Florida Power
CORPORATION
Crystal River Unit 3
Docket No. 50-302

May 30, 1996
3F0596-32

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D. C. 20555-0001

Subject: Licensee Event Report (LER) 96-012-01

Dear Sir:

Please find the enclosed Licensee Event Report (LER) 96-012-01. This supplemental report is submitted by Florida Power Corporation in accordance with 10 CFR 50.73 and includes additional information relative to the entire history of operability for Crystal River Unit 3's battery chargers.

Sincerely,

Gary W. Campbell for B.J. Hickle

B. J. Hickle, Director
Nuclear Plant Operations

TWC:ff

Attachment

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

JE22

NRC FORM 366 (5-92) U.S. NUCLEAR REGULATORY COMMISSION

LICENSEE EVENT REPORT (LER)

APPROVED OMB NO. 3150-0104
EXPIRES 5/31/95

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
CRYSTAL RIVER UNIT 3 (CR-3)	0 5 0 0 0 3 0 2	1 OF 1 4

TITLE (4): Operation Outside Design Basis Caused by Battery Chargers Having Inadequate Test Results Accepted in Error

EVENT DATE (5) MONTH	DAY	YEAR	LER NUMBER (6) YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	REPORT DATE (7) MONTH	DAY	YEAR	OTHER FACILITIES INVOLVED (8) FACILITY NAMES	DOCKET NUMBER(S)
0 4	1 1	9 6	9 6	0 1 2	0 1	0 5	3 0	9 6	N/A	0 5 0 0 0
									N/A	0 5 0 0 0

OPERATING MODE (9): 5

POWER LEVEL (10): 0 0 0

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (CHECK ONE OR MORE OF THE FOLLOWING) (11)

	20.402(b)		20.405(c)		50.73(a)(2)(iv)		73.71(b)
	20.405(a)(1)(i)		50.36(c)(1)		50.73(a)(2)(v)		73.71(c)
	20.405(a)(1)(ii)		50.36(c)(2)		50.73(a)(2)(vii)		OTHER (Specify in Abstract below and in Text, NRC Form 366A)
	20.405(a)(1)(iii)		50.73(a)(2)(i)		50.73(a)(2)(viii)(A)		
	20.405(a)(1)(iv)	X	50.73(a)(2)(ii)		50.73(a)(2)(viii)(B)		
	20.405(a)(1)(v)		50.73(a)(2)(iii)		50.73(a)(2)(x)		

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER AREA CODE	
T.W. Catchpole, Sr. Nuclear Licensing Engineer	3 5 2	5 6 3 - 4 6 0 1

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS
A	E J	B Y C	C 1 2 7	N					

SUPPLEMENTAL REPORT EXPECTED (14)		EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
YES (If yes, complete EXPECTED SUBMISSION DATE)	X NO				

ABSTRACT (Limit to 1400 spaces, i.e., approximately fifteen single-space typewritten lines) (16)

On April 11, 1996, Florida Power Corporation's Crystal River Unit 3 (CR-3) was in MODE 5 (COLD SHUTDOWN). FPC was informed by its battery charger manufacturer that testing had not been performed below input voltage of 432 VAC. The latest FPC purchase order specified input voltage criteria between 423 VAC and 528 VAC. FPC decided to return one "new" battery charger (1995 purchase) and one "old" charger (1971 purchase) for testing since the condition applied to both. Test results for the "new" battery charger were acceptable; however, results for the "old" battery charger were outside output voltage regulation criteria at full load and below 432 VAC input. This caused FPC to declare the "old" battery chargers outside CR-3's design basis and inoperable in higher modes of operation. The inadequate testing of battery chargers was caused primarily by a failure of the manufacturer to translate FPC requirements into their test program. An additional cause included an over-reliance on additional vendor information used by FPC engineering to accept test results that was subsequently found to be unsubstantiated. Analysis of past operability indicates the battery chargers would have been able to perform their safety function. Four "Old" battery chargers were replaced and an action request was issued to the manufacturer to address the "new" battery chargers. Other corrective actions will include use of this event as a "lessons learned" and improvements to receipt inspection guidance.

EVENT DESCRIPTION

On April 11, 1996, Florida Power Corporation's (FPC) Crystal River Unit 3 (CR-3) was in Mode 5 (COLD SHUTDOWN). On this date, it was determined that safety related battery chargers [EJ,BYC] supplied by C&D Charter Power Systems (C&D) may not have been qualified to operate within their specified range for AC input voltage. On April 4, 1996 an NRC inspector questioned the differences in voltage values pertaining to CR-3's original ("old") Model ARR130K200 battery chargers as reflected in various references including the charger's nameplate rating, instruction manual, drawing, and system design basis requirements. In response, the FPC design engineer requested clarification from C&D to resolve the discrepancies relative to the "old" battery chargers and also similar discrepancies relative to battery chargers purchased in 1995. These questions were based on the inspector's review of a modification package for the replacement of CR-3's six battery chargers, DPBC-1A through 1F (3A through 3F as depicted on Figure 1). The modification was required due to repetitive maintenance involving power transformers. The request to C&D for clarification noted the original specification for CR-3's Class 1E battery chargers required them to be able to consistently maintain DC output constant within +/- 1/2 % from no load (0 DC amps) to full load (200 DC amps) with input voltage 460 Volts AC (VAC) +/- 10 % (414 VAC to 506 VAC). This was compared to information on the drawing and nameplate for the "old" chargers which revealed their DC output voltage is based on AC voltage rating of 480 VAC +/- 10 % (432 VAC to 528 VAC).

FPC's procurement specification was revised in 1994 to support the most recent purchase of battery chargers associated with the replacement modification discussed above. The revision was made as a result of questioning by the FPC design engineer of C&D's quotation for the battery chargers which stated the low end operating limit of the chargers was 423 VAC (-12 % of 480 VAC) versus FPC's specified limit of 414 VAC. The FPC design engineer accepted C&D's explanation that they limited the range on the low AC input because their design may not provide the rated output or regulation below the -12 %. Since FPC's design basis established in calculations state the lowest voltage that could be available to the battery chargers is 427 VAC, the FPC design engineer changed the purchase specification to agree with C&D's quotation.

On April 11, 1996, C&D provided a letter stating that actual test reports for the original and replacement battery chargers indicate they were tested at the normal low, nominal and high input voltages of 432, 480 and 528 VAC. The letter also acknowledged that test data was not available to support the original June, 1972 certificate of conformance for the "old" battery chargers, nor was data available to support statements made in a C&D letter dated November 3, 1994 for the purchase of "new" battery chargers associated with the above modification package. Based on a review of published C&D product data, FPC determined the battery chargers should be able to support a low end input voltage of 424 VAC. FPC decided additional testing was warranted in order to establish whether or not the chargers

would meet CR-3's design basis. Upon learning that C&D did not have a similar model battery charger at their facility to test, FPC returned one "old" charger and one "new" charger to C&D for testing.

A Problem Report was generated on April 13, 1996 to describe the condition and was evaluated by the Shift Supervisor on Duty (SSOD) as suspected operation outside CR-3's design basis pending the results of testing by C&D. This determination was based on the written statement by C&D that the battery chargers were not tested to the specified values. To provide assurance that input voltage to the chargers would remain at least 432 VAC, the value actually supported by test data, the makeup pumps [CB,P], building spray pumps [BE,P], and the motor-driven emergency feedwater pump [BA,P] were administratively removed from service. A one-hour event notification was made at 2025 hours on April 13, 1996 in accordance with 10CFR50.72(b)(1)(ii)(B) as a suspected design basis issue and was assigned Event Number 30284. In addition, an Operability Concern Resolution (OCR) review was initiated in accordance with plant procedure CP-150 "Identifying and Processing Operability Concerns" to determine operability as a result of reduced electrical Engineered Safeguards (ES) loads present in MODE 5. The chargers were then evaluated as conditionally operable/potentially inoperable.

On April 16, 1996, FPC received satisfactory test results for the new battery charger. The results indicated the DC output for the new chargers maintains +/- 1/2 % output regulation between 423 VAC to 528 VAC input. Therefore, those battery chargers which had been replaced with new chargers purchased in 1995 (DPBC-1A and DPBC-1C) were determined to be operable for all modes of operation. These are the "A" DC train chargers.

On April 17, 1996, FPC received the testing results of the "old" charger which had been removed from the DPBC-1C location. The testing indicated the Direct Current Voltage (VDC) output was 131.25 VDC at 427 VAC input and full load (200 DC amps) which is below the tolerance value (+/- 1/2% of 132 VDC, a range of 131.34 to 132.66 VDC). The FPC design engineer then requested testing of the chargers at lower end points after which C&D reported they became unstable with respect to output voltage regulation and current at an input voltage of 420 VAC. At 414 VAC the DC output current decreased to a constant output of 185 amps. The criteria established in Improved Technical Specification (ITS) Surveillance Requirement (SR) 3.8.4.6, is for the battery chargers to be capable of supplying 190 amps. As a result, FPC determined the battery chargers which had not been replaced with new chargers (DPBC-1B, 1D, 1E, and 1F) were "operable but degraded" in MODE 5. This determination was based on the assurance of higher input voltages providing the pumps described above remained out of service, thereby limiting the loads on the 4160 volt AC Engineered Safeguards bus [EB,BU]. A decision was then made to replace DPBC-1B and DPBC-1D, the "B" DC train chargers, with "new" chargers to ensure both DC Power system (DP) trains would be fully operable.

TEXT (If more space is required, Use additional NRC Form 366A's (17)

The failure to have adequate test results to support CR-3's design requirements is considered to be a condition outside the plant design basis and is being reported in accordance with 10CFR50.73(a)(2)(ii)(B).

EVENT EVALUATION

The Class 1E battery chargers are part of the 250/125 Volt DC System. The 250 VDC source is obtained by use of two 125 VDC batteries [EJ,BTRY] connected in series. The Class 1E portion consists of two isolated bus sections, Train "A" and Train "B". Each bus is equipped with three battery chargers for each battery. The battery chargers convert AC power to DC power to maintain the batteries in a fully charged condition while supplying plant DC loads. During normal operation, two of the battery chargers for each bus are in service supplying a float charge to the battery and the third is available to be placed in service in the event one of the normally aligned battery chargers is out of service. In addition, the battery chargers are required to have sufficient capacity (not including the spare battery charger of the system) to fully recharge the associated battery in less than 24 hours while supplying the maximum steady state DC load connected to the system.

The battery chargers normally supply the DC System load and float charge to the batteries. These loads consist of DC pump motors, switchgear circuit breaker controls, control and instrumentation. In the event of a loss of normal power to the battery charger, the DC loads are automatically powered from the station 1E batteries. Credit is taken for Class 1E DC Power System operation in most of the Design Basis Accidents, with the most limiting scenario being the Loss of Electric Power Accident. This event, complete loss of all unit AC power, defines the limiting conditions for Class 1E DC Power System design. The DC electrical power system also conforms to the recommendations of Regulatory Guide 1.6 and IEEE-308 "IEEE Criteria for Class 1E Electrical Systems for Nuclear Power Generating Stations".

The safety functions of the Class 1E DC Power System are to distribute power from the 480 VAC ES busses to required DC load via the battery chargers and maintain the batteries in a fully charged state prior to, during and following a design basis event. During and following a design basis event when a complete loss of all offsite and onsite AC power occurs, the Class 1E DC Power System provides power from the batteries to supply required DC loads and provides a source of vital 120 VAC power [ED] via the dual input inverters [EE,INVT] (VBIT-1A, 1B, 1C, 1D).

The operational consequences of the slight degradation in DC output regulation of the battery chargers have been evaluated. Prior to 1991, the Start-Up Transformer [EB,XFMR] fed both 4160 VAC non-ES Unit Busses and both 4160 VAC ES busses. With 236.4 kilovolts (KV) in the Switchyard [FK], the input voltage is 400V at the Train "A" battery chargers and 398V at the Train "B" chargers. Due to the voltages being below the perceived acceptable voltage of 414 VAC (460 VAC -10%), a Problem Report was issued which resulted in LER 91-002 (see Similar Events). As corrective action

the Start-Up Transformer was operated with one 4160 VAC Unit Bus and two 4160 VAC ES busses. With these restrictions and a switchyard voltage of 236.4 KV, the voltages at the Train "A" battery chargers was 425V and 423V at the Train "B" chargers. Note that the voltages were above the perceived acceptable battery chargers' low line voltage of 414 VAC but below the battery chargers tested voltage of 432 VAC.

Prior to 1991, there are three time periods to be considered with regard to degraded voltage conditions: pre-1983, 1983 to 1989, and 1989 to 1991. The CR-3 Second Level Undervoltage Relay (SLUR) system was installed in 1983 as a result of NRC evaluations of industry degraded voltage events. Prior to this time CR-3's licensing basis did not include requirements to address degraded voltage conditions. The licensing basis was for loss of voltage only.

Second Level Undervoltage Relaying (SLUR) is set at a voltage level which assures that safety related components at all voltage levels receive adequate voltage. Upon sustained degraded grid conditions that result in voltage below the SLUR setpoint for a period of 5 seconds, the SLUR relays actuate and start the EDG's. This is followed by separation of the ES busses from the grid either (a), immediately if ES actuation is present or (b), after 13 seconds time delay if no ES actuation is present. First Level Undervoltage Relaying (FLUR) is a loss of voltage relaying and actuates in approximately 7.8 seconds upon complete loss of voltage. Its actuation results in starting of EDG's and separation of ES busses from the switchyard. FLUR's take longer than 7.8 seconds if voltage level is higher than zero and will not actuate at all if voltage level is greater than approximately 2350V. The SLUR relaying is currently set at 3952 volts with its high-end at 3970V and low-end at 3934 Volts. In the worst case, this means the SLUR's will allow degraded voltage conditions to persist at 3934 Volts without actuating. Both SLUR's and FLUR's operate independently of one another.

Between 1983 and 1989, the low-end SLUR setpoint was 3780 volts. Using a corrected model for the voltage drops, 3780 volts corresponds to 406 volts at the battery chargers. Prior to 1991, with both ES and Unit busses on the Startup Transformer, with accident conditions loading and with 236.4 KV in the switchyard, the chargers would have seen 400V and 398V at their terminals. Had accident conditions occurred when the switchyard voltage was 236.4 KV or less, the low line voltage at the chargers would have been 400V/398V or less and at ES "A" and "B" busses, would have been 3710V and 3716V respectively. These conditions would not have lasted for more than 5 seconds because SLURs would have been actuated and would have removed ES busses from the switchyard after the sequence described above. Once the ES busses are being supplied from the EDG's, concern over the affect of low bus voltages on the battery chargers is eliminated. During the time of degraded bus voltage (5 to 18 seconds), the station batteries would be available and their terminal voltage would dictate how low the charger output voltage will go. Since the DC Distribution system would be supplied by the battery, DC bus integrity would be maintained. It should also be noted that the chargers would provide some output

although this is difficult to quantify. Again, since the EDG voltage would recover bus voltage, the low degraded voltage problem is resolved.

To examine the case for a degraded voltage condition that is just above the SLUR setpoint such that no SLUR actuation occurs, requires clarification of the postulated event. Since no SLUR actuation occurs and the bus does not degrade further, it must be postulated that the degraded voltage is being caused by grid conditions and not an in-plant transient. Therefore, no accident loads exist on the DC bus and the system load would be only 5 to 10 amps. Even if accident conditions were present, the loading on the battery chargers under ES conditions is 68 amps. Using engineering judgement, the battery chargers would be able to produce 68 amps at 406 VAC input and the batteries would be able to maintain bus voltage while the chargers would maintain sufficient output. From recent tests, the "old" charger produced a constant 185 amps at 414 VAC input. At 406 VAC, it is apparent there would be enough capacity to maintain battery integrity. Because the bus voltage was maintained at or above battery terminal voltage in the above cases, no damage to DC-supplied components would occur. It is therefore concluded that the DC Distribution system remained capable of performing its intended function during the examined conditions.

Between 1989 and 1991, the low-end SLUR setpoint was 3852 volts which corresponds to low line voltage of 417/414V at the battery charger terminals. It can be shown that the same scenario applies as in the period between 1983 and 1989; however, due to increases in SLUR setpoints, the deviation from desired voltage would be less.

Prior to 1991, the low line voltages were not acceptable (from a design basis perspective) for the battery chargers and other plant components. This was addressed in Licensee Event Reports 89-13, 89-33, and 91-002 along with appropriate corrective actions (see Similar Events). Therefore, FPC had previously identified the problems regarding AC low line voltages that exceeded the voltages of the battery charger's tested voltage of 432 VAC and the perceived acceptable low line voltage of 414 VAC.

From early 1991 to mid-1994, even though the Start-Up Transformer was the worst case for low line AC voltages and could only be operated with two 4160 VAC ES busses and one 4160 Unit bus aligned, the ES busses were actually aligned most of the time to the Off-site Power Transformer (OPT) [EL,XFMR]. This is the new 230KV/4160V transformer installed in 1991 to resolve the Start-Up transformer loading problem. With ES busses aligned to the OPT, the low line AC voltages calculated with 236.4 VAC in the Switchyard were 454V for both "A" and "B" Train chargers. Note that these calculated voltages were above the battery chargers' tested low line voltage of 432 VAC.

In 1994 when the Back-Up ES Transformer (BEST) [EL,XFMR] was installed, the OPT was still the worst case as the 4160 VAC ES Busses can be aligned to either the OPT or

the BEST. With 236.4 KV in the Switchyard, the low line AC voltages shown above for the OPT are still the worst case.

With 224.5 KV in the Switchyard, the voltage when ES busses are at the low end of Secondary Level Undervoltage Relays [EB,27] (SLUR), the low line AC voltages are calculated at 428V for the "A" train battery chargers and 427V for the "B" train chargers. These voltage values are included in the Modification Approval Record (MAR) 93-05-07-01 which replaced the old battery chargers in Refuel 10. Note that the voltages were above the perceived acceptable battery chargers low line voltage of 414 VAC but below the battery chargers tested voltage of 432 VAC.

The Energy Control Center (ECC) maintains a normal voltage level of 238 KV to 242 KV in the Switchyard to assure 236.4 KV. Under emergency conditions, the ECC is permitted to reduced voltage to as low as 235 KV as established by agreement with CR3 in August 17, 1995.

A review of ECC data revealed there has been a total of 22 incidents of voltage levels below 236.4 during 1991 with the lowest being 230.6 KV, and 3 incidents in 1993 with the lowest being 231.9 KV. There was no voltage history available for 1992 and recorded data for 1994 and 1995 shows all voltages were above 236.4 KV.

The voltages at the battery charger with the switchyard voltage at 230.6 KV were calculated. The 230.6 KV is the lowest voltage recorded at the Switchyard as noted above. A case study was performed with the Switchyard voltage at 230.46 KV (conservative with respect to the 230.6 KV value) resulting 442 VAC for the "A" train battery chargers and 441 VAC for the "B" train chargers.

An analysis of the operational consequences of the slight degradation in DC output regulation of the battery chargers shows that at least one ES Train would have been operable for accident conditions. The test data provided by the various tests performed on the "old" and "new" battery chargers show they have always been operable at 432 VAC low line voltage. Even "old" battery charger with serial number ES71606 DC output of 131.2 VDC at 200 amps with the low line voltage at 432 VAC is acceptable. The basis for this determination is that, at 131.2 VDC, the output voltage is still above the battery voltage and can provide battery charging and load power. The output current is also at the design value of 200 amps. Although the output regulation is at -0.61% instead of -0.5%, outside the acceptance criteria of the battery charger, the battery DC voltage and output currents are within the operability range of the battery chargers, the batteries, and the DC loads.

The conditions in which the battery chargers may be required to carry full load occur when the DC bus has had a problem and the battery has discharged, or the inverter AC power is lost and the battery charger and battery are required to provide power to the inverters, or when there is a fault in the DC loads and the battery charger goes to current limit. Note that these conditions are

independently classified as single failures. Therefore, a single failure is required in order to require the battery chargers to be at full load (200 amps). The single failure is applied to one train only. With no problem occurring in the other train, the demand on the battery chargers during ES conditions is 68 amps which is the DC load excluding the inverters. The 68 amps is well within the battery charger output of 200 amps. Therefore, when the design condition of low line AC voltage occurs, the battery chargers are not at full load. The normal load on the battery charger is a trickle charge on the batteries and the normal DC loads. This is normally approximately 4 to 10 amps. Since the battery chargers are not at full load, the DC output voltage and current are acceptable for the conditions encountered from 1991 to the present. The lowest line voltage encountered on the battery chargers was 423 VAC. The testing performed on the "old" battery charger indicates that even though the DC output regulation was not within acceptance criteria, the battery charger could still provide adequate DC output voltage and current.

To address the requirement to fully charge the station batteries within 24 hours, a review of previous discharge/recharge tests was performed. These tests indicate it takes approximately 7 hours to fully recharge the batteries after they have been discharged down to terminal voltage with the chargers handling normal plant loads (approximately 5 amps). With the additional load of the inverters (up to 100 amps), it takes approximately twice as long, or 13 hours to fully charge the batteries. Therefore, even considering the pre-1991 voltage conditions of 398V/400V input, sufficient margin exists to ensure the batteries would have been fully charged within 24 hours.

In summary, based on a review of the operational history of CR-3's battery chargers for the period when degraded voltage was part of the licensing basis, the chargers were capable of performing their intended safety function. Therefore, there was no adverse effect on the health and safety of the public.

CAUSE

There are four distinct contributing causes to this event resulting in the failure of FPC to fully exercise its responsibility for the control of purchased material.

The primary contributing cause of this event was the failure of the battery charger manufacturer, C&D, to adequately test the type chargers supplied to CR-3 in accordance with FPC specification criteria. C&D is a nuclear supplier approved by FPC as having a QA Program based on 10CFR50 Appendix B. C&D provided quotations claiming the subject battery chargers were tested and qualified to FPC specifications and also provided certificates of compliance (CofC) to this effect. In its April 11, 1996 letter from the Director, Quality Assurance, C&D acknowledged that FPC voltage ranges were not translated to the facility which tested the

battery chargers. Instead, the facility utilized its normal testing procedure which called for testing at the nominal 480 VAC +/- 10 %

The second contributing cause relates to weaknesses in the receipt inspection process involving actions by the design engineer, procurement engineer, and receipt inspector. The design engineer utilized supplemental information which was subsequently discovered to be unsubstantiated. The acceptance of the supplemental information was based on over-reliance on technical information provided by C&D. Both the "old" and "new" chargers were tested at 480VAC +/- 10 %. For the "new" chargers, the FPC design engineer stated that although the test results did not envelope the input voltage ranges specified by FPC, he took into consideration other documentation including catalog data, the CofC to the purchase order, and statements from C&D engineering that similar model battery chargers had been tested to 423 VAC. The engineer failed to obtain evidence of this testing but accepted statements by C&D that the chargers had been type tested to this value. In retrospect, this information was not sufficient as a basis for acceptance considering C&D's April 11, 1996 letter indicating test data was unavailable to substantiate their CofC's. In November, 1995, a Quality Material Problem Report (QMPR) was issued to identify the need for an Engineering Software Acceptability Letter (ESAL) for required vendor submitted documentation (this included the test reports). A procurement engineer dispositioned the QMPR "use-as-is" in February, 1996 based on being provided an ESAL from the design engineer which presumably reflected acceptance of all documentation required by the purchase order. Although the inspection plan delineated "test results" as a specific deliverable requiring engineering acceptance, the receipt inspector accepted the disposition without test results being listed as a specific item on the ESAL. This would have provided an opportunity to request an explanation from the design engineer regarding the basis for acceptance of the test results.

A third contributing cause was FPC failure to recognize the differences between the specification requirements associated with the "old" chargers and the manufacturer's nameplate data and drawing information. For the "old" battery chargers, FPC utilized its architect engineer, Gilbert Associates for review of manufacturers' quality program procedures and technical data. The purchase order for the original chargers was dated February 10, 1971 and required C&D to submit a quality control program (it should be noted that 10CFR50 Appendix B was officially issued June 27, 1970 and 10CFR21 was not required to be made a part of purchase order until after January 6, 1978). A review of the "Vendor Evaluation Checklist" completed by Gilbert Associates in 1971 indicates C&D's Quality Control submittal was reviewed against the requirements of Military Specification MIL-Q-9858 "Quality Program Requirements". Evidence exists to confirm that C&D procedures were reviewed and tests were witnessed at the manufacturer's facility. C&D provided a CofC dated June 9, 1972 certifying the material met FPC's purchase order. However, C&D did not test to 460 VAC +/- 10 % and did not meet the 1/2 % regulation requirement in one case. A review of the "Charger Test Card" dated March 9, 1972 for S/N ES71606 reveals the test results at 432 VAC input yielded

only 131.2 DC volts at 200 DC amps (full load) versus the required 131.34 volts.

A fourth contributing cause was failure of the battery charger manufacturer to adequately inform FPC of a replacement schedule for components that needed to be replaced in the "old" battery chargers. During the investigation of this event, FPC discovered by review of the qualification report received with the "new" chargers that printed circuit cards and electrolytic capacitors should be replaced at 5-year intervals in order to maintain qualified life. Based on a review of work history, FPC determined that only DPBC-1D had 2 of 6 capacitors replaced. Some printed circuit cards were replaced on other battery chargers within the previous 5 years. Therefore, the battery chargers had been in service for approximately 25 years without required maintenance via periodic replacement of parts to ensure their qualified life. This became a concern during the operability evaluation conducted on April 17, 1996 and it was determined that the charger's reliability at low end voltages could not be assured. Based on recent conversations with the manufacturer, C&D battery chargers were qualification-tested between 1982 and 1984. Data was compiled after 1984 and a qualification report was prepared which addressed the above replacement schedule. FPC's implementation of the recommendations contained in Generic Letter (GL) 90-03 "Relaxation of Staff Position in Generic Letter 83-28, Item 2.2 Part 2 'Vendor Interface for Safety-Related Components'" included a requirement to periodically contact C&D as part of the Vendor Equipment Technical Information Program (VETIP) which also includes the Nuclear Plant Reliability Data System (NPRDS) and the Significant Event Evaluation and Information Network both managed by INPO. A review of these contacts reveals no mention of a replacement schedule for component parts. FPC did receive a letter from C&D dated August 14, 1989 containing notification of a 10CFR21 report by Philadelphia Electric Company regarding a problem with their model ARR130HK300 battery charger involving an inability of the charger to meet the required current output when replacement printed circuit boards are installed. FPC completed its review of this notice on September 8, 1989 concluding it was not applicable to CR-3 because our chargers were model ARR130K200 and because no evidence was discovered to indicate this problem had ever occurred at CR-3. Further review of the notice and a Operating Plant Experience Report (OE 3265) published April 5, 1989 in the INPO Nuclear Network revealed the OE states that circuit boards are replaced every five years based on a recommendation from an independent testing laboratory. There is no evidence OE 3265 was reviewed for applicability to CR-3 but, in hindsight, it may have provided an opportunity to recognize the need for replacement of battery charger component parts. C&D has not been formally requested to review this condition in accordance with 10CFR21; however, it has been suggested to C&D that they address it as a contributing cause and consider dissemination of the information to the industry.

IMMEDIATE CORRECTIVE ACTION

DPBC-1B and DPBC-1D, the "B" Train DC battery chargers, were declared operable but degraded on April 17, 1996 with reduced ES loads in MODE 5 and a decision was made requiring their replacement prior to entering MODE 4 (HOT SHUTDOWN).

ADDITIONAL CORRECTIVE ACTION

1. Battery Chargers DPBC-1A, 1B, 1C, and 1D were replaced during Refuel 10. The Train "A" chargers were fully operable on April 16, 1996 and the Train "B" chargers were declared fully operable as of April 23, 1996.

2. Battery Chargers DPBC-1E and 1F, the backup "swing" chargers, will be replaced with "new" chargers by July 31, 1996. Until that time, they remain inoperable in MODES 1 through 4. Any need to place these chargers in service prior to their replacement will require a justification for continued operation.

3. A Request for Corrective Action (RCA) was issued by FPC's Procurement Quality group on April 12, 1996 to C&D requesting a response to the identified deficiency regarding failure to test the "new" chargers in accordance with FPC specification criteria. C&D was also requested to provide FPC with evidence of their 10CFR21 evaluation for the purpose of determining reportability within the context of a "deviation in a basic component" as defined in 10CFR21.

ACTION TO PREVENT RECURRENCE

1. A copy of this event report along with management's expectations will be distributed to design and procurement engineers and receipt inspectors by July 31, 1996 as a "lessons learned".

2. The Preventive Maintenance program will be updated by August 30, 1996 to ensure printed circuit cards and capacitors are replaced in CR-3's Class 1E battery chargers every 5 years.

3. Additional guidance will be incorporated by June 28, 1996 into the Nuclear Procurement & Storage Manual section concerning receipt inspectors' review of software acceptability letters provided by engineering. This guidance will address the need to perform a line-by-line review of information contained in the software acceptability letter versus the applicable technical requirement reference.

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6) YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	PAGE (3)
CRYSTAL RIVER UNIT 3 (CR-3)	05000302	96	012	01	12 OF 14

TEXT (If more space is required, Use additional NRC Form 366A's (17)

4. Agreements between CR-3 and ECC for the control of switchyard voltage appear to be effectively implemented as evidenced from the lack of incidents in 1994 and 1995. Therefore, no additional action is planned in this area.

PREVIOUS SIMILAR EVENTS

As reflected in LER 89-13, on April 9, 1989 CR-3 experienced a degraded voltage condition which caused actuation of the SLUR's and resulted in the need to start an EDG. The voltage remained degraded long enough for the EDG to come up to full speed. However, the voltage did not stay degraded long enough to require the diesel to pick up the ES Buses and there was no noted effect on the battery chargers or station batteries. This event resulted in installation of a separate transformer in the 230Kv yard to act as the primary alternate power supply for the ES Buses. As reflected in LER 89-33, after discovering on September 8, 1989 that the SLUR system setpoint for the Engineered Safeguards buses was not conservative, FPC developed a conservative model of the voltage drops between the 4160 Volt ES buses and the 480 volt and 120 volt end devices. Based on this model, CR-3 raised the SLUR setpoint on both 4160 Volt ES buses. LER 91-002 reported the inability of the Unit 3 Startup Transformer to maintain voltage output above the SLUR setpoint under certain ES actuation conditions. This event resulted in installation of the BEST Transformer.

ATTACHMENT

Figure 1 - DC Distribution System
Figure 2 - AC Electrical Distribution System

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
CRYSTAL RIVER UNIT 3 (CR-3)	0 5 0 0 0 3 0 2	9 6	0 1 2	0 1	1 3 OF 1 4

TEXT (If more space is required, Use additional NRC Form 366A's) (17)

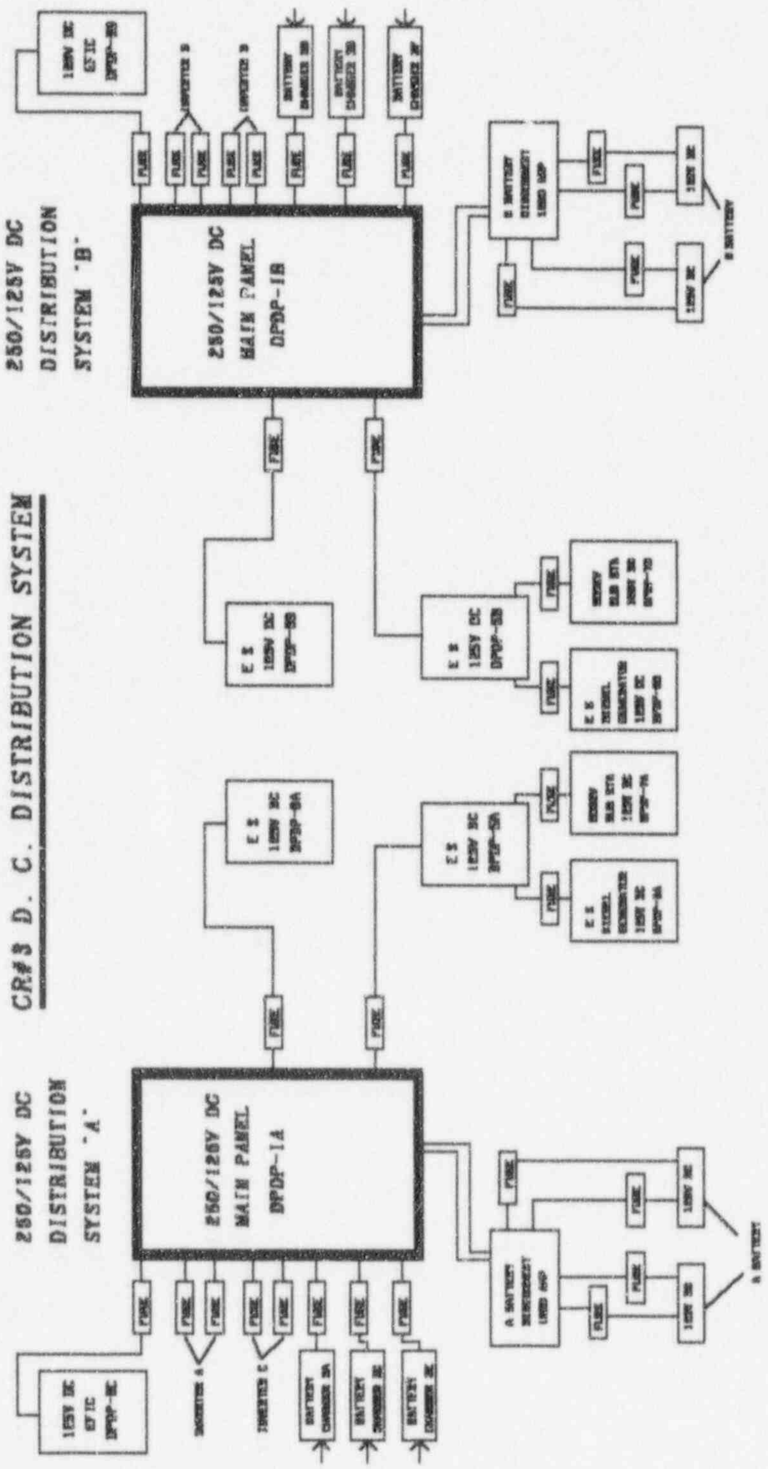

Figure 2

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6) YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	PAGE (3)
CRYSTAL RIVER UNIT 3 (CR-3)	0 5 0 0 0 3 0 2	9 6	— 0 1 2	— 0 1	1 4 OF 1 4

TEXT (If more space is required, Use additional NRC Form 366A's (17)

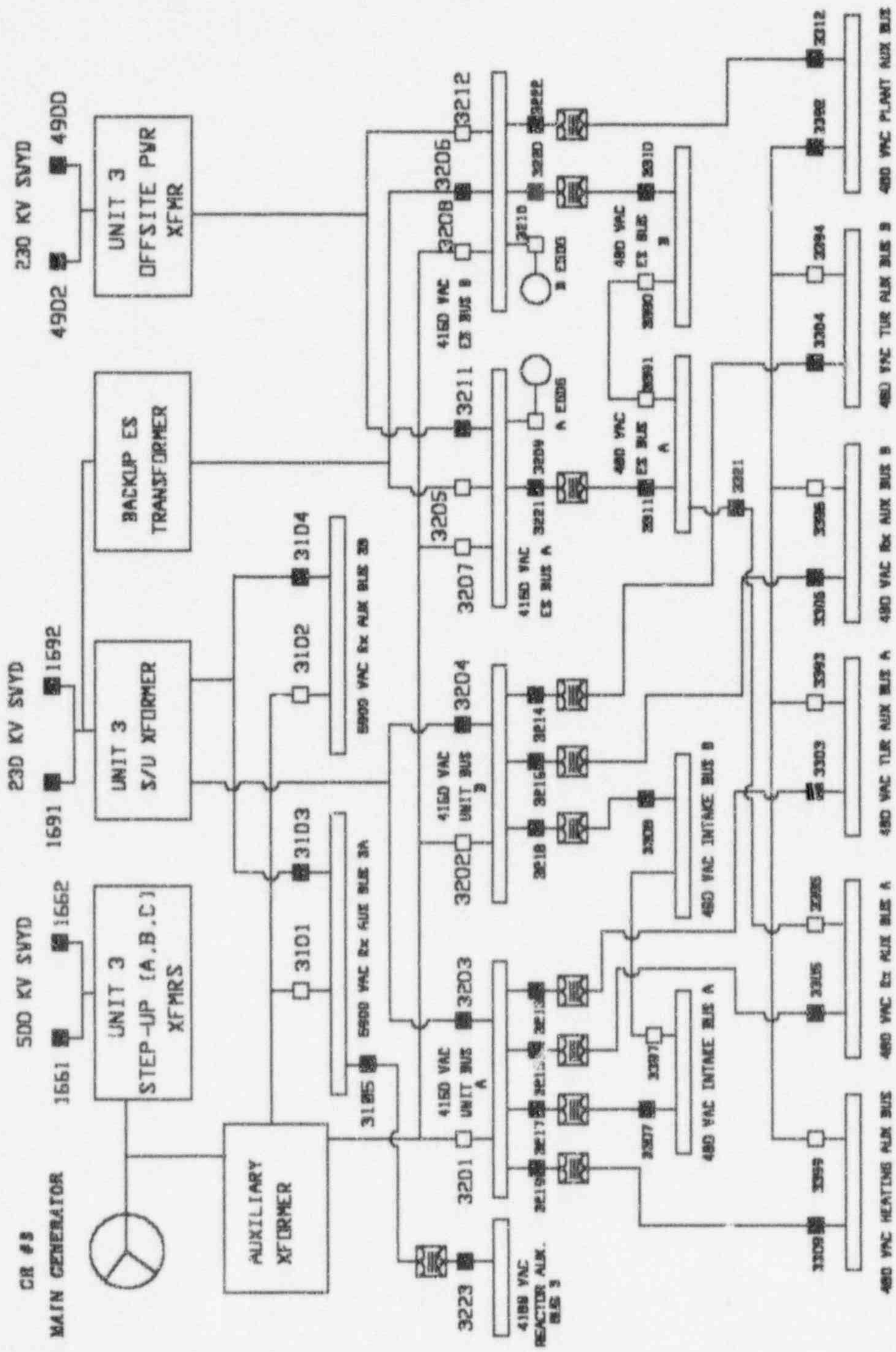

Figure 3 AC Electrical Distribution System (ELECDIST.DPF)