Omaha Public Power District
1623 Harney Omaha, Nebraska 68102
402/536-4000

April 22, 1983
LIC-83-097

Mr. R. A. Clark, Chief
U. S. Nuclear Regulatory Commission
Office of Nuclear Reactor Regulation
Division of Licensing
Operating Reactors Branch No. 3
Washington, D.C. 20555

Reference: Docket No. 50-285

Dear Mr. Clark:

Adequacy of the Fort Calhoun Station
Electrical Distribution System Voltages

The Omaha Public Power District received the Commission's letter dated March 7, 1983 requesting additional information on the above subject. The District's response is attached.

The District noted that Question 1 failed to reference two recent District submittals; namely, the District's letters dated March 19, 1982 and May 21, 1982. A majority of the requested information for this question was supplied in these two letters.

The Commission's request also makes no reference to the District's submittal dated August 28, 1978 which describes the Offsite Power Low Signal (OPLS) system modification. As far as the District's undervoltage relaying hardware is concerned, the September 17, 1976 submittal (see Question 3) has been obsolete since the OPLS modification was installed.

Question 3 also refers to a 90% setpoint on the degraded voltage relays which is never mentioned in the September 17, 1976 submittal (Question 3, reference d). In fact, the only station relays which have ever had a 90% setpoint are the OPLS relays installed in 1978. From these inconsistencies, it is unclear what documents have been reviewed. With the

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exception of the reference to a 90% setpoint, it appears the District's August 28, 1978 submittal was never considered in the Commission's review. This submittal addressed various aspects of both Questions 2 and 3 and should be reviewed. Information on these two questions is also provided in the attachments.

Sincerely,

W. C. Jones
Division Manager
Production Operations

WCJ/TLP:jmm

Attachments

cc: LeBoeuf, Lamb, Leiby & MacRae
1333 New Hampshire Avenue, N.W.
Washington, D.C. 20036

Mr. L. A. Yandell, NRC
Senior Resident Inspector

Attachment 1

RESPONSE TO NRC REQUEST FOR ADDITIONAL INFORMATION

Question 1

Position B.1.b(2)[b] requires the automatic separation of Class 1E distribution system from the offsite power system after a suitable time delay after actuation of the undervoltage (90%) relays under non-accident conditions. This is to protect the permanently connected Class 1E loads from damage. Your submittals indicate that this is not the case at Fort Calhoun Station since the second timer has not been provided as required by position B.1.b(2)[b].

Your submittal of the results of an analysis (in lieu of the second timer) for the Raw Water Pumps Motors operation during sustained degraded voltage conditions is not sufficient for our evaluation of all plant safeguard equipment. Similar analyses should be provided and results submitted for our review for all of the remaining Class 1E (safety grade) equipment that is operating during normal plant operation. Further, it must be shown that there is sufficient equipment available for safe shutdown of the plant, in case of equipment damage due to sustained degraded voltage during normal non-accident plant operations.

Response

The requested analyses for the remaining Class 1E loads which operate during normal plant operation have been provided to the NRC in previous submittals. Specifically, the analysis of the charging pumps (which are not Class 1E but were included because they auto-start upon an accident signal) was provided to the Commission in our December 1, 1982 letter (Reference c). The analysis of the Component Cooling Water Pumps was previously submitted in Reference f. The Containment Vent Fans analysis was submitted as part of Reference e.

In order to show that sufficient equipment exists for safe shutdown of the plants, the Fort Calhoun Station Technical Specifications (TS's) should be considered. The TS's require certain loads to be operable during normal operation. The applicable TS's are found in Attachment 2. These TS's are the minimum bounds for normal operation and normal safe shutdown of the plant.

Of the safeguards equipment, the one raw water pump, the one charging pump, and the one component cooling water pump which may be running during normal operation are not required to be operable for safe shutdown of the plant. All safeguards equipment have been analyzed to determine the effects of degraded voltage on its ability to operate. No adverse effects were found (see References c, e, and f). Thus, safe shutdown can be accomplished following a degraded voltage condition because no damage to vital equipment is expected to occur.

Question 2

The battery chargers have not been shown to maintain a full battery charge under the minimum analyzed steady-state AC voltages. The accident analysis, with loss of offsite power, assumes a fully charged battery prior to the start of the accident scenario. Show how the battery charge is not compromised by a degraded grid voltage (non-accident condition).

Response

The battery chargers presently have annunciation on both low input AC voltage (90%) and low output DC voltage (120V), as shown in the sections of the Operating Procedures, Attachment 3. The chargers have a constant voltage regulating capability which maintains the DC output at a normal level (134V) for ± 10V variation in AC input. Below 90% of input AC voltage, the DC output voltage drops proportionally. The taps of the input power transformers of the chargers are set at 460V AC. Since these transformers are being fed a bus voltage of 480V, the chargers will maintain a normal DC output voltage down to 86% of AC bus input voltage. If such a situation would arise (86% input voltage), the bus undervoltage relays would be in annunciation, having picked up at 90%. The output relays would not be picked up since the output would still be normal.

Upon annunciation of the 90% low input AC voltage alarm, the Operating Procedures instruct the operator to attempt to transfer loads to another offsite source. If for some reason this action is not completed, a significant drop in the bus voltage would still be required to reach a no-charge condition on the batteries. This occurs at approximately 120V DC which corresponds to 75-80% bus voltage. At this time, the Operating Procedures instruct the operator to put the standby charger in service.

This action would not clear the "Trouble" annunciation and the operator would again be instructed to transfer station supply to another offsite source.

If the operator fails to restore proper house service voltage from an alternate source, plant operators are required by Technical Specification 2.7 to place the plant in hot shutdown within 12 hours because of inoperable battery chargers on each DC bus (see Attachment 4).

While investigating this subject, it has come to the District's attention that the battery charger output undervoltage relays may require resetting to a slightly higher voltage as a result of the higher capacity rating of the new batteries (they were changed out in 1980). This change is currently being evaluated on the basis of battery discharge surveillance results.

Question 3

Your voltage analysis[d] shows that the degraded voltage relays (setpoint 90% + 2, -0) can be exposed to voltages that can cause the Class 1E distribution system to separate from offsite power under an accident condition concurrent with a degraded grid and the accident induced loading of the Class 1E buses.

Your analysis[d] was prepared prior to the issuance of the requirements of reference a, and shows the worst possible voltages with a degraded offsite source and worst case unit and accident loads. The assumptions made in your analysis[d], particularly the worst expected grid voltage, may be subject to revision at this time due to system improvements.

Discuss the basis for the present historical or projected minimum grid voltage (on the 151kV and the 345kV grids). What is the resultant bus voltage at the degraded voltage relays and at the battery chargers (Question 2)? Show that the potential for the spurious tripping of these voltage relays does not exist for your analyzed accident load as bounded by your presently expected minimum grid voltage.

Response

Load flow analyses were performed and results were submitted to the Commission in References d and g (specifically see Attachments 5 and 6 of Reference g). The District is currently performing an updated version of these analyses. The results will be available for submittal to the Commission in approximately 90 days. However, the District does not expect any significant changes from our earlier analyses.

The projected minimum grid voltage and resultant bus voltage at the battery chargers and degraded voltage relays will be submitted after the new load analysis is completed. The potential for spurious tripping was extensively detailed in a previous submittal (see Reference g).

References

a. NRC Letter to All Licensees, "Adequacy of Station Electric Distribution Systems Voltages," August 8, 1979.

b. Branch Technical Position PSB-1, "Adequacy of Station Electric Distribution System Voltages," NRC Power Systems Branch, Revision 0, July 1981.

c. Omaha Public Power District Letter from W. C. Jones to R. A. Clark, NRC, "Adequacy of the Fort Calhoun Station Electrical Distribution System Voltages," December 1, 1982.

d. Omaha Public Power District Letter from T. E. Short to George E. Lear, NRC, September 17, 1976.

e. Omaha Public Power District Letter from W. C. Jones to R. A. Clark, NRC, March 19, 1982.

f. Omaha Public Power District Letter from W. C. Jones to R. A. Clark, NRC, "Adequacy of Station Electrical Distribution System Voltages," May 21, 1982.

g. Omaha Public Power District Letter from T. E. Short to R. W. Reid, NRC, August 28, 1978.

FORT CALHOUN STATION TECHNICAL SPECIFICATIONS

2.0 LIMITING CONDITIONS FOR OPERATION

2.2 Chemical and Volume Control System

Applicability

Applies to the operational status of the chemical and volume control system.

Objective

To define those conditions of the chemical and volume control system necessary to assure safe reactor operation.

Specifications

(1) When fuel is in the reactor, there shall be at least one flow path to the core for boric acid injection.

(2) The reactor shall not be made critical unless all the following minimum requirements are met:

a. At least two charging pumps shall be operable.

b. One boric acid transfer pump shall be operable.

c. The two concentrated boric acid tanks together shall contain a minimum of 68 inches of a 6-1/4 percent to 12 percent by weight boric acid solution at a temperature of at least 20°F above saturation temperature for the concentration present in the tank.

d. System piping and valves shall be operable to the extent of establishing two flow paths from the concentrated boric acid tanks to the reactor coolant system and a flow path from the SIRW tank to the charging pumps.

e. Both channels of heat tracing shall be operable for the above flow paths.

f. Both level instruments on the concentrated boric acid tanks shall be operable.

(3) Modification of Minimum Requirements

During power operation, the minimum requirements may be modified to allow any one of the following conditions to exist at any one time. If the system is not restored to meet the minimum requirements within the time period specified, the reactor will be placed in a hot shutdown condition in 4 hours. If the minimum requirements are not satisfied within an additional 48 hours, a cold shutdown shall be initiated.

a. One of the operable charging pumps may be removed from service provided two charging pumps are operable within 24 hours.

b. Both boric acid pumps may be out of service for 24 hours.

c. One concentrated boric acid tank may be out of service provided a minimum of 68 inches of 6-1/4 percent to 12 percent by weight boric acid solution at a temperature of at least 20°F above saturation temperature is contained in the operable tank and provided that the tank is restored to operable status within 24 hours.

d. Only one flow path from the concentrated boric acid tanks to the reactor coolant system may be operable provided that either the other flow path from the concentrated boric acid tanks to the reactor coolant system or the flow path from the SIRW tank to the charging pumps is restored to operable status within 24 hours.

e. One channel of heat tracing may be out of service provided it is restored to operable status within 24 hours.

f. One level instrument on each concentrated boric acid tank may be out of service for 24 hours.

Basis

The chemical and volume control system provides control of the reactor coolant system boron inventory.[1] This is normally accomplished by using any one of the three charging pumps in series with one of the two boric acid pumps. An alternate method of boration will be to use the charging pumps directly from the SIRW storage tank. A third method will be to depressurize and use the safety injection pumps. There are two sources of borated water available for injection through three different paths.

(1) The boric acid pumps can deliver the concentrated boric acid tank contents (6-1/4 - 12 weight percent concentration of boric acid) to the charging pumps. The tanks are located above the charging pumps so that the boric acid will flow by gravity without being pumped.

(2) The safety injection pumps can take suction from the SIRW tank (at least 1700 ppm boron solution).

2.0 LIMITING CONDITIONS FOR OPERATION

2.4 Containment Cooling

Applicability

Applies to the operating status of the containment cooling systems.

Objective

To assure operability of equipment required to remove heat from the containment during normal operating and emergency situations.

Specifications

(1) Minimum Requirements

The reactor shall not be made critical, except for low-temperature physics tests, unless all the following conditions are met:

a. The following equipment normally associated with diesel-generator D1 (4.16-kV bus 1A3 and associated non-automatically transferring 480-Volt bus sections) is operable, except as noted:

Raw water pump*	AC-10A
Raw water pump*	AC-10C
Component cooling water pump	AC-3A
Component cooling water pump	AC-3C
Containment spray pump	SI-3A
Containment air cooling and filtering unit	VA-3A
Containment air cooling unit	VA-7C

b. The following equipment normally associated with diesel-generator D2 (4.16-kV bus 1A4 and associated non-automatically transferable 480 Volt bus sections) is operable, except as noted.

Raw water pump*	AC-10B
Raw water pump*	AC-10D
Component cooling water pump	AC-3B
Containment spray pump	SI-3B
Containment air cooling and filtering unit	VA-3B
Containment air cooling unit	VA-7D
Containment spray pump	SI-3C

c. All heat exchangers, valves, piping and interlocks associated with the above components and required to function during accident conditions are operable.

*One raw water pump AC-10A, 10B, 10C or 10D may be inoperable.

During power operation one of the components listed above (in addition to one raw water pump) may be inoperable. If the inoperable component is not restored to operability within seven days, the reactor shall be placed in a hot shutdown condition within 12 hours. If the inoperable component is not restored to operability within an additional 48 hours, the reactor shall be placed in a cold shutdown condition within 24 hours.

(2) Modification of Minimum Requirements

During power operation, the minimum requirements may be modified to allow a total of two of the components listed in a. and b. to be inoperable at any one time (in addition to one raw water pump) provided that the emergency diesel-generator connected to the other engineered safeguards 4.16-kV bus (1A4 or 1A3) is started to demonstrate operability. Only two raw water pumps may be out of service. If the operability of both components is not restored within 24 hours, the reactor shall be placed in a hot shutdown condition within 12 hours. If the operability of both components is not restored within an additional 48 hours, the reactor shall be placed in a cold shutdown condition within 24 hours.

Any valves, interlocks and piping directly associated with one of the above components and required to function during accident conditions shall be deemed to be part of that component and shall meet the same requirements as for that component.

Any valve, interlock or piping associated with the containment cooling system which is not included in the above paragraph and which is required to function during accident conditions may be inoperable for a period of no more than 24 hours. If operation is not restored within 24 hours, the reactor shall be placed in a hot shutdown condition within 12 hours.

Basis

The requirements of Section 2.3, Emergency Core Cooling System, apply to the specifications above with respect to the operability of the

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Operating Procedure No. 10
Annunciator A-15
Panel CB-20

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Breaker III Tripped A-1	161KV Supply Bkr. Lock-out Relay Operated 86/161 A-2	A-3	A-4	Battery Charger #1 Trouble A-5	Inverter A Trouble A-6	Computer Inverter A Trouble A-7	Instrument Bus A Low Voltage A-8	Instrument Bus #1 Low Voltage A-9
Transfer Trip Signal On B-1	120/208V AC Bkr. 1C3A Trip B-2	DC Bus #1 Ground B-3	B-4	Battery Charger #2 Trouble B-5	Inverter B Trouble B-6	Computer Inverter B Trouble B-7	Instrument Bus B Low Voltage B-8	Instrument Bus #2 Low Voltage B-9
Transfer Trip Off Normal C-1	120/208V AC Bkr. 1C4A Trip C-2	DC Bus #1 Low Voltage C-3	C-4	Battery Charger #3 Trouble C-5	Inverter C Trouble C-6	Computer Static Sw. Transfer C-7	Instrument Bus C Low Voltage C-8	C-9
House Service/ 161KV Lo Relay Test Sw Open D-1	Lockout Relay Supervision Tripped D-2	Panel AI-41A Transfer SW Off Normal D-3	Panel AI-41A Transfer SW Emerg. Supply Off Normal D-4	Security Uninterupt-able Power System Trouble D-5	Inverter D Trouble D-6	Computer Static Switch Trouble D-7	Instrument Bus D Low Voltage D-8	Battery Room 1 & 2 Ventilation Trouble D-9

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Window	Alarm	Trip Device	Set Point (Reset)	Corrective Action	Tech. Spec. Reference
A-1	Breaker 111 Tripped	Contact Operation in Breaker 111	T1A-3 or T1A-4 Differential or phase amperage, differential between breaker 111 and primary of T1A-3 and T1A-4 or T1A-3, or T1A-4 timed or instaneous overcurrent or T1A-3 or T1A-4 sudden pressure.	Auto: Alarm : Fast transfer of 4160V Buses being fed from 161KV. Auto start of D1 and D2. Followup: Insure transfer of 4160V Buses to 345KV system.	2.7
A-2	161KV Supply Breaker Lockout Relay Operated 86/161	Contact operation on Lockout relay 161	Phase amperage difference between breaker 111 and primary of T1A-3 and T1A-4.	Auto: Alarm : Fast transfer of 4160V Buses being fed from 161KV. Auto start of D1 and D2. Followup: Insure transfer of 4160V Buses to 345KV system.	2.7
A-5	Battery Charger #1 Trouble	Contact operation of undervoltage and ground fault relays	Ground on DC output of battery charger or low voltage on DC output.	Auto: Alarm Followup: Place standby charger in service if low voltage or attempt to isolate the ground. Contact electrical maintenance.	2.7

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Window	Alarm	Trip Device	Set Point (Reset)	Corrective Action	Tech. Spec. Reference
B-3	DC Bus #1 Ground	Contact operation on ground Protective Relay 64/DC Bus 1	Ground on #1 DC system	Auto: Alarm Followup: Contact electrical maintenance. Reset alarm light at DC Bus	
B-5	Battery Charger #2 Trouble	Contact operation of undervoltage and ground fault relays	Ground on DC output of Battery Charger or Low voltage on DC output. 120V	Auto: Alarm Followup: Place standby charger in service if loss of charger, or attempt to isolate the ground. Contact electrical maintenance.	2.7
B-6	Inverter B Trouble	Contact operation of undervoltage or ground fault relays	Low DC input voltage or ground on L-1 or L-2 AC output. 105V	Auto: Alarm Followup: Investigate cause of low voltage or ground. Contact Electrical Maintenance. Reset alarm light on Inverter B.	2.7
B-7	Computer Inverter B Trouble	Contact operation of undervoltage or ground fault relays	Low DC input voltage or ground on L-1 or L-2 AC output. 105V	Auto: Alarm Followup: Investigate cause of low voltage or ground. Contact Electrical Maintenance Reset alarm light on Inverter B.	
B-8	Instrument B Low Voltage	Contact operation on relay 27/I Bus B	Inverter or DC bus malfunction. 105VAC	Auto: Alarm Followup: As per EP-19 if all power lost. Caution: Do not parallel inverters.	2.7

Window	Alarm	Trip Device	Set Point (Reset)	Corrective Action	Tech. Spec. Reference
B-9	Instrument Bus #2 Low Voltage	Contact operation on relay 27/I Bus 2	Inverter malfunction or breaker trip on AI-40D. 105VAC	Auto: Alarm Follow-up-Select alternate feed on transfer switches, or attempt to reset breaker.	2.7
C-1	Transfer Trip Off Normal	Failure of Transfer Trip Receiver or Transmitter	Return of Transfer Trip Receiver and Transmitter to Service	Auto: Alarm Follow-up: Notify: 906/Elect.Maint. Notify System Protection for check prior to resetting any flags/relays.	
C-2	120/208AC Breaker	SH Dev 1C4A	Overcurrent on lighting bus 1C4A	Auto: Alarm : Energization of emergency lighting Follow-up-Investigate lighting system for signs of overheating of insulation. Contact electrical maintenance. Transfer water plant control to operable bus 1C3A.	
C-3	DC Bus #1 Low Voltage	EE-8F Distribution Panel Voltage Sensor	125VDC Drop-out 128VDC Pick-up	Auto: Alarm (tells of loss of battery charger on bus or complete loss of bus). Immediate - If complete loss of DC bus #1 occurs follow EP-19. Follow-up - If 125VDC present on bus place battery charger on bus in accordance with OI-EE-3.	2.7

Window	Alarm	Trip Device	Set Point (Reset)	Corrective Action	Tech. Spec. Reference
C-5	Battery Charger #3 Trouble	Contact operation of under-voltage and ground fault relays	Ground on DC output of Battery Charger or Low Voltage on DC output. 120V	Auto: Alarm Follow-up-Normally in alarm condition.	2.7
C-6	Inverter C Trouble	Contact operation of under-voltage or ground fault relays	Low DC input voltage or ground on L-1 or L-2 AC output. 105V	Auto: Alarm Follow-up-Investigate cause of low voltage or ground. Contact electrical maintenance. Reset alarm light on Inverter C.	2.7
C-7	Computer Inverter Transfer	Contact operation on transfer relay in Static Switch	Power failure or trip out of either Computer Inverter or manual transfer	Auto: Alarm : Transfer of load to operable inverter. Follow-up-Investigate cause of transfer and contact electrical maintenance.	

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Operating Procedure No. 10
Annunciator A-17
Panel CB-20

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Trans T1A-3 Oil Level Lo Oil Temp Hi A-1	Trans T1A-3 Secondary Low Voltage A-2	Trans T1A-3 4160 V Bus Ground A-3	4160 Volt Bus Trans to 161KV Blocked A-4	4160V Bus 1A1-1A3 Transfer Off Auto A-5	Fire Sprinkler Diesel RM-1 Actuated A-6	Aux. Bldg. Deluge Valve Open A-7	480V Bus 1B3A, 1B3B & 1B3C Ground A-8	480V Trans Secondary Bkrs. Trip/ Off Normal A-9
Trans T1A-3 Winding Temp. Hi B-1	4160 Bus 1A3 Trans Feeders Bkrs Auto Trip B-2	4160V Bus 1A3 Low Voltage B-3	B-4	B-5	Diesel Bkr. 1AD1 Trip B-6	B-7	480V Bus 1B3A, 1B3B & 1B3C Low Voltage B-8	480V Bus Tie Bkrs. Trip/Off Normal B-9
Trans T1A-3 Pressure Relay Oper C-1	Trans T1A-3 Gas Press Relief C-2	Bkr. 1A31 Auto Trip C-3	Bkr. 1A33 Auto Trip C-4	OPLS Lockout Relay Test Switch Open Ch. A C-5	Diesel D1 Overload C-6	C-7	480V Bus 1B4A/1B3B-4B/1B4B/ 1B4C 125V DC Transfer Sw. Off Normal C-8	480V Bus 1B4A/1B3B-4B/1B4B/ 1B4C 125V DC Transfer Sw. Emerg. Supply Off Normal C-9
Trans's T1A-3 & T1A-4 Deluge Vlv. Operated D-1	Trans T1A-3 Lockout Relay Oper 86/T1A3 D-2	Bkr. 1A31 Lockout Relay Oper 86/1A31 D-3	Bkr. 1A33 Lockout Relay Oper 86/1A33 D-4	Bus 1A3 Lockout Relay Oper 86/1A3-TFB D-5	Diesel D1 Lockout Relay Oper 86/D1 D-6	D-7	480V Bus 1B3A-4A 1B3B-4B 1B3C-4C Low Voltage D-8	Trans. T1B-3A/3B/ 3C Winding Temp Hi D-9

Fort Calhoun Station Unit No. 1
Operating Procedure No. 10
Annunciator A-17
Panel CB-20

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Window	Alarm	Trip Device	Set Point (Reset)	Corrective Action	Tech. Spec. Reference
B-1	Transformer T1A-3 Winding Temp Hi	Contact operation on winding temp. gauge	120°C	Auto: Alarm Follow-up-Reduce load on transformer by transferring auxiliaries. Determine cause of hi temp.	
B-2	4160 Bus 1A3 Transformer Feeder Breakers Auto Tripped	Contact operation of CB-20 control switch and breaker position.	CB-20 control switch in the after close position and the breaker open for the following breakers: T1B-3A, T1B-3B, T1B-3C, or T1B-3D.	Auto: Alarm : Trips 480V transformer secondary breaker and associated island bus tie. Follow-up-Close bus tie breakers to feed the island and 480V bus from Bus 1A4 after insuring the trip was not a fault on the bus. Carry out follow-up of A-9	2.7
B-3	4160V Bus 1A3 Low Voltage	27-1X / 1A3 27-2X / 1A4	90%	Auto: Alarm Follow-up-Verify if alarm if valid. Transfer power supply if power supply has malfunctioned. Contact Elect. Maint.	2.7

Window	Alarm	Trip Device	Set Point (Reset)	Corrective Action	Tech. Spec. Reference
B-6	Diesel Breaker 1AD1 Tripped	Contact operation in breaker 1AD1	Breaker Emergency Control Switch in the "Trip" position, control switch on CB-20 in the "Trip" position, lock relay 86/D1 provided breaker protection override is not in effect, or if diesel D1 shutdown.	Auto: Alarm : If lockout relay 86/D1 operates, D2 will start. Load shed of Bus 1A3 if no other power supply on bus. Follow-up-Investigate reason for trip and transfer emergency loads to Bus 1A4 insuring D-2 if operating does not exceed overload rating.	2.7
B-8	480V Bus 1B3A, 1B3B and 1B3C Low Voltage	27-1X / 1B3A and 27-2X / 1B3A or 27-1X / 1B3B and 27-2X / 1B3B or 27-1X / 1B3C and 27-2X / 1B3C	90%	Auto: Alarm Verify if valid alarm; if so, check for transformer malfunction and inform Electrical Maintenance.	

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Operating Procedure No. 10
Annunciator A21
Panel CB-10-11

Water Treatment Plant Malfunction A-1U	Primary Water Storage Tank Level Hi-Lo A-2U	Primary Water Storage Tank Emerg. Level Lo A-3U	Demin. Water Header Conductivity Hi A-4U	200# Nitrogen Header Press Hi-Lo A-5U	Sec. Plant Ph. Hi-Lo- A-6U	Waste Disposal System Malfunction A-7U
Demin. Water Awaiting Regen. A-1L	Demin. Water Surge Tank Level Hi-Lo A-2L	Vac. Deaerator Dissolved Oxygen Hi A-3L	Deaerated Water Header Conductivity Hi A-4L	100# Nitrogen Header Press Hi-Lo A-5L	Sec. Plant Specific Cond. Hi A-6L	Waste Evap. Malfunction A-7L
Demin. Water Regen. Complete B-1U	Demin. Water Surge Tank Emerg. Level Lo B-2U	Vac. Deaerator Hi or Emerg. Lo Level B-3U	Demin. Water Header Press Lo B-4U	100# Hydrogen Header Press Hi-Lo B-5U	Plant Air Press Lo B-6U	Gas Stripper Malfunction B-7U
Demin. Water Output Poor Quality B-1L	Blowdown Tank Level Hi-Lo B-2L	Vac. Deaerator Press Hi B-3L	Deaerated Water Header Press Lo B-4L	Radwaste Solidification System Trouble B-5L	Instrument Air Press Lo B-6L	Automatic Gas Analyzer WD-32 H_2O_2 Hi Level B-7L
Primary Sampling Sys. Malfunction C-1U	Blowdown Tank Pumps Overload Trip C-2U	Primary Water Booster Pumps Overload/Trip C-3U	Dearator Booster Pumps Overload/Trip C-4U	C-5U	Heating Steam Press Lo C-6U	DC Bus 2 Low Voltage C-7U
C-1L	Demin. Water Transfer Pumps Overload/Trip C-2L	C-3L	Dearator Vacuum Pumps Overload/Trip C-4L	C-5L	C-6L	Panel AI-41B Transfer Switch Off Normal C-7L

ISSUED

JAN 21 1982

Window	Alarm	Trip Device	Set Point (Reset)	Corrective Action	Tech. Spec. Reference
C-7L	Panel AI-41B Transfer Switch Off Normal	Aux. contact on manual transfer switch and undervoltage relays monitoring AI-41B DC Bus Voltage	Alarms transfer to DC #1 (Normal on DC #2). Alarms on trip of DC circ. breaker main feed to panel. Alarms on voltage: 110VDC drop-out 113VDC pick-up	Auto: Alarm Immediate: If complete loss of DC Bus #2 Voltage or AI-41B has occurred follow EP-18	2.7
C-7U	DC Bus #2 Low Voltage	EE-8G Distrib. Panel Voltage Sensor	125VDC Drop-out 128VDC Pick-up	Auto: Alarm (Indicates loss of battery charger supplying bus or complete loss of voltage on bus) Immediate: If complete loss of DC Bus #2 occurs follow EP-18. Follow-up-If 125VDC is present on bus, place battery charger on bus in accordance with OI-EE-3.	2.7

2.0 LIMITING CONDITIONS FOR OPERATION

2.7 Electrical Systems

Applicability

Applies to the availability of electrical power for the operation of plant components.

Objective

To define those conditions of electrical power availability necessary to provide for safe reactor operation and the continuing availability of engineered safety features.

Specifications

(1) Minimum Requirements

The reactor shall not be heated up or maintained at temperatures above 300°F unless the following electrical systems are operable:

a. Unit auxiliary power transformers TIA-1 or -2 (4,160 V).

b. House service transformers TIA-3 and 4 (4,160 V).

c. 4,160 V engineered safety feature buses 1A3 and 1A4.

d. 4,160 V/480 V Transformers TIB-3A, TIB-3B, TIB-3C, TIB-4A, TIB-4B, TIB-4C.

e. 480 V distribution buses 1B3A, 1B3A-4A, 1B4A, 1B3B, 1B3B-4B, 1B4B, 1B3C, 1B3C-4C, 1B4C.

f. MCC No. 3A1, 3B1, 3A2, 3C1, 3C2, 4A1, 4A2, 4C1 and 4C2.

g. 125 V d-c buses No. 1 and 2 (Panels EE-8F and EE-8G).

h. 125 V d-c distribution panels A1-41A and A1-41B.

i. Four instrument a-c buses (A), (B), (C) and (D).

j. AI-42A and A1-42B.

k. Two station batteries including at least one battery charger on each D.C. bus.

l. Both diesel generators, with a full engine base day tank and a minimum of 16,000 gallons of fuel in the underground storage tank.