Form 34731 (R8-94)

INFORMATION ONLY

Duke Power Company

PROCEDURE PROCESS RECORD

ID No. AP/2/A/5500/07

Change(s) 0 to 4 Incorporated

PREPARATION

(2) Station McGuire Nuclear Station

(3) Procedure Title Loss of Electrical Power

(4) Prepared By Chris McCall Date August 15, 1995

(5) Requires 10CFR50.59 evaluation?

☒ Yes (New procedure or reissue with major changes)

☐ No (Reissue with minor changes OR to incorporate previously approved changes)

(6) Reviewed By [signature] Date

Cross-Disciplinary Review By [signature] N/R [signature] Date 9/7/95

(7) Additional Reviews

Reviewed AC Williams Date 9/7/95

Reviewed ETQS [signature] Date 9/7/95

(8) Temporary Approval (*if necessary*)

By (SRO) Date

By Date

(9) Approved By [signature] Date 9/7/95

PERFORMANCE (compare with control copy every 14 calendar days)

(10) Compared with Control Copy Date

Compared with Control Copy Date

Compared with Control Copy Date

(11) Date(s) Performed

Work Order Number (WO#)

COMPLETION

(12) Procedure Completion Verification

☐ Yes ☐ N/A Check lists and/or blanks properly initialed, signed, dated or filled in N/A or N/R, as appropriate?

☐ Yes ☐ N/A Listed enclosures attached?

☐ Yes ☐ N/A Data sheets attached, completed, dated and signed?

☐ Yes ☐ N/A Charts, graphs, etc. attached and properly dated, identified and marked?

☐ Yes ☐ N/A Procedure requirements met?

Verified By Date

(13) Procedure Completion Approved Date

(14) Remarks (*attach additional pages, if necessary*)

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Duke Power Company
10CFR50.59 EVALUATION SCREENING

(1) McGuire Nuclear Station	(2) Unit(s): ☐ Unit 1 ☑ Unit 2	(3) Procedure Activity: ☑ Rewrite ☐ Change # ____

(4) Procedure Number AP/2/A/5512/6 Title Loss of Electrical Power

(5) SCREENING FOR INCREASED MANAGEMENT INVOLVEMENT

Does this item involve infrequently performed tests or evolutions that have the potential to significantly degrade the level of nuclear safety?

☐ Yes; consult with the Superintendent of Operations to determine if additional controls are necessary.

☑ No

Procedure Reviewer [signature] Date 9/7/95

Supt. of Operations N/A Date ____

(6) TECHNICAL SPECIFICATION REVIEW

A. Will technical specification changes be required? Technical Specifications Consulted: 3/4.8.1, Tables 3.3-3, 3.3-4, 3.3-5, 4.3-2

☐ Yes; change may not be performed under 10CFR50.59.

☑ No T.S. changes already approved as per w/ NSM 96-22392

(7) SCREENING FOR USQ EVALUATION APPLICABILITY

A.	Does the activity change the facility as described in the FSAR?	☐ Yes	☑ No
B.	Does the activity change procedures, methods of operation, or alter a test or experiment as described in the SAR?	☐ Yes	☑ No
C.	Does the activity appear significant enough to require inclusion in the SAR	☐ Yes	☑ No
D.	Could the activity adversely affect any system, structure, or component necessary to operate the plant in accordance with the SAR?	☐ Yes	☑ No
E.	Does the activity perform a test or experiment that is NOT described in the SAR?	☐ Yes	☑ No

SAR documents/sections consulted and justification. 8.3.1.1.4, 15.2.6, SER Supplement 8
Changes to PCR already evaluated per 50.59 of NSM-96-22392. (addition of degraded V bus actuation). This change incorporates changes made to Cont by mod into proc. Rest of changes are level of detail or human factors and do not change proc as described in SAR
See attached description of changes

If the answer to any question is "Yes" then this form cannot be used.

(8) APPROVAL

Preparer [signature] Date 9/6/95

Qualified Reviewer [signature] Date 9/7/95

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AP/07 Description of changes for 50.59

1. Change: Added to step 25 j. of Case I and step 22 ~~23~~ of Case II guidance to close feeder breakers to SATA and SATB if racked in.

   Basis: Restore normal power alignment.

2. Change: Encl 6, step 5, update steps referring to OP/0/A/6350/01B.

   Basis: OP encl #s changed.

3. Change: Added clarification to steps that restore offsite power if they apply to deenergized bus or bus powered from D/G. Also changed transitions to cover offsite power restoration if have combination of 1 bus energized from D/G and other bus deenergized.

   Basis: Clarify when steps apply.

4. Change: Added RN pump B flow limit if aligned to LLI, in Case II and in Encl 1.

   Basis: Flow limit is different depending on suction source. This is documented in PIP 0-M94-1429.

5. Change: Added actions in steps and enclosures that restore power to deenergized bus to bypass degraded UV relays. Also added actions to restore degraded UV relaying to normal.

   Basis: These relays prevent closing normal or standby incoming 4160V breakers to deenergized bus, unless they are bypassed. After bus is energized, relays need to be restored to normal. Addition of degraded UV relays is described and evaluated in NSM MG 12392 (22392).

6. Change: Add steps to kick around actions related to loss of offsite power, if reason for loss of normal power is degraded (vs lost) normal power supply. Added symptom to case I "Loss of normal power to both ETA and ETB".

   Basis: Assumption for Case I of AP/ 7 has always been that offsite power must have been lost to loose normal power to both essential busses. Now that degraded voltage could cause loss of normal power to essential busses (per NSM MG 12392 (22392)). Case I needs to consider that 6900 busses could still be energized.

A. Purpose

The purpose of this procedure is to verify proper response in the event of a loss of electrical power for the following cases:

Case I Loss of Normal Power to Both 2ETA and 2ETB
Case II Loss of Normal Power to Either 2ETA or 2ETB.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

B. Symptoms

- Loss of voltage or under frequency on 525KV grid
- PCBs 58, 59, 61, 62 and Generator Breakers open
- 6900V switchgear incoming feeder breakers tripped.
- Loss of normal power to both 2ETA and 2ETB.

C. Immediate Actions

None

D. Subsequent Actions

_____ 1. Verify D/Gs start and load 4160V busses:

a. Check both D/Gs – RUNNING.

a. Place "2A(2B) D/G Mode Select" to "C/R".

Reset "2A(2B) D/G Load Seq".

Manually start D/G.

IF neither D/G will start, **THEN GO TO** EP/2/A/5000/ECA-0.0, LOSS OF ALL AC POWER.

b. Check 4160V busses energized and sequencers applying loads.

b. Ensure "2ETA(2ETB) Normal Breaker" and "2ETA(2ETB) Stdby Breaker" open to allow auto loading of bus.

IF both 2ETA and 2ETB deenergized, **THEN GO TO** EP/2/A/5000/ECA-0.0, LOSS OF ALL AC POWER.

(RNO Continued On Next Page)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	IF D/G is off on affected bus, **THEN GO TO** step 2. **IF** bus not energized **OR** sequencer not loading bus, **THEN** manually load bus **PER** Enclosure 2.
2. Notify Unit 1 operator to start 1A RN Pump.	
3. Check S/G Pressure - STABLE OR INCREASING.	**IF** S/G pressure decreasing in an uncontrolled manner **AND** reactor tripped, **THEN** perform the following: a. Close all MSIVs and Bypasses. b. Place the following switches in "Close": ♦ 2SM-83 (A SM Line Drain) ♦ 2SM-89 (B SM Line Drain) ♦ 2SM-95 (C SM Line Drain) ♦ 2SM-101 (D SM Line Drain).
4. Verify #2 TD CA Pump - RUNNING.	**IF** needed for flow, **THEN** manually start pump.
5. Verify the following DC pumps start as required:	
a. Check Unit 2 6900V busses - AT ZERO VOLTS	a. **GO TO** step 6.
b. Main Turbine "Emerg Brg Oil Pump" - ON.	b. Manually start pump.
c. "2A(2B) CF Pump Turb EBOP" - ON.	c. Manually start pump.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
d. "DC B/U Vap Extractor" - ON	d. Manually start vapor extractor.
_____ 6. Control CA flow:	
a. Reset "CA Modulating Valves Reset Train 2A(2B)".	
NOTE For S/I event, S/G level should be controlled as required in EPs.	
b. Throttle CA Control valves to maintain S/G N/R Lvl at program level.	
_____ 7. Implement RP/0/A/5700/00, CLASSIFICATION OF EMERGENCY.	
_____ 8. Ensure no boron dilution of NC System is in progress.	
_____ 9. Place KC Pump recirc valve control switches on running KC Pumps - IN "AUTO":	
♦ 2KC-51A (Train 2A Recirc Isol)	
♦ 2KC-54B (Train 2B Recirc Isol).	
_____ 10. On any D/G that is running, ensure that its associated RN to KD inlet isolation valve is open:	Manually open valves. **IF** valves will not open, **THEN** dispatch operator to locally open valves.
♦ 2RN-70A (A D/G Hx Supply Isol)	
♦ 2RN-171B (B D/G Hx Supply Isol).	

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
11. Verify equipment was sequenced on **PER** Enclosure 2, Table 1 and Table 2.	Manually start equipment.
12. Maintain Unit 1 available:	
a. Start at least 2 RL Pumps.	
b. Start at least 2 KR Pumps.	
c. Check Unit 1 reactor – CRITICAL.	c. **GO TO** step 13.
d. Notify Unit 1 operator to start all Unit 1 RC Pumps.	
e. Notify Unit 1 operator to check Unit 1 main condenser vacuum – STABLE OR INCREASING.	e. **IF** vacuum is decreasing, **THEN** dispatch operator to locally: 1) Ensure 1RC-5 (RC Crossover Supply From Unit 1) – OPEN. 2) **WHEN** 1RC-5 is verified open, **THEN** close 1RC-7 (RC Crossover Supply From Unit 2).
13. **WHEN** Table 1 and Table 2 checked **PER** Enclosure 2, **THEN** reset "2A(2B) D/G Load Seq".	
14. Check ND System status:	
a. ND System – WAS IN RHR MODE AT TIME OF LOSS OF POWER.	a. **GO TO** step 15.
b. Check NC System level – GREATER THAN OR EQUAL TO PRE B/O LEVEL.	b. **REFER TO** AP/2/A/5500/19, LOSS OF ND OR ND SYSTEM LEAKAGE. **GO TO** step 15.
c. Check NC System subcooling – GREATER THAN 0°F.	c. **REFER TO** AP/2/A/5500/19, LOSS OF ND OR ND SYSTEM LEAKAGE. **GO TO** step 15.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
d. Place desired train of ND in service **PER** Enclosure 3.	
_____ 15. Ensure equipment was sequenced on **PER** Enclosure 2, Table 3 and Table 4.	Manually start equipment.
_____ 16. Check both D/G's – RUNNING.	**IF** a D/G is attempting to start but will not start, **THEN** dispatch operator to locally stop D/G by depressing "Emerg Stop" pushbutton to prevent relay damage.
NOTE For S/I event, N/A the following step.	
_____ 17. Initiate Enclosure 4 (VC/YC and VA System Operation) within 30 minutes.	

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

_____ 18. Check Generator Seal Oil System:

a. Check Unit 2 6900V busses – AT ZERO VOLTS.	a. **GO TO** step 19.
b. Dispatch operator to locally verify Air Side Backup Pump – RUNNING.	b. Dispatch operator to locally start pump.
c. Check normal Air Side Seal Oil Pump – AVAILABLE WITHIN 30 MINUTES.	c. Dispatch operator to locally slowly dump H2 from generator and purge with C02 **PER** OP/2/B/6300/03, GENERATOR HYDROGEN SYSTEM, Enclosure 4.3. Monitor air side seal oil pressure and prevent excessive pressure swings while venting by slowly venting H2. **IF AT ANY TIME** normal Air side Seal Oil Pump is returned to service, **THEN** stop the H2 vent of the generator. **NOTE** Stopping LG Pump in next step removes unnecessary load on 250 VDC Auxiliary Power System. **WHEN** C02 purge is complete **AND** 90 minutes from loss of power have elapsed, **THEN** dispatch operator to stop "AIR SIDE BACKUP" pump (turbine bldg, 760, 2F–23).

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

_____ 19. **WHEN** no longer required for flow **AND** D/G Load Seq is reset, **THEN** stop TD CA Pump **PER** OP/2/A/6250/02, AUXILIARY FEEDWATER SYSTEM, Enclosure 4.4.

NOTE For S/I event, N/A steps 20–22.

_____ 20. Ensure adequate water supply for CA System **PER** Enclosure 5.

_____ 21. Ensure all VL AHUs that are on are running in same speed.

_____ 22. **WHEN** no longer needed for NC makeup, **THEN** stop one NV Pump.

_____ 23. Align DC busses **PER** Enclosure 6.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
_____ 24. Ensure Computer Room Cooling as follows:	
a. Check Unit 2 6900V bus 2TB – AT ZERO VOLTS.	a. **IF** 2TB is energized, **THEN GO TO** step 25.
b. Check Unit 1 6900V busses – ENERGIZED.	b. Complete one of the following: ♦ **WHEN** Unit 1 600V shared load center 1SLXH is energized, **THEN** dispatch Maintenance to start Computer Room A/C Package #2. OR ♦ **WHEN** Unit 2 600V shared load center 2SLXF is energized, **THEN** dispatch Maintenance to start Computer Room A/C Package #1. **GO TO** step 25.
c. Dispatch Maintenance to ensure Computer Room A/C Package #2 is on.	
_____ 25. Restore offsite power to 6900V busses.	
a. Check Unit 2 6900V busses – AT ZERO VOLTS.	a. **GO TO** step 26.
b. Contact Toddville TCC by Outside Bell Line 399-9745 (9744), or microwave 382-9403, (9400), (9404), or two-way radio to coordinate the following steps.	
c. Open PCBs 58, 59, 61, 62.	c. Dispatch personnel to locally open PCBs from switchyard.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
d. Have Toddville TCC energize 525KV yellow bus from Cowan's Ford or other available source.	d. **GO TO** step 26.
e. Ensure Generator Breakers 2A and 2B are open.	
f. Remove all loads from 6900V busses as follows: 1) Place "2TA (2TB, 2TC, 2TD) Mode Select" switches to "Man". 2) Dispatch operator to locally: a) Open all breakers on 2TA, 2TB, 2TC, 2TD. b) Pull control power fuses for RC Pump breakers. 3) Place "A(B,C) Hotwell Pmp" and "A(B,C) CM Booster Pmp" switches to "Stop".	
g. Ensure lockouts reset.	
h. With Toddville TCC concurrence close PCBs 58, 59, 61, and 62.	h. Notify personnel in switchyard to locally close breakers in switchyard.
i. **IF** Enclosure 11 was used to power RF Pump A from 2ETB, **THEN** align back to normal **PER** Enclosure 11, step 9.	

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

j. Reenergize desired 6900V switchgear as follows:

- Close "2TA Normal Breaker" and place "2TA Mode Select" in "Auto".
- Close "2TB Normal Breaker" and place "2TB Mode Select" in "Auto".
- Close "2TC Normal Breaker" and place "2TC Mode Select" in "Auto".
- Close "2TD Normal Breaker" and place "2TD Mode Select" in "Auto".

k. Energize Aux transformers as follows:

- Close "2ATC Feeder Breaker".
- Close "2ATD Feeder Breaker".
- **IF** either of the following Unit 2 feeder breakers are racked in, **THEN** close breakers:
  - SATA Feeder Breaker.
  - SATB Feeder Breaker.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
26. Check available 4160V power supplies as follows:	
a. Check Unit 2 6900V busses – AT 6900V.	a. Perform one of the following: ♦ **IF** Unit 1 6900V busses are at 6900V, **AND** it is desired to power Unit 2 4160V bus from Unit 1, **THEN GO TO** step 28. OR ♦ **IF** offsite power will not be aligned to 4160V bus at this time, **THEN GO TO** step 29.
b. Check the following transformers – ENERGIZED AND AVAILABLE TO ALIGN TO 4160V BUSSES: ♦ 2ATC ♦ 2ATD.	b. Perform one of the following: ♦ **IF** it is desired to power 4160V bus from shared transformer, **THEN GO TO** step 28. OR ♦ **IF** offsite power will not be aligned to 4160V bus at this time, **THEN GO TO** step 29.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

_____ 27. Return 4160V busses to normal supply:

a. Verify D/Gs carrying 4160V busses.

a. Return deenergized 4160V bus to normal power supply as follows:

1) Dispatch operator with key #338 to select "TEST/BLOCK" on affected train:

- "2ETA DEGRADED VOLTAGE" switch located on TB–1689 (south wall 2ETA room, AA–63).
- "2ETB DEGRADED VOLTAGE" switch located on TB–1690 (south wall 2ETB room, AA–63).

2) Do not continue until "TEST/BLOCK" is selected in step above.

3) Place "2A(2B) D/G Mode Select" to "C/R".

4) Hold "Reset" on "2A(2B) D/G Load Seq" while completing the following steps.

5) Open the 600V essential load center feeder breakers on affected bus.

a. For A Train only:

- 2ELXA
- 2ELXC
- 2ELXE.

b. For B Train only:

- 2ELXB
- 2ELXD
- 2ELXF.

(RNO Continued On Next Page)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	6) Open CA Pump breaker on affected bus. **IF** breaker will not open, **THEN** open by depressing CA Pump "Start" and "Stop" at the same time.
	7) Depress "OFF" pushbutton to open any pump breakers that are closed on affected bus.
	8) Close normal incoming breaker to 4160V bus and verify bus is energized.
	9) Release "Reset" on "2A(2B) D/G Load Seq".
	10) Load bus as necessary **PER** Enclosure 2, Tables 1 and 3 or Tables 2 and 4.
	11) Place "2A(2B) D/G Mode Select" to "Auto".
b. **IF** there is an EP in effect, **THEN** obtain Emergency Coordinator's concurrence before placing 4160V busses energized by D/G on offsite power.	
c. Return 4160V busses energized by D/G to normal power supply and shutdown D/G **PER** OP/2/A/6350/02, DIESEL GENERATOR, Enclosure 4.2.	
d. Check 2ETA and 2ETB – ENERGIZED BY OFFSITE POWER.	e. **GO TO** step 28.
e. **GO TO** step 32.	

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

_____ 28. Place 4160V bus on alternate supply.

a. Verify D/G carrying the bus.

a. Place deenergized 4160V bus on shared transformer as follows:

1) **IF** desired to power 4160V bus from Unit 1, **THEN** perform Enclosure 7 or Enclosure 8.

2) **IF** desired to power 4160V bus from Unit 2, **THEN** perform Enclosure 9 or Enclosure 10.

b. **IF** there is an EP in effect, **THEN** obtain Emergency Coordinator's concurrence before placing 4160V busses energized by D/G on offsite power.

c. **IF** desired, **THEN** place 4160V bus energized by D/G on shared transformer **PER** OP/2/A/6350/05, AC ELECTRICAL OPERATION OTHER THAN NORMAL LINEUP, Enclosure 4.2 and 4.3.

d. Check 2ETA and 2ETB – ENERGIZED BY OFFSITE POWER.

d. **GO TO** step 29.

e. **GO TO** step 32.

_____ 29. Maintain fuel oil supply for D/G's.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE For S/I event, the remaining steps in this procedure should only be performed at the discretion of station management.

_____ 30. **IF** offsite power can not be restored within eight hours, **THEN REFER TO** OP/0/A/6350/03, RESTORING AUXILIARY BUILDING NON-ESSENTIAL VENTILATION DURING BLACKOUT.

NOTE The following step is concerned with the fire pump operability requirements of SLIC manual, Section 16.9, to allow continued operation of Unit 1.

_____ 31. **IF** all of the following conditions are met, **THEN** align emergency D/G power supply to RF Pump A **PER** Enclosure 11, steps 1-8:

- RF Pump C or RF Pump B is inoperable.
- Offsite power will not be restored for 24 hours.
- **IF** an SI has been actuated, **THEN** obtain Emergency Coordinator concurrence before making this alignment.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE Maintaining NCDT pressure less than VCT pressure prevents back flow from NCDT through NC Pump number 2 and 3 seals.

_____ 32. Check NCDT pressure – LESS THAN VCT PRESSURE.

REFER TO OP/2/A/6500/01, LIQUID WASTE SYSTEM, and attempt to reduce NCDT pressure.

IF NCDT pressure cannot be reduced, **THEN** close the following valves:

- 2NV-94A (NC Pmps Seal Ret C/I Inside)
- 2NV-95B (NC Pmps Seal Ret C/I Otsd).

NOTE For S/I event, N/A the following step.

_____ 33. Stop any unnecessary KC Pumps that were sequenced on **PER** OP/2/A/6400/05, COMPONENT COOLING WATER SYSTEM, Enclosure 4.3.

_____ 34. Restart equipment as follows:

a. **IF** D/G supplying load, **THEN** contact station management to evaluate D/G loading prior to restarting the following equipment:

b. Restart the following as necessary:

- KF Pump
- Backup Pzr Heaters
- Boric Acid Transfer Pump.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
_____ 35. Check if loss of 6900V bus – HAS OCCURRED DURING THIS EVENT.	Do not continue until degraded voltage condition has cleared. **WHEN** degraded voltage condition cleared, **GO TO** step 40.
_____ 36. Check offsite power – RESTORED TO UNIT 2 6900V BUSSES.	Do not continue until offsite power is available to align to Unit 2 6900V busses. **WHEN** offsite power is available to Unit 2 6900V busses, **THEN RETURN TO** step 25 to restore power.
_____ 37. Reenergize desired Unit 2 Load Centers **PER** Enclosure 12.	

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

_____ 38. **WHEN** normal power available, **THEN** establish alignment for Turbine Oil Pumps:

a. Start main Turbine "Brg Oil Pmp GSOB Pmp" **PER** OP/2/A/6300/07, TURBINE LUBE OIL SYSTEM, Enclosure 4.1.

b. Stop main Turbine "Emerg Brg Oil Pump" and place in Auto".

c. Start the "Oil Res Vapor Extr."

d. Stop "D/C B/U Vap Extractor" and place in "Auto".

e. Start the "2A CF Pump Turb Oil Vapor Extractor".

f. Start the "2B CF Pump Turb Oil Vapor Extractor".

g. Start either the "2A CF Pump Turb MOP 2A1" or "2A CF Pump Turb MOP 2A2".

h. Stop "2A CF Pump Turb EBOP" and place switch in "Auto".

i. Start either "2B CF Pump Turb MOP 2B1" or "2B CF Pump Turb MOP 2B2".

j. Stop "2B CF Pump Turb EBOP" and place switch in "Auto".

k. Dispatch operator to LG skid to start LG System **PER** OP/2/A/6300/04, GENERATOR SEAL OIL SYSTEM, Enclosure 4.1.

_____ 39. **REFER TO** Enclosure 13 and evaluate returning Shared Motor Control Centers to their normal power supply.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE
- The following steps realign plant systems for normal operation.
- For S/I event each of the following steps shall only be performed at the discretion of station management.
- For S/I event, equipment shall be operated in accordance with EPs.

_____ 40. Realign RN System for normal operation:

a. Restore suction and discharge alignments:

1) Open:

- 0RN-11B (Train 2B LLI Supply)
- 0RN-284B (Train 2B Disch To RC)
- 2RN-63B (AB Non Ess Return Isol)
- 2RN-64A (AB Non Ess Return Isol)
- 2RN-279B (AB Vent Sys Return Isol)
- 2RN-299A (AB Vent Sys Return Isol)
- 2RN-41B and 43A (Train 2B To Non Ess Hdr Isol).

2) Verify 0RN-10A,C (Train 2B LLI Supply) - OPEN.

2) Manually open valve.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

3) Close:

- 0RN-9B (Train 2B SNSWP Supply)
- 0RN-152B (Train 2B Disch to SNSWP).

b. Notify Unit 1 operator to:

1) Open:

- 1RN-43A (Train 1B To Non-Ess Hdr Isol)
- 1RN-41B (Train 1B To Non-Ess Hdr Isol).

2) **IF** no longer required, **THEN** stop 1A RN Pump **PER** OP/1/A/6400/06, Nuclear Service Water System, Enclosure 4.8.

c. Open 0RN-4A,C (Train 2B RC Supply).

_____ 41. Notify Unit 1 operator to stop any RV Pumps that auto started.

_____ 42. Restart the following EMF sample fans:

- 2EMF-35, 36, 37 (Unit Vent Par/Gas/Iod)
- 2EMF-42 (Fuel Bldg Ventilation)
- EMF-43A (Control Room Air Intake Loc A)
- EMF-41 (Aux Bldg Ventilation)
- 1EMF-43B (Control Room Air Intake Loc B)
- **IF** an S/I has not occurred, **THEN** restart sample fan for 2EMF-38,39,40.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

_____ 43. Return VA System to normal as follows:

a. Dispatch operator to local VA Filtered Exhaust panels to return VA to pre-blackout status by resetting the following:

- ABFXF-1A
- ABFXF-1B
- ABFXF-2A
- ABFXF-2B.

b. **REFER TO** OP/0/A/6450/03, AUXILIARY BUILDING VENTILATION SYSTEM, Enclosure 4.1 to:

- Restore switches positioned in Enclosure 4, steps 8 and 10 to normal alignment.
- Ensure VA returned to normal operation.

_____ 44. Verify VU, VL, VR, and VT units returned to normal operations **PER** OP/2/A/6450/01, CONTAINMENT VENTILATION SYSTEMS, Enclosures 4.1, 4.3, 4.5, 4.7.

_____ 45. Ensure VC/YC is returned to normal operation **PER** OP/0/A/6450/11, CONTROL AREA VENTILATION/CHILLED WATER SYSTEM, Enclosure 4.7.

_____ 46. Check if loss of 6900V bus - HAS OCCURRED DURING THIS EVENT. **GO TO** step 50.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

_____ 47. **WHEN** all RC Pump discharge valves are verified closed, **THEN** dispatch operator to locally replace control power fuses on all RC Pumps.

_____ 48. **WHEN** desired, **THEN** start RC Pumps **PER** OP/2/B/6400/01A, CONDENSER CIRCULATING WATER AND LOW LEVEL INTAKE SYSTEM, Enclosure 4.1.

_____ 49. **WHEN** desired, **THEN** start up Condensate and Feedwater Systems **PER** OP/2/A/6250/01, CONDENSATE AND FEEDWATER SYSTEM.

_____ 50. **WHEN** no longer required, **THEN** shutdown motor driven CA Pumps **PER** OP/2/A/6250/02, AUXILIARY FEEDWATER SYSTEM, Enclosure 4.2.

_____ 51. Stop any unnecessary running RN Pump **PER** OP/2/A/6400/06, NUCLEAR SERVICE WATER SYSTEM, Enclosure 4.8.

_____ 52. Align BB System and establish blowdown **PER** OP/2/A/6250/08, STEAM GENERATOR BLOWDOWN, Enclosure 4.1.

_____ 53. Align NM System **PER** OP/2/A/6200/63, NUCLEAR SAMPLING SYSTEM.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

_____ 54. Realign vital battery chargers as follows:

a. Determine which battery chargers are actually being powered from Unit 1.

b. For only the vital battery chargers that are being powered from Unit 1, depress "Stop" on associated Unit 2 "EVCA (B, C, D) Batt Charger" (M contactor).

_____ 55. **WHEN** an energized battery charger is aligned to 250 VDC Distribution Center 2DP, **THEN** dispatch operator to ensure the following breaker is closed:

- 2DP-1D (Reactor Bldg Deadlight Panel)

_____ 56. **IF** BMXA energized in step 30, **THEN** return BMXA to normal alignment **PER** OP/0/A/6350/03, RESTORING AUXILIARY BUILDING NON-ESSENTIAL VENTILATION DURING BLACKOUT.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

57. Return degraded voltage relaying to normal as follows:

    a. Check the following status lights – DARK:

    - "ETA LOSS/UNDERVOLTAGE PHASE X" (2SI-14, A-3)
    - "ETA LOSS/UNDERVOLTAGE PHASE Y" (2SI-14, B-3)
    - "ETA LOSS/UNDERVOLTAGE PHASE Z" (2SI-14, C-3)
    - "ETB LOSS/UNDERVOLTAGE PHASE X" (2SI-14, A-4)
    - "ETB LOSS/UNDERVOLTAGE PHASE Y" (2SI-14, B-4)
    - "ETB LOSS/UNDERVOLTAGE PHASE Z" (2SI-14, C-4)

    a. Do not continue until condition cleared.

    b. Dispatch operator to check degraded voltage relay targets on the following panels – NORMAL:

    - TB-1689 (south wall 2ETA room, AA-63)
    - TB-1690 (south wall 2ETB room, AA-63).

    b. Perform the following:

    1) Notify Shift Work Manager of activated targets.

    2) Reset targets.

    3) **IF** targets will not reset, **THEN** do not continue until condition cleared.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

c. Check the following status lights – DARK

- "ETA DEGRADED VOLTAGE RELAYS TEST/BLOCKED" (2SI-15, A-7)
- "ETB DEGRADED VOLTAGE RELAYS TEST/BLOCKED" (2SI-15, B-7).

c. Perform the following:

1) Contact station management to determine if degraded voltage relays should be placed in service.

2) **IF** degraded voltage relays are required to be placed in service, **THEN** dispatch operator to select "NORM" on the following switches:

- "2ETA DEGRADED VOLTAGE" on TB-1689 (south wall 2ETA room, AA-63)
- "2ETB DEGRADED VOLTAGE" on TB-1690 (south wall 2ETB room, AA-63).

3) **IF** degraded relays placed in service, **THEN** ensure the following status lights are dark:

- "ETA DEGRADED VOLTAGE RELAYS TEST/BLOCKED" (2SI-15, A-7)
- "ETB DEGRADED VOLTAGE RELAYS TEST/BLOCKED" (2SI-15, B-7).

END

B. Symptoms

- Loss of Normal Power to Bus
- Loss of normal operating components supplied from affected bus
- "Blackout Seq Actuated Train A" status light
- "Blackout Seq Actuated Train B" status light.

C. Immediate Actions

None

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

D. Subsequent Actions

_____ 1. Check bus energized and sequencer applying loads.

IF operating train is still energized by normal power supply, **THEN GO TO** step 2.

IF operating train lost, **THEN** perform the following:

a. Isolate letdown.

b. Start opposite train RN Pump as follows:

♦ To start RN Pump 2A:

1) Ensure suction flowpath to RN Pump 2A is available.

2) Place manual loader for 2RN-89A (RN to KC Hx A Control to 10% open).

3) Start RN pump 2A.

OR

♦ To start RN Pump 2B:

1) Ensure suction flowpath to RN Pump 2B is available.

2) Place manual loader for 2RN-190B (RN To KC Hx B Control) to 10% open.

3) Start RN Pump 2B.

(RNO Continued On Next Page)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

c. Start opposite train KC pumps as follows:

1) Place control switch for valve on train to be started in "AUTO":

- 2KC-51A (Train 2A Recirc Isol)

OR

- 2KC-54B (Train 2B Recirc Isol).

2) Start KC pumps one at a time.

3) Ensure the following valves open on energized train:

- A Train:
  - a) 2KC-230A (Trn 2A to RB Non Ess Sup Isol)
  - b) 2KC-3A (Rx Bldg Non Ess Return Isol)
  - c) 2KC-394A (A NC Pump Therm Bar Otlt)
  - d) 2KC-345A (C NC Pump Therm Bar Otlt).
- B Train:
  - a) 2KC-228B (Trn 2B to RB Non Ess Sup Isol)
  - b) 2KC-18B (Rx Bldg Non Ess Return Isol)
  - c) 2KC-364B (B NC Pump Therm Bar Otlt)
  - d) 2KC-413B (D NC Pump Therm Bar Otlt).

4) **IF** required, **THEN** raise KC flow to KF Hx to maintain thermal barrier isolation valves open.

5) Ensure KC flow is less than 4000 GPM per operating KC pump.

(RNO Continued On Next Page)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

d. **IF** ND pump on prior to event, **THEN** ensure 2NV-121 (ND Letdown Control) is closed.

e. **IF** RN Pump 2A started, **THEN** perform the following:

1) Close 2RN-43A (Train 2B to Non Ess Hdr Isol.

2) Throttle open 2RN-89A (RN To KC Hx A Control) to establish desired Train 2A KC cooling.

f. **IF** RN Pump 2B started, **THEN** perform the following:

- Throttle 2RN-190B (RN To KC Hx B Control) to establish train 2B KC cooling, while ensuring RN Pump 2B flow remains less than the following:

  - **IF** 2B RN Pump suction is aligned to Low Level Intake, **THEN** limit flow to 16,000 GPM.

  OR

  - **IF** 2B RN Pump suction is aligned to SNSWP, **THEN** limit flow to 13,000 GPM.

g. **IF** desired, **THEN** restore charging flow as follows:

1) Fully open 2NV-241 (Seal Inj Flow Control).

2) Place 2NV-238 (Charging Line Flow Control) in manual and close.

3) Start NV Lube Oil Pump.

4) Start NV Pump.

5) Place NV Lube Oil Pump in "Auto".

(RNO Continued On Next Page)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	6) Slowly restore seal injection flow to limit cooldown of NC Pump bearings to 1°F per minute: ♦ Throttle open 2NV-238. ♦ Throttle close 2NV-241. h. **GO TO** Enclosure 1.
_____ 2. Verify 2A RN Pump - RUNNING.	Manually start pump.
_____ 3. Notify Unit 1 operator to start 1A RN Pump.	
_____ 4. Verify D/G starts.	Place "2A(2B) D/G Mode Select" to "C/R". Reset "2A(2B) D/G Load Seq". Manually start D/G. **IF** D/G is attempting to start but will not start, **THEN** dispatch operator to locally stop the D/G by depressing "Emerg Stop" pushbutton to prevent relay damage. **IF** D/G will not start, **THEN GO TO** step 6.
_____ 5. Verify bus energized and sequencer applying loads.	Ensure "2ETA(2ETB) Normal Breaker" and "2ETA(2ETB) Stdby Breaker" open to allow auto loading of bus. **IF** bus not energized **OR** sequencer not loading bus, **THEN** manually load **PER** Enclosure 2.
_____ 6. Check #2 TD CA Pump - RUNNING.	**IF** needed for flow, **THEN** manually start pump.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

_____ 7. Control CA flow:

a. Reset "CA Modulating Valves Reset Train 2A(2B)".

NOTE For S/I event, S/G level should be controlled as required in EPs.

b. Throttle CA control valves to maintain S/G N/R Level at program level.

_____ 8. Place recirc valve control switch for running KC Pump(s) -- IN AUTO:

- 2KC-51A (Train 2A Recirc Isol)
- 2KC-54B (Train 2B Recirc Isol).

_____ 9. On any D/G that is running, ensure that its associated RN to KD inlet valve is open:

- 2RN-70A (A D/G HX Supply Isol)
- 2RN-171B (B D/G Hx Supply Isol).

Manually open valves.

IF valves will not open, **THEN** dispatch operator to locally open the valves.

_____ 10. **IF** bus is energized, **THEN** ensure equipment was sequenced on **PER** Enclosure 2, Table 1 or Table 2.

_____ 11. **WHEN** Table 1 or Table 2 checked **PER** Enclosure 2, **THEN** reset "2A(2B) D/G Load Seq".

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
12. Check ND System status:	
a. ND System – WAS IN RHR MODE ON TRAIN WITH B/O.	a. **GO TO** step 13.
b. Check NC System level – GREATER THAN OR EQUAL TO PRE – B/0 LEVEL.	b. **REFER TO** AP/2/A/5500/19, LOSS OF ND OR ND SYSTEM LEAKAGE. **GO TO** step 13.
c. Check NC System subcooling – GREATER THAN 0°F.	c. **REFER TO** AP/2/A/5500/19, LOSS OF ND OR ND SYSTEM LEAKAGE. **GO TO** step 13.
d. Check both ND pumps – OFF.	d. **GO TO** step 13.
e. Place desired train of ND in service **PER** Enclosure 3.	
13. Ensure equipment was sequenced on **PER** Enclosure 2 Table 3 or Table 4.	Manually start or align equipment.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE For S/I event, N/A steps 14–15.

_____ 14. Initiate Enclosure 4 (VC/YC and VA System Operation) within 30 minutes.

_____ 15. Ensure all VL AHUs that are on are running in same speed.

_____ 16. Ensure Computer Room cooling as follows:

a. Check Unit 2 6900V bus 2TB – ENERGIZED.

a. **GO TO** step c.

b. **GO TO** step 17.

c. Check Unit 1 6900V busses – ENERGIZED.

c. Complete one of the following:

- **WHEN** Unit 1 600V shared load center 1SLXH is energized, **THEN** dispatch Maintenance to start Computer Room A/C Package #2.

OR

- **WHEN** Unit 2 600V shared load center 2SLXF is energized, **THEN** dispatch Maintenance to start Computer Room A/C Package #1.

GO TO step 17.

d. Dispatch Maintenance to ensure Computer Room A/C Package #2 is on.

ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED

_____ 17. **WHEN** no longer required for flow **AND** D/G Load Seq is reset, **THEN** stop running CA Pumps as follows:

a. Close 2A(2B) Motor Driven CA Pump Control valves.

b. Stop Motor Driven CA Pump(s) **PER** OP/2/A/6250/02, AUXILIARY FEEDWATER SYSTEM, Enclosure 4.2.

c. Close #2 TD CA Control valves.

d. Stop #2 TD CA Pump **PER** OP/2/A/6250/02, AUXILIARY FEEDWATER SYSTEM, Enclosure 4.4.

NOTE For S/I event, N/A the following step.

e. **IF** B/O was on B Train, **THEN** open the following valves:

- 2CF-151B (A S/G Temper Isol)
- 2CF-153B (B S/G Temper Isol)
- 2CF-155B (C S/G Temper Isol)
- 2CF-157B (D S/G Temper Isol).

NOTE For S/I event, N/A the following step.

_____ 18. **IF** two NV Pumps are running, **THEN** stop either pump.

_____ 19. Align DC busses **PER** Enclosure 6.

_____ 20. Dispatch operators to locally check relay targets to determine location of any faults.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
_____ 21. Verify fault cleared or isolated.	Notify Transmission Personnel to repair faulted bus. Do not continue until fault cleared or isolated.
_____ 22. Check all 6900V busses - ENERGIZED.	Restore de-energized 6900V busses as follows: a. Remove all loads from de-energized 6900V busses. 1) Place "2TA (2TB) (2TC) (2TD) Mode Select" switches to "Man" on de-energized 6900V busses. 2) Dispatch operator to locally: a) Open all breakers on de-energized 6900V busses b) Pull control power fuses for RC Pumps powered from de-energized busses. 3) Place "A (B) (C) Hotwell Pmp" and "A (B) (C) CM Booster Pmp" switches for pumps powered from de-energized bus to "Stop". b. Contact Toddville TCC by Outside Bell Line 399-9745 (9744) or microwave 382-9403, (9400), (9404), or two-way radio to coordinate the following steps. c. Ensure lockouts reset. (RNO Continued On Next Page)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	d. With Toddville TCC concurrence, close PCB's on de-energized bus. 1) For 2A busline ♦ PCB 58 and 59. 2) For 2B busline ♦ PCB 61 and 62.
	e. **WHEN** busline energized, **THEN** re-energize desired 6900V bus: 1) Close "2TA(2TB)(2TC)(2TD) Normal Breaker" or "Standby Breaker" on de-energized busses. 2) Place "2TA(2TB)(2TC)(2TD) Mode Select" in "Auto".
	f. Energize desired Aux transformer(s): ♦ Close "2ATC Feeder Breaker" ♦ Close "2ATD Feeder Breaker" ♦ **IF** either of the following Unit 2 feeder breakers are racked in, **THEN** close breakers: ♦ SATA Feeder Breaker ♦ SATB Feeder Breaker.
_____ 23. Check normal power supply (from 2ATC or 2ATD) - CAN BE RESTORED.	**GO TO** step 25.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

____ 24. Return 4160V bus to normal supply:

a. Verify D/G carrying the bus.

a. Return 4160V bus to normal power supply as follows:

1) Dispatch operator with key #338 to select "TEST/BLOCK" on affected train:

- "2ETA DEGRADED VOLTAGE" switch located on TB-1689 (south wall 2ETA room, AA-63).
- "2ETB DEGRADED VOLTAGE" switch located on TB-1690 (south wall 2ETB room, AA-63).

2) Do not continue until "TEST/BLOCK" is selected in step above.

3) Place "2A(2B) D/G Mode Select" to "C/R".

4) Hold "Reset" on "2A(2B) D/G Load Seq" while completing the following steps.

5) Open the 600V essential load center feeder breakers on affected bus:

a) For A Train only:

- 2ELXA
- 2ELXC
- 2ELXE.

b) For B Train only:

- 2ELXB
- 2ELXD
- 2ELXF.

(RNO Continued On Next Page)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	6) Open CA Pump breaker on affected bus. **IF** breaker will not open, **THEN** open by depressing CA Pump "Start" and "Stop" at the same time. 7) Depress "OFF" pushbutton to open any other pump breakers that are closed in on the affected bus. 8) Close normal incoming breaker to affected 4160 bus and verify bus is energized. 9) Release "Reset" on "2A(2B) D/G Load Seq." 10) Load bus as necessary **PER** Enclosure 2, Tables 1 and 3 or Tables 2 and 4. 11) Place "2A(2B) D/G Mode Select" to "Auto". 12) **GO TO** step 26.
b. Return the 4160V bus to normal power supply and shutdown D/G **PER** OP/2/A/6350/02, DIESEL GENERATOR, Enclosure 4.2. c. **GO TO** step 26.	

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

_____ 25. Place 4160V bus on alternate supply.

a. Verify D/G carrying the bus.

a. Place 4160V bus on shared transformer as follows:

1) **IF** desired to power 4160V bus from Unit 1, **THEN** perform Enclosure 7 or 8.

2) **IF** desired to power 4160V bus from Unit 2, **THEN** perform Enclosure 9 or 10.

b. Place 4160V bus on shared transformer **PER** OP/2/A/6350/05, AC ELECTRICAL OPERATION OTHER THAN NORMAL LINEUP, Enclosure 4.2 or 4.3.

NOTE For S/I event, N/A the following step.

_____ 26. Stop any unnecessary KC Pumps that were sequenced on **PER** OP/2/A/6400/05, COMPONENT COOLING WATER SYSTEM, Enclosure 4.3.

_____ 27. Restart equipment as follows:

a. **IF** D/G carrying load, **THEN** contact station management to evaluate D/G loading prior to restarting the following equipment.

b. Restart the following as necessary:

- KF Pump
- Backup Pzr Heaters
- Boric Acid Transfer Pump.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
_____ 28. Check offsite power – RESTORED TO AFFECTED BUS.	**DO NOT** continue until offsite power is restored to affected bus **PER** step 24 or step 25.
_____ 29. Check if loss of 6900V buss – HAS OCCURRED DURING THIS EVENT.	**GO TO** step 32.
_____ 30. **REFER TO** Enclosure 12 and re-energize desired Unit 2 load centers.	
_____ 31. **REFER TO** Enclosure 13 and evaluate returning affected shared motor control centers to their normal power supply.	

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE
- The following steps realign plant systems for normal operation.
- For S/I event each of the following steps shall only be performed at the discretion of station management.
- For S/I event, equipment shall be operated in accordance with EPs.

_____ 32. Realign RN System:

a. Check – B/O OCCURRED ON TRAIN A.

a. **GO TO** step b.

1) Open
   - 2RN-64A (AB Non Ess Return Isol)
   - 2RN-43A (Train 2B To Non Ess Hdr Isol)
   - 2RN-299A (AB Vent Sys Return Isol).
   - 0RN-4A,C (Train 2B RC Supply)

2) Notify Unit 1 operator to open 1RN-43A (Train 1B To Non-Ess Hdr Isol).

3) **IF** no longer required, **THEN** notify Unit 1 operator to stop 1A RN Pump **PER** OP/1/A/6400/06, Nuclear Service Water System, Enclosure 4.8.

4) **IF** no longer required, **THEN** stop 2A RN Pump **PER** OP/2/A/6400/06, Nuclear Service Water System, Enclosure 4.8.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
5) Check 2RN-40A (Train 2A To Non Ess Hdr Isol) - OPEN	5) Perform the following: a) **IF** RN Pump 2A is off, **THEN** close 2RN-86A (2A KC Supply Isol). b) Open 2RN-40A (Train 2A To Non Ess Hdr Isol).

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

b. Check – B/O OCCURRED ON TRAIN B.

b. **GO TO** step 33.

1) Open:

- 2RN-41B (Train 2B To Non Ess Hdr Isol)
- 2RN-63B (AB Non Ess Return Isol)
- 0RN-11B (Train 2B LLI Supply)
- 0RN-284B (Train 2B Disch To RC)
- 2RN-279B (AB Vent Sys Return Isol).

2) Close:

- 0RN-9B (Train 2B SNSWP Supply)
- 0RN-152B (Train 2B Disch To SNSWP).

3) Notify Unit 1 operator to open 1RN-41B (Train 1B to Non-Ess Hdr Isol).

4) **IF** no longer required, **THEN** notify Unit 1 operator to stop 1A RN Pump **PER** OP/1/A/6400/06, Nuclear Service Water System, Enclosure 4.8.

5) Stop any Unit 2 RN Pumps that are no longer required **PER** OP/2/A/6400/06, Nuclear Service Water System, Enclosure 4.8.

_____ 33. Notify Unit 1 operator to stop any RV Pumps that auto started.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

_____ 34. Restart the following EMF sample fans:

- 2EMF-35, 36, 37 (Unit Vent Par/Gas/Iod)
- 2EMF-42 (Fuel Bldg Ventilation)
- EMF-43A (Control Room Air Intake Loc A)
- EMF-41 (Aux Bldg Ventilation)
- 1EMF-43B (Control Room Air Intake Loc B)
- **IF** an S/I has not occurred, **THEN** restart sample fan for 2EMF-38,39,40.

_____ 35. Return VA System to normal as follows:

a. Dispatch operator to local VA Filtered Exhaust panels to return VA to pre-blackout status by resetting the following:

- ABFXF-1A(1B)
- ABFXF-2A(2B).

b. **REFER TO** OP/0/A/6450/03, AUXILIARY BUILDING VENTILATION SYSTEM, Enclosure 4.1 to:

- Restore switches positioned in Enclosure 4, steps 8 and 10, to normal alignment.
- Ensure VA returned to normal operation.

_____ 36. Ensure VU, VL, VR and VT units returned to normal operation **PER** OP/2/A/6450/01, CONTAINMENT VENTILATION SYSTEMS, Enclosures 4.1, 4.3, 4.5, 4.7.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

_____ 37. Ensure VC/YC is returned to normal operation **PER** OP/0/A/6450/11, CONTROL AREA VENTILATION/CHILLED WATER SYSTEM, Enclosure 4.7.

_____ 38. Align BB System and establish blowdown **PER** OP/2/A/6250/08, STEAM GENERATOR BLOWDOWN, Enclosure 4.1.

_____ 39. Align NM System **PER** OP/2/A/6200/63, NUCLEAR SAMPLING SYSTEM.

_____ 40. Realign vital battery chargers as follows:

a. Determine which battery chargers are actually being powered from Unit 1.

b. For only the vital battery chargers that are being powered from Unit 1, depress "Stop" on associated Unit 2 "EVCA (B,C,D) Batt Charger" (M contactor).

_____ 41. **IF** loss of 6900V bus has occurred during this event, **THEN**:

a. Ensure affected RC Pump discharge valves are closed.

b. Dispatch operator to locally replace control power fuses on affected RC Pumps.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

_____ 42. Return degraded voltage relaying to normal as follows:

a. Check the following status lights – DARK:

- "ETA LOSS/UNDERVOLTAGE PHASE X" (2SI–14, A–3)
- "ETA LOSS/UNDERVOLTAGE PHASE Y" (2SI–14, B–3)
- "ETA LOSS/UNDERVOLTAGE PHASE Z" (2SI–14, C–3)
- "ETB LOSS/UNDERVOLTAGE PHASE X" (2SI–14, A–4)
- "ETB LOSS/UNDERVOLTAGE PHASE Y" (2SI–14, B–4)
- ETB LOSS/UNDERVOLTAGE PHASE Z" (2SI–14, C–4)

a. Do not continue until condition cleared.

b. Dispatch operator to check degraded voltage relay targets on the following panels – NORMAL:

- TB–1689 (south wall 1ETA room, AA–63)
- TB–1690 (south wall 1ETB room, AA–63).

b. Perform the following:

1) Notify Shift Work Manager of activated targets.

2) Reset targets.

3) **IF** targets will not reset, **THEN** do not continue until condition cleared.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
c. Check the following status lights - DARK: ♦ "ETA DEGRADED VOLTAGE RELAYS TEST/BLOCKED" (2SI-15, A-7) ♦ "ETB DEGRADED VOLTAGE RELAYS TEST/BLOCKED" (2SI-15, B-7).	c. Perform the following: 1) Contact station management to determine if degraded voltage relays should be placed is service. 2) **IF** degraded voltage relays are required to be placed in service, **THEN** dispatch operator to select "NORM" on the following switches: ♦ "2ETA DEGRADED VOLTAGE" on TB-1689 (south wall 2ETA room, AA-63) ♦ "2ETB DEGRADED VOLTAGE" ono TB-1690 (south wall 2ETB room, AA-63). 3) **IF** degraded relays placed in service, **THEN** ensure the following status lights are dark: ♦ "ETA DEGRADED VOLTAGE RELAYS TEST/BLOCKED" (2SI-15, A-7) ♦ "ETB DEGRADED VOLTAGE RELAYS TEST/BLOCKED" (2SI-15, B-7).

END

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION

- **This enclosure is written for normal operation conditions and assumes no S/I has occurred.**
- **For an S/I event, this enclosure shall only be performed at the discretion of station management.**

_____ 1. Check – B/O ON A TRAIN.

GO TO step 2.

a. Check 2RN-187B (B KC Hx Supply Isol) – OPEN.

a. Manually open valve.

b. Perform one of the following to isolate RN train crosstie:

- Dispatch operator to locally close 2RN-40A (Train 2A To Non Ess Hdr Isol) (aux bldg, 716 + 8, GG-56, north of RN Pump 1B).

OR

CAUTION **Closing 2RN-41B (Train 2B to Non-Ess Hdr Isol) will isolate B train RN flow to NC pumps and other non essential loads.**

- Evaluate closing 2RN-41B (Train 2B Non Ess Hdr Isol).

c. **WHEN** RN train crosstie is isolated, **THEN** 2RN-190B (RN To KC Hx B Control) may be throttled further open, while maintaining RN Pump 2B flow less than the following:

- **IF** 2B RN Pump suction is aligned to Low Level Intake, **THEN** limit flow to 16,000 GPM.

OR

- **IF** 2B RN Pump suction is aligned to SNSWP, **THEN** limit flow to 13,000 GPM.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
d. Dispatch operator to locally close the following: ♦ 2KC-230A (Trn 2A to RB Non-Ess Sup Isol) ♦ 2KC-3A (Rx Bldg Non Ess Return Isol).	
e. Check ND System - WAS IN RHR MODE ON TRAIN WITH B/O.	e. **GO TO** step 3.
f. Check NC System level - GREATER THAN OR EQUAL TO PRE B/O LEVEL.	f. **REFER TO** AP/2/A/5500/19, LOSS OF ND OR ND SYSTEM LEAKAGE. **GO TO** step 3.
g. Check NC System subcooling - GREATER THAN 0°F.	g. **REFER TO** AP/2/A/5500/19, LOSS OF ND OR ND SYSTEM LEAKAGE. **GO TO** step 3.
h. Place "B" Train ND in service as follows: 1) Close or verify closed the following: ♦- 2ND-34 (A & B ND Hx Bypass) ♦- 2ND-33 (A ND Hx Bypass) ♦- 2ND-32 (A ND Hx To Letdown Hx) ♦- 2ND-18 (B ND Hx Bypass) ♦- 2ND-17 (B ND Hx To Letdown Hx) ♦- 2ND-14 (B ND Hx Outlet)	h. **REFER TO** AP/2/A/5500/19, LOSS OF ND OR ND SYSTEM LEAKAGE. **GO TO** step 3.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

2) Throttle open 2KC-81B (KC To B ND Hx) to establish 2000 to 5000 GPM KC flow to "B" ND Hx. Limit flow to 4000 GPM per operating KC pump.

3) Start 2B ND Pump and ensure 2ND-67B (B ND Pump & B ND Hx Miniflow) opens.

4) Open or verify open the following valves:

   - 2ND-18 (B ND Hx Bypass)
   - 2NI-178B (Train 2B ND To C & D CL)
   - 2ND-15B (Train 2B ND To Hot Leg Isol).

CAUTION **Minimum ND System flow of 2000 GPM must be maintained anytime ND flow is discharging to all 4 cold legs.**

5) Slowly throttle open 2ND-34 (A & B ND Hx Bypass) to obtain ND flow of 2000 GPM or greater.

6) Throttle the following valves as necessary to maintain stable NC System temperature:

   - 2ND-34 (A & B ND Hx Bypass)
   - 2ND-14 (B ND Hx Outlet)
   - 2KC-81B (KC To B ND Hx).

     - **IF** NC System temperature is greater than 200°F, **THEN** KC flow must be maintained greater than 2000 GPM.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
7) **IF** desired, **THEN** establish letdown from the ND System **PER** OP/2/A/6200/01, CHEMICAL AND VOLUME CONTROL SYSTEM, Enclosure 4.1.	
i. **GO TO** step 3.	
2. Check – B/O ON B TRAIN.	
a. Verify 2RN-86A (2A KC Hx Supply) – OPEN.	a. Manually open valve.
b. Dispatch operator to locally close the following: ♦ 2KC-18B (Rx Bldg Non Ess Return Isol). ♦ 2KC-228B (Trn 2B to RB Non Ess Sup Isol).	
c. Check ND System – WAS IN RHR MODE ON TRAIN WITH B/O.	c. **GO TO** step 3.
d. Check NC System Level – GREATER THAN OR EQUAL TO PRE B/O LEVEL.	d. **REFER TO** AP/2/A/5500/19, LOSS OF ND OR ND SYSTEM LEAKAGE. **GO TO** step 3.
e. Check NC System subcooling – GREATER THAN O°F.	e. **REFER TO** AP/2/A/5500/19, LOSS OF ND OR ND SYSTEM LEAKAGE. **GO TO** step 3.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
f. Place "A" Train ND in service as follows:	f. **REFER TO** AP/2/A/5500/19, LOSS OF ND OR ND SYSTEM LEAKAGE. **GO TO** step 3.

1) Close or verify closed the following valves:
   - 2ND-29 (A ND Hx Outlet)
   - 2ND-34 (A & B ND Hx Bypass)
   - 2ND-33 (A ND Hx Bypass)
   - 2ND-32 (A ND Hx To Letdown Hx)
   - 2ND-18 (B ND Hx Bypass)
   - 2ND-17 (B ND Hx To Letdown Hx).
2) Throttle open 2KC-56A (KC To A ND Hx) to establish 2000 to 5000 GPM KC flow to "A" ND Hx. Limit KC flow to 4000 GPM per operating KC pump.
3) Start 2A ND Pump and ensure 2ND-68A (A ND Pump & A Hx Miniflow) opens.
4) Open or verify open the following valves:
   - 2NI-173A (Train 2A ND To A & B CL)
   - 2ND-30A (Train 2A ND To Hot Leg Isol)
   - 2ND-33 (A ND Hx Bypass).

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION **Minimum ND System flow of 2000 GPM must be maintained anytime ND flow is discharging to all 4 cold legs.**

5) Slowly throttle open 2ND-34 (A & B ND Hx Bypass) to obtain ND flow of 2000 GPM or greater.

6) Throttle the following valves as necessary to stabilize NC System temperature:

   - 2ND-29 (A ND Hx Outlet)
   - 2ND-34 (A & B ND Hx Bypass)
   - 2KC-56A (KC To A ND Hx).

     - **IF** NC System temperature is greater than 200°F, **THEN** KC flow must be maintained greater than 2000 GPM.

7) **IF** desired, **THEN** establish letdown from the ND System **PER** OP/2/A/6200/01, CHEMICAL AND VOLUME CONTROL SYSTEM, Enclosure 4.1.

_____ 3. Check - NORMAL LETDOWN IN SERVICE PRIOR TO B/O.

RETURN TO step in effect in body of procedure.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

_____ 4. Establish normal letdown as follows:

GO TO Step 5.

a. **IF** letdown is required prior to Staff evaluation in next step, **THEN** establish excess letdown **PER** Step 5.

b. Obtain Staff evaluation for potential voiding of letdown line prior to proceeding to next step.

c. Ensure 2NV-459 (A L/D Orifice Otlt Flo Cntrl) is closed.

d. Place 2NV-124 (Letdown Press Control) in "Man" and place between 10-20% open.

e. Adjust charging flow to maintain "Regen Hx L/D Temp" less than 220°F.

f. Open letdown line isolation valves:

1) 2NV-7B (Letdown Cont Isol Outside)

2) 2NV-1A and 2A (NC L/D Isol To Regen Hx)

3) 2NV-35A (A L/D Orifice Otlt Cont Isol).

g. Complete the following concurrently:

- Slowly open 2NV-459.
- As "L/D Press" increases, adjust 2NV-124 to maintain "L/D Press" between 250-350 PSIG.
- **WHEN** "L/D Press" is greater than 200 PSIG, **THEN** adjust charging flow to maintain "Regen Hx L/D Temp" less than 380°F.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

h. Continue with preceding step until flow rate of desired orifice is achieved:

- **IF** swapping to 2NV-457A (C L/D Orif Otlt Cont Isol), **THEN** adjust 2NV-459 to obtain 45 GPM.

  OR

- **IF** swapping to 2NV-458A (B L/D Orif Otlt Cont Isol), **THEN** adjust 2NV-459 to obtain 75 GPM.

i. Adjust 2NV-124 to obtain "L/D Press" of 250 PSIG.

NOTE The following step may require 2 operators.

j. Perform the following simultaneously:

- Select and hold "Close" on 2NV-35A.
- Select and hold "Open" on selected letdown orifice isolation valve:
  - 2NV-457A (for 45 GPM)

    OR

  - 2NV-458A (for 75 GPM).
- Adjust 2NV-124 as required to maintain "L/D Press" between 250-350 PSIG.

k. **WHEN** letdown orifice isolation valves in previous step are in selected positions, **THEN** return their control switches to "Auto".

l. Adjust 2NV-124 to obtain "L/D Press" of 350 PSIG.

m. Place 2NV-124 in "Auto".

n. Place 2NV-459 manual loader in closed position.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

o. Place 2NV-238 (Charging Line Flow Control) in "Auto".

p. Notify Chemistry that normal letdown is in service.

q. **RETURN TO** step in effect in body of procedure in effect.

_____ 5. Establish excess letdown:

a. Ensure open:

- 2KC-305B (Excess Letdn HX Sup Otsd Isol)
- 2KC-315B (Excess L/D HX Ret Hdr C/I Otsd).

b. Check - NCDT PRESSURE LESS THAN VCT PRESSURE.

b. Place 2NV-27B (Excess L/D HX Otlt 3-Way Cntrl) to "NCDT" position.

GO TO Step c.

1) Open:

- 2NV-94A (NC Pumps Seal Ret C/I Inside)
- 2NV-95B (NC Pumps Seal Ret C/I Otsd).

2) Ensure NCDT pressure maintained less than VCT pressure to prevent NC Pump seal damage.

3) Place 2NV-27B (Excess L/D HX Otlt 3-Way Cntrl) to "VCT" position.

c. Open 2NV-24B and 25B (C NC Loop To Exs L/D HX Isol).

d. Slowly open 2NV-26 (Excess L/D HX Outlet Cntrl) to maintain "Excess L/D HX Temp" less than 200°F.

e. Notify Chemistry that excess letdown is in service.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

f. **IF** an SI occurs, **THEN** immediately close 2NV-24B and 25B.

_____ 6. **WHEN** normal letdown is available, **THEN**:

a. Establish normal letdown **PER** Step 4.

b. Isolate excess L/D:

1) Close 2NV-26 (Excess L/D HX Outlet Cntrl).

2) Close 2NV-24B and 25B (C NC Loop to Exs L/D HX Isol).

3) Close 2KC-305B (Excess Letdn HX Sup Otsd Isol).

4) Close 2KC-315B (Excess L/D HX Ret Hdr C/I Otsd).

_____ 7. **RETURN TO** step in effect in body of procedure.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
_____ 1. Check 2ETA – ENERGIZED FROM OFFSITE POWER.	**GO TO** step 3.
_____ 2. **GO TO** step 13.	
_____ 3. Check 2ETA – ENERGIZED FROM D/G 2A.	**IF** 2A D/G will not start, **THEN GO TO** step 13. **IF** 2A D/G is running but "2ETA Emerg Breaker" is not closed, **THEN GO TO** step 6.
_____ 4. Check – SEQUENCER APPLYING LOADS TO 2ETA.	**GO TO** step 11.
_____ 5. **GO TO** step 13.	
_____ 6. Hold "Reset" on "2A D/G Load Seq" while completing steps 7–9.	
_____ 7. Unload 2ETA bus as follows:	
a. Open 2A CA Pump breaker.	a. Open breaker by depressing CA Pump "Start" and "Stop" at the same time.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

b. Open remaining pump breakers on 2ETA:

- ♦ NV Pump 2A
- ♦ ND Pump 2A
- ♦ NI Pump 2A
- ♦ KC Pump 2A1
- ♦ KC Pump 2A2
- ♦ RN Pump 2A
- ♦ KF Pump 2A
- ♦ NS Pump 2A.

c. Open 600V essential transformer feeder breakers:

- ♦ 2ELXA
- ♦ 2ELXC
- ♦ 2ELXE.

_____ 8. Place "2A D/G Mode Select" switch to "C/R".

_____ 9. Close "2ETA Emerg Breaker".

Release "Reset" on "2A D/G Load Seq".

Manually stop D/G 2A.

IF D/G 2A will not stop, **THEN** dispatch operator to locally stop using "Emerg Stop" pushbutton.

GO TO step 13.

_____ 10. Release "Reset" on "2A D/G Load Seq".

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
_____ 11. **IF** sequencer is not applying loads, **THEN** observe the following limitations while manually loading 2ETA in step 12: ♦ Continuous load on 2A D/G should not exceed 4000 KW. ♦ Maximum load on 2A D/G should not exceed 4400 KW for 2 hours in any 24 hour period. ♦ Voltage and frequency should be allowed to stabilize before applying the next load group.	
_____ 12. Ensure 2ETA loaded **PER** Table 1 of this enclosure. **GO TO** step 13.	
_____ 13. Check 2ETB – ENERGIZED FROM OFFSITE POWER	**GO TO** step 15.
_____ 14. Return to step in effect in procedure.	
_____ 15. Check 2ETB – ENERGIZED FROM D/G 2B.	**IF** D/G 2B will not start, **THEN** return to step in effect in procedure. **IF** D/G 2B is running but "2ETB Emerg Breaker" is not closed, **THEN GO TO** step 18.
_____ 16. Check – SEQUENCER APPLYING LOADS TO 2ETB.	**GO TO** step 23.
_____ 17. Return to step in effect in procedure.	
_____ 18. Hold "Reset" on "2B D/G Load Seq" while completing step 19–21.	

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

_____ 19. Unload 2ETB bus as follows:

a. Open 2B CA Pump breaker.

a. Open breaker by depressing CA Pump "Start" and "Stop" at the same time.

b. Open remaining pump breakers on 2ETB:

- NV Pump 2B
- ND Pump 2B
- NI Pump 2B
- KC Pump 2B1
- KC Pump 2B2
- RN Pump 2B
- KF Pump 2B
- NS Pump 2B.

c. Open 600V essential transformer feeder breakers:

- 2ELXB
- 2ELXD
- 2ELXF.

_____ 20. Place "2B D/G Mode Select" switch to "C/R".

_____ 21. Close "2ETB Emerg Breaker".

Release "Reset" on "2B D/G Load Seq".

Manually stop 2E D/G.

IF D/G 2B will not stop, **THEN** dispatch operator to locally stop using "Emerg Stop" pushbutton.

IF 2ETA is energized, **THEN** return to step in effect in procedure.

_____ 22. Release "Reset" on "2B D/G Load Seq".

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

_____ 23. **IF** sequencer is not applying loads, **THEN** observe the following limitations while manually loading 2ETB in step 24:

- Continuous load on 2B D/G should not exceed 4000 KW.
- Maximum load on 2B D/G should not exceed 4400 KW for 2 hours in any 24 hour period.
- Voltage and frequency should be allowed to stabilize before applying the next load group.

_____ 24. Ensure 2ETB loaded **PER** Table 2 of this enclosure.

TABLE 1
2ETA LOADS

Load Group #1	Position	Load
2ELXA Fdr Breaker	Close	2ETA-14
2A NV Pump	On	2ETA-7
EVCA Batt Charger	On	2EMXA-F1E
EVCC Batt Charger	On	2EMXA-F2E
Load Group #2A		
2ELXC Fdr Breaker	Close	2ETA-1
Load Group #5		
2A1 and 2A2 KC Pumps	On	2ETA-13 and 2ETA-12
Load Group #6		
2A RN Pump	On	2ETA-5
Load Group #7		
2A CA Pump	On	2ETA-6

IF CA Pump breaker is locked out, **THEN** close as follows:

1. Depress "Defeat" on "2A CA Pump Auto Start Defeat"
2. Close CA Pump breaker. **IF** breaker does not close, **THEN** remove and replace control power fuses before closing breaker.

IF S/I has occurred, **THEN** start additional equipment as required in EPs.

TABLE 2
2ETB LOADS

Load Group #1	Position	Load
2ELXB Fdr Breaker	Close	2ETB-14
2B NV Pump	On	2ETB-7
EVCB Batt Charger	On	2EMXB-5F
EVCD Batt Charger	On	2EMXB-6E
Load Group #2A		
2ELXD Fdr Breaker	Close	2ETB-1
Load Group #5		
2B1 and 2B2 KC Pumps	On	2ETB-13 and 2ETB-12
Load Group #6		
2B RN Pump	On	2ETB-5
Load Group #7		
2B CA Pump	On	2ETB-6

IF CA Pump breaker is locked out, **THEN** close as follows:

1. Depress "Defeat" on "2B CA Pump Auto Start Defeat".
2. Close CA Pump breaker. **IF** breaker does not close, **THEN** remove and replace control power fuses before closing breaker.

IF S/I has occurred, **THEN** start additional equipment as required in EPs.

TABLE 3
2ETA LOADS

Load Group #8	Position	Load
Alternate Feeder to 1EMXG (local)	Open	2ELXC-5C
Load Group #9		
IF A Train selected on VC/YC Train Select switch, **THEN** verify CR Area Chiller A starts after 15 minute time delay.	On	2ETA-17
NOTE For S/I event, RN alignment shall be in accordance with EPs.		
0RN-12A,C (Train 2A LLI Supply)	Open	1EMXH1-2B
0RN-13A (Train 2A LLI Supply)	Open	1EMXH-4C
2RN-86A (2A KC Hx Supply Isol)	Open	2EMXA-R9C
2RN-16A (A RN Pump Suction isol)	Open	2EMXA-R8B
2RN-43A (Train 2B To Non-Ess Hdr Isol)	Close	2EMXA-R11D
0RN-148A,C (Train 2A Disch To RC)	Open	1EMXH1-1E
1RN-43A (Train 1B To Non Ess Hdr Isol)	Close	1EMXA-R11D
2RN-296A (Train 2A Ess Hdr Return Isol)	Open	2EMXA-R11B
0RN-147A,C (Train 2A Disch To RC)	Open	1EMXH1-03B
0RN-7A (Train 2A SNSWP Supply)	Close	1EMXH-3C
2RN-299A (AB Vent Sys Return Isol)	Close	2EMXA-R11C
2RN-64A (AB Non Ess Return Isol)	Close	2EMXA-R9A

(Table 3 continued on next page)

TABLE 3 (Continued)
2ETA LOADS

	Position	Load
0RN-149A (Train 2A Disch To SNSWP)	Close	1EMXH-4A
0RN-4A,C (Train 2B RC Supply)	Close	1EMXH1-2C
0RN-3A (Train 2A RC Supply)	Close	1EMXH-3A
NOTE For S/I event the following equipment will not be available.		
2C-CRD Vent Fan	Start	2EMXC-3D
Pipe Tunnel Booster Fan 2A	Start	2EMXC-6A
VU AHU 2A	Start	2EMXC-6B
VU AHU 2C	Start	2EMXC-6C
VU Return Air Fan 2C	Start	2EMXC-7C
VU Return Air Fan 2A	Start	2EMXC-7B
VT AHU 2A	Start	2EMXC-8C
VL AHU 2A	Start	2EMXC-1A
VL AHU 2C	Start	2EMXC-2A
2A-CRD Vent Fan	Start	2EMXC-3C

TABLE 4
2ETB LOADS

Load Group #8	Position	Load
Normal Feeder to 2EMXG (local)	Close	2ELXD-5C
Load Group #9		
IF B Train selected on VC/YC Train Select switch, **THEN** verify CR Area Chiller B starts after 15 minute time delay.	On	2ETB-17
NOTE For S/I event, RN alignment shall be in accordance with EPs.		
0RN-9B (Train 2B SNSWP Supply)	Open	2EMXH-F2C
0RN-152B (Train 2B Disch To SNSWP)	Open	2EMXH-F3D
2RN-187B (B KC Hx Supply Isol)	Open	2EMXB2-R2C
2RN-41B (Train 2B To Non-Ess Hdr Isol)	Close	2EMXB2-R4B
2RN-297B (Train 2B Ess Hdr Ret Isol)	Open	2EMXB3-F1C
0RN-2B (Train 2A RC Supply)	Close	2EMXH-F2A
2RN-18B (B RN Pump Suction Isol)	Open	2EMXB2-R2A
0RN-11B (Train 2B LLI Supply)	Close	2EMXH-F2D
0RN-5B (Train 2B RC Supply)	Close	2EMXH-F2B
2RN-279B (AB Vent Sys Return Isol)	Close	2EMXB3-F3C
1RN-41B (Train 1B To Non Ess Hdr Isol)	Close	1EMXB2-R4B
2RN-63B (AB Non Ess Return Isol)	Close	2EMXB2-R3A
0RN-284B (Train 2B Disch To RC)	Close	2EMXH-F3C

(Table 4 continued on next page)

TABLE 4 (Continued)
2ETB LOADS

NOTE For S/I event, the following equipment will not be available.

	Position	Load
2D-CRD Vent Fan	Start	2EMXD-3D
Pipe Tunnel Booster Fan 2B	Start	2EMXD-3B
VU AHU 2B	Start	2EMXD-6C
VU AHU 2D	Start	2EMXD-6D
VU Return Air Fan 2D	Start	2EMXD-7B
VU Return Air Fan 2B	Start	2EMXD-5C
VT AHU 2B	Start	2EMXD-8B
VL AHU 2B	Start	2EMXD-1A
VL AHU 2D	Start	2EMXD-2A
2B-CRD Vent Fan	Start	2EMXD-3C

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

_____ 1. **IF** it is necessary to restart ND Pump on train with B/O during this enclosure, **THEN** ensure D/G load is less than 3700 KW.

_____ 2. Check – 2ETA AND 2ETB ENERGIZED. — **GO TO** step 6.

_____ 3. Use step 4 to start "A" Train ND or step 5 to start "B" Train ND.

_____ 4. To place "A" Train ND in service perform the following:

a. Close or verify closed the following:

- 2ND-29 (A ND Hx Outlet)
- 2ND-34 (A & B ND Hx Bypass)
- 2ND-33 (A ND Hx Bypass)
- 2ND-32 (A ND Hx To Letdown Hx)
- 2ND-18 (B ND Hx Bypass)
- 2ND-17 (B ND Hx To Letdown Hx)
- 2NI-178B (Train 2B ND To C&D CL)
- 2ND-15B (Train 2B ND To Hot Leg Isol).

b. Throttle open 2KC-56A (KC To A ND Hx) to establish 2000 to 5000 GPM KC flow to "A" ND Hx. Limit KC flow to 4000 GPM per operating KC pump.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

c. Start 2A ND Pump and ensure 2ND-68A (A ND Pump & A Hx Miniflow) opens.

d. Open the following valves:

- 2NI-173A (Train 2A ND To A&B CL)
- 2ND-30A (Train 2A ND To Hot Leg Isol)
- 2ND-33 (A ND Hx Bypass).

CAUTION **Minimum ND System flow of 2000 GPM must be maintained anytime ND flow is discharging to all 4 cold legs.**

e. Slowly throttle open 2ND-34 (A&B ND Hx Bypass) to obtain ND flow between 1000 and 2000 GPM.

f. Throttle the following valves as necessary to stabilize NC System temperature:

- 2ND-29 (A ND Hx Outlet)
- 2ND-34 (A&B ND Hx Bypass)
- 2KC-56A (KC To A ND Hx).
  - **IF** NC System temperature is greater than 200°F, **THEN** KC flow must be maintained greater than 2000 GPM.

g. **IF** desired, **THEN** establish letdown from the ND System **PER** OP/2/A/6200/01, CHEMICAL AND VOLUME CONTROL SYSTEM, Enclosure 4.1.

h. **RETURN TO** step in effect in body of procedure.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

_____ 5. To place "B" Train ND in service, perform the following:

a. Close or verify closed the following:

- 2NI-173A (Train 2A ND To A&B CL)
- 2ND-30A (Train 2A ND To Hot Leg Isol)
- 2ND-34 (A & B ND Hx Bypass)
- 2ND-33 (A ND Hx Bypass)
- 2ND-32 (A ND Hx To Letdown Hx)
- 2ND-18 (B ND Hx Bypass)
- 2ND-17 (B ND Hx To Letdown Hx)
- 2ND-14 (B ND Hx Outlet).

b. Throttle open 2KC-81B (KC To B ND Hx) to establish 2000 to 5000 GPM KC flow to "B" ND Hx. Limit KC flow to 4000 GPM per operating KC pump.

c. Start 2B ND Pump and ensure 2ND-67B (B ND Pump & B Hx Miniflow) opens.

d. Open the following valves:

- 2ND-18 (B ND Hx Bypass)
- 2NI-178B (Train 2B ND To C&D CL)
- 2ND-15B (Train 2B ND To Hot Leg Isol).

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION **Minimum ND System flow of 2000 GPM must be maintained anytime ND flow is discharging to all 4 cold legs.**

e. Slowly throttle open 2ND-34 (A&B ND Hx Bypass) to obtain ND flow between 1000 and 2000 GPM.

f. Throttle the following valves as necessary to stabilize NC System temperature:

- 2ND-14 (B ND Hx Outlet)
- 2ND-34 (A & B ND Hx Bypass)
- 2KC-81B (KC To B ND Hx).
  - **IF** NC System temperature is greater than 200°F, **THEN** KC flow must be maintained greater than 2000 GPM.

g. **IF** desired, **THEN** establish letdown from the ND System **PER** OP/2/A/6200/01, CHEMICAL AND VOLUME CONTROL SYSTEM, Enclosure 4.1.

h. **RETURN TO** step in effect in body of procedure.

_____ 6. Perform step 7 to place "A" Train ND in service or step 8 to place "B" Train ND in service.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

_____ 7. To place "A" Train ND in service, perform the following:

a. Close or verify closed the following:

- 2ND-29 (A ND Hx Outlet)
- 2ND-34 (A&B ND Hx Bypass)
- 2ND-33 (A ND Hx Bypass)
- 2ND-32 (A ND Hx To Letdown Hx)
- 2ND-18 (B ND Hx Bypass)
- 2ND-17 (B ND Hx To Letdown Hx).

b. Throttle open 2KC-56A (KC To A ND Hx) to establish 2000 to 5000 GPM KC flow to "A" ND Hx. Limit KC flow to 4000 GPM per operating KC pump.

c. Start 2A ND Pump and ensure 2ND-68A (A ND Pump & A Hx Miniflow) opens.

d. Open the following valves:

- 2NI-173A (Train 2A ND To A&B CL)
- 2ND-30A (Train 2A ND To Hot Leg Isol)
- 2ND-33 (A ND Hx Bypass).

CAUTION **Minimum ND System flow of 2000 GPM must be maintained anytime ND flow is discharging to all 4 cold legs.**

e. Slowly throttle open 2ND-34 (A&B ND Hx Bypass) to obtain ND flow of 2000 GPM or greater.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

f. Throttle the following valves as necessary to stabilize NC System temperature:

- 2ND-29 (A ND Hx Outlet)
- 2ND-34 (A&B ND Hx Bypass)
- 2KC-56A (KC To A ND Hx).
  - **IF** NC System temperature is greater than 200°F, **THEN** KC flow must be maintained greater than 2000 GPM.

g. **IF** desired, **THEN** establish letdown from the ND System **PER** OP/2/A/6200/01, CHEMICAL AND VOLUME CONTROL SYSTEM, Enclosure 4.1.

h. Return to step in effect in procedure.

_____ 8. To place "B" Train ND in service, perform the following:

a. Close or verify closed the following:

- 2ND-34 (A&B ND Hx Bypass)
- 2ND-33 (A ND Hx Bypass)
- 2ND-32 (A ND Hx To Letdown Hx)
- 2ND-18 (B ND Hx Bypass)
- 2ND-17 (B ND Hx To Letdown Hx)
- 2ND-14 (B ND Hx Outlet).

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

b. Throttle open 2KC-81B (KC To B ND Hx) to establish 2000 to 5000 GPM KC flow to "B" ND Hx. Limit KC flow to 4000 GPM per operating KC pump.

c. Start 2B ND Pump and ensure 2ND-67B (B ND Pump & B Hx Miniflow) opens.

d. Open the following valves:

- 2ND-18 (B ND Hx Bypass)
- 2NI-178B (Train 2B ND To C&D CL)
- 2ND-15B (Train 2B ND To Hot Leg Isol).

CAUTION **Minimum ND System flow of 2000 GPM must be maintained anytime ND flow is discharging to all 4 cold legs.**

e. Slowly throttle open 2ND-34 (A&B ND Hx Bypass) to obtain ND flow of 2000 GPM or greater.

f. Throttle the following valves as necessary to stabilize NC System temperature:

- 2ND-14 (B ND Hx Bypass)
- 2ND-34 (A&B ND Hx Bypass)
- 2KC-81B (KC To B ND Hx).
  - **IF** NC System temperature is greater than 200°F, **THEN** KC flow must be maintained greater than 2000 GPM.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

g. **IF** desired, **THEN** establish letdown from the ND System, **PER** OP/2/A/6200/01, CHEMICAL AND VOLUME CONTROL SYSTEM, Enclosure 4.1.

h. **RETURN TO** step in effect in procedure.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
_____ 1. Check the following HVAC annunciator alarm on train(s) with B/O signal – LIT: ♦ "VC/YC TRAIN A SAFETY ACTUATION" (OAD-11, G-1) ♦ "VC/YC TRAIN B SAFETY ACTUATION" (OAD-11,G-2).	On train(s) with B/O that has annunciator dark, depress VC/YC Safety Actuation "INITIATE" pushbutton.
_____ 2. Check the following VC equipment on train(s) with B/O signal – ON: ♦ "B TRAIN CONT RM OUTSIDE AIR PRESS FAN" ♦ "CONTROL ROOM AHU – B" ♦ "A TRAIN CONT RM OUTSIDE AIR PRESS FAN" ♦ "CONTROL ROOM AHU – A"	Start equipment.
_____ 3. Check train selected YC pump – ON.	Start pump.
_____ 4. Check "OPEN" lights on the following dampers – DARK: ♦ CRA-OAD-4 (CR Area Otsd Air Fans Damper) ♦ CRA-OAD-3 (CR Area Otsd Air Fans Damper).	Close dampers.
_____ 5. Check the following fans – OFF. ♦ "1 CRA OTSD AIR FAN" ♦ "2 CRA OTSD AIR FAN".	Stop fans.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
_____ 6. Check train selected Control Room Area Chiller - ON.	Perform the following: a. **IF** chiller off after 15 minute time delay, **THEN** start train selected chiller. b. **IF** train selected chiller will not start, **THEN** start opposite train chiller as follows: 1) Select the VC/YC Mode Select switch to the desired train. 2) Depress the "START" pushbutton for Control Room Area Chiller on desired train. 3) Stop the undesired train by selecting "OFF" with the VC/YC Mode Select switch. c. **IF** either train started, **THEN GO TO** step 7. d. **IF** neither train available, **THEN** perform the following: 1) Within 30 minutes of the loss of VC/YC perform the following: a) Dispatch IAE to perform the following: 1) Obtain the following keys from the IAE key locker: ♦ Key 19 ♦ Key 27 ♦ Key 28. 2) Open all cabinet doors on the following: ♦ 7300 Process Control Cabinets ♦ SSPS Cabinets. (RNO Continued On Next Page)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

b) Contact station management to evaluate opening control room doors to establish cooling:

- Auxiliary Building Doors
- Service Building Doors.

2) Contact station management to evaluate opening essential 4160 switchgear room doors to establish cooling:

- Auxiliary Building Doors
- Service Building doors.

3) **IF** neither train available due to loss of 4160 V power supply, **THEN** try to establish power source **PER** OP/0/A/6450/11 (Control Area Ventilation/Chilled Water System), Enclosure 4.5 (Transfer of A Train VC/YC Power Supply Between Units) or 4.6 (Transfer of B Train VC/YC Power Supply Between Units).

e. **IF** no single train of VC/YC can supply cooling, **THEN**:

1) Try cross-connecting trains **PER** OP/0/A/6450/11 (Control Area Ventilation/Chilled Water System), Enclosure 4.8 (Emergency Alignment and Operation for Cross-Connecting A&B Trains of VC/YC).

2) **IF** offsite power is available to either unit, **THEN** have station management evaluate performing AP/0/A/5500/39 (Control Room Hi Temperature).

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

_____ 7. Check the following VC equipment for train selected - ON:

- For A Train:
  - SSGR-AHU-1A (1ETA Supply)
  - SSGR-AHU-2A (2ETA Supply)
  - SSGR-AHU-1C (1ETB Supply)
  - SSGR-AHU-2C (2ETB Supply)
  - "CR AREA AHU-A"
  - "BATT ROOM EXH FAN A".

  OR

- For B Train:
  - SGR-AHU-1B (1ETB Supply)
  - SGR-AHU-2B (2ETA Supply)
  - SGR-AHU-1D (1ETB Supply)
  - SGR-AHU-2D (2ETB Supply)
  - "CR AREA AHU-B"
  - "BATT ROOM EXH FAN B"

Perform the following:

a. Start equipment.

b. **IF** switchgear room cooling is not available, **THEN** contact station management to evaluate opening essential 4160 switchgear room doors to establish cooling:
   - Auxiliary Building Doors
   - Turbine Building Doors.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

_____ 8. Ensure VA filter units remain in filter mode as follows:

a. Place the following switches in "TEST":

- "VA FILTER UNITS 1B TEST"
- "VA FILTER UNITS 1A TEST"
- "VA FILTER UNITS 2B TEST"
- "VA FILTER UNITS 2A TEST".

b. Ensure the following closed:

- 1ABF-D-3 (VA Filter Exh Bypass Dmpr Trn B)
- 1ABF-D-3 (VA Filter Exh Bypass Dmpr Trn A)
- 2ABF-D-3 (VA Filter Exh Bypass Dmpr Trn B)
- 2ABF-D-3 (VA Filter Exh Bypass Dmpr Trn A).

_____ 9. Restart the following EMF Sample Blowers as required:

- 2EMF-35, 36, 37 (Unit Vent Particulate, Gas, Iodine)
- 2EMF-42 (Fuel Bldg Ventilation)
- EMF-43A (Control Room Air Intake Loc A)
- EMF-41 (Aux Bldg Ventilation)
- 1EMF-43B (Control Room Air Intake Loc B).
- 2EMF-38, 39, 40 (Containment Par/Gas/Iod).

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

10. **WHEN** time and manpower allow, **THEN** dispatch operator to locally ensure VA System remains in proper alignment as follows:

NOTE Placing VA supply units and unfiltered exhaust fan switches in "OFF" position ensures fans remain off.

a. At 1RB-ECP-1 panel (767, PP-54) place the following switches in "OFF" position and verify fans - OFF:

- "A.B. UNFILTERED EXH FAN 1A"
- "A.B. UNFILTERED EXH FAN 1B"
- "A.B. SUPPLY UNIT 1A"
- "A.B. SUPPLY UNIT 1B".

b. At 2RB-ECP-1 panel (767, PP-58) place the following switches in "OFF" position and verify fans - OFF:

- "A.B. UNFILTERED EXH FAN 2A"
- "A.B. UNFILTERED EXH FAN 2B"
- "A.B. SUPPLY UNIT 2A"
- "A.B. SUPPLY UNIT 2B".

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

c. Ensure the following fans - ON:

- "A.B. FILTERED EXHAUST FAN - 1A" (panel location 767, MM-53)
- "A.B. FILTERED EXHAUST FAN - 1B" (panel location 767, PP-52)
- "2 A.B. FILTERED EXHAUST FAN 2A" (panel location 767, MM-59)
- "2 A.B. FILTERED EXHAUST FAN 2B" (panel location 767, PP-60).

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE This enclosure applies until CA no longer required.

_____ 1. Check VI header pressure – GREATER THAN 60 PSIG.

Perform the following:

a. Dispatch operator to monitor UST and CA storage tank level:

- UST level indication located at end of each UST, between USTs.
- CA storage tank level located on Unit 1 Turbine deck at freight elevator (1N–33).

b. **GO TO** Step 3.

_____ 2. Monitor CA suction sources:

- CA storage tank level
- UST level
- Hotwell level.

Perform the following:

a. Dispatch operator to monitor UST and CA storage tank level.

- UST level indication located at end of each UST, between USTs.
- CA storage tank level located on Unit 1 Turbine deck at freight elevator (1N–33).

CAUTION **Failure to isolate the CA storage tank or UST prior to emptying may result in air binding all running CA pumps.**

_____ 3. Use rate of level decrease in tanks to determine when action must be initiated to isolate tanks.

_____ 4. Prior to CA storage tank level going below 10%, close or dispatch operator to close 2CA–6 (CA Sup From CA Storage Tank) (service bldg, 739 + 13, U–28).

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
5. Prior to UST level going below 1 foot, dispatch operator to close 2CS-18 (CA Supply from UST) (Unit 2 turbine bldg 786 + 12, 2M-29 below UST).	**IF** 2CS-18 will not close, **THEN** dispatch operator to close 2CA-4 (CA Pump Suct From UST) (Unit 2 turbine bldg, 739 + 15, 2N-29).
6. Prior to emptying the UST, ensure vacuum is broken on the Hotwell.	
7. Check VI header pressure - GREATER THAN 60 PSIG.	**GO TO** Step 11.
8. Prior to hotwell level going below 0.5 feet, **THEN** dispatch operator to close 2CA-2 (CA Pump Suct From Hotwell) (Unit 2 turbine bldg, 739, 2H-25, condenser pit near Turbine Building Sump).	
9. Dispatch Chemistry to ensure YM Makeup Pump A or B - RUNNING.	
10. Initiate makeup as required to USTs from YM system.	

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

11. **WHEN** CA suction supply swaps to RN due to valid low CA suction pressure signal, **THEN** do the following:

    a. For 2A CA Pump:

    1) Verify the following valves - OPEN:
       - 2RN-69A (CA Assured Sup From Trn A RN)
       - 2CA-15A (A CA Pmp Sup Frm Trn A RN)
       - 2RN-70A (A D/G Hx Supply Isol).

       1) Open valves.

    2) **WHEN** the valves are open, **THEN** close 2CA-11A (A CA Pump Suction Isol).

    b. For 2B CA Pump:

    1) Verify the following valves - OPEN:
       - 2RN-162B (Sup Frm Trn B RN)
       - 2CA-18B (B CA Pump Sup Frm Trn B RN)
       - 2RN-171B (B D/G Hx Supply Isol).

       1) Open valves.

    2) **WHEN** the valves are open, **THEN** close 2CA-9B (B CA Pump Suction Isol).

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

c. For TD CA Pump #2:

1) **IF** valves have been aligned in Step a, **THEN** ensure 2CA-86A (TD CA Pmp Sup Frm Trn A RN) - OPEN.

2) **IF** valves have been aligned in Step b, **THEN** ensure 2CA-116B (TD CA Pmp Sup Frm Trn B RN) - OPEN.

3) **WHEN** step 1) **OR** step 2) has been completed, **THEN** close, or dispatch operator to locally close 2CA-7A (TD CA Pump Suction Isol).

_____ 12. **IF** all of the following conditions met, **THEN** isolated UST or CA storage tank may be realigned to CA pumps.

- **IF** required isolated by steps 4 and 5, **THEN** check both isolated prior to emptying.
- Tank level restored.
- CA suction from RN - ISOLATED.
- Unisolated tank levels are monitored and isolated as required by Steps 1-11.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
_____ 1. Check the following battery chargers – RUNNING. ♦ EVCA ♦ EVCB ♦ EVCC ♦ EVCD.	Dispatch an operator to align any Vital Instrument and Control Power chargers that are not running to Unit 1 **PER** OP/0/A/6350/01A, 125 VDC/120 VAC INSTRUMENT AND CONTROL POWER, Enclosure 4.19.
_____ 2. Check if loss of 6900V bus – HAS OCCURRED DURING THIS EVENT.	**RETURN TO** step in effect in body of procedure.
_____ 3. Check Unit 1 6900 busses – ENERGIZED.	**WHEN** offsite power restored to either unit, **THEN** re-energize Auxiliary Control Power battery chargers. **GO TO** Step 6.

NOTE Auxiliary Control Power battery chargers can be powered by:

- CXA: Powered by SMXQ which is fed by 2SLXH (normal) or 1SLXD (alternate). (CXA normally feeds bus DCA.)
- CXB: Powered by SMXW which is fed by 1SLXH (normal) or 2SLXF (alternate). (CXB normally feeds bus DCB.)
- CXS: Powered by SMXB which is fed by 1SLXB (normal) or 2SLXB (alternate). (CXS can feed bus DCA or DCB.)

_____ 4. Determine which battery chargers are aligned to DCA and DCB (OAC graphic or local).

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
_____ 5. Ensure battery chargers feeding DCA and DCB – RUNNING.	Ensure the following Unit 1 600V load center breakers are closed for any battery charger not running that is feeding DCA or DCB. ♦ For CXA: 1SLXD, 5C (MCC No. SMXQ Alternate Fdr) (located Service Bldg., 760). ♦ For CXB: 1SLXH, 5A (600V MCC SMXW Normal Fdr) (located Unit 1 Turbine Bldg., 760, 1L–24). ♦ For CXS: 1SLXB, 4D (600V MCC SMXB Normal Fdr) (located SB, 760). Start battery charger **PER** OP/0/A/6350/01B, 125 VDC – 240/120 VAC AUXILIARY CONTROL POWER, Enclosure 4.7 or 4.8.
_____ 6. Check if this enclosure was entered from Case I, LOSS OF NORMAL POWER TO BOTH 2ETA AND 2ETB.	**RETURN TO** step in effect in body of procedure.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

7. **WHEN** 90 minutes after the loss of offsite power have elapsed, **THEN** remove unnecessary loads on 250 VDC Auxiliary Power System as follows:

   a. Dispatch operator to open 2DP-1D (Reactor Bldg Deadlight Panel).

   b. Stop the "DC B/U VAP EXTRACTOR".

   c. Check both CF pumps – AT ZERO SPEED.

   d. Stop the following pumps:

      - 2A CF Pump Turb EBOP
      - 2B CF Pump Turb EBOP.

RETURN TO step in effect in body of procedure.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
_____ 1. Have Unit 1 RO check "1ETB Stdby Breaker" – OPEN.	**IF** desired, **THEN** place 1ETB on 1ATD **PER** OP/1/A/6350/05, AC ELECTRICAL OPERATION OTHER THAN NORMAL LINEUP, Enclosure 4.3. **IF** 1ETB power supply is not swapped, **THEN** return to step in effect in procedure.
_____ 2. Have Unit 1 RO check Unit 1 "SATB Feeder Breaker" – CLOSED.	**GO TO** step 4.
_____ 3. **GO TO** step 8.	
_____ 4. Open Unit 2 "SATB Feeder Breaker".	
_____ 5. Dispatch operator to locally check 2TB–4 (6900/4160V Transf. No. SATB) – BREAKER INSTALLED. a. Rack out breaker in 2TB–4 **PER** OP/0/A/6350/08, OPERATION OF STATION BREAKERS, Enclosure 4.3. b. Remove kirk–key from 2TB–4 and place key in 1TB–4 (6900/4160V Transf. No. SATB).	**GO TO** step 6.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE Actions to complete steps 6 - 8 should be initiated at the same time.

_____ 6. Dispatch operator to locally check 1TB-4 (6900/4160V Transf. No. SATB) - BREAKER INSTALLED.

Perform the following:

a. Rack out and remove any spare breaker in Unit 1 6900 switchgear room, except for normal or alternate incoming **PER** OP/0/A/6350/08, OPERATION OF STATION BREAKERS, Enclosure 4.3.

b. Place this breaker in 1TB-4 and rack in **PER** OP/0/A/6350/08, OPERATION OF STATION BREAKERS, Enclosure 4.3. Do not close this breaker.

GO TO step 8.

_____ 7. Rack in breaker in 1TB-4 **PER** OP/0/A/6350/08, OPERATION OF STATION BREAKERS, Enclosure 4.3. Do not close this breaker.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

_____ 8. Dispatch operator with key #338 to 2ETB room to align 2ETB to SATB:

a. Using key #338, select "TEST/BLOCK" on "2ETB DEGRADED VOLTAGE" switch located on TB-1690 (south wall 2ETB room, AA-63).

b. Open 2ETB-16 (Incoming Breaker Fed From Norm Transf No. 2ATD).

c. Rack out and remove breaker from 2ETB-16 **PER** OP/0/A/6350/08, OPERATION OF STATION BREAKERS, Enclosure 4.2.

d. Remove kirk-key from 2ETB-16 and insert this kirk-key in 2ETB-15 (Incoming Breaker Fed From Stby Transf. No. SATB).

e. Check - SECOND KIRK-KEY INSERTED IN 2ETB-15.

e. Remove kirk-key from 1ETB-2 (Incoming Breaker Fed From Stby Transf. No. SATB) and insert in 2ETB-15.

f. Place breaker removed from 2ETB-16 into 2ETB-15 cubicle and rack in **PER** OP/0/A/6350/08, OPERATION OF STATION BREAKERS, Enclosure 4.2. Do not close this breaker.

_____ 9. Ensure operators are away from breakers prior to closing in next steps.

_____ 10. Have Unit 1 RO check Unit 1 "SATB Feeder Breaker" - CLOSED.

Have Unit 1 RO close Unit 1 "SATB Feeder Breaker".

_____ 11. Hold "Reset" on "2B D/G Load Seq" while completing steps 12-14.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

_____ 12. Do the following from the Control Room:

a. Open the following:

- 2ELXB Fdr Breaker
- 2ELXD Fdr Breaker
- 2ELXF Fdr Breaker.

b. Open 2B CA Pump breaker.

b. Depress 2B CA Pump "Start" and "Stop" at the same time to open the breaker.

c. Open remaining pump breakers on 2ETB:

- NV Pump 2B
- ND Pump 2B
- NI Pump 2B
- KC Pump 2B1
- KC Pump 2B2
- RN Pump 2B
- KF Pump 2B
- NS Pump 2B.

_____ 13. Check "2B D/G Mode Select" switch – IN "C/R" POSITION.

Place "2B D/G Mode Select" switch to "C/R" position.

_____ 14. Close "2ETB Stdby Breaker" and verify bus energized.

_____ 15. Release "Reset" on "2B D/G Load Seq".

_____ 16. Place "2B D/G Mode Select" to "Auto".

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

_____ 17. Load bus as necessary **PER** Enclosure 2, Table 2.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
_____ 1. Have Unit 1 RO check "1ETA Stdby Breaker" - OPEN.	**IF** desired, **THEN** place 1ETA on 1ATC **PER** OP/1/A/6350/05, AC ELECTRICAL OPERATION OTHER THAN NORMAL LINEUP, Enclosure 4.2. **IF** 1ETA power supply is not swapped, **THEN** return to step in effect in procedure.
_____ 2. Have Unit 1 RO check Unit 1 "SATA Feeder Breaker" - CLOSED.	**GO TO** step 4.
_____ 3. **GO TO** step 8.	
_____ 4. Open Unit 2 "SATA Feeder Breaker".	
_____ 5. Dispatch operator to locally check 2TC-4 (6900/4160V Transf. No. SATA) - BREAKER INSTALLED. a. Rack out breaker in 2TC-4 **PER** OP/0/A/6350/08, OPERATION OF STATION BREAKERS, Enclosure 4.3. b. Remove kirk-key from 2TC-4 and place key in 1TC-4 (6900/4160V Transf. No. SATA).	**GO TO** step 6.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE Actions to complete steps 6 – 8 should be initiated at the same time.

_____ 6. Dispatch operator to locally check 1TC–4 (6900/4160V Transf. No. SATA) – BREAKER INSTALLED.

Perform the following:

a. Rack out and remove any spare breaker in Unit 1 6900 switchgear room, except for normal or alternate incoming, **PER** OP/0/A/6350/08, OPERATION OF STATION BREAKERS, Enclosure 4.3.

b. Place this breaker in 1TC–4 and rack in **PER** OP/0/A/6350/08, OPERATION OF STATION BREAKERS, Enclosure 4.3. Do not close this breaker.

GO TO step 8.

_____ 7. Rack in breaker in 1TC–4 **PER** OP/0/A/6350/08, OPERATION OF STATION BREAKERS, Enclosure 4.3. Do not close this breaker.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

_____ 8. Dispatch operator with key #338 to 2ETA room to align 2ETA to SATA:

a. Using key #338, select "TEST/BLOCK" on "2ETA DEGRADED VOLTAGE" switch located on TB-1689 (south wall 2ETA room, AA-63).

b. Open 2ETA-16 (Incoming Breaker Fed From Norm Transf. No. 2ATC).

c. Rack out and remove breaker from 2ETA-16 **PER** OP/0/A/6350/08, OPERATION OF STATION BREAKERS, Enclosure 4.2.

d. Remove kirk-key from 2ETA-16 and insert this kirk-key in 2ETA-15 (Incoming Breaker Fed From Stby Transf. No. SATA).

e. Check - SECOND KIRK-KEY INSERTED IN 2ETA-15.

e. Remove kirk-key from 1ETA-2 (Incoming Breaker Fed From Stby Transf. No. SATA) and insert in 2ETA-15.

f. Place breaker removed from 2ETA-16 into 2ETA-15 cubicle and rack in **PER** OP/0/A/6350/08, OPERATION OF STATION BREAKERS, Enclosure 4.2. Do not close this breaker.

_____ 9. Ensure operators are away from breakers prior to closing in next steps.

_____ 10. Have Unit 1 RO check Unit 1 "SATA Feeder Breaker" - CLOSED.

Have Unit 1 RO close Unit 1 "SATA Feeder Breaker".

_____ 11. Hold "Reset" on "2A D/G Load Seq" while completing steps 12-14.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
_____ 12. Do the following from the Control Room:	
a. Open the following: ♦ 2ELXA Fdr Breaker ♦ 2ELXC Fdr Breaker ♦ 2ELXE Fdr Breaker.	
b. Open 2A CA Pump breaker.	b. Depress 2A CA Pump "Start" and "Stop" at the same time to open the breaker.
c. Open remaining pump breakers on 2ETA: ♦ NV Pump 2A ♦ ND Pump 2A ♦ NI Pump 2A ♦ KC Pump 2A1 ♦ KC Pump 2A2 ♦ RN Pump 2A ♦ KF Pump 2A ♦ NS Pump 2A.	
_____ 13. Check "2A D/G Mode Select" switch - IN "C/R" POSITION.	Place "2A D/G Mode Select" switch to "C/R" position.
_____ 14. Close "2ETA Stdby Breaker" and verify bus energized.	
_____ 15. Release "Reset" on "2A D/G Load Seq".	
_____ 16. Place "2A D/G Mode Select" to "Auto".	

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

_____ 17. Load bus as necessary **PER** Enclosure 2, Table 1.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
_____ 1. Have Unit 1 RO check "1ETB Stdby Breaker" – OPEN.	**IF** desired, **THEN** place 1ETB on 1ATD **PER** OP/1/A/6350/05, AC ELECTRICAL OPERATION OTHER THAN NORMAL LINEUP, Enclosure 4.3. **IF** 1ETB power supply is not swapped, **THEN** return to step in effect in procedure.
_____ 2. Check Unit 2 "SATB Feeder Breaker" – CLOSED.	**GO TO** step 4.
_____ 3. **GO TO** step 8.	
_____ 4. Have Unit 1 RO open Unit 1 "SATB Feeder Breaker".	
_____ 5. Dispatch operator to locally check 1TB–4 (6900/4160V Transf. No. SATB) – BREAKER INSTALLED. a. Rack out breaker in 1TB–4 **PER** OP/0/A/6350/08, OPERATION OF STATION BREAKERS, Enclosure 4.3. b. Insert control power fuses in 1TB–4. c. Remove kirk–key from 1TB–4 and place key in 2TB–4 (6900/4160V Transf. No. SATB).	**GO TO** step 6.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE Actions to complete steps 6 – 8 should be initiated at the same time.

_____ 6. Dispatch operator to locally check 2TB–4 (6900/4160V Transf. No. SATB) – BREAKER INSTALLED.

Perform the following:

a. Rack out and remove any spare breaker in Unit 2 6900 switchgear room, except for normal or alternate incoming, **PER** OP/0/A/6350/08, OPERATION OF STATION BREAKERS, Enclosure 4.3.

b. Place this breaker in 2TB–4 and rack in **PER** OP/0/A/6350/08, OPERATION OF STATION BREAKERS, Enclosure 4.3. Do not close this breaker.

GO TO step 8.

_____ 7. Rack in breaker 2TB–4 **PER** OP/0/A/6350/08, OPERATION OF STATION BREAKERS, Enclosure 4.3. Do not close this breaker.

_____ 8. Dispatch operator with key #338 to 2ETB room to align 2ETB to SATB:

a. Using key #338, select "TEST/BLOCK" on "2ETB DEGRADED VOLTAGE" switch located on TB–1690 (south wall 2ETB room, AA–63).

b. Open 2ETB–16 (Incoming Breaker Fed From Norm. Transf. No. 2ATD).

c. Rack out and remove breaker from 2ETB–16 **PER** OP/0/A/6350/08, OPERATION OF STATION BREAKERS, Enclosure 4.2.

d. Remove kirk–key from 2ETB–16 and insert this kirk–key in 2ETB–15 (Incoming Breaker Fed From Stby Transf. No. SATB).

e. Check – SECOND KIRK–KEY INSERTED IN 2ETB–15.

e. Remove kirk–key from 1ETB–2, (Incoming Breaker Fed From Stby Transf. No. SATB) and insert in 2ETB–15.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

f. Place breaker removed from 2ETB-16 into 2ETB-15 cubicle and rack in **PER** OP/0/A/6350/08, OPERATION OF STATION BREAKERS, Enclosure 4.2. Do not close this breaker.

_____ 9. Ensure operators are away from breakers prior to closing in next steps.

_____ 10. Check Unit 2 "SATB Feeder Breaker" - CLOSED. — Close Unit 2 "SATB Feeder Breaker".

_____ 11. Hold "Reset" on "2B D/G Load Seq" while completing steps 12-14.

_____ 12. Do the following from the Control Room:

a. Open the following:

- 2ELXB Fdr Breaker
- 2ELXD Fdr Breaker
- 2ELXF Fdr Breaker.

b. Open 2B CA Pump breaker. — b. Depress 2B CA Pump "Start" and "Stop" at the same time to open the breaker.

c. Open remaining pump breakers on 2ETB:

- NV Pump 2B
- ND Pump 2B
- NI Pump 2B
- KC Pump 2B1
- KC Pump 2B2
- RN Pump 2B
- KF Pump 2B
- NS Pump 2B.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
_____ 13. Check "2B D/G Mode Select" switch – IN "C/R" POSITION.	Place "2B D/G Mode Select" switch to "C/R" position.
_____ 14. Close "2ETB Stdby Breaker" and verify bus energized.	
_____ 15. Release "Reset" on "2B D/G Load Seq".	
_____ 16. Place "2B D/G Mode Select" to "Auto".	
_____ 17. Load bus as necessary **PER** Enclosure 2, Table 2.	

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
_____ 1. Have Unit 1 RO check "1ETA Stdby Breaker" - OPEN.	**IF** desired, **THEN** place 1ETA on 1ATC **PER** OP/1/A/6350/05, AC ELECTRICAL OPERATION OTHER THAN NORMAL LINEUP, Enclosure 4.2. **IF** 1ETA power supply is not swapped, **THEN** return to step in effect in procedure.
_____ 2. Check Unit 2 "SATA Feeder Breaker" - CLOSED.	**GO TO** step 4.
_____ 3. **GO TO** step 8.	
_____ 4. Have Unit 1 RO open Unit 1 "SATA Feeder Breaker".	
_____ 5. Dispatch operator to locally check 1TC-4 (6900\4160V Transf. No. SATA) - BREAKER INSTALLED. a. Rack out breaker in 1TC-4 **PER** OP/0/A/6350/08, OPERATION OF STATION BREAKERS, Enclosure 4.3. b. Insert control power fuses in 1TC-4. c. Remove kirk-key from 1TC-4 and place key in 2TC-4 (6900/4160V Transf. No. SATA).	**GO TO** step 6.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE Actions to complete steps 6 – 8 should be initiated at the same time.

_____	6. Dispatch operator to locally check 2TC–4 (6900/4160V Transf. No. SATA) – BREAKER INSTALLED.	Perform the following: a. Rack out and remove any spare breaker in Unit 2 6900 switchgear room, except for normal or alternate incoming, **PER** OP/0/A/6350/08, OPERATION OF STATION BREAKERS, Enclosure 4.3. b. Place this breaker in 2TC–4 and rack in PER OP/0/A/6350/08, OPERATION OF STATION BREAKERS, Enclosure 4.3. Do not close this breaker. **GO TO** step 8.
_____	7. Rack in breaker 2TC–4 **PER** OP/0/A/6350/08, OPERATION OF STATION BREAKERS, Enclosure 4.3. Do not close this breaker.	

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
_____ 8. Dispatch operator with key #338 to 2ETA room to align 2ETA to SATA:	
a. Using key #338, select "TEST/BLOCK" on "2ETA DEGRADED VOLTAGE" switch located on TB-1689 (south wall 2ETA room, AA-63).	
b. Open 2ETA-16 (Incoming Breaker Fed From Norm. Transf. No. 2ATC).	
c. Rackout and remove breaker from 2ETA-16 **PER** OP/0/A/6350/08, OPERATION OF STATION BREAKERS, Enclosure 4.2.	
d. Remove kirk-key from 2ETA-16 and insert this kirk-key in 2ETA-15 (Incoming Breaker Fed From Stby Transf. No. SATA).	
e. Check - SECOND KIRK-KEY INSERTED IN 2ETA-15.	e. Remove kirk-key from 1ETA-2 (Incoming Breaker Fed From Stby Transf. No. SATA) and insert in 2ETA-15.
f. Place breaker removed from 2ETA-16 into 2ETA-15 cubicle and rack in **PER** OP/0/A/6350/08, OPERATION OF STATION BREAKERS, Enclosure 4.2. Do not close this breaker.	
_____ 9. Ensure operators are away from breakers prior to closing in next steps.	
_____ 10. Check Unit 2 "SATA Feeder Breaker" - CLOSED.	Close Unit 2 "SATA Feeder Breaker".
_____ 11. Hold "Reset" on "2A D/G Load Seq" while completing steps 12-14.	

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

_____ 12. Do the following from the Control Room:

a. Open the following:

- 2ELXA Fdr Breaker
- 2ELXC Fdr Breaker
- 2ELXE Fdr Breaker.

b. Open 2A CA Pump breaker.

b. Depress 2A CA Pump "Start" and "Stop" at the same time to open the breaker.

c. Open remaining pump breakers on 2ETA:

- NV Pump 2A
- ND Pump 2A
- NI Pump 2A
- KC Pump 2A1
- KC Pump 2A2
- RN Pump 2A
- KF Pump 2A
- NS Pump 2A.

_____ 13. Check "2A D/G Mode Select" switch – IN "C/R" POSITION.

Place "2A D/G Mode Select" switch to "C/R" position.

_____ 14. Close "2ETA Stdby Breaker" and verify bus energized.

_____ 15. Release "Reset" on "2A D/G Load Seq".

_____ 16. Place "2A D/G Mode Select" to "Auto".

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

_____ 17. Load bus as necessary **PER** Enclosure 2, Table 1.

_____ 1. **IF** it is necessary to run RF Pump A using this enclosure, **THEN** ensure D/G load is less than 3700 KW prior to starting RF Pump.

_____ 2. Ensure 2ETB - ENERGIZED.

_____ 3. Ensure "2B D/G Load Seq" "Reset" light - LIT.

_____ 4. Dispatch operator to locally open all breakers on 6900V bus 2TB and remove control power fuses from all breakers except breaker 4 (SATB Feeder Breaker) and breaker 8 (RF Pump A).

_____ 5. Notify IAE to locally jumper the Sync Check relay contact in the 2ETB Standby Breaker close circuit. (Located in 2ATC-24 H-26 to H-81). (Refer to MCEE-215.00.33-02).

_____ 6. To backcharge SATB transformer close "2ETB Stdby Breaker".

_____ 7. To energize 2TB bus, close "SATB Feeder Breaker".

_____ 8. RF Pump A can now be operated as necessary from essential power supply. No other 6900V bus loads should be closed in on 2TB.

_____ 9. **WHEN** Unit 2 offsite power is available, **THEN** perform the following:

a. Open "2ETB Stdby Breaker".

b. Open "SATB Feeder Breaker".

c. Notify IAE to locally remove jumper placed in step 5.

d. Dispatch operator to locally replace all control power fuses on 2TB except for RC Pump 2B.

_____ 1. **IF** it is desired to restore power to any of the following load centers, **THEN** dispatch an operator to locally open all breakers on the affected load center:

- 2LXA
- 2LXB
- 2LXC
- 2LXD
- 2LXE
- 2LXF
- 2LXG
- 2SLXA
- 2SLXB
- 2SLXC
- 2SLXD
- 2SLXF
- 2SLXG
- 2SLXH.

_____ 2. **IF** desired, **THEN** dispatch an operator to locally close the following breakers:

- 2TA-9 (6900/600 V Transf No. 2LXD)
- 2TA-11 (600 V Trans No. 2SLXG)
- 2TA-12 (6900/600 V Transf No. 2SLXD)
- 2TB-1 (6900/600 V Transf No. 2LXB)
- 2TB-7 (6900/600 V Transf No. 2SLXB)
- 2TB-9 (6900/600 V Transf No. 2LXE)
- 2TB-13 (6900/600 V Transf No. 2SLXF)
- 2TC-1 (6900/600 V Transf No. 2LXA)
- 2TC-9 (6900/600 V Transf No. 2SLXC)
- 2TC-12 (6900/600 V Transf No. 2LXF)
- 2TD-1 (6900/600 V Transf No. 2LXC)
- 2TD-8 (6900/600 V Transf No. 2SLXH)
- 2TD-9 (6900/600 V Transf No. 2SLXA)
- 2TD-12 (6900/600 V Transf No. 2LXG).

_____ 3. Place the "Brg Oil Pmp/GSOB Pmp" control switch to "Stop".

___ 4. Dispatch an operator to locally perform the following on GH system control panel (T.B. basement - column 2D-22):

- Place "Stator Water Pump #1 Motor Control" switch to "Pull to Lockout" position.
- Place "Stator Water Pump #2 Motor Control" switch to "Pull to Lockout" position.

_____ 5. Dispatch an operator to locally perform the following on H_2 seal oil control panel (Turbine bldg – 760 – column 2F–23):

- Place "Air Side" seal oil pump control to "Off".
- Place "H_2 Side" seal oil pump control to "Off".

_____ 6. **IF** desired, **THEN** energize load centers by closing the following breakers:

- 2LXA–4B (Incoming Bkr Fed From 6900/600V Transf. No. 2LXA)
- 2LXB–4B (Incoming Bkr Fed From 6900/600V Transf. No. 2LXB)
- 2LXC–4B (Incoming Bkr Fed From 6900/600V Transf. No. 2LXC)
- 2LXD–4B (Incoming Bkr Fed From 6900/600V Transf. No. 2LXD)
- 2LXE–4B (Incoming Bkr Fed From 6900/600V Transf. No. 2LXE)
- 2LXF–4B (Incoming Bkr Fed From 6900/600V Transf. No. 2LXF)
- 2LXG–4B (Incoming Bkr Fed From 6900/600V Transf. No. 2LXG)
- 2SLXA–4B (Incoming Bkr Fed From 6900/600V Transf. No. 2SLXA)
- 2SLXB–4B (Incoming Bkr Fed From 6900/600V Transf. No. 2SLXB)
- 2SLXC–4B (Incoming Bkr Fed From 6900/600V Transf. No. 2SLXC)
- 2SLXD–4B (Incoming Bkr Fed From 6900/600V Trans. No. 2SLXD)
- 2SLXF–4B (Incoming Bkr Fed From 6900/600V Transf 2SLXF)
- 2SLXG–4B (Incoming Bkr Fed From 6900/600V Trans No. 2SLXG)
- 2SLXH–4B (Incoming Bkr Fed From 6900/600V Trans No. 2SLXH).
- 2SLXI–4B (Incoming Fdr Transformer No. 2SLXI).

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
_____ 1. Check the following motor control centers – ENERGIZED FROM UNIT 2. ♦ SMXD normal feeder – 2SLXC–5A alternate – 1SLXD–5B ♦ SMXI normal feeder – 2SLXA–4D alternate – 1SLXA–5B ♦ SMXJ normal feeder – 2SLXF–4D alternate – 1SLXB–5A ♦ SMXK normal feeder – 2SLXF–5B alternate – 1SLXF–5A ♦ SMXL normal feeder – 2SLXB–5A alternate – 1SLXA–5C ♦ SMXM normal feeder – 2SLXB–4D alternate – 1SLXB–5B ♦ SMXO normal feeder – 2SLXH–4C alternate – 1SLXC–5C ♦ SMXP normal feeder – 2SLXI–4C alternate – 1SLXF–4D ♦ SMXQ normal feeder – 2SLXH–5A alternate – 1SLXD–5C ♦ SMXR normal feeder – 2SLXI–4D alternate – 1SLXC–5A ♦ SMXV normal feeder – 2SLXD–4D alternate – 1SLXC–5B	**IF** desired, **THEN** swap power supply to Unit 2, **PER** OP/2/A/6350/05, AC ELECTRICAL OPERATION OTHER THAN NORMAL LINEUP, Enclosure 4.8.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

- SMXY
  normal feeder – 2SLXG-5A
  alternate – 1SLXB-5C
- SMXZ
  normal feeder – 2SLXD-5A
  alternate – 1SLXD-5D.

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CERTIFICATION OF ENGINEERING CALCULATION

STATION AND UNIT NUMBER: McGuire Units 1 and 2

TITLE OF CALCULATION: EDG Past Operability Due To Turbocharger Failure (PIP 2M95-1225)

CALCULATION NUMBER: MCC-1301.00-00-0004

ORIGINALLY CONSISTING OF:

PAGES 1 THROUGH 11

TOTAL ATTACHMENTS 12 TOTAL MICROFICHE ATTACHMENTS N/A

TOTAL VOLUMES 1 TYPE I CALCULATION/ANALYSIS? YES [ ] NO [X]

TYPE I REVIEW FREQUENCY N/A

These engineering calculations cover QA Condition 1 items. In accordance with established procedures, the quality has been assured and I certify that the above calculation has been originated, checked or approved as noted below:

ORIGINATED BY [signature] DATE 7/26/95

CHECKED BY Rodney M. Roberts DATE 7/26/95

APRROVED BY Bruce Travis DATE 7/26/95

ISSUED TO TECHNICAL SERVICES DIVISION _____ DATE _____

RECEIVED BY TECHNICAL SERVICES DIVISION _____ DATE _____

MICROFICHE ATTACHMENT LIST: [ ] Yes [X] No See Form 101.4

REV. NO.	Calculation Pages (Vol)			Attachments (Vol)			Volumes		Orig Date	Chkd Date	Appr Date	Issued Rec'd
	Revised	Deleted	Added	Revised	Deleted	Added	Deleted	Added				

Form 101.2 Revision 1
28164 (R9-89)

File/Calculation No. MCC-1301.01-00-0004

REVISION DOCUMENTATION SHEET

Revision Number	Review Frequency Changed Yes/No	Revision Description
0	**No**	**Original issue**

A) Statement of Problem:
The McGuire Emergency Diesel Generators (EDGs) use ABB VTR-500 turbochargers to boost intake air manifold pressure, which in turn increases engine load rating. New turbochargers with a design flaw were installed on Unit 1 EDGs during 1 EOC9 (September 94) and on Unit 2 EDGs during 2 EOC 9 (December 94). This design flaw was discovered following two identical compressor blade failures on 6/12/95 (2A EDG) and 6/27/95 (2B EDG). The flaw was an addition of 17 jet assist nozzles in the compressor wall insert, which causes compressor blade resonance at EDG loads between 3700 and 4200 KW.
This calculation determines Past Operability for the McGuire EDGs.

B) Relation to QA Condition:
This calculation affects the McGuire EDGs, which are QA Condition 1.

C) Design Method Used:
This calculation compares various sources for EDG LOOP and LOCA loading requirements.

D) Applicable Codes and Standards:
1) NRC Regulatory Guide 1.9
2) 10 CFR 50.63, "Loss of all Alternating Current Power"
3) 10 CFR 50 Appendix A, General Design Criteria 17 "Electric Power Systems" and Criteria 18 "Inspection and Testing of Electric Power Systems"

E) Identification of Design Inputs:
1) EDG System Function

The starting capability of the diesel in eleven seconds or less is required to ensure that the diesel generator can supply power to help mitigate the consequences of the following design basis events.

1. Steam system piping failure accident with a LOOP.
2. Loss of normal electric power to the station auxiliaries.
3. Loss of normal feedwater flow with a LOOP.
4. Feedwater system pipe break with a LOOP.
5. Safety injection actuation coupled with or without a LOOP.

2) Performance Requirements

Per Reference (1), Section 8.3.1.1.7 "Standby Power Supplies": Each diesel-electric generating unit is rated for continuous operation at 4000 kW with added capacity to operate at 4400 kW for a period of two out of every twenty-four hours without adversely affecting the life of the unit. The design basis accident load level for each of the redundant trains does not exceed the 4000 kW continuous rating of its diesel-electric generating unit. Therefore the FSAR does not require the EDGs to operate at 4000 KW, but does require them to accept the loads necessary to cope with a LOOP/LOCA design basis event.

3) Design Conditions

Each EDG unit is rated at 4000kW, 0.8 PF, 4160 Volts.

4) Operational Requirements

Upon a LOOP signal, the diesel shall start from ambient condition and accelerate to at least 488 rpm in less than or equal to 11 seconds. The generator voltage and frequency shall be at least 4160 volts and 57 Hertz within 11 seconds after the start signal.

Upon the auto-start signal for LOOP, within 11 seconds the emergency busses shall be energized with permanently connected loads. After energization, the steady-state voltage and frequency of the emergency busses shall be maintained at 4160 ± 420 volts and 60 ± 1.2 Hertz. If a LOOP occurs at any time during safety injection, the diesel generators are available to supply power for essential loads.

5) Separation Requirements

ELECTRICAL SEPARATION : Each diesel generator and its support and control equipment are located in a separate room in the diesel building. Complete electrical separation between diesels 1A, 1B, 2A, and 2B shall be maintained. Each diesel has its own control and instrumentation systems, with no piece of equipment supplying more than one diesel generator. Also, separate power distribution systems are provided for each diesel.

MECHANICAL SEPARATION: All mechanical components of the diesels shall be specific to only one diesel generator in order to meet the single-failure criteria. Also, each of the diesel generator support systems (KD, LD, FD, etc.) shall be specifically dedicated to one diesel generator.

6) Testing Requirements

Per Reference (2) Surveillance 4.8.1.1.2(a), operability of the McGuire EDGs is demonstrated at least once per 31 days by "verifying the diesel starts from ambient condition and accelerates to at least 488 rpm in less than or equal to 11 seconds. The generator voltage and frequency shall be at lest 4160 volts and 57 Hz within 11 seconds after the start signal." Additionally, the generator is loaded "to greater than or equal to 3000 KW in less than or equal to 60 seconds, and to 4000 KW within 10 minutes and operates for at least 60 minutes". This testing is performed in accordance with operating procedures PT/1/A/4350/02A and /02B for Unit 1 and per PT/2/A/4350/02A and /02B for Unit 2.

F) Identification of FSAR Criteria Bearing on this Calculation:

1) McGuire FSAR Section 8.3.1.1.7, "Standby Power Supplies"
2) McGuire FSAR Table 8-1, "Maximum Loads to be Supplied from One of the Redundant Essential Auxiliary Power System"
3) McGuire FSAR Section 15.6.5 "Loss of Coolant Accidents"

G) Assumptions:

As stated in the body of this calculation.

H) References:

1) McGuire Nuclear Station Final Safety Analysis Report (FSAR), Updated 10/5/92
2) McGuire Tech Specs
3) MCC-1381.05-00-0187 "Summary of Analysis of Current Diesel Generator Loads"
4) MCC-1381.05-00-0240 "Analysis of Diesel Generator System Under Dynamic Loading Conditions Using the CYME Program"
5) ESF Testing per PT/1/A/4200/9A and PT/2/A/4200/9A during 1 and 2 EOC9 refueling outages
6) McGuire Emergency Procedure EP/1/A/5000/E-1 (Unit 1) and EP/2/A/5000/E-1 (Unit 2)
7) DBD for ND System, MCS-1561.ND-00-0001
8) DBD for NI System, MCS-1562.NI-00-0001
9) DBD for EQC System, MCS-120.00-EQC-0001
10) MCM-1301.00-0040 EDG Exciter Connection Diagram
11) MCM-1301.00-0093 EDG Auxiliaries Manual
12) DBD for KF System, MCS-1570.KF-00-0001
13) DBD for VX System, MCS-1557.VX-00-0001
14) DBD for VC/YC System , MCS-1578.VC-00-0001
15) MCM-1201.05-0215, Aux. Feedwater Pump Performance Curve

I) Evaluation:

Per FSAR Section 8.3.1.1.a, the McGuire EDGs are rated at 4000 KW, but full load capacity is not required. FSAR Table 8-1 provides conservative load requirements and load sequencer grouping for all loads required in response to a LOOP / LOCA event. Further calculations, special tests, and yearly ESF tests have been performed to more accurately predict diesel loading during LOOP and/or LOCA events, with resulting loads less than the FSAR Table 8-1 requirements. Additionally, some conservative estimates used in these later calculations regarding timing of sequencer loading may be reevaluated based on actual plant operation.

Turbocharger Failure Root Cause

The preliminary root cause for these failures is a design flaw resulting from an inadequate manufacturer's engineering review of a design change to the compressor wall insert. This design change resulted in 17 air assist holes through the wall insert establishing a fatigue forcing function on the compressor blades at a frequency 17 times the rotational speed of the turbo.

Acoustic test data was taken on all blades from the rotors removed from EDG 1A and 1B and partial testing was performed on rotor 2B. The frequency response for each blade was recorded between 0 and 5000 Hz, with the results shown in Attachment 2. Each blade showed a large natural frequency peak between 3675 and 3800 Hz, as summarized below:

TABLE I-3

Blade Number	1A - Blade Frequency	1B - Blade Frequency	2B - Blade Frequency
1	3775	3738	3750
2	3762	3800	3750
3	3750	3725	3700
4	3725	3738	3675
5	3712	3763	
6	3725	3763	
7	3725	3763	
8	3725	3763	
9	3738	3775	
10	3738	3775	3675
11	3738	3775	
12	3750	3775	
13	3688	3750	
14	3700	3750	3675
15	3712	3725	
16	3725	3725	
17	3725	3725	
18	3700	3738	
19	3700	3725	3675
20	3750	3725	
Average	3728	3751	3700
Maximum	3775	3800	3750
Minimum	3688	3725	3675

Therefore the natural frequency range of the compressor blades is between 3675 and 3800 HZ. This blade natural frequency range (where resonance may occur) can be converted to turbocharger speed (RPM) as follows:

$$\text{Maximum Natural Frequency} = \frac{(3800 Hz)\left(60\,^{sec}/_{min}\right)}{\left(17\,^{cycles}/_{rev}\right)} = \mathbf{13{,}410\ RPM}$$

$$\text{Minimum Natural Frequency} = \frac{(3675 Hz)\left(60\,^{sec}/_{min}\right)}{\left(17\,^{cycles}/_{rev}\right)} = \mathbf{12{,}970\ RPM}$$

Chart I-1

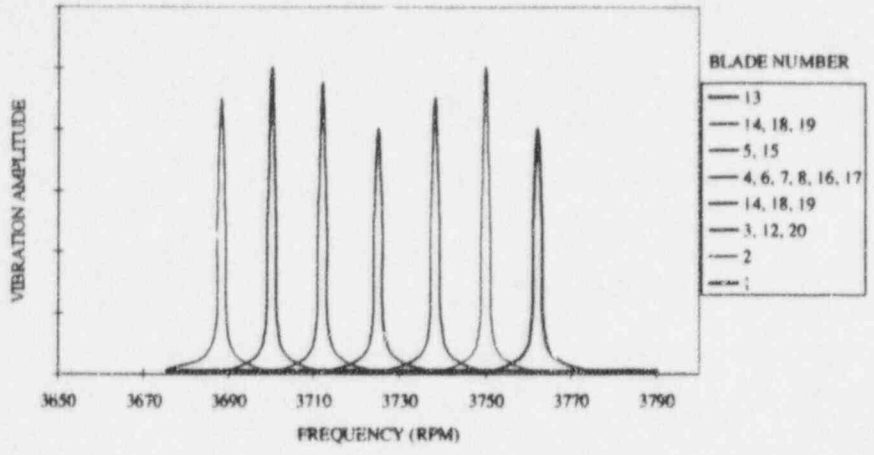


Chart I-1 is a plot of the natural frequencies for all blades of the EDG 1A compressor. Measured resonance induced vibration increases dramatically at these natural frequencies. These resonance vibration peaks are narrow in width, with induced vibration rapidly decreasing above or below the natural frequency. Since operation at frequencies between these peaks does not cause significant blade vibration, safe operation is possible within the 3675 to 3800 Hz range. This accounts for the lack of failures on Unit 1 even though the 1A and 1B EDGs were operated within the 3675 to 3800 Hz range.

Attachment 1 plots turbocharger speed versus load for data taken from all EDGs. Turbo speed was measured using a calibrated strobe light tachometer (accuracy +/- 20 RPM) and EDG generator load was obtained from the EDG control panel KW meter.

Since turbocharger operating speed is within the 12,970 to 13,410 RPM range with surveillance testing loads of 4000 to 4200 KW, the 17 hole air assist may cause the compressor blades to operated at their natural frequency during normal testing conditions. However, if expected turbocharger speed during actual LOOP/LOCA EDG loading is not within this resonance speed range, then the compressor blades would not be exposed to further resonance fatigue loading during an actual LOOP/LOCA event.

Failure Analysis Associates has compiled a report (Attachment 8) concerning this failure, dated July 20, 1995, which concurs with the root cause associated with the 17 hole air assist design. They further conclude based on aluminum having a finite fatigue life, that an undetectable crack would grow to failure in under 8 minutes at resonance conditions (and more likely under 4 minutes). Attachment 12 provides actual loads and times at 5 minute intervals (as obtained from the OAC) for the EDG 2A and 2B failure runs on 6/12/95 and 6/27/95. This data shows EDG 2A operated above 4000 KW for at least 40 minutes and EDG 2B operated above 4000 KW for at least 15 minutes. Since the turbocharger did not fail within 8 minutes of reaching the blade resonance range, it may be concluded no crack initiation had begun at the start of the test runs during which failure occurred. The compressor impeller blade cracks for each Unit 2 EDG initiated and grew to failure during their last surveillance test run.

Per Attachment 1, diesel operation at loads below approximately 3700 KW would have allowed safe turbocharger operation, even with the 17 hole compressor wall insert. The EDGs can be determined past operable if actual loading is acceptably less than 3700 KW.

LOCA Total EDG Load Information:
The following sources of information contain differing values for required Diesel Generator Loads during a Large Break LOCA:
1) MCC-1381.05-00-0240 "Analysis of Diesel Generator System Under Dynamic Loading Conditions Using the CYME Program" for 2A EDG: This calculation for dynamic diesel loading, with no load transformer and exciter losses, results in a steady state load of **3741 KW** following sequencer loading.

Note: MCC-1381.05-00-0240 is used instead of Reference 3 to give a more accurate representation of EDG parameters over time during a load sequence. Reference 3 provides a conservative model for the purpose of verifying the EDG is not overloaded at steady state conditions, but cannot provide the detailed analysis resulting from load modeling like that of CYME. CYME is intended to be a model of all 4 EDGs.

2) FSAR Table 8-1, "Maximum Loads to be Supplied from One of the Redundant Essential Auxiliary Power Systems" list loads required for LOOP / LOCA conditions. These loads are tabulated in Attachment 4, with required LOCA loads adding to approximately **3776 KW**.

3) ESF Testing per PT/1/A/4200/9A and PT/2/A/4200/9A during 1 and 2 EOC9 refueling outages (See Attachment 7):

1A EDG = **3611 KW**
1B EDG = **3411 KW**
2A EDG = **3611 KW**
2B EDG = **3511 KW**

4) To review actual loading conditions, McGuire Control Room Simulator testing was performed on 7/10/95 to review various EDG loading sequences. The worst case EDG Loading was verified to be the Large Break LOCA following LOOP. A graph of EDG frequency, power factor, loading (KW), and KVAR versus time is included as Attachment 3. This control room simulator sequence resulted in the following loads after initiation of a LOOP/LOCA condition:

a) Load at approximately 15 minutes: **3750 KW**
b) Load at approximately 16 minutes following CA Pump throttling (per procedure): **3400 KW**
c) Load at approximately 1 hour: **3250 KW**

The load reduction from 3400 to 3250 KW by the end of one hour is assumed to be due to differences in various pump loads resulting from changes in system pressures. Although this load drop is significant, no credit for it is taken in this calculation, which adds conservatism.

LOCA Individual Motor Load Information:
For each load considered the KW can be different based on how each calculation was performed. Therefore, the KW calculation for each model will be given::

1) Sequencer Group 8
Per Reference 1 (Table 8-1), Reference 13 (Sections 31.1.2.1 & 31.1.2.2), and Reference 14 (Section 20.4.1.3), the sequencer group 8 loads do not energize until 10 minutes following initiation of a LOOP/LOCA.

Load reductions due to the absence of the sequencer group 8 loads per Attachment 6 are:

a) CYME: -150 KW
b) FSAR/Simulator: -165 KW
c) ESF Test: 165 KW

These sequencer group 8 loads are assumed by this calculation to be started at 10 minutes after initiation of a LOOP/LOCA. Add 5 KW to CYME loads at 10 minutes to account for the Hydrogen Igniters.

2) Fuel Pool Cooling Pumps

Per Reference 12, Section 20.2.1.1.2 and Reference 1, Section 9.1.3.2.4, power to the Fuel Pool Cooling (KF) Pumps can be supplied approximately 1 hour after initiation of a LOOP/LOCA. The KF heat exchangers are cooled from the KC system non-essential header, which is isolated by the safety injection signal. Since the KC system would require realignment to supply cooling to the KF heat exchanger, engineering judgment would be required from the Technical Support Center (TSC) to initiate KF cooling. Based on a review of emergency procedures and expected operator action, the KF pumps are not expected to be started prior to 10 hours following a LOOP/LOCA, but these pumps may be off for much longer into the LOCA event.

Load reductions due to the absence of the Fuel Pool Cooling pumps per Attachment 6 are:

a) CYME: -146 KW
b) FSAR/Simulator: -149 KW
c) ESF Test: -158 KW

These KF Pump loads are assumed by this calculation to be started at 10 hours after initiation of a LOOP/LOCA.

3) MOV Positioning Complete

Per Reference 1 (Table 6-113) the maximum isolation time for the motor operated valves started with sequencer group 1 is 50 seconds. Therefore MOVs are assumed to have completed their valve positioning at 5 minutes into the LOOP/LOCA. Further MOV positioning is assumed to be 10% of the initial 112 KW load.

a) CYME: Load reduction included in simulation.
b) FSAR/Simulator: -101 KW
c) ESF Test: Load reduction included in test.

4) Auxiliary Feed Water Pumps

The Auxiliary Feed Water (CA) Pumps are severely throttled by the emergency procedures EP/1/A/5000/E-1 or EP/2/A/5000/ E-1), even in the worst case LOOP/LOCA, at about 8 to 10 minutes from LOCA initiation to maintain Steam Generator (S/G) level within a specified band (9 to 50%).

Data obtained from the Control Room Simulator indicated a 350 KW drop in EDG load due to throttling the CA Pumps, but this large load decrease cannot be verified from the flow curves. Core decay heat removal for a large break LOCA is provided by ECCS, and therefore little heat is removed by CA pump flow through the S/Gs. With no heat input, the S/G's will cool down due to the entrance of colder auxiliary feedwater. The only load from the S/Gs following level establishment will be the turbine driven CA pump, so little CA flow is required. The CA pumps are therefore expected to be operated with the S/G throttle valves fully shut at approximately 10 minutes following a large break LOOP/LOCA and the pumps will operate in recirculation.

Discussion with Babcock and Wilcox Engineers confirm that no credit is currently taken for Reference 1, Chapter 6 or Chapter 15 analysis during a large break LOCA for decay heat removal through the steam generators (or its effect on peak fuel temperature). Additionally, a computer simulation of S/G level following a large break LOCA shows that the maximum allowable S/G level (50%) will be reached at 8.3 minutes, which supports the CA pump throttling data obtained from the control room simulator (Attachment 3).

From Attachment 6, the reduction in load due to the pumps throttled to recirculation is:

a) CYME: -116 KW
b) FSAR/Simulator: -112 KW
c) ESF Test: -120 KW

Note: this is a conservative estimate compared to actual data taken from the Control Room Simulator.

Further, the FSAR Table 8.8 "Major Loads Connected to the Diesel" indicates that the CA Pumps are only needed for 254 minutes (~4 hours) during a LOCA. At this time, the S/G's are expected to have cooled down and depressurized so that no significant secondary side manipulations will be required. Therefore it is assumed that the remaining CA pump load would be secured.

Load reductions due to the securing of the CA pumps per Attachment 6 are:

a) CYME: -270 KW
b) FSAR/Simulator: -268 KW
c) ESF Test: -290 KW

5) VC/YC System and Chiller Loads

Only one VC/YC System train, either "train A" or "train B", is required following initiation of a LOOP/LOCA. The VC/YC chiller of the aligned train starts 15 minutes following actuation of sequencer group 10, since the chiller has a shutdown sequence that will not allow it to restart for that time period. The operators have approximately 30 minutes to verify that the selected VC/YC train is operating properly, or have the redundant train operating.

Load reductions due to the absence of the VC/YC chiller per Attachment 6 are:

a) CYME: -282 KW
b) FSAR/Simulator: -263 KW
c) ESF Test: -263 KW

Per standard operating practice, the VC/YC A and B trains are loaded from different Units, except during a Unit outage. Since only one train of VC/YC starts during a LOOP/LOCA event, three of the four station EDGs are significantly less loaded that the one carrying VC/YC. Therefore the VC/YC chiller loads above would not be loaded at 15 minutes and only the following sequencer group 8 loads be added at 10 minutes:

a) CYME: 80 KW
b) FSAR/Simulator: 84 KW
c) ESF Test: 84 KW

6) Hydrogen Recombiner

The Hydrogen Recombiner start permissive is provided with load sequencer group10 (same as the VC/YC chiller), but is started manually from a control panel located in the MG set rooms. This manual loading per the emergency procedures (Reference 6) is expected to occur at approximately 1 hour following initiation of a LOOP/LOCA. Further, this manual loading requires a gradual increase in load over approximately 30 minutes. This calculation will assume the Hydrogen Recombiners are loaded (64 KW) at the same time at 1 hour into the event.

7) Hydrogen Mitigation Panelboard

This 30 KVA (24 KW) load is not included in the CYME calculation, but is included with sequencer group 1 for the FSAR and ESF models. Since this is manually loaded at 30 minutes per emergency procedures, this load will add 24 KW to the CYME load at 30 minutes following a LOOP/LOCA.

Combined Loading Sequence

For EDG loading of sequencer groups 1 through 7 the load values in Table I-1 are obtain[illegible] from:

a) CYME:

EDG loading versus time data was obtained form the CYME computer program (Reference 4). This initial EDG loading ($P_{CYME, INITIAL}$) was modified to obtain EDG loading for sequencer groups 1 through 7 ($P_{CYME, LG\ 1-7}$) by adding 0.1833 minutes to each time (adds 11 seconds for consistency with FSAR times) and by adding 61 KW to generator output (per Attachment 5).

$$P_{CYME, LG\ 1-7} = P_{CYME, INITIAL} + 61\ KW$$

The results of this addition are tabulated and plotted in Attachment 9. At 1 minute, after the addition of sequencer groups 1 through 7, the CYME loads are:

$$P_{CYME, LG\ 1-7} = P_{CYME\ Load} - (LG\ 8) - (KF\ Pump) - (VC/YC\ Comp) - (H2\ Recomb)$$

$$P_{CYME, LG\ 1-7} = 3,741 - (150) - (146) - (282) - (64) = 3,099\ KW$$

b) FSAR:

EDG loading versus time for the first 7 sequencer groups is from Attachment 4, which lists and adds required LOCA loads per Reference 1, Table 8-1, and by adding 61 KW to generator output (per Attachment 5).

$$P_{FSAR, LG\ 1-7} = 3,134 + 61 = 3195\ KW$$

c) ESF Test:

The ESF loads are assumed to be at 1 minute into the LOOP/LOCA, and are:

$$P_{ESF, LG\ 1-7} = P_{ESF\ Load} - (LG\ 8) - (KF\ Pump) - (VC/YC\ Comp) - (Heat\ Tracing) - (H2\ Recomb)$$

Using ESF Loads values for Attachment 6, and by adding 61 KW to generator output (per Attachment 5):

$$P_{ESF, LG\ 1-7} = 3611 - (165) - (158) - (263) - (64) + 61 = 3,022\ KW$$

TABLE I-1

Time from LOOP/LOCA	Load Description	P_{CYME} (KW)	P_{FSAR} (KW)	P_{ESF} (KW)
0.18 Min	Group 1 Loads		+981	
0.27 Min	Group 2 Loads		+390	
0.33 Min	Group 3 Loads		+340	
0.42 Min	Group 4 Loads		+314	
0.5 Min	Group 5 Loads		+261	
0.58 Min	Group 6 Loads		+524	
0.67 Min	Group 7 Loads		+380	
1 Min	**EDG LOAD AT 1 MIN.**	**3,099**	**3,195**	**3,022**
5 Min	MOV Positioning Complete	0	-101	0
6 Min	**EDG LOAD AT 6 MIN.**	**3,099**	**3,094**	**3,022**
8 Min	CA Pump Throttle	-116	-112	-120
8 Min	**EDG LOAD AFTER 8 MIN.**	**2,983**	**2,982**	**2,902**

TABLE I-1 (cont'd)

TABLE I-1 (cont'd)

Time from LOOP/LOCA	Load Description	P_{CYME} (KW)	P_{FSAR} (KW)	P_{ESF} (KW)
8 Min	**EDG LOAD AFTER 8 MIN.**	**2,983**	**2,982**	**2,902**
10 Min	Sequencer Group 8 & H2 Igniters	155	165	165
10 Min	**EDG LOAD AFTER 10 MIN.**	**3,138**	**3,147**	**3,067**
15 Min	VC/YC Chiller to 1 EDG	282	263	263
15 Min	**EDG LOAD AFTER 15 MIN.**	**3,420**	**3,410**	**3,330**
30 Min	H2 Mitigation Panelboard	24	0	0
30 Min	**EDG LOAD AFTER 30 MIN.**	**3,444**	**3,410**	**3,330**
60 Min	H2 Recombiner	64	64	64
60 Min	**EDG LOAD AFTER 60 MIN.**	**3,508**	**3,474**	**3,394**
4 Hr	CA Pump Secured	-270	-268	-290
4 Hr	**EDG LOAD AFTER 4 Hr**	**3,238**	**3,206**	**3,104**
10 Hr	Fuel Pool Pump (~10 hr)	+146	+149	+158
10 Hr	**EDG LOAD AFTER 10 Hr**	**3,384**	**3,355**	**3,262**
	Total Long Term Load	**3,384**	**3,355**	**3,262**

Additionally, Three of the four EDGs per Station would NOT be carrying VC/YC System loads and the lower load on these EDGs would be:

TABLE I-2

Time from LOOP/LOCA	Load Description	P_{CYME} (KW)	P_{FSAR} (KW)	P_{ESF} (KW)
8 Min	**EDG LOAD AFTER 8 MIN.**	**2,983**	**2,982**	**2,902**
10 Min	Sequencer Group 8* & H2 Igniters	85	84	84
10 Min	**EDG LOAD AFTER 10 MIN.**	**3,068**	**3,066**	**2,986**
30 Min	H2 Mitigation Panelboard	24	0	0
30 Min	**EDG LOAD AFTER 30 MIN.**	**3,092**	**3,066**	**2,986**
60 Min	H2 Recombiner	64	64	64
60 Min	**EDG LOAD AFTER 30 MIN.**	**3,156**	**3,130**	**3,050**
4 Hr	CA Pump Secured	-270	-268	-290
4 Hr	**EDG LOAD AFTER 4 Hr**	**2,886**	**2,862**	**2,760**
10 Hr	Fuel Pool Pump (~10 hr)	+146	+149	+158
10 Hr	**EDG LOAD AFTER 10 Hr**	**3,032**	**3,011**	**2,918**
	Total Long Term Load	**3,032**	**3,011**	**2,918**

* See Attachment 6 for loads and values for sequencer group 8 of these EDGs.

Small Break LOCA Conditions

The fastest depressurization for a small break LOCA occurs with a 6 inch cold leg break, which will reduce NC System pressure to approximately 350 psig (steady) within the first 15 minutes, per Reference 1, Figure 15-148. Since this pressure is above the shutoff head of the ND pumps, these pumps will operate in recirculation mode, reducing load by approximately 200 HP. Further, the LOCA emergency procedures (Reference 6) require securing the ND pumps if pressure is stable above 286 psig (ND aligned to the FWST). This action is expected within the first 30 minutes of a small break LOCA.

Per Attachment 6, securing the ND pumps will reduce EDG loading by the following amount:

a) CYME: -352 KW
b) FSAR/Simulator: -339 KW
c) ESF Test: -365 KW

For a small break LOCA that results in NC System pressure greater than 286 psig, Reference 6 directs primary cooldown and depressurization. This pressure reduction (per EP/1/A/5000/ES-1.2 and EP/2/A/5000/ES-1.2) uses the S/Gs for cooldown and allows securing 1 NV pump (680 HP) and both NI pumps (440 HP) if proper subcooling requirements are met. At this point, the EDG loads will be far below the large break LOCA.

For a very small break LOCA that results in containment pressure remaining below 3 psig, the NS pumps will not start (420 HP) and the NI and ND pumps will remain in recirculation until secured early in the event. During cooldown and depressurization during this event, the backup pressurizer heaters (416 KW) may be used, but only after the above pumps are secured. Therefore this scenario will also have EDG loads below the large break LOCA. Emergency procedure decision and logic flow charts are included as Attachment 11.

LOOP Load Information:
The following sources of information contain differing values for required Diesel Generator Loads during a LOOP event:
1) FSAR Table 8-1, "Maximum Loads to be Supplied from One of the Redundant Essential Auxiliary Power Systems" list loads required for LOOP conditions. These loads are tabulated in Attachment 10, with required LOCA loads adding to approximately **3311 KW**.

2) ESF Testing per PT/1/A/4200/9A and PT/2/A/4200/9A during 1 and 2 EOC9 refueling outages:
1A EDG = **2685 KW**
1B EDG = **2335 KW**
2A EDG = **2757 KW**
2B EDG = **2851 KW**

3) As stated earlier, to review actual loading conditions, McGuire Control Room Simulator testing was performed on 7/10/95 to review various EDG loading sequences (Attachment 3). This testing resulted in the following loads after initiation of a LOOP/LOCA condition:
a) EDG Steady State Load = **2500 KW**

Since LOOP loads per the FSAR, ESF Testing, and the control room simulation testing resulted in loading significantly less than the LOOP/LOCA event reviewed initially in this calculation, LOOP shall be assumed to result in lower turbocharger speeds. No further review of LOOP will be performed in this calculation.

Turbocharger Speed at Loads
Using Attachment 1, the following values can be obtained for turbocharger speeds:

TABLE I-3

Load	Turbo Speed (CYME - RPM)	Turbo Speed (FSAR - RPM)	Turbo Speed (ESF - RPM)
LB LOCA after 8 Minutes	11,400-10,800	11,400-10,800	11,200-10,600
LB LOCA after 15 Minutes	12,500-11,900	12,400-11,800	12,200-11,600
LB LOCA after 1 Hour	12,600-12,000	12,500-11,900	12,500-11,900
LB LOCA after 4 Hour	12,200-11,600	11,900-11,300	11,700-11,100
LB LOCA after 10 Hour	12,500-11,900	12,300-11,700	12,100-11,500
LB LOCA (Highest, No VC/YC)	11,900-11,300	11,700-11,100	11,600-11,000

Material As Found Conditions
For Unit 1, the compressor wheel blades removed from EDGs 1A and 1B were dye penetrant (PT) inspected for fatigue cracks or indications but no significant ones were found. Therefore, since no crack initiation had begun on the Unit 1 blades and no fatigue forcing function was present at the actual ESF load turbocharger speeds, these compressor blades would not have failed during an actual ESF Event.

For Unit 2, however, each EDG experienced a single compressor blade failure during performance of the 1 hour monthly operability surveillance. Further PT examination of the compressor wheels from these EDGs revealed that one additional significant fatigue crack was present

J) Conclusions

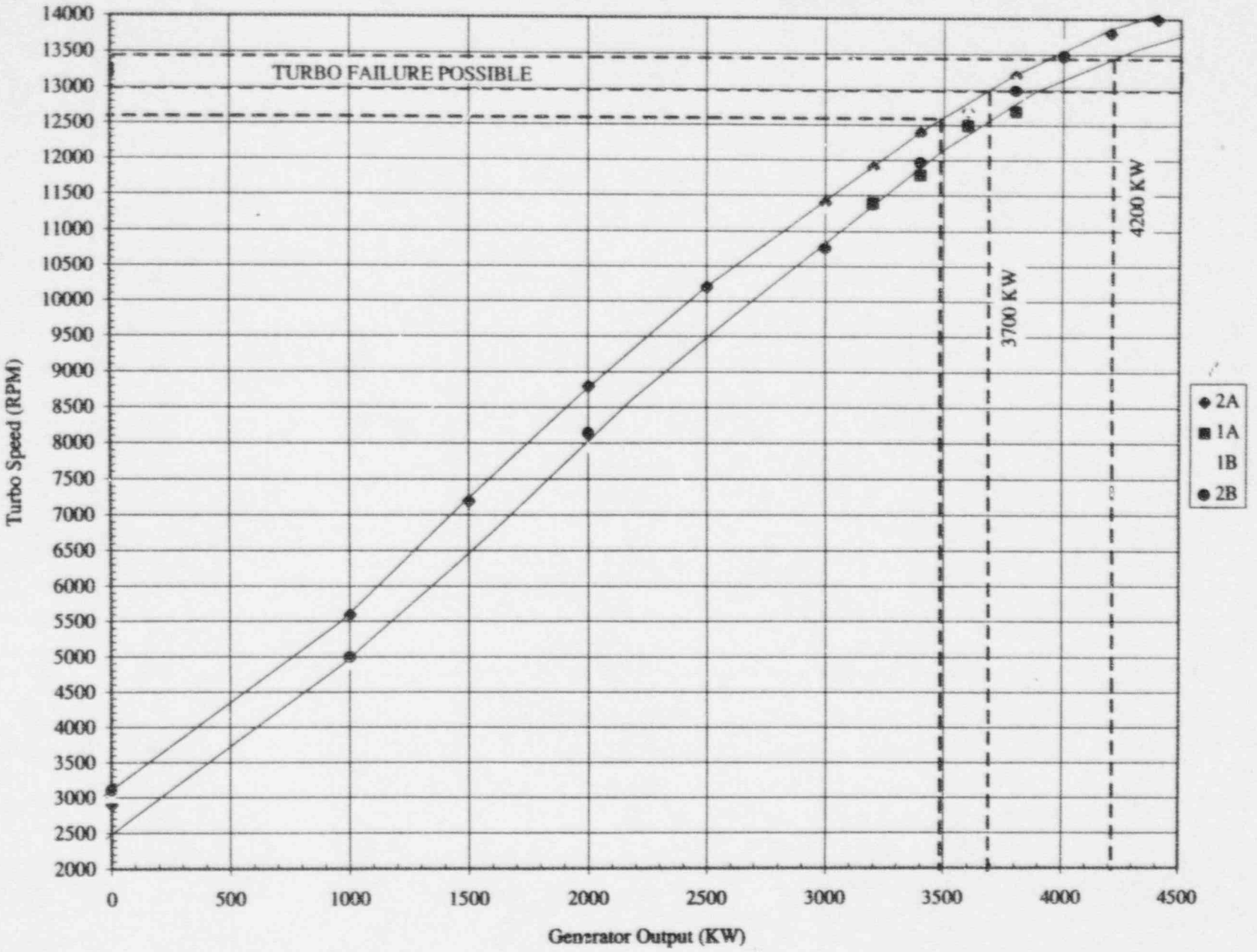
Using the CYME values, the worst case Large Break LOCA results in a maximum turbo speed of approximately 12,600 RPM, as compared to the minimum dangerous speed of 12,970 RPM. This estimated speed is sufficiently below the threshold of blade natural frequency to preclude resonance in these turbocharger blades. Since blade cracks for the Unit 2 EDGs initiated and grew to failure during their last surveillance test run, the EDGs would have been capable of supplying required loads during all design basis LOOP/LOCA events.

The Unit 1 EDGs are therefore Past Operable for the entire period with the 17 hole air assist design installed. The Unit 2 EDGs are Past Operable for the entire period with the 17 hole air assist design installed, except for:

EDG 2A	Inoperable from:	6/12/95, 1520	(EDG start time of 2A failure run)
	Operable on:	6/14/95, 1543	(Completion of 1 hour operability surveillance run)
EDG 2B	Inoperable from:	6/27/95, 0948	(EDG start time of 2B failure run)
	Operable on:	6/29/95, 0605	(Completion of 1 hour operability surveillance run)

K) Attachments

1) Graph of Turbocharger Speed Versus Diesel Load
2) EDG 1A and 1B Turbocharger Blade Acoustic Test Data
3) Graph of Control Room Simulator Loading versus Time
4) EDG LOCA Load Requirements per FSAR Table 8-1
5) Generator Exciter and Transformer Loading
6) Individual Motor Load Calculations
7) Units 1 and 2 EOC 9 ESF Test Data Sheets
8) Failure Analysis Associates Report, Dated 7/20/95
9) EDG Actual Loading as Adapted from CYME Calculation
10) EDG LOCA Load Requirements per FSAR Table 8-1
11) Procedure Flow Chart for LOOP/LOCA Conditions
12) Generator Output Data from the OAC


TURBO FAILURE POSSIBLE
3700 KW
4200 KW
Turbo Speed (RPM)
Generator Output (KW)
2A
1A
1B
2B
14000
13500
13000
12500
12000
11500
11000
10500
10000
9500
9000
8500
8000
7500
7000
6500
6000
5500
5000
4500
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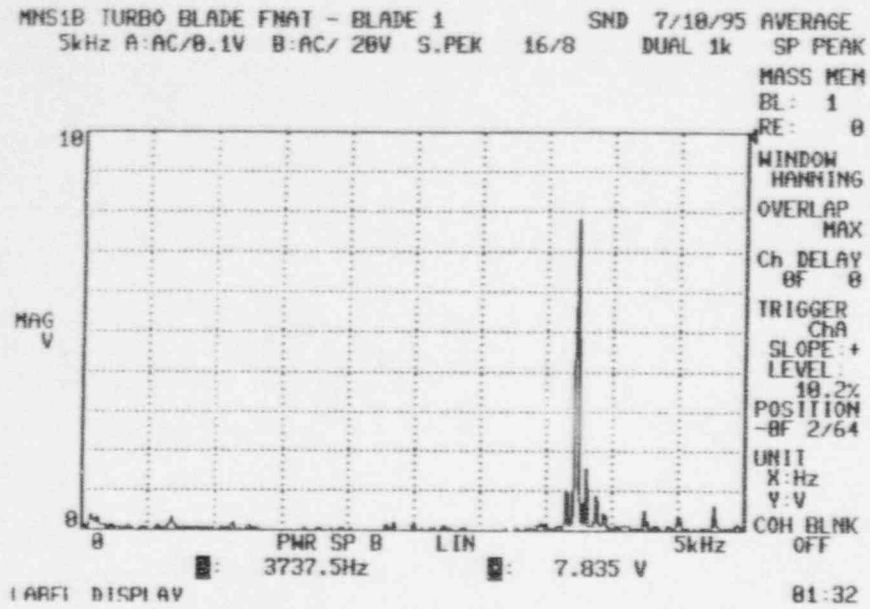
2500
3000
3500
4000
4500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MASS MEM
BL: 1
RE: 0
WINDOW HANNING
OVERLAP MAX
Ch DELAY 0F 0
TRIGGER ChA
SLOPE: +
LEVEL: 10.2%
POSITION -0F 2/64
UNIT X:Hz Y:V
COH BLNK OFF
MAG V
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0
0 PWR SP B LIN 5kHz
3737.5Hz 7.835 V
DISPLAY
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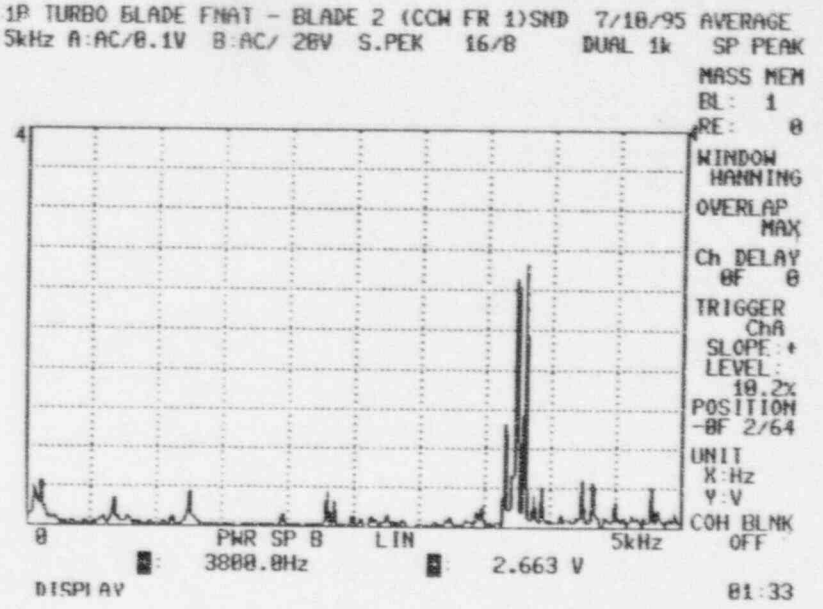
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MASS MEM
BL: 1
RE: 0
WINDOW HANNING
OVERLAP MAX
Ch DELAY 0F 0
TRIGGER ChA
SLOPE: +
LEVEL: 10.2%
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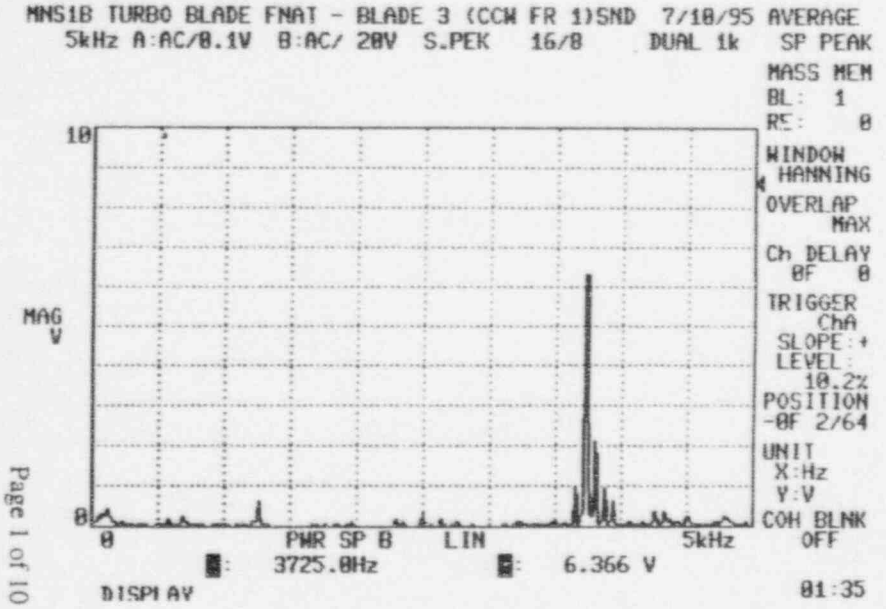
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MASS MEM
BL: 1
RE: 0
WINDOW HANNING
OVERLAP MAX
Ch DELAY 0F 0
TRIGGER ChA
SLOPE: +
LEVEL: 10.2%
POSITION -0F 2/64
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MAG V
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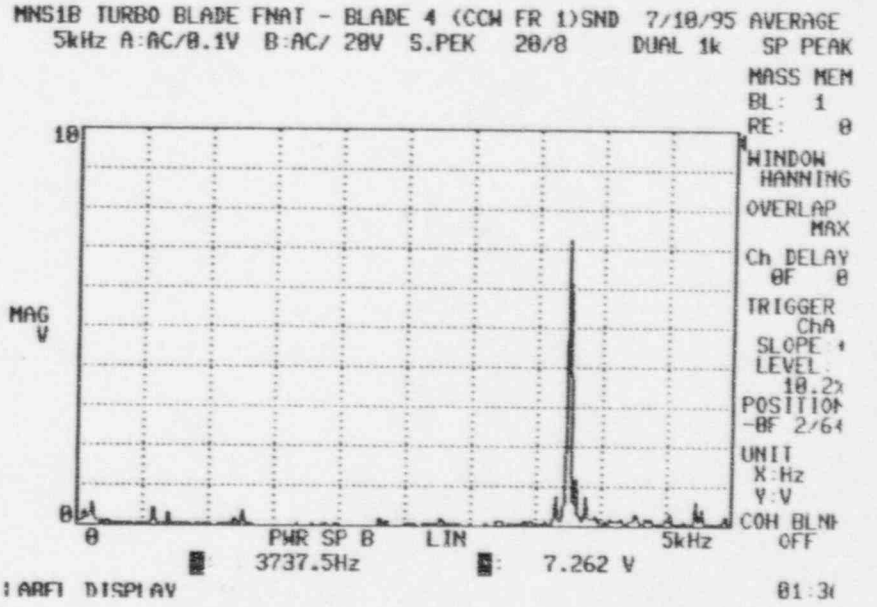
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MASS MEM
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RE: 0
WINDOW HANNING
OVERLAP MAX
Ch DELAY 0F 0
TRIGGER ChA
SLOPE: +
LEVEL: 10.2%
POSITION -0F 2/64
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DISPLAY
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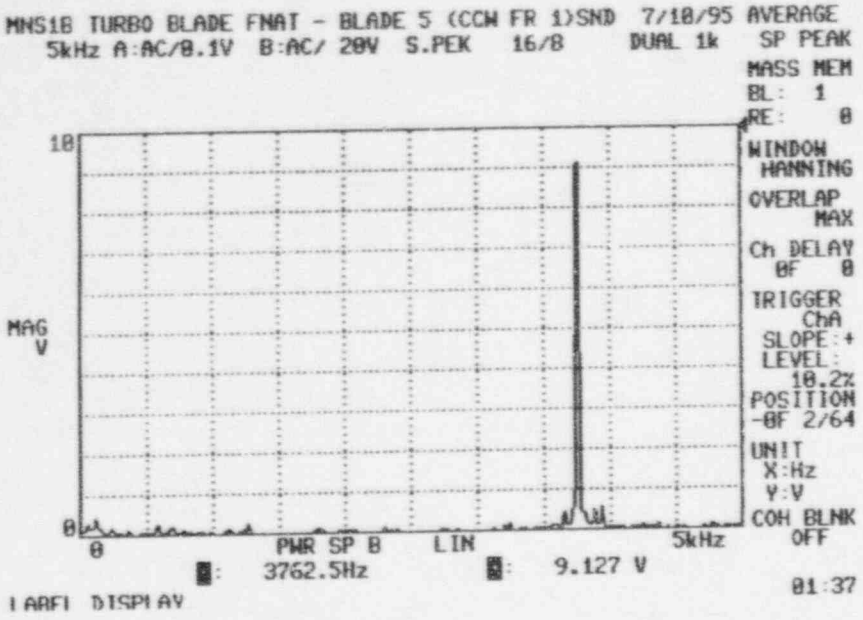
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MASS MEM
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RE: 0
WINDOW HANNING
OVERLAP MAX
Ch DELAY 0F 0
TRIGGER ChA
SLOPE: +
LEVEL: 10.2%
POSITION -0F 2/64
UNIT X:Hz Y:V
COH BLNK OFF
MAG V
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0
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PWR SP B
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5kHz
3762.5Hz
9.127 V
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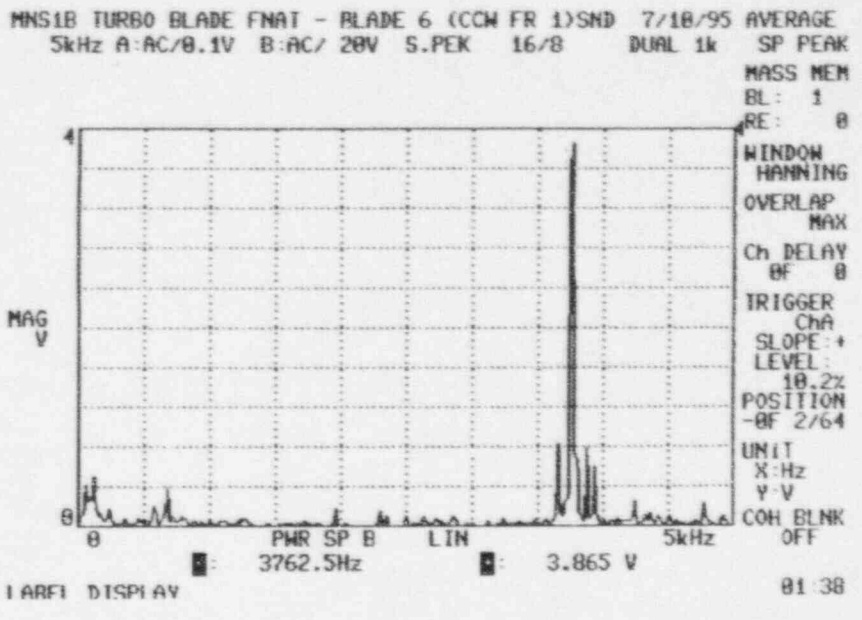
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MASS MEM
BL: 1
RE: 0
WINDOW HANNING
OVERLAP MAX
Ch DELAY 0F 0
TRIGGER ChA
SLOPE: +
LEVEL: 10.2%
POSITION -0F 2/64
UNIT X:Hz Y:V
COH BLNK OFF
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0
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LIN
5kHz
3762.5Hz
3.865 V
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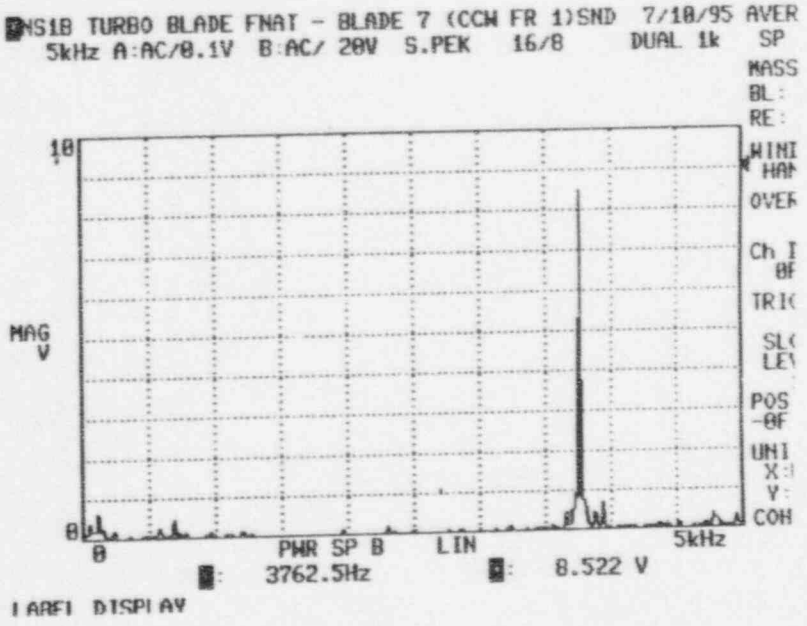
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5kHz A:AC/8.1V B:AC/ 20V S.PEK 16/8 DUAL 1k SP
MASS
BL:
RE:
WINI HAN
OVER
Ch I 0F
TRI(
SL(LE\
POS -0F
UNI X: Y:
COH
MAG V
10
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0
PWR SP B
LIN
5kHz
3762.5Hz
8.522 V
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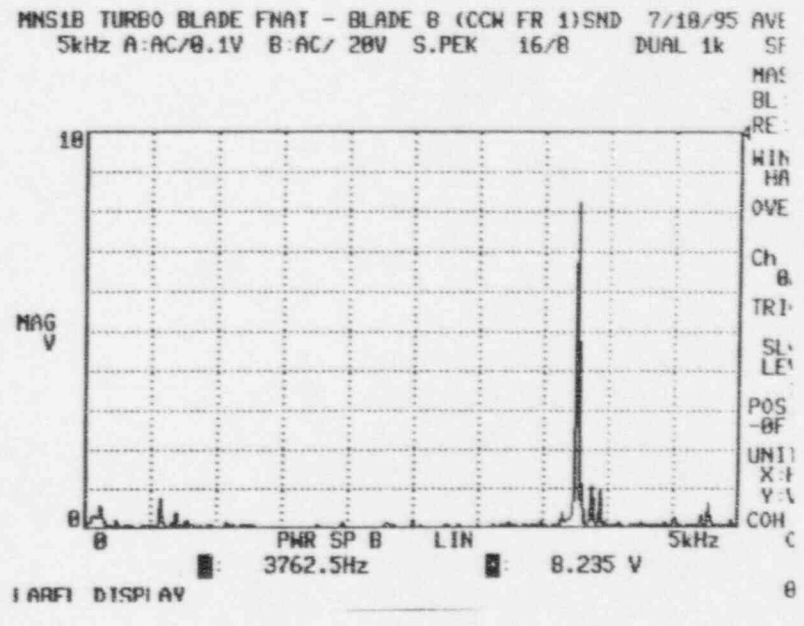
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MAS
BL:
RE:
WIN HA
OVE
Ch 0
TRI
SL LE
POS -0F
UNI X: Y:
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MAG V
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LIN
5kHz
3762.5Hz
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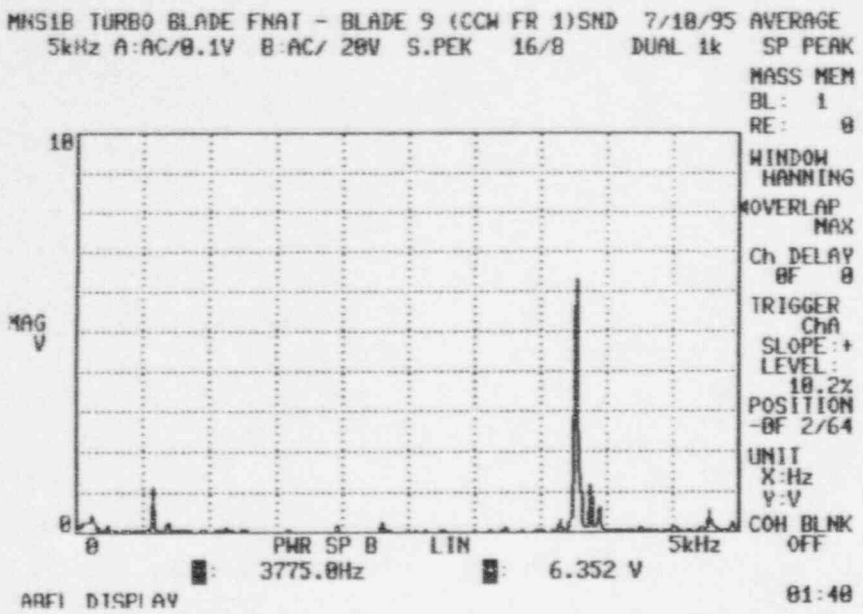
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5kHz A:AC/0.1V B:AC/ 20V S.PEK 16/8 DUAL 1k SP PEAK
MASS MEM
BL: 1
RE: 0
WINDOW
HANNING
OVERLAP
MAX
Ch DELAY
0F 0
TRIGGER
ChA
SLOPE:+
LEVEL:
10.2%
POSITION
-0F 2/64
UNIT
X:Hz
Y:V
COH BLNK
OFF
MAG
V
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0
PWR SP B
LIN
5kHz
3775.0Hz
6.352 V
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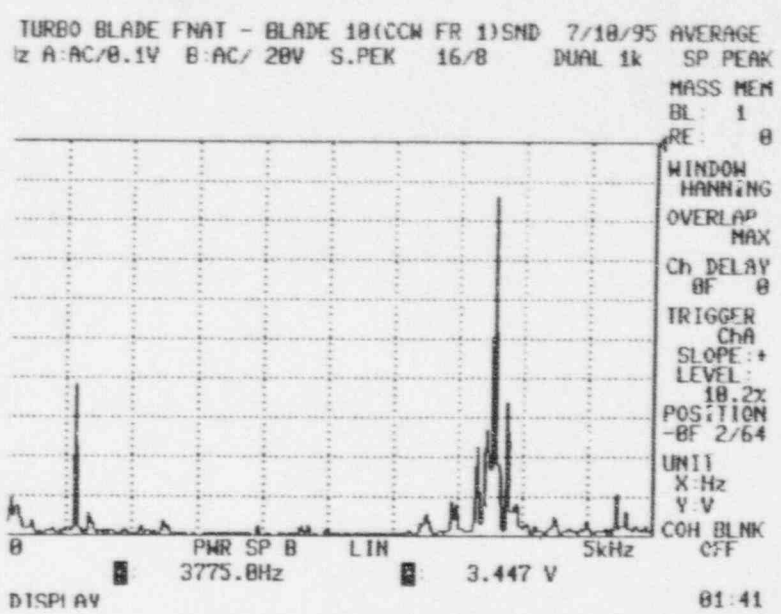
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MASS MEM
BL: 1
RE: 0
WINDOW
HANNING
OVERLAP
MAX
Ch DELAY
0F 0
TRIGGER
ChA
SLOPE:+
LEVEL:
10.2%
POSITION
-0F 2/64
UNIT
X:Hz
Y:V
COH BLNK
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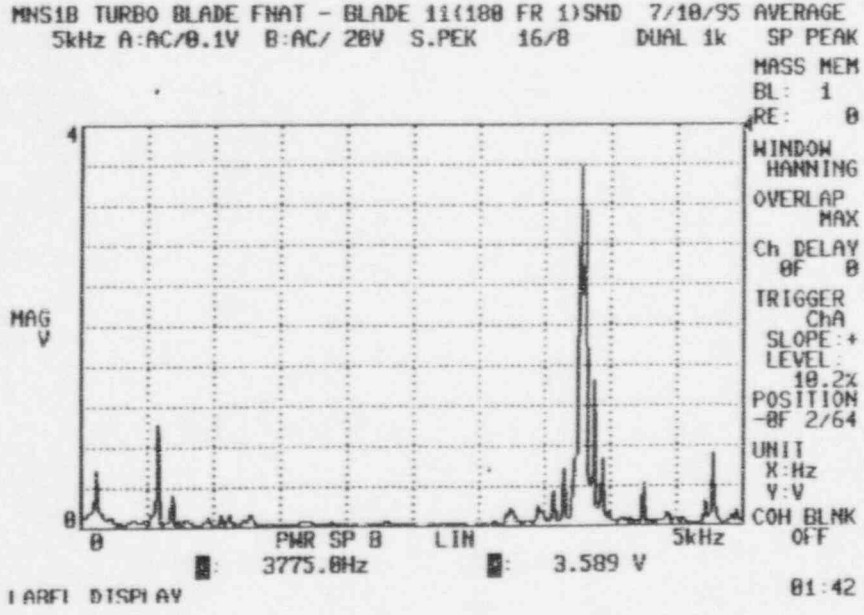
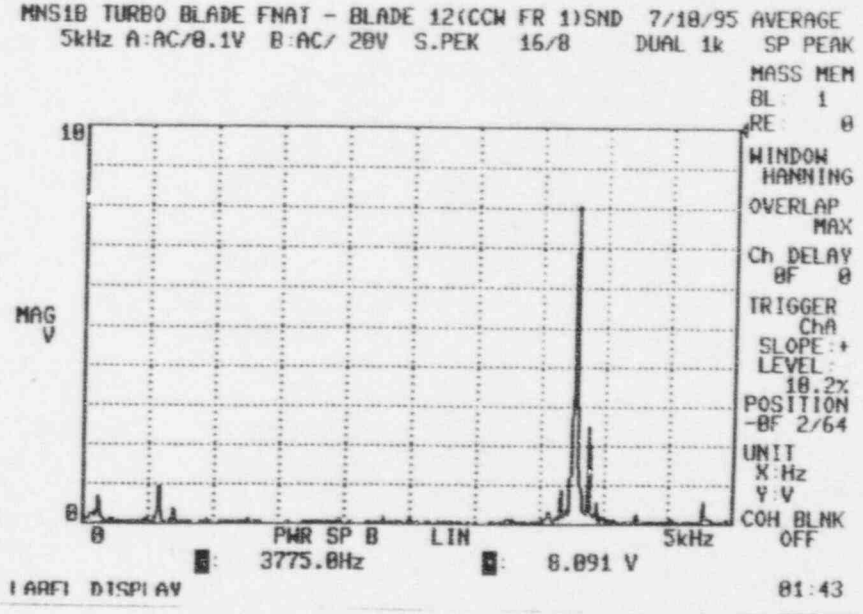
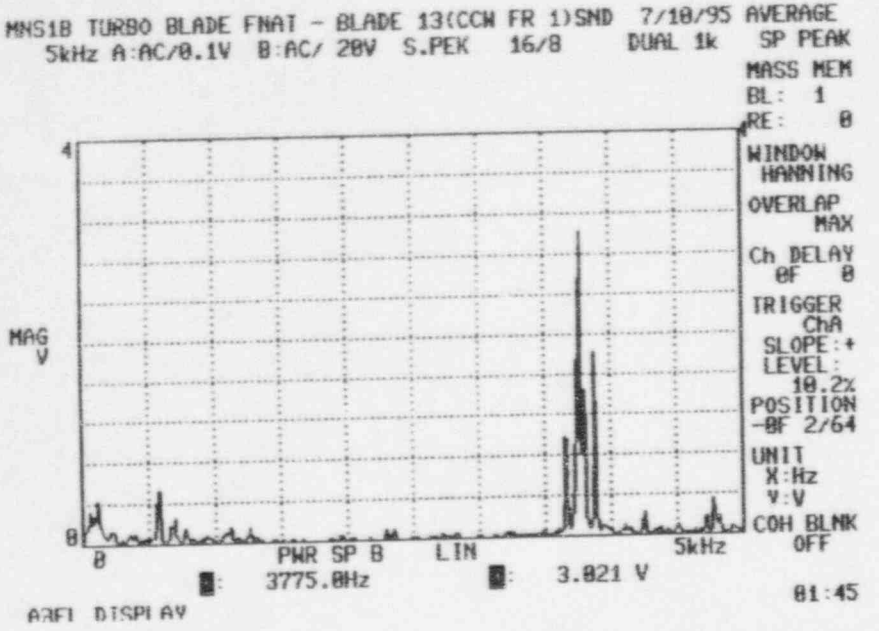
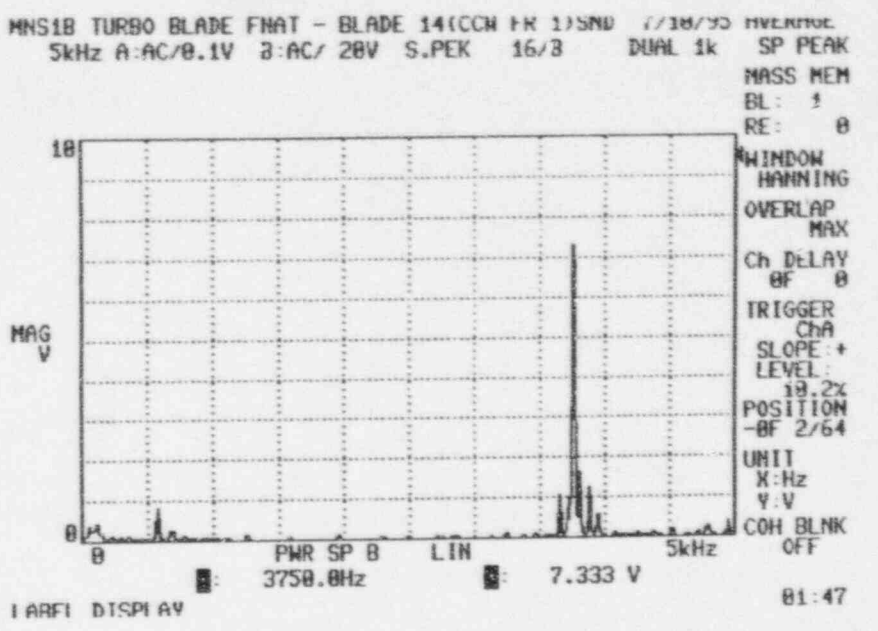
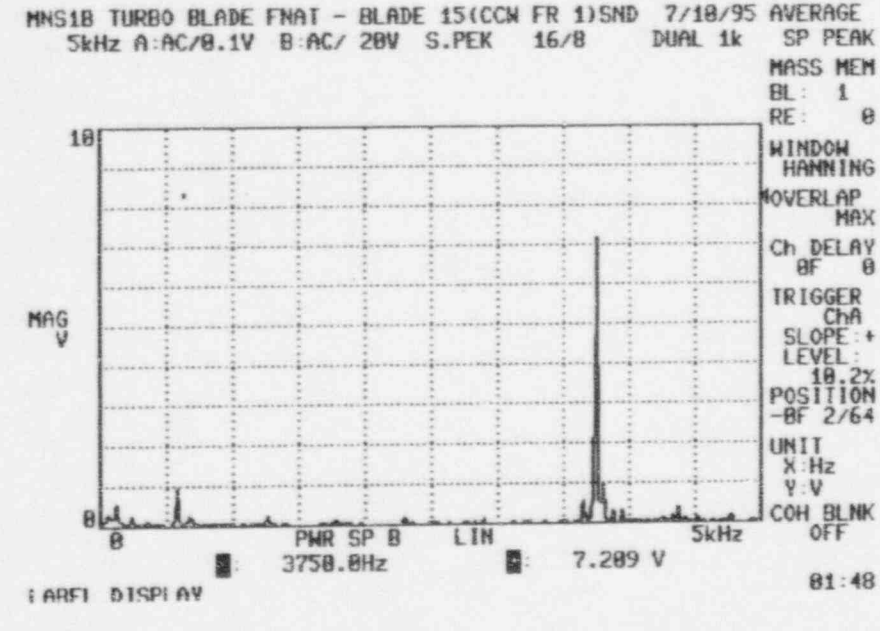
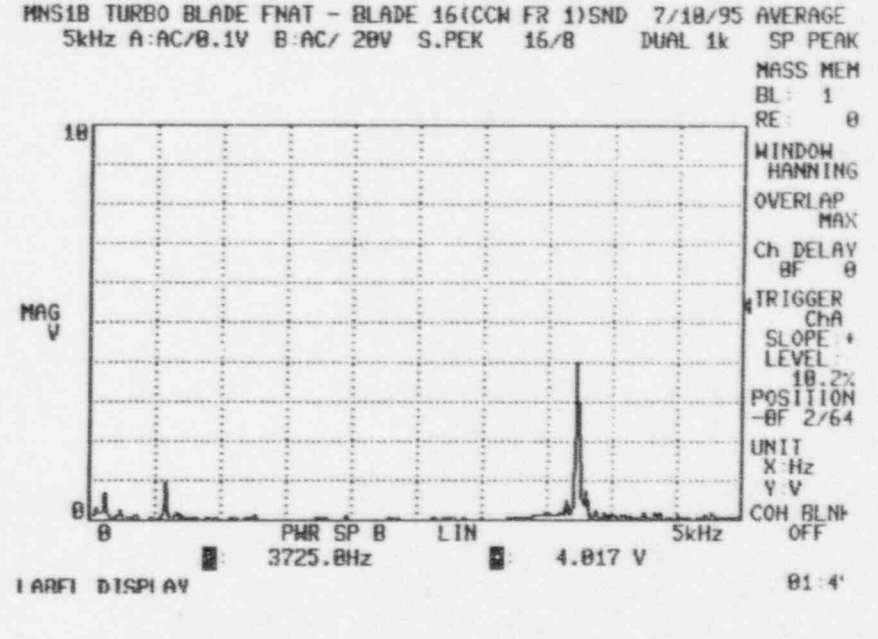

MNS1B TURBO BLADE FNAT - BLADE 11(180 FR 1)SND 7/18/95 AVERAGE
5kHz A:AC/0.1V B:AC/ 20V S.PEK 16/8 DUAL 1k SP PEAK
MASS MEM
BL: 1
RE: 0
WINDOW
HANNING
OVERLAP
MAX
Ch DELAY
0F 0
TRIGGER
ChA
SLOPE:+
LEVEL:
10.2%
POSITION
-0F 2/64
UNIT
X:Hz
Y:V
COH BLNK
OFF
MAG
V
4
0
0
PWR SP B
LIN
5kHz
3775.0Hz
3.589 V
MARFI DISPLAY
01:42

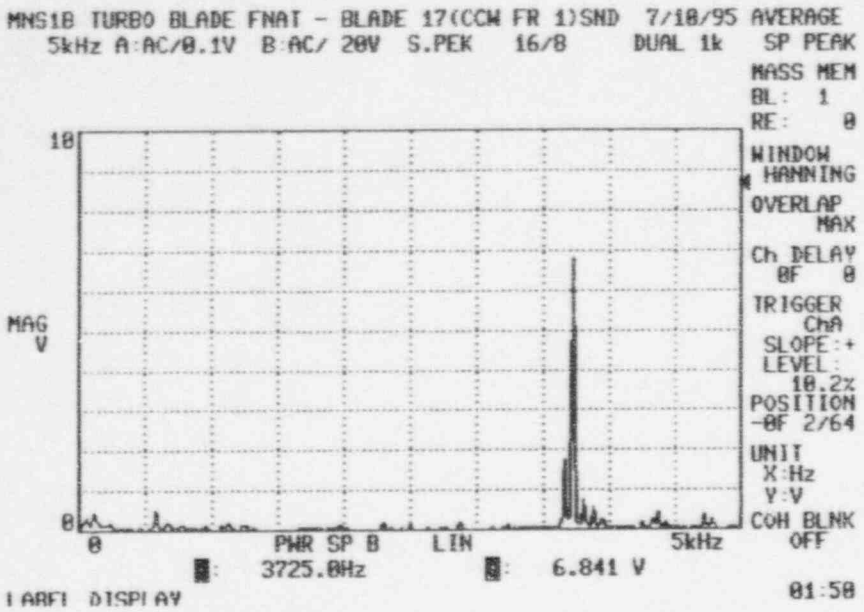

MNS1B TURBO BLADE FNAT - BLADE 12(CCW FR 1)SND 7/18/95 AVERAGE
5kHz A:AC/0.1V B:AC/ 20V S.PEK 16/8 DUAL 1k SP PEAK
MASS MEM
BL: 1
RE: 0
WINDOW
HANNING
OVERLAP
MAX
Ch DELAY
0F 0
TRIGGER
ChA
SLOPE:+
LEVEL:
10.2%
POSITION
-0F 2/64
UNIT
X:Hz
Y:V
COH BLNK
OFF
MAG
V
10
0
0
PWR SP B
LIN
5kHz
3775.0Hz
8.091 V
MARFI DISPLAY
01:43

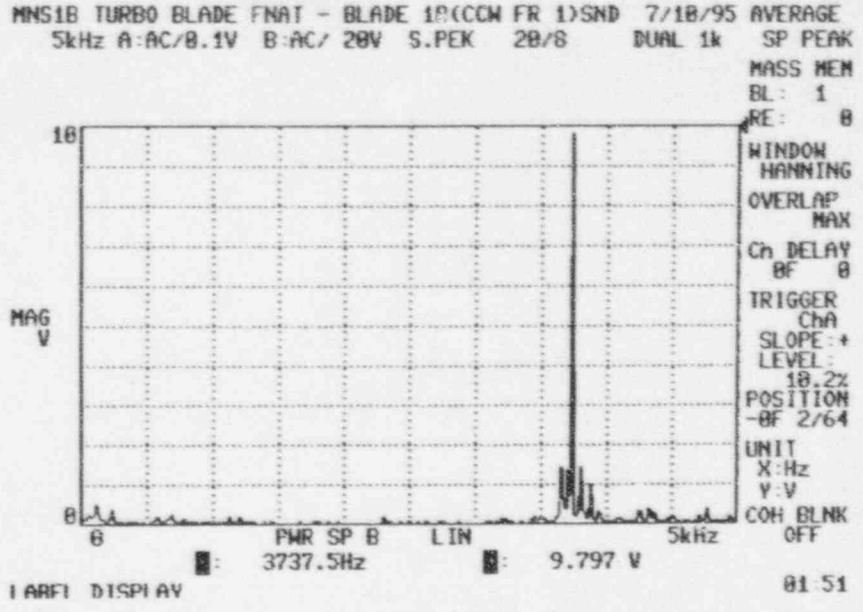

MNS1B TURBO BLADE FNAT - BLADE 13(CCW FR 1)SND 7/18/95 AVERAGE
5kHz A:AC/0.1V B:AC/ 20V S.PEK 16/8 DUAL 1k SP PEAK
MASS MEM
BL: 1
RE: 0
WINDOW HANNING
OVERLAP MAX
Ch DELAY
0F 0
TRIGGER ChA
SLOPE: +
LEVEL: 10.2%
POSITION -0F 2/64
UNIT X:Hz Y:V
COH BLNK OFF
MAG V
4
0
0
PWR SP B LIN
5kHz
3775.0Hz
3.021 V
01:45
ARFI DISPLAY

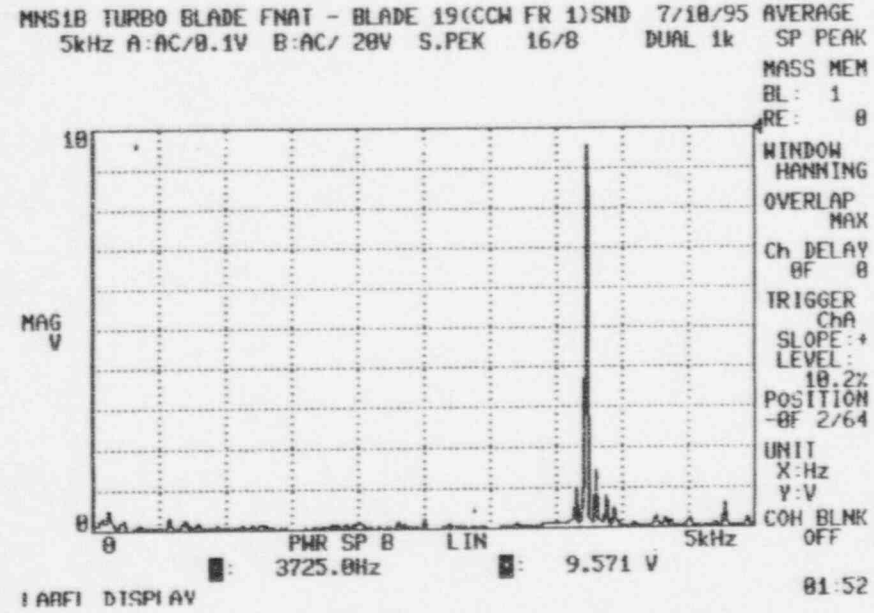

MNS1B TURBO BLADE FNAT - BLADE 14(CCW FR 1)SND 7/18/95 AVERAGE
5kHz A:AC/0.1V B:AC/ 20V S.PEK 16/8 DUAL 1k SP PEAK
MASS MEM
BL: 1
RE: 0
WINDOW HANNING
OVERLAP MAX
Ch DELAY
0F 0
TRIGGER ChA
SLOPE: +
LEVEL: 10.2%
POSITION -0F 2/64
UNIT X:Hz Y:V
COH BLNK OFF
MAG V
10
0
0
PWR SP B LIN
5kHz
3750.0Hz
7.333 V
01:47
ARFI DISPLAY

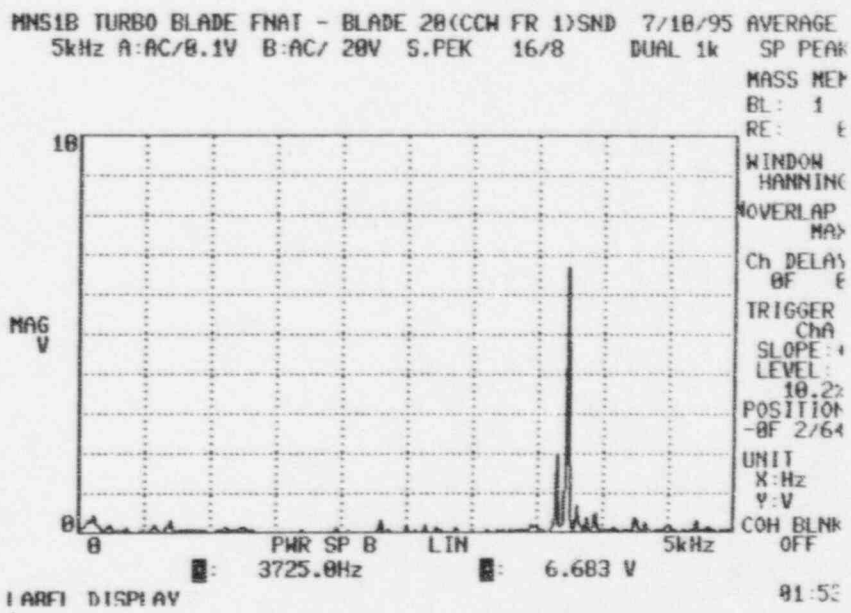

MNS1B TURBO BLADE FNAT - BLADE 15(CCW FR 1)SND 7/18/95 AVERAGE
5kHz A:AC/0.1V B:AC/ 20V S.PEK 16/8 DUAL 1k SP PEAK
MASS MEM
BL: 1
RE: 0
WINDOW HANNING
OVERLAP MAX
Ch DELAY
0F 0
TRIGGER ChA
SLOPE: +
LEVEL: 10.2%
POSITION -0F 2/64
UNIT X:Hz Y:V
COH BLNK OFF
MAG V
10
0
0
PWR SP B LIN
5kHz
3750.0Hz
7.209 V
01:48
ARFI DISPLAY

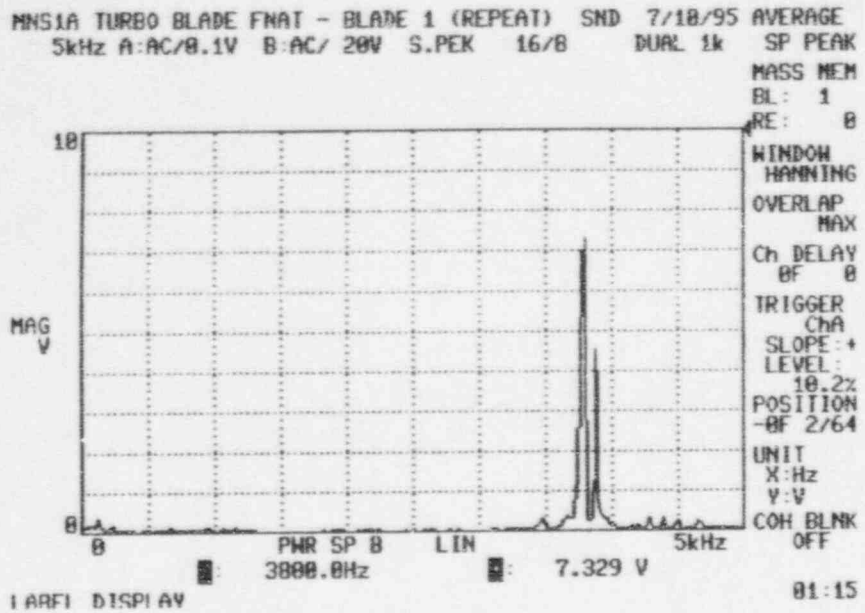

MNS1B TURBO BLADE FNAT - BLADE 16(CCW FR 1)SND 7/18/95 AVERAGE
5kHz A:AC/0.1V B:AC/ 20V S.PEK 16/8 DUAL 1k SP PEAK
MASS MEM
BL: 1
RE: 0
WINDOW HANNING
OVERLAP MAX
Ch DELAY
0F 0
TRIGGER ChA
SLOPE: +
LEVEL: 10.2%
POSITION -0F 2/64
UNIT X:Hz Y:V
COH BLNK OFF
MAG V
10
0
0
PWR SP B LIN
5kHz
3725.0Hz
4.017 V
01:4
ARFI DISPLAY

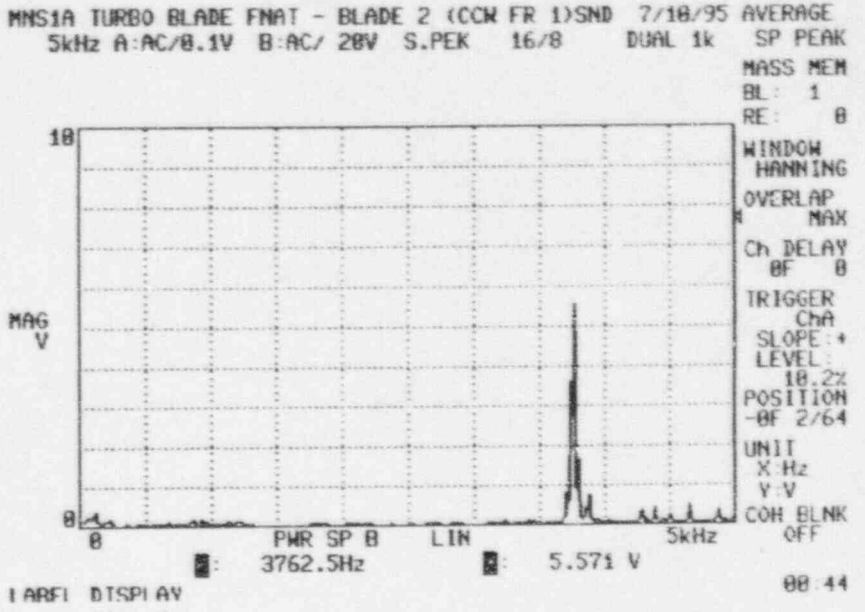

MNS1B TURBO BLADE FNAT - BLADE 17(CCW FR 1)SND 7/18/95 AVERAGE
5kHz A:AC/0.1V B:AC/ 20V S.PEK 16/8 DUAL 1k SP PEAK
MASS MEM
BL: 1
RE: 0
WINDOW
HANNING
OVERLAP
MAX
Ch DELAY
0F 0
TRIGGER
ChA
SLOPE:+
LEVEL:
10.2%
POSITION
-0F 2/64
UNIT
X:Hz
Y:V
COH BLNK
OFF
10
MAG
V
0
0
PWR SP B
LIN
5kHz
3725.0Hz
6.841 V
01:50
!ARFI DISPLAY

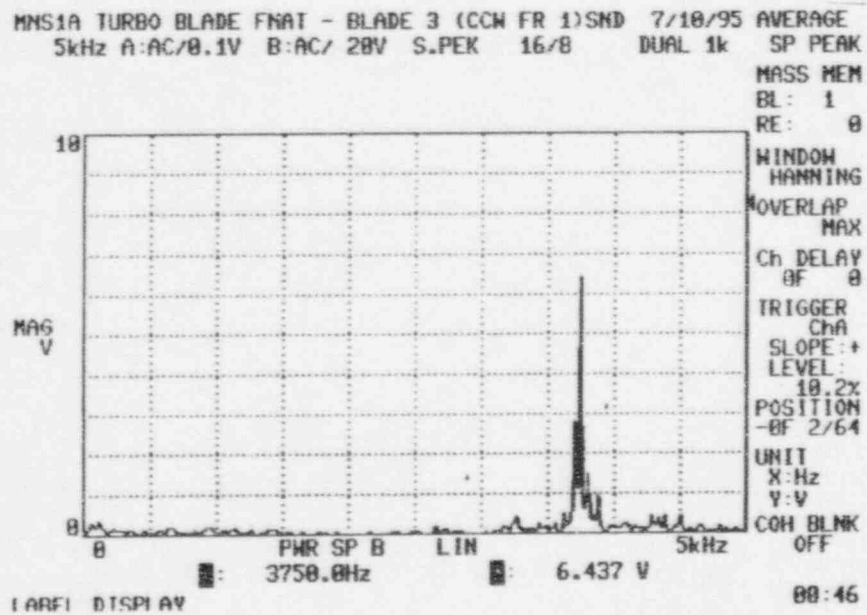

MNS1B TURBO BLADE FNAT - BLADE 18(CCW FR 1)SND 7/18/95 AVERAGE
5kHz A:AC/0.1V B:AC/ 20V S.PEK 20/8 DUAL 1k SP PEAK
MASS MEM
BL: 1
RE: 0
WINDOW
HANNING
OVERLAP
MAX
Ch DELAY
0F 0
TRIGGER
ChA
SLOPE:+
LEVEL:
10.2%
POSITION
-0F 2/64
UNIT
X:Hz
Y:V
COH BLNK
OFF
10
MAG
V
0
0
PWR SP B
LIN
5kHz
3737.5Hz
9.797 V
01:51
!ARFI DISPLAY

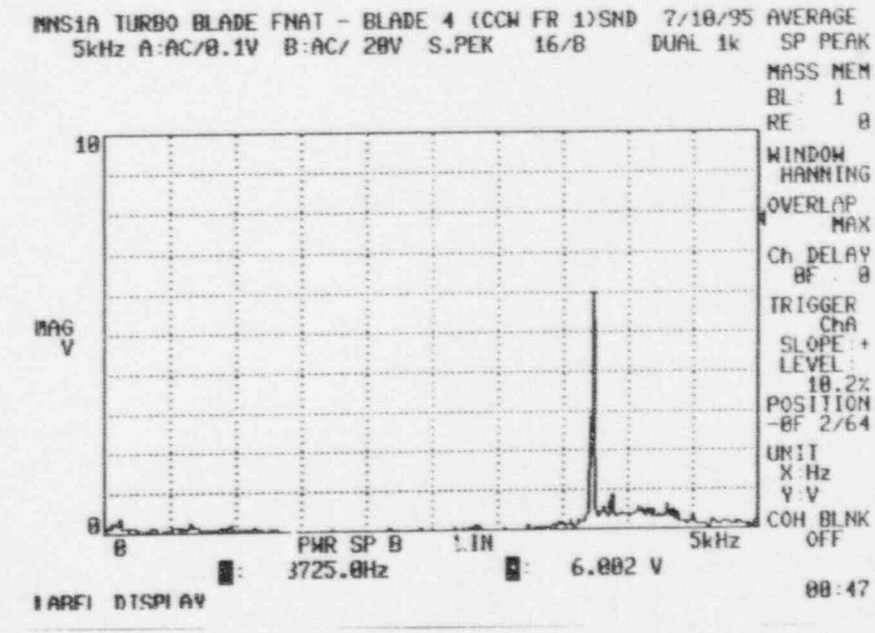

MNS1B TURBO BLADE FNAT - BLADE 19(CCW FR 1)SND 7/18/95 AVERAGE
5kHz A:AC/0.1V B:AC/ 20V S.PEK 16/8 DUAL 1k SP PEAK
MASS MEM
BL: 1
RE: 0
WINDOW
HANNING
OVERLAP
MAX
Ch DELAY
0F 0
TRIGGER
ChA
SLOPE:+
LEVEL:
10.2%
POSITION
-0F 2/64
UNIT
X:Hz
Y:V
COH BLNK
OFF
10
MAG
V
0
0
PWR SP B
LIN
5kHz
3725.0Hz
9.571 V
01:52
!ARFI DISPLAY

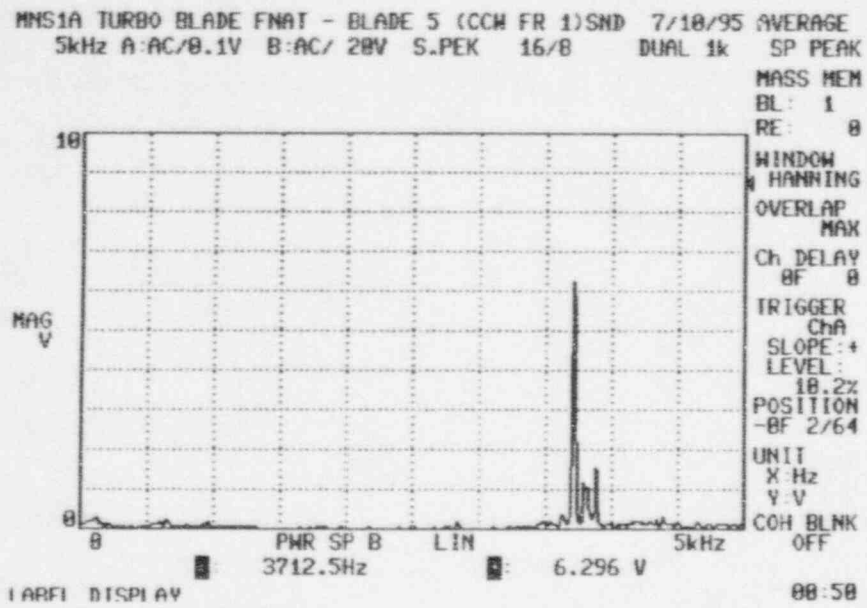

MNS1B TURBO BLADE FNAT - BLADE 20(CCW FR 1)SND 7/18/95 AVERAGE
5kHz A:AC/0.1V B:AC/ 20V S.PEK 16/8 DUAL 1k SP PEAK
MASS MEM
BL: 1
WINDOW
HANNING
OVERLAP
MAX
Ch DELAY
TRIGGER
ChA
SLOPE:+
LEVEL:
10.2%
POSITION
-0F 2/64
UNIT
X:Hz
Y:V
COH BLNK
OFF
10
MAG
V
0
0
PWR SP B
LIN
5kHz
3725.0Hz
6.683 V
!ARFI DISPLAY

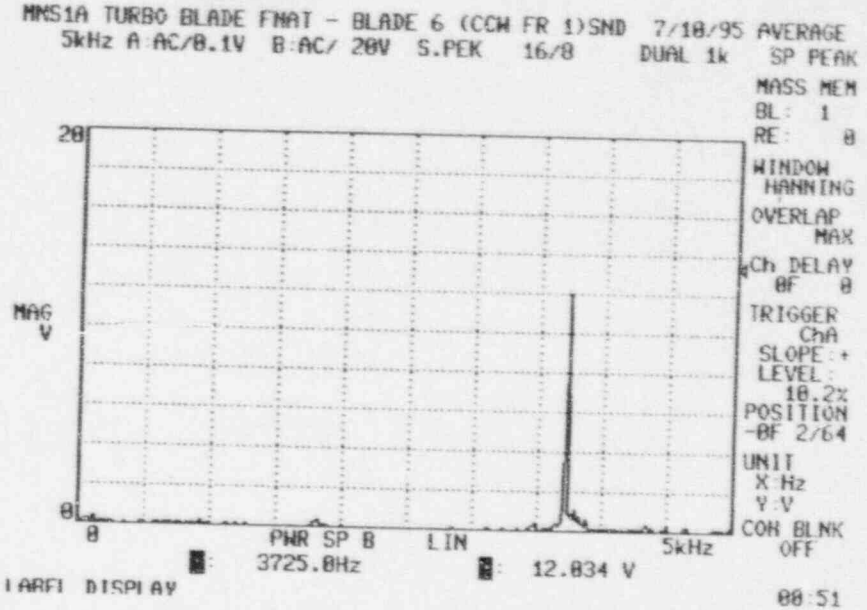

MNS1A TURBO BLADE FNAT - BLADE 1 (REPEAT) SND 7/18/95 AVERAGE
5kHz A:AC/0.1V B:AC/ 20V S.PEK 16/8 DUAL 1k SP PEAK
MASS MEM
BL: 1
RE: 0
WINDOW
HANNING
OVERLAP
MAX
Ch DELAY
0F 0
TRIGGER
ChA
SLOPE:+
LEVEL:
10.2%
POSITION
-0F 2/64
UNIT
X:Hz
Y:V
COH BLNK
OFF
10
MAG
V
0
0
PWR SP B
LIN
5kHz
3800.0Hz
7.329 V
01:15
!ARFI DISPLAY

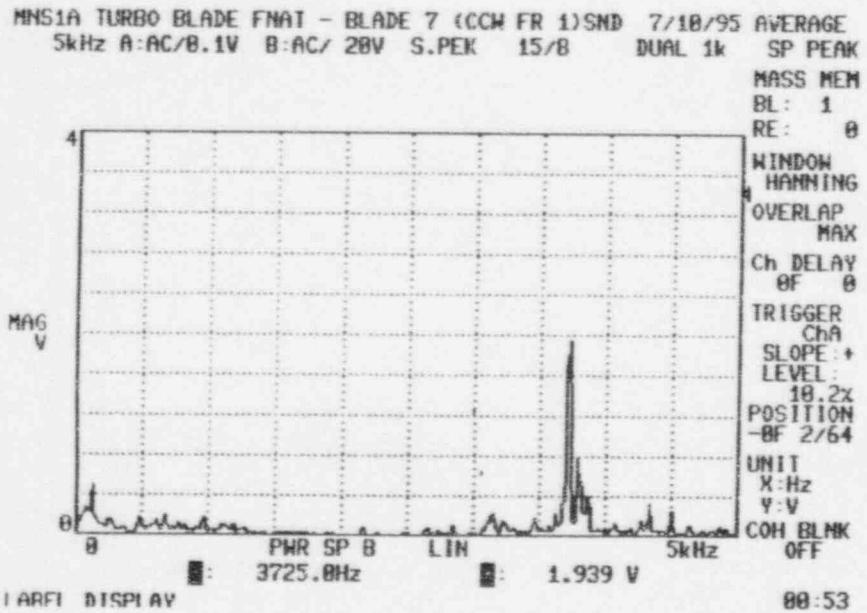

MNS1A TURBO BLADE FNAT - BLADE 2 (CCW FR 1)SND 7/18/95 AVERAGE
5kHz A:AC/0.1V B:AC/ 20V S.PEK 16/8 DUAL 1k SP PEAK
MASS MEM
BL: 1
RE: 0
WINDOW
HANNING
OVERLAP
MAX
Ch DELAY
0F 0
TRIGGER
ChA
SLOPE:+
LEVEL:
10.2%
POSITION
-0F 2/64
UNIT
X:Hz
Y:V
COH BLNK
OFF
10
MAG
V
0
0
PWR SP B
LIN
5kHz
3762.5Hz
5.571 V
00:44
!ARFI DISPLAY

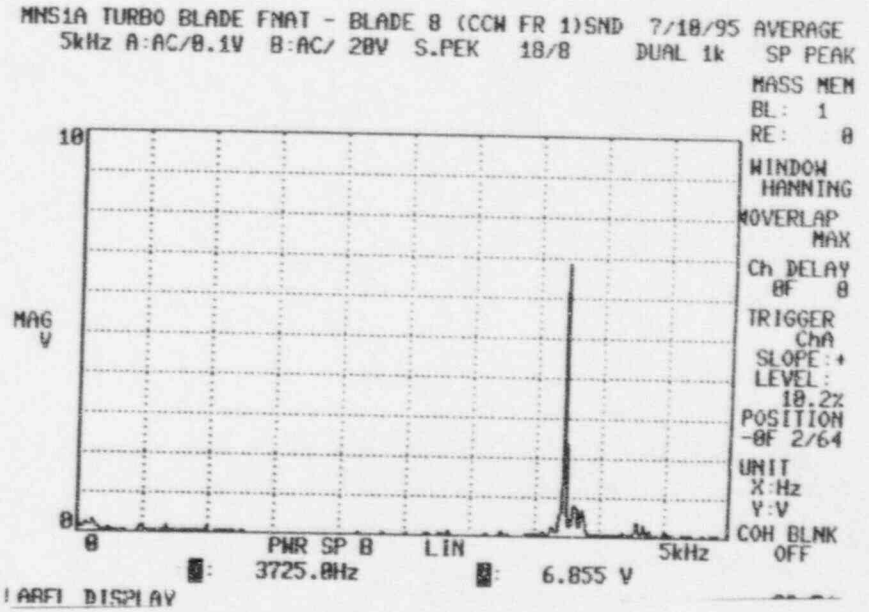

MNS1A TURBO BLADE FNAT - BLADE 3 (CCW FR 1)SND 7/18/95 AVERAGE
5kHz A:AC/0.1V B:AC/ 20V S.PEK 16/8 DUAL 1k SP PEAK
MASS MEM
BL: 1
RE: 0
WINDOW
HANNING
OVERLAP
MAX
Ch DELAY
0F 0
TRIGGER
ChA
SLOPE:+
LEVEL:
10.2%
POSITION
-0F 2/64
UNIT
X:Hz
Y:V
COH BLNK
OFF
10
MAG
V
0
0
PWR SP B
LIN
5kHz
3750.0Hz
6.437 V
00:46
!ARFI DISPLAY

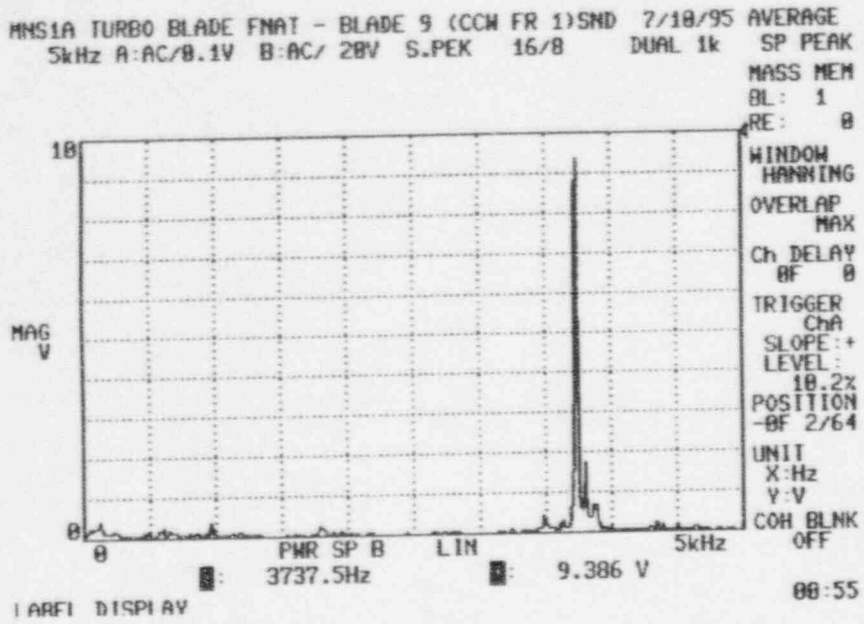

MNS1A TURBO BLADE FNAT - BLADE 4 (CCW FR 1)SND 7/18/95 AVERAGE
5kHz A:AC/0.1V B:AC/ 20V S.PEK 16/8 DUAL 1k SP PEAK
MASS MEM
BL: 1
RE: 0
WINDOW
HANNING
OVERLAP
MAX
Ch DELAY
0F 0
TRIGGER
ChA
SLOPE:+
LEVEL:
10.2%
POSITION
-0F 2/64
UNIT
X:Hz
Y:V
COH BLNK
OFF
10
MAG
V
0
0
PWR SP B
LIN
5kHz
3725.0Hz
6.002 V
00:47
!ARFI DISPLAY

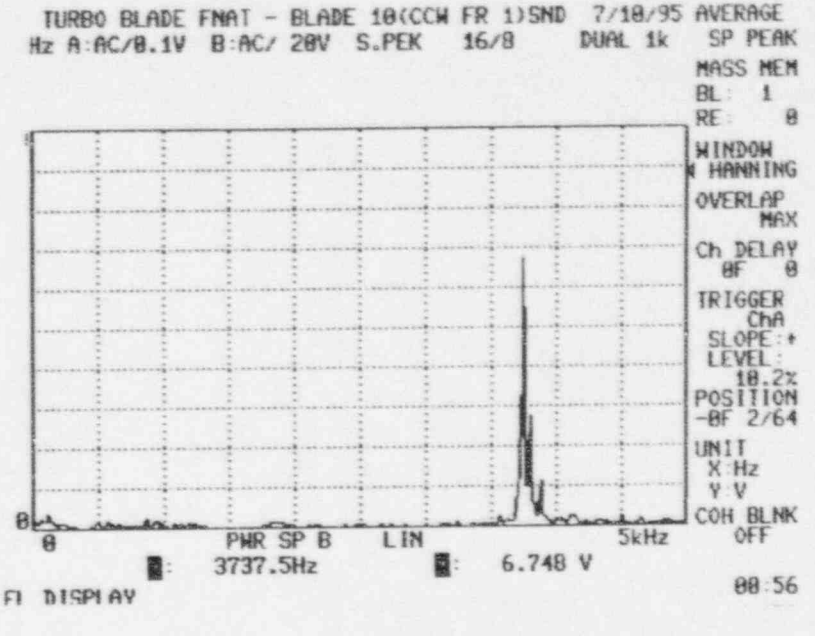

MNS1A TURBO BLADE FNAT - BLADE 5 (CCW FR 1)SND 7/10/95 AVERAGE
5kHz A:AC/0.1V B:AC/ 20V S.PEK 16/8 DUAL 1k SP PEAK
MASS MEM
BL: 1
RE: 0
WINDOW
HANNING
OVERLAP
MAX
Ch DELAY
0F 0
TRIGGER
ChA
SLOPE:+
LEVEL:
10.2%
POSITION
-0F 2/64
UNIT
X:Hz
Y:V
COH BLNK
OFF
10
MAG
V
0
0
PWR SP B
LIN
5kHz
3712.5Hz
6.296 V
!ARFI DISPLAY
00:50

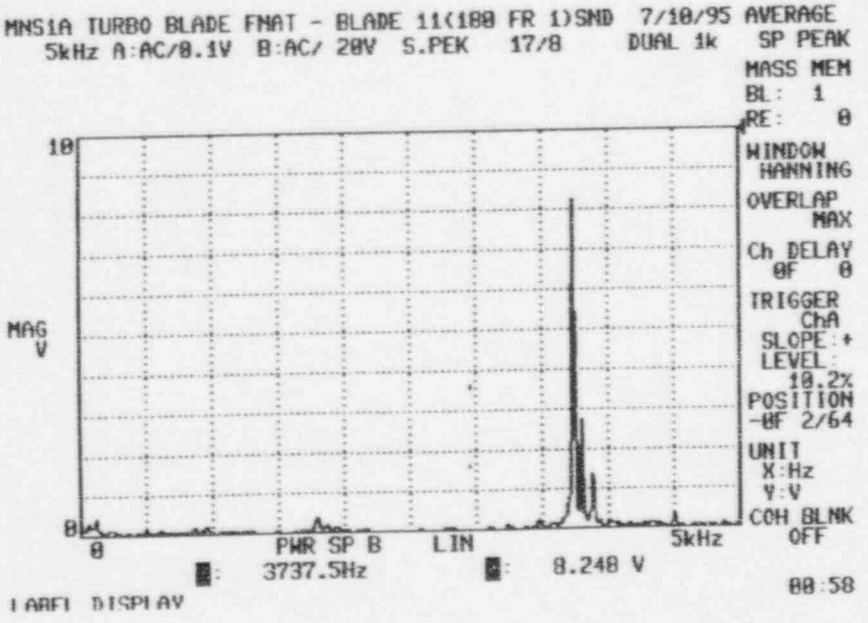

MNS1A TURBO BLADE FNAT - BLADE 6 (CCW FR 1)SND 7/10/95 AVERAGE
5kHz A:AC/0.1V B:AC/ 20V S.PEK 16/8 DUAL 1k SP PEAK
MASS MEM
BL: 1
RE: 0
WINDOW
HANNING
OVERLAP
MAX
Ch DELAY
0F 0
TRIGGER
ChA
SLOPE:+
LEVEL:
10.2%
POSITION
-0F 2/64
UNIT
X:Hz
Y:V
COH BLNK
OFF
20
MAG
V
0
0
PWR SP B
LIN
5kHz
3725.0Hz
12.834 V
!ARFI DISPLAY
00:51

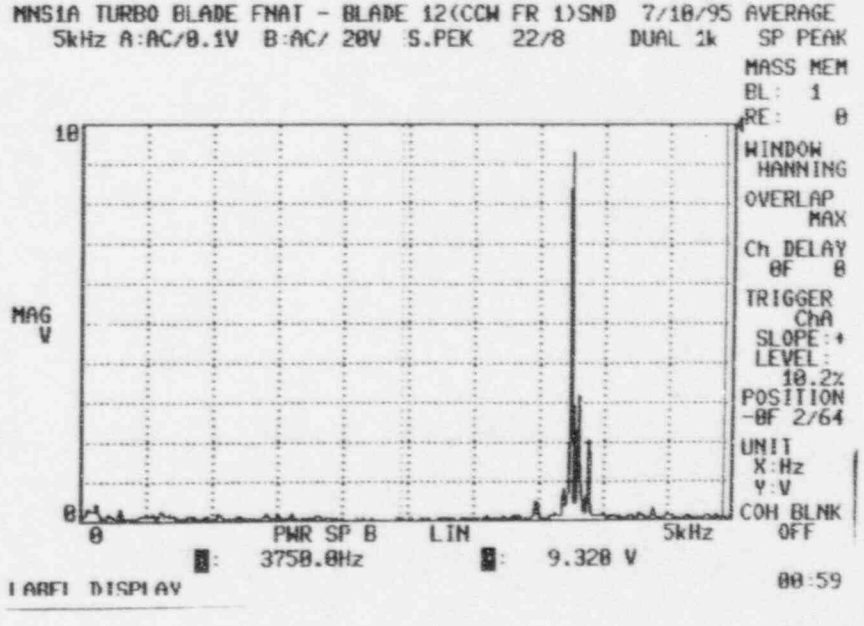

MNS1A TURBO BLADE FNAT - BLADE 7 (CCW FR 1)SND 7/10/95 AVERAGE
5kHz A:AC/0.1V B:AC/ 20V S.PEK 15/8 DUAL 1k SP PEAK
MASS MEM
BL: 1
RE: 0
WINDOW
HANNING
OVERLAP
MAX
Ch DELAY
0F 0
TRIGGER
ChA
SLOPE:+
LEVEL:
10.2%
POSITION
-0F 2/64
UNIT
X:Hz
Y:V
COH BLNK
OFF
4
MAG
V
0
0
PWR SP B
LIN
5kHz
3725.0Hz
1.939 V
!ARFI DISPLAY
00:53

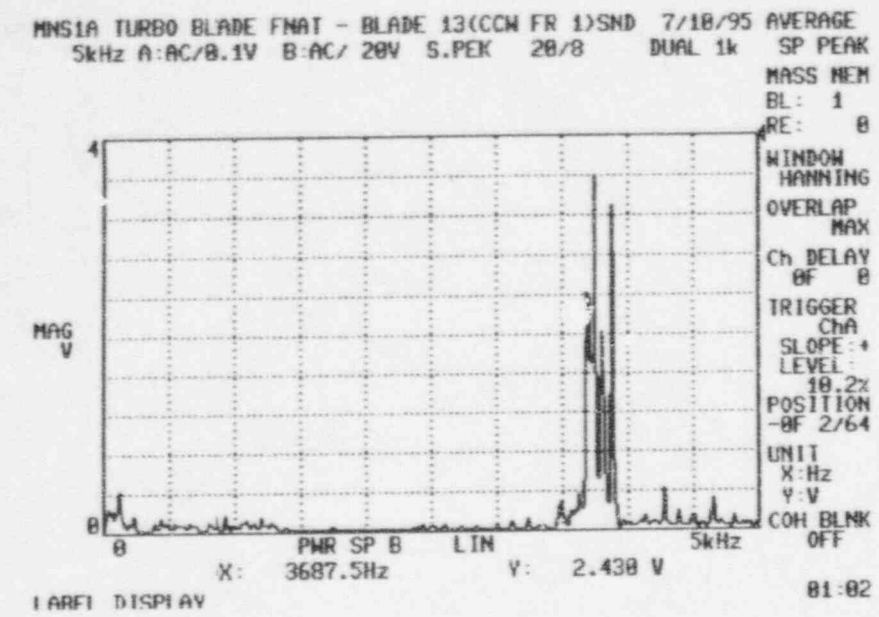

MNS1A TURBO BLADE FNAT - BLADE 8 (CCW FR 1)SND 7/10/95 AVERAGE
5kHz A:AC/0.1V B:AC/ 20V S.PEK 18/8 DUAL 1k SP PEAK
MASS MEM
BL: 1
RE: 0
WINDOW
HANNING
OVERLAP
MAX
Ch DELAY
0F 0
TRIGGER
ChA
SLOPE:+
LEVEL:
10.2%
POSITION
-0F 2/64
UNIT
X:Hz
Y:V
COH BLNK
OFF
10
MAG
V
0
0
PWR SP B
LIN
5kHz
3725.0Hz
6.855 V
!ARFI DISPLAY

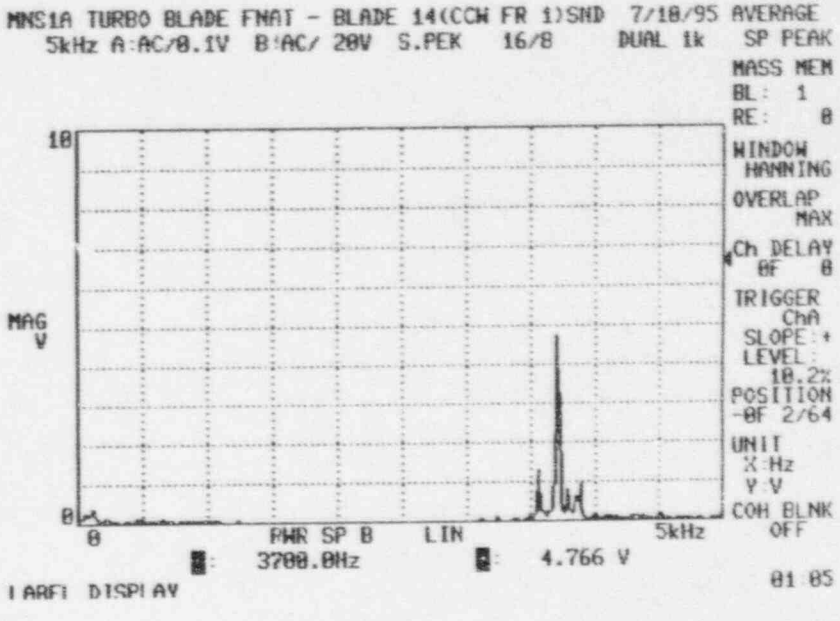

MNS1A TURBO BLADE FNAT - BLADE 9 (CCW FR 1)SND 7/10/95 AVERAGE
5kHz A:AC/0.1V B:AC/ 20V S.PEK 16/8 DUAL 1k SP PEAK
MASS MEM
BL: 1
RE: 0
WINDOW HANNING
OVERLAP MAX
Ch DELAY 0F 0
TRIGGER ChA
SLOPE:+
LEVEL: 10.2%
POSITION -0F 2/64
UNIT X:Hz Y:V
COH BLNK OFF
MAG V
10
0
0 PWR SP B LIN 5kHz
3737.5Hz 9.386 V
00:55
FARFI DISPLAY


TURBO BLADE FNAT - BLADE 10(CCW FR 1)SND 7/10/95 AVERAGE
Hz A:AC/0.1V B:AC/ 20V S.PEK 16/8 DUAL 1k SP PEAK
MASS MEM
BL: 1
RE: 0
WINDOW HANNING
OVERLAP MAX
Ch DELAY 0F 0
TRIGGER ChA
SLOPE:+
LEVEL: 10.2%
POSITION -0F 2/64
UNIT X:Hz Y:V
COH BLNK OFF
0
0 PWR SP B LIN 5kHz
3737.5Hz 6.748 V
00:56
FI DISPLAY


MNS1A TURBO BLADE FNAT - BLADE 11(180 FR 1)SND 7/10/95 AVERAGE
5kHz A:AC/0.1V B:AC/ 20V S.PEK 17/8 DUAL 1k SP PEAK
MASS MEM
BL: 1
RE: 0
WINDOW HANNING
OVERLAP MAX
Ch DELAY 0F 0
TRIGGER ChA
SLOPE:+
LEVEL: 10.2%
POSITION -0F 2/64
UNIT X:Hz Y:V
COH BLNK OFF
MAG V
10
0
0 PWR SP B LIN 5kHz
3737.5Hz 8.248 V
00:58
FARFI DISPLAY


MNS1A TURBO BLADE FNAT - BLADE 12(CCW FR 1)SND 7/10/95 AVERAGE
5kHz A:AC/0.1V B:AC/ 20V S.PEK 22/8 DUAL 1k SP PEAK
MASS MEM
BL: 1
RE: 0
WINDOW HANNING
OVERLAP MAX
Ch DELAY 0F 0
TRIGGER ChA
SLOPE:+
LEVEL: 10.2%
POSITION -0F 2/64
UNIT X:Hz Y:V
COH BLNK OFF
MAG V
10
0
0 PWR SP B LIN 5kHz
3750.0Hz 9.328 V
00:59
FARFI DISPLAY


MNS1A TURBO BLADE FNAT - BLADE 13(CCW FR 1)SND 7/18/95 AVERAGE
5kHz A:AC/8.1V B:AC/ 20V S.PEK 20/8 DUAL 1k SP PEAK
MASS MEM
BL: 1
RE: 0
WINDOW
HANNING
OVERLAP
MAX
Ch DELAY
0F 0
TRIGGER
ChA
SLOPE: +
LEVEL:
10.2%
POSITION
-0F 2/64
UNIT
X:Hz
Y:V
COH BLNK
OFF
MAG
V
4
0
0
PWR SP B
LIN
5kHz
X: 3687.5Hz
Y: 2.430 V
01:02
[ARFI DISPLAY


MNS1A TURBO BLADE FNAT - BLADE 14(CCW FR 1)SND 7/18/95 AVERAGE
5kHz A:AC/8.1V B:AC/ 20V S.PEK 16/8 DUAL 1k SP PEAK
MASS MEM
BL: 1
RE: 0
WINDOW
HANNING
OVERLAP
MAX
Ch DELAY
0F 0
TRIGGER
ChA
SLOPE: +
LEVEL:
10.2%
POSITION
-0F 2/64
UNIT
X:Hz
Y:V
COH BLNK
OFF
MAG
V
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0
0
PWR SP B
LIN
5kHz
3708.0Hz
4.766 V
01:05
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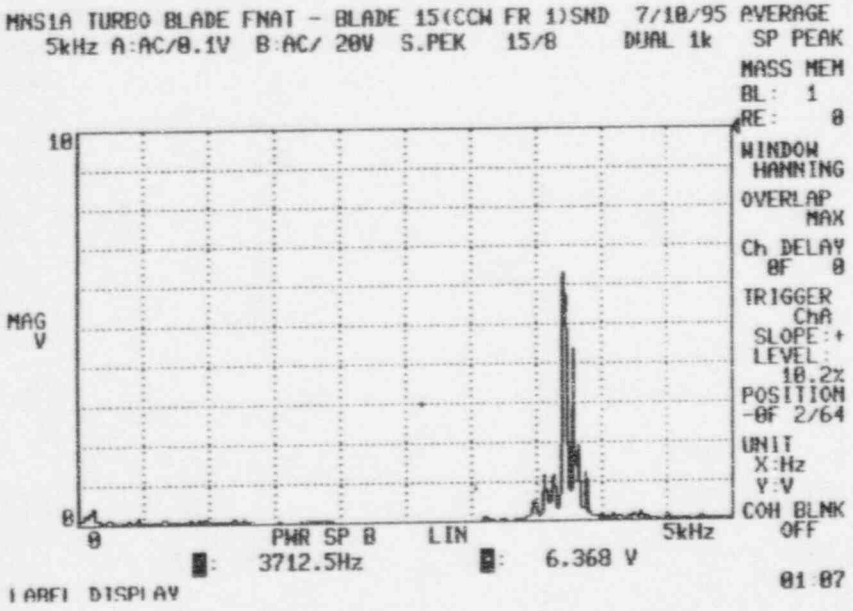
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5kHz A:AC/8.1V B:AC/ 20V S.PEK 15/8 DUAL 1k SP PEAK
MASS MEM
BL: 1
RE: 0
WINDOW
HANNING
OVERLAP
MAX
Ch DELAY
0F 0
TRIGGER
ChA
SLOPE: +
LEVEL:
10.2%
POSITION
-0F 2/64
UNIT
X:Hz
Y:V
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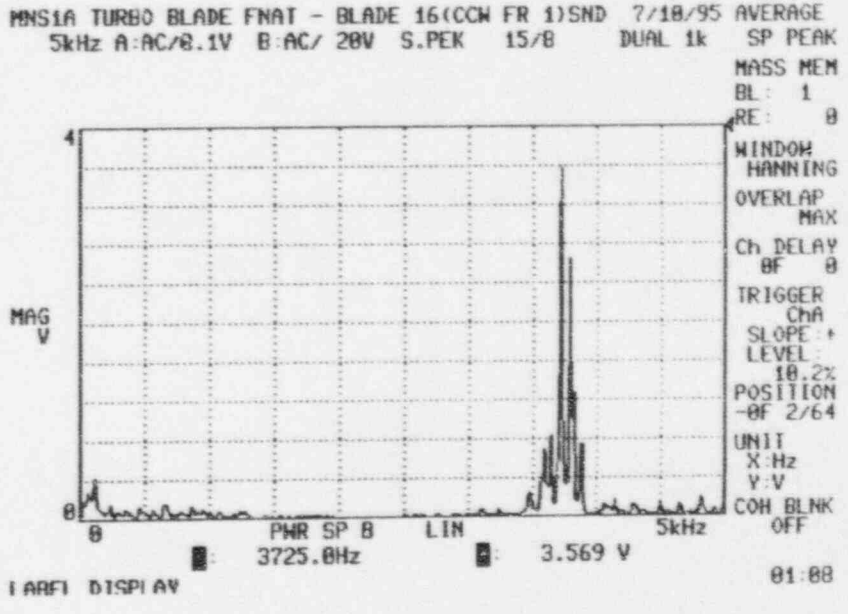
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MASS MEM
BL: 1
RE: 0
WINDOW
HANNING
OVERLAP
MAX
Ch DELAY
0F 0
TRIGGER
ChA
SLOPE: +
LEVEL:
10.2%
POSITION
-0F 2/64
UNIT
X:Hz
Y:V
COH BLNK
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MAG
V
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0
PWR SP B
LIN
5kHz
3725.0Hz
3.569 V
01:08
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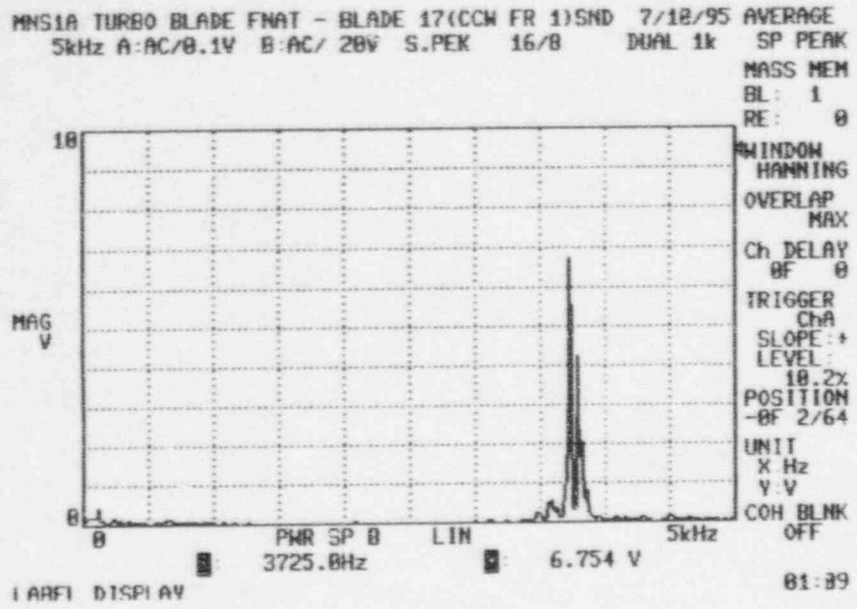
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5kHz A:AC/0.1V B:AC/ 20V S.PEK 16/8 DUAL 1k SP PEAK
MASS MEM
BL: 1
RE: 0
WINDOW HANNING
OVERLAP MAX
Ch DELAY 0F 0
TRIGGER ChA
SLOPE: +
LEVEL: 10.2%
POSITION -0F 2/64
UNIT X:Hz Y:V
COH BLNK OFF
MAG V
10
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PWR SP B
LIN
5kHz
3725.0Hz
6.754 V
01:09
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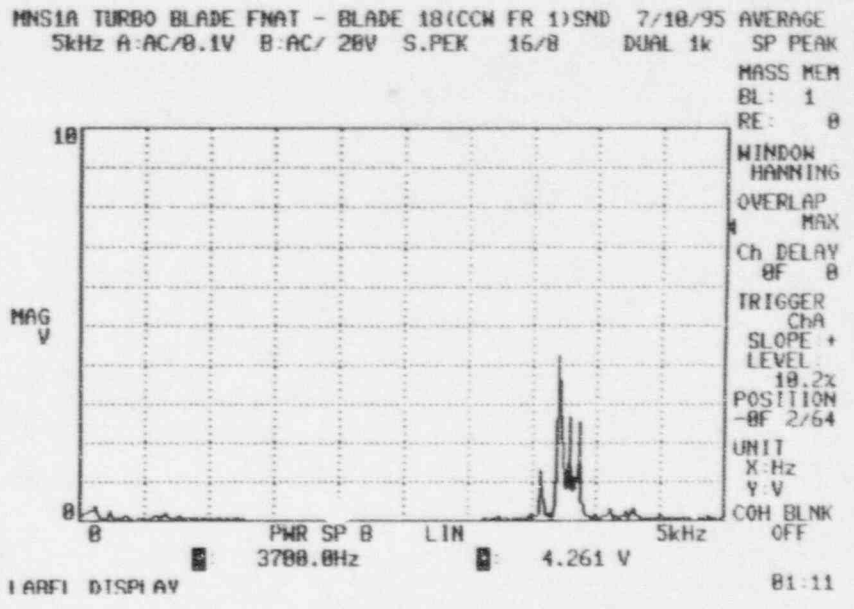
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MASS MEM
BL: 1
RE: 0
WINDOW HANNING
OVERLAP MAX
Ch DELAY 0F 0
TRIGGER ChA
SLOPE: +
LEVEL: 10.2%
POSITION -0F 2/64
UNIT X:Hz Y:V
COH BLNK OFF
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10
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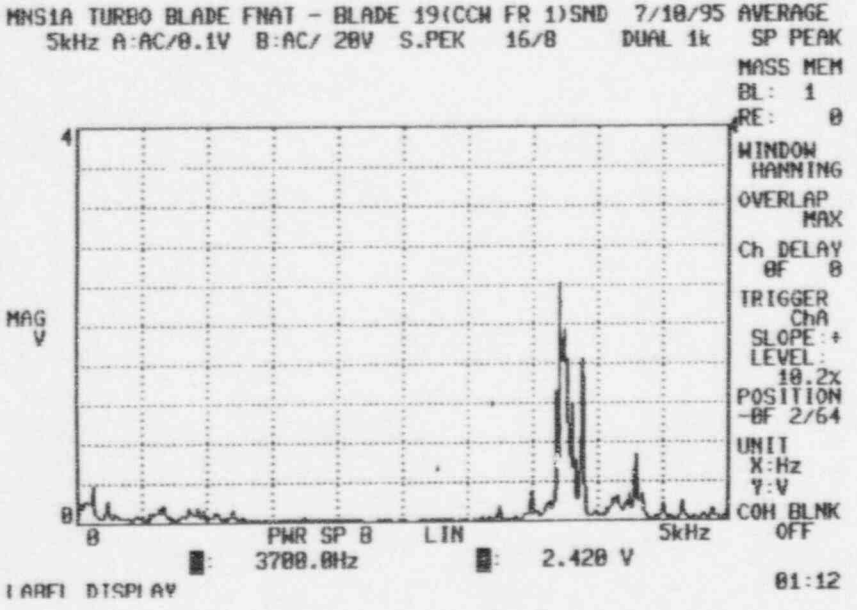
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MASS MEM
BL: 1
RE: 0
WINDOW HANNING
OVERLAP MAX
Ch DELAY 0F 0
TRIGGER ChA
SLOPE: +
LEVEL: 10.2%
POSITION -0F 2/64
UNIT X:Hz Y:V
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5kHz
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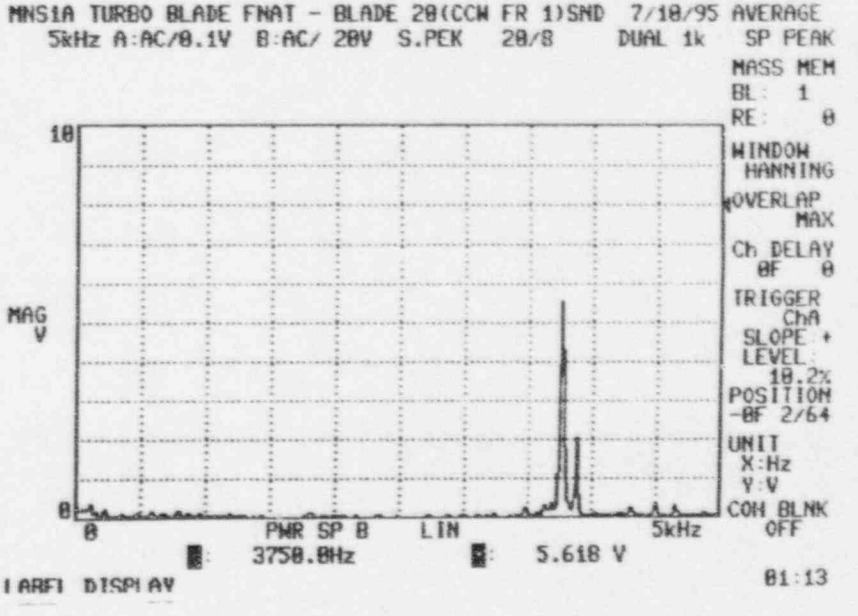
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5kHz A:AC/0.1V B:AC/ 20V S.PEK 20/8 DUAL 1k SP PEAK
MASS MEM
BL: 1
RE: 0
WINDOW HANNING
OVERLAP MAX
Ch DELAY 0F 0
TRIGGER ChA
SLOPE: +
LEVEL: 10.2%
POSITION -0F 2/64
UNIT X:Hz Y:V
COH BLNK OFF
MAG V
10
0
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PWR SP B
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5kHz
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01:13
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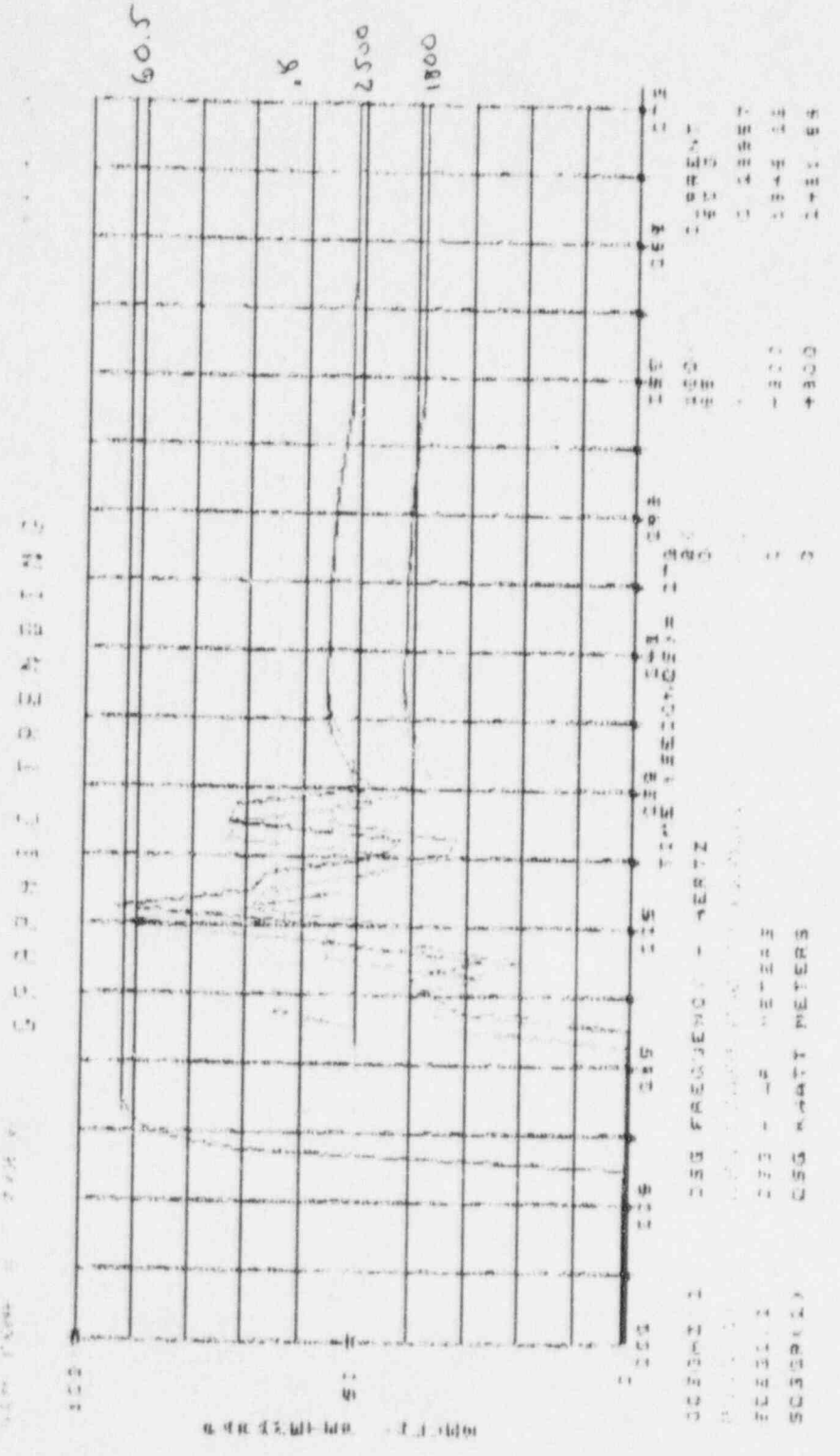
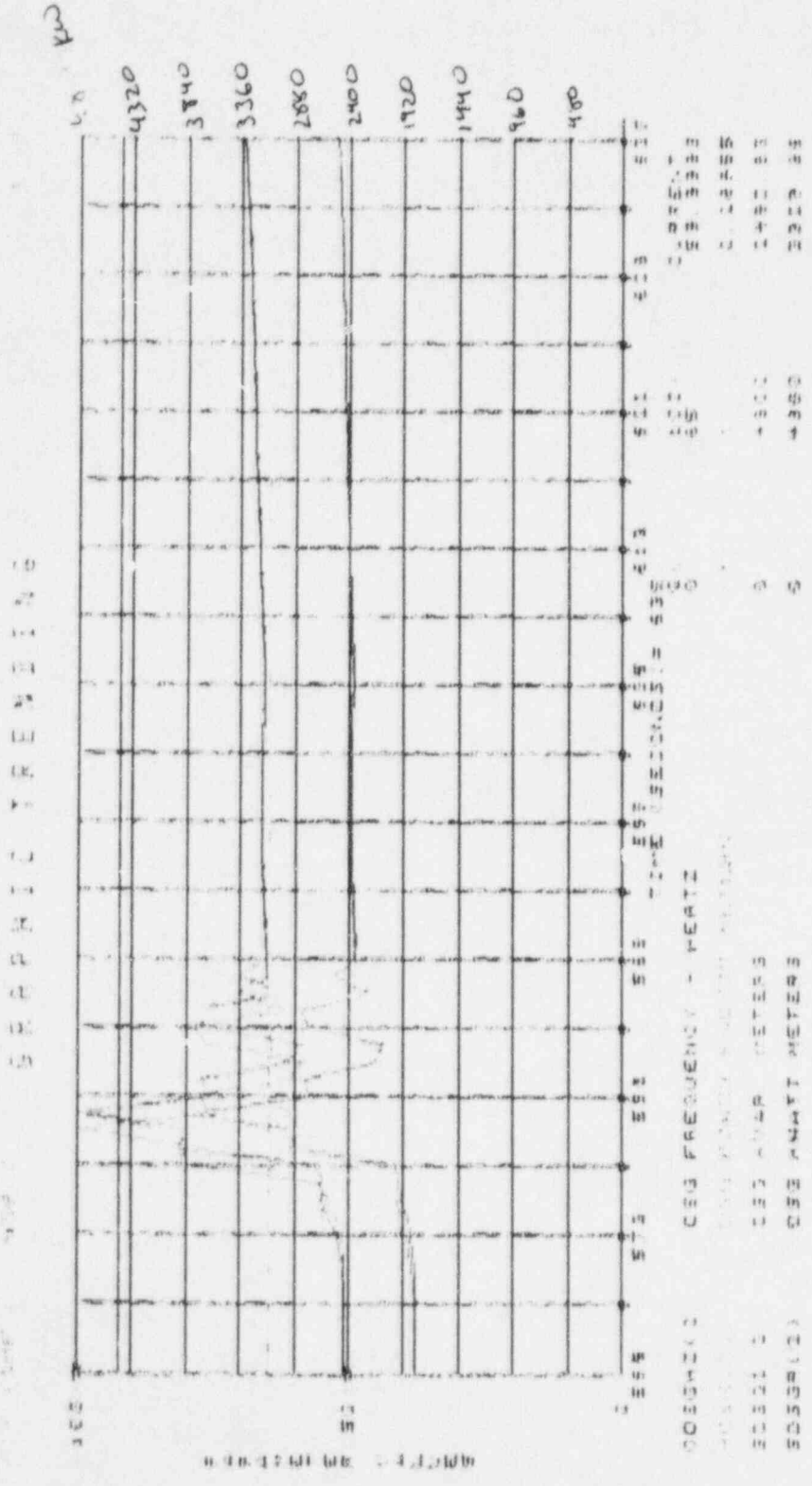

60.5
2500
1800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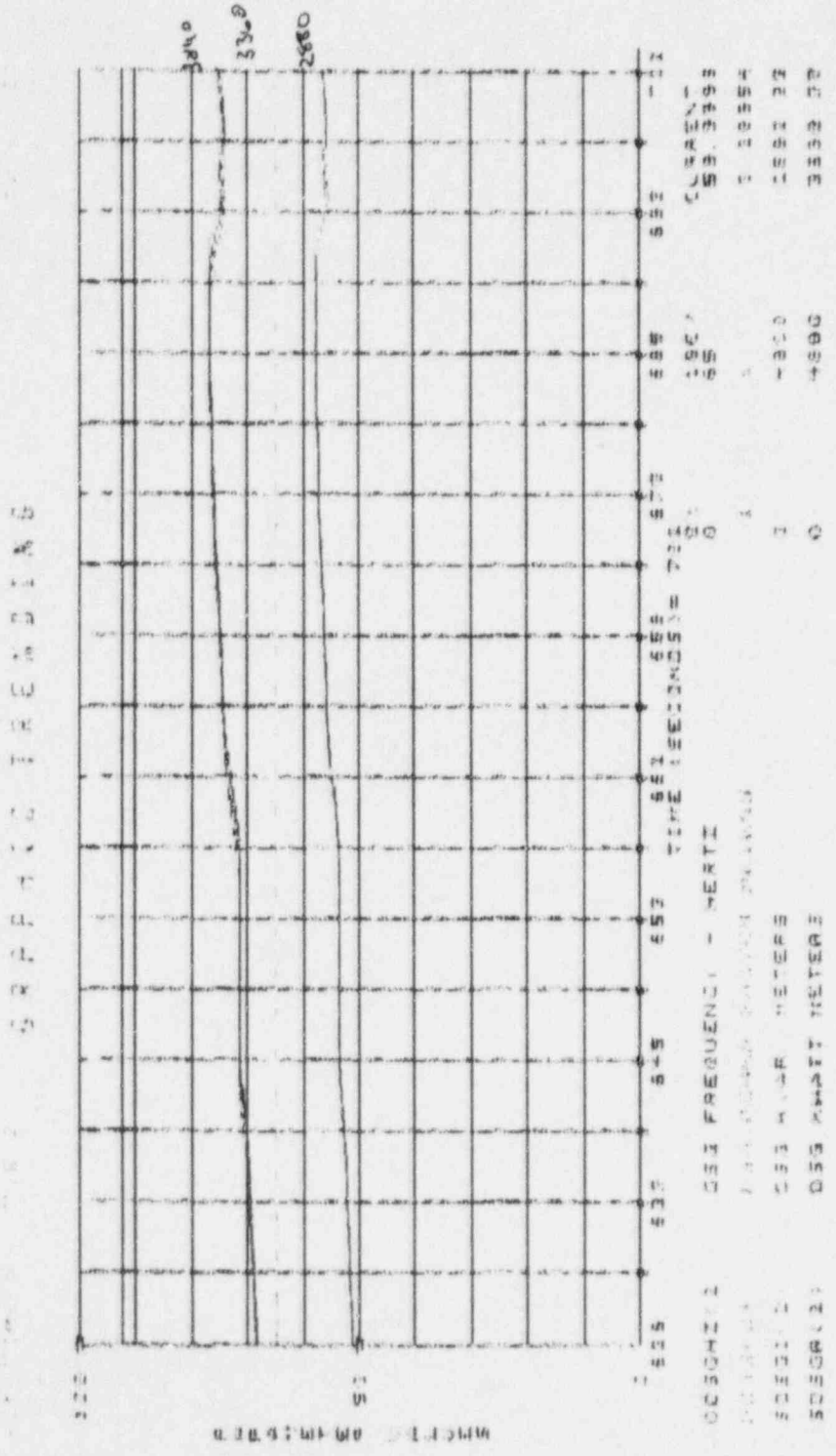
3840
3360
2880
2400
1920
1440
960
480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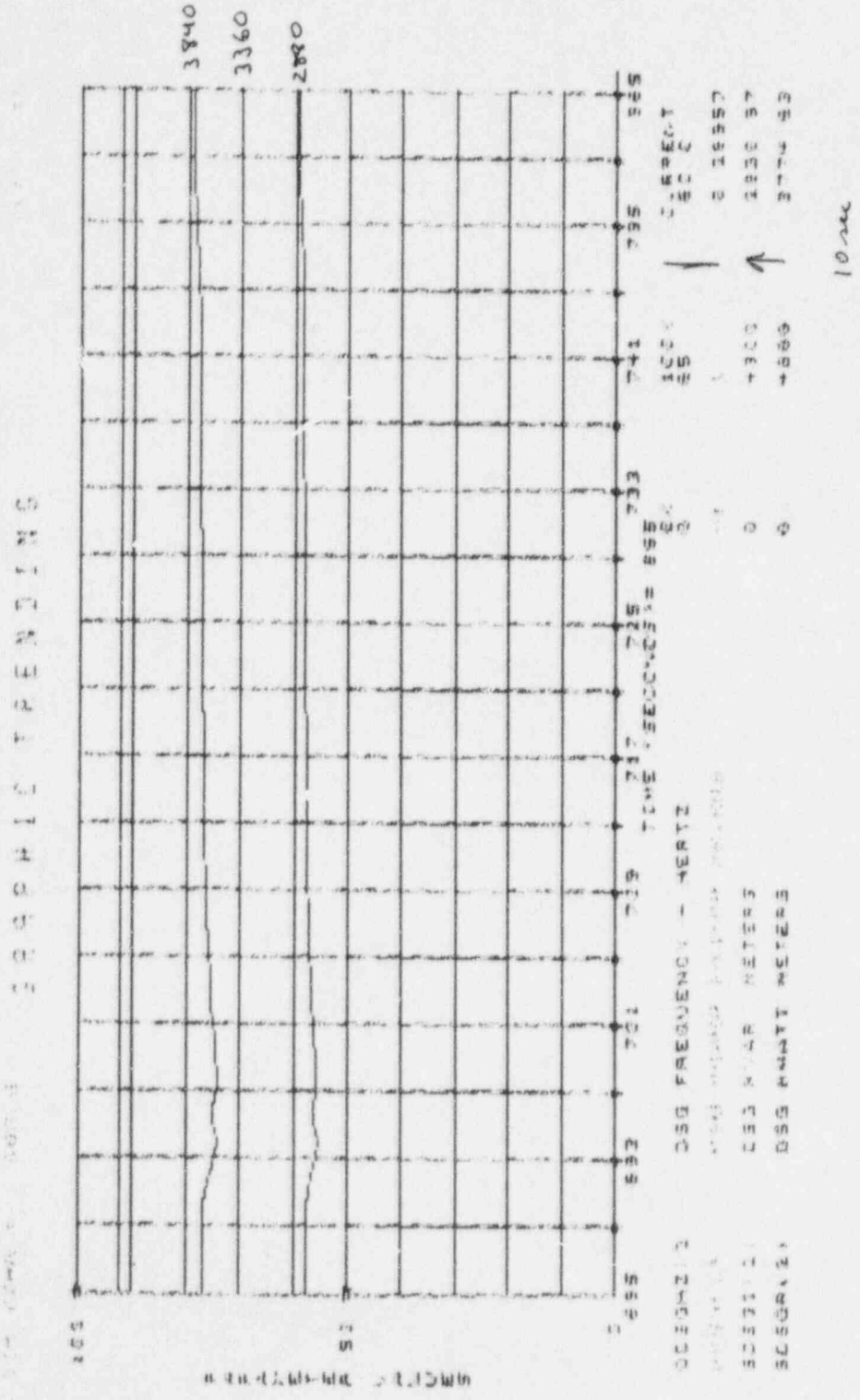
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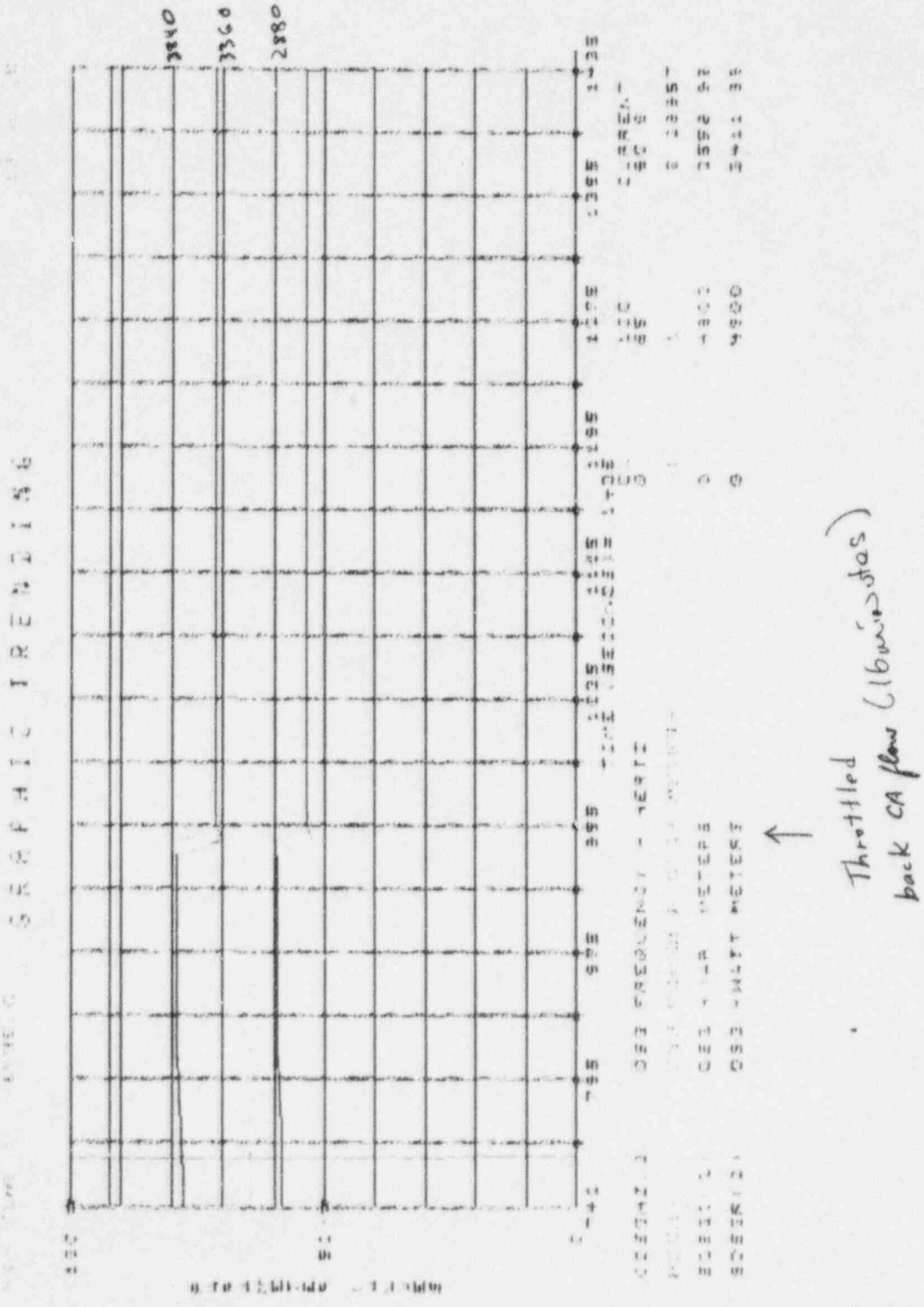
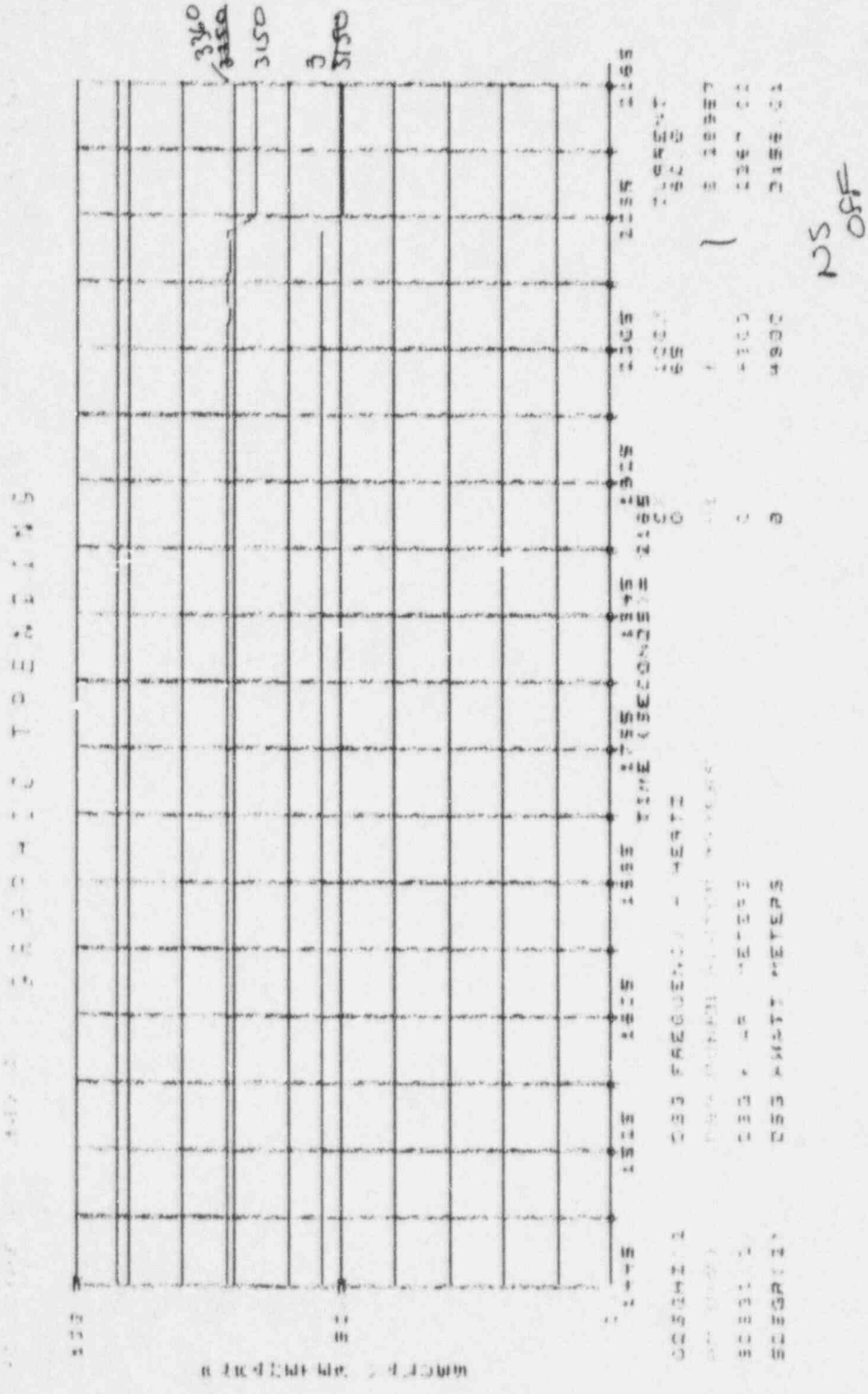
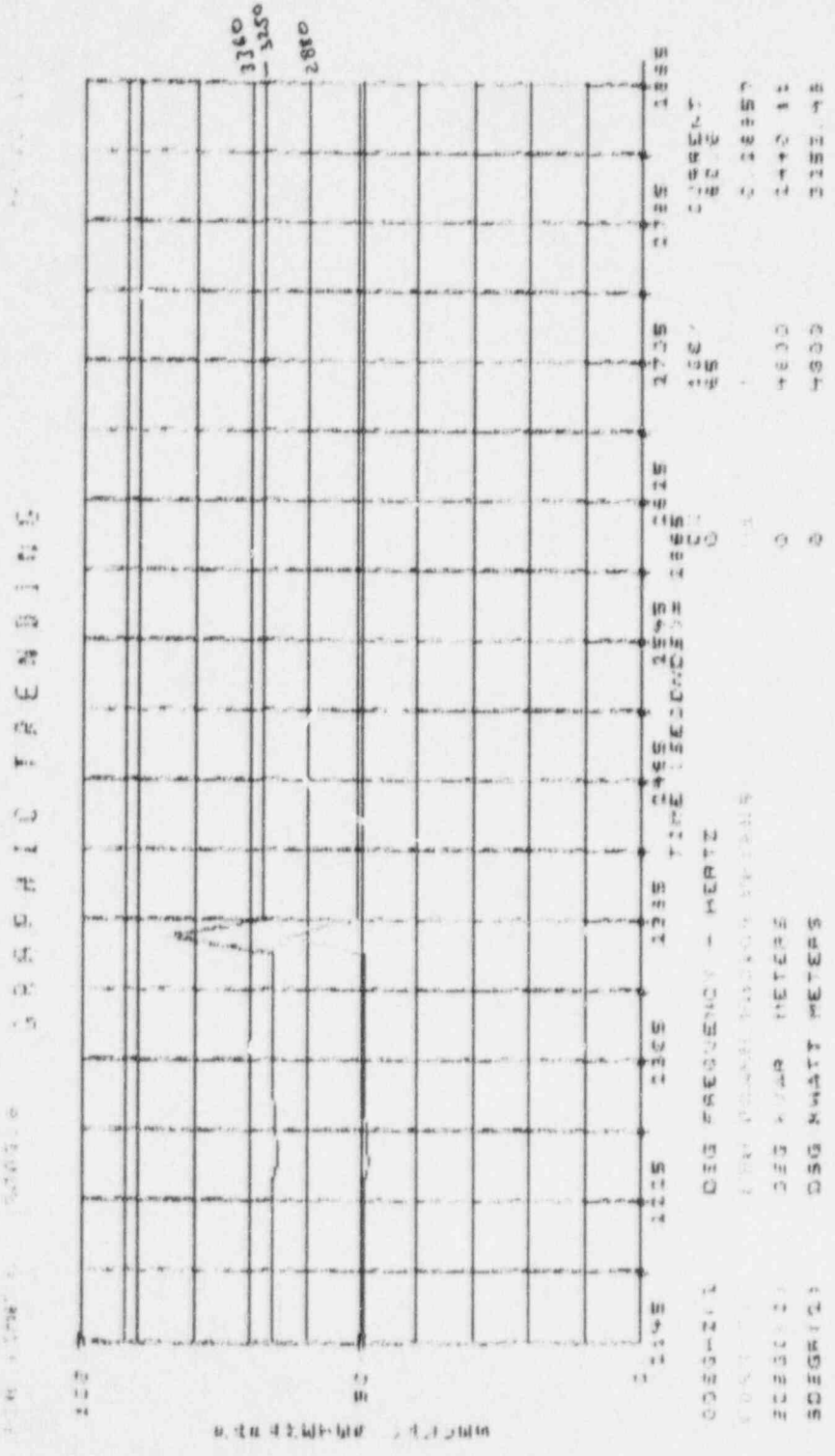
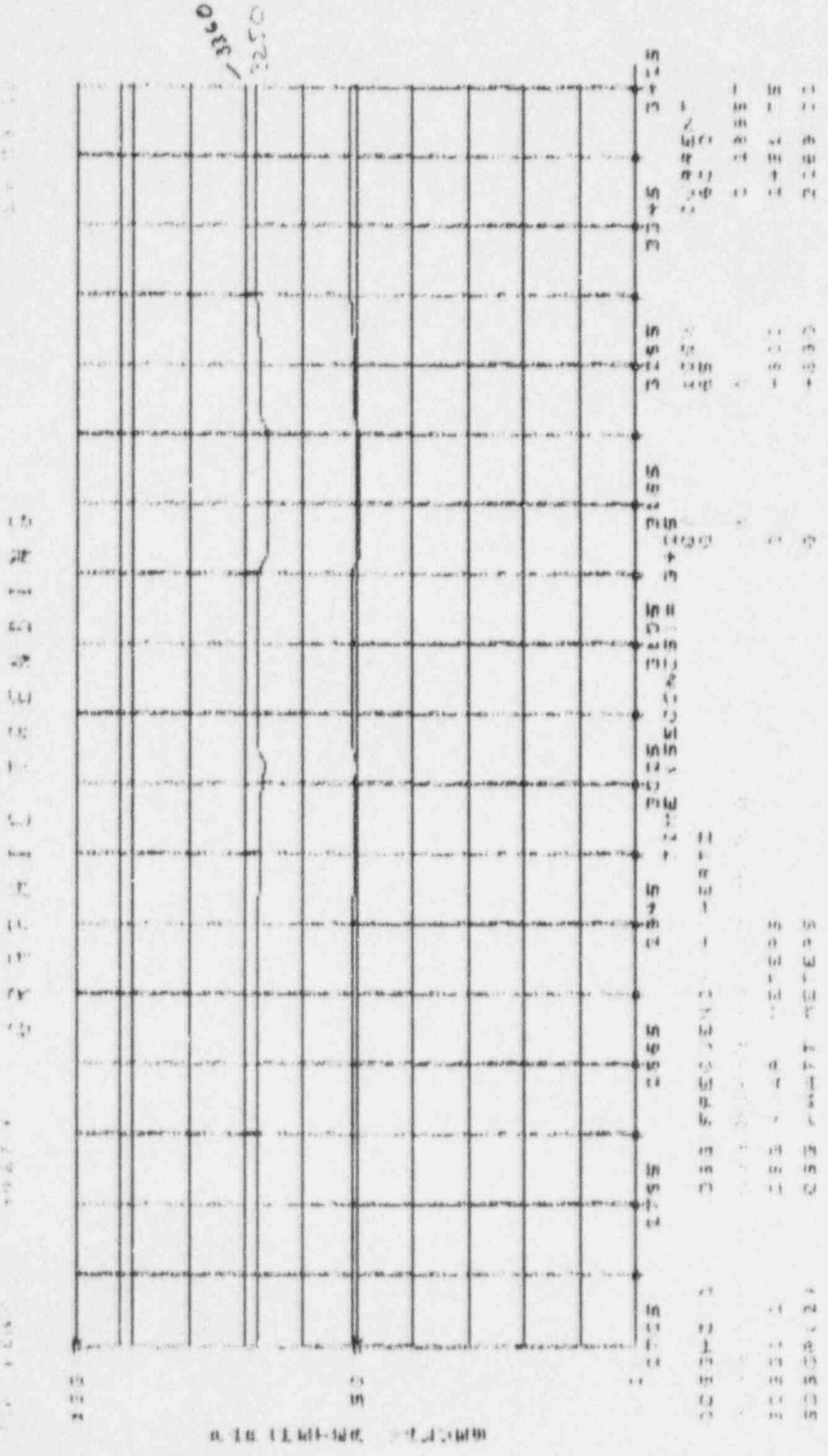
2880


3840
3360
2880
Throttled back CA flow (16 units/sec)


3360
3350
3150
3
3150
25
OFF




R2 Flow (max RV)

Attachment 4, LOCA EDG Load Requirement Per FSAR, Table 8-1

Sequence Number	Equipment Or Application	Required During LOCA	KW Load	Est Load Time (Min)	Remarks	Sum of KW
1	Centrifugal Charging Pump	680 HP	507	0.18	One per diesel	507
1	Motor Operated Valves	112 KW	112	0.18	Estimated	619
1	Vital AC-DC Sys. Batt. Chgrs.	60 KVA	60	0.18	Two per diesel	679
1	VA Filtered Exhaust Fans	50 HP	37	0.18	Plus 40 HP motor added w/ group 8	716
1	VC/YC System Control Room Air Handling Unit Fans	40 HP	30	0.18	Two per station	746
1	30 KVA transformer to H2 Analyzer (1/2 EMX A/B-R7D)	30 KVA	24	30.00		770
1	Diesel Air Compressors	30 HP	22	0.18	Two 15 HP comps.	792
1	Diesel Bldg.General Vent. Supply Fans	25 HP	19	0.18	Two 20 HP fans per diesel	811
1	Diesel Generator Rm. Sump Pump	26 HP	19	0.18	Two 15 HP pumps per diesel	830
1	Ground Water Drainage System Pumps	20 HP	15	0.18	Plus 10 HP motor added w/ group 8	845
1	Diesel Jacket/Intercooler Pump	19 HP	14	0.18	One per diesel	859
1	600/120 V Power Panelboard	14.8 KVA	11.8	0.18	Two per station	871
1	VC/YC Sys. Swgr.Rm. Air Handling Unit Fans	15 HP	11	0.18	Two 7.5 HP fans per diesel	882
1	VC/YC System Pressure Filter Heater	10 KW	10	0.18	Two per station	892
1	Diesel Lube Oil Before & After Pump	9.5 HP	7.1	0.18	One per diesel	899
1	VC/YC System Pressure Filter Fan	5 HP	4	0.18	Two per station	903
1	Diesel Generator Battery Charger	5 KVA	4	0.18	One per diesel	907
1	Diesel Lube Oil Heater Pump	5 HP	4	0.18	One per diesel	911
1	Hydrogen Mitigation Pnlbd.	5 KVA	4	0.18	One per diesel	915
1	R.H.R. & CS Sump Rm. Sump Pump	4.5 HP	3.4	0.18	One per diesel	918
1	Diesel 600/120V Panelboard	3.7 KVA	3	0.18	One per diesel	921
1	Diesel Fuel Oil Transfer Pump	1.5 HP	1.1	0.18	One per diesel	922
1	Hydrogen Analyzer	1.4 KVA	1.1	0.18	One per diesel	924
1	SSFARC Control Power	0.75 KVA	0.6	0.18	Two per station	924
1	Diesel Crank Case Vacuum	0.5 HP	0.4	0.18	One per diesel	925
1	Radiation Monitoring	0.25 HP	0.2	0.18	One per station	925
1	Diesel Fuel Oil Drip Tank Pump	0.1 HP	0.1	0.18	One per diesel	925
1	1500 KVA, 600 VAC Essential Aux. Power Sys. Load Center		0	0.18	Additional load center in Sequence 2	925
2	Safety Injection Pump	440 HP	328	0.27	One per diesel	1253
2	Annulus Ventilation System Moisture Separator Heaters	43 KW	43	0.27	One per diesel	1296
2	Annulus Ventilation System Fan	24 HP	18	0.27	One per diesel	1314
2	Radiation Monitoring	2	1.5	0.27		1315
2	1500 KVA, 600 VAC Essential Aux. Power Sys Load Center		0	0.27		1315
3	Residual Heat Removal Pump	455 HP	339	0.33	One per diesel	1654
3	Residual Heat Removal Pump AHU	1.2 HP	0.9	0.33		1655
4	Containment Spray Pump	420 HP	313	0.42	One per diesel	1968
4	Containment Spray Pump AHU	1.2 HP	0.9	0.42		1969

Attachment 4, LOCA EDG Load Requirement Per FSAR, Table 8-1

Sequence Number	Equipment Or Application	Required During LOCA	KW Load	Est Load Time (Min)	Remarks	Sum of KW
5	Component Cooling Water	350 HP	261	0.50	Two 200 HP pumps	2230
6	Nuclear Service Water Pump	700 HP	522	0.58	One per diesel	2752
6	Nuclear Service Water Strainer Backflush Drum Motor	3 HP	2.2	0.58	One per diesel	2754
7	Auxiliary Fdwtr Pump (Mtr. Dr.)	510 HP	380	0.67	One per diesel	**3134**
8	VC/YC System Control Room Area AHU Fans	70 HP	52	10.00	Two per station	3186
8	Hydrogen Skimmer Fan	44 HP	33	10.00	One per diesel	3219
8	VA Filtered Exhaust Fans	40 HP	30	10.00		3249
8	VC/YC System Control Rm. & Control Rm. Area Chilled Water	36 HP	27	10.00	Two per station	3276
8	Containment Air Return Fan	28 HP	21	10.00	One per diesel	3297
8	VC/YC Sys. Comp. Oil Pump	1.5 HP	1.1	10.00	Two per station	3298
8	VC/YC System Battery Rm. Exhaust Fans	1 HP	0.75	10.00	Two per station	3299
9	Fuel Pool Cooling Pump	200 HP	149	600.00	One per diesel	3448
9	Fuel Pool Cooling Pump AHU	1.3 HP	1	600.00	One per diesel	3449
10	VC/YC System Compressor	353 HP	263	15.00	Two per station	3712
10	Hydrogen Recombiner	64 KW	64	60.00	One per diesel	3776
					TOTAL	**3776**

Performed AC Williams 7/26/95
Checked AH Polaski 7/26/95

Generator Exciter and Transformer Loading:

Per M-1301.00-0040-001 Rev. DG, the Basler model SBHV exciter has a nameplate rating of:

Load = 27.0 KW
Current (Full Load) = 122.0 Amps

Per Section "E" of the EDG Auxiliaries Manual, the generator characteristics/limits are:

V_{field} = 218 Volts, DC
I_{field} = 121.6 Amps, DC

The exciter rating per the Section "E" information is therefore:

$(V_{field})(I_{field}) = (218\ V)(121.6\ A) = 26.5\ KW$

Therefore 26.5 KW ≈ 27 KW, which verifies the consistency of this information.

The Basler formula to convert current and voltage into AC input power is:

$S_{3\phi} = (1.28)(V_{field})(0.815)(I_{field})\sqrt{3}$
$S_{3\phi} = (1.28)(218)(0.815)(121.6)\sqrt{3}$
$S_{3\phi} = 47.9\ KVA$
$S_{3\phi} \approx 48\ KVA$

Per manufacturer's design, pf = 0.90; but 1.0 is more conservative, therefore:

$P_{3\phi} = pf(S_{3\phi}) = 48\ KW$

The no load transformer load is 3*(4.2 KW) = 12.6 KW, and therefore the total load to be added to the output data from the CYME program (Attachment 9) is:

$$\mathbf{P_{3\phi,\ Total} = 48 + 12.6 = 61\ KW}$$

Performed AC Williams 7/26/95
Checked JH Polcin 7/26/95

Based on the stated mechanical justifications, the adjustment in KW is calculated as follows:

LOCA Individual Motor Load Information:

1) Sequencer Group 8

The following values are to be used in the main calculation for sequencer group 8 motor loads:

TABLE A6 - 1

Load Name	KW Value (CYME)	FSAR Table 8-1 Load Value	KW Value (FSAR)	KW Value* (ESF)
Hydrogen Skimmer Fan	29	44 HP	33	33
Cont. Air Return Fan	22	28 HP	21	21
Battery Rm Exh Fans	.7	1 HP	.8	.8
CR/CRA Chilled Water Pump	28	36 HP	27	27
CRA AHU Fans	40	70 HP	52	52
Comp Oil Pump	1.1	1.5 HP	1.1	1.1
Aux Bldg Filtered Exh Fans	29	40 HP	30	30
Total	150		165	165

*ESF loads are assumed to be the same as FSAR loads.

Therefore:

a) CYME: $P_{SG8,\ CYME} = 150$ KW

b) FSAR/Simulator: $P_{SG8,\ FSAR} = 165$ KW

c) ESF Test: $P_{SG8,\ ESF} = 165$ KW

2) Fuel Pool Cooling (KF) Pumps

The following values are to be used in the main calculation for KF Pump motor loads in the main calculation:

a) CYME: $P_{KF,\ CYME} = 146$ KW (per Reference 4, Page F-2)

b) ESF Test:

Per Attachment 7, the KF Pump is modeled at 195 HP during a Blackout / LOCA. This converts to KW as follows (0.92 motor efficiency per MCM 1318.23-0008):

$$P_{KF,\ ESF} = \frac{(195HP)\left(.746\ KW/HP\right)}{0.92} = 158\ KW$$

c) FSAR/Simulator:

Per Attachment 4, the KF Pump requires 200 HP during a Blackout / LOCA. This converts to KW as follows:

$$P_{KF,\ FSAR} = (200HP)\left(.746\ KW/HP\right) = 149\ KW$$

Performed AC Williams 7/26/95
Checked JH Polite 7/26/95

3) MOV Positioning Complete

The motor operated valves started with sequencer group 1 are assumed to have completed their valve positioning at 5 minutes into the LOOP/LOCA.

a) CYME:

The CYME calculation is assumed to incorporate decreases in valve loads. No credit for reduction in load is taken.

b) FSAR/Simulator:

Per Attachment 4, the MOV load associated with sequencer group 1 is 112 KW. As stated in the main calculation, the steady state valve load is assumed to be 90% of the 112 KW initial load or :

$$P_{MOV} = (.9)(112KW) = 101\ KW$$

c) ESF Test:

The ESF data is taken following valve cycling and therefore no credit for reduction in load is taken.

4) Auxiliary Feed Water Pumps

As stated in the main calculation, the Auxiliary Feed Water (CA) Pumps are throttled at approximately 8 minutes into a large break LOCA. Since the S/G CA throttle valves will require almost complete closure at this point to maintain level less than 50%, the CA pump recirculation line flow of 200 gpm is assumed as the post-throttling flow for each motor driven pump. Plotting the difference in required horsepower from full pump flow (>450 gpm) to recirculation flow (200 gpm) from the CA pump performance curves (Reference 15) results in a load reduction of approximately 150 HP.

a) CYME:

$$P_{CA\ Throttle,\ CYME} = \left(\frac{150HP}{500HP}\right)385.7KW = 116\ KW$$ (Reference 4, Page F-8)

b) FSAR/Simulator:

Reference 1, Table 8-1 lists the required CA pump load as 510 HP.

$$P_{CA\ Throttle,\ FSAR} = (150HP)\left(.746\,KW/HP\right) = 112\ KW$$

c) ESF:

Since this pump is operated during the test, the KW must be reduced in two parts, because one part accounts for operating KW and the other accounts for predicted KW.

$$P_{CA\ Throttle,\ ESF} = \frac{(68HP)\left(.746\,KW/HP\right)}{0.92} + \frac{(150-68HP)\left(.746\,KW/HP\right)}{0.943*} = 120\ KW$$

* Motor efficiency per data sheet MCM-1318.16-0003.

These values shall be used for EDG reduction in load due to CA pump throttling in the main calculation.

As stated in the main calculation, the CA pumps are assumed to be secured within approximately 4 hours of initiation of a LOOP/LOCA. Therefore the entire CA pump load shall be removed from its associated EDG.

a) CYME: $P_{CA,\ CYME} = (386 - 116) = 270\ KW$ (Reference 4, Page F-8)

b) FSAR/Simulator:
Reference 1, Table 8-1 lists the required CA pump load as 510 HP.

$$P_{CA,\,FSAR} = (510HP)\left(.746\,KW/_{HP}\right) \cdot 112 = 268\ KW$$

c) ESF:

$$P_{CA,\,ESF} = \frac{(518HP)\left(.746\,KW/_{HP}\right)}{0.943} \cdot 120 = 290\ KW$$

5) VC/YC System Loads
As stated in the main calculation, the aligned VC/YC Compressor starts 15 minutes into a LOOP/LOCA event. The following values are used for motor loads in the main calculation:

a) CYME: $P_{VC/YC,\,CYME} = 282\ KW$ (Reference 4, Page F-5)

b) FSAR/Simulator:
Per Attachment 4, the VC/YC Compressor requires 353 HP during a LOOP / LOCA. This converts to KW as follows:

$$P_{VC/YC,\,FSAR} = (353HP)\left(.746\,KW/_{HP}\right) = 263\ KW$$

c) ESF Test:
Assume the same load value as for FSAR loads:

$$P_{VC/YC,\,ESF} = (353HP)\left(.746\,KW/_{HP}\right) = 263\ KW$$

The VC/YC Compressor would start for only one EDG at McGuire while the three remaining EDGs would not carry VC/YC loads. These EDGs would have significantly lower loading throughout this event. The sequencer group 8 loads added to the EDGs not carrying the VC/YC loads are calculated as follows:

TABLE A6 - 2

Load Name	KW Value (CYME)	FSAR Table 8-1 Load Value	KW Value (FSAR)	KW Value* (ESF)
Hydrogen Skimmer Fan	29	44 HP	33	33
Cont. Air Return Fan	22	28 HP	21	21
Aux Bldg Filtered Exh Fans	29	40 HP	30	30
Total	80		84	84

*ESF loads are assumed to be the same as FSAR loads.

Therefore:

a) CYME: $P_{SG8,\,CYME} = 80\ KW$

b) FSAR/Simulator: $P_{SG8,\,FSAR} = 84\ KW$

c) ESF Test: $P_{SG8,\,ESF} = 84\ KW$

Performed AC Williams 7/26/95
Checked JH Johnson 7/26/95

Small Break LOCA Individual Motor Load Information:

1) Residual Heat Removal Pump

The following values are available for Residual Heat Removal (ND) pump loads:

a) CYME: $P_{ND,\,CYME} = 352$ KW (Reference 4, Page F-7)

b) FSAR/Simulator: Per Attachment 4, the ND pump requires 455 HP during a Blackout / LOCA. This converts to KW as follows:

$$P_{ND,\,FSAR} = (455\,HP)\left(.746\,{}^{KW}/_{HP}\right) = 339 \text{ KW}$$

c) ESF Test:

Per Attachment 7, the ND pump requires 455 HP during a LOCA. Since this pump is operated during the test, the KW must be reduced in two parts, because one part accounts for operating KW and the other accounts for predicted KW.

$$P_{ND,\,ESF} = \frac{(205\text{HP})\left(.746\,{}^{\text{KW}}/_{\text{HP}}\right)}{0.92} + \frac{(250\text{HP})\left(.746\,{}^{\text{KW}}/_{\text{HP}}\right)}{0.939\,*} = 365 \text{ KW}$$

* Motor efficiency per data sheet MCM-1201.05-0025.

ENCLOSURE 13.12
POWER CALCULATION

Train A SI/BO

NOTES: 1) Power Calculation may be performed below or via computer program, using motor efficiency of 92% and Power Factor (PF) of 0.8.

2) Each Component's Rated hp/kW is from FSAR Table 8.1.2-1, Loads Required During LOCA.

3) Each Component's Running hp/kW may be determined from Head Curve readings or from Δ power readings off transducers.

• Calculate and record each component's Δ Power value:

Component	Rated hp/kW		Running hp/kW		Δ Power	
NV Pump 1A	650 hp	-	340	=	310	hp
NI Pump 1A	422 hp	-	230	=	192	hp
ND Pump 1A	455 hp	-	250	=	205	hp
NS Pump 1A	425 hp	-	285	=	140	hp
KC Pump 1A1	175 hp	-	185	=	0	hp
KC Pump 1A2	175 hp	-	185	=	0	hp
RN Pump 1A	710 hp	-	625	=	85	hp
CA Pump 1A	518 hp	-	450	=	68	hp
KF Pump 1A	195 hp	-	195	=	0	hp
A/C Compressor	495 hp	-	495	=	0	hp
Sump Pumps	67½ hp	-	67.5	=	0	hp
			Total hp	=	1000	hp
Total hp	92% Eff	*	0.746 kW/hp	=	811	kW
H_2 Recombiner	64 kW	-	64	=	0	kW
			Total kW	=	811	kW

Total Δ Power = Total kW / 0.8 PF = 1014 kVA

NOTE: D/G Load (kW) and Power Factor (PF) are taken from control room meters, high speed recorder, or computer data.

• Verify Total Calculated Load on D/G 1A is ≤ 5500 kVA:

$$\frac{\text{D/G Load}}{\text{D/G PF}} + \text{Total } \Delta \text{ Power} = \frac{2800}{0.8} + 1014 = 4514 \text{ kVA}$$

Performed by: Bruce Gross Date: 10/4/94

Checked by: Farha Kazi Date: 10/4/94

ENCLOSURE 13.12
POWER CALCULATION

Train A BO

NOTES:
1) Power Calculation may be performed below or via computer program, using motor efficiency of 92% and Power Factor (PF) of 0.8.
2) Each Component's Rated hp/kW/kVA is from FSAR Table 8.1.2-1, Loads Required During Blackout.
3) Each Component's Running hp/kW/kVA may be determined from Head Curve readings or from Δ power readings off transducers.

· Calculate and record each component's Δ Power value:

Component	Rated hp/kW		Running hp/kW		Δ Power	
NV Pump 1A	450 hp	-	340	=	110	hp
KC Pump 1A1	190 hp	-	140	=	50	hp
KC Pump 1A2	190 hp	-	140	=	50	hp
RN Pump 1A	690 hp	-	400	=	290	hp
CA Pump 1A	518 hp	-	450	=	68	hp
KF Pump 1A	195 hp	-	195	=	0	hp
A/C Compressor	495 hp	-	495	=	0	hp
Sump Pumps	67½ hp	-	67.5	=	0	hp
			Total hp	=	568	hp
Total hp	92% Eff	*	0.746 kW/hp	=	461	kW
Backup PZR Htrs	416 kW	-	416	=	0	kW
			Total kW	=	461	kW
	Total kW		0.8 PF	=	576	kVA
Emerg. Ltng.	30 kVA	-	0	=	30	kVA
Inverter 1KS	15 kVA	-	15	=	0	kVA
			Total Δ Power	=	606	kVA

NOTE: D/G Load (kW) and Power Factor (PF) are taken from control room meters, high speed recorder, or computer data.

· Verify Total Calculated Load on D/G 1A is ≤ 5500 kVA:

$$\frac{\text{D/G Load}}{\text{D/G PF}} + \text{Total Δ Power} = \frac{2200}{0.8} + 606 = 3356 \text{ kVA}$$

Performed by: Bruce Gragg Date: 10/4/94

Checked by: Farhan Karim Date: 10/4/94

ENCLOSURE 13.12
POWER CALCULATION

Train B SI/BO

NOTES: 1) Power Calculation may be performed below or via computer program, using motor efficiency of 92% and Power Factor (PF) of 0.8.

2) Each Component's Rated hp/kW is from FSAR Table 8.1.2-1, Loads Required During LOCA.

3) Each Component's Running hp/kW may be determined from Head Curve readings or from Δ power readings off transducers.

• Calculate and record each component's Δ Power value:

Component	Rated hp/kW		Running hp/kW		Δ Power	
NV Pump 1B	650 hp	-	340	=	310	hp
NI Pump 1B	422 hp	-	230	=	192	hp
ND Pump 1B	455 hp	-	250	=	205	hp
NS Pump 1B	425 hp	-	285	=	140	hp
KC Pump 1B1	175 hp	-	185	=	0	hp
KC Pump 1B2	175 hp	-	185	=	0	hp
RN Pump 1B	710 hp	-	625	=	85	hp
CA Pump 1B	518 hp	-	450	=	68	hp
KF Pump 1B	195 hp	-	195	=	0	hp
A/C Compressor	495 hp	-	495	=	0	hp
Sump Pumps	67½ hp	-	67.5	=	0	hp
			Total hp	=	1000	hp
Total hp	92% Eff	*	0.746 kW/hp	=	811	kW
H_2 Recombiner	64 kW	-	64	=	0	kW
			Total kW	=	811	kW

Total Δ Power = Total kW ÷ 0.8 PF = 1014 kVA

NOTE: D/G Load (kW) and Power Factor (PF) are taken from control room meters, high speed recorder, or computer data.

• Verify Total Calculated Load on D/G 1B is ≤ 5500 kVA:

$$\frac{\text{D/G Load}}{\text{D/G PF}} + \text{Total Δ Power} = \frac{2600}{0.86} + 1014 = 4037 \text{ kVA}$$

Performed by: Bruce Gregg Date: 10/4/94

Checked by: Farha Kazmi Date: 10/4/94

Train B BO

NOTES: 1) Power Calculation may be performed below or via computer program, using motor efficiency of 92% and Power Factor (PF) of 0.8.

2) Each Component's Rated hp/kW/kVA is from FSAR Table 8.1.2-1, Loads Required During Blackout.

3) Each Component's Running hp/kW/kVA may be determined from Head Curve readings or from Δ power readings off transducers.

· Calculate and record each component's Δ Power value:

Component	Rated hp/kW		Running hp/kW		Δ Power	
NV Pump 1B	450 hp	-	340	=	110	hp
KC Pump 1B1	190 hp	-	140	=	50	hp
KC Pump 1B2	190 hp	-	140	=	50	hp
RN Pump 1B	690 hp	-	400	=	290	hp
CA Pump 1B	518 hp	-	450	=	68	hp
KF Pump 1B	195 hp	-	195	=	0	hp
A/C Compressor	495 hp	-	495	=	0	hp
Sump Pumps	67½ hp	-	67.5	=	0	hp
			Total hp	=	568	hp
Total hp _ 92% Eff		*	0.746 kW/hp	=	461	kW
Backup PZR Htrs	416 kW	-	416	=	0	kW
			Total kW	=	461	kW
	Total kW	_	0.8 PF	=	576	kVA
Emerg. Ltng.	30 kVA	-	0	=	30	kVA
Inverter 1KS	15 kVA	-	15	=	~~75~~ 0	kVA
			Total Δ Power	=	606	kVA

NOTE: D/G Load (kW) and Power Factor (PF) are taken from control room meters, high speed recorder, or computer data.

· Verify Total Calculated Load on D/G 1B is ≤ 5500 kVA:

$$\frac{\text{D/G Load}}{\text{D/G PF}} + \text{Total Δ Power} = \frac{1850}{0.82} + 606 = 2862 \text{ kVA}$$

Performed by: Barry Gregg Date: 10/4/94

Checked by: Faiha Kasim Date: 10/4/94

ENCLOSURE 13.12
POWER CALCULATION

Train A SI/BO

NOTES: 1) Power Calculation may be performed below or via computer program, using motor efficiency of 92% and Power Factor (PF) of 0.8.

2) Each Component's Rated hp/kW is from FSAR Table 8.1.2-1, Loads Required During LOCA.

3) Each Component's Running hp/kW may be determined from Head Curve readings or from Δ power readings off transducers.

· Calculate and record each component's Δ Power value:

Component	Rated hp/kW		Running hp/kW		Δ Power	
NV Pump 2A	650 hp	-	340	=	310	hp
NI Pump 2A	422 hp	-	230	=	192	hp
ND Pump 2A	455 hp	-	250	=	205	hp
NS Pump 2A	425 hp	-	285	=	140	hp
KC Pump 2A1	175 hp	-	185	=	0	hp
KC Pump 2A2	175 hp	-	185	=	0	hp
RN Pump 2A	710 hp	-	625	=	85	hp
CA Pump 2A	518 hp	-	450	=	68	hp
KF Pump 2A	195 hp	-	195	=	0	hp
A/C Compressor	495 hp	-	495	=	0	hp
Sump Pumps	67½ hp	-	67.5	=	0	hp
			Total hp	=	1000	hp
Total hp	92% Eff	*	0.746 kW/hp	=	811	kW
H_2 Recombiner	64 kW	-	64	=	0	kW
			Total kW	=	811	kW

Total Δ Power = Total kW ÷ 0.8 PF = 1014 kVA

NOTE: D/G Load (kW) and Power Factor (PF) are taken from control room meters, high speed recorder, or computer data.

· Verify Total Calculated Load on D/G 2A is ≤ 5500 kVA:

$$\frac{\text{D/G Load}}{\text{D/G PF}} + \text{Total Δ Power} = \frac{2800}{0.85} + 1014 = 4309 \text{ kVA}$$

Performed by: Bruce Groff Date: 1/4/95

Checked by: Richard Pontti Date: 1/4/95

ENCLOSURE 13.12
POWER CALCULATION

Train A BO

NOTES: 1) Power Calculation may be performed below or via computer program, using motor efficiency of 92% and Power Factor (PF) of 0.8.

2) Each Component's Rated hp/kW/kVA is from FSAR Table 8.1.2-1, Loads Required During Blackout.

3) Each Component's Running hp/kW/kVA may be determined from Head Curve readings or from Δ power readings off transducers.

- Calculate and record each component's Δ Power value:

Component	Rated hp/kW		Running hp/kW		Δ Power	
NV Pump 2A	450 hp	-	340	=	110	hp
KC Pump 2A1	190 hp	-	140	=	50	hp
KC Pump 2A2	190 hp	-	140	=	50	hp
RN Pump 2A	690 hp	-	400	=	290	hp
CA Pump 2A	518 hp	-	450	=	68	hp
KF Pump 2A	195 hp	-	195	=	0	hp
A/C Compressor	495 hp	-	495	=	0	hp
Sump Pumps	67½ hp	-	67.5	=	0	hp
			Total hp	=	568	hp
Total hp	92% Eff	*	0.746 kW/hp	=	461	kW
Backup PZR Htrs	416 kW	-	0	=	416	kW
			Total kW	=	877	kW
			Total kW	0.8 PF =	1097	kVA
Emerg. Ltng.	30 kVA	-	0	=	30	kVA
Inverter 1KS	15 kVA	-	15	=	0	kVA
			Total Δ Power	=	1127	kVA

NOTE: D/G Load (kW) and Power Factor (PF) are taken from control room meters, high speed recorder, or computer data.

- Verify Total Calculated Load on D/G 2A is ≤ 5500 kVA:

$$\frac{\text{D/G Load}}{\text{D/G PF}} + \text{Total } \Delta \text{ Power} = \frac{1800}{0.85} + 1127 = 3244 \text{ kVA}$$

Performed by: Bruce Graff Date: 1/4/95

Checked by: Richard L. Panetti Date: 1/4/95

ENCLOSURE 13.12
POWER CALCULATION

Train B SI/BO

NOTES:
1) Power Calculation may be performed below or via computer program, using motor efficiency of 92% and Power Factor (PF) of 0.8.
2) Each Component's Rated hp/kW is from FSAR Table 8.1.2-1, Loads Required During LOCA.
3) Each Component's Running hp/kW may be determined from Head Curve readings or from Δ power readings off transducers.

· Calculate and record each component's Δ Power value:

Component	Rated hp/kW		Running hp/kW		Δ Power	
NV Pump 2B	650 hp	-	340	=	310	hp
NI Pump 2B	422 hp	-	230	=	192	hp
ND Pump 2B	455 hp	-	250	=	205	hp
NS Pump 2B	425 hp	-	285	=	140	hp
KC Pump 2B1	175 hp	-	175	=	0	hp
KC Pump 2B2	175 hp	-	175	=	0	hp
RN Pump 2B	710 hp	-	625	=	85	hp
CA Pump 2B	518 hp	-	450	=	68	hp
KF Pump 2B	195 hp	-	195	=	0	hp
A/C Compressor	495 hp	-	495	=	0	hp
Sump Pumps	67½ hp	-	67.5	=	0	hp
			Total hp	=	1000	hp
Total hp _ 92% Eff		×	0.746 kW/hp	=	811	kW
H_2 Recombiner	64 kW	-	64	=	0	kW
			Total kW	=	811	kW

Total Δ Power = Total kW _ 0.8 PF = 1014 kVA

NOTE: D/G Load (kW) and Power Factor (PF) are taken from control room meters, high speed recorder, or computer data.

· Verify Total Calculated Load on D/G 2B is ≤ 5500 kVA:

$$\frac{\text{D/G Load}}{\text{D/G PF}} + \text{Total } \Delta \text{ Power} = \frac{2700}{0.85} + 1014 = 4191 \text{ kVA}$$

Performed by: [signature] Date: 1/4/95

Checked by: Richard L. Pautti Date: 1/4/95

ENCLOSURE 13.12
POWER CALCULATION

Train B BO

NOTES:
1) Power Calculation may be performed below or via computer program, using motor efficiency of 92% and Power Factor (PF) of 0.8.
2) Each Component's Rated hp/kW/kVA is from FSAR Table 8.1.2-1, Loads Required During Blackout.
3) Each Component's Running hp/kW/kVA may be determined from Head Curve readings or from Δ power readings off transducers.

* Calculate and record each component's Δ Power value:

Component	Rated hp/kW		Running hp/kW		Δ Power	
NV Pump 2B	450 hp	-	340	=	110	hp
KC Pump 2B1	190 hp	-	140	=	50	hp
KC Pump 2B2	190 hp	-	140	=	50	hp
RN Pump 2B	690 hp	-	400	=	290	hp
CA Pump 2B	518 hp	-	450	=	68	hp
KF Pump 2B	195 hp	-	195	=	0	hp
A/C Compressor	495 hp	-	495	=	0	hp
Sump Pumps	67½ hp	-	67.5	=	0	hp
			Total hp	=	568	hp
Total hp	92% Eff	*	0.746 kW/hp	=	461	kW
Backup PZR Htrs	416 kW	-	0	=	416	kW
			Total kW	=	877	kW
	Total kW		0.8 PF	=	1097	kVA
Emerg. Ltng.	30 kVA	-	0	=	30	kVA
Inverter 1KS	15 kVA	-	15	=	0	kVA
			Total Δ Power	=	1127	kVA

NOTE: D/G Load (kW) and Power Factor (PF) are taken from control room meters, high speed recorder, or computer data.

* Verify Total Calculated Load on D/G 2B is ≤ 5500 kVA:

$$\frac{\text{D/G Load}}{\text{D/G PF}} + \text{Total Δ Power} = \frac{1950}{0.8} + 1127 = 3564 \text{ kVA}$$

Performed by: Bruce Gragg Date: 1/4/95
Checked by: Richard L. Poretti Date: 1/4/95

Failure Analysis Associates
Failure Analysis Associates, inc.
Engineering and Scientific Services
1501 Venera Avenue
Coral Gables, Florida 33146
(305) 661-7726 Telex 704216 Fax (305) 665-0248

Observations and Comments:

Blade Fractures and Bearing Cage Fractures

Duke Power McGuire 2A and 2B Nordberg

Emergency Diesel Generators,

Brown Boveri VTR 500 Turbocharger Compressor Wheels

Prepared for

Duke Power Company

McGuire Nuclear Station

Engineering Department

Prepared by

Lee A. Swanger, Ph.D., P.E.

Failure Analysis Associates, Inc.

Coral Gables, Florida

July 20, 1995

MCC-1301.00-00-0004
Attachment 8, Page 1 of 6

Summary

The Unit 2 diesels at McGuire Nuclear Station both experienced single compressor blade failures while operating at 100% power. The failures were of blades on the compressor wheels of the Brown Boveri (ABB) VTR 500 turbochargers used on the Nordberg diesel engines.

A new configuration of VTR 500 turbocharger (installed at McGuire in September and December, 1994) with 17 jet assist holes in the insert wall created a condition of resonance in the compressor blades. This resonance caused fatigue cracks in the compressor blades in an unacceptably short operating time period. It is estimated that the crack grew from a non-detectable size to final fracture in less than four minutes.

There is no evidence of metallurgical defects, or manufacturing defects contributing to the failure. Instead, the failures appear to be manifestations of a design defect.

The appropriate, prudent corrective action is replacement of the insert walls with those insert walls without the jet assist holes. The reinstallation of refurbished compressor wheels used at McGuire before 1995 is appropriate, since those compressor wheels were not exposed to the cyclic stresses that caused the recent failures.

Attachment 8, Pg. 2 of 6

Background

Duke Power Co. requested Failure Analysis Associates, Inc. (FaAA) to assist in the investigation of turbocharger blade failures experienced on the Nordberg Emergency Diesel Generators at the McGuire Nuclear Station. The failures were of blades on the compressor wheels of the Brown Boveri (ABB) VTR 500 turbochargers used on the Nordberg diesel engines.

After more than ten years of acceptable service, Duke reportedly decided to replace the turbochargers with new units and have the extant turbochargers rebuilt for use as future spares. This decision was motivated by ABB's announcement that they would not be supplying spare parts for the VTR 500 series of turbocharger in the future. Duke also entered into an agreement with CP&L and AEP to adopt a common configuration of turbocharger for interchangeability among the utilities.

McGuire Unit 1 A and B diesels were reportedly converted to new turbochargers in about September, 1994, and the Unit 2 A and B diesels were reportedly converted in about December, 1994. Currently the Unit 1 diesels have operated at or above 100% power for 35 to 40 hours, and the Unit 2 diesels have operated for about 10 hours at 100% power. The new Unit 1 turbochargers have operated nominally, without anomalous symptoms.

The Unit 2 diesels have experienced compressor blade failures while operating at 100% power, 2A failing on June 12, 1995, and 2B failing on June 27, 1995.

Physical Evidence

FaAA engineer Lee Swanger examined the 2A and 2B turbocharger compressor wheels on June 27, 1995. Both compressor wheels had experienced similar failures of a single blade, with the fracture following a curved path. Both fractures showed features of progressive fracture, with elliptical beach marks over part of the surface, and apparent fast overload fracture on the remaining portion. Examination of other blades on the same wheels with low power (10X) magnification revealed no incipient cracking on any other blades.

The fractured blade on wheel 2A was cut from the wheel in the McGuire machine shop and delivered to John Weigle in the Duke Power Co. Metallurgy Lab for microscopic examination. FaAA observed the examination, which will be reported in detail by Mr. Weigle. The major observations were that the progressive portion of the fracture occurred by high cycle fatigue, the single origin of the fatigue crack was near the outer (radial) end of the fatigue portion of the fracture, and that there was no obvious metallurgical (porosity or inclusion) or geometric (tooling mark or impact damage) crack initiator at the crack origin. Of the two cracked blades on the two

compressor-wheels, one fracture had initiated on the leading side of the blade and the other fracture had initiated on the trailing side of its blade.

The material of the compressor wheels was reported to be a monolithic 7075-T6 aluminum forging. The surface finish on the wheels was observed to be machined all over, and not polished or otherwise finished. A refurbished wheel from ABB was observed in the McGuire machine shop, and it appeared to have been bead blasted. One of the ABB technicians confirmed that the rebuild process includes glass bead blasting to clean the surface.

The turbine end bearings from the 2A and 2B turbochargers were observed. These are cylindrical roller bearings with cast bronze cages. In both cases the cage had fractured into several pieces. The rollers and the raceways of the inner and outer rings showed no evidence of distress at all during 1X observation.

Design Change

According to Duke engineers, ABB had made a design change to the jet assist feature of the turbochargers, replacing the older jet assist slot with a series of 17 jet assist nozzle holes in the insert wall. The plenum feeding these holes is blanked off for the McGuire application. At the time of Lee Swanger's arrival at McGuire, two Duke engineers (Mitch Hatley and Whit Gallman) had hypothesized that an aerodynamic excitation could be occurring that would overstress the blades.

Another design change observed was that the original turbocharger compressor blades supplied in the late 1960's had a tapered edge, whereas the recent (vintage 1981) blades had a squared edge. It was pointed out, however, that McGuire had been using replacement square edge blades since 1986 due to earlier replacements.

Testing for Resonant Conditions

During his inspection, Lee Swanger rang representative blades with a fingernail, and estimated the major ringing frequency to be between 2000 Hz and 4000 Hz. Computing the blade pass frequency at the nominal full-load turbocharger speed of 13,500 rpm yields a forcing function at 3825 Hz. FaAA requested an acoustic test of the blades, which was accomplished by Duke's Joe Spencer on June 29, 1995. Mr. Spencer will be reporting his results in detail separately, but he determined the dominant frequency of representative blades was 3750 Hz. There is only a 2% difference between the computed forcing function and the resonant frequency of the blades.

Attachment 8, Pg 4 of 6

Information from ABB

During a phone call with ABB/Switzerland on June 27, their representative said that they knew of no failures of turbochargers in commercial service with up to 12,000 hours of operation. He did say that these turbochargers had a different number of jet assist nozzle holes. He also described vibration testing of blades with attached strain gages, with and without jet assist holes, and indicated that there was no difference in the stresses measured. He concluded by stating that he was not sure if this testing was actually done on a VTR 500 turbo.

In a second telephone call with ABB/Switzerland, followed by a letter, they indicated that the wall inserts with jet assist holes should be replaced with blank insert walls. On June 30, an ABB/Switzerland representative stated that the VTR 500 with 17 hole jet assist had not been tested for blade stress.

Discussion

The leading hypothesis, with no significant alternatives, is that the new configuration of VTR 500 turbocharger with 17 jet assist holes creates a condition of resonance in the compressor blade structures that operate in close proximity to the jet assist holes. This resonance creates cyclic stresses sufficiently high to initiate and propagate fatigue cracks in the compressor blades in an unacceptably short operating time period.

There is no evidence of metallurgical defects, or manufacturing defects contributing to the failure. Forged 7075-T6 aluminum, a well-characterized high performance aircraft alloy, is an appropriate material for this application. The failures appear to be manifestations of a mechanical design defect.

The long successful service of this exact design of compressor wheel in commercial service, and in two turbochargers at McGuire (since 1986 and 1989, reportedly), is evidence that the wheel itself is not defective, but that the combination of wheel, 17 jet assist holes, and operation at 13,500 rpm is a defective condition.

Replacement of the insert walls with those insert walls with no jet assist, or the previous jet assist slot is the appropriate corrective action. The use of wheels previously used without the 17 hole jet assist insert wall is appropriate, since those compressor wheels were not exposed to the cyclic stresses that caused the recent failures. The 2A turbocharger compressor wheel was run for two hours in conjunction with jet assist holes, but this is deemed acceptable due to the absence of further significant cyclic stress, the dye penetrant examination performed, and the computation, detailed below, that had a fatigue crack been initiated, it would have progressed to detectable size very rapidly. In addition, the glass beading used to clean the compressor wheels may induce

meaningful-favorable compressive residual stresses in the surface, and will certainly not cause problems.

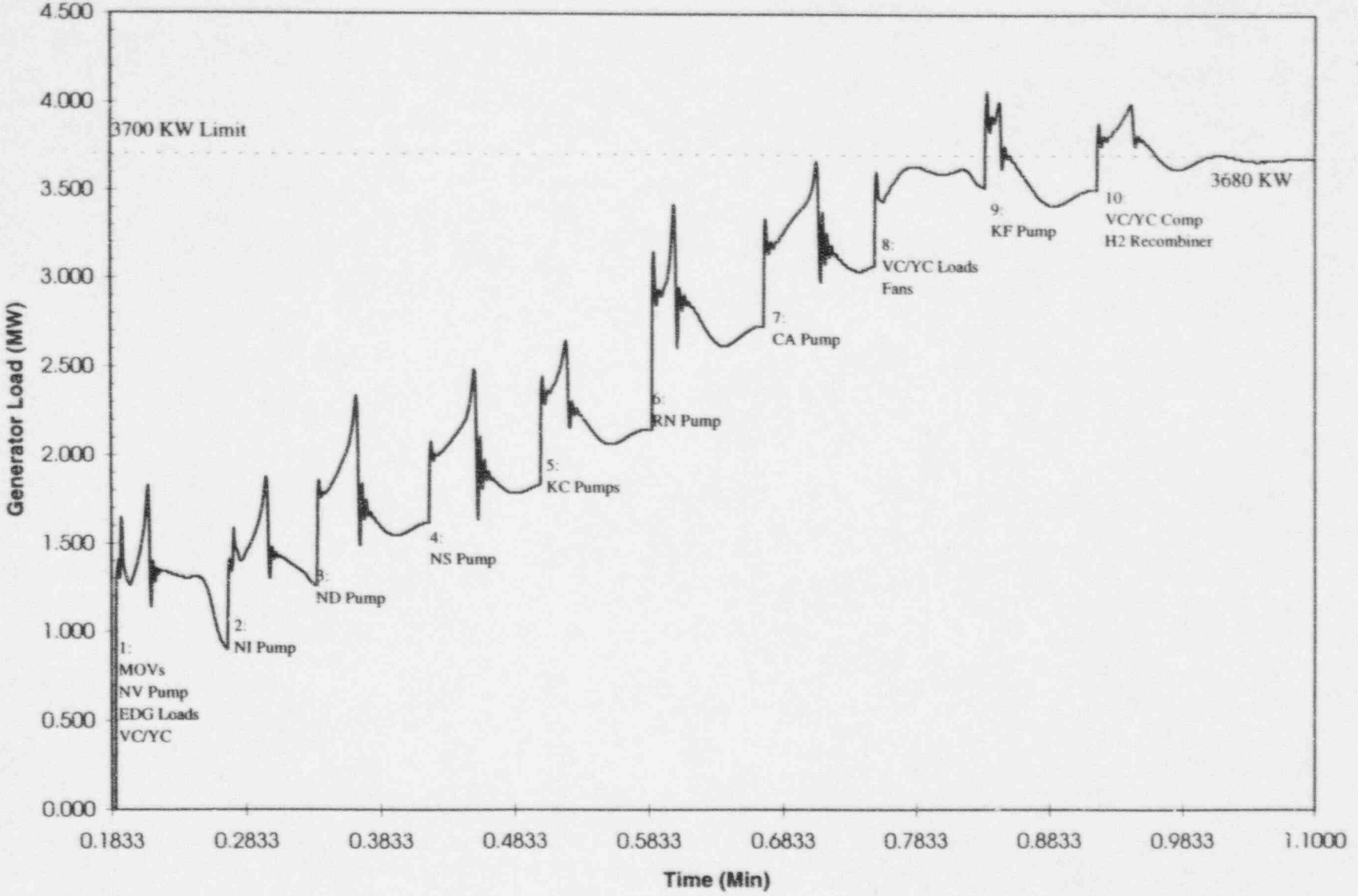
The turbine end bearing cage failures are very likely the result of the severe imbalance caused by the blade failures. Conversely, there is no plausible mechanism by which cage cracks alone could induce the compressor blade failures.

The failed 2A and 2B turbochargers have accumulated about 100,000,000 stress cycles at full load from vanes passing jet assist holes. The 1A and 1B turbochargers, which have not failed, have experienced about 500,000,000 cycles. Since the excitation and stresses should be the same, the conclusion is that small differences in surface conditions have determined the presence or absence of failures in the set of four turbochargers at McGuire. In the absence of an endurance limit for aluminum, it is expected that all these turbochargers would experience a fatigue failure of a compressor blade at some point in time. The previous history of wheels such as those in the Unit 1 diesels also does not constitute a proof test, since conditions may exist that will cause the initiation of a propagating fatigue crack at any point in the future.

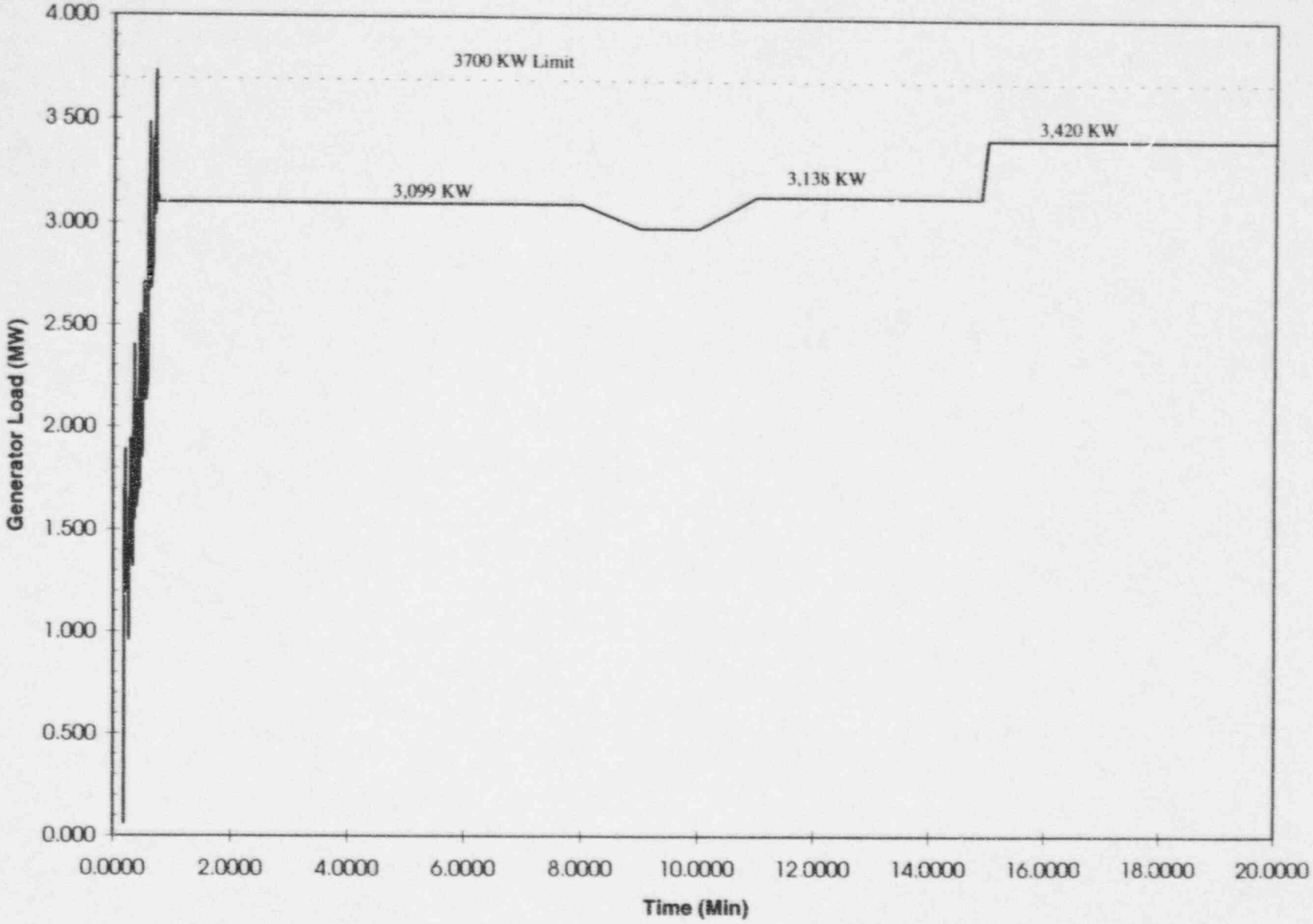
Indeed, the statistical probability of possible initiation sites increases continuously and probably exponentially as smaller and smaller sites (associated with longer initiation times) are considered. Also at the minimum average crack growth rate of 10**-6 inches/cycle, it would take only eight minutes for a non-detectable but growing initiated fatigue crack to reach critical size and fail the turbocharger compressor wheel. More likely the crack would have grown to final fracture in less than four minutes. Accordingly, there is very likely not an inspection criteria that could assure any significant future life of a compressor wheel used in association with a 17 hole jet assist insert wall at or near 13,500 rpm.

The fatigue crack growth properties of 7075-T6 aluminum forgings are well known to aircraft designers. At the request of Duke Power, FaAA is using its NASCRAC computer code to simulate the fracture of these blades, and will issue a separate report with the detailed quantitative results of that analysis.

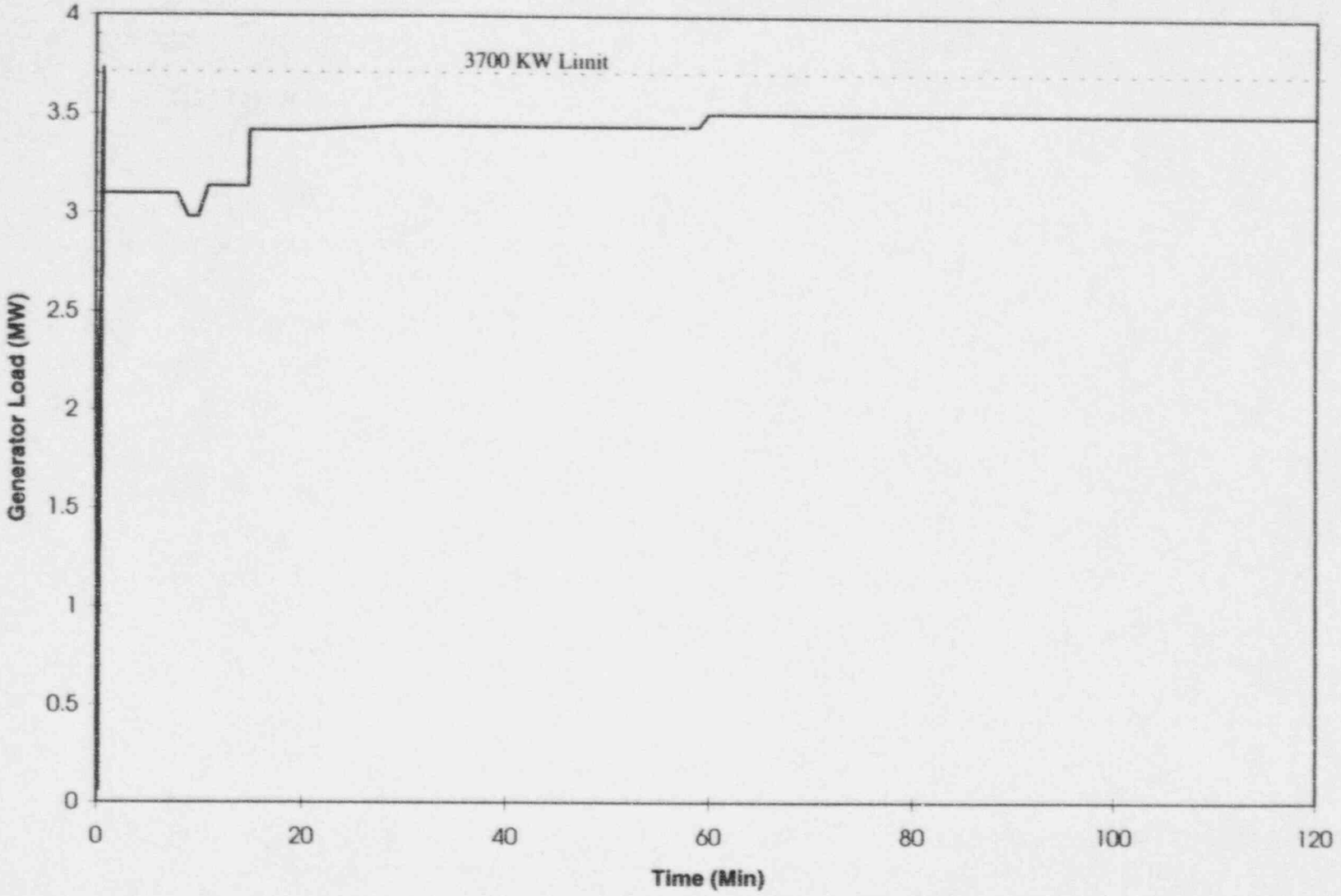
Attachment 8, Pg 6 of 6


CYME Calc - D/G 2A MW-LOCA Simulation Committed Seq.
Generator Load (MW)
4.500
4.000
3.500
3.000
2.500
2.000
1.500
1.000
0.500
0.000
3700 KW Limit
3680 KW
1:
MOVs
NV Pump
EDG Loads
VC/YC
2:
NI Pump
3:
ND Pump
4:
NS Pump
5:
KC Pumps
6:
RN Pump
7:
CA Pump
8:
VC/YC Loads
Fans
9:
KF Pump
10:
VC/YC Comp
H2 Recombiner
0.1833
0.2833
0.3833
0.4833
0.5833
0.6833
0.7833
0.8833
0.9833
1.1000
Time (Min)

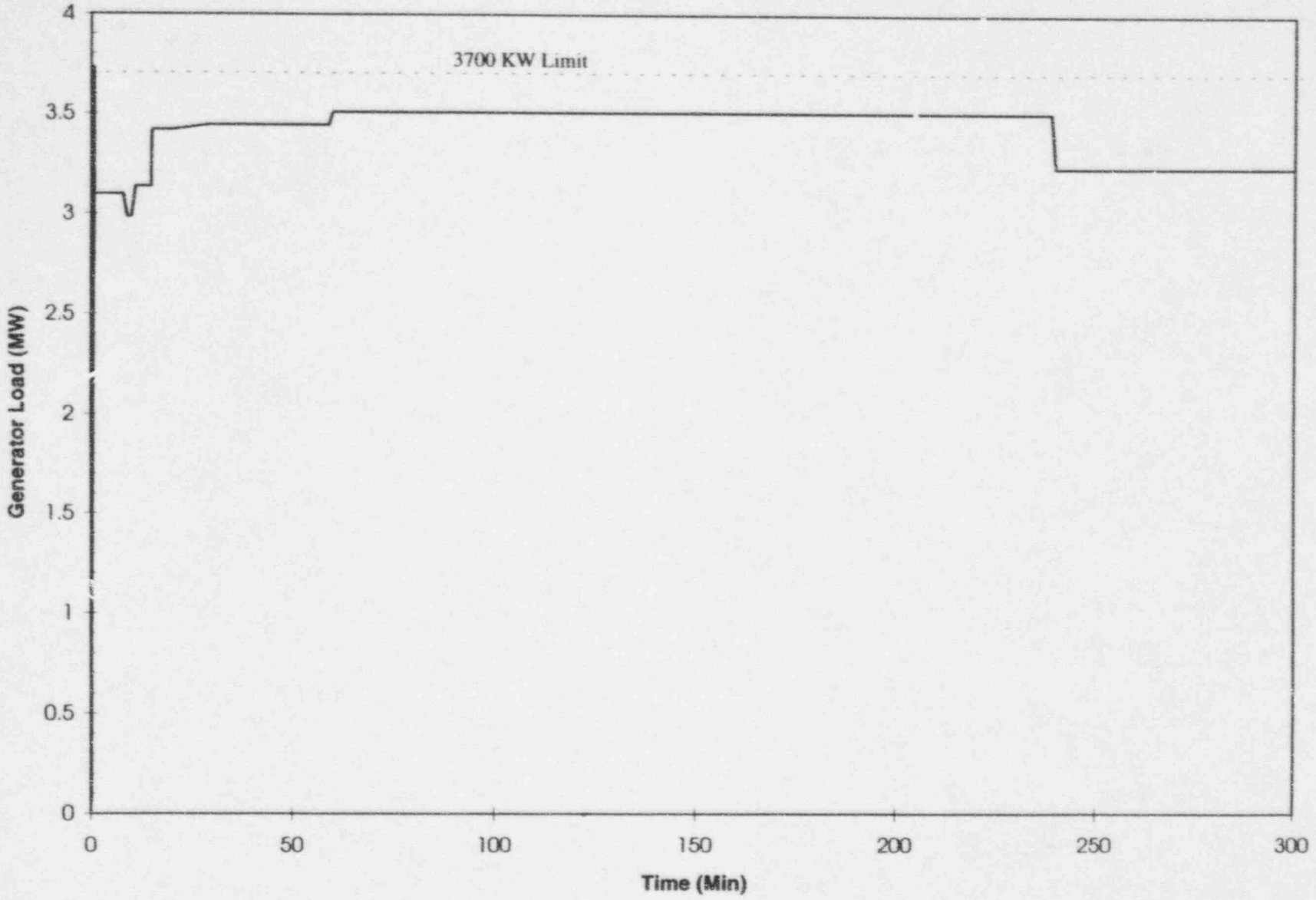
D/G 2A MW-LOCA Simulation Committed Seq. (Expected)

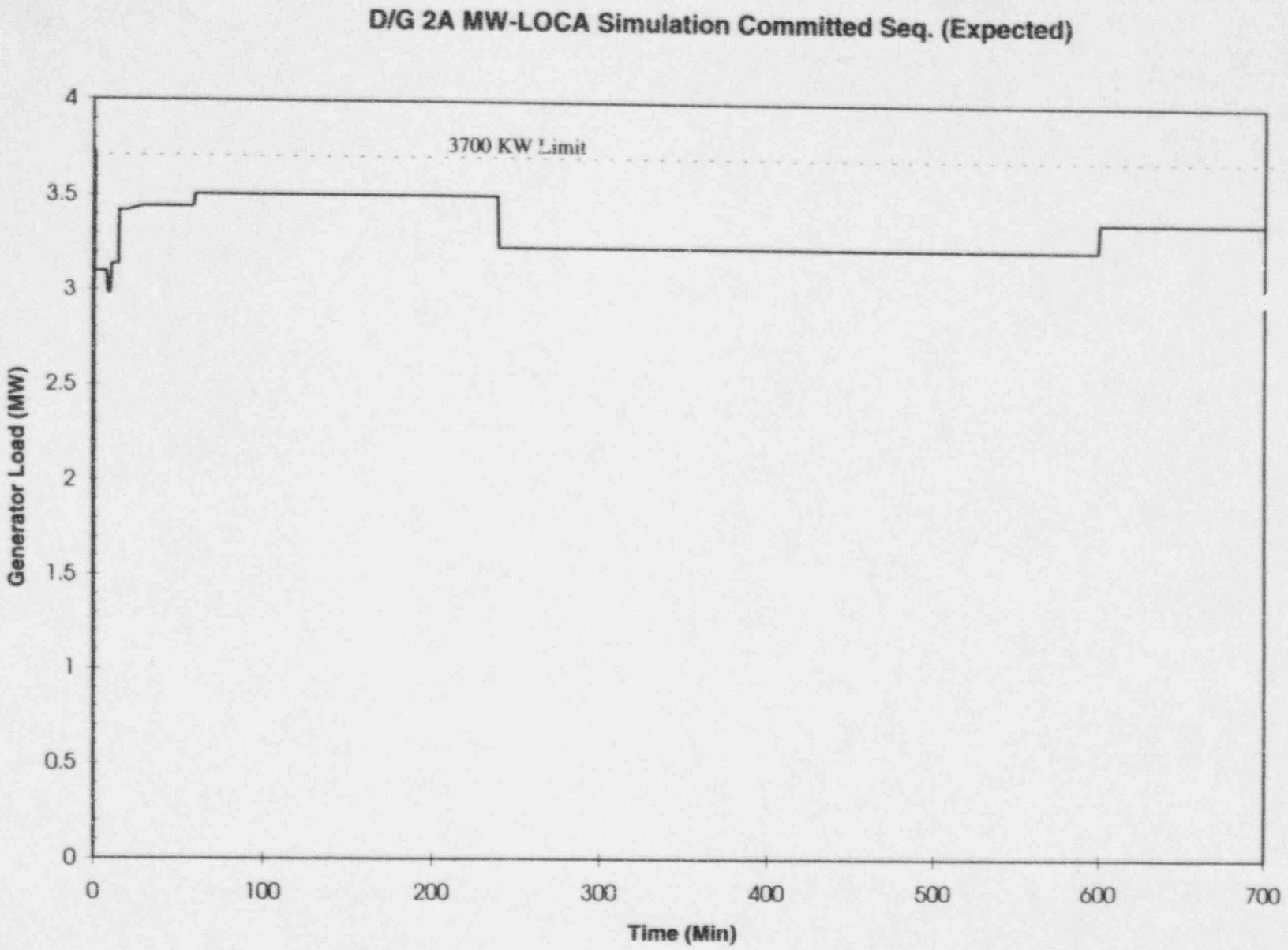


D/G 2A MW-LOCA Simulation Committed Seq. (Expected)



D/G 2A MW-LOCA Simulation Committed Seq. (Expected)




D/G 2A MW-LOCA Simulation Committed Seq. (Expected)
3700 KW Limit
Generator Load (MW)
Time (Min)
4
3.5
3
2.5
2
1.5
1
0.5
0
0
100
200
300
400
500
600
700

	Time +11 Sec	No-VC/YC EDG Actual Loading	Actual Loading	No LG 9 KF Pump / No LG 10 Chiller	No LG 8 VC/YC or Fan Loads till 10 Min	Exciter	Total Load
Event	Time					+0.056	CYME
	Min	MW	MW	MW	MW	MW	MW
	0.1833	0.061	0.061	0.061	0.061	0.061	0.000
	0.1839	0.061	0.061	0.061	0.061	0.061	0.000
	0.1844	0.061	0.061	0.061	0.061	0.061	0.000
	0.1850	0.061	0.061	0.061	0.061	0.061	0.000
	0.1856	0.061	0.061	0.061	0.061	0.061	0.000
	0.1861	0.061	0.061	0.061	0.061	0.061	0.000
Load Group 1	0.1867	1.311	1.311	1.311	1.311	1.311	1.250
	0.1872	1.391	1.391	1.391	1.391	1.391	1.330
	0.1878	1.421	1.421	1.421	1.421	1.421	1.360
	0.1883	1.441	1.441	1.441	1.441	1.441	1.380
	0.1889	1.471	1.471	1.471	1.471	1.471	1.410
	0.1894	1.361	1.361	1.361	1.361	1.361	1.300
	0.1900	1.381	1.381	1.381	1.381	1.381	1.320
	0.1906	1.711	1.711	1.711	1.711	1.711	1.650
	0.1911	1.681	1.681	1.681	1.681	1.681	1.620
	0.1917	1.541	1.541	1.541	1.541	1.541	1.480
	0.1922	1.431	1.431	1.431	1.431	1.431	1.370
	0.1928	1.411	1.411	1.411	1.411	1.411	1.350
	0.1933	1.401	1.401	1.401	1.401	1.401	1.340
	0.1939	1.381	1.381	1.381	1.381	1.381	1.320
	0.1944	1.371	1.371	1.371	1.371	1.371	1.310
	0.1950	1.351	1.351	1.351	1.351	1.351	1.290
	0.1956	1.341	1.341	1.341	1.341	1.341	1.280
	0.1961	1.331	1.331	1.331	1.331	1.331	1.270
	0.1967	1.321	1.321	1.321	1.321	1.321	1.260
	0.1972	1.321	1.321	1.321	1.321	1.321	1.260
	0.1978	1.331	1.331	1.331	1.331	1.331	1.270
	0.1983	1.341	1.341	1.341	1.341	1.341	1.280
	0.1989	1.361	1.361	1.361	1.361	1.361	1.300
	0.1994	1.371	1.371	1.371	1.3[illegible]	1.371	1.310
	0.2000	1.381	1.381	1.381	1.3[illegible]	1.381	1.320
	0.2006	1.401	1.401	1.401	1.401	1.401	1.340
	0.2011	1.411	1.411	1.411	1.411	1.411	1.350
	0.2017	1.431	1.431	1.431	1.431	1.431	1.370
	0.2022	1.441	1.441	1.441	1.441	1.441	1.380
	0.2028	1.461	1.461	1.461	1.461	1.461	1.400
	0.2033	1.481	1.481	1.481	1.481	1.481	1.420
	0.2039	1.491	1.491	1.491	1.491	1.491	1.430
	0.2044	1.511	1.511	1.511	1.511	1.511	1.450
	0.2050	1.531	1.531	1.531	1.531	1.531	1.470
	0.2056	1.561	1.561	1.561	1.561	1.561	1.500
	0.2061	1.581	1.581	1.581	1.581	1.581	1.520
	0.2067	1.611	1.611	1.611	1.611	1.611	1.550
	0.2072	1.641	1.641	1.641	1.641	1.641	1.580
	0.2078	1.671	1.671	1.671	1.671	1.671	1.610
	0.2083	1.711	1.711	1.711	1.711	1.711	1.650
	0.2089	1.761	1.761	1.761	1.761	1.761	1.700
	0.2094	1.811	1.811	1.811	1.811	1.811	1.750
	0.2100	1.861	1.861	1.861	1.861	1.861	1.800
	0.2106	1.891	1.891	1.891	1.891	1.891	1.830
	0.2111	1.821	1.821	1.821	1.821	1.821	1.760
	0.2117	1.611	1.611	1.611	1.611	1.611	1.550
	0.2122	1.321	1.321	1.321	1.321	1.321	1.260
	0.2128	1.201	1.201	1.201	1.201	1.201	1.140
	0.2133	1.331	1.331	1.331	1.331	1.331	1.270
	0.2139	1.461	1.461	1.461	1.461	1.461	1.400
	0.2144	1.441	1.441	1.441	1.441	1.441	1.380
	0.2150	1.351	1.351	1.351	1.351	1.351	1.290
	0.2156	1.341	1.341	1.341	1.341	1.341	1.280
	0.2161	1.391	1.391	1.391	1.391	1.391	1.330
	0.2167	1.421	1.421	1.421	1.421	1.421	1.360
	0.2172	1.401	1.401	1.401	1.401	1.401	1.340
	0.2178	1.381	1.381	1.381	1.381	1.381	1.320
	0.2183	1.391	1.391	1.391	1.391	1.391	1.330
	0.2189	1.401	1.401	1.401	1.401	1.401	1.340

Attachment 9. Actual EDG Loading Based on CYME Calculation

	Time +11 Sec	No-VC/YC EDG Actual Loading	Actual Loading	No LG 9 KF Pump / No LG 10 Chiller	No LG 8 VC/YC or Fan Loads till 10 Min	Exciter	Total Load
Event	Time					+0.056	CYME
	Min	MW	MW	MW	MW	MW	MW
	0.2194	1.411	1.411	1.411	1.411	1.411	1.350
	0.2200	1.401	1.401	1.401	1.401	1.401	1.340
	0.2206	1.401	1.401	1.401	1.401	1.401	1.340
	0.2211	1.401	1.401	1.401	1.401	1.401	1.340
	0.2217	1.401	1.401	1.401	1.401	1.401	1.340
	0.2222	1.401	1.401	1.401	1.401	1.401	1.340
	0.2228	1.401	1.401	1.401	1.401	1.401	1.340
	0.2233	1.401	1.401	1.401	1.401	1.401	1.340
	0.2239	1.401	1.401	1.401	1.401	1.401	1.340
	0.2244	1.401	1.401	1.401	1.401	1.401	1.340
	0.2250	1.391	1.391	1.391	1.391	1.391	1.330
	0.2256	1.391	1.391	1.391	1.391	1.391	1.330
	0.2261	1.391	1.391	1.391	1.391	1.391	1.330
	0.2267	1.391	1.391	1.391	1.391	1.391	1.330
	0.2272	1.391	1.391	1.391	1.391	1.391	1.330
	0.2278	1.391	1.391	1.391	1.391	1.391	1.330
	0.2283	1.381	1.381	1.381	1.381	1.381	1.320
	0.2289	1.381	1.381	1.381	1.381	1.381	1.320
	0.2294	1.381	1.381	1.381	1.381	1.381	1.320
	0.2300	1.381	1.381	1.381	1.381	1.381	1.320
	0.2306	1.381	1.381	1.381	1.381	1.381	1.320
	0.2311	1.381	1.381	1.381	1.381	1.381	1.320
	0.2317	1.381	1.381	1.381	1.381	1.381	1.320
	0.2322	1.371	1.371	1.371	1.371	1.371	1.310
	0.2328	1.371	1.371	1.371	1.371	1.371	1.310
	0.2333	1.371	1.371	1.371	1.371	1.371	1.310
	0.2339	1.371	1.371	1.371	1.371	1.371	1.310
	0.2344	1.371	1.371	1.371	1.371	1.371	1.310
	0.2350	1.371	1.371	1.371	1.371	1.371	1.310
	0.2356	1.371	1.371	1.371	1.371	1.371	1.310
	0.2361	1.371	1.371	1.371	1.371	1.371	1.310
	0.2367	1.371	1.371	1.371	1.371	1.371	1.310
	0.2372	1.361	1.361	1.361	1.361	1.361	1.300
	0.2378	1.361	1.361	1.361	1.361	1.361	1.300
	0.2383	1.361	1.361	1.361	1.361	1.361	1.300
	0.2389	1.361	1.361	1.361	1.361	1.361	1.300
	0.2394	1.361	1.361	1.361	1.361	1.361	1.300
	0.2400	1.361	1.361	1.361	1.361	1.361	1.300
	0.2406	1.361	1.361	1.361	1.361	1.361	1.300
	0.2411	1.361	1.361	1.361	1.361	1.361	1.300
	0.2417	1.361	1.361	1.361	1.361	1.361	1.300
	0.2422	1.371	1.371	1.371	1.371	1.371	1.310
	0.2428	1.371	1.371	1.371	1.371	1.371	1.310
	0.2433	1.371	1.371	1.371	1.371	1.371	1.310
	0.2439	1.371	1.371	1.371	1.371	1.371	1.310
	0.2444	1.371	1.371	1.371	1.371	1.371	1.310
	0.2450	1.371	1.371	1.371	1.371	1.371	1.310
	0.2456	1.371	1.371	1.371	1.371	1.371	1.310
	0.2461	1.371	1.371	1.371	1.371	1.371	1.310
	0.2467	1.371	1.371	1.371	1.371	1.371	1.310
	0.2472	1.371	1.371	1.371	1.371	1.371	1.310
	0.2478	1.371	1.371	1.371	1.371	1.371	1.310
	0.2483	1.371	1.371	1.371	1.371	1.371	1.310
	0.2489	1.361	1.361	1.361	1.361	1.361	1.300
	0.2494	1.361	1.361	1.361	1.361	1.361	1.300
	0.2500	1.361	1.361	1.361	1.361	1.361	1.300
	0.2506	1.361	1.361	1.361	1.361	1.361	1.300
	0.2511	1.351	1.351	1.351	1.351	1.351	1.290
	0.2517	1.351	1.351	1.351	1.351	1.351	1.290
	0.2522	1.341	1.341	1.341	1.341	1.341	1.280
	0.2528	1.331	1.331	1.331	1.331	1.331	1.270
	0.2533	1.321	1.321	1.321	1.321	1.321	1.260
	0.2539	1.311	1.311	1.311	1.311	1.311	1.250
	0.2544	1.301	1.301	1.301	1.301	1.301	1.240
	0.2550	1.291	1.291	1.291	1.291	1.291	1.230

Attachment 9, Actual EDG Loading Based on CYME Calculation

	Time +11 Sec	No-VC/YC EDG Actual Loading	Actual Loading	No LG 9 KF Pump / No LG 10 Chiller	No LG 8 VC/YC or Fan Loads till 10 Min	Exciter	Total Load
Event	Time					+0.056	CYME
	Min	MW	MW	MW	MW	MW	MW
	0.2556	1.271	1.271	1.271	1.271	1.271	1.210
	0.2561	1.261	1.261	1.261	1.261	1.261	1.200
	0.2567	1.241	1.241	1.241	1.241	1.241	1.180
	0.2572	1.221	1.221	1.221	1.221	1.221	1.160
	0.2578	1.201	1.201	1.201	1.201	1.201	1.140
	0.2583	1.191	1.191	1.191	1.191	1.191	1.130
	0.2589	1.171	1.171	1.171	1.171	1.171	1.110
	0.2594	1.151	1.151	1.151	1.151	1.151	1.090
	0.2600	1.131	1.131	1.131	1.131	1.131	1.070
	0.2606	1.111	1.111	1.111	1.111	1.111	1.050
	0.2611	1.101	1.101	1.101	1.101	1.101	1.040
	0.2617	1.081	1.081	1.081	1.081	1.081	1.020
	0.2622	1.061	1.061	1.061	1.061	1.061	1.000
	0.2628	1.051	1.051	1.051	1.051	1.051	0.990
	0.2633	1.041	1.041	1.041	1.041	1.041	0.980
	0.2639	1.021	1.021	1.021	1.021	1.021	0.960
	0.2644	1.011	1.011	1.011	1.011	1.011	0.950
	0.2650	1.001	1.001	1.001	1.001	1.001	0.940
	0.2656	1.001	1.001	1.001	1.001	1.001	0.940
	0.2661	0.991	0.991	0.991	0.991	0.991	0.930
	0.2667	0.981	0.981	0.981	0.981	0.981	0.920
	0.2672	0.981	0.981	0.981	0.981	0.981	0.920
	0.2678	0.971	0.971	0.971	0.971	0.971	0.910
	0.2683	0.971	0.971	0.971	0.971	0.971	0.910
	0.2689	0.961	0.961	0.961	0.961	0.961	0.900
	0.2694	0.961	0.961	0.961	0.961	0.961	0.900
Load Group 2	0.2700	1.361	1.361	1.361	1.361	1.361	1.300
	0.2706	1.461	1.461	1.461	1.461	1.461	1.400
	0.2711	1.471	1.471	1.471	1.471	1.471	1.410
	0.2717	1.431	1.431	1.431	1.431	1.431	1.370
	0.2722	1.401	1.401	1.401	1.401	1.401	1.340
	0.2728	1.431	1.431	1.431	1.431	1.431	1.370
	0.2733	1.451	1.451	1.451	1.451	1.451	1.390
	0.2739	1.651	1.651	1.651	1.651	1.651	1.590
	0.2744	1.601	1.601	1.601	1.601	1.601	1.540
	0.2750	1.551	1.551	1.551	1.551	1.551	1.490
	0.2756	1.531	1.531	1.531	1.531	1.531	1.470
	0.2761	1.531	1.531	1.531	1.531	1.531	1.470
	0.2767	1.521	1.521	1.521	1.521	1.521	1.460
	0.2772	1.511	1.511	1.511	1.511	1.511	1.450
	0.2778	1.491	1.491	1.491	1.491	1.491	1.430
	0.2783	1.471	1.471	1.471	1.471	1.471	1.410
	0.2789	1.461	1.461	1.461	1.461	1.461	1.400
	0.2794	1.461	1.461	1.461	1.461	1.461	1.400
	0.2800	1.461	1.461	1.461	1.461	1.461	1.400
	0.2806	1.471	1.471	1.471	1.471	1.471	1.410
	0.2811	1.471	1.471	1.471	1.471	1.471	1.410
	0.2817	1.481	1.481	1.481	1.481	1.481	1.420
	0.2822	1.491	1.491	1.491	1.491	1.491	1.430
	0.2828	1.501	1.501	1.501	1.501	1.501	1.440
	0.2833	1.511	1.511	1.511	1.511	1.511	1.450
	0.2839	1.521	1.521	1.521	1.521	1.521	1.460
	0.2844	1.531	1.531	1.531	1.531	1.531	1.470
	0.2850	1.531	1.531	1.531	1.531	1.531	1.470
	0.2856	1.541	1.541	1.541	1.541	1.541	1.480
	0.2861	1.551	1.551	1.551	1.551	1.551	1.490
	0.2867	1.561	1.561	1.561	1.561	1.561	1.500
	0.2872	1.571	1.571	1.571	1.571	1.571	1.510
	0.2878	1.581	1.581	1.581	1.581	1.581	1.520
	0.2883	1.591	1.591	1.591	1.591	1.591	1.530
	0.2889	1.601	1.601	1.601	1.601	1.601	1.540
	0.2894	1.611	1.611	1.611	1.611	1.611	1.550
	0.2900	1.621	1.621	1.621	1.621	1.621	1.560
	0.2906	1.631	1.631	1.631	1.631	1.631	1.570
	0.2911	1.651	1.651	1.651	1.651	1.651	1.590

	Time +11 Sec	No-VC/YC EDG Actual Loading	Actual Loading	No LG 9 KF Pump / No LG 10 Chiller	No LG 8 VC/YC or Fan Loads till 10 Min	Exciter	Total Load
Event	Time					+0.056	CYME
	Min	MW	MW	MW	MW	MW	MW
	0.2917	1.661	1.661	1.661	1.661	1.661	1.600
	0.2922	1.671	1.671	1.671	1.671	1.671	1.610
	0.2928	1.691	1.691	1.691	1.691	1.691	1.630
	0.2933	1.701	1.701	1.701	1.701	1.701	1.640
	0.2939	1.721	1.721	1.721	1.721	1.721	1.660
	0.2944	1.741	1.741	1.741	1.741	1.741	1.680
	0.2950	1.761	1.761	1.761	1.761	1.761	1.700
	0.2956	1.781	1.781	1.781	1.781	1.781	1.720
	0.2961	1.811	1.811	1.811	1.811	1.811	1.750
	0.2967	1.841	1.841	1.841	1.841	1.841	1.780
	0.2972	1.881	1.881	1.881	1.881	1.881	1.820
	0.2978	1.911	1.911	1.911	1.911	1.911	1.850
	0.2983	1.941	1.941	1.941	1.941	1.941	1.880
	0.2989	1.921	1.921	1.921	1.921	1.921	1.860
	0.2994	1.811	1.811	1.811	1.811	1.811	1.750
	0.3000	1.601	1.601	1.601	1.601	1.601	1.540
	0.3006	1.411	1.411	1.411	1.411	1.411	1.350
	0.3011	1.361	1.361	1.361	1.361	1.361	1.300
	0.3017	1.451	1.451	1.451	1.451	1.451	1.390
	0.3022	1.531	1.531	1.531	1.531	1.531	1.470
	0.3028	1.541	1.541	1.541	1.541	1.541	1.480
	0.3033	1.501	1.501	1.501	1.501	1.501	1.440
	0.3039	1.471	1.471	1.471	1.471	1.471	1.410
	0.3044	1.481	1.481	1.481	1.481	1.481	1.420
	0.3050	1.501	1.501	1.501	1.501	1.501	1.440
	0.3056	1.511	1.511	1.511	1.511	1.511	1.450
	0.3061	1.501	1.501	1.501	1.501	1.501	1.440
	0.3067	1.491	1.491	1.491	1.491	1.491	1.430
	0.3072	1.481	1.481	1.481	1.481	1.481	1.420
	0.3078	1.491	1.491	1.491	1.491	1.491	1.430
	0.3083	1.491	1.491	1.491	1.491	1.491	1.430
	0.3089	1.491	1.491	1.491	1.491	1.491	1.430
	0.3094	1.481	1.481	1.481	1.481	1.481	1.420
	0.3100	1.481	1.481	1.481	1.481	1.481	1.420
	0.3106	1.481	1.481	1.481	1.481	1.481	1.420
	0.3111	1.481	1.481	1.481	1.481	1.481	1.420
	0.3117	1.471	1.471	1.471	1.471	1.471	1.410
	0.3122	1.471	1.471	1.471	1.471	1.471	1.410
	0.3128	1.471	1.471	1.471	1.471	1.471	1.410
	0.3133	1.461	1.461	1.461	1.461	1.461	1.400
	0.3139	1.461	1.461	1.461	1.461	1.461	1.400
	0.3144	1.461	1.461	1.461	1.461	1.461	1.400
	0.3150	1.451	1.451	1.451	1.451	1.451	1.390
	0.3156	1.451	1.451	1.451	1.451	1.451	1.390
	0.3161	1.451	1.451	1.451	1.451	1.451	1.390
	0.3167	1.441	1.441	1.441	1.441	1.441	1.380
	0.3172	1.441	1.441	1.441	1.441	1.441	1.380
	0.3178	1.441	1.441	1.441	1.441	1.441	1.380
	0.3183	1.441	1.441	1.441	1.441	1.441	1.380
	0.3189	1.431	1.431	1.431	1.431	1.431	1.370
	0.3194	1.431	1.431	1.431	1.431	1.431	1.370
	0.3200	1.431	1.431	1.431	1.431	1.431	1.370
	0.3206	1.421	1.421	1.421	1.421	1.421	1.360
	0.3211	1.421	1.421	1.421	1.421	1.421	1.360
	0.3217	1.421	1.421	1.421	1.421	1.421	1.360
	0.3222	1.421	1.421	1.421	1.421	1.421	1.360
	0.3228	1.411	1.411	1.411	1.411	1.411	1.350
	0.3233	1.411	1.411	1.411	1.411	1.411	1.350
	0.3239	1.411	1.411	1.411	1.411	1.411	1.350
	0.3244	1.401	1.401	1.401	1.401	1.401	1.340
	0.3250	1.401	1.401	1.401	1.401	1.401	1.340
	0.3256	1.401	1.401	1.401	1.401	1.401	1.340
	0.3261	1.391	1.391	1.391	1.391	1.391	1.330
	0.3267	1.391	1.391	1.391	1.391	1.391	1.330
	0.3272	1.391	1.391	1.391	1.391	1.391	1.330

	Time +11 Sec	No-VC/YC EDG Actual Loading	Actual Loading	No LG 9 KF Pump / No LG 10 Chiller	No LG 8 VC/YC or Fan Loads till 10 Min	Exciter	Total Load
Event	Time					+0.056	CYME
	Min	MW	MW	MW	MW	MW	MW
	0.3278	1.381	1.381	1.381	1.381	1.381	1.[illegible]
	0.3283	1.381	1.381	1.381	1.381	1.381	1
	0.3289	1.371	1.371	1.371	1.371	1.371	[illegible]
	0.3294	1.361	1.361	1.361	1.361	1.361	1
	0.3300	1.361	1.361	1.361	1.361	1.361	1.3[illegible]
	0.3306	1.351	1.351	1.351	1.351	1.351	1.290
	0.3311	1.351	1.351	1.351	1.351	1.351	1.290
	0.3317	1.341	1.341	1.341	1.341	1.341	1.280
	0.3322	1.341	1.341	1.341	1.341	1.341	1.280
	0.3328	1.331	1.331	1.331	1.331	1.331	1.270
	0.3333	1.331	1.331	1.331	1.331	1.331	1.270
	0.3339	1.331	1.331	1.331	1.331	1.331	1.270
	0.3344	1.321	1.321	1.321	1.321	1.321	1.260
	0.3350	1.321	1.321	1.321	1.321	1.321	1.260
	0.3356	1.321	1.321	1.321	1.321	1.321	1.260
Load Group 3	0.3361	1.321	1.321	1.321	1.321	1.321	1.260
	0.3367	1.811	1.811	1.811	1.811	1.811	1.750
	0.3372	1.911	1.911	1.911	1.911	1.911	1.850
	0.3378	1.921	1.921	1.921	1.921	1.921	1.860
	0.3383	1.871	1.871	1.871	1.871	1.871	1.810
	0.3389	1.831	1.831	1.831	1.831	1.831	1.770
	0.3394	1.821	1.821	1.821	1.821	1.821	1.760
	0.3400	1.841	1.841	1.841	1.841	1.841	1.780
	0.3406	1.851	1.851	1.851	1.851	1.851	1.790
	0.3411	1.851	1.851	1.851	1.851	1.851	1.790
	0.3417	1.851	1.851	1.851	1.851	1.851	1.790
	0.3422	1.841	1.841	1.841	1.841	1.841	1.780
	0.3428	1.851	1.851	1.851	1.851	1.851	1.790
	0.3433	1.851	1.851	1.851	1.851	1.851	1.790
	0.3439	1.861	1.861	1.861	1.861	1.861	1.800
	0.3444	1.861	1.861	1.861	1.861	1.861	1.800
	0.3450	1.871	1.871	1.871	1.871	1.871	1.810
	0.3456	1.871	1.871	1.871	1.871	1.871	1.810
	0.3461	1.881	1.881	1.881	1.881	1.881	1.820
	0.3467	1.891	1.891	1.891	1.891	1.891	1.830
	0.3472	1.901	1.901	1.901	1.901	1.901	1.840
	0.3478	1.901	1.901	1.901	1.901	1.901	1.840
	0.3483	1.911	1.911	1.911	1.911	1.911	1.850
	0.3489	1.921	1.921	1.921	1.921	1.921	1.860
	0.3494	1.931	1.931	1.931	1.931	1.931	1.870
	0.3500	1.941	1.941	1.941	1.941	1.941	1.880
	0.3506	1.941	1.941	1.941	1.941	1.941	1.880
	0.3511	1.951	1.951	1.951	1.951	1.951	1.890
	0.3517	1.961	1.961	1.961	1.961	1.961	1.900
	0.3522	1.971	1.971	1.971	1.971	1.971	1.910
	0.3528	1.981	1.981	1.981	1.981	1.981	1.920
	0.3533	1.991	1.991	1.991	1.991	1.991	1.930
	0.3539	2.001	2.001	2.001	2.001	2.001	1.940
	0.3544	2.011	2.011	2.011	2.011	2.011	1.950
	0.3550	2.021	2.021	2.021	2.021	2.021	1.960
	0.3556	2.031	2.031	2.031	2.031	2.031	1.970
	0.3561	2.041	2.041	2.041	2.041	2.041	1.980
	0.3567	2.051	2.051	2.051	2.051	2.051	1.990
	0.3572	2.061	2.061	2.061	2.061	2.061	2.000
	0.3578	2.071	2.071	2.071	2.071	2.071	2.010
	0.3583	2.081	2.081	2.081	2.081	2.081	2.020
	0.3589	2.101	2.101	2.101	2.101	2.101	2.040
	0.3594	2.111	2.111	2.111	2.111	2.111	2.050
	0.3600	2.121	2.121	2.121	2.121	2.121	2.060
	0.3606	2.141	2.141	2.141	2.141	2.141	2.080
	0.3611	2.161	2.161	2.161	2.161	2.161	2.100
	0.3617	2.181	2.181	2.181	2.181	2.181	2.120
	0.3622	2.201	2.201	2.201	2.201	2.201	2.140
	0.3628	2.231	2.231	2.231	2.231	2.231	2.170
	0.3633	2.261	2.261	2.261	2.261	2.261	2.200

Attachment 9, Actual EDG Loading Based on CYME Calculation

	Time +11 Sec	No-VC/YC EDG Actual Loading	Actual Loading	No LG 9 KF Pump / No LG 10 Chiller	No LG 8 VC/YC or Fan Loads till 10 Min	Exciter	Total Load
Event	Time					+0.056	CYME
	Min	MW	MW	MW	MW	MW	MW
	0.3639	2.301	2.301	2.301	2.301	2.301	2.240
	0.3644	2.341	2.341	2.341	2.341	2.341	2.280
	0.3650	2.381	2.381	2.381	2.381	2.381	2.320
	0.3656	2.401	2.401	2.401	2.401	2.401	2.340
	0.3661	2.351	2.351	2.351	2.351	2.351	2.290
	0.3667	2.171	2.171	2.171	2.171	2.171	2.110
	0.3672	1.861	1.861	1.861	1.861	1.861	1.800
	0.3678	1.591	1.591	1.591	1.591	1.591	1.530
	0.3683	1.551	1.551	1.551	1.551	1.551	1.490
	0.3689	1.721	1.721	1.721	1.721	1.721	1.660
	0.3694	1.891	1.891	1.891	1.891	1.891	1.830
	0.3700	1.901	1.901	1.901	1.901	1.901	1.840
	0.3706	1.791	1.791	1.791	1.791	1.791	1.730
	0.3711	1.701	1.701	1.701	1.701	1.701	1.640
	0.3717	1.701	1.701	1.701	1.701	1.701	1.640
	0.3722	1.771	1.771	1.771	1.771	1.771	1.710
	0.3728	1.811	1.811	1.811	1.811	1.811	1.750
	0.3733	1.791	1.791	1.791	1.791	1.791	1.730
	0.3739	1.741	1.741	1.741	1.741	1.741	1.680
	0.3744	1.721	1.721	1.721	1.721	1.721	1.660
	0.3750	1.731	1.731	1.731	1.731	1.731	1.670
	0.3756	1.741	1.741	1.741	1.741	1.741	1.680
	0.3761	1.741	1.741	1.741	1.741	1.741	1.680
	0.3767	1.731	1.731	1.731	1.731	1.731	1.670
	0.3772	1.711	1.711	1.711	1.711	1.711	1.650
	0.3778	1.711	1.711	1.711	1.711	1.711	1.650
	0.3783	1.711	1.711	1.711	1.711	1.711	1.650
	0.3789	1.711	1.711	1.711	1.711	1.711	1.650
	0.3794	1.701	1.701	1.701	1.701	1.701	1.640
	0.3800	1.691	1.691	1.691	1.691	1.691	1.630
	0.3806	1.681	1.681	1.681	1.681	1.681	1.620
	0.3811	1.681	1.681	1.681	1.681	1.681	1.620
	0.3817	1.681	1.681	1.681	1.681	1.681	1.620
	0.3822	1.671	1.671	1.671	1.671	1.671	1.610
	0.3828	1.671	1.671	1.671	1.671	1.671	1.610
	0.3833	1.661	1.661	1.661	1.661	1.661	1.600
	0.3839	1.651	1.651	1.651	1.651	1.651	1.590
	0.3844	1.651	1.651	1.651	1.651	1.651	1.590
	0.3850	1.651	1.651	1.651	1.651	1.651	1.590
	0.3856	1.641	1.641	1.641	1.641	1.641	1.580
	0.3861	1.641	1.641	1.641	1.641	1.641	1.580
	0.3867	1.631	1.631	1.631	1.631	1.631	1.570
	0.3872	1.631	1.631	1.631	1.631	1.631	1.570
	0.3878	1.631	1.631	1.631	1.631	1.631	1.570
	0.3883	1.621	1.621	1.621	1.621	1.621	1.560
	0.3889	1.621	1.621	1.621	1.621	1.621	1.560
	0.3894	1.621	1.621	1.621	1.621	1.621	1.560
	0.3900	1.621	1.621	1.621	1.621	1.621	1.560
	0.3906	1.621	1.621	1.621	1.621	1.621	1.560
	0.3911	1.611	1.611	1.611	1.611	1.611	1.550
	0.3917	1.611	1.611	1.611	1.611	1.611	1.550
	0.3922	1.611	1.611	1.611	1.611	1.611	1.550
	0.3928	1.611	1.611	1.611	1.611	1.611	1.550
	0.3933	1.611	1.611	1.611	1.611	1.611	1.550
	0.3939	1.611	1.611	1.611	1.611	1.611	1.550
	0.3944	1.611	1.611	1.611	1.611	1.611	1.550
	0.3950	1.611	1.611	1.611	1.611	1.611	1.550
	0.3956	1.611	1.611	1.611	1.611	1.611	1.550
	0.3961	1.611	1.611	1.611	1.611	1.611	1.550
	0.3967	1.611	1.611	1.611	1.611	1.611	1.550
	0.3972	1.611	1.611	1.611	1.611	1.611	1.550
	0.3978	1.611	1.611	1.611	1.611	1.611	1.550
	0.3983	1.611	1.611	1.611	1.611	1.611	1.550
	0.3989	1.611	1.611	1.611	1.611	1.611	1.550
	0.3994	1.621	1.621	1.621	1.621	1.621	1.560

Attachment 9, Actual EDG Loading Based on CYME Calculation

	Time +11 Sec	No-VC/YC EDG Actual Loading	Actual Loading	No LG 9 KF Pump / No LG 10 Chiller	No LG 8 VC/YC or Fan Loads till 10 Min	Exciter	Total Load
Event	Time					+0.056	CYME
	Min	MW	MW	MW	MW	MW	MW
	0.4000	1.621	1.621	1.621	1.621	1.621	1.560
	0.4006	1.621	1.621	1.621	1.621	1.621	1.560
	0.4011	1.621	1.621	1.621	1.621	1.621	1.560
	0.4017	1.621	1.621	1.621	1.621	1.621	1.560
	0.4022	1.621	1.621	1.621	1.621	1.621	1.560
	0.4028	1.631	1.631	1.631	1.631	1.631	1.570
	0.4033	1.631	1.631	1.631	1.631	1.631	1.570
	0.4039	1.631	1.631	1.631	1.631	1.631	1.570
	0.4044	1.631	1.631	1.631	1.631	1.631	1.570
	0.4050	1.641	1.641	1.641	1.641	1.641	1.580
	0.4056	1.641	1.641	1.641	1.641	1.641	1.580
	0.4061	1.641	1.641	1.641	1.641	1.641	1.580
	0.4067	1.641	1.641	1.641	1.641	1.641	1.580
	0.4072	1.651	1.651	1.651	1.651	1.651	1.590
	0.4078	1.651	1.651	1.651	1.651	1.651	1.590
	0.4083	1.651	1.651	1.651	1.651	1.651	1.590
	0.4089	1.651	1.651	1.651	1.651	1.651	1.590
	0.4094	1.661	1.661	1.661	1.661	1.661	1.600
	0.4100	1.661	1.661	1.661	1.661	1.661	1.600
	0.4106	1.661	1.661	1.661	1.661	1.661	1.600
	0.4111	1.661	1.661	1.661	1.661	1.661	1.600
	0.4117	1.671	1.671	1.671	1.671	1.671	1.610
	0.4122	1.671	1.671	1.671	1.671	1.671	1.610
	0.4128	1.671	1.671	1.671	1.671	1.671	1.610
	0.4133	1.671	1.671	1.671	1.671	1.671	1.610
	0.4139	1.671	1.671	1.671	1.671	1.671	1.610
	0.4144	1.671	1.671	1.671	1.671	1.671	1.610
	0.4150	1.681	1.681	1.681	1.681	1.681	1.620
	0.4156	1.681	1.681	1.681	1.681	1.681	1.620
	0.4161	1.681	1.681	1.681	1.681	1.681	1.620
	0.4167	1.681	1.681	1.681	1.681	1.681	1.620
	0.4172	1.681	1.681	1.681	1.681	1.681	1.620
	0.4178	1.681	1.681	1.681	1.681	1.681	1.620
	0.4183	1.681	1.681	1.681	1.681	1.681	1.620
	0.4189	1.681	1.681	1.681	1.681	1.681	1.620
	0.4194	1.681	1.681	1.681	1.681	1.681	1.620
Load Group 4	0.4200	2.001	2.001	2.001	2.001	2.001	1.940
	0.4206	2.111	2.111	2.111	2.111	2.111	2.050
	0.4211	2.141	2.141	2.141	2.141	2.141	2.080
	0.4217	2.101	2.101	2.101	2.101	2.101	2.040
	0.4222	2.051	2.051	2.051	2.051	2.051	1.990
	0.4228	2.031	2.031	2.031	2.031	2.031	1.970
	0.4233	2.041	2.041	2.041	2.041	2.041	1.980
	0.4239	2.061	2.061	2.061	2.061	2.061	2.000
	0.4244	2.071	2.071	2.071	2.071	2.071	2.010
	0.4250	2.071	2.071	2.071	2.071	2.071	2.010
	0.4256	2.071	2.071	2.071	2.071	2.071	2.010
	0.4261	2.061	2.061	2.061	2.061	2.061	2.000
	0.4267	2.061	2.061	2.061	2.061	2.061	2.000
	0.4272	2.071	2.071	2.071	2.071	2.071	2.010
	0.4278	2.071	2.071	2.071	2.071	2.071	2.010
	0.4283	2.081	2.081	2.081	2.081	2.081	2.020
	0.4289	2.081	2.081	2.081	2.081	2.081	2.020
	0.4294	2.081	2.081	2.081	2.081	2.081	2.020
	0.4300	2.091	2.091	2.091	2.091	2.091	2.030
	0.4306	2.091	2.091	2.091	2.091	2.091	2.030
	0.4311	2.101	2.101	2.101	2.101	2.101	2.040
	0.4317	2.101	2.101	2.101	2.101	2.101	2.040
	0.4322	2.111	2.111	2.111	2.111	2.111	2.050
	0.4328	2.111	2.111	2.111	2.111	2.111	2.050
	0.4333	2.121	2.121	2.121	2.121	2.121	2.060
	0.4339	2.121	2.121	2.121	2.121	2.121	2.060
	0.4344	2.131	2.131	2.131	2.131	2.131	2.070
	0.4350	2.131	2.131	2.131	2.131	2.131	2.070
	0.4356	2.141	2.141	2.141	2.141	2.141	2.080

Attachment 9, Actual EDG Loading Based on CYME Calculation

	Time +11 Sec	No-VC/YC EDG Actual Loading	Actual Loading	No LG 9 KF Pump / No LG 10 Chiller	No LG 8 VC/YC or Fan Loads till 10 Min	Exciter	Total Load
Event	Time					+0.056	CYME
	Min	MW	MW	MW	MW	MW	MW
	0.4361	2.141	2.141	2.141	2.141	2.141	2.080
	0.4367	2.151	2.151	2.151	2.151	2.151	2.090
	0.4372	2.161	2.161	2.161	2.161	2.161	2.100
	0.4378	2.161	2.161	2.161	2.161	2.161	2.100
	0.4383	2.171	2.171	2.171	2.171	2.171	2.110
	0.4389	2.171	2.171	2.171	2.171	2.171	2.110
	0.4394	2.181	2.181	2.181	2.181	2.181	2.120
	0.4400	2.181	2.181	2.181	2.181	2.181	2.120
	0.4406	2.191	2.191	2.191	2.191	2.191	2.130
	0.4411	2.191	2.191	2.191	2.191	2.191	2.130
	0.4417	2.201	2.201	2.201	2.201	2.201	2.140
	0.4422	2.211	2.211	2.211	2.211	2.211	2.150
	0.4428	2.211	2.211	2.211	2.211	2.211	2.150
	0.4433	2.221	2.221	2.221	2.221	2.221	2.160
	0.4439	2.221	2.221	2.221	2.221	2.221	2.160
	0.4444	2.231	2.231	2.231	2.231	2.231	2.170
	0.4450	2.241	2.241	2.241	2.241	2.241	2.180
	0.4456	2.251	2.251	2.251	2.251	2.251	2.190
	0.4461	2.251	2.251	2.251	2.251	2.251	2.190
	0.4467	2.261	2.261	2.261	2.261	2.261	2.200
	0.4472	2.271	2.271	2.271	2.271	2.271	2.210
	0.4478	2.281	2.281	2.281	2.281	2.281	2.220
	0.4483	2.301	2.301	2.301	2.301	2.301	2.240
	0.4489	2.311	2.311	2.311	2.311	2.311	2.250
	0.4494	2.331	2.331	2.331	2.331	2.331	2.270
	0.4500	2.351	2.351	2.351	2.351	2.351	2.290
	0.4506	2.371	2.371	2.371	2.371	2.371	2.310
	0.4511	2.401	2.401	2.401	2.401	2.401	2.340
	0.4517	2.431	2.431	2.431	2.431	2.431	2.370
	0.4522	2.471	2.471	2.471	2.471	2.471	2.410
	0.4528	2.521	2.521	2.521	2.521	2.521	2.460
	0.4533	2.551	2.551	2.551	2.551	2.551	2.490
	0.4539	2.531	2.531	2.531	2.531	2.531	2.470
	0.4544	2.401	2.401	2.401	2.401	2.401	2.340
	0.4550	2.121	2.121	2.121	2.121	2.121	2.060
	0.4556	1.811	1.811	1.811	1.811	1.811	1.750
	0.4561	1.701	1.701	1.701	1.701	1.701	1.640
	0.4567	1.851	1.851	1.851	1.851	1.851	1.790
	0.4572	2.081	2.081	2.081	2.081	2.081	2.020
	0.4578	2.171	2.171	2.171	2.171	2.171	2.110
	0.4583	2.071	2.071	2.071	2.071	2.071	2.010
	0.4589	1.921	1.921	1.921	1.921	1.921	1.860
	0.4594	1.871	1.871	1.871	1.871	1.871	1.810
	0.4600	1.931	1.931	1.931	1.931	1.931	1.870
	0.4606	2.021	2.021	2.021	2.021	2.021	1.960
	0.4611	2.041	2.041	2.041	2.041	2.041	1.980
	0.4617	1.991	1.991	1.991	1.991	1.991	1.930
	0.4622	1.941	1.941	1.941	1.941	1.941	1.880
	0.4628	1.921	1.921	1.921	1.921	1.921	1.860
	0.4633	1.951	1.951	1.951	1.951	1.951	1.890
	0.4639	1.971	1.971	1.971	1.971	1.971	1.910
	0.4644	1.971	1.971	1.971	1.971	1.971	1.910
	0.4650	1.951	1.951	1.951	1.951	1.951	1.890
	0.4656	1.931	1.931	1.931	1.931	1.931	1.870
	0.4661	1.921	1.921	1.921	1.921	1.921	1.860
	0.4667	1.931	1.931	1.931	1.931	1.931	1.870
	0.4672	1.931	1.931	1.931	1.931	1.931	1.870
	0.4678	1.931	1.931	1.931	1.931	1.931	1.870
	0.4683	1.921	1.921	1.921	1.921	1.921	1.860
	0.4689	1.911	1.911	1.911	1.911	1.911	1.850
	0.4694	1.911	1.911	1.911	1.911	1.911	1.850
	0.4700	1.911	1.911	1.911	1.911	1.911	1.850
	0.4706	1.901	1.901	1.901	1.901	1.901	1.840
	0.4711	1.901	1.901	1.901	1.901	1.901	1.840
	0.4717	1.891	1.891	1.891	1.891	1.891	1.830

	Time +11 Sec	No-VC/YC EDG Actual Loading	Actual Loading	No LG 9 KF Pump / No LG 10 Chiller	No LG 8 VC/YC or Fan Loads till 10 Min	Exciter	Total Load
Event	Time					+0.056	CYME
	Min	MW	MW	MW	MW	MW	MW
	0.4722	1.891	1.891	1.891	1.891	1.891	1.830
	0.4728	1.891	1.891	1.891	1.891	1.891	1.830
	0.4733	1.881	1.881	1.881	1.881	1.881	1.820
	0.4739	1.881	1.881	1.881	1.881	1.881	1.820
	0.4744	1.881	1.881	1.881	1.881	1.881	1.820
	0.4750	1.871	1.871	1.871	1.871	1.871	1.810
	0.4756	1.871	1.871	1.871	1.871	1.871	1.810
	0.4761	1.871	1.871	1.871	1.871	1.871	1.810
	0.4767	1.861	1.861	1.861	1.861	1.861	1.800
	0.4772	1.861	1.861	1.861	1.861	1.861	1.800
	0.4778	1.861	1.861	1.861	1.861	1.861	1.800
	0.4783	1.861	1.861	1.861	1.861	1.861	1.800
	0.4789	1.851	1.851	1.851	1.851	1.851	1.790
	0.4794	1.851	1.851	1.851	1.851	1.851	1.790
	0.4800	1.851	1.851	1.851	1.851	1.851	1.790
	0.4806	1.851	1.851	1.851	1.851	1.851	1.790
	0.4811	1.851	1.851	1.851	1.851	1.851	1.790
	0.4817	1.851	1.851	1.851	1.851	1.851	1.790
	0.4822	1.851	1.851	1.851	1.851	1.851	1.790
	0.4828	1.851	1.851	1.851	1.851	1.851	1.790
	0.4833	1.851	1.851	1.851	1.851	1.851	1.790
	0.4839	1.851	1.851	1.851	1.851	1.851	1.790
	0.4844	1.851	1.851	1.851	1.851	1.851	1.790
	0.4850	1.851	1.851	1.851	1.851	1.851	1.790
	0.4856	1.851	1.851	1.851	1.851	1.851	1.790
	0.4861	1.851	1.851	1.851	1.851	1.851	1.790
	0.4867	1.851	1.851	1.851	1.851	1.851	1.790
	0.4872	1.851	1.851	1.851	1.851	1.851	1.790
	0.4878	1.851	1.851	1.851	1.851	1.851	1.790
	0.4883	1.851	1.851	1.851	1.851	1.851	1.790
	0.4889	1.851	1.851	1.851	1.851	1.851	1.790
	0.4894	1.851	1.851	1.851	1.851	1.851	1.790
	0.4900	1.861	1.861	1.861	1.861	1.861	1.800
	0.4906	1.861	1.861	1.861	1.861	1.861	1.800
	0.4911	1.861	1.861	1.861	1.861	1.861	1.800
	0.4917	1.861	1.861	1.861	1.861	1.861	1.800
	0.4922	1.861	1.861	1.861	1.861	1.861	1.800
	0.4928	1.861	1.861	1.861	1.861	1.861	1.800
	0.4933	1.871	1.871	1.871	1.871	1.871	1.810
	0.4939	1.871	1.871	1.871	1.871	1.871	1.810
	0.4944	1.871	1.871	1.871	1.871	1.871	1.810
	0.4950	1.871	1.871	1.871	1.871	1.871	1.810
	0.4956	1.871	1.871	1.871	1.871	1.871	1.810
	0.4961	1.881	1.881	1.881	1.881	1.881	1.820
	0.4967	1.881	1.881	1.881	1.881	1.881	1.820
	0.4972	1.881	1.881	1.881	1.881	1.881	1.820
	0.4978	1.881	1.881	1.881	1.881	1.881	1.820
	0.4983	1.881	1.881	1.881	1.881	1.881	1.820
	0.4989	1.891	1.891	1.891	1.891	1.891	1.830
	0.4994	1.891	1.891	1.891	1.891	1.891	1.830
	0.5000	1.891	1.891	1.891	1.891	1.891	1.830
	0.5006	1.891	1.891	1.891	1.891	1.891	1.830
	0.5011	1.891	1.891	1.891	1.891	1.891	1.830
	0.5017	1.901	1.901	1.901	1.901	1.901	1.840
	0.5022	1.901	1.901	1.901	1.901	1.901	1.840
	0.5028	1.901	1.901	1.901	1.901	1.901	1.840
Load Group 5	0.5033	2.331	2.331	2.331	2.331	2.331	2.270
	0.5039	2.471	2.471	2.471	2.471	2.471	2.410
	0.5044	2.511	2.511	2.511	2.511	2.511	2.450
	0.5050	2.461	2.461	2.461	2.461	2.461	2.400
	0.5056	2.391	2.391	2.391	2.391	2.391	2.330
	0.5061	2.351	2.351	2.351	2.351	2.351	2.290
	0.5067	2.361	2.361	2.361	2.361	2.361	2.300
	0.5072	2.391	2.391	2.391	2.391	2.391	2.330
	0.5078	2.421	2.421	2.421	2.421	2.421	2.360

	Time +11 Sec	No-VC/YC EDG Actual Loading	Actual Loading	No LG 9 KF Pump / No LG 10 Chiller	No LG 8 VC/YC or Fan Loads till 10 Min	Exciter	Total Load
Event	Time					+0.056	CYME
	Min	MW	MW	MW	MW	MW	MW
	0.5083	2.431	2.431	2.431	2.431	2.431	2.370
	0.5089	2.421	2.421	2.421	2.421	2.421	2.360
	0.5094	2.411	2.411	2.411	2.411	2.411	2.350
	0.5100	2.411	2.411	2.411	2.411	2.411	2.350
	0.5106	2.421	2.421	2.421	2.421	2.421	2.360
	0.5111	2.431	2.431	2.431	2.431	2.431	2.370
	0.5117	2.441	2.441	2.441	2.441	2.441	2.380
	0.5122	2.451	2.451	2.451	2.451	2.451	2.390
	0.5128	2.461	2.461	2.461	2.461	2.461	2.400
	0.5133	2.461	2.461	2.461	2.461	2.461	2.400
	0.5139	2.471	2.471	2.471	2.471	2.471	2.410
	0.5144	2.481	2.481	2.481	2.481	2.481	2.420
	0.5150	2.491	2.491	2.491	2.491	2.491	2.430
	0.5156	2.511	2.511	2.511	2.511	2.511	2.450
	0.5161	2.521	2.521	2.521	2.521	2.521	2.460
	0.5167	2.531	2.531	2.531	2.531	2.531	2.470
	0.5172	2.541	2.541	2.541	2.541	2.541	2.480
	0.5178	2.561	2.561	2.561	2.561	2.561	2.500
	0.5183	2.571	2.571	2.571	2.571	2.571	2.510
	0.5189	2.591	2.591	2.591	2.591	2.591	2.530
	0.5194	2.611	2.611	2.611	2.611	2.611	2.550
	0.5200	2.631	2.631	2.631	2.631	2.631	2.570
	0.5206	2.651	2.651	2.651	2.651	2.651	2.590
	0.5211	2.681	2.681	2.681	2.681	2.681	2.620
	0.5217	2.701	2.701	2.701	2.701	2.701	2.640
	0.5222	2.711	2.711	2.711	2.711	2.711	2.650
	0.5228	2.671	2.671	2.671	2.671	2.671	2.610
	0.5233	2.541	2.541	2.541	2.541	2.541	2.480
	0.5239	2.351	2.351	2.351	2.351	2.351	2.290
	0.5244	2.221	2.221	2.221	2.221	2.221	2.160
	0.5250	2.221	2.221	2.221	2.221	2.221	2.160
	0.5256	2.291	2.291	2.291	2.291	2.291	2.230
	0.5261	2.361	2.361	2.361	2.361	2.361	2.300
	0.5267	2.371	2.371	2.371	2.371	2.371	2.310
	0.5272	2.341	2.341	2.341	2.341	2.341	2.280
	0.5278	2.311	2.311	2.311	2.311	2.311	2.250
	0.5283	2.291	2.291	2.291	2.291	2.291	2.230
	0.5289	2.301	2.301	2.301	2.301	2.301	2.240
	0.5294	2.321	2.321	2.321	2.321	2.321	2.260
	0.5300	2.331	2.331	2.331	2.331	2.331	2.270
	0.5306	2.321	2.321	2.321	2.321	2.321	2.260
	0.5311	2.311	2.311	2.311	2.311	2.311	2.250
	0.5317	2.291	2.291	2.291	2.291	2.291	2.230
	0.5322	2.291	2.291	2.291	2.291	2.291	2.230
	0.5328	2.291	2.291	2.291	2.291	2.291	2.230
	0.5333	2.291	2.291	2.291	2.291	2.291	2.230
	0.5339	2.291	2.291	2.291	2.291	2.291	2.230
	0.5344	2.281	2.281	2.281	2.281	2.281	2.220
	0.5350	2.271	2.271	2.271	2.271	2.271	2.210
	0.5356	2.261	2.261	2.261	2.261	2.261	2.200
	0.5361	2.261	2.261	2.261	2.261	2.261	2.200
	0.5367	2.261	2.261	2.261	2.261	2.261	2.200
	0.5372	2.251	2.251	2.251	2.251	2.251	2.190
	0.5378	2.241	2.241	2.241	2.241	2.241	2.180
	0.5383	2.241	2.241	2.241	2.241	2.241	2.180
	0.5389	2.231	2.231	2.231	2.231	2.231	2.170
	0.5394	2.231	2.231	2.231	2.231	2.231	2.170
	0.5400	2.221	2.221	2.221	2.221	2.221	2.160
	0.5406	2.211	2.211	2.211	2.211	2.211	2.150
	0.5411	2.211	2.211	2.211	2.211	2.211	2.150
	0.5417	2.201	2.201	2.201	2.201	2.201	2.140
	0.5422	2.201	2.201	2.201	2.201	2.201	2.140
	0.5428	2.191	2.191	2.191	2.191	2.191	2.130
	0.5433	2.191	2.191	2.191	2.191	2.191	2.130
	0.5439	2.181	2.181	2.181	2.181	2.181	2.120

	Time +11 Sec	No-VC/YC EDG Actual Loading	Actual Loading	No LG 9 KF Pump / No LG 10 Chiller	No LG 8 VC/YC or Fan Loads till 10 Min	Exciter	Total Load
Event	Time					+0.056	CYME
	Min	MW	MW	MW	MW	MW	MW
	0.5444	2.181	2.181	2.181	2.181	2.181	2.120
	0.5450	2.171	2.171	2.171	2.171	2.171	2.110
	0.5456	2.171	2.171	2.171	2.171	2.171	2.110
	0.5461	2.161	2.161	2.161	2.161	2.161	2.100
	0.5467	2.161	2.161	2.161	2.161	2.161	2.100
	0.5472	2.151	2.151	2.151	2.151	2.151	2.090
	0.5478	2.151	2.151	2.151	2.151	2.151	2.090
	0.5483	2.151	2.151	2.151	2.151	2.151	2.090
	0.5489	2.141	2.141	2.141	2.141	2.141	2.080
	0.5494	2.141	2.141	2.141	2.141	2.141	2.080
	0.5500	2.141	2.141	2.141	2.141	2.141	2.080
	0.5506	2.141	2.141	2.141	2.141	2.141	2.080
	0.5511	2.131	2.131	2.131	2.131	2.131	2.070
	0.5517	2.131	2.131	2.131	2.131	2.131	2.070
	0.5522	2.131	2.131	2.131	2.131	2.131	2.070
	0.5528	2.131	2.131	2.131	2.131	2.131	2.070
	0.5533	2.131	2.131	2.131	2.131	2.131	2.070
	0.5539	2.131	2.131	2.131	2.131	2.131	2.070
	0.5544	2.131	2.131	2.131	2.131	2.131	2.070
	0.5550	2.131	2.131	2.131	2.131	2.131	2.070
	0.5556	2.131	2.131	2.131	2.131	2.131	2.070
	0.5561	2.131	2.131	2.131	2.131	2.131	2.070
	0.5567	2.131	2.131	2.131	2.131	2.131	2.070
	0.5572	2.131	2.131	2.131	2.131	2.131	2.070
	0.5578	2.131	2.131	2.131	2.131	2.131	2.070
	0.5583	2.131	2.131	2.131	2.131	2.131	2.070
	0.5589	2.131	2.131	2.131	2.131	2.131	2.070
	0.5594	2.131	2.131	2.131	2.131	2.131	2.070
	0.5600	2.131	2.131	2.131	2.131	2.131	2.070
	0.5606	2.141	2.141	2.141	2.141	2.141	2.080
	0.5611	2.141	2.141	2.141	2.141	2.141	2.080
	0.5617	2.141	2.141	2.141	2.141	2.141	2.080
	0.5622	2.141	2.141	2.141	2.141	2.141	2.080
	0.5628	2.141	2.141	2.141	2.141	2.141	2.080
	0.5633	2.151	2.151	2.151	2.151	2.151	2.090
	0.5639	2.151	2.151	2.151	2.151	2.151	2.090
	0.5644	2.151	2.151	2.151	2.151	2.151	2.090
	0.5650	2.151	2.151	2.151	2.151	2.151	2.090
	0.5656	2.161	2.161	2.161	2.161	2.161	2.100
	0.5661	2.161	2.161	2.161	2.161	2.161	2.100
	0.5667	2.161	2.161	2.161	2.161	2.161	2.100
	0.5672	2.171	2.171	2.171	2.171	2.171	2.110
	0.5678	2.171	2.171	2.171	2.171	2.171	2.110
	0.5683	2.171	2.171	2.171	2.171	2.171	2.110
	0.5689	2.171	2.171	2.171	2.171	2.171	2.110
	0.5694	2.181	2.181	2.181	2.181	2.181	2.120
	0.5700	2.181	2.181	2.181	2.181	2.181	2.120
	0.5706	2.181	2.181	2.181	2.181	2.181	2.120
	0.5711	2.181	2.181	2.181	2.181	2.181	2.120
	0.5717	2.191	2.191	2.191	2.191	2.191	2.130
	0.5722	2.191	2.191	2.191	2.191	2.191	2.130
	0.5728	2.191	2.191	2.191	2.191	2.191	2.130
	0.5733	2.191	2.191	2.191	2.191	2.191	2.130
	0.5739	2.191	2.191	2.191	2.191	2.191	2.130
	0.5744	2.201	2.201	2.201	2.201	2.201	2.140
	0.5750	2.201	2.201	2.201	2.201	2.201	2.140
	0.5756	2.201	2.201	2.201	2.201	2.201	2.140
	0.5761	2.201	2.201	2.201	2.201	2.201	2.140
	0.5767	2.201	2.201	2.201	2.201	2.201	2.140
	0.5772	2.201	2.201	2.201	2.201	2.201	2.140
	0.5778	2.211	2.211	2.211	2.211	2.211	2.150
	0.5783	2.211	2.211	2.211	2.211	2.211	2.150
	0.5789	2.211	2.211	2.211	2.211	2.211	2.150
	0.5794	2.211	2.211	2.211	2.211	2.211	2.150
	0.5800	2.211	2.211	2.211	2.211	2.211	2.150

	Time +.1 Sec	No-VC/YC EDG Actual Loading	Actual Loading	No LG 9 KF Pump / No LG 10 Chiller	No LG 8 VC/YC or Fan Loads till 10 Min	Exciter	Total Load
Event	Time					+0.056	CYME
	Min	MW	MW	MW	MW	MW	MW
	0.5806	2.211	2.211	2.211	2.211	2.211	2.150
	0.5811	2.211	2.211	2.211	2.211	2.211	2.150
	0.5817	2.211	2.211	2.211	2.211	2.211	2.150
	0.5822	2.211	2.211	2.211	2.211	2.211	2.150
	0.5828	2.211	2.211	2.211	2.211	2.211	2.150
	0.5833	2.211	2.211	2.211	2.211	2.211	2.150
	0.5839	2.211	2.211	2.211	2.211	2.211	2.150
	0.5844	2.211	2.211	2.211	2.211	2.211	2.150
	0.5850	2.211	2.211	2.211	2.211	2.211	2.150
	0.5856	2.211	2.211	2.211	2.211	2.211	2.150
	0.5861	2.211	2.211	2.211	2.211	2.211	2.150
Load Group 6	0.5867	2.891	2.891	2.891	2.891	2.891	2.830
	0.5872	3.151	3.151	3.151	3.151	3.151	3.090
	0.5878	3.211	3.211	3.211	3.211	3.211	3.150
	0.5883	3.111	3.111	3.111	3.111	3.111	3.050
	0.5889	2.991	2.991	2.991	2.991	2.991	2.930
	0.5894	2.911	2.911	2.911	2.911	2.911	2.850
	0.5900	2.911	2.911	2.911	2.911	2.911	2.850
	0.5906	2.951	2.951	2.951	2.951	2.951	2.890
	0.5911	2.991	2.991	2.991	2.991	2.991	2.930
	0.5917	3.001	3.001	3.001	3.001	3.001	2.940
	0.5922	2.991	2.991	2.991	2.991	2.991	2.930
	0.5928	2.971	2.971	2.971	2.971	2.971	2.910
	0.5933	2.961	2.961	2.961	2.961	2.961	2.900
	0.5939	2.961	2.961	2.961	2.961	2.961	2.900
	0.5944	2.981	2.981	2.981	2.981	2.981	2.920
	0.5950	3.001	3.001	3.001	3.001	3.001	2.940
	0.5956	3.011	3.011	3.011	3.011	3.011	2.950
	0.5961	3.021	3.021	3.021	3.021	3.021	2.960
	0.5967	3.031	3.031	3.031	3.031	3.031	2.970
	0.5972	3.041	3.041	3.041	3.041	3.041	2.980
	0.5978	3.051	3.051	3.051	3.051	3.051	2.990
	0.5983	3.071	3.071	3.071	3.071	3.071	3.010
	0.5989	3.101	3.101	3.101	3.101	3.101	3.040
	0.5994	3.131	3.131	3.131	3.131	3.131	3.070
	0.6000	3.181	3.181	3.181	3.181	3.181	3.120
	0.6006	3.221	3.221	3.221	3.221	3.221	3.160
	0.6011	3.281	3.281	3.281	3.281	3.281	3.220
	0.6017	3.341	3.341	3.341	3.341	3.341	3.280
	0.6022	3.411	3.411	3.411	3.411	3.411	3.350
	0.6028	3.481	3.481	3.481	3.481	3.481	3.420
	0.6033	3.461	3.461	3.461	3.461	3.461	3.400
	0.6039	3.241	3.241	3.241	3.241	3.241	3.180
	0.6044	2.871	2.871	2.871	2.871	2.871	2.810
	0.6050	2.671	2.671	2.671	2.671	2.671	2.610
	0.6056	2.761	2.761	2.761	2.761	2.761	2.700
	0.6061	2.941	2.941	2.941	2.941	2.941	2.880
	0.6067	3.011	3.011	3.011	3.011	3.011	2.950
	0.6072	2.991	2.991	2.991	2.991	2.991	2.930
	0.6078	2.941	2.941	2.941	2.941	2.941	2.880
	0.6083	2.901	2.901	2.901	2.901	2.901	2.840
	0.6089	2.881	2.881	2.881	2.881	2.881	2.820
	0.6094	2.921	2.921	2.921	2.921	2.921	2.860
	0.6100	2.961	2.961	2.961	2.961	2.961	2.900
	0.6106	2.971	2.971	2.971	2.971	2.971	2.910
	0.6111	2.951	2.951	2.951	2.951	2.951	2.890
	0.6117	2.921	2.921	2.921	2.921	2.921	2.860
	0.6122	2.911	2.911	2.911	2.911	2.911	2.850
	0.6128	2.921	2.921	2.921	2.921	2.921	2.860
	0.6133	2.931	2.931	2.931	2.931	2.931	2.870
	0.6139	2.931	2.931	2.931	2.931	2.931	2.870
	0.6144	2.921	2.921	2.921	2.921	2.921	2.860
	0.6150	2.911	2.911	2.911	2.911	2.911	2.850
	0.6156	2.901	2.901	2.901	2.901	2.901	2.840
	0.6161	2.901	2.901	2.901	2.901	2.901	2.840

Attachment 9, Actual EDG Loading Based on CYME Calculation

	Time +11 Sec	No-VC/YC EDG Actual Loading	Actual Loading	No LG 9 KF Pump / No LG 10 Chiller	No LG 8 VC/YC or Fan Loads till 10 Min	Exciter	Total Load
Event	Time					+0.056	CYME
	Min	MW	MW	MW	MW	MW	MW
	0.6167	2.901	2.901	2.901	2.901	2.901	2.840
	0.6172	2.901	2.901	2.901	2.901	2.901	2.840
	0.6178	2.891	2.891	2.891	2.891	2.891	2.830
	0.6183	2.881	2.881	2.881	2.881	2.881	2.820
	0.6189	2.871	2.871	2.871	2.871	2.871	2.810
	0.6194	2.871	2.871	2.871	2.871	2.871	2.810
	0.6200	2.861	2.861	2.861	2.861	2.861	2.800
	0.6206	2.861	2.861	2.861	2.861	2.861	2.800
	0.6211	2.851	2.851	2.851	2.851	2.851	2.790
	0.6217	2.841	2.841	2.841	2.841	2.841	2.780
	0.6222	2.831	2.831	2.831	2.831	2.831	2.770
	0.6228	2.821	2.821	2.821	2.821	2.821	2.760
	0.6233	2.821	2.821	2.821	2.821	2.821	2.760
	0.6239	2.811	2.811	2.811	2.811	2.811	2.750
	0.6244	2.801	2.801	2.801	2.801	2.801	2.740
	0.6250	2.791	2.791	2.791	2.791	2.791	2.730
	0.6256	2.781	2.781	2.781	2.781	2.781	2.720
	0.6261	2.781	2.781	2.781	2.781	2.781	2.720
	0.6267	2.771	2.771	2.771	2.771	2.771	2.710
	0.6272	2.761	2.761	2.761	2.761	2.761	2.700
	0.6278	2.761	2.761	2.761	2.761	2.761	2.700
	0.6283	2.751	2.751	2.751	2.751	2.751	2.690
	0.6289	2.741	2.741	2.741	2.741	2.741	2.680
	0.6294	2.741	2.741	2.741	2.741	2.741	2.680
	0.6300	2.731	2.731	2.731	2.731	2.731	2.670
	0.6306	2.731	2.731	2.731	2.731	2.731	2.670
	0.6311	2.721	2.721	2.721	2.721	2.721	2.660
	0.6317	2.721	2.721	2.721	2.721	2.721	2.660
	0.6322	2.711	2.711	2.711	2.711	2.711	2.650
	0.6328	2.711	2.711	2.711	2.711	2.711	2.650
	0.6333	2.701	2.701	2.701	2.701	2.701	2.640
	0.6339	2.701	2.701	2.701	2.701	2.701	2.640
	0.6344	2.701	2.701	2.701	2.701	2.701	2.640
	0.6350	2.691	2.691	2.691	2.691	2.691	2.630
	0.6356	2.691	2.691	2.691	2.691	2.691	2.630
	0.6361	2.691	2.691	2.691	2.691	2.691	2.630
	0.6367	2.681	2.681	2.681	2.681	2.681	2.620
	0.6372	2.681	2.681	2.681	2.681	2.681	2.620
	0.6378	2.681	2.681	2.681	2.681	2.681	2.620
	0.6383	2.681	2.681	2.681	2.681	2.681	2.620
	0.6389	2.681	2.681	2.681	2.681	2.681	2.620
	0.6394	2.681	2.681	2.681	2.681	2.681	2.620
	0.6400	2.681	2.681	2.681	2.681	2.681	2.620
	0.6406	2.681	2.681	2.681	2.681	2.681	2.620
	0.6411	2.681	2.681	2.681	2.681	2.681	2.620
	0.6417	2.681	2.681	2.681	2.681	2.681	2.620
	0.6422	2.681	2.681	2.681	2.681	2.681	2.620
	0.6428	2.681	2.681	2.681	2.681	2.681	2.620
	0.6433	2.691	2.691	2.691	2.691	2.691	2.630
	0.6439	2.691	2.691	2.691	2.691	2.691	2.630
	0.6444	2.691	2.691	2.691	2.691	2.691	2.630
	0.6450	2.691	2.691	2.691	2.691	2.691	2.630
	0.6456	2.701	2.701	2.701	2.701	2.701	2.640
	0.6461	2.701	2.701	2.701	2.701	2.701	2.640
	0.6467	2.701	2.701	2.701	2.701	2.701	2.640
	0.6472	2.701	2.701	2.701	2.701	2.701	2.640
	0.6478	2.711	2.711	2.711	2.711	2.711	2.650
	0.6483	2.711	2.711	2.711	2.711	2.711	2.650
	0.6489	2.711	2.711	2.711	2.711	2.711	2.650
	0.6494	2.721	2.721	2.721	2.721	2.721	2.660
	0.6500	2.721	2.721	2.721	2.721	2.721	2.660
	0.6506	2.721	2.721	2.721	2.721	2.721	2.660
	0.6511	2.731	2.731	2.731	2.731	2.731	2.670
	0.6517	2.731	2.731	2.731	2.731	2.731	2.670
	0.6522	2.731	2.731	2.731	2.731	2.731	2.670

	Time +11 Sec	No-VC/YC EDG Actual Loading	Actual Loading	No LG 9 KF Pump / No LG 10 Chiller	No LG 8 VC/YC or Fan Loads till 10 Min	Exciter	Total Load
Event	Time					+0.056	CYME
	Min	MW	MW	MW	MW	MW	MW
	0.6528	2.741	2.741	2.741	2.741	2.741	2.680
	0.6533	2.741	2.741	2.741	2.741	2.741	2.680
	0.6539	2.741	2.741	2.741	2.741	2.741	2.680
	0.6544	2.751	2.751	2.751	2.751	2.751	2.690
	0.6550	2.751	2.751	2.751	2.751	2.751	2.690
	0.6556	2.751	2.751	2.751	2.751	2.751	2.690
	0.6561	2.761	2.761	2.761	2.761	2.761	2.700
	0.6567	2.761	2.761	2.761	2.761	2.761	2.700
	0.6572	2.761	2.761	2.761	2.761	2.761	2.700
	0.6578	2.761	2.761	2.761	2.761	2.761	2.700
	0.6583	2.771	2.771	2.771	2.771	2.771	2.710
	0.6589	2.771	2.771	2.771	2.771	2.771	2.710
	0.6594	2.771	2.771	2.771	2.771	2.771	2.710
	0.6600	2.781	2.781	2.781	2.781	2.781	2.720
	0.6606	2.781	2.781	2.781	2.781	2.781	2.720
	0.6611	2.781	2.781	2.781	2.781	2.781	2.720
	0.6617	2.781	2.781	2.781	2.781	2.781	2.720
	0.6622	2.781	2.781	2.781	2.781	2.781	2.720
	0.6628	2.791	2.791	2.791	2.791	2.791	2.730
	0.6633	2.791	2.791	2.791	2.791	2.791	2.730
	0.6639	2.791	2.791	2.791	2.791	2.791	2.730
	0.6644	2.791	2.791	2.791	2.791	2.791	2.730
	0.6650	2.791	2.791	2.791	2.791	2.791	2.730
	0.6656	2.791	2.791	2.791	2.791	2.791	2.730
	0.6661	2.791	2.791	2.791	2.791	2.791	2.730
	0.6667	2.791	2.791	2.791	2.791	2.791	2.730
	0.6672	2.791	2.791	2.791	2.791	2.791	2.730
	0.6678	2.791	2.791	2.791	2.791	2.791	2.730
	0.6683	2.791	2.791	2.791	2.791	2.791	2.730
	0.6689	2.791	2.791	2.791	2.791	2.791	2.730
	0.6694	2.791	2.791	2.791	2.791	2.791	2.730
Load Group 7	0.6700	3.161	3.161	3.161	3.161	3.161	3.100
	0.6706	3.351	3.351	3.351	3.351	3.351	3.290
	0.6711	3.401	3.401	3.401	3.401	3.401	3.340
	0.6717	3.341	3.341	3.341	3.341	3.341	3.280
	0.6722	3.251	3.251	3.251	3.251	3.251	3.190
	0.6728	3.201	3.201	3.201	3.201	3.201	3.140
	0.6733	3.201	3.201	3.201	3.201	3.201	3.140
	0.6739	3.231	3.231	3.231	3.231	3.231	3.170
	0.6744	3.261	3.261	3.261	3.261	3.261	3.200
	0.6750	3.271	3.271	3.271	3.271	3.271	3.210
	0.6756	3.261	3.261	3.261	3.261	3.261	3.200
	0.6761	3.241	3.241	3.241	3.241	3.241	3.180
	0.6767	3.231	3.231	3.231	3.231	3.231	3.170
	0.6772	3.231	3.231	3.231	3.231	3.231	3.170
	0.6778	3.251	3.251	3.251	3.251	3.251	3.190
	0.6783	3.261	3.261	3.261	3.261	3.261	3.200
	0.6789	3.271	3.271	3.271	3.271	3.271	3.210
	0.6794	3.271	3.271	3.271	3.271	3.271	3.210
	0.6800	3.271	3.271	3.271	3.271	3.271	3.210
	0.6806	3.271	3.271	3.271	3.271	3.271	3.210
	0.6811	3.281	3.281	3.281	3.281	3.281	3.220
	0.6817	3.291	3.291	3.291	3.291	3.291	3.230
	0.6822	3.301	3.301	3.301	3.301	3.301	3.240
	0.6828	3.301	3.301	3.301	3.301	3.301	3.240
	0.6833	3.311	3.311	3.311	3.311	3.311	3.250
	0.6839	3.311	3.311	3.311	3.311	3.311	3.250
	0.6844	3.321	3.321	3.321	3.321	3.321	3.260
	0.6850	3.331	3.331	3.331	3.331	3.331	3.270
	0.6856	3.331	3.331	3.331	3.331	3.331	3.270
	0.6861	3.341	3.341	3.341	3.341	3.341	3.280
	0.6867	3.351	3.351	3.351	3.351	3.351	3.290
	0.6872	3.351	3.351	3.351	3.351	3.351	3.290
	0.6878	3.361	3.361	3.361	3.361	3.361	3.300
	0.6883	3.371	3.371	3.371	3.371	3.371	3.310

Event	Time +11 Sec	No-VC/YC EDG Actual Loading	Actual Loading	No LG 9 KF Pump / No LG 10 Chiller	No LG 8 VC/YC or Fan Loads till 10 Min	Exciter	Total Load
	Time					+0.056	CYME
	Min	MW	MW	MW	MW	MW	MW
	0.6889	3.371	3.371	3.371	3.371	3.371	3.310
	0.6894	3.381	3.381	3.381	3.381	3.381	3.320
	0.6900	3.381	3.381	3.381	3.381	3.381	3.320
	0.6906	3.391	3.391	3.391	3.391	3.391	3.330
	0.6911	3.401	3.401	3.401	3.401	3.401	3.340
	0.6917	3.401	3.401	3.401	3.401	3.401	3.340
	0.6922	3.411	3.411	3.411	3.411	3.411	3.350
	0.6928	3.411	3.411	3.411	3.411	3.411	3.350
	0.6933	3.421	3.421	3.421	3.421	3.421	3.360
	0.6939	3.421	3.421	3.421	3.421	3.421	3.360
	0.6944	3.431	3.431	3.431	3.431	3.431	3.370
	0.6950	3.431	3.431	3.431	3.431	3.431	3.370
	0.6956	3.441	3.441	3.441	3.441	3.441	3.380
	0.6961	3.441	3.441	3.441	3.441	3.441	3.380
	0.6967	3.451	3.451	3.451	3.451	3.451	3.390
	0.6972	3.451	3.451	3.451	3.451	3.451	3.390
	0.6978	3.461	3.461	3.461	3.461	3.461	3.400
	0.6983	3.461	3.461	3.461	3.461	3.461	3.400
	0.6989	3.461	3.461	3.461	3.461	3.461	3.400
	0.6994	3.471	3.471	3.471	3.471	3.471	3.410
	0.7000	3.471	3.471	3.471	3.471	3.471	3.410
	0.7006	3.481	3.481	3.481	3.481	3.481	3.420
	0.7011	3.491	3.491	3.491	3.491	3.491	3.430
	0.7017	3.491	3.491	3.491	3.491	3.491	3.430
	0.7022	3.501	3.501	3.501	3.501	3.501	3.440
	0.7028	3.511	3.511	3.511	3.511	3.511	3.450
	0.7033	3.511	3.511	3.511	3.511	3.511	3.450
	0.7039	3.521	3.521	3.521	3.521	3.521	3.460
	0.7044	3.541	3.541	3.541	3.541	3.541	3.480
	0.7050	3.551	3.551	3.551	3.551	3.551	3.490
	0.7056	3.561	3.561	3.561	3.561	3.561	3.500
	0.7061	3.581	3.581	3.581	3.581	3.581	3.520
	0.7067	3.601	3.601	3.601	3.601	3.601	3.540
	0.7072	3.631	3.631	3.631	3.631	3.631	3.570
	0.7078	3.661	3.661	3.661	3.661	3.661	3.600
	0.7083	3.691	3.691	3.691	3.691	3.691	3.630
	0.7089	3.721	3.721	3.721	3.721	3.721	3.660
	0.7094	3.731	3.731	3.731	3.731	3.731	3.670
	0.7100	3.681	3.681	3.681	3.681	3.681	3.620
	0.7106	3.531	3.531	3.531	3.531	3.531	3.470
	0.7111	3.281	3.281	3.281	3.281	3.281	3.220
	0.7117	3.071	3.071	3.071	3.071	3.071	3.010
	0.7122	3.041	3.041	3.041	3.041	3.041	2.980
	0.7128	3.201	3.201	3.201	3.201	3.201	3.140
	0.7133	3.391	3.391	3.391	3.391	3.391	3.330
	0.7139	3.441	3.441	3.441	3.441	3.441	3.380
	0.7144	3.331	3.331	3.331	3.331	3.331	3.270
	0.7150	3.191	3.191	3.191	3.191	3.191	3.130
	0.7156	3.141	3.141	3.141	3.141	3.141	3.080
	0.7161	3.201	3.201	3.201	3.201	3.201	3.140
	0.7167	3.291	3.291	3.291	3.291	3.291	3.230
	0.7172	3.321	3.321	3.321	3.321	3.321	3.260
	0.7178	3.281	3.281	3.281	3.281	3.281	3.220
	0.7183	3.211	3.211	3.211	3.211	3.211	3.150
	0.7189	3.181	3.181	3.181	3.181	3.181	3.120
	0.7194	3.201	3.201	3.201	3.201	3.201	3.140
	0.7200	3.241	3.241	3.241	3.241	3.241	3.180
	0.7206	3.251	3.251	3.251	3.251	3.251	3.190
	0.7211	3.231	3.231	3.231	3.231	3.231	3.170
	0.7217	3.201	3.201	3.201	3.201	3.201	3.140
	0.7222	3.191	3.191	3.191	3.191	3.191	3.130
	0.7228	3.191	3.191	3.191	3.191	3.191	3.130
	0.7233	3.201	3.201	3.201	3.201	3.201	3.140
	0.7239	3.201	3.201	3.201	3.201	3.201	3.140
	0.7244	3.201	3.201	3.201	3.201	3.201	3.140

Attacnment 9. Actual EDG Loading Based on CYME Calculation

Event	Time +11 Sec	No-VC/YC EDG Actual Loading	Actual Loading	No LG 9 KF Pump / No LG 10 Chiller	No LG 8 VC/YC or Fan Loads till 10 Min	Exciter	Total Load
	Time					+0.056	CYME
	Min	MW	MW	MW	MW	MW	MW
	0.7250	3.181	3.181	3.181	3.181	3.181	3.120
	0.7256	3.171	3.171	3.171	3.171	3.171	3.110
	0.7261	3.171	3.171	3.171	3.171	3.171	3.110
	0.7267	3.171	3.171	3.171	3.171	3.171	3.110
	0.7272	3.171	3.171	3.171	3.171	3.171	3.110
	0.7278	3.161	3.161	3.161	3.161	3.161	3.100
	0.7283	3.151	3.151	3.151	3.151	3.151	3.090
	0.7289	3.151	3.151	3.151	3.151	3.151	3.090
	0.7294	3.141	3.141	3.141	3.141	3.141	3.080
	0.7300	3.141	3.141	3.141	3.141	3.141	3.080
	0.7306	3.141	3.141	3.141	3.141	3.141	3.080
	0.7311	3.141	3.141	3.141	3.141	3.141	3.080
	0.7317	3.131	3.131	3.131	3.131	3.131	3.070
	0.7322	3.131	3.131	3.131	3.131	3.131	3.070
	0.7328	3.121	3.121	3.121	3.121	3.121	3.060
	0.7333	3.121	3.121	3.121	3.121	3.121	3.060
	0.7339	3.121	3.121	3.121	3.121	3.121	3.060
	0.7344	3.121	3.121	3.121	3.121	3.121	3.060
	0.7350	3.121	3.121	3.121	3.121	3.121	3.060
	0.7356	3.111	3.111	3.111	3.111	3.111	3.050
	0.7361	3.111	3.111	3.111	3.111	3.111	3.050
	0.7367	3.111	3.111	3.111	3.111	3.111	3.050
	0.7372	3.111	3.111	3.111	3.111	3.111	3.050
	0.7378	3.111	3.111	3.111	3.111	3.111	3.050
	0.7383	3.111	3.111	3.111	3.111	3.111	3.050
	0.7389	3.101	3.101	3.101	3.101	3.101	3.040
	0.7394	3.101	3.101	3.101	3.101	3.101	3.040
	0.7400	3.101	3.101	3.101	3.101	3.101	3.040
	0.7406	3.101	3.101	3.101	3.101	3.101	3.040
	0.7411	3.101	3.101	3.101	3.101	3.101	3.040
	0.7417	3.101	3.101	3.101	3.101	3.101	3.040
	0.7422	3.101	3.101	3.101	3.101	3.101	3.040
	0.7428	3.101	3.101	3.101	3.101	3.101	3.040
	0.7433	3.101	3.101	3.101	3.101	3.101	3.040
	0.7439	3.111	3.111	3.111	3.111	3.111	3.050
	0.7444	3.111	3.111	3.111	3.111	3.111	3.050
	0.7450	3.111	3.111	3.111	3.111	3.111	3.050
	0.7456	3.111	3.111	3.111	3.111	3.111	3.050
	0.7461	3.111	3.111	3.111	3.111	3.111	3.050
	0.7467	3.111	3.111	3.111	3.111	3.111	3.050
	0.7472	3.121	3.121	3.121	3.121	3.121	3.060
	0.7478	3.121	3.121	3.121	3.121	3.121	3.060
	0.7483	3.121	3.121	3.121	3.121	3.121	3.060
	0.7489	3.121	3.121	3.121	3.121	3.121	3.060
	0.7494	3.121	3.121	3.121	3.121	3.121	3.060
	0.7500	3.121	3.121	3.121	3.121	3.121	3.060
	0.7506	3.131	3.131	3.131	3.131	3.131	3.070
	0.7511	3.131	3.131	3.131	3.131	3.131	3.070
	0.7517	3.131	3.131	3.131	3.131	3.131	3.070
	0.7522	3.131	3.131	3.131	3.131	3.131	3.070
	0.7528	3.131	3.131	3.131	3.131	3.131	3.070
Load Group 8	0.7533	3.099	3.099	3.099	3.099	3.481	3.420
(Assume after LG 7 Load = 3042 = 3.680+.056 -.282 -.064 -.169 -.146)	0.7539	3.099	3.099	3.099	3.099	3.621	3.560
	0.7544	3.099	3.099	3.099	3.099	3.671	3.610
	0.7550	3.099	3.099	3.099	3.099	3.641	3.580
	0.7556	3.099	3.099	3.099	3.099	3.571	3.510
	0.7561	3.099	3.099	3.099	3.099	3.531	3.470
	0.7567	3.099	3.099	3.099	3.099	3.521	3.460
	0.7572	3.099	3.099	3.099	3.099	3.511	3.450
	0.7578	3.099	3.099	3.099	3.099	3.511	3.450
	0.7583	3.099	3.099	3.099	3.099	3.511	3.450
	0.7589	3.099	3.099	3.099	3.099	3.501	3.440
	0.7594	3.099	3.099	3.099	3.099	3.501	3.440
	0.7600	3.099	3.099	3.099	3.099	3.501	3.440

Attachment 9, Actual EDG Loading Based on CYME Calculation

	Time +11 Sec	No-VC/YC EDG Actual Loading	Actual Loading	No LG 9 KF Pump / No LG 10 Chiller	No LG 8 VC/YC or Fan Loads till 10 Min	Exciter	Total Load
Event	Time					+0.056	CYME
	Min	MW	MW	MW	MW	MW	MW
	0.7606	3.099	3.099	3.099	3.099	3.521	3.460
	0.7611	3.099	3.099	3.099	3.099	3.531	3.470
	0.7617	3.099	3.099	3.099	3.099	3.541	3.480
	0.7622	3.099	3.099	3.099	3.099	3.551	3.490
	0.7628	3.099	3.099	3.099	3.099	3.551	3.490
	0.7633	3.099	3.099	3.099	3.099	3.551	3.490
	0.7o39	3.099	3.099	3.099	3.099	3.561	3.500
	0.7644	3.099	3.099	3.099	3.099	3.571	3.510
	0.7650	3.099	3.099	3.099	3.099	3.581	3.520
	0.7656	3.099	3.099	3.099	3.099	3.591	3.530
	0.7661	3.099	3.099	3.099	3.099	3.601	3.540
	0.7667	3.099	3.099	3.099	3.099	3.601	3.540
	0.7672	3.099	3.099	3.099	3.099	3.611	3.550
	0.7678	3.099	3.099	3.099	3.099	3.611	3.550
	0.7683	3.099	3.099	3.099	3.099	3.621	3.560
	0.7689	3.099	3.099	3.099	3.099	3.631	3.570
	0.7694	3.099	3.099	3.099	3.099	3.631	3.570
	0.7700	3.099	3.099	3.099	3.099	3.641	3.580
	0.7706	3.099	3.099	3.099	3.099	3.641	3.580
	0.7711	3.099	3.099	3.099	3.099	3.651	3.590
	0.7717	3.099	3.099	3.099	3.099	3.661	3.600
	0.7722	3.099	3.099	3.099	3.099	3.661	3.600
	0.7728	3.099	3.099	3.099	3.099	3.671	3.610
	0.7733	3.099	3.099	3.099	3.099	3.671	3.610
	0.7739	3.099	3.099	3.099	3.099	3.681	3.620
	0.7744	3.099	3.099	3.099	3.099	3.681	3.620
	0.7750	3.099	3.099	3.099	3.099	3.681	3.620
	0.7756	3.099	3.099	3.099	3.099	3.691	3.630
	0.7761	3.099	3.099	3.099	3.099	3.691	3.630
	0.7767	3.099	3.099	3.099	3.099	3.691	3.630
	0.7772	3.099	3.099	3.099	3.099	3.691	3.630
	0.7778	3.099	3.099	3.099	3.099	3.691	3.630
	0.7783	3.099	3.099	3.099	3.099	3.701	3.640
	0.7789	3.099	3.099	3.099	3.099	3.701	3.640
	0.7794	3.099	3.099	3.099	3.099	3.701	3.640
	0.7800	3.099	3.099	3.099	3.099	3.701	3.640
	0.7806	3.099	3.099	3.099	3.099	3.701	3.640
	0.7811	3.099	3.099	3.099	3.099	3.701	3.640
	0.7817	3.099	3.099	3.099	3.099	3.701	3.640
	0.7822	3.099	3.099	3.099	3.099	3.701	3.640
	0.7828	3.099	3.099	3.099	3.099	3.701	3.640
	0.7833	3.099	3.099	3.099	3.099	3.701	3.640
	0.7839	3.099	3.099	3.099	3.099	3.701	3.640
	0.7844	3.099	3.099	3.099	3.099	3.701	3.640
	0.7850	3.099	3.099	3.099	3.099	3.701	3.640
	0.7856	3.099	3.099	3.099	3.099	3.701	3.640
	0.7861	3.099	3.099	3.099	3.099	3.701	3.640
	0.7867	3.099	3.099	3.099	3.099	3.701	3.640
	0.7872	3.099	3.099	3.099	3.099	3.701	3.640
	0.7878	3.099	3.099	3.099	3.099	3.701	3.640
	0.7883	3.099	3.099	3.099	3.099	3.701	3.640
	0.7889	3.099	3.099	3.099	3.099	3.691	3.630
	0.7894	3.099	3.099	3.099	3.099	3.691	3.630
	0.7900	3.099	3.099	3.099	3.099	3.691	3.630
	0.7906	3.099	3.099	3.099	3.099	3.691	3.630
	0.7911	3.099	3.099	3.099	3.099	3.691	3.630
	0.7917	3.099	3.099	3.099	3.099	3.681	3.620
	0.7922	3.099	3.099	3.099	3.099	3.681	3.620
	0.7928	3.099	3.099	3.099	3.099	3.681	3.620
	0.7933	3.099	3.099	3.099	3.099	3.681	3.620
	0.7939	3.099	3.099	3.099	3.099	3.681	3.620
	0.7944	3.099	3.099	3.099	3.099	3.681	3.620
	0.7950	3.099	3.099	3.099	3.099	3.681	3.620
	0.7956	3.099	3.099	3.099	3.099	3.671	3.610
	0.7961	3.099	3.099	3.099	3.099	3.671	3.610

Attachment 9, Actual EDG Loading Based on CYME Calculation

	Time +11 Sec	No-VC/YC EDG Actual Loading	Actual Loading	No LG 9 KF Pump / No LG 10 Chiller	No LG 8 VC/YC or Fan Loads till 10 Min	Exciter	Total Load
Event	Time					+0.056	CYME
	Min	MW	MW	MW	MW	MW	MW
	0.7967	3.099	3.099	3.099	3.099	3.671	3.610
	0.7972	3.099	3.099	3.099	3.099	3.671	3.610
	0.7978	3.099	3.099	3.099	3.099	3.671	3.610
	0.7983	3.099	3.099	3.099	3.099	3.671	3.610
	0.7989	3.099	3.099	3.099	3.099	3.671	3.610
	0.7994	3.099	3.099	3.099	3.099	3.661	3.600
	0.8000	3.099	3.099	3.099	3.099	3.661	3.600
	0.8006	3.099	3.099	3.099	3.099	3.661	3.600
	0.8011	3.099	3.099	3.099	3.099	3.661	3.600
	0.8017	3.099	3.099	3.099	3.099	3.661	3.600
	0.8022	3.099	3.099	3.099	3.099	3.661	3.600
	0.8028	3.099	3.099	3.099	3.099	3.661	3.600
	0.8033	3.099	3.099	3.099	3.099	3.661	3.600
	0.8039	3.099	3.099	3.099	3.099	3.661	3.600
	0.8044	3.099	3.099	3.099	3.099	3.661	3.600
	0.8050	3.099	3.099	3.099	3.099	3.661	3.600
	0.8056	3.099	3.099	3.099	3.099	3.661	3.600
	0.8061	3.099	3.099	3.099	3.099	3.661	3.600
	0.8067	3.099	3.099	3.099	3.099	3.661	3.600
	0.8072	3.099	3.099	3.099	3.099	3.661	3.600
	0.8078	3.099	3.099	3.099	3.099	3.661	3.600
	0.8083	3.099	3.099	3.099	3.099	3.661	3.600
	0.8089	3.099	3.099	3.099	3.099	3.661	3.600
	0.8094	3.099	3.099	3.099	3.099	3.671	3.610
	0.8100	3.099	3.099	3.099	3.099	3.671	3.610
	0.8106	3.099	3.099	3.099	3.099	3.671	3.610
	0.8111	3.099	3.099	3.099	3.099	3.671	3.610
	0.8117	3.099	3.099	3.099	3.099	3.671	3.610
	0.8122	3.099	3.099	3.099	3.099	3.671	3.610
	0.8128	3.099	3.099	3.099	3.099	3.671	3.610
	0.8133	3.099	3.099	3.099	3.099	3.671	3.610
	0.8139	3.099	3.099	3.099	3.099	3.681	3.620
	0.8144	3.099	3.099	3.099	3.099	3.681	3.620
	0.8150	3.099	3.099	3.099	3.099	3.681	3.620
	0.8156	3.099	3.099	3.099	3.099	3.681	3.620
	0.8161	3.099	3.099	3.099	3.099	3.681	3.620
	0.8167	3.099	3.099	3.099	3.099	3.681	3.620
	0.8172	3.099	3.099	3.099	3.099	3.691	3.630
	0.8178	3.099	3.099	3.099	3.099	3.691	3.630
	0.8183	3.099	3.099	3.099	3.099	3.691	3.630
	0.8189	3.099	3.099	3.099	3.099	3.691	3.630
	0.8194	3.099	3.099	3.099	3.099	3.691	3.630
	0.8200	3.099	3.099	3.099	3.099	3.691	3.630
	0.8206	3.099	3.099	3.099	3.099	3.691	3.630
	0.8211	3.099	3.099	3.099	3.099	3.691	3.630
	0.8217	3.099	3.099	3.099	3.099	3.681	3.620
	0.8222	3.099	3.099	3.099	3.099	3.681	3.620
	0.8228	3.099	3.099	3.099	3.099	3.681	3.620
	0.8233	3.099	3.099	3.099	3.099	3.681	3.620
	0.8239	3.099	3.099	3.099	3.099	3.671	3.610
	0.8244	3.099	3.099	3.099	3.099	3.671	3.610
	0.8250	3.099	3.099	3.099	3.099	3.661	3.600
	0.8256	3.099	3.099	3.099	3.099	3.661	3.600
	0.8261	3.099	3.099	3.099	3.099	3.651	3.590
	0.8267	3.099	3.099	3.099	3.099	3.641	3.580
	0.8272	3.099	3.099	3.099	3.099	3.641	3.580
	0.8278	3.099	3.099	3.099	3.099	3.631	3.570
	0.8283	3.099	3.099	3.099	3.099	3.631	3.570
	0.8289	3.099	3.099	3.099	3.099	3.621	3.560
	0.8294	3.099	3.099	3.099	3.099	3.611	3.550
	0.8300	3.099	3.099	3.099	3.099	3.611	3.550
	0.8306	3.099	3.099	3.099	3.099	3.601	3.540
	0.8311	3.099	3.099	3.099	3.099	3.601	3.540
	0.8317	3.099	3.099	3.099	3.099	3.601	3.540
	0.8322	3.099	3.099	3.099	3.099	3.601	3.540

Attachment 9, Actual EDG Loading Based on CYME Calculation

	Time +11 Sec	No-VC/YC EDG Actual Loading	Actual Loading	No LG 9 KF Pump / No LG 10 Chiller	No LG 8 VC/YC or Fan Loads till 10 Min	Exciter	Total Load
Event	Time					+0.056	CYME
	Min	MW	MW	MW	MW	MW	MW
	0.8328	3.099	3.099	3.099	3.099	3.591	3.530
	0.8333	3.099	3.099	3.099	3.099	3.591	3.530
	0.8339	3.099	3.099	3.099	3.099	3.591	3.530
	0.8344	3.099	3.099	3.099	3.099	3.591	3.530
	0.8350	3.099	3.099	3.099	3.099	3.591	3.530
	0.8356	3.099	3.099	3.099	3.099	3.581	3.520
	0.8361	3.099	3.099	3.099	3.099	3.581	3.520
Load Group 9	0.8367	3.099	3.099	3.099		3.941	3.880
	0.8372	3.099	3.099	3.099		4.091	4.030
	0.8378	3.099	3.099	3.099		4.131	4.070
	0.8383	3.099	3.099	3.099		4.061	4.000
	0.8389	3.099	3.099	3.099		3.961	3.900
	0.8394	3.099	3.099	3.099		3.901	3.840
	0.8400	3.099	3.099	3.099		3.901	3.840
	0.8406	3.099	3.099	3.099		3.941	3.880
	0.8411	3.099	3.099	3.099		3.991	3.930
	0.8417	3.099	3.099	3.099		3.991	3.930
	0.8422	3.099	3.099	3.099		3.981	3.920
	0.8428	3.099	3.099	3.099		3.961	3.900
	0.8433	3.099	3.099	3.099		3.951	3.890
	0.8439	3.099	3.099	3.099		3.961	3.900
	0.8444	3.099	3.099	3.099		3.981	3.920
	0.8450	3.099	3.099	3.099		4.011	3.950
	0.8456	3.099	3.099	3.099		4.031	3.970
	0.8461	3.099	3.099	3.099		4.051	3.990
	0.8467	3.099	3.099	3.099		4.071	4.010
	0.8472	3.099	3.099	3.099		4.071	4.010
	0.8478	3.099	3.099	3.099		3.991	3.930
	0.8483	3.099	3.099	3.099		3.801	3.740
	0.8489	3.099	3.099	3.099		3.691	3.630
	0.8494	3.099	3.099	3.099		3.721	3.660
	0.8500	3.099	3.099	3.099		3.761	3.700
	0.8506	3.099	3.099	3.099		3.791	3.730
	0.8511	3.099	3.099	3.099		3.821	3.760
	0.8517	3.099	3.099	3.099		3.811	3.750
	0.8522	3.099	3.099	3.099		3.771	3.710
	0.8528	3.099	3.099	3.099		3.751	3.690
	0.8533	3.099	3.099	3.099		3.751	3.690
	0.8539	3.099	3.099	3.099		3.761	3.700
	0.8544	3.099	3.099	3.099		3.771	3.710
	0.8550	3.099	3.099	3.099		3.771	3.710
	0.8556	3.099	3.099	3.099		3.761	3.700
	0.8561	3.099	3.099	3.099		3.741	3.680
	0.8567	3.099	3.099	3.099		3.731	3.670
	0.8572	3.099	3.099	3.099		3.731	3.670
	0.8578	3.099	3.099	3.099		3.731	3.670
	0.8583	3.099	3.099	3.099		3.731	3.670
	0.8589	3.099	3.099	3.099		3.721	3.660
	0.8594	3.099	3.099	3.099		3.711	3.650
	0.8600	3.099	3.099	3.099		3.701	3.640
	0.8606	3.099	3.099	3.099		3.691	3.630
	0.8611	3.099	3.099	3.099		3.691	3.630
	0.8617	3.099	3.099	3.099		3.691	3.630
	0.8622	3.099	3.099	3.099		3.681	3.620
	0.8628	3.099	3.099	3.099		3.671	3.610
	0.8633	3.099	3.099	3.099		3.661	3.600
	0.8639	3.099	3.099	3.099		3.661	3.600
	0.8644	3.099	3.099	3.099		3.651	3.590
	0.8650	3.099	3.099	3.099		3.651	3.590
	0.8656	3.099	3.099	3.099		3.641	3.580
	0.8661	3.099	3.099	3.099		3.631	3.570
	0.8667	3.099	3.099	3.099		3.631	3.570
	0.8672	3.099	3.099	3.099		3.621	3.560
	0.8678	3.099	3.099	3.099		3.621	3.560
	0.8683	3.099	3.099	3.099		3.611	3.550

	Time +11 Sec	No-VC/YC EDG Actual Loading	Actual Loading	No LG 9 KF Pump / No LG 10 Chiller	No LG 8 VC/YC or Fan Loads till 10 Min	Exciter	Total Load
Event	Time					+0.056	CYME
	Min	MW	MW	MW	MW	MW	MW
	0.8689	3.099	3.099	3.099		3.601	3.540
	0.8694	3.099	3.099	3.099		3.601	3.540
	0.8700	3.099	3.099	3.099		3.591	3.530
	0.8706	3.099	3.099	3.099		3.591	3.530
	0.8711	3.099	3.099	3.099		3.581	3.520
	0.8717	3.099	3.099	3.099		3.571	3.510
	0.8722	3.099	3.099	3.099		3.571	3.510
	0.8728	3.099	3.099	3.099		3.561	3.500
	0.8733	3.099	3.099	3.099		3.561	3.500
	0.8739	3.099	3.099	3.099		3.551	3.490
	0.8744	3.099	3.099	3.099		3.541	3.480
	0.8750	3.099	3.099	3.099		3.541	3.480
	0.8756	3.099	3.099	3.099		3.531	3.470
	0.8761	3.099	3.099	3.099		3.531	3.470
	0.8767	3.099	3.099	3.099		3.521	3.460
	0.8772	3.099	3.099	3.099		3.521	3.460
	0.8778	3.099	3.099	3.099		3.511	3.450
	0.8783	3.099	3.099	3.099		3.511	3.450
	0.8789	3.099	3.099	3.099		3.511	3.450
	0.8794	3.099	3.099	3.099		3.501	3.440
	0.8800	3.099	3.099	3.099		3.501	3.440
	0.8806	3.099	3.099	3.099		3.501	3.440
	0.8811	3.099	3.099	3.099		3.491	3.430
	0.8817	3.099	3.099	3.099		3.491	3.430
	0.8822	3.099	3.099	3.099		3.491	3.430
	0.8828	3.099	3.099	3.099		3.491	3.430
	0.8833	3.099	3.099	3.099		3.491	3.430
	0.8839	3.099	3.099	3.099		3.481	3.420
	0.8844	3.099	3.099	3.099		3.481	3.420
	0.8850	3.099	3.099	3.099		3.481	3.420
	0.8856	3.099	3.099	3.099		3.481	3.420
	0.8861	3.099	3.099	3.099		3.481	3.420
	0.8867	3.099	3.099	3.099		3.481	3.420
	0.8872	3.099	3.099	3.099		3.481	3.420
	0.8878	3.099	3.099	3.099		3.481	3.420
	0.8883	3.099	3.099	3.099		3.481	3.420
	0.8889	3.099	3.099	3.099		3.481	3.420
	0.8894	3.099	3.099	3.099		3.481	3.420
	0.8900	3.099	3.099	3.099		3.481	3.420
	0.8906	3.099	3.099	3.099		3.481	3.420
	0.8911	3.099	3.099	3.099		3.481	3.420
	0.8917	3.099	3.099	3.099		3.491	3.430
	0.8922	3.099	3.099	3.099		3.491	3.430
	0.8928	3.099	3.099	3.099		3.491	3.430
	0.8933	3.099	3.099	3.099		3.491	3.430
	0.8939	3.099	3.099	3.099		3.491	3.430
	0.8944	3.099	3.099	3.099		3.491	3.430
	0.8950	3.099	3.099	3.099		3.501	3.440
	0.8956	3.099	3.099	3.099		3.501	3.440
	0.8961	3.099	3.099	3.099		3.501	3.440
	0.8967	3.099	3.099	3.099		3.501	3.440
	0.8972	3.099	3.099	3.099		3.511	3.450
	0.8978	3.099	3.099	3.099		3.511	3.450
	0.8983	3.099	3.099	3.099		3.511	3.450
	0.8989	3.099	3.099	3.099		3.511	3.450
	0.8994	3.099	3.099	3.099		3.521	3.460
	0.9000	3.099	3.099	3.099		3.521	3.460
	0.9006	3.099	3.099	3.099		3.521	3.460
	0.9011	3.099	3.099	3.099		3.521	3.460
	0.9017	3.099	3.099	3.099		3.531	3.470
	0.9022	3.099	3.099	3.099		3.531	3.470
	0.9028	3.099	3.099	3.099		3.531	3.470
	0.9033	3.099	3.099	3.099		3.541	3.480
	0.9039	3.099	3.099	3.099		3.541	3.480
	0.9044	3.099	3.099	3.099		3.541	3.480

	Time +11 Sec	No-VC/YC EDG Actual Loading	Actual Loading	No LG 9 KF Pump / No LG 10 Chiller	No LG 8 VC/YC or Fan Loads till 10 Min	Exciter	Total Load
Event	Time					+0.056	CYME
	Min	MW	MW	MW	MW	MW	MW
	0.9050	3.099	3.099	3.099		3.541	3.480
	0.9056	3.099	3.099	3.099		3.541	3.480
	0.9061	3.099	3.099	3.099		3.551	3.490
	0.9067	3.099	3.099	3.099		3.551	3.490
	0.9072	3.099	3.099	3.099		3.551	3.490
	0.9078	3.099	3.099	3.099		3.551	3.490
	0.9083	3.099	3.099	3.099		3.551	3.490
	0.9089	3.099	3.099	3.099		3.561	3.500
	0.9094	3.099	3.099	3.099		3.561	3.500
	0.9100	3.099	3.099	3.099		3.561	3.500
	0.9106	3.099	3.099	3.099		3.561	3.500
	0.9111	3.099	3.099	3.099		3.561	3.500
	0.9117	3.099	3.099	3.099		3.561	3.500
	0.9122	3.099	3.099	3.099		3.571	3.510
	0.9128	3.099	3.099	3.099		3.571	3.510
	0.9133	3.099	3.099	3.099		3.571	3.510
	0.9139	3.099	3.099	3.099		3.571	3.510
	0.9144	3.099	3.099	3.099		3.571	3.510
	0.9150	3.099	3.099	3.099		3.571	3.510
	0.9156	3.099	3.099	3.099		3.571	3.510
	0.9161	3.099	3.099	3.099		3.571	3.510
	0.9167	3.099	3.099	3.099		3.571	3.510
	0.9172	3.099	3.099	3.099		3.571	3.510
	0.9178	3.099	3.099	3.099		3.571	3.510
	0.9183	3.099	3.099	3.099		3.571	3.510
	0.9189	3.099	3.099	3.099		3.571	3.510
	0.9194	3.099	3.099	3.099		3.571	3.510
Load Group 10	0.9200	3.099	3.099	3.099		3.821	3.760
	0.9206	3.099	3.099	3.099		3.931	3.870
	0.9211	3.099	3.099	3.099		3.951	3.890
	0.9217	3.099	3.099	3.099		3.921	3.860
	0.9222	3.099	3.099	3.099		3.861	3.800
	0.9228	3.099	3.099	3.099		3.821	3.760
	0.9233	3.099	3.099	3.099		3.821	3.760
	0.9239	3.099	3.099	3.099		3.851	3.790
	0.9244	3.099	3.099	3.099		3.871	3.810
	0.9250	3.099	3.099	3.099		3.881	3.820
	0.9256	3.099	3.099	3.099		3.871	3.810
	0.9261	3.099	3.099	3.099		3.861	3.800
	0.9267	3.099	3.099	3.099		3.851	3.790
	0.9272	3.099	3.099	3.099		3.851	3.790
	0.9278	3.099	3.099	3.099		3.871	3.810
	0.9283	3.099	3.099	3.099		3.881	3.820
	0.9289	3.099	3.099	3.099		3.881	3.820
	0.9294	3.099	3.099	3.099		3.881	3.820
	0.9300	3.099	3.099	3.099		3.881	3.820
	0.9306	3.099	3.099	3.099		3.881	3.820
	0.9311	3.099	3.099	3.099		3.891	3.830
	0.9317	3.099	3.099	3.099		3.901	3.840
	0.9322	3.099	3.099	3.099		3.911	3.850
	0.9328	3.099	3.099	3.099		3.911	3.850
	0.9333	3.099	3.099	3.099		3.911	3.850
	0.9339	3.099	3.099	3.099		3.921	3.860
	0.9344	3.099	3.099	3.099		3.921	3.860
	0.9350	3.099	3.099	3.099		3.931	3.870
	0.9356	3.099	3.099	3.099		3.931	3.870
	0.9361	3.099	3.099	3.099		3.941	3.880
	0.9367	3.099	3.099	3.099		3.951	3.890
	0.9372	3.099	3.099	3.099		3.951	3.890
	0.9378	3.099	3.099	3.099		3.961	3.900
	0.9383	3.099	3.099	3.099		3.971	3.910
	0.9389	3.099	3.099	3.099		3.971	3.910
	0.9394	3.099	3.099	3.099		3.981	3.920
	0.9400	3.099	3.099	3.099		3.991	3.930
	0.9406	3.099	3.099	3.099		4.001	3.940

Attachment 9. Actual EDG Loading Based on CYME Calculation

	Time +11 Sec	No-VC/YC EDG Actual Loading	Actual Loading	No LG 9 KF Pump / No LG 10 Chiller	No LG 8 VC/YC or Fan Loads till 10 Min	Exciter	Total Load
Event	Time					+0.056	CYME
	Min	MW	MW	MW	MW	MW	MW
	0.9411	3.099	3.099	3.099		4.001	3.940
	0.9417	3.099	3.099	3.099		4.011	3.950
	0.9422	3.099	3.099	3.099		4.021	3.960
	0.9428	3.099	3.099	3.099		4.031	3.970
	0.9433	3.099	3.099	3.099		4.041	3.980
	0.9439	3.099	3.099	3.099		4.051	3.990
	0.9444	3.099	3.099	3.099		4.061	4.000
	0.9450	3.099	3.099	3.099		4.061	4.000
	0.9456	3.099	3.099	3.099		4.051	3.990
	0.9461	3.099	3.099	3.099		4.011	3.950
	0.9467	3.099	3.099	3.099		3.951	3.890
	0.9472	3.099	3.099	3.099		3.881	3.820
	0.9478	3.099	3.099	3.099		3.831	3.770
	0.9483	3.099	3.099	3.099		3.821	3.760
	0.9489	3.099	3.099	3.099		3.841	3.780
	0.9494	3.099	3.099	3.099		3.871	3.810
	0.9500	3.099	3.099	3.099		3.881	3.820
	0.9506	3.099	3.099	3.099		3.881	3.820
	0.9511	3.099	3.099	3.099		3.871	3.810
	0.9517	3.099	3.099	3.099		3.851	3.790
	0.9522	3.099	3.099	3.099		3.851	3.790
	0.9528	3.099	3.099	3.099		3.851	3.790
	0.9533	3.099	3.099	3.099		3.861	3.800
	0.9539	3.099	3.099	3.099		3.861	3.800
	0.9544	3.099	3.099	3.099		3.851	3.790
	0.9550	3.099	3.099	3.099		3.851	3.790
	0.9556	3.099	3.099	3.099		3.841	3.780
	0.9561	3.099	3.099	3.099		3.831	3.770
	0.9567	3.099	3.099	3.099		3.831	3.770
	0.9572	3.099	3.099	3.099		3.831	3.770
	0.9578	3.099	3.099	3.099		3.831	3.770
	0.9583	3.099	3.099	3.099		3.821	3.760
	0.9589	3.099	3.099	3.099		3.811	3.750
	0.9594	3.099	3.099	3.099		3.811	3.750
	0.9600	3.099	3.099	3.099		3.811	3.750
	0.9606	3.099	3.099	3.099		3.801	3.740
	0.9611	3.099	3.099	3.099		3.801	3.740
	0.9617	3.099	3.099	3.099		3.791	3.730
	0.9622	3.099	3.099	3.099		3.791	3.730
	0.9628	3.099	3.099	3.099		3.781	3.720
	0.9633	3.099	3.099	3.099		3.771	3.710
	0.9639	3.099	3.099	3.099		3.771	3.710
	0.9644	3.099	3.099	3.099		3.761	3.700
	0.9650	3.099	3.099	3.099		3.761	3.700
	0.9656	3.099	3.099	3.099		3.751	3.690
	0.9661	3.099	3.099	3.099		3.751	3.690
	0.9667	3.099	3.099	3.099		3.741	3.680
	0.9672	3.099	3.099	3.099		3.741	3.680
	0.9678	3.099	3.099	3.099		3.741	3.680
	0.9683	3.099	3.099	3.099		3.731	3.670
	0.9689	3.099	3.099	3.099		3.731	3.670
	0.9694	3.099	3.099	3.099		3.721	3.660
	0.9700	3.099	3.099	3.099		3.721	3.660
	0.9706	3.099	3.099	3.099		3.721	3.660
	0.9711	3.099	3.099	3.099		3.711	3.650
	0.9717	3.099	3.099	3.099		3.711	3.650
	0.9722	3.099	3.099	3.099		3.711	3.650
	0.9728	3.099	3.099	3.099		3.701	3.640
	0.9733	3.099	3.099	3.099		3.701	3.640
	0.9739	3.099	3.099	3.099		3.701	3.640
	0.9744	3.099	3.099	3.099		3.701	3.640
	0.9750	3.099	3.099	3.099		3.701	3.640
	0.9756	3.099	3.099	3.099		3.691	3.630
	0.9761	3.099	3.099	3.099		3.691	3.630
	0.9767	3.099	3.099	3.099		3.691	3.630

	Time +11 Sec	No-VC/YC EDG Actual Loading	Actual Loading	No LG 9 KF Pump / No LG 10 Chiller	No LG 8 VC/YC or Fan Loads till 10 Min	Exciter	Total Load
Event	Time					+0.056	CYME
	Min	MW	MW	MW	MW	MW	MW
	0.9772	3.099	3.099	3.099		3.691	3.630
	0.9778	3.099	3.099	3.099		3.691	3.630
	0.9783	3.099	3.099	3.099		3.691	3.630
	0.9789	3.099	3.099	3.099		3.691	3.630
	0.9794	3.099	3.099	3.099		3.691	3.630
	0.9800	3.099	3.099	3.099		3.691	3.630
	0.9806	3.099	3.099	3.099		3.691	3.630
	0.9811	3.099	3.099	3.099		3.691	3.630
	0.9817	3.099	3.099	3.099		3.691	3.630
	0.9822	3.099	3.099	3.099		3.691	3.630
	0.9828	3.099	3.099	3.099		3.691	3.630
	0.9833	3.099	3.099	3.099		3.691	3.630
	0.9839	3.099	3.099	3.099		3.691	3.630
	0.9844	3.099	3.099	3.099		3.691	3.630
	0.9850	3.099	3.099	3.099		3.701	3.640
	0.9856	3.099	3.099	3.099		3.701	3.640
	0.9861	3.099	3.099	3.099		3.701	3.640
	0.9867	3.099	3.099	3.099		3.701	3.640
	0.9872	3.099	3.099	3.099		3.701	3.640
	0.9878	3.099	3.099	3.099		3.711	3.650
	0.9883	3.099	3.099	3.099		3.711	3.650
	0.9889	3.099	3.099	3.099		3.711	3.650
	0.9894	3.099	3.099	3.099		3.711	3.650
	0.9900	3.099	3.099	3.099		3.711	3.650
	0.9906	3.099	3.099	3.099		3.721	3.660
	0.9911	3.099	3.099	3.099		3.721	3.660
	0.9917	3.099	3.099	3.099		3.721	3.660
	0.9922	3.099	3.099	3.099		3.721	3.660
	0.9928	3.099	3.099	3.099		3.721	3.660
	0.9933	3.099	3.099	3.099		3.731	3.670
	0.9939	3.099	3.099	3.099		3.731	3.670
	0.9944	3.099	3.099	3.099		3.731	3.670
	0.9950	3.099	3.098	3.099		3.741	3.680
	0.9956	3.099	3.099	3.099		3.741	3.680
	0.9961	3.099	3.099	3.099		3.741	3.680
	0.9967	3.099	3.099	3.099		3.741	3.680
	0.9972	3.099	3.099	3.099		3.741	3.680
	0.9978	3.099	3.099	3.099		3.741	3.680
	0.9983	3.099	3.099	3.099		3.751	3.690
	0.9989	3.099	3.099	3.099		3.751	3.690
	0.9994	3.099	3.099	3.099		3.751	3.690
	1.0000	3.099	3.099	3.099		3.751	3.690
	1.0006	3.099	3.099	3.099		3.751	3.690
	1.0011	3.099	3.099	3.099		3.761	3.700
	1.0017	3.099	3.099	3.099		3.761	3.700
	1.0022	3.099	3.099	3.099		3.761	3.700
	1.0028	3.099	3.099	3.099		3.761	3.700
	1.0033	3.099	3.099	3.099		3.761	3.700
	1.0039	3.099	3.099	3.099		3.761	3.700
	1.0044	3.099	3.099	3.099		3.761	3.700
	1.0050	3.099	3.099	3.099		3.761	3.700
	1.0056	3.099	3.099	3.099		3.761	3.700
	1.0061	3.099	3.099	3.099		3.761	3.700
	1.0067	3.099	3.099	3.099		3.771	3.710
	1.0072	3.099	3.099	3.099		3.771	3.710
	1.0078	3.099	3.099	3.099		3.771	3.710
	1.0083	3.099	3.099	3.099		3.771	3.710
	1.0089	3.099	3.099	3.099		3.771	3.710
	1.0094	3.099	3.099	3.099		3.771	3.710
	1.0100	3.099	3.099	3.099		3.771	3.710
	1.0106	3.099	3.099	3.099		3.771	3.710
	1.0111	3.099	3.099	3.099		3.771	3.710
	1.0117	3.099	3.099	3.099		3.771	3.710
	1.0122	3.099	3.099	3.099		3.771	3.710
	1.0128	3.099	3.099	3.099		3.771	3.710

Attachment 9, Actual EDG Loading Based on CYME Calculation

	Time +11 Sec	No-VC/YC EDG Actual Loading	Actual Loading	No LG 9 KF Pump / No LG 10 Chiller	No LG 8 VC/YC or Fan Loads till 10 Min	Exciter	Total Load
Event	Time					+0.056	CYME
	Min	MW	MW	MW	MW	MW	MW
	1.0133	3.099	3.099	3.099		3.771	3.710
	1.0139	3.099	3.099	3.099		3.771	3.710
	1.0144	3.099	3.099	3.099		3.771	3.710
	1.0150	3.099	3.099	3.099		3.771	3.710
	1.0156	3.099	3.099	3.099		3.771	3.710
	1.0161	3.099	3.099	3.099		3.771	3.710
	1.0167	3.099	3.099	3.099		3.761	3.700
	1.0172	3.099	3.099	3.099		3.761	3.700
	1.0178	3.099	3.099	3.099		3.761	3.700
	1.0183	3.099	3.099	3.099		3.761	3.700
	1.0189	3.099	3.099	3.099		3.761	3.700
	1.0194	3.099	3.099	3.099		3.761	3.700
	1.0200	3.099	3.099	3.099		3.761	3.700
	1.0206	3.099	3.099	3.099		3.761	3.700
	1.0211	3.099	3.099	3.099		3.761	3.700
	1.0217	3.099	3.099	3.099		3.761	3.700
	1.0222	3.099	3.099	3.099		3.761	3.700
	1.0228	3.099	3.099	3.099		3.751	3.690
	1.0233	3.099	3.099	3.099		3.751	3.690
	1.0239	3.099	3.099	3.099		3.751	3.690
	1.0244	3.099	3.099	3.099		3.751	3.690
	1.0250	3.099	3.099	3.099		3.751	3.690
	1.0256	3.099	3.099	3.099		3.751	3.690
	1.0261	3.099	3.099	3.099		3.751	3.690
	1.0267	3.099	3.099	3.099		3.751	3.690
	1.0272	3.099	3.099	3.099		3.751	3.690
	1.0278	3.099	3.099	3.099		3.751	3.690
	1.0283	3.099	3.099	3.099		3.741	3.680
	1.0289	3.099	3.099	3.099		3.741	3.680
	1.0294	3.099	3.099	3.099		3.741	3.680
	1.0300	3.099	3.099	3.099		3.741	3.680
	1.0306	3.099	3.099	3.099		3.741	3.680
	1.0311	3.099	3.099	3.099		3.741	3.680
	1.0317	3.099	3.099	3.099		3.741	3.680
	1.0322	3.099	3.099	3.099		3.741	3.680
	1.0328	3.099	3.099	3.099		3.741	3.680
	1.0333	3.099	3.099	3.099		3.741	3.680
	1.0339	3.099	3.099	3.099		3.741	3.680
	1.0344	3.099	3.099	3.099		3.741	3.680
	1.0350	3.099	3.099	3.099		3.741	3.680
	1.0356	3.099	3.099	3.099		3.741	3.680
	1.0361	3.099	3.099	3.099		3.741	3.680
	1.0367	3.099	3.099	3.099		3.741	3.680
	1.0372	3.099	3.099	3.099		3.741	3.680
	1.0378	3.099	3.099	3.099		3.741	3.680
	1.0383	3.099	3.099	3.099		3.731	3.670
	1.0389	3.099	3.099	3.099		3.731	3.670
	1.0394	3.099	3.099	3.099		3.731	3.670
	1.0400	3.099	3.099	3.099		3.731	3.670
	1.0406	3.099	3.099	3.099		3.731	3.670
	1.0411	3.099	3.099	3.099		3.731	3.670
	1.0417	3.099	3.099	3.099		3.731	3.670
	1.0422	3.099	3.099	3.099		3.741	3.680
	1.0428	3.099	3.099	3.099		3.741	3.680
	1.0433	3.099	3.099	3.099		3.741	3.680
	1.0439	3.099	3.099	3.099		3.741	3.680
	1.0444	3.099	3.099	3.099		3.741	3.680
	1.0450	3.099	3.099	3.099		3.731	3.670
	1.0456	3.099	3.099	3.099		3.731	3.670
	1.0461	3.099	3.099	3.099		3.741	3.680
	1.0467	3.099	3.099	3.099		3.741	3.680
	1.0472	3.099	3.099	3.099		3.741	3.680
	1.0478	3.099	3.099	3.099		3.741	3.680
	1.0483	3.099	3.099	3.099		3.741	3.680
	1.0489	3.099	3.099	3.099		3.741	3.680

Attachment 9, Actual EDG Loading Based on CYME Calculation

	Time +11 Sec	No-VC/YC EDG Actual Loading	Actual Loading	No LG 9 KF Pump / No LG 10 Chiller	No LG 8 VC/YC or Fan Loads till 10 Min	Exciter	Total Load
Event	Time					+0.056	CYME
	Min	MW	MW	MW	MW	MW	MW
	1.0494	3.099	3.099	3.099		3.741	3.680
	1.0500	3.099	3.099	3.099		3.741	3.680
	1.0506	3.099	3.099	3.099		3.741	3.680
	1.0511	3.099	3.099	3.099		3.741	3.680
	1.0517	3.099	3.099	3.099		3.741	3.680
	1.0522	3.099	3.099	3.099		3.741	3.680
	1.0528	3.099	3.099	3.099		3.741	3.680
	1.0533	3.099	3.099	3.099		3.741	3.680
	1.0539	3.099	3.099	3.099		3.741	3.680
	1.0544	3.099	3.099	3.099		3.741	3.680
	1.0550	3.099	3.099	3.099		3.741	3.680
	1.0556	3.099	3.099	3.099		3.741	3.680
	1.0561	3.099	3.099	3.099		3.741	3.680
	1.0567	3.099	3.099	3.099		3.741	3.680
	1.0572	3.099	3.099	3.099		3.741	3.680
	1.0578	3.099	3.099	3.099		3.741	3.680
	1.0583	3.099	3.099	3.099		3.741	3.680
	1.0589	3.099	3.099	3.099		3.741	3.680
	1.0594	3.099	3.099	3.099		3.741	3.680
	1.0600	3.099	3.099	3.099		3.741	3.680
	1.0606	3.099	3.099	3.099		3.741	3.680
	1.0611	3.099	3.099	3.099		3.751	3.690
	1.0617	3.099	3.099	3.099		3.751	3.690
	1.0622	3.099	3.099	3.099		3.751	3.690
	1.0628	3.099	3.099	3.099		3.751	3.690
	1.0633	3.099	3.099	3.099		3.751	3.690
	1.0639	3.099	3.099	3.099		3.751	3.690
	1.0644	3.099	3.099	3.099		3.751	3.690
	1.0650	3.099	3.099	3.099		3.751	3.690
	1.0656	3.099	3.099	3.099		3.751	3.690
	1.0661	3.099	3.099	3.099		3.751	3.690
	1.0667	3.099	3.099	3.099		3.751	3.690
	1.0672	3.099	3.099	3.099		3.751	3.690
	1.0678	3.099	3.099	3.099		3.751	3.690
	1.0683	3.099	3.099	3.099		3.751	3.690
	1.0689	3.099	3.099	3.099		3.751	3.690
	1.0694	3.099	3.099	3.099		3.751	3.690
	1.0700	3.099	3.099	3.099		3.751	3.690
	1.0706	3.099	3.099	3.099		3.751	3.690
	1.0711	3.099	3.099	3.099		3.751	3.690
	1.0717	3.099	3.099	3.099		3.751	3.690
	1.0722	3.099	3.099	3.099		3.751	3.690
	1.0728	3.099	3.099	3.099		3.751	3.690
	1.0733	3.099	3.099	3.099		3.751	3.690
	1.0739	3.099	3.099	3.099		3.751	3.690
	1.0744	3.099	3.099	3.099		3.751	3.690
	1.0750	3.099	3.099	3.099		3.751	3.690
	1.0756	3.099	3.099	3.099		3.751	3.690
	1.0761	3.099	3.099	3.099		3.751	3.690
	1.0767	3.099	3.099	3.099		3.751	3.690
	1.0772	3.099	3.099	3.099		3.751	3.690
	1.0778	3.099	3.099	3.099		3.751	3.690
	1.0783	3.099	3.099	3.099		3.751	3.690
	1.0789	3.099	3.099	3.099		3.751	3.690
	1.0794	3.099	3.099	3.099		3.751	3.690
	1.0800	3.099	3.099	3.099		3.751	3.690
	1.0806	3.099	3.099	3.099		3.751	3.690
	1.0811	3.099	3.099	3.099		3.751	3.690
	1.0817	3.099	3.099	3.099		3.751	3.690
	1.0822	3.099	3.099	3.099		3.751	3.690
	1.0828	3.099	3.099	3.099		3.751	3.690
	1.1000	3.099	3.099	3.099		3.741	3.680
	1.2000	3.099	3.099	3.099		3.741	3.680
	8.0000	3.099	3.099				

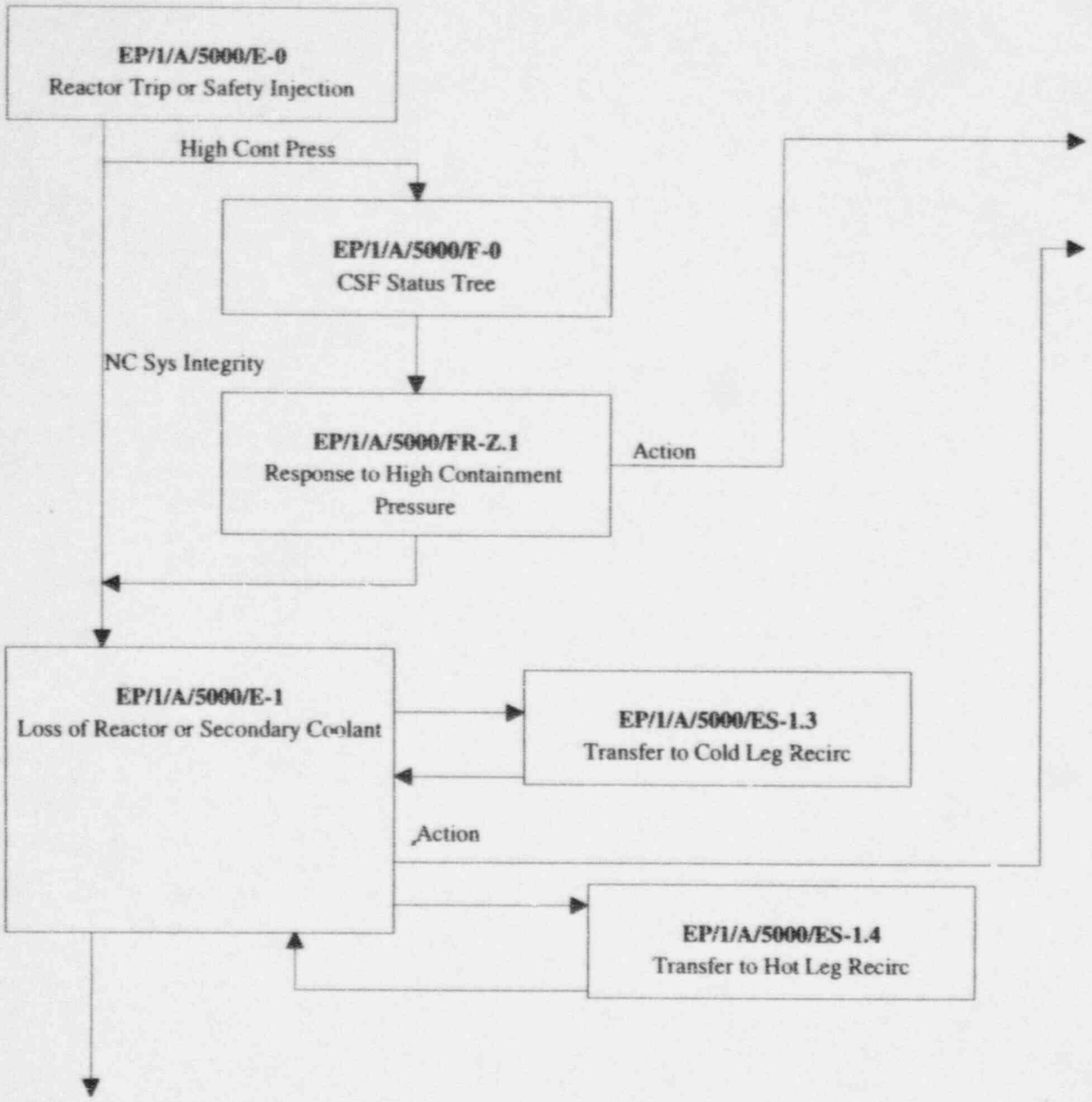
Attachment 9, Actual EDG Loading Based on CYME Calculation

	Time +11 Sec	No-VC/YC EDG Actual Loading	Actual Loading	No LG 9 KF Pump / No LG 10 Chiller	No LG 8 VC/YC or Fan Loads till 10 Min	Exciter	Total Load
Event	Time					+0.056	CYME
	Min	MW	MW	MW	MW	MW	MW
CA Pump Throttle (-116 KW)	9.0000	2.983	2.983				
	10.0000	2.983	2.983				
Add Load Grp 8 (+169 or 85 KW)	11.0000	3.068	3.138				
	14.9000	3.068	3.138				
VC/YC Compressor Start (+282 KW)	15.0000	3.068	3.420				
	20.0000	3.068	3.420				
H2 Analyzer (+.024)	29.0000	3.092	3.444				
	30.0000	3.092	3.444				
	40.0000	3.092	3.444				
	50.0000	3.092	3.444				
	59.0000	3.092	3.444				
H2 Recombiner (+64 KW)	60.0000	3.156	3.508				
	120.0000	3.156	3.508				
	239.0000	3.156	3.508				
Remove Remaining CA Pump Load (-270 KW)	240.0000	2.886	3.238				
	300.0000	2.886	3.238				
	599.0000	2.886	3.238				
Add KF Pump at 10 Hrs (+146 KW)	600.0000	3.032	3.384				
	700.0000	3.032	3.384				

Attachment 10, EDG Blackout Load Requirements Per FSAR Table 8-1

Sequence Number	Equipment Or Application	Required During LOCA	KW Load	Remarks	Sum of KW
1	Centrifugal Charging Pump	500 HP	373	One per diesel	373
1	Motor Operated Valves	112 KW	112	Estimated	485
1	Tech Support Center	130 KVA	104		589
1	Vital AC-DC Sys. Batt. Chgrs.	60 KVA	60	Two per diesel	649
1	VA Filtered Exhaust Fans	50 HP	37	Plus 40 HP motor	686
1	VC/YC System Control Room Air Handling Unit Fans	40 HP	30	Two per station	716
1	30 KVA transformer to H2 Analyzer (1/2 EMX A/B-R7D)	10 KVA	8		724
1	Diesel Air Compressors	30 HP	22	Two 15 HP comps.	746
1	Diesel Bldg.General Vent. Supply Fans	25 HP	19	Two 20 HP fans per	765
1	Diesel Generator Rm. Sump Pump	26 HP	19	Two 15 HP pumps	784
1	Ground Water Drainage System Pumps	20 HP	15	Plus 10 HP motor	799
1	Diesel Jacket/Intercooler Pump	19 HP	14	One per diesel	813
1	600/120 V Power Panelboard	14.8 KVA	11.8	Two per station	825
1	VC/YC Sys. Swgr.Rm. Air Handling Unit Fans	15 HP	11	Two 7.5 HP fans per	836
1	VC/YC System Pressure Filter Heater	10 KW	10	Two per station	846
1	Diesel Lube Oil Before & After Pump	9.5 HP	7.1	One per diesel	853
1	VC/YC System Pressure Filter Fan	5 HP	4	Two per station	857
1	Diesel Generator Battery Charger	5 KVA	4	One per diesel	861
1	Diesel Lube Oil Heater Pump	5 HP	4	One per diesel	865
1	R.H.R. & CS Sump Rm. Sump Pump	4.5 HP	3.4	One per diesel	868
1	Diesel 600/120V Panelboard	3.7 KVA	3	One per diesel	871
1	Diesel Fuel Oil Transfer Pump	1.5 HP	1.1	One per diesel	872
1	Hydrogen Analyzer	1.4 KVA	1.1	One per diesel	874
1	SSFARC Control Power Transformers	0.75 KVA	0.6	Two per station	874
1	Diesel Crank Case Vacuum Blower	0.5 HP	0.4	One per diesel	875
1	Radiation Monitoring	0.25 HP	0.2	One per station	875
1	Diesel Fuel Oil Drip Tank Pump	0.1 HP	0.1	One per diesel	875
1	1500 KVA, 600 VAC Essential Aux. Power Sys. Load		0	Additional load	875
2	Emerg AC Lighting	30 KVA	24		899
2	Pipe Tunnel Booster Fans	15 HP	11		910
2	CRDM Fans	100 HP	75		985
2	Lower Cont Cooling Units	250 HP	187		1172
2	Upper Comt AHU	20 HP	15		1187
2	Upper Cont Return Air Fans	2 HP	1.5		1188
2	Incore Inst. Room AHU	1.7 HP	1.3		1190
2	Press Booster Fan	8.6 HP	6.4		1196
2	Radiation Monitoring	2	1.5		1198
2	1500 KVA, 600 VAC Essential Aux. Power Sys Load		0		1198
5	Component Cooling Water Pumps	380 HP	283	Two 200 HP pumps	1481
6	Nuclear Service Water Pump	650 HP	485	One per diesel	1966
6	Nuclear Service Water Strainer Backflush Drum Motor	3 HP	2.2	One per diesel	1968
7	Auxiliary Fdwtr Pump (Mtr. Dr.)	510 HP	380	One per diesel	2348
8	VC/YC System Control Room Area AHU Fans	70 HP	52	Two per station	2400
8	VA Filtered Exhaust Fans	40 HP	30		2430
8	VC/YC System Control Rm. & Control Rm. Area Chilled	36 HP	27	Two per station	2457
8	Inverter KS	15 KVA	12		2469
8	VC/YC Sys. Comp. Oil Pump	1.5 HP	1.1	Two per station	2470
8	VC/YC System Battery Rm. Exhaust Fans	1 HP	0.75	Two per station	2471
9	B/U PZR Heaters	416 KW	416		2887
9	Fuel Pool Cooling Pump	200 HP	149	One per diesel	3036
9	BAT Pump	11.25 KW	11.25		3047
9	Fuel Pool Cooling Pump AHU	1.3 HP	1	One per diesel	3048
10	VC/YC System Compressor	353 HP	263	Two per station	3311
				TOTAL	**3311**

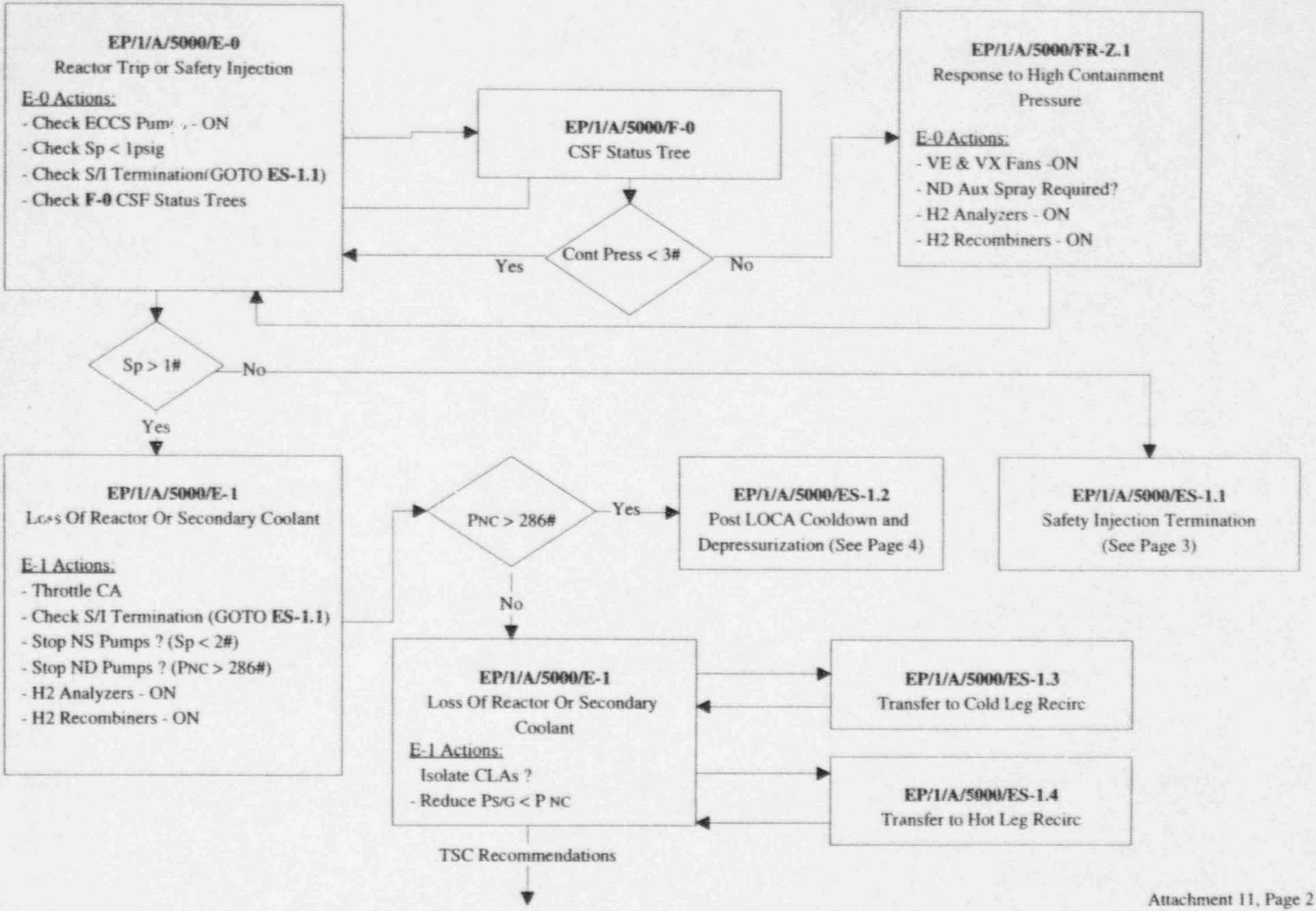
Large Break LOCA Procedures and Actions



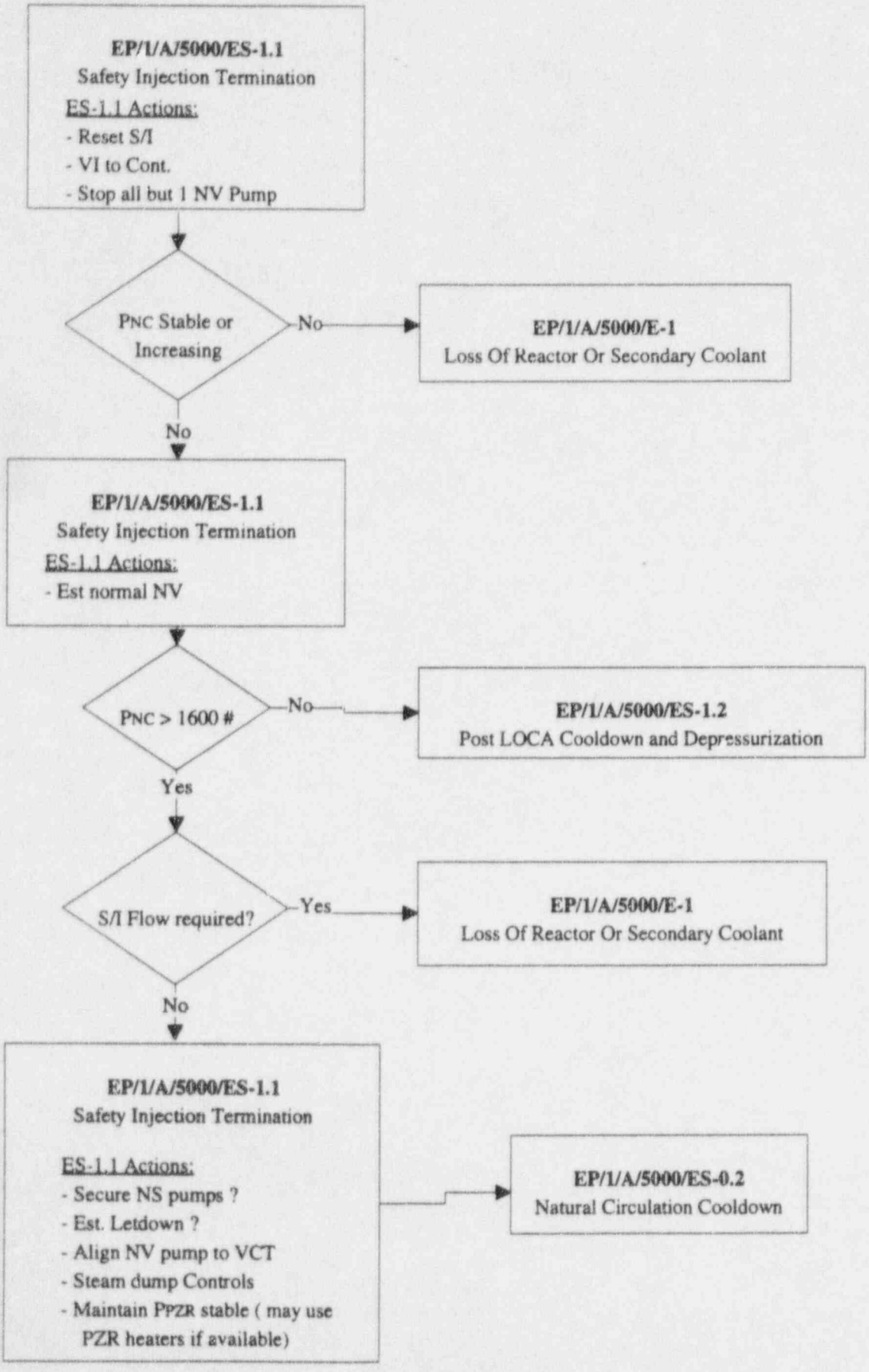
TIME ACTIONS
(Min)

0 Verify NV, NI, ND, KC, RN, & CA Pump Start (ECA-0.2 or E-0)
10 Turn H2 Igniters ON (FR-Z.1)
20 Cold Leg Recirc (ES-1.3)
30 Energize Heat Tracing Panel (FR-Z.1)
35 Turn H2 Analyzer ON (FR-Z.1)
50 ND Aux Spray (E-1)
60 Turn H2 Recombiner ON (FR-Z.1)
420 Hot Leg Recirc (ES-1.4)

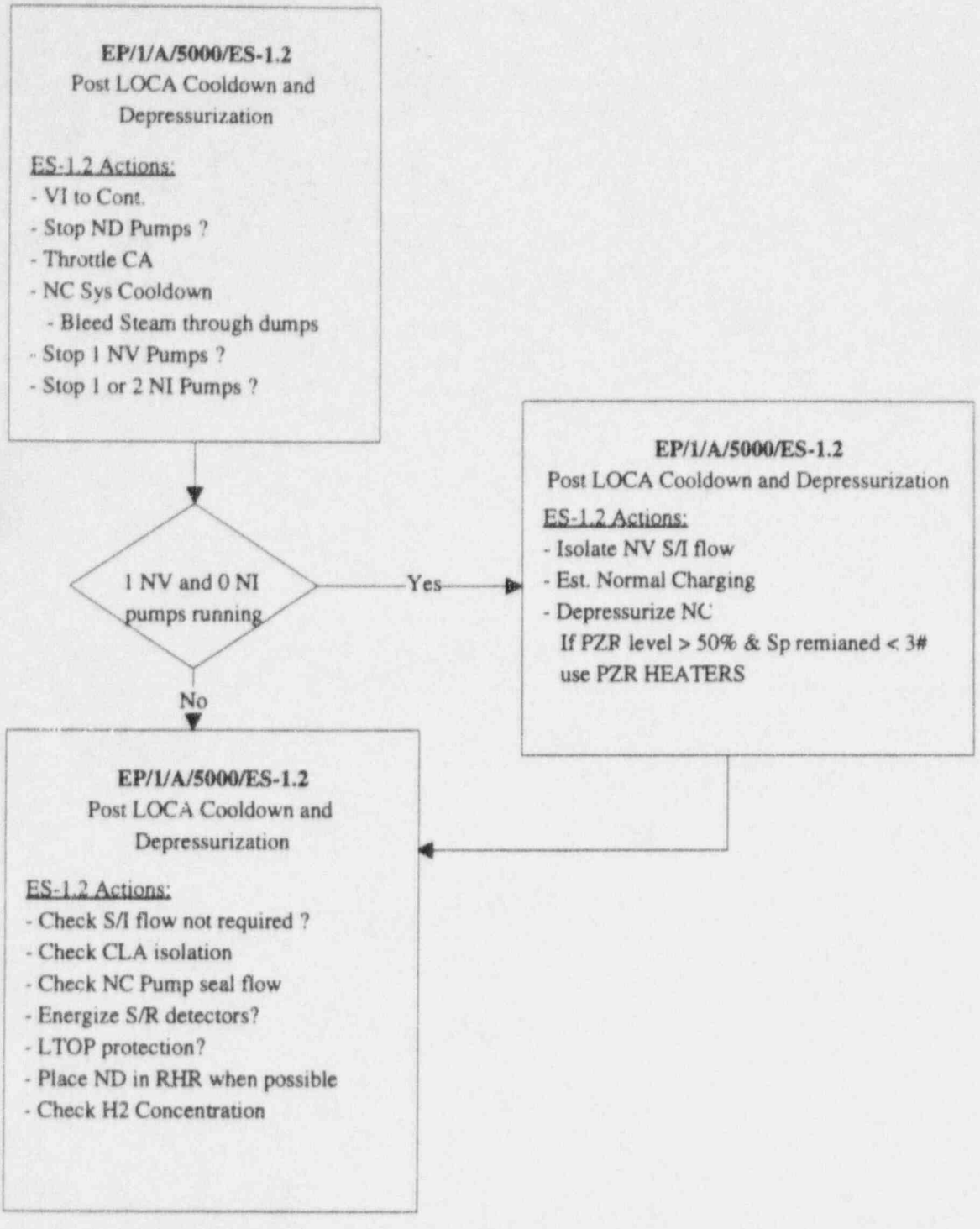
Small Break LOCA Procedures and Actions



Small Break LOCA Procedures and Actions (cont'd)



Small Break LOCA Procedures and Actions (cont'd)



Generator Output Data from the OAC

The following data was obtained from the APD Server for points 2A1027 (EDG 2A) and 2A0871 (EDG 2B). This data represents EDG loads and times during the surveillance runs during which turbocharger failures occurred.

EDG 2A From 6/12/95

Time	Load (MW)
15:25	0
15:30	4.180
15:35	4.133
15:40	4.109
15:45	4.141
15:50	4.117
15:55	4.125
16:00	4.117
16:05	4.125
16:10	4.125
16:15	0.992

EDG 2B From 6/2/95

Time	Load (MW)
10:15	2.914
10:20	4.070
10:25	4.086
10:30	4.039
10:35	4.039
10:40	0