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VAN BRUNT, E. E. Arizona Nuclear Power Project (formerly Arizona Public Serv
RECIP. NAME RECIPIENT AFFILIATION

KNIGHTON, G. W. PWR Project Directorate 7

SUBJECT: "Auxiliary Feedwater Pump 48 H Endurance Test Results," per SSER (NUREG-0857). W/851224 ltr.

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Arizona Nuclear Power Project
P.O. BOX 52034 • PHOENIX, ARIZONA 85072-2034

December 24, 1985
ANPP-34329-EEVB/PGN-98.07

Director of Nuclear Reactor Regulation
Attention: Mr. George W. Knighton, Deputy Director
PWR Project Directorate #7
Division of Pressurized Water Reactor Licensing - B
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

Subject: Palo Verde Nuclear Generating Station (PVNGS)
Unit 2
Docket No. STN 50-529 (License NPF-46)
Auxiliary Feedwater Pump 48 Hour Endurance Test
File: 85-056-026

Reference: Safety Evaluation Report related to the operation of Palo Verde Nuclear Generating Station, Units 1, 2 and 3 (NUREG-0857) dated November, 1981

Dear Mr. Knighton:

As required by Section 22.2 (II.E.1.1) of the above reference, please find attached the results of the auxiliary feedwater system (AFWS) pump 48-hour endurance tests.

If you have any questions or require additional information, please contact Mr. W. F. Quinn of my staff.

Very truly yours,

E. E. Van Brunt

E. E. Van Brunt, Jr.
Executive Vice President
Project Director

EEVB/WFQ/PGN/dlm
Attachment

cc: E. A. Licitra
M. C. Ley
R. P. Zimmerman
A. C. Gehr

A001 1/1

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Attachment to
ANPP-34329

ATTACHMENT

Auxiliary Feedwater Pump

48 - Hour

Endurance Test

Results

A001
1/1

1) 2M-AFN-P01 - Non-essential AFW pump 48 hour endurance testing data:

a) Date of testing: July 2, 1985 through July 4, 1985

b) Bearing Temperatures - The limits for each bearing temperature, along with the maximum obtained temperature are listed below:

AFN-TE-79 (Limit 190°F max)	:	Max. 161°F
AFN-TE-81 (Limit 190°F max)	:	Max. 153°F
AFN-TE-89 (Limit 200°F max)	:	Max. 161°F
AFN-TE-90 (Limit 200°F max)	:	Max. 152°F
AFN-TE-91 (Limit 200°F max)	:	Max. 163°F

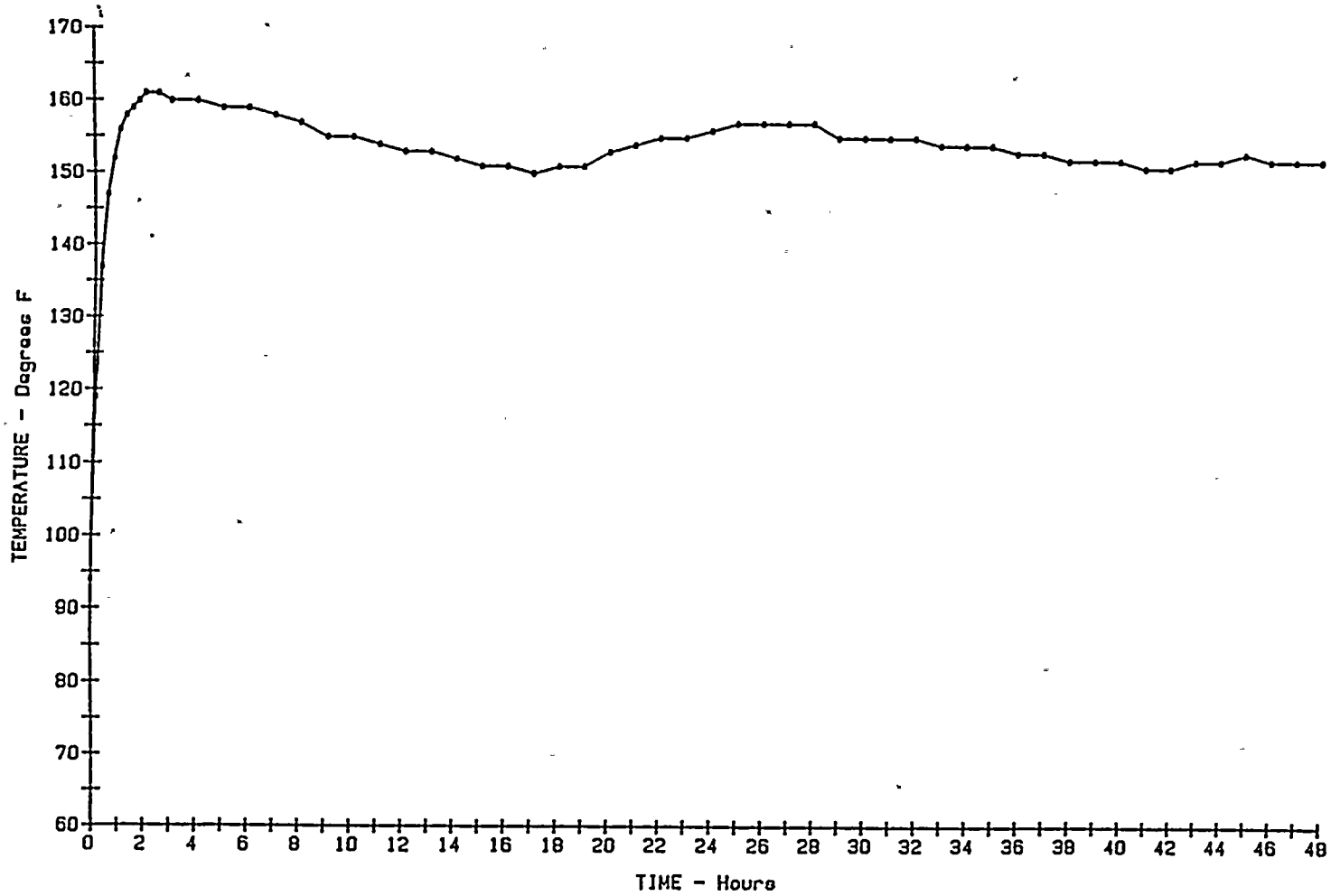
c) Flow Data: Data was collected with a clamp on flowmeter on the recirculation line to the CST. The M&TE used was a Controlotron Model #65580 and flow data recorded was about 280 gpm during the test.

d) Vibration Data: Data was collected using a hand held vibration meter and probe. The M&TE used was an IRD Model #810. The maximum vibration limits are 5 mils and the actual vibrations recorded during the test are listed below:

Inboard bearing: .4 - .6 mils
Outboard bearing: .9 - 1.2 mils

The 91PE-2AF01 48-hour endurance run demonstrated that 2M-AFN-P01 remained within design limits with respect to bearing temperatures and vibration. The following plots made for the bearing temperatures versus time demonstrated that the design limits were not exceeded.

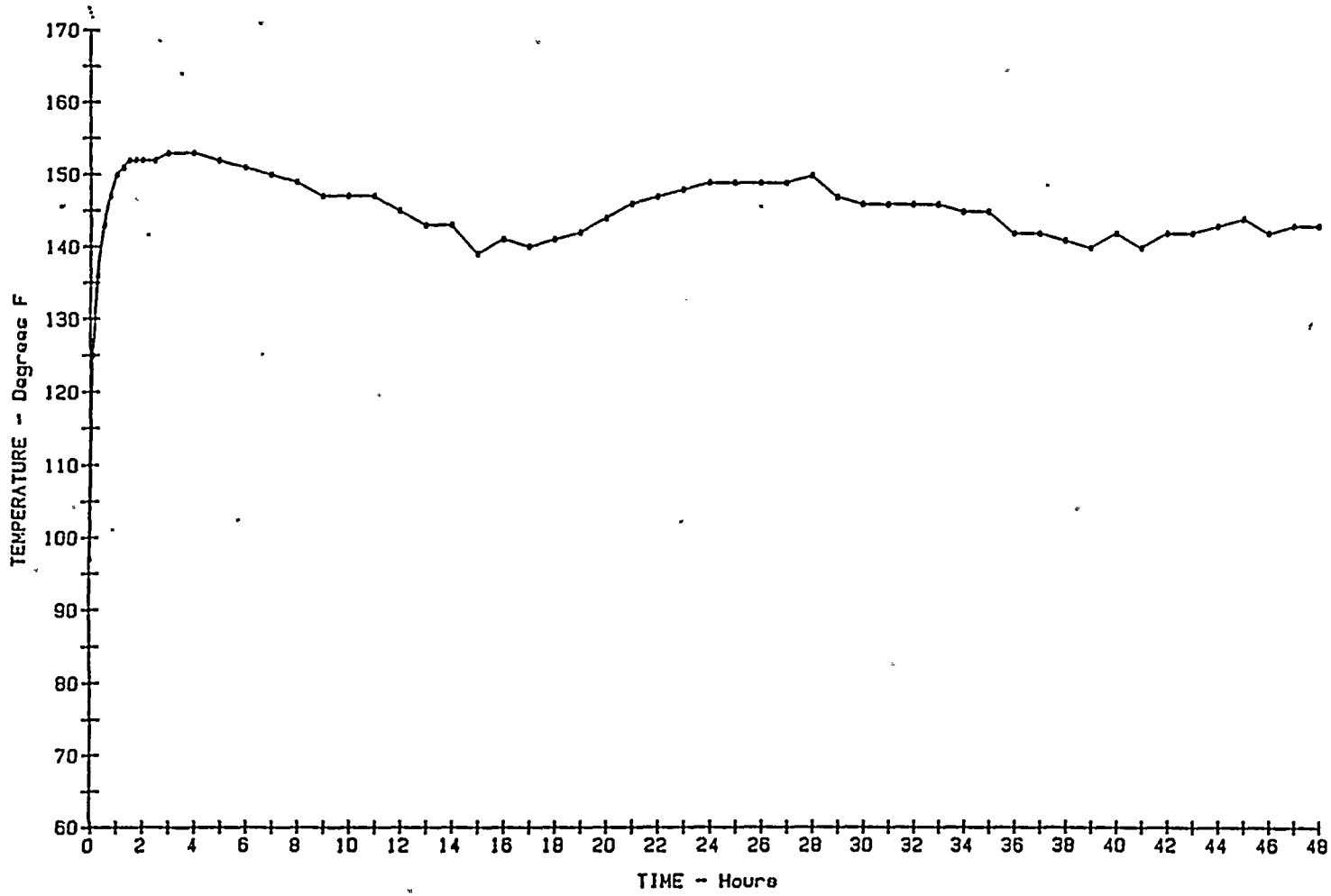
2M-AFN-P01 AUXILIARY FEEDWATER PUMP
AFN-TE-79 - FREE END MOTOR BEARING



48 HOUR RUN

1 HOUR RUN
AFTER COOLDOWN

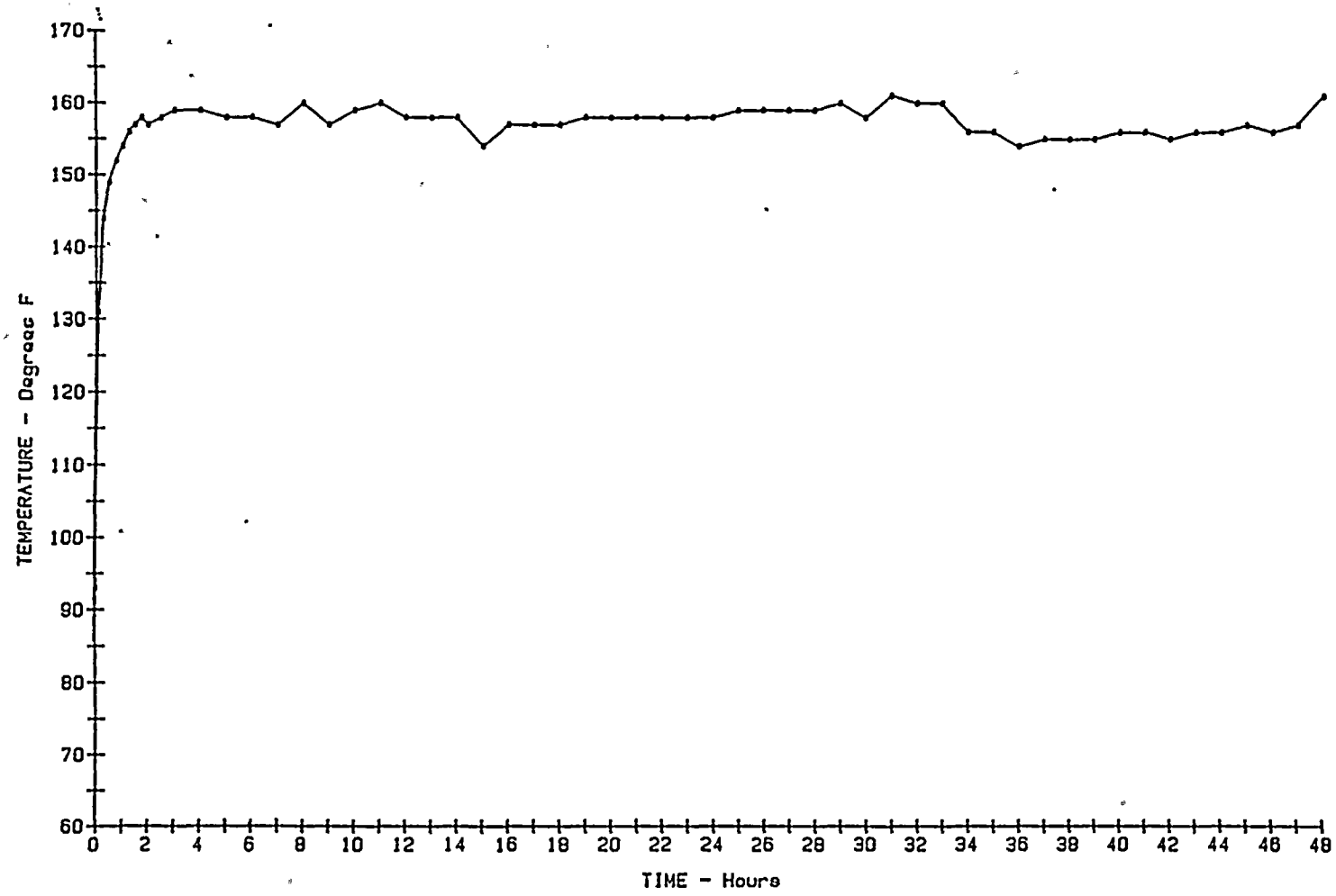
2M-AFN-P01 AUXILIARY FEEDWATER PUMP
AFN-TE-81 - COUPLING END MOTOR BEARING



48 HOUR RUN

1 HOUR RUN
AFTER COOLDOWN

2M-AFN-P01 AUXILIARY FEEDWATER PUMP
AFN-TE-89 - PUMP THRUST BEARING

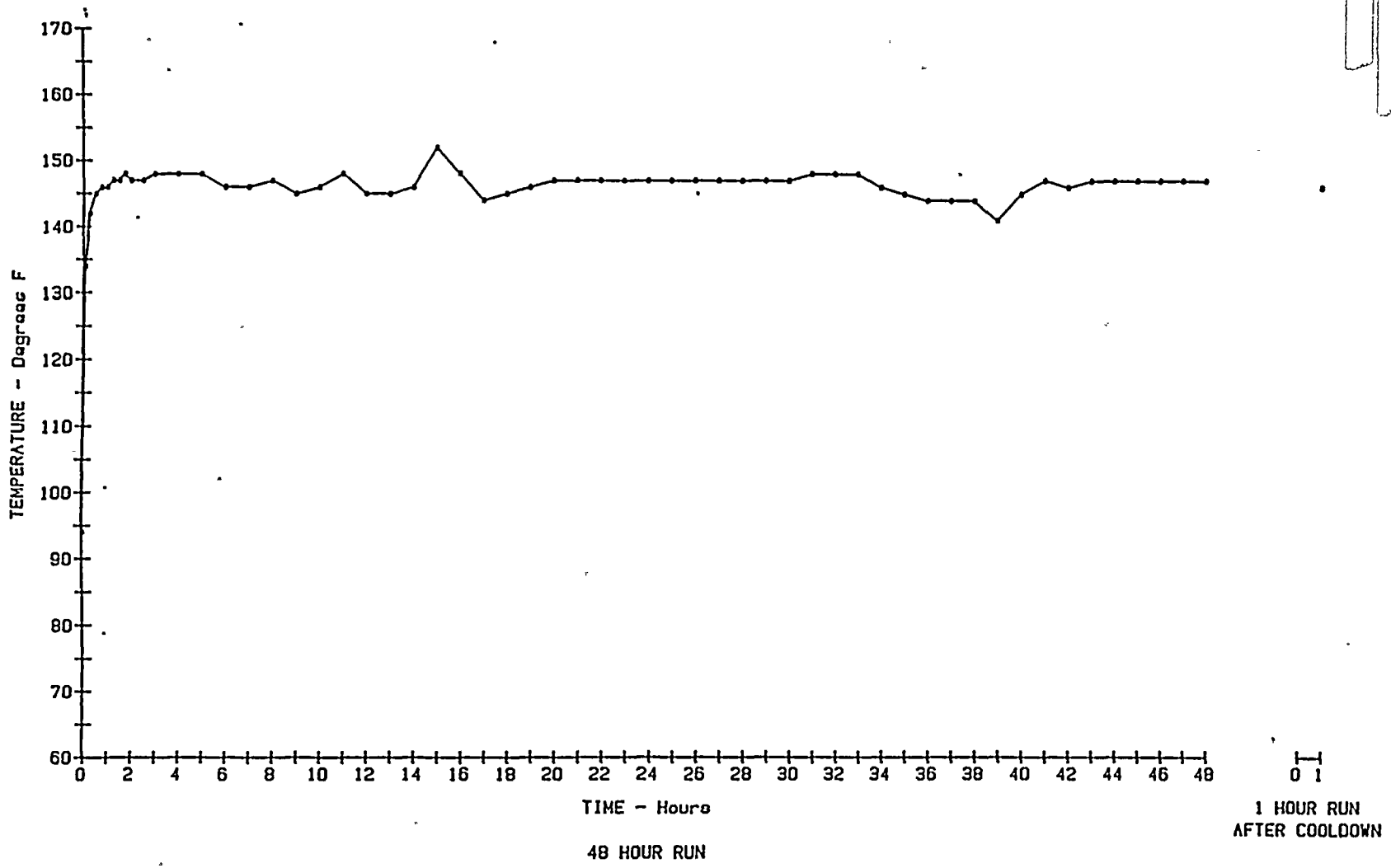


48 HOUR RUN

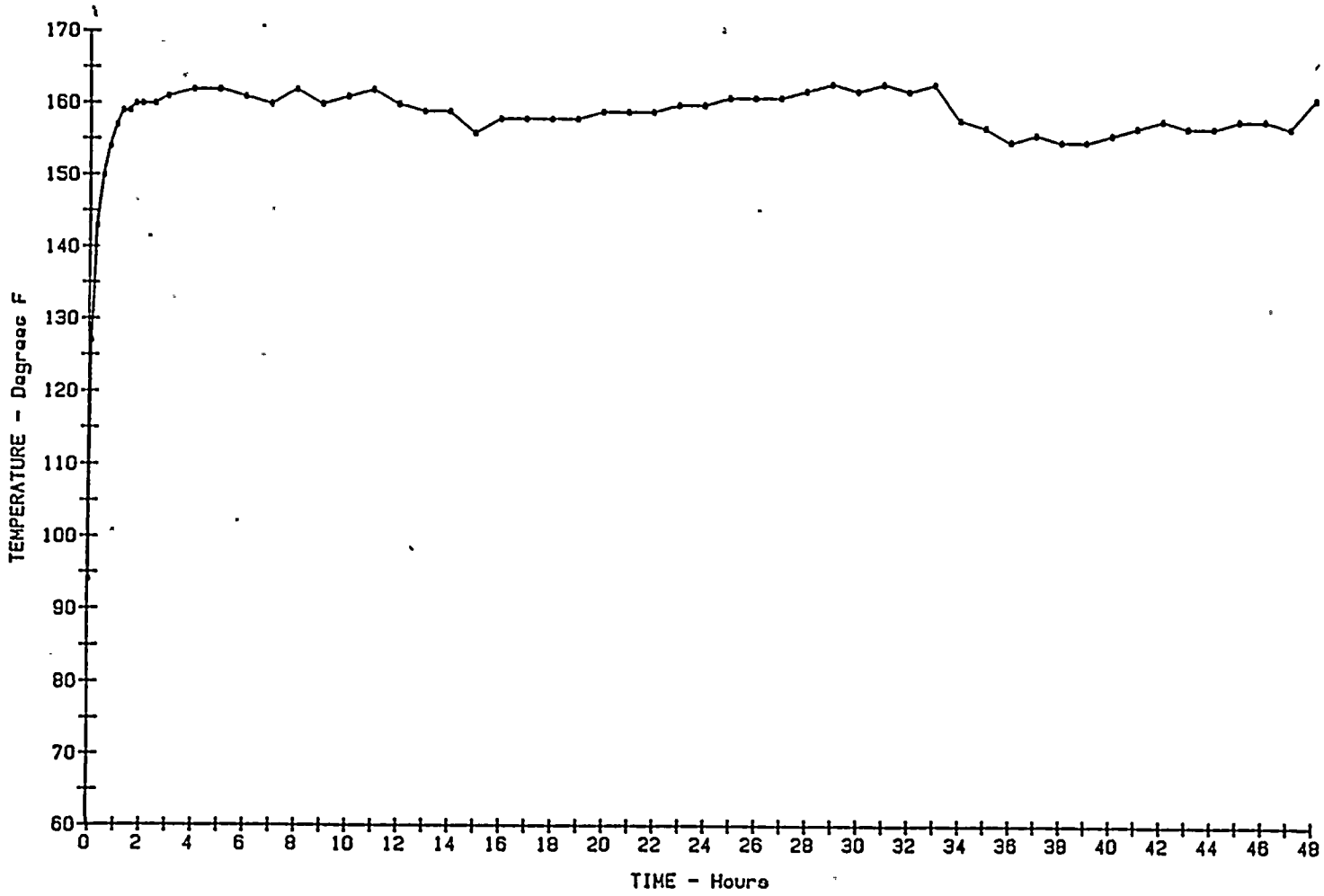
0 1

1 HOUR RUN
AFTER COOLDOWN

2M-AFN-P01 AUXILIARY FEEDWATER PUMP
AFN-TE-90 - PUMP COUPLING END JOURNAL BEARING



2M-AFN-P01 AUXILIARY FEEDWATER PUMP
AFN-TE-91 - PUMP FREE END JOURNAL BEARING



48 HOUR RUN

0 1

1 HOUR RUN
AFTER COOLDOWN

2) 2M-AFB-P01 - Essential AFW pump 48-hour endurance testing data:

a) Date of Testing: June 13, 1985 through June 15, 1985.

b) Bearing Temperatures - The limits for each bearing temperature, along with the maximum obtained temperature are listed below:

AFN-TE-80 (Limit 190°F max) : Max. 151°F
AFN-TE-82 (Limit 190°F max) : Max. 149°F
AFN-TE-86 (Limit 200°F max) : Max. 162°F
AFN-TE-87 (Limit 200°F max) : Max. 161°F
AFN-TE-88 (Limit 200°F max) : Max. 148°F

c) Flow Data: Data was collected using a clamp on flowmeter on the recirculation line to the CST. The M&TE used was a Controlotron Model #65580 and flow data recorded was about 235 gpm during the test.

d) Vibration Data: Data was collected using a hand held vibration meter and probe. The M&TE used was and IRD Model #810. The maximum vibration limits are 5 mils and the actual vibrations recorded during the test are listed below.

Inboard Bearing: .8 - 1.0 mils
Outboard Bearing: .9 - 1.2 mils

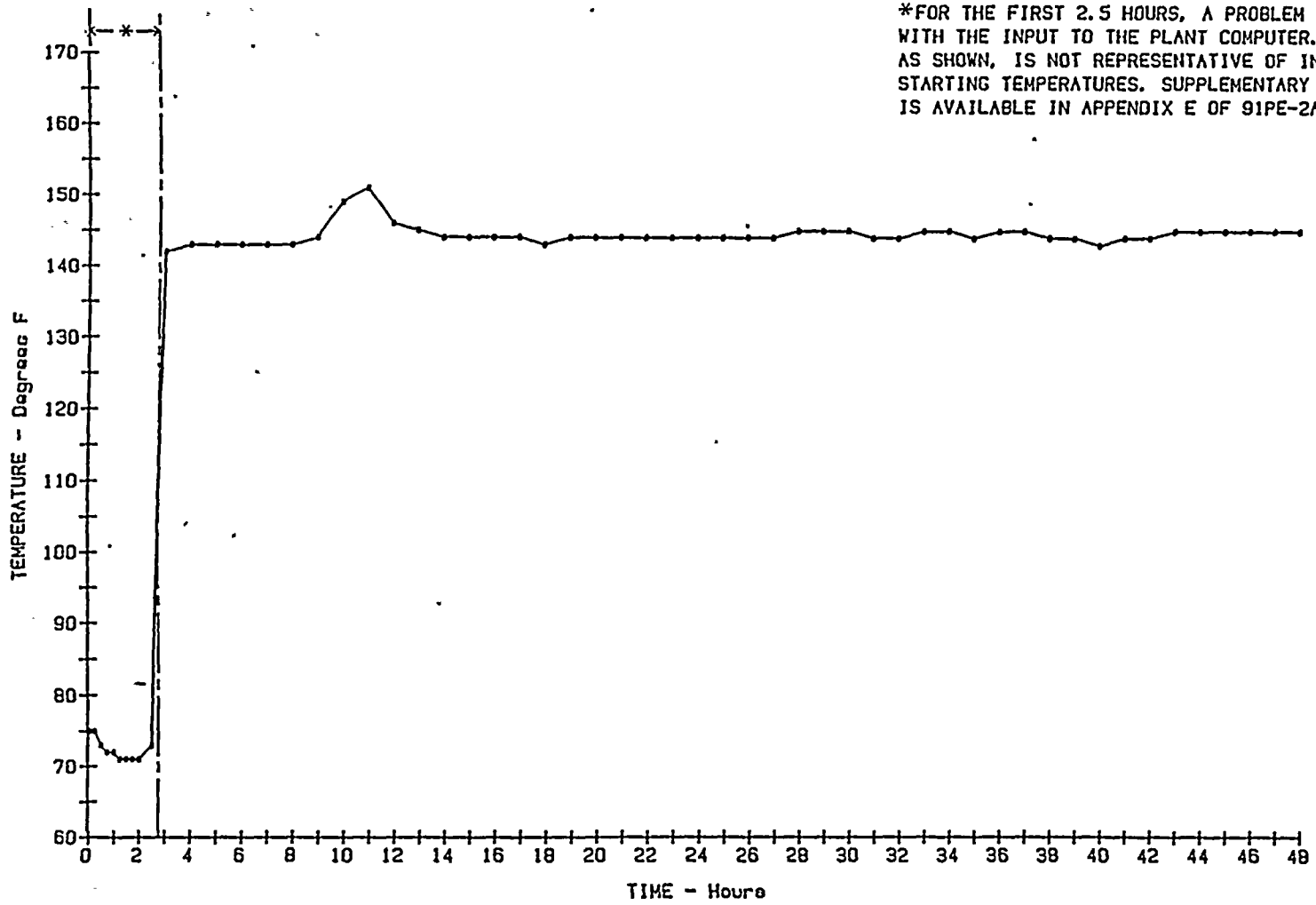
e) Pump room temperature and humidity data: Data was collected using a psychrometer to measure wet and dry bulb temperatures. From this data relative humidity was also calculated.

Temperature Range: 68°F - 73°F
Relative Humidity Range: 52% - 82%

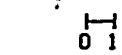
The 48-hour endurance run demonstrated that 2M-AFB-P01 remained within design limits with respect to bearing temperatures and vibrations. The test data also showed that the pump room ambient conditions (temperature, humidity) did not exceed environmental qualification limits for safety related equipment in the room. The following plots made for the bearing temperatures versus time demonstrated that the design limits were not exceeded. Plots were also made for the pump room temperature and humidity data versus time.

2M-AFB-P01 AUXILIARY FEEDWATER PUMP
AFN-TE-80 - FREE END MOTOR BEARING

*FOR THE FIRST 2.5 HOURS, A PROBLEM EXISTED WITH THE INPUT TO THE PLANT COMPUTER. DATA, AS SHOWN, IS NOT REPRESENTATIVE OF INITIAL STARTING TEMPERATURES. SUPPLEMENTARY DATA IS AVAILABLE IN APPENDIX E OF 91PE-2AF01.

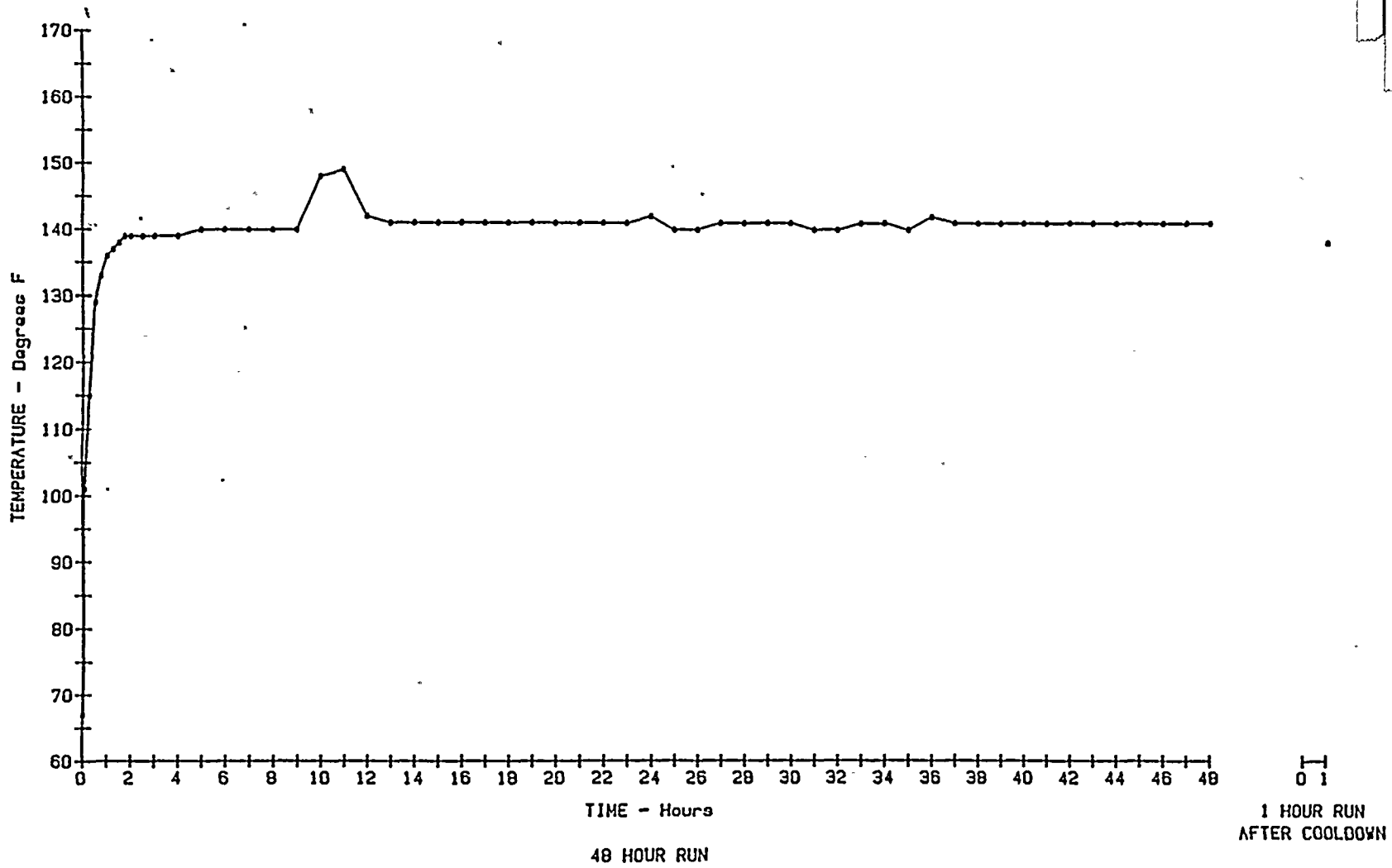


48 HOUR RUN

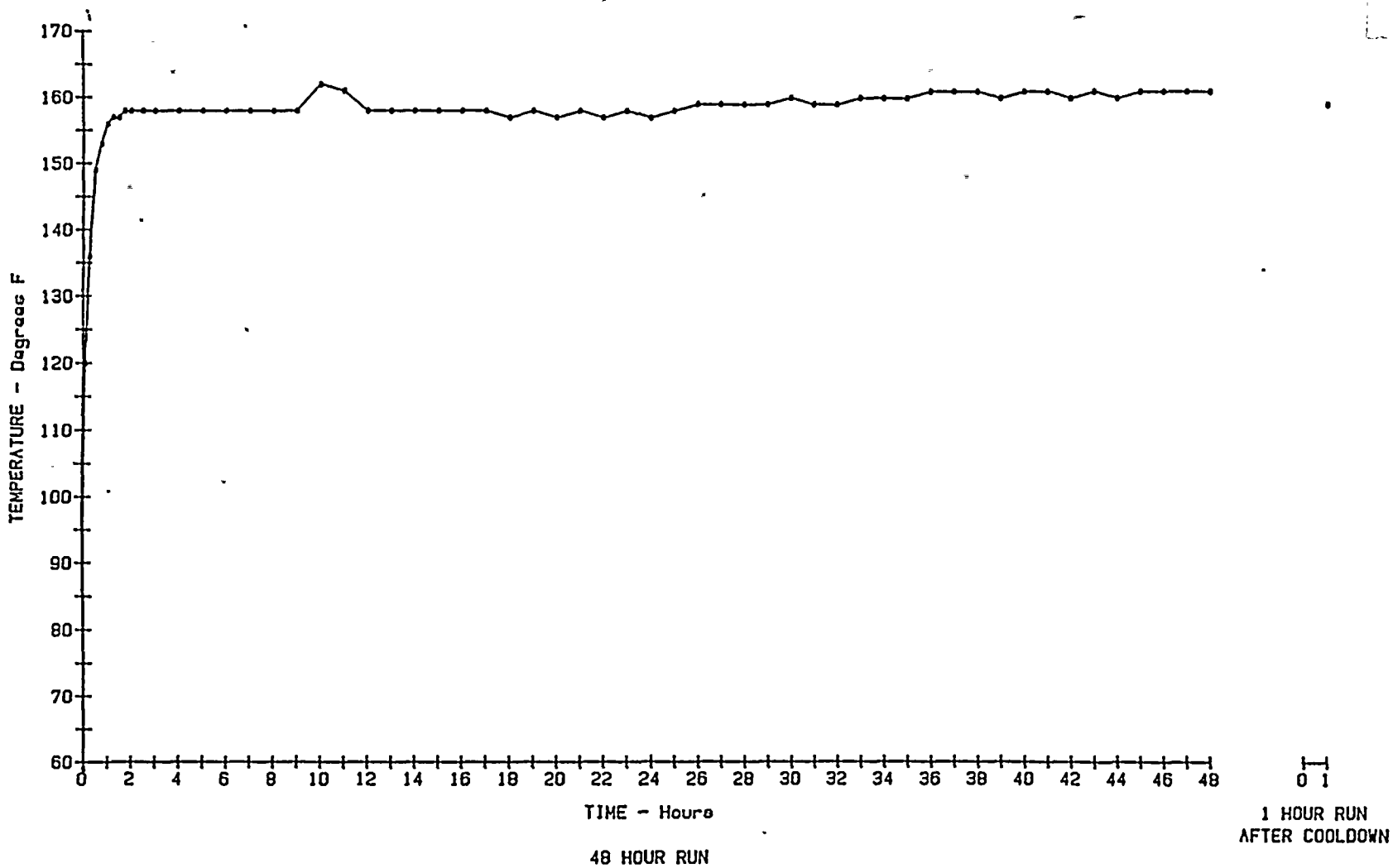


1 HOUR RUN
AFTER COOLDOWN

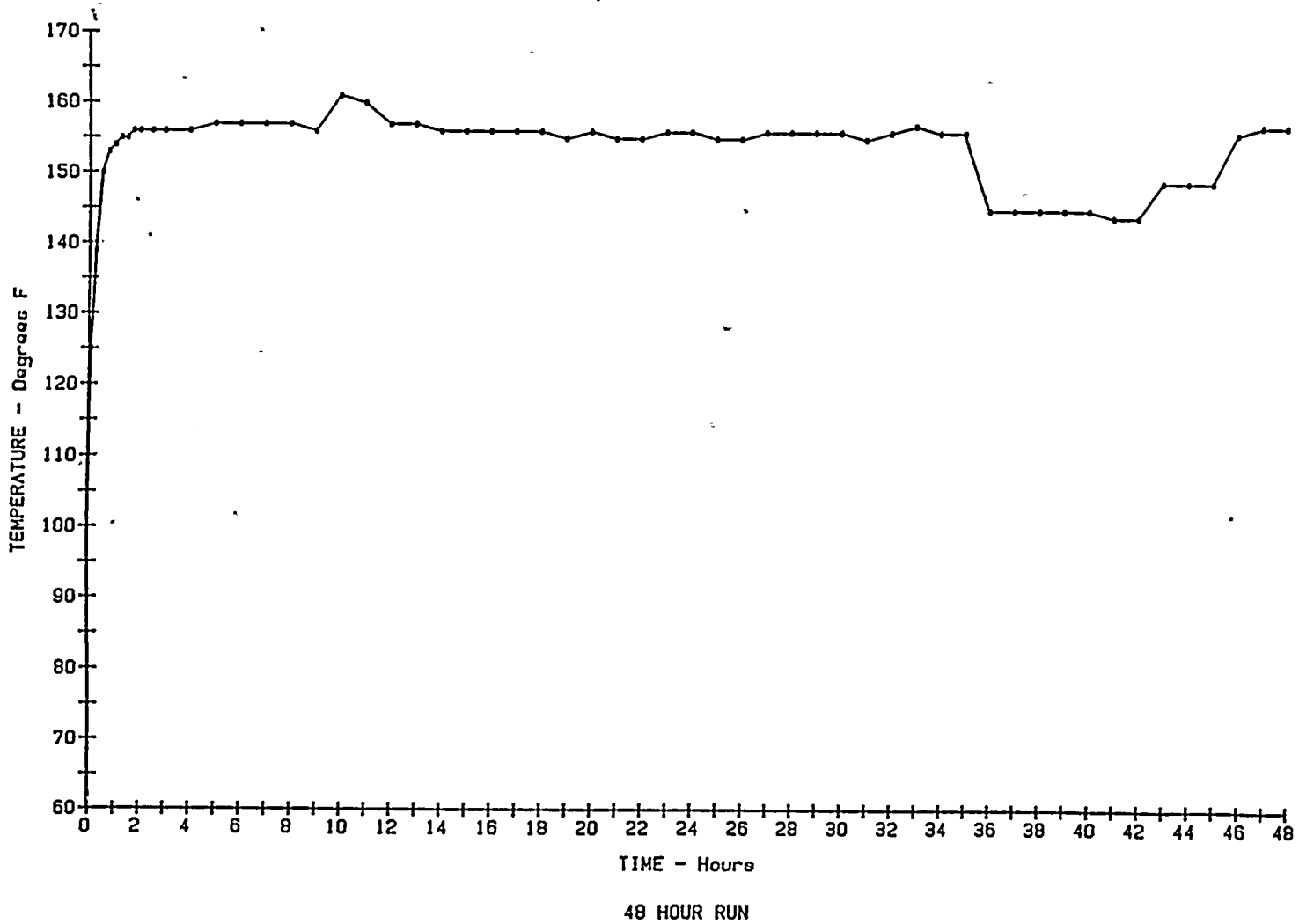
2M-AFB-P01 AUXILIARY FEEDWATER PUMP
AFN-TE-82 - COUPLING END MOTOR BEARING



2M-AFB-P01 AUXILIARY FEEDWATER PUMP
AFN-TE-86 - PUMP FREE END JOURNAL BEARING

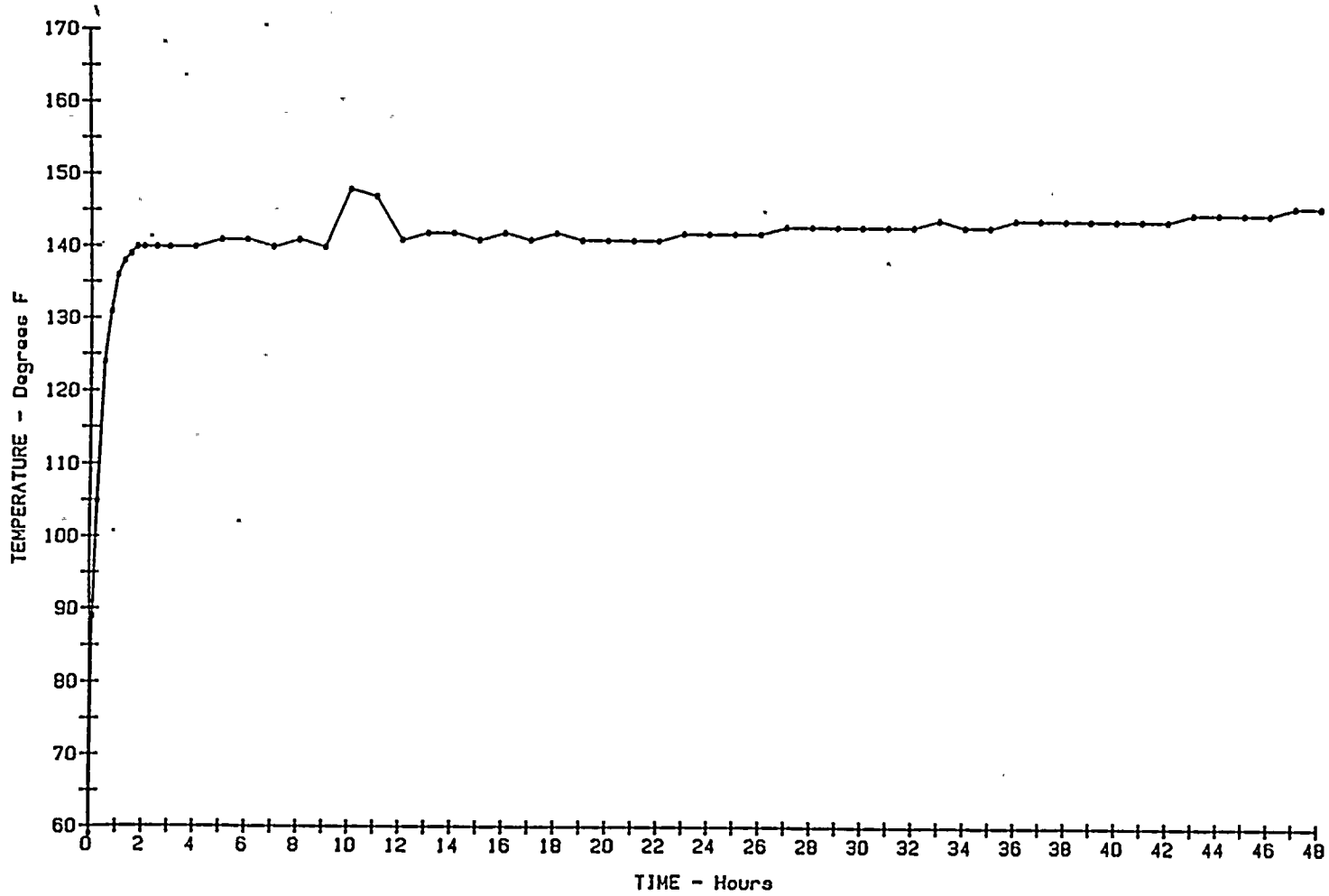


2M-AFB-P01 AUXILIARY FEEDWATER PUMP
AFN-TE-87 - PUMP COUPLING END JOURNAL BEARING



0 1
1 HOUR RUN
AFTER COOLDOWN

2M-AFB-P01 AUXILIARY FEEDWATER PUMP
AFN-TE-88 - PUMP THRUST BEARING

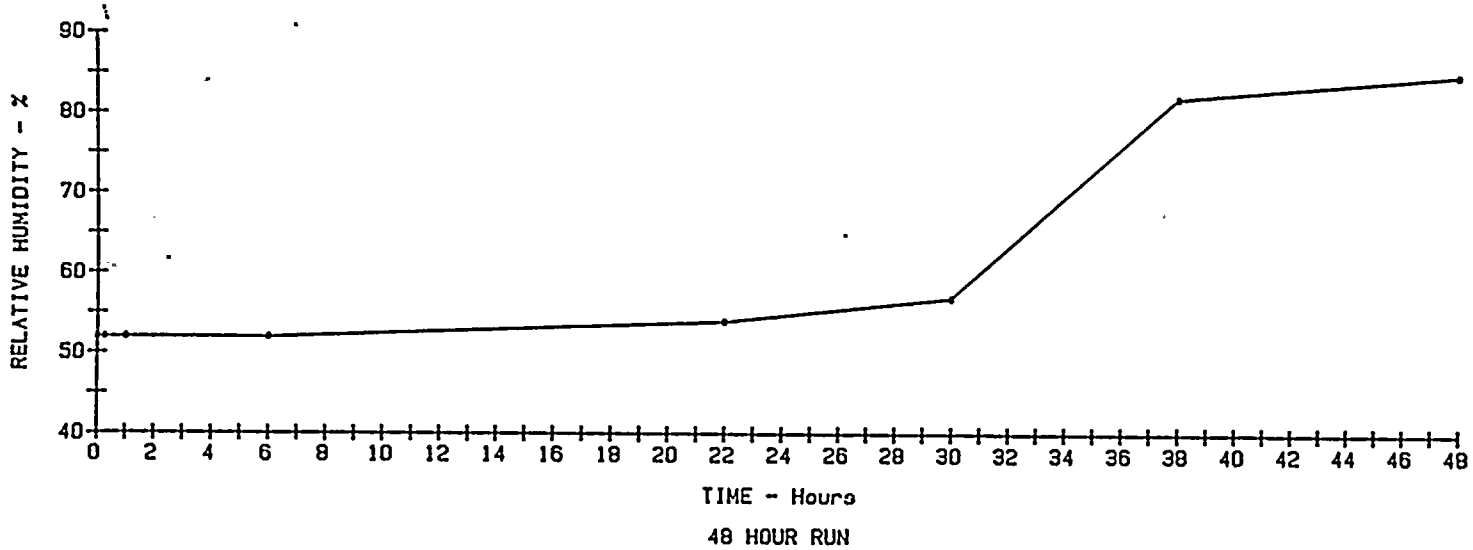


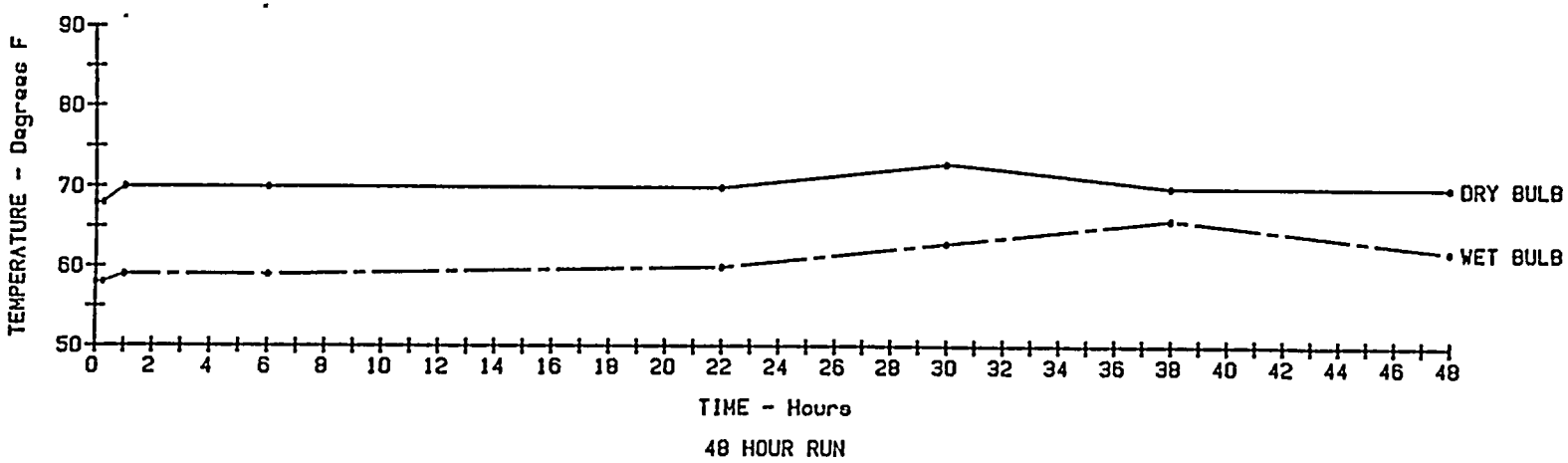
48 HOUR RUN

0 1

1 HOUR RUN
AFTER COOLDOWN

2M-AFB-P01 AUXILIARY FEEDWATER PUMP ROOM
ENVIRONMENTAL DATA





3) 2M-AFA-P01 Essential AFW pump 48 hour endurance test data

a) Date of testing: July 12, 1985 through July 14, 1985, and July 19, 1985.

b) Bearing Temperatures - The limits for each bearing temperature, along with the maximum obtained temperature are listed below:

AFN-TE-59 (Limit 200°F max) : Max. 137°F (128.8°F)*
AFN-TE-60 (Limit 200°F max) : Max. 115°F (126.7°F)*
AFN-TE-83 (Limit 200°F max) : Max. 167°F
AFN-TE-84 (Limit 200°F max) : Max. 157°F
AFN-TE-85 (Limit 200°F max) : Max. 166°F

*Maximum values while using hand held contact pyrometer (M&TE) for bearing surface temperatures.

c) Flow Data: AFA-P01 was run on minimum recirculation during the 48 hour run. Operations also used AFA-P01 to feed the steam generators while at the 565°F and 2250 psia test plateau.

d) Vibration Data: Data was collected using a hand held vibration meter and probe. The M&TE used was an IRD Model #350. The maximum vibration limits are 5 mils and the actual vibrations recorded during the test are listed below.

Inboard Bearing: .24 - .46 mils
Outboard Bearing: .35 - .64 mils

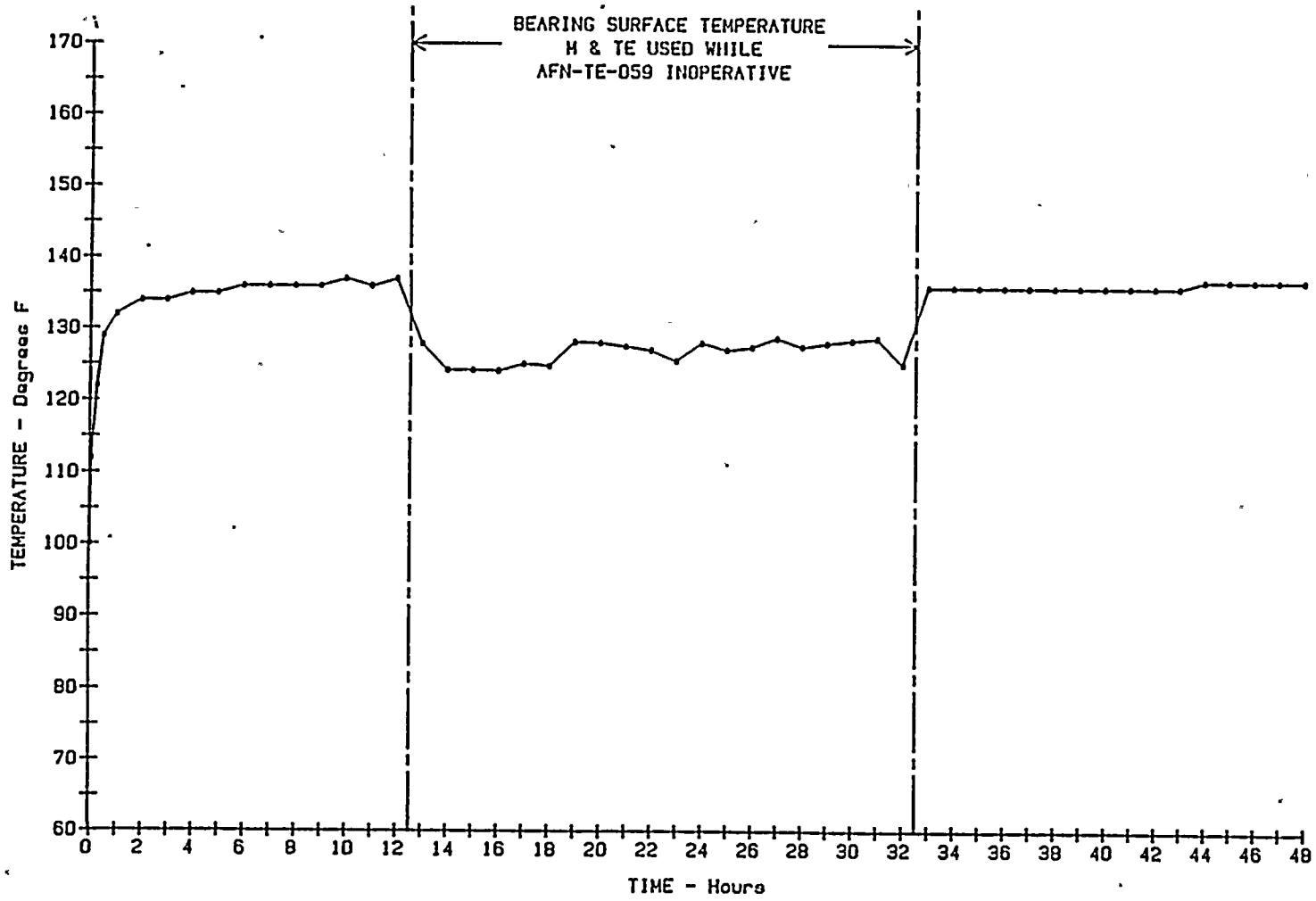
e) Pump room temperature and humidity data: Data was collected using a calibrated temperature and humidity meter (M&TE).

Temperature Range: 67.2°F to 80.5°F
Humidity Range: 49.3% to 70.9%

The 48-hour endurance run demonstrated that 2M-AFA-P01 remained within design limits with respect to bearing temperatures and vibration. The test data also showed that the pump room ambient conditions (temperature, humidity) did not exceed environmental qualification limits for safety related equipment in the room. The following plots made for the bearing temperatures versus time demonstrated that the design limits were not exceeded. Plots were also made for the pump room temperature and humidity data versus time.

AJM:GEP:RLG:WHF:mj

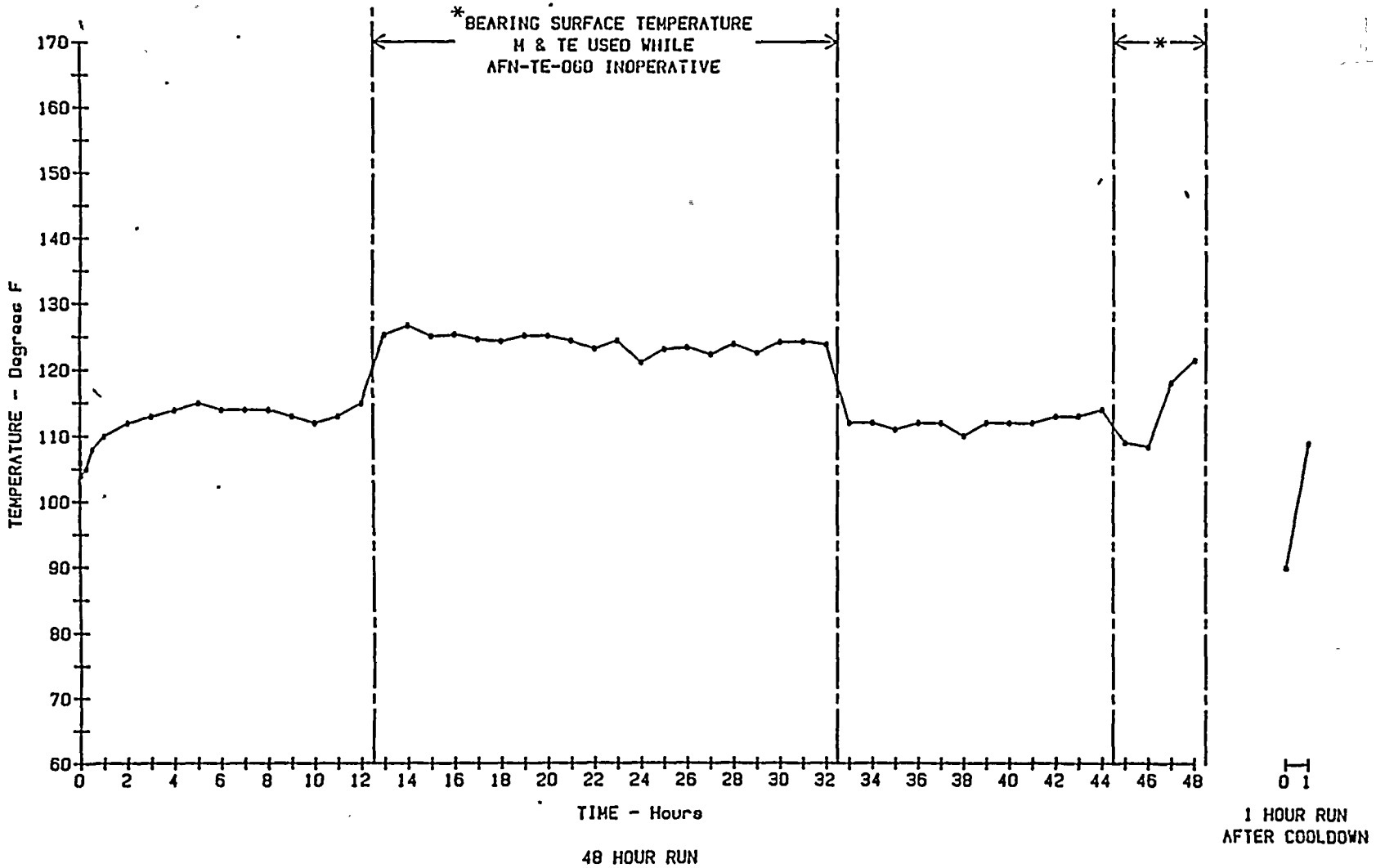
2M-AFA-P01 AUXILIARY FEEDWATER PUMP
AFN-TE-59 - TURBINE GOVERNOR END JOURNAL BEARING



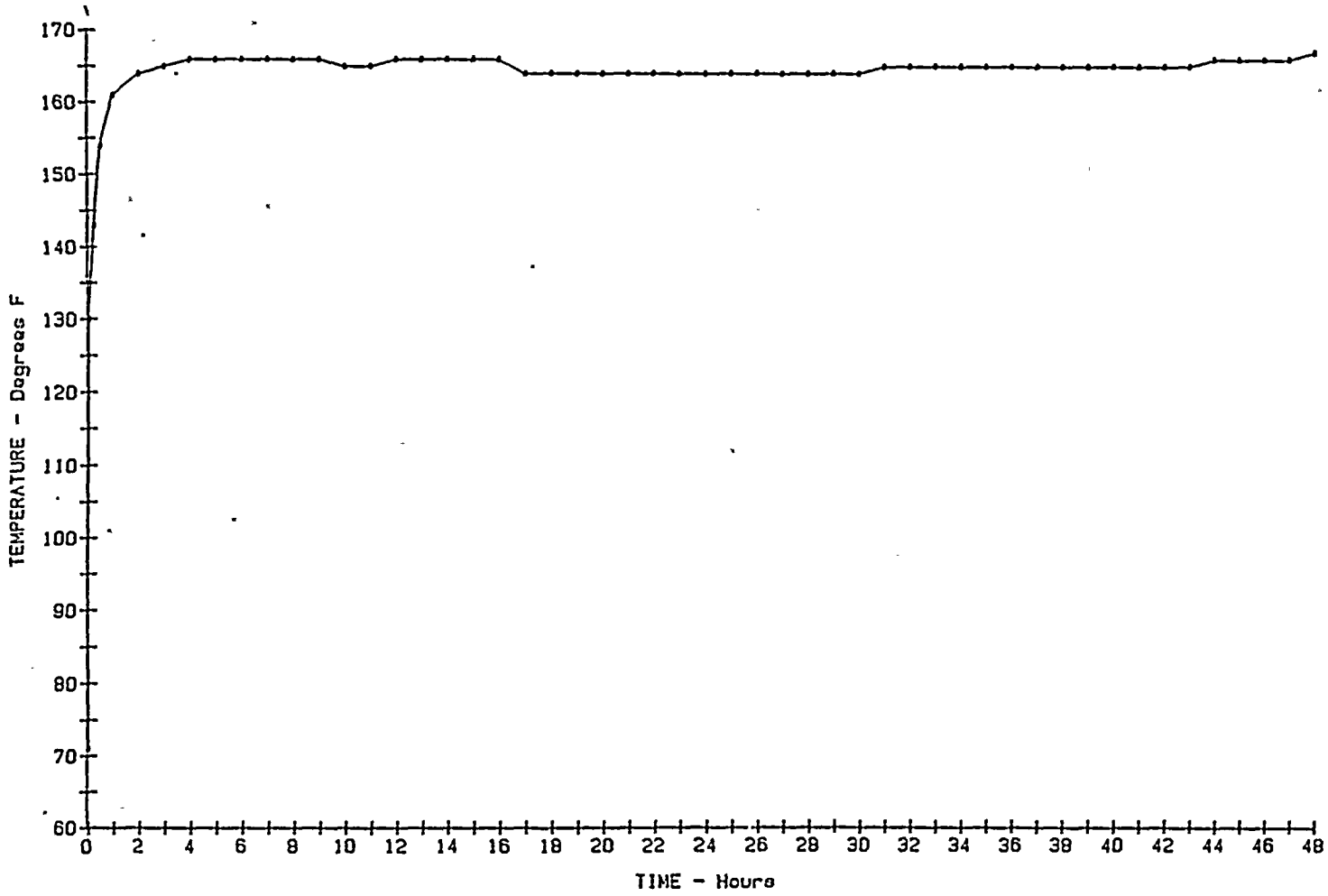
48 HOUR RUN

1 HOUR RUN
AFTER COOLDOWN

2M-AFA-P01 AUXILIARY FEEDWATER PUMP
AFN-TE-60 - TURBINE COUPLING END JOURNAL BEARING



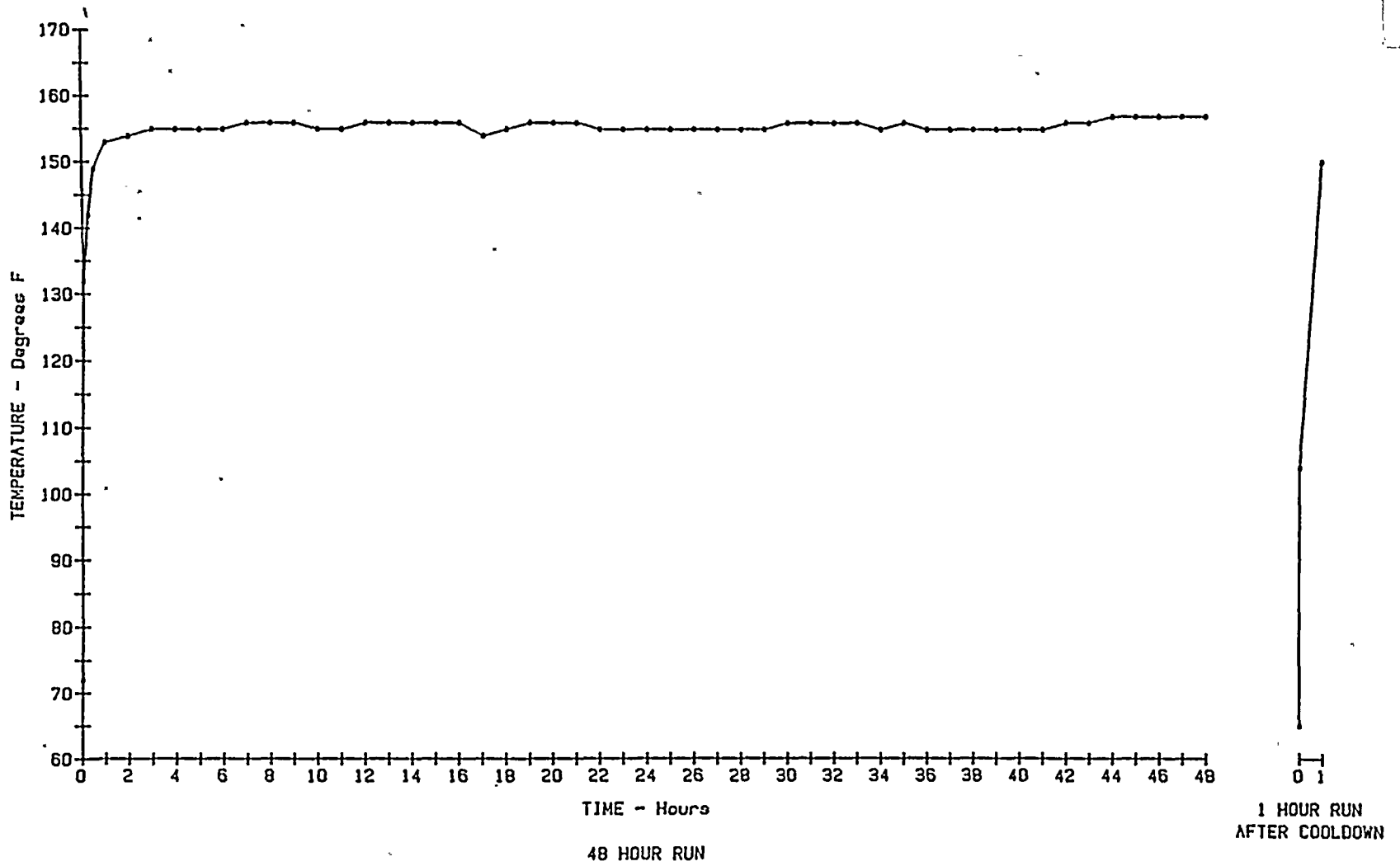
2M-AFA-P01 AUXILIARY FEEDWATER PUMP
AFN-TE-83 - PUMP FREE END JOURNAL BEARING



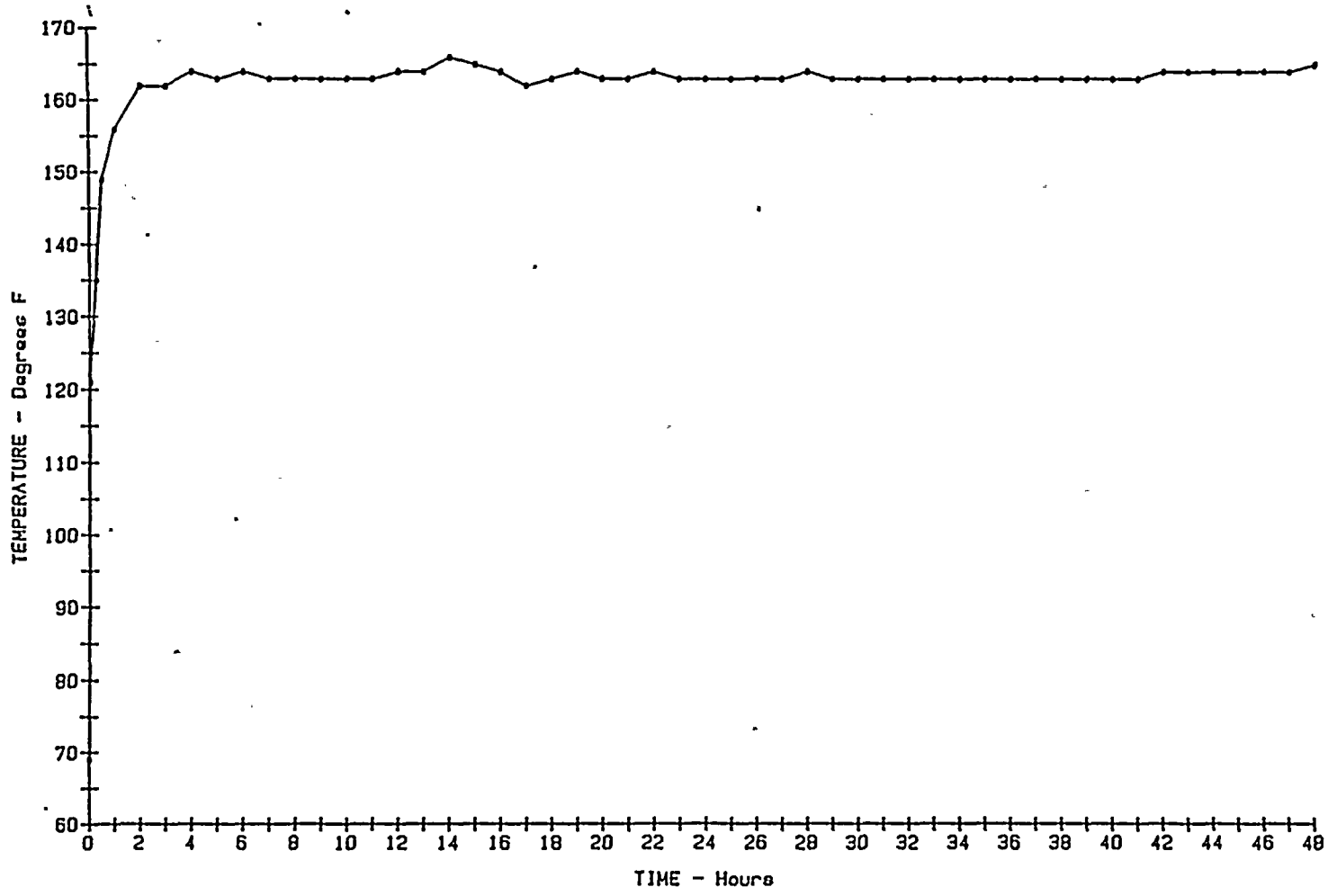
48 HOUR RUN

1 HOUR RUN
AFTER COOLDOWN

2M-AFA-P01 AUXILIARY FEEDWATER PUMP
AFN-TE-84 - PUMP COUPLING END JOURNAL BEARING



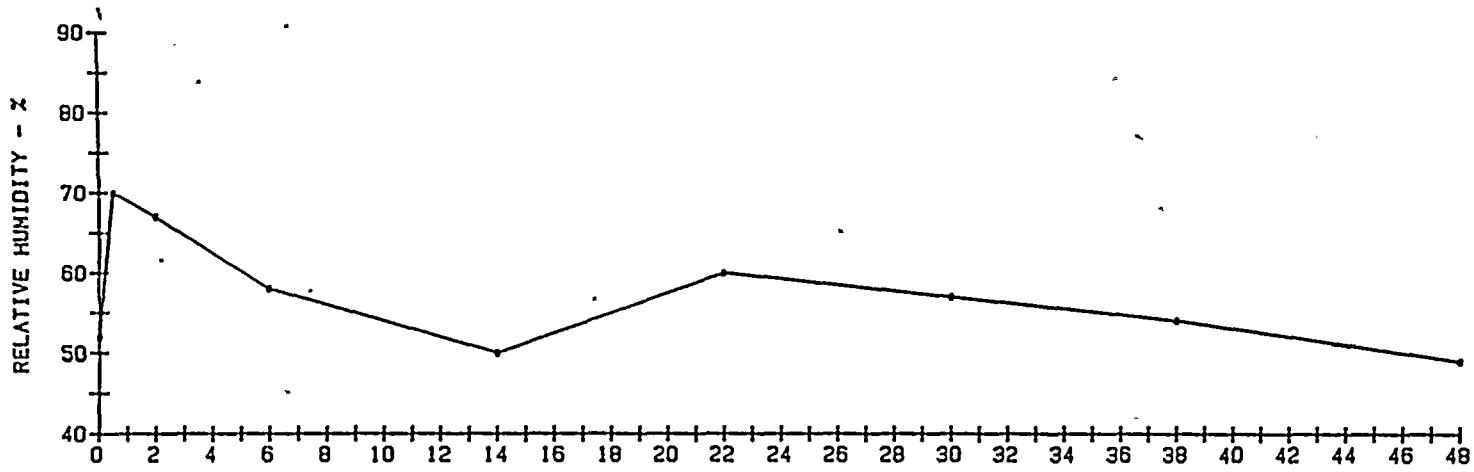
2M-AFA-P01 AUXILIARY FEEDWATER PUMP
AFN-TE-85 - PUMP THRUST BEARING



48 HOUR RUN

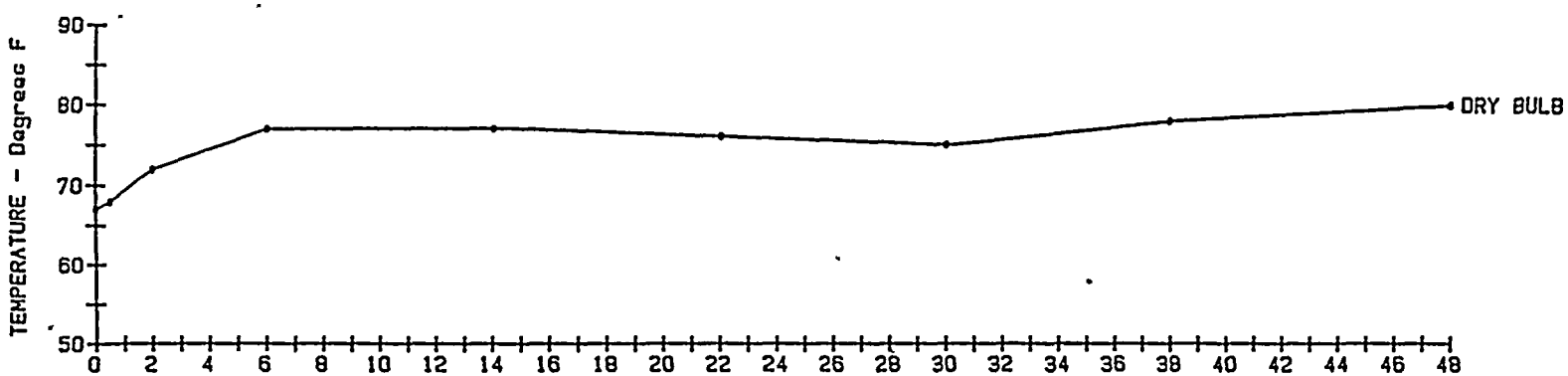
1 HOUR RUN
AFTER COOLDOWN

2M-AFA-P01 AUXILIARY FEEDWATER PUMP ROOM
ENVIRONMENTAL DATA



TIME - Hours

48 HOUR RUN



TIME - Hours

48 HOUR RUN