

APPENDIX B:

**LETTERS AND INFORMATION RELATED TO THE SEARCH
FOR ONSITE METEOROLOGICAL INFORMATION
AND
RFP WIND DOCUMENTS PROVIDED BY DR. PHILILIP KREY**



Department of Energy
Environmental Measurements Laboratory
376 Hudson Street
New York, New York 10014

February 6, 1996

Mr. Joseph Binder
Colorado State University
Radiological Health Sciences
308 MRB
Fort Collins, CO 80523

Dear Mr. Binder:

As you requested, enclosed are copies of the documents:

C. R. Dickson and G. E. Start, Plutonium Releases to the Environment at Rocky Flats
memo to the Files, February 4, 1970

Letter to Phil Krey from S. E. Hammond, July 21, 1970.

I hope that they will be of some assistance to you.

Sincerely,

A handwritten signature in cursive script that reads "Philip W. Krey".

Philip W. Krey, Acting Director
Environmental Measurements Laboratory



U. S. DEPARTMENT OF COMMERCE
ENVIRONMENTAL SCIENCE SERVICES ADMINISTRATION
RESEARCH LABORATORIES

OFFICIAL USE ONLY

February 4, 1970

To The Files

IN REPLY REFER TO:
D. H. Dickson
G. E. Start

PLUTONIUM RELEASES TO THE ENVIRONMENT AT ROCKY FLATS

In direct response to the January 13, 1970 report submitted to Dr. Seaborg by E. A. Martell, Chairman, Subcommittee on Rocky Flats, Colorado Committee for Environmental Information, Boulder, Colorado; Mr. Philip Krey, New York Operations Office, USAEC, made a telephone request to Dr. I. Van der Hoven, Chief, ERL, ESSA, Washington, D. C., for a meteorological examination of the Rocky Flats area. This examination was requested to scope the environmental bounds of plutonium sampling in and around the plant. During the process of researching the plant fire of May 11, 1969 we met with Dr. E. A. Martell and read and discussed the letters and reports cumulating in the January 13 report to Dr. Seaborg.

We also met with Mr. Pilsingrud and Mr. Hammond, Dow Chemical, Rocky Flats, discussed the "Martell Report" of January 13, and obtained copies of meteorological records and summaries. Our contacts with these three men were extremely good. Both Dr. Martell and the Dow personnel fully cooperated in every way to provide background information and reports.

This letter to the files summarizes the findings and professional opinions formed by us during our visits to Boulder and Rocky Flats during the week of January 26, 1970.

There is ample evidence to show that more than normal background amounts of Pu-239 exist in the soil environment surrounding the Rocky Flats facility. Martell and Poet of NCAR, Boulder, have found this existence in some twenty odd soil samples, plus water and sediment samples. Hammond of Dow, Rocky Flats, confirms similar quantitative results from a lesser number of samples.

The plant fire on May 11, 1969 brought the possibility of environmental contamination to the forefront and the initial investigations concentrated on whether this fire may have released Pu-239. More complete investigations showed that while the May 11, 1969 fire may have contributed to the plutonium found in the environment, two other situations in the past probably contributed more, if not most, of the Pu-239 excess.

On September 11, 1957 a major fire involving Pu-239 occurred in Building 771. During this fire the air filtration systems were believed to have been burned out and an unknown and possibly large quantity of Pu-239 was exhausted out through the nearby 200' stack.

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The second situation is even more difficult to quantitatively define. As a result of the cleanup of Bldg. 771 or some other operation, a large amount of cleaning solvents, such as C Cl₄, became highly contaminated with plutonium (chemical form unknown). These contaminated solvents were placed in 50 to 100 gal drums and stored during 1958 at an outside storage site in the SE corner of the plant area. (see Figure 1.) These drums were left in place until sometime in 1968. About six years after being moved to the outside storage area, or about 1964, a survey of the area (by an alpha detector) revealed that contaminated solvents had begun to leak from the barrels and the ground surface had become very highly contaminated. Additional ground surveys were made to the east and south of the fenced drum storage area at points on a prespecified rectangular mesh of points (Dow Chemical has plotted isopleths (dpm/cm²) of which we did not obtain copies). These survey values ranged from about 10⁰ dpm/cm² inside the storage fence to hundreds and tens of thousands dpm/cm² outside the fence. The highest survey values outside the fence were initially to both the south and east of the drums. A year later the highest survey values outside the fence were more to the southeast and east, suggesting a gradual southeastward movement may be taking place.

Since 1953 an anemovane wind sensor, mounted on a tower above the Building 123, had been used to measure the wind speed and direction. This wind data has been extracted as hourly mean values by Dow personnel for an 8 point compass. These hourly wind values are tabulated monthly as the number of times the wind blew from each of the eight sectors or compass points (the frequency of that span of directions) and as the sum of wind speeds within that sector. The sum of speeds is divided by the number of cases to estimate the average wind speed from the sector. Table I. To provide a first estimate of the Rocky Flats wind rose, the monthly sector frequencies (%) and average hourly wind speeds (mph) were averaged over the 17 year period of record. The resultant wind rose figure 2 is plotted on polar graph paper. West winds occur almost 25% of the time. The strongest gusts and the directions of the most frequent strong gusts (speeds greater than 40 mph) are from the west. The resultant wind vector (derived from the wind rose frequencies and mean speeds) points almost exactly eastward.

Strong gusty winds frequently occur in the lee of the mountains at Rocky Flats. Several days each year wind gusts exceeding 70 to 80 mph can be expected. Consequently, at Rocky Flats wind erosion has removed most fine soil, alluvium, leaving mostly coarse rock and sand particles at the ground surface. Figure 3 shows the outer or cattle fence boundary of the plant and the locations at which Dow personnel have routinely collected samples. Two creeks, Walnut Creek and Woman Creek, pass through the outer fenced area and just outside the security fences of the plant proper. These creeks begin to flow through significantly deep gullies as they flow by the eastern limits of the plant. The soil in the gullies becomes finer and deeper and is more likely to become a trap for windborn particles of plutonium. Samples A, I, B, and K from Martell's report tend to support

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To the Files

- 3 -

February 4, 1970

this view. Figure 4 is reproduced from the Martell report with the $\text{dpm}/\mu\text{m}$ for Pu-239 plotted and isoplotted on it. The isopleths should be considered more from a qualitative view at distances beyond 5 to 6 miles because of incomplete sampling coverage.

The recommendations regarding additional sampling sites are the following.

Within the first 4 to 5 miles from the plant samples should be taken within boundaries of the Rocky Flats facility, especially

- (1) around buildings 771 and 776-777
- (2) around the drum storage area
- (3) along Walnut and Women Creeks closer to the facility and
- (4) to the SW through NW where winds were blowing on the afternoon of May 11.

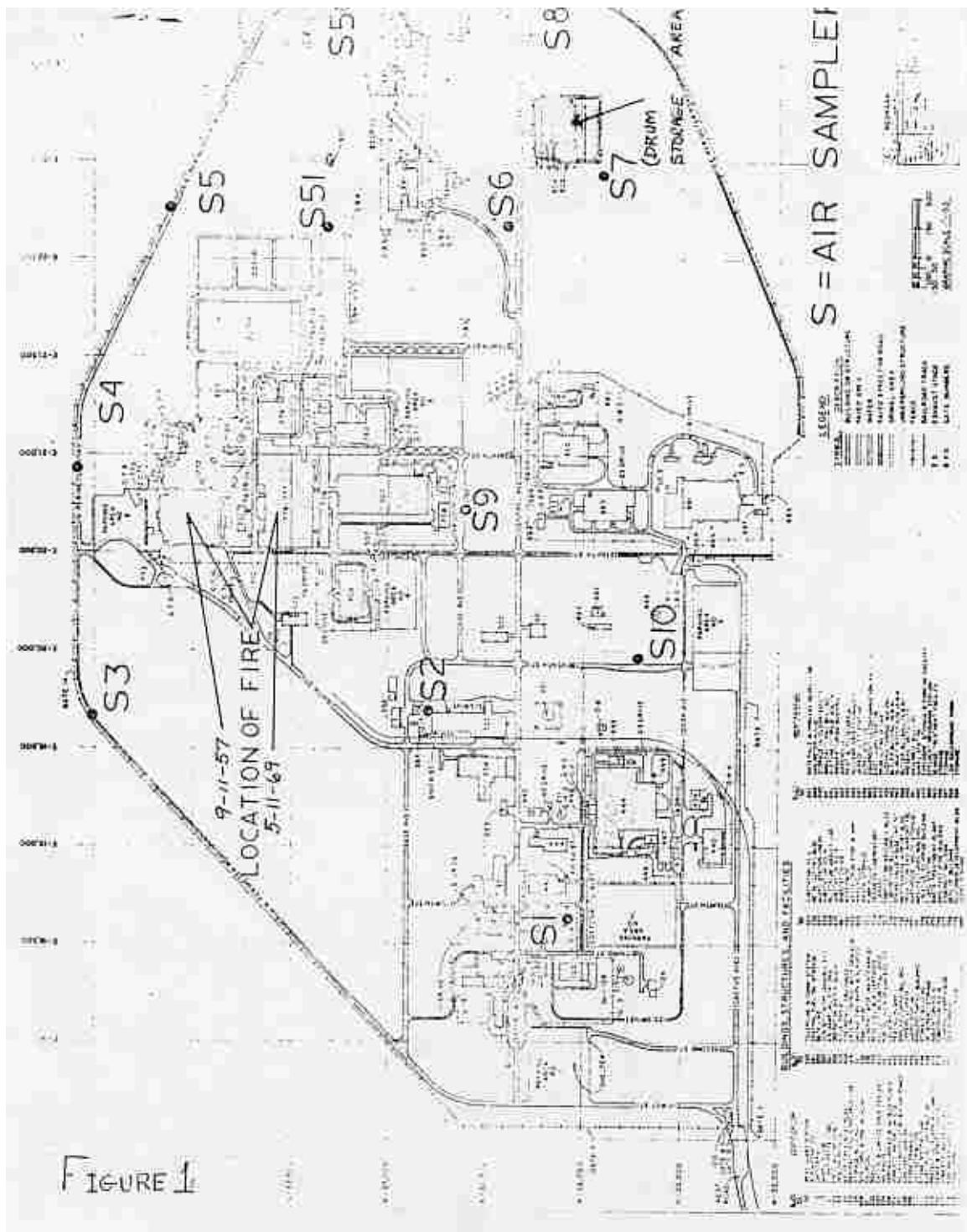
Samples should also be collected on successively expanded concentric areas, such as 10, 15, and 20 miles away. When sampling at successively greater distances the following geographical changes in wind flow should be considered. The Denver wind rose shows southerly to southwesterly winds are most frequent; west winds are most frequent at the Rocky Flats site closer to the mountains. Therefore, air flowing eastward from Rocky Flats should merge with the southerly air flow across Denver and be carried north-northeastward. The south Platt River Valley, about 20 miles east of Rocky Flats, is the logical terrain feature along which this transition from westerly flow should approach completion.

A copy of the continuation of Table 1, Martell's report, is attached listing the Pu-239 analysis results for sample positions 0 through 8. A few additional Pu-239/Sr-90 ratios are also listed, but most Sr-90 samples were still undergoing analysis last week. A copy of the September 1957 monthly weather summary for Rocky Flats is also attached.

A copy of the wind trace for May 11, 1969 is also attached.

G. Ray Dickson *GRD*
G. E. Start *GES*

208 5



11/8/40

Rocky FLAT

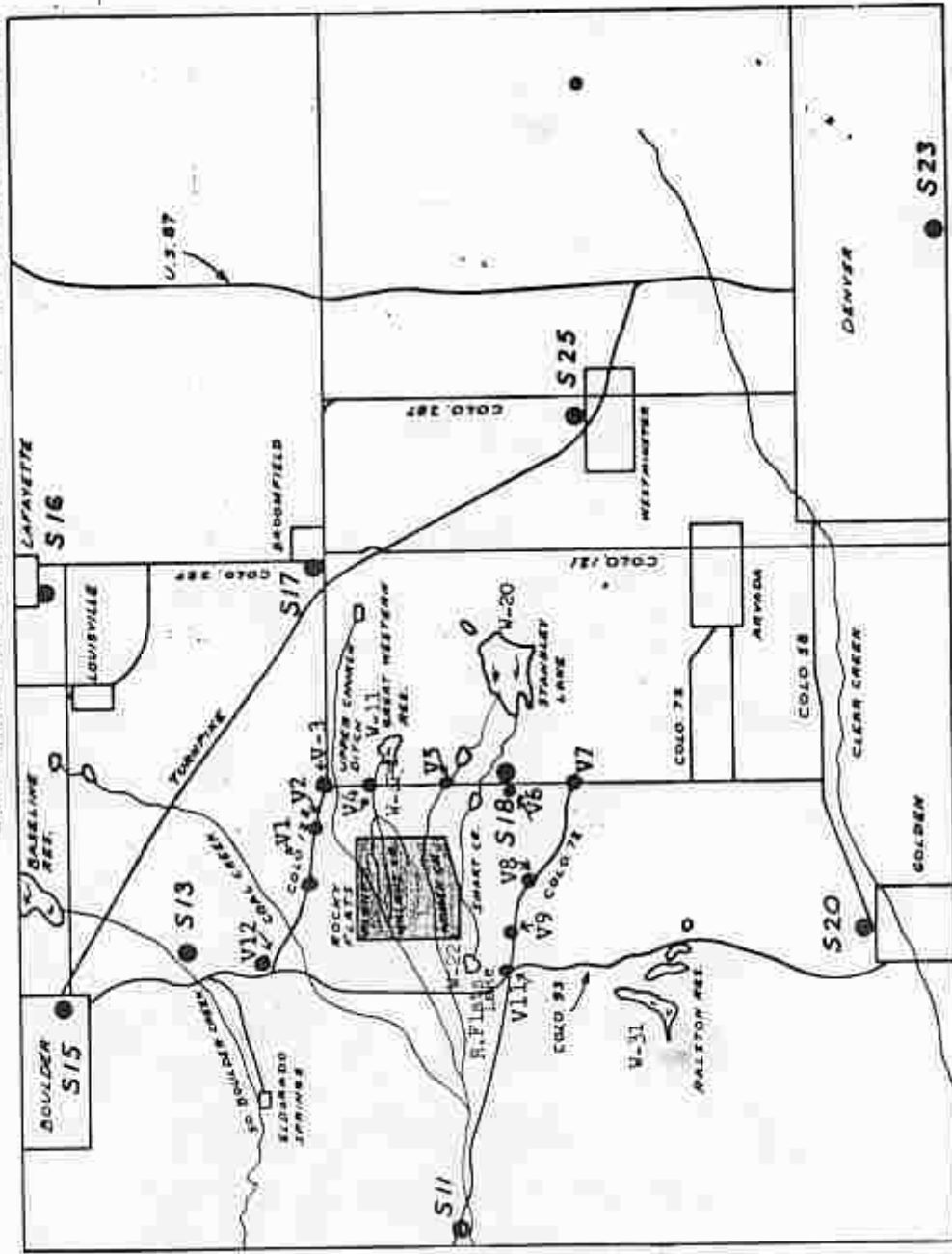
ce	M0	N	VV	% MEVV	% BEVV	% SEVV	% SEVV	% SWVV	% WV	% MW	VAR	C						
1953	12.8	8.1	5.6	4.9	6.3	5.2	10.0	5.7	5.0	7.0	3.7	7.7	31.2	13.8	15.4	9.2	2.1%	2
54	12.6	7.0	6.3	4.9	6.9	5.0	11.5	5.8	6.5	6.9	9.1	7.5	28.6	12.5	15.7	7.4	2.7%	3
55	11.0	8.0	5.0	7.0	6.0	5.0	9.0	7.0	6.0	8.0	9.0	10.0	29.0	17.0	15.0	8.0	8.0%	4
56	13.0	7.0	6.0	6.0	4	8	9	7	4	8	10	8	28	12	13	8	9	3
57	14	8	5	6	5	6	8	7	4	7	9	7	24	12	14	8	12	6
58	(13)	7	6	5	6	6	12	7	2	8	11	7	23	11	18	7	9	1
59	7	10	6	6	6	5	12	7	4	8	16	16	23	13	19	8	6	2
60	7	10	4	7	6	7	11	6	6	6	18	9	14	11	25	9	5	4
61	7	8	6	6	7	5	11	5	6	7	19	9	15	11	23	9	5	1
62	11	9	6	5	5	5	11	5	8	7	15	7	17	10	21	9	4	2
63	10	8	6	5	6	5	10	5	6	7	16	7	19	10	21	8	4	2
64	13	8	6	6	3	5	9	5	8	7	12	7	24	12	14	8	7	2
65	15	8	8	5	3	4	14	5	6	5	13	6	21	11	16	7	3	1
66	11	8	8	5	7	5	11	6	8	7	14	8	22	10	17	7	2	C
67	13	8	7	5	5	5	10	6	9	7	14	8	25	13	16	8	1	0
68	11	7	7	5	6	5	10	6	8	7	15	7	23	11	18	7	2	C
69	10	7	8	5	5	6	12	6	7	7	14	7	23	11	17	7	3	C
Total	190	136	107	94	94	92	181	102	101	120	207	219	490	202	204	124	57	3
Avg	11.2	8	6.3	5.5	5.5	5.4	10.6	6	6	7	9	13.6	29	11.9	17.5	7.8	5.1	

Details
% frequency
Ave velocity

(DOW CHEM.)

ROCKY FLATS PLANT
ENVIRONMENTAL MONITORING

V - V#8. sample location
S - Air sample location
W - Water sample location



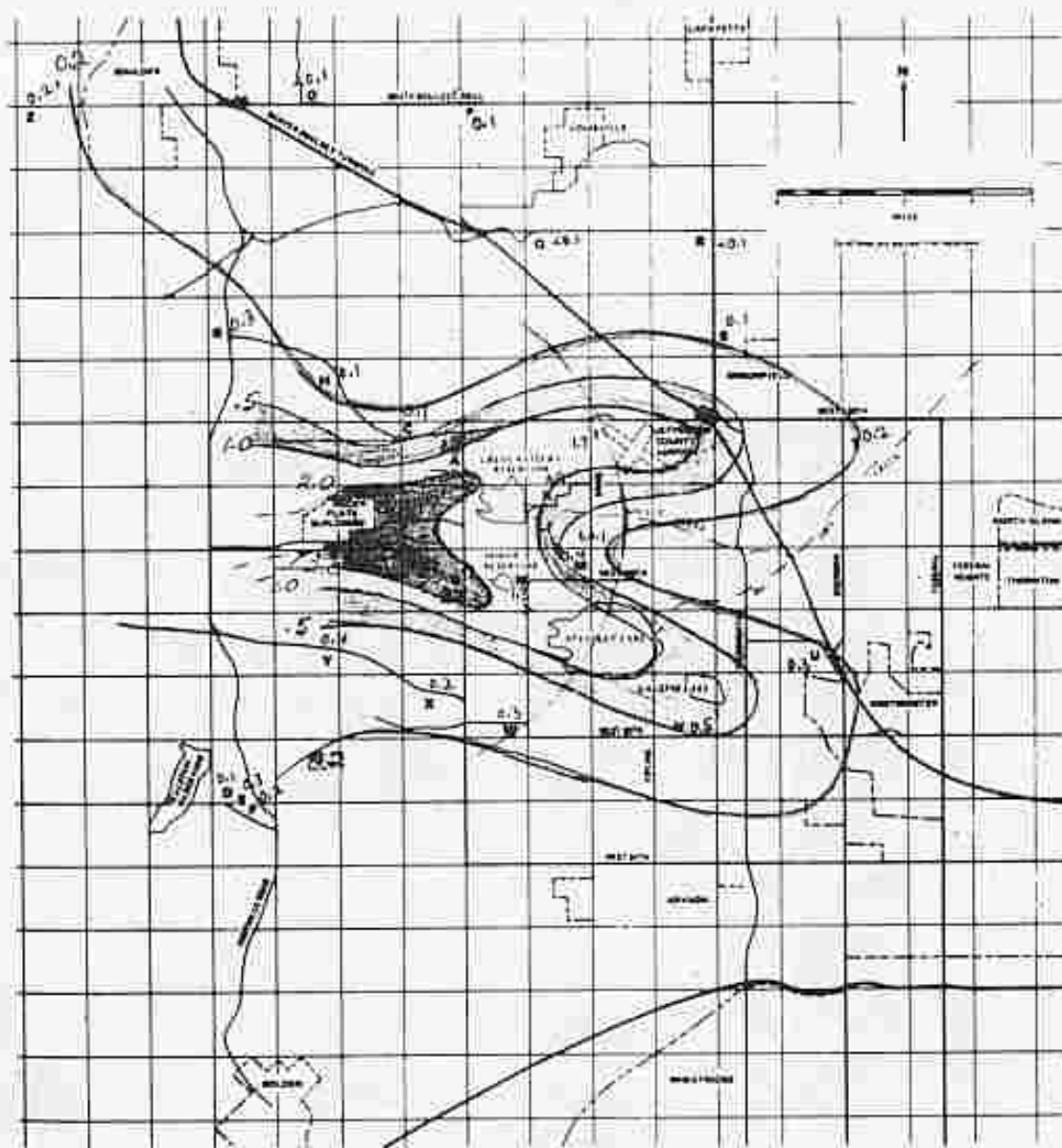


FIGURE 4: Dow Rocky Flats Plutonium Plant and surrounding areas. Capital letters indicate soil sampling sites (see Table 1 for partial results). Prevailing winds are westerlies.

Sample	P_c^{25} dgm/y ± 1.0
O	.068 ± .011
P	.105 ± .015
Q	.040 ± .007
R	.078 ± .016
S	.102 ± .011
T	.175 ± .038
U	.332 ± .046
V	.543 ± .027
W	.033 ± .009
X	.687 ± .017
Y	.420 ± .025
Z ₁	.192 ± .014
Z ₂	.104 ± .023

(sandy)
Soil Profile 1 at I location
I₁ = 1.72 ± .08 dgm/y P_c²⁵
I₂ = .370 ± .028

Top 1/8" = .090 ± .022

1/8 - 1/4" = .049 ± .010

1/4 - 1" = .030 ± .008

2" - 3" = .078 ± .015

5" - 5 1/2" = .135 ± .018

.096 ± .016

(clay type soil)
Soil Profile 2 @ 1/2 mile N of "J"

Top 1/8" 3.44 ± .53 dgm/y P_c²⁵

1/8 - 1/4" 1.73 ± .09

1/4 - 1" .070 ± .011

1" - 2"

2" - 3" .020 ± .006

5" - 4"

** Sample from same general position not taken same time as Z₁

Location	$2p/\bar{p} \pm 1\sigma$ P_{23}	$4p/\bar{p} \pm 1\sigma$ P_{43}	$P_{24}/P_{34} \pm 1\sigma$
D	$0.128 \pm .007$	$2.242 \pm .010$	$0.439 \pm .034$
P	$0.105 \pm .015$	$1.41 \pm .02$	$0.077 \pm .010$
M ⁶⁵	$0.304 \pm .025$	$4.24 \pm .01$	$0.063 \pm .005$
Depth hole from 20g sample	$0.043 \pm .005$	$1.00 \pm .01$	$0.043 \pm .005$
Soil from post hole - 14" deep - lowest area	$.068 \pm .012$	$0.126 \pm .018$	$.314 \pm .122$
Silt - bottom of gully near B	$1.58 \pm .07$	$0.185 \pm .016$	$8.42 \pm .81$
(clay type soil) Soil Profile #3 (near Southwestern Reservoir)	$5.02 \pm .17$ $2p/\bar{p} P_{23}$		

MONTHLY WEATHER SUMMARY FOR SEPTEMBER, 1957
 (Compiled by the Health Physics and Medical Section)

Weather conditions at Rocky Flats for the month
 of September are summarized as follows:

1. Temperature

(Temperature data except maximum and minimum are based on hourly observations.)

	Sept., 1957	Five years including 1957 NORMAL	NO-NORM 1956
Mean Temperature	60° F	64° F	66° F
Maximum Temperature	87° F 9/ 8/57	89° F	93° F 9/ 1/55
Minimum Temperature	32° F 9/13,14/57	37° F	32° F 9/13,14/56
Average of daily maximums	72° F	76° F	80° F 1956
Average of daily minimums	48° F	52° F	48° F 1957

2. Relative Humidity
 (Based on hourly observations)

Average relative humidity	49%	39%	49% 1957
Average relative humidity at 5 A.M.	63%	51%	63% 1957
Average relative humidity at 2 P.M.	36%	28%	36% 1957

3. Precipitation (reported as inches of water)

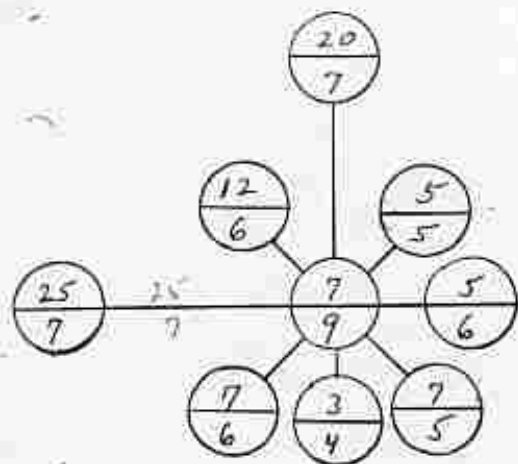
Total precipitation	1.76	1.01	2.15 1955
No. of days with 0.01" or more	5	3	6 1954

4. Wind

a - Peak gust velocities

Peak gust velocity	41 mph	55 mph	73 mph 9/28/53
Direction of peak gust	W	W	W
Average of daily peak gust velocities	21 mph	23 mph	25 mph '53 & '56
Predominant direction for peak gusts	W	W	W
No. of days with peak gusts over 40 mph in this period	2	4	5 '54 & '56

Norm 6



- A = frequency for a direction (%)
- B = average velocity (mph) for a direction from which the wind blows
- C = calms (%)
- D = variable direction (%)

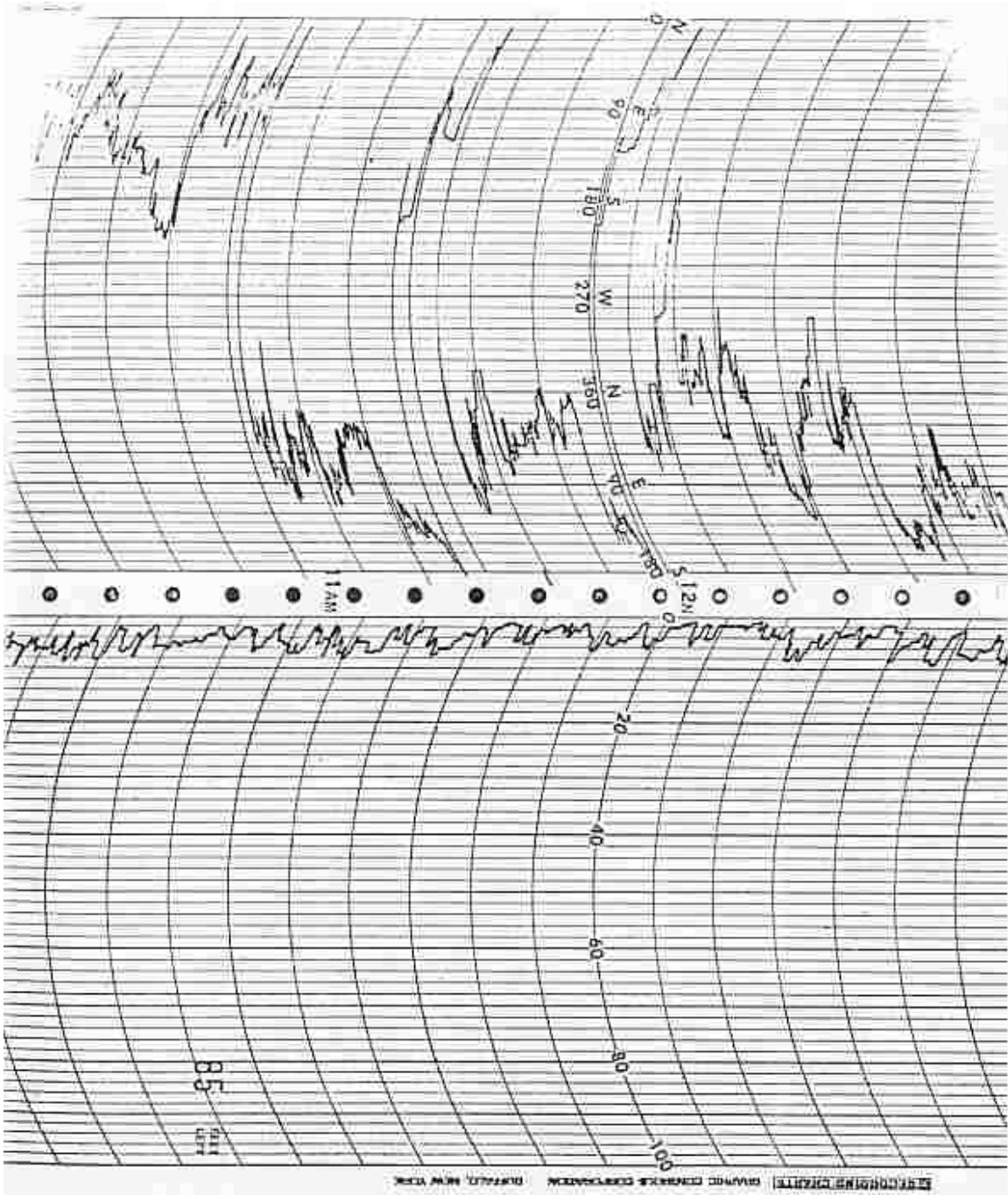


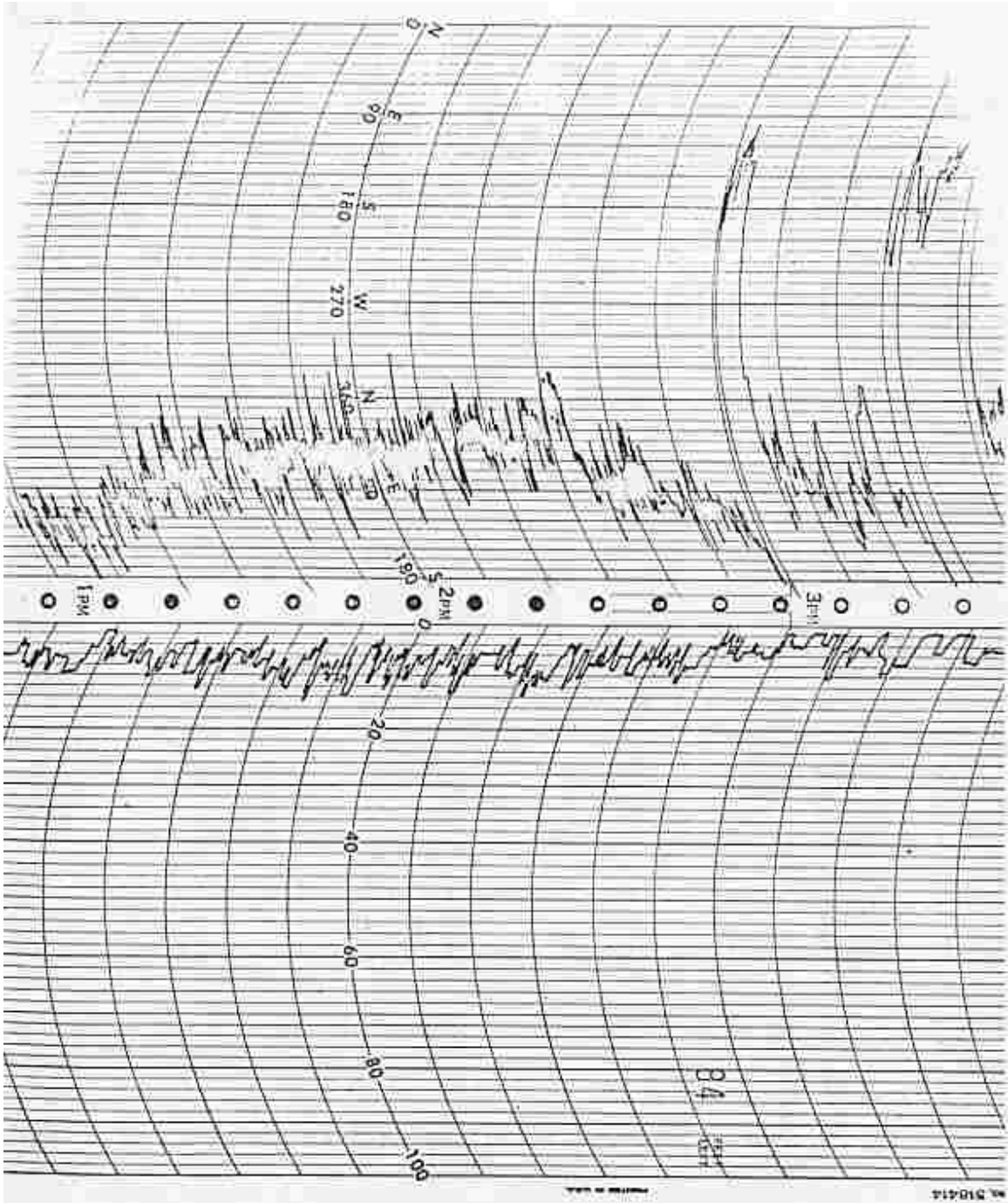
Scale for length of wind frequency lines

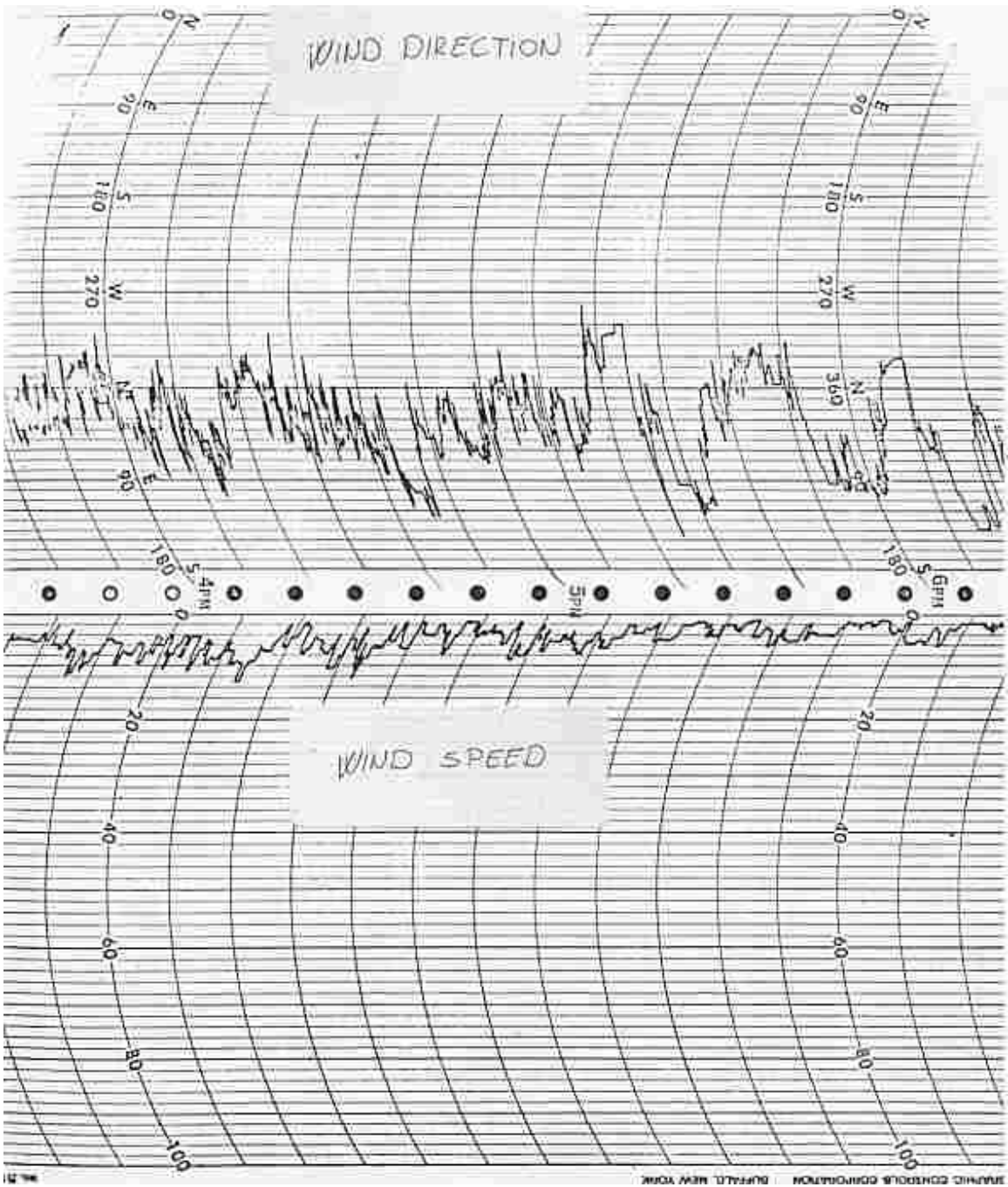
b - Wind rose

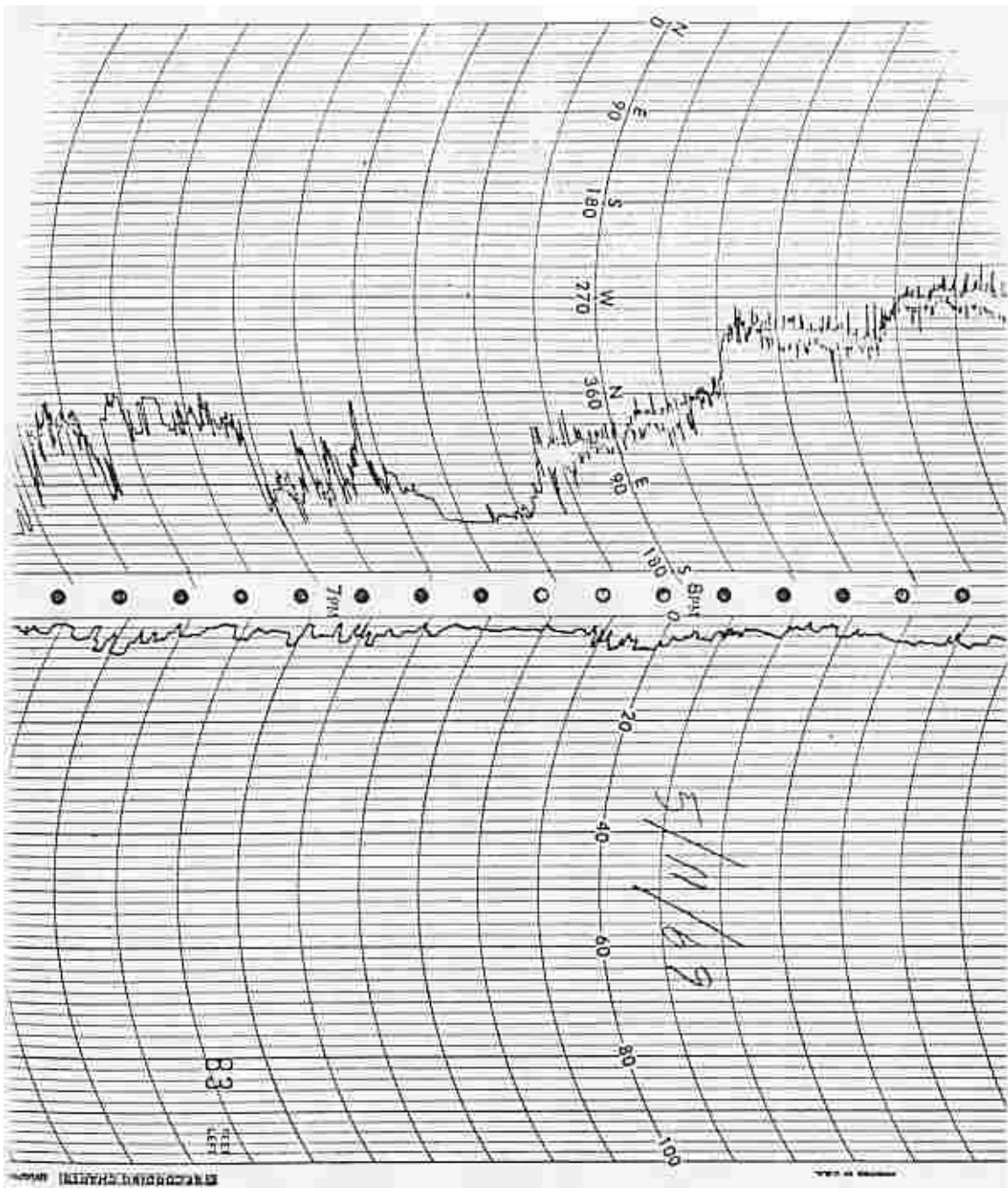
DAILY WEATHER SUMMARY FOR SEPTEMBER, 1957

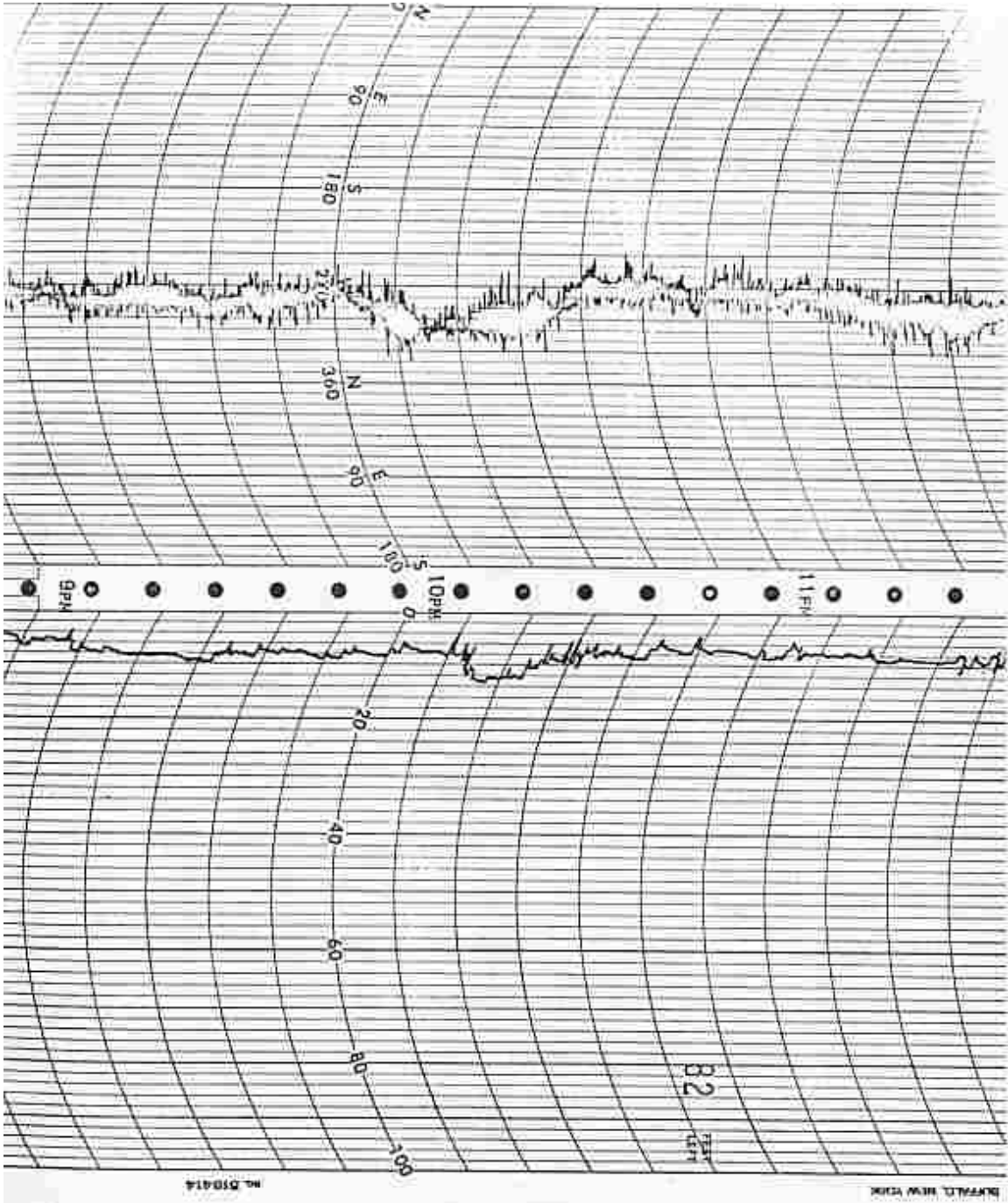
Date	Max. Temp.	Min. Temp.	Mean Temp.	Mean Press. (Hg, in.)	Mean Humidity	Total Precipitation
1	75 ^o P.	52 ^o P.	64 ^o P.	24.33	44	--
2	82	48	65	24.37	43	--
3	81	58	69	24.32	38	--
4	84	58	69	24.29	36	--
5	80	59	69	24.35	38	--
6	74	50	56	24.44	80	0.02
7	75	46	62	24.30	53	--
8	87	56	71	24.11	33	--
9	64	47	54	24.20	58	trace
10	59	42	52	24.22	79	0.12
11	70	48	55	24.25	61	--
12	74	51	61	24.26	37	--
13	53	32	43	24.25	89	1.45
14	63	32	49	24.25	63	--
15	73	46	60	24.22	46	--
16	81	47	66	24.09	43	--
17	81	58	69	24.04	35	--
18	72	47	59	23.98	59	--
19	50	39	44	24.14	90	0.15
20	49	38	43	24.06	84	0.02
21	55	38	45	24.22	64	--
22	65	34	50	24.36	41	--
23	75	40	59	24.37	30	--
24	78	49	64	24.30	30	--
25	75	50	63	24.26	29	--
26	70	49	59	24.33	39	--
27	78	45	62	24.35	34	--
28	82	56	69	24.35	26	--
29	82	55	68	24.40	28	--
30	80	56	66	24.40	33	--

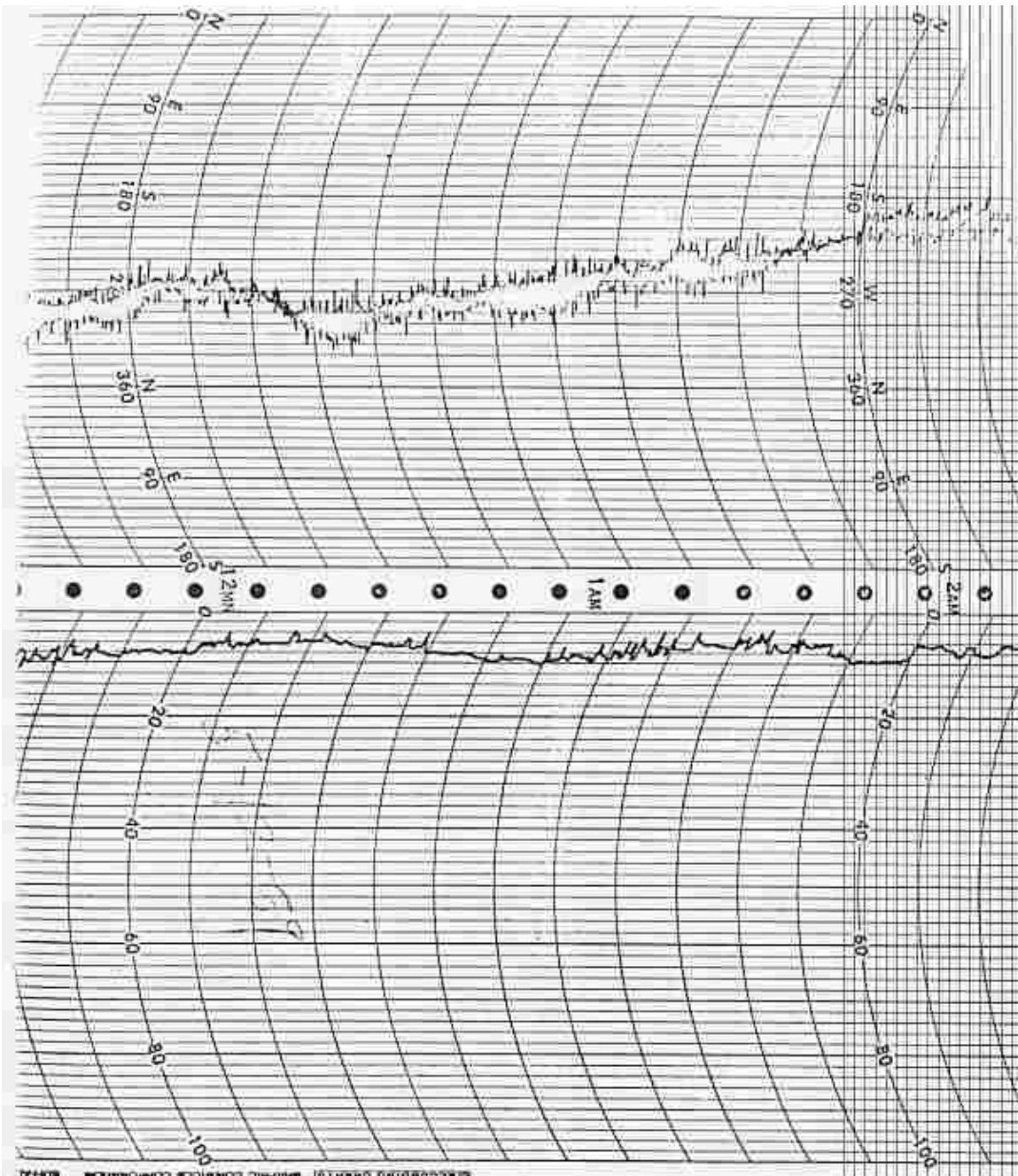


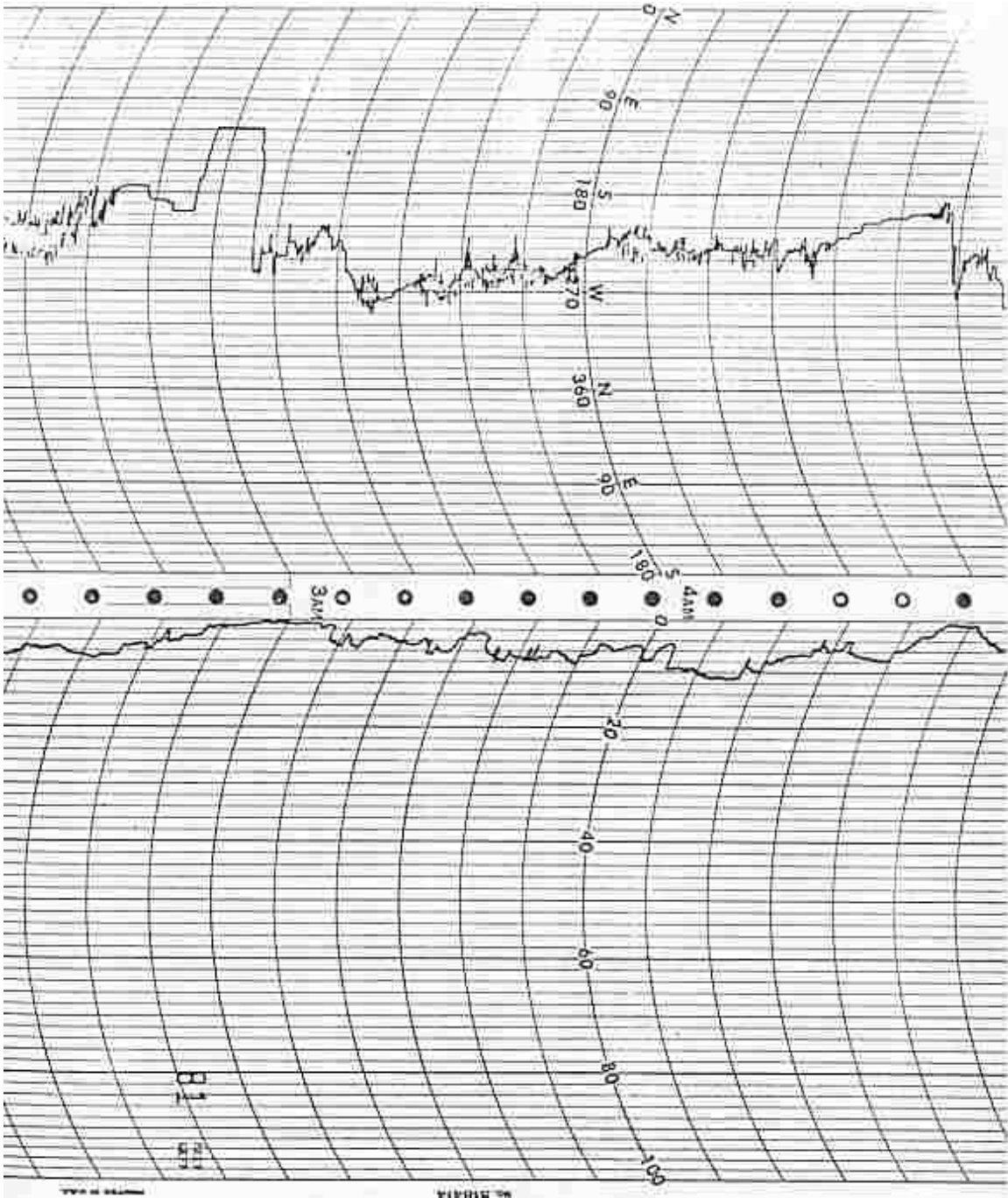


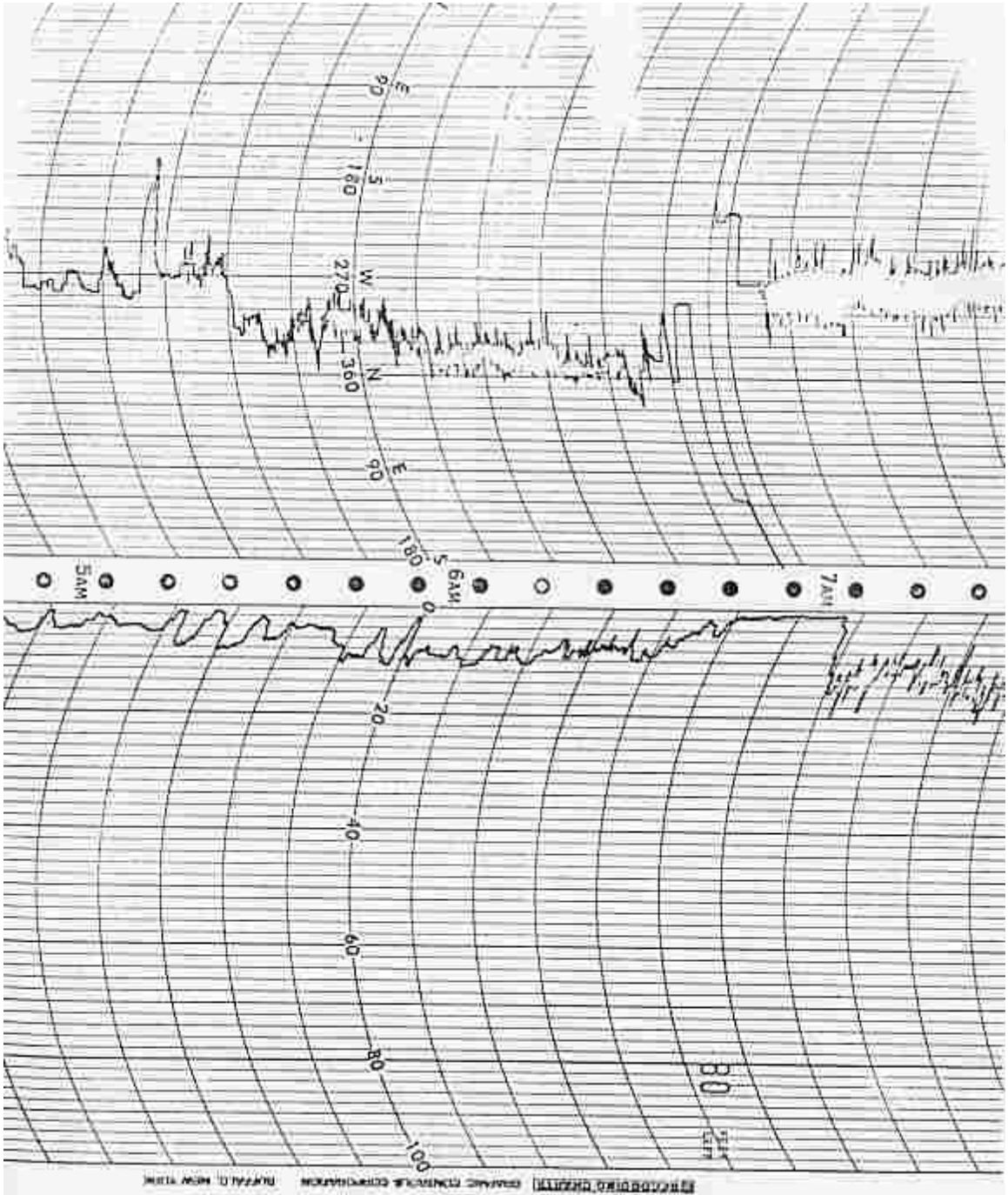


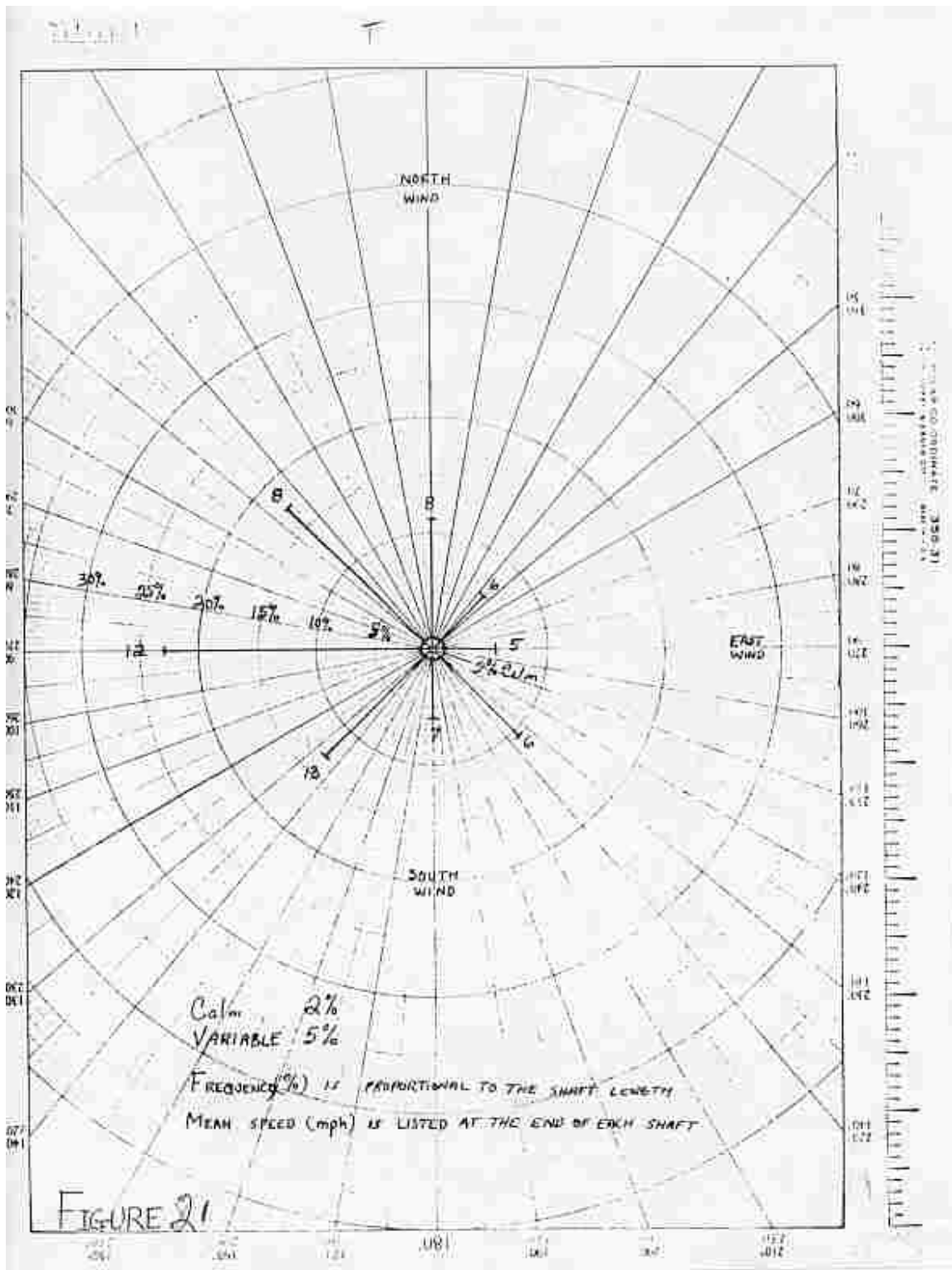














THE DOW CHEMICAL COMPANY

ROCKY FLATS DIVISION
P. O. BOX 888
GOLDEN, COLORADO 80401

July 21, 1970

Mr. Phil Krey
AEC/NYO HASL

Enclosed is a summary of wind conditions at Rocky Flats during the Building 771 fire. The time tabulated is about the duration of the fire from detection until filters were extinguished. There was no precipitation during this period.

I hope this serves your needs. Call again if you need anything else.


S. E. Hammond
Health Physics

SEH:ab
Enc.

AVERAGE WIND VELOCITY AND DIRECTION

<u>9-11-57</u>	<u>Direction</u>	<u>MPH</u>	<u>9-12-57</u>	<u>Direction</u>	<u>MPH</u>
10:00 pm	160°	4	4:15 am	290°	5
10:15	160°	1	4:30	350°	3
10:30	75°	1	4:45	120°	7
10:45	30°	3	5:00	180°	7
11:00	315°	7	5:15	150°	6
11:15	315°	7	5:30	120°	6
11:30	315°	7	5:45	95°	2
11:45	330°	10	6:00	75°	2
Midnight	290°	10	6:15	315°	1
			6:30	315°	5
<u>9-12-57</u>			6:45	315°	7
12:15 am	285°	11	7:00	330°	8
12:30 am	285°	14	7:15	310°	5
12:45 am	285°	9	7:30	345°	4
1:00	280°	8	7:45	350°	1
1:15	290°	6	8:00	30°	1
1:30	285°	7	8:15	60°	3
1:45	285°	6	8:30	75°	2
2:00	285°	6	8:45	40°	4
2:15	285°	9	9:00	30°	4
2:30	285°	10	9:15	40°	3
2:45	275°	10	9:30	25°	4
3:00	275°	13	9:45	35°	5
3:15	275°	15	10:00	30°	6
3:30	270°	12			
3:45	270°	11			
4:00	275°	12			

2-25-63

Date: Apr. 19, 1996

To: Mary Hammack, Rocky Flats plant

Fm: Joe Binder, for *Radiological Assessments Corporation*

Subj: Anemometer Traces (strip charts)

Dear Ms Hammack,

Attached is a section of On-Site Rocky Flats Plant Anemometer Traces (wind speed and wind direction strip charts from the onsite weather station). The charts show wind speed and wind direction at Rocky Flats on May 11, 1969. I obtained these traces from Phil Krey who had received them from Ray Dickson and G. E. Start. What I'm trying to locate are the complete set of wind strip charts for the period October 1, 1968 through May 1, 1969.

A telephone conversation with Reed Hodgkin, a Denver meteorological modeling consultant who has worked at the Rocky Flats facility, revealed that these charts were stored in a cargo container behind Building 123 until 1987. In 1987, they were moved to the Wind Site. And finally, in 1989, they were to be archived at the Federal Records Center in Denver. George Setlock and Wanda Busby participated in the 1989 archival process.

These anemometer traces (strip charts) are potentially of great significance to the Rocky Flats Dose Reconstruction Project being performed by *Radiological Assessments Corporation* for the Colorado Department of Public Health and Environment, and are requested under the Freedom of Information Act. Your assistance in locating these materials would be greatly appreciated.

Sincerely,

Joe Binder
Graduate Student, CSU
Consultant to *Radiological Assessments Corporation*
1175 Niagara #7, Fort Collins CO 80525

Telephone: 970-493-6410 day
970-221-4768 home
970-491-5222 Colorado State University
Fax: 970-224-5667

Date: Apr. 12, 1996

To: Bert Crist

Fm: Joe Binder

Subj: Anemometer Traces

Dear Mr. Crist,

Attached is a section of On-Site Rocky Flats Plant Anemometer Traces (wind speed and wind direction strip charts). The charts show wind speed and wind direction at Rocky Flats on May 11, 1969. I obtained these traces from Phil Krey who had received them from Ray Dickson and G. E. Start. What I'm trying to locate are the wind strip charts for the following time period: 10/01/1968 - 05/01/1969.

A telephone conversation with Reed Hodgkin revealed that these charts were stored in a cargo container behind Building 123 until 1987. In 1987, they were moved to the Wind Site. And finally, in 1989, they were supposedly archived at the Federal Record Center in Denver. Supposedly George Setlock and Wanda Bushy participated in the 1989 archival process. It is possible the boxes are still in the possession of Mr. Setlock.

I would appreciate if you could provide any assistance in finding these anemometer traces.

Sincerely,

Joe Binder

My phone #'s: 970-493-6410 day
970-221-4768 home
970-491-5222 Colorado State University

You can leave a message for me at any of these phones.

Fax # 303-966-4987

Date: Feb. 28, 1996
To: Loretta Dolan
From: Joe Binder

Dear Loretta,

Enclosed is a copy of a certain section of the document I received from Dr. Philip Krey. I hope that this information will eventually lead us to the location of the anemometer traces taken at the Rocky Flats Plant Meteorological Station.

Please contact me as soon as you have information either regarding the telephone number of C. Ray Dickson or the location of the original Rocky Flats anemometer traces (wind direction and speed charts).

Sincerely,
Joe Binder

My home phone number: 970-221-4768
Phone number at CSU Rad. Health Sci. Office: 970-491-5222
(you can leave message at either place)

2/28/96
sent at 2:15pm
JH

Date: Apr. 04, 1996

To: David Procknell

From: Joe Binder

Subject: Anemometer Traces

Dear David,

Attached is a section of On-Site Rocky Flats Plant Anemometer Traces (wind speed and wind direction strip charts). The charts show wind speed and wind direction at Rocky Flats on May 11, 1969. I obtained these traces from Phil Krey who had received them from Ray Dickson and G. E. Start. What I'm trying to locate are the wind strip charts for the following time period: 10/01/1968 - 05/01/1969.

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I would appreciate if you could provide any assistance in finding these anemometer traces.

Sincerely,

Joe Binder

My phone #'s: 970-493-6410 day
970-221-4788 home
970-491-5222 Colorado State University

You can leave a message for me at any of these phones.

This is an original Roshy Flats wind speed and direction trace.

