FIG. 1

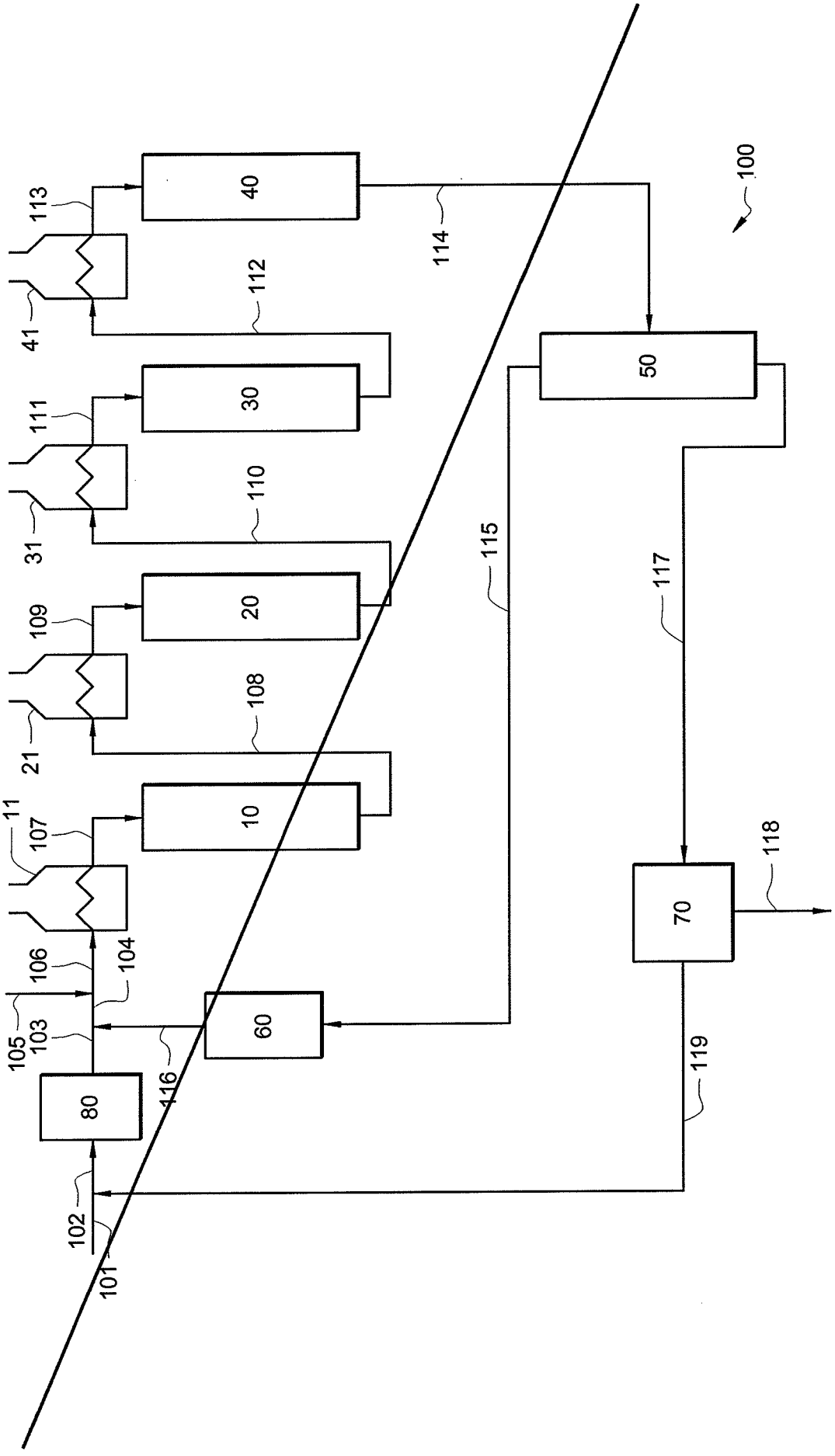

100
40
30
20
10
50
60
70
80
113
41
112
111
31
110
109
21
108
11
107
106
105
103
104
102
101
114
115
116
117
118
119

FIG. 2A

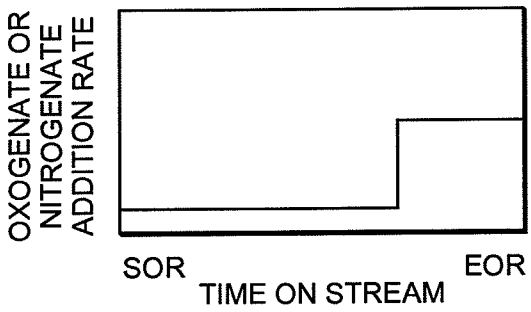


FIG. 2B

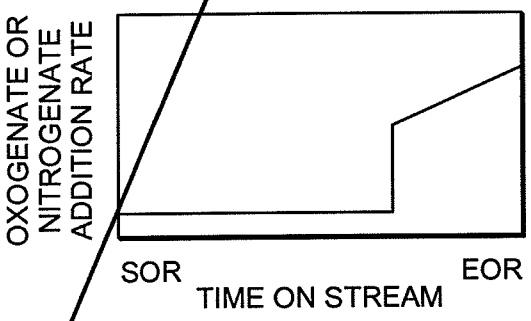


FIG. 2C

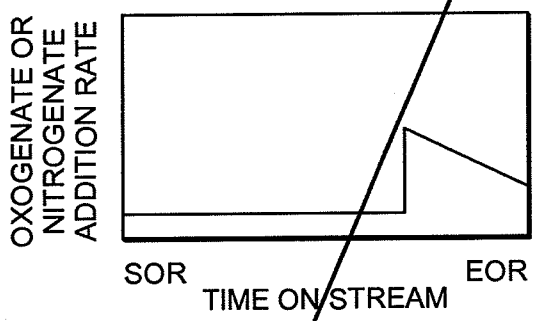
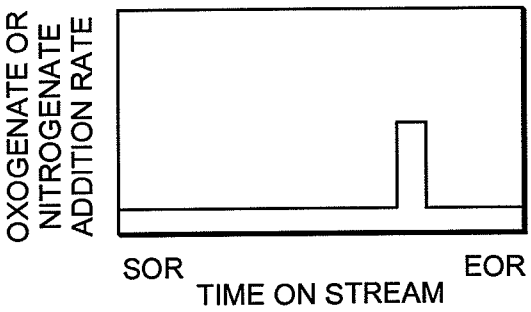


FIG. 2D



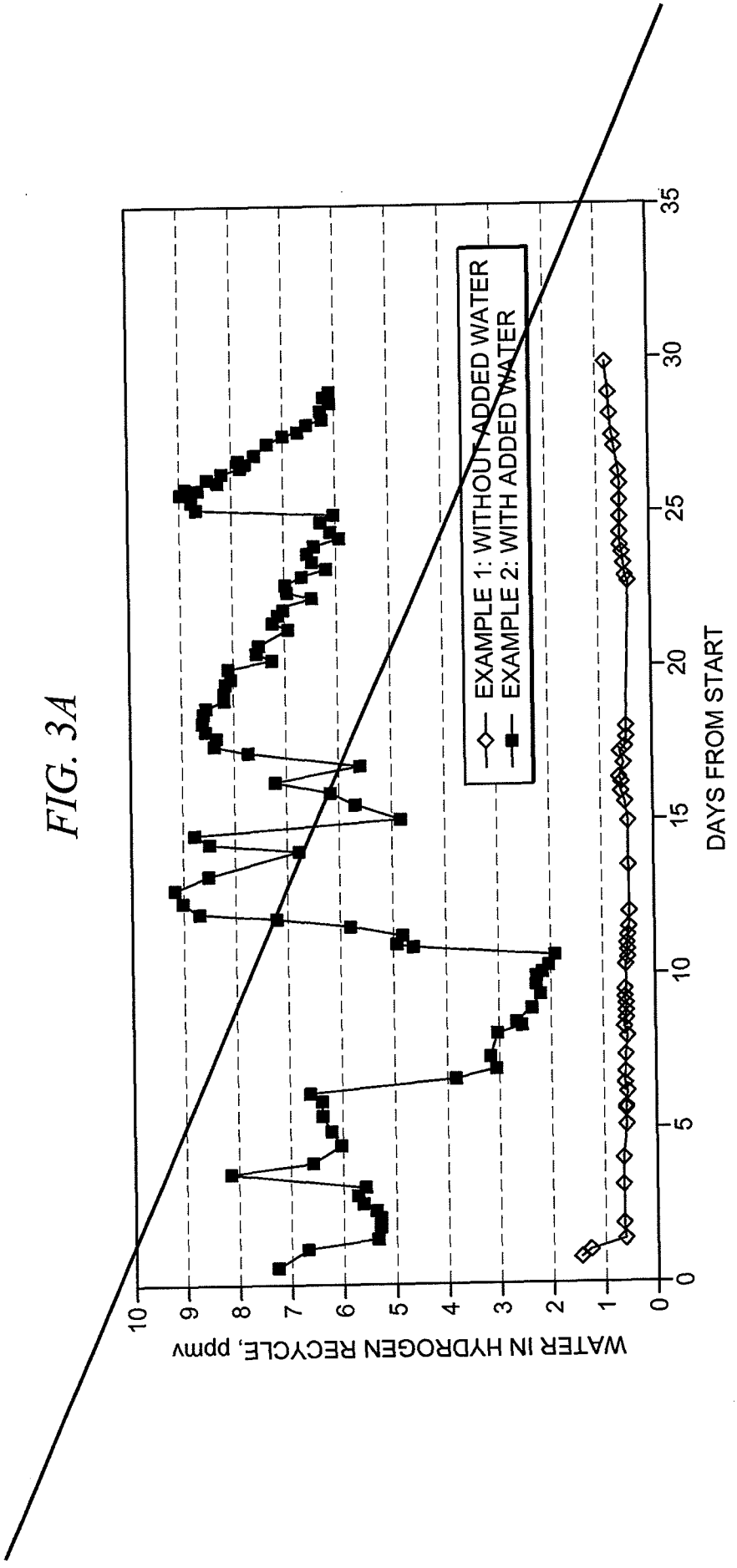

WATER IN HYDROGEN RECYCLE, ppmv
DAYS FROM START
EXAMPLE 1: WITHOUT ADDED WATER
EXAMPLE 2: WITH ADDED WATER
0
1
2
3
4
5
6
7
8
9
10
0
5
10
15
20
25
30
35

FIG. 3A

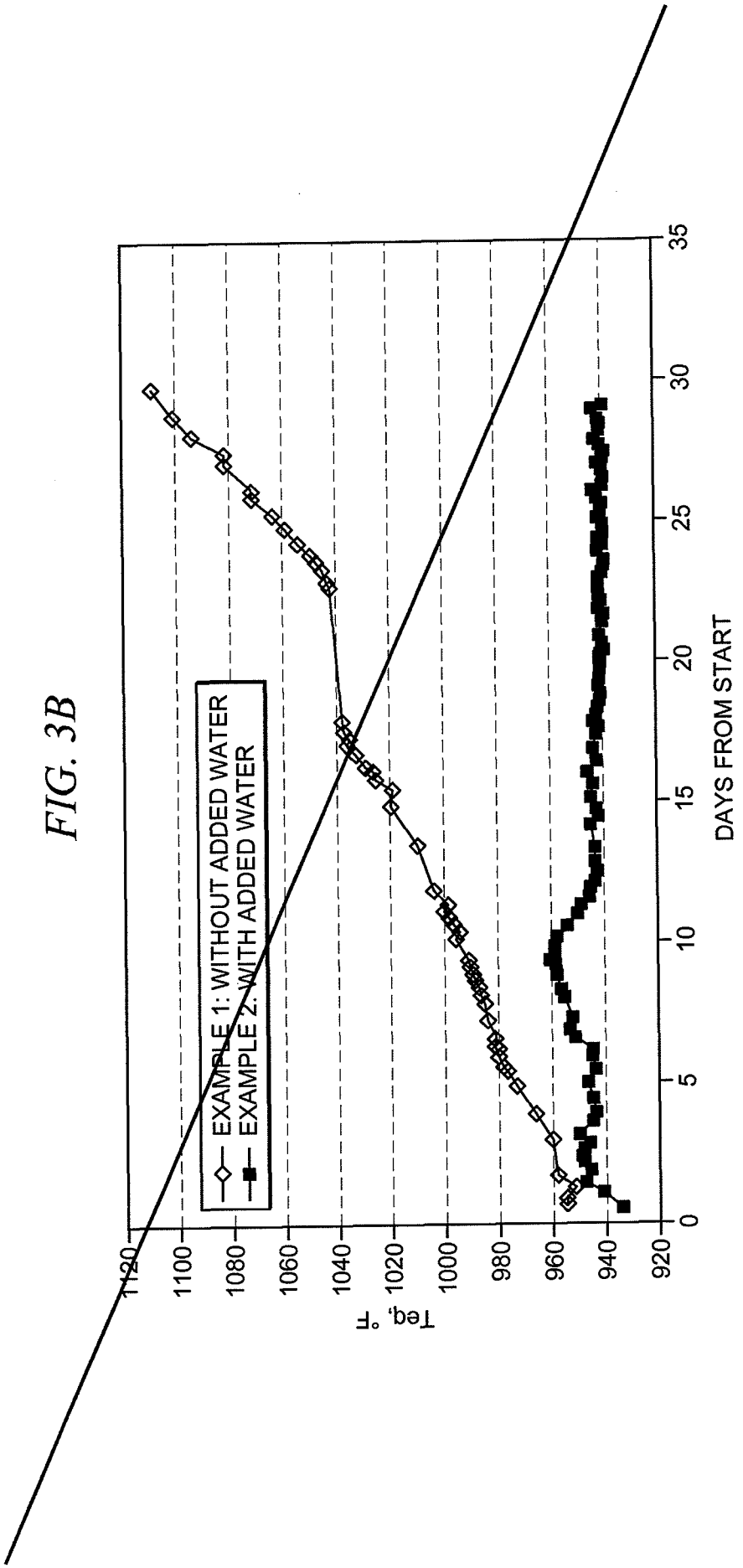

EXAMPLE 1: WITHOUT ADDED WATER
EXAMPLE 2: WITH ADDED WATER
Teq, °F
DAYS FROM START
1120
1100
1080
1060
1040
1020
1000
980
960
940
920
0
5
10
15
20
25
30
35

FIG. 3B

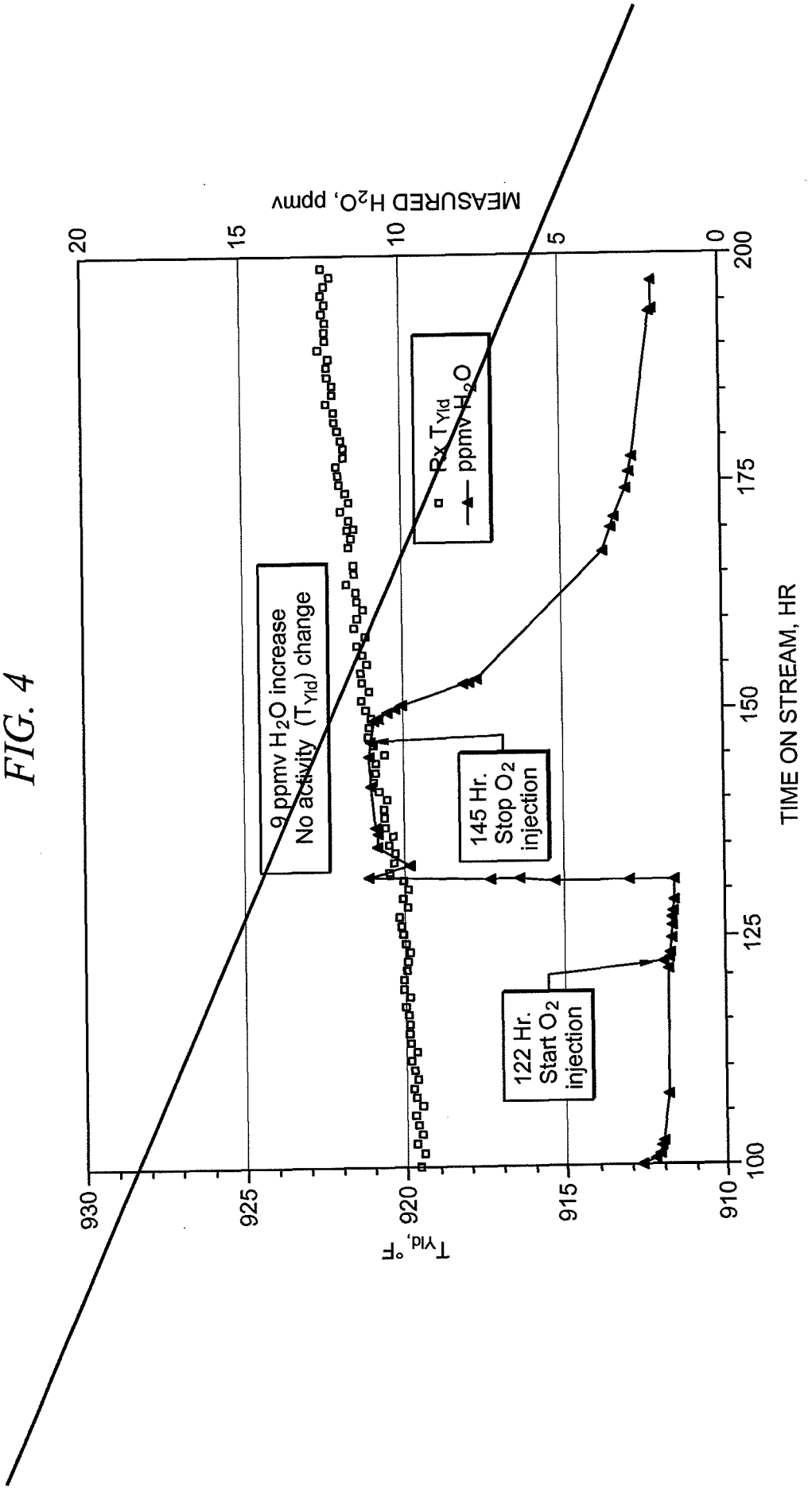

MEASURED H2O, ppmv
20
15
10
5
0
930
925
920
915
910
Tyld, °F
200
175
150
125
100
TIME ON STREAM, HR
Rx TYld
ppmv H2O
9 ppmv H2O increase
No activity (TYld) change
145 Hr.
Stop O2
injection
122 Hr.
Start O2
injection

FIG. 4

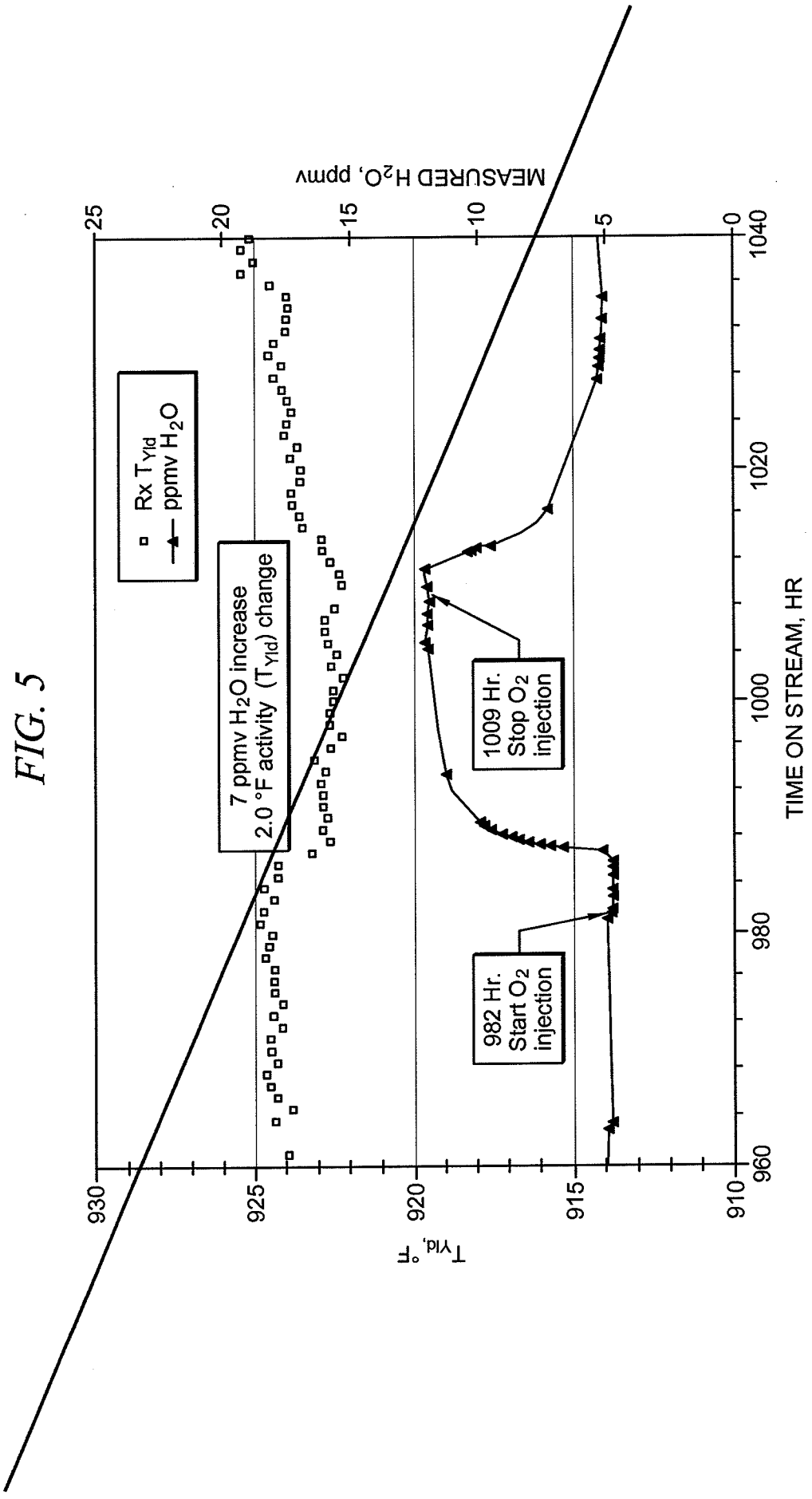

MEASURED H2O, ppmv
25
20
15
10
5
0
Rx TYld
ppmv H2O
7 ppmv H2O increase
2.0 °F activity (TYld) change
1009 Hr.
Stop O2
injection
982 Hr.
Start O2
injection
TYld, °F
930
925
920
915
910
1040
1020
1000
980
960
TIME ON STREAM, HR

FIG. 5

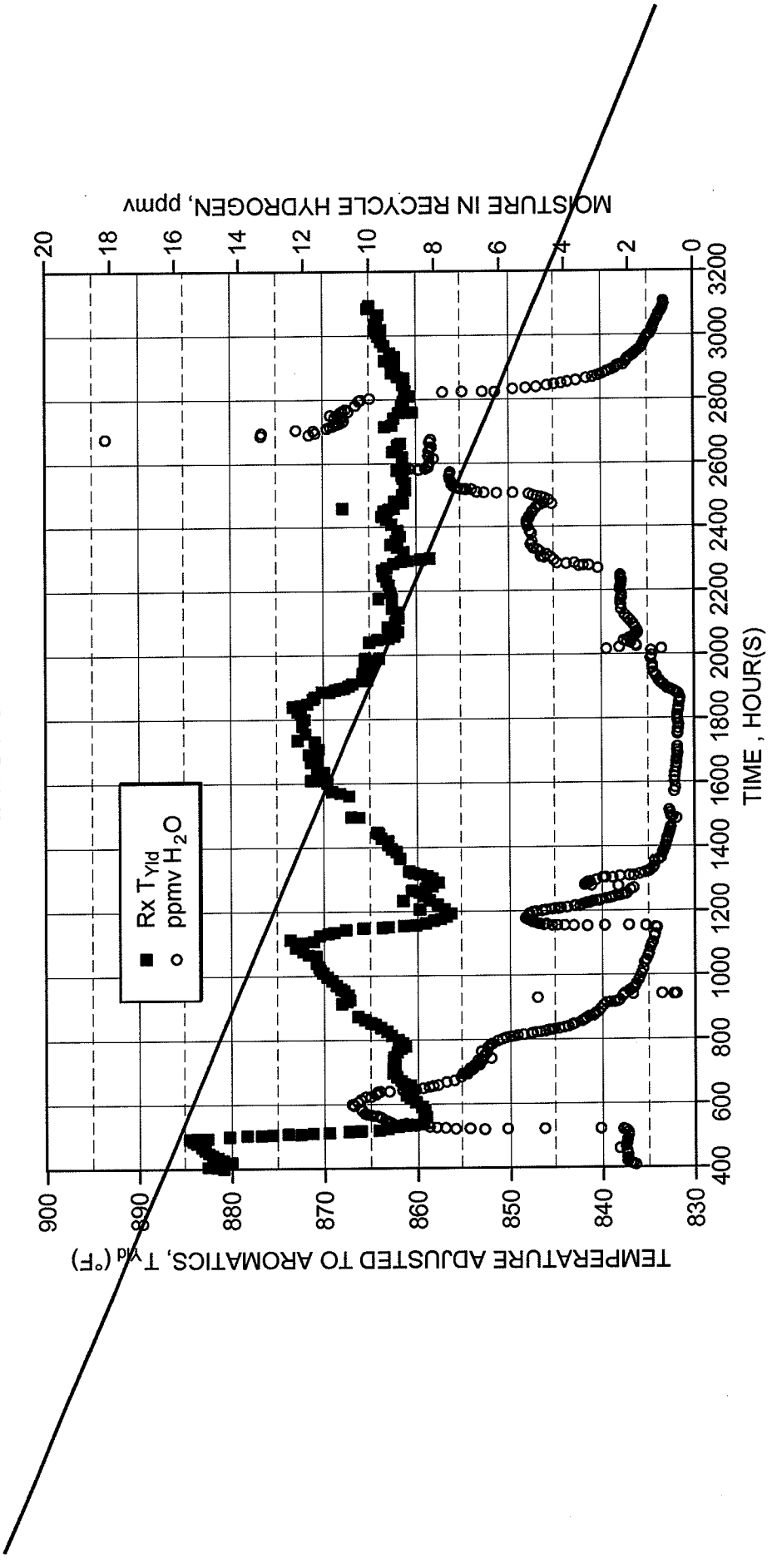

TEMPERATURE ADJUSTED TO AROMATICS, T_{Yld} (°F)
900
890
880
870
860
850
840
830
MOISTURE IN RECYCLE HYDROGEN, ppmv
20
18
16
14
12
10
8
6
4
2
0
TIME , HOUR(S)
400 600 800 1000 1200 1400 1600 1800 2000 2200 2400 2600 2800 3000 3200
Rx T_{Yld}
ppmv H_2O

FIG. 6

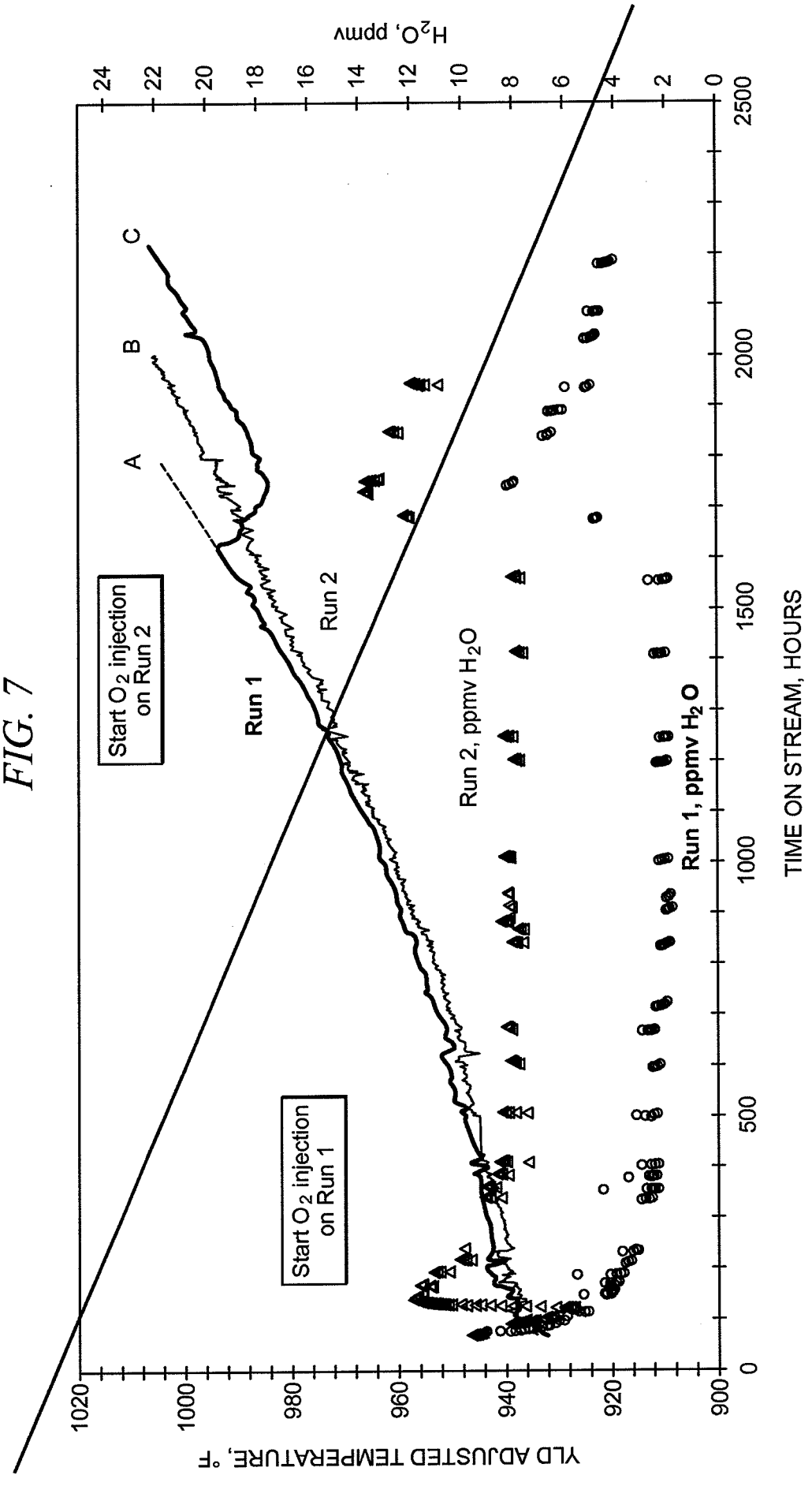

YLD ADJUSTED TEMPERATURE, °F
1020
1000
980
960
940
920
900
H_2O, ppmv
24
22
20
18
16
14
12
10
8
6
4
2
0
TIME ON STREAM, HOURS
0
500
1000
1500
2000
2500
Run 1, ppmv H_2O
Run 2, ppmv H_2O
Run 1
Run 2
A
B
C
Start O_2 injection on Run 2
Start O_2 injection on Run 1

FIG. 7

FIG. 8A

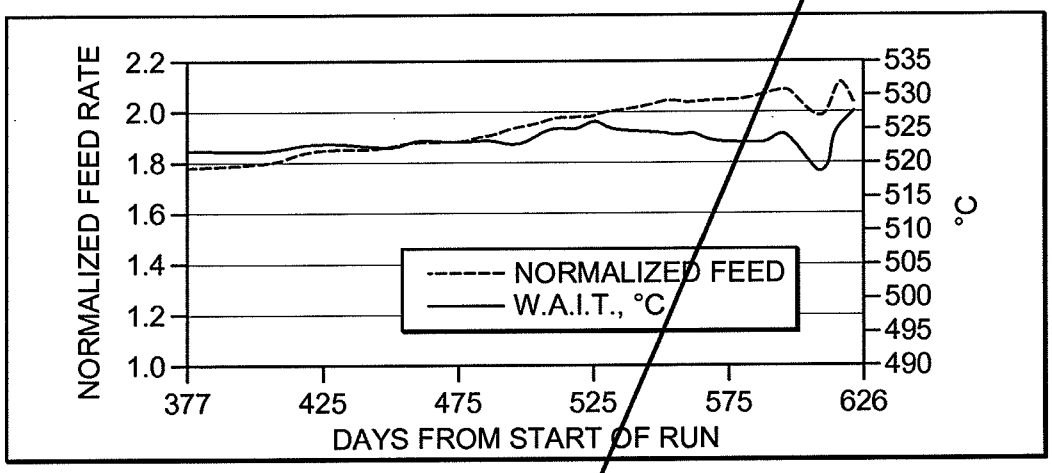


FIG. 8B

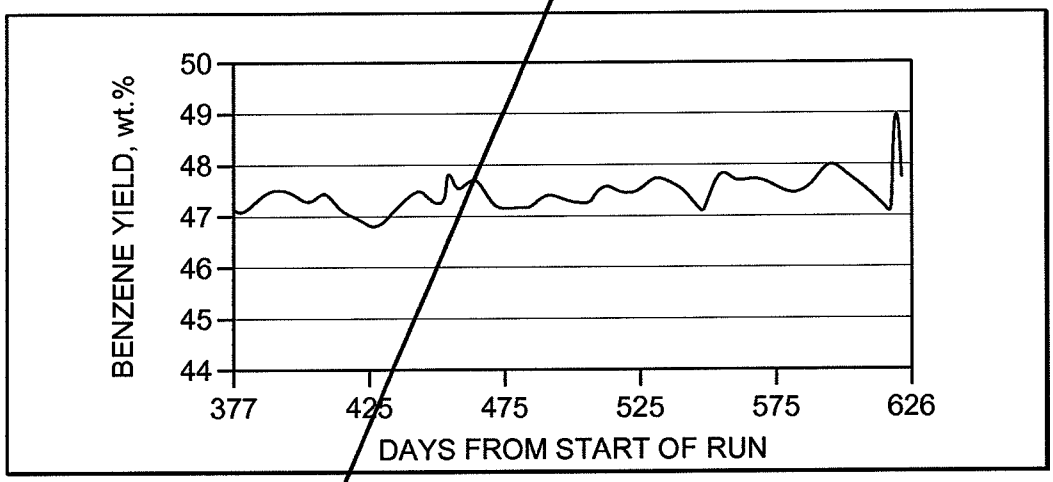


FIG. 8C

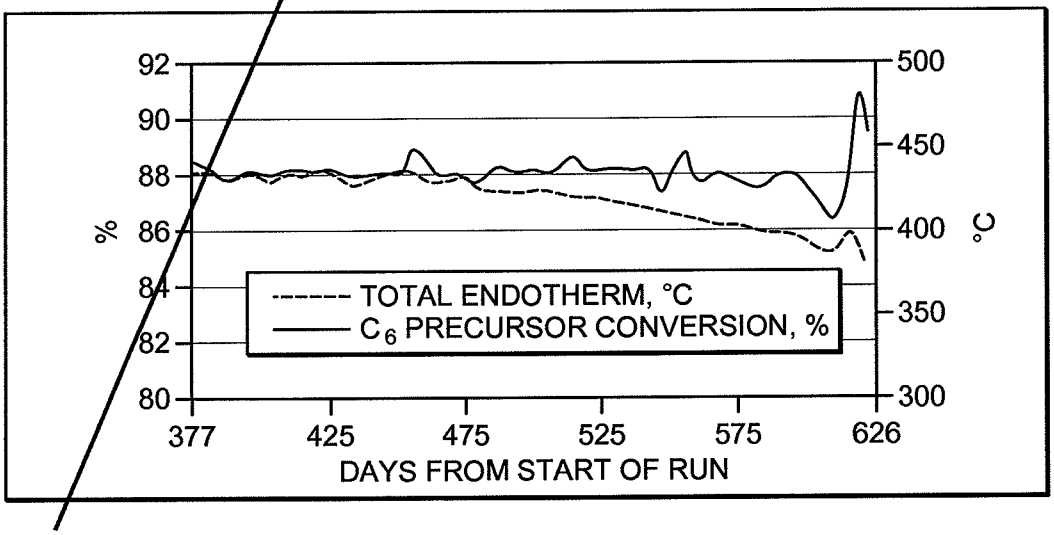


FIG. 8D

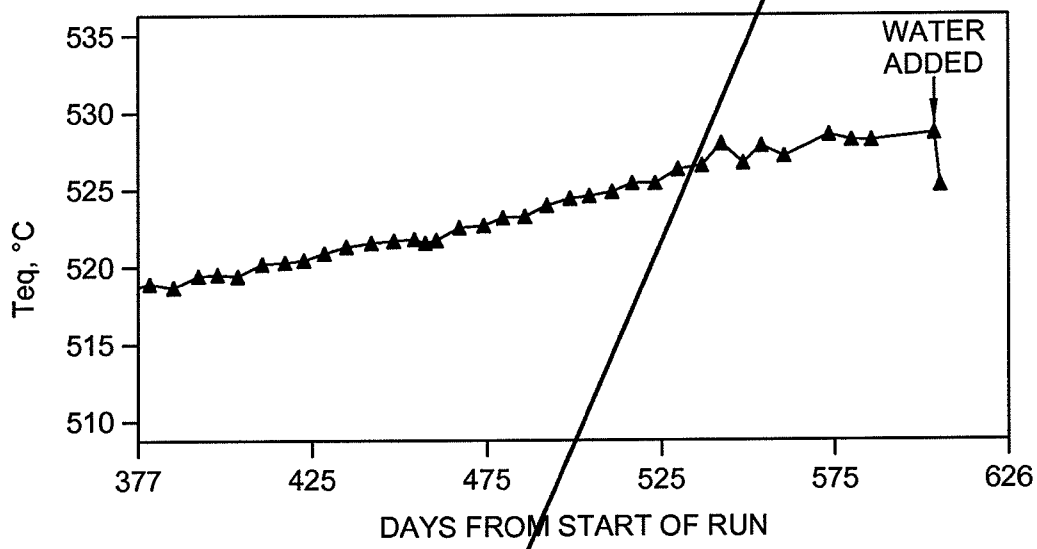
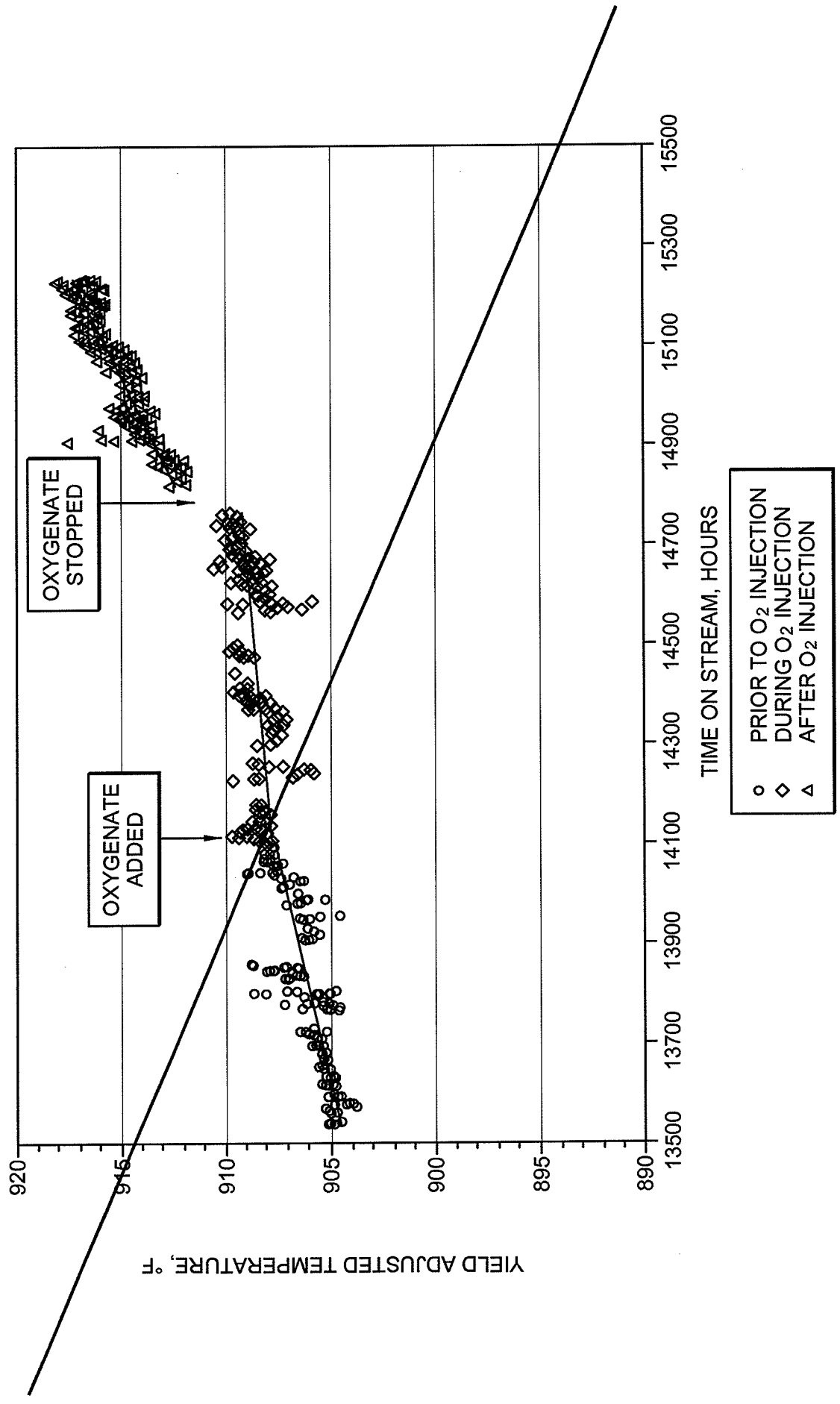

WATER
ADDED
535
530
525
520
515
510
Teq, °C
377
425
475
525
575
626
DAYS FROM START OF RUN

FIG. 9


YIELD ADJUSTED TEMPERATURE, °F
920
915
910
905
900
895
890
TIME ON STREAM, HOURS
13500
13700
13900
14100
14300
14500
14700
14900
15100
15300
15500
OXYGENATE ADDED
OXYGENATE STOPPED
PRIOR TO O_2 INJECTION
DURING O_2 INJECTION
AFTER O_2 INJECTION

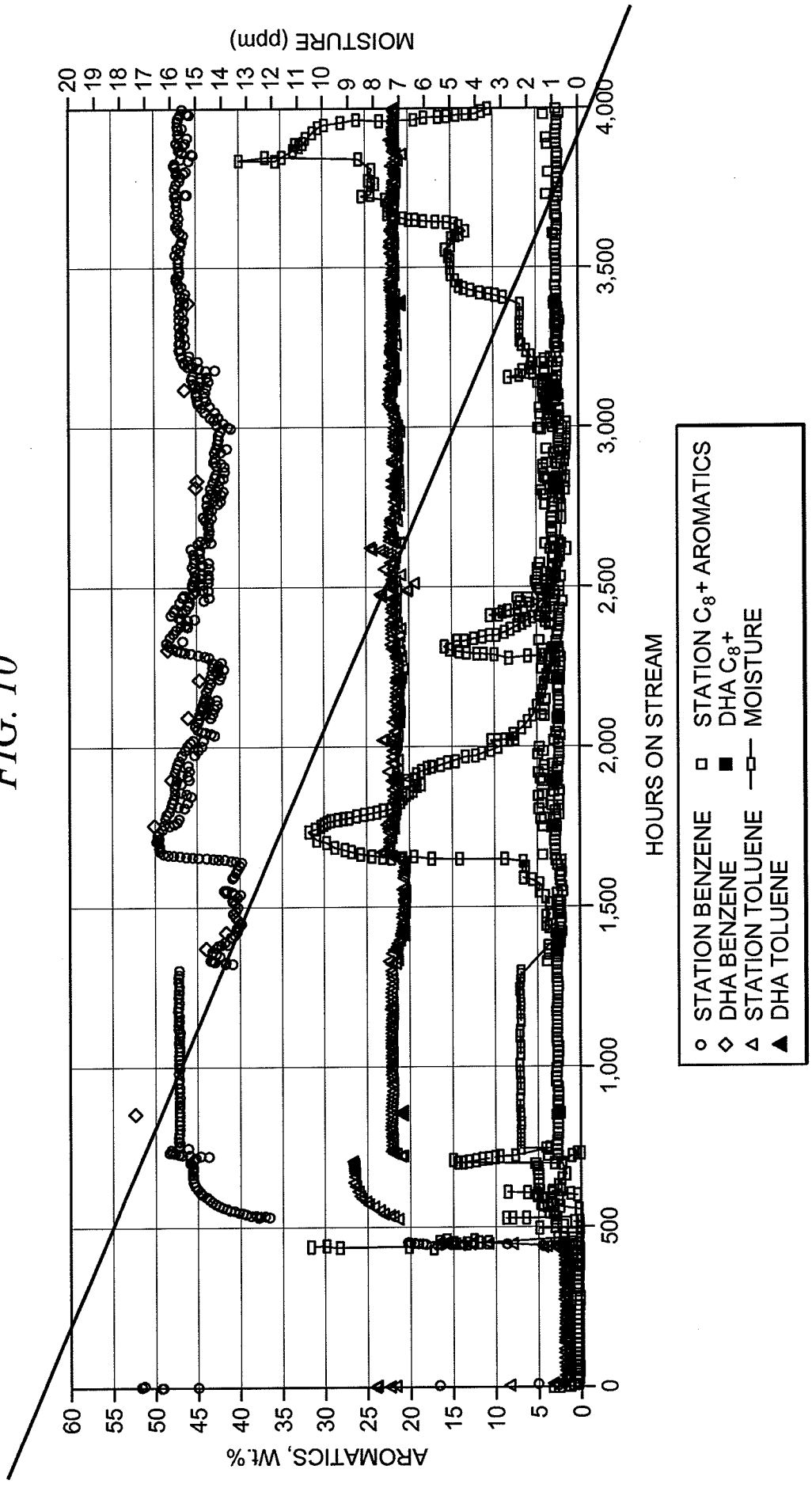

AROMATICS, Wt.%
MOISTURE (ppm)
HOURS ON STREAM
STATION BENZENE
DHA BENZENE
STATION TOLUENE
DHA TOLUENE
STATION C_8+ AROMATICS
DHA C_8+
MOISTURE

FIG. 10

FIG. 11

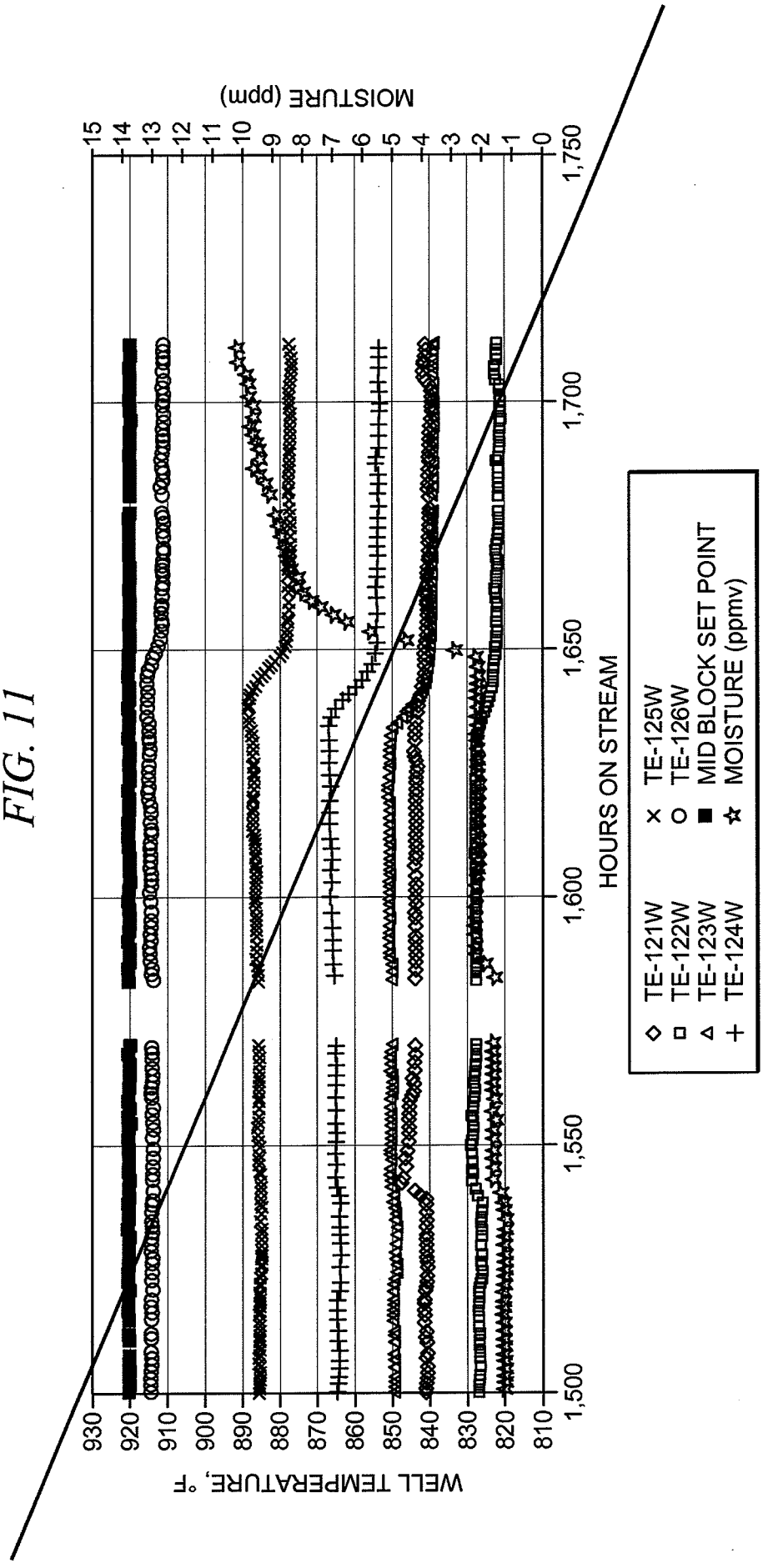

WELL TEMPERATURE, °F
930
920
910
900
890
880
870
860
850
840
830
820
810
MOISTURE (ppm)
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
1,500
1,550
1,600
1,650
1,700
1,750
HOURS ON STREAM
TE-121W
TE-122W
TE-123W
TE-124W
TE-125W
TE-126W
MID BLOCK SET POINT
MOISTURE (ppmv)

FIG. 1

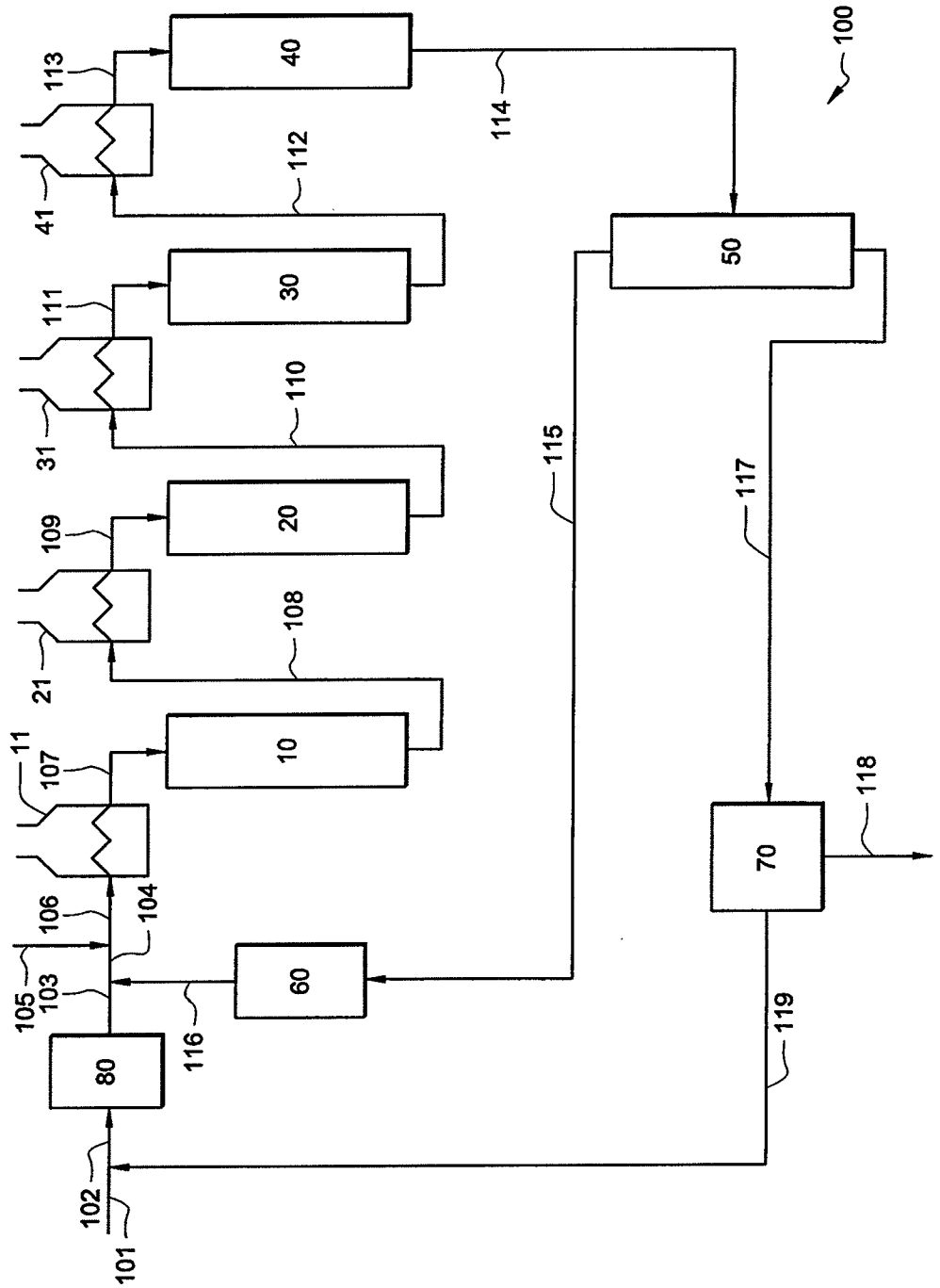

100
101
102
103
104
105
106
107
108
109
110
111
112
113
114
115
116
117
118
119
10
11
20
21
30
31
40
41
50
60
70
80

FIG. 2A

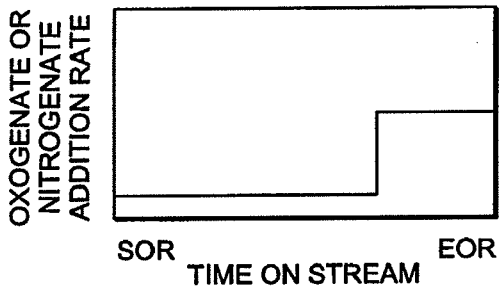


FIG. 2B

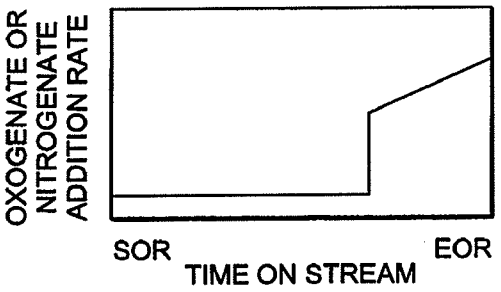


FIG. 2C

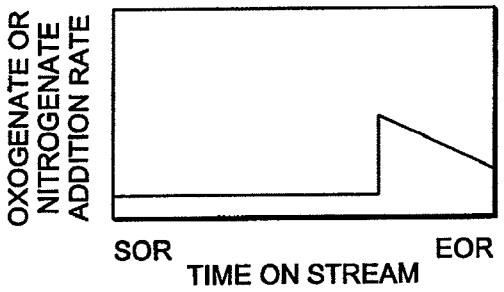


FIG. 2D

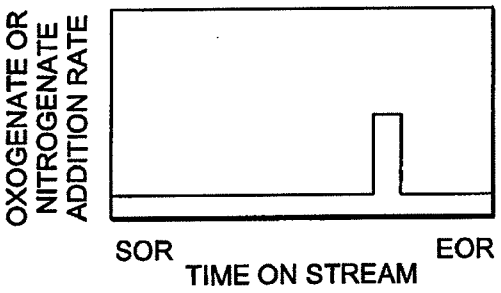


FIG. 3A

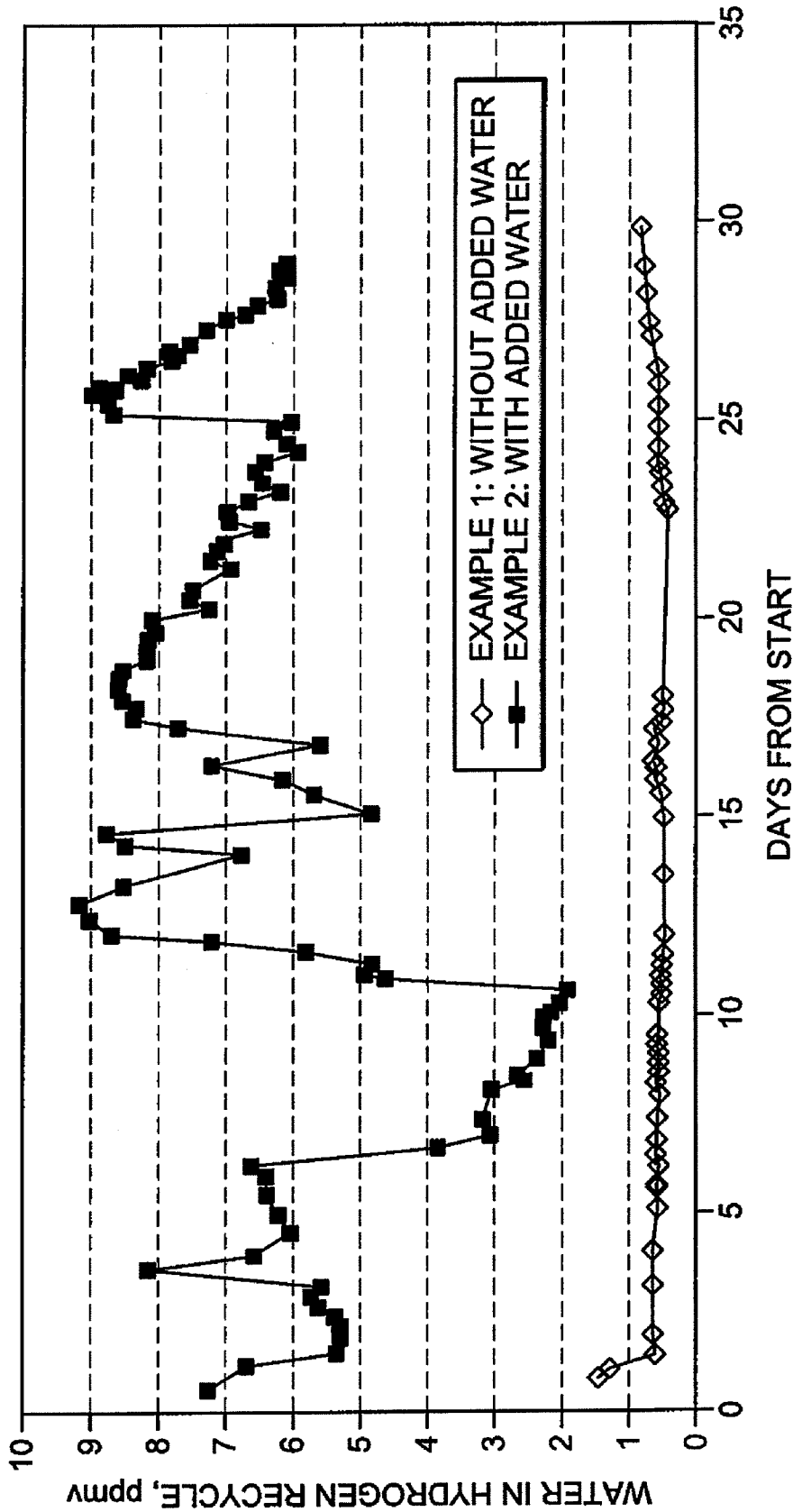

WATER IN HYDROGEN RECYCLE, ppmv
DAYS FROM START
EXAMPLE 1: WITHOUT ADDED WATER
EXAMPLE 2: WITH ADDED WATER
0
1
2
3
4
5
6
7
8
9
10
0
5
10
15
20
25
30
35

FIG. 3B

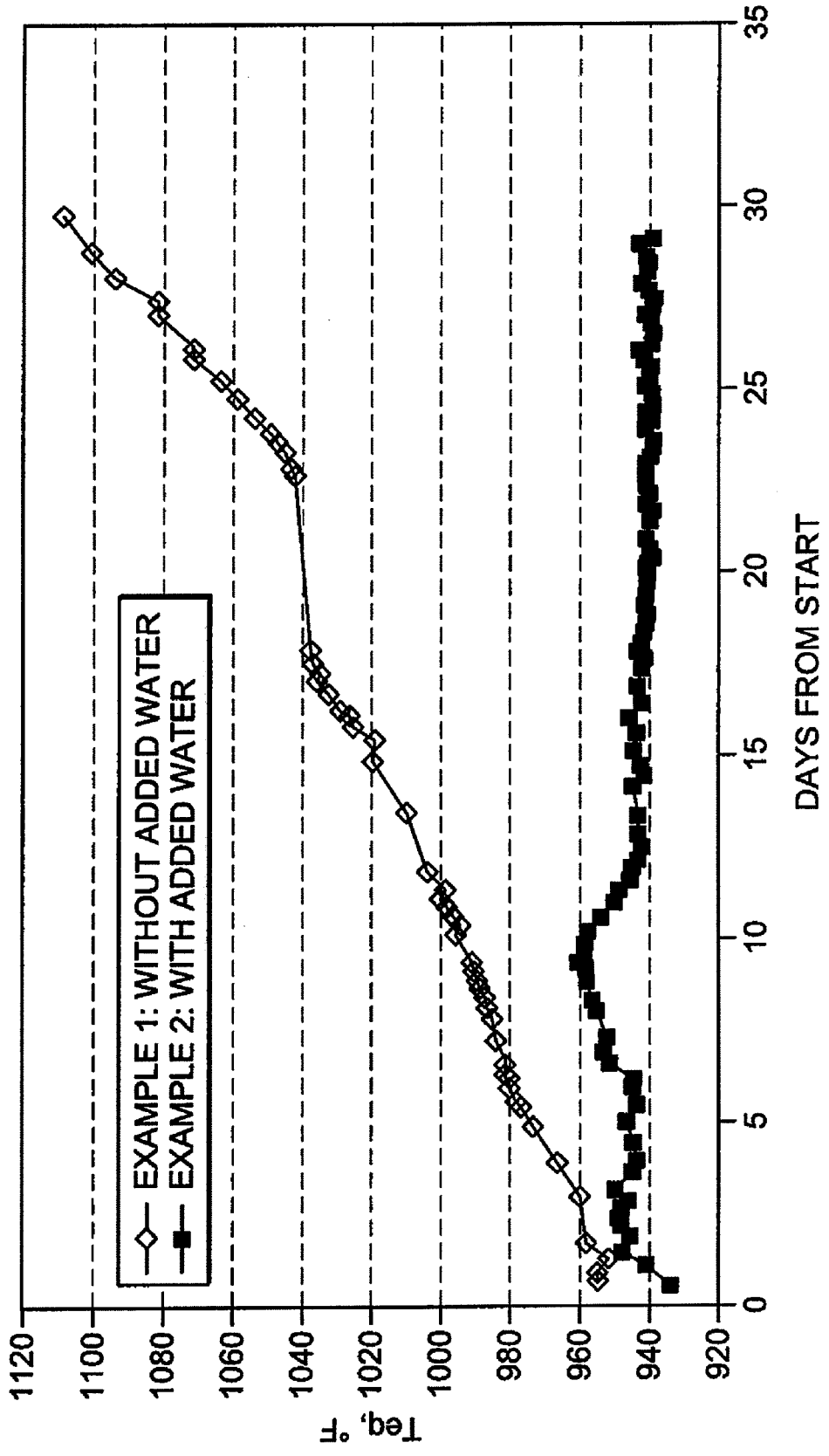

EXAMPLE 1: WITHOUT ADDED WATER
EXAMPLE 2: WITH ADDED WATER
Tea, °F
DAYS FROM START
1120
1100
1080
1060
1040
1020
1000
980
960
940
920
0
5
10
15
20
25
30
35

FIG. 4

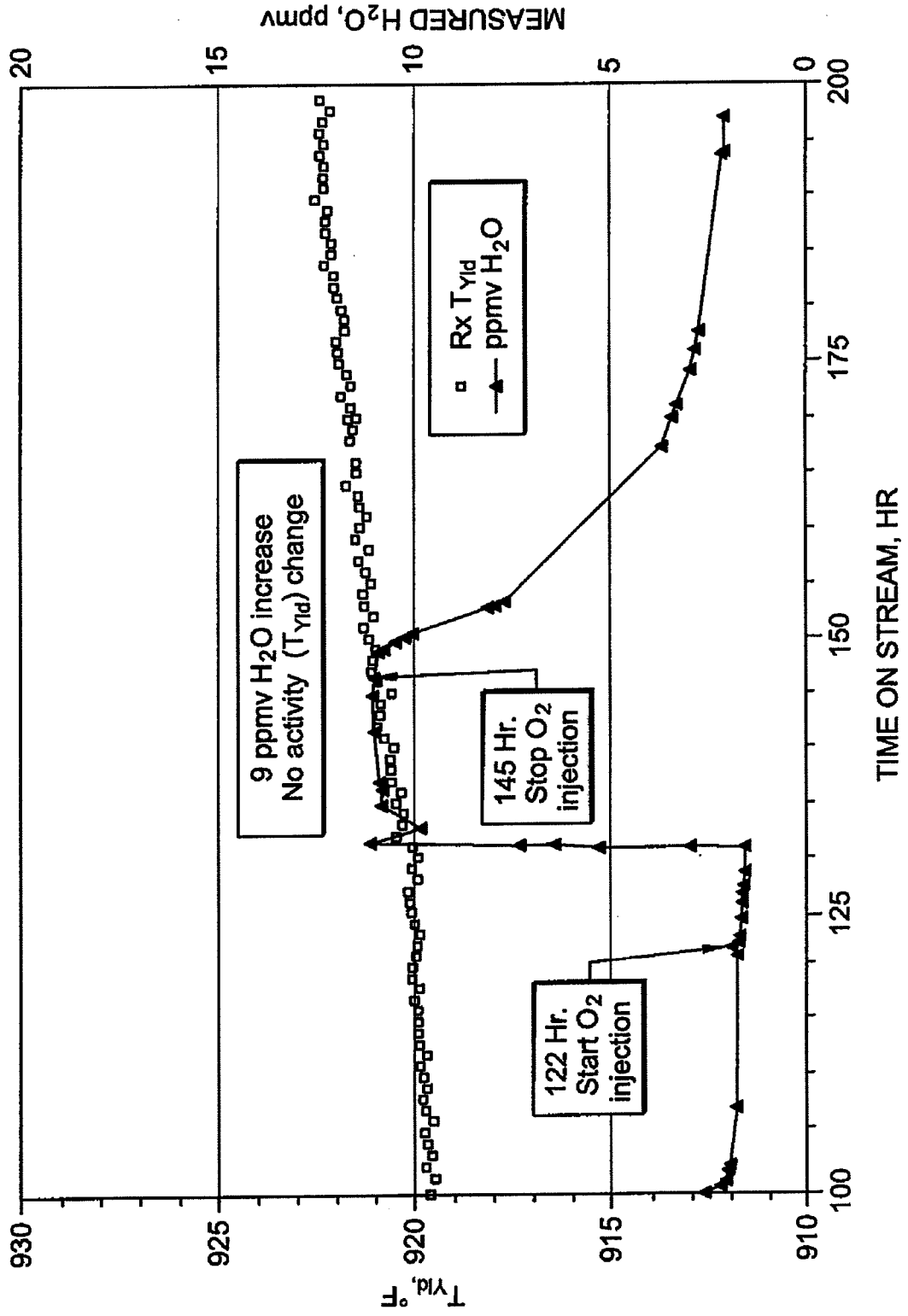

MEASURED H_2O, ppmv
20
15
10
5
0
930
925
920
915
910
T_{Yld}, °F
100
125
150
175
200
TIME ON STREAM, HR
Rx T_{Yld}
ppmv H_2O
9 ppmv H_2O increase
No activity (T_{Yld}) change
145 Hr.
Stop O_2
injection
122 Hr.
Start O_2
injection

FIG. 5

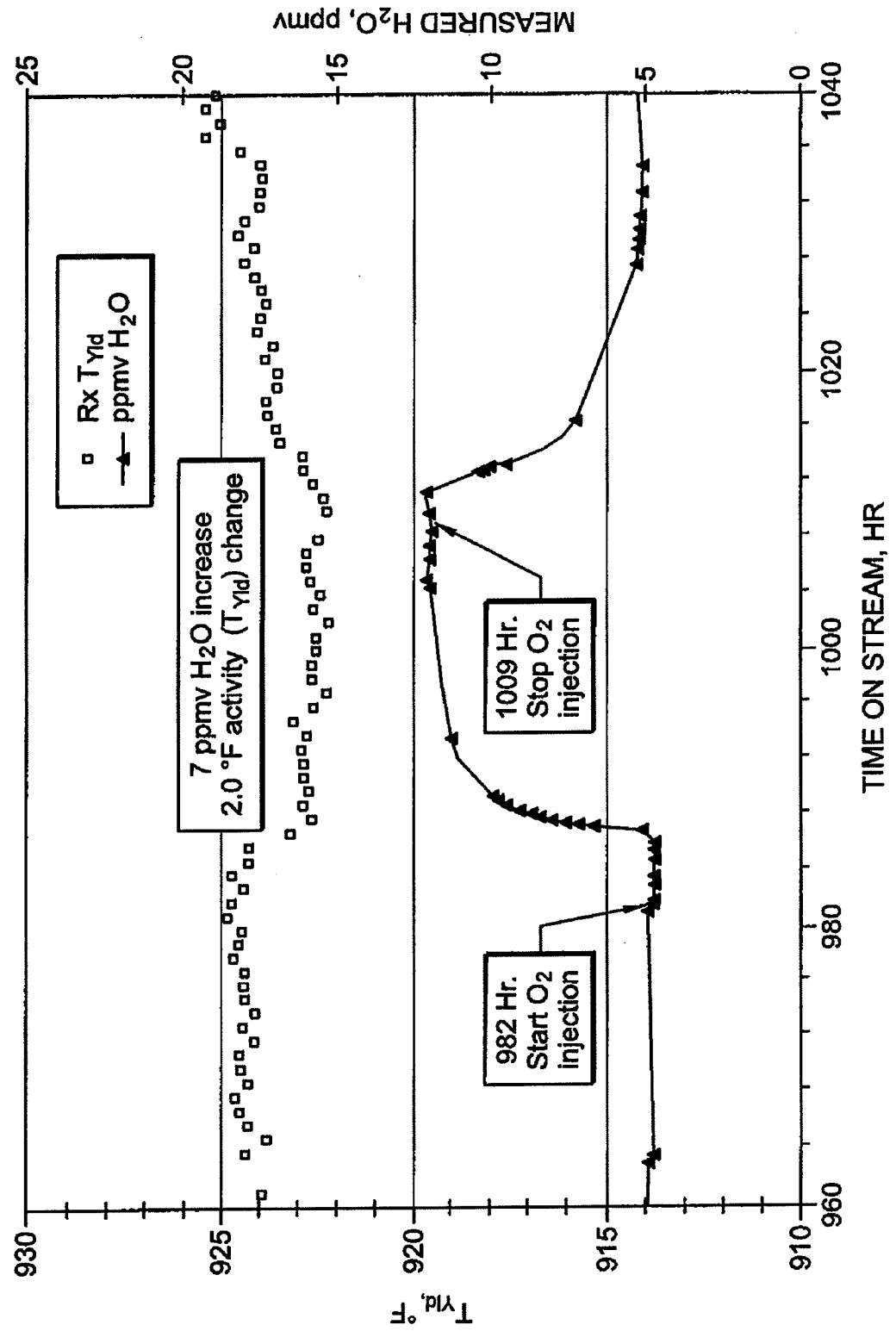

MEASURED H2O, ppmv
25
20
15
10
5
0
Rx TYld
ppmv H2O
7 ppmv H2O increase
2.0 °F activity (TYld) change
1009 Hr.
Stop O2
injection
982 Hr.
Start O2
injection
TYld, °F
930
925
920
915
910
1040
1020
1000
980
960
TIME ON STREAM, HR

FIG. 6

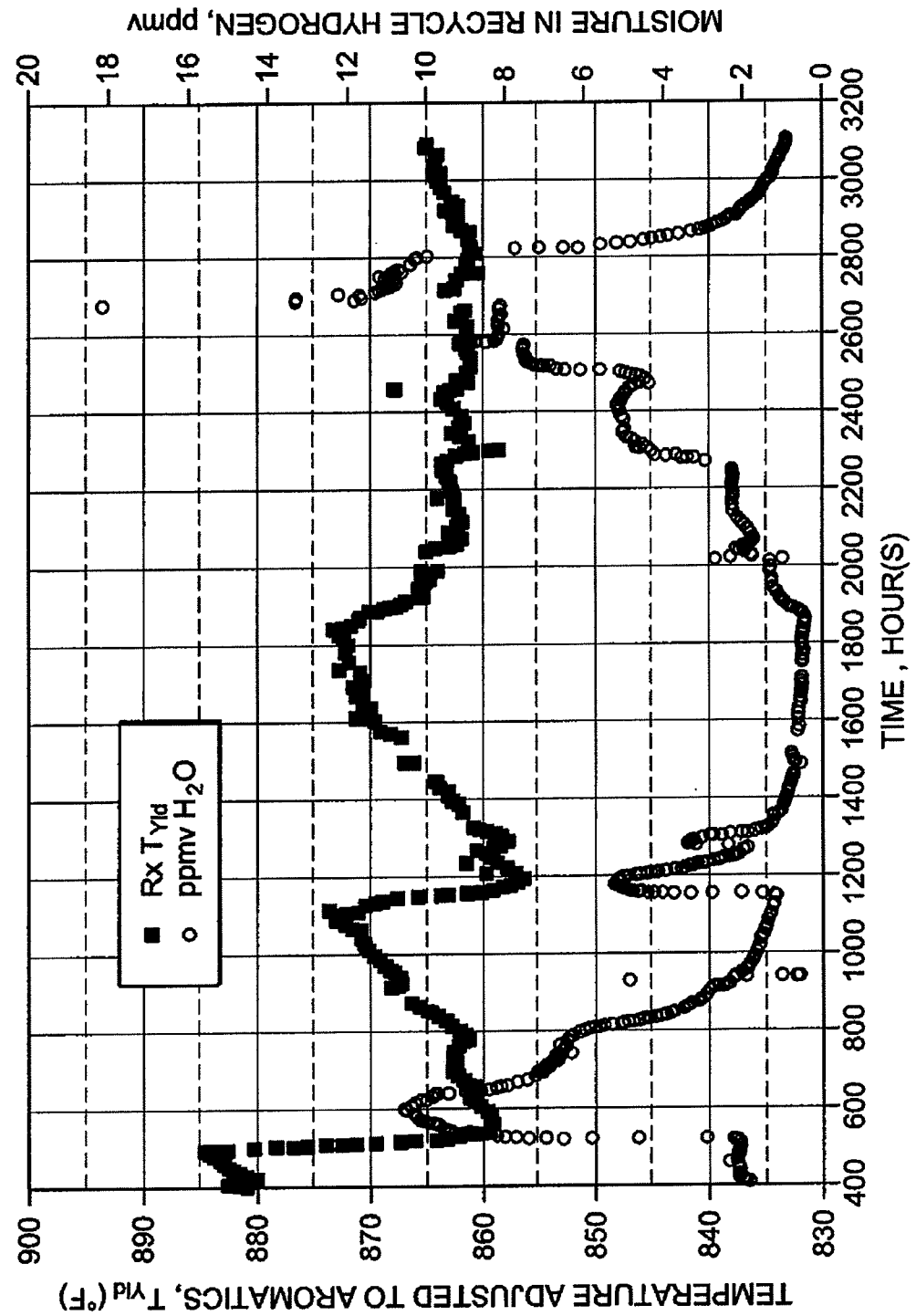

MOISTURE IN RECYCLE HYDROGEN, ppmv
20
18
16
14
12
10
8
6
4
2
0
TEMPERATURE ADJUSTED TO AROMATICS, T_{Yld} (°F)
900
890
880
870
860
850
840
830
TIME, HOUR(S)
400
600
800
1000
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
Rx T_{Yld}
ppmv H_2O

FIG. 7

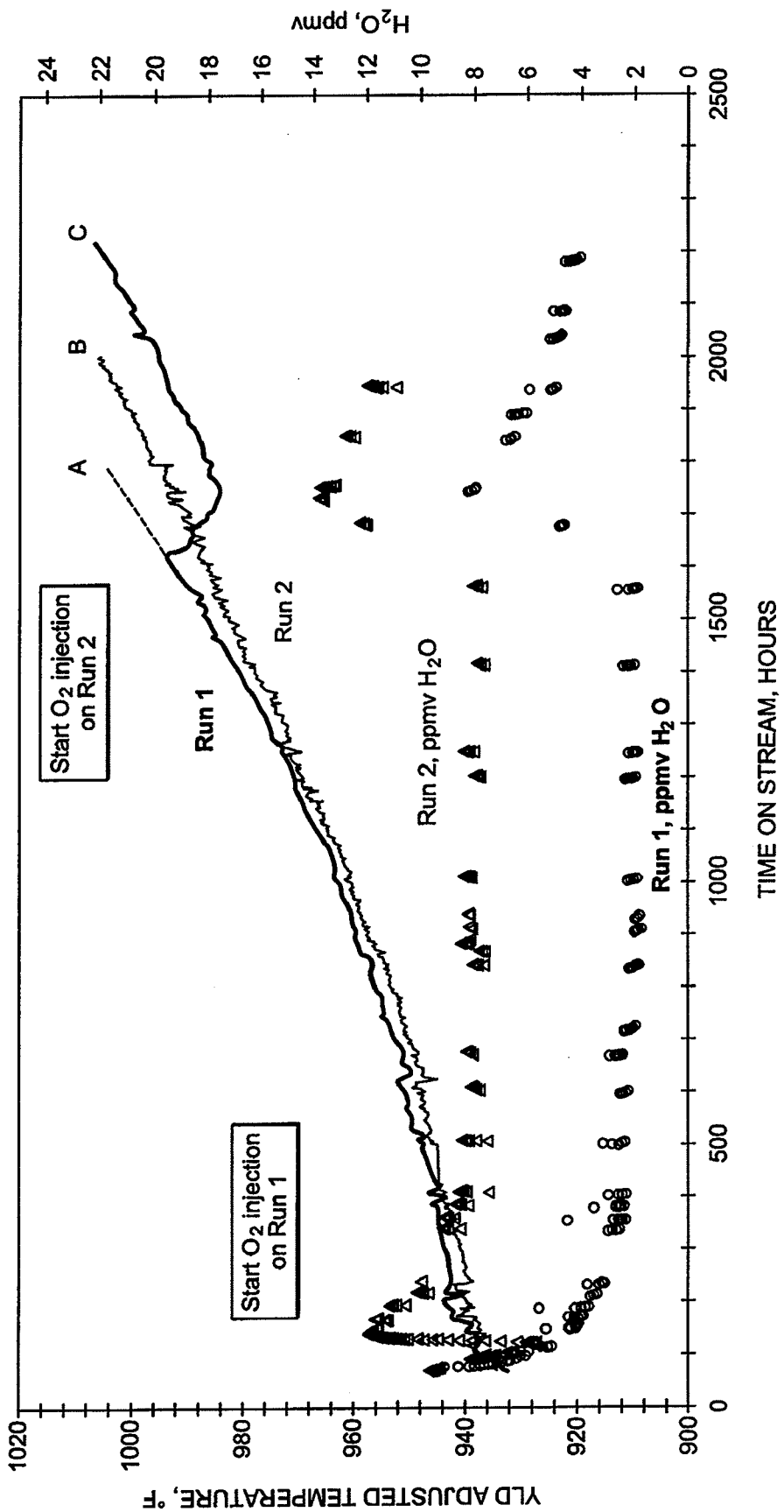

YLD ADJUSTED TEMPERATURE, °F
1020
1000
980
960
940
920
900
H_2O, ppmv
24
22
20
18
16
14
12
10
8
6
4
2
0
2500
2000
1500
1000
500
0
TIME ON STREAM, HOURS
Start O_2 injection on Run 2
Start O_2 injection on Run 1
A
B
C
Run 1
Run 2
Run 2, ppmv H_2O
Run 1, ppmv H_2O

FIG. 8A

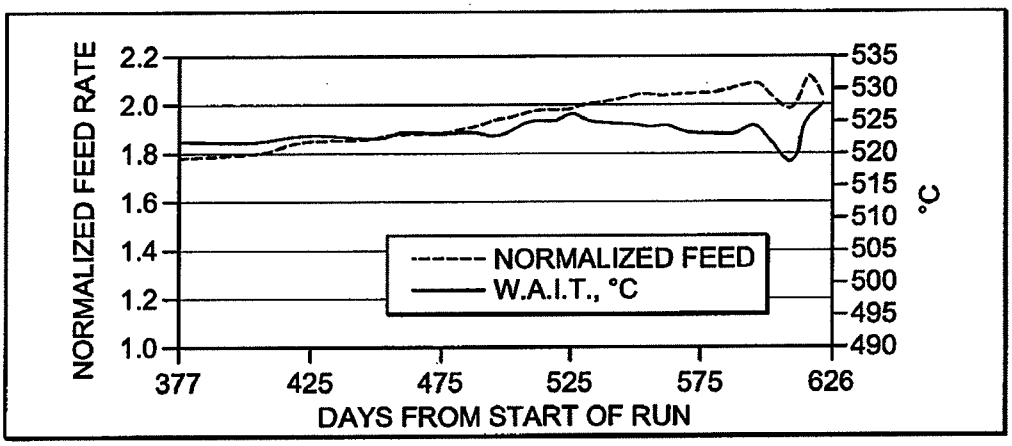


FIG. 8B

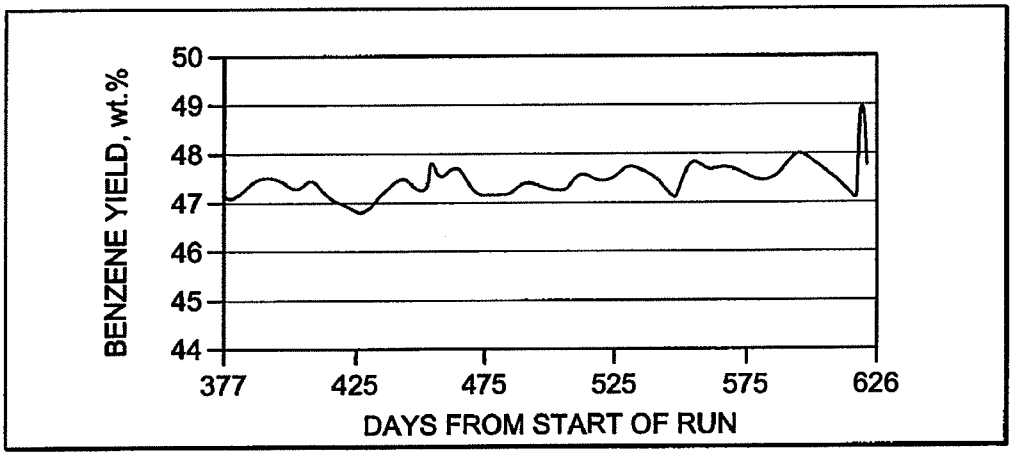


FIG. 8C

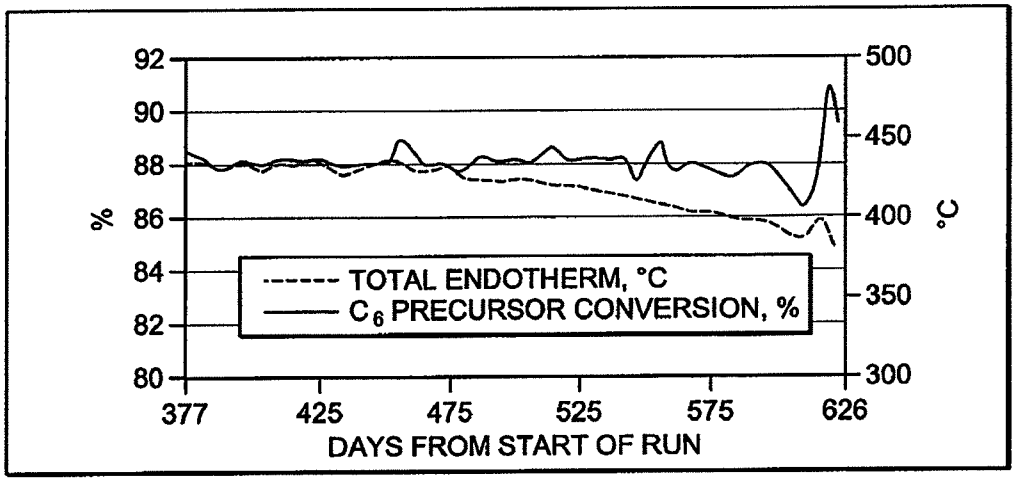


FIG. 8D

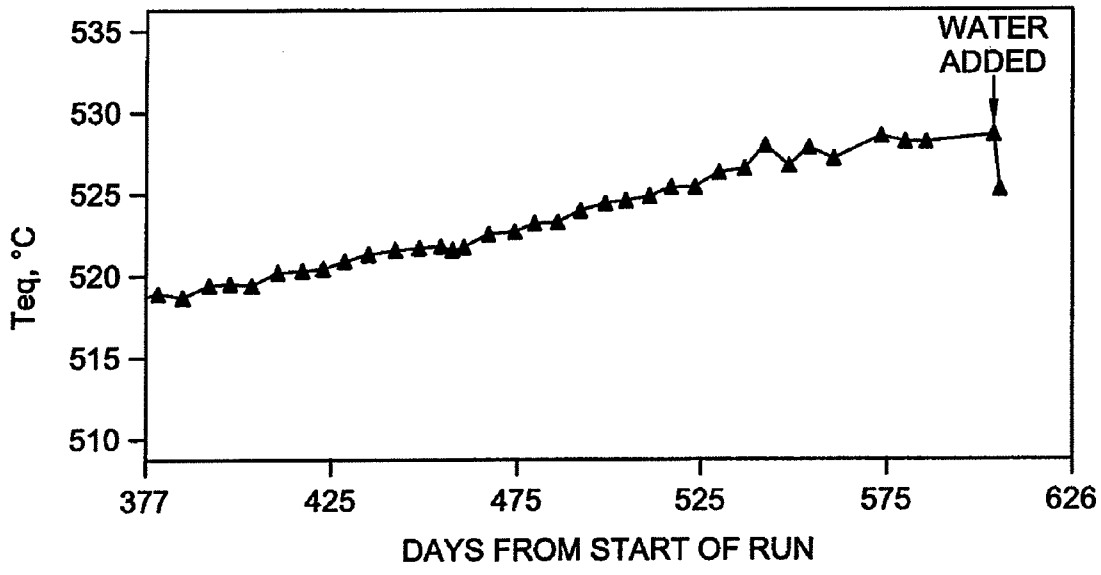

WATER
ADDED
535
530
525
520
515
510
Teq, °C
377
425
475
525
575
626
DAYS FROM START OF RUN

FIG. 9

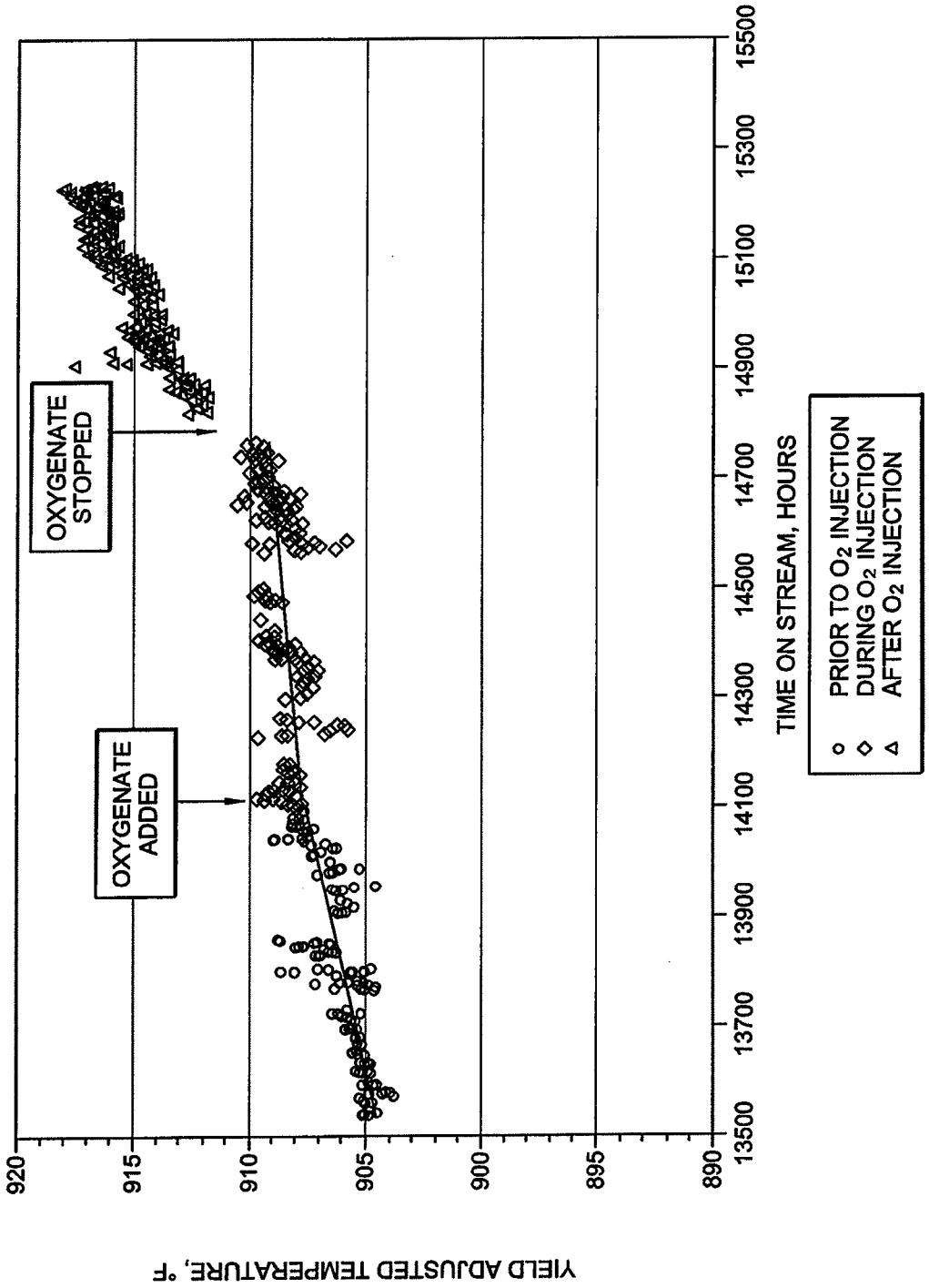

YIELD ADJUSTED TEMPERATURE, °F
920
915
910
905
900
895
890
13500
13700
13900
14100
14300
14500
14700
14900
15100
15300
15500
TIME ON STREAM, HOURS
OXYGENATE ADDED
OXYGENATE STOPPED
PRIOR TO O_2 INJECTION
DURING O_2 INJECTION
AFTER O_2 INJECTION

FIG. 10

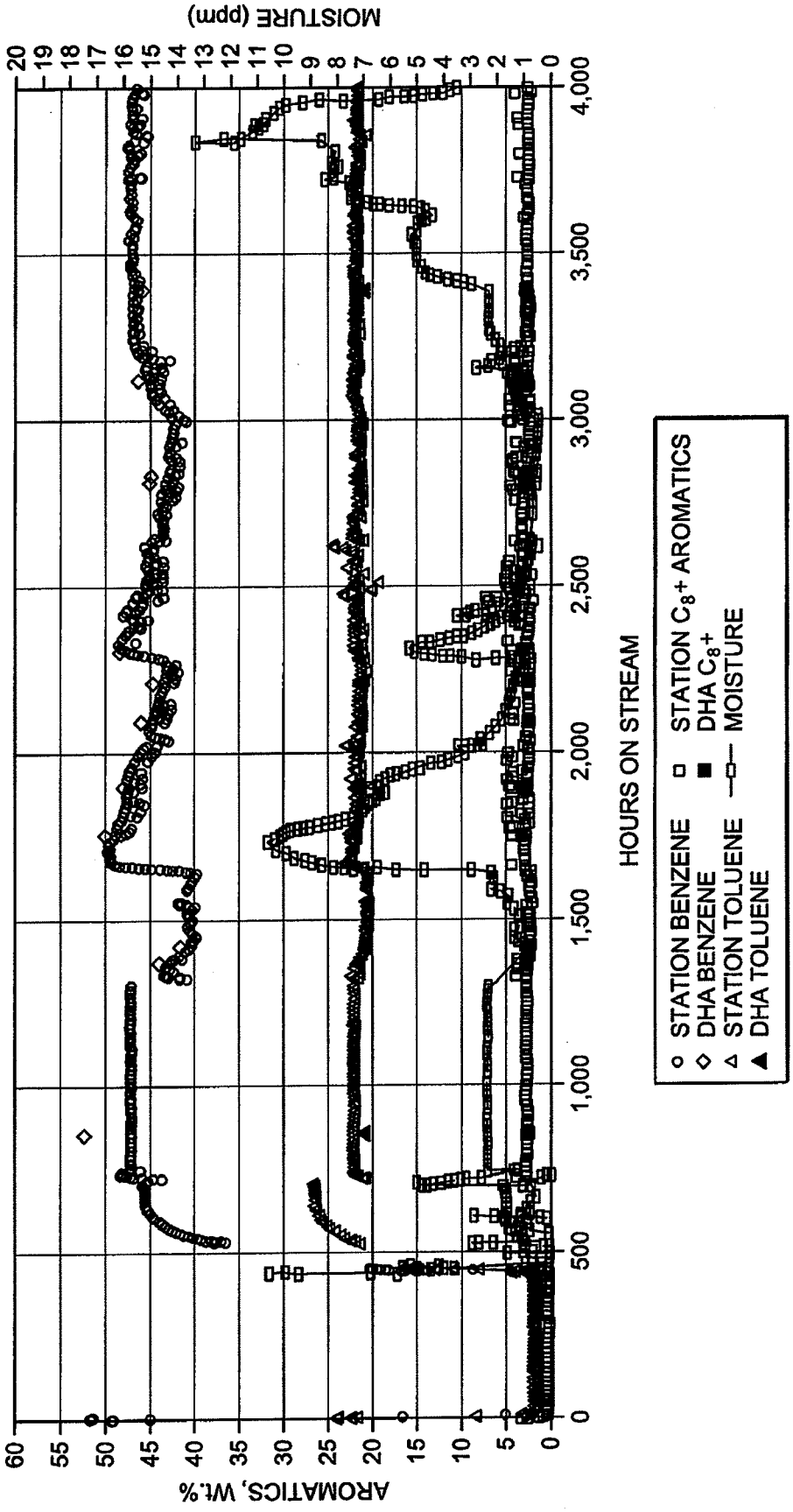
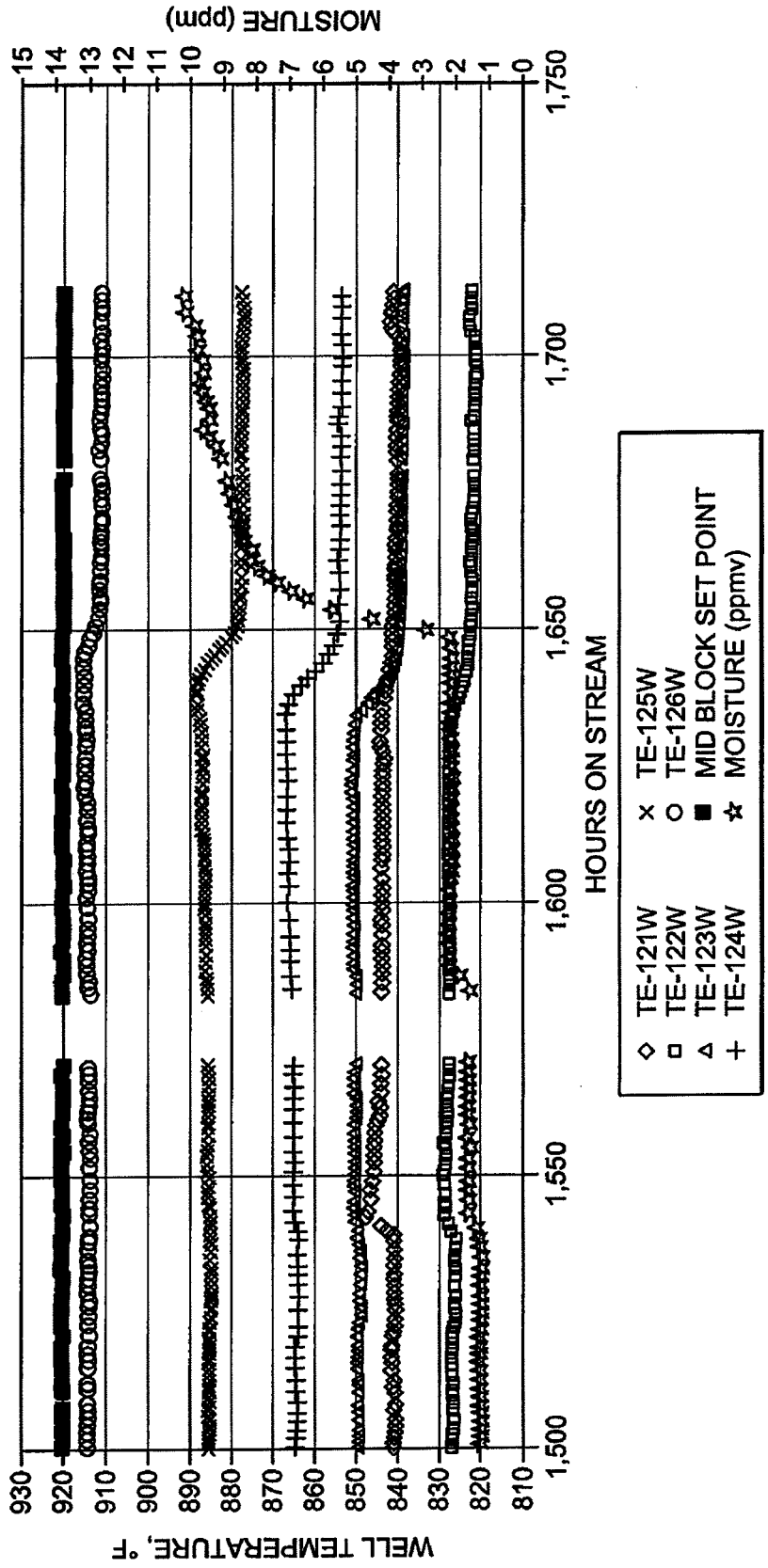

MOISTURE (ppm)
AROMATICS, Wt.%
HOURS ON STREAM
STATION BENZENE
DHA BENZENE
STATION TOLUENE
DHA TOLUENE
STATION C8+ AROMATICS
DHA C8+
MOISTURE

FIG. 11


MOISTURE (ppm)
WELL TEMPERATURE, °F
HOURS ON STREAM
TE-121W
TE-122W
TE-123W
TE-124W
TE-125W
TE-126W
MID BLOCK SET POINT
MOISTURE (ppmv)