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 AUTH. NAME AUTHOR AFFILIATION
 HAYNES, J. G. Arizona Nuclear Power Project (formerly Arizona Public Serv
 RECIP. NAME RECIPIENT AFFILIATION
 KNIGHTON, G. W. PWR Project Directorate 7

SUBJECT: Forwards results of auxiliary feedwater sys pump 48 h
 endurance tests required by Item II.E.1.1.B.2 of SER (NUREG-
 0857).

562
RPH

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NOTES: Standardized plant. M. Davis, NRR: 1Cy.

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Arizona Nuclear Power Project

P.O. BOX 52034 • PHOENIX, ARIZONA 85072-2034

February 11, 1987
ANPP-40082-JGH/PGN/98.05

Director of Nuclear Reactor Regulation
Attention: Mr. George W. Knighton, Project 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 3
Docket No. STN 50-530
Auxiliary Feedwater Pump 48-Hour Endurance Test
File: 87-G-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,

J. G. Haynes
Vice President
Nuclear Production

JGH/PGN/rw
Attachment

cc: O. M. De Michele
E. E. Van Brunt, Jr.
E. A. Licitra
R. P. Zimmerman
A. C. Gehr

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PDR ADDCK 05000530
E PDR

Boo!
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Essential Steam Turbine Driven Auxiliary
Feedwater Pump 48 Hour Endurance Test
3M-AFA-P01

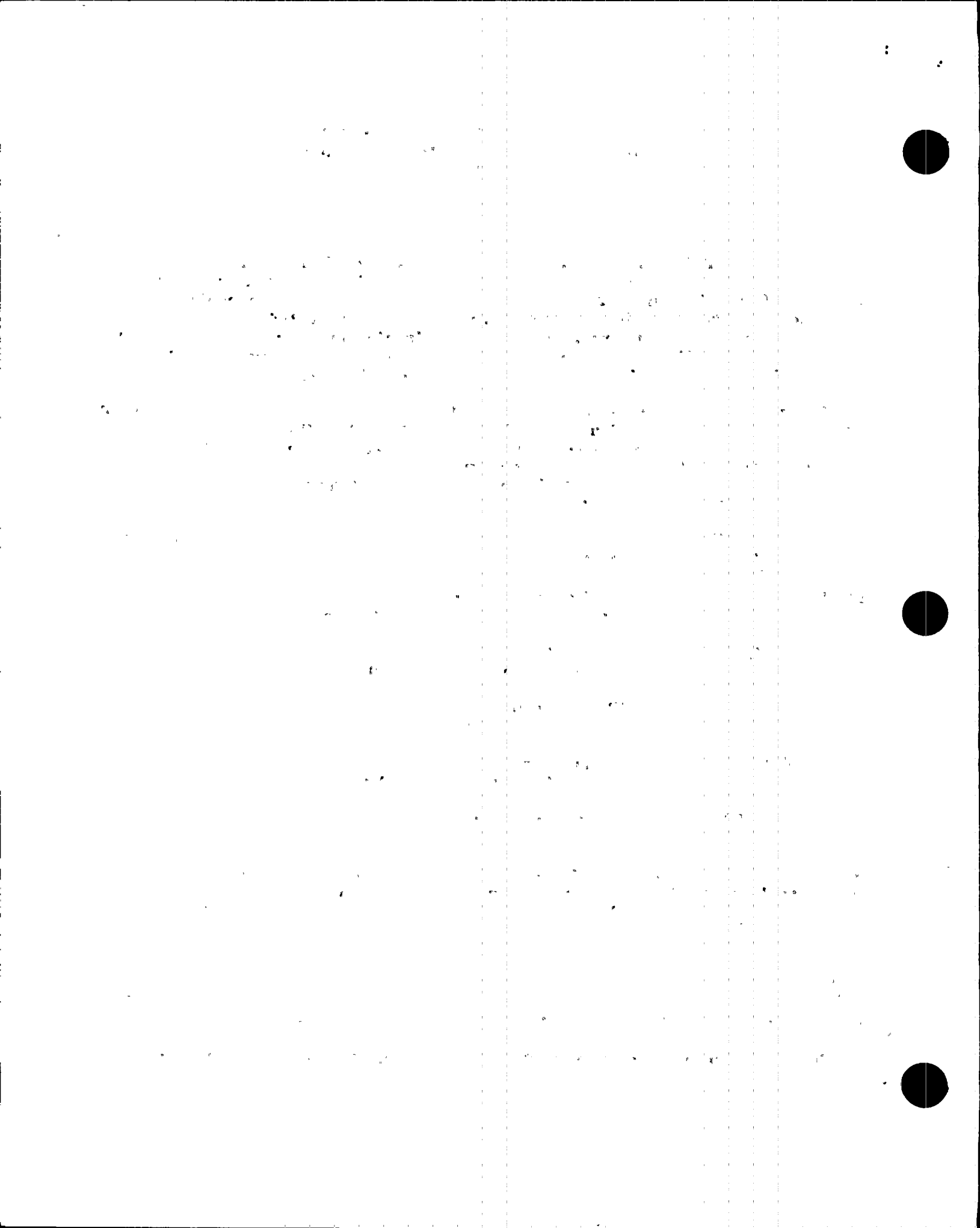
As required by ITEM II.E.1.1.B.2 of NUREG 0857, a 48 hour endurance test was performed on AFA-P01 to verify the pump's ability to provide continuous operation for a 48 hour period. NUREG 0857 further required a cooldown after pump operation to allow bearing temperatures to cool to within 10°F of ambient and a subsequent one hour run. Acceptance Criteria for operability of AFA-P01 included not exceeding bearing/bearing oil temperature and bearing cap vibration limits while operating within specified environmental temperatures.

Testing was performed in accordance with 91HF-3AF01. The 48 hour run commenced November 2, 1986, and continuing until November 5, 1986. The test was initiated and terminated by manual operation of the Control Room handswitch. Pump bearing/bearing oil temperatures were monitored using the Plant Monitoring System computer display of the following plant instrumentation (see attached graphs for all recorded data):

<u>INSTRUMENT (PMS)</u>	<u>PARAMETER</u>	<u>LIMIT</u>	<u>MAXIMUM OBSERVED TEMPERATURE</u>
AFN-TE-59 (AFT59)	AFA-P01 Turbine Outboard Bearing Temperature	200°F max	154°F
AFN-TE-60 (AFT60)	AFA-P01 Turbine Inboard Bearing Temperature	200°F max	132°F
AFN-TE-83 (AFT83)	AFA-P01 Pump Inboard Bearing Temperature	200°F max	156°F
AFN-TE-84 (AFT84)	AFA-P01 Pump Outboard Bearing Temperature	200°F max	129°F
AFN-TE-85 (AFT85)	AFA-P01 Pump Thrust Bearing Temperature	200°F max	138°F

Pump inboard and outboard bearing cap vibration was monitored using an IRD model 810 portable vibration analyzer and probe. The following maximum values were observed and are compared to the upper limit (see attached graphs for all recorded data):

<u>PARAMETER</u>	<u>LIMIT</u>	<u>MAXIMUM OBSERVED VIBRATION</u>
AFA-P01 Pump Inboard Bearing Cap Vibration	5 mils max	2.3 mils
AFA-P01 Pump Outboard Bearing Cap Vibration	5 mils max	3.0 mils



Essential Steam Turbine Driven Auxiliary
Feedwater Pump 48 Hour Endurance Test
3M-AFA-P01

AFA-P01 Pump Room environmental conditions were monitored with a VAISALA HUMICAP Model HM131. The following maximum values were observed and are compared to the specified limits (see attached graphs for all recorded data):

<u>PARAMETER</u>	<u>LIMIT</u>	<u>OBSERVED VALUE</u>
AFA-P01 Pump Room Temperature	104°F max (NOTE)	80.8°F Maximum
AFA-P01 Pump Room Relative Humidity	20-90% RH	45.0-57.4%

NOTE: Temperatures up to 120°F are allowable for up to 4 hours with a restoration to 104°F over the next 24 hours.

A review of all data recorded during the above endurance testing shows that upper limits on bearing/bearing oil temperatures, bearing cap vibration and pump room temperature were not exceeded.



3M-AFA-P01 STEAM TURBINE DRIVEN ESSENTIAL AUXILIARY FEEDWATER PUMP
48 HOUR ENDURANCE RUN - BEARING TEMPERATURES (DEGREES F)

RUN TIME	AFN-TE-59 TURB OB	AFN-TE-60 TURB IB	AFN-TE-83 PUMP IB	AFN-TE-84 PUMP OB	AFN-TE-85 THRUST
PRESTART	92	92	87	87	87
5 MIN	96	106	115	105	95
15 MIN	129	117	131	115	113
30 MIN	139	126	144	127	122
1 HR	150	130	150	129	127
2 HR	152	130	150	128	132
3 HR	152	130	151	128	133
4 HR	152	130	150	128	132
5 HR	153	130	151	128	133
6 HR	153	130	151	128	133
7 HR	153	130	151	128	133
8 HR	152	130	152	128	133
9 HR	152	130	152	127	134
10 HR	152	130	152	128	134
11 HR	151	129	152	127	134
12 HR	151	129	152	127	134
13 HR	150	129	152	128	134
14 HR	151	130	153	127	135
15 HR	151	130	153	127	135
16 HR	151	130	153	128	135
17 HR	151	130	154	128	136
18 HR	151	130	154	128	135
19 HR	151	130	154	128	136
20 HR	151	131	155	128	136
21 HR	152	131	154	128	136
22 HR	152	130	154	128	136
23 HR	152	130	154	128	136
24 HR	152	130	154	128	136
25 HR	153	131	154	128	137
26 HR	153	131	154	128	137
27 HR	153	131	154	128	137
28 HR	152	130	154	128	136
29 HR	152	130	154	128	136
30 HR	152	131	154	129	135
31 HR	152	130	154	128	135
32 HR	152	130	154	128	135
33 HR	152	130	154	128	136
34 HR	152	131	155	129	136
35 HR	152	131	155	129	136
36 HR	154	131	154	129	137
37 HR	154	131	155	129	137
38 HR	154	131	154	129	137
39 HR	154	131	154	129	136
40 HR	153	131	155	129	137
41 HR	152	131	154	129	137
42 HR	152	131	155	128	137
43 HR	153	131	155	129	137
44 HR	153	131	156	129	138
45 HR	151	130	154	129	138
46 HR	152	130	155	128	138
47 HR	153	131	156	128	138
48 HR	152	131	156	128	138

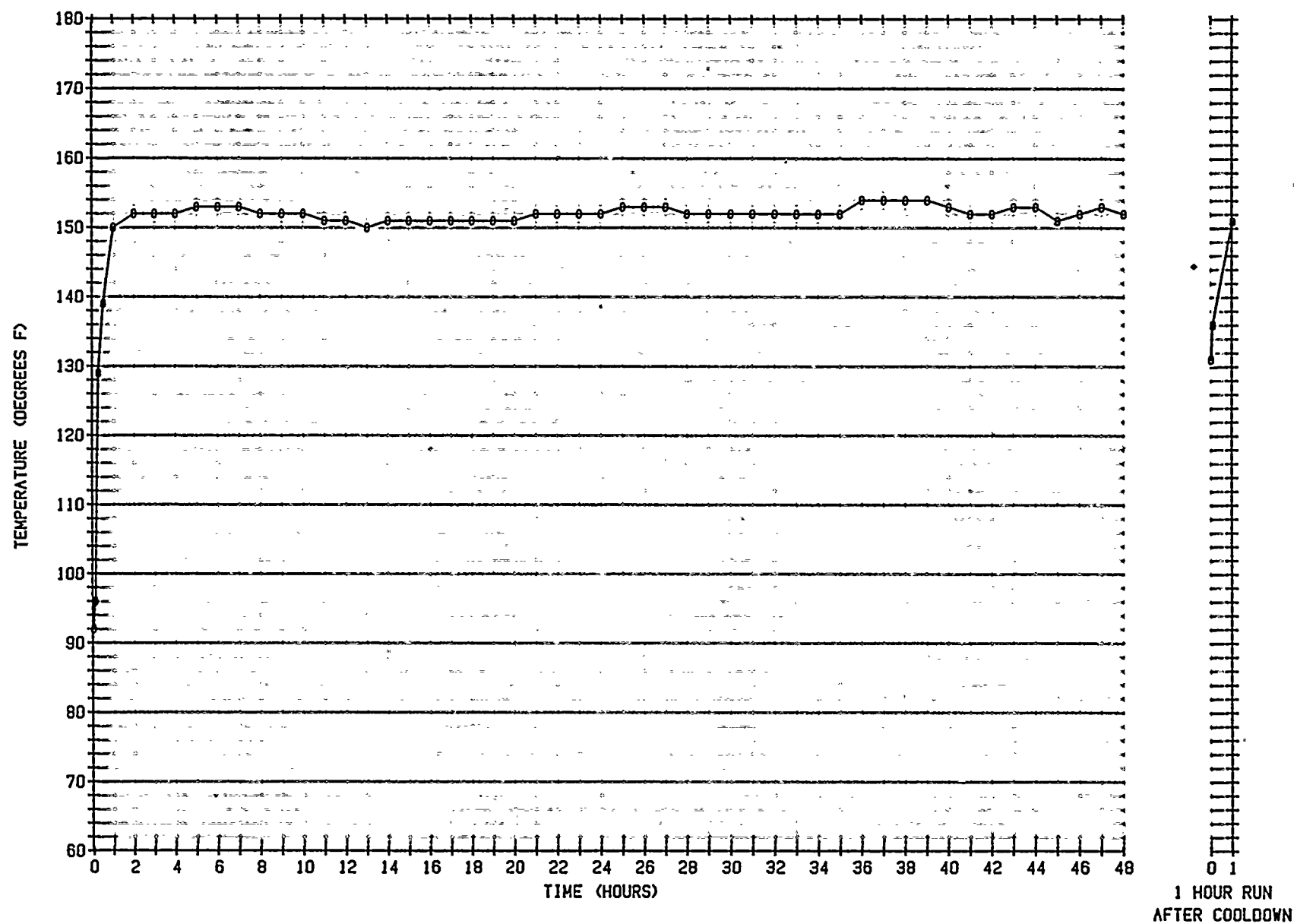
POST ENDURANCE TEST 1 HOUR RUN

PRESTART	131	128	91	93	91
5 MIN	136	129	140	122	114
1 HR	151	132	151	128	133

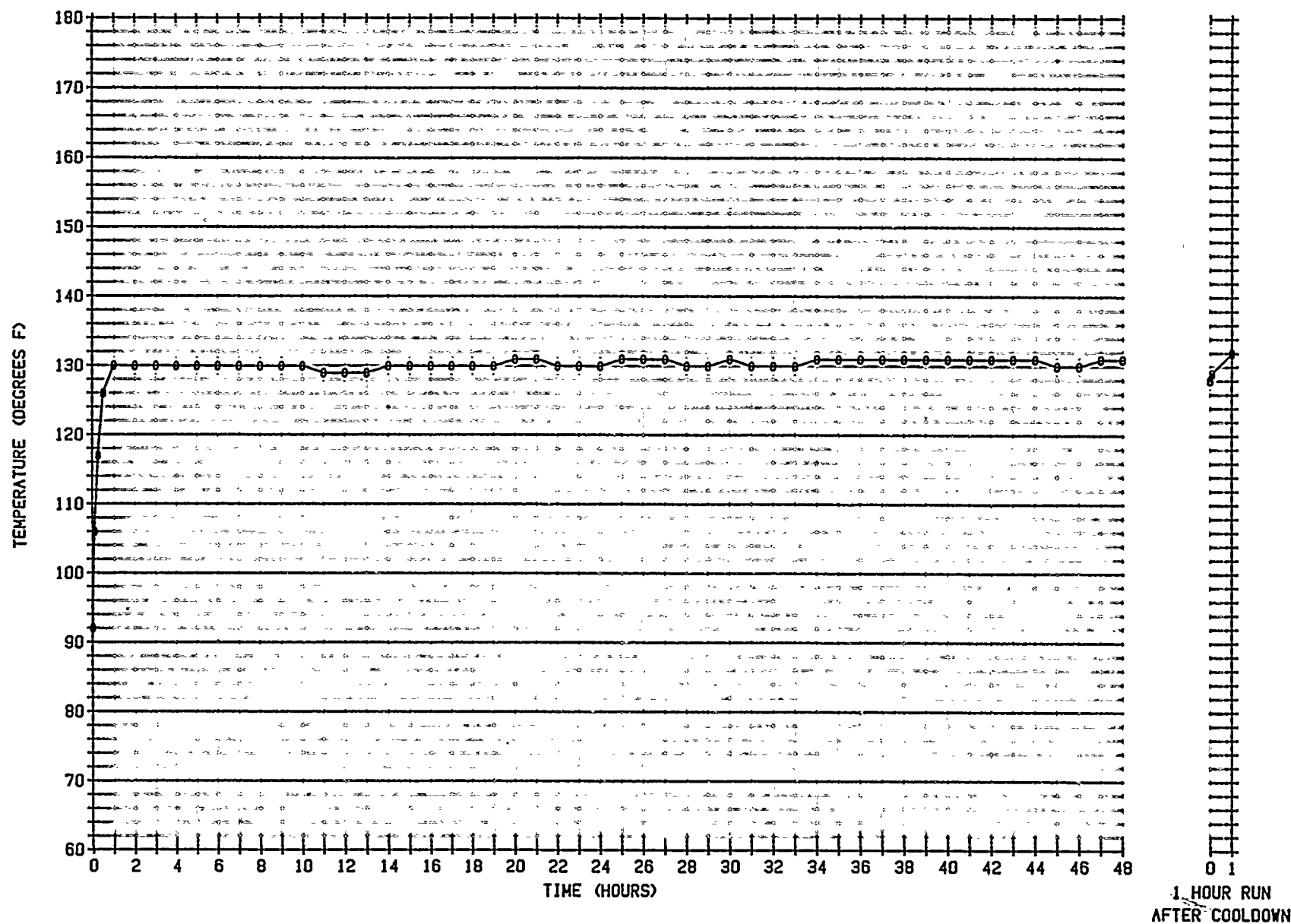
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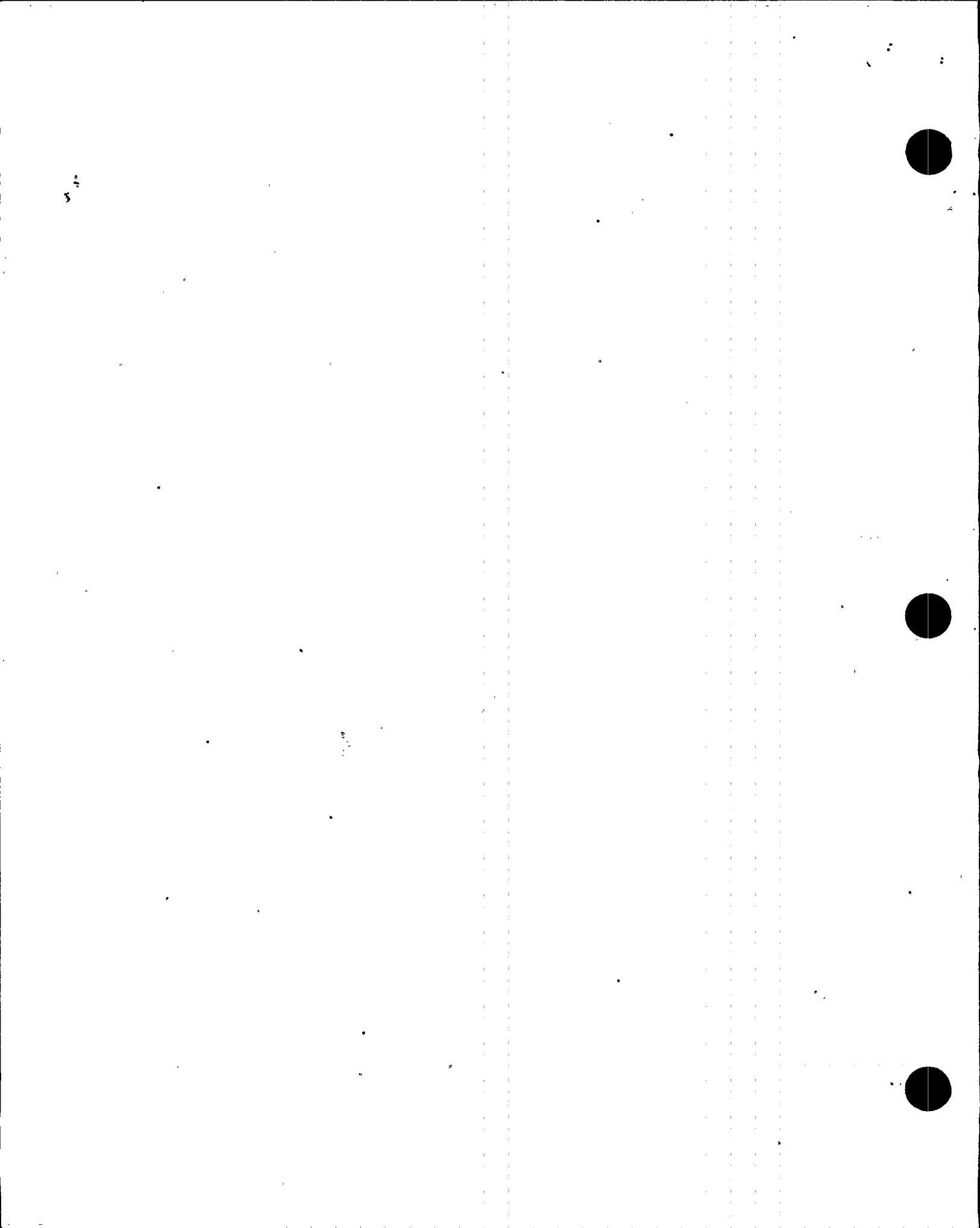
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3M-AFA-P01 STEAM TURBINE DRIVEN ESSENTIAL AUXILIARY FEEDWATER PUMP
AFN-TE-59 TURBINE OUTBOARD BEARING TEMPERATURE

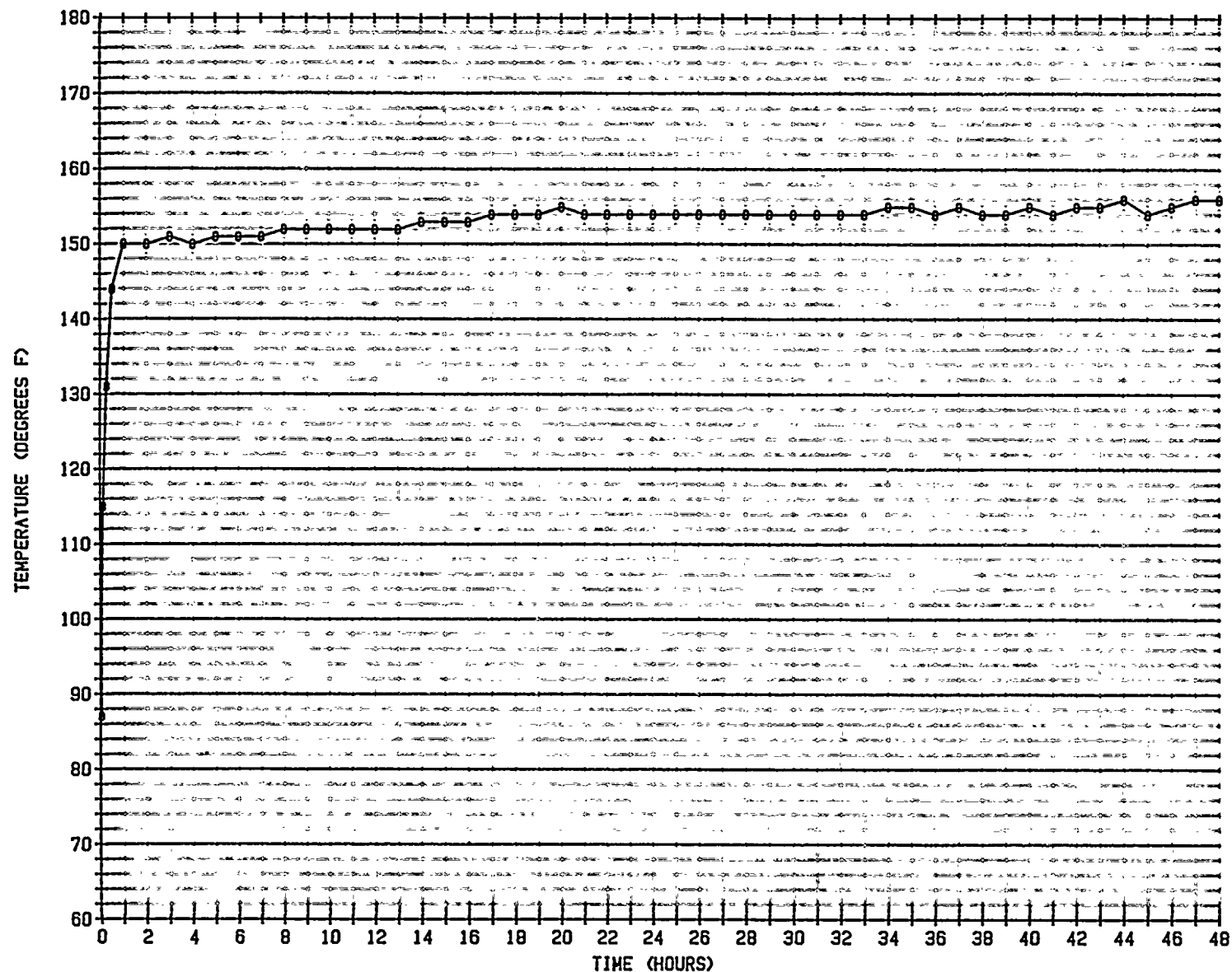


3M-AFA-P01 STEAM TURBINE DRIVEN ESSENTIAL AUXILIARY FEEDWATER PUMP AFN-TE-60 TURBINE INBOARD BEARING TEMPERATURE



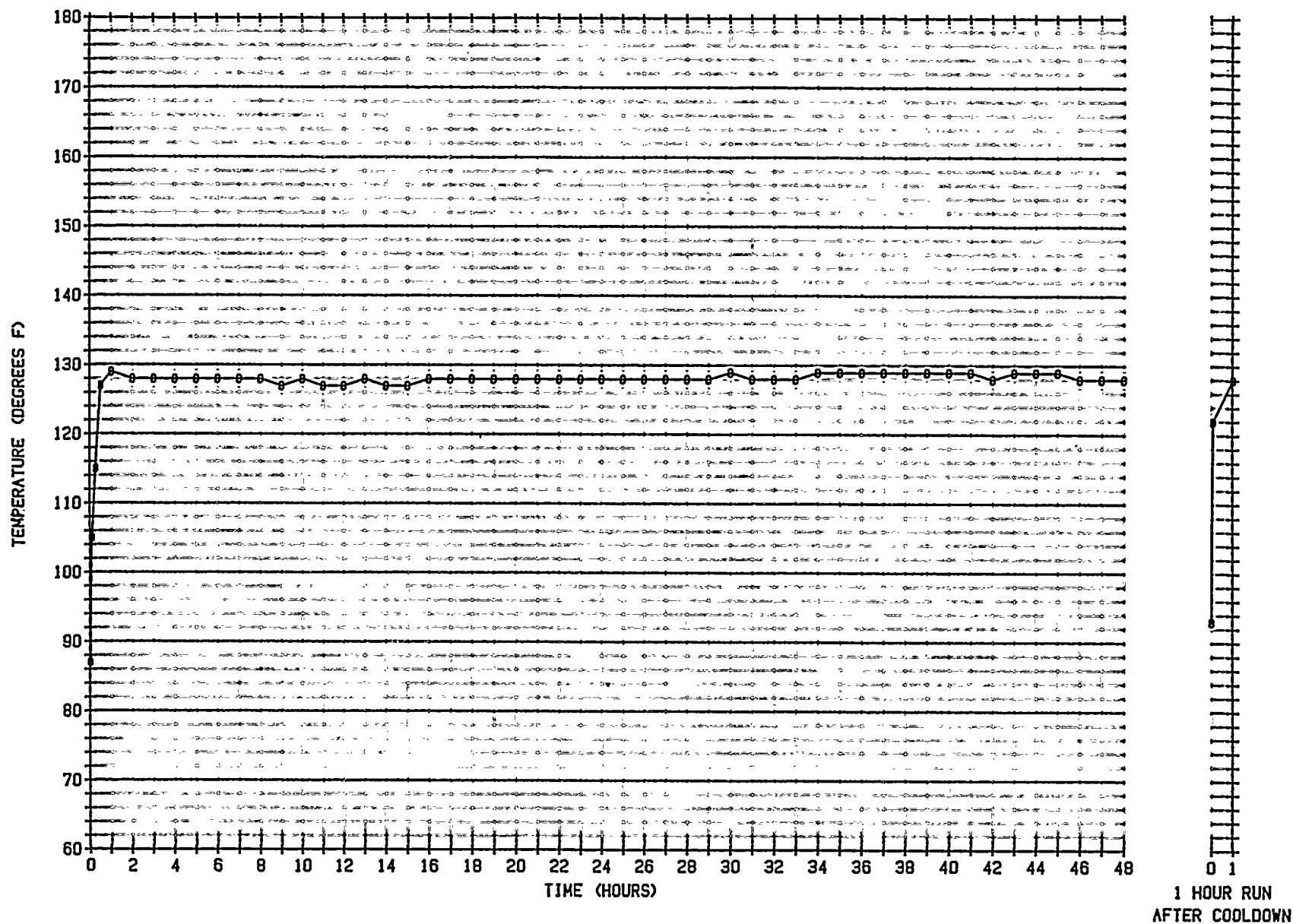


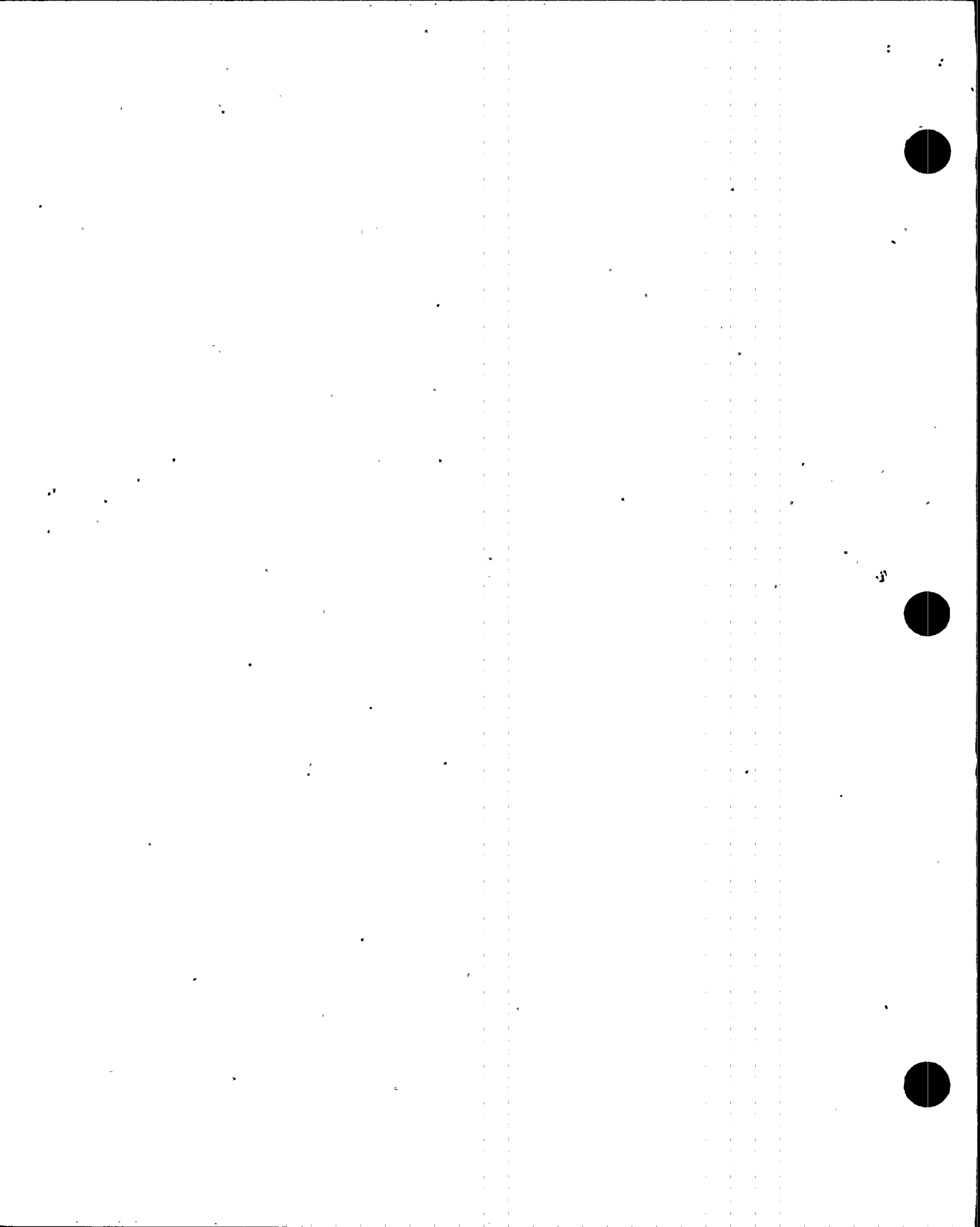
3M-AFA-P01 STEAM TURBINE DRIVEN ESSENTIAL AUXILIARY FEEDWATER PUMP AFN-TE-83 PUMP INBOARD BEARING TEMPERATURE



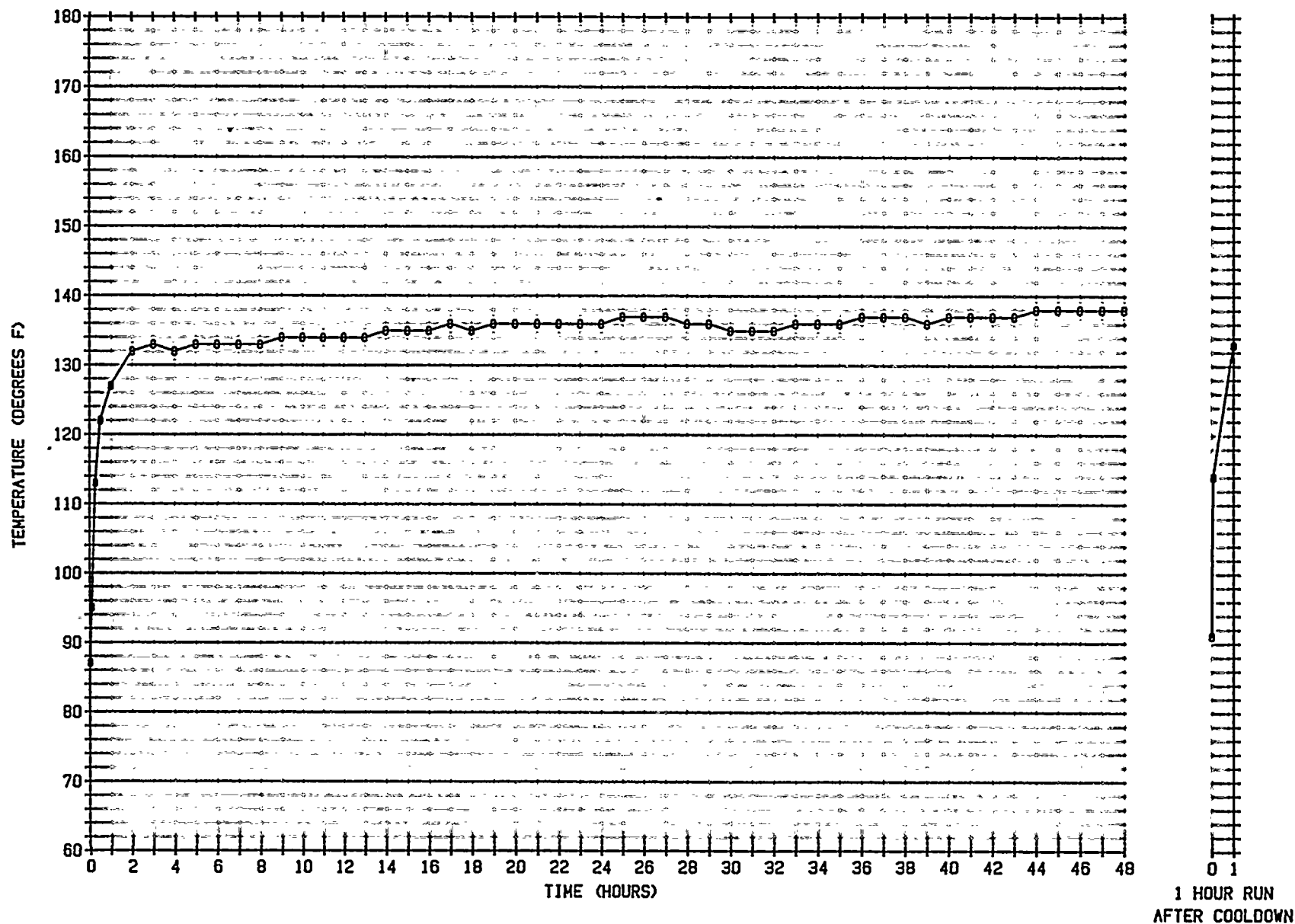
1 HOUR RUN
AFTER COOLDOWN

3M-AFA-P01 STEAM TURBINE DRIVEN ESSENTIAL AUXILIARY FEEDWATER PUMP AFN-TE-84 PUMP OUTBOARD BEARING TEMPERATURE





3M-AFA-P01 STEAM TURBINE DRIVEN ESSENTIAL AUXILIARY FEEDWATER PUMP AFN-TE-85 PUMP THRUST BEARING TEMPERATURE



3M-AFA-P01 STEAM TURBINE DRIVEN ESSENTIAL AUXILIARY FEEDWATER PUMP
48 HOUR ENDURANCE RUN - BEARING VIBRATION (Mils P to P)

RUN TIME	IB BRG	OB BRG
5 MIN	0.26	0.26
15 MIN	0.27	0.26
30 MIN	0.26	0.26
1 HR	0.26	0.26
2 HR	0.26	0.24
3 HR	0.26	0.23
4 HR	0.25	0.23
5 HR	0.25	0.23
6 HR	0.25	0.23
7 HR	0.25	0.23
8 HR	0.25	0.20
9 HR	0.25	0.20
10 HR	0.30	0.25
11 HR	1.30	1.70
12 HR	1.30	1.60
13 HR	1.00	1.70
14 HR	1.00	1.70
15 HR	1.00	1.70
16 HR	1.30	2.00
17 HR	1.20	2.00
18 HR	1.40	2.10
19 HR	1.50	2.10
20 HR	1.50	2.00
21 HR	2.30	3.00
22 HR	2.00	2.70
23 HR	2.10	2.60
24 HR	1.80	2.40
25 HR	1.50	2.30
26 HR	1.50	2.30
27 HR	1.60	2.20
28 HR	1.50	2.10
29 HR	1.50	2.10
30 HR	1.50	2.10
31 HR	1.60	2.30
32 HR	1.60	2.40
33 HR	1.60	2.40
34 HR	1.60	2.30
35 HR	1.60	2.30
36 HR	1.60	2.30
37 HR	1.50	2.20
38 HR	1.30	2.00
39 HR	1.80	2.30
40 HR	1.50	2.20
41 HR	1.40	2.20
42 HR	1.60	2.40
43 HR	1.80	2.60
44 HR	1.30	1.90
45 HR	1.30	2.00
46 HR	1.30	2.00
47 HR	1.40	2.00
48 HR	1.40	2.00

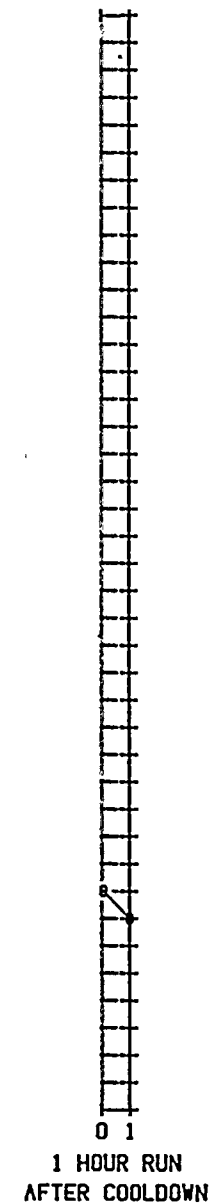
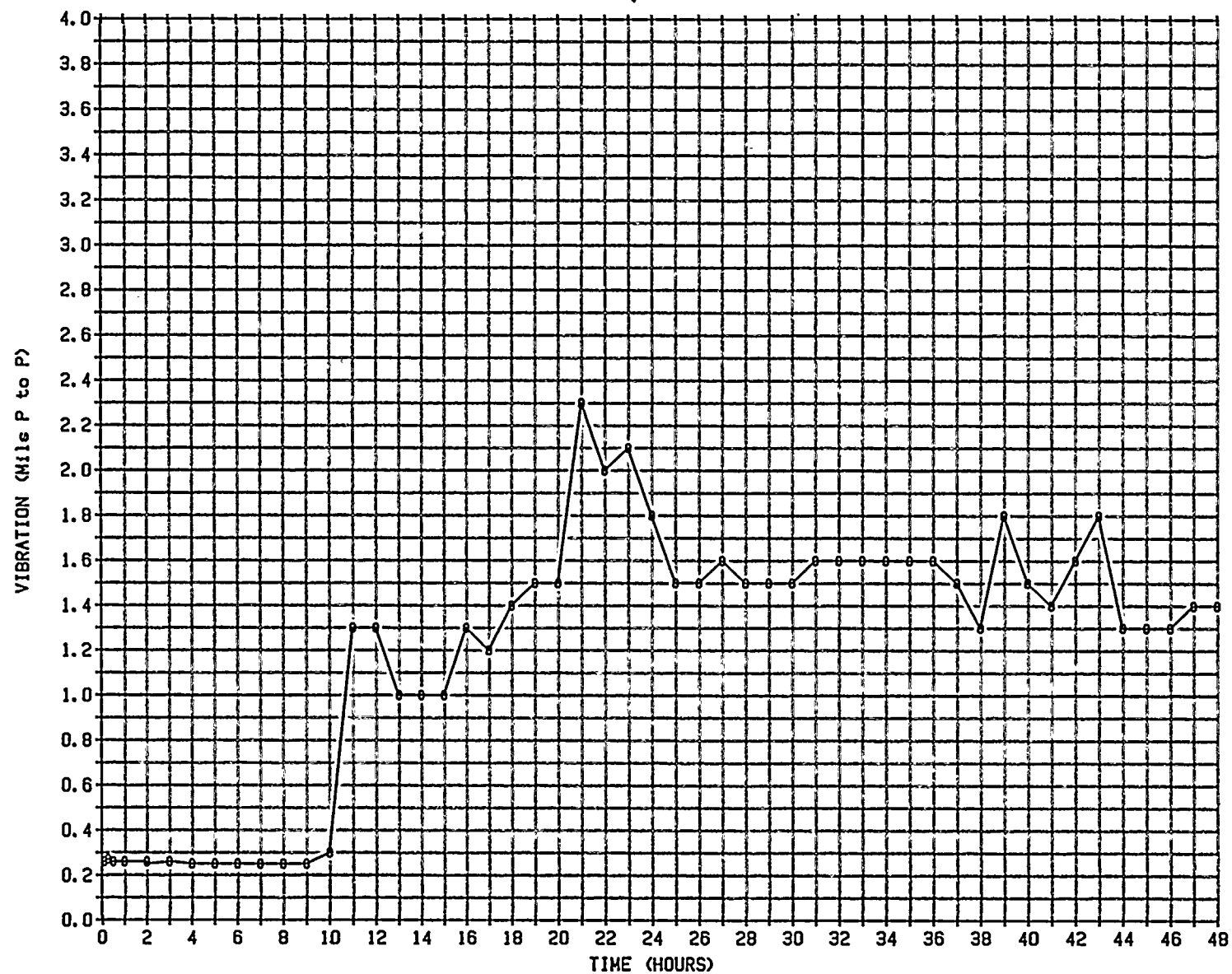
POST ENDURANCE TEST 1 HOUR RUN

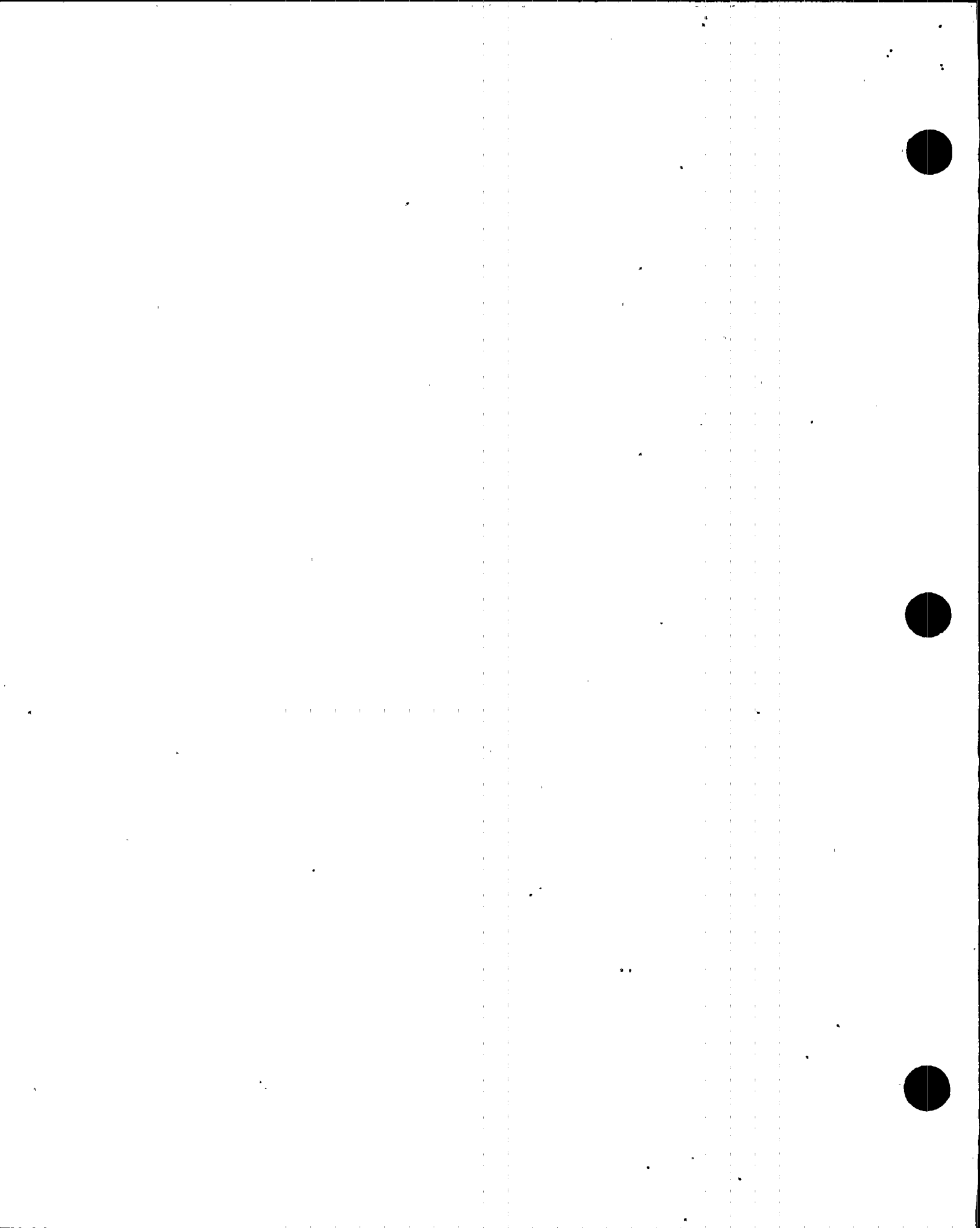
5 MIN	0.80	1.40
1 HR	0.70	1.20

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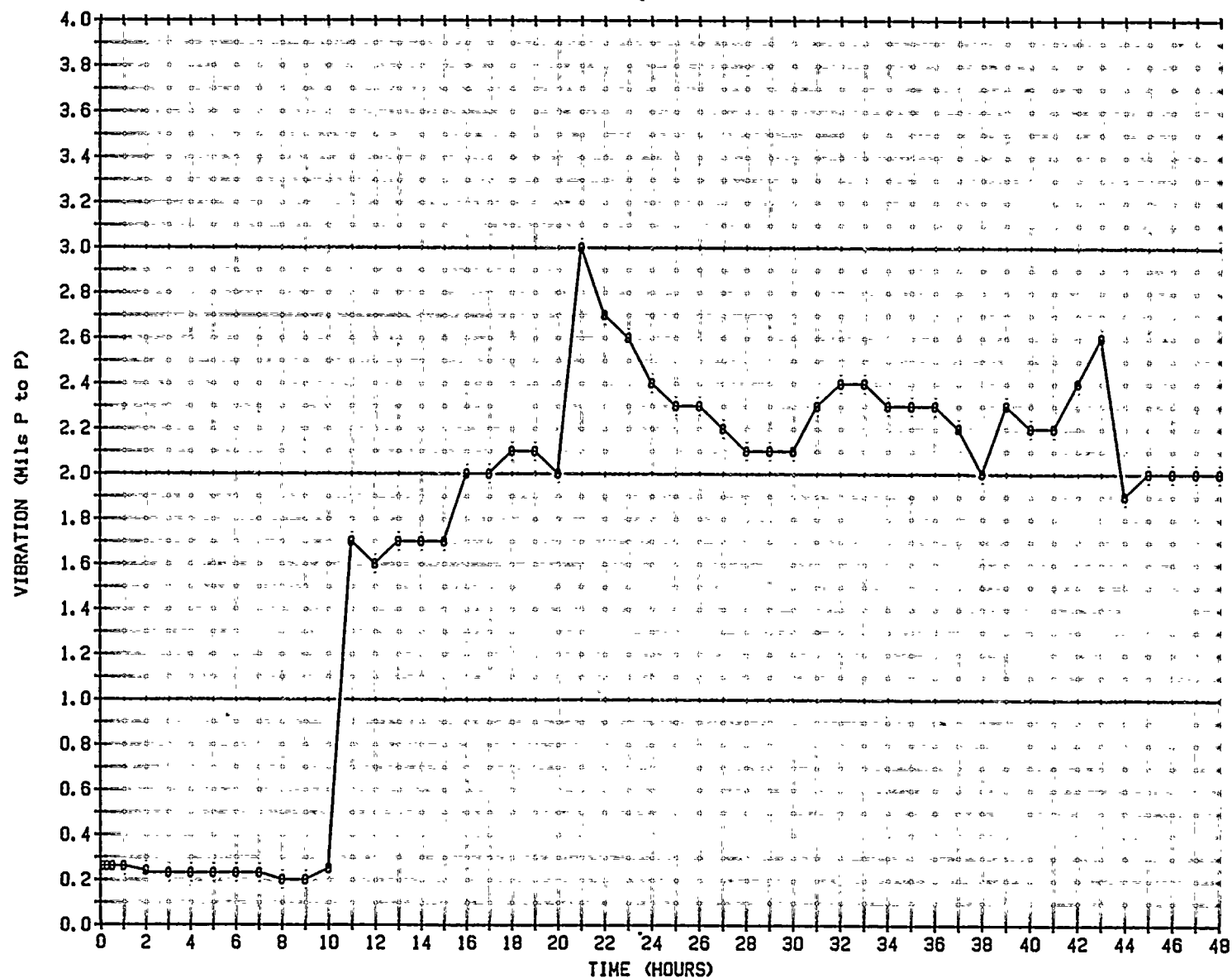
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3M-AFA-P01 TURBINE DRIVEN ESSENTIAL AUXILIARY FEEDWATER PUMP
PUMP INBOARD BEARING VIBRATION

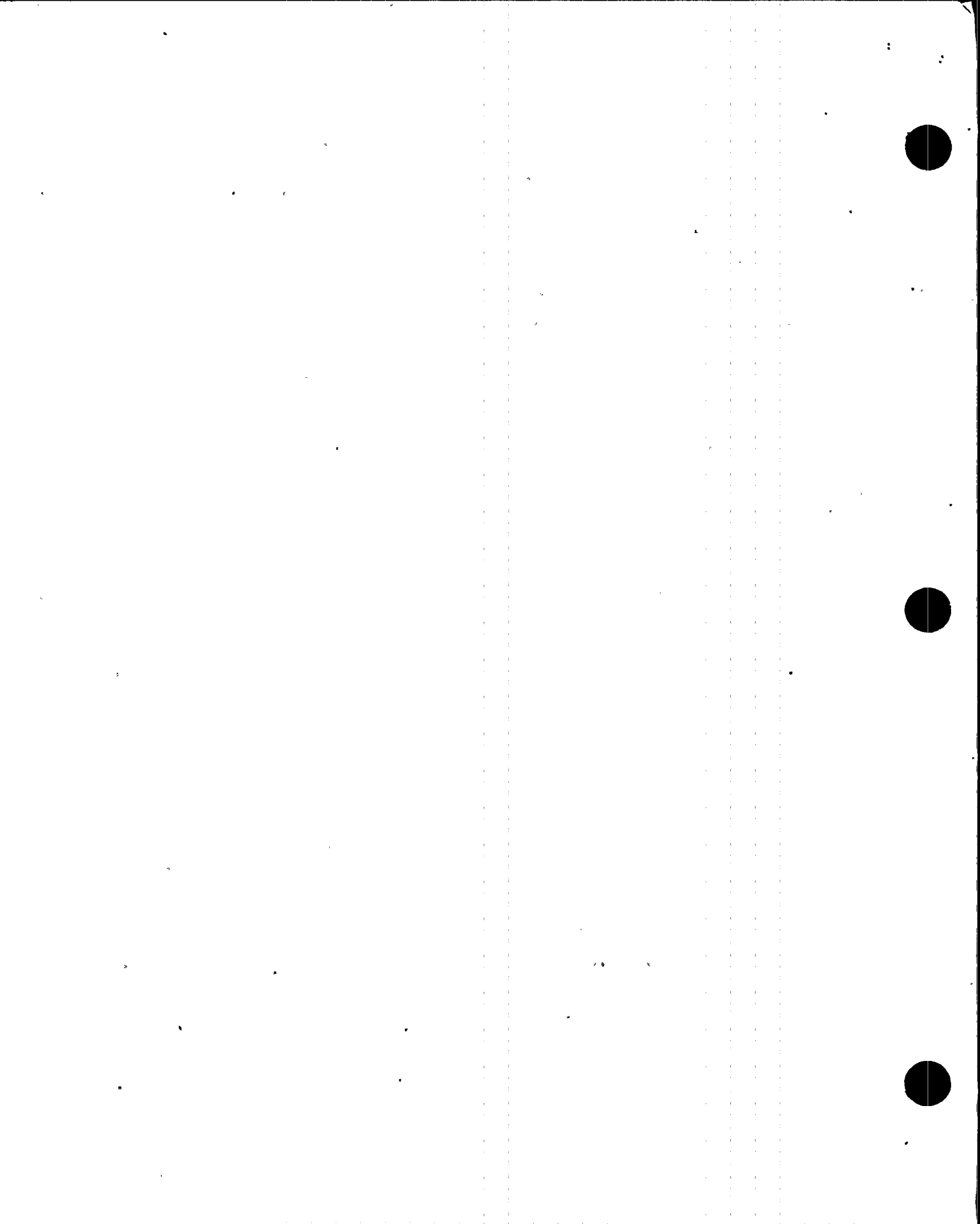




3M-AFA-P01 TURBINE DRIVEN ESSENTIAL AUXILIARY FEEDWATER PUMP PUMP OUTBOARD BEARING VIBRATION



1 HOUR RUN
AFTER COOLDOWN

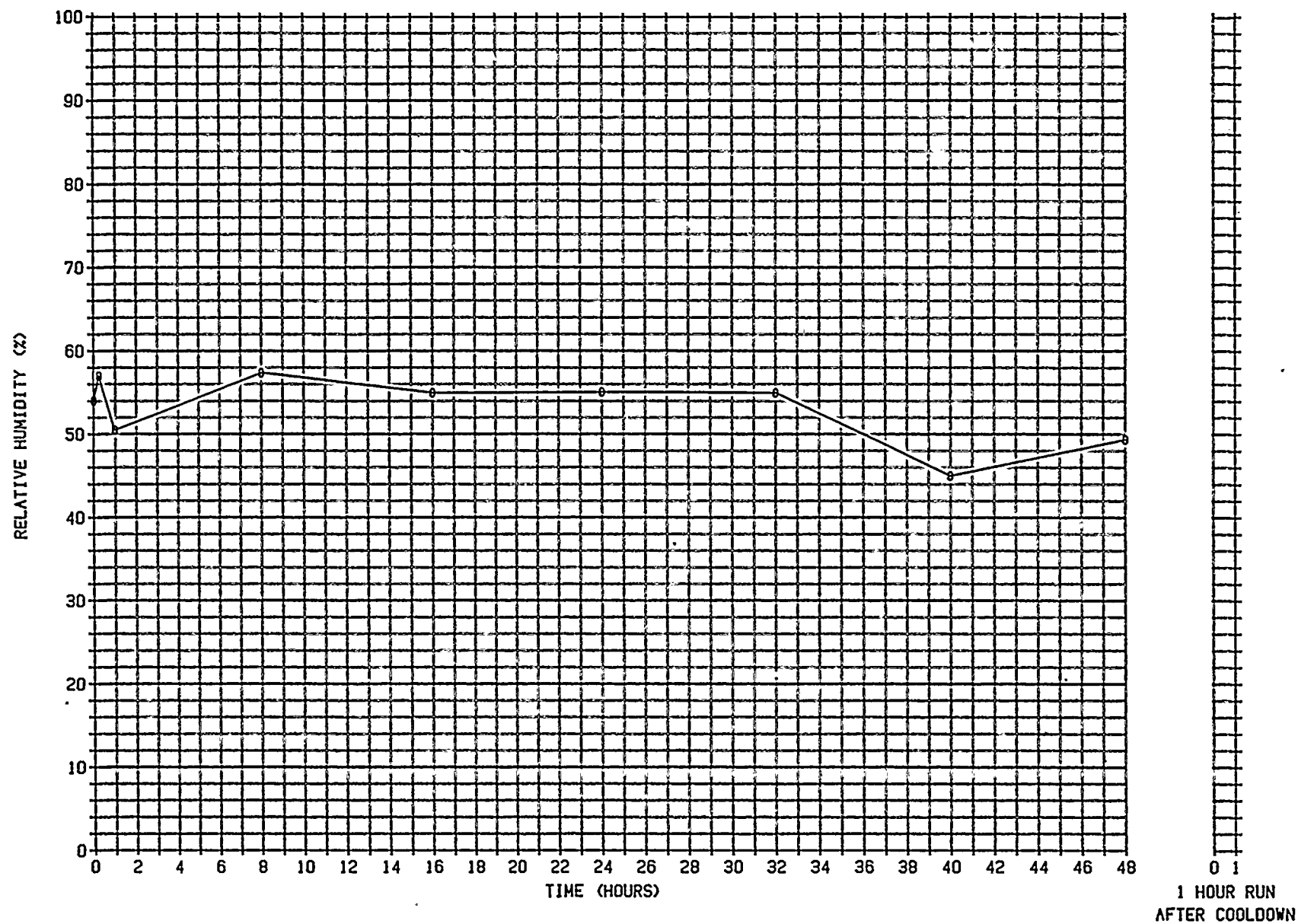


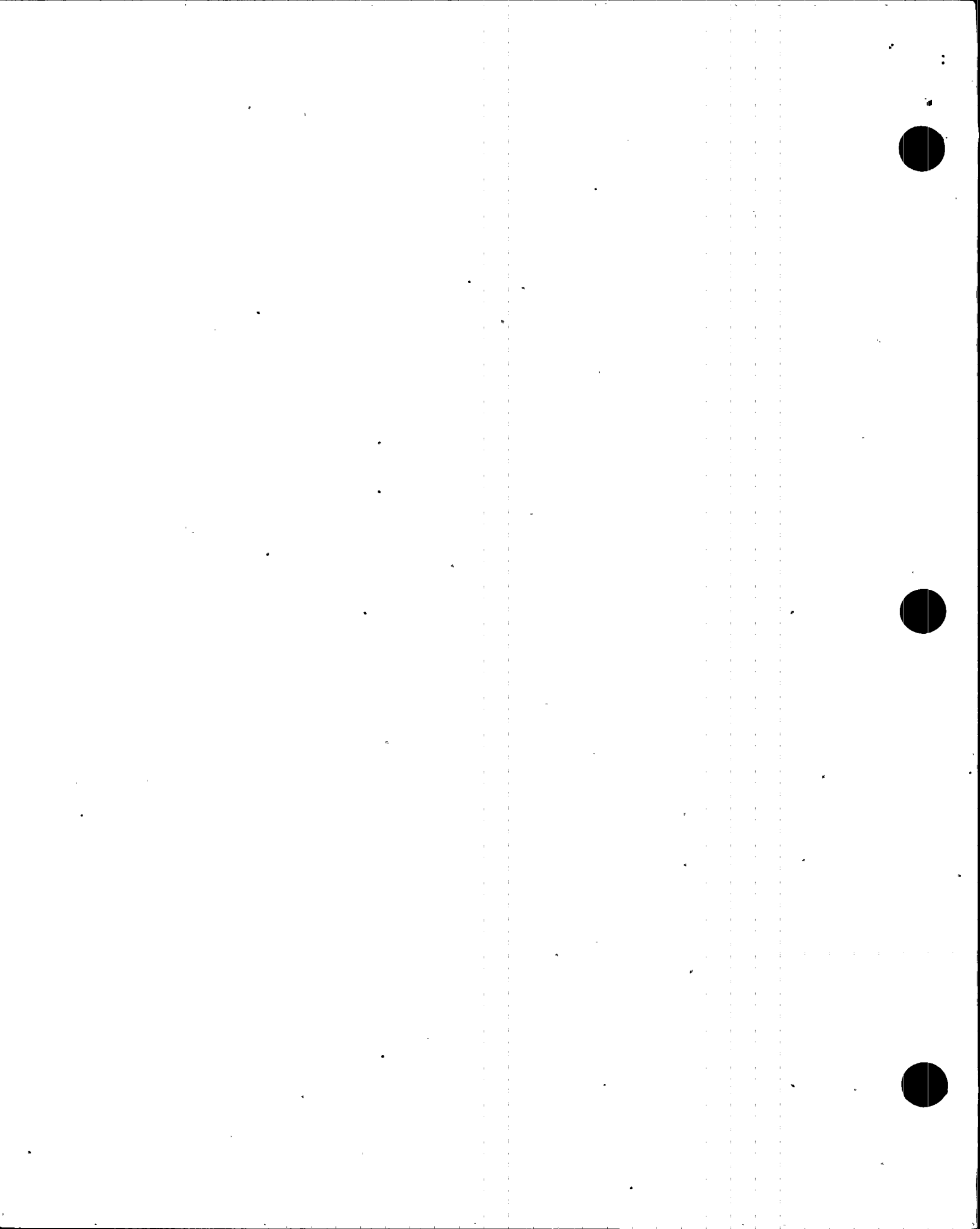
3M-AFA-P01 STEAM TURBINE DRIVEN ESSENTIAL AUXILIARY FEEDWATER PUMP
48 HOUR ENDURANCE RUN - ENVIRONMENTAL DATA (% RH/Degrees F)

RUN TIME	HUMIDITY	TEMPERATURE
PRESTART	54.0	80.0
15 MIN	57.0	80.8
1 HR	50.5	80.3
8 HR	57.4	75.2
16 HR	55.0	78.0
24 HR	55.1	76.1
32 HR	55.0	75.0
40 HR	45.0	76.0
48 HR	49.4	75.2

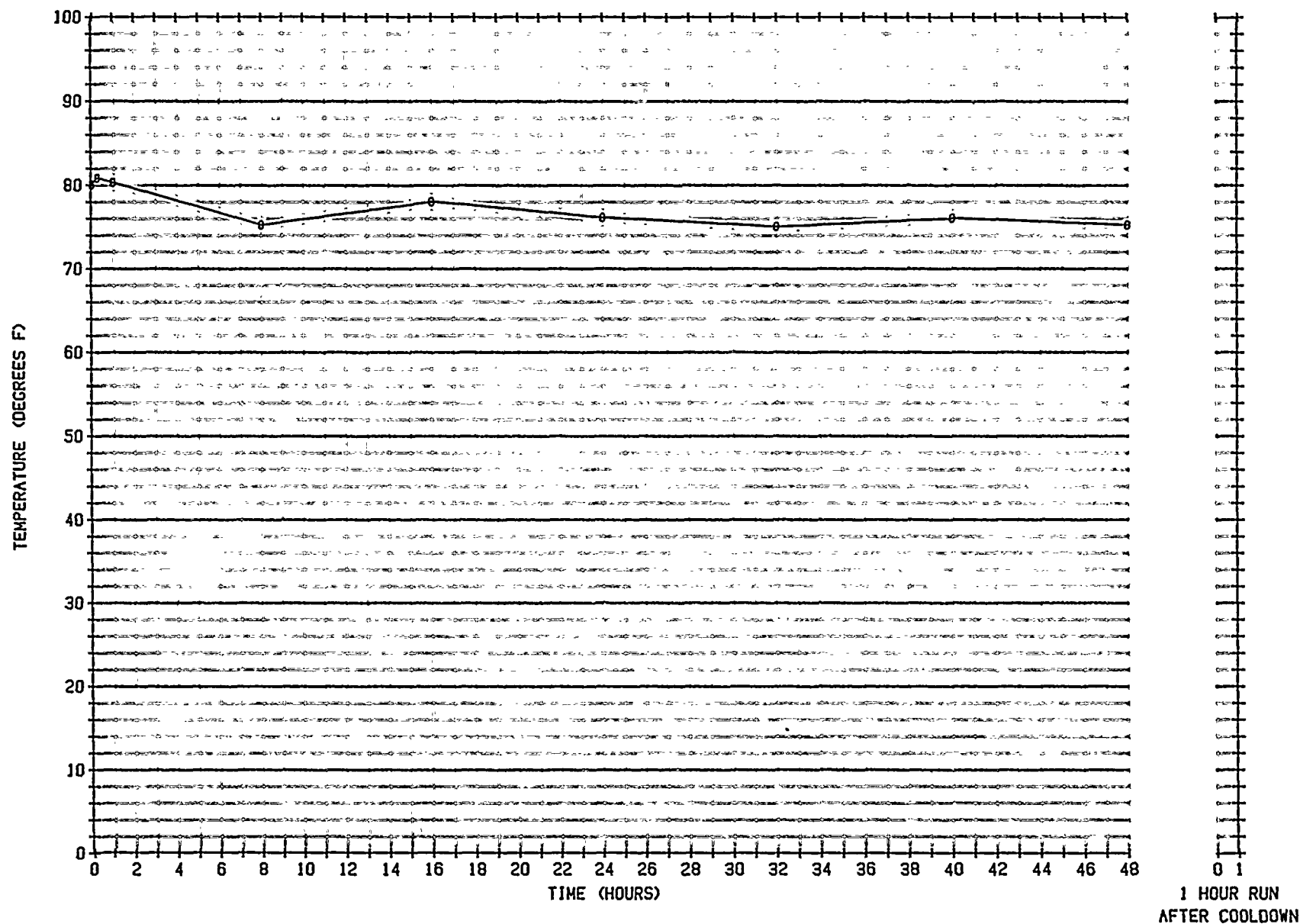


3M-AFA-P01 TURBINE DRIVEN ESSENTIAL AUXILIARY FEEDWATER PUMP
PUMP ROOM RELATIVE HUMIDITY





3M-AFA-P01 TURBINE DRIVEN ESSENTIAL AUXILIARY FEEDWATER PUMP PUMP ROOM TEMPERATURE



Essential Motor Driven Auxiliary Feedwater
Pump 48 Hour Endurance Test
3M-AFB-P01

As required by ITEM II.E.1.1.B.2 of NUREG 0857, a 48 hour endurance test was performed on AFB-P01 to verify the pump's ability to provide continuous operation for a 48 hour period. NUREG 0857 further required a cooldown after pump operation to allow bearing temperatures to cool to within 10°F of ambient and a subsequent one hour run. Acceptance Criteria for operability of AFB-P01 included not exceeding bearing/bearing oil temperature and bearing cap vibration limits while operating within specified environmental temperatures.

Testing was performed in accordance with 91PE-3AF01. The 48 hour run commenced on October 2, 1986, and continuing until October 5, 1986. The test was initiated and terminated by manual operation of the Control Room handswitch. Pump bearing/bearing oil temperatures were monitored using the Plant Monitoring System computer display of the following plant instrumentation (see attached graphs for all recorded data):

<u>INSTRUMENT (PMS)</u>	<u>PARAMETER</u>	<u>LIMIT</u>	<u>MAXIMUM OBSERVED TEMPERATURE</u>
AFB-TE-80 (AFT80)	AFB-P01 Motor Outboard Bearing Temperature	190°F max	140°F
AFB-TE-82 (AFT82)	AFB-P01 Motor Inboard Bearing Temperature	190°F max	147°F
AFB-TE-86 (AFT86)	AFB-P01 Pump Outboard Bearing Temperature	200°F max	117°F
AFB-TE-87 (AFT87)	AFB-P01 Pump Inboard Bearing Temperature	200°F max	163°F
AFB-TE-88 (AFT88)	AFB-P01 Pump Thrust Bearing Temperature	200°F max	147°F

Pump inboard and outboard bearing cap vibration was monitored using an IRD model 810 portable vibration analyzer and probe. The following maximum values were observed and are compared to the upper limit (see attached graphs for all recorded data):

<u>PARAMETER</u>	<u>LIMIT</u>	<u>MAXIMUM OBSERVED VIBRATION</u>
AFB-P01 Inboard Bearing Cap Vibration	5.0 mils max	0.9 mils
AFB-P01 Outboard Bearing Cap Vibration	5.0 mils max	1.5 mils



Essential Motor Driven Auxiliary Feedwater
Pump 48 Hour Endurance Test
3M-AFB-P01

AFB-P01 Pump Room environmental conditions were monitored with a dial thermometer for temperature and a psychrometer for relative humidity. The following maximum values were observed and are compared to the specified limits (see attached graphs for all recorded data):

<u>PARAMETER</u>	<u>LIMIT</u>	<u>OBSERVED VALUE</u>
AFB-P01 Pump Room Temperature	104°F max (NOTE)	79°F WB Maximum 87°F DB Maximum
AFB-P01 Pump Room Relative Humidity	20-90% RH	54-70%

NOTE: Temperatures up to 120°F are allowable for up to 4 hours with a restoration to 104°F over the next 24 hours.

A review of all data recorded during the above endurance testing shows that upper limits on bearing/bearing oil temperatures, bearing cap vibration and pump room temperature were not exceeded.

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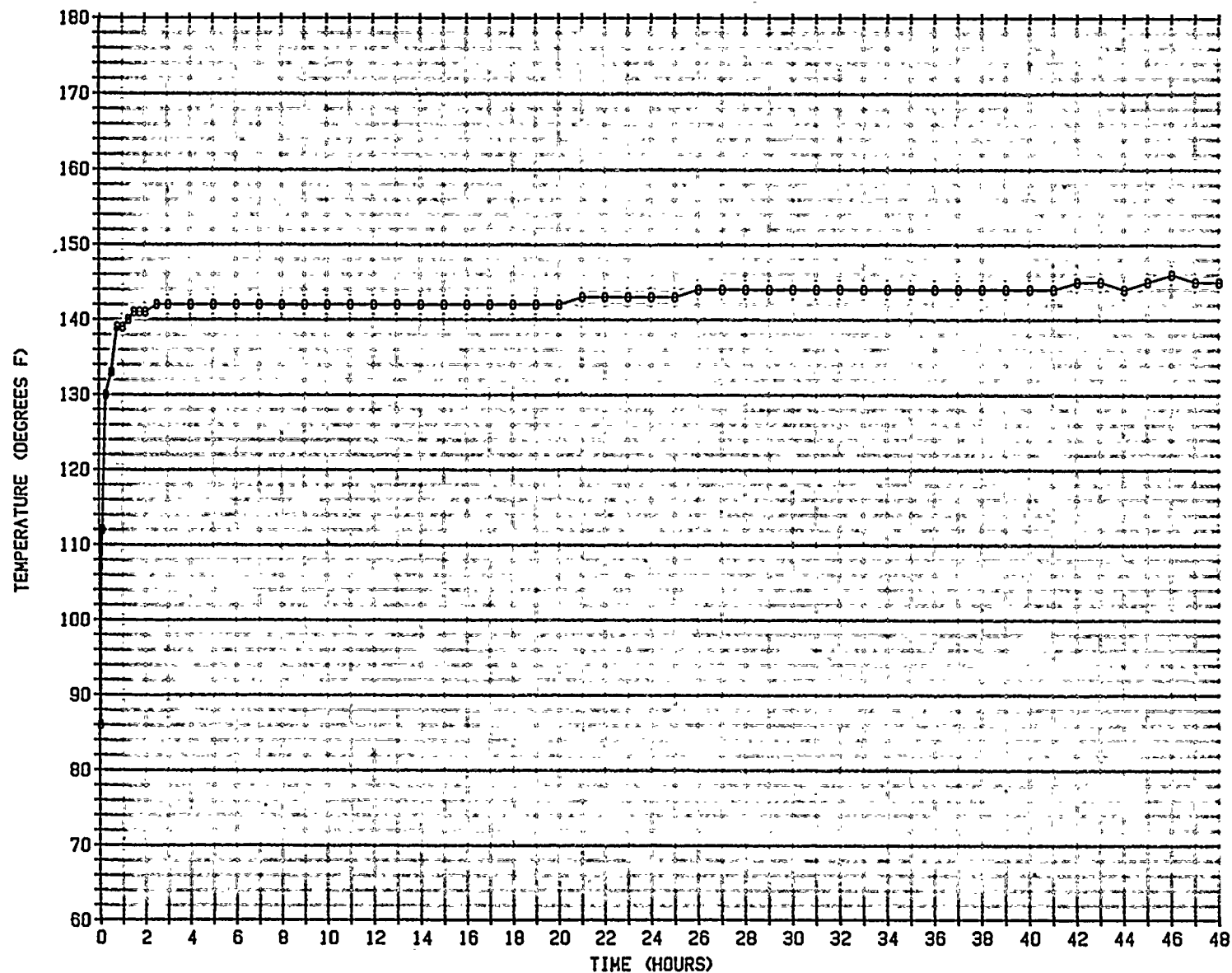
3M-AFB-P01 MOTOR DRIVEN ESSENTIAL AUXILIARY FEEDWATER PUMP
48 HOUR ENDURANCE RUN - BEARING TEMPERATURES (DEGREES F)

RUN TIME	AFB-TE-80 MOTR OB	AFB-TE-82 MOTR IB	AFB-TE-86 PUMP OB	AFB-TE-87 PUMP IB	AFB-TE-88 THRUST
PRESTART	88	88	84	87	86
5 MIN	105	117	101	138	112
15 MIN	125	134	107	152	130
30 MIN	128	137	108	154	133
45 MIN	134	140	112	157	139
1 HR	134	141	114	157	139
1.25 HR	135	141	112	157	140
1.5 HR	136	141	113	157	141
1.75 HR	136	141	112	158	141
2 HR	136	141	112	157	141
2.5 HR	136	141	112	157	142
3 HR	136	141	113	157	142
4 HR	136	141	112	157	142
5 HR	136	141	111	157	142
6 HR	136	141	110	157	142
7 HR	136	141	110	157	142
8 HR	136	141	110	157	142
9 HR	136	141	110	157	142
10 HR	136	141	109	157	142
11 HR	136	141	109	157	142
12 HR	136	141	109	157	142
13 HR	136	140	109	157	142
14 HR	136	140	109	158	142
15 HR	136	140	109	157	142
16 HR	136	140	109	157	142
17 HR	136	140	108	157	142
18 HR	136	140	108	157	142
19 HR	135	140	108	157	142
20 HR	136	140	109	157	142
21 HR	136	140	108	158	143
22 HR	136	140	108	158	143
23 HR	136	140	108	158	143
24 HR	136	140	108	158	143
25 HR	136	140	109	158	143
26 HR	136	140	108	158	144
27 HR	136	141	109	158	144
28 HR	136	140	108	158	144
29 HR	136	141	108	158	144
30 HR	136	141	108	158	144
31 HR	136	140	108	158	144
32 HR	136	140	108	158	144
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41 HR	136	141	109	159	144
42 HR	136	141	109	160	145
43 HR	136	141	110	160	145
44 HR	136	141	108	158	144
45 HR	136	141	108	158	145
46 HR	136	141	109	160	146
47 HR	136	141	110	159	145
48 HR	136	141	109	159	145

POST ENDURANCE TEST 1 HOUR RUN

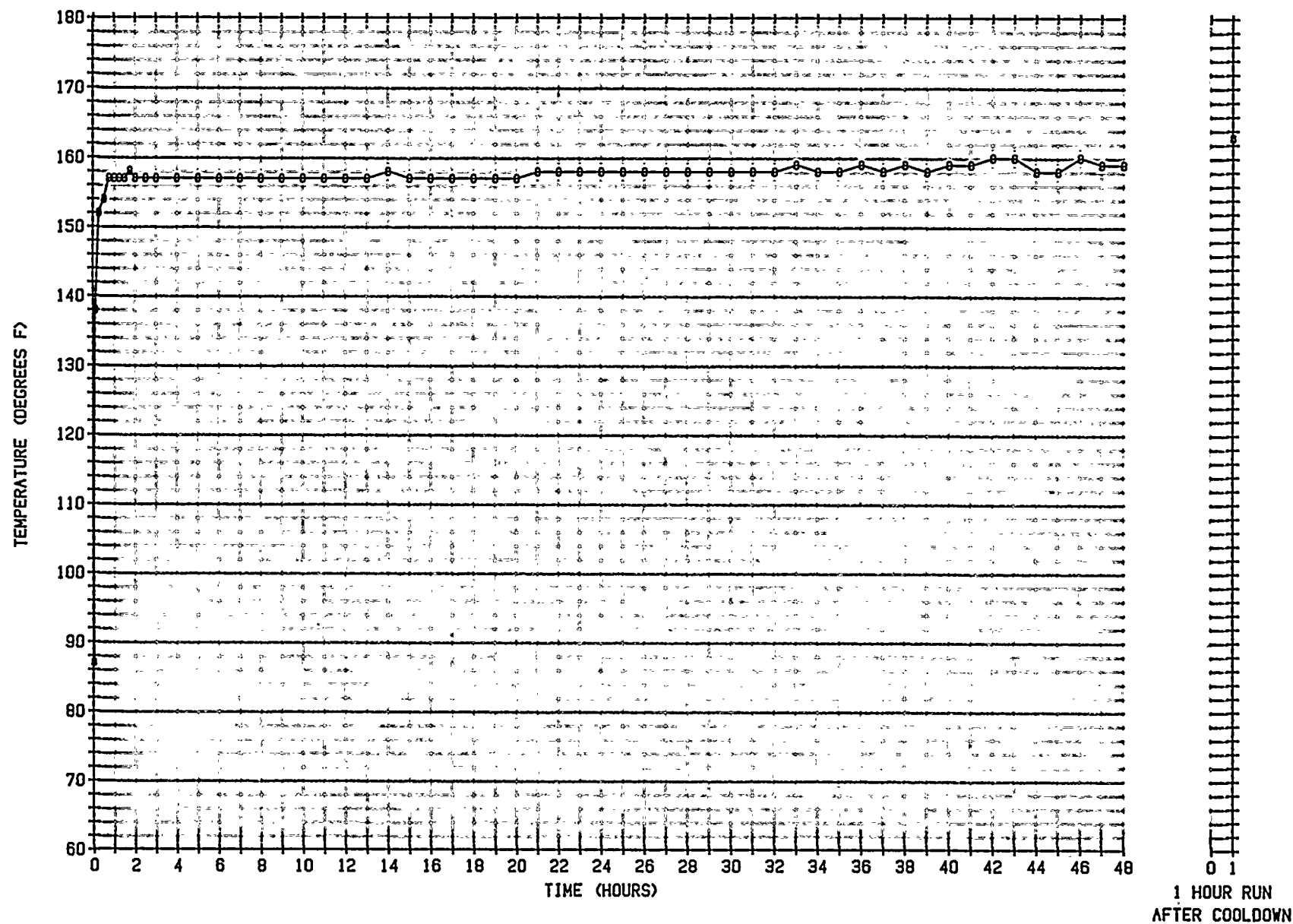
1 HR	140	147	117	163	147
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3M-AFB-P01 MOTOR DRIVEN ESSENTIAL AUXILIARY FEEDWATER PUMP
AFB-TE-88 PUMP THRUST BEARING TEMPERATURE

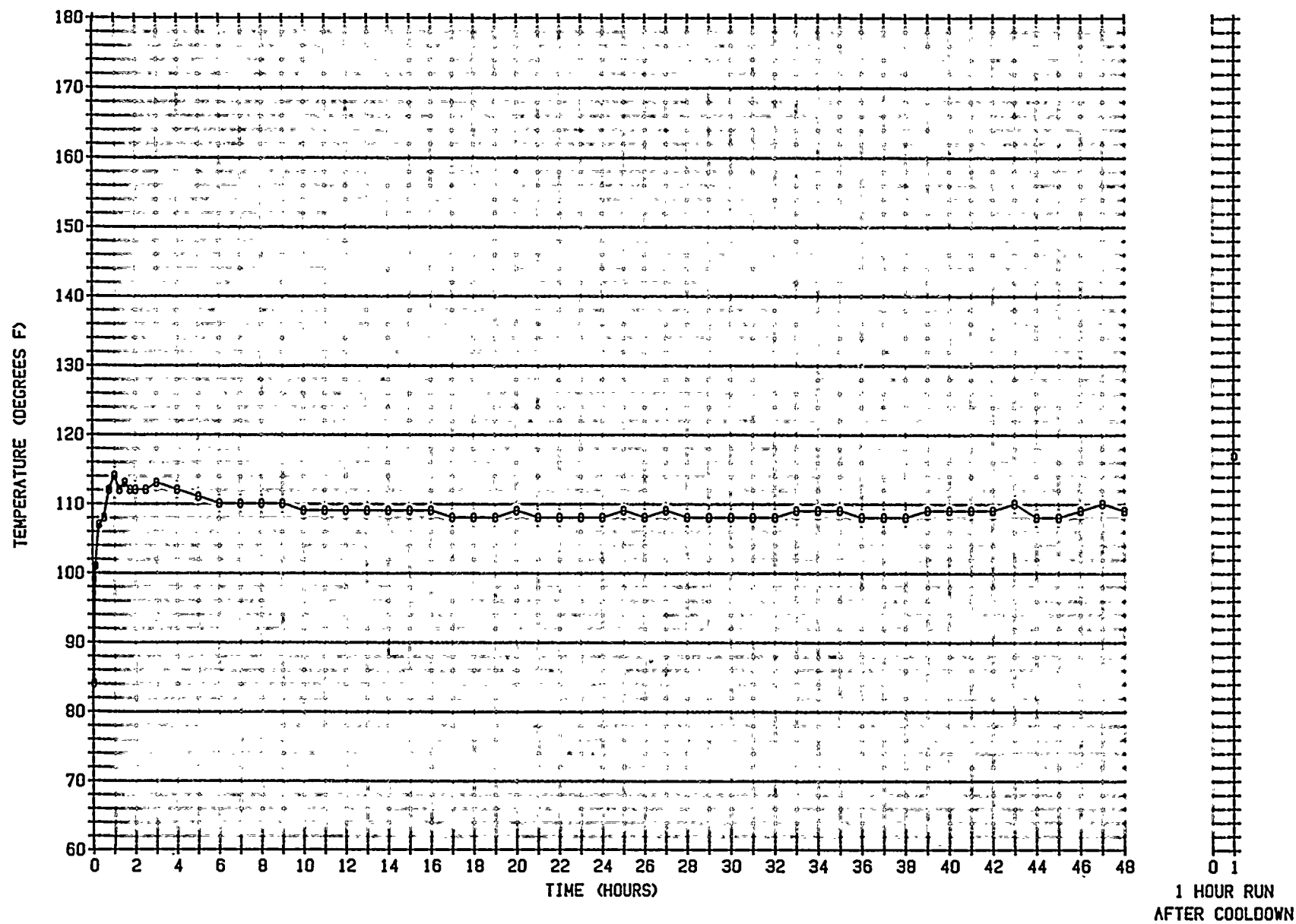


1 HOUR RUN
AFTER COOLDOWN

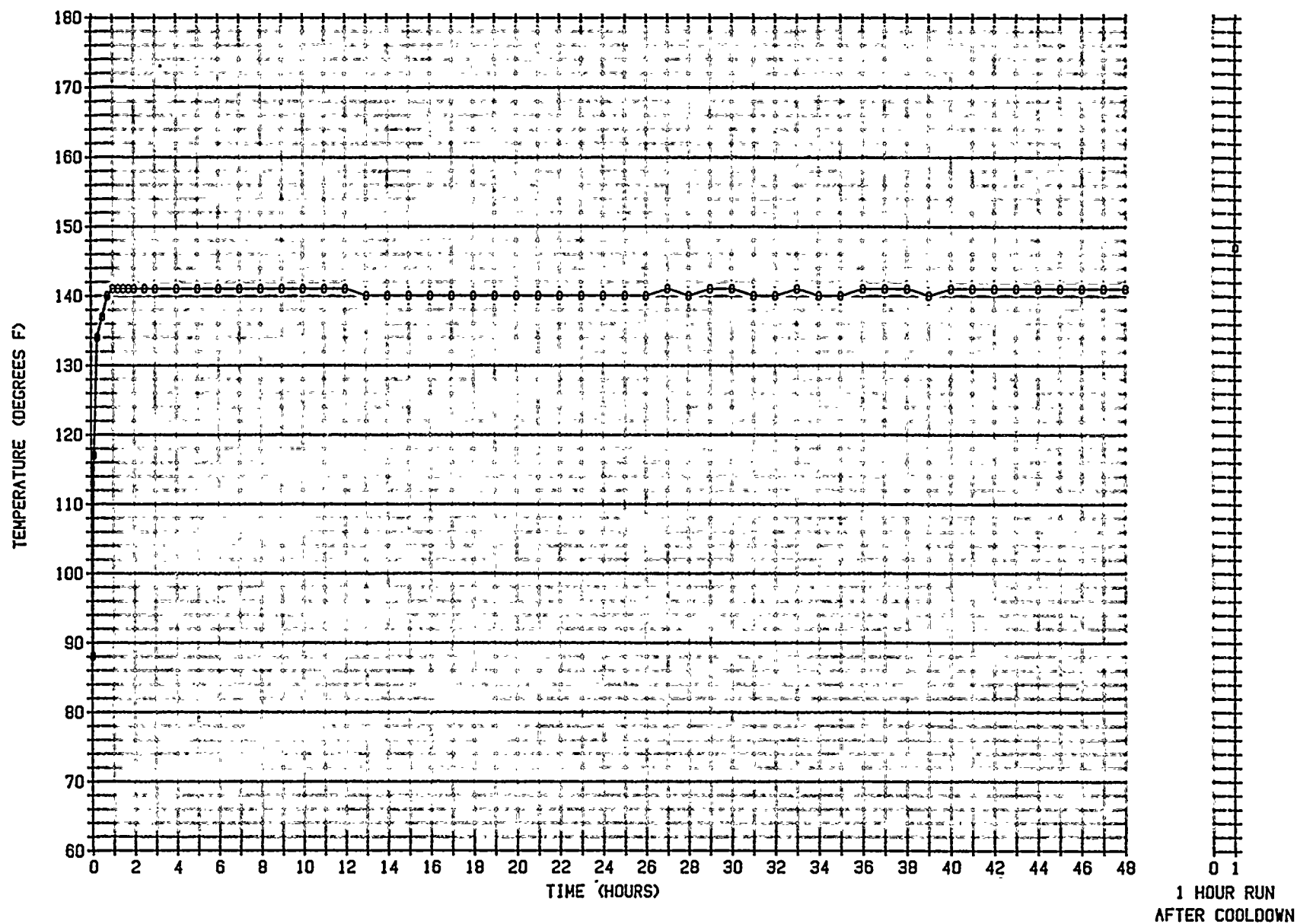
3M-AFB-P01 MOTOR DRIVEN ESSENTIAL AUXILIARY FEEDWATER PUMP
AFB-TE-87 PUMP INBOARD BEARING TEMPERATURE

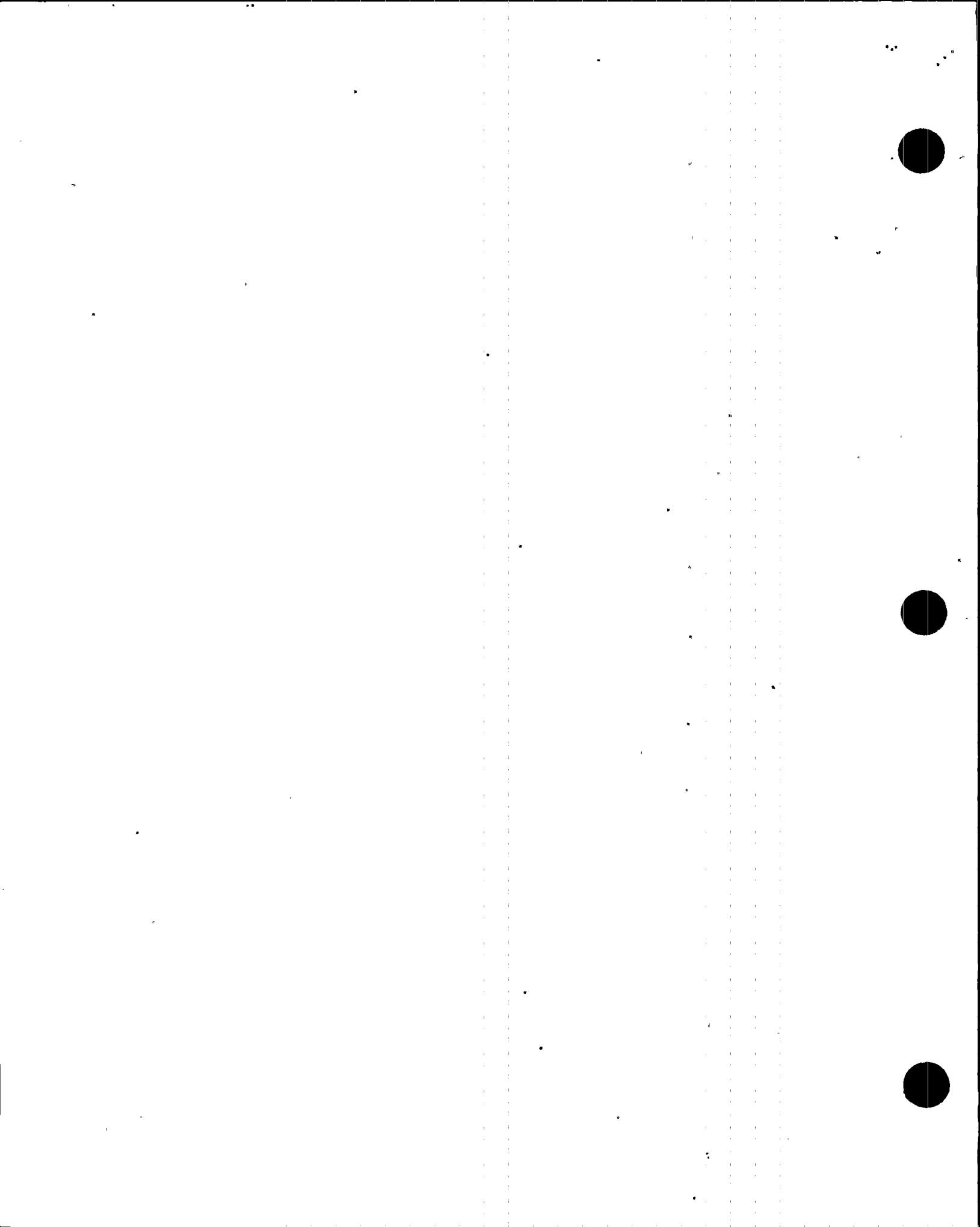


3M-AFB-P01 MOTOR DRIVEN ESSENTIAL AUXILIARY FEEDWATER PUMP
AFB-TE-86 PUMP OUTBOARD BEARING TEMPERATURE

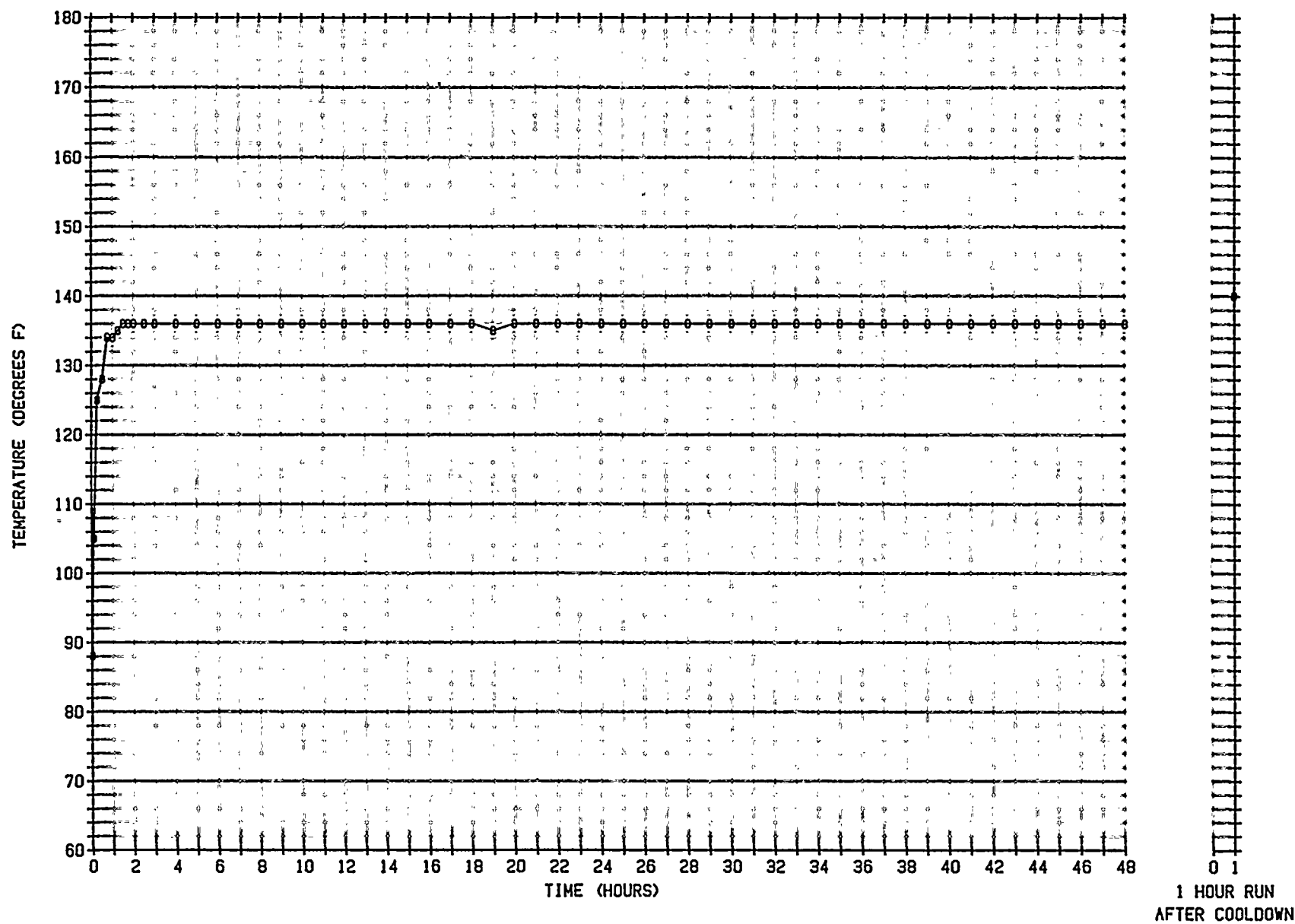


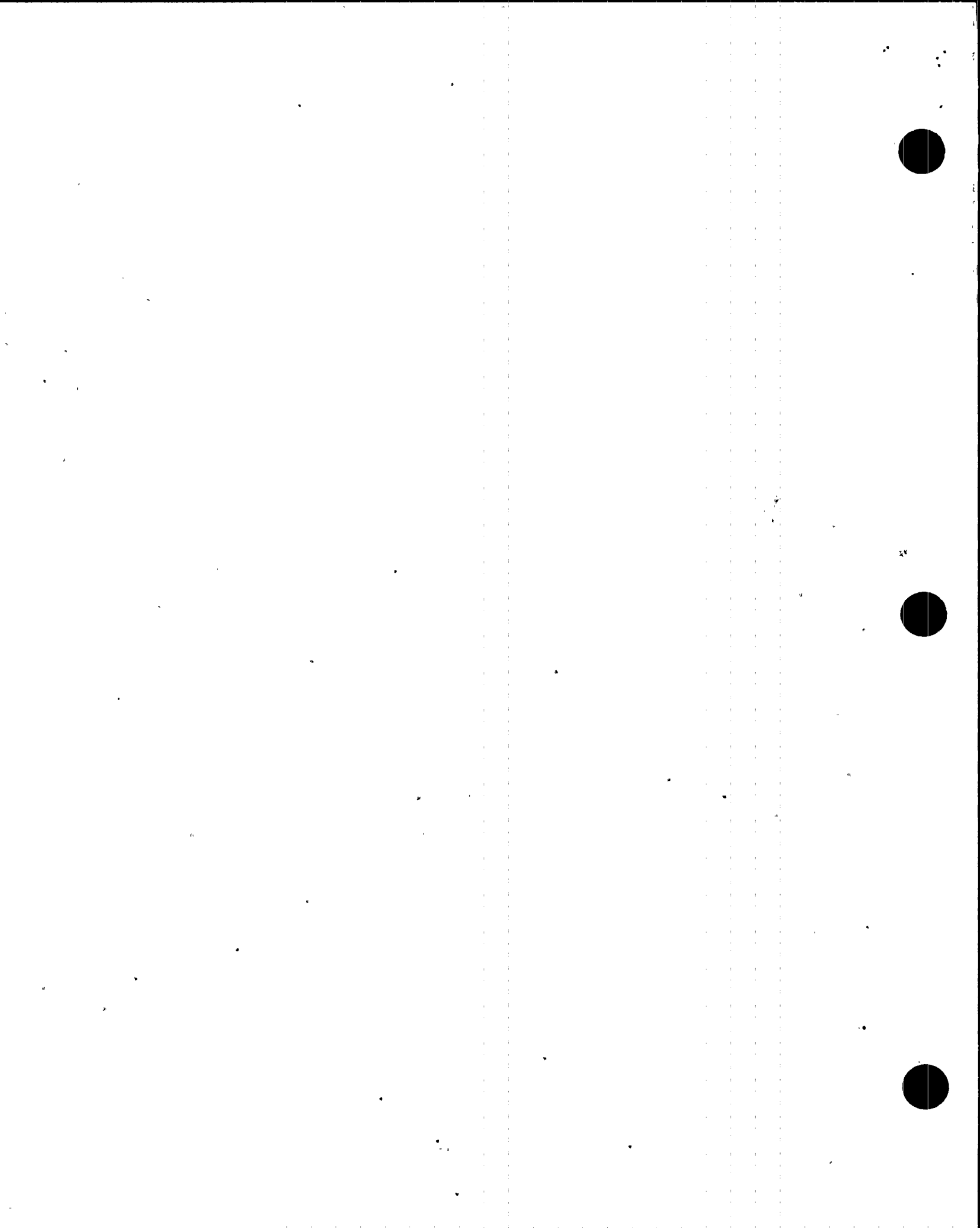
3M-AFB-PO1 MOTOR DRIVEN ESSENTIAL AUXILIARY FEEDWATER PUMP
AFB-TE-82 MOTOR INBOARD BEARING TEMPERATURE





3M-AFB-P01 MOTOR DRIVEN ESSENTIAL AUXILIARY FEEDWATER PUMP
AFB-TE-80 MOTOR OUTBOARD BEARING TEMPERATURE





3M-AFB-P01 MOTOR DRIVEN ESSENTIAL AUXILIARY FEEDWATER PUMP
48 HOUR ENDURANCE RUN - BEARING VIBRATION (Mils P to P)

RUN TIME	IB BRG	OB BRG
5 MIN	0.70	1.10
15 MIN	0.85	1.30
30 MIN	0.75	1.20
1 HR	0.75	1.30
1.25 HR	0.75	1.30
1.5 HR	0.75	1.30
1.75 HR	0.75	1.30
2 HR	0.75	1.30
2.5 HR	0.75	1.30
3 HR	0.75	1.30
4 HR	0.75	1.30
5 HR	0.75	1.30
6 HR	0.75	1.30
7 HR	0.75	1.40
8 HR	0.75	1.30
9 HR	0.75	1.30
10 HR	0.75	1.40
11 HR	0.75	1.40
12 HR	0.78	1.40
13 HR	0.76	1.40
14 HR	0.78	1.40
15 HR	0.78	1.40
16 HR	0.78	1.40
17 HR	0.76	1.30
18 HR	0.78	1.40
19 HR	0.74	1.30
20 HR	0.76	1.30
21 HR	0.75	1.30
22 HR	0.75	1.30
23 HR	0.75	1.30
24 HR	0.75	1.30
25 HR	0.82	1.20
26 HR	0.75	1.20
27 HR	0.75	1.30
28 HR	0.75	1.30
29 HR	0.75	1.30
30 HR	0.75	1.30
31 HR	0.75	1.20
32 HR	0.75	1.20
33 HR	0.73	1.20
34 HR	0.74	1.20
35 HR	0.75	1.30
36 HR	0.75	1.10
37 HR	0.74	1.20
38 HR	0.74	1.20
39 HR	0.74	1.10
40 HR	0.72	1.10
41 HR	0.74	1.20
42 HR	0.75	1.20
43 HR	0.75	1.20
44 HR	0.74	1.20
45 HR	0.75	1.10
46 HR	0.75	1.20
47 HR	0.75	1.20
48 HR	0.75	1.20

POST ENDURANCE TEST 1 HOUR RUN

1 HR	0.90	1.50
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TO THE DIRECTOR, FBI, FROM THE DIRECTOR, FBI, 1/10/68

RE: [illegible]

DATE: [illegible]

BY: [illegible]

[illegible text]

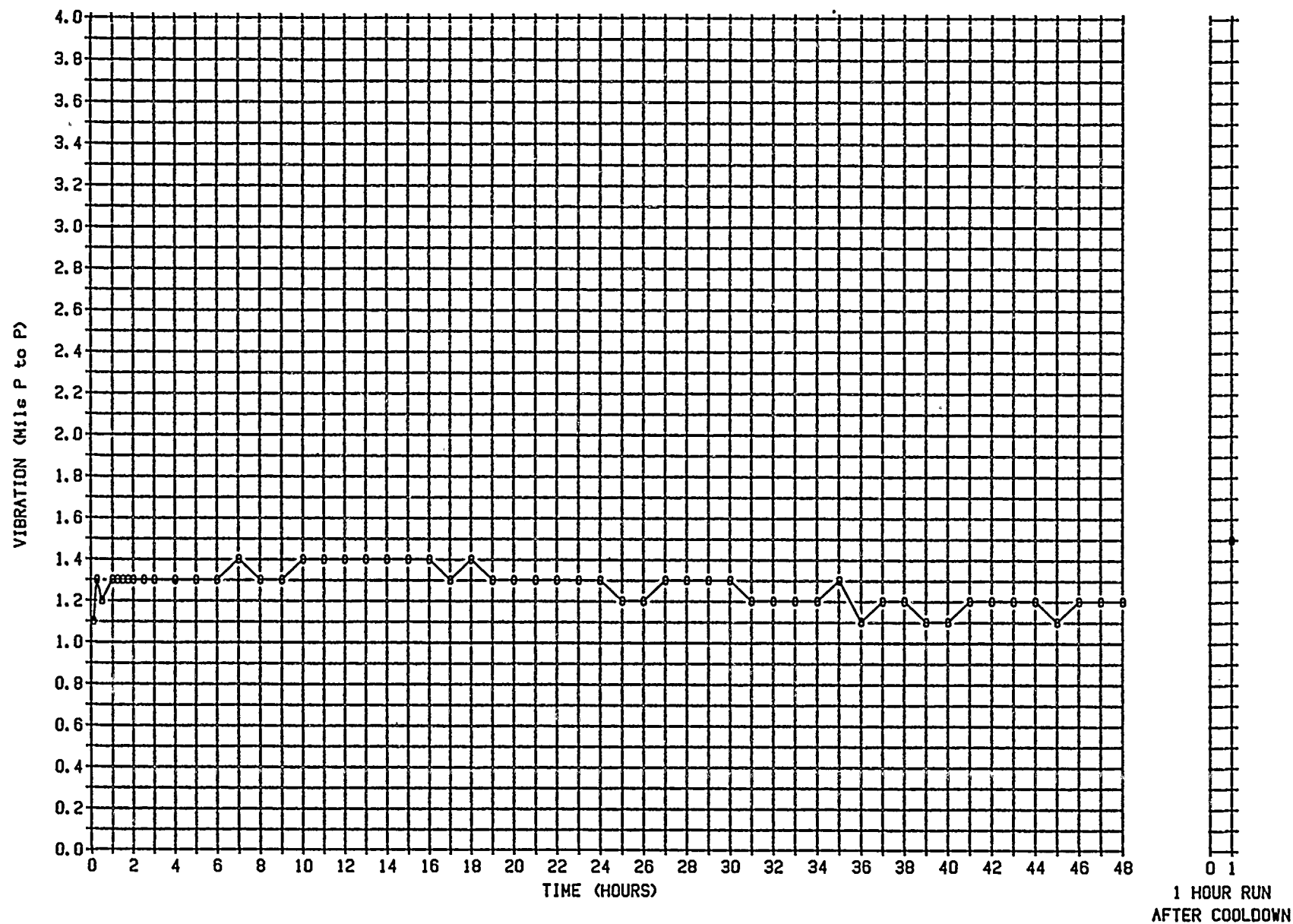
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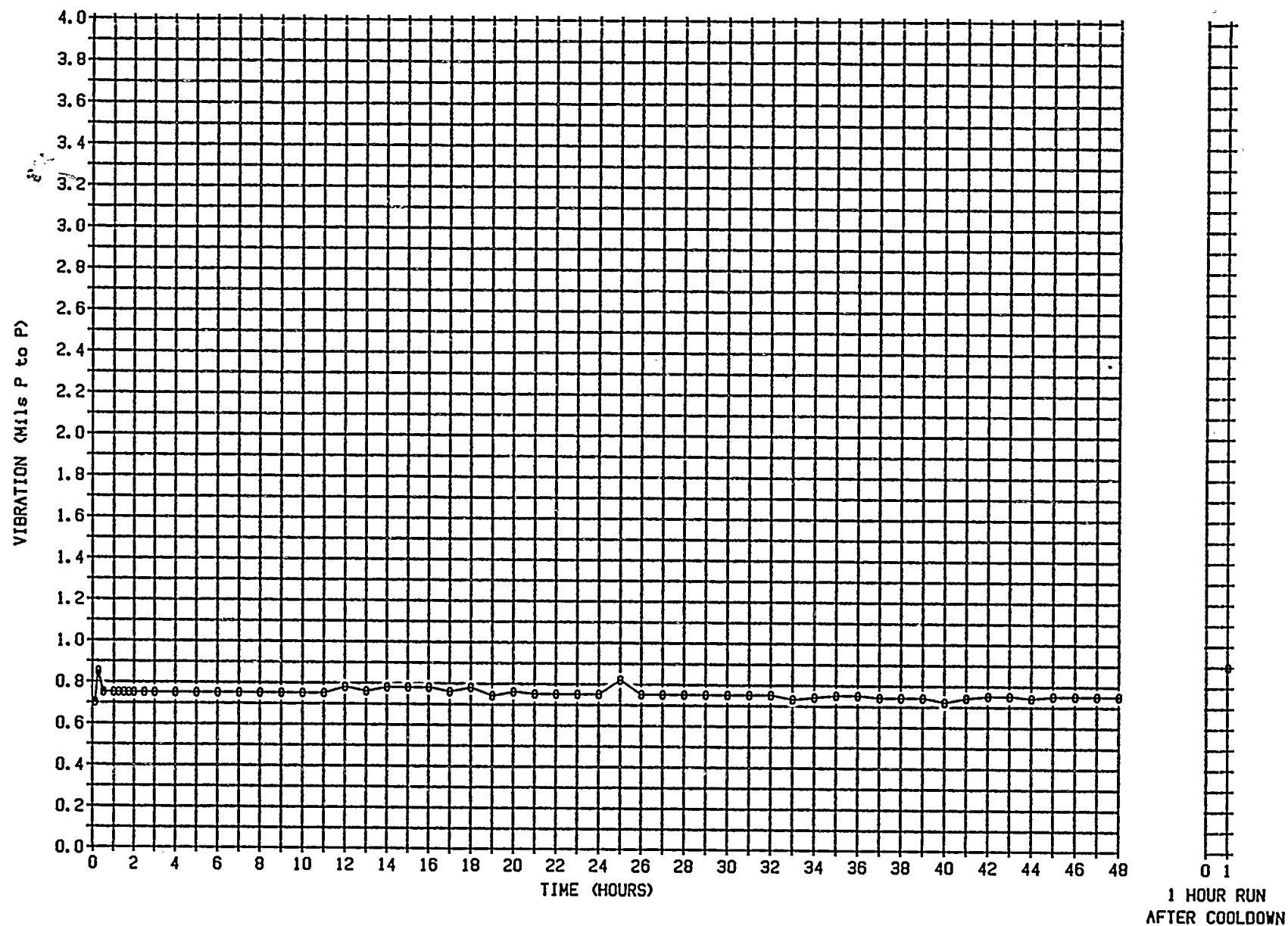
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3M-AFB-P01 MOTOR DRIVEN ESSENTIAL AUXILIARY FEEDWATER PUMP
PUMP OUTBOARD BEARING VIBRATION



3M-AFB-P01 MOTOR DRIVEN ESSENTIAL AUXILIARY FEEDWATER PUMP
PUMP INBOARD BEARING VIBRATION



3M-AFB-P01 MOTOR DRIVEN ESSENTIAL AUXILIARY FEEDWATER PUMP
48 HOUR ENDURANCE RUN - ENVIRONMENTAL DATA (% RH/DEGREES F)

RUN TIME	HUMIDITY	TEMPERATURE
PRESTART	54.0	77.0
5 MIN	54.0	72.0
15 MIN	54.0	73.0
30 MIN	54.0	73.0
45 MIN	73.0	72.0
1 HR	72.0	72.0
1.25 HR	58.0	72.0
1.5 HR	58.0	72.0
1.75 HR	61.0	71.0
2 HR	58.0	72.0
2.5 HR	60.0	71.0
3 HR	58.0	72.0
4 HR	58.0	72.0
5 HR	60.0	71.0
6 HR	60.0	71.0
7 HR	59.0	71.0
8 HR	59.0	71.0
9 HR	58.0	70.0
10 HR	60.0	71.0
11 HR	62.5	71.0
12 HR	62.5	71.0
13 HR	61.0	71.0
14 HR	61.0	71.0
15 HR	64.0	70.0
16 HR	58.0	70.0
17 HR	61.0	70.0
18 HR	58.0	71.0
19 HR	58.0	70.0
20 HR	58.0	70.0
21 HR	60.0	71.0
22 HR	60.0	70.0
23 HR	60.0	70.0
24 HR	60.0	70.0
25 HR	58.0	71.0
26 HR	60.0	70.0
27 HR	60.0	71.0
28 HR	58.0	71.0
29 HR	60.0	70.0
30 HR	58.0	71.0
31 HR	58.0	70.0
32 HR	58.0	71.0
33 HR	60.0	70.0
34 HR	60.0	70.0
35 HR	60.0	70.0
36 HR	60.0	70.0
37 HR	60.0	70.0
38 HR	60.0	70.0
39 HR	60.0	70.0
40 HR	60.0	70.0
41 HR	58.0	71.0
42 HR	58.0	71.0
43 HR	58.0	71.0
44 HR	61.0	71.0
45 HR	65.0	71.0
46 HR	65.0	71.0
47 HR	68.0	70.0
48 HR	68.0	70.0

POST ENDURANCE TEST 1 HOUR RUN

1 HR	70.0	87.0
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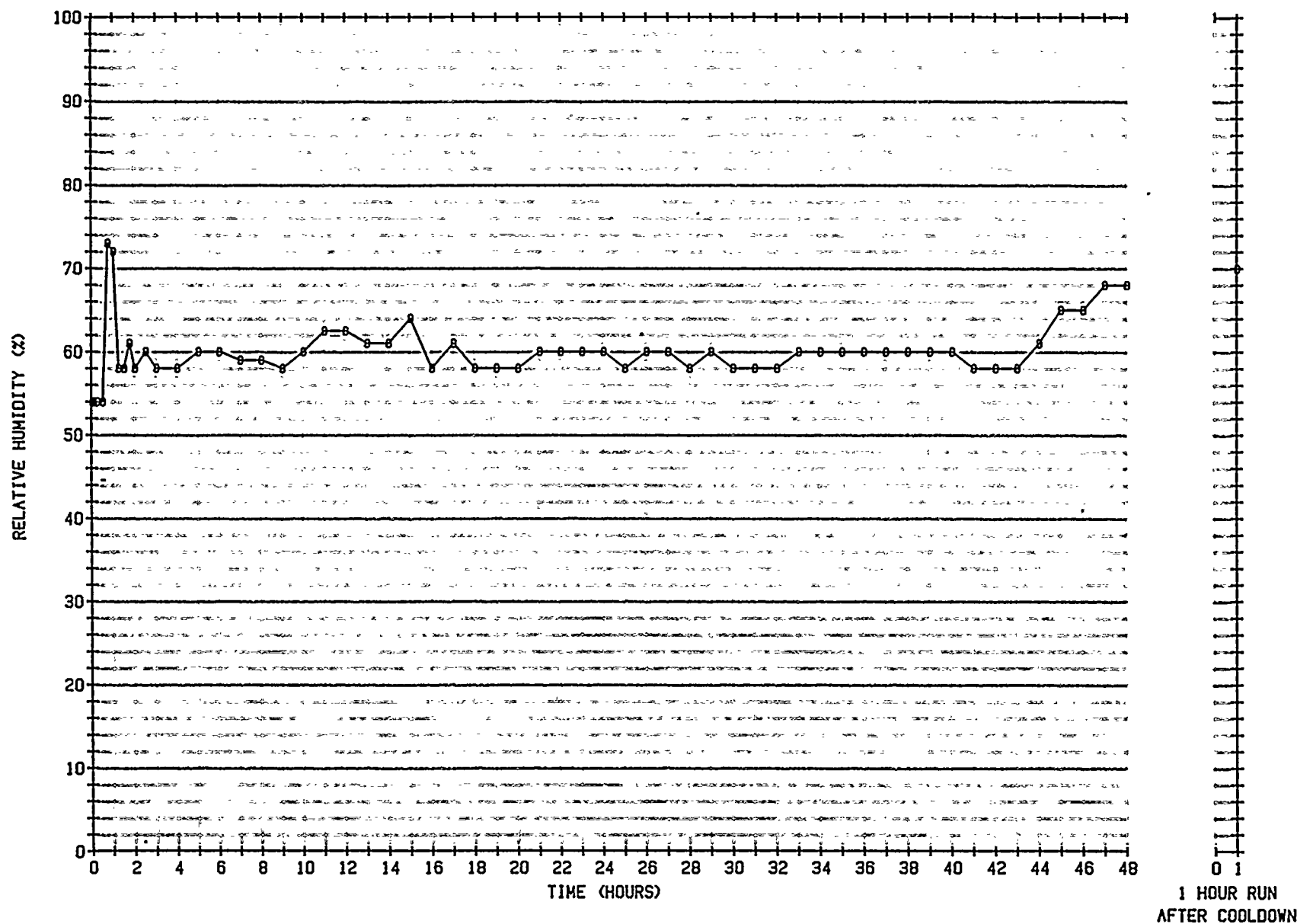
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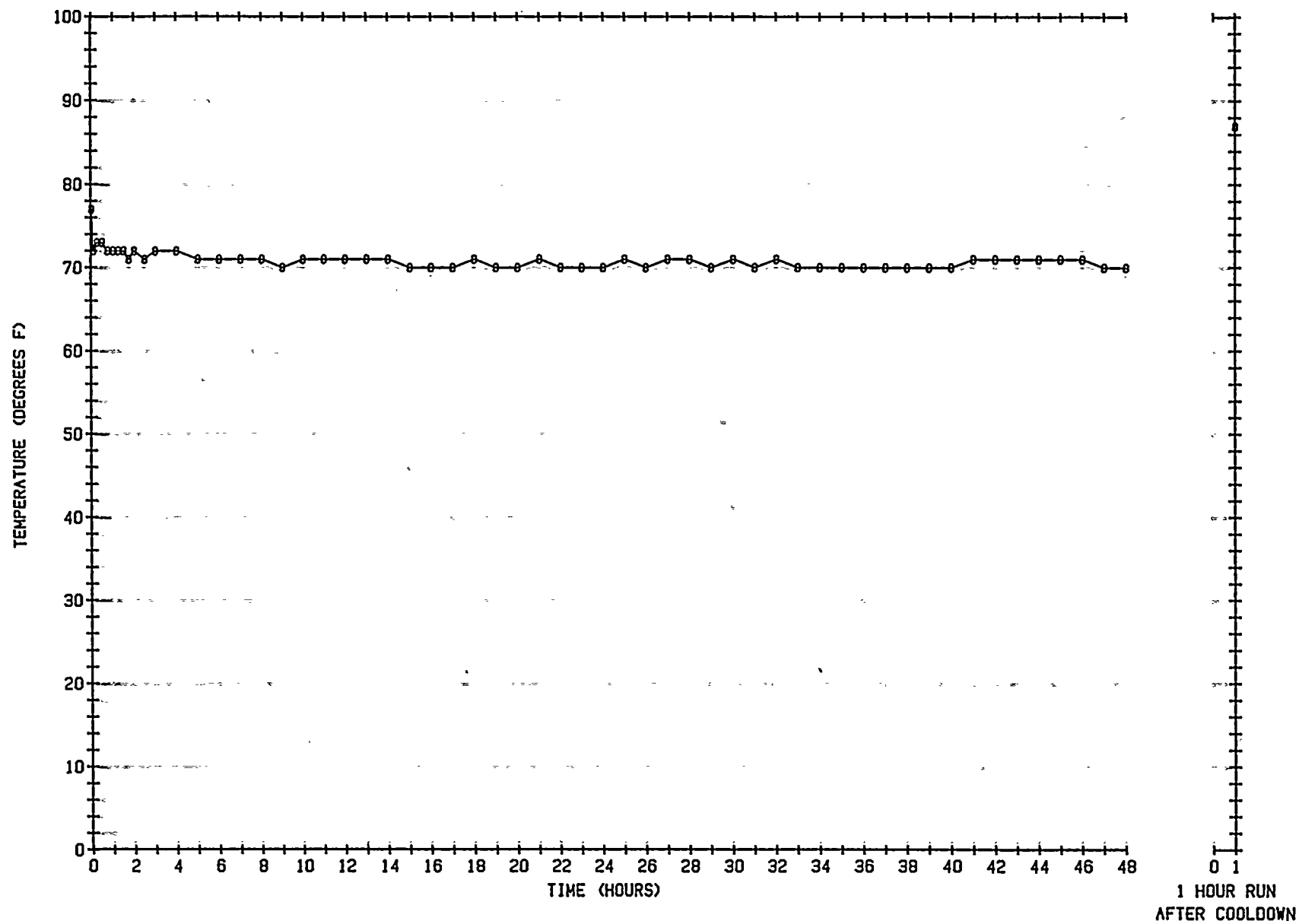
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3M-AFB-PO1 MOTOR DRIVEN ESSENTIAL AUXILIARY FEEDWATER PUMP PUMP ROOM RELATIVE HUMIDITY



3M-AFB-P01 MOTOR DRIVEN ESSENTIAL AUXILIARY FEEDWATER PUMP
PUMP ROOM TEMPERATURE



Non-Essential Auxiliary Feedwater Pump
48 Hour Endurance Test
3M-AFN-P01

As required by ITEM II.E.1.1.B.2 of NUREG 0857, a 48 hour endurance test was performed on AFN-P01 to verify the pump's capability to provide continuous operation for a 48 hour period. NUREG 0857 further required a cooldown after pump operation to allow bearing temperatures to cool to within 10°F of ambient and a subsequent one hour run. Throughout this testing, bearing/bearing oil temperatures and bearing cap vibration were monitored to verify that no parameter exceeded its design limit.

Testing was performed in accordance with 91PE-3AF01. The 48 hour run commenced on September 28, 1986, and continuing until October 1, 1986. The test was initiated and terminated by manual operation of the Control Room pump handswitch. Pump bearing/bearing oil temperatures were monitored using the Plant Monitoring System computer display of the following plant instrumentation (see attached graphs for all recorded data):

<u>INSTRUMENT (PMS)</u>	<u>PARAMETER</u>	<u>LIMIT</u>	<u>MAXIMUM OBSERVED TEMPERATURE</u>
AFN-TE-79 (AFT79)	AFN-P01 Motor Outboard Bearing	190°F max	148°F
AFN-TE-81 (AFT81)	AFN-P01 Motor Inboard Bearing	190°F max	148°F
AFN-TE-89 (AFT89)	AFN-P01 Thrust Bearing	200°F max	158°F
AFN-TE-90 (AFT90)	AFN-P01 Pump Inboard Bearing	200°F max	123°F
AFN-TE-91 (AFT91)	AFN-P01 Pump Outboard Bearing	200°F max	129°F

Pump inboard and outboard bearing cap vibration was monitored using an IRD model 810 portable vibration analyzer and probe. The following values were observed and are compared to the upper limit (see attached graphs for all recorded data):

<u>PARAMETER</u>	<u>LIMIT</u>	<u>MAXIMUM OBSERVED VIBRATION</u>
AFN-P01 Inboard Bearing Cap Vibration	5.0 mils	0.44 mils
AFN-P01 Outboard Bearing Cap Vibration	5.0 mils	0.58 mils

A review of all data recorded during the above endurance testing shows that no upper limits on bearing/bearing oil temperatures or bearing cap vibration were exceeded.

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3M-AFN-P01 MOTOR DRIVEN NONESSENTIAL AUXILIARY FEEDWATER PUMP
48 HOUR ENDURANCE RUN - BEARING TEMPERATURES (DEGREES F)

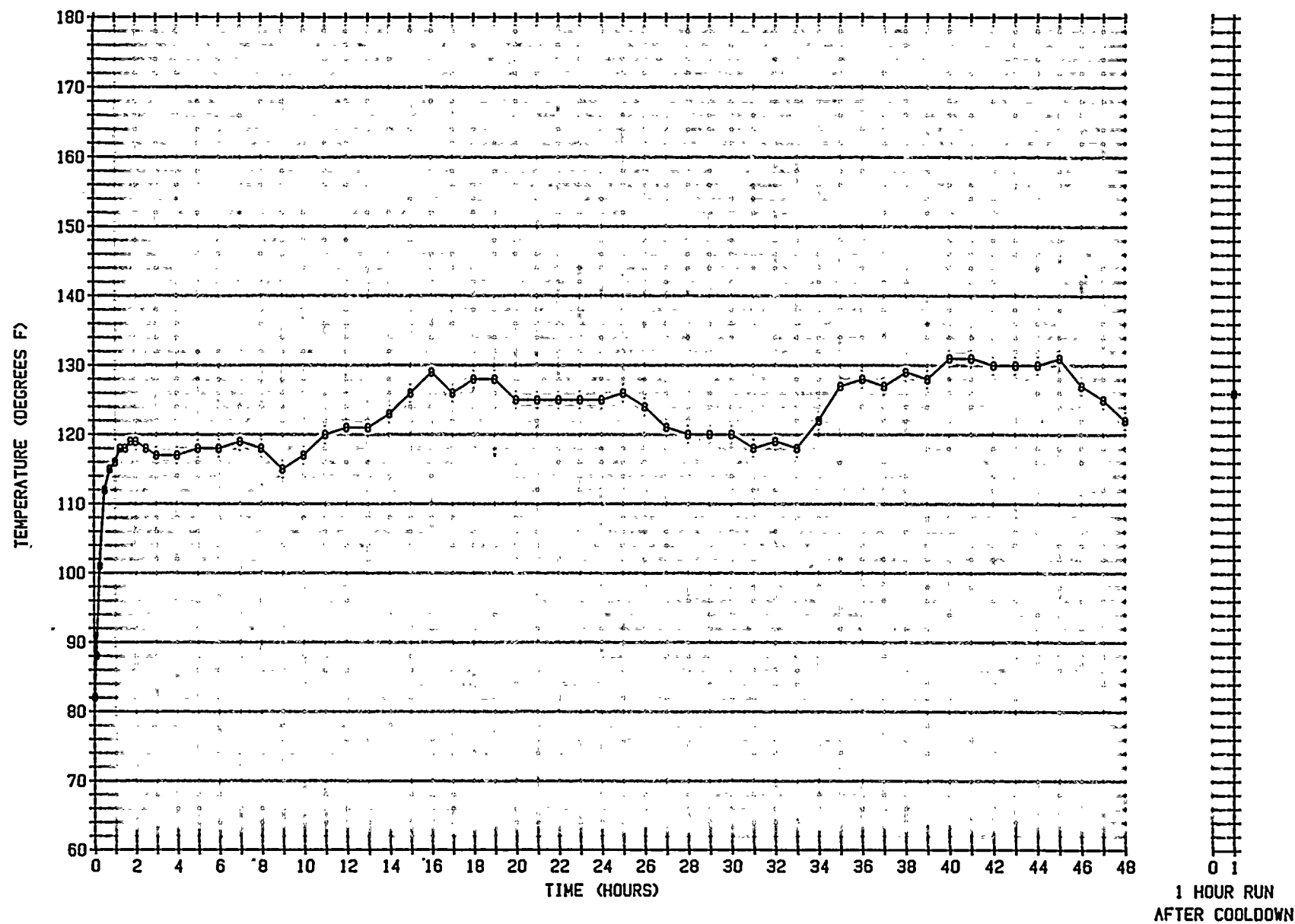
RUN TIME	AFN-TE-79 MOTR OB	AFN-TE-81 MOTR IB	AFN-TE-89 THRUST	AFN-TE-90 PUMP IB	AFN-TE-91 PUMP OB
PRESTART	98	89	84	79	82
5 MIN	113	115	107	85	88
15 MIN	126	129	120	98	101
30 MIN	135	137	132	107	112
45 MIN	138	140	136	110	115
1 HR	140	140	137	110	116
1.25 HR	141	141	144	112	118
1.5 HR	141	141	144	111	118
1.75 HR	141	141	143	112	119
2 HR	141	141	144	112	119
2.5 HR	141	140	138	111	118
3 HR	140	139	138	110	117
4 HR	139	139	138	111	117
5 HR	139	140	145	111	118
6 HR	139	140	146	112	118
7 HR	139	140	146	112	119
8 HR	137	139	145	111	118
9 HR	136	136	138	107	115
10 HR	137	138	145	109	117
11 HR	139	140	146	111	120
12 HR	141	141	148	113	121
13 HR	142	142	147	113	121
14 HR	143	143	149	115	123
15 HR	145	145	151	118	126
16 HR	146	147	153	120	129
17 HR	146	146	151	118	126
18 HR	147	147	153	120	128
19 HR	147	147	152	119	128
20 HR	146	145	150	117	125
21 HR	145	144	151	117	125
22 HR	145	144	151	116	125
23 HR	144	143	150	116	125
24 HR	144	144	151	116	125
25 HR	142	144	152	118	126
26 HR	141	142	151	115	124
27 HR	139	138	149	110	121
28 HR	138	138	149	110	120
29 HR	137	138	149	110	120
30 HR	137	137	148	110	120
31 HR	136	136	147	108	118
32 HR	135	136	147	108	119
33 HR	136	136	146	108	118
34 HR	137	139	149	113	122
35 HR	139	143	154	118	127
36 HR	141	143	154	118	128
37 HR	143	144	154	118	127
38 HR	145	146	155	120	129
39 HR	145	146	155	120	128
40 HR	146	148	157	122	131
41 HR	146	148	157	122	131
42 HR	148	148	157	122	130
43 HR	148	148	157	123	130
44 HR	147	147	156	122	130
45 HR	146	147	158	123	131
46 HR	145	145	152	119	127
47 HR	144	143	153	117	125
48 HR	142	140	145	113	122

POST ENDURANCE TEST 1 HOUR RUN

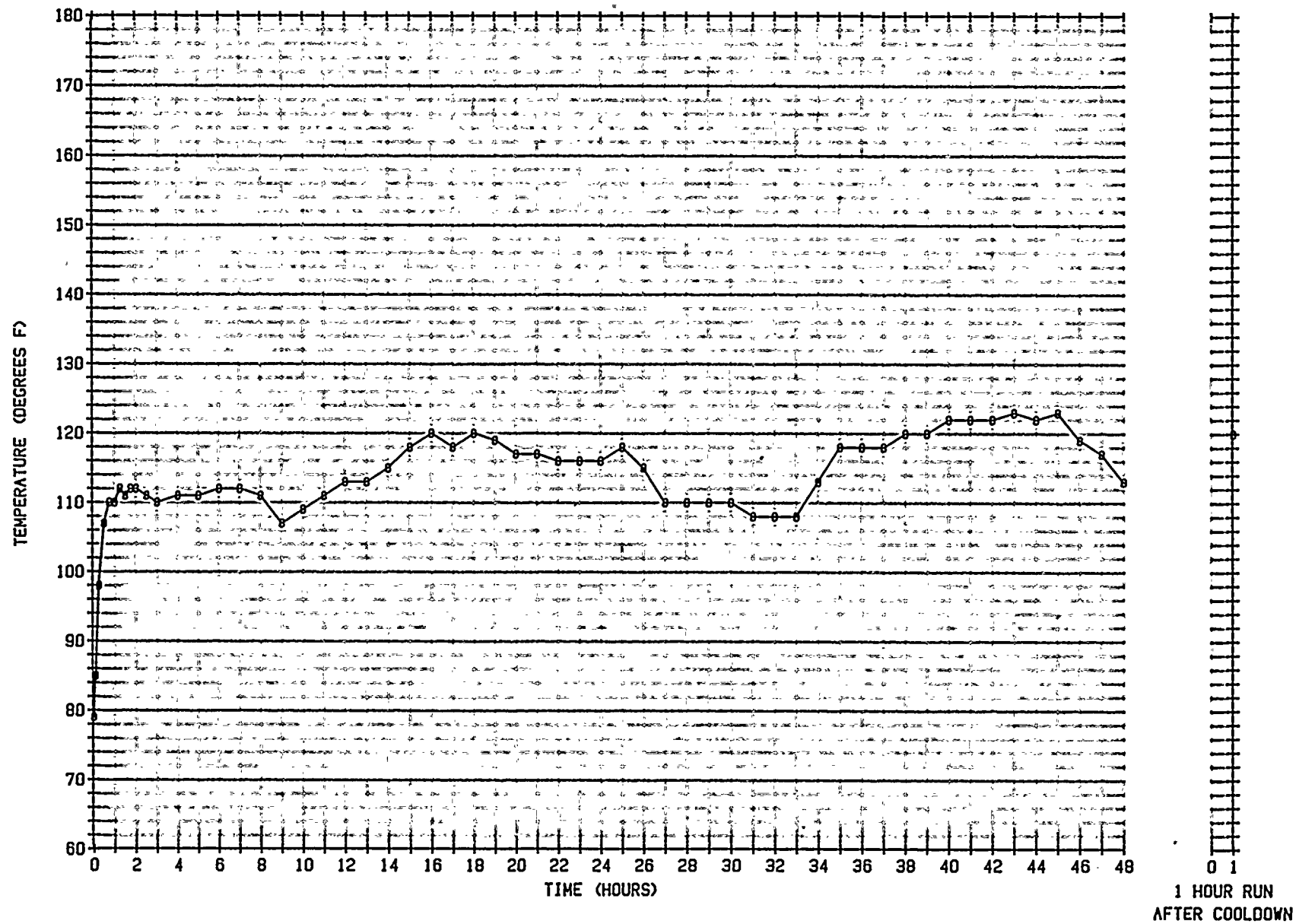
1 HR	142	145	146	120	126
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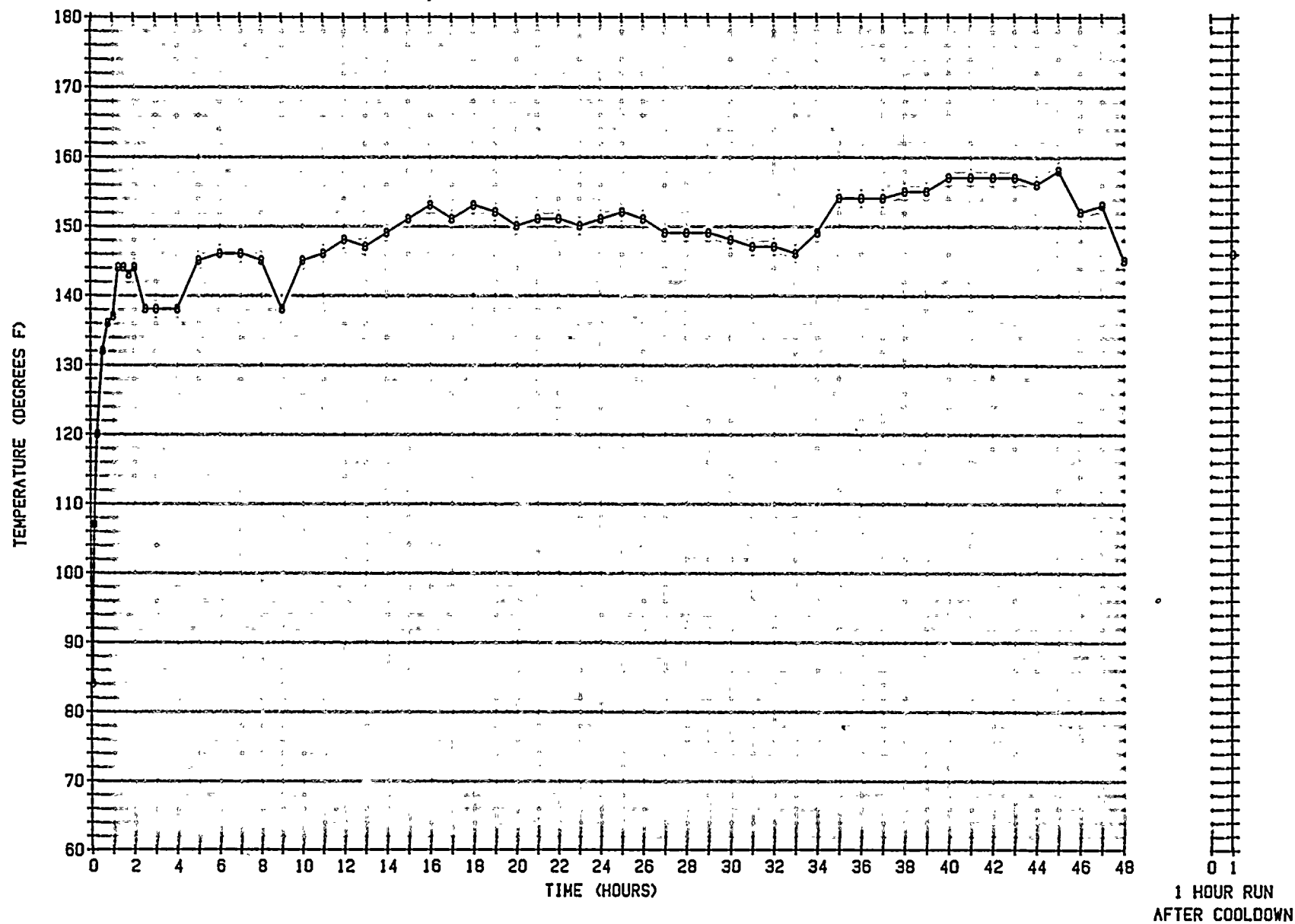
3M-AFN-P01 MOTOR DRIVEN NONESSENTIAL AUXILIARY FEEDWATER PUMP
AFN-TE-91 PUMP OUTBOARD BEARING TEMPERATURE



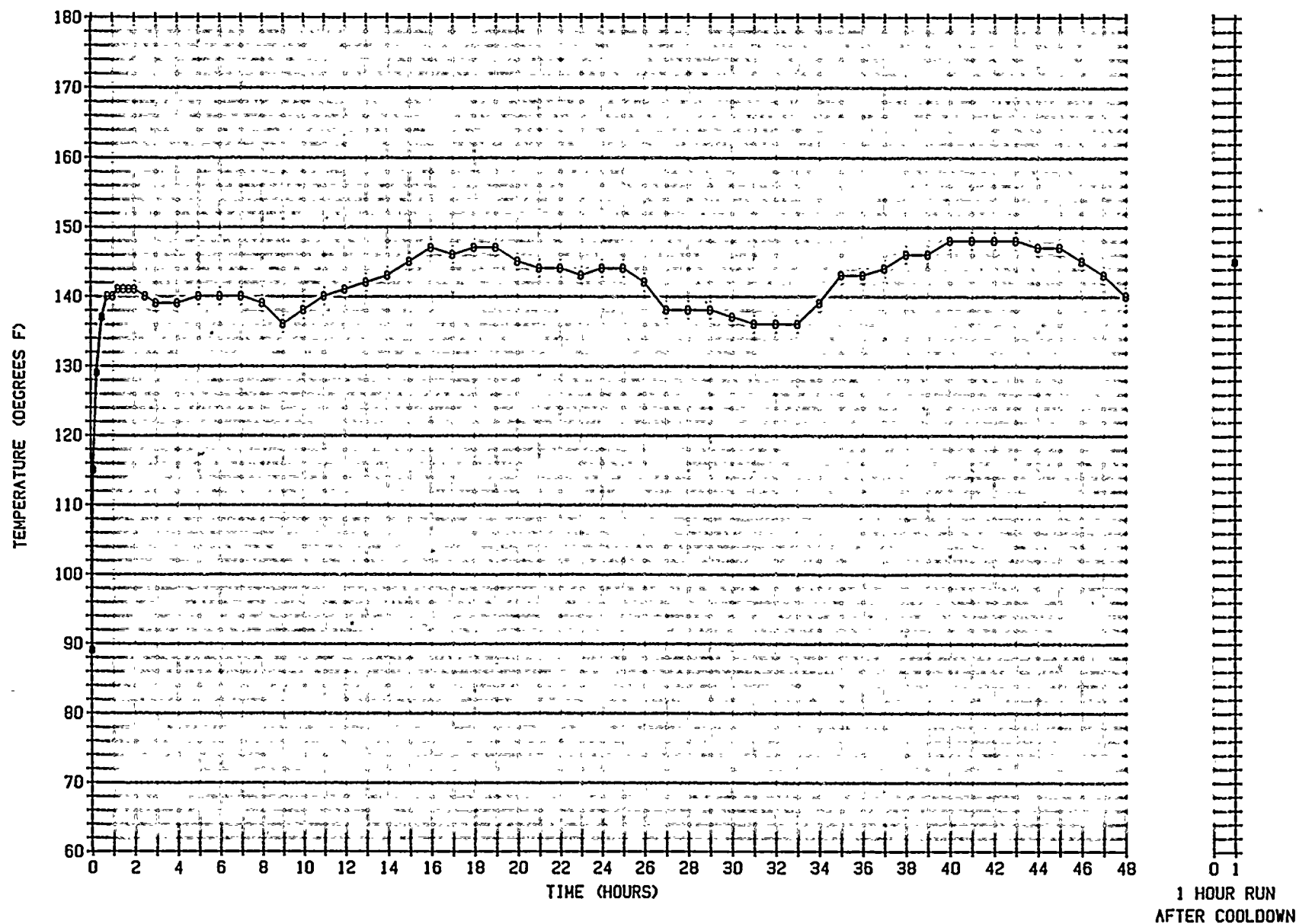
3M-AFN-P01 MOTOR DRIVEN NONESSENTIAL AUXILIARY FEEDWATER PUMP AFN-TE-90 PUMP INBOARD BEARING TEMPERATURE



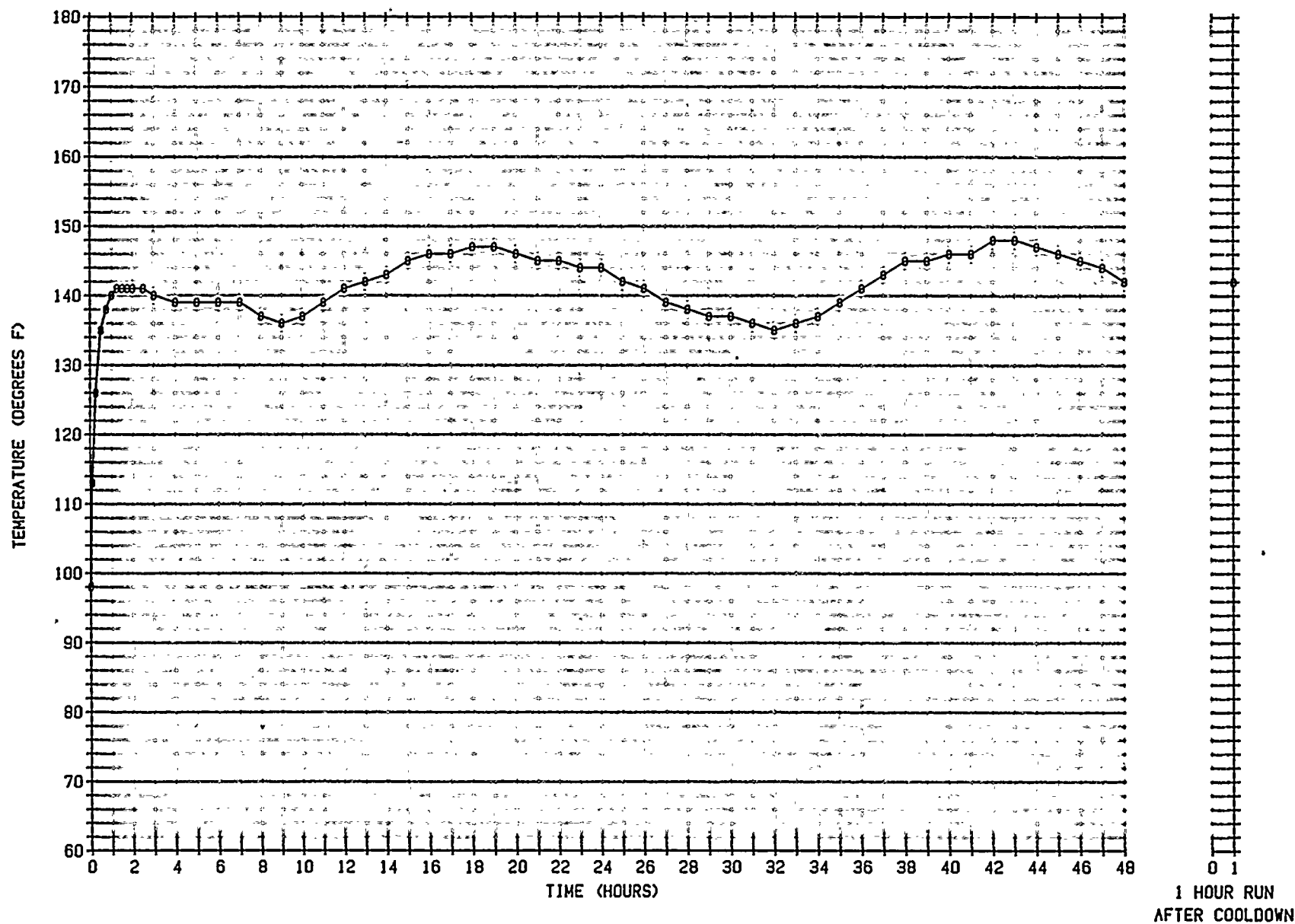
3M-AFN-P01 MOTOR DRIVEN NONESSENTIAL AUXILIARY FEEDWATER PUMP
AFN-TE-89 PUMP THRUST BEARING TEMPERATURE



3M-AFN-PO1 MOTOR DRIVEN NONESSENTIAL AUXILIARY FEEDWATER PUMP AFN-TE-81 MOTOR INBOARD BEARING TEMPERATURE



3M-AFN-PO1 MOTOR DRIVEN NONESSENTIAL AUXILIARY FEEDWATER PUMP
AFN-TE-79 MOTOR OUTBOARD BEARING TEMPERATURE



3M-AFN-P01 MOTOR DRIVEN NONESSENTIAL AUXILIARY FEEDWATER PUMP
48 HOUR ENDURANCE RUN - BEARING VIBRATION (Mils P to P)

RUN TIME	IB BRG	OB BRG
5 MIN	0.38	0.56
15 MIN	0.40	0.58
30 MIN	0.38	0.56
1 HR	0.38	0.54
1.25 HR	0.40	0.55
1.5 HR	0.38	0.56
1.75 HR	0.38	0.54
2 HR	0.40	0.56
2.5 HR	0.40	0.54
3 HR	0.40	0.55
4 HR	0.40	0.54
5 HR	0.40	0.55
6 HR	0.38	0.56
7 HR	0.40	0.56
8 HR	0.42	0.55
9 HR	0.40	0.55
10 HR	0.42	0.55
11 HR	0.43	0.55
12 HR	0.43	0.55
13 HR	0.40	0.56
14 HR	0.44	0.54
15 HR	0.42	0.55
16 HR	0.42	0.53
17 HR	0.40	0.54
18 HR	0.40	0.54
19 HR	0.40	0.54
20 HR	0.42	0.56
21 HR	0.40	0.56
22 HR	0.42	0.58
23 HR	0.42	0.56
24 HR	0.40	0.56
25 HR	0.40	0.55
26 HR	0.40	0.56
27 HR	0.40	0.56
28 HR	0.42	0.58
29 HR	0.42	0.58
30 HR	0.40	0.56
31 HR	0.40	0.56
32 HR	0.42	0.56
33 HR	0.42	0.56
34 HR	0.42	0.56
35 HR	0.42	0.56
36 HR	0.42	0.52
37 HR	0.42	0.52
38 HR	0.42	0.56
39 HR	0.42	0.54
40 HR	0.42	0.54
41 HR	0.40	0.56
42 HR	0.40	0.56
43 HR	0.40	0.58
44 HR	0.42	0.56
45 HR	0.42	0.58
46 HR	0.42	0.58
47 HR	0.42	0.56
48 HR	0.42	0.56

POST ENDURANCE TEST 1 HOUR RUN

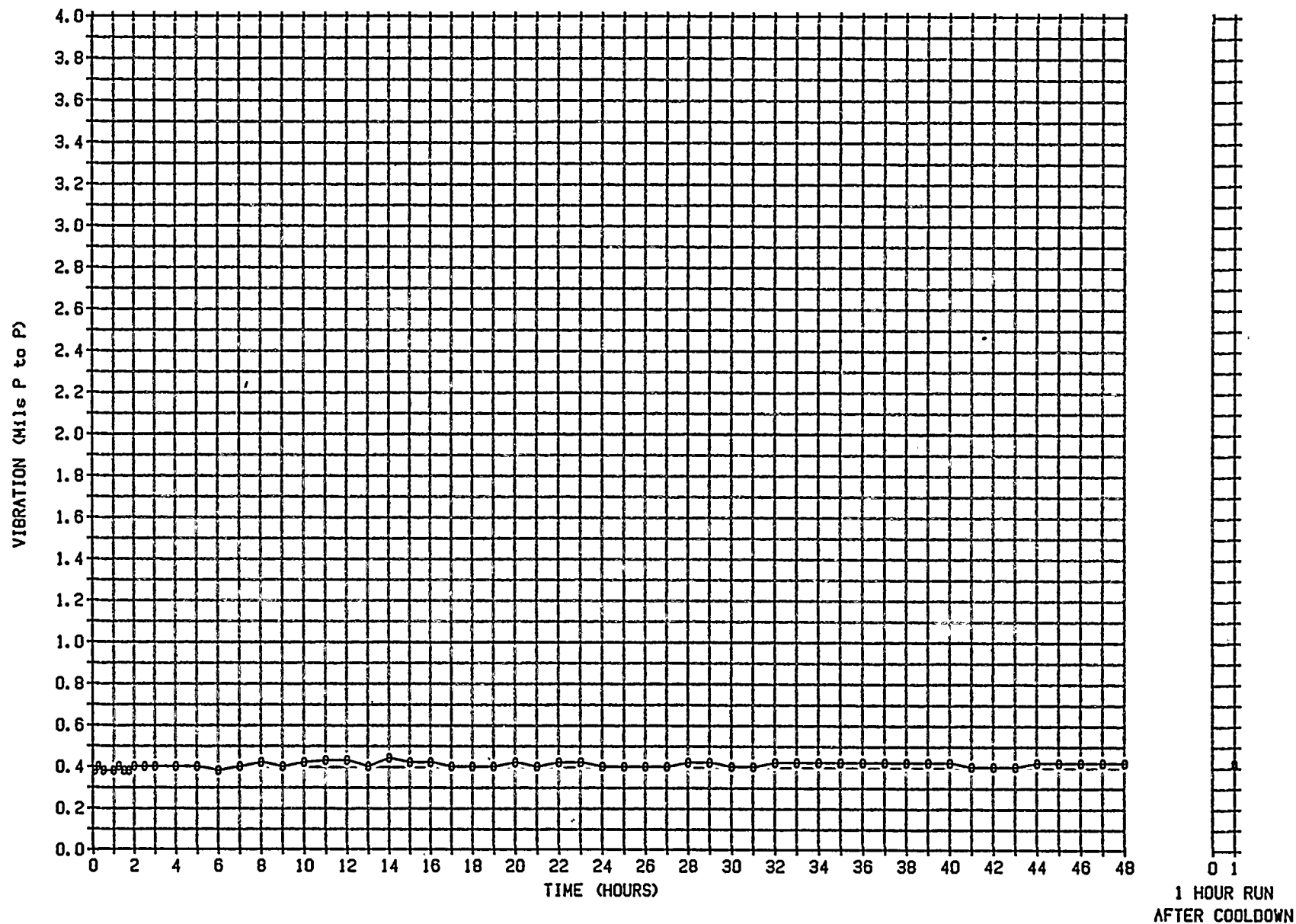
1 HR	0.42	0.54
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MEMORANDUM FOR THE RECORD
SUBJECT: [Illegible]

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DATE: [Illegible]
BY: [Illegible]

3M-AFN-P01 MOTOR DRIVEN NONESSENTIAL AUXILIARY FEEDWATER PUMP
PUMP INBOARD BEARING VIBRATION



3M-AFN-P01 MOTOR DRIVEN NONESSENTIAL AUXILIARY FEEDWATER PUMP PUMP OUTBOARD BEARING VIBRATION

