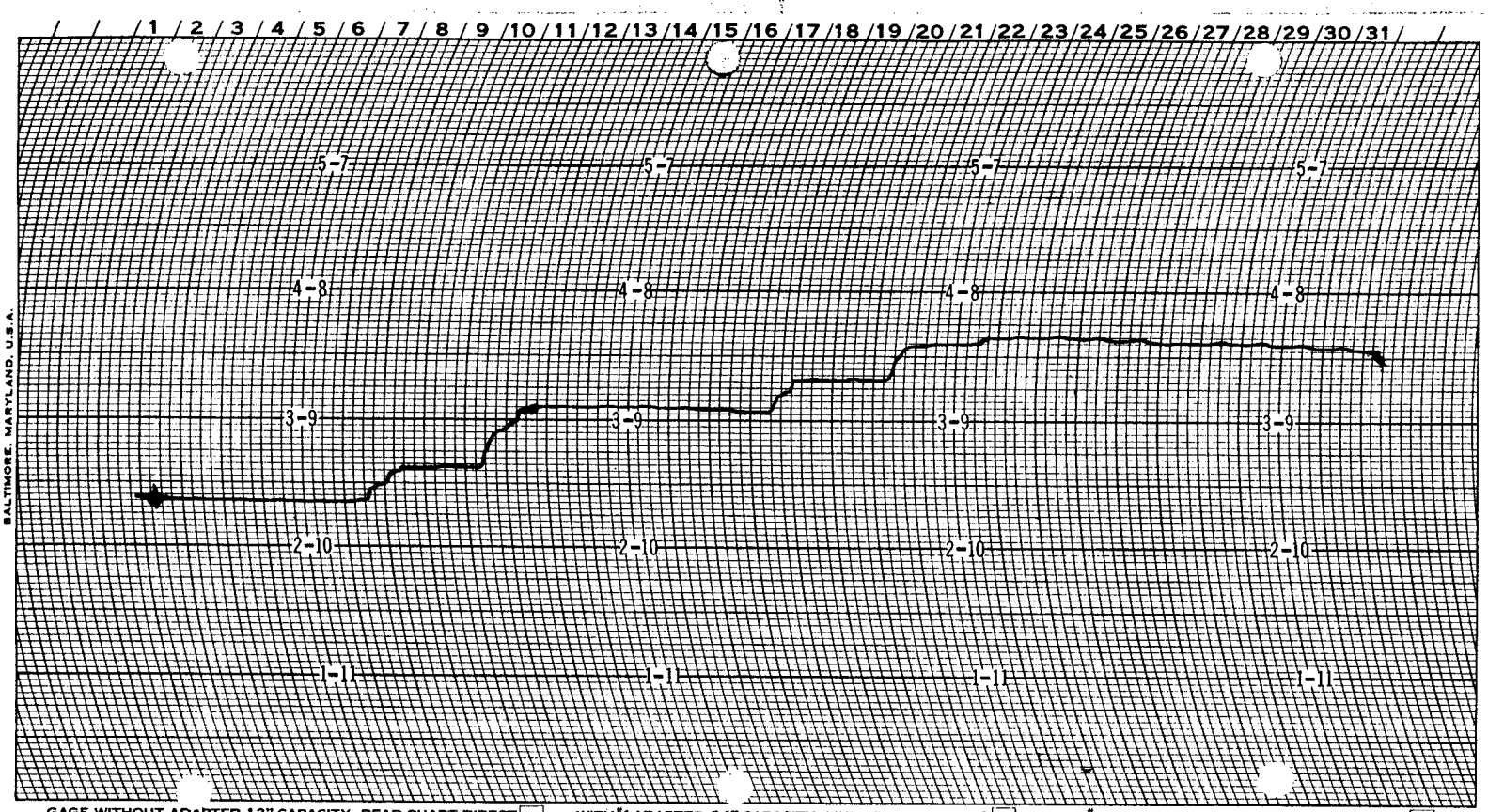
PRINTED IN U.S.A.

CHART NO. 15668

12-INCH DUAL TRAVERSE MONTHLY-861 HRS.
UNIVERSAL RAIN GAGE

BELFORT INSTRUMENT COMPANY
BALTIMORE, MARYLAND, U.S.A.



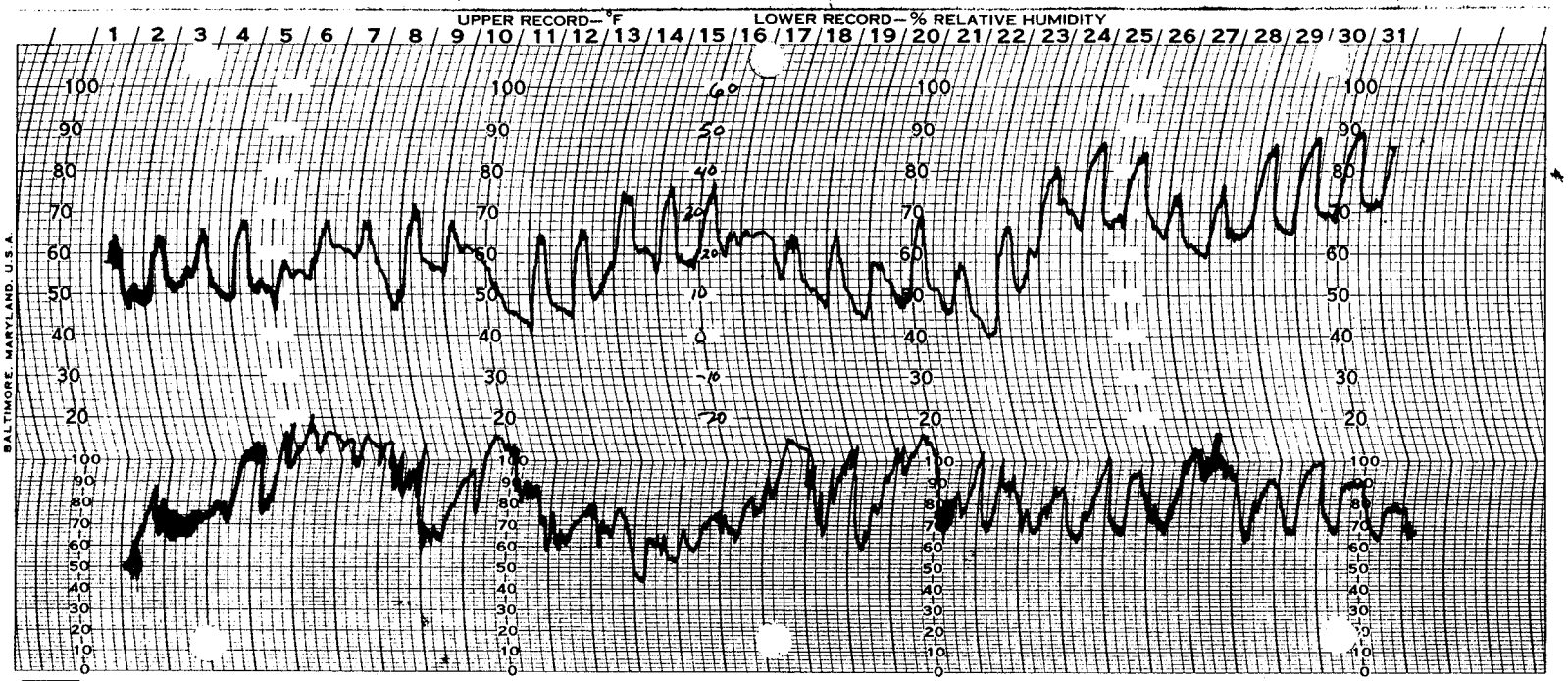
GAGE WITHOUT ADAPTER, 12" CAPACITY, READ CHART DIRECT ☐ WITH #1 ADAPTER, 24" CAPACITY, MULTIPLY CHART X 2 ☐ WITH #2 ADAPTER, 48" CAPACITY, MULTIPLY X 4 ☐

OBSERVER Karl B. Houskeeper ON 10 12 A.M. P.M. 2-2 19 94

STATION _____ OFF 10 10 A.M. P.M. 3-4 19 94

HYGROTHERMOGRAPH
CHART NO. 15627
MONTHLY-861 HRS.
BELFORT INSTRUMENT COMPANY
BALTIMORE, MARYLAND, U.S.A.

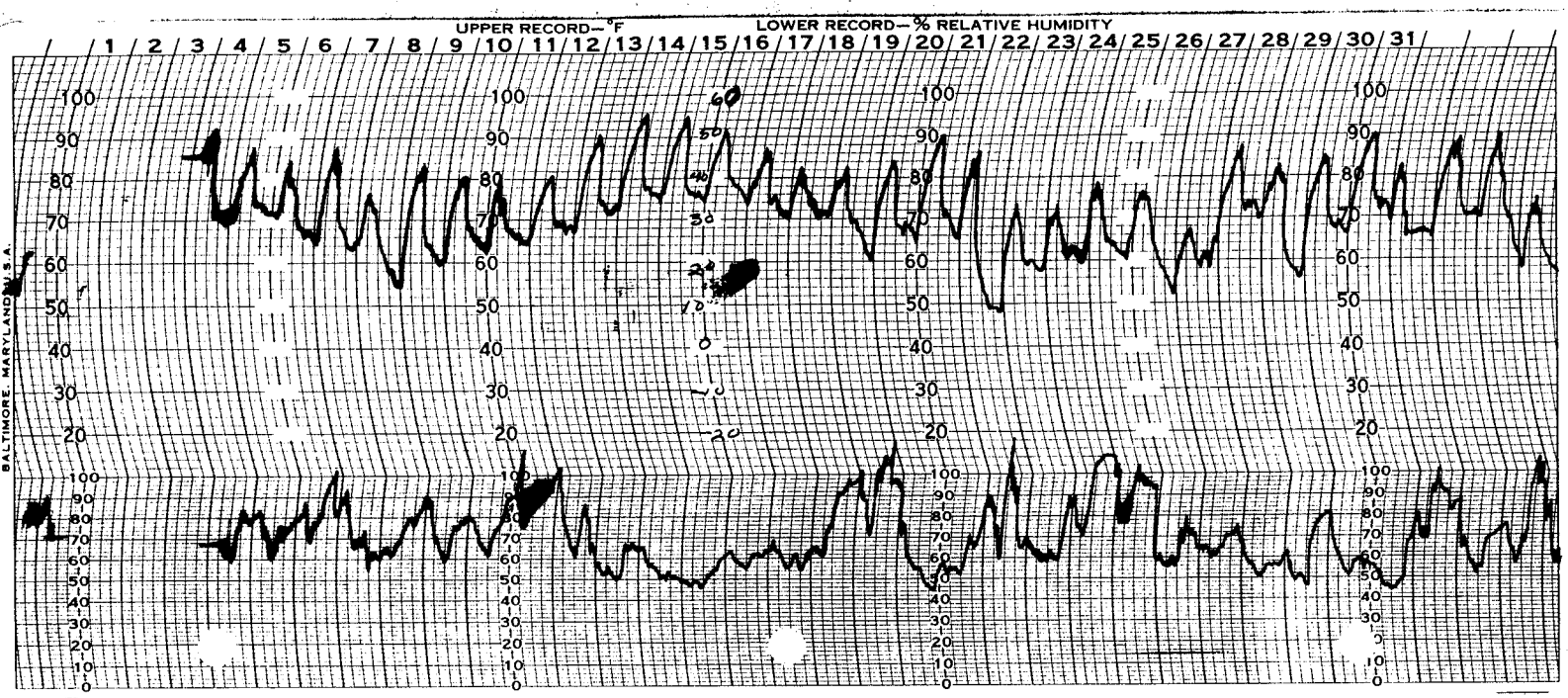
PRINTED IN U.S.A.



OBSERVER Ken R. Hauskrapp ON 1 0 18 A.M. P.M. 2-2 1994

STATION _____ OFF 10 29 A.M. P.M. 3-4 1994

CHART NO. 15627
MONTHLY-861 HRS.
BELFORT INSTRUMENT COMPANY
BALTIMORE, MARYLAND, U.S.A.



OBSERVER Karl R. Housteeper ON 1030 A.M. P.M. 3/4 1994

STATION _____ OFF 1007 A.M. P.M. 4/5 1994

CHART NO. 15668

12-INCH DUAL TRAVERSE MONTHLY-861 HRS.

UNIVERSAL RAIN GAGE

BELFORT INSTRUMENT COMPANY

BALTIMORE, MARYLAND, U.S.A.

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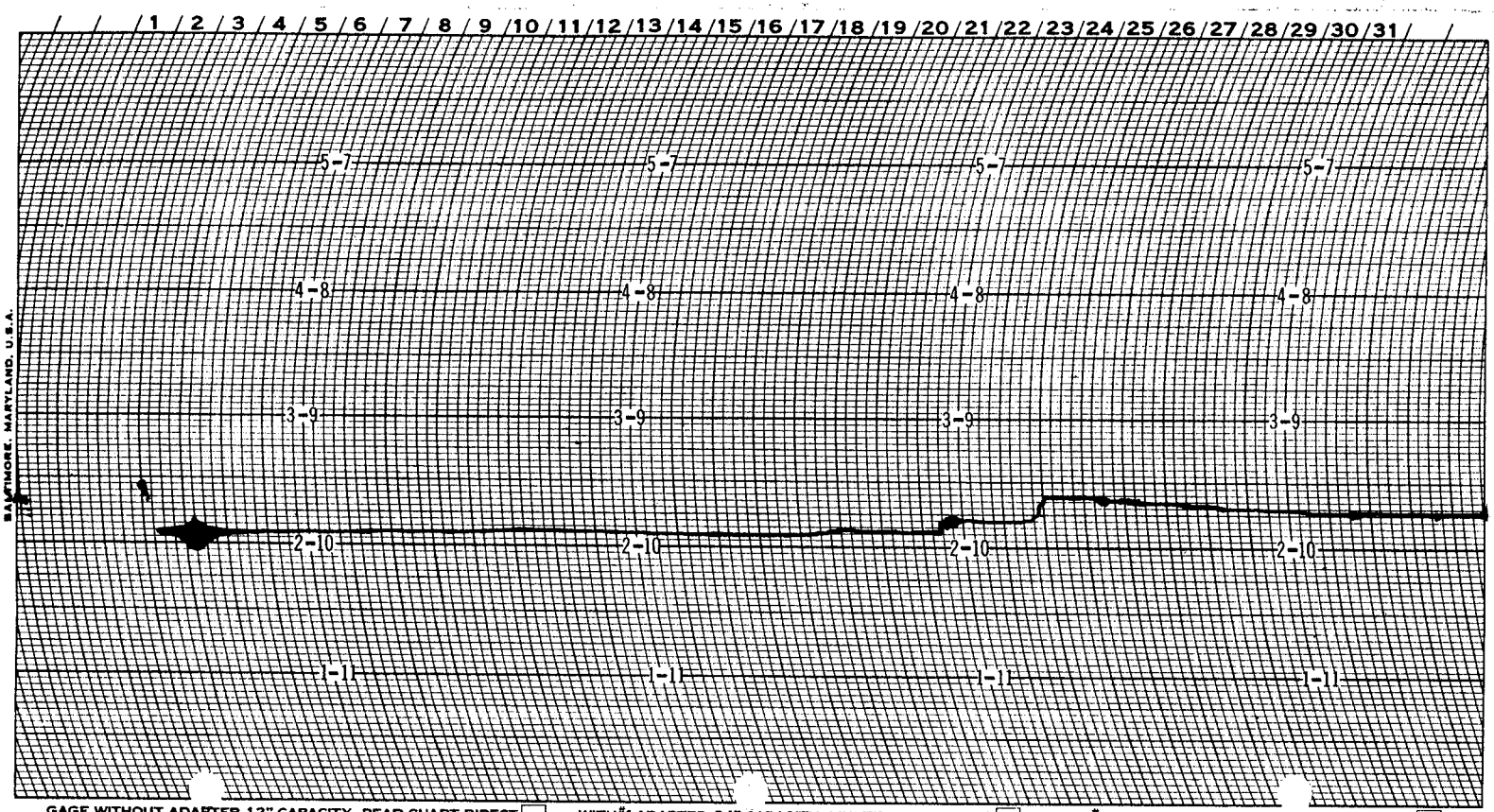

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OBSERVER Karl R. Housteeper

STATION

ON 1018 A.M. P.M. 3/4 19 94

OFF 1006 A.M. P.M. 4/5 19 94

CHART NO. 15668

12-INCH DUAL TRAVERSE MONTHLY-861 HRS.

UNIVERSAL RAIN GAGE

BELFORT INSTRUMENT COMPANY
BALTIMORE, MARYLAND, U.S.A.

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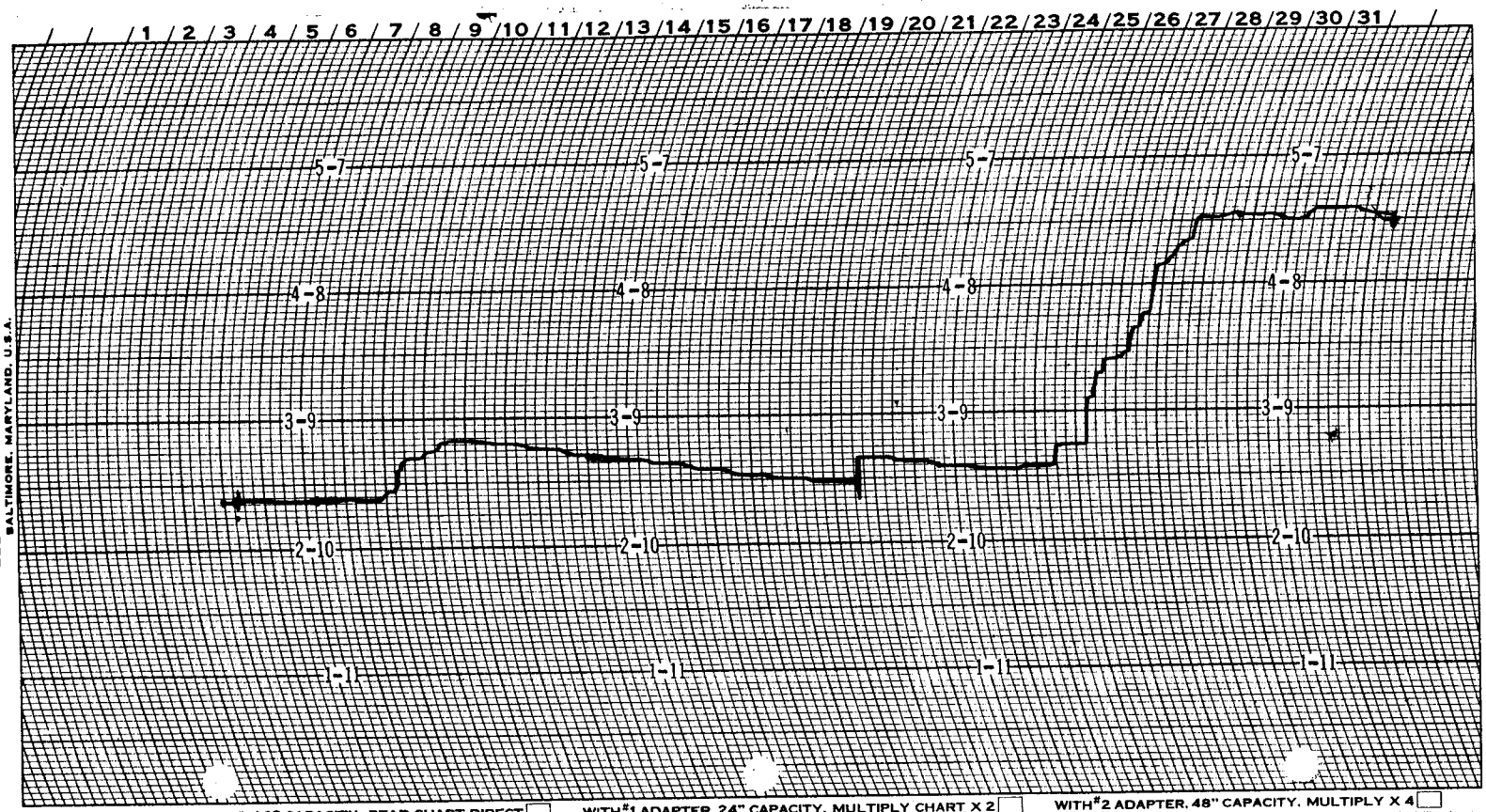

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OBSERVER Karl R. Housekeeper

STATION

ON 10:07 A.M. P.M. 4/6 19 94

OFF 12:15 A.M. P.M. 5/3 19 94

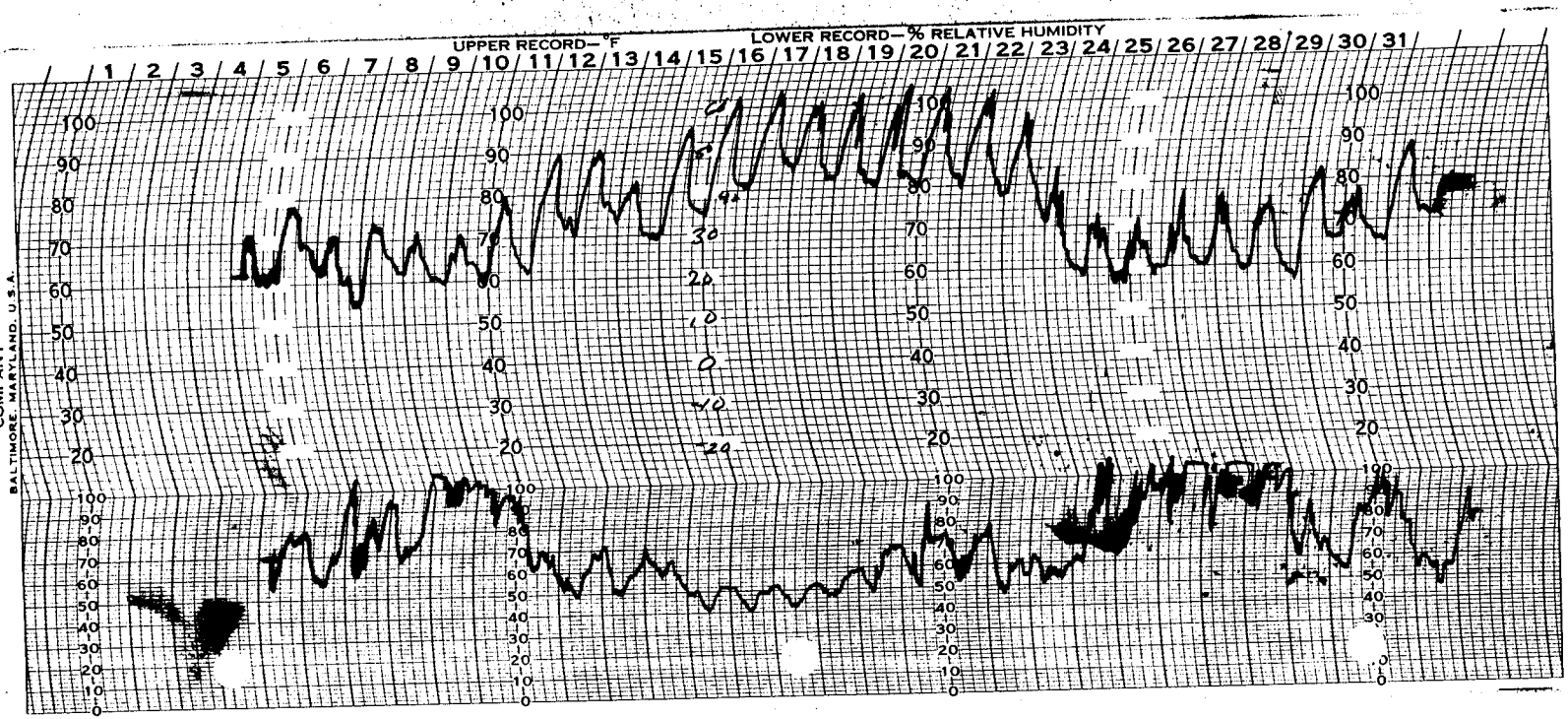
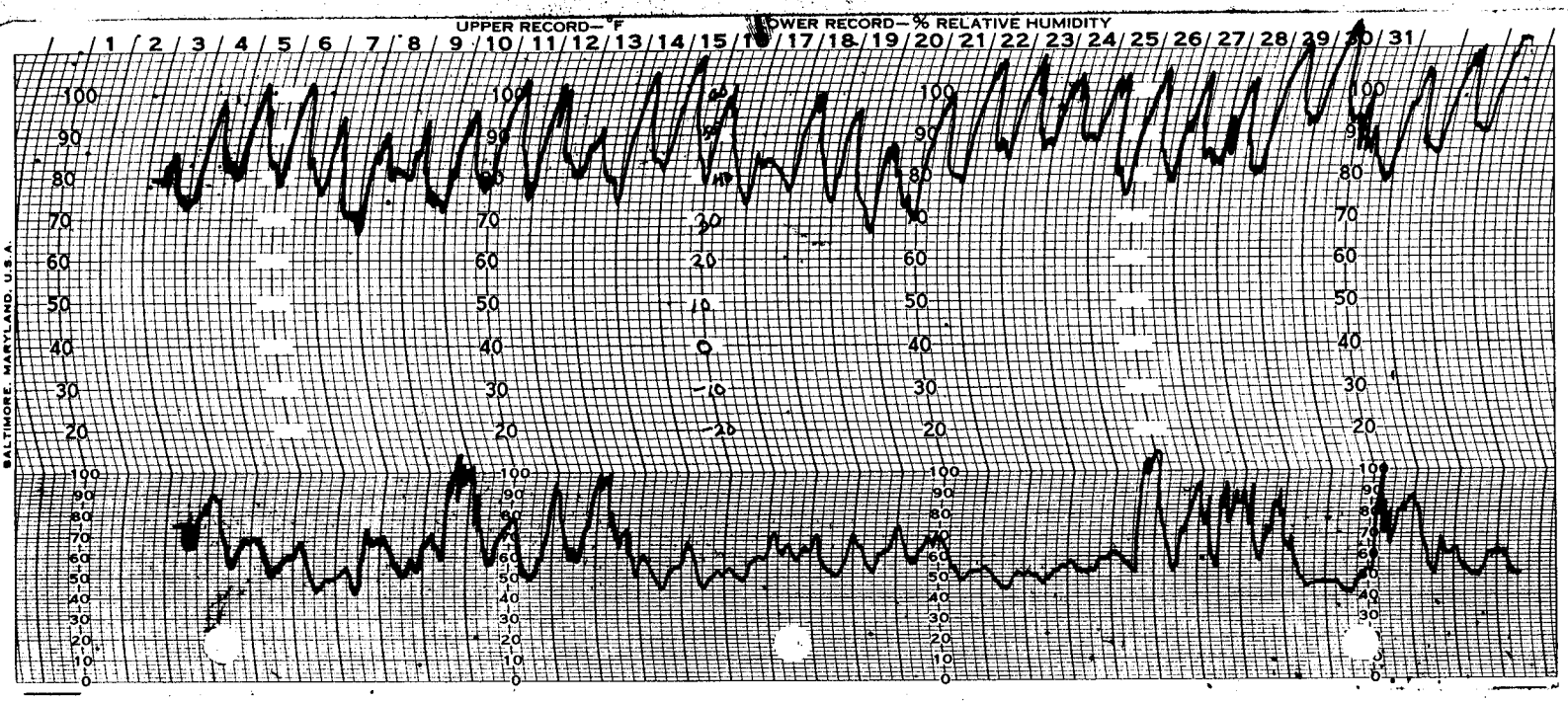


CHART NO. 15027
MONTHLY-861 HRS.
BELFORT INSTRUMENT COMPANY
BALTIMORE, MARYLAND, U.S.A.

OBSERVER Karl R. Houskeeper ON 1011 A.M. P.M. 4/5 1994

STATION _____ OFF 1225 A.M. P.M. 5/3 1997

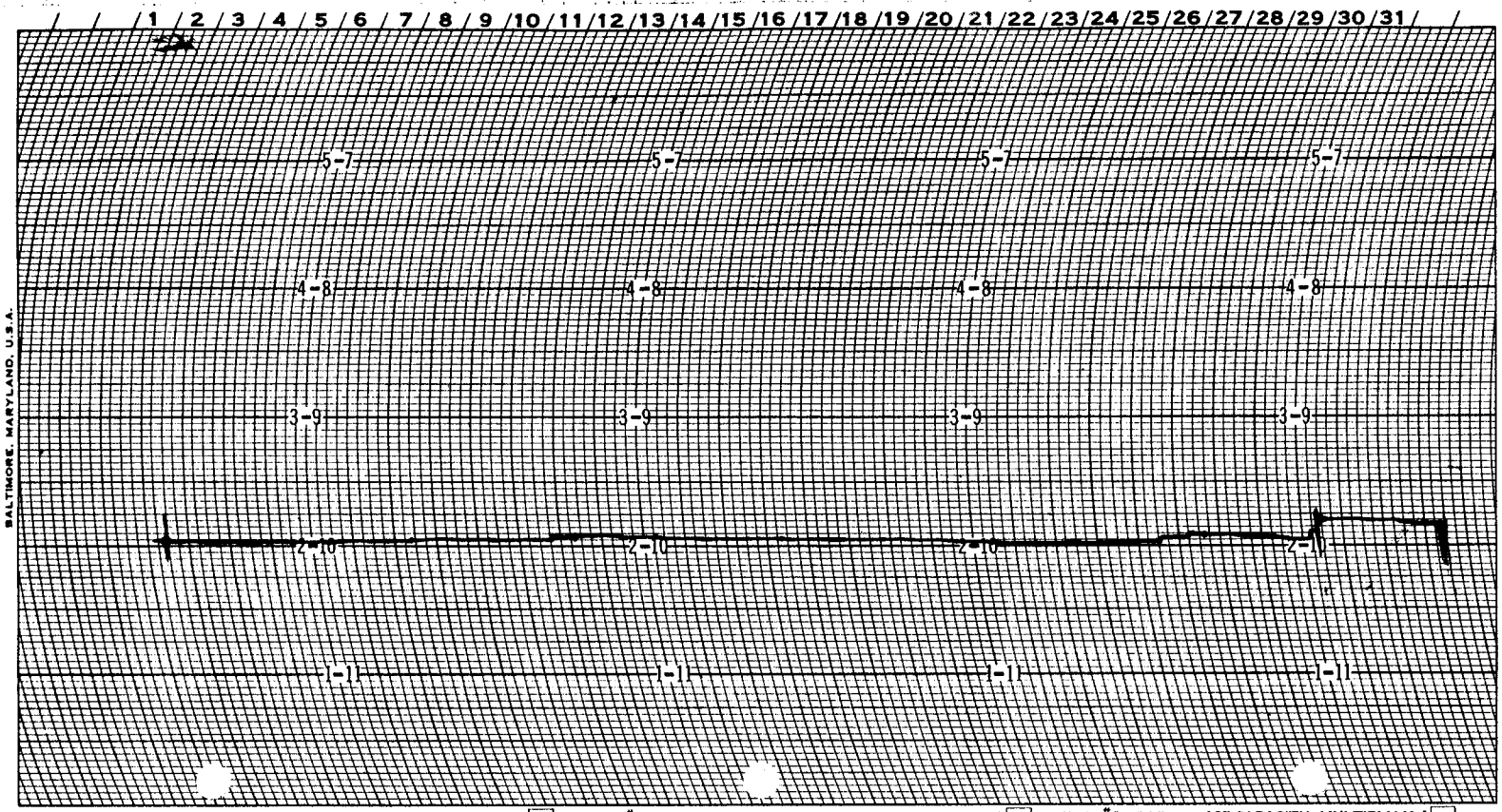
CHART NO. 15627
MONTHLY-861 HRS.
BELFORT INSTRUMENT COMPANY
BALTIMORE, MARYLAND, U.S.A.



OBSERVER Karl R. Hausknecht ON 1220 A.M. P.M. May 3 1954
OFF 1330 A.M. P.M. June 2 1954
STATION

UNIVERSAL RAIN GAUGE

BELFORT INSTRUMENT COMPANY
BALTIMORE, MARYLAND, U.S.A.



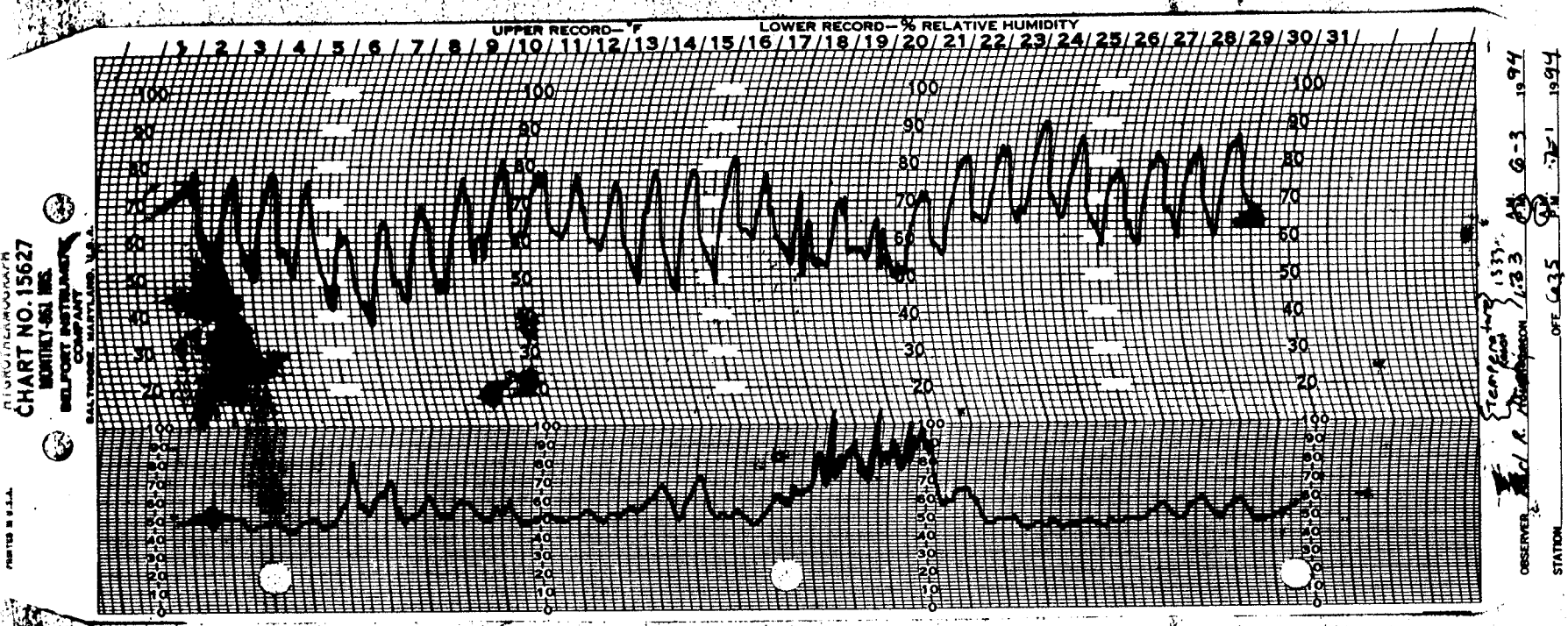
GAGE WITHOUT ADAPTER, 12" CAPACITY, READ CHART DIRECT ☐ WITH #1 ADAPTER, 24" CAPACITY, MULTIPLY CHART X 2 ☐ WITH #2 ADAPTER, 48" CAPACITY, MULTIPLY X 4 ☐

ON 1218 A.M. P.M. May 3 1994

OFF 1341 A.M. P.M. June 2 19 94

OBSERVER Karl E. Hauberger

STATION



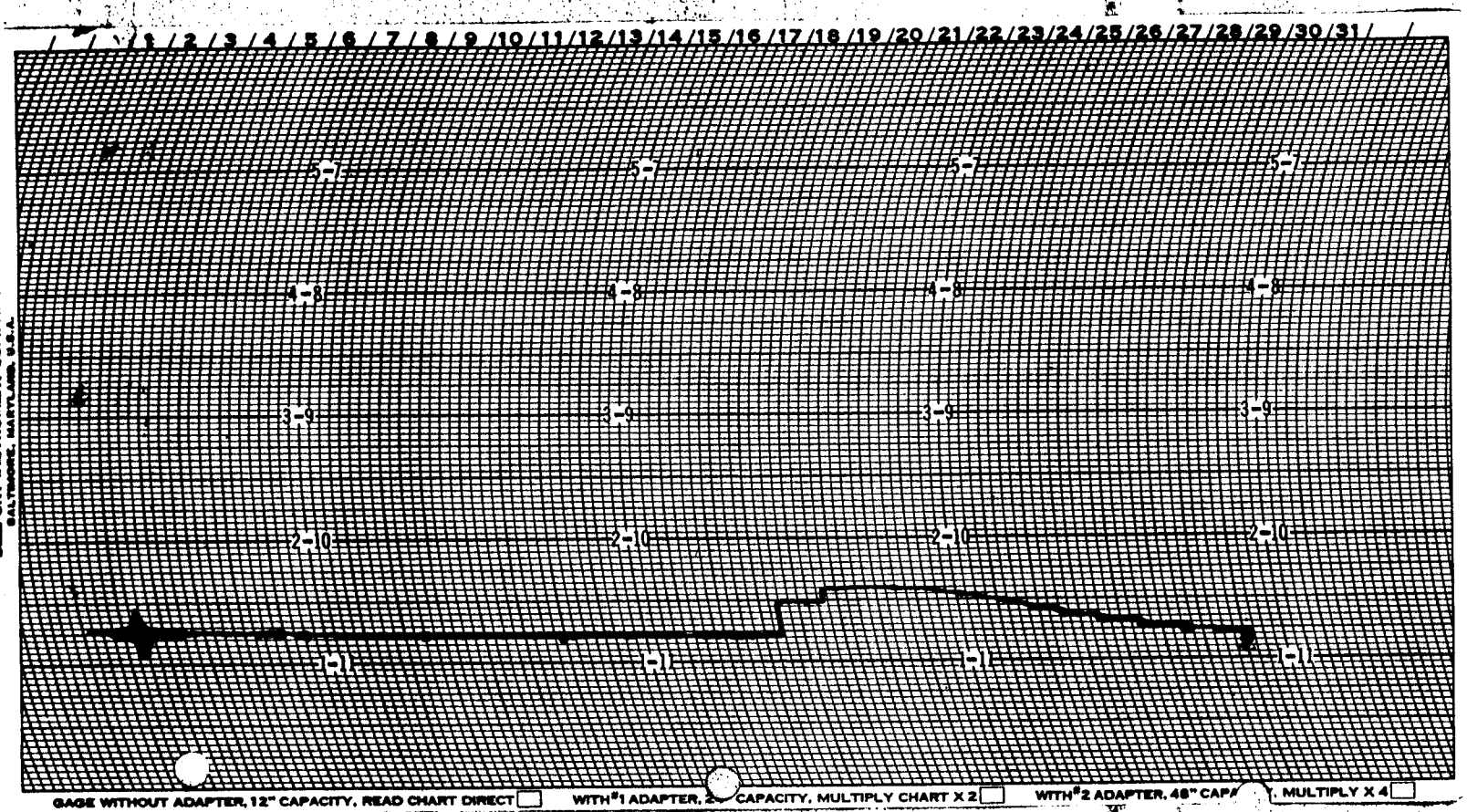
HYGROTHERMOGRAPH
CHART NO. 15627
MONTHLY-9&1 HRS.
BELFORT INSTRUMENT COMPANY
BALTIMORE, MARYLAND, U.S.A.
UPPER RECORD—°F
LOWER RECORD—% RELATIVE HUMIDITY
OBSERVER
STATION
OFF

CHART NO. 15668

12-INCH DUAL TRAVERSE MONTHLY-861 HRS.
UNIVERSAL RAIN GAGE

BELFORT INSTRUMENT COMPANY
BALTIMORE, MARYLAND, U.S.A.

PRINTED IN U.S.A.



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OBSERVER Karl R. Housteeper

STATION

ON 1343 AM 6-3 19 94

OFF 630 PM 7-1 19 94

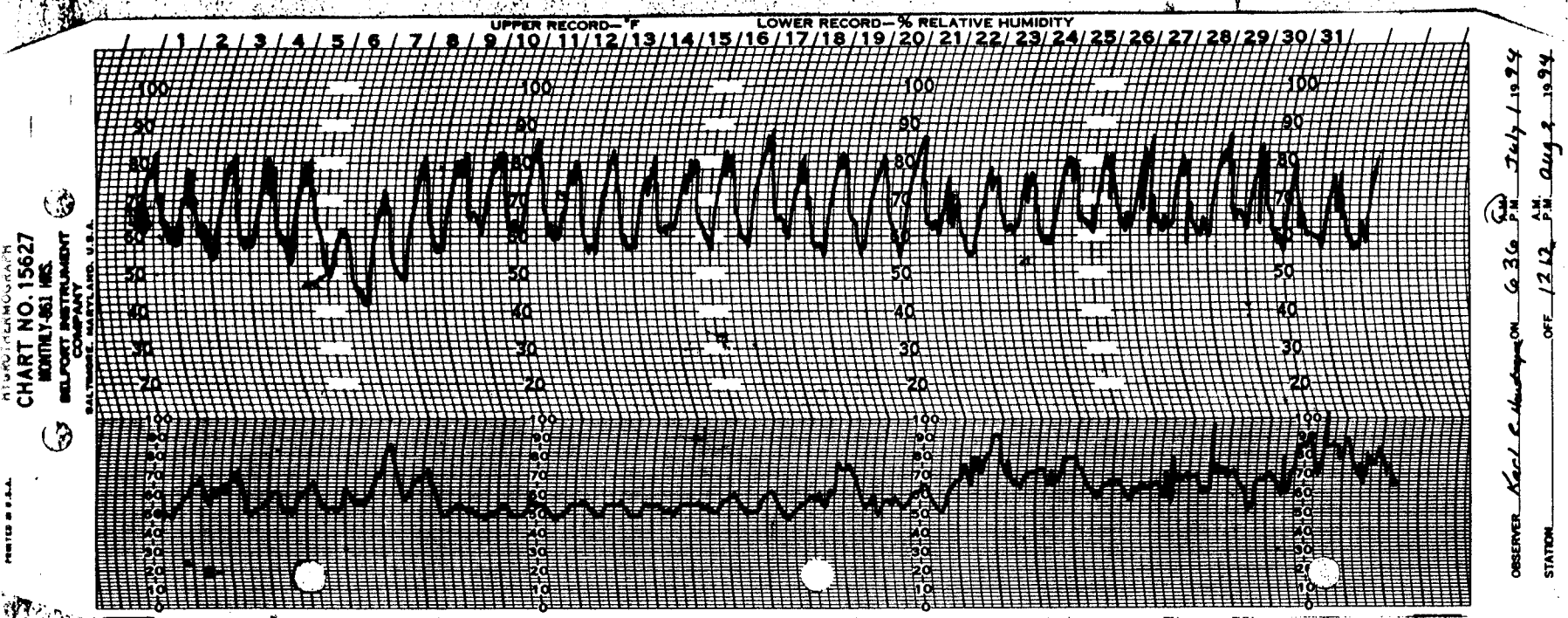

HYGROTHERMOGRAPH
CHART NO. 15627
MONTHLY-861 HRS.
BELFORT INSTRUMENT COMPANY
BALTIMORE, MARYLAND, U.S.A.
UPPER RECORD—°F
LOWER RECORD—% RELATIVE HUMIDITY
OBSERVER Karl R. Hardinger ON 636 A.M. P.M. July 1 1994
STATION OFF 1212 A.M. P.M. Aug 2 1994

CHART NO. 15668

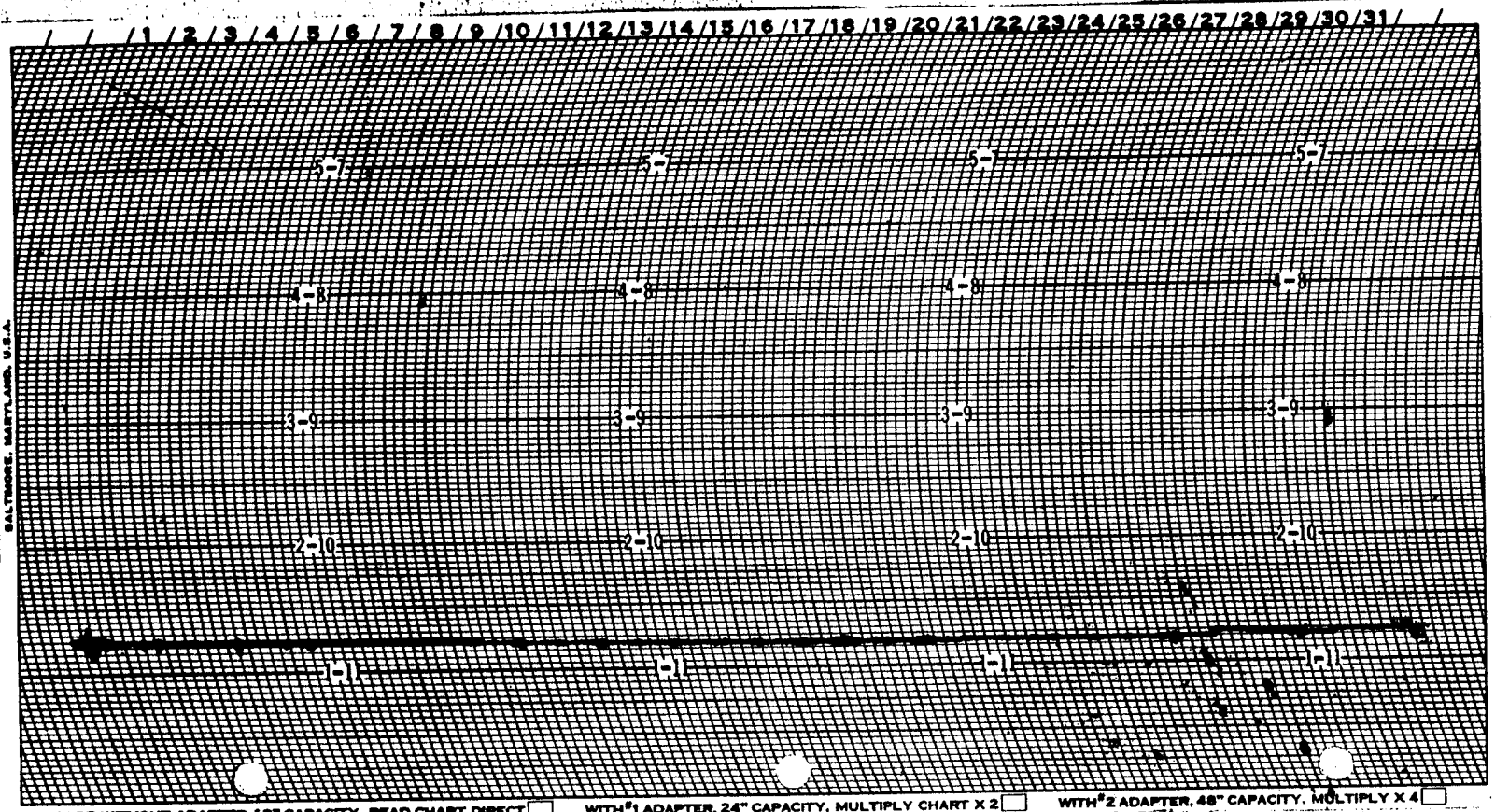
12-INCH DUAL TRAVERSE MONTHLY-861 HRS.

UNIVERSAL RAIN GAGE

BELFORT INSTRUMENT COMPANY

BALTIMORE, MARYLAND, U.S.A.

PRINTED IN U.S.A.



GAGE WITHOUT ADAPTER, 12" CAPACITY, READ CHART DIRECT ☐ WITH #1 ADAPTER, 24" CAPACITY, MULTIPLY CHART X 2 ☐ WITH #2 ADAPTER, 48" CAPACITY, MULTIPLY X 4 ☐

OBSERVER Karl R. Houstrope

STATION

ON 631 A.M. P.M. July 1 1994

OFF 1202 A.M. P.M. July 2 1994

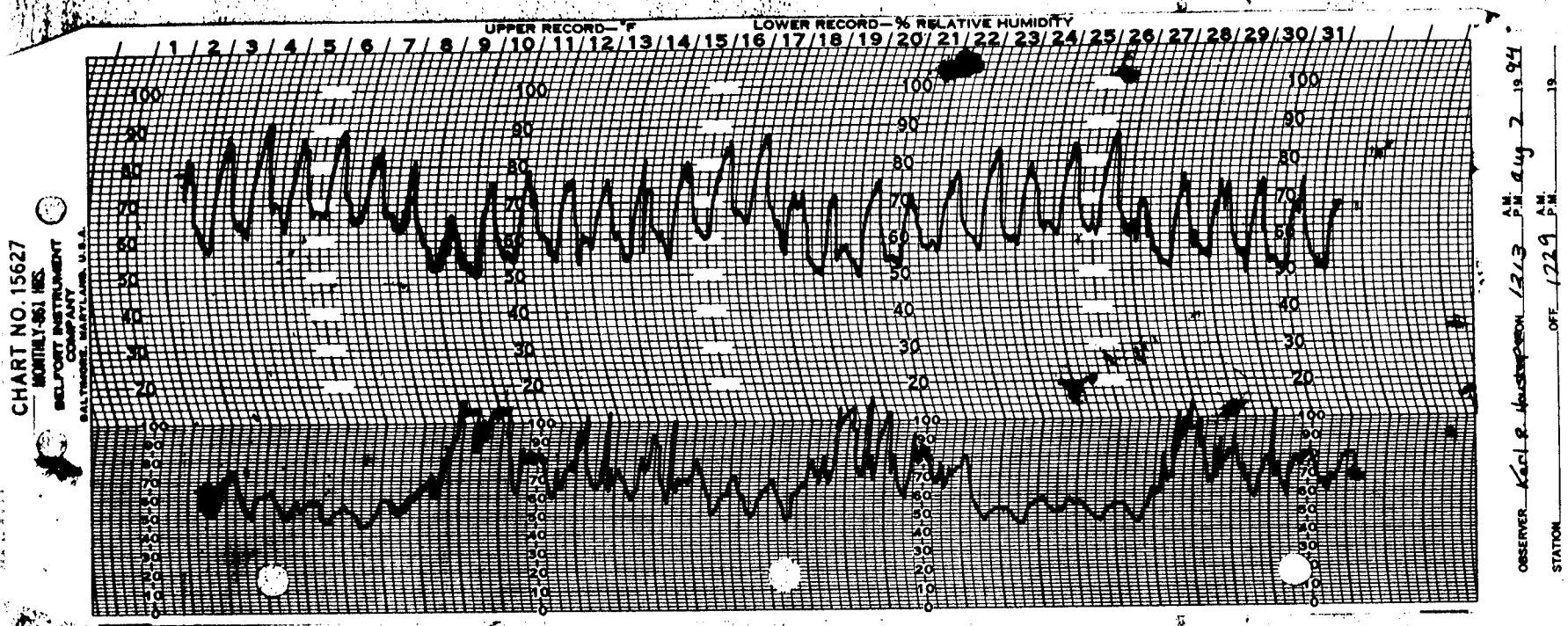
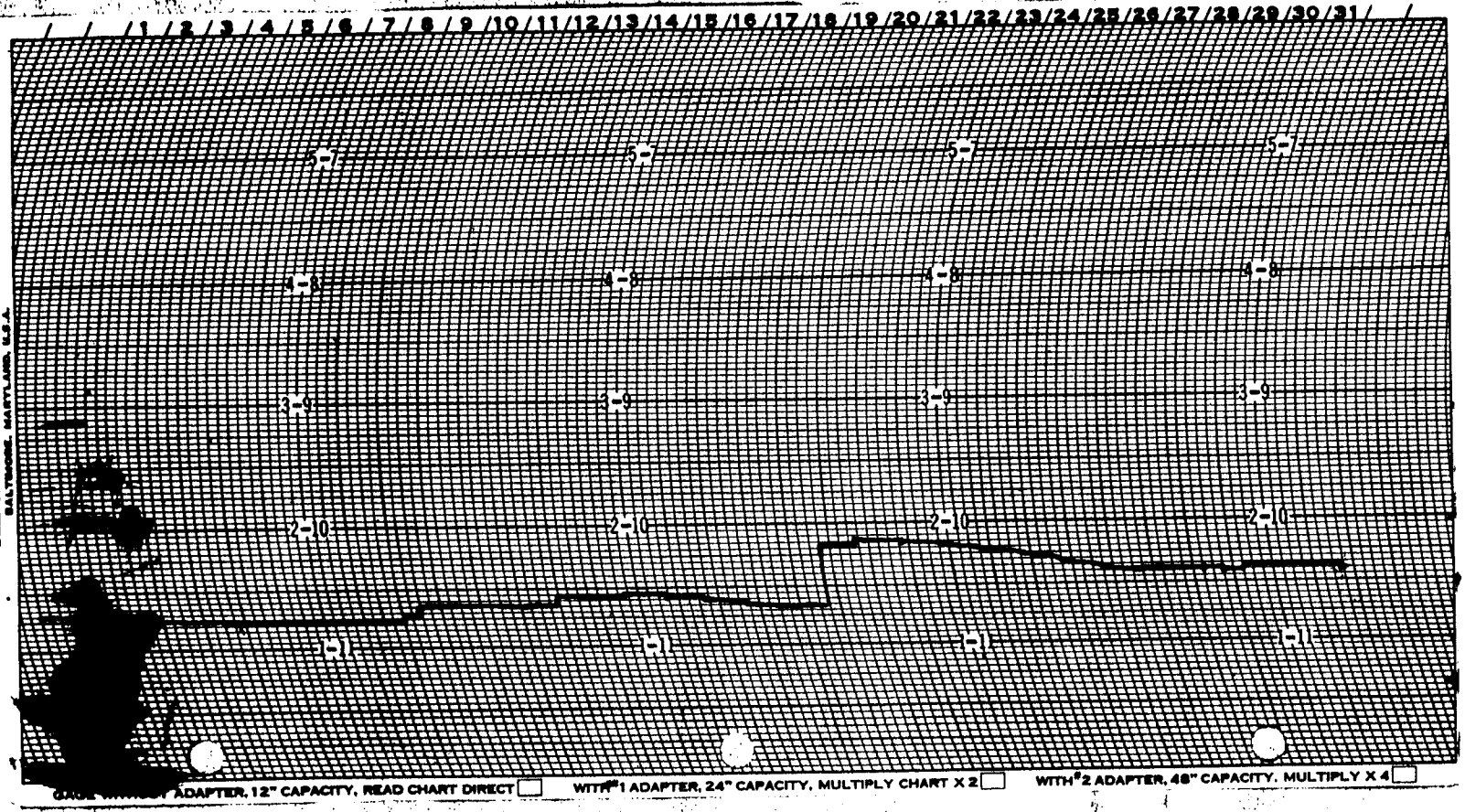


CHART NO. 15627
MONTHLY-861 HRS.
BELFORT INSTRUMENT COMPANY
BALTIMORE, MARYLAND, U.S.A.
UPPER RECORD—°F
LOWER RECORD—% RELATIVE HUMIDITY
OBSERVER Karl R. Houstrup
STATION
ON 1213 A.M. P.M. Aug 2 1994
OFF 1229 A.M. P.M. 19

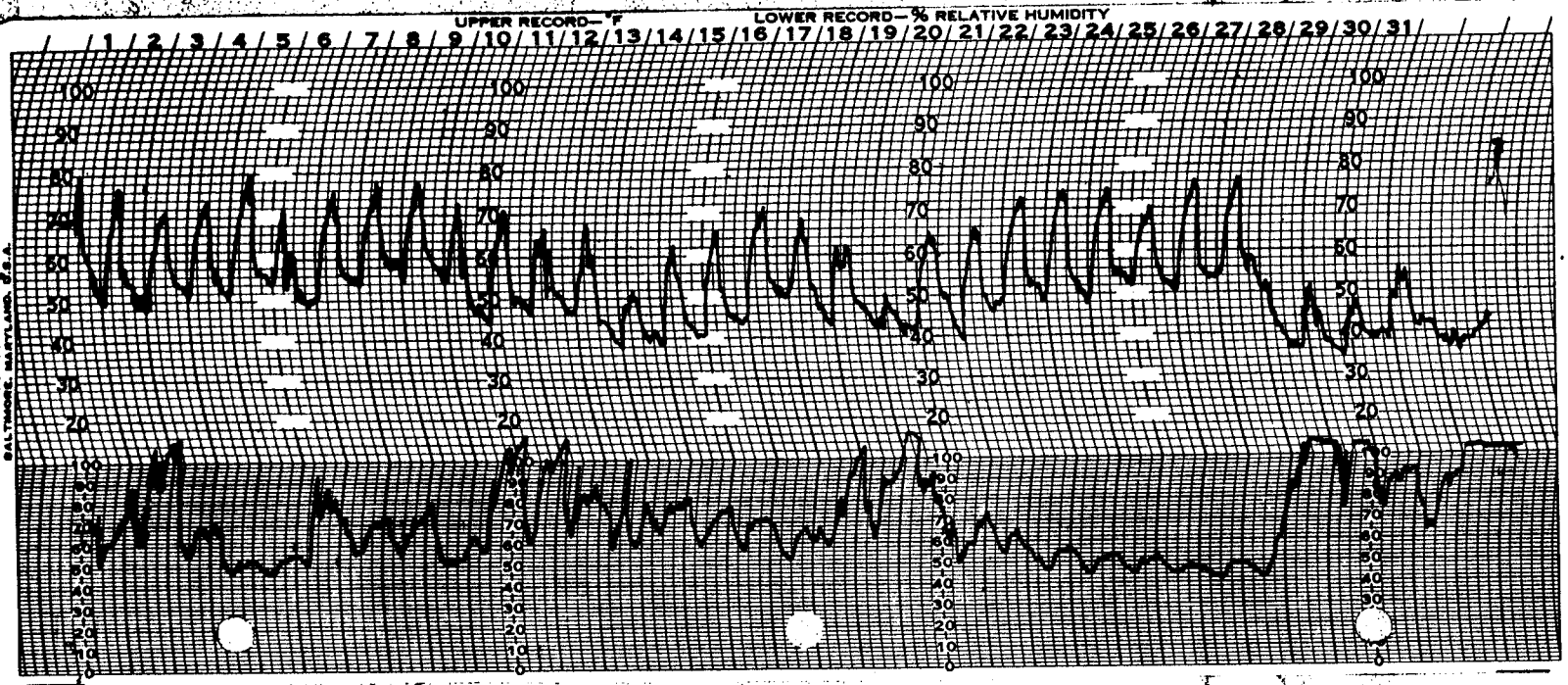
CHART NO. 15668
12-INCH DUAL TRAVERSE MONTHLY-861 HRS.
UNIVERSAL RAIN GAGE
BELFORT INSTRUMENT COMPANY
BALTIMORE, MARYLAND, U.S.A.



GAGE WITHOUT ADAPTER, 12" CAPACITY, READ CHART DIRECT ☐ WITH #1 ADAPTER, 24" CAPACITY, MULTIPLY CHART X 2 ☐ WITH #2 ADAPTER, 48" CAPACITY, MULTIPLY X 4 ☐

OBSERVER Karl R. Housekeeper ON 1206 A.M. P.M. Aug 2 1994
STATION OFF 1222 A.M. P.M. 9-1 1994

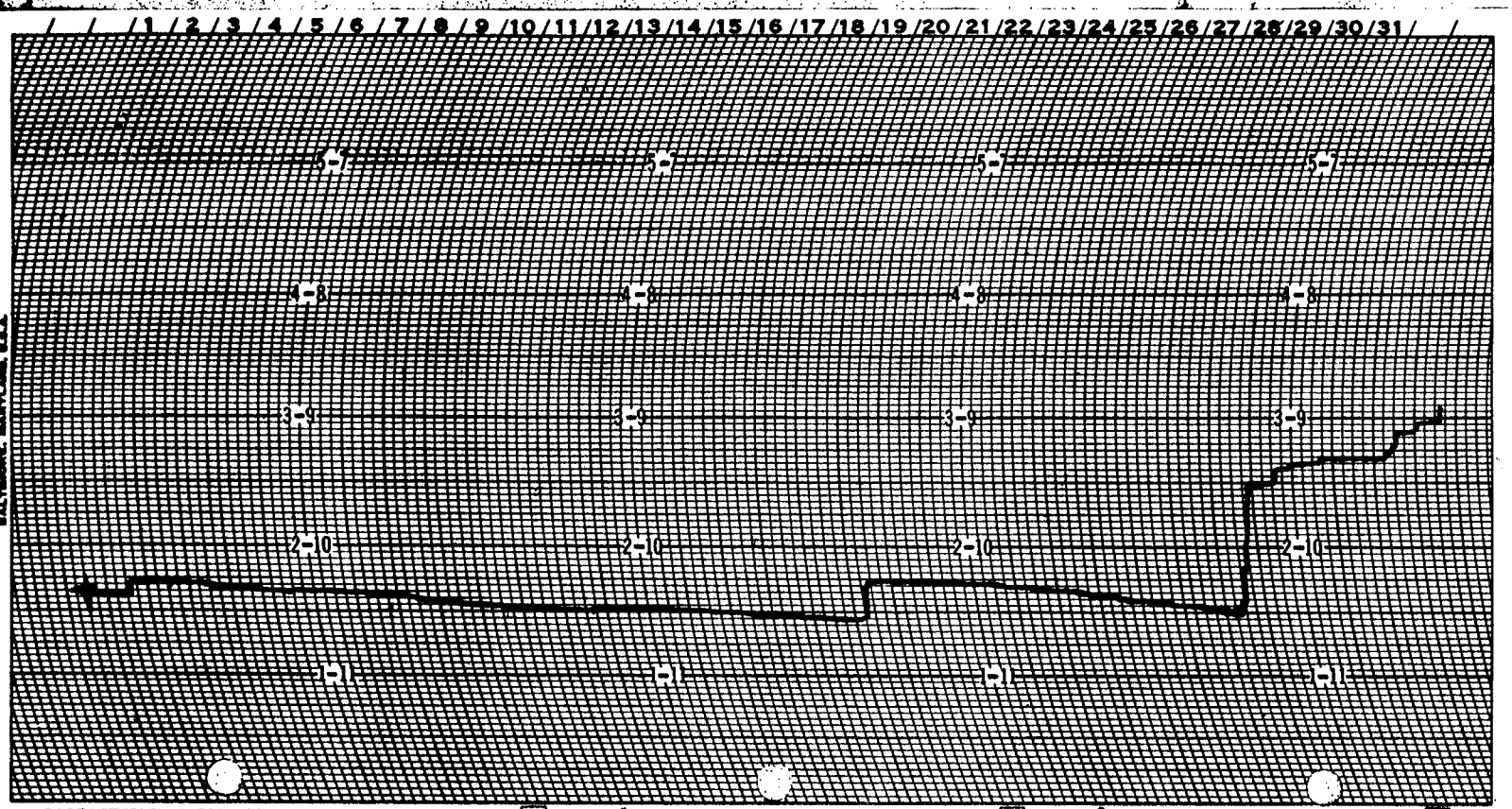
HYGROTHERMOGRAPH
CHART NO. 15627
MONTHLY-861 HRS.
BELFORT INSTRUMENT COMPANY
BALTIMORE, MARYLAND, U.S.A.



OBSERVER Karl R. Housman 1230 A.M. P.M. Sept 1 1994

STATION _____ OFF 1410 A.M. P.M. 10-4 1994

CHART NO. 15668
12-INCH DUAL TRAVERSE MONTHLY-861 HRS.
UNIVERSAL RAIN GAGE
BELFORT INSTRUMENT COMPANY
BALTIMORE, MARYLAND, U.S.A.



GAGE WITHOUT ADAPTER, 12" CAPACITY, READ CHART DIRECT ☐ WITH #1 ADAPTER, 24" CAPACITY, MULTIPLY CHART X 2 ☐ WITH #2 ADAPTER, 48" CAPACITY, MULTIPLY X 4 ☐

OBSERVER Karl R Housteeper

STATION

ON 1223 A.M. P.M. Sept. 1 1994

OFF 1355 A.M. P.M. 10-4 1994

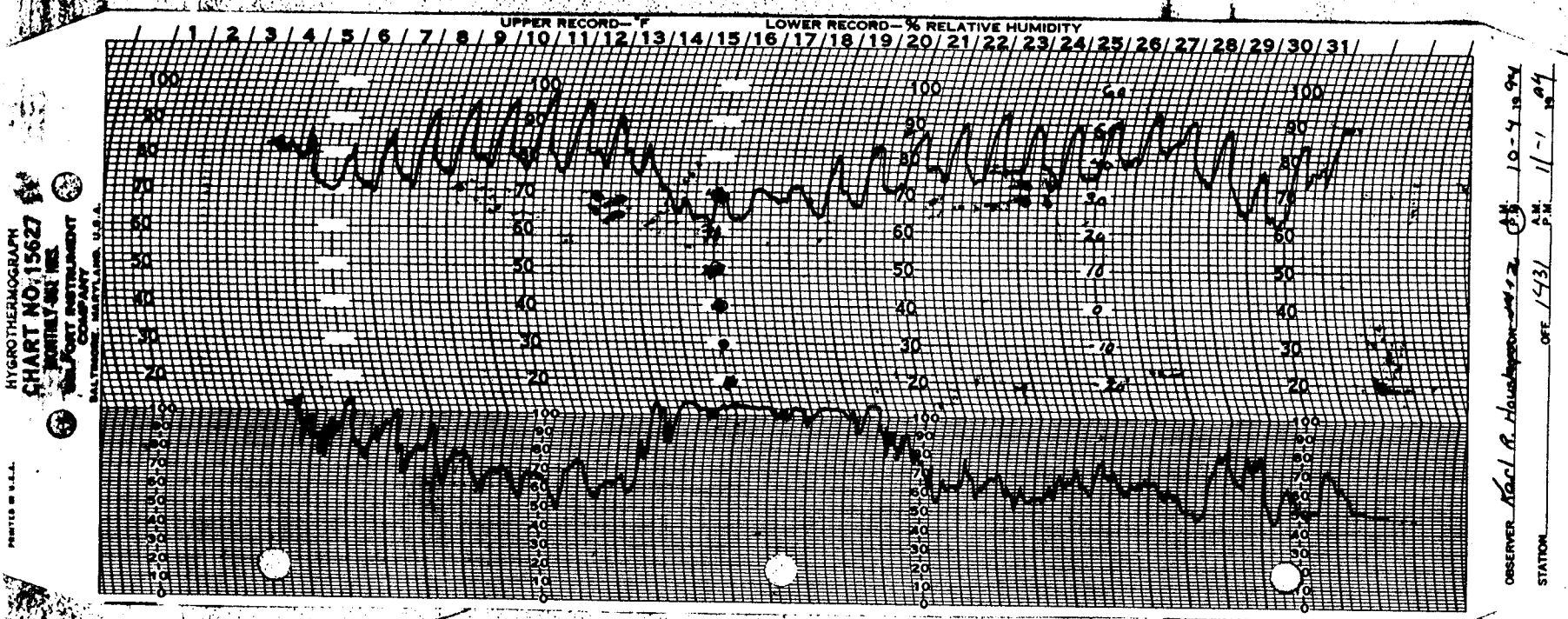

HYGROTHERMOGRAPH
CHART NO. 15627
FORT INSTRUMENT COMPANY
BALTIMORE, MARYLAND, U.S.A.
UPPER RECORD—°F
LOWER RECORD—% RELATIVE HUMIDITY
OBSERVER Karl R. Houskopson
STATION
OFF 1431
A.M. P.M. 10-4 1994
A.M. P.M. 11-1 1994

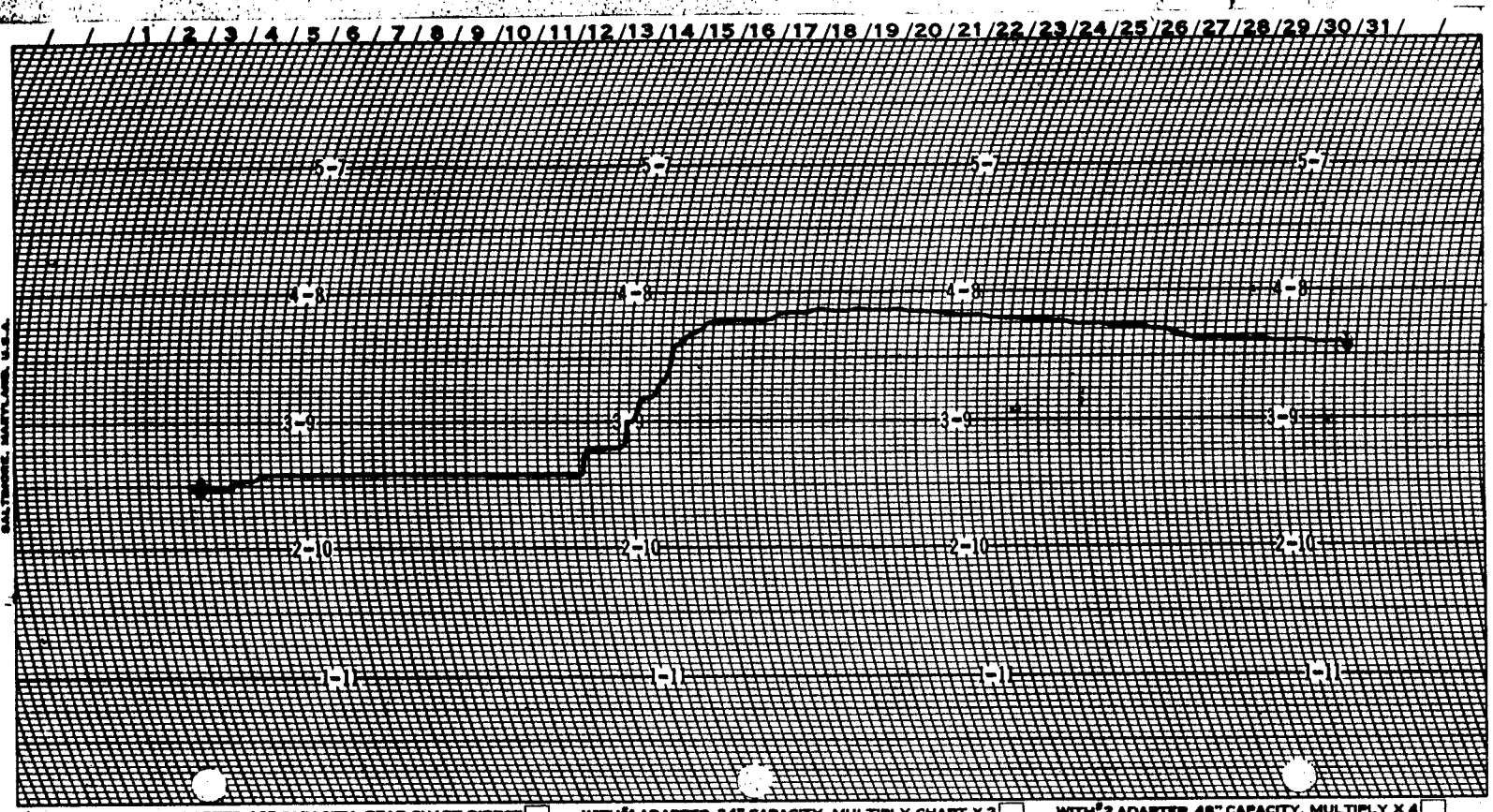
CHART NO. 15668

12-INCH DUAL TRAVERSE MONTHLY-861 HRS.

UNIVERSAL RAIN GAGE

BELFORT INSTRUMENT COMPANY

SALTIMORE, MARYLAND, U.S.A.



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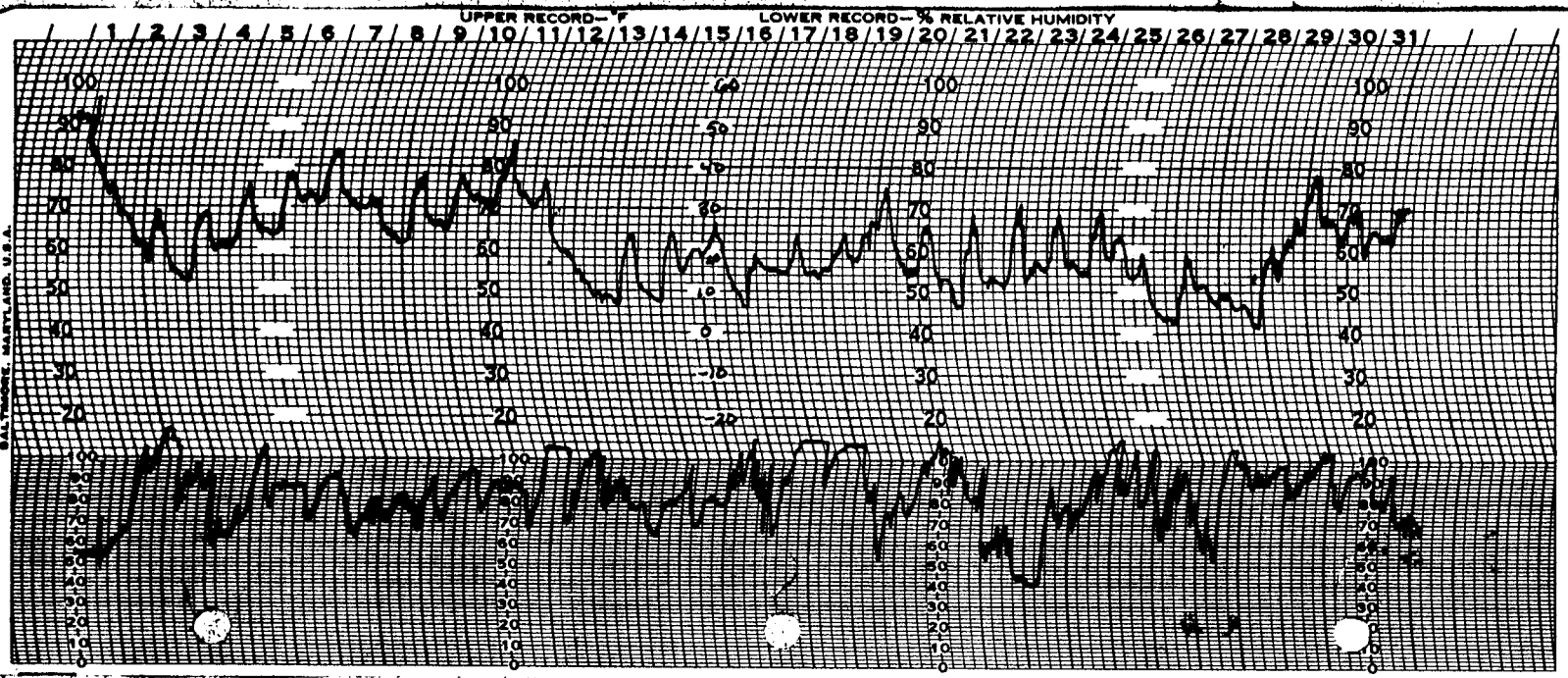
OBSERVER Karl R. Housteeper

STATION

ON 1356 A.M. P.M. 10-4 1994

OFF 1425 A.M. P.M. 11-1 1994

HYGROTHERMOGRAPH
CHART NO. 15627
MONTHLY-[illegible] HRS.
BELFORT INSTRUMENT COMPANY
BALTIMORE, MARYLAND, U.S.A.



OBSERVER Karl R. Houstrop SON 1433 A.M. P.M. 11-1 1994

STATION _____ OFF 1054 A.M. P.M. 12-2 1994

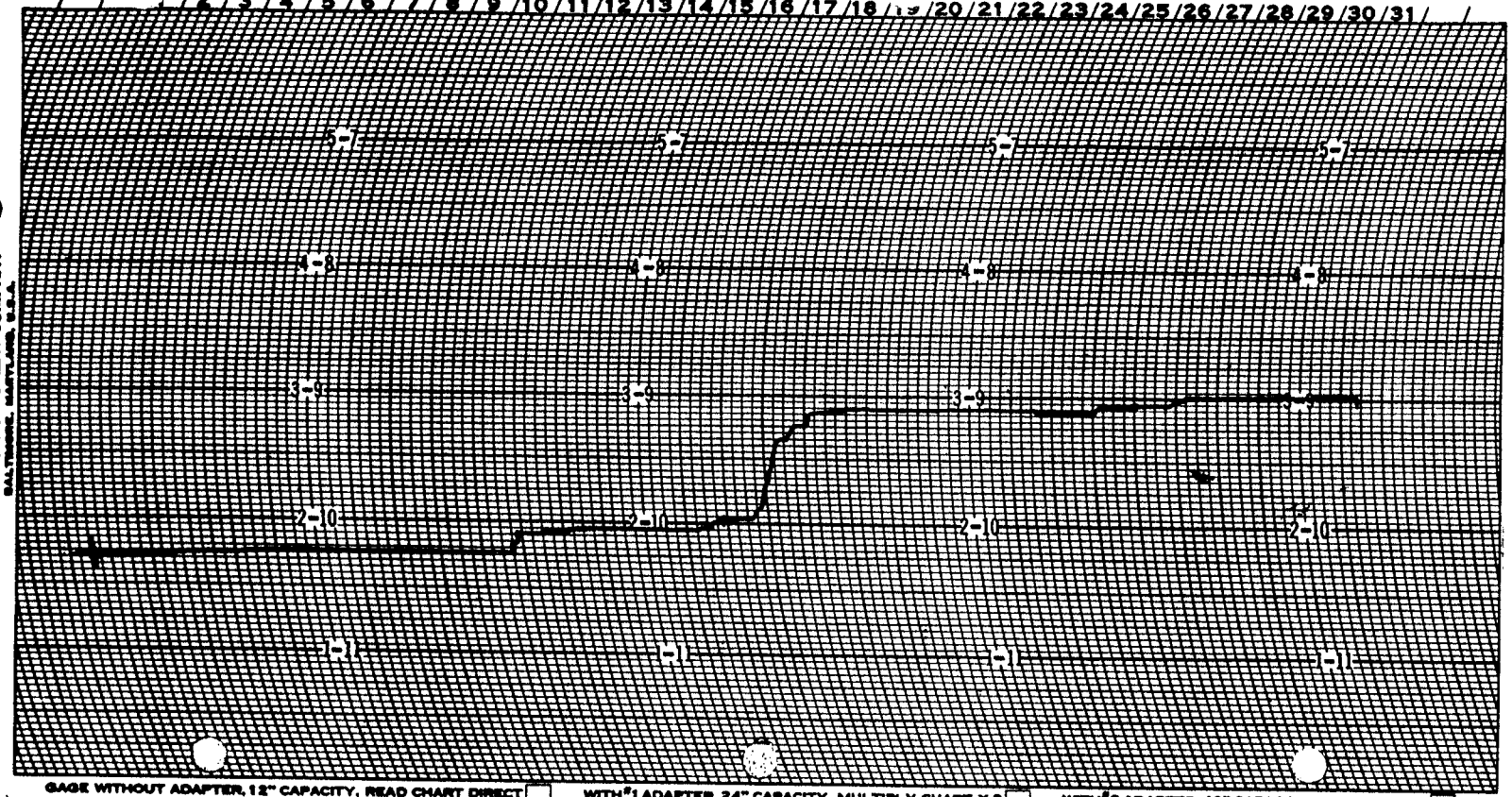


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CHART NO. 15668
12-INCH DUAL TRAVERSE MONTHLY-861 HRS.
UNIVERSAL DAIN GAGE
BELFORT INSTRUMENT COMPANY
BALTIMORE, MARYLAND, U.S.A.

OBSERVER Karl R. Housekeeper
STATION

ON 1447 A.M. P.M. 11-1 19 94
OFF 1044 A.M. P.M. 12-2 19 94

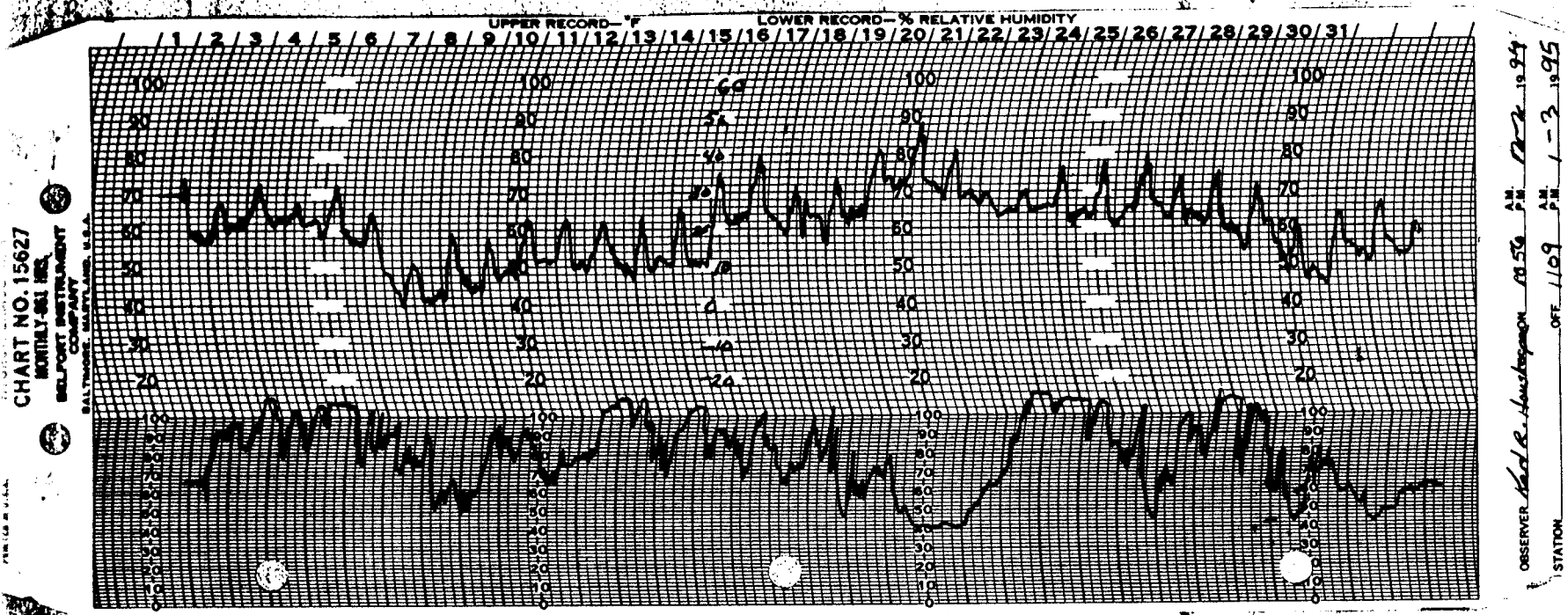
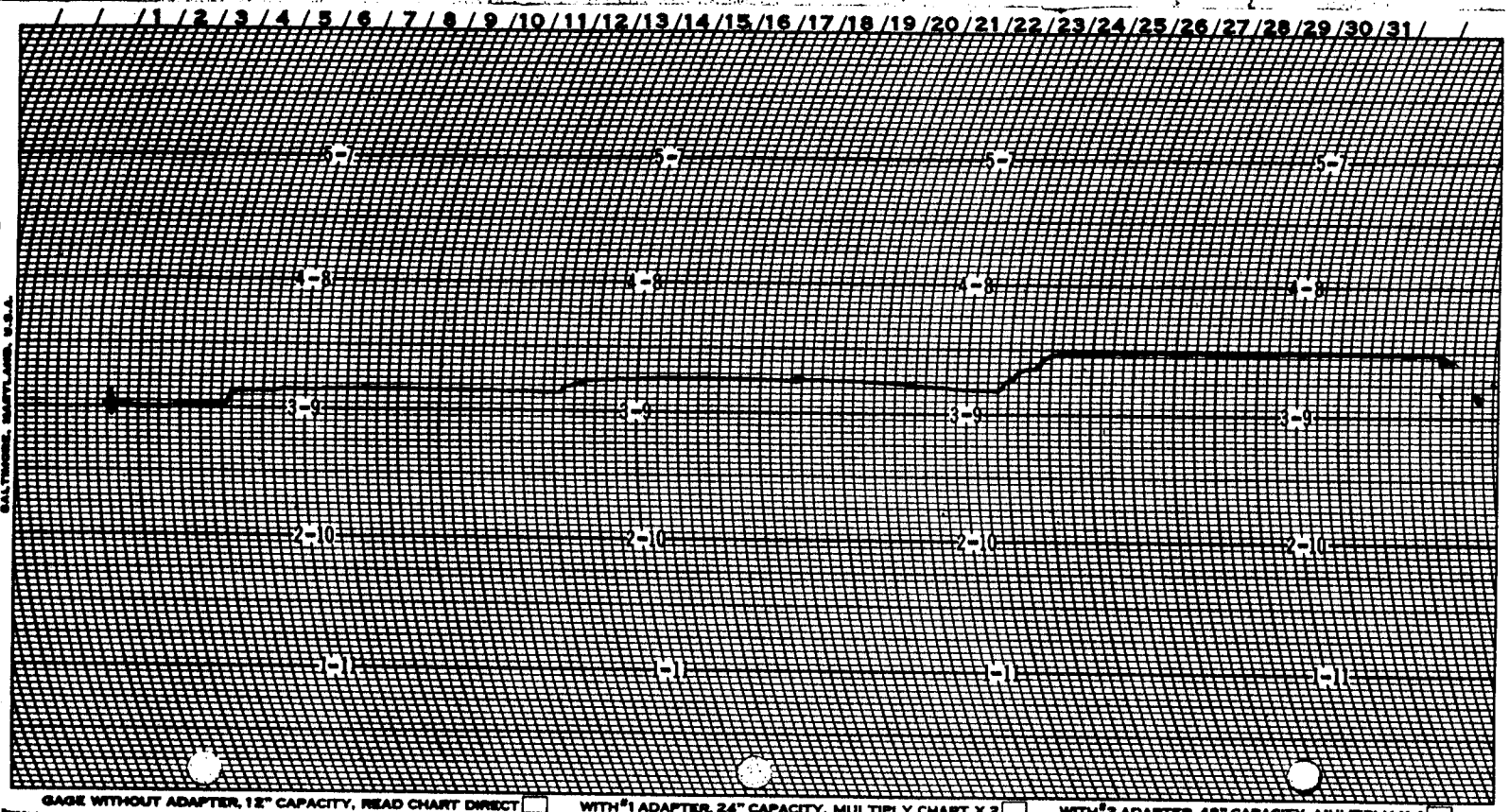


CHART NO. 15627
MONTHLY-861 HRS.
BELFORT INSTRUMENT COMPANY
BALTIMORE, MARYLAND, U.S.A.
UPPER RECORD—°F
LOWER RECORD—% RELATIVE HUMIDITY
OBSERVER
STATION
ON
OFF
A.M.
P.M.
1-3 1995

CHART NO. 15668

12-INCH DUAL TRAVERSE MONTHLY-861 HRS.
UNIVERSAL RAIN GAGE

BELFORT INSTRUMENT COMPANY
BALTIMORE, MARYLAND, U.S.A.



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OBSERVER Karl R. Houskeeper

STATION

ON 1047 A.M. P.M. 12-2 1994

OFF 1102 A.M. P.M. 1-3 1995

APPENDIX Q

PACIFICORP
ENERGY WEST
HYDROLOGIC MONITORING PROGRAM
DEER CREEK, WILBERG/COTTONWOOD, and DES-BEE-DOVE
TRAIL MOUNTAIN MINES

I. Monitoring Locations

A. Surface Water Hydrology (see Map HM-1 for East Mountain / Map 7-1 and 7-2 for Trail Mountain locations listed below)

1. Cottonwood Creek Drainage System

a. Cottonwood Canyon Creek

(1) SW-1 - Above Trail Mtn. Mine
(Approximately 5000 feet upstream from the inlet culvert for the disturbed area.) 2150 feet South, 2000 feet East of the Northwest corner of Section 24, Township 17 South, Range 6 East.

(2) SW-2 - Below Trail Mtn. Mine
(Approximately 200 feet downstream from the outlet culvert for the disturbed area.) 1300 feet South, 1750 feet West of the Northeast corner of Section 25, Township 17 South, Range 6 East.

(3) CCC01 - USGS Flume:
(Approximately 200 feet downstream from the outlet culvert for the disturbed area.)1500 feet North, 200 feet East of the Southwest corner of Section 31, Township 17 South, Range 7 East.

(4) SW-3 - Below Trail Mtn. Mine
(Approximately 3800 feet above confluence with Straight Canyon) 2400 feet South, 2400 feet East of the Northeast corner of Section 6, Township 18 South, Range 7 East.

b. Unnamed Drainage off Straight Canyon

(1) T-19
(Approximately 200 feet upstream from the from confluence with Straight Canyon) 2500 feet South, 1100 feet East of the Northeast corner of Section 3, Township 18 South, Range 6 East

c. Grimes Wash

(1) GWR01 - Right Fork:
(Approximately 1500 feet upstream from the inlet culvert for the disturbed area.) 550 feet North, 1500 feet West of the Southwest corner of Section 22, Township 17 South, Range 7 East.

(2) GWR02 - Left Fork:
(Approximately 50 feet upstream from the inlet culvert for the disturbed area.) 200 feet South, 2350 feet East of the Northwest corner of Section 27, Township 17 South, Range 7 East.

(3) GWR03 - Below the mine:
(Approximately 500 feet downstream from the outlet culvert below the disturbed area.) 1770 feet South, 1820 feet West of the Northeast corner of Section 27, Township 17 South, Range 7 East.

2. Huntington Creek Drainage System

a. Huntington Creek

(1) HCC01 - Above Deer Creek Confluence:
1400 feet north, 2200 feet west of the southeast corner of Section 36, Township 16 South, Range 7 East.

(2) HCC02 - Below Deer Creek Confluence:
300 feet north, 300 feet west of the southwest corner of Section 31, Township 16 South, Range 8 East.

(3) HCC03 - Below Huntington Power Plant:
2500 feet north, 1500 feet east of the southeast corner of Section 6, Township 17 South, Range 8 East.

(4) HCC04 - @ Research Farm*
800 feet north, 200 feet east of the southwest corner of Section 5, Township 17 South, Range 8 East.

* Not listed on map due to scale.

b. Deer Creek

(1) DCR01 - Above the mine:
(Approximately 600 feet upstream from the mine facility.) 200 feet North, 800 feet West of the Southeast corner of Section 10, Township 17 South, Range 7 East.

(2) DCR02 - Near Discharge:
(Exit of undisturbed drainage)
2700 feet north, 700 feet east of the southwest corner of Section 10, Township 17 South, Range 7 East.

(3) DCR03 - Below Coal Pile:
(Below old American Fuel Mine)
1200 feet south, 1900 feet east of the northwest corner of Section 11, Township 1 South, Range 7 East.

(4) DCR04 - At Permit:
(Approximately 5,000 feet downstream from the mine facility.) 480 feet North, 3360 feet East of the Northwest corner of Section 1, Township 17 South, Range 7 East.

(5) DCR05 - Below the Mine:
(Approximately 12,000 feet downstream from the mine facility.) 480 feet South, 3360 feet East of the Northwest corner of Section 1, Township 17 South, Range 7 East.

(6) DCR06 - @ Huntington Creek Confluence:
(Approximately 15,000 feet downstream from the facility)
1400 feet north, 1100 feet east of the southeast corner of Section 36, Township 16 South, Range 7 East.

c. Meetinghouse Canyon - South Fork:
(Approximately 200 feet upstream from the north and south convergence.) 800 feet North, 1500 feet East of the Southwest corner of Section 35, Township 16 South, Range 7 East.

d. Rilda Canyon:

(1) RCF-1 - Rilda Canyon - Right Fork: 400 feet South, 200 feet West of the Northeast corner of Section 30, Township 16 South, Range 7 East.

(2) RCLF1 - Rilda Canyon - Left Fork: 2400 feet North, 2100 feet West of the Southeast corner of Section 29, Township 16 South, Range 7 East.

(3) RCF2 - Rilda Canyon: 2500 feet South, 400 feet West of the Northeast corner of Section 29, Township 16 South, Range 7 East.

(4) RCF3 - Rilda Canyon: 2550 feet South, 1000 feet East of the Northeast corner of Section 28, Township 16 South, Range 7 East.

(5) RCW4 - Rilda Canyon: 850 feet North, 1900 feet West of the Southeast corner of Section 26, Township 16 South, Range 7 East.

3. Reclamation Monitoring: Following stage 1 final reclamation backfilling and grading monitoring will be conducted at points immediately above and below the last sediment pond(s). Cottonwood Fan Portal: reclamation monitoring will occur at points above and below the two sediment basins (see Map 3-14).

B. Groundwater Hydrology

1. East Mountain Springs (see maps HM-4 and HM-5)
Burnt Tree *+
Elk Spring *+
Sheba Springs *+
Ted's Tub
79-2
79-10 *+
79-15
79-23 *+
79-24
79-26 *+
79-28 (Flag Lake)
79-29 *+
79-32
79-34
79-35 *+
79-38
79-40
80-41
80-43
80-44 *+
80-46 *+
80-47
80-48
82-51

82-52 *+
84-56 *+
89-60 (Alpine Spring)
89-61
89-65
89-66
89-67
89-68

* Recession Study Springs (Field August & September)
+ Baseline analysis performed in 1991 and will be repeated every five years.

2. Trail Mountain Springs (see Trail Mountain Spring Map 7-1)
T-6
T-8
T-9
T-10
T-14
T-14A
T-15
T-16

3. Piezometric Data
a. Surface
(1) Rilda Canyon (see Map HM-1 for locations)
P1
P4
P5
P6
P7
EM-47
(2) Cottonwood Canyon Creek
EM-31
CCCW-1A
CCCW-1S
CCCW-2A
CCCW-3A
CCCW-3S U
CCCW-3S L
TM-1B
TM-3

b. Underground: In-Mine
(1) Deer Creek Mine (see Map HM-2 for locations)
(a) DCP1 3rd N xc-8

3. In-Mine Water Quality
a. Deer Creek Mine (see Map HM-2 for locations)
(a) Main North - Main East
(b) 3rd North xc-65 (TW-10)
b. Wilberg/Cottonwood Mines (see Map HM-3 for location)
2nd South xc-11
TMA xc-32
c. Trail Mountain Mine
(a) UG-3

4. Waste Rock Wells (see Map HM-1 for locations)
a. Deer Creek
b. Cottonwood

II. Monitoring Schedule

A. Field Measurement: Listed below are the sites which will be monitored by PacifiCorp - Energy West in accordance with the guidelines established by DOGM; i.e.,
- Date and Time
- Flow
- pH
- Temperature
- Conductivity
- Dissolved oxygen (perennial streams only)

1. Cottonwood Canyon Creek
a. (1) SW-1
(2) SW-2
(3) Cottonwood Canyon Creek - USGS Flume
(4) SW-3
b. Grimes Wash
(1) GWR01
(2) GWR02
(3) GWR03
c. Straight Canyon
(1) T-18 (Oliphant Mine Discharge)
(2) T-19 (Unnamed Side Drainage)

2. Huntington Canyon Drainage
a. Deer Creek
(1) DCR01
(2) DCR04

(3) DCR06

b. Huntington Creek
   (1) HCC01
   (2) HCC02
   (3) HCC04

c. Meetinghouse Canyon - South Fork

d. Rilda Canyon
   (1) RCF1
   (2) RCF3
   (3) RCW4

3. East Mountain Springs (see monitoring location list)
4. Trail Mountain Springs (see monitoring location list)
5. In-Mine
   a. Deer Creek
   b. Wilberg/Cottonwood
   c. Trail Mountain
6. Waste Rock Wells
   a. Deer Creek
   b. Cottonwood

All sites will be monitored monthly except for East/Trail Mountain Springs, in-mine locations, T-18, T-19, and waste rock wells. East/Trail Mountain Springs will be field tested during the months of July and October. In addition, the East Mountain Recession Study Springs (denoted by asterisks in the Monitoring Location section) will be field tested from July through October. In-mine locations will be field tested for all field parameters except pH, conductivity, and dissolved oxygen. Waste rock wells will be field tested quarterly. Straight Canyon sites, T-18 and T-19 will be field tested quarterly. Flow in Huntington Creek is a measured only at HCC01 by Utah Power & Light, and will be reported in the Annual Hydrologic Report.

B. Quality Sampling (Laboratory Measurements)

1. Surface Water Hydrology: Water samples will be collected and analyzed quarterly (one sample at low flow and high flow) during the first or second week of the quarter. Parameters analyzed are those listed in the DOGM Guidelines for Surface Water Quality (see Table #1). Quarterly sampling was initiated during March 1988 and will continue throughout the year; i.e., June, September, and December. Baseline analysis was performed in 1991 and will be repeated every five years thereafter.
   a. Cottonwood Creek Drainage
      (1)Cottonwood Canyon Creek
         (a) SW-1
         (b) SW-2
         (c) SW-3
      (2)Grimes Wash
         (a)GWR01
         (b)GWR02
         (c)GWR03
      (3) Straight Canyon
         (a) T-18 (Field & Quality Quarterly)
         (b) T-19 (Field & Quality Quarterly)
   b. Huntington Creek Drainage
      (1) Deer Creek
         (a) DCR01
         (b) DCR04
         (c) DCR06
      (2) Huntington Creek
         (a) HCC01
         (b) HCC02
         (c) HCC04
      (3) Meetinghouse Canyon - South Fork: MCH01
      (4) Rilda Canyon
         (a) RCF1
         (b) RCF3
         (c) RCW4

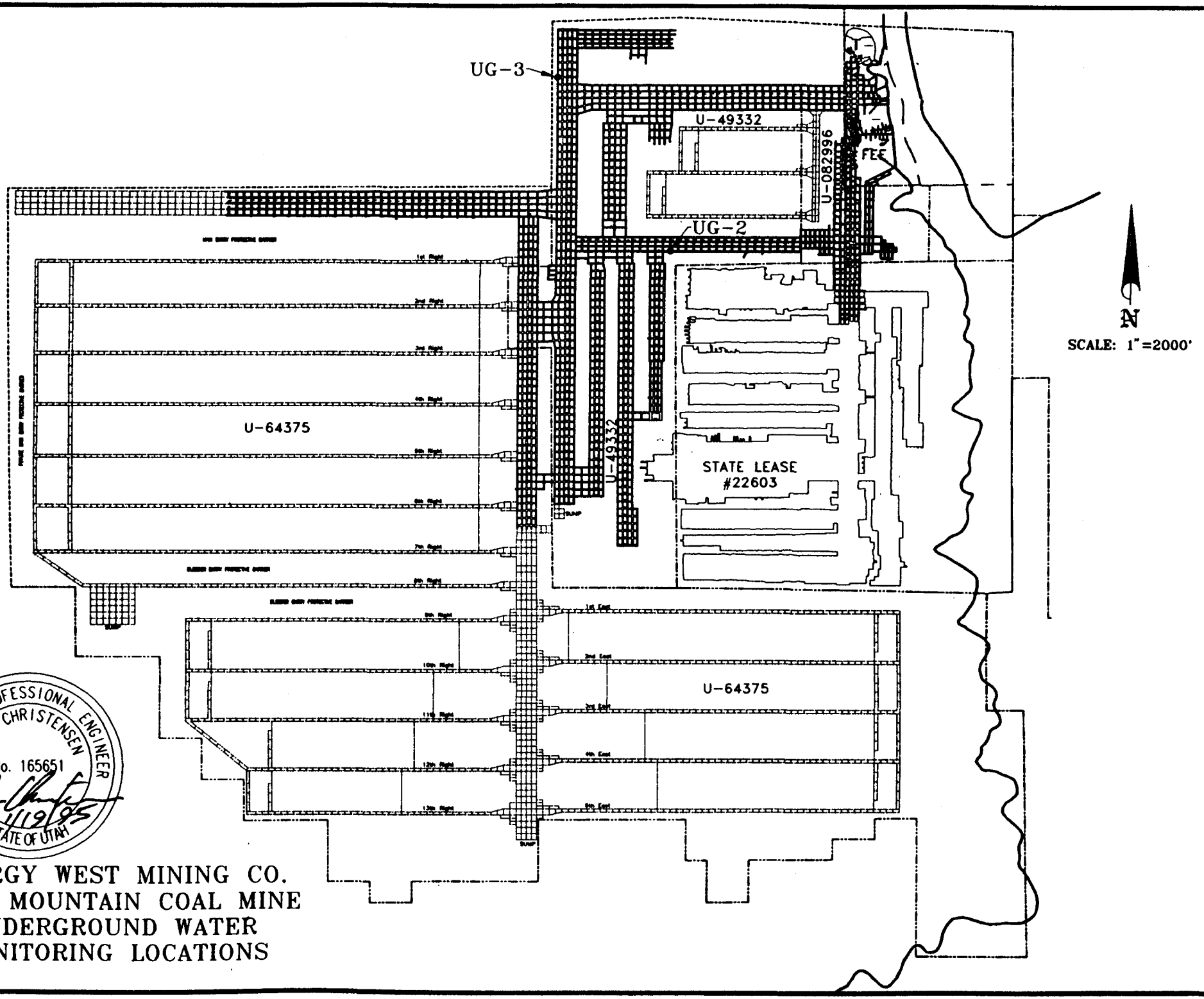
2. Groundwater Hydrology
   a. East/Trail Mountain Springs: Water samples will be collected and analyzed during the months of July and October. Parameters analyzed are those listed in the DOGM Guidelines for Groundwater Water Quality (see Table #2).

b. In-Mine: Two water samples will be collected and analyzed per mine quarterly. Parameters analyzed are those listed in the DOGM Guidelines for Groundwater Water Quality (see Table #2).

c. Waste Rock Wells: One water sample will be collected and analyzed per location quarterly. Parameters analyzed are those listed in the DOGM Guidelines for Groundwater Water Quality (see Table #2).

III. Annual Reports

All data collected regarding the hydrology of East/Trail Mountain will be summarized by the applicant in an annual Hydrologic Monitoring Report. Copies of the report will be submitted to the OSM; U.S. Forest Service; and the Utah State Division of Oil, Gas and Mining. In addition, any raw data collected will be submitted to the Utah State Division of Oil, Gas and Mining on a quarterly basis.



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LICENSED PROFESSIONAL ENGINEER
JOHN CHRISTENSEN
No. 165651
1/19/95
STATE OF UTAH

ENERGY WEST MINING CO.
TRAIL MOUNTAIN COAL MINE
UNDERGROUND WATER
MONITORING LOCATIONS