



UNITED STATES
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
WASHINGTON, D. C. 20555

September 11, 1985

MEMORANDUM FOR: C. Wylie, Chairman, CE System 80 Subcommittee
ACRS Members

FROM: G. A. Reed *GA Reed*

SUBJECT: Attached Morning Report on Palo Verde Incident

You are acquainted with my position that the Palo Verde (CE System 80) units had "lean" systems as far as assured core cooling was concerned and that my opinion favored the inclusion of a PORV system. (ACRS letters in the past have expressed concern about the noninclusion of PORVs in the System 80 design.) The attached Morning Report of August 25, 1985 indicates to me that reliance by CE on Auxiliary Feed Pumps (in the configuration at Palo Verde) for the accidents of tube rupture and steam line breaks (wherein the need for primary depressurization and assured core cooling becomes complicated) should be further reviewed on an urgent basis.

In my opinion, this Palo Verde incident may also be a precursor indicating a need for ACRS to reflect further on my proposed primary blowdown -- redundant in principle -- concepts for some PWRs.

Attachment: as stated

cc: J. Flack

8604030595 860311
PDR FOIA
SCOTT86-435 PDR

B/7

Take to Sept. 1st. Reactor

MORNING REPORT - REGION V
DATE: AUGUST 23, 1985

FACILITY

ARIZONA PUBLIC
SERVICE COMPANY
PVNGS #1
DN 50-528

NOTIFICATION

FAX FROM SENIOR
RESIDENT INSPECTOR

ITEM OR EVENT

BECHTEL NOTIFIED THE LICENSEE THAT AN ENGINEERING EVALUATION HAS SHOWN THAT A MAIN STEAM LINE BREAK IN THE MAIN STEAM SUPPORT STRUCTURE COULD RESULT IN TWO AUXILIARY FEEDWATER (AFW) PUMP ROOMS BEING PRESSURIZED TO APPROXIMATELY 20 PSIG AND 260 F DEGREES. THE LICENSEE HAS DECLARED BOTH PUMPS INOPERABLE BASED ON THE PUMPS AND ASSOCIATED INSTRUMENTATION NOT BEING QUALIFIED FOR THE REVISED, ASSUMED ENVIRONMENTAL CONDITIONS. PALO VERDE 1 WILL REMAIN IN MODE 4 UNTIL CONDUIT SEALANT (WHICH IS THE MEANS BY WHICH THE STEAM WOULD BE COMMUNICATED INTO THE AFW PUMP ROOMS) IS UPGRADED TO PREVENT LEAKAGE.

REGIONAL ACTION

FOLLOWUP PER MC 2515

ARIZONA PUBLIC
SERVICE COMPANY
PVNGS #1
DN 50-528

FAX FROM SENIOR
RESIDENT INSPECTOR

THE LICENSEE WAS NOTIFIED BY COMBUSTION ENGINEERING THAT AT PALO VERDE 1 THE VARIABLE SETPOINT (VSP) CARDS ASSOCIATED WITH THE VARIABLE OVERPOWER TRIP (VOPT) RATE CIRCUIT IS SUBJECT TO RANDOM SETPOINT FLUCTUATIONS AT VARYING POWER LEVELS. IF A RANDOM SETPOINT INCREASE WERE TO OCCUR SIMULTANEOUS WITH A CONTROL ELEMENT ASSEMBLY EJECTION, THE ACCIDENT ANALYSES MAY BE VIOLATED. THE UNIT IS CURRENTLY SHUTDOWN AND HAS BEEN SINCE JULY 24, 1985, TO PERFORM VARIOUS MAINTENANCE ACTIVITIES. THE LICENSEE HAS MODIFIED THE VSP CARD IN ACCORDANCE WITH CE RECOMMENDATIONS TO PREVENT A SETPOINT FLUCTUATION. OPERATIONAL RESTRICTIONS PROPOSED BY CE WILL ALSO BE IMPLEMENTED UNTIL THE MODIFIED CIRCUITRY HAS BEEN TESTED.

FOLLOWUP PER MC 2515

ARIZONA PUBLIC
SERVICE COMPANY
PVNGS #2&3
DN 50-529
50-530

TELEPHONE CALL FROM
LICENSEE AT 2:00 PM
ON 08/21/85

POTENTIAL 50.55(E) AND PART 21:
CE HAS IDENTIFIED NONCONFORMANCES CONCERNING STAINLESS STEEL FLEXIBLE CONDUIT ON CE SUPPLIED INSTRUMENT RACKS AS INSTALLED IN UNIT 2. THESE NONCONFORMANCES INCLUDE VIOLATION OF MINIMUM BEND RADIUS CRITERIA, DAMAGED CONDUIT, LOOSE FITTING NUTS, ONE DISCONNECTED END FITTING. (DER 85-28)

FOLLOWUP PER MC 2512

Copy to J. Flack

ANPP/NRC MEETING TO DISCUSS
PVNGS AUXILIARY SPRAY CAPABILITY AND
THE STARTUP TESTING EVENT OF SEPTEMBER 12, 1985

- | | | |
|------|--|---|
| I. | INTRODUCTION | J. G. HAYNES
V. P. - NUCLEAR PRODUCTION |
| II. | SEPTEMBER 12, 1985 EVENT | 1) R. E. GOUGE
UNIT 1 DAY SHIFT SUPV.
2) D. D. SWAN
UNIT 1 ASST. SHIFT SUPV. |
| III. | AUXILIARY SPRAY DESIGN/
LICENSING COMMITMENTS | T. F. QUAN
LICENSING SUPERVISOR |
| IV. | EVENT EVALUATION | T. F. QUAN |
| V. | CONCLUSION | J. G. HAYNES
V. P. - NUCLEAR PRODUCTION |

CONDITIONS PRIOR TO EVENT OF 9-12-85

1. REACTOR AT 53% FULL POWER
2. TURBINE GENERATOR ONLINE AT 585 MWe
3. PREPARING FOR 50% LOSS OF LOAD TEST

PURPOSE OF 50% LOSS OF LOAD TEST:

1. DEMONSTRATE THAT THE PLANT CAN ACCOMMODATE
A LOAD REJECTION FROM 50% POWER
2. VERIFY THAT THE TRANSIENT DID NOT INITIATE
A REACTOR POWER CUTBACK

SEQUENCE OF EVENTS

- 2208 TEST INITIATED BY REMOTE MANUAL OPENING OF BOTH
GENERATOR OUTPUT BREAKERS. (TURBINE-GENERATOR
FLUCTUATIONS)
- 2209 REACTOR TRIP (FLOW-PROJECTED DNBR TRIP FROM CPC)
- 2209 TURBINE TRIP (CAUSED BY REACTOR TRIP)
- 2215 NON-SAFETY RELATED AUXILIARY FEEDWATER PUMP STARTED
- 2217 ATMOSPHERIC DUMP VALVES (ONE ON EACH STEAM GENERATOR)
OPENED 3%
- 2218 MAIN STEAMLINE DRAINS AUTOMATICALLY REOPENED UPON
RESTORATION ON NON-1E ELECTRICAL POWER
- 2222 SIAS AND CIAS INITIATED (1837 psia; 540⁰ F)
SIAS AND CIAS ACTUATIONS WERE VERIFIED AS PER DESIGN
WITH HPSI INJECTING APPROXIMATELY 75 GPM TO EACH COLD
LEG
- 2223 NOTIFICATION OF UNUSUAL EVENT DECLARED DUE TO
COMPLICATED REACTOR TRIP AND INITIATION OF A SIAS
- 2225 AUXILIARY OPERATOR RE-ENERGIZED MOTOR CONTROL CENTER
NHN-M-72 UNDER CONTROL ROOM DIRECTION (RE-ENERGIZED
CHN UV-501, VCT OUTLET AND UV-536, RWT HIGH SUCTION
TO CHARGING PUMPS.)

SEQUENCE OF EVENTS (CONT.)

2237 CHARGING HEADER LOW FLOW ALARM (40 GPM)
INTERMITTANT CHARGING HEADER PRESSURE ALARMS

FOR THE NEXT 43 MINUTES, OPERATORS WERE
ATTEMPTING TO REESTABLISH CHARGING PUMP
SUCTION FROM:

- (1) RWT HIGH SUCTION VIA CH UV 536
- (2) RWT LOW SUCTION VIA CHN V 327
- (3) RWT HIGH SUCTION VIA UV 532 -- BAMP
CH 514 TO THE CHARGING PUMPS (AFTER
NON-1E POWER RESTORATION)

2320 REESTABLISHED CHARGING FLOW WITH TWO CHARGING
PUMPS INJECTING 44 GPM TO RCS

2358 RESET SIAS AND CIAS (RCS PRESSURE AND INVENTORY
STABLE AND UNDER CONTROL)

0102 9/13/85 TERMINATION OF NOTIFICATION OF UNUSUAL
EVENT

DESIGN/LICENSING CRITERIA

LONG-TERM COOLDOWN

1978 RSB5-1 ISSUED, SYSTEM UPGRADED TO MEET
CLASS 2 PLANT REQUIREMENTS -- REDUNDANT
AUX SPRAY VALVE

Q440.6 SUBMITTED BY THE NRC ON CESSAR/
PVNGS DOCKETS *descriptions of de*

descriptions of degrees of capability
may reflect relative impact
of broad Cops use

CESSAR RESPONSE TO Q440.6 SUBMITTAL

described active concepts w/d for
and p. v. v.

AL
boraf cog was
safet related
system.

CESSAR COMMITS TO UPGRADE CH-141 AND

CH-501 *anyone values the go from common
in English to be possible from vital ones*

As it

"SAFETY GRADE AUXILIARY SPRAY SYSTEM"

Why Pok vs not 6
be constant

62

- "SAFETY-RELATED METHOD FOR RAPID
DEPRESSURIZATION ... CONSISTENT WITH
THE RECOMMENDATIONS OF RSB5-1]

slip

- STATED CEN-239 APPLICABLE TO PVNGS

Contd.

- SUBMITTED CEN-239, SUPPLEMENT 3

6

1890, 1891, 1892

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III-1

CHRONOLOGY OF AUXILIARY SPRAY (CONT.)

SHORT-TERM
MITIGATION

4/27/84

- NRC LETTER REQUIRING ANALYSIS ASSUMING FULL OPEN ADV FAILURE

in this case scenario asked to model of actions

9/1/84

- PLANT-SPECIFIC SGTR + LOP + FAILED ADV ANALYSIS SUBMITTED

analysis submitted - this

*- staff expected
concern + A Doctus
analytical response
not
requested assume
values not
open more than
10% or
revised
analysis
in
acc for
full open
in tube
response
etc*

ORIGINAL AUXILIARY SPRAY CRITERIA

OPERATOR CONTROL OF THE RCS PRESSURE DURING
FINAL STAGES OF COOLDOWN (WHEN PRESSURE LESS THAN
REQUIRED FOR RCP) AND FOR COOLDOWN OF PRESSURIZER.

CURRENT AUXILIARY SPRAY CRITERIA

SAFETY GRADE PLANT COOLDOWN CONSISTENT WITH
THE GUIDANCE OF BTP RSB 5-1. FOR CLASS 2 PLANTS:

- o OPERATOR ACTIONS OUTSIDE CONTROL ROOM *are adjusted*
- o OPERATOR ACTIONS INSIDE CONTAINMENT *for suitable*
AFTER SSE *feedback*
- o REMAINING AT HOT STANDBY UNTIL MANUAL
ACTIONS OR REPAIRS ARE COMPLETED.

AUX SPRAY SYSTEM

ACTIVE COMPONENTS

SPRAY VALVES

LOOP ISOLATION VALVES

CHARGING PUMPS (*safety grade*)

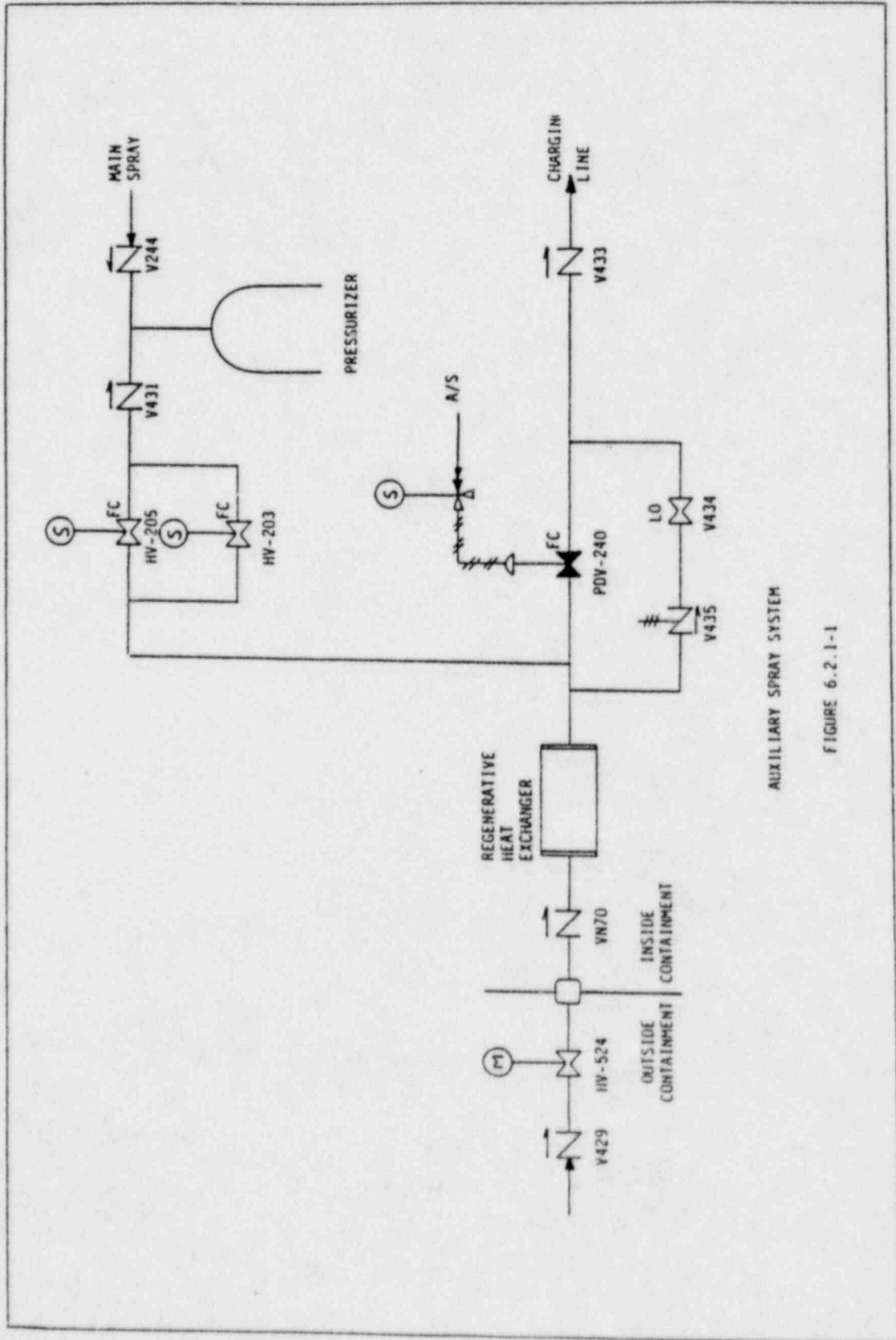
DETAILED DESCRIPTION IN RESPONSE TO 440.6

*why was some of water
not identified*

AUX SPRAY SYSTEM

CESSAR vs PVNGS

- o PVNGS HAS REMOVED INTERNALS FROM
MAIN SPRAY BACKFLOW CHECK VALVE
- o PVNGS HAS MODELED AUX SPRAY IN
TRANSIENT ANALYSIS OF CERTAIN SG
TUBE RUPTURE TRANSIENTS



AUXILIARY SPRAY SYSTEM

FIGURE 6.2.1-1

AUX SPRAY USE IN

SAFETY ANALYSES

- DURING LONG-TERM COOLDOWN PHASE FOLLOWING
EVENT: *1, 2 hr phase*

CESSAR-E

PVNGS-FSAR (ORIGINAL)

ALL WITH LOP

ALL WITH LOP

- DURING SHORT-TERM MITIGATION
PHASE OF EVENT:

CESSAR-E

PVNGS-FSAR (AMEND 14)

NONE

SGTR/LOP/FULL OPEN

FAILED ADV

*even if this
feedback - not
sufficient
critical*

*Chap 5, 5.1.5
did not take in
credit that
did not assess
that word's
effect come / events*

PVNGS-FSAR (APPENDIX 15A)

SGTR ANALYSIS RESULTS

<u>EVENT</u>	<u>TIME</u> (SECONDS)	<u>FSAR</u> <u>THYROID DOSE</u> (REM)	<u>ESTIMATED*</u> <u>THYROID DOSE</u> (REM)
SGTR & STUCK OPEN ADV	0	0	0
LOP	51	0	0
AFAS (INTACT/AFFECTED)	122/132	0	0
ADV OPENS	460	0	0
MSIS	513		
SIAS	581		
AFW OVERRIDE	655		
AUX SPRAY	1015	115	115*
TUBES RECOVERED	1385	182	186*
2 HR DOSE @ EAB	7200	200	210*

*ESTIMATED DOSE BASED ON REMOVAL OF EFFECT OF AUX SPRAY FLOW.
(REGULATORY DOSE LIMIT 300 REM)

EVENT EVALUATION

ITEM 1 - LOSS OF VCT LEVEL

COMPENSATORY MEASURES - MONITOR REFERENCE LEG WATER LEVEL

- Instructions to op* - ALIGN REFUELING WATER TANK TO
CHARGING PUMP SUCTION PROMPTLY
ON LOSS OF POWER *from control room before MS*
- INSTITUTE PROCEDURAL CAUTIONS
ON RESTART OF CHARGING PUMPS

ITEM 2 - LOSS OF POWER TO CVCS VALVES (501, 536)

COMPENSATORY MEASURE - ALIGN REFUELING WATER TANK TO
CHARGING PUMP SUCTION PROMPTLY
ON LOSS OF POWER

Page 1 of 2

Sequence of Events
PVNGS Unit 1
September 12, 1985

55% power

Prior to start of the load rejection test, 525 KV BKR PL 915 (one of two main generator output breakers) was opened per the test procedure.

<u>TIME</u>	<u>DESCRIPTION</u>
22:08:29	Generator output breaker PL 918 was opened from the control room to start the test.
22:08:30	Fast closure of the main turbine control and intercept valves.
22:08:31:254	Turbine trip - "first in" indication was "No ESTV Press trip" (no electric trip solenoid valve pressure) - turbine trip was not expected to occur, troubleshooting ongoing.
22:08:53:721	Low DNBR trip on Channel A - CPC projected low flow causing DNBR
22:08:53:738	Low DNBR trip on Channel B - reactor trip signal
22:08:53:796-808	Channel A - D trip breakers opened
22:09:45	FWPT "A" tripped on low control oil pressure. The control oil pump is supplied from nonessential power
22:10:51	Main generator exciter tripped
22:10:53	Circulating water and condensate pumps trip - test configuration prevented fast transfer.
22:10:58	Main steam line drain valves are manually shut - auto opened on turbine trip, per design
22:15:10	Nonclass AFW pump started to maintain SG levels
22:17:42	Manually opened ADV on SG2 to dump steam to atmosphere to prevent degrading vacuum and insure adequate delta T for natural circulation
22:18:36	ADV on SG1 manually opened
22:19:07	ADV on SG2 manually closed
22:19:37	Main steam line low point drain valves open automatically when nonessential power is restored with turbine trip signal present
22:21:07	ADV on SG2 manually reopened

B19

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Sequence of Events
PVNGS Unit 1
September 12, 1985

22:21:38 SIAS/CIAS on low pressurizer pressure (1837 psig).
Nonclass AFW pump shed, "B" AFW pump starts but is
not used to add water due to SG levels being in
normal band. Pressurizer pressure low point is 1819
psig.

22:23:28 ADVs manually closed

22:23 Unusual Event declared by S/S based on Rx trip and
SIAS/CIAS

22:24:16 Main steam line drain valves manually shut

22:32:05 Established boric acid makeup pump flow to charging
pumps via RWT following gas binding of pumps

22:33:01 Established RCP seal injection

22:33:47 Established charging flow to RCS

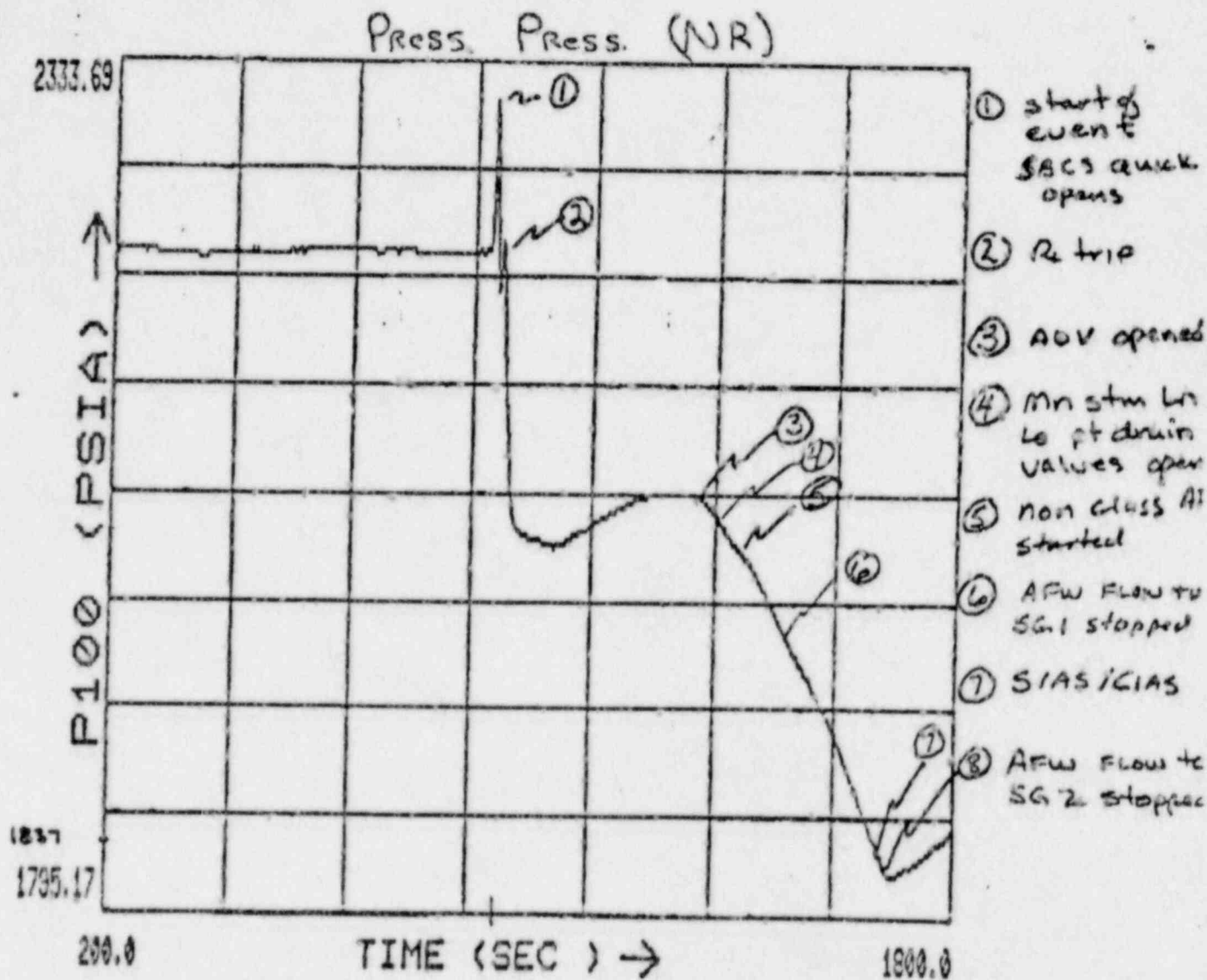
Approx 24:00 Pressurizer LVL back in normal band

Approx 00:50 Started RCPs

01:03 Terminated Unusual Event

RZ:sh

2309



PVNGS1 RPCS TEST 50% LOSS OF LOAD 400 BUFFERS 5SCAN/SEC

TEST DATE: 12-SEP-85

START TIME: 21:52:33.0

P100 MINIMUM 1819.65 PSIA

P100 MAXIMUM 2309.21 PSIA

AT 1684.0 SEC

AT 924.0 SEC

TIME: 228.571 SEC /DIVISION

P100: 67.315 PSIA/DIVISION

POINTS PLOTTED FROM EVERY 10 SCANS

2250