Progress Energy
Crystal River Nuclear Plant
Docket No. 50-302
Operating License No. DPR-72

August 21, 2012
3F0812-02

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555-0001

Subject: Crystal River Unit 3 – Response to Second Request for Additional Information to Support NRC Electrical Engineering Branch (EEEB) Technical Review of the CR-3 Extended Power Uprate LAR (TAC No. ME6527)

References:
1. CR-3 to NRC letter dated June 15, 2011, "Crystal River Unit 3 – License Amendment Request #309, Revision 0, Extended Power Uprate" (ADAMS Accession No. ML112070659)
2. Email from S. Lingam (NRC) to D. Westcott (CR-3) dated June 7, 2012, "RE: Crystal River, Unit 3 EPU LAR - Draft RAIs from Electrical Branch (EEEB) (TAC No. ME6527)"
3. NRC to CR-3 letter dated July 17, 2012, "Crystal River Unit 3 Nuclear Generating Plant – Request For Additional Information For Extended Power Uprate License Amendment Request (TAC No. ME6527)" (ADAMS Accession No. ML12194A417)

Dear Sir:

By letter dated June 15, 2011, Florida Power Corporation requested a license amendment to increase the rated thermal power level of Crystal River Unit 3 (CR-3) from 2609 megawatts (MWt) to 3014 MWt (Reference 1). On June 7, 2012, via electronic mail, the NRC provided a draft request for additional information (RAI) needed to support the EEEB technical review of the CR-3 Extended Power Uprate (EPU) License Amendment Request (LAR) (Reference 2). By teleconference on June 25, 2012, CR-3 discussed the draft RAI with the NRC to confirm an understanding of the information being requested. On July 17, 2012, the NRC provided a formal RAI required to complete its evaluation of the CR-3 EPU LAR (Reference 3).

The attachment to this correspondence, "Response to Second Request for Additional Information – Electrical Engineering Branch Technical Review of the CR-3 EPU LAR," provides the formal response to the RAI.

In support of the EPU technical review RAI responses, three enclosures are being provided to the attachment. Enclosure 1, "CR-3 EPU – New or Replaced EQ Components," provides specific environmental qualification (EQ) design information for the new and replacement components requiring qualification in accordance with 10 CFR 50.49. Enclosure 2, "Summary of Qualification - EFW Pump Recirculation Line Differential Pressure Switches," provides the

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environmental qualification results associated with the new differential pressure switches for the emergency feedwater pump recirculation line modification. Enclosure 3, "CR-3 Electrical Figures," provide simplified diagrams of selected CR-3 electrical configurations to support the RAI responses.

This correspondence contains no new regulatory commitments.

If you have any questions regarding this submittal, please contact Mr. Dan Westcott, Superintendent, Licensing and Regulatory Programs at (352) 563-4796.

Sincerely,

Jon A. Franke
Vice President
Crystal River Nuclear Plant

JAF/gwe

Attachment: Response to Second Request for Additional Information – Electrical Engineering Branch Technical Review of the CR-3 EPU LAR

Enclosures:

1. CR-3 EPU – New or Replaced EQ Components

2. Summary of Qualification - EFW Pump Recirculation Line Differential Pressure Switches

3. CR-3 Electrical Figures

xc: NRR Project Manager
Regional Administrator, Region II
Senior Resident Inspector
State Contact

STATE OF FLORIDA

COUNTY OF CITRUS

Jon A. Franke states that he is the Vice President, Crystal River Nuclear Plant for Florida Power Corporation; that he is authorized on the part of said company to sign and file with the Nuclear Regulatory Commission the information attached hereto; and that all such statements made and matters set forth therein are true and correct to the best of his knowledge, information, and belief.

Jon A. Franke
Vice President
Crystal River Nuclear Plant

The foregoing document was acknowledged before me this 31 day of August, 2012, by Jon A. Franke.

Signature of Notary Public
State of Florida

CAROLYN E. PORTMANN
Commission # DD 937553
Expires March 1, 2014
Bonded Thru Troy Fain Insurance 800-385-7019

(Print, type, or stamp Commissioned Name of Notary Public)

Personally Known ✓ -OR- Produced Identification _____

FLORIDA POWER CORPORATION

CRYSTAL RIVER UNIT 3

DOCKET NUMBER 50-302 / LICENSE NUMBER DPR-72

ATTACHMENT

RESPONSE TO SECOND REQUEST FOR ADDITIONAL INFORMATION – ELECTRICAL ENGINEERING BRANCH TECHNICAL REVIEW OF THE CR-3 EPU LAR

RESPONSE TO SECOND REQUEST FOR ADDITIONAL INFORMATION – ELECTRICAL ENGINEERING BRANCH TECHNICAL REVIEW OF THE CR-3 EPU LAR

By letter dated June 15, 2011, Florida Power Corporation (FPC) requested a license amendment to increase the rated thermal power level of Crystal River Unit 3 (CR-3) from 2609 megawatts (MWt) to 3014 MWt (Reference 1). On June 7, 2012, via electronic mail, the NRC provided a draft request for additional information (RAI) needed to support the Electrical Engineering Branch (EEEB) technical review of the CR-3 Extended Power Uprate (EPU) License Amendment Request (LAR). By teleconference on June 25, 2012, CR-3 discussed the draft RAI with the NRC to confirm an understanding of the information being requested. On July17, 2012, the NRC provided a formal RAI required to complete its evaluation of the CR-3 EPU LAR.

For tracking purposes, each item related to this RAI is uniquely identified as EEEB X-Y, with X indicating the RAI set and Y indicating the sequential item number.

1. (EEEB 2-1)

In response to EEEB 1-2 dated April 16, 2012, the licensee stated that the new equipment listed in the original LAR (dated June 15, 2011) Section 2.3.1, "Environmental Qualification [EQ] of Electrical Equipment," are being evaluated in the associated CR-3 Engineering Change packages. The licensee also stated that finalization of the EPU plant modifications is currently in progress and includes the associated EQ evaluations which will be completed once the specific location and type of component is known.

In view of above the NRC staff has the following questions:

a) The licensee's EQ equipment and component design finalization and the determination of the specific location(s) have not been completed for the EPU operation, and therefore the NRC staff cannot accept the response without the submittal of the completed design. The licensee needs to provide the completed design information with type of equipment, specific location, and category/environmental characteristics, with a complete list of all new and replacement equipment (with Tag number(s)) that need to be environmentally qualified under EPU conditions.

Response:

Enclosure 1, "CR-3 EPU – New or Replaced EQ Components," to this attachment provides a tabular listing of the new and replacement components requiring qualification in accordance with 10 CFR 50.49, "Environmental qualification of electric equipment important to safety for nuclear power plants." For each listed component, Enclosure 1 includes the expected equipment tag numbers; the vendor and model number; and the associated location by building and zone, Also, the pre-EPU value, EPU value, qualified value, and margin are provided for the EQ parameters impacted by EPU conditions; pressure, temperature, and radiation.

Specifically, Enclosure 1 provides EQ design information for the following:

- The turbine driven emergency feedwater (EFW) pump recirculation line differential pressure indicating switches and solenoid valve; refer to Enclosure 1, Items (B) and (E).

- The new transmitters associated with the atmospheric dump valves and the Fast Cooldown System; refer to Enclosure 1, Items (H), and (I).

- The new transmitters, penetrations, and motor operator valves associated with the Low Pressure Injection (LPI) System cross-tie line and the Reactor Coolant System (RCS) hot leg injection (HLI) line; refer to Enclosure 1, Items (D), (F), and (G).

- The new transmitters and temperature elements associated with the Inadequate Core Cooling Mitigation System and the EQ classification change to eight core exit thermocouples (CETs); refer to Enclosure 1, Items (A), (C), and (D).

- The CET cable routing, which are commodity components in the applicable electrical penetration; refer to Enclosure 1, Items (F) and (J).

- RCS HLI blowdown line solenoid valves; refer to Enclosure 1, Item (E).

b) The licensee's response in (iii) dated April 16, 2012, is that a vendor qualification package for the new differential pressure switches associated with the emergency feedwater (EFW) system is being finalized for the new EQ components. The NRC staff needs the final EQ details of the new differential pressure switches to complete the safety review.

Response:

The new different pressure switches associated with the EFW pump recirculation line modification have established qualification to EPU conditions as documented in the associated vendor qualification package (VQP). Enclosure 2, "Summary of Qualification - EFW Pump Recirculation Line Differential Pressure Switches," to this attachment provides the VQP results associated with the new differential pressure switches.

c) The licensee stated in response (iv) dated April 16, 2012, that eight core exit thermocouples are being upgraded to safety-related in support of the new Inadequate core cooling mitigation system. Clarify if upgrading means that these thermocouples will be new equipment? Also clarify whether these thermocouples are being added to the EQ master list. If so, provide information that demonstrates that the EQ of these components bounds EPU conditions.

Response:

Upgrading the existing CETs is accomplished by replacing the existing non-EQ CETs with new CETs qualified in accordance with 10 CFR 50.49.

The new safety-related CETs are the same model currently qualified by the CR-3 EQ Program. Thus, the new CETs are being added to the CR-3 EQ master list and included in the associated VQP. Enclosure 1 to this attachment includes the new CETs and shows that the qualification of these components bound the EPU conditions.

2. (EEEB 2-2)

In response to EEEB 1-5 dated April 16, 2012, the licensee stated that with the exception of the reactor building sump transmitter capillary tubes, electrical equipment important to safety is installed above the expected flood level.

Provide clarification that the sump transmitter and its wiring to the equipment are also above the expected flood level so that the function is not impacted by any flooding conditions during EPU operation. Provide a discussion how these are appropriately qualified.

Response:

Currently, the CR-3 reactor building (RB) sump transmitter is an assembly consisting of a containment sump transmitter installed above the maximum RB flood level of 102 ft. elevation, with connecting sealed sensing capillary tubes routed down into the RB sump to measure RB sump water level from the bottom of the RB sump to the top of the RB sump cavity. This current RB sump transmitter assembly is designed to operate under maximum calculated flooding conditions. Since the RB flood level has not changed as a result of EPU conditions, this RB sump level transmitter assembly remains qualified per the existing VQP. The electronic transmitter and instrumentation wiring remains located above the maximum RB flood level by design. The only portion of the RB sump transmitter assembly exposed to submerged (flooding) conditions is the sealed capillary tubes. The non-electrical capillary tubes are not subject to the effects of flooding and do not provide water intrusion paths to the RB sump transmitter or associated wiring. Thus, the RB sump transmitter, including instrumentation wiring to plant equipment, is not impacted by flooding during EPU operation and can continue to perform its safety function.

3. (EEEB 2-3)

In response to EEEB 1-8 dated April 16, 2012, regarding short-circuit current available at the isolated phase bus (IPB) duct versus the IPB short-circuit capacity rating, the licensee stated that the changes that impact electrical calculations are not yet included in the formal calculations, but are evaluated using the electrical system calculation Impact Assessment process to ensure that the composite effect of the electrical system changes are acceptable. The licensee further stated that additional changes due to EPU operation are being evaluated and are expected to be bounded by the equipment ratings.

Provide the summary of the final results of the completed calculation to demonstrate that the maximum short circuit capacity of the IPB is adequate to support operation at EPU conditions.

Response:

Electrical calculations have been revised to include the major EPU upgrades; e.g., main generator upgrade, feedwater booster pumps, condensate pumps, and IPB-duct cooler motors. The fault current impact, as a result of other pending EPU changes, will be insignificant by comparison to these large IPB electrical loads; the cumulative momentary fault current of other pending IPB loads is estimated to be less than 100 amperes. As such, further changes that may impact the final EPU electrical configuration will have minimal impact on the short circuit capability of the IPB.

Table 1, "CR-3 Isophase Bus Momentary Duty Summary," provides the IPB momentary fault current capability and the momentary duty results during EPU operation for the IPB sections associated with the CR-3 main generator, main transformers, and the unit auxiliary transformer (UAT). The Electrical Transient Analyzer Program (ETAP) conservatively compares the total fault current momentary duty at a device location to the equipment fault current momentary capability. The asymmetrical total momentary duty is calculated by applying the multiplication factor (M.F.) to the symmetrical total momentary duty. The M.F. is calculated by the ETAP software based on the system reactance (X) and resistance (R); X/R ratio.

Per the CR-3 ETAP momentary duty summary report and as indicated in Table 1, the IPB duct between the main generator and the main transformers deviate from the applicable asymmetrical device momentary duty capability. In these cases, as described in Institute of Electrical and Electronics Engineers (IEEE) 551 – 2006, "IEEE Recommended Practice for Calculating Short-Circuit Currents in Industrial and Commercial Power Systems," (Reference 3), more refined calculations are used to determine the fault current momentary duty acceptability. In general, electrical equipment will not be subjected to the total fault current, but will be subjected to the fault current contribution from upstream sources or downstream sources depending on the location of the fault.

For the CR-3 IPB duct, the upstream sources contribute the larger fault current. Thus, to determine if the IPB duct was acceptable, the upstream symmetrical contribution was multiplied by the M.F. so that the upstream asymmetrical fault current contribution can be compared to the device capability.

Table 1: CR-3 Isophase Bus Momentary Duty Summary

Isophase Bus Section	**CR-3 UAT**
Symmetrical Total Momentary Duty (kA rms)	232.5
M.F.	1.651
Asymmetrical Total Momentary Duty (kA rms)	**383.9**
Asymmetrical Device Momentary Capability (kA rms)	**479.0**
Results	**Acceptable**
Isophase Bus Section	**CR-3 Main Generator**
Symmetrical Total Momentary Duty (kA rms)	233.5
M.F.	1.652
Asymmetrical Total Momentary Duty (kA rms)	385.7
Asymmetrical Device Momentary Capability (kA rms)	**345.0**
Upstream Contribution Bus	CR-3 Main Transformers IPB
Symmetrical Upstream Contribution (kA rms)	131.4
Asymmetrical Upstream Momentary Duty (kA rms)	**217.1**
Results	**Acceptable**
Isophase Bus Section	**CR-3 Main Transformers**
Symmetrical Total Momentary Duty (kA rms)	234.8
M.F.	1.651
Asymmetrical Total Momentary Duty (kA rms)	387.7
Asymmetrical Device Momentary Capability (kA rms)	**321.0**
Upstream Contribution Bus	500 kV Grid
Symmetrical Upstream Contribution (kA rms)	129.6
Asymmetrical Upstream Momentary Duty (kA rms)	**213.9**
Results	**Acceptable**

As shown in Table 1, the revised IPB ETAP calculation results, which include the major EPU electrical loads, are acceptable. The asymmetric upstream momentary duty of the CR-3 main generator IPB is approximately 217 kA, which is within the IPB momentary capability of 345 kA and conservative with respect to the cited 250 kA in RAI Response EEEB 1-8 in the FPC to NRC letter dated April 16, 2012 (Reference 2); the asymmetric upstream momentary duty of the CR-3 main transformers IPB is approximately 213 kA, which is within the IPB momentary capability of 321 kA; and the asymmetric total momentary duty of the CR-3 UAT IPB is approximately 384 kA, which is within the IPB momentary capability of 479 kA. As such, the revised CR-3 electrical calculations demonstrate that the maximum short circuit capacity of the IPB is acceptable and adequate margin exists to support operation at EPU conditions.

4. (EEEB 2-4)

In response to EEEB 1-11 dated April 16, 2012, the licensee stated that subsequent to the submittal of the CR-3 EPU LAR, the licensee discovered an incorrect design input in the nonsafety related electrical transient analyzer program analysis. This condition was evaluated in the corrective action program and the short-circuit analysis has been re-done. The analysis indicates that the short-circuit ratings are exceeded at EPU conditions on several nonsegregated bus ducts that require modification for higher short-circuit rating. As a result, the licensee stated that the five 4160 volt nonsegregated bus duct sections will be replaced prior to EPU operation.

Identify the five 4160 volt nonsegregated bus duct sections discussed above and provide the continuous and short-circuit current ratings at EPU operation. Clarify if this modification is a part of the Regulatory Commitment in Attachment 10 of the LAR, where it is stated that "CR-3 will implement all EPU modifications."

Response:

The sections of the 4160 V non-segregated bus duct that are identified for replacement to support CR-3 operation are indicated in Figure 1, "Markup of FSAR Figure 8-2 – Electrical One Line Diagram Composite," and Figure 2, "Isometric of 4160 V Non Segregated Bus Replacement Project," of Enclosure 3, "CR-3 Electrical Figures," to this attachment and include the bus duct sections between 4160 V engineered safeguard (ES) buses 3A and 3B, and, the 4160 V unit buses 3A and 3B. Table 2, "Replacement Bus Duct – EPU Continuous and Short-Circuit Ratings and Duty," provides a list of the continuous and short-circuit ratings of each of the modified sections of non-segregated bus duct and the continuous and short-circuit duty of the bus sections in operation at EPU conditions.

Table 2: Replacement Bus Duct – EPU Continuous and Short-Circuit Ratings and Duty

UAT 4160 V Bus Duct Section	**Continuous Rating** (amperes)	**Continuous Duty** (amperes)	**Momentary Short-Circuit Rating (Asymm. kA rms)**	**Total Momentary Short-Circuit Duty (Asymm. kA rms) Note 2**
3000A bus section in unit switchgear room	3000	1721	86.0	69.5
2000 A bus section to Unit Bus 3A	2000	1734	86.0	69.5

UAT 4160 V Bus Duct Section	Continuous Rating (amperes)	Continuous Duty (amperes)	Momentary Short-Circuit Rating (Asymm. kA rms)	Total Momentary Short-Circuit Duty (Asymm. kA rms) Note 2
2000A bus section to Unit Bus 3B	2000	1721	86.0	69.1
2000A bus sections from the unit switchgear room to the ES Bus 3B switchgear room	2000	965 Note 1	86.0	64.2
1200A bus sections to ES Buses 3A and 3B	1200	965 Note 1	86.0	63.6

Note 1: ES Bus 3A and ES Bus 3B are not aligned to the UAT during power operations. ES Bus 3A and ES Bus 3B may be aligned to the UAT when the plant is in cold shutdown conditions. The continuous duty value represents the maximum calculated loading during UAT backfeed operation and is not expected to change as a result of EPU operation.

Note 2: Total momentary short-circuit duty values will decrease slightly when the bus sections are replaced due to the slightly higher reactance parameter of the new bus sections.

As shown in Table 2, the continuous duty of the 4160 V nonsegregated bus duct sections remain within the associated continuous ratings. However, replacement of these nonsegregated bus duct sections is required to ensure the short-circuit fault current is within the momentary short-circuit rating of the nonsegregated bus duct at EPU conditions. Therefore, this modification is a required modification for implementing EPU at CR-3 and is included in the scope of modifications identified in the second regulatory commitment in Attachment 10 of the EPU LAR (Reference 1).

5. (EEEB 2-5)

In response to EEEB 1-12 dated April 16, 2012, the licensee provided a discussion on the Class 1E battery system for the EFW System pump recirculation line modification. The licensee stated that this modification adds 2 amperes to the B-positive battery and less than 2 amperes to the diesel driven EFW (emergency feedwater pump (EFP-3) battery.

a) Provide the latest direct current (DC) one line diagram of the Class 1E battery and the EFP-3 battery systems. Provide a discussion on the configuration of the B-positive and B-negative Class 1E station batteries.

Response:

To correct RAI Response EEEB 1-12 in FPC to NRC letter dated April 16, 2012 (Reference 2), the EFW System pump recirculation line modification adds less than 2 amperes to the B-negative battery; not the B-positive battery. The response does correctly state that this modification adds less than 2 amperes to the diesel driven EFW pump (EFP-3) battery.

Figure 3, "CR-3 FSAR Figure 8-8A – Electrical One Line Diagram 250/125V DC System," and Figure 4, "Simplified 125/250 VDC Electrical Power System Train One Line Diagram,"

are provided in Enclosure 3 to this attachment. Figure 3 is a block diagram showing the Class 1E batteries, chargers, and DC electrical distribution panels. Figure 4 is a simplified electrical schematic of one train of the Class 1E batteries and associated chargers.

For each Class 1E DC electrical power train, one Class 1E 250 VDC battery bank is center-tapped (PN) to create two 125 VDC electrical distribution subsystems as shown in Figure 4. Since the two banks of each battery are connected in series at the PN terminal, the nominal voltage across the entire battery (P to N) is approximately 250 VDC. Thus, the A station battery consists of battery banks 3A1 and 3A2. The terminals for bank 3A1 (A-positive) are P (+) and PN (-), and the terminals for bank 3A2 (A-negative) are N (-) and PN (+). The B station battery consists of battery banks 3B1 and 3B2. The terminals for bank 3B1 (B-negative) are N (-) and PN (+), and the terminals for bank 3B2 (B-positive) are P (+) and PN (-).

Figure 5, "EFP-3 Battery System Block Diagram," of Enclosure 3 to this attachment provides a block diagram showing the EFP-3 battery, charger, and the EFP-3 DC electrical distribution panel. Figure 6, "Simplified EFP-3 DC Power System One Line Diagram," of Enclosure 3 to this attachment provides a one line diagram of the EFP-3 battery system.

As illustrated in Figures 5 and 6, the EFP-3 battery consists of one 125 VDC battery bank (DPBA-1D) and one 125 VDC battery charger (DPBC-1J).

b) Clarify that the above additional loads will not adversely impact the capacity margin of the Class 1E battery and the EFW (EFP-3) battery systems.

Response:

To clarify the less than 2 ampere loading increase to the Class 1E battery and the EFP-3 battery systems described in RAI Response EEEB 1-12 of FPC to NRC letter dated April 16, 2012 (Reference 2), the new DC loads are conservatively assumed to be energized for the full station blackout (SBO) coping period of 4 hours. In addition, the cumulative DC electrical calculation impact assessment includes the DC powered solenoids associated with the new RCS HLI blowdown line modification. Also, the cumulative DC electrical calculation impact assessment includes battery capacity impacts associated with other pending plant modifications not directly related to EPU operation. This cumulative assessment indicates: 1) an additional 17 ampere-hours (A-H) usage projected for the 'A-negative' Class 1E battery; 2) an additional 24 A-H usage projected for the 'B-negative' battery; 3) an additional 8 A-H usage projected for the EFP-3 battery; and 4) the voltage throughout the Class 1E 125/250 VDC Electrical Distribution System is essentially unchanged and the Class 1E 125/250 VDC DC Electrical System voltage profile calculations are not adversely impacted as a result of the EPU modifications. Therefore, it is concluded that the additional DC loading, as a result of EPU, will not adversely impact the capacity margin of the Class 1E battery and the EFP-3 battery systems.

c) The licensee stated that "In accordance with the CR-3 engineering change process, the electrical loading calculation will be revised to incorporate the actual DC electrical loading impacts from the EPU operation and EPU-related modifications following finalization of the modifications to confirm the battery loading is acceptable for operation at EPU conditions."

Provide the summary of the final results of the completed calculation to demonstrate that the battery loading is bounded at EPU conditions by the available battery capacity.

Response:

Per the CR-3 engineering change process, DC electrical calculations are not formally revised prior to the as-built electrical configuration unless there is a significant impact to the electrical calculation. However, a DC electrical calculation impact assessment has been performed and the plant DCSYSTEM software has been re-run to determine the cumulative effect on the CR-3 safety related DC System to ensure battery loading margin is acceptable during EPU operation. This assessment considered the EPU modifications and other pending plant modifications and uses conservative loading values such that when the calculation is revised, the final electrical calculation merely confirms the loading is adequate.

Table 3, "CR-3 Safety Related Battery Cumulative Capacity Change," provides a summary of the cumulative DC electrical calculation impact assessment on the CR-3 safety related Class 1E 125/250 VDC System, based on EPU and other plant modifications, and includes the safety related battery capacities in A-H.

Table 3: CR-3 Safety Related Battery Cumulative Capacity Change

CR-3 Station Battery	Battery Capacity Rating (8 hour A-H)	Pre-EPU Required SBO Capacity (4 hour A-H)	EPU Required SBO Capacity (4 hour A-H)	A-H Loading Increase
A-positive (3A1)	1708	768	768	0
A-negative (3A2)	1708	761	778	17
B-positive (3B2)	1708	779	779	0
B-negative (3B1)	1708	565	589	24
EFP-3 (DPBA-1D)	231	22	30	8

Based on the results of this cumulative DC electrical calculation impact assessment, the safety related battery loading, including additional DC loading as a result of EPU modifications, is bounded by the available Class 1E and EFP-3 battery capacities and adequate margin exists to support operation at EPU conditions.

Also, the EPU modifications have been evaluated for impact to the non-Class 1E 125/250 VDC Electrical System and it is concluded that the non-Class 1E 125/250 VDC Electrical System calculation is not adversely impacted as a result of the EPU modifications since the steady state current increase is less than 1 ampere. Thus, the non safety related battery loading, as a result of EPU modifications, is bounded by the available non Class 1E battery capacity and adequate margin exists to support operation at EPU conditions.

References

1. FPC to NRC letter dated June 15, 2011, "Crystal River Unit 3 – License Amendment Request #309, Revision 0, Extended Power Uprate." (ADAMS Accession No. ML112070659)

2. FPC to NRC letter dated April 16, 2012, "Crystal River Unit 3 – Response to Request for Additional Information to Support NRC Electrical Systems Branch (EEEB) Technical Review of the CR-3 Extended Power Uprate LAR (TAC No. ME6527)." (ADAMS Accession No. ML12114A002)

3. Institute of Electrical and Electronics Engineers (IEEE) Report IEEE 551 – 2006, "IEEE Recommended Practice for Calculating Short-Circuit Currents in Industrial and Commercial Power Systems."

FLORIDA POWER CORPORATION

CRYSTAL RIVER UNIT 3

DOCKET NUMBER 50-302 / LICENSE NUMBER DPR-72

ENCLOSURE 1

CR-3 EPU – NEW OR REPLACED EQ COMPONENTS

CR-3 EPU – NEW OR REPLACED EQ COMPONENTS

Component	Tag Number	Vendor	Model	Building / Zone	Pressure (psig)				Temperature (°F)				Radiation (rads)			
					Pre EPU	EPU	Qualified Value	Margin	Pre EPU	EPU	Qualified Value	Margin	Pre EPU	EPU	Qualified Value	Margin
Core Exit Temperature Elements (A)	IM-3F-TE*, IM-7E-TE*, IM-13F-TE*, IM-9G-TE*, IM-11K-TE*, IM-9M-TE*, IM-5K-TE*, IM-7M-TE*	AREVA	9029603-101	RB / 39	54.2	54.9	66	16.6	302	302	570	268	1.11 E+08	1.30 E+08	2.01E+08	7.10E+07
Differential Pressure Switch (B)	EF-62-FS1, EF-62-FS2, EF-62-FS3	ITT Barton	580A-2	IB / 14	N/A	8.85	10	2.0	N/A	150	180	30	N/A	1.86 E+04	1.00E+07	9.98E+06
Pressure Transmitter (C)	RC-223-PT	Rosemount	1154GP9RA	RB / 38	54.2	54.9	110	60.6	302	302	420	118	4.70 E+07	5.76 E+07	1.10E+08	5.24E+07
Pressure and Differential Pressure Transmitter (D)	RC-224-PT, DH-64-DPT, DH-65-DPT, DH-66-PT, DH-67-PT	Rosemount	1154SH9RA 1154HH5RAN 0018	RB / 38	54.2	54.9	85	35.6	302	302	420	118	4.70 E+07	5.76 E+07	1.16E+08	5.84E+07
Solenoid Operated Valve (E)	EFV-180	Target Rock Corporation	11Z519-002	IB / 14	N/A	8.85	69	61.0	N/A	471	492	21	N/A	2.00 E+07	2.00E+08	1.80E+08
	DHV-222, 223, 227, 228		TBD Note 1	RB / 40B	N/A	54.9	69	19.6	N/A	302	492	190	N/A	1.83 E+08	2.00E+08	1.70E+07
Reactor Building Penetration (F)	PEN-327, PEN-328, PEN-408	Conax Corporation	EPA's: 7GZ5-10001-01/02 EEDTHRUs: 7PX8-12000-01	RB / 38 & 39	54.2	54.9	74.5	25.1	302	302	371	69	4.70 E+07	5.76 E+07	1.28E+08	7.04E+07
				AB / 37 & 64	Atm.	Atm.	74.5	N/A	120	115 Note 2	371	256	6.06 E+05	1.87 E+06	1.28E+08	1.26E+08

CR-3 EPU – NEW OR REPLACED EQ COMPONENTS

Component	Tag Number	Vendor	Model	Building / Zone	Pressure (psig)				Temperature (°F)				Radiation (rads)			
					Pre EPU	EPU	Qualified Value	Margin	Pre EPU	EPU	Qualified Value	Margin	Pre EPU	EPU	Qualified Value	Margin
Motor Operated Valve (G)	DHV-514, 614	Limitorque	SBM-0	RB / 38	54.2	54.9	70	20.6	302	302	420	118	1.60 E+08	1.83 E+08	2.04E+08	2.10E+07
Pressure Transmitter (H)	MS-122-PT, MS-123-PT	Rosemount	1153GD9RA	IB / 17, 16	1.3	8.85	85	77.0	322	322	420	98	8.90 E+04	1.10 E+05	1.16E+08	1.16E+08
Differential Pressure Transmitter (I)	MU-23-DPT13, MU-23-DPT14, MU-23-DPT15, MU-23-DPT16	Rosemount	1154SH9RA 1154HH5RAN 0018	AB / 3	Atm.	Atm.	85	N/A	97	97	420	323	2.16 E+06	4.17 E+06	1.16E+08	1.12E+08
Tape Termination and Splices (J)	Various	Kerite Company	Scotch 27, Scotch 70, 130C Bishop W926 and/or Permacel P-212	RB / 39	54.2	54.9	80	30.6	302	302	325	23	N/A	5.76 E+07	1.00E+08	4.24E+07
	Various	Kerite Company		IB / 17 &57	6.2	8.85	80	72.0	322	322	325	3	N/A	1.10 E+05	1.00E+08	9.99E+07
	Various	Kerite Company		AB / 37	Atm.	Atm.	80	N/A	120	115 Note 2	325	210	N/A	2.00 E+07	1.00E+08	8.00E+07

Note 1: The specific model of Target Rock solenoids for the new Reactor Coolant System hot leg injection blowdown valves (DHV-222, 223, 227, 228) have not been identified. However, the solenoids will be, as a minimum, qualified using the current Target Rock EQ certification criteria.

Note 2: The maximum temperature of 115°F in the auxiliary building at EPU conditions is lower than the pre-EPU temperature value due to an adjustment in the EQ calculations; pre-EPU maximum temperature of 120°F represents the maximum temperature in the emergency diesel generator building and is not representative of the maximum auxiliary building temperature.

FLORIDA POWER CORPORATION

CRYSTAL RIVER UNIT 3

DOCKET NUMBER 50-302 / LICENSE NUMBER DPR-72

ENCLOSURE 2

SUMMARY OF QUALIFICATION - EFW PUMP RECIRCULATION LINE DIFFERENTIAL PRESSURE SWITCHES

SUMMARY OF QUALIFICATION
EFW PUMP RECIRCULATION LINE DIFFERENTIAL PRESSURE SWITCHES

TAG NO: EF-62-FS1, EF-62-FS2, EF-62-FS3 **FUNCTION:** Control EFV-180 **SYSTEM:** EFW **SERVICE:** EFW Flow Control

COMPONENT LOCATION: Intermediate Building ELEV. 95'-0", EFP-2 Area **ZONE:** 14

COMPONENT DESCRIPT: Differential Pressure Switch

VQP NUMBER: INST-B040-18-EPU **EQ CATEGORY:** 10CFR50.49

COMPONENT DATA	ENVIRONMENT			DOCUMENTATION REFERENCES		QUALIFICATION METHOD
	ENVIRONMENTAL PARAMETER	CR-3 VALUE	QUALIFIED TEST VALUE	CR-3 SPECIFICATION REFERENCE	VQP REFERENCE LOCATION	
MANUFACTURER: ITT BARTON	OPERATING TIME (HR)	6 MONTHS	> 6 MONTHS	EQPPD-EPU	TAB E1	TEST & ANALYSIS
MODEL/TYPE: 580A-2	PEAK TEMPERATURE (°F)	150	180	TAB D1 NOTE 2.1	TAB D1 NOTE 2.1	TEST & ANALYSIS
	PEAK PRESSURE (PSIG)	8.85	10	EQPPD-EPU, ZONE 14	TAB F1, PAGE 19	TEST
	RELATIVE HUMIDITY (%)	100	90**	EQPPD-EPU, ZONE 14	TAB F1, PAGE 73	TEST
	CHEMICAL SPRAY	NOT APPLICABLE	NOT APPLICABLE	EQPPD-EPU, ZONE 14	TAB D1, NOTE 6	NOT APPLICABLE
	RADIATION (RADS)	1.86 E+4 (TID)	1.00 E+ 7	EQPPD-EPU, ZONE 14	TAB D1, NOTE 3	TEST
LOOP ACC. CALC: I11-0002	AGING	25 YEARS*	60 YEARS*	EQPPD-EPU, ZONE 14	TAB E1	TEST & ANALYSIS
	SUBMERGENCE	2"	NOT APPLICABLE	EQPPD-EPU, ZONE 14	TAB D, NOTE 5	ANALYSIS

* Aging time is calculated from the time of installation to the time of license termination (i.e., 25 years).

** The testing documented a minimum of 90% humidity; however, when the differential pressure switches are installed in a sealed NEMA 4 insulated enclosure, the humidity will not increase above the 90% tested value. Thus, the differential pressure switches are qualified for humidity; refer to TAB I4.

FLORIDA POWER CORPORATION

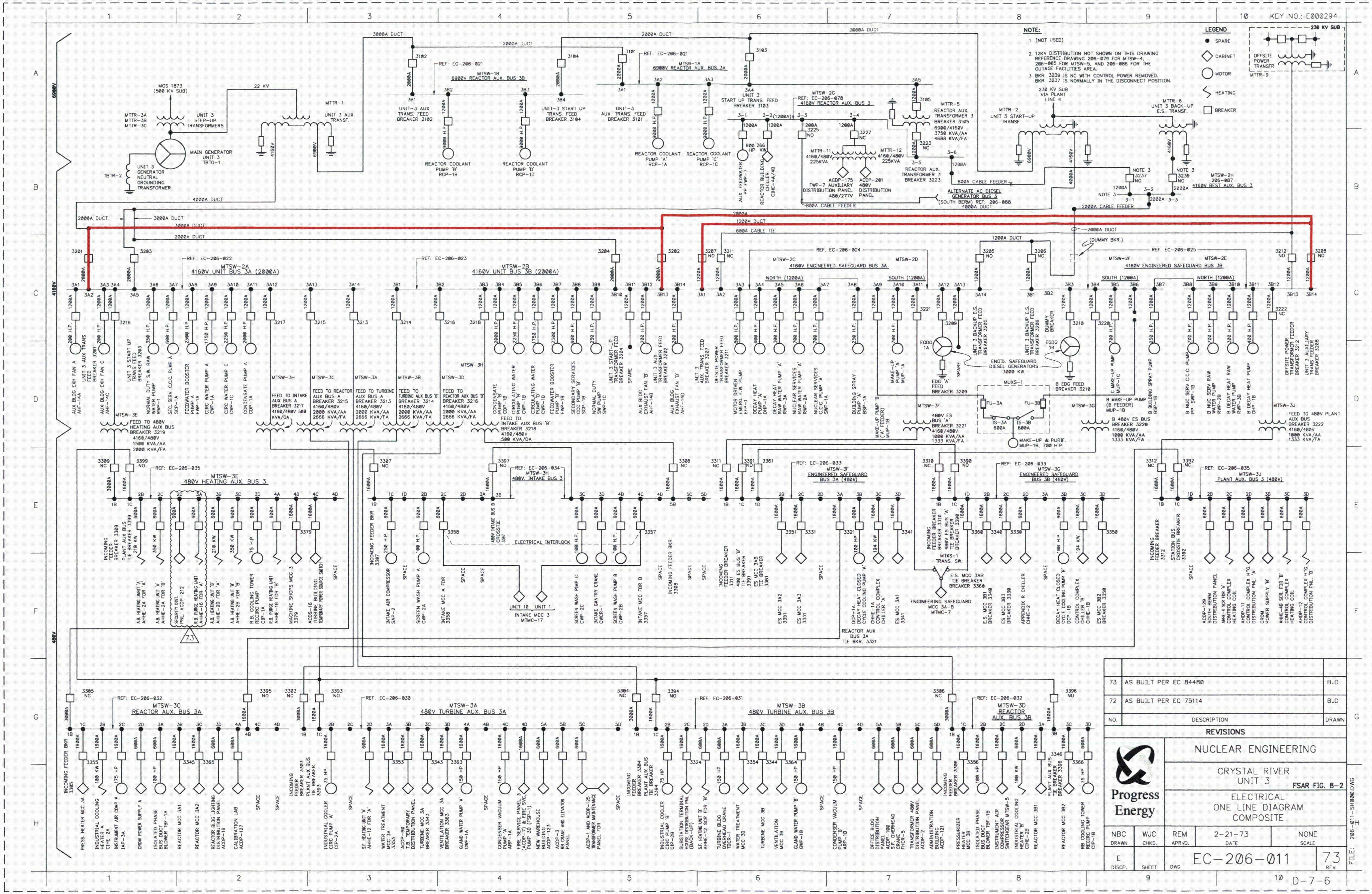
CRYSTAL RIVER UNIT 3

DOCKET NUMBER 50-302 / LICENSE NUMBER DPR-72

ENCLOSURE 3

CR-3 ELECTRICAL FIGURES

Figure 1
Markup of FSAR Figure 8-2 – Electrical One Line Diagram Composite



NO.	DESCRIPTION	DRAWN
73	AS BUILT PER EC 84480	BJD
72	AS BUILT PER EC 75114	BJD

REVISIONS

Progress Energy

NUCLEAR ENGINEERING

CRYSTAL RIVER UNIT 3

FSAR FIG. 8-2

ELECTRICAL ONE LINE DIAGRAM COMPOSITE

DRAWN	CHKD.	APRVD.	DATE	SCALE
NBC	WJC	REM	2-21-73	NONE

DISCP. E — SHEET — DWG. EC-206-011 — REV. 73

FILE: 206-011-SH000 DWG

D-7-6

Figure 2
Isometric of 4160 V Non Segregated Bus Replacement Project

Figure 2
Isometric of 4160 V Non Segregated Bus Replacement Project

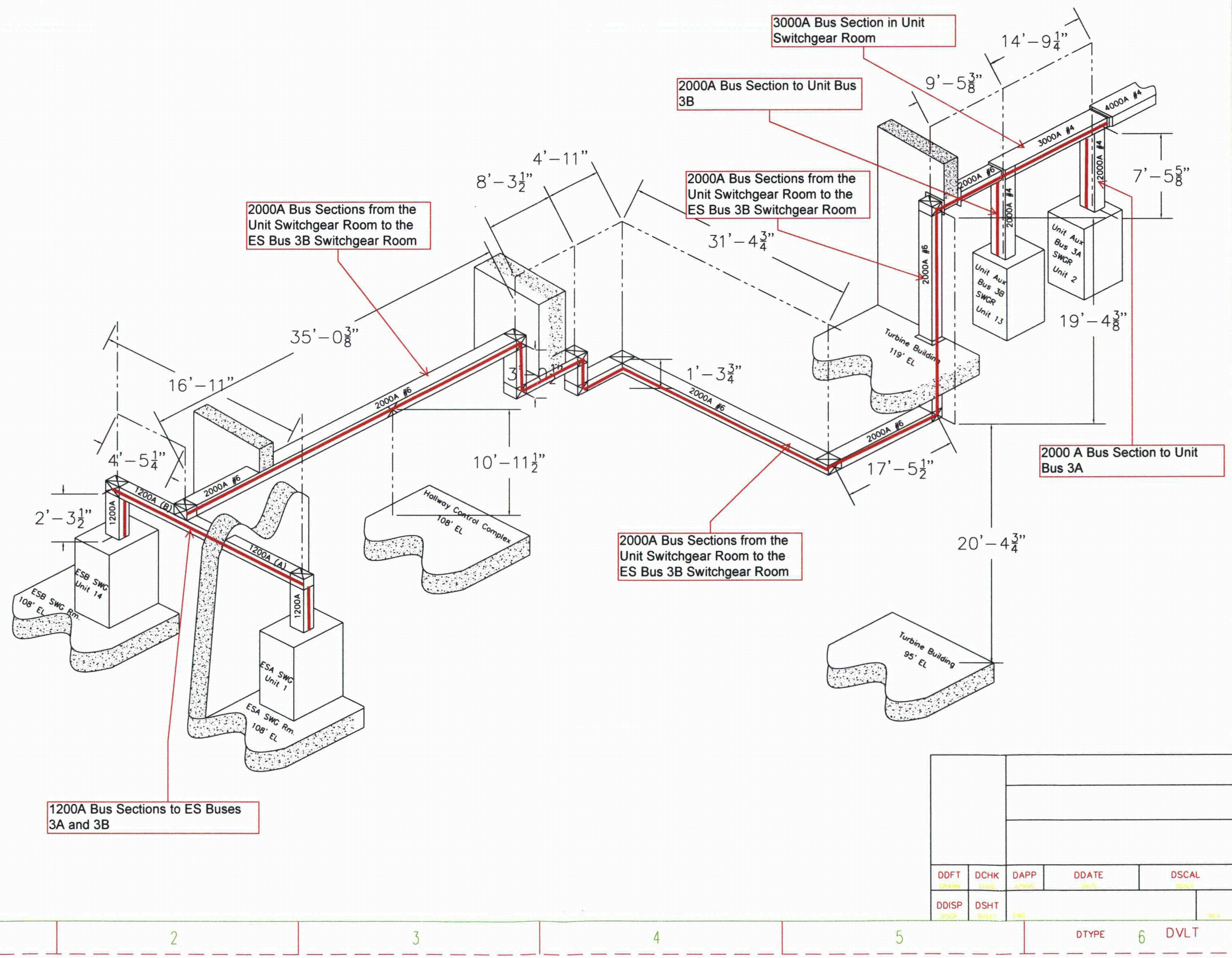
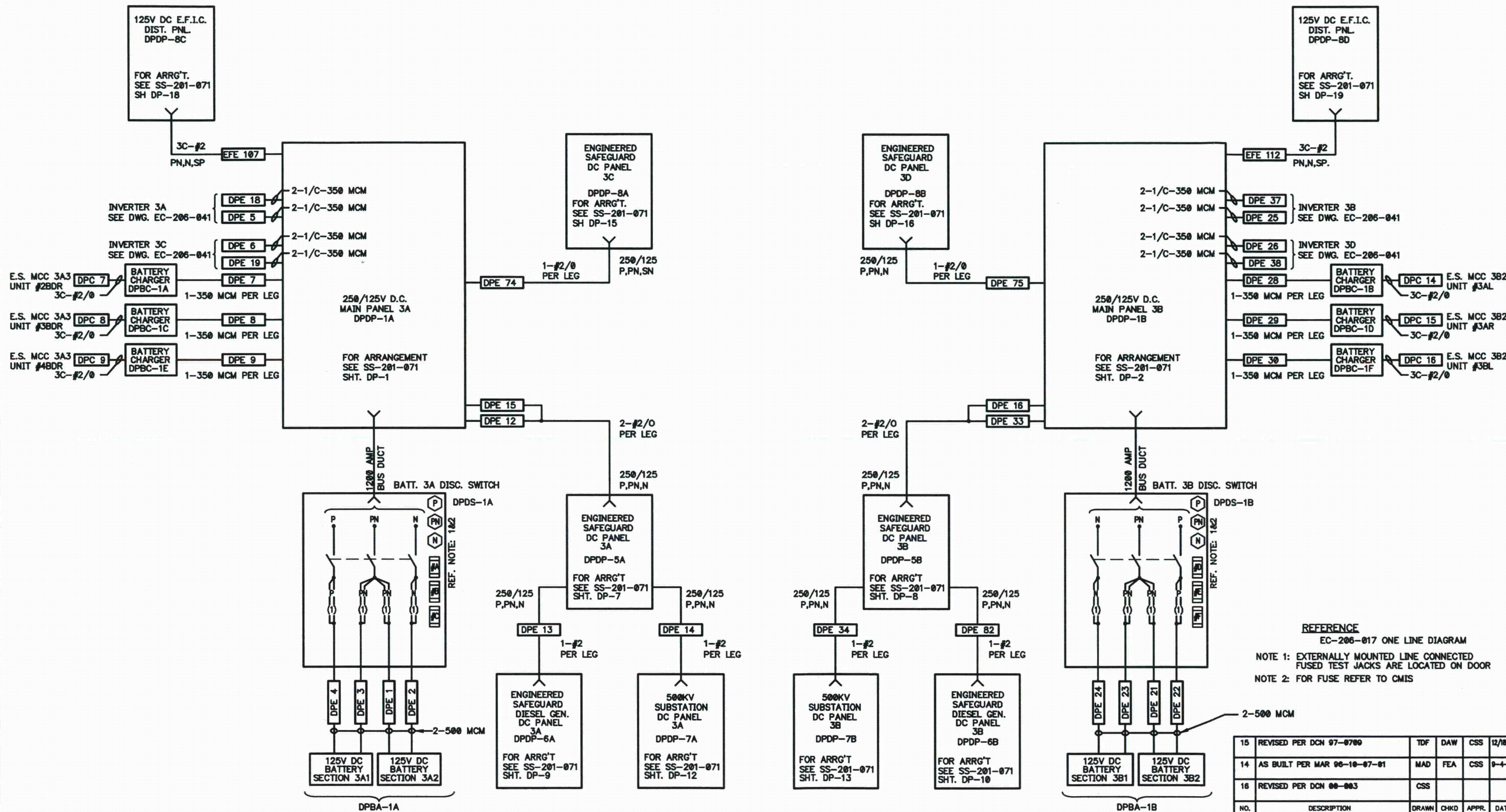


Figure 3
CR 3 FSAR Figure 8-8A – Electrical One Line Diagram 250/125V DC System

KEY NO. E000315



REFERENCE
EC-206-017 ONE LINE DIAGRAM

NOTE 1: EXTERNALLY MOUNTED LINE CONNECTED FUSED TEST JACKS ARE LOCATED ON DOOR

NOTE 2: FOR FUSE REFER TO CMIS

FUSE IDENTIFIER	FUSE TAG NO.	LOCATION
#A #B #C	DPDS-1A-AA-FU-01 DPDS-1A-AA-FU-02 DPDS-1A-AA-FU-03	FUSE BLOCK-AA MOUNTED INSIDE DPDS-1A
#D #E #F	DPDS-1B-BB-FU-01 DPDS-1B-BB-FU-02 DPDS-1B-BB-FU-03	FUSE BLOCK-BB MOUNTED INSIDE DPDS-1B

WIRE COLOR CODE

WIRE NO.	BASE COLOR	FIRST TRACER
1	BLACK	
2	WHITE	
3	RED	
4	GREEN	
5	ORANGE	
6	BLUE	
7	WHITE	BLACK
8	RED	BLACK
9	GREEN	BLACK
10	ORANGE	BLACK
11	BLUE	BLACK
12	BLACK	WHITE
13	RED	WHITE
14	GREEN	WHITE
15	BLUE	WHITE

NO.	DESCRIPTION	DRAWN	CHKD	APPR.	DATE
15	REVISED PER DCN 97-0709	TDF	DAW	CSS	12/18/97
14	AS BUILT PER MAR 96-10-07-01	MAD	FEA	CSS	9-4-97
16	REVISED PER DCN 00-003	CSS			

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FLORIDA POWER CORPORATION

ENERGY SUPPLY ENGINEERING SUPPORT SERVICES

CRYSTAL RIVER PLANT
UNIT NO. 3

FSAR FIG. 8-8A

ELECTRICAL
ONE LINE DIAGRAM
250/125V DC SYSTEM

16

DRAWN	CHKD.	APRVD.	DATE	SCALE
KLK			2/14/94	NONE

DISCP.	SHEET	DWG.	REV.
E	1	EC-206-051	16

FILE: 206051S1.DWG

D-7-6

Figure 4
Simplified 125/250 VDC Electrical Power System Train One Line Diagram

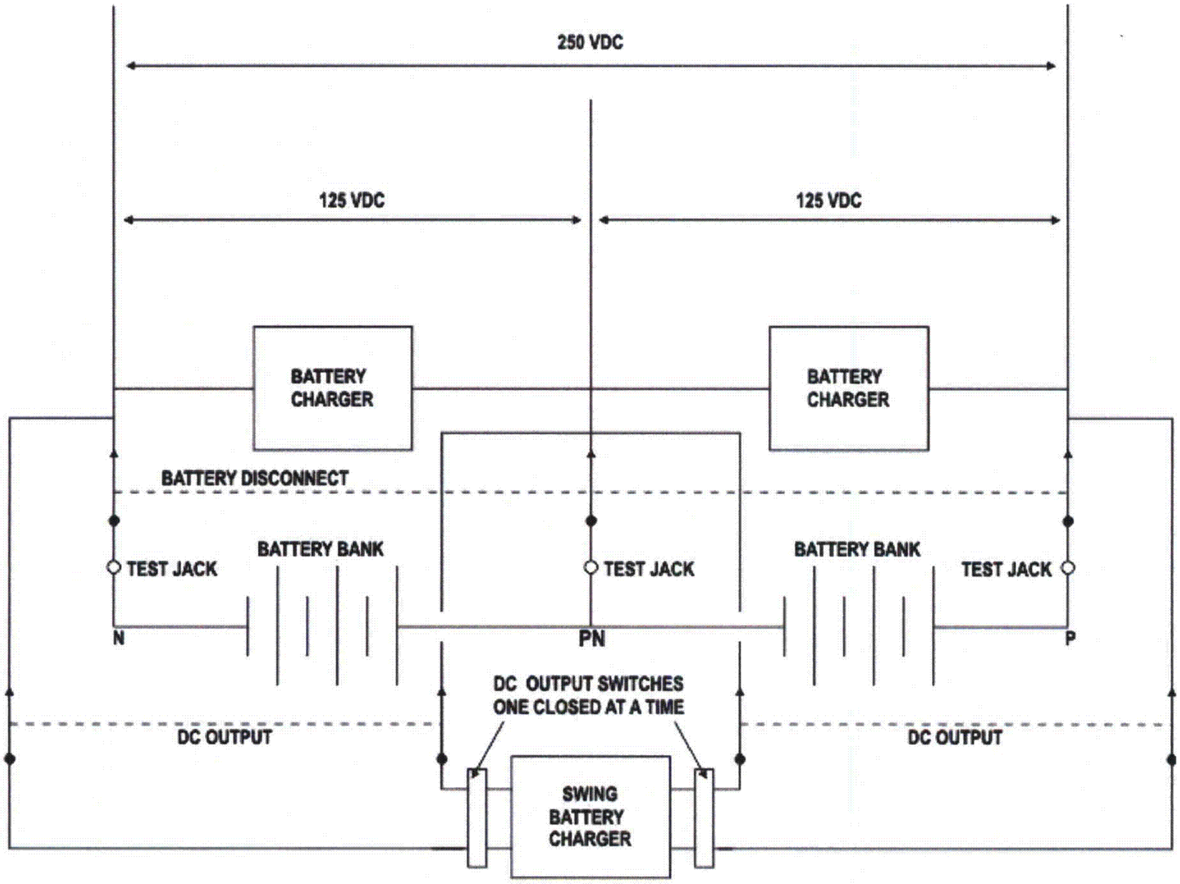

Figure 5
EFP-3 Battery System Block Diagram

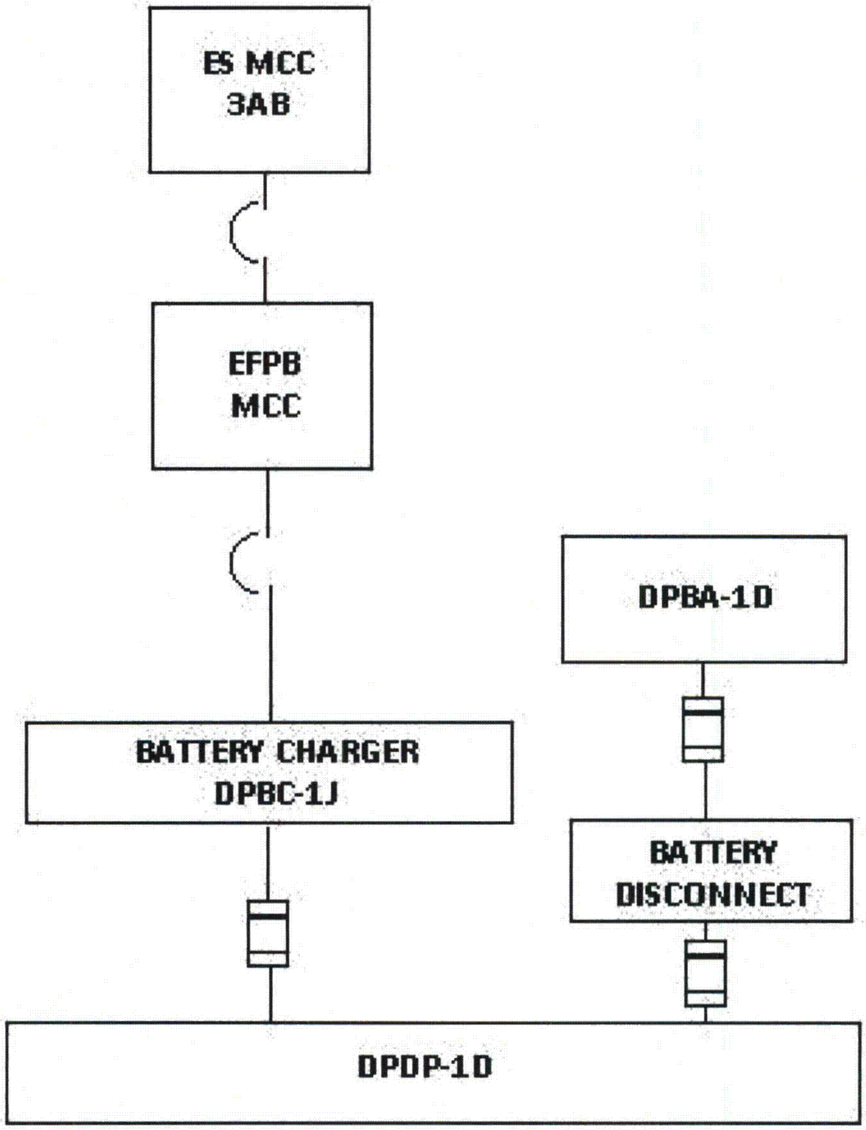

Figure 6
Simplified EFP-3 DC Power System One Line Diagram