

HC.SE-PR.RL-0001(Q)  
Revision 1

HOPE CREEK GENERATING STATION

BAILEY 862 SYSTEM LOGIC MODULE

FAILURE DATA REPORT

PERIOD: SECOND QUARTER 1991

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7/1/91  
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## BAILEY SSLM REPORT

### A. SUMMARY OF FAILURES BY MONTH DURING REPORT PERIOD

#### APRIL 1991

NO FAILURES

#### MAY 1991

NO FAILURES

#### JUNE 1991

- 1) 06/10/91 1BC653 SLOT 1-3-11 O-1008 N-1518  
OUTPUT BUFFER #5 FAILED OPEN CONFIRMED FAILURE  
OUTPUT BUFFER #6 SHORTED  
WO 910610082 PROBLEM: 1AX502 TAP CHANGER CONTROLLER  
ALTERNATING  
BETWEEN AUTO AND MANUAL.
- 2) 06/17/91 1BC653 SLOT 5-4-3 O-2281 N-1422  
LOGIC OUTPUT #3 SHORTED CONFIRMED FAILURE  
LOGIC OUTPUT #4 OPENED  
BUFFER OUTPUT #4 SHORTED  
WO 910613092  
PROBLEM: 'B' SECONDARY CONDENSATE PUMP TRIPPED WITH NO  
FIELD FAULTS.

TOTAL MONTHLY FAILURES = 2

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TOTAL QUARTERLY FAILURES = 2 SSLM'S

### B. FAILURE RATE DATA

- 1) 26 CONFIRMED FAILURES FROM 07/01/90 THRU 06/30/91.
- 2) 2278 SSLM POPULATION
- 3) ANNUAL FAILURE RATE PERCENTAGE:
  - a.  $26 \div 2278 = 0.01141 \times 100 = 1.41 \%$
- 4) MEAN TIME BETWEEN FAILURES DETERMINATION:  
MTBF FROM 07/01/90 THRU 06/30/91.
  - a. 12 MONTH SERVICE HOURS = 8760 HOURS
  - b. TOTAL MODULE SERVICE HOURS

$$8760 \times 2278 = 19.95 \times 10^6$$

$$19.95 \times 10^6 + 26 \text{ FAILURES} = 767,511 \text{ HOURS}$$

$$c. \quad 26 + 19.95 \times 10^6 = 1.30 \text{ FAILURES PER MILLION HOURS FAILURE RATE.}$$

#### C. COMPARISON STANDARD

- 1) THE IEEE 500 STANDARD EXPECTED FAILURE RATE OF SOLID STATE COMPUTATION DEVICES IS EQUAL TO 1.19 FAILURES PER MILLION HOURS FAILURE RATE.
- 2) THE HCGS BAILEY 862 SSLM FAILURE RATE FROM JUL 1990 THRU JUN 1991 IS EQUAL TO 1.30 FAILURES PER MILLION HOURS FAILURE RATE.

#### D. ANALYSIS

- 1) HCGS BAILEY 862 SSLM FAILURE RATE APPEARS TO HAVE A SLIGHT DECREASE DURING THE LATEST 12 MONTH PERIOD. THIS DECREASE IS ATTRIBUTIBLE TO ONLY ONE FORCED OUTAGE IN NOVEMBER AND THE THIRD REFUEL OUTAGE FROM 12/90 TO 3/91. HOPE CREEK HAS SHOWN CONSISTENTLY GOOD FAILURE RATES DURING ITS NONOUTAGE PERIODS.
- 2) ONE CONFIRMED FAILURE HAD SIGNIFICANCE WITH REGARD TO SAFE AND RELIABLE OPERATION OF THE PLANT. TRIPPING OF THE 'B' SECONDARY CONDENSATE PUMP RESULTED IN A RUNBACK AND A CHALLENGE TO THE PLANT AND THE OPERATORS. ALL SYSTEMS WORKED AS PER DESIGN TO MITIGATE THE CONSEQUENCES OF THE CONDENSATE PUMP TRIP. THE IDENTIFIED FAILURE WHICH CAUSED THE TRIP, A FAILED LOGIC OUTPUT SIGNAL IS RELATIVELY RARE AS COMPARED TO OTHER KNOWN FAILURE MECHANISMS SUCH AS INPUT OR OUTPUT BUFFER FAILURES.

#### E. RECOMMENDATIONS

- 1) NO SPECIFIC RECOMMENDATIONS ARE BEING MADE AS A RESULT OF THE TWO MODULE FAILURES THIS QUARTER.
- 2) SYSTEM ENGINEERING HAS INSTITUTED A MONITORING OF LOGIC MODULE STATUS FOR THE 4.16KV INFEED BREAKERS BECAUSE OF SIGNIFICANT FAILURES IN THE PREVIOUS QUARTER. NO MODULE FAILURES HAVE BEEN IDENTIFIED DURING THIS MONITORING TO DATE. THIS PROCESS WILL CONTINUE TO ASSIST OUR DETERMINATION OF ROOT CAUSES

OF MODULE FAILURES.

- 3) SYSTEM ENGINEERING HAS PURSUED INVESTIGATION OF BREAKER PM'S FOR ANY PROBLEMS AND HAS NOT BEEN ABLE TO IDENTIFY ANY SPECIFIC FAULTS WITH OUR PROCEDURES. WE WILL CONTINUE TO PURSUE THIS LINE SO THAT WE CAN ELIMINATE ALL POSSIBLE FIELD INDUCED LOGIC MODULE FAILURES.