

January 4, 1993

Docket No. 50-255

LICENSEE: Consumers Power Company
FACILITY: Palisades Nuclear Generating Plant
SUBJECT: RECENT PLANT PERFORMANCE MEETING SUMMARY

A meeting was held at NRC Headquarters on November 30, 1992 to discuss recent plant performance at the Palisades Plant. Enclosure 1 provides a list of attendees; Enclosure 2, the handouts from the meeting.

The presentation summarized the root causes, event ramifications, and subsequent corrective actions of the reactor trips encountered on July 1, July 24, August 14, August 24, and October 30, 1992. Of the five reactor trips, three were caused by the installation of and minor design changes to the digital electro-hydraulic (DEH) system. The August 14 reactor trip was caused by fatigue failure of a air line on feedwater Reg valve to "A" steam generator. The August 24 reactor trip was due to a blown undersized fuse coincident with an inverter failure in the reactor protection system (RPS). There were also two forced outages due to a fatal accident and troubleshooting of electro-hydraulic control (EHC) system on September 18 and September 20, 1992, respectively.

In addition, the licensee also discussed Licensee Event Reports (LERs) of significance which were attributed to equipment failures, outage work control, procedural compliance, inadequate test procedures/instructions, design deficiencies resulting from lack of environmental qualification, and the configuration control program.

The licensee has since formed a programmatic review committee which is evaluating all trips as a whole. Also, the licensee is working with INPO managers to explore insights and recommendations regarding these recent events. The result of this joint effort will be presented in the next management meeting between the licensee and the NRC.

/S/

Doris M. Liao, Intern
Project Directorate III-1
Division of Reactor Projects-III/IV/V
Office of Nuclear Reactor Regulation

- Enclosures:
1. List of Attendees
2. Handouts

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DATE	<i>12/31/92</i>	12/31/92	1/4/93	1/4/92

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Memorandum
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Palisades Plant

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MEETING ATTENDANCE

DATE: November 30, 1992

LOCATION: OWFN 1-F-19

PLANT (DOCKET NO.): Palisades (50-255)

SUBJECT: Discussions on Recent Palisades Performance

NAME	AFFILIATION	PHONE
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TJ Palmisano	CPCO / OPERATIONS MGR	
ROBERT HAMM	CPCO / IFC SUPERVISOR	
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To: KEOsborne, System Engineering Manager

From: ^{MPKnopp}MPKnopp, Performance Monitoring Coordinator

CONSUMERS
POWER
COMPANY

Date: November 24, 1992

Subject: Palisades Plant
Performance Monitoring Report
Third Quarter 1992 -Revised

Internal
Correspondence

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- DCC 950/22*30*23/L

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Please find attached a revised Quarterly Performance Monitoring Report for the third quarter of 1992. The report has been revised for record purposes because the August 25 trip was inaccurately described and has been revised. I apologize for any inconvenience this may have caused.

PLANT PERFORMANCE STATUS SUMMARY

During the third quarter of 1992, the plant experienced five outages which included four plant trips.

The first outage occurred on July 1, and was caused by a DEH trip due to fluctuations on the E bus from a perturbation on the Argenta transmission line. After repairs of some loose cards in the system, the plant was put back on line July 4.

On July 24, voltage fluctuations on the E bus during a test of the Safety Injection System caused the DEH system to trip the turbine. After installation and testing of a new uninterruptible power supply, the plant went on line July 29.

A failed air hose to a Feedwater Regulating Valve caused the plant to trip on August 14. After repairs, the reactor went critical August 16 but did not go on-line until August 17 due to problems with the DEH Turbine Control System. The plant was holding at 25% power for a heat balance when there was a large EHC fluid leak due to a failed seal. Power was rapidly reduced and the plant was taken off-line but still critical. The unit was again put on-line August 18.

On August 25, a failed Sola transformer in the Y-20 preferred AC inverter coupled with an undetected blown fuse caused a trip. After repairs and testing of the Reactor Protective System, the plant was put back on line August 27.

On September 18, the plant started a deescalation in power to facilitate an investigation into a fatal accident during testing of the main generator circuitry. The plant was taken off-line but still critical on September 19. After data collection at the accident site and all necessary repairs were finished, the plant began the process to start up. However, it was determined that the reheat stop and intercept valves were not actuating fast enough. After troubleshooting and repairs, the plant went on-line September 28 and reached full power September 29.

The causes of lost generation for this quarter and the past year are shown below in Table 1.

Table 1 - System Contribution to Lost Generation, MWeHr (Unplanned)

System	First Quarter 1992	Second Quarter 1992	Third Quarter 1992	Total
CWS	4,054		451	4,505
FWS		405	71,417	71,822
MSS	1,770			1,770
RPS			47,687	47,687
TGS			320,002	320,002

SYSTEM PERFORMANCE SUMMARIES

A summary of system performance indicator results is presented in Table 2 on the following pages. Trends of the specific indicators may be found in the following sections which describe the performance of the various systems.

System Performance Monitoring Report
Third Quarter 1992

Table 2 System Performance Indicators - Third Quarter 1992

	Parameter	Target	Previous Quarter	Current Quarter
AES	System Component Availability (%)	≥ 85	99.8	99.8
AFW	System Functional Availability (%)	≥ 99.0	99.48	99.84
	System Functional Reliability (%)	≥ 97.5	100	100
CAS	System Component Availability (%)	≥ 85	99.9	99.9
	System Functional Availability (%)	≥ 95.0	98.7	99.5
	HP Air System Availability (%)	≥ 95.0	99.5	96.2
	Ave Compressor Cycle Time Ratio C-2A&C/C-2B	≤ 1.25/≤ 2.5	0.98/1.82	0.98/1.85
CCW	System Component Availability (%)	≥ 85	99.8	99.9
	System Functional Availability (%)	≥ 99.0	98.2 *	100
	System Functional Reliability (%)	≥ 97.5	100 *	100
	Chemistry in Specification (%)	≥ 99	83 *	100
CDS	System Component Availability (%)	≥ 85	99.6	100
	Average Deviation From Max Calculated Backpressure (HGA)	≤ 0.15	0.10	0.18
	Average Daily Dissolved Oxygen (ppm)	≤ 0.1	1.008	0.00152
	Average Daily Offgas Flowrate (cfm)	≤ 5.0	2.37	1.82
CIS	System Component Availability (%)	≥ 85	99.7	100
	Containment Leakage Margin (%)	≥ 50	73.7	73.7
CRD	System Component Availability (%)	≥ 85	99.2	98.7
	Average Control Rod Drive Leakoff (ml/min)	≤ 100	66.2	98.6
	Hours CRD Leakoff Temp ≤ 200°F (%)	≥ 99.5	99.2	98.6
	Time PIP, SPI and Thermocouples Operable (%)	≥ 96.7	98.52	98.52
CSS	System Functional Availability (%)	≥ 99.0	100	99.89
	System Functional Reliability (%)	≥ 90	100	100
CVC	System Component Availability (%)	≥ 85	99.8	100
	Chemistry in Specification (%)	≥ 99.6	100	100
	Comparative P-55A Packing Life (%)	≥ 100	213	115
	Boric Acid Injection System Availability (%)	≥ 95	96.5	No data
CWS	System Component Availability (%)	≥ 85	99.5	99.8
	Average Cooling Tower Range (°F)	≥ 30	33.5	35.6
	Average Cooling Tower Approach Temperature (°F)	≤ 12.0	10.0	7.8
DMW	System Component Availability (%)	≥ 85	99.8	99.9
	Average Process End Conductivity (µmho)	≤ 0.065	0.058	0.060
	Average Gallons Processed per Regen (gallons)	≥ 500,000	413,000	521,000

**System Performance Monitoring Report
Third Quarter 1992**

	Parameter	Target	Previous Quarter	Current Quarter
DWS	System Component Availability (%)	≥ 85	97.1	99.9
EPS	System Component Availability (%)	≥ 85	99.8	99.8
	System Functional Availability (%)	≥ 99.0	98.17	98.7
	System Functional Reliability (%)	≥ 97.5	100	100
ESS	System Component Availability (%)	≥ 85	99.97	99.99
FHS	System Component Availability (%)	≥ 85	96.6	98.8
	Fuel Movement Rate (bundles per hour) shuffle/reload	3.2/3.0	No data	No data
FOS	System Component Availability (%)	≥ 85	99.4	99.9
FPS	System Component Availability (%)	≥ 85	99.68	99.91
FWS	System Component Availability (%)	≥ 85	99.5	100
	Time S/G Chemistry in Specification (%)	≥ 98.0	99.39	100
HED	System Component Availability (%)	≥ 85	99.5	100
	Ave Feedwater Train Heat Input vs. Design (%) Train A/B	≥ 95.0	95.1/95.2	93.3/93.5
HPI	System Functional Availability (%)	≥ 99.6	99.93	99.95
	System Functional Reliability (%)	≥ 99	100	100
LPI	System Functional Availability (%)	≥ 99.0	100	99.88
	System Functional Reliability (%)	≥ 99.0	100	100
MGS	System Component Availability (%)	≥ 85	99.5	99.9
	Average Nitrogen Consumption (hcf/day)	≤ 100	61.9	33.1
	Average Hydrogen Consumption (scf/day)	≤ 120	361.5	223.9
MSS	System Component Availability (%)	≥ 85	99.0	99.8
	Steam Dump / Turbine Bypass Availability (%)	≥ 99	No data	100
	Primary to Secondary Leakrate (gpm)	≤ 0.01	0	0
	Average Daily S/G Blowdown Rate (lbm/hr) S/G A / S/G B	≤ 20,000	25,809/ 28,463	28,669/ 28,198
PCS	System Component Availability (%)	≥ 85	98.9	99.9
	PCS Leakrate (gpm)	≤ 0.1	0.0975	0.0855
RWS	System Component Availability (%)	≥ 85	99.94	99.7
	Evaporator Availability (%) A Evap/B Evap	87.25/85.75	100/61.7	37.7/63.3
	Evaporator Average Process Rate (gpm) A Evap/ B Evap	11.77/13.93	23.1/14.8	16.4/9.7
	Time Evap Bottom Chemistry in Specification (%)		100/100	100/100

System Performance Monitoring Report
Third Quarter 1992

	Parameter	Target	Previous Quarter	Current Quarter
SCS	System Component Availability (%)	≥ 85	100	100
SFP	System Component Availability (%)	≥ 85	99.8	99.9
	Chemistry in Specification (%)	≥ 95	94.6	100
SIT	System Functional Availability (%)	≥ 99.0	99.81	99.93
	Average Number of Level Adjustments per Month	1.25	1.10	1.25
SPS	System Component Availability (%)	≥ 85	99.4	99.7
	Time Without DC Ground > 3 ma (%)	≥ 96.0	No data	No data
	2400/4160 Volt System Functional Availability (%)	≥ 99.946	No data	No data
	480 Volt System Availability (%)	≥ 99.8	No data	No data
	125 VDC System Availability (%)	≥ 99.4	No data	No data
SWS	System Component Availability (%)	≥ 85	99.8	99.5
	System Functional Availability (%)	≥ 99.0	100	99.2
	System Functional Reliability (%)	≥ 99.0	98.9	100
TGS	System Component Availability (%)	≥ 85	98.0	99.8
	Turbine Generator Availability (%)	≥ 99	95.0833 #	86.4723
	Percent Average Daily Reheat Temperature of Design (%) A/B/C/D	≥ 98	99.7/99.9/ 99.9/99.9	99.1/99.5 99.3/99.5
VAS	System Component Availability (%)	≥ 85	99.8	99.78
	Control Room HVAC Functional Availability (%)	≥ 98	98.3	98.86
VRS	VRS Availability (%)	≥ 58.67	83.7	76.3
WGS	System Component Availability (%)	≥ 85	99.96	99.9
	Number of Waste Gas Decay Tanks Above 5% Oxygen (%)	0	0	No data

Shaded values indicate performance indicator did not meet target value

* Combined value for first and second quarter

Fourth contract year (July 1, 1991 through June 30, 1992)

AFW - AUXILIARY FEEDWATER SYSTEM

System operation continued without incident throughout the quarter.

CAS - COMPRESSED AIR SYSTEM

The humidity alarm on the M-2 instrument air dryer continues to be an item of concern. The humidity alarm was regularly in while the C-2B air compressor was in service during the summer months. The compressor was not kept in service for the normal equipment rotations due to these concerns. The problem has improved due to change in weather conditions but will return with warmer weather.

CCW - COMPONENT COOLING WATER SYSTEM

The limits for beta and gamma activity in the Component Cooling System have been revised to reflect expected conditions. This will result in a more useful evaluation of trend data.

CDS - CONDENSATE SYSTEM

The spare condensate pump is being refurbished. This refurbishment will eliminate a source of vibration and air in-leakage.

CIS - CONTAINMENT ISOLATION SYSTEM

Both the Personnel Air Lock and the Emergency Air Lock successfully passed their respective full pressure tests in September.

CRD - CONTROL ROD DRIVE SYSTEM

CRD leakoff rate dropped significantly following the mid August trip and stabilized at about 80 ml/minute after the next trip. This is unusual in that CRD-20 temperature remained high, but it may indicate self-lapping of the seal faces. CRD-20 temperature has remained stable at 207-208°F.

Rod 4" deviation alarms were determined to be a normal phenomenon which becomes especially apparent during repeated small rod movements. Resolution will include information for operators and evaluation of need to revise maintenance procedures, to be completed in time for the 1993 REFOUT.

There is no indication of sticking or dragging control rods during the several trips. However, a spare support tube is ready for installation if such problems are identified in the future.

CSS - CONTAINMENT SPRAY SYSTEM

System operation continued without incident throughout the quarter.

CVC - CHEMICAL AND VOLUME CONTROL SYSTEM

On August 25, the plant tripped from full power due to DEH problems. During the trip, Preferred AC Bus Y-20 and Channel B Pressurizer Level Control were lost. When pressurizer level control was switched to channel A, which was still powered, the constant speed charging pumps were expected to start. The pumps did not start and were subsequently started manually. It was found that a design flaw exists that allows an auto start signal and a trip signal to be present at the same time. The auto start signal was initiated much faster than the pressurizer level control signal could clear the standing trip signal. It is proposed to modify the Charging Pump control circuitry so that this problem will not reoccur.

DMW - DEMINERALIZED WATER SYSTEM

The average gallons processed per demineralizer regeneration significantly improved over the previous quarter. Changes were made to the chemical addition times near the end of the second quarter to correct a deficiency in sodium leakage. This appears to have been successful based on the improved throughput the demineralizers experienced during the third quarter.

EPS - EMERGENCY POWER SYSTEM

During the quarter, there were twenty six planned starts of the diesel generators with no start failures. Also, during the quarter the generators were loaded ten times with no load failures. The lower availability was caused by planned 1-2 diesel generation maintenance outage in September.

FHS - FUEL HANDLING SYSTEM

The system was not active during the quarter but planning and repairs continue to support the next REFOUT.

FOS - FUEL OIL SYSTEM

System operation continued without incident throughout the quarter.

FPS - FIRE PROTECTION SYSTEM

System operation continued without incident this quarter. The fire protection system for the Outage/Training Building was placed in service during the quarter.

FWS - MAIN FEEDWATER SYSTEM

On August 14, the reactor tripped on low Steam Generator A level caused by broken instrument air tubing on Main Feedwater Regulating Valve CV-0701. The tubing was replaced and the instrument tubing was inspected on other critical valves that could cause a trip or derate. During the inspection several small leaks were detected.

The radius of the spare Main Feedwater Pump impeller was reduced. The oversized impeller was found to have been the cause of the excessive vibrations that occurred on the A Main Feedwater Pump following the 1990 REFOUT.

HED - HEATERS, EXTRACTIONS AND DRAINS SYSTEM

Actuator yoke cracking was experienced on Reheater Drain Tank Control Valves CV-0538 and CV-0554. The cracking was experienced during the startup following the August 14 trip. Monitoring will be performed during subsequent startups to determine the root cause of the actuator cracking.

High Pressure Feedwater Heater (E-6A and E-6B) three inch running vent headers have through wall leaks where the one inch running vent enters the header. These headers were replaced during the 1992 REFOUT with stainless steel. A root cause investigation will be performed.

Heater Drain Pump P-10A packing gland cooling flow has been decreasing. During the period before the 1992 REFOUT the flow was 30% of full flow, but has now decreased to 8%. Continued monitoring will be performed by the system engineer.

HPI - HIGH PRESSURE SAFETY INJECTION SYSTEM

System operation continued without incident throughout the quarter.

LPI - LOW PRESSURE SAFETY INJECTION SYSTEM

System operation continued without incident throughout the quarter.

MGS - MISCELLANEOUS GAS SYSTEM

System operation continued without incident throughout the quarter.

MGS - HYDROGEN MONITORS AND RECOMBINERS

Both channels of the Hydrogen Monitoring System had an availability of 100% for the quarter.

MSS - MAIN STEAM SYSTEM

Both steam generator blowdowns are being operated near maximum capacity to reduce both sulfates and fluorides in the feedwater system.

Main Steam Isolation Valve CV-0501 developed a stuffing box packing plug leak. An engineering analysis identified a safety issue with pumping the stuffing box with sealant. Since the leak is minimal, repairs will be deferred until the 1993 REFOUT unless the leak propagates.

NMS - NEUTRON MONITORING SYSTEM

Source/Wide Range availability for the quarter was 99.95%.

Power Range availability for the quarter was 100%

PCS - PRIMARY COOLANT SYSTEM

System operation continued without incident throughout the quarter.

PCS - THERMAL MARGIN MONITOR

Cumulative Thermal Margin Monitor system availability is 99.8 %.

PCS - REACTOR VESSEL LEVEL MONITORING SYSTEM (RVLMS)

System availability for the quarter was 100%.

"A" Channel RVLMS has one sensor of the lower four inoperable. Resolution of the failed sensor is pending an evaluation of the system and determination if continued operation with a failed sensor is desirable. One failed sensor does not make the channel inoperable and replacement of the entire probe is the only repair option.

RIA - RADIATION MONITORS (AREA)

System availability for the quarter was 99.0 %.

RIA - RADIATION MONITORS (PROCESS)

System availability for the quarter was 98.83 %.

RPS - REACTOR PROTECTION SYSTEM

System availability from the startup from the 1992 REFOUT when the Reactor Protection System upgrade was installed is 98.3 %.

RWS - RADWASTE SYSTEM

Asbestos abatement was completed on "A" Evaporator. This was a major undertaking which while not adding efficiency should improve availability by easing maintenance. The "B" Evaporator was out of service for general maintenance which should improve efficiency in the future. Both evaporators still suffer from instrument problems which have been identified on the instrument upgrade program. Until upgrades occur the system will continue to be unable to reach manufacturer's design process rates.

SDC - SHUTDOWN COOLING SYSTEM

The shutdown cooling system was not in operation this quarter.

SFP - SPENT FUEL COOLING SYSTEM

The system operated reliably during the entire quarter.

SIT - SAFETY INJECTION TANKS (MECHANICAL)

Safety injection tank performance was affected this quarter by T-82 Relief Valve (RV-3128) lifting prematurely during the July 1 reactor trip. The valve was disassembled and found to have an eccentric compression screw bonnet bore. The bonnet was replaced and the valve tested satisfactorily. The valve has not lifted since the repair.

SPS - STATION POWER SYSTEM

With the exception of breakers 252-102 and 152-308, all 2400/4160 breakers functioned properly during the quarter.

During the July 1 plant trip, 4160 volt Bus 1A failed to fast transfer. The root cause for failed fast transfer was that breaker movement during closing action caused the breaker's foot pedal to bounce on the trip latch resulting in the breaker tripping free. Breaker 252-102 was removed from its cubicle to make foot pedal adjustments at a later date and replaced with the spare 4160 breaker. As a result of the 252-102 breaker's failure to close during the fast transfer, Bus 1A was inoperable for approximately 49 hours.

Heater Drain Pump P-10B Breaker 152-308 failed to close on August 18. Troubleshooting found the DC coil in the 52/X auxiliary closing relay to be burnt open. The spare 2400 volt breaker was installed and P-10B was returned to service. As a result of the 152-308 failure, P-10B was unavailable for approximately five hours.

SWS - SERVICE WATER SYSTEM

Travelling Screen F-4B jammed when one of its baskets had one of two mounting bolts back out. This allowed the basket to drop on one end and jam in the screen's guide boot. Divers were brought on site to complete repairs. After repairs were completed maintenance was completed on the remaining baskets on F-4B and on the other travelling screen to prevent similar problems.

Divers also retrieved bolting lost during the last Service Water Pump P-7B rebuild activity and perform Zebra mussel inspections on the service water bay, Fire System Jockey Pump P-13, and Motor Drive Fire Pump P-9A. The service water bay did not appear to have significant regrowth of mussels since it was hydrolased. P-9A did show a higher degree of Zebra mussel regrowth than was anticipated. The divers cleaned P-9A's suction screen which was approximately 69% covered with mussels. The components in the service water system will continued to be monitored for Zebra mussel infestation.

SWY - SWITCHYARD

Overhaul maintenance has been in progress for all switchyard air compressors. A review of the run time of the switchyard air compressors shows that air compressor 29F7 is not operating within the 1 hr/day goal.

TGS - TURBINE GENERATOR SYSTEM

There were three forced outages during the third quarter attributed to the turbine generator system. The first occurred on July 1 and was caused by a DEH trip due to a voltage fluctuation on 'E' bus due to a perturbation on the Argenta transmission line. The second trip

was on July 24 and was caused by a DEH trip due to a voltage fluctuation on 'E' bus during QO-1 testing. The third trip was on August 17 caused by an EHC O-ring failure on a reheat stop valve.

Losses in availability occurred as a result of the three trips discussed above. Availability losses were also caused by the DEH system during a start up of the plant after the August 14 forced outage and EHC troubleshooting and modifications performed during the September 19 outage as a result of the turbine valves not closing quickly during turbine trip testing.

The DEH system was modified after two forced outages by installing an Uninterruptible Power Supply (UPS) after it was found that the DEH was susceptible to fluctuations in power supply voltage. Further modifications were completed in the fourth quarter after another plant trip attributed to the DEH system.

Troubleshooting and testing implemented several modifications to the system as well as changes in system operation after several of the intercept and reheat stop valves did not close quickly on the turbine trip test after the September 19 outage. The cause of the sluggish valve closure was a combination of trip testing with cold EHC fluid and orifices in the reheat stop and intercept valves that were too large. Orifices plates with smaller orifices were installed and the operating temperature for the EHC system was raised to 100-120°F. Final testing of the system verified that the modifications were successful in eliminating the sluggish closing of the reheat stop and intercept valves.

VAS - HEATING, VENTILATION AND AIR CONDITIONING SYSTEMS

During the quarter both the Control Room HVAC and the plant HVAC systems performed well. Modification packages are being prepared maintain this level of performance. As a result of 10 CFR Part 21 concern, the electric heater contactors will be replaced on the emergency charcoal filters. A temporary modification will be developed to support the operability of Control Room HVAC Unit VC-10 when service water temperatures are lowered. Also, a redesigned control scheme will be developed to develop a suction head on start up of Control Room HVAC Units VC-10 and VC-11.

WGS - WASTE GAS SYSTEM

The waste gas system generally performed well. However, problems were found with the Waste Gas Decay Tanks Vent Flow Transmitter FIT-1121 being "pegged" off scale. Also, the pressure control valve was found to not be controlling pressure well and was thought to be contributing to the transmitter problems. It was discovered that Waste Gas Discharge Drain Trap DT-1123 was not operating properly resulting in water backing up into the pressure control valve causing it to fail. The problem was traced to a deficiency with a system operating procedure which has been corrected.

COMMENTS

CONDITION MONITORING

The following information is provided to indicate general trends and required action. System Engineers, Maintenance and Operations have been informed of the equipment conditions noted and the planned or predictive maintenance.

Pumps/Motors

Average pump/motor vibration level ended the third quarter at .24 ips, unchanged from the end of the second quarter value.

Current pump/motor concerns include: Containment Spray Pump P-54C (motor axial clearance), Seal Oil Cooler Booster Pump P-44 (motor stator eccentricity) and Air Side Seal Oil Pump P-22 (pump bearing wear). P-44 is scheduled to be replaced prior to the REFOUT and P-54C and P-22 are scheduled for maintenance during future outages.

Fans/Compressors

Overall fan/compressor vibration was 1.34 ips at the end of the third quarter, up slightly from the 1.27 ips second quarter value. This was primarily a result of increased vibration on Gland Steam Condenser Exhauster C-1A due to fan unbalance. It is planned to obtain and install a balanced fan to correct this problem.

Cooling Tower Fans

No testing was done on the cooling tower fans during the quarter. However, two gearboxes failed on cells B-7 and A-7, the seventh and thirteenth highest vibration levels of the thirty-six fans. Shortly after the quarter ended, the motor on B-11, which has the fourth highest vibration, catastrophically failed due to high gearbox vibration. These types of failures were expected and will likely continue in the future. Historically these fans have been run until failure then replaced. The cost effectiveness of this strategy is being evaluated.

Turbine Bearings

Turbine bearing vibration level was down slightly to 2.23 mils from last quarter's 2.35 mils. No concerns exist in this area.

THERMAL PERFORMANCE

The plant operated at full power for 58 days during the quarter and full power production averaged 812 Mwe. Significant production losses were seen during the quarter. These occurred in conjunction with discovery of instrument errors and weather conditions. Listed below are the conditions seen during the quarter and third effects on megawatt production.

- 10.0 Discovery of an error in the Plant gross megawatt meter resulting in higher than actual readings.
- 10.0 Warmer weather during the quarter compared to the second quarter resulted in lower plant production.
- 3.0 Decrease in condenser cleanliness.
- 1.2 Decrease in reheat steam temperature
- 3.2 Additional correction for potentiometer adjustment on June 29.
- 27.4 Total

A summary of plant thermal performance statistics is presented below:

Year-to-Date Gross Heat Rate.....	10,510Btu/kwh
Goal Gross Heat Rate.....	10,550Btu/kwh
Year-to-Date INPO Thermal Performance Indicator.....	99.64%
Goal INPO Thermal Performance Indicator.....	99.50%

COMPONENT FAILURE ANALYSIS REPORT

No concerns other than those identified in the Second Quarter System Performance Monitoring Report were identified in the current standard Component Failure Analysis Report (CFAR).

PALISADES



NUCLEAR PLANT

**PALISADES
PERFORMANCE**

November 30, 1992



**Consumers
Power**

**POWERING
MICHIGAN'S PROGRESS**

PALISADES PERFORMANCE

- **INTRODUCTION** **PAT DONNELLY**
- **PLANT SHUTDOWNS** **TOM PALMISANO**
BOB HAMM
- **LEERS** **TOM PALMISANO**
- **CLOSING** **JERRY SLADE**
DAVE HOFFMAN

INTRODUCTION

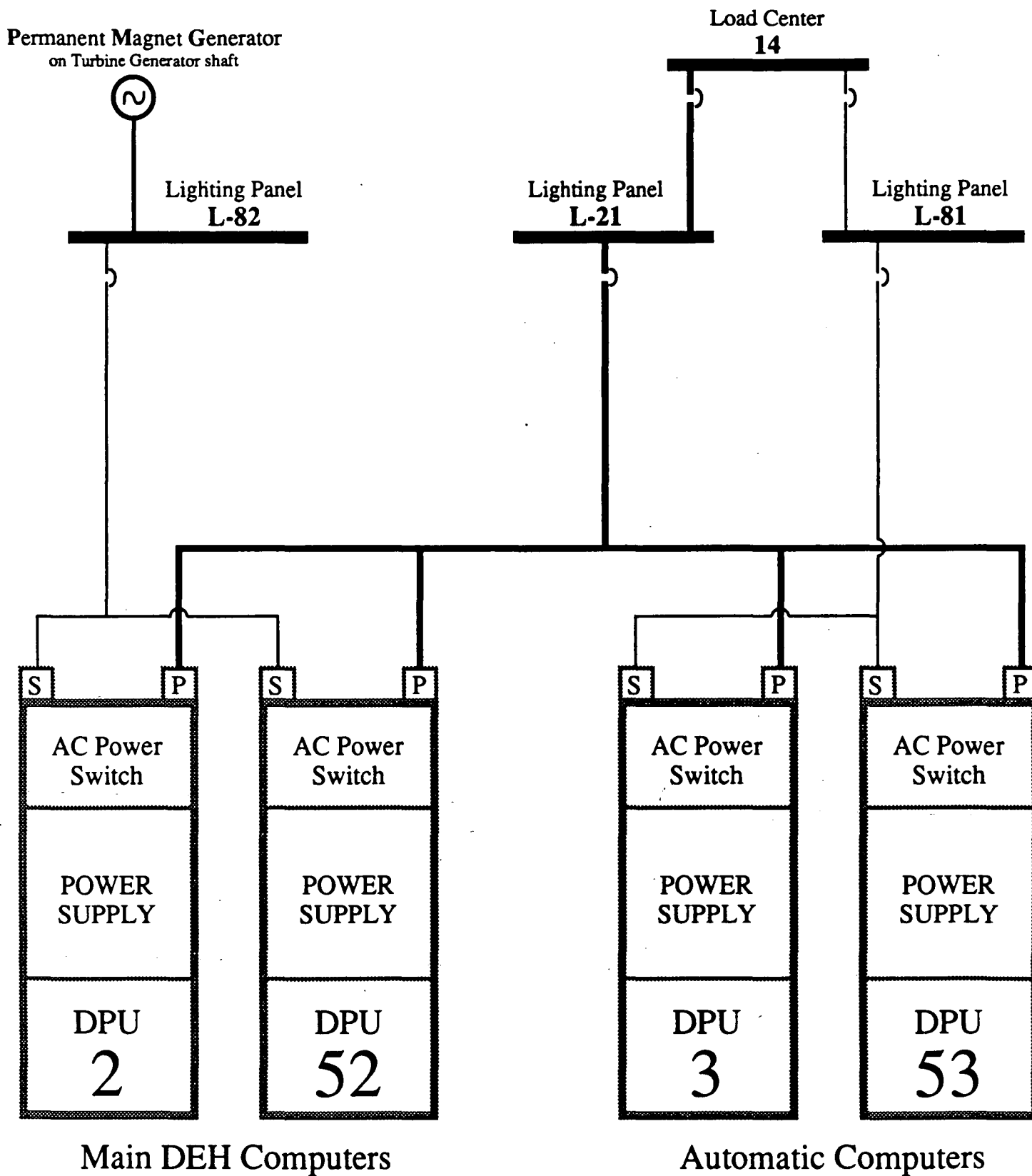
- **STARTUP FROM 92 REFOUT
APRIL 19**
- **100% CAPACITY FACTOR MAY
AND JUNE**
- **FOUR REACTOR TRIPS IN JULY
AND AUGUST**
- **FATAL ACCIDENT IN SEPTEMBER**
- **EIGHT DAY EHC SYSTEM
OUTAGE IN SEPTEMBER**
- **REACTOR TRIP IN OCTOBER**

JULY 1 REACTOR TRIP

- **PLANT OPERATING NORMALLY AT 100%**
- **TURBINE TRIP**
- **REACTOR TRIP CAUSED BY TURBINE TRIP**
- **CAUSE: LOOSE CONNECTORS IN DEH COMPUTERS, POWER SUPPLY VOLTAGE TRANSIENT**
- **PLANT RESPONSE VERY GOOD**

Simplified DEH computer layout and power supplies

SHOWS PRIOR TO ADDITION OF UPS FOLLOWING JULY 24, '92 REACTOR TRIP

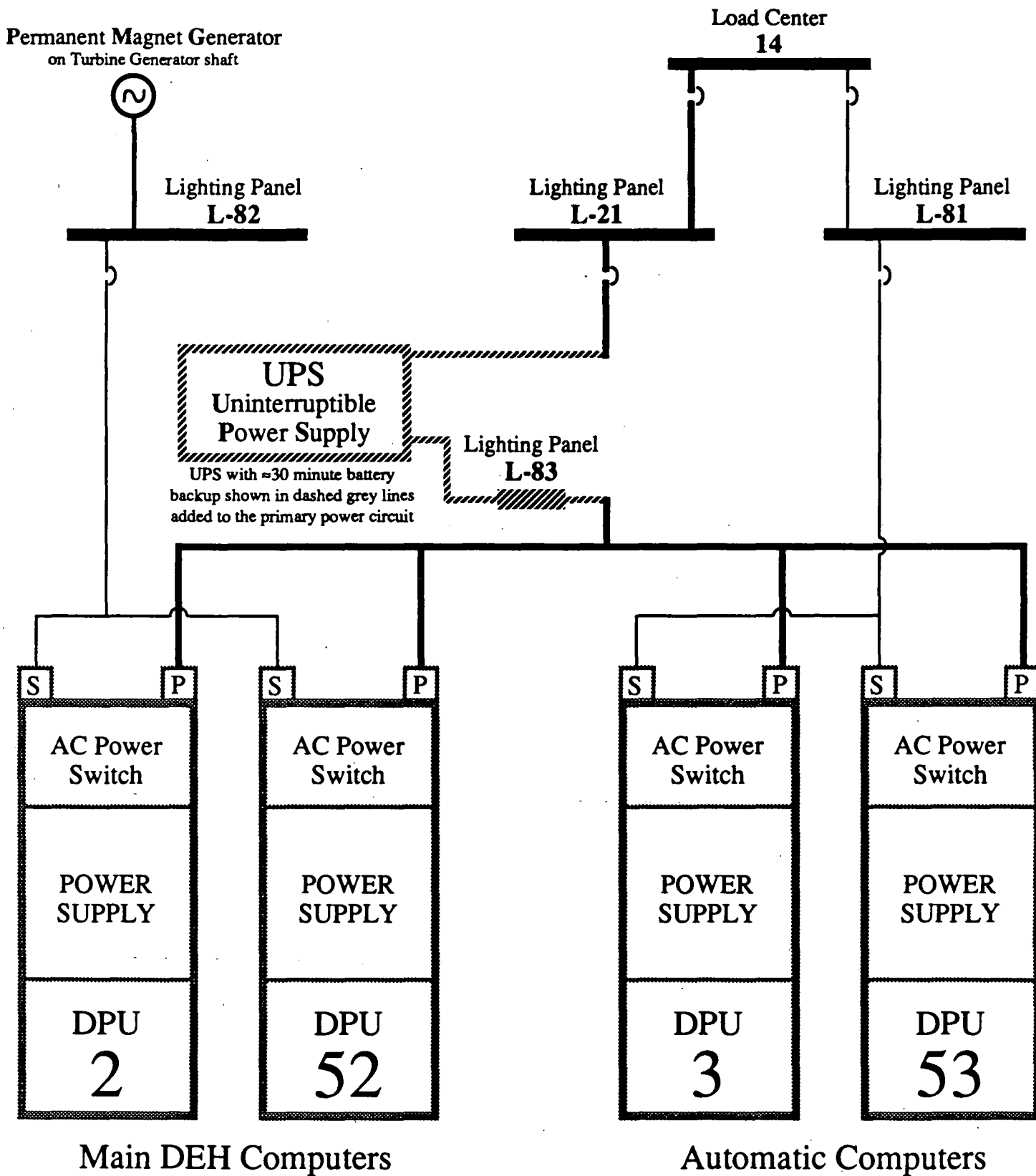


JULY 24 REACTOR TRIP

- **PLANT OPERATING NORMALLY
AT 100%**
- **TURBINE TRIP**
- **REACTOR TRIP CAUSED BY
TURBINE TRIP**
- **CAUSE: VOLTAGE TRANSIENT
DURING SURVEILLANCE TEST
CAUSED DEH COMPUTERS TO
DROP OFF**
- **DEH COMPUTERS FUNCTIONING
PROPERLY DURING SAME TEST
ON 10/26/92**
- **PLANT RESPONSE EXCELLENT**

Simplified DEH computer layout and power supplies

SHOWS ADDITION OF UPS FOLLOWING JULY 24, '92 REACTOR TRIP



AUGUST 14 REACTOR TRIP

- **PLANT OPERATING NORMALLY AT 100%**
- **PARTIAL LOSS OF FEED TO "A" STEAM GENERATOR**
- **REACTOR TRIP ON LOW STEAM GENERATOR LEVEL**
- **CAUSE: BROKEN AIR LINE ON FEEDWATER REG VALVE TO "A" STEAM GENERATOR**
- **PLANT RESPONSE EXCELLENT**

AUGUST 24 REACTOR TRIP

- **PLANT OPERATING NORMALLY AT 100%**
- **FAILURE OF ONE OF FOUR 120VAC PREFERRED BUSES**
- **BLOWN FUSE IN POWER SUPPLY ON RPS MATRIX**
- **REACTOR TRIP DUE TO DE-ENERGIZATION OF RPS MATRIX**
- **CAUSE: FAILED REGULATING TRANSFORMERS IN INVERTER, UNDERSIZED FUSE IN RPS**
- **PLANT RESPONSE EXCELLENT**

SEPTEMBER 18 FATAL ACCIDENT

- **TECHNICIAN TROUBLESHOOTING
MEGAWATT TRANSDUCERS**
- **DURING RESTORATION
INADVERTENTLY OPEN CIRCUITED
A CURRENT TRANSFORMER**
- **EXPOSED TO ESTIMATED 5500 VOLTS**
- **REMOVED PLANT FROM SERVICE
FOR 24 HOURS TO INVESTIGATE
AND REPAIR CIRCUITRY**

SEPTEMBER 20 EHC OUTAGE

- **DURING TURBINE STARTUP REHEAT & INTERCEPT VALVES FAILED TO CLOSE PROPERLY ON TRIP TEST**
- **EXTENSIVE TROUBLESHOOTING OF EHC SYSTEM**
- **PLANT OFFLINE FOR EIGHT DAYS FOR TROUBLESHOOTING AND REPAIRS**

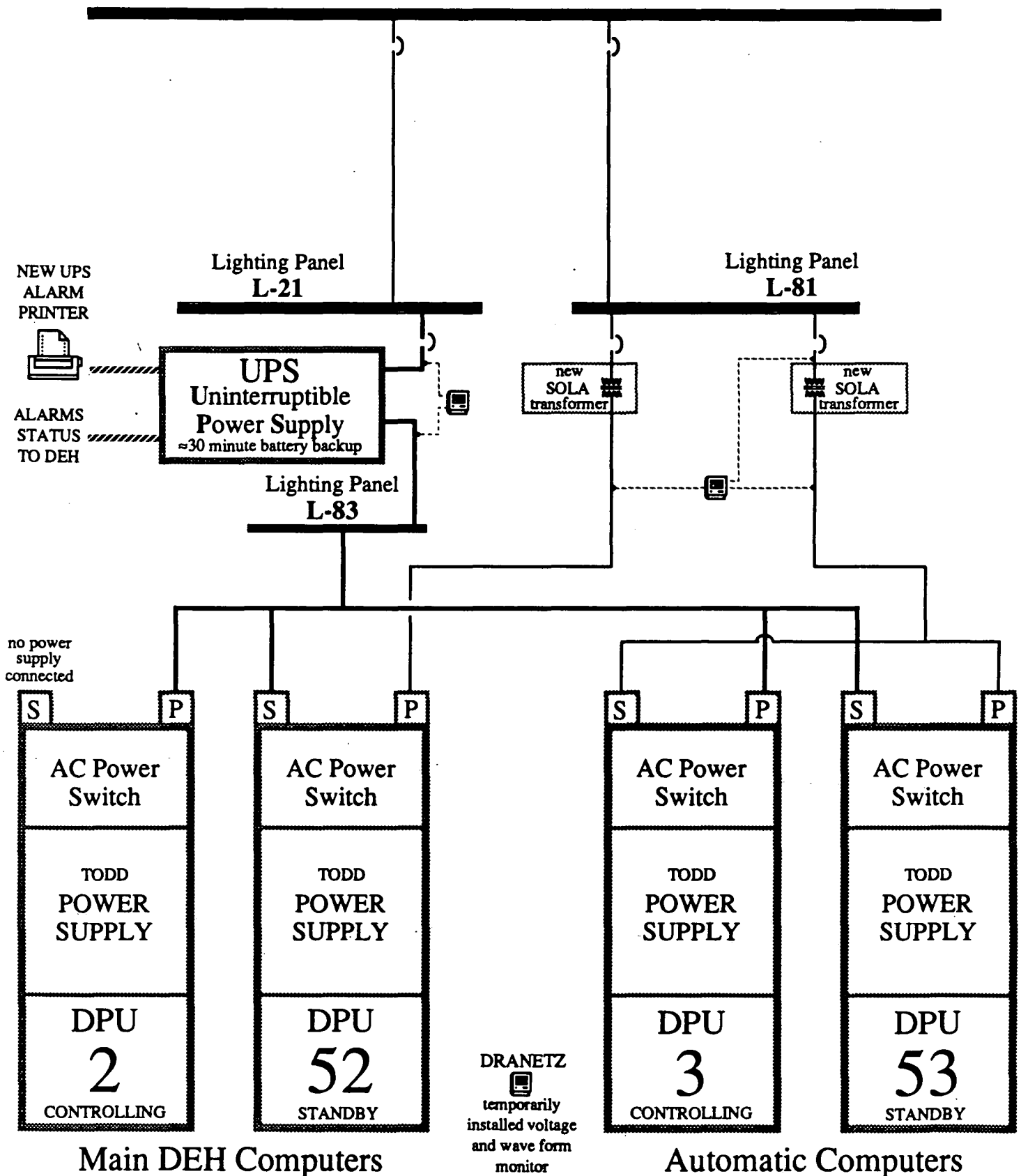
OCTOBER 30 REACTOR TRIP

- **PLANT OPERATING NORMALLY AT 100%**
- **TURBINE TRIP**
- **REACTOR TRIP CAUSED BY TURBINE TRIP**
- **CAUSE: FAILURE OF UNINTERRUPTIBLE
POWER SUPPLY TO DEH COMPUTERS**
- **DEH FUNCTIONING PROPERLY DURING
TRANSMISSION SYSTEM TRANSIENTS ON
11/16/92**
- **PLANT RESPONSE VERY GOOD**

Simplified DEH computer layout and power supplies

Shows rewiring of DPU power supplies, SOLA, and addition of new UPS alarm printer and status information to DEH.

Load Center 14



SUMMARY

- **FIVE REACTOR TRIPS**
 - **THREE OF FIVE DUE TO NEW DEH SYSTEM; POWER SUPPLY SENSITIVITY APPEARS TO BE CAUSE**
 - **ONE TRIP DUE TO UNDERSIZED FUSE IN RPS**
 - **ONE TRIP DUE TO BROKEN AIR LINE**
- **EHC OUTAGE**
- **POSITIVE PERFORMANCE OF MODIFICATIONS**
- **PLANT AND OPERATOR RESPONSE WERE EXCELLENT**

LER SUMMARY

EQUIPMENT FAILURES

92004: LOSS OF CONTAINMENT INTEGRITY DUE TO ESCAPE AIRLOCK EQUALIZING VALVE FAILURE

92008: BOTH TRAINS OF CONTROL ROOM HVAC INOPERABLE DUE TO FAILURE

CONTROL OF OUTAGE WORK

92021: LOSS OF CONTAINMENT INTEGRITY DUE TO OPENING AFW CHECK VALVE DURING INAPPROPRIATE PLANT CONDITIONS

92024: LOSS OF 1C BUS CAUSING ESF ACTUATION AND LOSS OF SHUTDOWN COOLING

(continued)

PROCEDURAL COMPLIANCE

92029: LEFT CHANNEL SEQUENCER ACTUATION
CAUSED BY DE-ENERGIZING 1C BUS BY
OPENING EDG OUTPUT BREAKER

TEST PROCEDURE/TEST INSTRUCTIONS
INADEQUATE

92031: LEFT CHANNEL DBA SEQUENCER
ACTUATION CAUSED BY INCORRECT
TEST CABLE CONNECTIONS

92032: RIGHT CHANNEL SIS ACTUATION CAUSED
BY INADEQUATE TEST PROCEDURE
DURING DBA SEQUENCER TESTING

(continued)

DESIGN ISSUE, ENVIRONMENTAL QUALIFICATION

92007: MSIV ACTUATOR SOLENOIDS NOT ENVIRONMENTALLY QUALIFIED FOR A MSLB OUTSIDE OF CONTAINMENT

92016: CONTROL FOR SERVICE WATER VALVES TO THE CCW HEAT EXCHANGERS NOT ENVIRONMENTALLY QUALIFIED FOR A MSLB OUTSIDE OF CONTAINMENT

92018: SAFETY INJECTION TANK CONTROL VALVES NOT ENVIRONMENTALLY QUALIFIED FOR A LOCA

92023: HOT LEG INJECTION VALVE ELECTRICAL CONNECTIONS NOT ENVIRONMENTALLY QUALIFIED FOR A LOCA

DESIGN ISSUE, CONFIGURATION CONTROL PROGRAM

92028: DIESEL GENERATOR ROOM COOLING FANS NOT POWERED FROM CLASS 1E POWER

Meeting Summary, Memoranda for Trip Reports or Site Visits

DISTRIBUTION:

Docket File (50-255)

NRC & Local PDRs

PDIII-1 Reading File

T. Murley/F. Miraglia

J. Partlow

J. Roe

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L. Marsh

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D. Liao

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OGC

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NRC Participants

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W. Shafer, Region III

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