Load Rejection

1. Initial Transient Produces
   - Overvoltage
   - Overspeed
   - Level of overspeed/overvoltage dependent on predisturbanece level of real and reactive power levels on the turbine/generator

2. Following an initial transient a steady decay in generator speed will occur. Deceleration rate dependent on:
   - Steam remaining in the turbine system to produce an accelerating torque
   - The connected plant load and rotational losses available to produce a decelerating torque

Study of Millstone Unit 3 Electrical Distribution System Following A Full Load Rejection

Study incorporated the follwing components in the computer model:

- MP3 Steam System
- Main Turbine Generator
- Exciter
- Automatic Voltage Regulator
- Transformers (Both Main and NSST'S)
- Cable Impedances
- Induction Motors
- Other Loads

Details of Computer Model

Computer model utilizes a package of modules for the listed equipment provided by Power Technologies, Incorporated

- Modules follow standards as accepted by the Institute of Electric and Electronics Engineers (IEEE)
- IEEE standards represent industry views for representing equipment actions mathamatically
- Modules allows users to incorporate plant specifics into the overall model
- Steam system module was developed based on test data taken from Startup Test No.8032, "Generator Trip at 100% Power"

Correlation of Computer Model to Real World

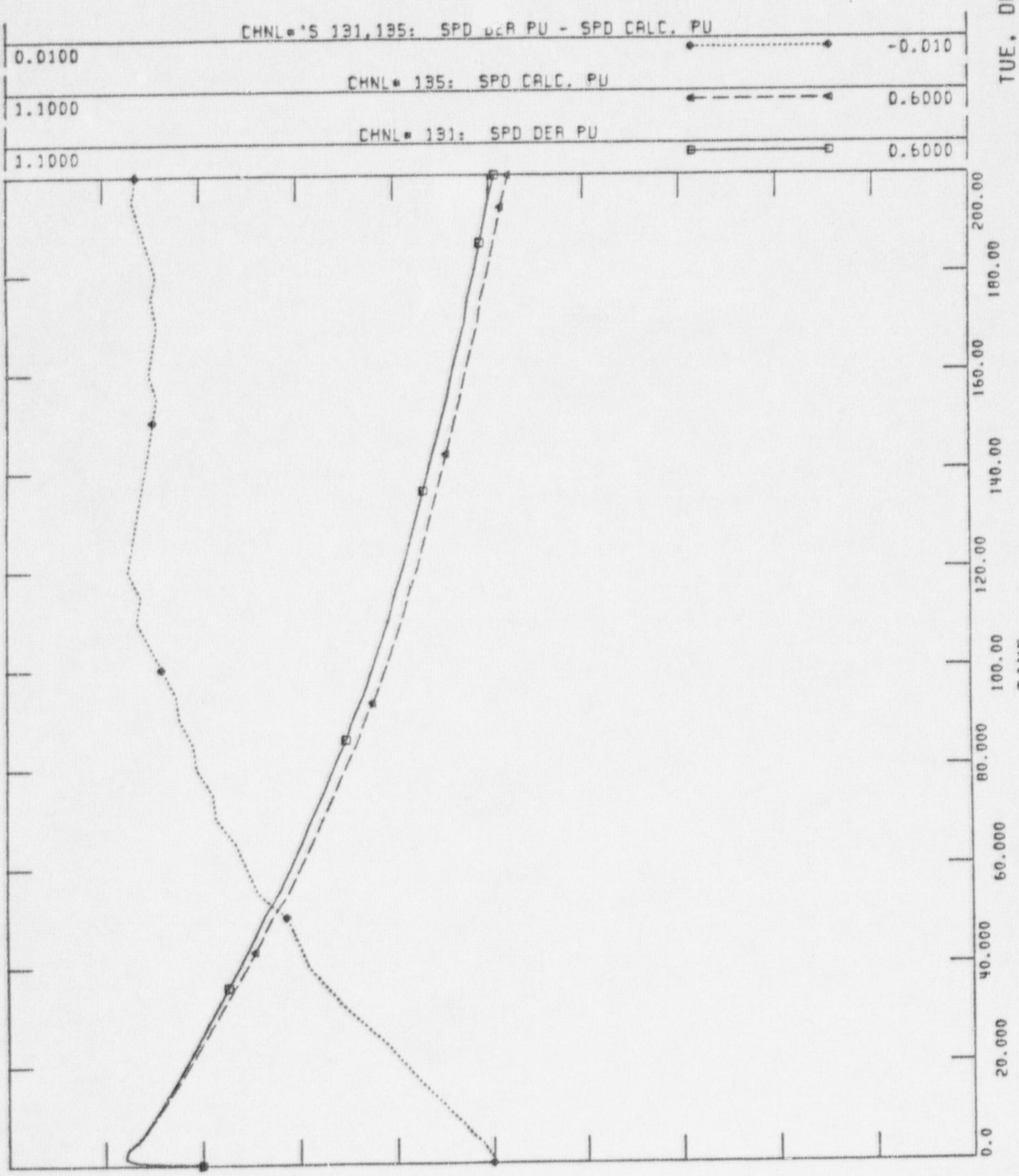
- A simulation to predict turbine speed was performed for a full load rejection with no plant load remaining connected
- Simulated turbine speed results were compared with the turbine speed obtained in the Startup Test No. 8032
- Error between the computer simulated speed results and field test speed results were less than .01 p.u. on a 1800 RPM base

MP3 STATION BLACKOUT LOAD REJECTION STUDY
MP3=1189MW+166MVAR ET=0.9916PU
SIMULATION OF PAST FULL LOAD REJECTION TEST

FILE: CASE5

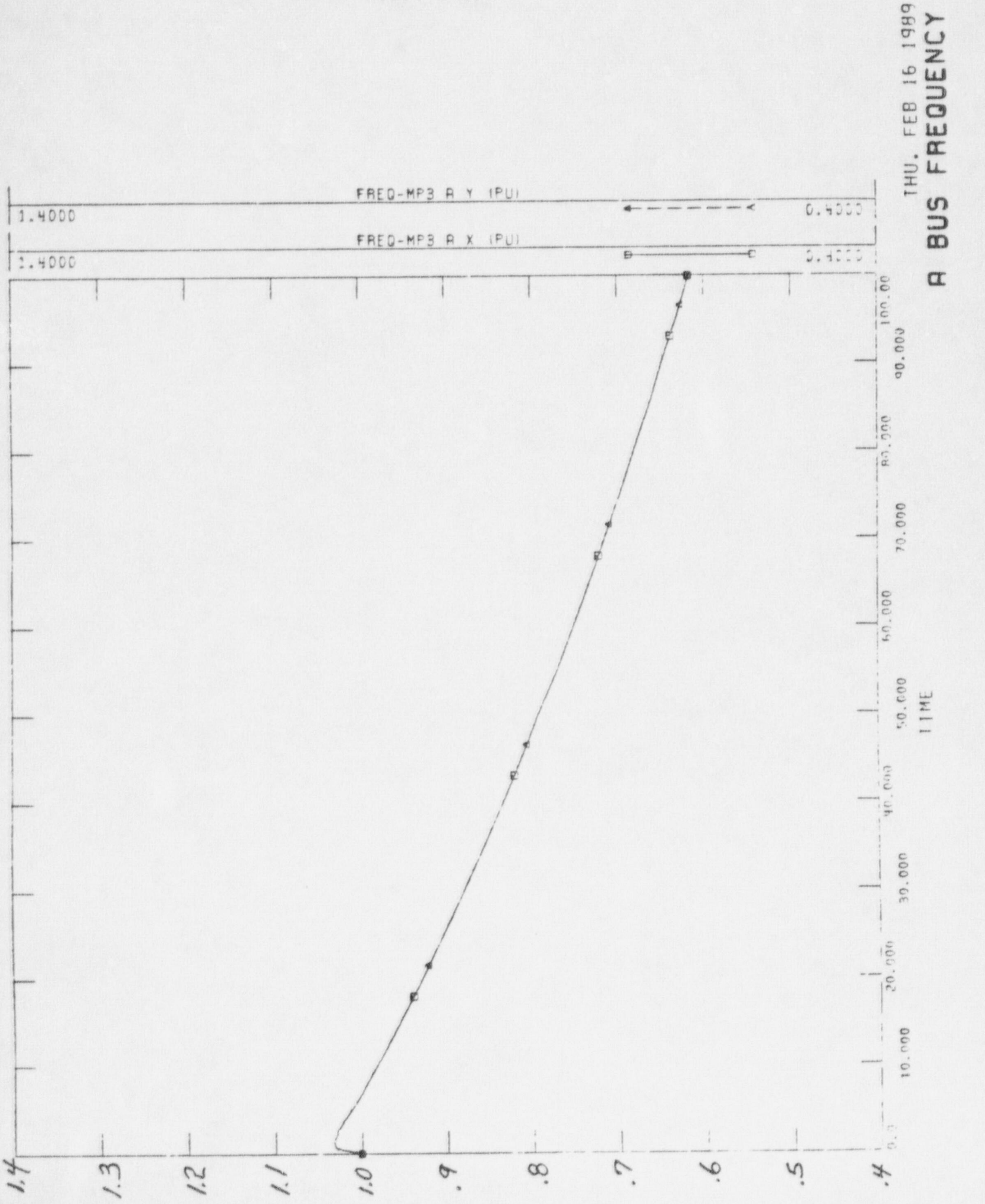
TUE. DEC 27 1988 15:16

MP3 SPEED COMPARISON



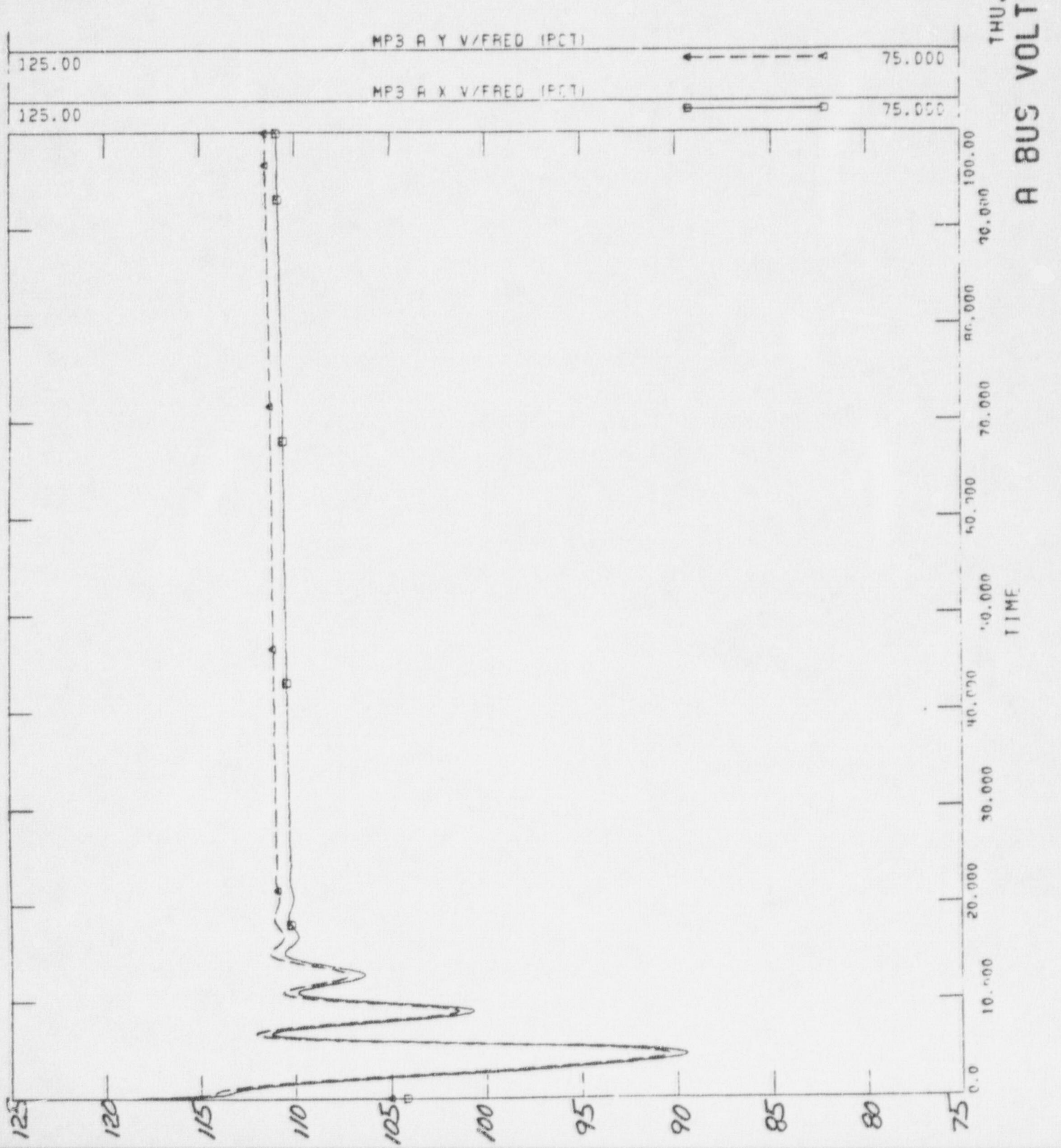
MP3 STATION BLACKOUT LOAD REJECTION STUDY
MP3=1189MW+300MVAR ET=1.0019
LOSS OF SWITCHYARD LOAD AT T=0.0 SECONDS

FILE: CASE7



MP3 STATION BLACKOUT LOAD REJECTION STUDY
MP3=1189MW+300MVAR ET=1.0019
LOSS OF SWITCHYARD LOAD AT T=0.0 SECONDS

FILE: CASE7



MP3 STATION BLACKOUT LOAD REJECTION STUDY
MP3=1189MW+300MVAR ET=1.0019
LOSS OF SWITCHYARD LOAD AT T=0.0 SECONDS

FILE: CASE7

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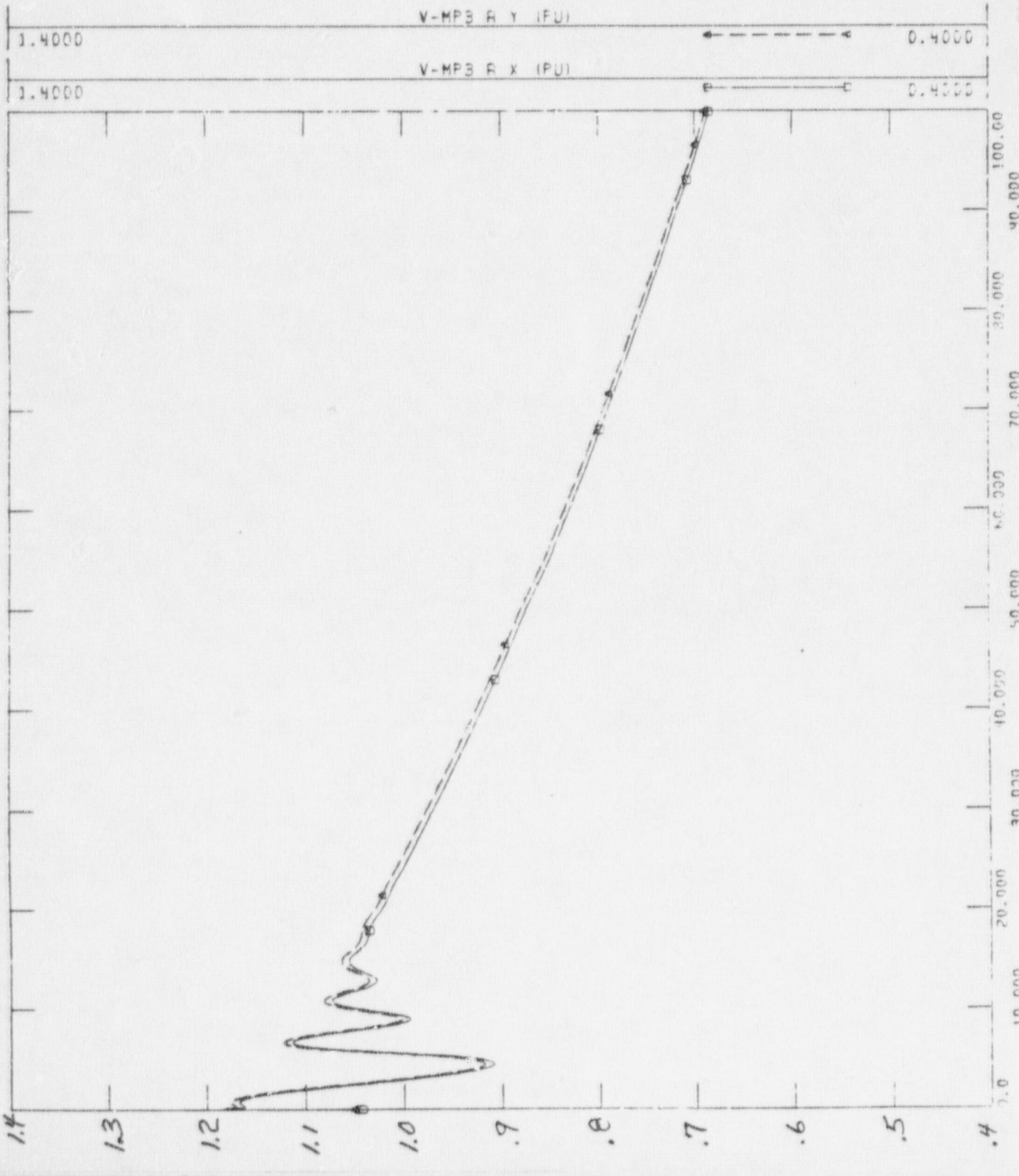
A BUS VOLTAGES (PU)



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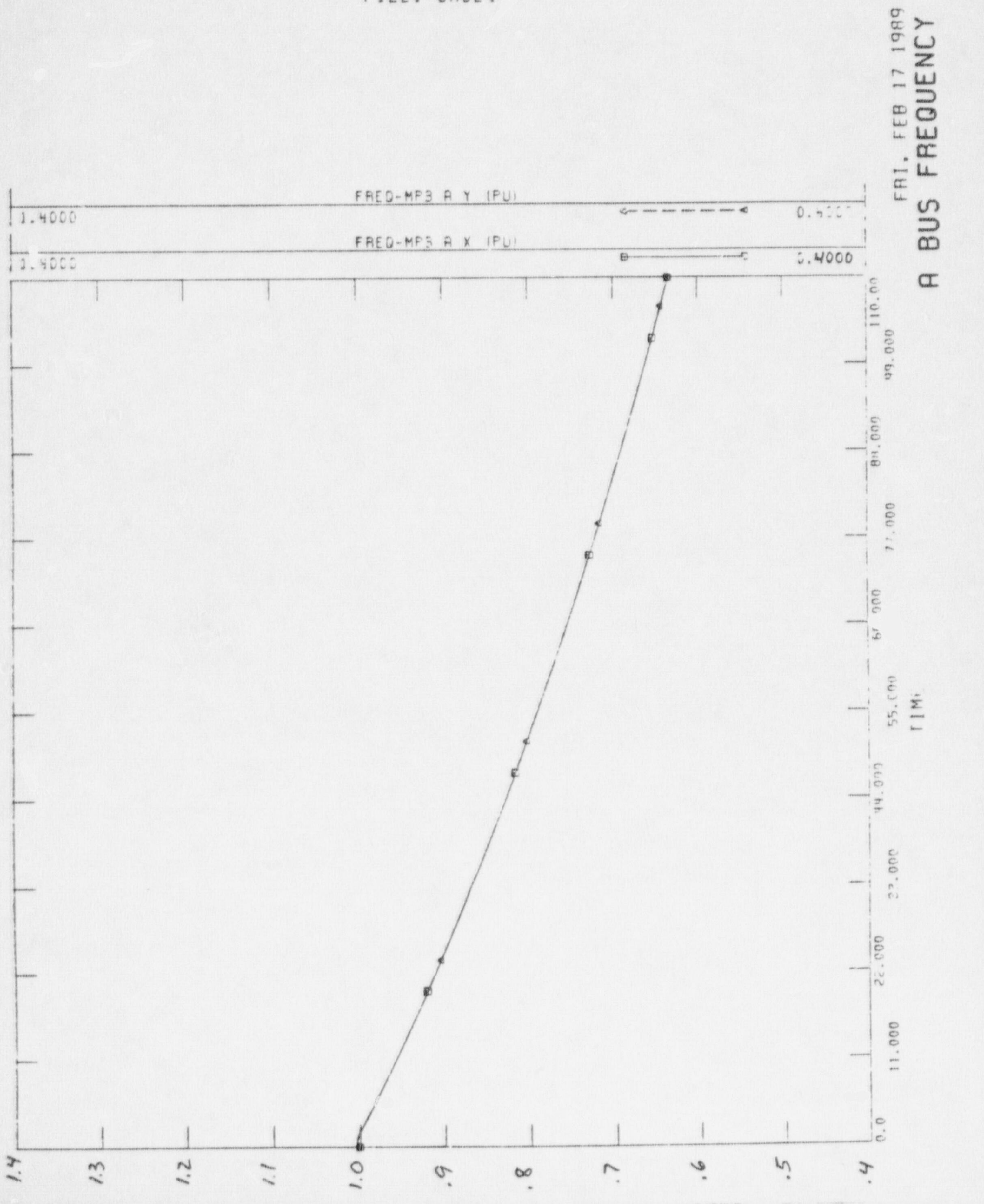
MP3 STATION BLACKOUT LOAD REJECTION STUDY
MP3=238MW+33MVAR ET=0.9837PU
LOSS OF SWITCHYARD LOAD AT T=0.0 SECONDS

FILE: CASE4



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MP3 STATION BLACKOUT LOAD REJECTION STUDY
MP3=238MW+33MVAR ET=0.9837PU
LOSS OF SWITCHYARD LOAD AT T=0.0 SECONDS

FILE: CASE4

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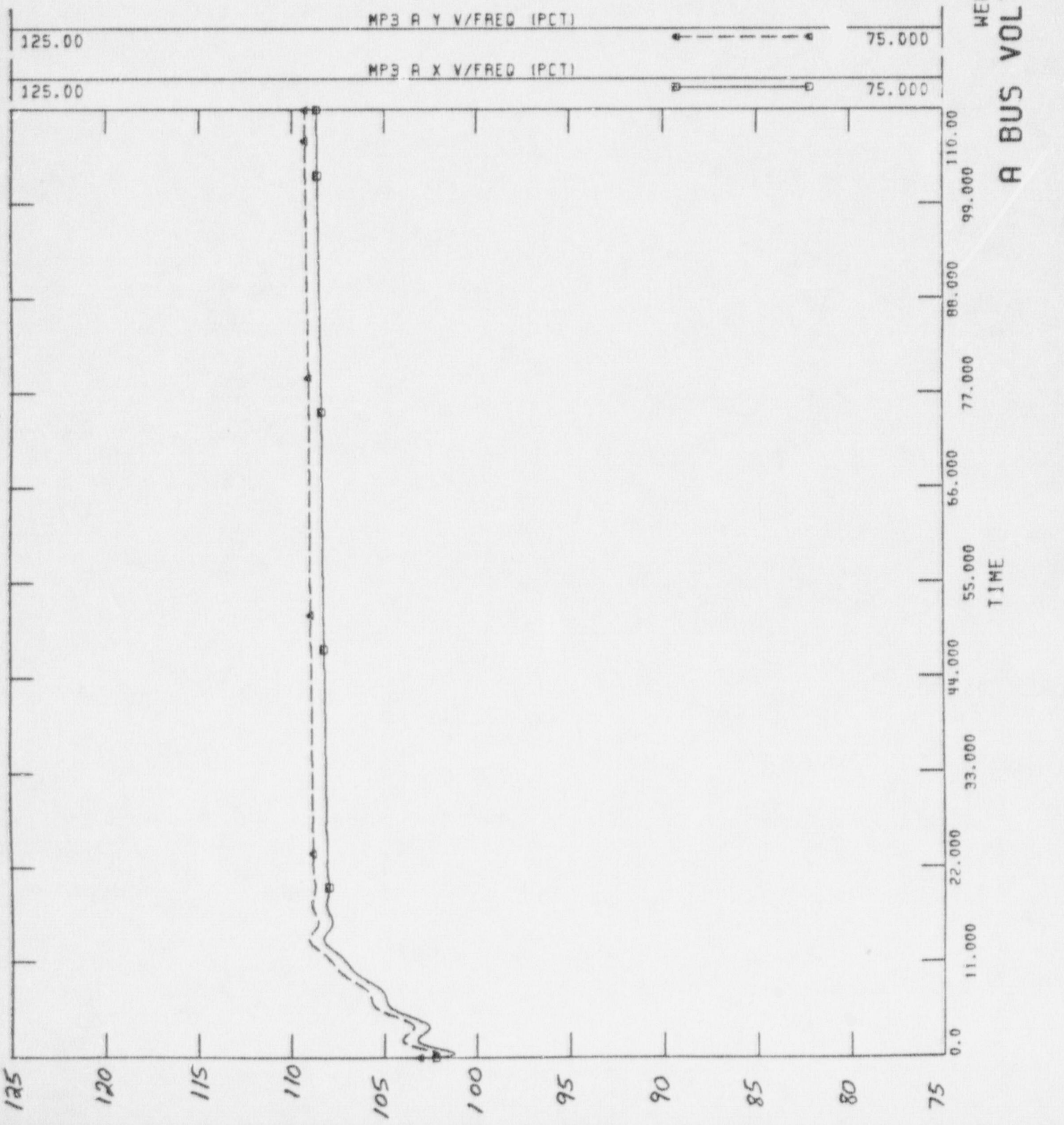
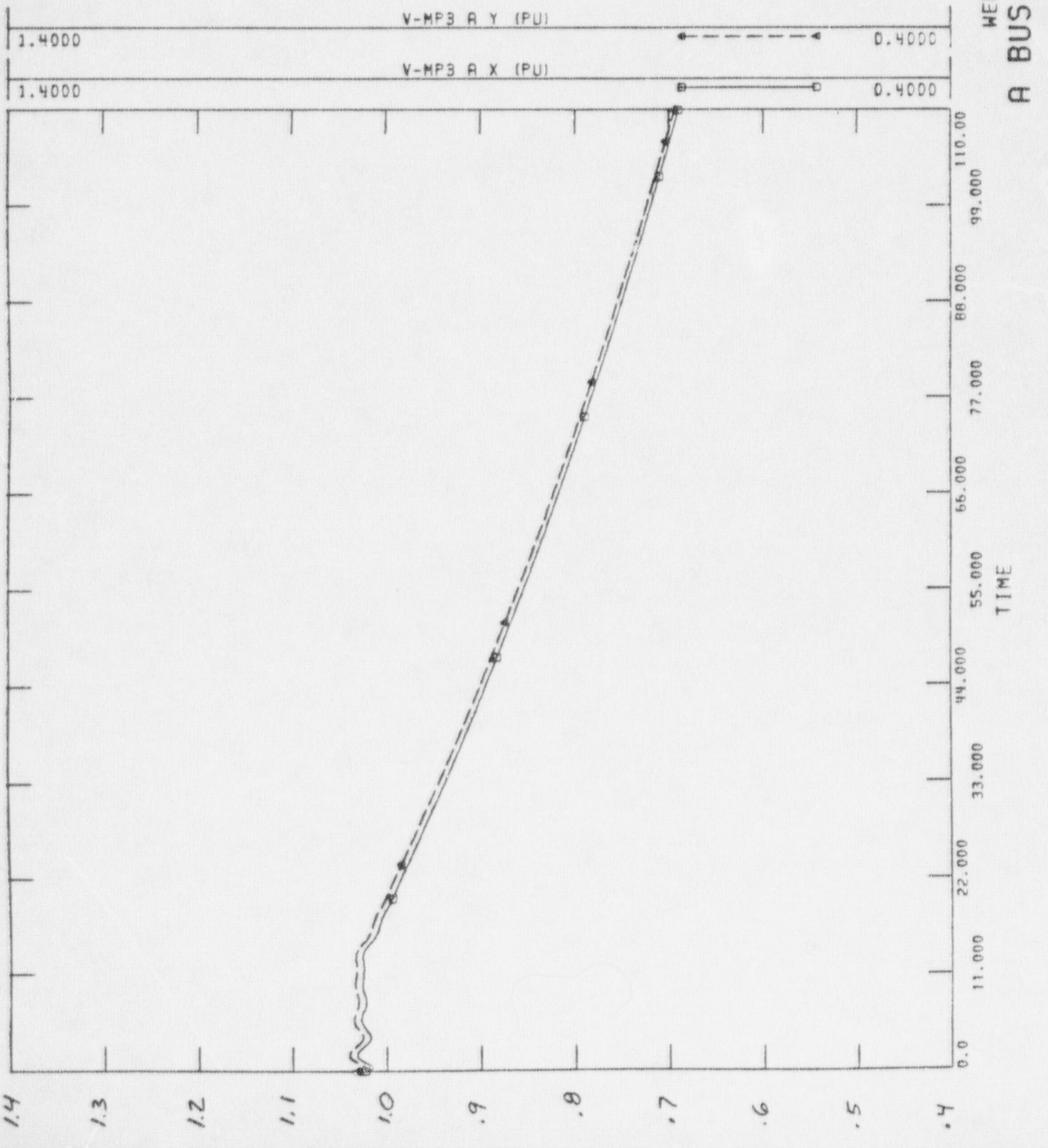


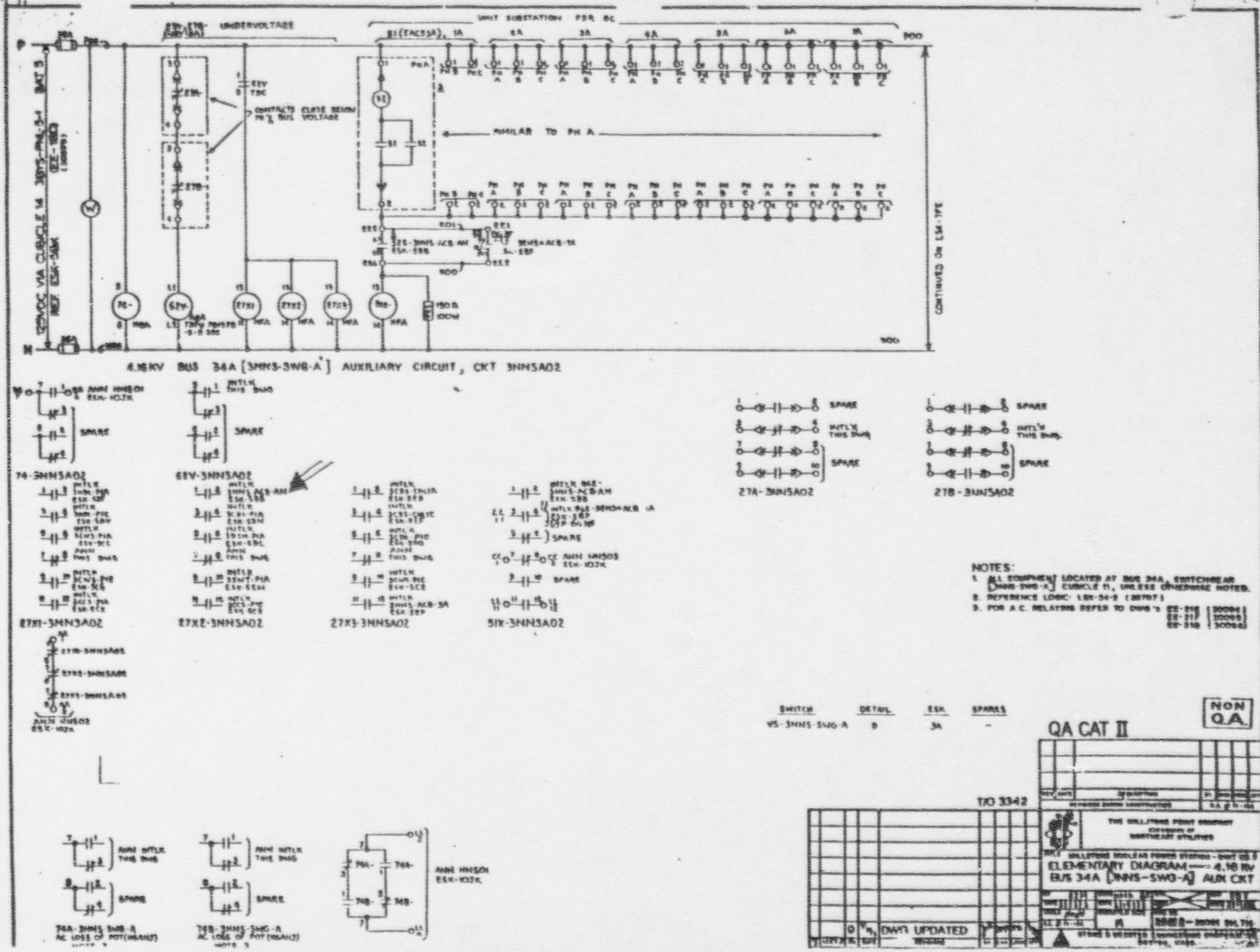
MP3 STATION BLACKOUT LOAD REJECTION STUDY
MP3=238MW+33MVAR ET=0.9837PU
LOSS OF SWITCHYARD LOAD AT T=0.0 SECONDS

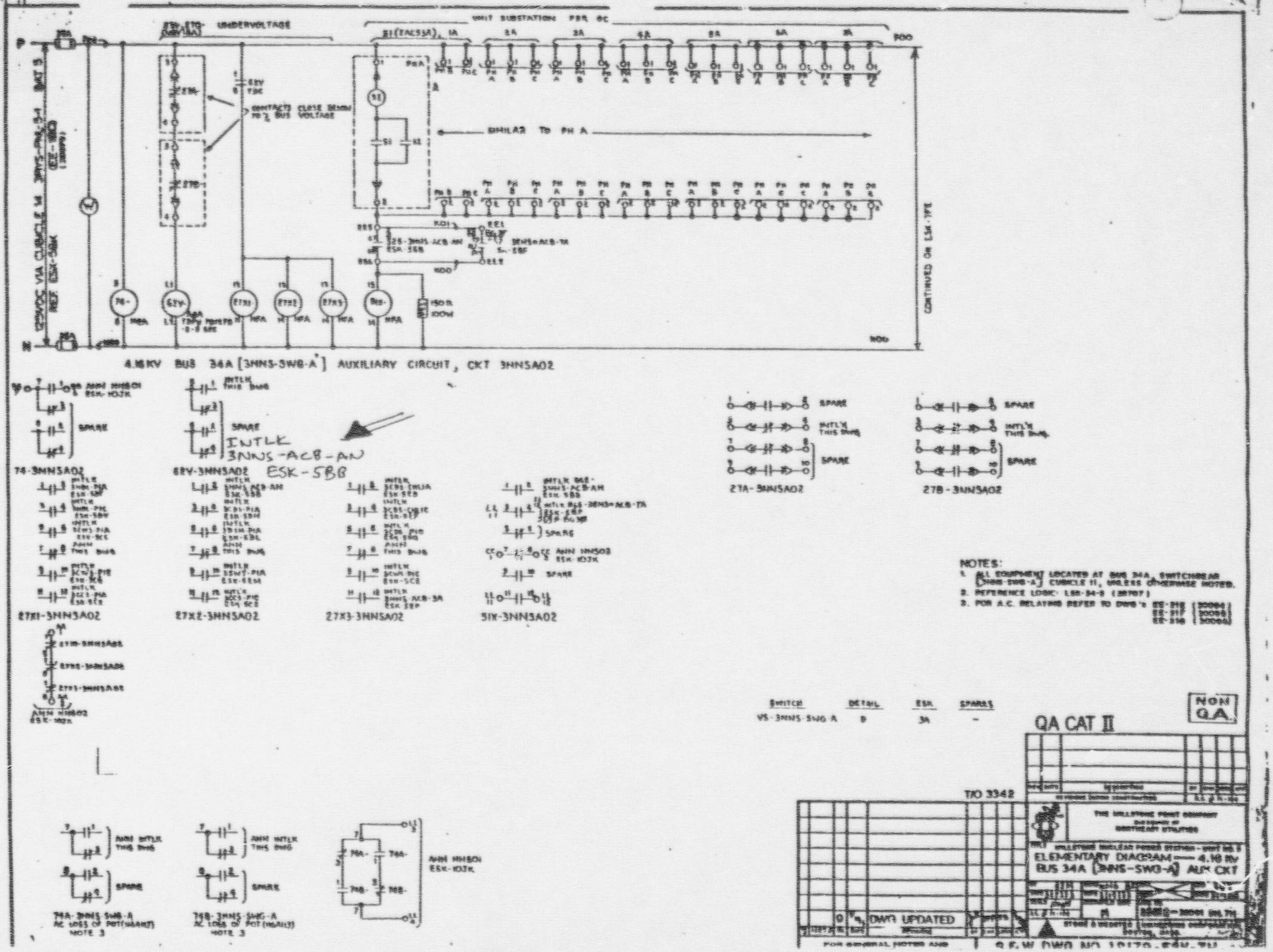
FILE: CASE4

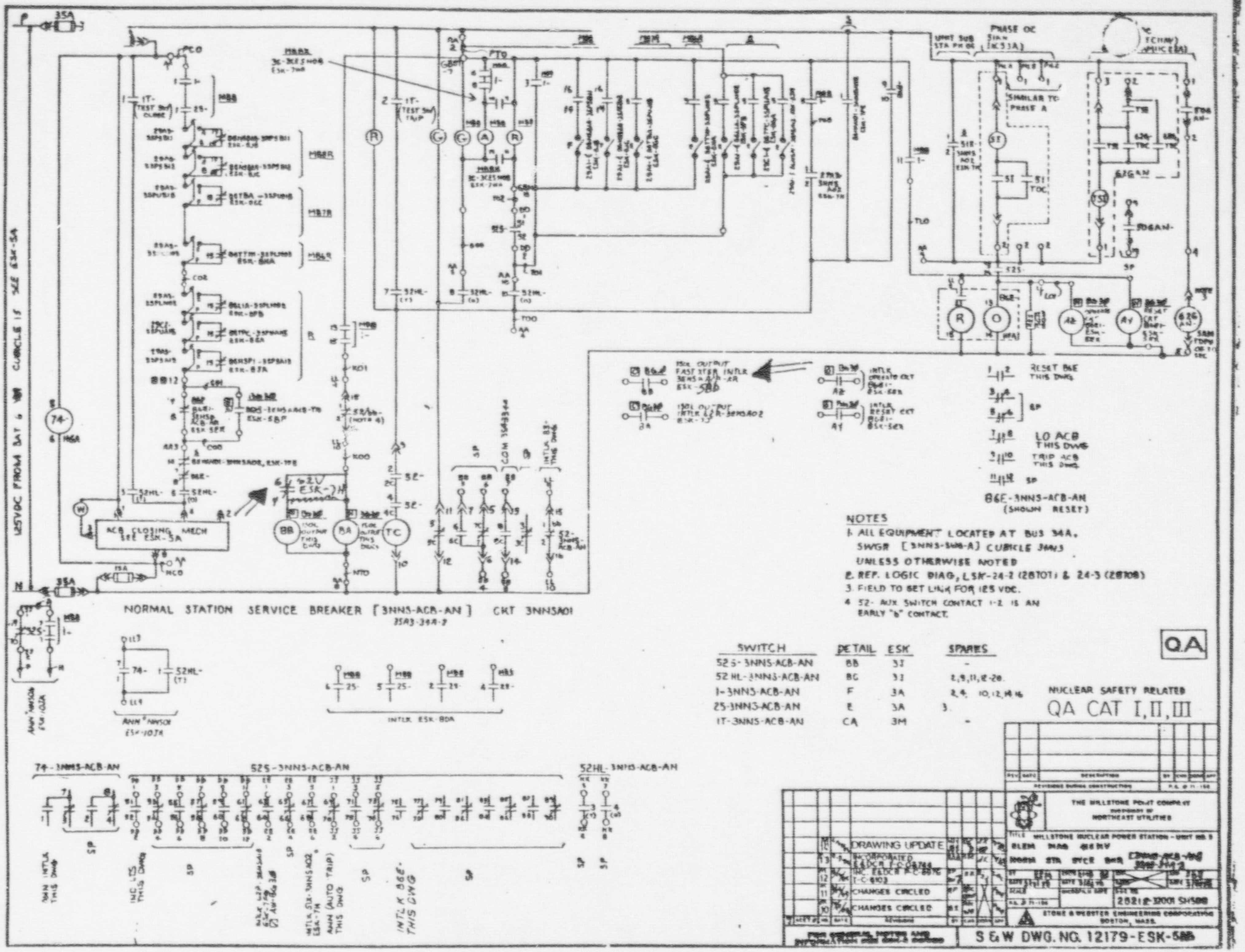


TYPES OF EQUIPMENT REVIEWED

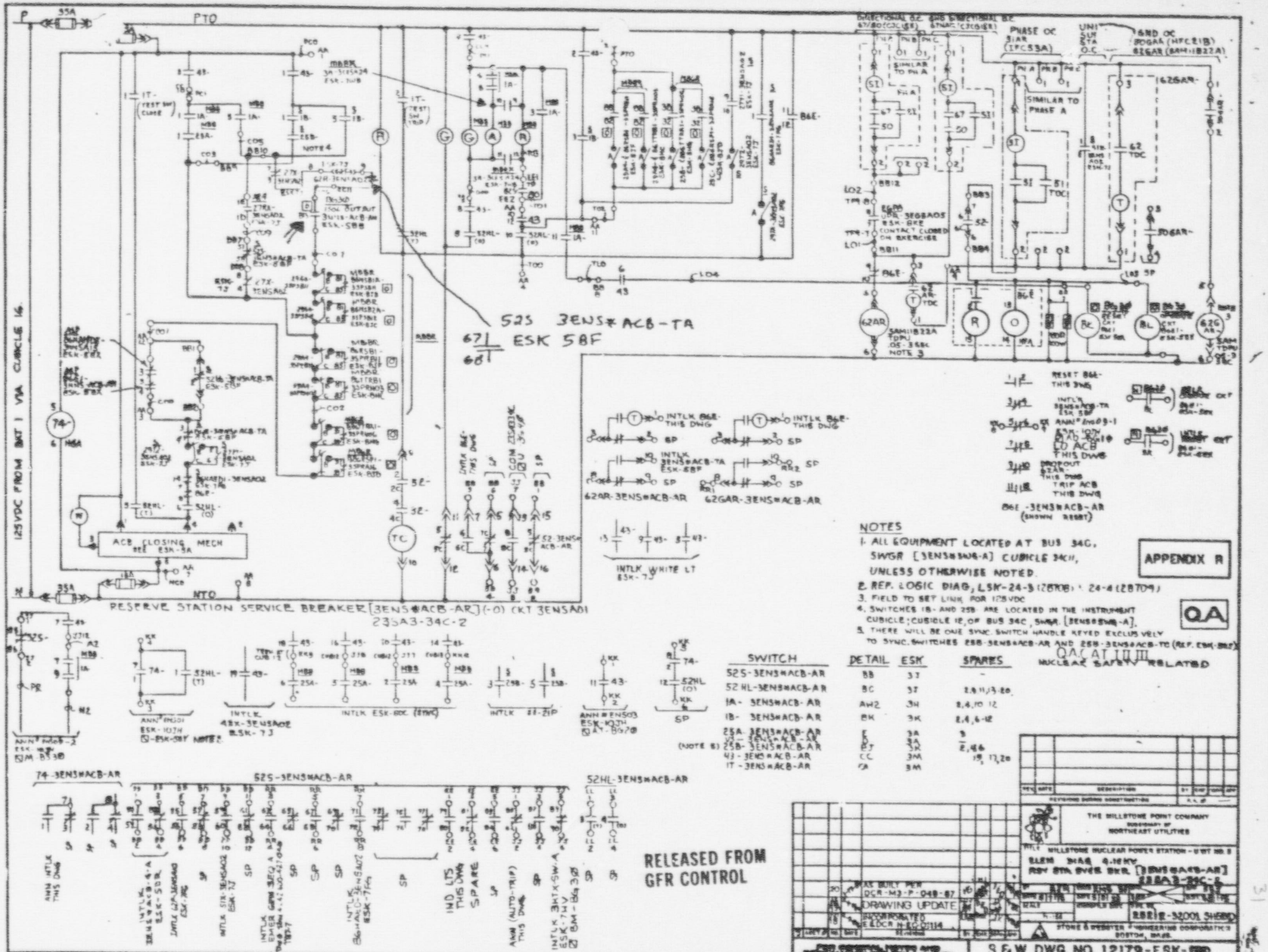
- Motors
- Transformers
- Cables
- Battery Chargers
- Uninterruptable Power Supplies
- Switchgear
- Motor Control Centers
- Protective Relays
- Distribution Panels
- Emergency DC Lighting
- Insulating Materials

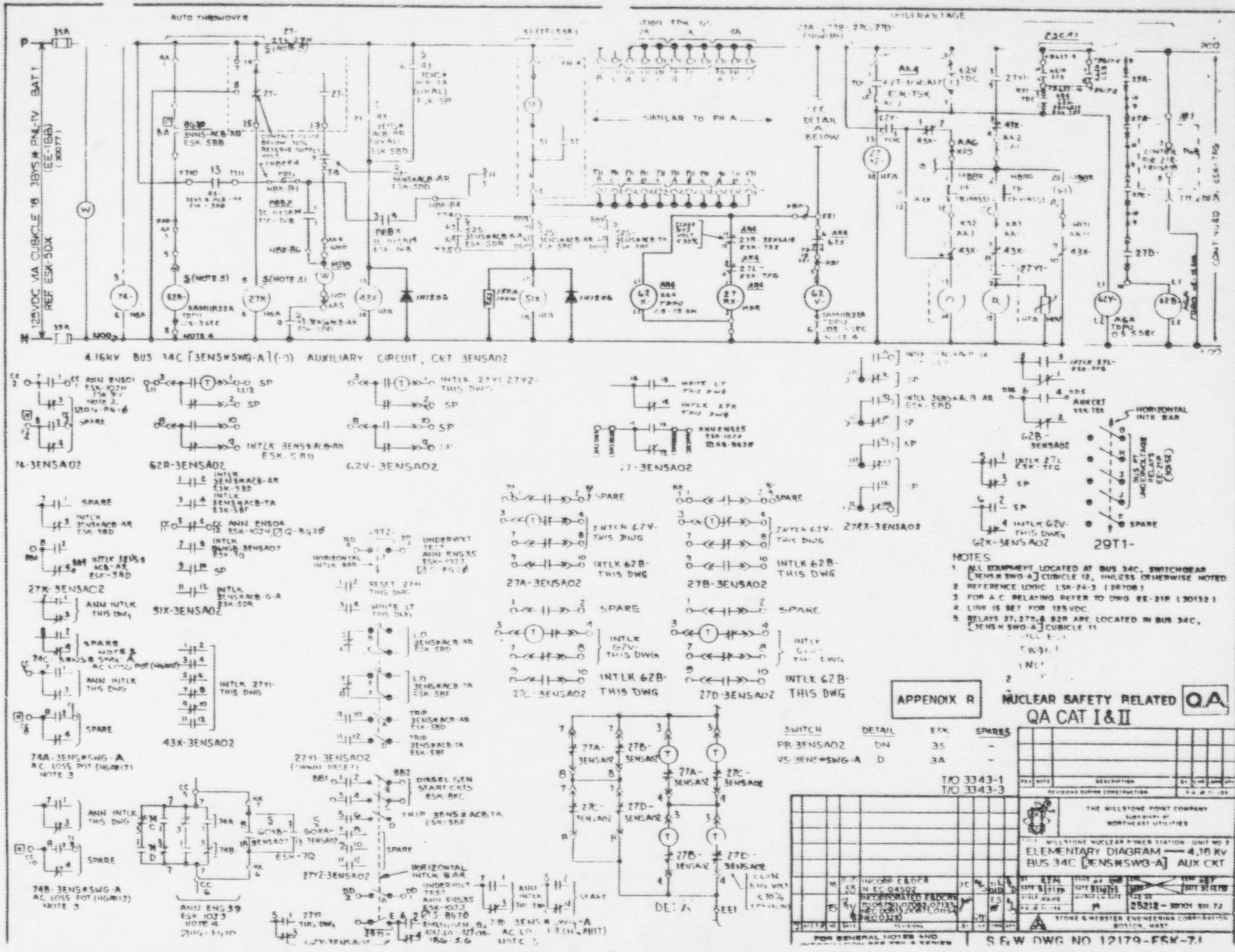

UNIT SUBSTATION FDR BC
UNDERVOLTAGE
CONTACTS CLOSE BELOW 70% BUS VOLTAGE
SIMILAR TO PH A
CONTINUED ON ESK-7PE
4.16KV BUS 34A [3NNS-SWG-A] AUXILIARY CIRCUIT, CKT 3NNSA02
125VDC VIA CUBICLE 14 3BYS-PNL-3-1 BAT 3
REF ESK-5AK
74-3NNSA02
62V-3NNSA02
27X1-3NNSA02
27X2-3NNSA02
27X3-3NNSA02
51X-3NNSA02
27A-3NNSA02
27B-3NNSA02
SPARE
INTLK THIS DWG
74A-3NNS-SWG-A AC LOSS OF POT (ALARM)
74B-3NNS-SWG-A AC LOSS OF POT (ALARM)
ANN HNS01 ESK-103K
NOTES:
1. ALL EQUIPMENT LOCATED AT BUS 34A, SWITCHGEAR [3NNS-SWG-A] CUBICLE 11, UNLESS OTHERWISE NOTED.
2. REFERENCE LOGIC: LSK-34-2 (28707)
3. FOR A.C. RELAYING REFER TO DWG'S
SWITCH
DETAIL
ESK
SPARES
VS-3NNS-SWG-A
B
3A
-
NON Q.A.
QA CAT II
T/O 3342
THE MILLSTONE POINT COMPANY
NORTHEAST UTILITIES
MILLSTONE NUCLEAR POWER STATION - UNIT NO. 3
ELEMENTARY DIAGRAM — 4.16 KV
BUS 34A [3NNS-SWG-A] AUX CKT
DWG UPDATED
STONE & WEBSTER


UNIT SUBSTATION PBR BC
UNDERVOLTAGE
CONTACTS CLOSE ON ½ BUS VOLTAGE
SIMILAR TO PH A
CONTINUED ON ESK-7PE
125VDC VIA CUBICLE 14 3RPS-PNL-3-4
REF ESK-5BK
4.16KV BUS 34A [3NNS-SWG-A] AUXILIARY CIRCUIT, CKT 3NNSA02
INTLK
3NNS-ACB-AN
ESK-5BB
SPARE
74-3NNSA02
62Y-3NNSA02
27A-3NNSA02
27B-3NNSA02
27X1-3NNSA02
27X2-3NNSA02
27X3-3NNSA02
51X-3NNSA02
NOTES:
1. ALL EQUIPMENT LOCATED AT BUS 34A, SWITCHGEAR [3NNS-SWG-A] CUBICLE 11, UNLESS OTHERWISE NOTED.
2. REFERENCE LOGIC: LSK-34-3
3. FOR A.C. RELAYING REFER TO DWG'S
SWITCH
DETAIL
ESK
SPARES
VS-3NNS-SWG-A
B
3A
-
QA CAT II
NON Q.A.
T/O 3342
74A-3NNS-SWG-A AC LOSS OF POT NOTE 3
74B-3NNS-SWG-A AC LOSS OF POT NOTE 3
ANN HH501 ESK-103K
DWG UPDATED
ELEMENTARY DIAGRAM — 4.16 KV
BUS 34A [3NNS-SWG-A] AUX CKT
29



125VDC FROM BAT 6 VIA CUBICLE 15 SEE ESK-5A
ACB CLOSING MECH SEE ESK-3A
NORMAL STATION SERVICE BREAKER [3NNS-ACB-AN] CKT 3NNSA01
35A3-34A-2
PHASE OC
SIMILAR TO PHASE A
RESET 86E THIS DWG
LO ACB THIS DWG
TRIP ACB THIS DWG
86E-3NNS-ACB-AN (SHOWN RESET)
NOTES
1. ALL EQUIPMENT LOCATED AT BUS 34A, SWGR [3NNS-SWG-A] CUBICLE 34A13 UNLESS OTHERWISE NOTED
2. REF. LOGIC DIAG, LSK-24-2 (28T07) & 24-3 (28T08)
3. FIELD TO SET LINK FOR 125 VDC.
4. 52- AUX SWITCH CONTACT 1-2 IS AN EARLY "b" CONTACT.
QA
SWITCH | DETAIL | ESK | SPARES
52S-3NNS-ACB-AN | BB | 3J | -
52HL-3NNS-ACB-AN | BC | 3J | 2,9,11,12-20.
1-3NNS-ACB-AN | F | 3A | 2,4, 10,12,14,16
25-3NNS-ACB-AN | E | 3A | 3.
1T-3NNS-ACB-AN | CA | 3M | -
NUCLEAR SAFETY RELATED
QA CAT I,II,III
INTLK ESK-8DA
74-3NNS-ACB-AN
52S-3NNS-ACB-AN
52HL-3NNS-ACB-AN
ANN INTLK THIS DWG
IND LTS THIS DWG
INTLK K 86E THIS DWG
ANN (AUTO TRIP) THIS DWG
DRAWING UPDATE
CHANGES CIRCLED
CHANGES CIRCLED
THE MILLSTONE POINT COMPANY
NORTHEAST UTILITIES
MILLSTONE NUCLEAR POWER STATION - UNIT NO. 3
STONE & WEBSTER ENGINEERING CORPORATION BOSTON, MASS.
S&W DWG. NO. 12179-ESK-5BB


125VDC FROM BAT 1 VIA CUBICLE 16
PTO
ACB CLOSING MECH
SEE ESK-5A
NTO
525 3ENS#ACB-TA
67 ESK 5BF
68
RESERVE STATION SERVICE BREAKER [3ENS#ACB-AR] (-0) CKT 3ENSA01
23SA3-34C-2
PHASE OC
GND OC
62AR-3ENS#ACB-AR
62GAR-3ENS#ACB-AR
86E -3ENS#ACB-AR
(SHOWN RESET)
INTLK WHITE LT
ESK-7J
INTLK ESK-6DC (SYNC)
74-3ENS#ACB-AR
52S-3ENS#ACB-AR
52HL-3ENS#ACB-AR
APPENDIX R
QA
NOTES
1. ALL EQUIPMENT LOCATED AT BUS 34C, SWGR [3ENS#SWG-A] CUBICLE 34C11, UNLESS OTHERWISE NOTED.
2. REF. LOGIC DIAG. LSK-24-3 (28708) & 24-4 (28709)
3. FIELD TO SET LINK FOR 125VDC
4. SWITCHES 1B- AND 25B- ARE LOCATED IN THE INSTRUMENT CUBICLE; CUBICLE 12, OF BUS 34C, SWGR. [3ENS#SWG-A].
5. THERE WILL BE ONE SYNC. SWITCH HANDLE KEYED EXCLUSIVELY TO SYNC. SWITCHES 25B-3ENS#ACB-AR AND 25B-3ENS#ACB-TC (REF. ESK-5BZ)
QA CAT I II III
NUCLEAR SAFETY RELATED
SWITCH | DETAIL | ESK | SPARES
52S-3ENS#ACB-AR | BB | 3J | -
52HL-3ENS#ACB-AR | BC | 3J | 2,8,11,13-20
1A- 3ENS#ACB-AR | AH2 | 3H | 2,4,10,12
1B- 3ENS#ACB-AR | BK | 3K | 2,4,6-12
25A-3ENS#ACB-AR | E | 3A | 3
25B-3ENS#ACB-AR (NOTE 5) | BJ | 3K | 2,4,6
43-3ENS#ACB-AR | CC | 3M | 15,17,20
1T-3ENS#ACB-AR | CA | 3M |
RELEASED FROM
GFR CONTROL
AS BUILT PER DCR-M3-P-048-87
DRAWING UPDATE
INCORPORATED E&DCR N-EC-01114
THE MILLSTONE POINT COMPANY
SUBSIDIARY OF NORTHEAST UTILITIES
MILLSTONE NUCLEAR POWER STATION - UNIT NO. 3
ELEM DIAG 4.16KV
RSV STA SVCE BKR. [3ENS#ACB-AR]
23SA3-34C-2
STONE & WEBSTER ENGINEERING CORPORATION
BOSTON, MASS.
S&W DWG. NO. 12179-ESK-6BD


4.16KV BUS 34C [3ENS*SWG-A] (-) AUXILIARY CIRCUIT, CKT 3ENSA02
125VDC VIA CUBICLE 18 3BYS* PNL-1V BAT 1
REF ESK-5DX
AUTO THROWOVER
SIMILAR TO PH A
UNDERVOLTAGE
74-3ENSA02
62R-3ENSA02
62V-3ENSA02
27-3ENSA02
27RX-3ENSA02
62B-3ENSA02
62X-3ENSA02
29T1-
27X-3ENSA02
51X-3ENSA02
43X-3ENSA02
27A-3ENSA02
27B-3ENSA02
27C-3ENSA02
27D-3ENSA02
27Y1-3ENSA02
27Y2-3ENSA02
74A-3ENS*SWG-A
A.C. LOSS POT (HGA11J)
NOTE 3
74B-3ENS*SWG-A
A.C. LOSS POT (HGA11J)
NOTE 3
ANN ENS39
ESK-10Z3
NOTE 4
HORIZONTAL INTLK BAR
DIESEL GEN START CKTS ESK-8KC
DETAIL A
NOTES:
1. ALL EQUIPMENT LOCATED AT BUS 34C, SWITCHGEAR [3ENS*SWG-A] CUBICLE 12, UNLESS OTHERWISE NOTED
2. REFERENCE LOGIC LSK-24-3 (20708)
3. FOR A.C. RELAYING REFER TO DWG EE-21P (30132)
4. LINK IS SET FOR 125VDC.
5. RELAYS 27,27X & 62R ARE LOCATED IN BUS 34C, [3ENS*SWG-A] CUBICLE 11
APPENDIX R
NUCLEAR SAFETY RELATED
QA
QA CAT I & II
SWITCH
DETAIL
ESK
SPARES
PB-3ENSA02
DN
3S
-
VS-3ENS*SWG-A
D
3A
-
T/O 3343-1
T/O 3343-3
THE MILLSTONE POINT COMPANY
NORTHEAST UTILITIES
MILLSTONE NUCLEAR POWER STATION - UNIT NO 3
ELEMENTARY DIAGRAM — 4.16 KV
BUS 34C [3ENS*SWG-A] AUX CKT
STONE & WEBSTER ENGINEERING CORPORATION
BOSTON, MASS
S & W DWG NO 12179-ESK-7J
FOR GENERAL NOTES AND

LER 3-88-26

LER 3-88-26 Out of Phase Fast Transfer Possibility

Indadvertant opening of 13T and 14T through:

manual operation, relay failures, or external line faults can cause a turbine trip with no generator breaker trip

This results in a generator coastdown with offsite power available through the RSST

At 80% voltage (about 86 seconds after the turbine trip) the NSST supply breakers open and the RSST supply breakers close in 6 cycles (fast transfer)

This results in an out of phase transfer

Because offsite power is available REG Guide 1.68 startup test 5jj would not have identified the problem

LER 3-88-28 Reactor Trip 12-29-88

Plant electrical loads are being supplied the RSST

A diesel generator is in the process of being paralleled to the bus

When the diesel is placed in the parallel mode a directional overcurrent trip on emergency bus to normal bus overcurrent is placed in service

As current from the emergency bus to the normal bus is in excess of the trip setpoint the tie breaker opened

The opening of the tie breaker causes a loss of a normal bus and subsequent reactor trip

The trip was caused by inadequate procedurial guidance to operations personnel. Procedures cautioned operators not to start any large loads in the parallel mode, but failed to alert operators to the directional overcurrent trip setpoint.

Additional testing of the type described in REG Guide 1.68 would not have provided any additional information concerning the tie breaker directional overcurrent trip.

CONCLUSIONS

Previous testing adequately demonstrates the capability of electrical transfer schemes

Technical Specification surveillance testing provides assurance that LOP functions will continue to remain operable

Analysis of the transient in question shows that the plant can handle it with no problem

Further testing would not reveal anything significantly new

Problems identified in LER 3-88-26 and 3-88-28 were previously identified or identified by analysis. Proposed additional testing would not have identified the problem

Performance of the test would place an unnecessary transient on the plant in that it :

- Places the plant in a natural circulation condition

- Will require additional starts and stops of plant equipment such as Reactor Coolant Pumps, Condensate Pumps, and Circ Water Pumps

- Violates Technical Specifications by placing the plant in loss of all offsite power

- Constitutes an unreviewed safety question in that it increases the probability of a Loss of all AC power