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AUTH.NAME AUTHOR AFFILIATION
UHRIG,R.E. Florida Power & Light Co.
RECIP.NAME RECIPIENT AFFILIATION
EISENHUT,D.E. Division of Licensing

SUBJECT: Forwards responses to NRC request for addl info re battery capacity & load shedding during station blackout. Responses will be incorporated into future amend to FSAR.

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	NRR/DE/EQB	13	3	3	NRR/DE/GB	28	2	2
	NRR/DE/HGEB	30	2	2	NRR/DE/MEB	18	1	1
	NRR/DE/MTEB	17	1	1	NRR/DE/QAB	21	1	1
	NRR/DE/SAB	24	1	1	NRR/DE/SEB	25	1	1
	NRR/DHFS/HFEB	40	1	1	NRR/DHFS/LQB	32	1	1
	NRR/DHFS/OLB	34	1	1	NRR/DHFS/PTRB	20	1	1
	NRR/DSI/AEB	26	1	1	NRR/DSI/ASB	27	1	1
	NRR/DSI/CPB	10	1	1	NRR/DSI/CSB	09	1	1
	NRR/DSI/ETSB	12	1	1	NRR/DSI/ICSB	16	1	1
	NRR/DSI/PSB	19	1	1	NRR/DSI/RAB	22	1	1
	NRR/DSI/RSB	23	1	1	NRR/DST/LGB	33	1	1
	REG FILE	04	1	1				
EXTERNAL:	ACRS	41	16	16	BNL(AMDTS ONLY)		1	1
	FEMA-REP DIV	39	1	1	LPDR	03	1	1
	NRC PDR	02	1	1	NSIC	05	1	1
	NTIS		1	1				

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FLORIDA POWER & LIGHT COMPANY

November 10, 1981
L-81-474

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U.S. NUCLEAR REGULATORY COMMISSION

Office of Nuclear Reactor Regulation
Attention: Mr. Darrell G. Eisenhut, Director
Division of Licensing
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Dear Mr. Eisenhut:

Re: St. Lucie Unit 2
Docket No. 50-389
Final Safety Analysis Report
Requests For Additional Information

Attached are Florida Power & Light Company (FPL) responses to NRC staff requests for additional information which have not been formally submitted on the St. Lucie Unit 2 docket. These responses will be incorporated into the St. Lucie Unit 2 FSAR in a future amendment.

Very truly yours,

Robert E. Uhrig
Vice President
Advanced Systems & Technology

REU/TCG/ah

Attachments

cc: J. P. O'Reilly, Director, Region II (w/o attachments)
Harold F. Reis, Esquire (w/o attachments)

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S1/1

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PDR ADOCK 05000389
F PDR

Attachment to L-81-474
November 10, 1981

A. Changes to section 4.2 requested by NRC reviewer Mr. Dale Powers.

B. NRC request for additional clarification of battery capacity and load shedding during the Station Blackout procedure.

C. Field trip report to Mr. Ehasz from Mr. Mercurio. (This report was requested to be placed on the St. Lucie 2 docket by Mr. Pichumani).

D. Minutes of a meeting held on November 9, 1981 on the topic of Seismic Reflection Data for the posulated Armstrong fault.

E. Additional information requested by Mark Rubin on Control Room Habitability and voiding in Reactor Vessel head.

F. Revised Table 15C.4-1 (continued).

G. Revised Fiture 15C.4-6.

H. Revised Figure 15C.4-3.

I. I.C.C. Delivery Schedule as of November 1981.

J. Revised Matrix Power Supply Isolalation Device Testing submittal.

Subject: SL2 FSAR, Section 4.2
Per Request of S. Ritterbusch
The Following Information is to be Given to Mr. D. Powers

A. For 9 percent helium pressure release the poison rod internal pressure buildup will remain below system pressure.

B. Axial growth design limit - Adequate clearance is evaluated on the basis that under adverse design conditions a clearance of greater than zero shall be maintained.

C. Mechanical fracture design limits - fracture stress limits for fuel rods shall be in accordance with page 9-6 of CENPD-178-P, Rev. 1. Previous reference to limit of 90% of irradiated yield strength at temperature is no longer valid.

Response: NRC request for additional clarification of battery capacity and load shedding during the station blackout event.

To assure that sufficient battery capacity exists to accomodate the station blackout event an iterative set of battery load profile calculations were performed. The acceptable load profile which emcompasses the conservatively defined event duration of four hours was obtained and is shown in Figure 1.

The load profile was developed and based on the most heavily loaded DC bus, 2B, and includes loads on the swing bus 2AB. (Calculations assure the AB bus is being supplied from the 2B bus). The assumption is made that no operator action occurs in the first 30 minutes of the event, as reflected in the load profile.

Thirty minutes into the event the operators secure power to selected DC loads, listed in Table 1, which reduces the load on the battery, as reflected in the load profile. At three hours and fifty-nine minutes into the event the operator flashes the diesel generator field in accordance with IEE 485, "Recommended practices for sizing large lead storage batteries for generating stations and substations". A standard calculation utilizing the Hoxie methodology was performed to demonstrate that the battery capacity was sufficient to support the defined load profile.

The load shedding operation which is performed thirty minutes into the event can be conducted by the operator from panels which are on the 43'-0 elevation of the Reactor Auxiliary Building, directly beneath the control room.

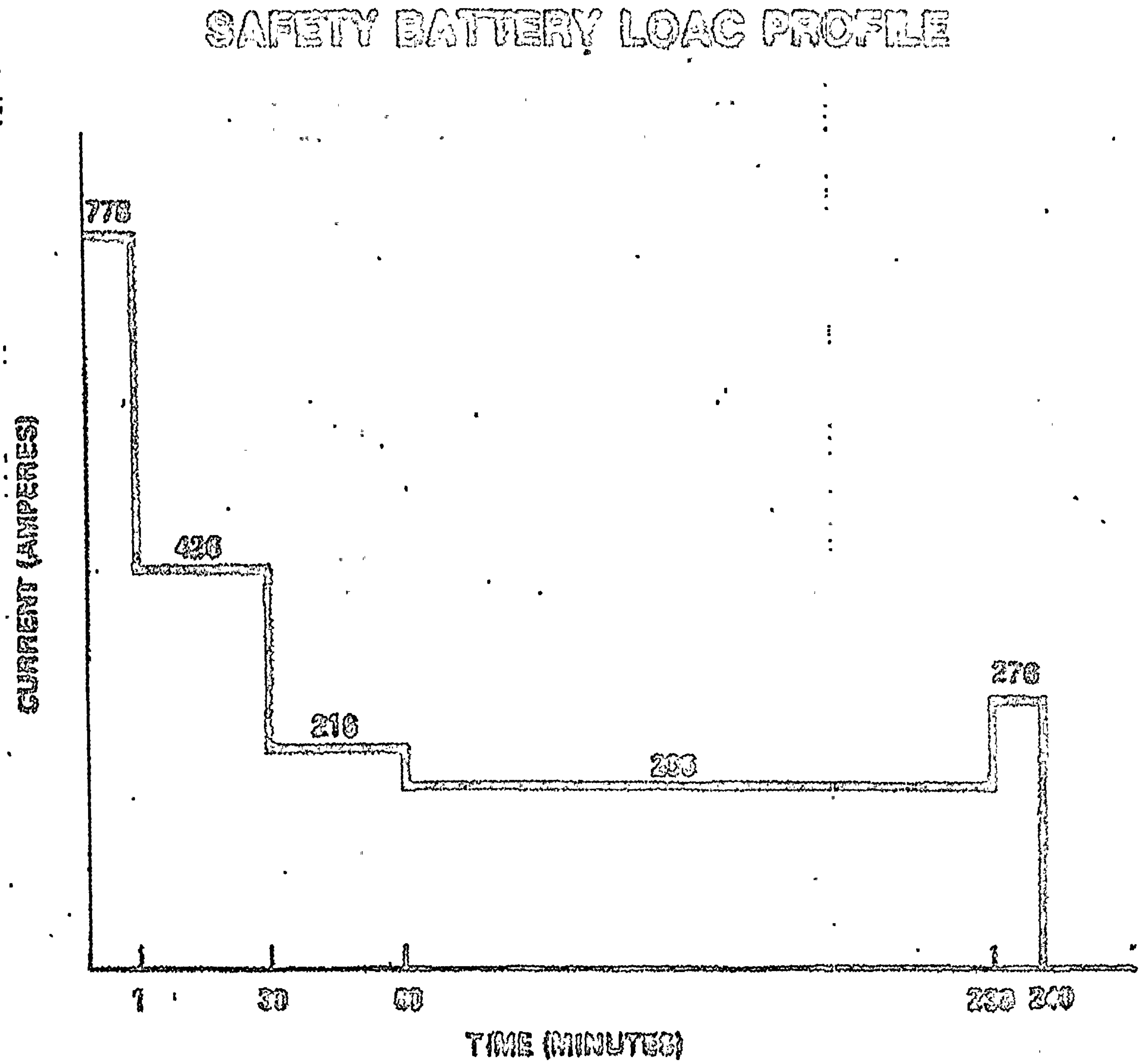
The loads which are shed are comprised of non-safety related loads and selected safety related loads which have no function because of the nature of the initiating event. The non-safety related loads include the 120VAC static uninterruptable power supply (SUPS), turbine switchgear control power, main, auxiliary and startup transformer control power, turbine generator hydrogen and seal oil control panels, and non safety related switchgear control power.

The safety related loads include control power for the 4.16KV and 480V switchgear and control power for the Heating and Ventilating Control Board. Since AC power is not available to the switchgear on ventilation equipment, control power has no safety significance during this event. Prior to restoration of AC power, DC control power will be restored to all effected safety related control circuits in accordance with the station blackout emergency operating procedures.

Table 1
DC Bus 2B and 2AB Shed at Time 30

2B Circuit Number	Description	CWD Number
1	Turbine Generator Hydrogen Monitoring Panel	867
3	Turbine Generator Hydrogen Seal Oil Panel	855
4	Start Up Transformer Control Panel 2B	908
5	480V Pressurizer Heater Bus 2B3 Control Room	132
6	Main Transformer 2B Control Panel	864
7	480V Switchgear 2B2 Control Power	899
8	Unit Auxiliary Transformer 2B Control Power	909
9	Turbine Generator Exictation Switchgear Control Panel	874
11	480V Switchgear 2B1 Control Panel	988
12	6.9KV Switchgear 2B1 Control Power	928
14	4.16KV Switchgear 2B2 Control Power	930
15	480V Switchgear 2B2 Control Power	992
18	4.16KV Switchgear 2B3 Control Power	932
38	Heating Ventilating Control Board Control Room	1239

2AB Circuit Number	Description	CWD Number
9	Static Uninterruptable Power Supply	1008



SAFETY BATTERY LOAC PROFILE
CURRENT (AMPERES)
778
426
216
203
278
1
30
60
238
240
TIME (MINUTES)

FIG. 1

Oct. 22, 1975

To: J L Ehasz

From: W F Mercurio

Subject: ST. LUCIE UNITS 1 & 2
COMPACTION PILES NORTH OF UNIT 1 INTAKE &
SOUTH OF UNIT 2 INTAKE
FIELD TRIP REPORT

The writer visited the jobsite on Oct. 2,3,16 and 17, 1975, for the purpose of observing pile driving for the displacement piles at the subject location. The work is being performed by Raymond Concrete Pile. Our office contact is Dick Stockpole, V.P. Sales Manager (404-448-1130). Their on-site representative is Bob Campbell, Project Superintendent.

The pile driving began on Oct. 3, performing the work in accordance with our specification FLO 9560.069. In accordance with the requirements of the NRC Staff (L. Heller), we first preaugered five holes, using the wet method with an 18 inch diameter churn bit, to permit relief of pore pressures. We only preaugered the pile location to an elevation of approximately -50. Only one pass of the auger was used. The pile hammer was a Raymond 0A with an energy of 48,750 ft. lbs. The pile driving was extremely difficult with blows per foot greater than 100. The pile completely broke apart at the head due to the extremely hard driving (even with the use of a plywood cushion atop the pile head). Driving was stopped at a tip elevation of approximately -42, eight foot higher than had been preaugered. A replacement pile was later driven adjacent to this pile using the procedures discussed below.

Since driving the pile was proved impossible without additional preaugering, we established a procedure of preaugering using 3 passes. Two passes would be to the bottom of our Class II fill and only one would extend below to the proposed pile tip of elevation -62. Using this procedure, pile driving proceeded. We estimated that we removed approximately 100 cu. ft. of Class II material in order to drive the 170 cu. ft. pile. Because of the preaugering procedure described above, it is felt that very little material is being removed from the natural material and that we are densifying this material by pile displacement as required by the NRC staff. Measurements of the heave plate and of the piles themselves, usually indicate zero vertical movement. In a few limited cases, the settlement plate has moved 1/8 of an inch downward due to the vibration of the pile driving.

It should be noted that we attempted to drive the piles with only 2 passes of the auger. However, using this procedure, we also hung up a pile 20' above the tip elevation of -62. For all additional piles, 3 passes of the auger was utilized.

The writer visited the jobsite again on October 16th to review the procedures and work that had been performed thus far. As of October 17, 28 piles had been successfully driven. As of this date, the work North of the Unit 1 Intake is completed and the piling is moving South of the Unit 2 Intake. The work looks excellent, and is being performed in accordance with our specs and should be completed about Oct. 31st.

The water washing the slopes was corrected by cutting a drainage channel to direct flow to the emergency cooling water barrier excavation.

M. Pavone has been the on-site Ebasco inspector, keeping driving records, heave plate readings and a daily diary.

The work is being performed by Raymond for $159,250. No extras or out-of-scopes have been asked for by Raymond.

WFM/dg

cc: A A Ferlito
M Weber
H J Kuo
L Borchardt
L Tsakaris
J R Fotheringham
J F Burket
M Pavone
W F Mercurio

Minutes for FPL/NRC
Meeting of November 9, 1981

Subject: Siesmic Reflection Data for the Postulted Armstrong Fault

Location: Florida Power & Light Conference Room at the Triangle Towers Building, Bethesda, Maryland

Attendees:

NRC	FPL	Ebasco	LAW
V. Nerses	J.E. Sheetz	D.J. Chin	R. White
R.E. Jackson	W.F. Brannen		J. Custin
R.L. Rothman			
T. Cardone			
S. Brocoum			
A.K. Ibrahim			
R. McMullen			

Proceedings:

Law Engineering presented a program that should improve the quality of the subject siesmic data. Their proposed program consists of the following:

(1) Converting the data from analog to digital.

(2) Fathometer records will be used to assist in designing a deconvolution filter for removing resonance or "ringing" in the reflection data.

(3) Auto-correlation will be performed on traces at intervals of approximately 150 traces. This operation should reveal the presence and period of multiples and of resonance.

(4) Using information from (1) and (2), a deconvolution operator, which can vary over the length of the profile, will be designed and used to remove the resonance and any multiples present.

(5) A frequency analysis of the deconvolved traces at intervals of approximately 150 traces will be performed to determine if the reflection profiles can be improved through selective filtering.

(6) Prints of the deconvolved and filtered seismic reflection sections will then be furnished.

The NRC staff representatives provided the following comments:

(1) They suggested that the filtered data be submitted to the NRC for a determination as to the acceptability of the quality of the data prior to interpretation by Law.

(2) They requested that the final data submittal be provided with enough information to allow the NRC to perform an independent interpretation.

(3) They also requested that Law provide their interpretation with the final data submittal.

(4) The NRC agreed to review the proposal outlined above and provide written comments.

It was noted that recordings of the data for lines 2, 3.1 and (see FSAR Fig. 25.40e) 9 are not available. These recordings were lost as a result of equipment problems encountered during the data collection program. It was agreed that the data for all the remaining lines, 3, 4, 4.1, 5, 5.1, 8.1, 6(B), 6.1, 7, will be filtered.

Auxiliary feedwater is automatically actuated on the Tax steam generator level. Flow is provided by the turbine driven pump which derives all its control power from the station batteries. The operator opens the Atmospheric Dump Valves (ADVs) and regulates them from the control room to maintain steam generator pressure below the setpoint at the MSSVs and to reduce the primary system temperature to maintain subcooling in the hot leg.

Control Room Habitability:

The loss of AC power will result in the loss of control room air conditioning. The low initial temperature of the control room and the surrounding heat sinks (floor, walls, etc.,) and the greatly reduced internal heat load due to a loss of power both serve to moderate the temperature rise resulting from the loss of cooling. In addition, certain manual operations can be performed such as opening rooftop dampers and exterior doors to establish natural circulation cooling paths. The limited duration of the blackout helps to ensure that the control room remains habitable and that the equipment required for hot standby remains operable during this period.

Restoration of AC Power:

Although the analysis which follows shows acceptable results assuming no AC power for 4 hours, in actuality AC power would be restored to the plant prior to this time (within 35 minuts to one hour) by either one of the following corrective actions.

1) Offsite power is restored and the onsite buses are manually connected to the startup transformers. Equipment is manually loaded on these buses, recording to plant emergency procedures or,

2) One (or both) Unit 2 diesel generators is started and safeguards loads are manually sequenced onto its 4.16 KV bus.

15C.4.3 Analysis of Effects and Consequences

A. Mathematical Models

The NSSS response to a Station Blackout was simulated using the CESEC-III computer program.

B. Input Parameters and Initial Conditions

The initial conditions assumed for this event are contained in Table 15C.4-2. These conditions were chosen to provide the largest and most rapid depletion of RCS inventory and shutdown margin. The highest initial pressurizer pressure, least negative doppler efficient and most positive moderator temperature coefficeint

The steam generator liquid level decreases during the transient and reaches a minimum value after auxiliary feedwater flow is automatically actuated suing the steam-driven auxiliary feedwater pump. Steam generator level increases until normal water level is reached. The operator subsequently controls auxiliary feedwater to maintain normal level. See Figure 15C.4.6.

The RCS pressure and temperature gradually decrease at fairly constant rates in the long term as a result of pressurizer heat loss, RCS leakage, low heat transfer rates at the steam generators, and the operator manually reducing secondary side pressure. Since the RCS pressure decreases at a higher rate than the RCS temperature, the pressure approaches the saturation pressure.

Saturation occurs in the reactor vessel head. Continued primary pressure drop without a significant decrease in primary temperatures would result in saturated conditions in the hot leg. Credit is taken for operator action to maintain at least 10°F subcooling in the hot leg. This is accomplished by further opening the atmospheric dump valves to reduce the secondary system pressure and temperature. The increased heat removal in the steam generators caused by the larger ΔT accross the steam generator tubes reduces the primary system temperatures. Voiding is restricted to the vessel head. The maximum void fraction occurs at 3.5 hours. The size of the void is calculated to be 1076 ft.^{3} and remains above the inlets to the hot legs. After this time the discharge of borated water from the safety injection tanks prevents additional void growth. Natural circulation is not adversely impacted for more than 4 hours.

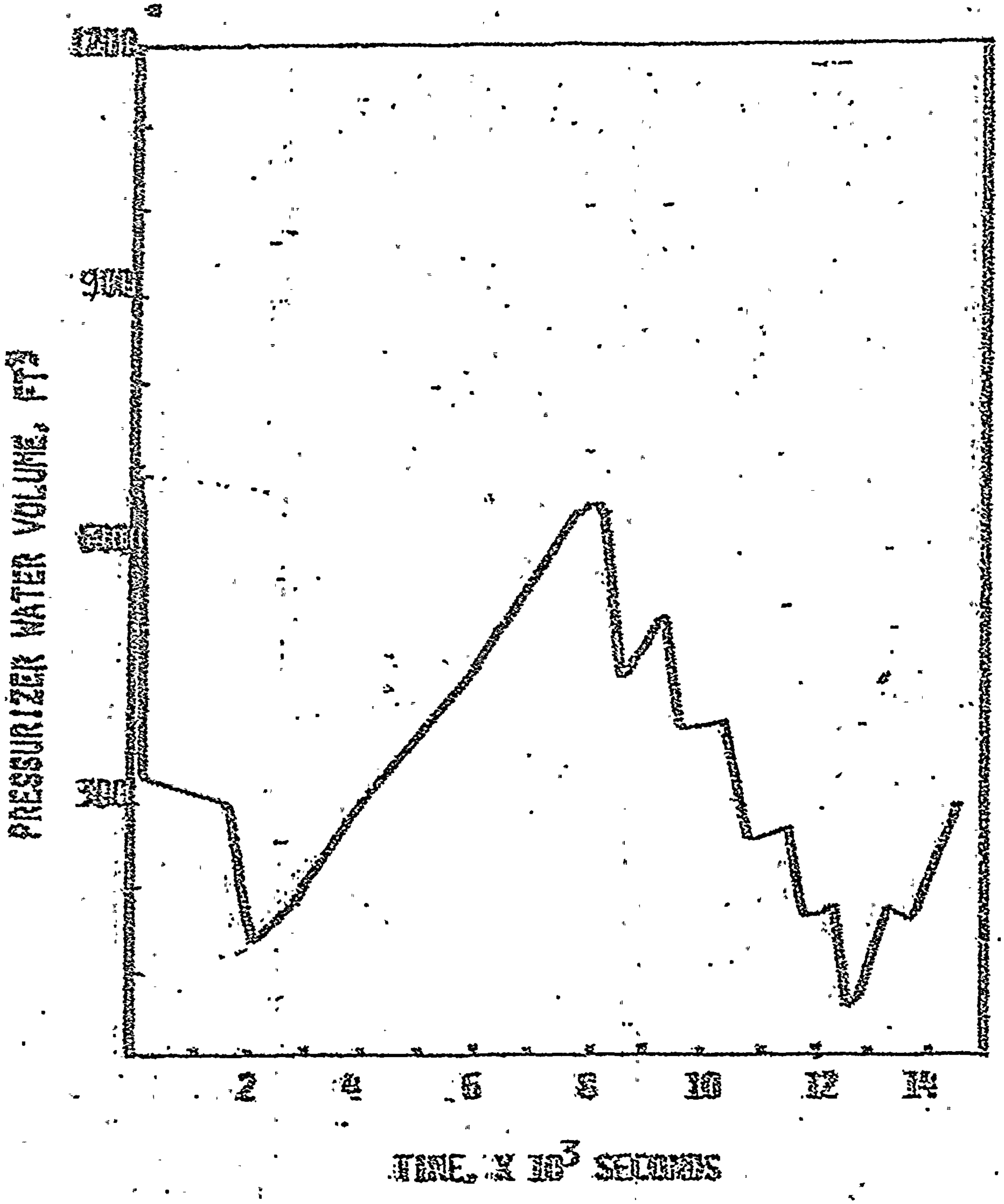
The Safety Injection Tanks (SITs) provide borated water to the RCS after RCS pressure is reduced below their discharge pressure. No credit is taken for the negative reactivity added as a result of this discharge.

At 4 hours, sufficient AC power is assumed to be restored to provide power to the charging pumps and pressurizer heaters. These will be used to pressurizer the RCS and to continue hot leg subcooling.

Operability of the turbine driven auxiliary feedwater pump requires at least 50 psia secondary pressure. At 4 hours after the initiation of the event, the secondary pressure will be greater than 300 psia. less than 180,000 gallons of auxiliary feedwater are used during the event. The condensate storage tank capacity is greater than 380,000 gallons.

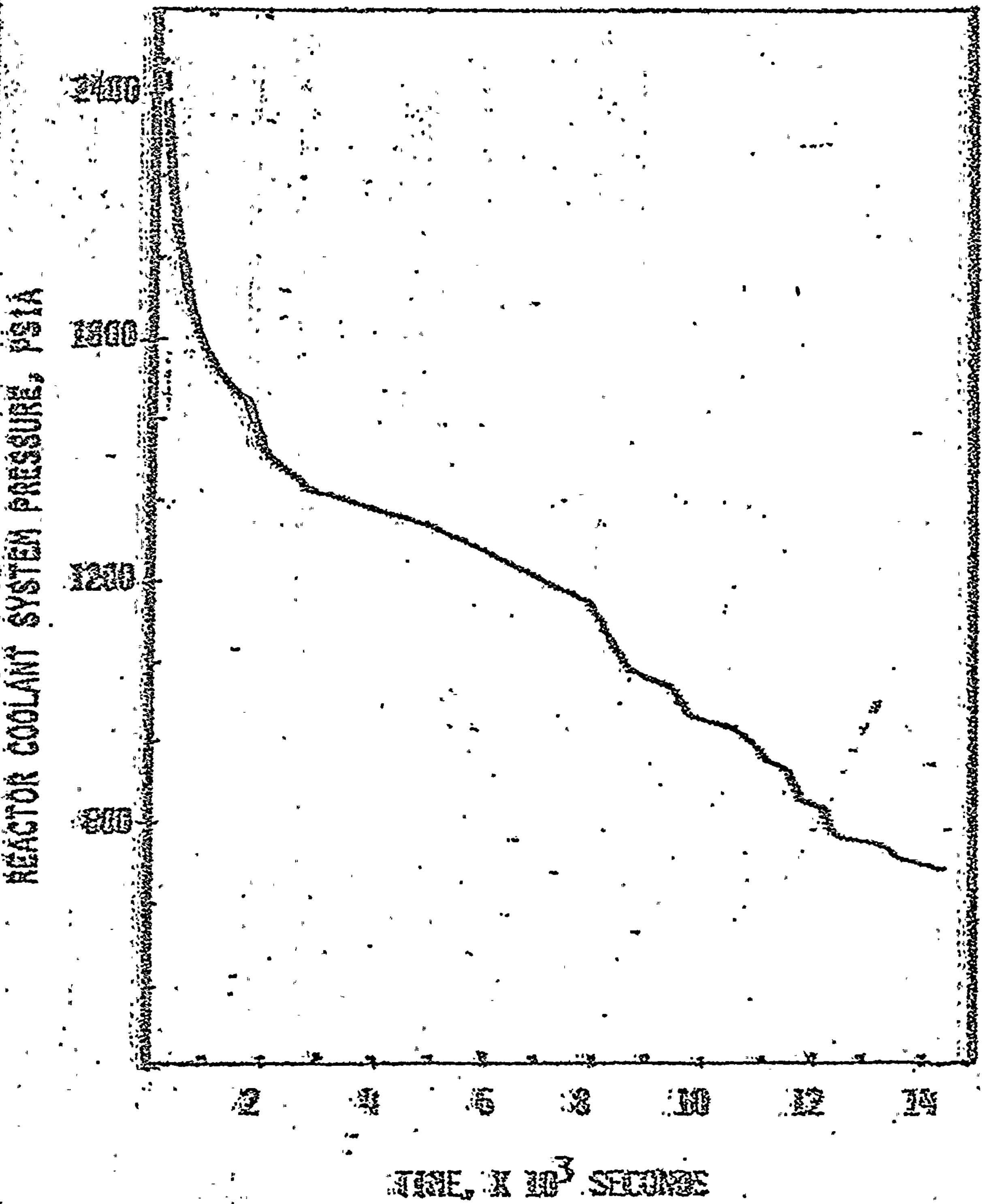
Table 15C.4-1 (continued)

Time (sec)	Event	Setpoint or Value
2258	Voiding occurs in Reactor Vessel Head	--
8600	Operator Begins to Reduce Steam Generator Pressure to Maintain Hog Leg Subcooling	--
11750	Main Steam Isolation Valves Close, psig	450.0
12540	Safety Injection Tanks Actuated, psia	583.0
14400	1. Operator Restores AC Power	--
	2. Total Atmospheric Dump Valve Release lbm.	363300.0



FLORIDA POWER & LIGHT COMPANY
ST. LUCIE PLANT UNIT 2

PRESSURIZER WATER VOLUME VS. TIME
FIGURE 15C.4-6



FLORIDA POWER & LIGHT COMPANY
ST. LUCIE PLANT UNIT 2

REACTOR COOLANT SYSTEM
PRESSURE VS TIME

FIGURE 15C.4-3

I.C.C. Delivery Schedule
as of November 1981

Item	In Order - Started	Delivery Date
1. Fixed in core detector (CET)	8-81	9-82
2. H.J.T.C. (Heated junction thermocouple)	1-81 (prototype completed)	9-82
3. M.I. Cable	9-81	6-82
4. Modification to ICI nozzle and head H.J.T.C. shroud	6-81 (started)	12-81 (completed)
5. Q.S.P.D.S. calculator - displays	7-81	9-82
6. Process instrumentation Q.S.P.D.S. (subcooling margin monitor)	12-81	7-82

MATRIX POWER SUPPLY ISOLATION DEVICE TESTING

Isolation within the Reactor Protective System is discussed in general within the response to NRC question 420.7. Below are excerpts from this response:

> "Each matrix is powered from the diode isolated power supplies located in two different channels of the RPS. Each power supply has with it an isolation circuit which limits the fault to acceptable values and prevents the fault from disturbing the independent vital buses.
>
> All isolation devices discussed above are qualified to 480V ac and 325V dc and tested to 600V ac and 400 dc. The entire system is also subjected to an EMI test in accordance with MIL-STD-461A 'Electromagnetic Interference Characteristics Requirements for Equipment' for both conducted and radiated signals using test CS01, CS02, CS06, RS07 and RS03."

The following provides further definition on the method of qualifying the RPS matrix power supply (with associated isolation networks) to the requirements of IEEE-323-1974. Aging qualification requirements are not considered in this discussion. The results of each test discussed below will be provided by the NRC.

A. <u>Fault Isolation Qualification</u>

The maximum credible fault is limited to 600 VAC and 400 VDC due to the following design separation and precaution described below:

- All cables routed from the respective instrument bus to various loads are classified as low level circuits and are routed in enclosed raceways with one exception. This cable is a control circuit whose cable route is through the cable vault area. Both instrumentation and control cables do not exceed a voltage of 480 volt.

- The cable spreading area and control room do not contain high energy equipment such as high energy switchgear, transformers over 480 volts, high energy rotating equipment, or potential sources of missiles or pipe whip, and are not used for storing flammable materials.

- High energy circuits are considered to be those with available fault currents in excess of the interrupting rating of the 480V motor control centers.

- Circuits in the cable spreading area and control room are limited to control functions, instrument functions and those power supply circuits and facilities serving the control room and instrument systems.

- D C Power supply feeders from redundant MA, MB, MC and MD instrument buses to the control room are installed in enclosed raceways that qualify as barriers.

- The instrument power supply system equipment is designed to meet seismic and environmental qualification requirements for class IE equipment.

- All cables are flame resistant and are qualified in accordance with IEEE Standard 383.

- Different parameter signal cables are in the same wireway as long as they do not belong to separate redundant channels; separate tray and conduct systems are provided for power and control and low level instrument systems.

- All cables are inspected by site quality control to assure that they are not damaged in the process of cable pulling. The inspection of these cables is documented and subject to random audit by quality compliance.

- All electrical raceways are seismically supported.

Matrix power supplies and isolation circuits are configured within the RPS as shown in Figure 1. The test involves simulating (with identical equipment) a typical RPS matrix (Figure 2) including bistable trip units, bistable power supplies, matrix power supplies, matrix relays, and isolation relays. Vital bus power (120 Vac) is simulated by using two power isolation transformers. The isolation test will consist of the application of a 600 Vac and 400 vdc fault in the circuit in the common and transverse modes. The basis for the 600 vac and the 400 Vdc test voltage is as follows:

- 600 Vac: The highest credible AC fault voltage which could appear within the RPS is 480 Vac. This voltage is increased by 10% to 528 Vac to account for normal voltage tolerances and then again increased by 10% to 581 Vac to account for IEEE-STD-323-1974 margin. This voltage is then rounded off to 600 Vac.

- 400 Vdc: The highest credible DC fault voltage which could appear within the RPS is 325 Vdc. This voltage is increased by 10% to 358 Vdc to account for normal voltage tolerances and then again increased by 10% to 394 Vdc to account for IEEE-STD-323-1974 margin. This voltage is then rounded off to 400 Vdc.

1. Common Mode Test

The common mode test is accomplished by applying a fault to the DC side of a matrix power supply between point (G) and the power supply chassis. The fault voltage and current are monitored to define the fault characteristics. Also, the 120 Vac line side of the power supply is monitored to document any effect as a result of application of the fault. All monitoring is by means of a light beam recorder. This same process is repeated for point (H) to the power supply chassis.

For the purpose of this test, it has been conservatively assumed that if a fault appeared on vital bus B (points A or B to chassis ground in Figure 1) it would propagate through the DC power supply (PS-B) and appear at points C or D. Since PS-B is directly connected to PS-A (through CR-1 and CR-2) the fault is assumed to appear at points G of H to ground. Therefore, it is required to show that when a fault is present on the DC side of a matrix power supply it does not propagate to the 120 Vac side of the power supply, thereby affecting more than one vital bus. It should be noted that complete propagation of a fault from power supply primary to secondary is a conservative fault circuit evaluation which would most likely not occur.

2. Transverse Mode Test

The transverse mode test is accomplished by applying the fault directly to the output terminals (E and F) of the isolation circuit. This fault voltage and current are monitored to define the fault characteristics. Also, the input side (G and H) of the isolation circuit and the 120 Vac line side (J and K) of the power supply is monitored to document any effects as a result of application of the faults. All monitoring is by means of a light beam recorder.

Similar to the common mode test, a fault appearing on vital bus B (Figure 1 points A and B) is assumed to propagate completely to points E and F. Therefore, it must be shown that application of a fault to the output of the isolation circuit (points E and F) does not propagate in the 120 Vac side of power supply A thereby affecting more than one vital bus. It should be noted that the isolation circuit clamps the fault voltage such that power supply damage does not occur, as discussed below:

- Clamp Circuit - The power supply fault clamp circuit is designed to limit or shortout a positive or negative fault. Figure 1 is a schematic of the fault clamp circuit which is connected to each matrix power supply. During normal operation VRI is in the open circuit condition, SCR-Q1 is deenergized and CR4 is reverse biased. The normal 28 Vdc output of the power supply will be seen between points E and F.

  The clamp circuit operates in the following manner. On the negative cycle, the fault is clamped or shorted out by CR4, causing F1 to open. On a positive cycle, the fault would cause VR1 to conduct upon reaching an amplitude to 47V (combined 28V PS volts and 19V fault).

  With VRI conducting, SCR-QI will energize, shorting out or clamping the fault and the power supply output, causing F1 and F2 to open.

3. Acceptance Criterion

The acceptance criterion for the above tests is that upon application of the fault the input power supply voltage, observed at points J and K, does not vary more than ± 10% from the nominal voltage. It will be shown that before, during, and after a fault application the system will perform its protective function (trip actuation) when required.

B. Surge Qualification

A surge test will be performed on the RPS according to the guidance of IEEE Standard 472-1974, to the extent practical. The test will be performed similar to that which was performed on the ANO-2 Plant Protection System (PPS) and subsequently approved by the NRC.

The test involves simulating (with identical equipment) a typical RPS matrix (Figure 2) including bistable trip units, bistable power supplies, matrix power supplies, matrix relays, and isolation relays. Vital bus power (120 Vac) is simulated by using two power isolation transformers. A 300 Vac surge (negative peak to positive peak) will then be superimposed on one vital bus. Thus, the test voltage from neutral to peak will be 337 volts (120 Vac + 10%) x 1.414 plus the neutral to peak surge 300V/2. The surge voltage is based on a calculation performed for the ANO-2 PPS which concluded that circuit damage or false operation would not occur provided the peak AC voltage is maintained below 400 Vac. The calculation is based on dielectric strength of materials within the ANO-2 PPS. Since the equipment within the St. Lucie Unit 2 PPS is similar (but not identical) to the ANO-2 PPS it is assumed that calculation conclusions are applicable to the RPS.

An ultra isolation transformer is being added to the vital bus inverter system in order to attinuate any line surges which may pass through the inverter system. The isolation transformer will be surge qualified in accordance with the guidelines of IEEE standard 472-1974. This will include application of the surge (2.5KV to 3.0 KV) to the primary winding in both the common and transverse modes. The acceptance criteria for this test is that the transformer limits this surge on the secondary to a 50 Volt pulse. Note that the credible surge seen by the RPS is limited to 50 volts which is a factor of one third less than the surge being applied to the RPS. The transformer will also be qualified to the requirements of IEEE standard 344-1975 and IEEE standard 323-1974 (minus aging).

1. Common Mode Test (Figure 1)

The common mode test is accomplished by applying a surge to the AC side of the matrix power supply between point (A) and the power supply chassis. During surge application the simulated RPS circuit is operated to show proper function and accuracy. Also, the 120 Vac line of the associated power supply is monitored across points (J) and (K). The same process is repeated for point (B) and the power supply chassis.

2. Transverse Mode Test (Figure 1)

The transverse mode test is accomplished by applying a surge to the AC side of the matrix power supply between points (A) and (B). During application of the surge the simulated RPS circuit is operated to show proper function and accuracy. Also the 120 Vac line of the associated power supply is monitored across points (J) and (K).

3. Acceptance Criterion

The acceptance criterion for the above tests is that all circuits shall operate correctly and within their normal accuracy requirements before, during, and after the surge application. Also, the voltage observed at points J and K should not vary more than ± 10% of the nominal voltage.

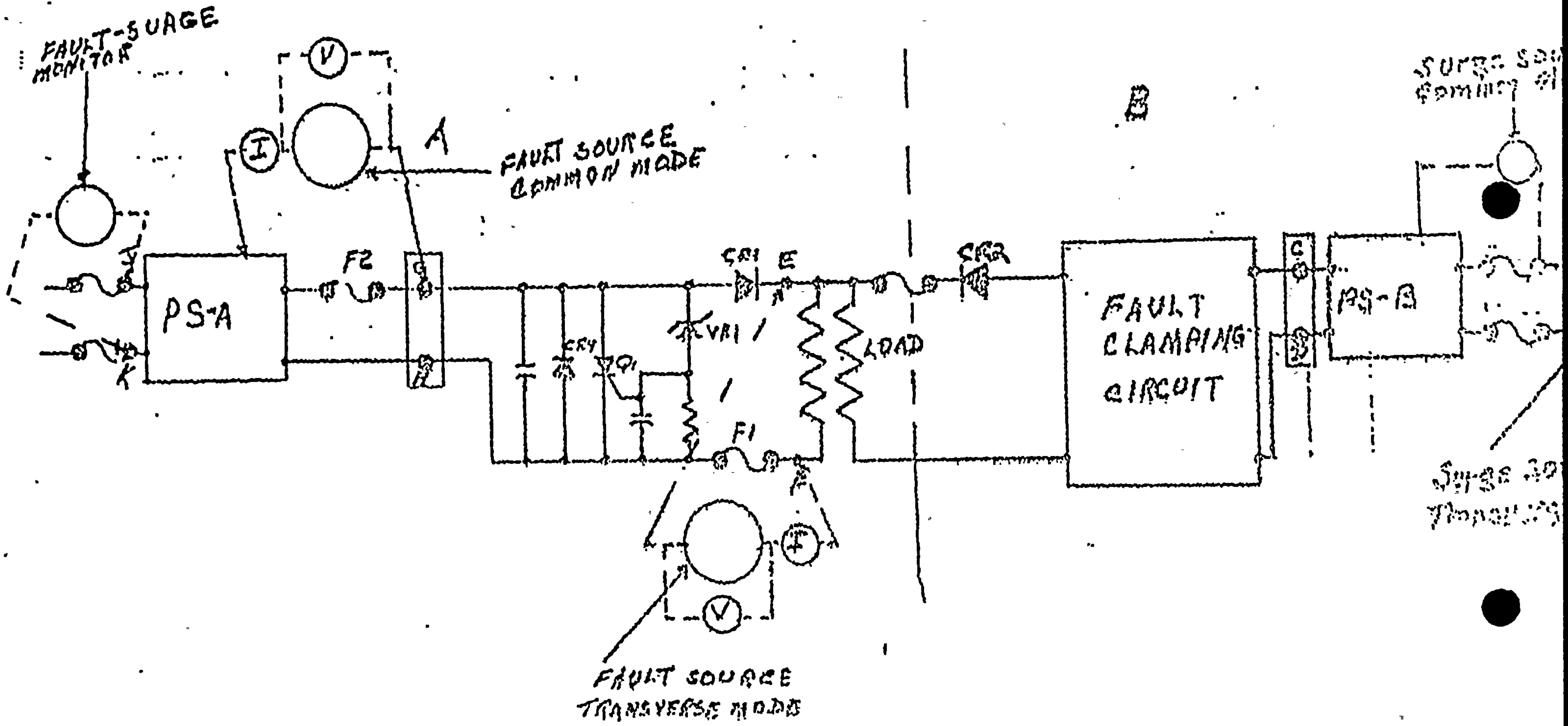
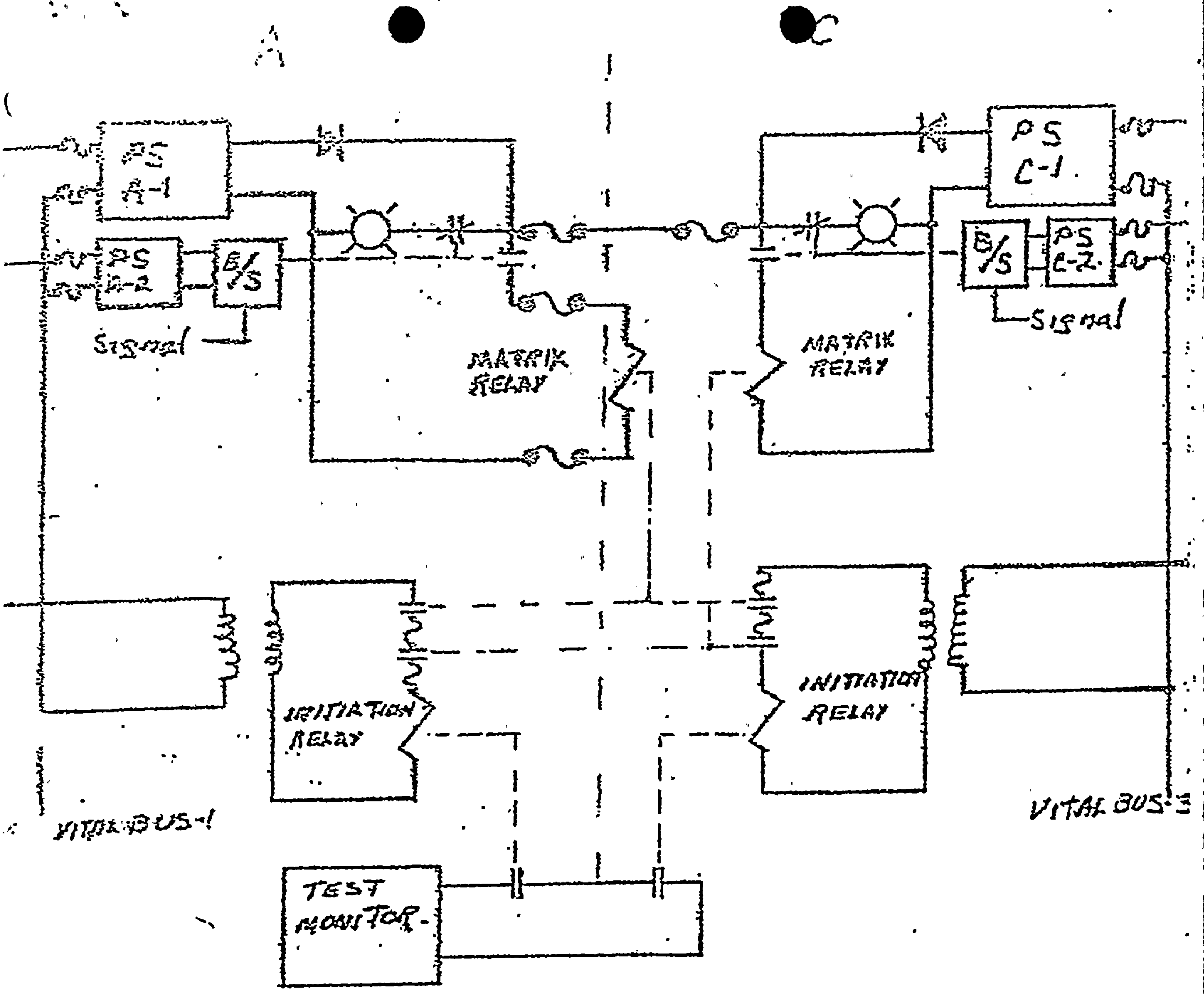

FAULT-SURGE MONITOR
PS-A
F2
A
FAULT SOURCE COMMON MODE
CR1
E
VR1
LOAD
F1
FAULT SOURCE TRANSVERSE MODE
B
FAULT CLAMPING CIRCUIT
PS-B

Figure - 1



B/S - Bistable

PS-A1 & C1 have clamp circuit.

Figure -2