UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
101 MARIETTA STREET, N.W.
ATLANTA, GEORGIA 30303

JAN 16 1979

Central File
50-335
389

In Reply Refer To:
RII:JPO
50-335, 50-389
50-250, 50-251

Florida Power and Light Company
Advanced Systems and Technology
Attn: Dr. R. E. Uhrig, Vice President
P. O. Box 529100
Miami, Florida 33152

Gentlemen:

The enclosed Circular 79-02 is forwarded to you for information. If there are any questions related to your understanding of the suggested actions, please contact this office.

Sincerely,

James P O'Reilly

James P. O'Reilly
Director

Enclosures:
1. IE Circular 79-02
2. List of IE Curculars Issued in the last 12 months

7901220193

A02
GD

cc w/encl:
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UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT
WASHINGTON, D.C. 20555

January 16, 1979

IE Circular No. 79-02

FAILURE OF 120 VOLT VITAL AC POWER SUPPLIES

Description of Circumstances:

On September 16, 1978, Arkansas Nuclear One - Unit 2, while in hot functional testing preceding initial criticality, suffered a degradation of both of the independent off-site power sources. This produced an undervoltage condition on the Engineering Safety Features (ESF) Buses and caused an inadvertent ESF actuation. The licensee determined that the ESF actuation occurred on a loss of at least two of the uninterruptable 120 volt vital AC power sources. Immediate investigation revealed that all four of the Solidstate Controls, Inc., (SCI) inverter static switches had automatically transferred to the alternate power supply (the 120 volt AC being supplied by transformers directly off the ESF buses rather than from the inverter output.) Figure 1 (attached) shows the functional interconnection of the 120 volt AC power supply system.

A single conclusive cause of the undesired SCI inverter static switch transfer could not be identified. However, the following problems were discovered during subsequent investigation.

(a) The SCI inverters have circuitry to monitor the incoming DC voltage level which, on sensing a low voltage (nominally 104 DC volts for these inverters) will trip both input breakers to the inverter component after an adjustable time delay.

The setting of these time delay relays were not verified during either preoperational testing or subsequent maintenance. The time delay is necessary in order to accommodate transient loading conditions which may be encountered.

(b) On one SCI inverter, a DC fuse within the inverter component was found blown. The vendor indicated that this fuse will blow due to an excessive DC voltage to the inverter component caused by a transient on the 480 AC input. The licensee has subsequently reset the taps on the 480V to 120V three-phase AC input transformer to limit the DC voltage to the inverter to less than the nameplate maximum rating in the event of a high AC input voltage transient.

(c) The SCI inverter static switch is designed to transfer to an alternate source on inverter output overcurrent or undervoltage. Initially, these trips were set at 125 percent overcurrent and 80 percent undervoltage. An explanation for the transfer of two of the inverter static switches is that during one of the transfers of site loads, the instantaneous inductive load caused these trip set points to be exceeded. The licensee has subsequently adjusted the transfer sensing circuitry to higher overcurrent and lower undervoltage trip settings to assure that the inverter will maintain load over the widest possible range of voltage and current. (Note that in this case, once the SCI inverter transfers to the alternate source, it will not automatically transfer back to normal source.)

All holders of operating licenses should be aware of the potential problems of the types noted above. It is recommended that the following items be considered in your review of this matter:

1. Determine whether or not time delay circuitry is used in your inverter units. If so, have they been adjusted to the appropriate set point as required by equipment and the integrated system designs?

2. Determine if the AC input voltage and transformer tap settings are optimized to prevent exceeding the inverter component nameplate maximum rated DC input voltage in the event of a high AC input voltage transient.

3. If an alternate 120 volt source is used in your design, determine if the protection transfer circuitry of the inverter has been optimized within design limits to ensure maximum possible availability of the inverter system during transient loading conditions. An operating history of inexplicable transfers may be indicative of the above.

4. Determine if the administrative controls employed by your facility ensures operability of safety systems after its subcomponents (e.g., time delay relays, switches, etc.) have been subjected to maintenance or testing.

This Circular is also being forwarded to all holders of construction permits for their information with regard to preoperational and startup testing.

No written response to this Circular is required. If you require additional information regarding this matter, contact the Director of the appropriate NRC Regional Office.

Attachment:
Figure 1

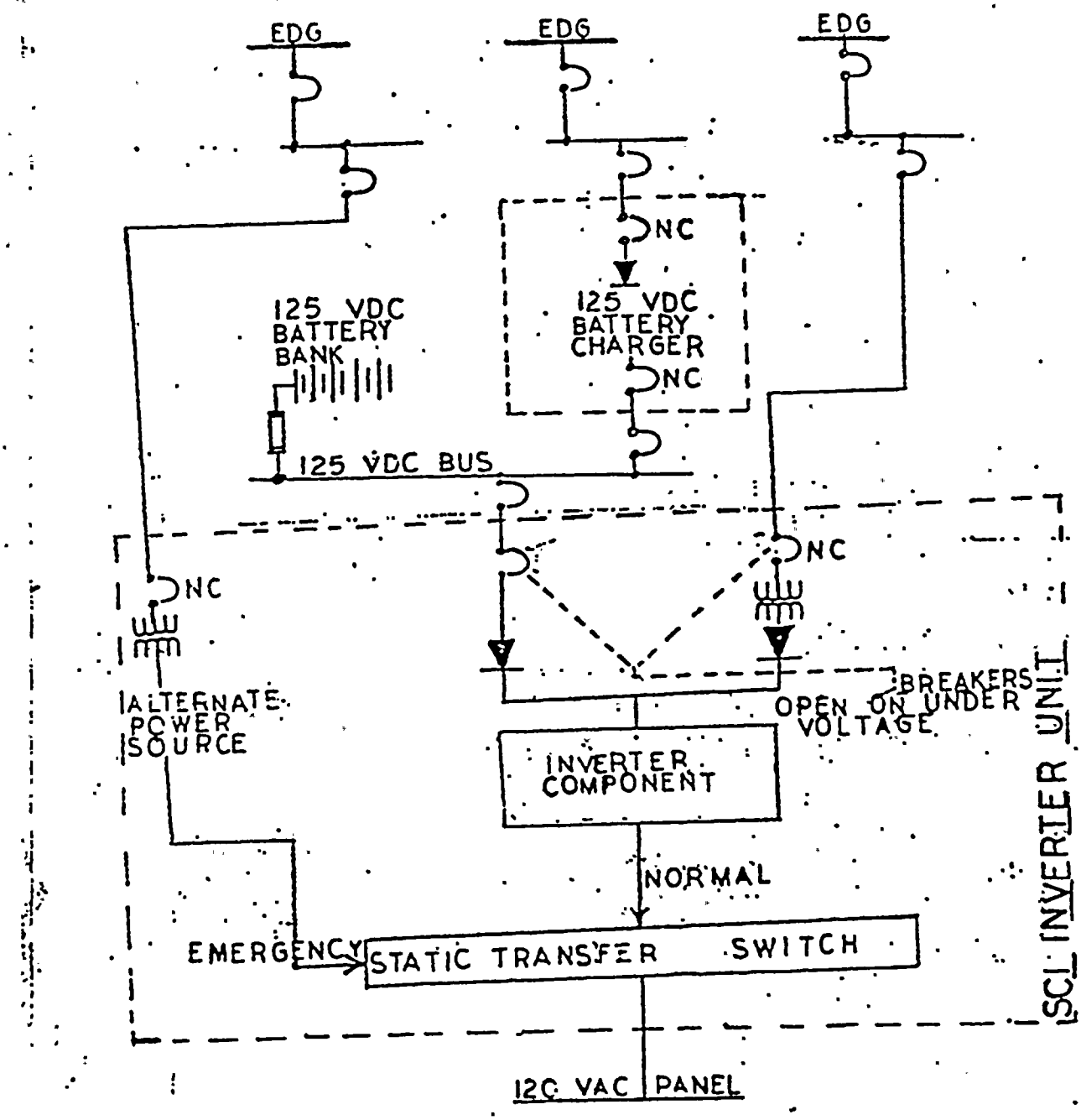

FIGURE 1
SINGLE LINE DIAGRAM - 120 VAC

IE Circular No. 79-02
January 16, 1979

LISTING OF IE CIRCULARS ISSUED IN
LAST TWELVE MONTHS

Circular No.	Subject	Date of Issue	Issued To
78-01	Loss of Well Logging Source	4/5/78	All Holders of Well Logging Source Licenses
78-02	Proper Lubricating Oil for Terry Turbines	4/20/78	All Holders of Reactor OLs or CPs
78-03	Packaging Greater Than Type A Quantities of Low Specific Activity Radioactive Material for Transport	5/12/78	All Holders of Reactor OLs, CPs, Fuel Cycle, Priority I Material and Waste Disposal Licenses
78-04	Installation Error That Could Prevent Closing of Fire Doors	5/15/78	All Holders of Reactor OLs or CPs
78-05	Inadvertent Safety Injection During Cooldown	5/23/78	All Holders of Reactor OLs or CPs
78-06	Potential Common Mode Flooding of ECCS Equipment Rooms at BWR Facilities	5/23/78	All Holders of Reactor OLs or CPs
78-07	Damaged Components of a Bergen-Paterson Series 25000 Hydraulic Test Stand	5/31/78	All Holders of Reactor OLs or CPs
78-08	Environmental Qualification of Safety Related Equipment at Nuclear Power Plants	5/31/78	All Holders of Reactor OLs or CPs
78-09	Arcing of General Electric Company Size 2 Contactors	6/5/78	All Holders of CPs

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LISTING OF IE CIRCULARS ISSUED IN
LAST TWELVE MONTHS

Circular No.	Subject	Date of Issue	Issued to
78-10	Control of Sealed Sources Used in Radiation Therapy	6/14/78	All Medical Licensees in Categories G and G1
78-11	Recirculation M-G Set Overspeed Stops	6/15/78	All Holders of BWR OLs or CPs
78-12	HPCI Turbine Control Valve Lift Rod Bending	6/30/78	All Holders of BWR OLs or CPs for plants with HPCI Terry Turbine
78-13	Inoperability of Multiple Service Water Pumps	7/10/78	All Holders of Reactor OLs and CPs except for plants located in: AL, AK, CA, FL, GA, LA, MS, SC
78-14	HPCI Turbine Reversing Chamber Hold Down Bolting	7/12/78	All Holders of BWR OLs or CPs for plants with a HPCI Terry Turbine excepting Duane Arnold and Monticello
78-15	Checkvalves Fail to Close In Vertical Position	7/20/78	All Holders of Reactor OLs or CPs
7-16	Limitorque Valve Actuators	7/26/78	All Holders of Reactor OLs or CPs
7-17	Inadequate Guard Training/ Qualification and Falsified Training Records	10/13/78	All Holders of and applicants for Reactor OLs.

LISTING OF IE CIRCULARS ISSUED IN LAST TWELVE MONTHS

Circular No.	Subject	Date of Issue	Issued To
78-18	UL Fire Test	11/6/78	All Holders of Reactor OLs or CPs
78-19	Manual Override (Bypass) of Safety Actuation Signals	12/28/78	All Holders of CPs
79-01	Administration of Unauthorized Byproduct Material to Humans	1/12/79	All Medical Licensees except Teletherapy Medical Licensees and each Radiopharmaceutical Suppliers