TEXAS UTILITIES GENERATING COMPANY
SKYWAY TOWER • 400 NORTH OLIVE STREET, L.B. 81 • DALLAS, TEXAS 75201

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919

August 24, 1984

Director of Nuclear Reactor Regulation
Attention: Mr. B. J. Youngblood, Chief
Licensing Branch No. 1
Division of Licensing
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

SUBJECT: COMANCHE PEAK STEAM ELECTRIC STATION
DOCKET NOS. 50-445 AND 50-446
RESPONSE TO QUESTIONS ON THE SAFETY
PARAMETER DISPLAY SYSTEM

REF: (1) B. J. Youngblood to M. D. Spence letter of August 7, 1984, entitled "Request for Additional Information Concerning the Safety Parameter Display System (SPDS) for Comanche Peak Steam Electric Station (Units 1 and 2)"

Dear Sir:

Attached is the response to reference (1). Attachment A responds to the specific questions. Attachment B is a list of the parameters available in each Mode of Operation (NORMAL, HEAT UP/COOL DOWN, and/or COLD SHUTDOWN). Also indicated in the list is if the parameter is trended or available (numerically) in the 1/2 page Accident Indication Displays (AIDs). Also available on the top level display is the Critical Safety Function Monitor (CSFM) summary for each tree. In the message area of the top level display are indications of Power, AUCT HI T_{avg}, Start-up rate, etc.

The final parameter safety analysis is scheduled for completion mid-September 1984. This analysis will be submitted when available.

Respectfully,

D R Woodlan for

H. C. Schmidt

DRW:tls
Attachments
Original + 40 copies

B001
1/1

Q033.1 SAFETY PARAMETER DISPLAY SYSTEM

Each operating reactor shall be provided with a Safety Parameter Display System (SPDS). The Commission approved requirements for an SPDS are defined in NUREG-0737, Supplement 1. In the Regional Workshops on Generic Letter 82-33 held during March 1983, the NRC discussed these requirements and the staff's review of the SPDS.

The staff reviewed the SPDS description provided by Texas Utilities Generating Company (Reference 1). The staff was unable to complete the review because of insufficient information. The following additional information is required to continue the review:

Instrumentation and Control Systems Information

1. Isolation Devices:

   Provide the following:

   a. For each type of device used to accomplish electrical isolation, describe the specific testing performed to demonstrate that the device is acceptable for its application(s). This description should include elementary diagrams when necessary to indicate the test configuration and how the maximum credible faults were applied to the devices.

   b. Data to verify that the maximum credible faults applied during the test were the maximum voltage/current to which the device

could be exposed, and define how the maximum voltage/current was determined.

c. Data to verify that the maximum credible fault was applied to the output of the device in the transverse mode (between signal and return) and other faults were considered (i.e., open and short circuits).

d. Define the pass/fail acceptance criteria for each type of device.

e. A commitment that the isolation devices comply with the environmental qualifications (10 CFR 50.49) and with the seismic qualifications which were the basis for plant licensing.

f. A description of the measures taken to protect the safety systems from electrical interference (i.e., Electrostatic Coupling, EMI, Common Mode and Crosstalk) that may be generated by the SPDS.

2. Provide conclusions regarding unreviewed safety questions or changes to technical specifications.

The applicant has committed to providing a safety analysis concerning the SPDS prior to fuel load (Reference 2). When that analysis is submitted and the applicant has responded to this request for information, the staff will continue its review process.

REFERENCES

1. Amendment 36 to the Comanche Peak FSAR, Section III, A-21 through A-28.

2. Letter to B. J. Youngblood (NRC) from R. J. Gary (TUGCO), dated April 15, 1983.

R033.1 1. Isolation Devices

The isolation of the SPDS from safety related devices is described as follows for each type of safety related device that has an input to the SPDS computer system.

1.1 Multiplexed Analog and Digital Inputs

These inputs are obtained from various systems throughout the plant. Examples of analog signals are: tank levels, system pressures, flow rates, etc. Examples of digital signals are: valve position, breaker position, etc. All multiplexed inputs from safety related devices are routed to their respective (Train A or B) qualified multiplexer cabinets (MUX) located in the environmentally protected cable spread room. Since the output of the qualified multiplexers is used as input to the non-qualified SPDS computer system, an appropriate qualified isolation device was chosen that would electrically isolate the MUXs from the SPDS and also allow the rapid transmission of data. Fiber Optic Cable (FOC) was chosen as the isolation device. FOC provides optical coupling and is totally immune to all

types of electrical interference (i.e., electrostatic coupling, electro-magnetic interference, RF interference, cross talk, etc.) that might otherwise affect the safety device. All credible adverse conditions were considered and tested per specifications given in the qualification test report. The isolation devices are in compliance with applicable NRC guidelines and IEEE standards for environmental and seismic qualification and the entire MUX system is designed and qualified for "fail-safe" operation.

1.2 Core Cooling Monitor Inputs

The inputs to the SPDS from the core exit thermocouples and the Margin to Saturation indicator is by way of the two (Train A and Train B) qualified safety related Core Cooling Monitors (CCM). The input signal from each CCM is an optically isolated ASCII character string transmitted on a standard RS232 data link. The optical isolation between the safety related circuits and the non-qualified data link is accomplished within the CCM itself using a qualified optical isolator which provides electrical isolation and rapid data transmission. All credible adverse conditions were considered and tested per specifications given in the qualification test report. The isolation devices are in compliance with applicable NRC guidelines and IEEE standards for environmental and seismic qualification and the entire CCM system is designed for "fail-safe" operation.

1.3 Radiation Monitoring System Inputs

All inputs to the SPDS from the Radiation Monitoring System (RMS) are transmitted as ASCII data from the RMS computer system. (Except for containment radiation inputs which are routed to the multiplexers described in section 1.1 above.) The RMS computers are non-safety related devices therefore no provision for electrical isolation between them and the SPDS is required.

1.4 Reactor Vessel Level Indication System Inputs

All inputs to the SPDS from the qualified Reactor Vessel Level Indication System (RVLIS) are transmitted as ASCII data through a fiber optic cable (FOC) data link from the qualified, safety related RVLIS cabinet to the SPDS computer system. FOC was chosen as the electrical isolation device for the reasons given in 1.1 above. All credible adverse conditions were considered and tested per specifications given in the qualification test reports. The isolation devices are in compliance with applicable NRC guidelines and IEEE standards for environmental and seismic qualification and the entire RVLIS system is designed for "fail-safe" operation.

2.0 Safety Question/Technical Specification

All portions of the SPDS have been designed and specified such that all design basis safety questions have been considered. The SPDS, as implemented at CPSES Units 1 and 2,

1. does not increase the probability of occurrence or the consequences of an accident or malfunction of equipment important to safety previously evaluated in the FSAR,

2. does not create the possibility for an accident or malfunction of a different type than any evaluated previously in the FSAR, or

3. does not reduce the margin of safety as defined in the technical specifications.

No changes to the CPSES Unit 1 or Unit 2 Technical Specifications have been effected by the addition of the SPDS.

Reference 2 did not include a commitment to submit the parameter safety analysis; however, in response to this question, the analysis will be submitted by separate letter when completed.

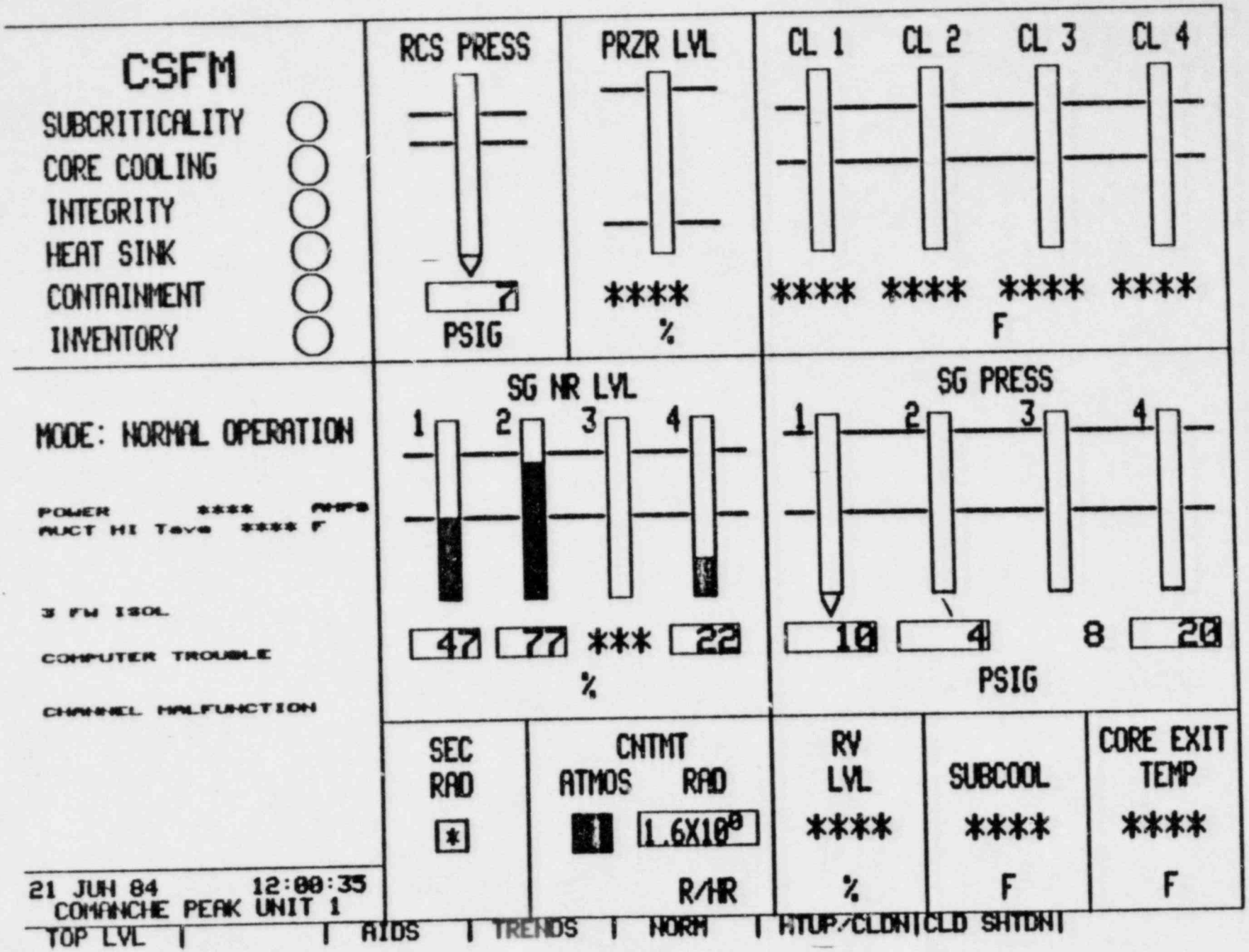
ATTACHMENT B

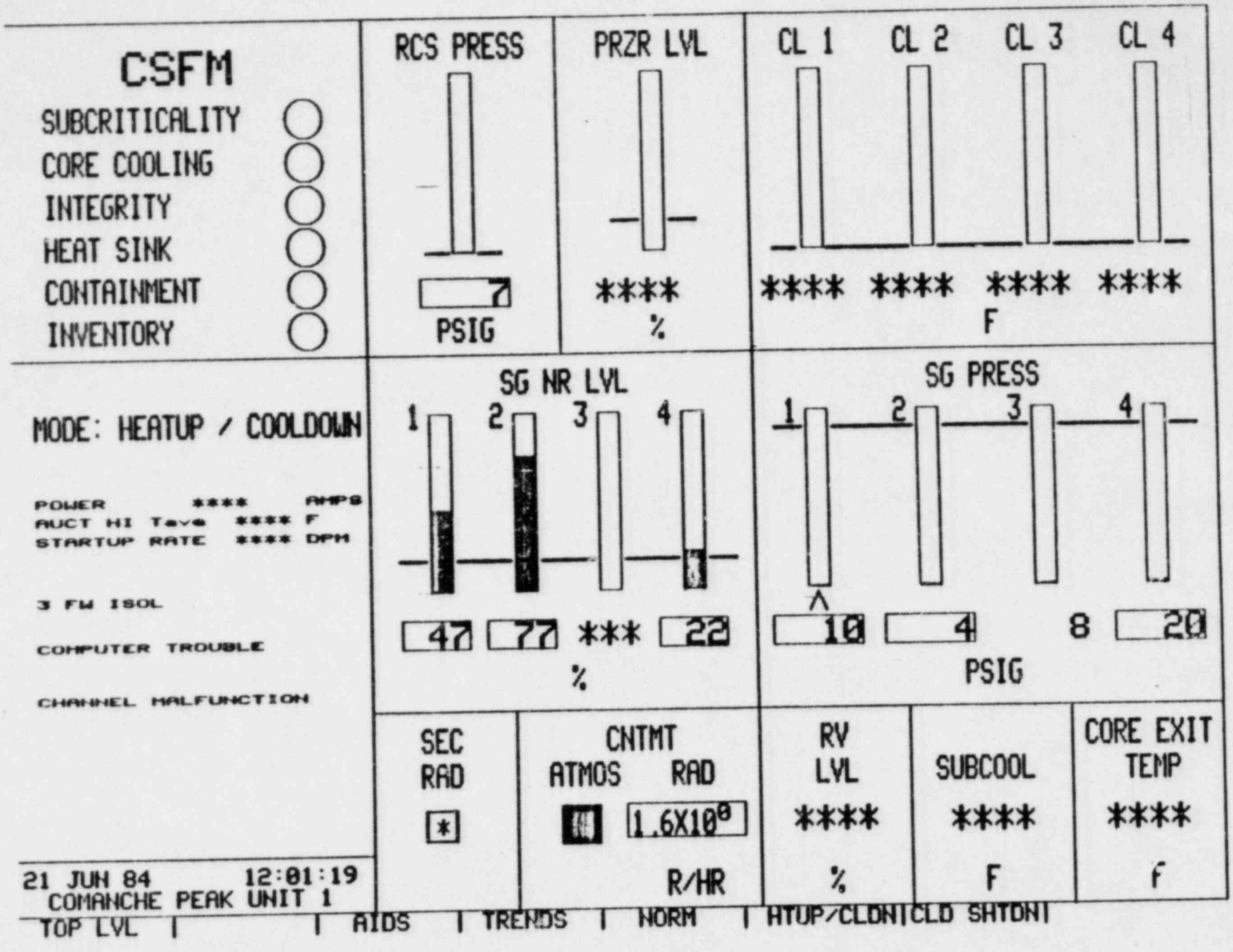
INPUT PARAMETER	MODES NORMAL	MODES HU/CLDN	MODES (2 Hr. Trend) CLD SHTDN	AIDS	TRENDS (½ HR)
RCS PRESS	X	X	X	LOCA SGTR	X
PRZR LVL	X	X		LOCA SGTR LOSC	X
RCS LOOP TEMP CL1	X	X			X
RCS LOOP TEMP CL2	X	X			X
RCS LOOP TEMP CL3	X	X			X
RCS LOOP TEMP CL4	X	X			X
SG NR LVL 1	X	X		LOSC SGTR ICC	X
SG NR LVL 2	X	X		LOSC SGTR ICC	X
SG NR LVL 3	X	X		LOSC SGTR ICC	X
SG NR LVL 4	X	X		LOSC SGTR ICC	X
SG PRESS 1	X	X		LOSC	X
SG PRESS 2	X	X		LOSC	X
SG PRESS 3	X	X		LOSC	X
SG PRESS 4	X	X		LOSC	X
SEC RAD TARGET	X	X			
(a) COND OFF GAS				SGTR	X
(b) SG BLDN RAD				SGTR	X
CNTMT ATMOS TARGET	X	X			
(a) PRESSURE				LOCA SGTR LOSC	X
(b) TEMP				LOCA SGTR LOSC	X

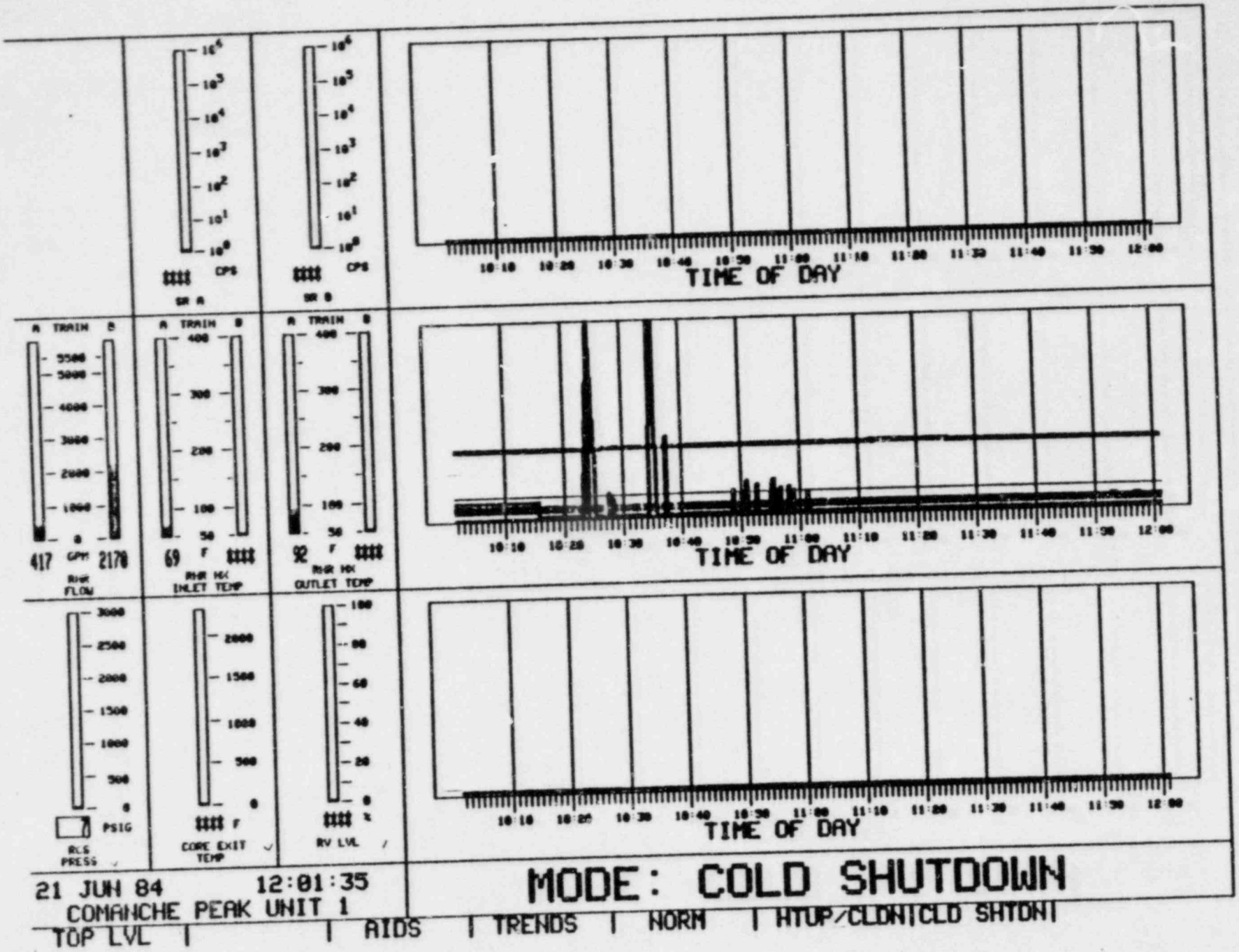
INPUT PARAMETER	MODES NORMAL	HU/CLDN	(2 Hr. Trend) CLD SHTDN	AIDS	TRENDS (½ HR)
(c) WTR LVL				LOCA	X
(d) HUMIDITY				LOCA SGTR LOSC	X
CNTMT RAD	X	X		LOCA	X
RV LVL	X	X	X	ICC	X
MARGIN TO SATURATION	X	X		ICC	X
CORE EXIT TEMP	X	X	X	ICC	X
SR A			X		
SR B			X		
RHR FLOW A			X		
RHR FLOW B			X		
RHR HX INLET TEMP A			X		
RHR HX INLET TEMP B			X		
RHR HX OUTLET TEMP A			X		
RHR HX OUTLET TEMP B			X		
PRZR PORV				LOCA	
PRZR SFTY VLV				LOCA	
PRT PRESS				LOCA	
HIGHEST CNTMT SUMP LVL				LOSC SGTR	
HIGHEST SG NR LVL				SGTR	
SG AFW FLOW 1				SGTR	
SG AFW FLOW 2				SGTR	
SG AFW FLOW 3				SGTR	
SG AFW FLOW 4				SGTR	
LOWEST SG NR LVL				LOSC	
LOWEST SG PRESS				LOSC	

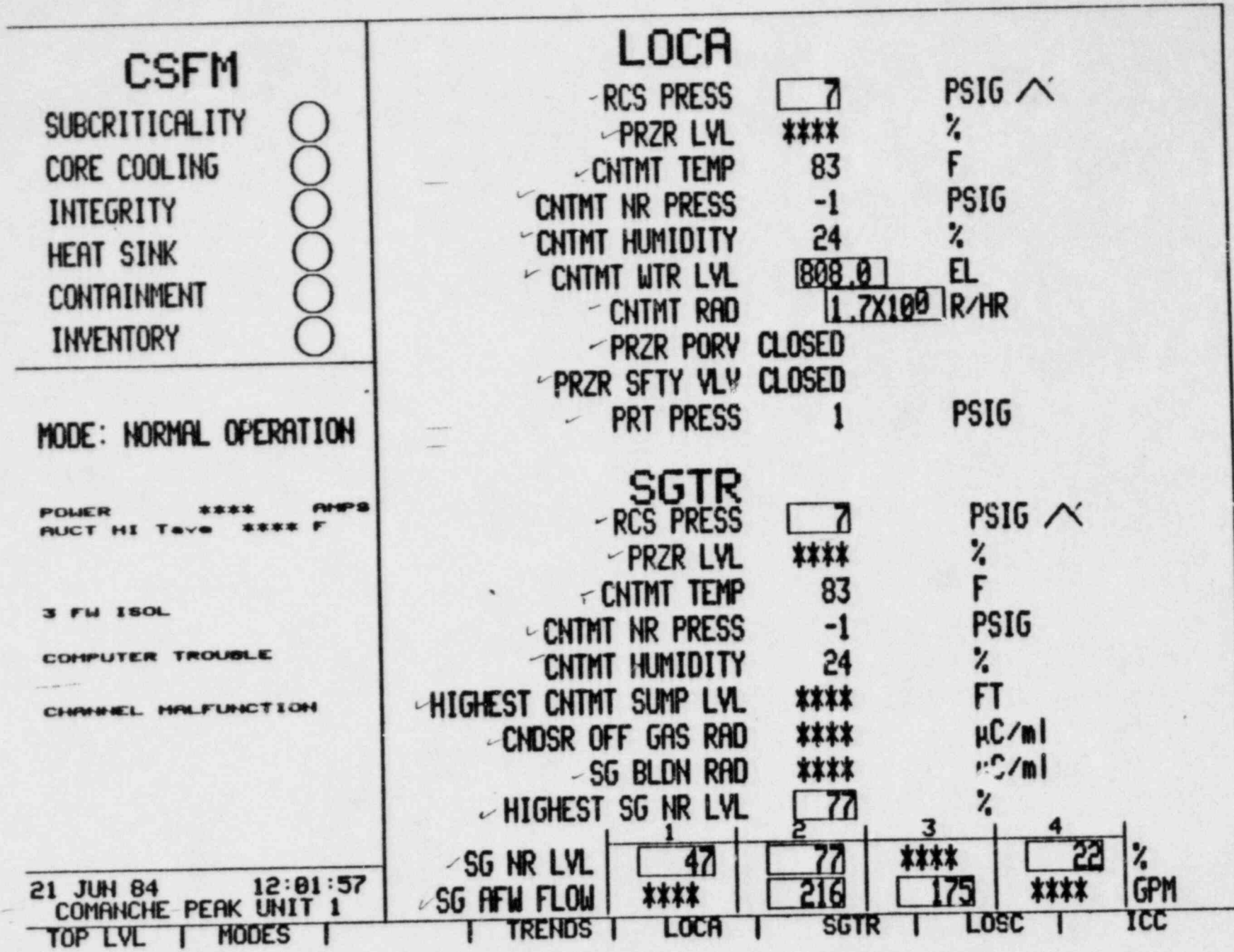
INPUT PARAMETER	MODES NORMAL	HU/CLDN	(2 Hr. Trend) CLD SHTDN	AIDS	TRENDS (½ HR)
MS-FW MISMATCH 1				LOSC	
MS-FW MISMATCH 2				LOSC	
MS-FW MISMATCH 3				LOSC	
MS-FW MISMATCH 4				LOSC	
RCP (ON/OFF)				ICC	
SR				ICC	X
IR					X
PR					X
CNTMT SUMP LVL 1					X
CNTMT SUMP LVL 2					X
RWST					X
CST					X
SG WR LVL 1					X
SG WR LVL 2					X
SG WR LVL 3					X
SG WR LVL 4					X
STM FLOW 1					X
STM FLOW 2					X
STM FLOW 3					X
STM FLOW 4					X
AFW FLOW 1					X
AFW FLOW 2					X
AFW FLOW 3					X
AFW FLOW 4					X

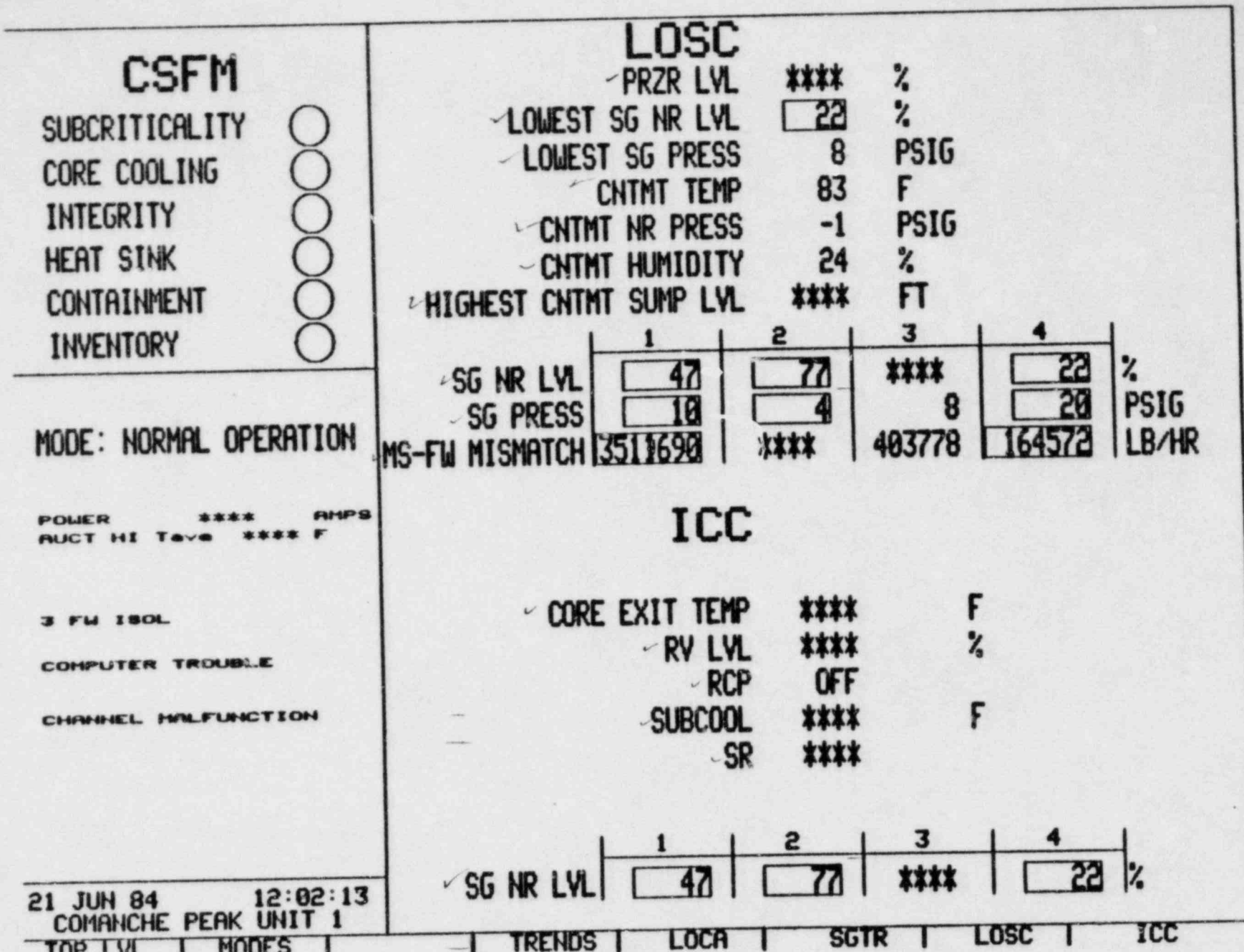
INPUT PARAMETER	MODES NORMAL	MODES HU/CLDN	MODES (2 Hr. Trend) CLD SHTDN	AIDS	TRENDS (½ HR)
RCS LOOP TEMP HL 1					X
RCS LOOP TEMP HL 2					X
RCS LOOP TEMP HL 3					X
RCS LOOP TEMP HL 4					X
CNTMT H_2 CONC					X
HIGHEST MSL RAD					X


CSFM
SUBCRITICALITY
CORE COOLING
INTEGRITY
HEAT SINK
CONTAINMENT
INVENTORY
RCS PRESS
PSIG
PRZR LVL
%
CL 1
CL 2
CL 3
CL 4
F
MODE: NORMAL OPERATION
POWER **** AMPS
AUCT HI Tave **** F
3 FW ISOL
COMPUTER TROUBLE
CHANNEL MALFUNCTION
SG NR LVL
%
SG PRESS
PSIG
SEC RAD
CNTMT ATMOS RAD
R/HR
RV LVL
%
SUBCOOL
F
CORE EXIT TEMP
F
21 JUN 84 12:00:35
COMANCHE PEAK UNIT 1
TOP LVL
AIDS
TRENDS
NORM
HTUP/CLDN
CLD SHTDN


CSFM
SUBCRITICALITY
CORE COOLING
INTEGRITY
HEAT SINK
CONTAINMENT
INVENTORY
RCS PRESS
7
PSIG
PRZR LVL
****
%
CL 1
CL 2
CL 3
CL 4
**** **** **** ****
F
MODE: HEATUP / COOLDOWN
POWER **** AMPS
AUCT HI Tave **** F
STARTUP RATE **** DPM
3 FW ISOL
COMPUTER TROUBLE
CHANNEL MALFUNCTION
SG NR LVL
1 2 3 4
47 77 *** 22
%
SG PRESS
1 2 3 4
10 4 8 20
PSIG
SEC RAD
*
CNTMT ATMOS RAD
1.6X10⁰
R/HR
RV LVL
****
%
SUBCOOL
****
F
CORE EXIT TEMP
****
f
21 JUN 84 12:01:19
COMANCHE PEAK UNIT 1
TOP LVL | AIDS | TRENDS | NORM | HTUP/CLDN | CLD SHTDN


SR A
CPS
SR B
CPS
A TRAIN B
417 GPM 2170
RHR FLOW
A TRAIN B
69 F
RHR HX INLET TEMP
A TRAIN B
92 F
RHR HX OUTLET TEMP
TIME OF DAY
TIME OF DAY
TIME OF DAY
PSIG
RCS PRESS
F
CORE EXIT TEMP
%
RV LVL
21 JUN 84 12:01:35
COMANCHE PEAK UNIT 1
MODE: COLD SHUTDOWN
TOP LVL | AIDS | TRENDS | NORM | HTUP/CLDN|CLD SHTDN|


CSFM
SUBCRITICALITY
CORE COOLING
INTEGRITY
HEAT SINK
CONTAINMENT
INVENTORY
MODE: NORMAL OPERATION
POWER **** AMPS
AUCT HI Tave **** F
3 FW ISOL
COMPUTER TROUBLE
CHANNEL MALFUNCTION
21 JUN 84 12:01:57
COMANCHE PEAK UNIT 1
TOP LVL | MODES |
LOCA
RCS PRESS 7 PSIG
PRZR LVL **** %
CNTMT TEMP 83 F
CNTMT NR PRESS -1 PSIG
CNTMT HUMIDITY 24 %
CNTMT WTR LVL 808.0 EL
CNTMT RAD 1.7X10⁰ R/HR
PRZR PORV CLOSED
PRZR SFTY VLV CLOSED
PRT PRESS 1 PSIG
SGTR
RCS PRESS 7 PSIG
PRZR LVL **** %
CNTMT TEMP 83 F
CNTMT NR PRESS -1 PSIG
CNTMT HUMIDITY 24 %
HIGHEST CNTMT SUMP LVL **** FT
CNDSR OFF GAS RAD **** µC/ml
SG BLDN RAD **** µC/ml
HIGHEST SG NR LVL 77 %
1 2 3 4
SG NR LVL 47 77 **** 22 %
SG AFW FLOW **** 216 175 **** GPM
| TRENDS | LOCA | SGTR | LOSC | ICC


CSFM
SUBCRITICALITY
CORE COOLING
INTEGRITY
HEAT SINK
CONTAINMENT
INVENTORY
MODE: NORMAL OPERATION
POWER **** AMPS
AUCT HI Tave **** F
3 FW ISOL
COMPUTER TROUBLE
CHANNEL MALFUNCTION
21 JUN 84 12:02:13
COMANCHE PEAK UNIT 1
TOP LVL | MODES |
LOSC
PRZR LVL **** %
LOWEST SG NR LVL 22 %
LOWEST SG PRESS 8 PSIG
CNTMT TEMP 83 F
CNTMT NR PRESS -1 PSIG
CNTMT HUMIDITY 24 %
HIGHEST CNTMT SUMP LVL **** FT
1 2 3 4
SG NR LVL 47 77 **** 22 %
SG PRESS 10 4 8 20 PSIG
MS-FW MISMATCH 351690 **** 403778 164572 LB/HR
ICC
CORE EXIT TEMP **** F
RV LVL **** %
RCP OFF
SUBCOOL **** F
SR ****
1 2 3 4
SG NR LVL 47 77 **** 22 %
TRENDS | LOCA | SGTR | LOSC | ICC

CSFM

SUBCRITICALITY ○
CORE COOLING ○
INTEGRITY ○
HEAT SINK ○
CONTAINMENT ○
INVENTORY ○

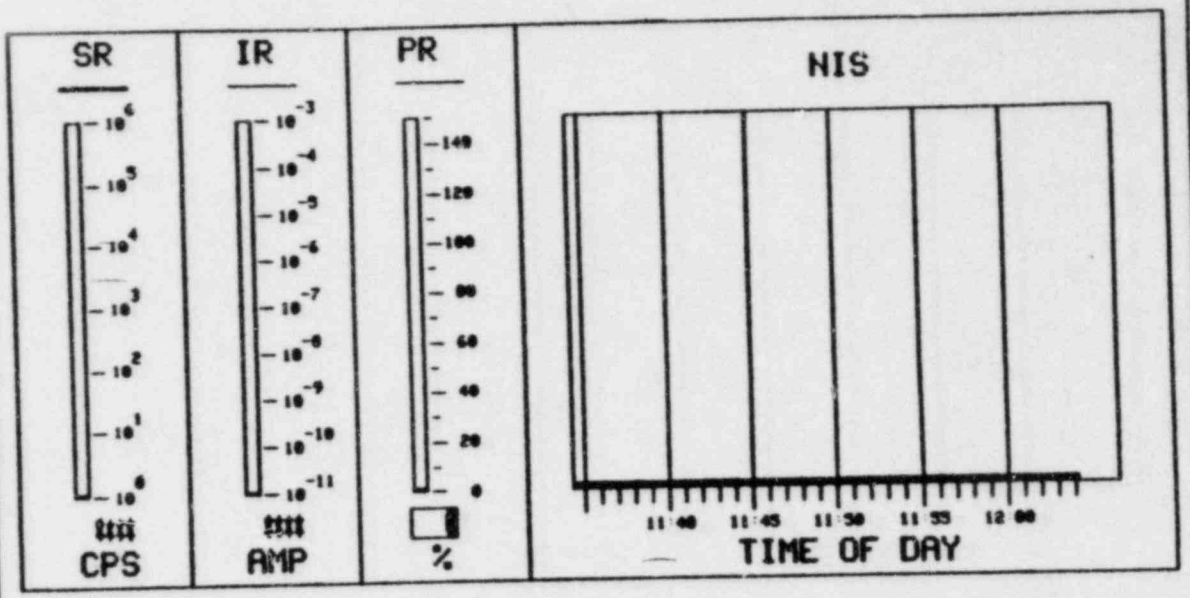
MODE: NORMAL OPERATION

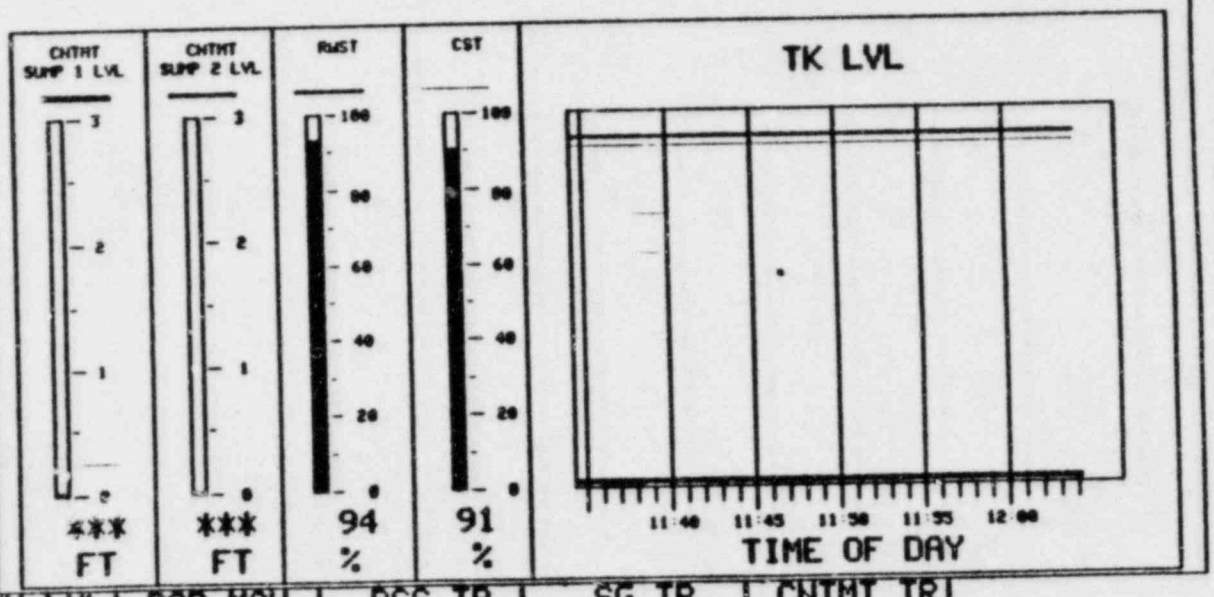
POWER **** AMPS
AUCT HI Tave **** F

3 FW ISOL

COMPUTER TROUBLE

CHANNEL MALFUNCTION





21 JUN 84 12:04:29
COMANCHE PEAK UNIT 1

TOP LVL | NIS | TANK LVL | RAD MON | RCS TR | SG TR | CNTMT TR

CSFM

SUBCRITICALITY ○
CORE COOLING ○
INTEGRITY ○
HEAT SINK ○
CONTAINMENT ○
INVENTORY ○

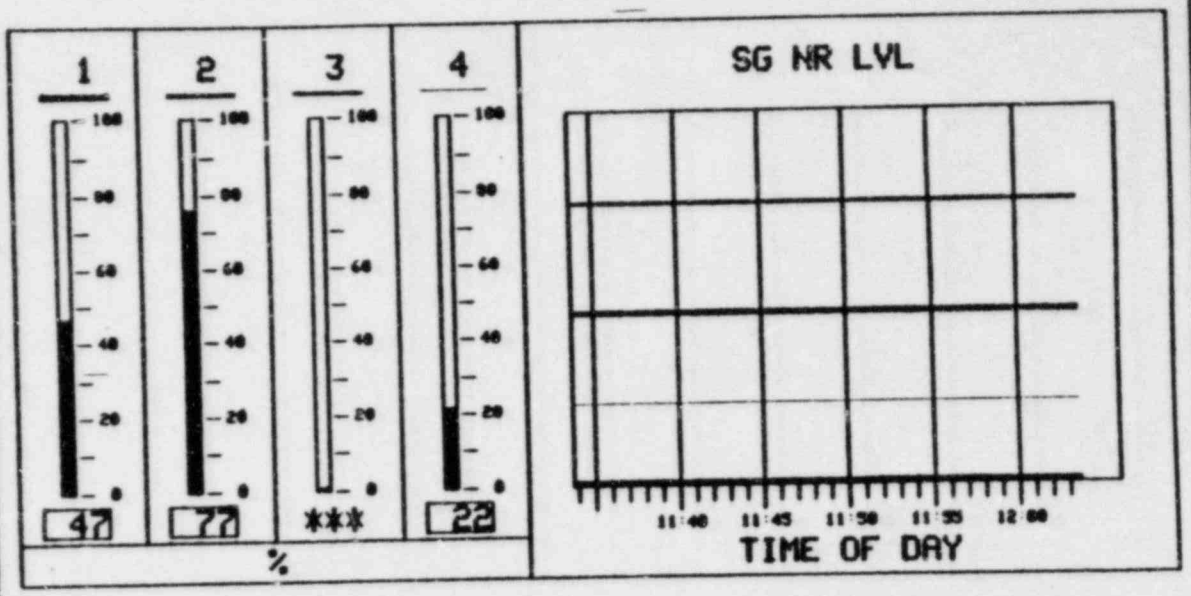
MODE: NORMAL OPERATION

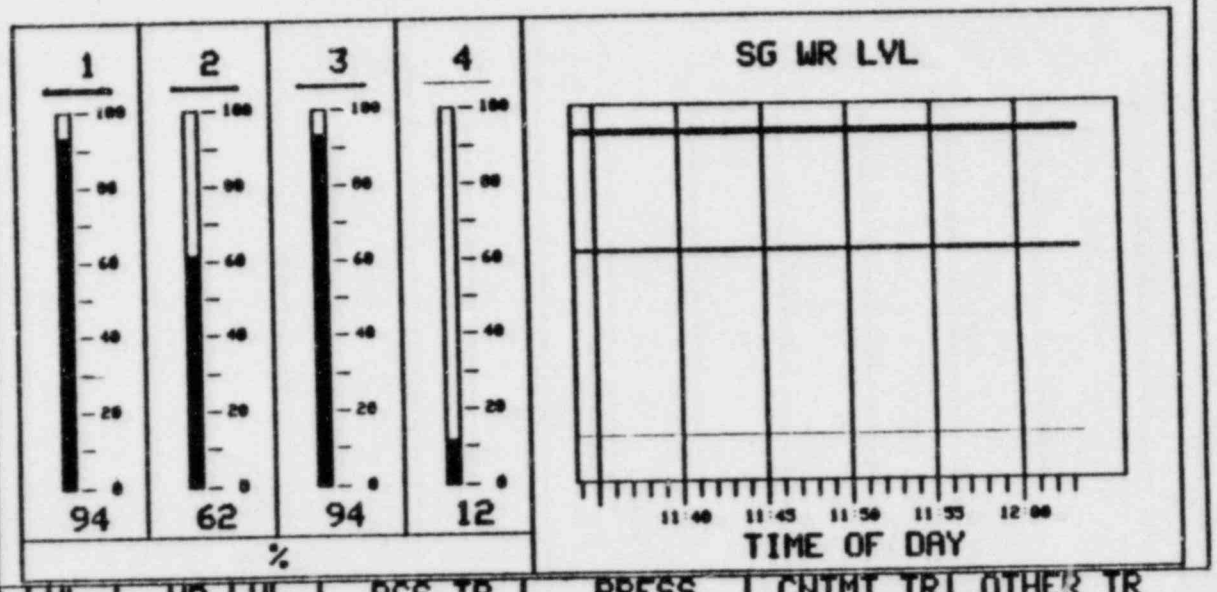
POWER **** AMPS
RUCT HI Tave **** F

3 FW ISOL

COMPUTER TROUBLE

CHANNEL MALFUNCTION





21 JUN 84 12:03:54
COMANCHE PEAK UNIT 1

TOP LVL | FLOW TR | NR LVL | WR LVL | RCS TR | PRESS | CNTMT TR | OTHER TR

CSFM

SUBCRITICALITY ○
CORE COOLING ○
INTEGRITY ○
HEAT SINK ○
CONTAINMENT ○
INVENTORY ○

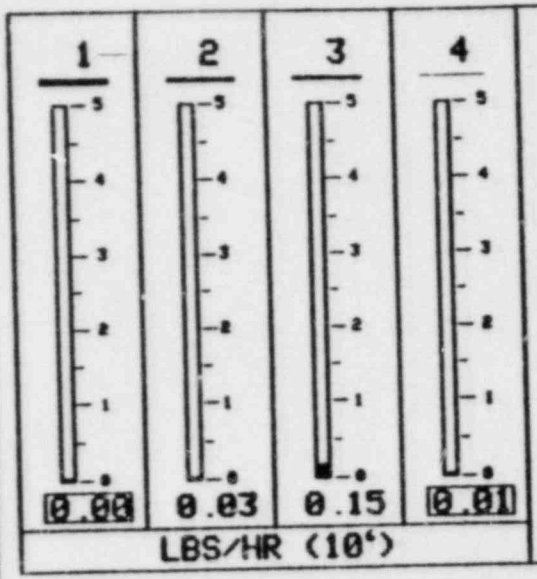
MODE: NORMAL OPERATION

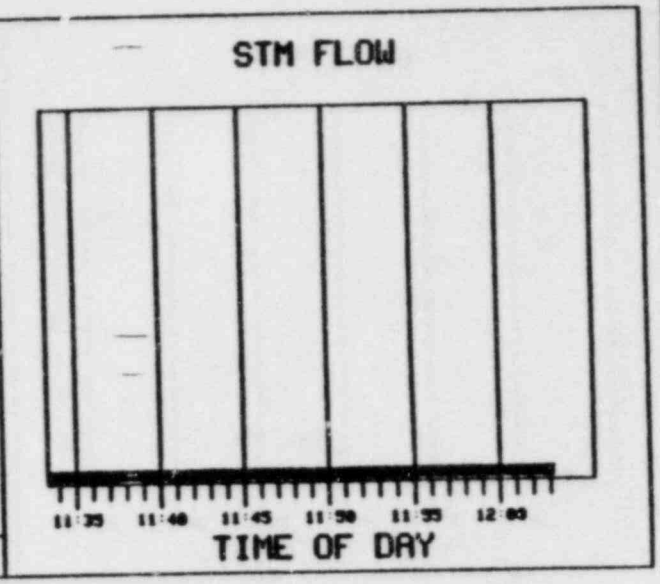
POWER **** AMPS
AUCT HI Tave **** F

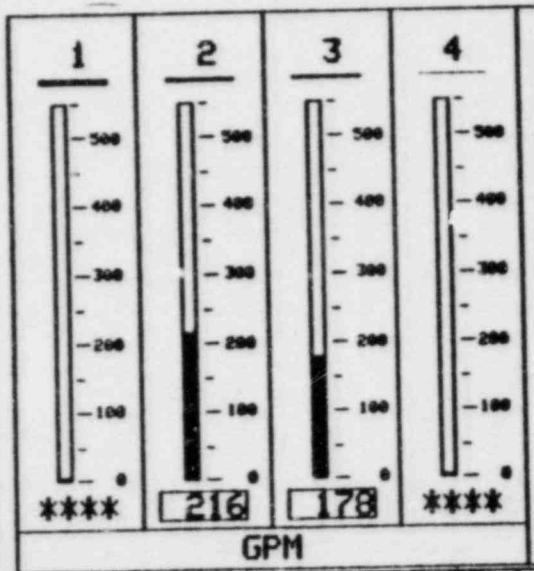
3 FW ISOL

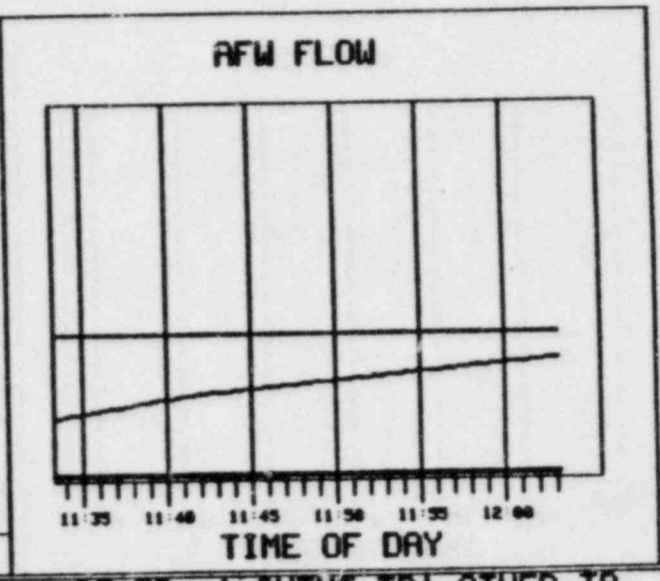
COMPUTER TROUBLE

CHANNEL MALFUNCTION









21 JUN 84 12:03:31
COMANCHE PEAK UNIT 1

TOP LVL | | STM FLOW | AFW FLOW | RCS TR | SG TR | CNTMT TR | OTHER TR

CSFM

SUBCRITICALITY ○
CORE COOLING ○
INTEGRITY ○
HEAT SINK ○
CONTAINMENT ○
INVENTORY ○

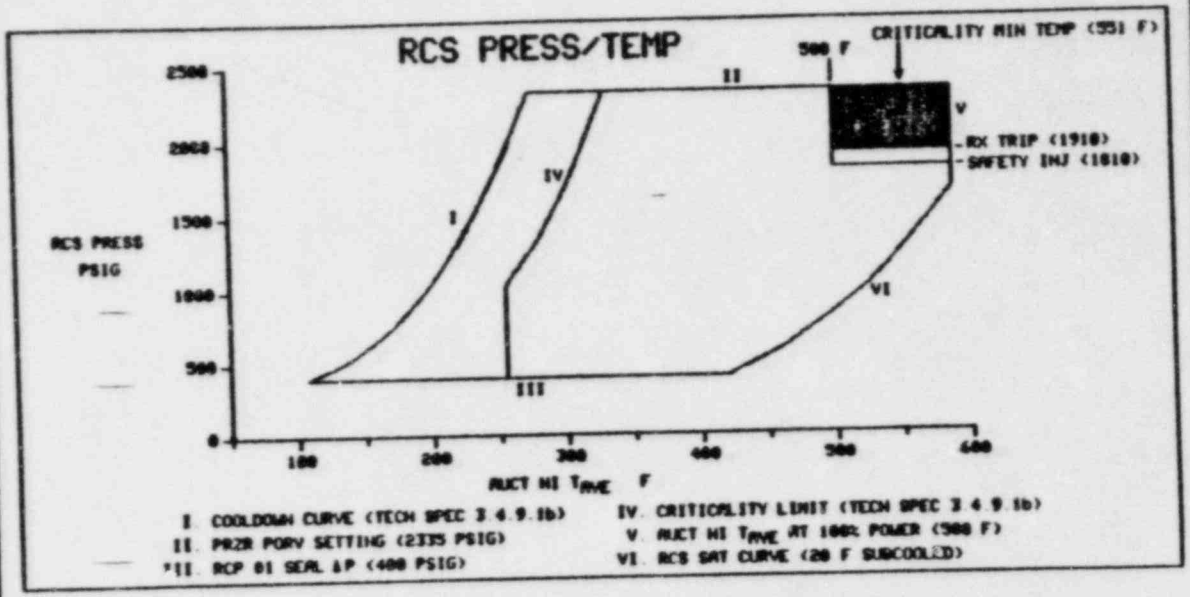
MODE: NORMAL OPERATION

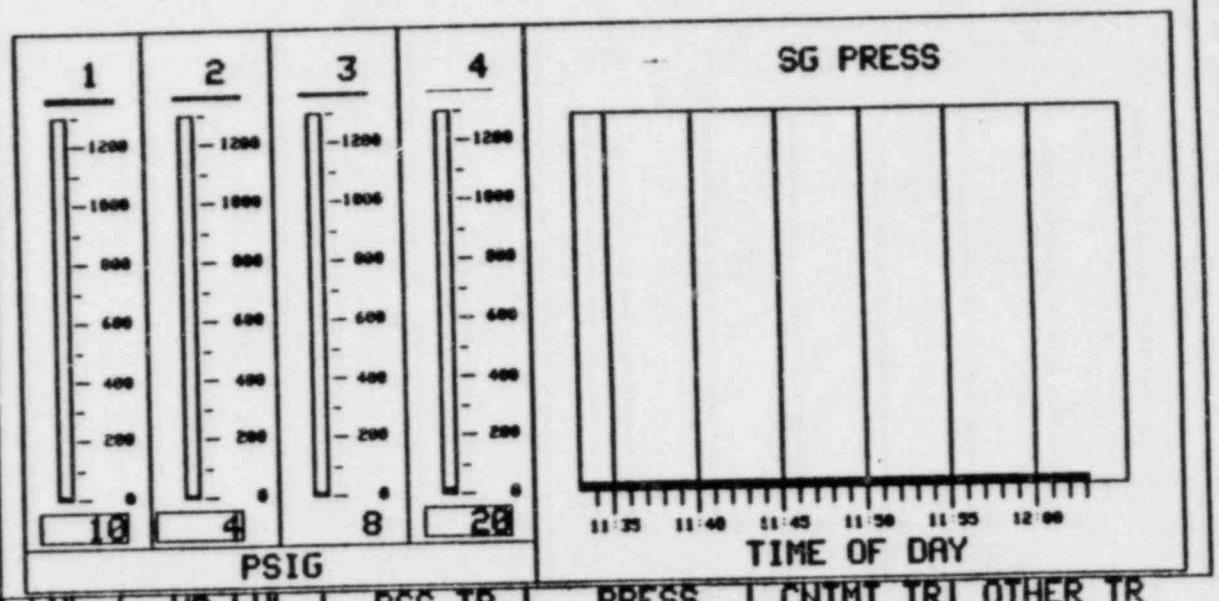
POWER **** AMPS
AUCT HI Tave **** F

3 FW ISOL

COMPUTER TROUBLE

CHANNEL MALFUNCTION





21 JUN 84 12:03:13
COMANCHE PEAK UNIT 1

TOP LVL | FLOW TR | NR LVL | WR LVL | RCS TR | PRESS | CNTMT TR | OTHER TR

CSFM

SUBCRITICALITY ○
CORE COOLING ○
INTEGRITY ○
HEAT SINK ○
CONTAINMENT ○
INVENTORY ○

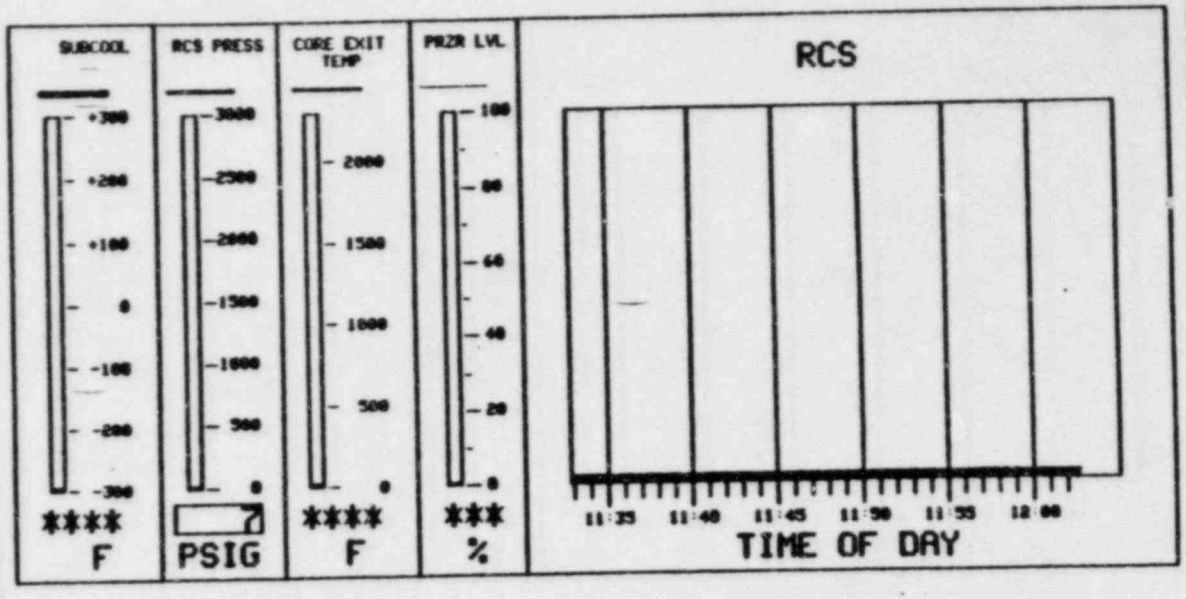
MODE: NORMAL OPERATION

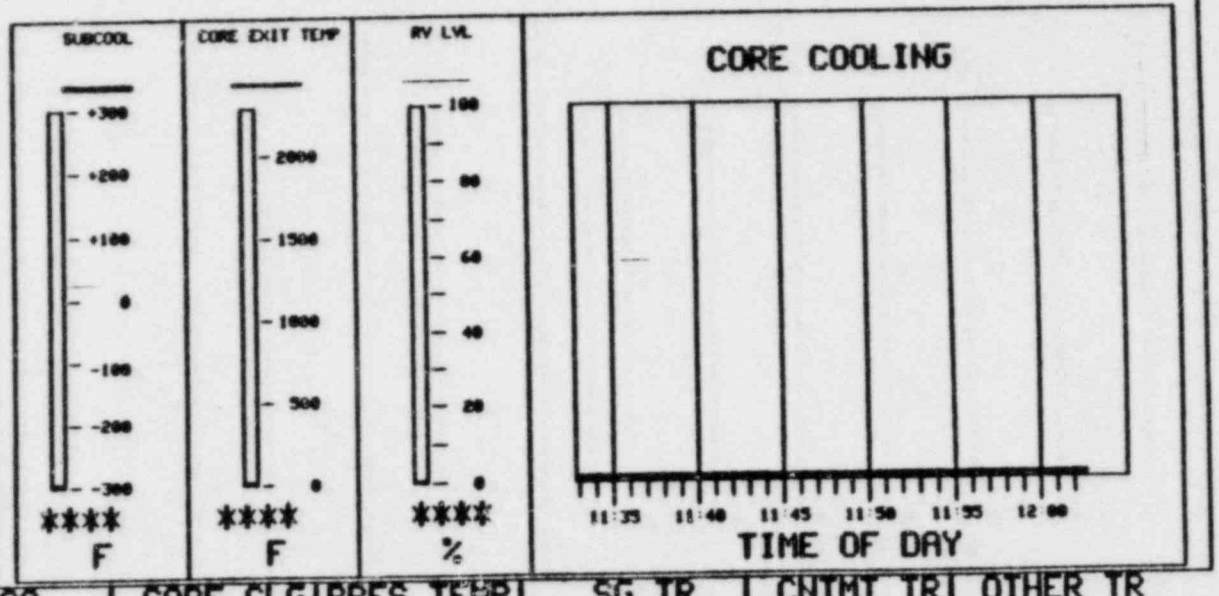
POWER **** AMPS
AUCT H/ Tave **** F

3 FW ISOL

COMPUTER TROUBLE

CHANNEL MALFUNCTION





21 JUN 84 12:02:58
COMANCHE PEAK UNIT 1

TOP LVL | LOOP TR | RCS | CORE CLG | PRES TEMP | SG TR | CNTMT TR | OTHER TR

CSFM

SUBCRITICALITY ○
CORE COOLING ○
INTEGRITY ○
HEAT SINK ○
CONTAINMENT ○
INVENTORY ○

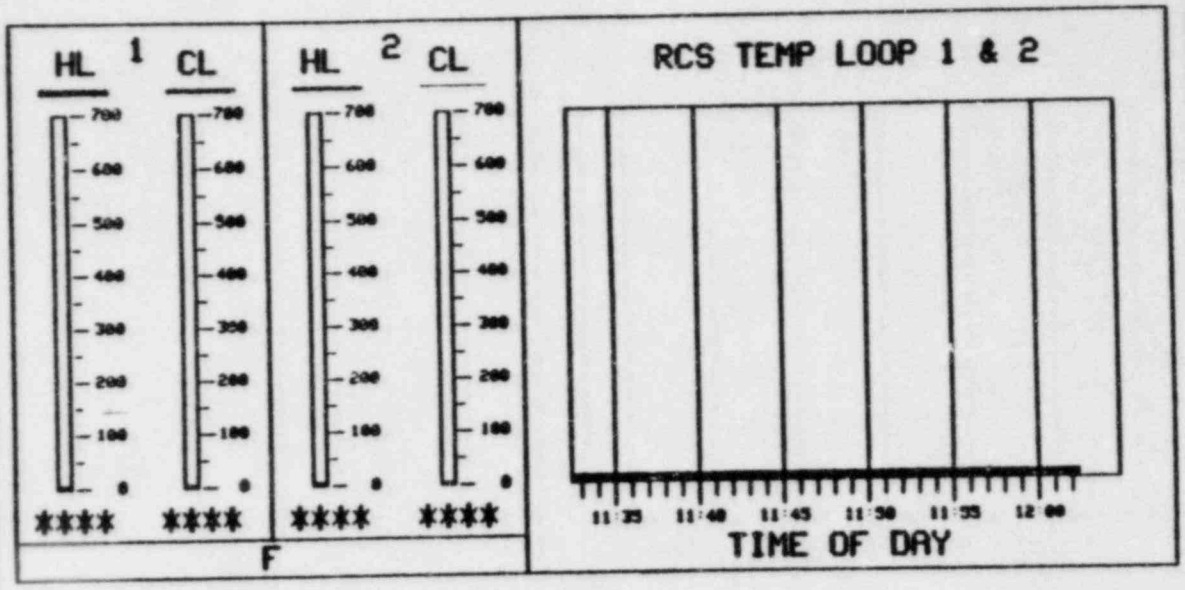
MODE: NORMAL OPERATION

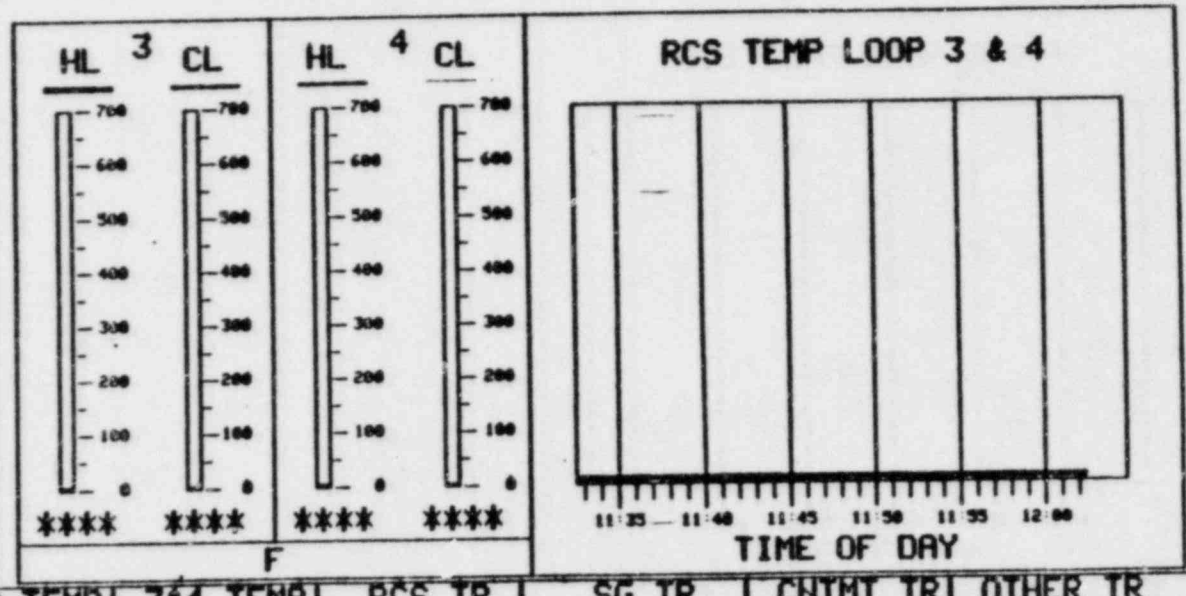
POWER **** AMPS
AUCT HI Tave **** F

3 FW ISOL

COMPUTER TROUBLE

CHANNEL MALFUNCTION





21 JUN 84 12:02:40
COMANCHE PEAK UNIT 1

TOP LVL | | 1&2 TEMP | 3&4 TEMP | RCS TR | SG TR | CNTMT TR | OTHER TR

CSFM

SUBCRITICALITY ○
CORE COOLING ○
INTEGRITY ○
HEAT SINK ○
CONTAINMENT ○
INVENTORY ○

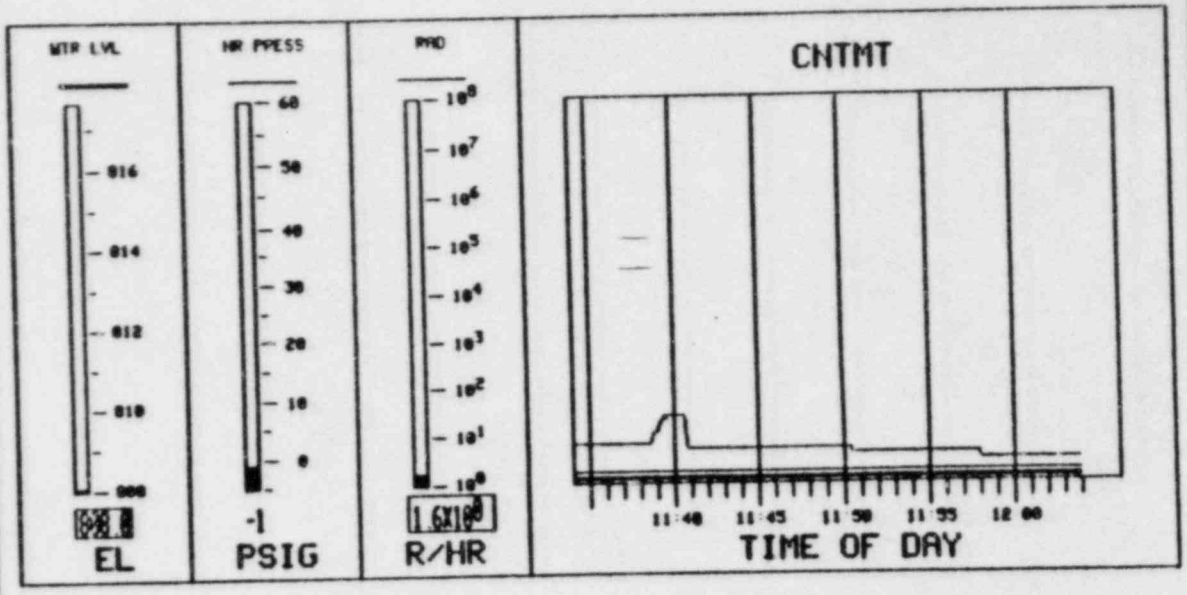
MODE: NORMAL OPERATION

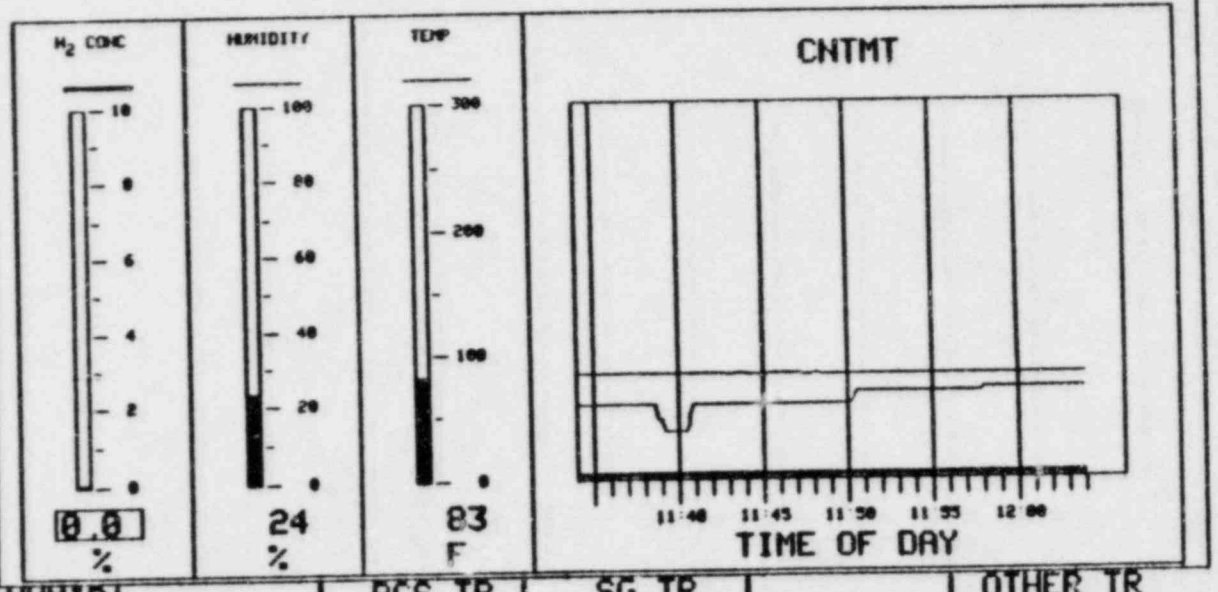
POWER **** AMPS
AUCT HI Tave **** F

3 FW ISOL

COMPUTER TROUBLE

CHANNEL MALFUNCTION





21 JUN 84 12:04:11
COMANCHE PEAK UNIT 1

TOP LVL | LVL PRESS | H2 HUMID | | RCS TR | SG TR | | OTHER TR

CSFM

SUBCRITICALITY ○
CORE COOLING ○
INTEGRITY ○
HEAT SINK ○
CONTAINMENT ○
INVENTORY ○

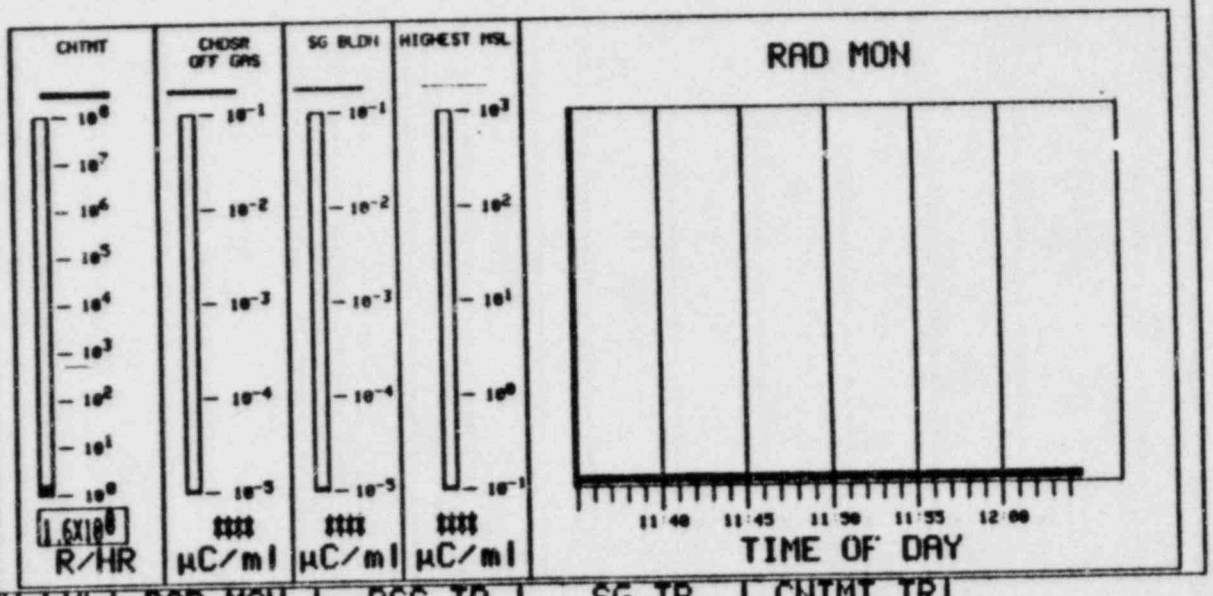
MODE: HEATUP / COOLDOWN

POWER **** AMPS
RUCT HI Tave **** F
STARTUP RATE **** DPM

3 FW ISOL

COMPUTER TROUBLE

CHANNEL MALFUNCTION



21 JUN 84 12:04:57
COMANCHE PEAK UNIT 1

TOP LVL | NIS | TANK LVL | RAD MON | RCS TR | SG TR | CNTMT TR |