ENVIRONMENTAL DATA BASE
FOR REGIONAL STUDIES IN THE HUMID TROPICS

MONTHLY
MICROCLIMATIC SUMMARY

JANUARY 1967

LIBRARY

N.O.A.A.
U.S Dept of Commerce

Prepared by

Michael A. Fradel, Project Officer
and
Dr. Wilfried H. Portig, Meteorologist

USATECOM Project No. 9-4-0013-01

This research was supported by the Advanced Research Projects Agency of the Department of Defense and by the Army Research Office, OCRD, Department of Army

Conducted by

US Army
Tropic Test Center
Fort Clayton, Canal Zone
with contractual services provided by
Weather Engineers of Panama Corp.

QC
986
.P2
M66
1967
Jan.-June

144 857

National Oceanic and Atmospheric Administration

Climate Database Modernization Program

ERRATA NOTICE

One or more conditions of the original document may affect the quality of the image, such as:

Discolored pages
Faded or light ink
Binding intrudes into the text

This document has been imaged through the NOAA Climate Database Modernization Program. To view the original document, please contact the NOAA Central Library in Silver Spring, MD at (301) 713-2607 x124 or www.reference@nodc.noaa.gov.

LASON
Imaging Subcontractor
12200 Kiln Court
Beltsville, MD 20704-1387
March 28, 2002

Distribution of this document is unlimited

TABLE OF CONTENTS

	Page
Introduction	1
Sites	1
Instrumentation	1
Data Reduction and Storage	2
Figures	
1. Location Map, Isthmus of Panama	3
2. Frequency of Observations	4
3. Albrook Forest Site, Generalized Plot	5
4. Chiva Chiva Open Site, Generalized Plot	6
5. Instrument Location on Towers	7
Data Summary Sheets	
Monthly Means of Air Temperature by Hour	8
Monthly Ranges of Air Temperature by Hour	9
Monthly Means of Relative Humidity by Hour	10
Monthly Ranges of Relative Humidity by Hour	11
Monthly Means of Other Elements by Hour	12
Monthly Means of Wet Bulb Temperature by Hour	
Monthly Means of Barometric Pressure by Hour	
Monthly Means of Precipitation by Hour	
Monthly Totals of Precipitation by Hour	
Monthly Ranges of Other Elements by Hour	13
Monthly Ranges of Wet Bulb Temperature by Hour	
Monthly Ranges of Barometric Pressure by Hour	
Monthly Ranges of Precipitation by Hour	
Monthly Means of Wind Speed by Hour	14
Monthly Ranges of Wind Speed by Hour	15
Relative Frequencies of Wind Directions (46 meters, Albrook)	16
Relative Frequencies of Wind Directions (26.5 meters, Albrook)	17
Relative Frequencies of Wind Directions (4 meters, Albrook)	18
Relative Frequencies of Wind Directions (46 meters, Chiva Chiva)	19
Relative Frequencies of Wind Directions (26.5 meters, Chiva Chiva)	20
Relative Frequencies of Wind Directions (4 meters, Chiva Chiva)	21
Summary of Elements with Non-Hourly Frequencies of Observation	22
WBGT (Albrook)	
Evaporation (Albrook)	
Precipitation (Manual gauge network, Albrook)	
Precipitation (Stem Flow, Albrook)	
WBGT (Chiva Chiva)	
Evaporation (Chiva Chiva)	
Minimum Grass Temperature (Chiva Chiva)	

MONTHLY MICROCLIMATIC SUMMARY

Introduction

Monthly microclimatic data summarized in this series of reports were collected by the US Army Tropic Test Center and the Weather Engineers of Panama Corporation under the project, Environmental Data Base for Regional Studies in the Humid Tropics. The project is sponsored by the Advanced Research Projects Agency of the Department of Defense and by the Army Research Office, Office of the Chief of Research and Development. It is an investigation of microclimatic, air chemistry, vegetation, soils, microbiological, and macrofaunal conditions at selected sites in the principal tropical environments of the Panama Canal Zone and the Rio Hato Military Reservation. The objective of the project is to assemble quantitative environmental data for RDT&E purposes.

Sites. Data summarized in this report were collected at the Albrook Forest and Chiva Chiva sites. Figure 1 shows the site locations within the Isthmus of Panama. Geographic coordinates are shown below:

Albrook Forest	09° 01'N, 79° 33'W
Chiva Chiva	09° 01'N, 79° 35'W

The Chiva Chiva open site and the Albrook Forest site are paired for comparative study of environmental conditions in a tropical semideciduous forest and in a large clearing. Both are located in a region where the annual precipitation is approximately 80 inches and there is a pronounced dry season. The other satellite sites were located primarily for soil studies purposes. Albrook and Fort Kobbe have climatic regimes similar to the principal sites.

The Albrook and Chiva Chiva main sites are approximately four kilometers apart. Each has a 46 meter walk-up tower and an air-conditioned building to house the recording equipment and observers. Both sites are approximately 30 meters above sea level. The top of the forest canopy at the Albrook site is about 26.5 meters above the ground.

Instrumentation. A wide range of climatic elements are measured at the Albrook and Chiva Chiva sites. Types of observations and frequencies are shown on Figure 2. The towers at the Albrook and Chiva Chiva sites are similarly oriented. Sensing equipment is mounted at several levels on the towers to provide measurements through the vertical profile. Additional instruments are emplaced in the immediate vicinity on or near the ground. All instrument exposures are duplicated at each site. Figures 3, 4, and 5 show the instrument array at these sites.

Data Reduction and Storage. All data, as applicable, are recorded at or reduced to each full hour and transposed to punch cards. These punch cards, together with all raw data, are stored in the Tropic Test Center Technical Library Annex.

The relative humidity data contained in this report required some adjustment due to the difficult problems in maintaining hair hygrometers in the humid tropics. The hygrometers show saturation at a time when the psychrometer shows a relative humidity well below 100%. For this reason the hourly measurements made by means of a hair hygrometer have been modified on the basis of simultaneous psychrometer readings of other levels. Details will be given in the fourth Semiannual Report. It can be assumed that the means of relative humidity presented in this volume are very close to the true means.

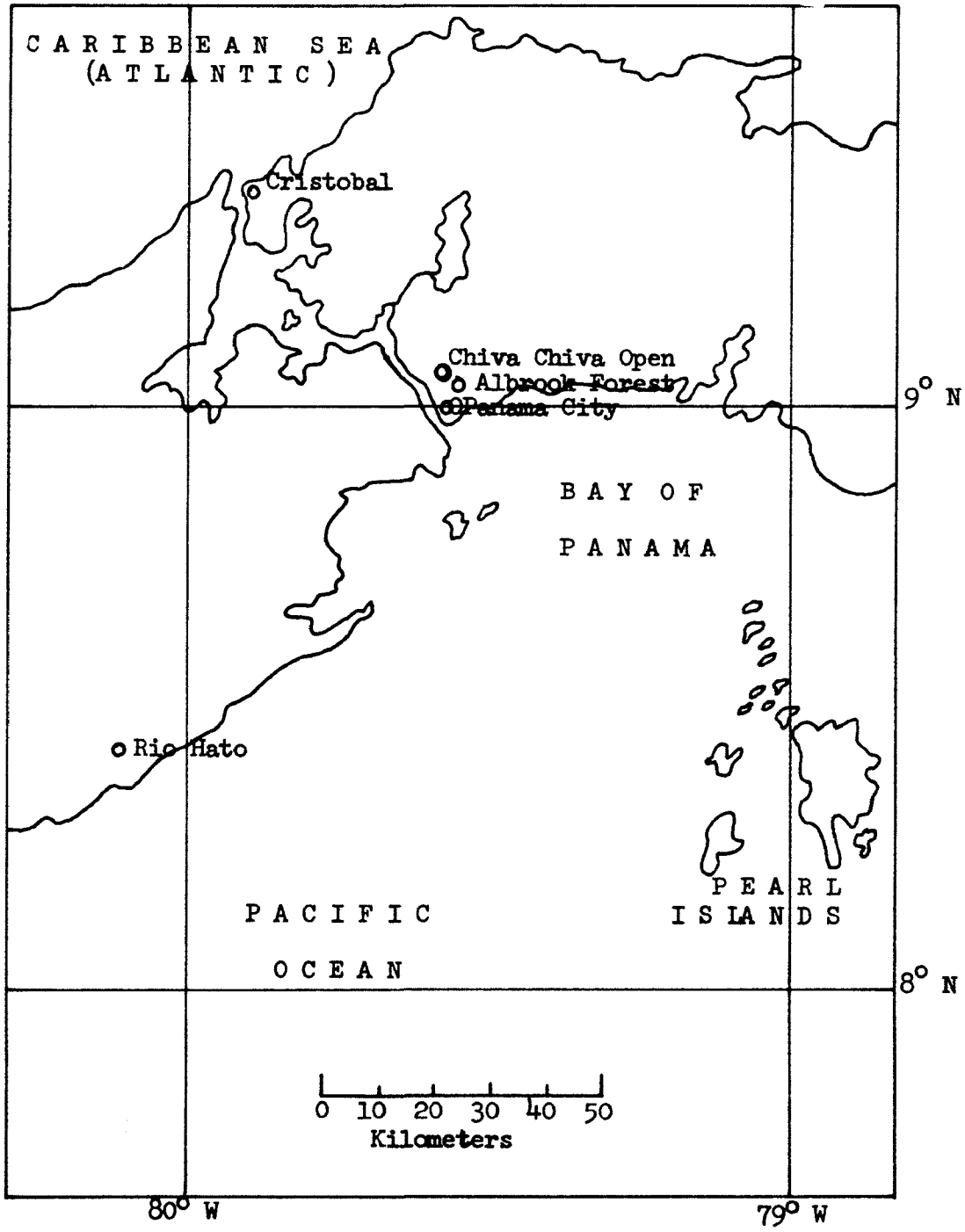

FIGURE 1. LOCATION MAP, ISTHMUS OF PANAMA

FIGURE 2. FREQUENCY OF OBSERVATIONS

# Element	Height (meters) Sfc	0.5	1.0	2.0	4.0	8.0	13.5	26.5	28.5	46.0	Frequency
Temperature:											
Dry Bulb	-	1	1	1	1	2	1	1	-	1	Hourly*/Continuously
Wet Bulb	-	1	-	1	1	-	-	-	-	-	Hourly*/Continuously
Grass Minimum	3	-	-	-	-	-	-	-	-	-	Once Daily
WBGT Index	-	-	1	-	-	-	-	-	-	-	Hourly (0600-1900 EST)
Relative Humidity	-	1	1	1	1	-	1	1	-	1	Hourly*/Continuously
Barometric Pressure	-	-	1	-	-	-	-	-	-	-	Continuously
Evaporation	-	1	-	-	-	-	2	2	-	2	Once Daily
Precipitation:											
Recording Gage	-	-	1	-	-	-	-	-	-	2	Continuously
Manual Gage	-	-	2	-	-	-	-	-	-	-	4 Times Daily
Stem Flow	-	-	-	2	-	-	-	-	-	-	4 Times Daily
Wind:											
Direction	-	-	-	-	1	-	-	1	-	1	Continuously
Speed	-	-	-	3**	1	-	3**	1	-	1	Hourly**/Continuously

1. Albrook and Chiva Chiva
2. Albrook only
3. Chiva Chiva only

* Observations made with sling psychrometer when recorders are inoperative.

** Hourly

\# Instrument descriptions are contained in the Environmental Data Base semiannual reports.

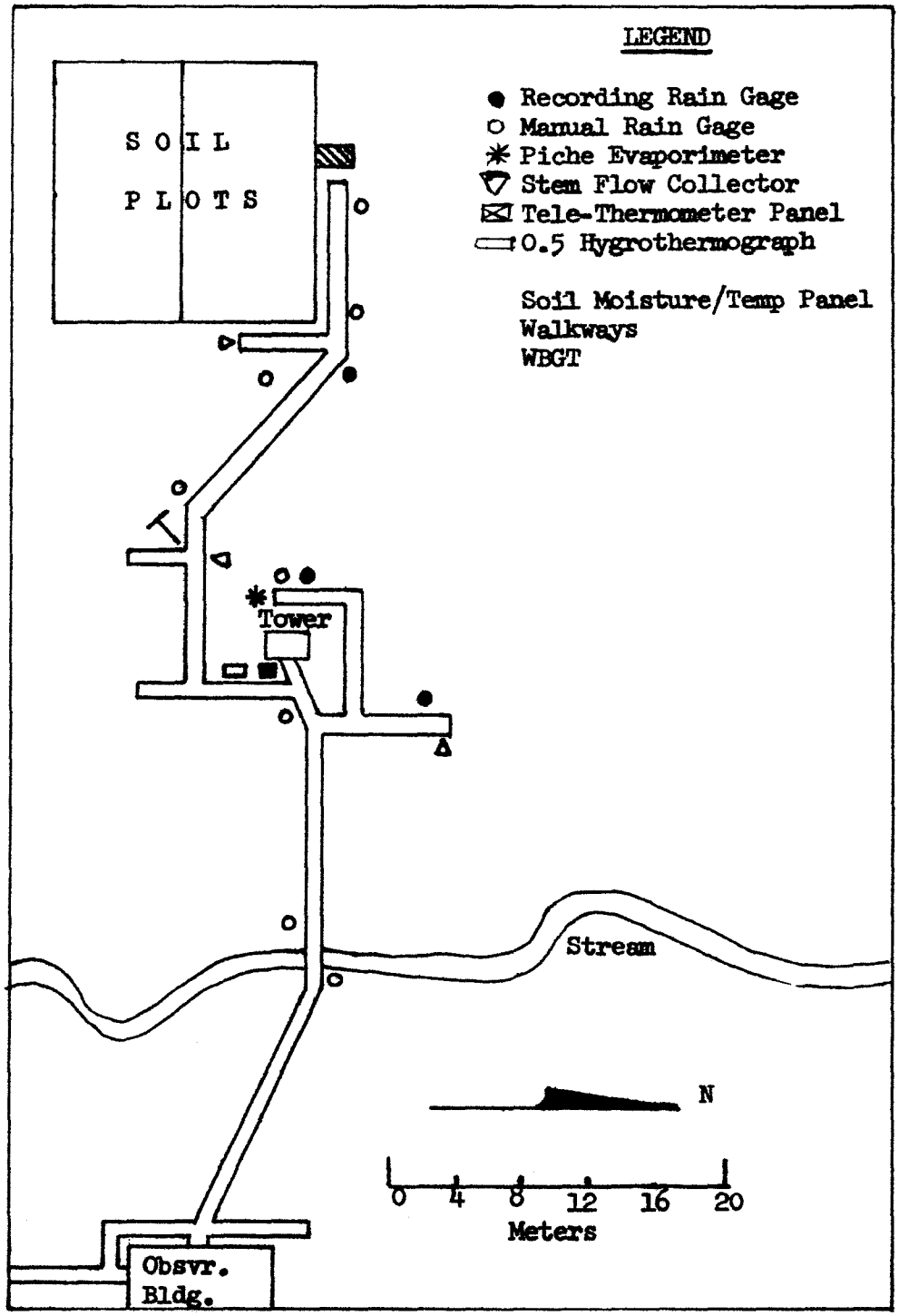

FIGURE 3. ALBROOK FOREST SITE, GENERALIZED PLOT

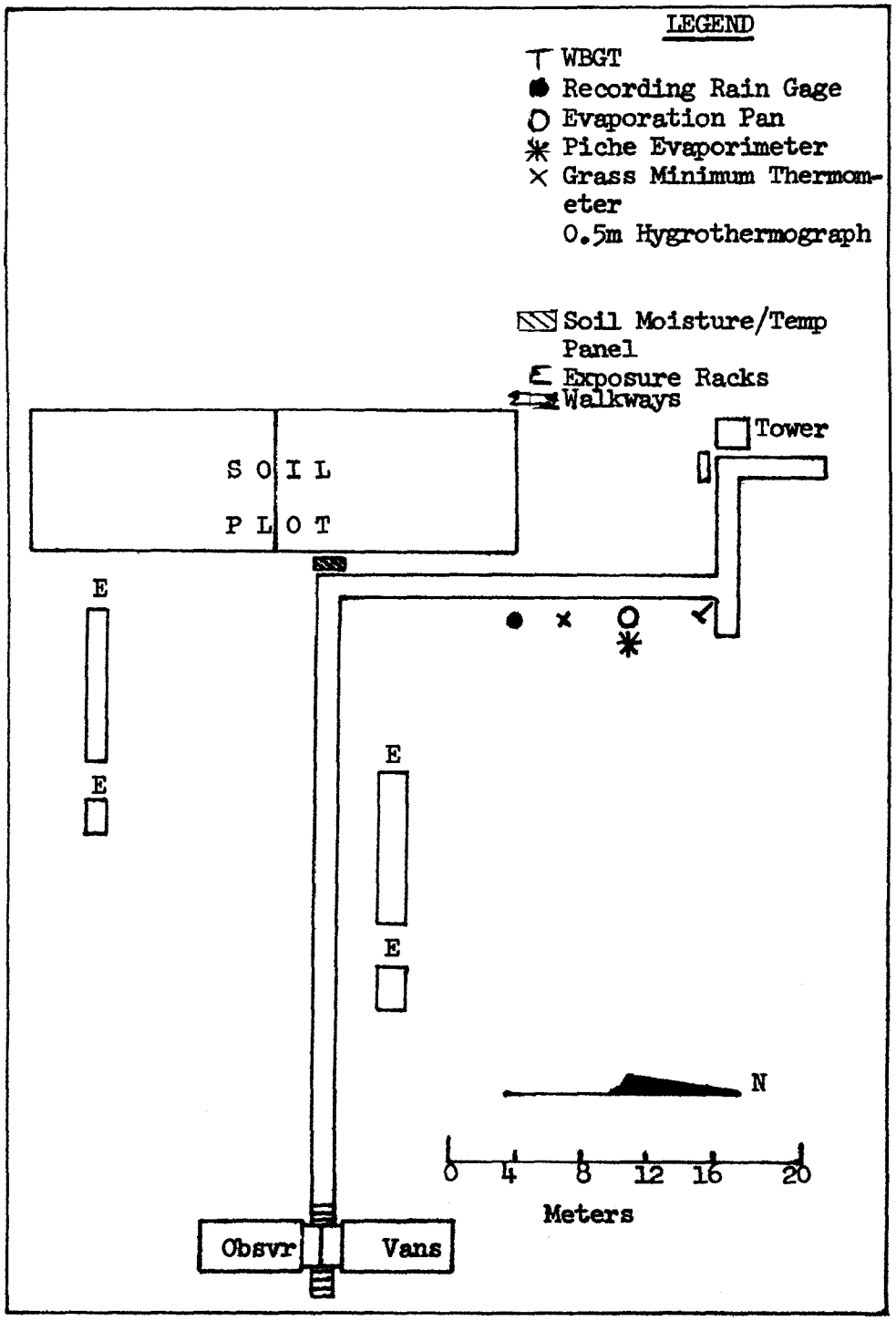

FIGURE 4. CHIVA CHIVA OPEN, GENERALIZED PLOT

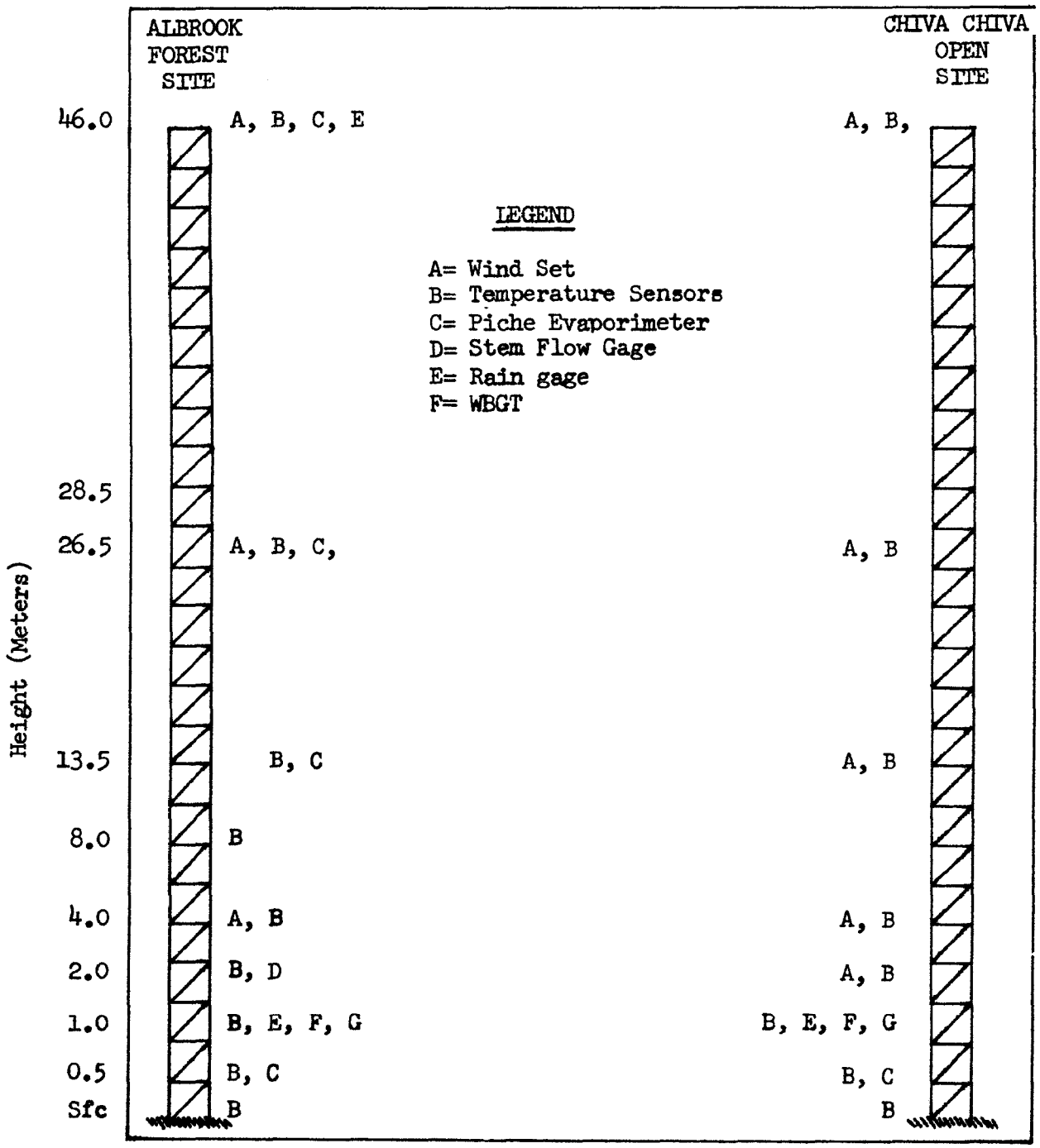

FIGURE 5. INSTRUMENT LOCATION ON TOWERS

SUMMARY OF METEOROLOGICAL OBSERVATIONS

HOURLY DATA

JANUARY 1967

Exposure		Monthly Means of Air Temperature by Hour (°F)																								Monthly Summary			
Site	Level	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	No. of obs.	Min.	Mean	Max.
Albrook (Forest site)	46.0 m	74.9	74.7	74.5	74.4	74.2	74.2	74.7	76.8	80.6	82.7	84.0	84.9	85.6	85.3	85.0	83.7	82.3	80.1	77.8	76.7	76.0	75.5	75.0	74.9	744	71.7	78.7	89.2
	28.5 m	This level was not instrumented for air temperature at this time																											
	26.5 m	74.5	74.3	74.0	73.9	73.6	73.5	73.8	76.3	80.8	83.3	84.8	85.6	86.1	86.2	86.0	84.7	83.6	81.0	77.9	76.6	75.7	75.3	74.9	74.6	744	69.1	78.8	89.1
	13.5 m	74.1	73.9	73.6	73.4	73.3	73.0	72.9	74.9	78.5	81.2	83.2	84.5	85.0	85.3	84.6	83.5	82.5	80.1	77.8	76.5	75.6	74.9	74.5	74.2	744	69.3	78.0	88.2
	8.0 m	73.5	73.2	73.1	72.6	72.6	72.5	72.4	74.8	78.6	81.2	82.9	83.9	84.6	84.5	83.8	82.9	81.5	78.9	76.5	75.5	74.7	74.3	73.8	73.5	743	69.1	77.3	87.9
	4.0 m	73.1	72.8	72.5	72.2	72.3	72.0	72.1	74.7	78.6	81.1	82.7	83.6	84.6	84.3	84.0	82.8	81.0	78.1	76.2	75.0	74.2	73.9	73.4	73.1	744	69.0	77.0	87.8
	2.0 m	73.0	72.7	72.4	72.2	72.2	72.0	72.0	74.5	78.2	80.5	82.3	83.3	84.3	84.1	84.0	82.7	80.8	78.1	76.2	74.9	74.1	73.8	73.3	73.1	744	69.0	76.9	87.7
	1.0 m	73.2	73.0	72.8	72.5	72.4	72.1	72.2	74.5	78.2	80.7	82.4	83.6	84.5	84.9	83.9	82.8	81.1	78.4	76.2	75.5	74.7	74.1	73.8	73.4	744	69.2	77.1	91.0
	0.5 m	73.5	73.2	73.0	72.7	72.6	72.4	72.3	74.0	77.3	79.7	81.6	83.0	83.7	83.8	83.8	82.8	81.3	79.0	76.9	75.7	74.9	74.3	73.9	73.5	742	70.0	77.0	86.7
Chiva Chiva (Open site)	46.0 m	75.1	75.0	74.9	74.8	74.7	74.6	74.9	76.2	79.3	81.4	83.0	84.0	84.5	84.5	84.2	83.3	82.1	80.2	77.9	76.9	76.2	75.9	75.5	75.3	743	72.3	78.5	86.7
	28.5 m	This level was not instrumented for air temperature at this time																											
	26.5 m	75.1	74.9	74.8	74.7	74.5	74.3	74.4	76.3	79.6	81.8	83.4	84.5	84.9	85.0	84.6	83.9	82.7	80.6	78.3	77.3	76.4	76.0	75.6	75.4	744	71.4	78.7	86.5
	13.5 m	74.9	74.7	74.6	74.5	74.3	74.1	74.2	76.4	80.1	82.2	83.7	84.7	85.2	85.3	84.9	84.0	82.7	80.6	78.2	77.1	76.3	75.9	75.5	75.2	744	70.2	78.7	87.6
	8.0 m	This level was not instrumented for air temperature at this time																											
	4.0 m	74.3	74.0	74.1	74.0	73.7	73.2	73.8	78.4	81.3	84.1	85.2	86.3	86.7	86.6	85.9	84.7	82.9	79.7	77.3	76.2	75.4	75.0	74.8	74.6	744	69.5	78.8	89.5
	2.0 m	73.8	73.6	73.7	73.7	73.2	72.6	73.6	78.8	82.0	84.8	86.3	87.5	87.8	87.7	86.7	85.4	83.6	79.7	77.2	76.0	75.2	74.8	74.4	74.1	744	68.8	79.0	90.4
	1.0 m	73.8	73.5	73.5	73.3	73.0	72.3	73.5	79.2	82.7	85.6	87.0	88.6	88.8	88.6	87.4	85.5	83.5	79.6	76.9	76.5	75.5	74.9	74.4	74.1	744	68.5	79.2	93.0
	0.5 m	73.4	73.3	73.1	73.1	72.8	72.4	73.2	80.0	84.6	87.4	88.8	90.3	90.0	90.1	88.5	86.5	84.2	79.5	77.0	75.8	75.0	74.5	74.1	73.7	744	68.9	79.6	94.9

SUMMARY OF METEOROLOGICAL OBSERVATIONS

HOURLY DATA

JANUARY 1967

Exposure		Monthly Ranges of Air Temperature by Hour (°F)																								Monthly Summary*			
Site	Level	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24				
Albrook (Forest site)	46.0 m	3.8	3.3	3.0	3.7	5.0	5.4	3.6	5.9	6.9	4.9	4.9	6.5	7.6	7.1	8.1	10.0	8.4	7.4	6.2	2.9	3.6	3.3	4.6	4.8				
	28.5 m	This level was not instrumented for air temperature at this time																											
	26.5 m	3.7	3.9	5.1	7.0	7.5	8.0	6.3	7.4	6.9	5.5	5.4	7.1	8.1	7.5	8.6	10.9	10.8	10.0	6.2	4.2	3.8	3.0	4.2	4.3				
	13.5 m	5.6	5.9	6.4	5.8	6.4	6.9	5.6	6.3	5.0	5.2	6.2	8.8	7.8	7.2	8.6	9.0	8.3	7.0	5.1	4.5	4.3	4.8	4.9	4.7				
	8.0 m	4.9	5.6	5.6	5.6	5.4	5.6	6.1	5.5	5.3	6.6	7.4	10.8	7.0	7.9	9.1	8.9	8.3	10.2	5.1	4.9	5.1	4.9	5.2	4.7				
	4.0 m	5.7	5.0	5.1	5.8	5.3	5.4	5.1	6.1	5.5	5.5	6.7	9.3	7.8	7.5	7.9	8.6	6.8	6.5	4.9	4.5	5.1	5.5	5.6	5.5				
	2.0 m	5.9	5.5	5.0	5.2	5.8	5.5	5.4	5.8	5.2	5.5	7.0	9.7	8.3	7.2	7.5	8.7	6.6	5.7	5.0	4.5	5.0	5.2	5.3	5.7				
	1.0 m	4.7	4.1	4.1	4.5	4.8	4.3	4.9	5.0	5.0	6.1	7.5	9.4	9.5	10.2	9.3	9.0	6.5	6.2	4.2	4.3	4.5	4.9	5.1	4.9				
	0.5 m	6.2	5.2	5.0	4.2	4.2	5.0	5.3	5.4	3.8	4.0	7.4	7.0	7.2	6.6	6.6	7.8	7.2	5.8	4.8	3.7	3.8	4.8	5.4	5.6				

* No monthly summary was computed for the ranges.

Chiva Chiva (Open site)	46.0 m	2.6	3.4	3.7	3.8	4.1	3.6	3.3	3.8	5.1	3.7	3.8	4.4	6.0	4.9	8.3	7.7	7.4	6.8	4.7	3.3	3.3	3.8	3.8	3.7				
	28.5 m	This level was not instrumented for air temperature at this time																											
	26.5 m	3.9	3.4	3.6	5.1	5.1	5.0	4.7	5.8	4.9	4.6	3.8	4.9	5.9	5.0	8.1	8.2	8.3	8.1	5.1	3.9	3.4	3.9	4.3	4.1				
	13.5 m	3.5	4.0	5.0	5.4	6.7	6.3	6.4	5.4	4.6	4.0	4.2	4.5	6.6	5.9	8.1	7.6	7.2	6.6	6.2	4.0	3.4	3.2	3.5	3.4				
	8.0 m	This level was not instrumented for air temperature at this time																											
	4.0 m	5.7	5.7	6.6	6.6	6.5	5.8	5.9	6.6	7.6	5.9	5.3	7.0	7.8	8.1	10.9	10.7	9.1	6.5	4.2	4.5	4.7	4.3	4.9	6.2				
	2.0 m	5.6	5.7	6.3	6.2	7.6	7.4	6.0	7.2	7.8	6.0	6.3	7.5	8.1	8.0	11.1	9.1	9.1	6.3	4.4	4.4	5.6	4.9	5.8	5.6				
	1.0 m	4.8	4.8	5.5	5.7	6.5	7.5	6.5	8.7	10.6	9.2	8.3	10.0	9.0	10.0	13.2	10.3	8.9	6.2	6.4	3.8	4.6	4.0	4.6	4.8				
	0.5 m	6.0	6.4	6.7	6.1	7.1	7.3	6.2	7.5	10.8	9.7	10.8	13.9	15.4	10.6	10.1	10.5	9.0	6.4	4.0	3.6	5.1	4.6	4.8	5.6				

SUMMARY OF METEOROLOGICAL OBSERVATIONS

HOURLY DATA

JANUARY 1967

Exposure		Monthly Means of Relative Humidity by Hour (%)																								Monthly Summary			
Site	Level	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	No of obs.	Min.	Mean	Max.
Albrook (Forest site)	46.0 m	85	86	86	86	86	86	85	80	72	67	62	60	58	59	61	63	67	72	77	81	83	84	85	85	740	46	76	96
	28.5 m	This level was not instrumented for relative humidity at this time																											
	26.5 m	88	89	89	89	90	90	88	83	72	67	63	60	59	60	61	63	66	73	79	82	85	86	87	88	744	50	77	97
	13.5 m	92	92	93	93	93	94	94	92	81	74	69	65	63	63	66	67	69	74	79	84	87	90	91	91	744	51	81	97
	8.0 m	This level was not instrumented for relative humidity at this time																											
	4.0 m	94	95	96	96	96	96	96	93	83	75	71	67	64	66	69	70	74	80	84	88	91	91	93	94	744	50	84	100
	2.0 m	95	95	96	96	96	96	97	94	86	78	73	70	66	67	69	72	76	81	85	89	91	92	94	94	744	52	85	100
	1.0 m	94	94	94	95	95	95	96	95	87	79	74	70	68	68	70	72	77	81	86	88	91	92	92	93	744	57	85	98
	0.5 m	94	94	94	95	95	95	96	95	91	84	78	74	71	71	72	75	79	82	86	88	90	92	93	93	730	56	87	100
Chiva Chiva (Open site)	46.0 m	86	87	87	88	87	88	87	83	76	70	64	61	59	59	60	63	66	72	77	81	84	85	85	86	744	49	77	98
	28.5 m	This level was not instrumented for relative humidity at this time																											
	26.5 m	87	88	88	88	88	89	88	83	74	68	63	60	59	58	59	62	65	71	77	82	84	85	86	87	744	47	77	97
	13.5 m	88	88	87	88	88	89	88	82	74	68	62	59	58	58	59	62	66	72	78	82	84	85	86	87	744	47	77	98
	8.0 m	This level was not instrumented for relative humidity at this time																											
	4.0 m	90	91	90	91	91	92	92	82	74	67	62	59	59	59	60	63	68	73	80	83	86	88	89	89	744	48	78	100
	2.0 m	91	91	90	91	91	93	92	81	72	65	62	58	58	57	59	62	66	73	80	84	86	88	89	90	743	46	78	99
	1.0 m	91	91	91	91	92	93	92	83	74	66	60	57	56	56	57	60	65	74	82	85	87	88	89	90	742	46	78	99
	0.5 m	92	92	92	92	93	94	93	79	69	63	59	56	56	55	58	62	65	75	81	84	87	89	90	90	744	42	78	100

SUMMARY OF METEOROLOGICAL OBSERVATIONS

HOURLY DATA

JANUARY 1967

Exposure		Monthly Ranges of Relative Humidity by Hour (%)																								Monthly Summary*			
Site	Level	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24				
Albrook (Forest site)	46.0 m	12	9	10	13	21	20	15	18	27	27	29	32	34	30	35	35	34	26	20	17	9	11	12	13				
	28.5 m	This level was not instrumented for relative humidity at this time																											
	26.5 m	12	13	9	14	17	16	13	18	30	22	22	28	32	31	31	40	31	25	26	16	11	12	11	12				
	13.5 m	9	12	10	8	11	11	7	11	24	25	30	38	35	32	42	38	40	28	25	20	15	10	9	9				
	8.0 m	This level was not instrumented for relative humidity at this time																											
	4.0 m	12	13	10	9	8	9	11	13	24	28	37	47	39	40	41	44	37	26	24	19	15	13	14	12				
	2.0 m	10	12	9	8	8	9	10	11	23	29	35	46	39	37	39	43	32	29	22	19	14	13	13	9				
	1.0 m	7	9	8	8	6	6	6	9	22	30	31	36	32	29	37	37	27	22	16	12	10	8	7	8				
	0.5 m	13	11	11	10	10	6	8	8	17	25	33	38	36	36	37	38	34	26	21	18	12	15	12	12				
Chiva Chiva (Open site)	46.0 m	16	16	12	16	14	20	20	12	18	17	16	27	29	29	33	35	31	27	20	14	14	16	16	18				
	28.5 m	This level was not instrumented for relative humidity at this time																											
	26.5 m	17	16	10	14	14	18	14	13	19	18	20	26	32	30	34	35	32	26	22	15	15	18	17	18				
	13.5 m	16	13	13	17	14	17	16	14	19	17	20	27	32	31	34	35	32	25	20	16	16	18	19	20				
	8.0 m	This level was not instrumented for relative humidity at this time																											
	4.0 m	18	15	13	16	17	15	17	20	28	18	19	29	33	31	32	34	35	27	23	19	18	14	16	19				
	2.0 m	16	11	12	13	14	12	13	20	29	23	21	27	34	33	33	34	37	25	25	20	19	20	19	20				
	1.0 m	13	11	13	14	14	12	13	23	28	22	22	32	38	33	34	36	33	26	17	13	11	14	18	16				
	0.5 m	11	12	13	11	13	14	12	23	33	22	25	40	43	31	27	40	33	24	22	16	12	14	18	19				

* No monthly summary was computed for the ranges.

SUMMARY OF METEOROLOGICAL OBSERVATIONS

HOURLY DATA

JANUARY 1967

Exposure		Monthly Means[2] of other Elements by Hour																								Monthly Summary			
Site	Code[1]	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	No of obs.	Min.	Mean	Max.
Albrook (Forest site)	WB (4.0 m)	71.9	71.8	71.6	71.5	71.5	71.3	71.4	73.3	74.8	75.0	75.3	75.0	74.9	75.2	75.6	75.1	74.6	73.5	72.8	72.4	72.3	72.1	72.0	71.9	744	68.0	73.2	80.0
	WB (2.0 m)	72.0	71.7	71.6	71.5	71.5	71.3	71.4	73.3	75.0	75.4	75.5	75.4	75.3	75.4	75.9	75.5	75.0	73.9	73.0	72.5	72.3	72.2	72.1	71.9	744	68.0	73.4	79.5
	WB (0.5 m)	72.2	72.0	71.8	71.7	71.6	71.5	71.4	73.0	75.2	75.9	76.2	76.3	76.2	76.2	76.4	76.2	75.8	74.9	73.7	73.1	72.7	72.5	72.3	72.1	730	68.8	73.8	80.6
	BP	.728	.714	.700	.695	.700	.711	.733	.755	.770	.773	.762	.739	.712	.688	.666	.662	.667	.678	.700	.715	.735	.746	.747	.743	744	.620	.718	.820
	P1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.03	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5	0.01	0.51	0.38
	P2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.01	0.00	0.00	0.00	0.00	0.00	0.26	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4	0.01	0.33	0.26
	P3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.01	0.00	0.00	0.00	0.00	0.00	0.30	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4	0.01	0.37	0.30
	P4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.01	0.00	0.00	0.00	0.00	0.00	0.31	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4	0.01	0.41	0.31
Chiva Chiva (Open site)	WB (4.0 m)	72.2	72.0	72.0	72.0	71.7	71.5	72.1	74.2	74.8	75.1	75.1	75.0	75.2	75.1	75.0	74.7	74.5	73.3	72.8	72.6	72.5	72.4	72.4	72.3	744	69.2	73.4	79.9
	WB (2.0 m)	71.9	71.7	71.7	71.8	71.5	71.1	71.9	74.4	75.1	75.5	75.7	75.6	75.6	75.5	75.3	75.0	74.5	73.3	72.7	72.5	72.3	72.2	72.0	71.9	743	68.2	73.4	78.5
	WB (0.5 m)	71.7	71.6	71.6	71.5	71.3	71.1	71.8	74.9	76.3	76.8	77.0	77.2	76.9	76.8	76.4	75.8	75.1	73.5	72.7	72.5	72.3	72.2	72.0	71.8	744	68.7	73.8	79.3
	BP	.813	.799	.785	.782	.786	.800	.818	.841	.860	.863	.854	.831	.806	.777	.756	.753	.757	.768	.788	.804	.825	.835	.834	.829	744	.705	.807	.915
	PS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2	0.02	0.11	0.09

WB - Wet bulb temperature (°F)
BP - Barometric pressure (in. of Hg minus 29.0)

PS - *Precipitation at 1.0 m. in open area (in.)*
P1 - Precipitation at 46.0 m. above canopy (in.)
P2 - Precipitation under full canopy (in.)

P3 - Precipitation under drip canopy (in.)
P4 - Precipitation under open canopy (in.)

[2] Monthly means of precipitation are computed for precipitation days.

Precipitation totals are substituted for the mean in the monthly summary.

SUMMARY OF METEOROLOGICAL OBSERVATIONS

HOURLY DATA

JANUARY 1967

Exposure		Monthly Ranges[2] of other Elements by Hour																								Monthly Summary*			
Site	Code[1]	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24				
Albrook (Forest site)	WB (4.0 m)	4.5	4.3	4.0	4.0	5.0	5.5	4.9	3.3	4.0	3.8	4.9	5.8	5.7	6.2	7.2	8.2	7.1	5.7	4.9	4.2	3.8	4.0	4.7	4.5				
	WB (2.0 m)	4.1	4.5	4.3	4.5	5.0	5.5	5.1	3.5	3.3	4.0	5.3	6.0	5.2	5.7	6.1	7.8	6.0	5.1	4.5	4.2	4.1	4.1	4.4	4.2				
	WB (0.5 m)	4.4	4.5	4.9	5.1	5.3	5.5	5.8	4.9	3.0	3.7	4.9	8.2	5.4	5.7	6.2	6.2	6.0	6.0	4.8	4.5	4.3	4.2	3.8	4.4				
	BP	.090	.095	.095	.100	.110	.105	.110	.100	.095	.090	.115	.105	.105	.120	.085	.090	.100	.115	.115	.110	.120	.115	.110	.095				
	P1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
	P2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
	P3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
	P4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Chiva Chiva (Open site)	WB (4.0 m)	3.7	3.7	4.0	3.0	4.2	3.7	4.4	3.1	2.8	4.2	4.2	5.1	5.2	5.9	8.0	7.4	8.2	5.2	5.0	5.1	4.2	3.8	4.1	4.4				
	WB (2.0 m)	4.2	3.8	4.0	3.5	5.5	5.0	4.2	2.8	2.7	4.5	4.5	4.5	5.0	6.3	6.0	4.8	6.5	5.5	5.0	5.1	4.5	4.1	4.5	4.5				
	WB (0.5 m)	3.5	3.9	4.4	3.7	4.6	4.6	3.6	3.5	3.0	3.3	3.8	3.4	3.2	3.4	3.0	3.5	4.6	4.0	3.9	3.9	3.5	3.4	4.1	4.3				
	BP	.100	.090	.090	.090	.110	.110	.105	.100	.100	.095	.100	.100	.095	.100	.090	.095	.115	.120	.140	.130	.115	.110	.105	.100				
	PS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				

* No monthly summary was computed for the ranges.

WB - Wet bulb temperature (°F)
BP - Barometric pressure (in. of Hg minus 29.0)

PS - Precipitation at 1.0 m. in open area (in.)
P1 - Precipitation at 46.0 m. above canopy (in.)
P2 - Precipitation under full canopy (in.)

P3 - Precipitation under drip canopy (in.)
P4 - Precipitation under open canopy (in.)

[2]Monthly ranges of precipitation are computed for precipitation days.

SUMMARY OF METEOROLOGICAL OBSERVATIONS

HOURLY DATA

JANUARY 1967

Exposure		Monthly Means of Wind Speed by Hour (miles/hr.)																								Monthly Summary			
Site	Level	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	No of obs.	Min.	Mean	Max.
Albrook (Forest site)	46.0 m	6	5	5	5	5	6	6	5	6	8	10	9	9	10	8	9	7	6	6	6	5	5	6	6	712	0	7	22
	28.5 m	This level was not instrumented for wind speed at this time																											
	26.5 m	1	1	1	1	1	1	2	2	2	3	3	3	3	4	2	3	2	2	2	1	2	2	2	2	710	0	2	17
	13.5 m	This level was not instrumented for wind speed at this time																											
	8.0 m	This level was not instrumented for wind speed at this time																											
	4.0 m	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1	1	0	0	0	0	1	1	709	0	0	6
	2.0 m	This level was not instrumented for wind speed at this time																											
	1.0 m	This level was not instrumented for wind speed at this time																											
	0.5 m	This level was not instrumented for wind speed at this time																											
Chiva Chiva (Open site)	46.0 m	7	7	8	7	7	7	7	7	9	11	12	13	13	14	13	12	11	10	8	9	8	8	8	7	741	0	9	25
	28.5 m	This level was not instrumented for wind speed at this time																											
	26.5 m	6	6	7	6	5	5	5	6	8	11	11	13	13	14	13	12	11	9	8	7	7	6	6	6	725	0	8	24
	13.5 m	3	3	3	3	2	2	2	4	7	11	13	14	14	14	14	12	10	8	5	5	4	4	4	4	744	0	7	30
	8.0 m	This level was not instrumented for wind speed at this time																											
	4.0 m	3	3	4	4	3	3	3	5	7	9	10	10	10	12	10	10	8	7	5	5	4	4	4	4	722	0	6	19
	2.0 m	1	2	2	2	1	1	1	3	5	7	8	9	9	10	9	8	7	4	3	3	2	2	2	2	744	0	4	18
	1.0 m	This level was not instrumented for wind speed at this time																											
	0.5 m	This level was not instrumented for wind speed at this time																											

SUMMARY OF METEOROLOGICAL OBSERVATIONS

HOURLY DATA

JANUARY 1967

Exposure		Monthly Ranges of Wind Speed by Hour (miles/hr.)																								Monthly Summary*			
Site	Level	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24				
Albrook (Forest site)	46.0 m	11	12	11	10	13	10	11	11	16	16	19	13	20	22	17	16	11	9	8	10	10	9	11	11				
	28.5 m	This level was not instrumented for wind speed at this time																											
	26.5 m	5	5	5	5	4	5	6	5	11	8	14	10	10	17	5	7	10	9	4	4	5	5	5	7				
	13.5 m	This level was not instrumented for wind speed at this time																											
	8.0 m	This level was not instrumented for wind speed at this time																											
	4.0 m	3	3	3	3	1	3	1	1	2	2	3	4	4	4	3	2	2	4	1	1	2	1	6	4				
	2.0 m	This level was not instrumented for wind speed at this time																											
	1.0 m	This level was not instrumented for wind speed at this time																											
	0.5 m	This level was not instrumented for wind speed at this time																											
Chiva Chiva (Open site)	46.0 m	13	11	16	12	12	12	12	10	13	21	15	19	19	15	14	13	11	11	10	9	10	12	14	15				
	28.5 m	This level was not instrumented for wind speed at this time																											
	26.5 m	10	13	16	9	10	11	12	11	13	14	13	22	19	15	14	15	12	12	9	8	14	11	13	14				
	13.5 m	11	24	9	11	7	6	6	12	19	22	29	25	24	20	22	20	14	20	15	12	17	17	10	16				
	8.0 m	This level was not instrumented for wind speed at this time																											
	4.0 m	7	10	10	9	9	6	9	8	11	10	14	18	14	13	11	13	12	12	7	6	8	9	9	9				
	2.0 m	6	10	7	6	6	4	5	8	11	14	14	18	15	16	12	15	15	13	10	6	10	6	7	12				
	1.0 m	This level was not instrumented for wind speed at this time																											
	0.5 m	This level was not instrumented for wind speed at this time																											

* No monthly summary was computed for the ranges.

ALBROOK (Forest site) JANUARY 1967

Relative Frequencies* of Wind Directions by Hour at 46.0 m.
(%)

Dir. \ Hr.	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
N			3.3			3.4			10.4	27.4	37.8	39.9	13.3	26.6	27.5	20.0	13.3	3.3	6.6		6.6	3.3	3.4	
NNE	3.3						3.4			10.4	6.8	10.0	6.6	3.3	3.4	3.3	3.3		3.3					
NE									3.4		6.8	3.3				6.6								
ENE										3.4		3.3												
E																								
ESE																								
SE																								
SSE									3.4			3.3		3.3										
S					3.3																			
SSW		3.3							3.4	3.4														
SW		6.6							3.4						3.4	3.3						3.3		
WSW	3.3	3.3	6.6	3.3	3.3			6.8			3.4		3.3	6.6			6.6		3.3		3.3		3.4	3.3
W	56.4	49.8	49.8	49.8	59.8	61.9	65.4	55.0	20.7		13.8	3.3	16.6	10.0	17.2	26.6	20.0	20.0	16.6	53.1	49.8	59.8	65.4	73.1
WNW	20.0	16.6	23.3	26.6	13.4	20.9	17.3	10.4	10.4	17.2	3.4	3.3	10.0	10.0	3.4	13.3	10.0	20.0	23.3	13.3	23.3	16.6	3.4	6.6
NW	10.0	10.0	6.6	10.0	10.0	3.4	6.8	17.2	17.2	20.8	6.8	20.0	33.2	20.0	13.8	16.6	29.9	33.2	29.9	23.3	13.3	10.0	10.4	13.3
NNW	3.3	3.3	3.3	6.6		3.4			17.2	10.4	20.8	13.3	13.3	16.6	24.2	10.0	16.6	23.3	16.6	6.6			10.4	
CALM	3.3	6.6	6.6	3.3	10.0	6.8	6.8	10.4	10.4	6.8			3.3	3.3	6.8					3.3	3.3	6.6	3.4	3.3

* Note: Due to rounding, percentage totals do not equal 100%.

IMPRESORA, S. A. 45895

ALBROOK (Forest site) JANUARY 1967

Relative Frequencies* of Wind Directions by Hour at 26.5 m.
(%)

Dir. \ Hr.	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
N							3.4		10.4	3.5	17.9	10.0	10.0	16.6	10.4	6.6	10.0	6.6	3.3	3.3			3.4	
NNE									3.4	3.5	3.5	16.6		6.6	6.8	6.6	3.3	6.6	3.3					
NE										21.4	17.9	3.3	10.0	6.6	3.4	10.0	3.3	6.6				3.3		
ENE													3.3		10.4	6.6	3.3		3.3					
E										3.5					3.4		3.3							
ESE											3.5			3.3										
SE												3.3												
SSE														3.3										
S												3.3	3.3	3.3										
SSW										3.5														
SW			3.3						3.4		3.5	3.3				3.3								
WSW								3.4	3.4				3.3		3.4	3.3				3.3	3.3		3.4	
W	10.0	10.0	3.3	6.6	10.0	20.8	17.2	13.8	6.8			3.3	10.0	3.3	6.8		10.0	10.0	6.6	6.6	13.3	10.0	3.4	10.0
WNW	23.3	23.3	26.6	13.3	16.6	10.4	17.2	10.4	6.8	3.5	3.5	6.6	3.3	13.3	3.4	20.0	10.0	3.3	10.0	10.0	13.3	26.6	31.0	23.3
NW	3.3	3.3	6.6	6.6	10.0	6.8	10.4	17.2	13.8	17.9	17.9	16.6	20.0	13.3	13.8	23.3	26.6	13.3	20.0	33.2	23.3	10.0	10.4	6.6
NNW	3.3			3.3			6.8	6.8	3.4	10.8	3.5	6.6	10.0	6.6	10.4	3.3		6.6	13.3	6.6		3.3		6.6
CALM	59.8	63.1	59.8	69.7	63.1	61.8	44.7	48.2	48.2	32.1	28.7	26.6	26.6	23.3	27.5	16.6	29.9	46.6	39.9	36.6	46.6	46.6	48.3	53.1

* Note: Due to rounding, percentage totals do not equal 100%.

IMPRESORA, S. A. 45885

ALBROOK (Forest site) JANUARY 1967

Relative Frequencies* of Wind Directions by Hour at 4.0 m.
(%)

Dir. \ Hr.	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
N	3.3		3.3		3.3		3.4	6.9	6.9	6.9	3.4	10.0	6.6	3.3	3.4	6.6	13.3	10.0	3.3		10.0	6.6	3.4	
NNE				3.3							6.9	6.6			3.4			6.6	6.6	3.3				
NE												3.3	6.6	10.0	3.4			3.3	3.3	3.3				
ENE									3.4	6.9				6.6			3.3							
E										6.9	3.4		10.0	6.6	6.9	6.6								
ESE												3.3	3.3		6.9									
SE										3.4	6.9	6.6	3.3	6.6		6.6								
SSE											3.4				3.4									
S											3.4	10.0	3.3	3.3		3.3		3.3						3.3
SSW				3.3					3.4		10.4	3.3	6.6	6.6	3.4		6.6				3.3			
SW				3.3					3.4		3.4	3.3	3.3	3.3	3.4	3.3	3.3	3.3	3.3			3.3		
WSW									3.4				3.3	3.3			3.3	3.3						3.3
W	3.3	6.6	3.3	3.3	3.3	3.4	3.4			6.9	3.4	3.3	3.3	3.3	3.4	3.3	3.3	10.0	3.3	10.0	3.3		10.4	10.0
WNW	10.0	3.3	6.6	3.3		6.9			3.4	10.4		3.3	3.3			6.6	3.3			6.6	6.6	6.6	6.9	3.3
NW	13.3	10.0	13.3	20.0	26.6	17.2	13.8	6.9	6.9			3.3			3.4	6.6	3.3		10.0	6.6	3.3	16.6	3.4	10.0
NNW	3.3		6.6			10.4		3.4			3.4			10.0							3.3	3.3	13.8	10.0
CALM	66.4	79.7	66.4	63.1	66.4	61.9	79.0	82.4	68.8	58.4	51.6	43.2	46.6	46.6	58.6	56.6	59.8	59.8	69.7	69.7	69.7	63.1	61.9	59.8

* Note: Due to rounding, percentage totals do not equal 100%.

IMPRESORA, S. A. 45551

CHIVA CHIVA (Open site) JANUARY 1967

Relative Frequencies* of Wind Directions by Hour at 46.0 m.
(%)

Dir. \ Hr.	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
N	25.8	22.6	25.8	19.4	22.6	19.4	9.7	19.4	38.7	32.2	35.5	29.0	25.8	26.6	38.7	45.2	32.2	29.0	38.7	16.1	16.6	23.3	25.8	16.1
NNE	3.2	3.2				6.4	6.4			22.6	19.4	19.4	16.1	13.3	16.1	9.7	12.9	3.2	3.2	3.2				3.2
NE										12.9	6.4	9.7	12.9		3.2	3.2		3.2						
ENE										3.2														3.2
E																					3.3			
ESE	3.2																							
SE											3.2	3.2												
SSE																								
S													3.2											6.4
SSW			3.2																					
SW		3.2			3.2																			
WSW				3.2		3.2																		
W						3.2		9.7				3.2									3.3	3.3	3.2	
WNW		6.4	3.2	6.4	9.7	3.2	6.4	3.2		3.2			3.2	3.3	3.2	3.2	12.9					3.3	3.2	3.2
NW	19.4	12.9	16.1	32.2	38.7	29.0	45.2	25.8	12.9		12.9		9.7	20.0	9.7	12.9	9.7	22.6	22.6	35.5	26.6	33.2	29.0	29.0
NNW	48.4	51.6	48.4	38.7	25.8	35.5	29.0	41.9	48.4	25.8	22.6	35.5	29.0	36.6	29.0	25.8	32.2	41.9	35.5	45.2	49.8	36.6	38.7	38.7
CALM			3.2				3.2																	

* Note: Due to rounding, percentage totals do not equal 100%.

IMPRESORA, S. A. 43655

CHIVA CHIVA (Open site) JANUARY 1967

Relative Frequencies* of Wind Directions by Hour at 26.5 m.
(%)

Dir. \ Hr.	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
N	36.6	29.9	49.8	43.2	29.9	33.2	23.3	26.6	66.4	35.5	25.8	22.6	25.8	49.8	45.2	48.4	46.6	43.2	53.2	59.8	55.0	58.4	49.8	39.9
NNE	13.3	20.0	6.6	3.3	13.3	6.6	6.6	6.6	13.3	19.4	25.8	32.2	29.0	16.6	22.6	19.4	16.6	20.0	20.0	3.3	6.8	3.4	3.3	10.0
NE							10.0	3.3	3.3	29.0	25.8	29.0	19.4	16.6	19.4	12.9	6.6	3.3	6.6	6.6	3.4			3.3
ENE										3.2			6.4		3.2	3.2		3.3						3.3
E	3.3			3.3						3.2		3.2									3.4			3.3
ESE																							3.3	
SE	3.3	3.3				3.3					3.2													3.3
SSE																								
S								3.3				3.2												
SSW							3.3																	
SW	3.3			3.3	3.3				3.3															
WSW																								
W		3.3		3.3		6.6															3.4			
WNW				3.3	3.3			3.3									3.3				3.4	3.4	3.3	
NW	10.0	3.3	16.6	13.3	6.6	10.0	23.3	3.3	3.3	6.4		3.2	9.7	6.6	6.4	6.4	13.3	6.6	3.3	13.3		17.2	10.0	10.0
NNW	29.9	36.6	20.0	26.6	39.9	36.6	29.9	49.8	10.0	3.2	19.4	6.4	9.7	10.0	3.2	9.7	13.3	23.3	16.6	16.6	24.2	17.2	23.3	23.3
CALM		3.3	6.6		3.3	3.3	3.3	3.3															6.6	3.3

* Note: Due to rounding, percentage totals do not equal 100%.

IMPRESORA, S. A. 45555

CHIVA CHIVA (Open site) JANUARY 1967

Relative Frequencies* of Wind Directions by Hour at 4.0 m.
(%)

Dir. \ Hr.	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
N	6.4	19.4	19.4	12.9	6.4	6.4	3.2	12.9	29.0	48.4	45.2	29.0	22.6	36.6	29.0	32.2	45.2	29.0	32.2	16.1	10.0	20.0	16.1	19.4
NNE	3.2		6.4	9.7	12.9		9.7	3.2	12.9	3.2	16.1	22.6	12.9	13.3	3.2	12.9	3.2	6.4	3.2	3.2				9.7
NE		3.2	3.2		6.4		9.7	3.2		16.1	12.9	16.1	19.4	3.3	16.1		6.4				13.3	3.3		6.4
ENE						16.1															3.3			9.7
E				3.2																			3.2	3.2
ESE	3.2	3.2			3.2						3.2													
SE	3.2	3.2																						
SSE																								
S			3.2					3.2				3.2												
SSW						3.2																		
SW		3.2														3.2						3.3	3.2	
WSW		3.2			3.2												3.2							
W	3.2	3.2		3.2	3.2	3.2	3.2	6.4		3.2		3.2					3.2			3.2	3.3	6.6	3.2	
WNW	9.7	9.7	3.2	3.2			16.1	6.4	3.2	3.2			6.4		9.7	3.2	3.2	9.7					3.2	9.7
NW	22.6	22.6	32.2	35.5	29.0	32.2	35.5	35.5	25.8	3.2	12.9	9.7	19.4	23.3	9.7	12.9	12.9	19.4	32.2	38.7	20.0	39.9	32.2	9.7
NNW	41.9	19.4	25.8	25.8	29.0	29.0	12.9	25.8	29.0	22.6	9.7	16.1	19.4	23.3	32.2	35.5	22.6	35.5	32.2	38.7	49.8	26.6	32.2	32.2
CALM	6.4	9.7	6.4	6.4	6.4	9.7	9.7	3.2															6.4	

* Note: Due to rounding, percentage totals do not equal 100%.

IMPRESORA, S. A. 45695

SUMMARY OF NON HOURLY DATA

JANUARY 1967

Summary of Elements with Non-hourly Frequencies of Observation

Site	Element, Units and Exposure	Description	Number of obs.	Minimum Value	Mean or Total Value	Maximum Value
Albrook (Forest site)	WBGT Index[1] (at 1.0 meters)	Index value	434	63.8	76.6	82.5
		Dry bulb temp.	434	69.2	79.7	91.0
		Wet bulb temp.	434	68.5	75.1	91.0
		Black bulb temp.	434	69.8	80.3	96.8
	Evaporation[3] (in. at 4 levels)	Piche (46.0 m)	31	0.189	15.971*	0.762
		Piche (26.5 m)	31	0.128	11.092*	0.500
		Piche (13.5 m)	31	0.055	5.147*	0.250
		Piche (0.5 m)	31	0.030	3.019*	0.165
	Precipitation from Raingauge Network[2] (in. at 1.0 meters)	Gauge # 1	4	0.01	0.41*	0.33
		Gauge # 2	5	0.01	0.41*	0.34
		Gauge # 3	5	0.01	0.53*	0.41
		Gauge # 4	3	0.01	0.36*	0.32
		Gauge # 5	4	0.01	0.41*	0.33
		Gauge # 6	4	0.01	0.37*	0.30
		Gauge # 7	4	0.01	0.46*	0.35
		Gauge # 8	3	0.01	0.30*	0.25
	Stem Flow[2] (in. at 2.0 meters)	Small tree	2	0.02	0.36*	0.34
		Medium tree	2	0.01	0.49*	0.48
		Large tree	1	0.14	0.14*	0.14
Chiva Chiva (Open site)	WBGT Index (at 1.0 meters)	Index value	434	68.0	79.5	86.9
		Dry bulb temp.	434	68.5	82.8	93.0
		Wet bulb temp.	434	68.0	75.3	93.0
		Black bulb temp.	428	67.9	92.4	112.8
	Evaporation[3] (in. at 0.5 meters)	Piche	24	0.116	8.869*	0.512
		Pan	38	0.054	9.366*	0.531
	Minimum Grass temp[3] (°F at grass tips)	None	30	63.5	67.2	70.0

1 - Hourly observations between 0600 and 1900 hours inclusive

2 - Six hourly observations

3 - Daily observations

*Total Values

DISTRIBUTION LIST

Address	No. of Copies
Director Advanced Research Projects Agency Washington, DC 20301	6
Advanced Research Projects Agency R&D Field Unit APO San Francisco, California 96346	1
Defense Documentation Center for Scientific and Technical Information Cameron Station Alexandria, Virginia 22314	20
Director of Defense Research and Engineering ATTN: Technical Library Washington, DC 20301	1
Chief of Research and Development Department of the Army ATTN: CRD/M Washington, DC 20310	10
Assistant Chief of Staff for Intelligence Department of the Army ATTN: ACSI-DSRSI Washington, DC 20310	1
Commanding General US Army Materiel Command ATTN: AMCRD-SE Washington, DC 20315	1
Commanding General US Army Materiel Command ATTN: AMCRD-RV-A Washington, DC 20315	1
Commanding General US Army Test and Evaluation Command ATTN: AMSTE-NB Aberdeen Proving Ground, Maryland 21005	1
Commanding General US Army Test and Evaluation Command ATTN: AMSTE-TA-A Aberdeen Proving Ground, Maryland 21005	1
Commanding General US Army Test and Evaluation Command ATTN: AMSTE-EL Aberdeen Proving Ground, Maryland 21005	1

DISTRIBUTION LIST (cont'd)

Address	No. of Copies
Commanding General US Army CDC Combined Arms Group Fort Leavenworth, Kansas 66027	1
Commanding General US Army Missile Command ATTN: AMSMI-RRA, Bldg. 5422 Physical Sciences Laboratory Research and Development Directorate Redstone Arsenal, Alabama 35809	1
Commanding Officer US Army CDC CBR Agency ATTN: Mr. N. W. Bush Fort McClellan, Alabama 36205	1
US Army Munitions Command Operation Research Group Edgewood Arsenal, Maryland 21010	1
Commanding General US Army Natick Laboratories ATTN: Earth Sciences Laboratory Geography Division Natick, Massachusetts 01762	1
Commanding General US Army Natick Laboratories ATTN: Pioneering Research Laboratory Natick, Massachusetts 01762	1
Project TREND Applied Scientific Research Corporation of Thailand APO San Francisco, California 96346	1
Commanding Officer US Army Cold Regions Research and Engineering Laboratories ATTN: Photographic Interpretation Research Division Hanover, New Hampshire 03755	1
Commanding Officer US Army Ballistics Research Laboratories ATTN: AMXBR-B Aberdeen Proving Ground, Maryland 21005	1
Commanding Officer US Army Ballistics Research Laboratories ATTN: AMXBR-IA Aberdeen Proving Ground, Maryland 21005	1

DISTRIBUTION LIST (cont'd)

Address	No. of Copies
Director US Army Engineer Waterways Experiment Station ATTN: Mobility and Environmental Division Vicksburg, Mississippi 39180	1
Commanding Officer US Army Dugway Proving Ground ATTN: Chief, Meteorological Division Dugway, Utah 84022	1
Commanding Officer US Army CDC Artillery Agency Fort Sill, Oklahoma 73504	1
Commanding Officer US Army Picatinny Arsenal ATTN: SMUPA-TV-3 Dover, New Jersey 07801	1
Commanding Officer US Army Frankford Arsenal ATTN: SMUFA-L-8000 Philadelphia, Pennsylvania 19137	1
Commandant US Army Artillery & Missile School ATTN: Meteorology Division (Target Acquisition Department) Fort Sill, Oklahoma 73503	1
Commandant Special Warfare School Fort Bragg, N. C. 28307	1
Commanding General US Army Electronics Command ATTN: AMSEL-EW Fort Monmouth, New Jersey 07703	1
Commandant US Army CBR School, Micrometeorological Section Fort McClellan, Alabama 36205	1
Commandant US Army Signal School ATTN: Meteorological Department Fort Monmouth, New Jersey 07703	1
Chief, Atmospheric Science Research Division Atmospheric Science Laboratory US Army Electronics Command Fort Huachuca, Arizona 85613	1

DISTRIBUTION LIST (cont'd)

Address	No. of Copies
Chief, Atmospheric Science Office Atmospheric Science Laboratory US Army Electronics Command ATTN: AMSEL-BL-WS-M White Sands Missile Range, New Mexico 88002	1
Officer in Charge US Naval Weather Research Facility US Naval Air Station, Bldg. R-48 Norfolk, Virginia 23511	1
Commander USAF Air Weather Service ATTN: AWSES TIPD Scott Air Force Base, Illinois 62225	1
Commander Air Force Cambridge Research Laboratories ATTN: CREW 1065 Main Street Waltham, Massachusetts 02154	1
Director Bureau of Research and Development Federal Aviation Agency Washington, DC 20553	1
Chief Fallout Studies Branch Atomic Energy Commission Washington, DC 20545	1
US Department of Agriculture Forest Service North Central Forest Experiment Station Folvell Avenue St. Paul, Minnesota 55101	1
Director Atmospheric Physics and Chemistry Laboratory ESSA - Department of Commerce PSRB Bldg. No. 2 Boulder, Colorado 80302	1
Director Atmospheric Sciences Library Environmental Science Service Administration Silver Spring, Maryland 20910	1
National Center for Atmospheric Research ATTN: NCAR Library Acquisitions Boulder, Colorado 80302	1

DISTRIBUTION LIST (cont'd)

Address	No. of Copies
Remote Area Conflict Information Center Battelle Memorial Institute 505 King Avenue Columbus, Ohio 43201	1
Commander Operational Test and Evaluation Force US Naval Base Norfolk, Virginia 23511	1
Panama Canal Company Meteorological and Hydrographic Branch ATTN: Chief Hydrographer Box "M" Balboa Heights, Canal Zone	1
Commander Detachment 5, 5th Weather Wing Bldg. 235, Howard Air Force Base Canal Zone	
Director Data Processing Division Environmental Technical Applications Center (MAC) US Air Force Federal Building Asheville, North Carolina 28801	1
Commander Air Force Cambridge Research Laboratories ATTN: CREW Laurence G. Hanscom Field Bedford, Massachusetts 01760	1
Commanding General US Army CDC Combat Support Group Fort Belvoir, Virginia 22060	1
Commanding General Deseret Test Center Bldg. 103, Soldier's Circle Fort Douglas, Utah 84113	1
Commanding General US Army Munitions Command ATTN: AMSMU-RE-R Dover, New Jersey 07801	1
Commanding General US Army Electronics Command ATTN: AMSEL-BL-AP Fort Monmouth, New Jersey 07703	1

DISTRIBUTION LIST (cont'd)

Address	No. of Copies
Commanding Officer US Army Electronics Command Meteorological Support Activity Fort Huachuca, Arizona 85613	1

UNCLASSIFIED
Security Classification

DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY *(Corporate author)*

US Army Tropic Test Center
Fort Clayton, Canal Zone

2a. REPORT SECURITY CLASSIFICATION

UNCLASSIFIED

2b. GROUP

3. REPORT TITLE

Monthly Microclimatic Summary, January 1967: Environmental Data Base for Regional Studies in the Humid Tropics

4. DESCRIPTIVE NOTES *(Type of report and inclusive dates)*

Data Summary, January 1967

5. AUTHOR(S) *(First name, middle initial, last name)*

6. REPORT DATE

March 1968

7a. TOTAL NO. OF PAGES

28

7b. NO. OF REFS

8a. CONTRACT OR GRANT NO.

b. PROJECT NO. 2M025001A724-01

c. USATECOM No. 9-4-0013-01

d. Work Unit: USATTC #001

9a. ORIGINATOR'S REPORT NUMBER(S)

9b. OTHER REPORT NO(S) *(Any other numbers that may be assigned this report)*

10. DISTRIBUTION STATEMENT

Distribution of this document is unlimited.

11. SUPPLEMENTARY NOTES

12. SPONSORING MILITARY ACTIVITY

Advanced Research Projects Agency
Army Research Projects Office, OCRD

13. ABSTRACT

This report contains detailed microclimatic data for January 1967 from specific sites in the Panama Canal Zone and vicinity. The data are presented in tabular form, summarized for hourly and or daily observations from surface to 46-meter levels. Elements listed are: temperature, pressure, precipitation, wind speed and direction, relative humidity, and evaporation.

DD FORM 1 NOV 65 1473 REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

UNCLASSIFIED
Security Classification

UNCLASSIFIED
Security Classification

14. KEY WORDS	LINK A ROLE	LINK A WT	LINK B ROLE	LINK B WT	LINK C ROLE	LINK C WT
Climate						
Microclimatology						
Tropic Environment						
Humid Tropics						
Panama Canal Zone Microclimatology						
Data Base						

12-2346

UNCLASSIFIED
Security Classification

ENVIRONMENTAL DATA BASE
FOR REGIONAL STUDIES IN THE HUMID TROPICS

MONTHLY
MICROCLIMATIC SUMMARY

FEBRUARY 1968

Prepared by

Michael A. Fradel, Project Officer
and
Dr. Wilfried H. Portig, Meteorologist

USATECOM Project No. 9-4-0013-01

This research was supported by the Advanced Research Projects Agency of the Department of Defense and by the Army Research Office, OCRD, Department of Army

Conducted by

US Army
Tropic Test Center
Fort Clayton, Canal Zone
with contractual services provided by
Weather Engineers of Panama Corp.

~~144 858~~

M06.1/728.8
U5818en
Feb. 1967

Distribution of this document is unlimited

TABLE OF CONTENTS

	Page
Introduction	1
Sites	1
Instrumentation	1
Data Reduction and Storage	2
Figures	
1. Location Map, Isthmus of Panama	3
2. Frequency of Observations	4
3. Albrook Forest Site, Generalized Plot	5
4. Chiva Chiva Open Site, Generalized Plot	6
5. Instrument Location on Towers	7
Data Summary Sheets	
Monthly Means of Air Temperature by Hour	8
Monthly Ranges of Air Temperature by Hour	9
Monthly Means of Relative Humidity by Hour	10
Monthly Ranges of Relative Humidity by Hour	11
Monthly Means of Other Elements by Hour	12
Monthly Means of Wet Bulb Temperature by Hour	
Monthly Means of Barometric Pressure by Hour	
Monthly Means of Precipitation by Hour	
Monthly Totals of Precipitation by Hour	
Monthly Ranges of Other Elements by Hour	13
Monthly Ranges of Wet Bulb Temperature by Hour	
Monthly Ranges of Barometric Pressure by Hour	
Monthly Ranges of Precipitation by Hour	
Monthly Means of Wind Speed by Hour	14
Monthly Ranges of Wind Speed by Hour	15
Relative Frequencies of Wind Directions (46 meters, Albrook)	16
Relative Frequencies of Wind Directions (26.5 meters, Albrook)	17
Relative Frequencies of Wind Directions (4 meters, Albrook)	18
Relative Frequencies of Wind Directions (46 meters, Chiva Chiva)	19
Relative Frequencies of Wind Directions (26.5 meters, Chiva Chiva)	20
Relative Frequencies of Wind Directions (4 meters, Chiva Chiva)	21
Summary of Elements with Non-Hourly Frequencies of Observation	22
WBGT (Albrook)	
Evaporation (Albrook)	
Precipitation (Manual gauge network, Albrook)	
Precipitation (Stem Flow, Albrook)	
WBGT (Chiva Chiva)	
Evaporation (Chiva Chiva)	
Minimum Grass Temperature (Chiva Chiva)	

MONTHLY MICROCLIMATIC SUMMARY

Introduction

Monthly microclimatic data summarized in this series of reports were collected by the US Army Tropic Test Center and the Weather Engineers of Panama Corporation under the project, Environmental Data Base for Regional Studies in the Humid Tropics. The project is sponsored by the Advanced Research Projects Agency of the Department of Defense and by the Army Research Office, Office of the Chief of Research and Development. It is an investigation of microclimatic, air chemistry, vegetation, soils, microbiological, and macrofaunal conditions at selected sites in the principal tropical environments of the Panama Canal Zone and the Rio Hato Military Reservation. The objective of the project is to assemble quantitative environmental data for RDT&E purposes.

Sites. Data summarized in this report were collected at the Albrook Forest and Chiva Chiva sites. Figure 1 shows the site locations within the Isthmus of Panama. Geographic coordinates are shown below:

Albrook Forest	09° 01'N, 79° 33'W
Chiva Chiva	09° 01'N, 79° 35'W

The Chiva Chiva open site and the Albrook Forest site are paired for comparative study of environmental conditions in a tropical semideciduous forest and in a large clearing. Both are located in a region where the annual precipitation is approximately 80 inches and there is a pronounced dry season. The other satellite sites were located primarily for soil studies purposes. Albrook and Fort Kobbe have climatic regimes similar to the principal sites.

The Albrook and Chiva Chiva main sites are approximately four kilometers apart. Each has a 46 meter walk-up tower and an air-conditioned building to house the recording equipment and observers. Both sites are approximately 30 meters above sea level. The top of the forest canopy at the Albrook site is about 26.5 meters above the ground.

Instrumentation. A wide range of climatic elements are measured at the Albrook and Chiva Chiva sites. Types of observations and frequencies are shown on Figure 2. The towers at the Albrook and Chiva Chiva sites are similarly oriented. Sensing equipment is mounted at several levels on the towers to provide measurements through the vertical profile. Additional instruments are emplaced in the immediate vicinity on or near the ground. All instrument exposures are duplicated at each site. Figures 3, 4, and 5 show the instrument array at these sites.

Data Reduction and Storage. All data, as applicable, are recorded at or reduced to each full hour and transposed to punch cards. These punch cards, together with all raw data, are stored in the Tropic Test Center Technical Library Annex.

The relative humidity data contained in this report required some adjustment due to the difficult problems in maintaining hair hygrometers in the humid tropics. The hygrometers show saturation at a time when the psychrometer shows a relative humidity well below 100%. For this reason the hourly measurements made by means of a hair hygrometer have been modified on the basis of simultaneous psychrometer readings of other levels. Details will be given in the fourth Semiannual Report. It can be assumed that the means of relative humidity presented in this volume are very close to the true means.

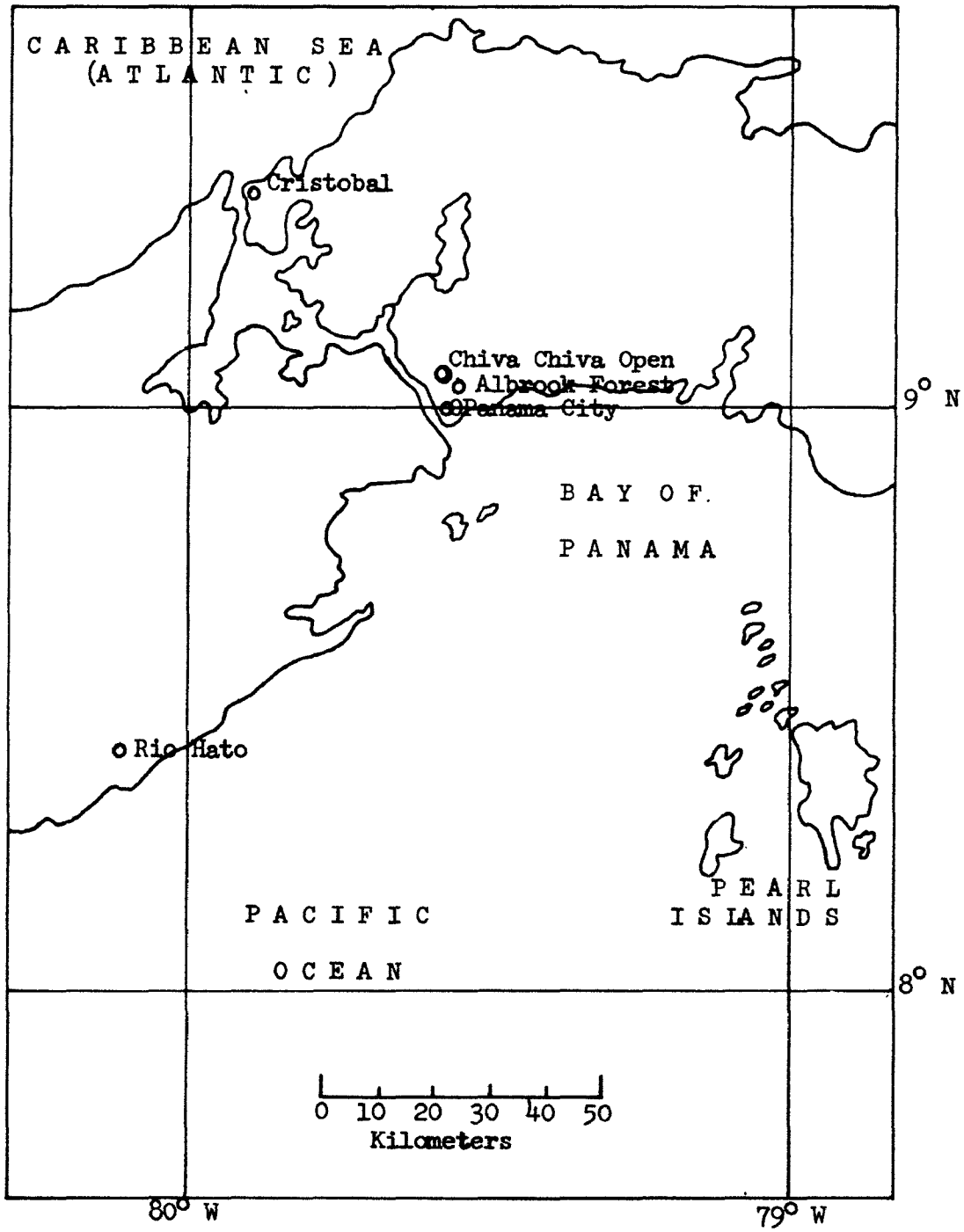

FIGURE 1. LOCATION MAP, ISTHMUS OF PANAMA

FIGURE 2. FREQUENCY OF OBSERVATIONS

Height (meters)

# Element	Sfc	0.5	1.0	2.0	4.0	8.0	13.5	26.5	28.5	46.0	Frequency
Temperature:											
Dry Bulb	-	1	1	1	1	-	1	1	-	1	Hourly*/Continuously
Wet Bulb	-	1	-	1	1	-	-	-	-	-	Hourly*/Continuously
Grass Minimum	3	-	-	-	-	-	-	-	-	-	Once Daily
WBGT Index	-	-	1	-	-	-	-	-	-	-	Hourly (0600-1900 EST)
Relative Humidity	-	1	1	1	1	-	1	1	-	1	Hourly*/Continuously
Barometric Pressure	-	-	1	-	-	-	-	-	-	-	Continuously
Evaporation	-	1	-	-	-	-	2	2	-	2	Once Daily
Precipitation:											
Recording Gage	-	-	1	-	-	-	-	-	-	2	Continuously
Manual Gage	-	-	2	-	-	-	-	-	-	-	4 Times Daily
Stem Flow	-	-	-	2	-	-	-	-	-	-	4 Times Daily
Wind:											
Direction	-	-	-	-	1	-	-	1	-	1	Continuously
Speed	-	-	-	3**	1	-	3**	1	-	1	Hourly**/Continuously

1. Albrook and Chiva Chiva
2. Albrook only
3. Chiva Chiva only

* Observations made with sling psychrometer when recorders are inoperative.

** Hourly

\# Instrument descriptions are contained in the Environmental Data Base semiannual reports.

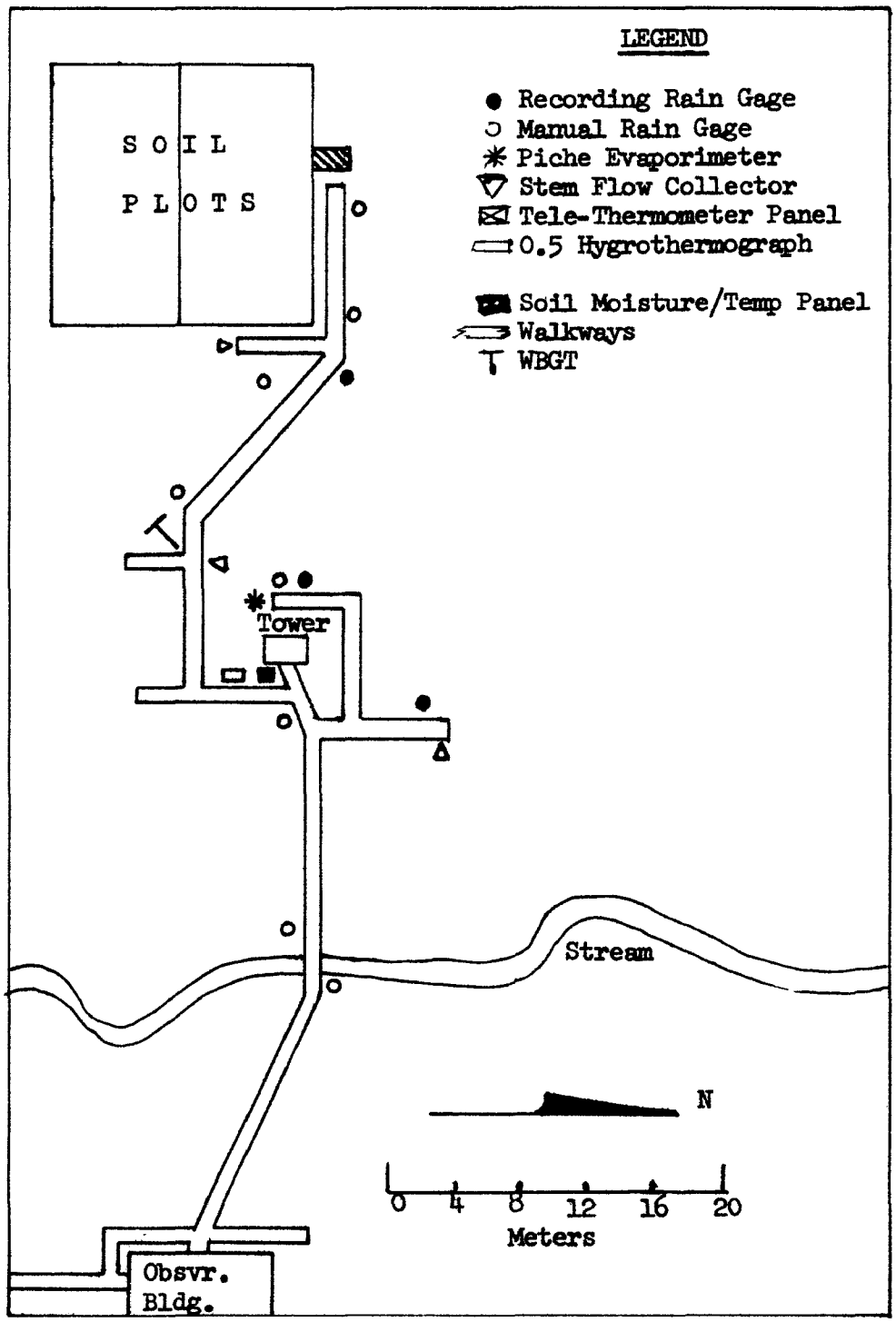

FIGURE 3. ALBROOK FOREST SITE, GENERALIZED PLOT

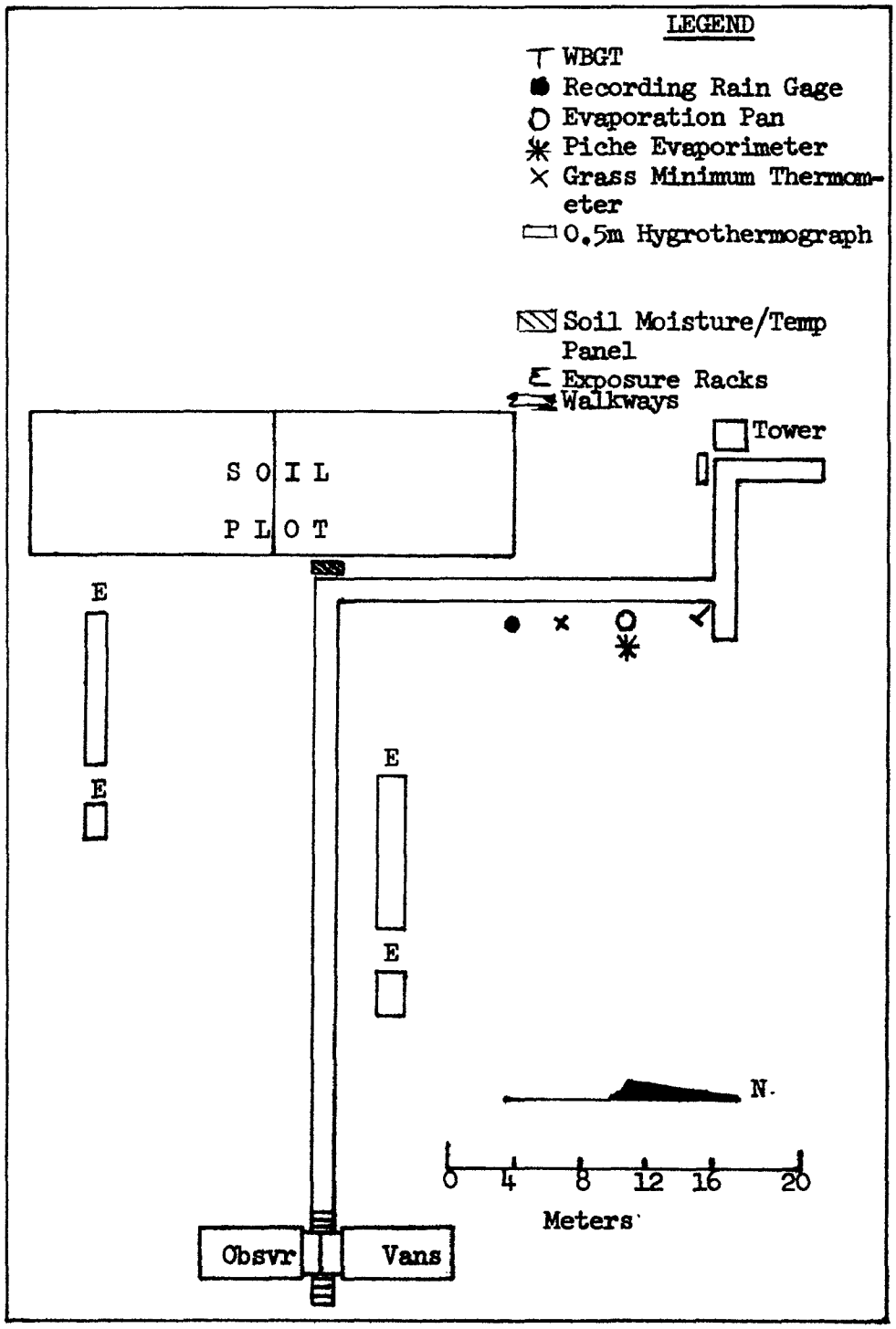

FIGURE 4. CHIVA CHIVA OPEN, GENERALIZED PLOT

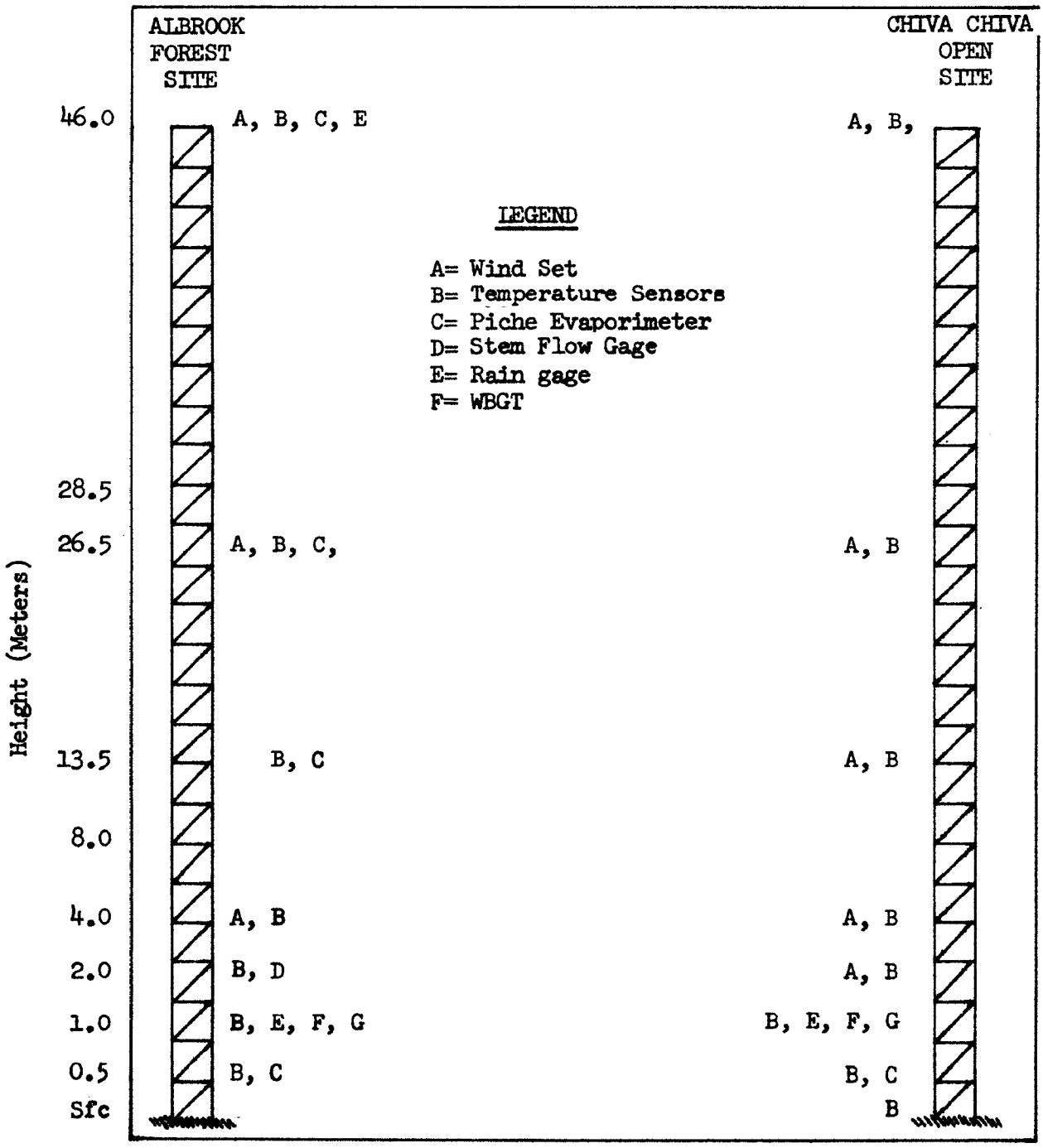

FIGURE 5. INSTRUMENT LOCATION ON TOWERS

SUMMARY OF METEOROLOGICAL OBSERVATIONS

HOURLY DATA

FEBRUARY 1967

Exposure		Monthly Means of Air Temperature by Hour (°F)																								Monthly Summary			
Site	Level	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	No of obs.	Min.	Mean	Max.
Albrook (Forest site)	46.0 m	74.1	73.9	73.6	73.4	73.3	73.3	73.5	75.6	79.5	81.7	84.0	84.9	85.2	85.4	85.7	84.6	82.9	80.8	77.9	76.6	75.6	75.1	74.6	74.5	672	71.2	78.3	88.6
	28.5 m	This level was not instrumented for air temperature at this time																											
	26.5 m	73.3	73.1	72.8	72.6	72.5	72.3	73.2	76.6	81.1	83.5	85.4	86.5	86.5	87.0	87.0	85.8	83.9	80.9	77.3	75.9	75.0	74.5	74.0	73.8	670	68.1	78.5	90.5
	13.5 m	73.2	72.8	72.6	72.3	72.0	71.7	71.8	74.3	78.8	81.5	83.6	84.9	85.4	85.6	85.7	84.6	83.2	80.5	77.7	76.2	75.3	74.5	74.0	73.6	672	67.8	77.8	88.5
	8.0 m	This level was not instrumented for air temperature at this time																											
	4.0 m	72.2	71.9	71.9	71.5	71.1	70.8	71.1	74.2	78.6	81.4	83.5	84.9	85.4	85.2	85.6	84.1	82.3	79.2	76.5	75.0	74.1	73.4	73.0	72.7	670	67.3	77.0	88.5
	2.0 m	72.0	71.9	71.8	71.4	71.0	70.6	70.9	73.9	78.2	81.1	83.3	84.8	85.3	85.1	85.6	84.2	82.3	79.2	76.4	74.9	74.0	73.3	72.8	72.6	670	66.7	76.9	88.7
	1.0 m	72.1	71.8	71.7	71.3	70.9	70.9	71.1	73.9	78.0	81.0	83.4	85.2	85.6	85.8	86.2	84.7	82.6	79.4	76.3	75.4	74.2	73.6	73.1	72.6	667	67.3	77.0	89.5
	0.5 m	72.7	72.4	72.2	71.9	71.6	71.3	71.2	73.7	77.5	80.4	82.7	84.4	84.8	85.0	85.0	84.3	82.4	79.8	77.2	75.7	74.7	74.1	73.5	73.2	668	68.0	77.1	88.2
Chiva Chiva (Open site)	46.0 m	74.2	74.1	73.9	73.6	73.4	73.3	73.4	75.2	78.8	81.2	83.6	84.5	84.9	85.3	85.3	84.5	82.9	80.8	78.1	76.8	75.8	75.4	75.0	74.6	672	70.1	78.3	87.3
	28.5 m	This level was not instrumented for air temperature at this time																											
	26.5 m	74.1	73.9	73.6	73.4	73.1	73.0	73.0	75.2	78.9	81.6	83.9	84.9	85.3	85.8	85.6	84.9	83.3	81.1	78.5	77.0	76.1	75.5	75.1	74.6	671	70.1	78.4	88.4
	13.5 m	73.9	73.7	73.3	73.2	72.8	72.6	72.8	75.1	78.9	81.5	83.9	84.9	85.3	85.7	85.7	85.0	83.2	81.1	78.3	76.9	75.8	75.4	74.9	74.5	668	69.3	78.2	87.7
	8.0 m	This level was not instrumented for air temperature at this time																											
	4.0 m	73.2	73.2	72.9	72.6	72.1	72.1	72.6	77.4	80.6	83.4	85.5	86.7	86.9	87.3	87.1	86.1	83.8	80.6	77.9	76.3	75.3	75.0	74.5	73.9	671	67.6	78.6	90.1
	2.0 m	72.9	72.8	72.6	72.3	71.6	71.7	72.4	77.6	81.1	83.8	86.1	87.2	87.3	87.8	87.7	86.5	84.0	80.5	77.5	76.0	75.2	74.7	74.2	73.4	670	67.7	78.6	91.2
	1.0 m	73.2	72.9	72.6	72.4	71.9	71.0	72.1	78.8	82.5	86.2	88.4	89.8	89.5	90.0	89.0	88.3	84.6	81.1	77.8	76.8	75.5	75.0	74.4	73.9	660	66.5	79.4	94.0
	0.5 m	72.7	72.5	72.2	72.0	71.3	71.1	72.1	80.2	85.0	88.1	90.3	91.3	91.5	91.4	90.5	88.3	85.6	81.7	77.7	75.9	74.9	74.4	73.7	73.1	671	67.1	79.9	94.4

SUMMARY OF METEOROLOGICAL OBSERVATIONS

HOURLY DATA

FEBRUARY 1967

Exposure		Monthly Ranges of Air Temperature by Hour (°F)																								Monthly Summary*			
Site	Level	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24				
Albrook (Forest site)	46.0 m	5.0	4.5	4.0	3.9	4.0	4.1	3.9	4.4	9.8	9.3	7.3	6.2	14.6	9.9	6.0	13.2	11.2	9.0	6.4	4.5	3.3	3.5	4.2	4.0				
	28.5 m	This level was not instrumented for air temperature at this time																											
	26.5 m	6.3	7.0	5.6	5.9	6.0	7.5	6.2	7.1	9.7	9.2	6.9	6.5	15.9	12.4	9.4	12.1	11.3	8.3	4.9	4.4	5.1	4.5	5.3	5.6				
	13.5 m	4.2	5.2	5.8	6.1	6.1	6.5	7.9	7.5	8.3	6.0	5.5	5.6	13.6	11.5	7.5	10.0	10.5	8.1	5.6	4.3	5.1	5.2	5.0	4.8				
	8.0 m	This level was not instrumented for air temperature at this time																											
	4.0 m	5.5	6.0	6.8	7.3	7.0	6.4	8.3	6.5	6.8	6.5	6.1	5.9	13.5	11.5	7.3	8.9	9.8	6.0	3.6	5.4	4.6	5.8	6.1	5.9				
	2.0 m	5.6	5.8	6.7	7.4	6.8	6.6	8.5	6.7	6.5	6.5	6.5	6.4	13.7	11.6	7.9	9.0	9.5	5.9	4.2	5.3	4.5	5.8	6.3	5.8				
	1.0 m	6.1	6.0	6.4	6.2	6.5	6.3	7.1	6.6	6.1	6.0	6.9	5.4	15.0	13.0	9.5	9.8	10.0	6.1	7.1	4.9	4.8	4.5	5.4	5.6				
	0.5 m	5.3	5.3	5.9	5.9	6.2	5.8	6.4	8.8	7.4	7.2	7.0	7.1	13.8	12.4	8.2	9.0	9.5	6.7	4.1	4.8	4.5	4.3	4.4	4.8				
Chiva Chiva (Open site)	46.0 m	5.8	6.1	5.0	5.2	5.0	4.6	4.6	5.4	7.4	6.1	4.7	5.8	14.0	10.7	7.1	6.5	7.7	4.9	3.5	3.7	3.3	3.8	4.8	5.2				
	28.5 m	This level was not instrumented for air temperature at this time																											
	26.5 m	5.3	5.7	5.2	6.0	4.7	4.7	5.2	5.4	7.5	4.9	4.8	6.0	14.1	11.7	7.9	7.0	8.4	5.2	3.5	2.3	3.0	3.3	4.1	4.6				
	13.5 m	5.8	6.0	6.7	5.9	6.1	5.8	5.6	5.6	5.9	4.5	4.6	6.0	14.3	11.0	7.0	6.9	9.0	5.3	4.2	3.6	3.1	3.9	4.3	4.5				
	8.0 m	This level was not instrumented for air temperature at this time																											
	4.0 m	6.5	7.0	7.5	7.0	7.9	8.0	7.5	6.7	7.5	4.9	5.6	7.7	13.4	10.3	4.7	4.3	8.4	4.3	3.1	3.3	3.3	4.2	4.0	5.9				
	2.0 m	6.6	7.3	7.5	6.8	7.8	7.3	7.5	7.4	7.6	5.0	5.7	7.8	15.7	10.4	5.4	4.8	9.5	3.6	2.2	3.0	2.8	3.8	4.6	5.5				
	1.0 m	6.1	7.4	7.5	7.5	7.4	8.7	8.5	8.4	9.9	7.6	8.0	12.2	18.5	12.0	13.0	6.5	9.8	4.0	3.3	3.6	3.5	4.1	5.1	5.0				
	0.5 m	6.5	7.2	7.7	7.3	8.0	8.2	7.6	10.2	10.9	7.7	8.6	10.7	17.9	10.6	5.8	4.7	8.5	4.5	3.2	3.1	3.8	4.1	6.1	5.4				

* No monthly summary was computed for the ranges.

SUMMARY OF METEOROLOGICAL OBSERVATIONS

HOURLY DATA

FEBRUARY 1967

Exposure		Monthly Means of Relative Humidity by Hour (%)																								Monthly Summary			
Site	Level	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	No of obs.	Min.	Mean	Max.
Albrook (Forest site)	46.0 m	84	84	84	85	85	85	84	81	71	66	59	55	53	53	52	54	59	65	72	76	80	82	83	83	672	36	72	90
	28.5 m	This level was not instrumented for relative humidity at this time																											
	26.5 m	87	88	88	88	88	89	87	81	70	64	59	56	55	55	54	57	61	68	76	80	83	85	86	87	670	36	75	98
	13.5 m	89	90	90	90	91	92	92	88	76	67	61	58	57	57	55	58	60	66	73	79	83	85	86	88	672	38	76	100
	8.0 m	This level was not instrumented for relative humidity at this time																											
	4.0 m	92	93	93	94	95	95	95	91	78	69	63	60	59	59	57	61	64	71	78	82	86	89	90	91	670	38	79	100
	2.0 m	92	93	93	94	95	96	96	92	80	71	65	61	59	60	58	62	65	72	79	78	87	90	91	91	670	40	80	100
	1.0 m	92	92	92	93	93	94	95	94	80	71	64	61	60	60	59	61	65	71	79	84	87	89	90	91	672	45	80	98
	0.5 m	91	91	91	92	93	93	94	91	83	74	68	64	62	61	61	62	67	73	79	82	85	87	89	89	668	43	80	100
Chiva Chiva (Open site)	46.0 m	84	84	85	85	86	86	86	81	73	66	58	54	53	52	51	53	58	64	72	77	80	81	82	83	672	29	72	96
	28.5 m	This level was not instrumented for relative humidity at this time																											
	26.5 m	85	85	86	86	87	87	86	81	72	65	58	55	53	52	52	53	58	64	72	78	81	82	83	84	669	31	73	96
	13.5 m	86	86	86	87	88	88	87	80	71	63	57	54	53	52	52	54	59	65	72	78	81	82	83	85	672	32	73	98
	8.0 m	This level was not instrumented for relative humidity at this time																											
	4.0 m	88	88	89	90	91	91	90	79	71	63	57	54	54	52	52	53	59	66	73	78	81	82	85	87	672	34	74	100
	2.0 m	89	90	90	91	93	93	92	79	70	63	56	54	54	52	51	53	59	67	74	79	82	84	86	88	670	35	75	99
	1.0 m	88	88	89	90	92	91	91	78	68	60	53	52	50	48	49	51	55	63	73	78	82	83	85	87	669	30	73	98
	0.5 m	88	88	89	90	91	92	91	73	62	55	51	48	48	47	48	52	55	63	73	79	82	83	85	87	671	33	72	97

SUMMARY OF METEOROLOGICAL OBSERVATIONS

HOURLY DATA

FEBRUARY 1967

Exposure		Monthly Ranges of Relative Humidity by Hour (%)																								Monthly Summary*			
Site	Level	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24				
Albrook (Forest site)	46.0 m	17	15	15	14	13	12	11	11	18	29	20	25	43	43	35	49	47	37	26	18	16	16	16	15				
	28.5 m	This level was not instrumented for relative humidity at this time																											
	26.5 m	13	14	12	11	10	14	14	20	26	27	22	21	47	50	39	52	46	36	20	15	11	14	19	19				
	13.5 m	19	19	18	14	14	15	15	15	25	26	24	27	45	53	44	52	48	49	35	32	27	22	23	24				
	8.0 m	This level was not instrumented for relative humidity at this time																											
	4.0 m	16	15	10	13	9	11	15	18	25	31	27	33	48	55	43	51	58	41	30	29	22	16	21	20				
	2.0 m	16	12	12	12	9	9	13	12	24	31	26	32	48	53	45	48	57	41	30	28	20	15	18	19				
	1.0 m	11	9	15	10	7	6	10	12	23	23	20	28	44	48	42	47	49	37	25	21	16	13	14	12				
	0.5 m	12	12	15	12	14	12	10	13	24	25	26	34	50	46	49	53	52	46	29	24	22	18	16	17				
Chiva Chiva (Open site)	46.0 m	20	19	14	18	17	17	15	9	17	16	21	24	44	48	41	39	50	25	20	12	13	16	13	18				
	28.5 m	This level was not instrumented for relative humidity at this time																											
	26.5 m	18	15	13	16	15	15	15	11	19	15	18	26	43	48	41	36	48	23	19	11	12	15	13	17				
	13.5 m	22	17	16	17	17	16	17	12	17	15	19	23	42	51	37	34	47	23	18	13	15	17	14	17				
	8.0 m	This level was not instrumented for relative humidity at this time																											
	4.0 m	23	18	16	13	15	16	15	20	24	25	16	27	46	48	35	31	48	22	23	17	19	17	17	21				
	2.0 m	23	18	15	15	14	11	15	20	26	23	20	28	46	48	33	28	46	22	21	15	20	19	15	20				
	1.0 m	19	17	17	15	14	16	15	18	26	23	19	30	49	43	36	39	44	28	19	15	17	19	16	19				
	0.5 m	18	15	14	15	14	12	14	19	30	23	23	32	48	41	29	18	41	25	19	15	15	18	14	17				

* No monthly summary was computed for the ranges.

SUMMARY OF METEOROLOGICAL OBSERVATIONS

HOURLY DATA

FEBRUARY 1967

Exposure		Monthly Means[2] of other Elements by Hour																								Monthly Summary			
Site	Code[1]	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	No of obs.	Min.	Mean	Max.
Albrook (Forest site)	WB (4.0 m)	70.4	70.4	70.4	70.1	70.0	69.8	70.1	72.1	73.3	73.6	73.9	74.1	74.0	73.9	73.5	73.5	73.0	72.2	71.5	71.2	71.2	71.2	70.9	70.8	672	66.5	71.9	77.7
	WB (2.0 m)	70.4	70.4	70.5	70.1	70.0	69.8	70.1	72.2	73.5	73.9	74.1	74.3	74.1	74.0	74.0	73.8	73.2	72.5	71.7	71.4	71.2	71.3	70.9	70.7	672	66.3	72.0	78.1
	WB (0.5 m)	70.7	70.5	70.4	70.3	70.1	70.0	69.9	71.4	73.6	74.2	74.5	74.4	74.5	74.5	74.4	74.1	73.7	73.2	72.3	71.7	71.5	71.4	71.2	71.1	668	66.4	72.2	77.9
	BP	.775	.758	.746	.737	.739	.749	.770	.787	.804	.809	.801	.777	.750	.726	.700	.691	.693	.706	.726	.746	.766	.783	.792	.786	672	.640	.755	.895
	P1	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.13	0.03	0.00	0.17	0.14	0.01	0.00	0.00	0.00	0.00	0.00	0.00	8	0.01	0.53	0.17
	P2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.02	0.00	0.19	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4	0.02	0.36	0.19
	P3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.01	0.00	0.12	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4	0.01	0.22	0.12
	P4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.18	0.01	0.00	0.23	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4	0.01	0.50	0.13
Chiva Chiva (Open site)	WB (4.0 m)	70.7	70.7	70.6	70.4	70.2	70.3	70.6	72.7	73.5	73.7	73.6	73.6	73.7	73.5	73.4	73.0	72.6	72.2	71.5	71.4	71.2	71.2	71.2	71.1	672	67.1	71.9	77.1
	WB (2.0 m)	70.7	70.7	70.6	70.4	70.2	70.3	70.7	72.9	73.7	74.0	73.9	74.0	74.0	73.9	73.8	73.3	73.0	72.3	71.7	71.5	71.3	71.2	71.3	71.0	671	67.2	72.1	77.2
	WB (0.5 m)	70.2	70.1	69.9	69.9	69.5	69.4	70.2	73.5	74.7	75.4	75.6	75.5	75.4	75.1	74.9	74.4	73.3	72.3	71.3	71.2	71.1	70.9	70.7	70.4	671	65.6	72.2	78.9
	BP	.866	.851	.839	.831	.833	.845	.864	.883	.900	.907	.900	.876	.849	.821	.798	.789	.792	.805	.825	.842	.859	.879	.884	.879	672	.725	.851	.999
	PS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2	0.04	0.24	0.20

WB - Wet bulb temperature (°F)
BP - Barometric pressure (in. of Hg minus 29.0)

PS - Precipitation at 1.0 m. in open area (in.)
P1 - Precipitation at 46.0 m. above canopy (in.)
P2 - Precipitation under full canopy (in.)
P3 - Precipitation under drip canopy (in.)
P4 - Precipitation under open canopy (in.)

ıthly means of precipitation are computed for precipitation days. Precipitation totals are substituted for the mean in the monthly summary.

SUMMARY OF METEOROLOGICAL OBSERVATIONS

HOURLY DATA

FEBRUARY 1967

Exposure		Monthly Ranges[2] of other Elements by Hour																								Monthly Summary*			
Site	Code[1]	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24				
Albrook (Forest site)	WB (4.0 m)	4.5	5.2	5.7	5.7	5.5	6.4	6.2	5.0	4.9	5.0	5.5	6.6	5.0	6.7	7.8	6.2	8.1	5.0	5.6	3.8	4.2	4.8	5.5	5.0				
	WB (2.0 m)	4.5	4.9	5.6	5.7	5.6	6.0	6.7	5.5	5.2	5.0	6.5	6.6	5.5	6.9	8.1	6.4	8.6	4.9	5.7	4.5	3.7	4.7	5.3	5.0				
	WB (0.5 m)	5.1	4.9	5.2	5.5	5.6	5.6	6.5	6.7	6.2	4.6	5.5	5.5	5.7	4.9	7.0	6.1	7.2	6.2	5.2	4.3	3.5	3.7	4.6	5.0				
	BP	.150	.155	.155	.145	.145	.145	.150	.140	.140	.145	.130	.150	.130	.135	.130	.130	.120	.130	.135	.135	.130	.145	.150	.150				
	P1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
	P2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
	P3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
	P4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Chiva Chiva (Open site)	WB (4.0 m)	5.0	4.8	4.6	4.6	5.9	5.0	4.4	4.4	5.5	5.3	5.3	5.5	4.8	5.6	8.2	7.3	7.7	4.4	4.6	4.2	3.8	4.6	5.9	4.2				
	WB (2.0 m)	4.8	4.4	5.2	4.4	5.7	4.7	4.4	3.9	3.9	4.9	5.5	5.4	4.6	5.7	7.4	6.8	7.1	4.8	3.9	3.5	3.2	4.3	4.3	4.1				
	WB (0.5 m)	5.4	5.2	5.3	4.6	5.7	6.6	5.4	5.2	3.7	4.8	4.5	4.4	3.8	5.8	8.0	4.2	6.3	4.4	4.5	3.3	3.6	4.9	4.7	4.1				
	BP	.170	.165	.160	.165	.160	.170	.170	.170	.165	.164	.140	.155	.145	.145	.135	.145	.140	.143	.145	.145	.150	.160	.160	.155				
	PS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				

* No monthly summary was computed for the ranges.

WB - Wet bulb temperature (°F)
BP - Barometric pressure (in. of Hg minus 29.0)

PS - Precipitation at 1.0 m. in open area (in.)
P1 - Precipitation at 46.0 m. above canopy (in.)
P2 - Precipitation under full canopy (in.)

P3 - Precipitation under drip canopy (in.)
P4 - Precipitation under open canopy (in.)

[2] Monthly ranges of precipitation are computed for precipitation days.

SUMMARY OF METEOROLOGICAL OBSERVATIONS

HOURLY DATA

FEBRUARY 1967

Exposure		Monthly Means of Wind Speed by Hour (miles/hr.)																								Monthly Summary			
Site	Level	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	No of obs.	Min.	Mean	Max.
Albrook (Forest site)	46.0 m	5	5	5	5	5	5	5	4	7	8	10	11	11	10	9	9	9	7	6	6	5	5	5	5	654	0	7	22
	28.5 m	This level was not instrumented for wind speed at this time																											
	26.5 m	3	2	3	2	3	2	2	2	4	4	5	5	6	5	4	4	4	2	3	2	2	3	3	3	654	0	3	12
	13.5 m	This level was not instrumented for wind speed at this time																											
	8.0 m	This level was not instrumented for wind speed at this time																											
	4.0 m	1	0	0	1	0	1	0	0	1	1	1	2	2	1	1	1	1	0	0	0	0	0	0	0	635	0	1	5
	2.0 m	This level was not instrumented for wind speed at this time																											
	1.0 m	This level was not instrumented for wind speed at this time																											
	0.5 m	This level was not instrumented for wind speed at this time																											
Chiva Chiva (Open site)	46.0 m	7	7	8	8	7	7	7	7	10	12	14	14	15	14	15	14	13	11	10	9	9	8	8	8	669	0	10	20
	28.5 m	This level was not instrumented for wind speed at this time																											
	26.5 m	6	6	6	7	6	6	5	6	9	11	13	13	14	13	14	14	12	10	8	8	7	7	7	6	629	0	9	20
	13.5 m	3	3	3	3	3	2	3	5	8	12	14	15	15	14	16	16	14	9	7	6	5	4	4	4	666	0	8	26
	8.0 m	This level was not instrumented for wind speed at this time																											
	4.0 m	3	4	4	4	4	3	3	4	6	8	9	9	10	10	10	10	9	7	6	5	5	4	4	4	651	0	6	16
	2.0 m	2	2	2	2	2	1	1	3	5	8	8	10	10	9	10	10	8	6	3	3	3	2	2	2	672	0	5	18
	1.0 m	This level was not instrumented for wind speed at this time																											
	0.5 m	This level was not instrumented for wind speed at this time																											

SUMMARY OF METEOROLOGICAL OBSERVATIONS

HOURLY DATA

FEBRUARY 1967

Exposure		Monthly Ranges of Wind Speed by Hour (miles/hr.)																								Monthly Summary*			
Site	Level	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24				
Albrook (Forest site)	46.0 m	8	11	8	10	10	8	8	7	13	16	17	20	16	18	16	10	11	9	10	11	8	6	9	8				
	28.5 m								This level was not instrumented for wind speed at this time																				
	26.5 m	7	6	4	4	6	4	5	5	9	8	9	11	11	9	7	5	7	5	4	4	6	4	5	4				
	13.5 m								This level was not instrumented for wind speed at this time																				
	8.0 m								This level was not instrumented for wind speed at this time																				
	4.0 m	4	3	1	3	1	5	2	1	2	2	2	3	3	3	4	4	3	2	1	1	1	1	1	1				
	2.0 m								This level was not instrumented for wind speed at this time																				
	1.0 m								This level was not instrumented for wind speed at this time																				
	0.5 m								This level was not instrumented for wind speed at this time																				
Chiva Chiva (Open site)	46.0 m	9	13	12	13	11	14	12	11	9	13	15	16	12	16	14	10	15	9	11	10	8	9	7	9				
	28.5 m								This level was not instrumented for wind speed at this time																				
	26.5 m	10	12	10	11	10	12	12	8	10	12	16	14	11	14	11	9	12	9	9	9	10	7	9	10				
	13.5 m	6	8	7	8	8	12	10	10	15	19	17	20	10	22	16	19	26	22	15	12	12	10	9	11				
	8.0 m								This level was not instrumented for wind speed at this time																				
	4.0 m	6	6	6	5	6	6	6	7	8	9	11	12	10	16	9	10	7	7	7	7	4	4	5	6				
	2.0 m	4	5	3	4	5	4	6	5	10	10	10	13	10	15	13	14	14	13	7	7	7	5	6	6				
	1.0 m								This level was not instrumented for wind speed at this time																				
	0.5 m								This level was not instrumented for wind speed at this time																				

* No monthly summary was computed for the ranges.

ALBROOK (Forest site) FEBRUARY 1967

Relative Frequencies* of Wind Directions by Hour at 46.0 m.

(%)

Dir. \ Hr.	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
N					7.6				11.5	15.4	11.5	18.5	21.4	10.7	35.7	21.4	17.9	10.7	3.6		10.7			
NNE								3.9		3.9	7.6		7.0	7.0	3.6	3.6	7.0							
NE									7.6		3.9		3.6	7.0			3.6							
ENE										3.9														
E										3.9				3.6		3.6								
ESE													3.6											
SE									3.9			3.7												
SSE																								
S												3.7												
SSW																								
SW											3.9		3.6	3.6				3.6						
WSW					11.5			7.6	3.9		3.9					7.0		3.6	3.6			7.0	3.6	7.0
W	62.9	51.8	59.2	62.9	53.9	65.5	65.5	73.1	30.8	7.6	7.6	14.8	14.3	3.6	10.7	7.0	10.7	17.9	28.6	39.3	42.9	50.0	39.3	42.9
WNW	14.8	29.6	22.2	18.5	19.2	23.0	15.4	3.9	11.5	19.2	7.6	3.7	7.0	7.0	17.9	7.0	25.0	14.3	17.9	14.3	14.3	14.3	25.0	28.6
NW	18.5	11.1	14.8	11.1	3.9		3.9	3.9	7.6	26.9	38.4	22.2	17.9	25.0	14.3	25.0	17.9	46.4	32.1	35.7	28.6	25.0	17.9	14.3
NNW						3.9	7.6		23.1	15.4	15.4	33.3	21.4	28.6	17.9	25.0	17.9	3.6	14.3	10.7		3.6	10.7	7.0
CALM	3.7	7.3	3.7	7.3	3.9	7.6	7.6	7.6		3.9				3.6							3.6		3.6	

* Note: Due to rounding, percentage totals do not equal 100%.

IMPRESORA, S. A. 43895

ALBROOK (Forest site) FEBRUARY 1967

Relative Frequencies* of Wind Directions by Hour at 26.5 m.
(%)

Dir. \ Hr.	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
N	7.3		3.7			3.9	3.9		3.9	7.6	15.4	22.2	17.9	25.0	17.9	10.7	10.7			10.7	7.0	3.6		7.0
NNE				3.7						11.5	3.9			10.7		7.0	3.6	7.0	10.7	7.0	3.6		3.6	
NE								3.9		15.4	7.6	7.3	3.6	7.0	10.7	10.7	3.6	3.6	3.6		3.6		3.6	
ENE									3.9	15.4	7.6		3.6					3.6						
E								3.9	3.9	3.9	3.9	3.7		3.6	10.7		3.6	3.6	3.6					
ESE										7.6	7.6	3.7							3.6					
SE									7.6			3.7	7.0	3.6			3.6						3.6	
SSE								3.9	3.9	3.9		3.7				3.6								
S															3.6	7.0	3.6			3.6				
SSW											3.9		3.6	3.6		3.6				3.6				
SW		3.7						3.9	3.9	3.9			7.0	10.7	7.0			3.6						7.0
WSW	3.7	3.7		3.7	11.5		15.4	15.4				3.7	3.6		7.0							3.6	7.0	
W	14.8		22.2	25.9	26.9	38.4	7.6	19.2	11.5			11.1	7.0	7.0	10.7	3.6	7.0	7.0	10.7	7.0	14.3	14.3	14.3	14.3
WNW	44.5	25.9	37.0	18.5	30.8	26.9	38.4	15.4	19.2	3.9	11.5	14.8	21.4	7.0	7.0	7.0	17.9	14.3	14.3	7.0	25.0	35.7	32.1	28.6
NW	11.1	48.1	22.2	18.5	23.0	15.4	19.2	23.0	19.2	15.4	23.0	18.5	14.3	7.0	14.3	32.1	28.6	42.9	35.7	39.3	21.4	25.0	21.4	32.1
NNW	14.8	3.7	3.7	18.5	3.9	3.9	3.9	7.6	19.2	7.6	15.4	7.3	10.7	14.3	10.7	14.3	14.3	10.7	17.9	21.4	10.7	10.7	7.0	10.7
CALM	3.7	14.8	11.1	11.1	3.9	11.5	11.5	3.9	3.9	3.9							3.6	3.6			14.3	7.0	7.0	

* Note: Due to rounding, percentage totals do not equal 100%.

IMPRESORA, S. A. 45886

ALBROOK (Forest site) FEBRUARY 1967

Relative Frequencies* of Wind Directions by Hour at 4.0 m.
(%)

Dir. \ Hr.	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
N		3.7	7.3			3.9	7.6	7.9		3.9	16.1	7.6	3.7		10.7	3.6	7.0	3.7	7.0	3.6			10.7	
NNE	7.3	3.7	3.7	3.7	3.9	3.9	3.9		3.9			11.5	14.9		3.6	3.6				3.6			7.0	3.6
NE									7.6		12.0	7.6	3.7		3.6	10.7	10.7	7.3						
ENE									3.9	7.6	7.9		7.3	3.7		3.6	10.7		3.6					
E									3.9		4.0	3.9	14.9	11.1	3.6	3.6	7.0							
ESE									4.0	3.9		3.7	3.6		3.6									
SE									3.9	3.9	4.0	3.9		3.7	7.0	7.0			3.6					
SSE									3.9		4.0	3.9			3.6		3.6							
S										3.9	12.0	3.9	7.3	3.7	10.7	3.6	7.0	7.3	3.6	3.6				
SSW	3.7			7.3		7.6			3.9	3.9			7.3	11.1	10.7	10.7	7.0			3.6				
SW		3.7							15.4	11.5	12.0	11.5	11.1	14.8	17.9		3.6	3.7	3.6	3.6				
WSW		3.7		3.7	3.9	3.9		4.0		7.6	4.0	7.6	7.3	3.7	3.6	10.7		3.7	3.6					3.6
W	7.3	7.3	7.3		7.6	3.9		7.9	11.5	7.6	4.0	19.2	7.3		3.6	3.6		7.3	3.6	7.0	3.6			
WNW	3.7			3.7	7.6	3.9	7.6	7.9	7.6	11.5	7.9	3.9	7.3		3.6	7.0		7.3	7.0	7.0	7.0	7.0	3.6	10.7
NW	25.9	14.8	14.8	29.6	7.6	34.6	15.4	12.0	3.9	3.9		3.9	3.7	22.2		10.7	3.6	3.7	3.6	10.7	10.7	10.7	14.3	21.4
NNW	3.7	3.7	7.3	7.3	11.6		11.6		3.9	3.9					3.6		7.0	3.7	3.6		3.6			
CALM	48.1	59.4	59.2	44.5	57.8	38.4	53.9	60.2	26.9	30.8	7.9	7.6	3.7	22.2	10.7	21.4	28.6	51.8	57.1	57.0	75.0	82.1	64.3	60.7

* Note: Due to rounding, percentage totals do not equal 100%.

IMPRESORA, S. A. 45895

CHIVA CHIVA (Open site) FEBRUARY 1967

Relative Frequencies* of Wind Directions by Hour at 46.0 m.
(%)

Dir. \ Hr.	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
N	18.5	11.1	11.1	22.2	11.1	25.9	11.1	22.2	39.3	37.0	44.5	53.6	21.4	35.7	35.7	28.6	32.1	39.3	28.6	39.3	17.9	14.3	25.9	22.2
NNE		3.7							7.0	18.5	11.1	14.3	10.7		10.7	10.7	7.0	3.6			3.6		3.7	
NE								3.7		3.7		3.6			3.6						3.6			
ENE																								
E																								
ESE																								
SE								3.7																
SSE														3.6										
S											3.7													
SSW																								
SW							3.7					3.6												
WSW																								
W		3.7	3.7			3.7	3.7							3.6										
WNW	3.7	3.7		7.3	7.3	3.7	3.7	3.7			3.7			7.0		7.0			3.6		3.6	3.6		
NW	33.3	44.5	44.5	22.2	44.5	29.6	48.1	37.0	28.6	18.5	7.3	7.0	7.0	3.6	17.9	7.0	10.7	21.4	14.3	10.7	21.4	21.4	18.5	33.3
NNW	44.5	33.3	40.8	44.5	37.0	37.0	29.6	29.6	25.0	22.2	29.6	17.9	60.7	46.4	32.1	46.4	50.0	35.7	53.6	50.0	50.0	60.7	51.8	44.5
CALM				3.7																				

* Note: Due to rounding, percentage totals do not equal 100%.

IMPRESORA. S. A. 45888

CHIVA CHIVA (Open site) FEBRUARY 1967

Relative Frequencies* of Wind Directions by Hour at 26.5 m.

(%)

Dir. \ Hr.	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
N	64.3	35.7	60.7	66.6	50.0	39.3	32.1	60.7	60.7	25.9	37.0	39.3	53.6	46.4	50.0	60.7	64.3	53.6	57.1	57.1	67.9	71.4	64.3	67.9
NNE	7.0	21.4	10.7	11.1	3.6	17.9	10.7	3.6	21.4	22.2	18.5	32.1	21.4	28.6	10.7	10.7	17.9	28.6	28.6	35.7	14.3	14.3	17.9	7.0
NE				3.7		3.6			3.6	33.3	25.9	17.9	10.7	10.7	32.1	21.4	3.6	7.0	7.0	3.6	3.6		3.6	3.6
ENE									3.6	7.3	7.3	7.0	3.6											
E																	3.6							
ESE																								
SE																								
SSE														3.6										
S											3.7													
SSW																								
SW																								
WSW												3.6												
W			3.6			3.6		3.6																3.6
WNW																								
NW		7.0	7.0	7.3	10.7	7.0	10.7	3.6						7.0		7.0		3.6			3.6	7.0		
NNW	21.4	28.6	14.3	7.3	35.7	25.0	35.7	28.6	10.7	11.1	7.3		10.7	3.6	7.0		10.7	7.0	7.0	3.6	10.7	7.0	14.3	14.3
CALM	7.0	7.0	3.6	3.7		3.6	10.7																	3.6

* Note: Due to rounding, percentage totals do not equal 100%.

IMPRESORA. S. A. 45895

CHIVA CHIVA (Open site) FEBRUARY 1967

Relative Frequencies* of Wind Directions by Hour at 4.0 m.
(%)

Dir. \ Hr.	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
N	10.7	7.0	14.3	10.7		17.9	7.0	7.0	17.9	22.2	29.6	35.7	25.0	32.1	32.1	25.0	25.0	21.4	21.4	21.4	17.9	17.9	10.7	17.9
NNE		7.0	3.6			3.6	7.0		7.0	29.6	14.8	14.3	10.7	7.0	10.7	14.3		3.6	3.6	3.6			7.0	
NE				3.6	3.6	7.0	7.0			3.7		3.6					3.6							
ENE											3.7													
E				3.6																				
ESE																								
SE																								
SSE																								
S											3.7													3.6
SSW								3.6																
SW	3.6	3.6																						3.6
WSW							3.6																	
W	3.6	3.6			7.0		7.0			3.7			3.6		3.6						3.6			
WNW	7.0	10.7	17.9	7.0	32.1		3.6	10.7		3.7	3.7		3.6	3.6	3.6		7.0	3.6	3.6	3.6	3.6		7.0	3.6
NW	46.4	46.4	28.6	42.9	32.1	39.3	60.7	35.7	32.1	25.9	11.1	21.4	28.6	32.1	35.7	32.1	10.7	17.9	17.9	28.6	35.7	39.3	32.1	46.4
NNW	25.0	21.4	28.6	32.1	25.0	14.3	7.0	32.1	42.9	14.8	29.6	25.0	32.1	17.9	17.9	25.0	53.6	53.6	53.6	42.9	39.3	42.9	42.9	25.0
CALM	3.6		7.0			10.7	3.6	3.6						3.6										

* Note: Due to rounding, percentage totals do not equal 100%.

IMPRESORA. S. A. 45555

SUMMARY OF NON HOURLY DATA

FEBRUARY 1967

Summary of Elements with Non-hourly Frequencies of Observation

Site	Element, Units and Exposure	Description	Number of Obs.	Minimum Value	Mean or Total Value	Maximum Value
Albrook (Forest site)	WBGT Index[1] (at 1.0 meters)	Index value	392	67.0	76.2	85.0
		Dry bulb temp.	392	66.8	80.3	89.9
		Wet bulb temp.	392	66.5	74.0	89.9
		Black bulb temp.	392	68.5	81.5	98.0
	Evaporation[3] (in. at 4 levels)	Piche (46.0 m)	28	0.159	19.302*	1.025
		Piche (26.5 m)	28	0.098	12.023*	0.616
		Piche (13.5 m)	28	0.024	5.994*	0.311
		Piche (0.5 m)	28	0.018	4.376*	0.226
	Precipitation from Raingauge Network[2] (in. at 1.0 meters)	Gauge # 1	2	0.13	0.54*	0.41
		Gauge # 2	2	0.12	0.58*	0.46
		Gauge # 3	2	0.10	0.67*	0.57
		Gauge # 4	2	0.09	0.47*	0.38
		Gauge # 5	2	0.09	0.53*	0.43
		Gauge # 6	2	0.09	0.43*	0.33
		Gauge # 7	2	0.09	0.53*	0.43
		Gauge # 8	2	0.09	0.37*	0.28
	Stem Flow[2] (in. at 2.0 meters)	Small tree	1	0.46	0.46*	0.46
		Medium tree	1	0.44	0.44*	0.44
		Large tree	1	0.15	0.15*	0.15
Chiva Chiva (Open site)	WBGT Index[1] (at 1.0 meters)	Index value	392	66.0	78.9	87.3
		Dry bulb temp.	392	66.5	83.4	94.0
		Wet bulb temp.	392	66.0	74.0	94.0
		Black bulb temp.	386	65.3	93.7	116.0
	Evaporation[3] (in. at 0.5 meters)	Piche	27	0.159	14.990*	0.781
		Pan	27	0.163	7.144*	0.346
	Minimum Grass temp[3] (°F at grass tips)	None	27	60.5	65.8	76.4

1 - Hourly observations between 0600 and 1900 hours inclusive
2 - Six hourly observations
3 - Daily observations

* Total Value

DISTRIBUTION LIST

Address	No. of Copies
Director Advanced Research Projects Agency Washington, DC 20301	6
Advanced Research Projects Agency R&D Field Unit APO San Francisco, California 96346	1
Defense Documentation Center for Scientific and Technical Information Cameron Station Alexandria, Virginia 22314	20
Director of Defense Research and Engineering ATTN: Technical Library Washington, DC 20301	1
Chief of Research and Development Department of the Army ATTN: CRD/M Washington, DC 20310	10
Assistant Chief of Staff for Intelligence Department of the Army ATTN: ACSI-DSRSI Washington, DC 20310	1
Commanding General US Army Materiel Command ATTN: AMCRD-SE Washington, DC 20315	1
Commanding General US Army Materiel Command ATTN: AMCRD-RV-A Washington, DC 20315	1
Commanding General US Army Test and Evaluation Command ATTN: AMSTE-NB Aberdeen Proving Ground, Maryland 21005	1
Commanding General US Army Test and Evaluation Command ATTN: AMSTE-TA-A Aberdeen Proving Ground, Maryland 21005	1
Commanding General US Army Test and Evaluation Command ATTN: AMSTE-EL Aberdeen Proving Ground, Maryland 21005	1

DISTRIBUTION LIST (cont'd)

Address	No. of Copies
Commanding General US Army CDC Combined Arms Group Fort Leavenworth, Kansas 66027	1
Commanding General US Army Missile Command ATTN: AMSMI-RRA, Bldg. 5422 Physical Sciences Laboratory Research and Development Directorate Redstone Arsenal, Alabama 35809	1
Commanding Officer US Army CDC CBR Agency ATTN: Mr. N. W. Bush Fort McClellan, Alabama 36205	1
US Army Munitions Command Operation Research Group Edgewood Arsenal, Maryland 21010	1
Commanding General US Army Natick Laboratories ATTN: Earth Sciences Laboratory Geography Division Natick, Massachusetts 01762	1
Commanding General US Army Natick Laboratories ATTN: Pioneering Research Laboratory Natick, Massachusetts 01762	1
Project TREND Applied Scientific Research Corporation of Thailand APO San Francisco, California 96346	1
Commanding Officer US Army Cold Regions Research and Engineering Laboratories ATTN: Photographic Interpretation Research Division Hanover, New Hampshire 03755	1
Commanding Officer US Army Ballistics Research Laboratories ATTN: AMXBR-B Aberdeen Proving Ground, Maryland 21005	1
Commanding Officer US Army Ballistics Research Laboratories ATTN: AMXBR-IA Aberdeen Proving Ground, Maryland 21005	1

DISTRIBUTION LIST (cont'd)

Address	No. of Copies
Director US Army Engineer Waterways Experiment Station ATTN: Mobility and Environmental Division Vicksburg, Mississippi 39180	1
Commanding Officer US Army Dugway Proving Ground ATTN: Chief, Meteorological Division Dugway, Utah 84022	1
Commanding Officer US Army CDC Artillery Agency Fort Sill, Oklahoma 73504	1
Commanding Officer US Army Picatinny Arsenal ATTN: SMUPA-TV-3 Dover, New Jersey 07801	1
Commanding Officer US Army Frankford Arsenal ATTN: SMUFA-L-8000 Philadelphia, Pennsylvania 19137	1
Commandant US Army Artillery & Missile School ATTN: Meteorology Division (Target Acquisition Department) Fort Sill, Oklahoma 73503	1
Commandant Special Warfare School Fort Bragg, N. C. 28307	1
Commanding General US Army Electronics Command ATTN: AMSEL-EW Fort Monmouth, New Jersey 07703	1
Commandant US Army CBR School, Micrometeorological Section Fort McClellan, Alabama 36205	1
Commandant US Army Signal School ATTN: Meteorological Department Fort Monmouth, New Jersey 07703	1
Chief, Atmospheric Science Research Division Atmospheric Science Laboratory US Army Electronics Command Fort Huachuca, Arizona 85613	1

144 858

DISTRIBUTION LIST (cont'd)

Address	No. of Copies
Chief, Atmospheric Science Office Atmospheric Science Laboratory US Army Electronics Command ATTN: AMSEL-BL-WS-M White Sands Missile Range, New Mexico 88002	1
Officer in Charge US Naval Weather Research Facility US Naval Air Station, Bldg. R-48 Norfolk, Virginia 23511	1
Commander USAF Air Weather Service ATTN: AWSES/TIPD Scott Air Force Base, Illinois 62225	1
Commander Air Force Cambridge Research Laboratories ATTN: CREW 1065 Main Street Waltham, Massachusetts 02154	1
Director Bureau of Research and Development Federal Aviation Agency Washington, DC 20553	1
Chief Fallout Studies Branch Atomic Energy Commission Washington, DC 20545	1
US Department of Agriculture Forest Service North Central Forest Experiment Station Folvell Avenue St. Paul, Minnesota 55101	1
Director Atmospheric Physics and Chemistry Laboratory ESSA - Department of Commerce PSRB Bldg. No. 2 Boulder, Colorado 80302	1
Director Atmospheric Sciences Library Environmental Science Service Administration Silver Spring, Maryland 20910	1
National Center for Atmospheric Research ATTN: NCAR Library Acquisitions Boulder, Colorado 80302	1

DISTRIBUTION LIST (cont'd)

Address	No. of Copies
Remote Area Conflict Information Center Battelle Memorial Institute 505 King Avenue Columbus, Ohio 43201	1
Commander Operational Test and Evaluation Force US Naval Base Norfolk, Virginia 23511	1
Panama Canal Company Meteorological and Hydrographic Branch ATTN: Chief Hydrographer Box "M" Balboa Heights, Canal Zone	1
Commander Detachment 5, 5th Weather Wing Bldg. 235, Howard Air Force Base Canal Zone	
Director Data Processing Division Environmental Technical Applications Center (MAC) US Air Force Federal Building Asheville, North Carolina 28801	1
Commander Air Force Cambridge Research Laboratories ATTN: CREW Laurence G. Hanscom Field Bedford, Massachusetts 01760	1
Commanding General US Army CDC Combat Support Group Fort Belvoir, Virginia 22060	1
Commanding General Deseret Test Center Bldg. 103, Soldier's Circle Fort Douglas, Utah 84113	1
Commanding General US Army Munitions Command ATTN: AMSMU-RE-R Dover, New Jersey 07801	1
Commanding General US Army Electronics Command ATTN: AMSEL-BL-AP Fort Monmouth, New Jersey 07703	1

DISTRIBUTION LIST (cont'd)

Address	No. of Copies
Commanding Officer US Army Electronics Command Meteorological Support Activity Fort Huachuca, Arizona 85613	1

UNCLASSIFIED

Security Classification

DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY *(Corporate author)* US Army Tropic Test Center Fort Clayton, Canal Zone	2a. REPORT SECURITY CLASSIFICATION UNCLASSIFIED 2b. GROUP

3. REPORT TITLE

Monthly Microclimatic Summary, February 1967: Environmental Data Base for Regional Studies in the Humid Tropics

4. DESCRIPTIVE NOTES *(Type of report and inclusive dates)*

Data Summary, February 1967

5. AUTHOR(S) *(First name, middle initial, last name)*

6. REPORT DATE April 1968	7a. TOTAL NO. OF PAGES 28	7b. NO. OF REFS
8a. CONTRACT OR GRANT NO. b. PROJECT NO. 2M025001A724-01 c. USATECOM No. 9-4-0013-01 d. Work Unit: USATTC #001	9a. ORIGINATOR'S REPORT NUMBER(S) 9b. OTHER REPORT NO(S) *(Any other numbers that may be assigned this report)*	

10. DISTRIBUTION STATEMENT

Distribution of this document is unlimited.

11. SUPPLEMENTARY NOTES	12. SPONSORING MILITARY ACTIVITY Advanced Research Projects Agency Army Research Projects Office, OCRD

13. ABSTRACT

This report contains detailed microclimatic data for February 1967 from specific sites in the Panama Canal Zone and vicinity. The data are presented in tabular form, summarized for hourly and/or daily observations from surface to 46-meter levels. Elements listed are: temperature, pressure, precipitation, wind speed and direction, relative humidity, and evaporation.

DD FORM 1 NOV 65 1473 REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

UNCLASSIFIED

Security Classification

UNCLASSIFIED
Security Classification

14. KEY WORDS	LINK A ROLE	LINK A WT	LINK B ROLE	LINK B WT	LINK C ROLE	LINK C WT
Climate						
Microclimatology						
Tropic Environment						
Humid Tropics						
Panama Canal Zone Microclimatology						
Data Base						

12-2346

UNCLASSIFIED
Security Classification

ENVIRONMENTAL DATA BASE
FOR REGIONAL STUDIES IN THE HUMID TROPICS

MONTHLY
MICROCLIMATIC SUMMARY

MARCH 1967

ATMOSPHERIC SCIENCES
LIBRARY

OCT 26 1967

E. S. S. A.
U. S. Dept. of Commerce

Prepared by

Michael A. Fradel, Project Officer
and
Dr. Wilfried H. Portig, Meteorologist

USATECOM Project No. 9-4-0013-01

This research was supported by the Advanced Research Projects Agency of the Department of Defense and by the Army Research Office, OCRD, Department of Army

Conducted by

US Army
Tropic Test Center
Fort Clayton, Canal Zone
with contractual services provided by
Weather Engineers of Panama Corp.

M06.1/728.8
U58/8ew
march 1967

~~142-538~~

Distribution of this document is unlimited

TABLE OF CONTENTS

	Page
Introduction	1
Sites	1
Instrumentation	1
Data Reduction and Storage	2
Figures	
1. Location Map, Isthmus of Panama	3
2. Frequency of Observations	4
3. Albrook Forest Site, Generalized Plot	5
4. Chiva Chiva Open Site, Generalized Plot	6
5. Instrument Location on Towers	7
Data Summary Sheets	
Monthly Means of Air Temperature by Hour	8
Monthly Ranges of Air Temperature by Hour	9
Monthly Means of Relative Humidity by Hour	10
Monthly Ranges of Relative Humidity by Hour	11
Monthly Means of Other Elements by Hour	12
Monthly Means of Soil Surface Temperature by Hour	
Monthly Means of Wet Bulb Temperature by Hour	
Monthly Means of Barometric Pressure by Hour	
Monthly Means of Precipitation by Hour	
Monthly Totals of Precipitation	
Monthly Ranges of Other Elements by Hour	13
Monthly Ranges of Soil Surface Temperature by Hour	
Monthly Ranges of Wet Bulb Temperature by Hour	
Monthly Ranges of Barometric Pressure by Hour	
Monthly Ranges of Precipitation by Hour	
Monthly Means of Wind Speed by Hour	14
Monthly Ranges of Wind Speed by Hour	15
Relative Frequencies of Wind Directions (46 meters, Albrook)	16
Relative Frequencies of Wind Directions (26.5 meters, Albrook)	17
Relative Frequencies of Wind Directions (4 meters, Albrook)	18
Relative Frequencies of Wind Directions (46 meters, Chiva Chiva)	19
Relative Frequencies of Wind Directions (26.5 meters, Chiva Chiva)	20
Relative Frequencies of Wind Directions (4 meters, Chiva Chiva)	21
Summary of Elements with Non-Hourly Frequencies of Observation	22
WBGT (Albrook)	
Evaporation (Albrook)	
Precipitation (Manual gauge network, Albrook)	
Precipitation (Stem Flow, Albrook)	
WBGT (Chiva Chiva)	

TABLE OF CONTENTS (cont'd)

Minimum Grass Temperature (Chiva Chiva)
Maximum Temperature (Albrook satellite)
Minimum Temperature (Albrook satellite)
Maximum Relative Humidity (Albrook satellite)
Minimum Relative Humidity (Albrook satellite)
Precipitation (Albrook satellite)
Maximum Temperature (Fort Kobbe satellite)
Minimum Temperature (Fort Kobbe satellite)
Maximum Relative Humidity (Fort Kobbe satellite)
Minimum Relative Humidity (Fort Kobbe satellite)
Precipitation (Fort Kobbe satellite)
Maximum Temperature (Fort Sherman satellite)
Minimum Temperature (Fort Sherman satellite)
Maximum Relative Humidity (Fort Sherman satellite)
Precipitation (Fort Sherman satellite)

MONTHLY MICROCLIMATIC SUMMARY

Introduction

Monthly microclimatic data summarized in this series of reports were collected by the US Army Tropic Test Center and the Weather Engineers of Panama Corporation under the project, Environmental Data Base for Regional Studies in the Humid Tropics. The project is sponsored by the Advanced Research Projects Agency of the Department of Defense and by the Army Research Office, Office of the Chief of Research and Development. It is an investigation of microclimatic, air chemistry, vegetation, soils, microbiological, and macrofaunal conditions at selected sites in the principal tropical environments of the Panama Canal Zone and the Rio Hato Military Reservation. The objective of the project is to assemble quantitative environmental data for RDT&E purposes.

Sites. Data summarized in this report were collected at the Albrook Forest and Chiva Chiva sites. Figure 1 shows the site locations within the Isthmus of Panama. Geographic coordinates are shown below:

Albrook Forest	09° 01'N, 79° 33'W
Chiva Chiva	09° 01'N, 79° 35'W
Fort Kobbe (satellite)	08° 54'N, 79° 34'W
Fort Sherman (satellite)	09° 16'N, 79° 59'W
Albrook (satellite)	09 00'N, 79° 33'W

The Chiva Chiva open site and the Albrook Forest site are paired for comparative study of environmental conditions in a tropical semideciduous forest and in a large clearing. Both are located in a region where the annual precipitation is approximately 80 inches and there is a pronounced dry season. The other satellite sites were located primarily for soil studies purposes. Albrook and Fort Kobbe have climatic regimes similar to the principal sites.

The Albrook and Chiva Chiva main sites are approximately four kilometers apart. Each has a 46-meter walk-up tower and an air-conditioned building to house the recording equipment and observers. Both sites are approximately 30 meters above sea level. The top of the forest canopy at the Albrook site is about 26.5 meters above the ground.

Instrumentation. A wide range of climatic elements are measured at the Albrook and Chiva Chiva sites. Types of observations and frequencies are shown on Figure 2. The towers at the Albrook and Chiva Chiva sites are similarly oriented. Sensing equipment is mounted at several levels on the towers to provide measurements through the vertical profile. Additional instruments are emplaced in the immediate vicinity on or near the ground.

All instrument exposures are duplicated at each site. Figures 3, 4, and 5 show the instrument array at these sites.

Data Reduction and Storage. All data, as applicable, are recorded at or reduced to each full hour and transposed to punch cards. These punch cards, together with all raw data, are stored in the Tropic Test Center Technical Library Annex.

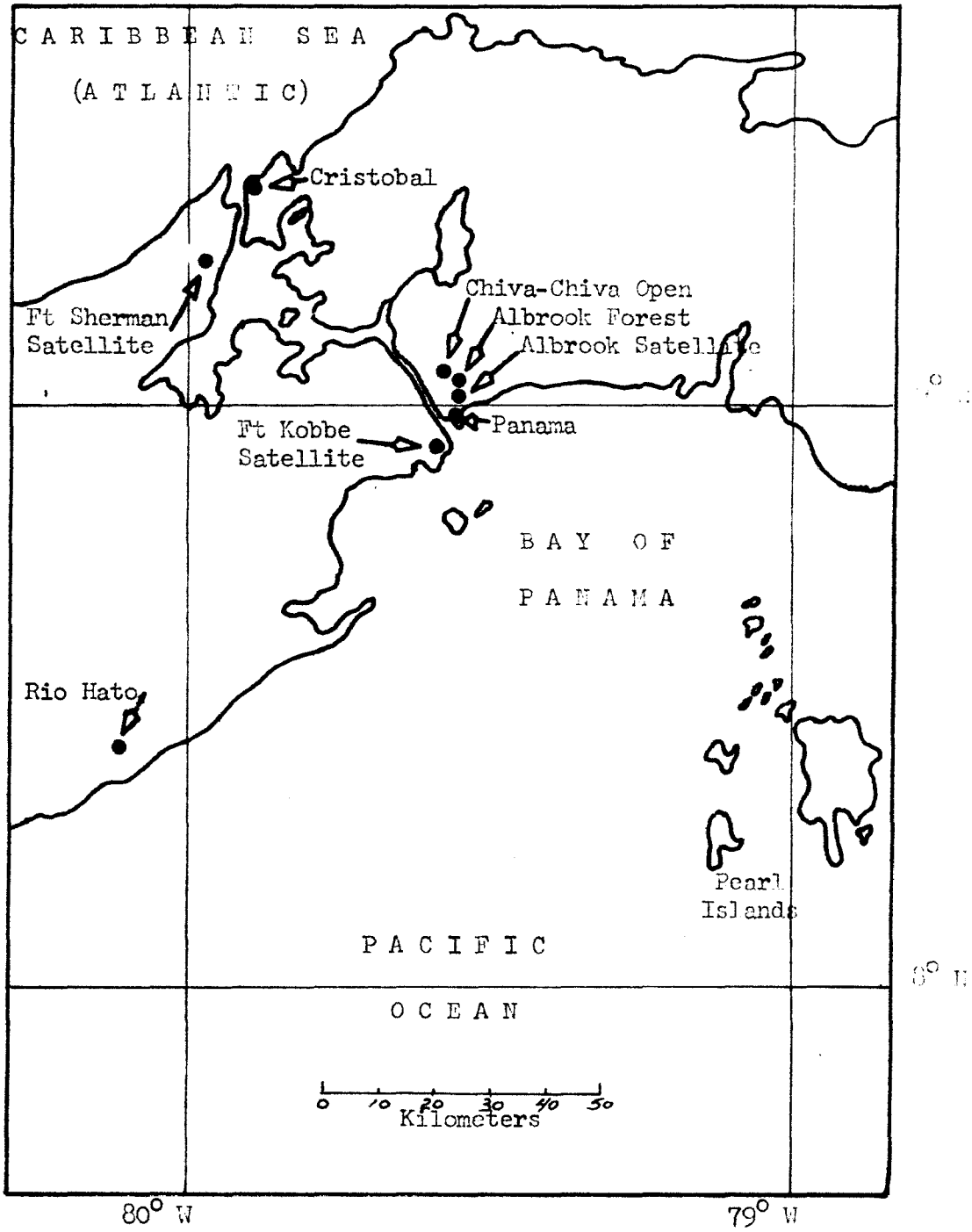

FIGURE 1.

LOCATION MAP, ISTHMUS OF PANAMA

FIGURE 2. FREQUENCY OF OBSERVATIONS

# Element	Height (meters) Sfc	0.5	1.0	2.0	4.0	8.0	13.5	26.5	46.0	Frequency
Temperature:										
Dry Bulb	2	2	1	2	2	2	2	2	2	Hourly*/Continuously
Wet Bulb	-	2	-	2	2	-	-	-	-	Hourly*/Continuously
Grass Minimum	4	-	-	-	-	-	-	-	-	Once Daily
WBGT Index	-	-	2	-	-	-	-	-	-	Hourly(0600-1900 EST)
Relative Humidity	-	2	1	2	2	2	2	2	2	Hourly*/Continuously
Barometric Pressure	-	-	2	-	-	-	-	-	-	Continuously
Evaporation	2	-	-	-	-	-	-	3	3	Once Daily
Precipitation:										
Recording Gage	-	-	1	-	-	-	-	-	3	Continuously
Manual Gage	-	-	3	-	-	-	-	-	-	4 Times Daily
Stem Flow	-	-	3	-	-	-	-	-	-	4 Times Daily
Wind:										
Direction	-	-	-	-	5	-	-	-	2	Continuously
Speed	-	-	-	2**	5	-	2**	2**	2	Hourly**/Continuously

1. All sites
2. Albrook and Chiva Chiva
3. Albrook only
4. Chiva Chiva only
5. Main sites

* Observation made with sling psychrometer when recorders are inoperative.

** Hourly.

Instrument descriptions are contained in the Environmental Data Base semiannual reports.

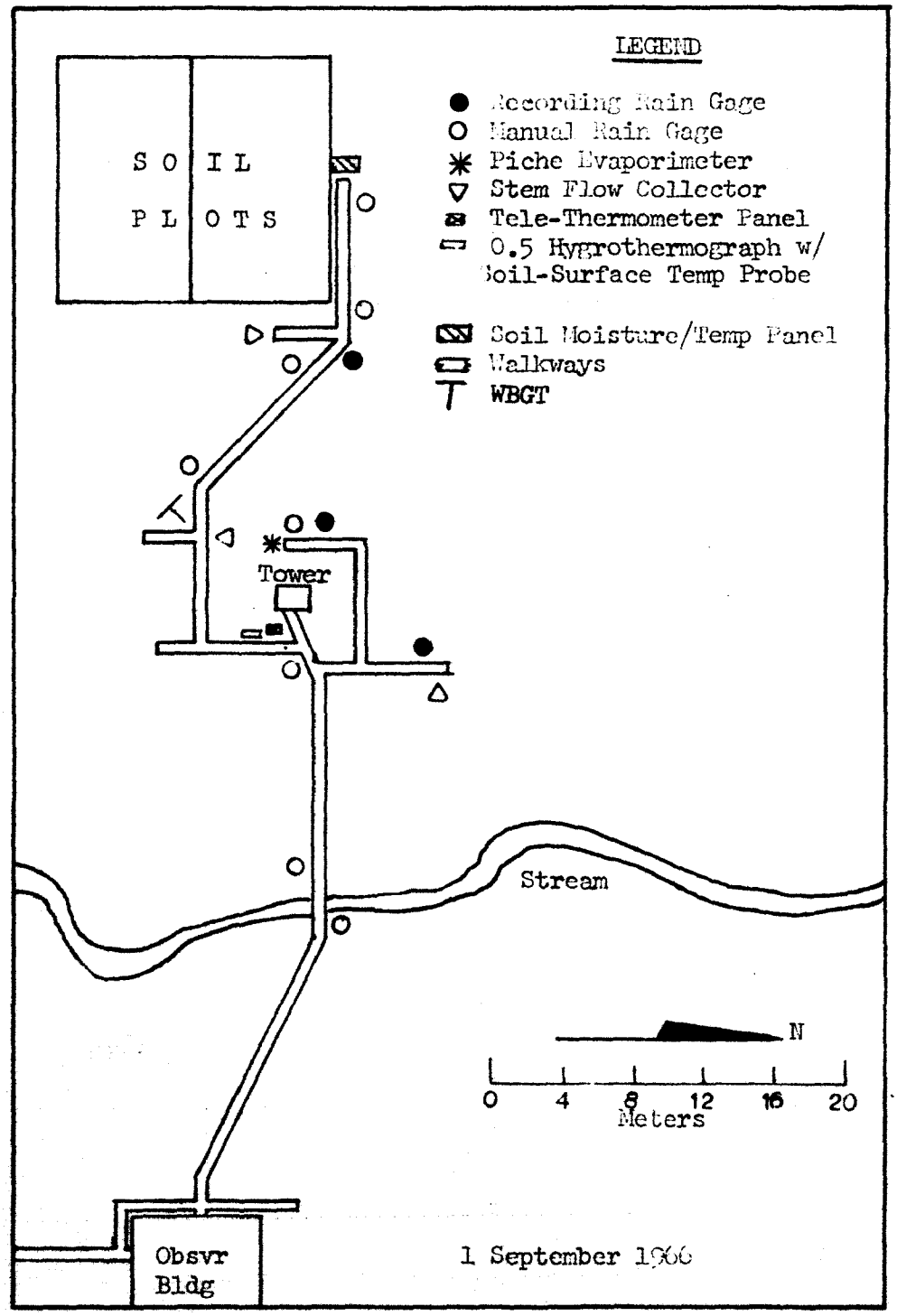

FIGURE 3.

ALBROOK FOREST SITE, GENERALIZED PLOT

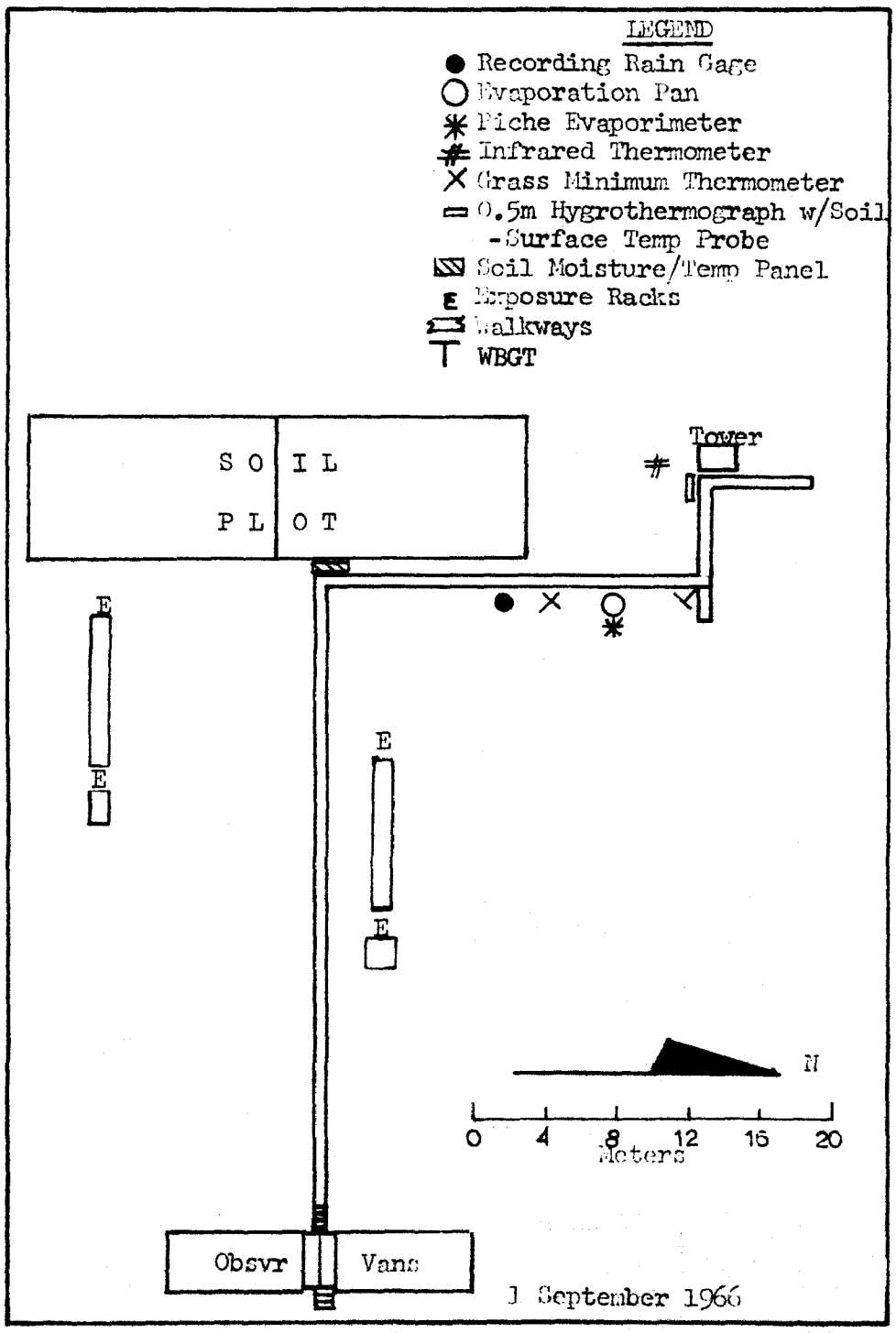

FIGURE 4.

CHIVA CHIVA OPEN, GENERALIZED PLOT

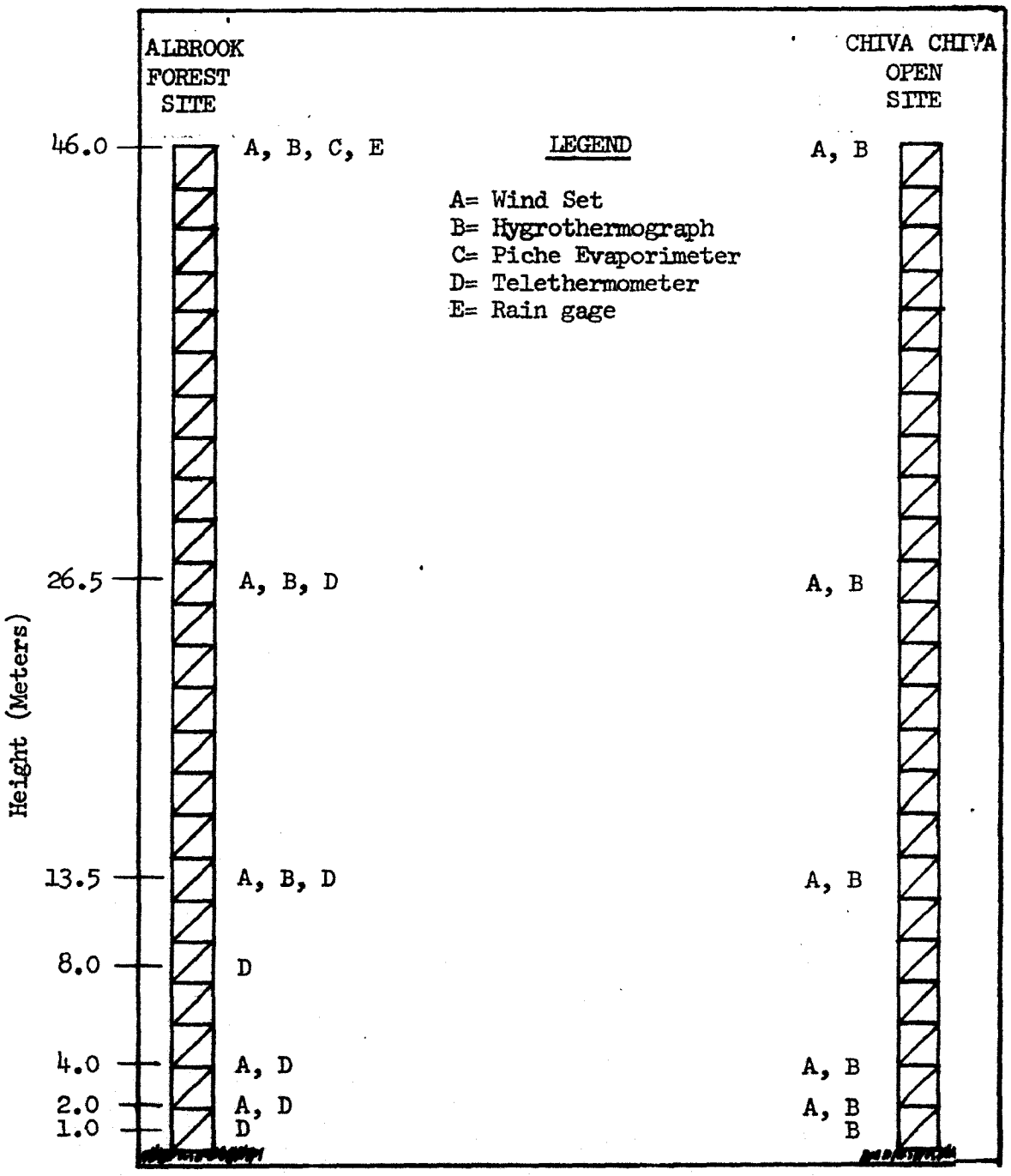

FIGURE 5.

INSTRUMENT LOCATION ON TOWERS

SUMMARY OF METEOROLOGICAL OBSERVATIONS

HOURLY DATA

MARCH 1967

Exposure		Monthly Means of Air Temperature by Hour (°F)																								Monthly Summary			
Site	Level	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	No. of Obs.	Min.	Mean	Max.
Albrook (Forest site)	46.0 m	74.3	74.0	73.8	73.5	73.3	73.1	74.0	76.8	80.5	82.5	84.4	85.4	85.5	84.8	84.4	84.0	82.7	79.9	77.8	76.7	75.8	75.3	75.0	74.6	744	69.8	78.4	89.3
	28.5 m	74.0	73.6	73.3	73.0	72.9	72.4	74.1	77.9	81.2	83.2	84.5	85.5	85.7	85.1	85.0	84.6	83.8	80.3	77.5	76.3	75.5	74.9	74.6	73.8	744	67.6	78.4	90.3
	26.5 m	73.8	73.5	73.2	72.9	72.7	72.7	73.7	77.5	81.3	83.8	85.3	86.4	86.4	86.1	85.9	85.0	83.6	80.1	77.3	76.1	75.2	74.8	74.5	73.8	744	68.2	78.6	95.3
	13.5 m	73.1	72.6	72.2	72.1	71.9	71.6	72.3	75.8	81.4	82.6	84.1	84.6	85.0	84.1	83.7	83.0	82.6	79.4	77.0	75.6	74.8	74.1	73.6	73.1	744	67.2	77.5	88.3
	8.0 m	72.4	72.0	71.6	71.3	71.2	71.1	72.0	75.1	79.5	82.3	84.8	85.5	85.2	84.6	84.3	83.4	82.2	79.7	77.1	75.5	74.6	73.6	73.1	72.6	742	66.2	77.3	89.7
	4.0 m	71.9	71.5	71.1	70.9	70.5	70.4	71.3	75.4	79.7	83.2	85.2	86.0	85.7	85.0	84.4	83.7	82.0	79.3	76.5	75.0	74.0	73.1	72.7	72.2	737	65.7	77.1	89.9
	2.0 m	71.8	71.4	71.1	70.9	70.5	70.4	71.1	74.8	79.4	82.9	85.0	85.9	85.5	85.1	84.5	83.5	81.9	79.2	76.5	74.8	73.9	73.1	72.6	72.1	737	65.7	76.9	89.6
	1.0 m	71.9	71.4	71.1	70.9	70.6	70.2	71.0	74.6	80.7	83.3	85.1	86.0	86.3	85.8	85.4	84.1	82.6	79.6	76.9	75.6	74.4	73.5	72.8	72.3	744	66.3	77.3	91.0
	0.5 m	72.4	72.0	71.6	71.4	71.1	71.0	71.1	73.7	77.9	81.7	84.7	85.5	85.8	85.1	84.4	83.8	82.5	80.1	77.5	75.9	74.8	73.9	73.2	72.8	744	67.6	77.2	89.7
Chiva Chiva (Open site)	46.0 m	74.3	74.1	73.9	73.6	73.3	73.0	73.4	75.8	79.6	81.9	84.1	85.1	85.6	85.4	84.6	84.1	82.3	80.5	78.0	77.0	75.9	75.4	74.9	74.7	744	69.7	78.3	88.1
	28.5 m	This level was not instrumented for air temperature at this time																											
	26.5 m	74.4	74.1	73.7	73.5	73.1	72.8	73.2	75.9	79.8	82.0	84.2	85.1	85.6	85.6	84.8	84.4	82.6	80.7	78.4	77.3	76.2	75.7	75.1	74.8	738	70.0	78.4	88.7
	13.5 m	74.0	73.6	73.3	73.0	72.5	72.1	72.5	75.7	79.9	82.4	84.5	85.5	86.1	86.1	85.2	84.5	82.8	80.6	78.2	77.1	75.9	75.4	74.8	74.4	741	67.9	78.2	89.3
	8.0 m	This level was not instrumented for air temperature at this time																											
	4.0 m	73.5	72.9	72.6	72.0	71.8	71.2	72.6	77.9	81.8	84.1	86.2	87.3	87.9	87.2	86.7	85.6	83.8	80.8	78.1	76.8	75.6	74.8	74.5	73.8	743	66.5	78.7	90.9
	2.0 m	73.2	72.7	72.5	71.7	71.5	70.9	72.5	78.3	82.4	84.7	86.9	87.9	88.4	87.9	87.2	86.1	84.0	80.9	78.1	76.8	75.6	74.7	74.2	73.6	742	65.6	78.8	91.9
	1.0 m	72.8	72.4	72.1	71.5	71.0	70.2	72.7	79.8	83.9	87.0	89.2	90.7	90.9	90.3	89.1	87.6	85.1	81.3	78.1	76.8	75.5	74.6	74.0	73.4	744	64.0	79.5	95.5
	0.5 m	72.8	72.3	72.1	71.5	71.2	70.6	72.2	79.4	84.7	87.8	90.4	91.2	91.3	89.4	87.8	86.8	84.1	80.5	77.2	75.9	74.8	74.1	73.5	73.1	744	66.3	79.3	95.6

SUMMARY OF METEOROLOGICAL OBSERVATIONS

HOURLY DATA

MARCH 1967

Exposure		Monthly Ranges of Air Temperature by Hour (°F)																								Monthly Summary *			
Site	Level	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24				
Albrook (Forest site)	46.0 m	4.6	4.5	5.0	4.8	5.2	5.6	7.0	6.4	4.9	5.3	5.1	11.7	10.0	16.6	14.7	7.3	7.4	7.7	4.1	3.4	3.8	3.8	4.2	4.4				
	28.5 m	8.4	9.1	6.0	7.9	7.0	7.9	9.3	7.2	6.0	5.7	7.9	11.8	9.6	19.7	15.7	10.2	10.8	7.7	7.2	4.7	4.2	6.2	4.9	6.9				
	26.5 m	5.6	5.2	5.8	7.8	6.6	7.0	10.1	7.5	6.7	7.8	7.7	14.1	12.6	22.8	21.6	13.8	10.6	7.6	6.1	3.1	4.8	5.7	5.1	6.3				
	13.5 m	9.2	9.0	7.6	8.0	7.3	7.7	7.9	4.6	6.0	6.6	6.4	13.1	9.9	17.3	14.3	9.7	9.7	6.4	7.0	4.9	4.9	5.8	6.5	7.1				
	8.0 m	10.1	9.9	8.2	8.9	7.9	9.4	12.6	6.1	3.6	5.4	6.4	14.2	9.8	19.2	15.5	11.2	8.9	6.7	7.0	5.7	5.4	6.3	7.5	7.9				
	4.0 m	8.0	8.7	8.8	7.9	8.3	8.6	8.7	5.3	4.5	5.5	DTF.	DTF.	DTF.	DTF.	16.0	11.7	9.4	7.7	7.3	6.9	5.8	6.9	7.9	8.3				
	2.0 m	8.0	8.8	8.8	8.0	7.8	DTF.	8.6	5.6	3.9	5.5	DTF.	DTF.	DTF.	DTF.	16.7	11.5	9.7	8.0	7.3	7.2	6.3	6.7	7.9	8.2				
	1.0 m	6.4	6.1	5.7	5.0	6.4	7.7	8.4	4.9	8.0	7.9	5.6	14.0	11.5	19.5	17.2	11.7	10.6	9.1	8.2	6.8	6.0	5.0	5.3	5.9				
	0.5 m	6.8	6.9	6.9	6.4	6.6	7.5	6.8	4.9	3.5	4.8	6.0	12.9	12.5	15.3	17.6	10.9	9.6	8.9	7.6	8.6	5.9	5.7	5.8	6.4				

Note: DTF. indicates data of doubtful validity.

* No monthly summary was computed for the ranges.

Chiva Chiva (Open site)	46.0 m	4.8	5.6	5.5	5.7	5.6	6.1	6.8	5.7	5.6	5.6	4.2	10.4	9.9	9.0	10.7	6.5	5.4	6.1	4.5	3.7	3.5	3.0	3.7	3.8				
	28.5 m	This level was not instrumented for air temperature at this time																											
	26.5 m	4.7	5.3	6.4	6.2	5.7	6.1	6.8	6.5	5.6	5.7	5.1	9.9	9.4	9.5	10.6	7.1	6.7	6.9	4.4	4.8	3.8	2.9	3.3	4.7				
	13.5 m	6.4	7.1	7.0	6.6	6.6	8.1	8.2	8.7	4.7	5.7	5.1	10.5	9.4	10.1	11.9	7.3	6.0	6.5	4.6	3.8	3.6	4.4	4.8	6.6				
	8.0 m	This level was not instrumented for air temperature at this time																											
	4.0 m	8.4	9.2	8.5	7.6	8.4	9.9	9.9	4.3	6.5	5.1	5.6	11.3	10.9	11.2	9.1	8.7	6.2	5.6	4.3	3.3	3.3	6.1	7.0	8.4				
	2.0 m	9.2	9.7	8.2	8.3	8.0	10.6	10.1	5.6	5.9	5.0	7.1	11.9	11.4	10.9	9.3	8.6	6.4	5.6	4.7	2.5	3.2	6.2	7.1	9.4				
	1.0 m	8.8	9.8	8.4	8.1	8.1	12.7	10.2	7.5	7.6	9.0	12.2	15.0	14.5	12.0	11.3	10.4	7.4	6.0	5.0	2.9	3.6	4.9	6.9	8.0				
	0.5 m	7.9	8.1	6.7	6.3	6.9	8.5	8.2	5.8	5.6	7.7	11.8	15.9	14.0	14.3	13.6	7.4	6.8	5.1	3.9	3.0	3.2	3.7	5.8	7.3				

SUMMARY OF METEOROLOGICAL OBSERVATIONS

HOURLY DATA

MARCH 1967

Exposure		Monthly Means of Relative Humidity by Hour (%)																								Monthly Summary			
Site	Level	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	No of obs.	Min.	Mean	Max.
Albrook (Forest site)	46.0 m	83.0	84.0	85.0	85.0	85.0	86.0	85.0	81.0	69.0	62.0	56.0	54.0	54.0	56.0	56.0	58.0	59.0	66.0	72.0	75.0	78.0	80.0	82.0	82.0	744	40.0	72.0	93.0
	28.5 m	This level was not instrumented for relative humidity at this time																											
	26.5 m	84.0	84.0	84.0	84.0	84.0	84.0	83.0	80.0	68.0	61.0	56.0	55.0	55.0	56.0	57.0	59.0	60.0	67.0	75.0	79.0	81.0	82.0	83.0	83.0	742	43.0	73.0	93.0
	13.5 m	88.0	88.0	88.0	89.0	89.0	90.0	90.0	86.0	73.0	63.0	58.0	55.0	56.0	58.0	60.0	60.0	61.0	66.0	73.0	79.0	82.0	84.0	86.0	86.0	741	42.0	75.0	94.0
	8.0 m	This level was not instrumented for relative humidity at this time																											
	4.0 m	92.0	92.0	93.0	93.0	94.0	94.0	93.0	85.0	72.0	63.0	58.0	55.0	58.0	60.0	62.0	62.0	64.0	70.0	77.0	82.0	85.0	88.0	89.0	90.0	738	37.0	78.0	100.0
	2.0 m	92.0	93.0	93.0	94.0	94.0	95.0	94.0	88.0	73.0	65.0	59.0	56.0	59.0	60.0	62.0	64.0	65.0	72.0	78.0	83.0	86.0	88.0	90.0	91.0	738	39.0	79.0	100.0
	1.0 m	91.0	92.0	92.0	93.0	94.0	94.0	94.0	91.0	77.0	68.0	60.0	58.0	59.0	61.0	62.0	64.0	66.0	72.0	78.0	81.0	84.0	87.0	89.0	90.0	742	43.0	79.0	98.0
	0.5 m	91.0	92.0	93.0	92.0	94.0	94.0	93.0	90.0	79.0	69.0	61.0	59.0	59.0	60.0	62.0	64.0	66.0	71.0	77.0	81.0	84.0	86.0	89.0	90.0	744	42.0	79.0	99.0
Chiva Chiva (Open site)	46.0 m	82.0	82.0	82.0	82.0	83.0	83.0	83.0	79.0	70.0	62.0	57.0	54.0	53.0	53.0	55.0	56.0	58.0	64.0	69.0	75.0	78.0	80.0	81.0	82.0	744	43.0	70.0	83.0
	28.5 m	This level was not instrumented for relative humidity at this time																											
	26.5 m	80.0	81.0	80.0	81.0	81.0	81.0	81.0	77.0	68.0	60.0	56.0	52.0	52.0	52.0	54.0	55.0	58.0	64.0	70.0	75.0	78.0	80.0	80.0	80.0	741	40.0	69.0	81.0
	13.5 m	80.0	81.0	80.0	81.0	81.0	81.0	81.0	76.0	68.0	60.0	55.0	52.0	51.0	52.0	53.0	54.0	58.0	63.0	70.0	75.0	79.0	80.0	80.0	80.0	744	39.0	69.0	86.0
	8.0 m	This level was not instrumented for relative humidity at this time																											
	4.0 m	84.0	86.0	87.0	88.0	89.0	90.0	88.0	75.0	64.0	57.0	52.0	49.0	49.0	50.0	52.0	53.0	57.0	63.0	70.0	75.0	78.0	81.0	82.0	84.0	743	35.0	71.0	100.0
	2.0 m	85.0	87.0	87.0	89.0	90.0	91.0	89.0	75.0	64.0	57.0	52.0	50.0	50.0	51.0	52.0	54.0	58.0	64.0	71.0	75.0	79.0	81.0	83.0	84.0	742	39.0	71.0	98.0
	1.0 m	84.0	84.0	83.0	84.0	84.0	84.0	84.0	76.0	66.0	57.0	52.0	49.0	48.0	48.0	51.0	51.0	56.0	64.0	71.0	77.0	81.0	83.0	83.0	83.0	744	35.0	70.0	84.0
	0.5 m	86.0	87.0	88.0	88.0	89.0	90.0	89.0	73.0	61.0	54.0	49.0	46.0	46.0	50.0	52.0	53.0	58.0	65.0	73.0	78.0	81.0	83.0	85.0	86.0	744	34.0	71.0	98.0

SUMMARY OF METEOROLOGICAL OBSERVATIONS

HOURLY DATA

MARCH 1967

Exposure		Monthly Ranges of Relative Humidity by Hour (%)																								Monthly Summary *			
Site	Level	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24				
Albrook (Forest site)	46.0 m	8.0	8.0	7.0	7.0	13.0	12.0	5.0	13.0	21.0	18.0	18.0	24.0	28.0	38.0	44.0	34.0	40.0	34.0	19.0	12.0	10.0	9.0	13.0	9.0				
	28.5 m	This level was not instrumented for relative humidity at this time																											
	26.5 m	8.0	7.0	5.0	5.0	4.0	3.0	5.0	12.0	14.0	16.0	15.0	26.0	25.0	50.0	50.0	33.0	36.0	37.0	20.0	11.0	7.0	7.0	9.0	5.0				
	13.5 m	11.0	11.0	9.0	10.0	20.0	8.0	9.0	13.0	23.0	20.0	19.0	25.0	29.0	49.0	49.0	39.0	40.0	41.0	32.0	20.0	12.0	10.0	11.0	12.0				
	8.0 m	This level was not instrumented for relative humidity at this time																											
	4.0 m	19.0	15.0	18.0	20.0	16.0	13.0	19.0	21.0	18.0	18.0	24.0	23.0	33.0	63.0	55.0	50.0	42.0	40.0	29.0	23.0	19.0	19.0	19.0	21.0				
	2.0 m	19.0	14.0	14.0	21.0	15.0	14.0	18.0	22.0	18.0	20.0	28.0	24.0	33.0	61.0	58.0	53.0	46.0	39.0	30.0	23.0	20.0	20.0	20.0	20.0				
	1.0 m	13.0	14.0	13.0	13.0	9.0	9.0	15.0	21.0	26.0	26.0	32.0	35.0	30.0	54.0	55.0	51.0	47.0	38.0	23.0	19.0	14.0	16.0	13.0	16.0				
	0.5 m	15.0	9.0	12.0	10.0	11.0	14.0	15.0	17.0	27.0	25.0	30.0	36.0	33.0	51.0	54.0	47.0	45.0	35.0	29.0	21.0	20.0	16.0	13.0	15.0				
Chiva Chiva (Open site)	46.0 m	8.0	8.0	7.0	6.0	5.0	7.0	6.0	13.0	14.0	15.0	17.0	22.0	24.0	17.0	29.0	19.0	25.0	26.0	22.0	17.0	14.0	10.0	11.0	9.0				
	28.5 m	This level was not instrumented for relative humidity at this time																											
	26.5 m	6.0	7.0	6.0	5.0	4.0	6.0	5.0	12.0	10.0	16.0	17.0	20.0	29.0	21.0	33.0	24.0	26.0	30.0	24.0	15.0	11.0	8.0	7.0	6.0				
	13.5 m	6.0	6.0	6.0	4.0	4.0	6.0	6.0	12.0	12.0	20.0	21.0	23.0	30.0	23.0	34.0	27.0	27.0	31.0	24.0	11.0	9.0	7.0	11.0	6.0				
	8.0 m	This level was not instrumented for relative humidity at this time																											
	4.0 m	17.0	18.0	21.0	21.0	24.0	25.0	23.0	20.0	13.0	16.0	22.0	21.0	28.0	28.0	25.0	30.0	26.0	27.0	22.0	13.0	12.0	14.0	16.0	18.0				
	2.0 m	18.0	19.0	21.0	21.0	20.0	24.0	25.0	25.0	13.0	14.0	19.0	22.0	23.0	26.0	22.0	26.0	23.0	26.0	17.0	11.0	11.0	16.0	17.0	18.0				
	1.0 m	5.0	4.0	5.0	8.0	7.0	7.0	9.0	15.0	15.0	16.0	17.0	22.0	30.0	23.0	36.0	29.0	24.0	27.0	21.0	12.0	10.0	8.0	6.0	6.0				
	0.5 m	11.0	12.0	11.0	15.0	15.0	20.0	17.0	17.0	13.0	19.0	22.0	27.0	29.0	27.0	30.0	27.0	25.0	24.0	16.0	12.0	15.0	12.0	14.0	13.0				

* No monthly summary was computed for the ranges.

SUMMARY OF METEOROLOGICAL OBSERVATIONS

HOURLY DATA

MARCH 1967

Exposure		Monthly Means[2] of other Elements by Hour																								Monthly Summary			
Site	Code[1]	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	No of obs.	Min.	Mean	Max.
Albrook (Forest site)	WB (4.0 m)	70.1	69.9	69.7	69.5	69.4	69.3	69.9	72.2	72.9	73.4	73.6	73.6	74.0	73.5	73.9	73.5	72.7	72.0	71.3	71.0	70.8	70.6	70.4	70.2	744	65.3	71.6	77.9
	WB (2.0 m)	70.1	69.9	69.7	69.5	69.4	69.3	69.8	72.2	73.0	73.6	73.7	73.6	74.0	73.7	74.0	73.7	73.0	72.3	71.5	71.1	70.9	70.7	70.5	70.2	744	65.3	71.6	77.5
	WB (0.5 m)	70.5	70.4	70.2	70.0	69.9	69.8	69.8	71.6	73.2	73.9	74.1	74.2	74.3	74.1	74.1	74.1	73.6	72.9	72.0	71.6	71.3	71.1	70.9	70.6	744	66.1	72.0	77.1
	BP	.786	.770	.757	.751	.753	.761	.780	.797	.810	.814	.810	.786	.760	.736	.713	.709	.708	.718	.740	.760	.780	.794	.802	.800	744	.615	.766	.930
	P1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.80	0.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	732	0.03	0.50	0.80
	P2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.35	0.75	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	744	0.13	0.41	0.75
	P3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.43	0.86	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	744	0.01	0.43	0.86
	P4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.45	0.75	0.07	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	744	0.01	0.32	0.75

Note: Total (Mean) for P1 includes 6-hourly readings which are not included in hourly means.

Chiva Chiva (Open site)	WB (4.0 m)	70.2	70.0	70.0	69.6	69.5	69.2	70.1	72.2	72.7	72.7	72.8	72.8	73.2	73.0	73.2	72.5	72.2	71.5	71.0	71.0	70.8	70.6	70.7	70.3	744	65.2	71.3	77.4
	WB (2.0 m)	70.1	69.9	69.8	69.5	69.5	69.0	70.2	72.3	73.0	73.1	73.3	73.4	73.8	73.6	73.6	73.1	72.7	71.9	71.2	71.2	70.9	70.7	70.6	70.3	744	65.4	71.5	77.1
	WB (0.5 m)	69.9	69.6	69.5	69.1	69.0	68.6	70.0	73.0	74.1	74.6	74.9	74.6	74.6	74.3	74.1	73.6	72.9	71.9	71.0	71.0	70.8	70.6	70.3	70.1	744	64.7	71.7	77.9
	BP	.881	.864	.850	.845	.848	.860	.877	.894	.908	.913	.900	.884	.858	.832	.811	.805	.810	.823	.844	.861	.882	.893	.898	.896	743	.005	.858	.995
	PS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	744	0.00	0.00	0.00

WB - Wet bulb temperature (°F)
BP - Barometric pressure (in. of Hg minus 29.0)

PS - Precipitation at 1.0 m in open area (in.)
P1 - Precipitation at 46.0 m above canopy (in.)
P2 - Precipitation under full canopy (in.)

P3 - Precipitation under drip canopy (in.)
P4 - Precipitation under open canopy (in.)

[2] Monthly means of precipitation are computed for precipitation days. Precipitation totals are substituted for the mean in the monthly summary.

SUMMARY OF METEOROLOGICAL OBSERVATIONS

HOURLY DATA

MARCH 1967

Exposure		Monthly Ranges[2] of other Elements by Hour																								Monthly Summary *			
Site	Code[1]	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24				
Albrook (Forest site)	WB (4.0 m)	5.9	5.8	6.3	7.1	6.8	6.7	6.2	4.1	4.3	4.9	6.7	6.3	7.5	8.1	9.4	7.7	8.0	6.3	5.5	5.3	4.8	5.7	5.8	6.6				
	WB (2.0 m)	5.9	6.0	6.5	7.2	6.8	6.5	6.3	4.0	5.1	5.1	6.6	5.9	8.1	7.8	7.5	6.5	7.8	6.0	5.5	5.2	4.8	5.3	5.9	6.9				
	WB (0.5 m)	6.0	5.8	5.9	6.4	6.8	6.8	6.4	3.9	5.7	4.5	4.9	4.9	5.0	5.7	6.9	7.1	6.3	5.6	5.5	5.1	5.1	4.8	5.5	5.8				
	BP	.170	.170	.175	.180	.180	.185	.190	.190	.180	.185	.185	.195	.195	.215	.210	.210	.210	.200	.200	.190	.175	.170	.165	.170				
	P1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
	P2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
	P3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
	P4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Chiva Chiva (Open site)	WB (4.0 m)	5.9	6.5	5.2	5.1	5.4	7.3	7.0	4.0	3.6	4.7	5.4	6.3	7.2	8.4	7.4	6.7	6.3	5.4	4.1	3.6	3.6	4.1	4.6	5.7				
	WB (2.0 m)	5.5	5.9	4.9	5.2	5.2	7.0	6.7	3.8	3.8	4.4	5.3	5.9	6.8	7.2	8.3	6.4	5.5	5.1	3.3	3.3	3.3	4.2	4.6	5.4				
	WB (0.5 m)	6.0	6.2	5.7	5.1	6.3	7.3	6.1	3.7	3.3	4.0	4.4	6.8	4.8	7.2	5.9	6.0	5.3	4.7	4.0	4.0	3.5	3.5	5.0	5.3				
	BP	.170	.165	.170	.170	.175	.185	.190	.180	.180	.180	.185	.185	.200	.205	.200	.205	.200	.190	.195	.180	.180	.170	.165	.170				
	PS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				

* No monthly summary was computed for the ranges.

WB - Wet bulb temperature (°F)
BP - Barometric pressure (in. of Hg minus 29.0)

PS - Precipitation at 1.0 m in open area (in.)
P1 - Precipitation at 46.0 m above canopy (in.)
P2 - Precipitation under full canopy (in.)

P3 - Precipitation under drip canopy (in.)
P4 - Precipitation under open canopy (in.)

[2] Monthly ranges of precipitation are computed for precipitation days.

SUMMARY OF METEOROLOGICAL OBSERVATIONS

HOURLY DATA

MARCH 1967

Exposure		Monthly Means of Wind Speed by Hour (miles / hr.)																								Monthly Summary			
Site	Level	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	No of obs.	Min.	Mean	Max.
Albrook (Forest site)	46.0 m	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	8.0	10.0	11.0	10.0	10.0	10.0	10.0	10.0	10.0	8.0	7.0	6.0	6.0	5.0	6.0	6.0	726	0.0	8.0	18.0
	28.5 m	This level was not instrumented for wind speed at this time																											
	26.5 m	3.0	2.0	2.0	3.0	3.0	3.0	3.0	3.0	4.0	5.0	5.0	6.0	5.0	5.0	4.0	4.0	4.0	3.0	2.0	2.0	2.0	2.0	3.0	2.0	726	0.0	3.0	11.0
	13.5 m	This level was not instrumented for wind speed at this time																											
	8.0 m	This level was not instrumented for wind speed at this time																											
	4.0 m	1.0	0.0	0.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	2.0	2.0	2.0	2.0	1.0	1.0	1.0	1.0	0.0	0.0	0.0	0.0	1.0	1.0	726	0.0	1.0	5.0
	2.0 m	This level was not instrumented for wind speed at this time																											
	1.0 m	This level was not instrumented for wind speed at this time																											
	0.5 m	This level was not instrumented for wind speed at this time																											
Chiva Chiva (Open site)	46.0 m	8.0	7.0	7.0	7.0	7.0	6.0	6.0	7.0	11.0	13.0	14.0	14.0	15.0	15.0	14.0	15.0	14.0	12.0	9.0	9.0	8.0	8.0	8.0	7.0	744	0.0	10.0	24.0
	28.5 m	This level was not instrumented for wind speed at this time																											
	26.5 m	7.0	6.0	6.0	6.0	6.0	5.0	5.0	7.0	11.0	12.0	14.0	13.0	14.0	14.0	13.0	14.0	14.0	11.0	9.0	8.0	7.0	7.0	7.0	7.0	731	0.0	9.0	24.0
	13.5 m	4.0	4.0	3.0	3.0	3.0	3.0	2.0	5.0	10.0	11.0	13.0	13.0	14.0	13.0	15.0	16.0	15.0	10.0	7.0	5.0	5.0	5.0	4.0	4.0	712	0.0	7.0	31.0
	8.0 m	This level was not instrumented for wind speed at this time																											
	4.0 m	4.0	4.0	4.0	3.0	3.0	3.0	3.0	5.0	8.0	10.0	11.0	10.0	10.0	11.0	10.0	11.0	10.0	8.0	6.0	5.0	4.0	5.0	4.0	4.0	744	0.0	6.0	18.0
	2.0 m	2.0	2.0	2.0	1.0	1.0	1.0	2.0	3.0	6.0	7.0	8.0	8.0	9.0	9.0	9.0	10.0	9.0	6.0	4.0	3.0	3.0	3.0	2.0	2.0	744	0.0	4.0	18.0
	1.0 m	This level was not instrumented for wind speed at this time																											
	0.5 m	This level was not instrumented for wind speed at this time																											

SUMMARY OF METEOROLOGICAL OBSERVATIONS

HOURLY DATA

MARCH 1967

Exposure		Monthly Ranges of Wind Speed by Hour (miles/hr.)																								Monthly Summary *			
Site	Level	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24				
Albrook (Forest site)	46.0 m	11.0	6.0	7.0	6.0	8.0	10.0	9.0	12.0	12.0	13.0	10.0	13.0	15.0	14.0	17.0	15.0	16.0	13.0	8.0	7.0	9.0	8.0	8.0	6.0				
	28.5 m	This level was not instrumented for wind speed at this time																											
	26.5 m	6.0	6.0	5.0	5.0	6.0	5.0	5.0	6.0	6.0	7.0	7.0	9.0	8.0	9.0	10.0	11.0	10.0	10.0	5.0	5.0	6.0	5.0	7.0	5.0				
	13.5 m	This level was not instrumented for wind speed at this time																											
	8.0 m	This level was not instrumented for wind speed at this time																											
	4.0 m	2.0	2.0	1.0	1.0	2.0	3.0	2.0	1.0	2.0	3.0	3.0	5.0	3.0	4.0	3.0	2.0	3.0	2.0	1.0	1.0	2.0	1.0	2.0	2.0				
	2.0 m	This level was not instrumented for wind speed at this time																											
	1.0 m	This level was not instrumented for wind speed at this time																											
	0.5 m	This level was not instrumented for wind speed at this time																											
Chiva Chiva (Open site)	46.0 m	9.0	13.0	11.0	14.0	13.0	15.0	14.0	13.0	13.0	16.0	14.0	12.0	14.0	18.0	20.0	14.0	15.0	14.0	12.0	10.0	10.0	11.0	8.0	13.0				
	28.5 m	This level was not instrumented for wind speed at this time																											
	26.5 m	7.0	9.0	8.0	12.0	11.0	13.0	14.0	12.0	13.0	14.0	13.0	12.0	12.0	18.0	18.0	13.0	15.0	13.0	12.0	8.0	7.0	9.0	7.0	11.0				
	13.5 m	10.0	10.0	8.0	10.0	10.0	12.0	12.0	13.0	18.0	23.0	15.0	25.0	25.0	20.0	31.0	21.0	25.0	15.0	13.0	9.0	11.0	10.0	8.0	11.0				
	8.0 m	This level was not instrumented for wind speed at this time																											
	4.0 m	5.0	8.0	7.0	7.0	6.0	9.0	12.0	11.0	10.0	11.0	12.0	12.0	13.0	15.0	16.0	10.0	11.0	11.0	9.0	5.0	7.0	7.0	5.0	7.0				
	2.0 m	5.0	5.0	4.0	5.0	5.0	5.0	8.0	9.0	11.0	11.0	13.0	13.0	13.0	15.0	15.0	13.0	17.0	12.0	8.0	6.0	6.0	7.0	6.0	6.0				
	1.0 m	This level was not instrumented for wind speed at this time																											
	0.5 m	This level was not instrumented for wind speed at this time																											

* No monthly summary was computed for the ranges.

ALBROOK (Forest site) MARCH 1967

Relative Frequencies * of Wind Directions by Hour at 46.0 m
(%)

Dir. \ Hr.	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
N			3.3			6.6		6.6	16.1	9.7	25.8	12.9	16.1	16.6	20.6	23.3	13.3	16.1	10.0		6.6	3.3	3.3	
NNE										3.2	3.2	6.4	9.7		13.3	6.6		3.2						
NE								3.3		6.4	3.2		3.2			6.6	6.6							
ENE										6.4	3.2	3.2			3.3									
E														3.3	3.3	3.3								
ESE			3.3						3.2			3.2		3.3		6.6								
SE										3.2	6.4		6.4	10.0										
SSE											3.2	3.2	6.4	3.3	3.3									
S											3.2	9.7	6.4	3.3	3.3						3.3			
SSW									3.2															
SW	3.3			3.3				3.3				3.2			6.6									
WSW	10.0	6.6	10.0	3.3	13.3	6.6	10.0	6.6	3.2		3.2	3.2	3.2	6.6	3.3	6.6		6.4		3.3	3.3	3.3		3.3
W	49.8	59.8	36.6	66.4	59.8	59.8	56.4	53.1	16.1	9.7	6.4	6.4	3.2	13.3	3.3	6.6	13.3	9.7	23.3	29.9	33.2	46.6	53.1	49.8
WNW	20.0	13.3	20.0	13.3	16.6	10.0	20.0	6.6	16.1	9.7	16.1	6.4	19.4	3.3	6.6	10.3	3.3	6.4	23.3	13.3	29.9	23.3	23.3	16.6
NW	13.3	13.3	26.6	6.6	10.0	10.0	3.3	13.3	25.8	22.6	19.4	19.4	16.1	6.6	23.3	20.0	16.6	29.0	23.3	39.9	10.0	23.3	10.0	23.3
NNW	3.3	6.6		6.6		3.3	3.3	3.3	16.1	29.0	6.4	22.6	9.7	26.6	10.0	10.0	43.2	25.8	20.0	13.3	10.0		10.0	6.6
CALM						3.3	6.6	3.3									3.3	3.2			3.3			

* Note: Due to rounding, percentage totals do not equal 100%.

ALBROOK (Forest site) MARCH 1967

Relative Frequencies * of Wind Directions by Hour at 26.5 m
(%)

Dir. \ Hr.	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
N	6.6					10.0	3.3	13.3	12.9	25.8	12.9	12.9	6.4	16.6	16.6	26.6	33.2	29.0	20.0	29.9	10.0	3.3		3.3
NNE	3.3		6.6		3.3		3.3	3.3	9.7	12.9	12.9	6.4	9.7	3.3	3.3	13.3	10.0	3.2	6.6					3.3
NE						3.3		3.3	3.2	3.2	6.4	12.9	6.1	16.6	20.0	16.6	6.6	9.7					3.3	
ENE						3.3		3.3	3.2	6.4	3.2	9.7	6.4	6.6	3.3	3.3		3.2						
E									9.7	9.7	6.4		3.2		3.3	3.3		6.4		3.3	3.3			
ESE								3.3	6.4		3.2	3.2	6.4	6.6	3.3		6.6							
SE										3.2	3.2	3.2	6.4	10.0			6.6							
SSE									3.2	3.2		3.2		3.3		3.3								
S									3.2		9.7	3.2	6.4		10.0									
SSW											3.2			6.6	6.6	3.3								
SW				3.3								3.2	3.2		3.3							3.3		
WSW						3.3				3.2														
W	3.3	13.3	3.3	6.6		10.0	6.6	3.3		3.2				3.3			6.6	6.4	10.0			3.3	20.0	3.3
WNW	13,3	6.6	20.0	13.3	13.3	10.0	10.0	16.6	12.9	3.2	12.9		6.4	13.3		6.6	6.6	9.7	6.6	6.6	3.3	6.6	13.3	20.0
NW	39.9	46.6	33.2	43.2	63.1	33.2	36.6	33.2	19.4	9.7	16.1	16.1	12.9	3.3	10.0	10.0	6.6	9.7	20.0	20.0	33.2	36.6	33.2	26.6
NNW	26.6	20.0	20.0	23.3	13.3	13.3	29.9	13.3	16.1	16.1	9.7	25.8	12.9	10.0	16.6	6.6	10.0	16.1	29.0	26.6	33.2	29.9	23.3	26.6
CALM	6.6	13.3	16.6	10.0	6.6	13.3	10.0	6.6					3.2		3.3	6.6	6.6	6.4	6.6	13.3	16.6	16.6	6.6	16.6

* Note: Due to rounding, percentage totals do not equal 100%.

ALBROOK (Forest site) MARCH 1967

Relative Frequencies * of Wind Directions by Hour at 4.0 m
(%)

Dir. \ Hr.	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
N	6.6	6.6	3.3	6.6	3.3	6.6	6.6		9.7	16.1	6.4	12.9	12.9	3.3	10.0		13.3	9.7	10.0		6.6	6.6		3.3
NNE		3.3					3.3	3.3	3.2	3.2	3.2	3.2	3.2	10.0	3.3	3.4	3.3	6.4		6.6			3.3	
NE					3.3	6.6	3.3	6.6					3.2	6.6	13.3		20.0	16.1					3.3	3.3
ENE										3.2	12.9	3.2	6.4	6.6	3.3	10.3								3.3
E								6.6	6.4	9.7	6.4	6.4	6.4	10.0	6.6	13.7	6.6	9.7		3.3				
ESE										3.2	9.7	3.2	6.4	6.6	3.3		6.6							
SE									3.2	6.4		22.6		3.3		10.3	3.3							
SSE									3.2	6.4		3.2		3.3	3.3			3.2						
S						3.3	3.3	3.3	22.6	16.1	16.1	9.7	16.1	16.6	20.0	13.7	6.6	6.4	3.3	3.3				
SSW	3.3	3.3							6.4	3.2	6.4	3.2	3.2	3.3							3.3			
SW		3.3	6.6		3.3	3.3		3.3		3.2	9.7	12.9			3.3	3.4					3.3		3.3	
WSW		3.3		3.3			3.3	26.6	6.4	6.4	6.4		9.7	6.6		3.4	3.3	3.2	13.3					
W	3.3	6.6		3.3	6.6	6.6	6.6	6.6	9.7	9.7	6.4		3.2	3.3	6.6	3.4		9.7	10.0	10.0	6.6	6.6	6.6	20.0
WNW	16.6	6.6	20.0	16.6	6.6	10.0	10.0	3.3	6.4		6.4	6.4	6.4	6.6	3.3	10.3	16.6	3.2	6.6	3.3	6.6	6.6	6.6	13.3
NW	20.0		10.0	20.0	33.2	6.6	6.6	10.0	9.7	12.9	9.7	12.9	9.7	3.3	13.3			3.2	3.3	3.3	16.6	10.0	16.6	13.3
NNW	3.3	10.0	6.6	3.3	3.3	13.3	3.3							3.3		3.4				3.3	3.3	6.6	10.0	6.6
CALM	46.6	56.4	53.1	46.6	39.9	43.2	53.1	43.2	12.9				12.9	6.6	10.0	24.0	20.0	29.0	53.1	66.4	53.1	63.1	49.8	36.6

* Note: Due to rounding, percentage totals do not equal 100%.

CHIVA CHIVA (Open site) MARCH 1967

Relative Frequencies * of Wind Directions by Hour at 46.0 m
(%)

Dir. \ Hr.	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
N	3.2	9.7		3.2	6.4	19.4	9.7	9.7	25.8	32.2	16.1	19.4	38.7	32.2	29.0	25.8	22.6	35.5	22.6	12.9	6.4	12.9	9.7	3.2
NNE	3.2			3.2		3.2			9.7	3.2	6.4	9.7	3.2	6.4	6.4	3.2	3.2	3.2						
NE																								
ENE									3.2	3.2														3.2
E											3.2			3.2										
ESE													6.4											
SE						3.2					3.2	3.2		3.2	3.2									
SSE												3.2										3.2		
S															3.2	3.2								
SSW				3.2																				
SW																								
WSW																								
W	3.2			6.4		3.2						3.2		3.2	3.2	3.2	3.2							3.2
WNW	6.4	3.2	6.4			9.7	3.2	6.4	3.2		3.2		9.7	6.4	9.7		6.4			3.2	3.2			
NW	51.6	54.8	58.1	64.5	67.7	32.2	67.7	51.6	29.0	35.5	32.2	25.8	32.2	16.1	12.9	32.2	16.1	19.4	22.6	32.2	45.2	51.6	51.6	64.5
NNW	32.2	32.2	35.5	19.4	22.6	29.0	19.4	32.2	29.0	25.8	35.5	35.5	9.7	29.0	32.2	32.2	48.4	41.9	54.8	51.6	45.2	32.2	38.7	25.8
CALM					3.2																			

* Note: Due to rounding, percentage totals do not equal 100%.

CHIVA CHIVA (Open site) MARCH 1967

Relative Frequencies * of Wind Directions by Hour at 26.5 m
(%)

Dir. \ Hr.	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
N	51.6	64.5	54.8	54.8	41.9	41.9	35.5	48.4	49.8	38.7	45.2	32.2	32.2	12.9	22.6	45.2	41.9	35.5	48.4	38.7	67.7	51.6	56.4	61.3
NNE	9.7	3.2	6.4	6.4	6.4	12.9	9.7	3.2	16.6	16.1	16.1	25.8	9.7	38.7	35.5	9.7	32.2	29.0	29.0	22.6	12.9	16.4	13.3	9.7
NE					3.2		3.2	9.7	10.0	22.6	16.1	16.1	29.0	16.1	6.4	12.9	9.7	16.1	3.2	3.2		3.2		
ENE		3.2				3.2			3.3				3.2	3.2	3.2	6.4	3.2	3.2						
E					3.2	3.2			3.3			3.2							3.2					3.2
ESE						3.2				3.2			3.2											
SE						3.2		3.2			6.4			3.2	3.2									
SSE												6.4		3.2										
S													3.2			3.2								
SSW															3.2									
SW						3.2																		
WSW																				3.2		3.2		
W			3.2	3.2	3.2		3.2									3.2								
WNW	3.2	3.2	6.4		3.2		3.2	3.2				3.2		3.2			3.2							3.2
NW	9.7	6.4	9.7	9.7	6.4	6.4	16.1	12.9	3.3		3.2		3.2	12.9	19.4	3.2	3.2			3.2	9.7	9.7	3.3	6.4
NNW	25.8	19.6	19.6	25.8	32.2	22.6	29.0	19.4	13.3	19.4	12.9	12.9	16.1	6.4	6.4	16.1	6.4	16.1	16.1	29.0	9.7	16.1	26.6	16.1
CALM																								

* Note: Due to rounding, percentage totals do not equal 100%.

CHIVA CHIVA (Open site) MARCH 1967

Relative Frequencies * of Wind Directions by Hour at 4.0 m
(%)

Dir. \ Hr.	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
N	3.2	6.4	12.9	3.2	9.7	16.1	12.9	3.2	29.0	22.6	29.0	22.6	32.2	32.2	19.4	12.9	32.2	19.4	35.5	19.4	3.2	6.4	9.7	6.4
NNE	6.4	9.7		6.4	6.4	12.9	6.4	6.4	6.4	6.4	3.2	3.2	12.9	12.9	6.4	12.9	6.4	3.2	3.2		6.4		3.2	
NE						9.7	3.2		3.2		3.2							6.4				3.2		3.2
ENE					3.2	3.2																	3.2	
E					3.2	6.4				3.2					3.2									
ESE											3.2		3.2	3.2										
SE					3.2								3.2		3.2							3.2		
SSE							3.2				3.2	6.4		3.2										
S															3.2	3.2								
SSW							3.2																	
SW		3.2																						
WSW		3.2	3.2	3.2	3.2		6.4																	
W	6.4	9.7	6.4	3.2	6.4		6.4	3.2				3.2		3.2	3.2		6.4				3.2			
WNW	16.1	3.2	9.7	12.9	12.9	3.2	9.7	19.4	6.4		3.2	6.4	6.4	6.4	16.1	6.4	3.2			6.4		9.7	9.7	22.6
NW	58.1	45.2	45.2	58.1	41.9	32.2	25.8	51.6	29.0	32.2	25.8	22.6	22.6	9.7	16.1	35.5	19.4	16.1	6.4	38.7	51.6	51.6	58.1	64.5
NNW	9.7	19.4	22.6	12.9	9.7	16.1	19.4	16.1	25.8	35.5	29.0	35.5	19.4	29.0	29.0	29.0	32.2	54.8	54.8	35.5	35.5	25.8	16.1	3.2
CALM							3.2																	

* Note: Due to rounding, percentage totals do not equal 100%.

SUMMARY OF NON HOURLY DATA

MARCH 1967

Summary of Elements with Non-hourly Frequencies of Observation

Site	Element, Units and Exposure	Description	Number of Obs.	Minimum Value	Mean or Total Value	Maximum Value
Albrook (Forest site)	WBGT Index[1] (at 1.5 meters)	Index value	434	65.6	76.0	83.2
		Dry bulb temp.	434	66.3	80.8	91.0
		Wet bulb temp.	434	65.4	73.5	81.0
		Black bulb temp.	434	66.6	82.2	95.5
	Evaporation[3] (in. at 4 levels)	Piche (46.0 m)	31	0.451	22.869*	0.970
		Piche (26.5 m)	31	0.281	14.324*	0.580
		Piche (13.5 m)	31	0.110	7.433*	0.311
		Piche (0.5 m)	31	0.061	5.857*	0.281
	Precipitation from Raingauge Network[2] (in. at 1.0 meters)	Gauge # 1	1	1.42	1.42*	1.42
		Gauge # 2	1	1.39	1.39*	1.39
		Gauge # 3	2	0.02	1.68*	1.66
		Gauge # 4	2	0.01	1.63*	1.62
		Gauge # 5	2	0.01	1.48*	1.47
		Gauge # 6	2	0.01	1.84*	1.83
		Gauge # 7	2	0.02	1.46*	1.44
		Gauge # 8	1	1.56	1.56*	1.56
	Stem Flow[2] (in. at 2.0 meters)	Small tree	1	36.62	36.62*	36.62
		Medium tree	1	3.80	3.80*	3.80
		Large tree	1	2.18	2.18*	2.18
Chiva Chiva (Open site)	WBGT Index[1] (at 1.5 meters)	Index value	434	63.8	78.8	88.5
		Dry bulb temp.	434	64.0	84.0	95.5
		Wet bulb temp.	434	64.0	73.7	78.0
		Black bulb temp.	434	63.0	94.0	115.0
	Evaporation[3] (in. at 0.5 meters)	Piche	31	0.390	19.010*	0.769
		Pan	31	0.048	8.591*	0.363
	Minimum Grass temp[3] (°F at grass tips)	None	26	DTF.	65.5	71.5

1 - Hourly observations between 0600 and 1900 hours inclusive

2 - Six hourly observations

3 - Daily observations

Note: DTF. indicates data of doubtful validity.

* Total Values

DISTRIBUTION LIST

Address	No. of Copies
Director Advanced Research Projects Agency Washington, DC 20301	6
Advanced Research Projects Agency R&D Field Unit APO San Francisco, California 96346	1
Defense Documentation Center for Scientific and Technical Information Cameron Station Alexandria, Virginia 22314	20
Director of Defense Research and Engineering ATTN: Technical Library Washington, DC 20301	1
Chief of Research and Development Department of the Army ATTN: CRD/M Washington, DC 20310	10
Assistant Chief of Staff for Intelligence Department of the Army ATTN: ACSI-DSRSI Washington, DC 20310	1
Commanding General US Army Materiel Command ATTN: AMCRD-SE Washington, DC 20315	1
Commanding General US Army Materiel Command ATTN: AMCRD-RV-A Washington, DC 20315	1
Commanding General US Army Test and Evaluation Command ATTN: AMSTE-NB Aberdeen Proving Ground, Maryland 21005	1
Commanding General US Army Test and Evaluation Command ATTN: AMSTE-TA-A Aberdeen Proving Ground, Maryland 21005	1
Commanding General US Army Test and Evaluation Command ATTN: AMSTE-EL Aberdeen Proving Ground, Maryland 21005	1
Commanding General US Army CDC Combined Arms Group Fort Leavenworth, Kansas 66027	1
Commanding General US Continental Army Command ATTN: Reconnaissance Branch ODCS for Intelligence Fort Monroe, Virginia 23351	1
Commanding General US Army Missile Command ATTN: AMSMI-RRA, Bldg 5422 Physical Sciences Laboratory Research and Development Directorate Redstone Arsenal, Alabama 35809	1
Commanding General US Army Munitions Command ATTN: AMSMU-RE-R Dover, New Jersey 07801	1
Commanding Officer US Army CDC CBR Agency ATTN: Mr. N. W. Bush Fort McClellan, Alabama 36205	1
US Army Munitions Command Operation Research Group Edgewood Arsenal, Maryland 21010	1
Commanding General US Army Natick Laboratories ATTN: Earth Sciences Laboratory Geography Division Natick, Massachusetts 01762	1
Commanding General US Army Natick Laboratories ATTN: Pioneering Research Division Natick, Massachusetts 01762	1
Project TREND Applied Scientific Research Corporation of Thailand APO San Francisco, California 96346	1
Commanding Officer US Army Cold Regions Research and Engineering Laboratories ATTN: Photographic Interpretation Research Division Hanover, New Hampshire 03755	1

DISTRIBUTION LIST (cont'd)

Address	No. of Copies
Commanding Officer US Army Ballistics Research Laboratories ATTN: AMXBR-B Aberdeen Proving Ground, Maryland 21005	1
Commanding Officer US Army Ballistics Research Laboratories ATTN: AMXBR-IA Aberdeen Proving Ground, Maryland 21005	1
Director US Army Engineer Waterways Experiment Station ATTN: Mobility and Environmental Division Vicksburg, Mississippi 39180	1
Commanding Officer US Army Dugway Proving Ground ATTN: Chief, Meteorological Division Dugway, Utah 84022	1
President US Army Artillery Board Fort Sill, Oklahoma 73504	1
Commanding Officer US Army CDC Artillery Agency Fort Sill, Oklahoma 73504	1
Commanding Officer US Army Picatinny Arsenal ATTN: SMUPA-TV-3 Dover, New Jersey 07801	1
Commanding Officer US Army Frankford Arsenal ATTN: SMUFA-L-8000 Philadelphia, Pennsylvania 19137	1
Commandant US Army Artillery & Missile School ATTN: Meteorology Division (Target Acquisition Department) Fort Sill, Oklahoma 73503	1
Commandant Special Warfare School Fort Bragg, N.C. 28307	1
Commanding General US Army Electronics Command ATTN: AMSEL-EW Fort Monmouth, New Jersey 07703	1
Commanding General Deseret Test Center Bldg 103, Soldier's Circle Fort Douglas, Utah 84113	1
Commandant US Army CBR School, Micrometeorological Section Fort McClellan, Alabama 36205	1
Commandant US Army Signal School ATTN: Meteorological Department Fort Monmouth, New Jersey 07703	1
Commanding General US Army Electronics Proving Ground ATTN: Field Test Department Fort Huachuca, Arizona 85613	1
Chief, Atmospheric Science Research Division Atmospheric Science Laboratory US Army Electronics Command Fort Huachuca, Arizona 85613	1
Chief, Atmospheric Science Office Atmospheric Science Laboratory US Army Electronics Command ATTN: AMSEL-BL-WS-M White Sands Missile Range, New Mexico 88002	1
Chief of Naval Operations ATTN: Code 427 Department of the Navy Washington, DC 20350	1
Officer in Charge US Naval Weather Research Facility US Naval Air Station, Bldg R-28 Norfolk, Virginia 23511	1
Commander USAF Air Weather Service ATTN: AWSES/TIPD Scott Air Force Base, Illinois 62225	1
Commander Air Force Cambridge Research Laboratories ATTN: CREW 1065 Main Street Waltham, Massachusetts 02154	1

DISTRIBUTION LIST (cont'd)

Address	No. of Copies
Director Bureau of Research and Development Federal Aviation Agency Washington, DC 20553	1
Chief Fallout Studies Branch Atomic Energy Commission Washington, DC 20545	1
US Department of Agriculture Forest Service Forest Fire Laboratory Missoula, Montana 59801	1
US Department of Agriculture Forest Service Lake States Forest Experiment Station ATTN: E. P. Van Arsdel St. Paul Campus, University of Minnesota St. Paul, Minnesota 55101	1
Director Atmospheric Physics and Chemistry Laboratory ESSA- Department of Commerce Boulder, Colorado 80302	
Director Atmospheric Sciences Library Environmental Science Service Administration Silver Spring, Maryland 20910	1
National Center for Atmospheric Research ATTN: NCAR Library Acquisitions Boulder, Colorado 80302	1
Remote Area Conflict Information Center Battelle Memorial Institute 505 King Avenue Columbus, Ohio 43201	1
Commander Operational Test and Evaluation Force US Naval Base Norfolk, Virginia 23511	1
Panama Canal Company Meteorological and Hydrographic Branch ATTN: Chief Hydrographer Box "M" Balboa Heights, Canal Zone	1
Commander Detachment 5, 5th Weather Wing Bldg 235, Howard Air Force Base Canal Zone	1
Director Data Processing Division Environmental Technical Applications Center (MAC) US Air Force Federal Building Asheville, North Carolina 28801	1
Commander Air Force Cambridge Research Laboratories ATTN: CROA Laurence G. Hanscom Field Bedford, Massachusetts 01730	1
Commandant US Army Infantry School Fort Benning, Georgia	1
Commandant US Army Armor School Fort Knox, Kentucky	1
Commandant US Army Air Defense School Fort Bliss, Texas	1
Commandant US Army Aviation School Fort Rucker, Alabama	1
Commandant US Army Engineer School Fort Belvoir, Virginia 22060	1

UNCLASSIFIED
Security Classification

DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY *(Corporate author)*

US Army Tropic Test Center
Fort Clayton, Canal Zone

2a. REPORT SECURITY CLASSIFICATION

UNCLASSIFIED

2b. GROUP

3. REPORT TITLE

Monthly Microclimatic Summary, March 1967: Environmental Data Base for Regional Studies in the Humid Tropics

4. DESCRIPTIVE NOTES *(Type of report and inclusive dates)*

Data Summary, March 1967

5. AUTHOR(S) *(First name, middle initial, last name)*

6. REPORT DATE

August 1967

7a. TOTAL NO. OF PAGES

28

7b. NO. OF REFS

8a. CONTRACT OR GRANT NO.

b. PROJECT NO. 2M025001A724-01

c. USATECOM No. 9-4-0013-01

d. Work Unit: USATTC #001

9a. ORIGINATOR'S REPORT NUMBER(S)

9b. OTHER REPORT NO(S) *(Any other numbers that may be assigned this report)*

10. DISTRIBUTION STATEMENT

Distribution of this document is unlimited

11. SUPPLEMENTARY NOTES

12. SPONSORING MILITARY ACTIVITY

Advanced Research Projects Agency
Army Research Projects Office, OCRD

13. ABSTRACT

This report contains detailed microclimatic data for March 1967 from specific sites in the Panama Canal Zone and vicinity. The data are presented in tabular form, summarized for hourly and/or daily observations from surface to 46-meter levels. Elements listed are: temperature, pressure, precipitation, wind speed and direction, relative humidity, and evaporation.

142 538

DD FORM 1 NOV 65 1473 REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Security Classification

14. KEY WORDS	LINK A ROLE	LINK A WT	LINK B ROLE	LINK B WT	LINK C ROLE	LINK C WT
Climate						
Microclimatology						
Tropic Environment						
Humid Tropics						
Panama Canal Zone Microclimatology						
Data Base						

ENVIRONMENTAL DATA BASE
FOR REGIONAL STUDIES IN THE HUMID TROPICS

MONTHLY
MICROCLIMATIC SUMMARY

APRIL 1967

Prepared by

Michael A. Fradel, Project Officer
and
Dr. Wilfried H. Portig, Meteorologist

USATECOM Project No. 9-4-0013-01

This research was supported by the Advanced Research Projects Agency of the Department of Defense and by the Army Research Office, OCRD, Department of Army

Conducted by

US Army
Tropic Test Center
Fort Clayton, Canal Zone
with contractual services provided by
Weather Engineers of Panama Corp.

~~144 859~~

M06.1/728.8
U5818an
april 1967

Distribution of this document is unlimited

Disregard all references to satellite sites.

TABLE OF CONTENTS

	Page
Introduction	1
Sites	1
Instrumentation	1
Data Reduction and Storage	2
Figures	
1. Location Map, Isthmus of Panama	3
2. Frequency of Observations	4
3. Albrook Forest Site, Generalized Plot	5
4. Chiva Chiva Open Site, Generalized Plot	6
5. Instrument Location on Towers	7
Data Summary Sheets	
Monthly Means of Air Temperature by Hour	8
Monthly Ranges of Air Temperature by Hour	9
Monthly Means of Relative Humidity by Hour	10
Monthly Ranges of Relative Humidity by Hour	11
Monthly Means of Other Elements by Hour	12
Monthly Means of Soil Surface Temperature by Hour	
Monthly Means of Wet Bulb Temperature by Hour	
Monthly Means of Barometric Pressure by Hour	
Monthly Means of Precipitation by Hour	
Monthly Totals of Precipitation	
Monthly Ranges of Other Elements by Hour	13
Monthly Ranges of Soil Surface Temperature by Hour	
Monthly Ranges of Wet Bulb Temperature by Hour	
Monthly Ranges of Barometric Pressure by Hour	
Monthly Ranges of Precipitation by Hour	
Monthly Means of Wind Speed by Hour	14
Monthly Ranges of Wind Speed by Hour	15
Relative Frequencies of Wind Directions (46 meters, Albrook)	16
Relative Frequencies of Wind Directions (26.5 meters, Albrook)	17
Relative Frequencies of Wind Directions (4 meters, Albrook)	18
Relative Frequencies of Wind Directions (46 meters, Chiva Chiva)	19
Relative Frequencies of Wind Directions (26.5 meters, Chiva Chiva)	20
Relative Frequencies of Wind Directions (4 meters, Chiva Chiva)	21
Summary of Elements with Non-Hourly Frequencies of Observation	22
WBGT (Albrook)	
Evaporation (Albrook)	
Precipitation (Manual gauge network, Albrook)	
Precipitation (Stem Flow, Albrook)	
WBGT (Chiva Chiva)	

TABLE OF CONTENTS (cont'd)

Minimum Grass Temperature (Chiva Chiva)
Maximum Temperature (Albrook satellite)
Minimum Temperature (Albrook satellite)
Maximum Relative Humidity (Albrook satellite)
Minimum Relative Humidity (Albrook satellite)
Precipitation (Albrook satellite)
Maximum Temperature (Fort Kobbe satellite)
Minimum Temperature (Fort Kobbe satellite)
Maximum Relative Humidity (Fort Kobbe satellite)
Minimum Relative Humidity (Fort Kobbe satellite)
Precipitation (Fort Kobbe satellite)
Maximum Temperature (Fort Sherman satellite)
Minimum Temperature (Fort Sherman satellite)
Maximum Relative Humidity (Fort Sherman satellite)
Precipitation (Fort Sherman satellite)

MONTHLY MICROCLIMATIC SUMMARY

Introduction

Monthly microclimatic data summarized in this series of reports were collected by the US Army Tropic Test Center and the Weather Engineers of Panama Corporation under the project, Environmental Data Base for Regional Studies in the Humid Tropics. The project is sponsored by the Advanced Research Projects Agency of the Department of Defense and by the Army Research Office, Office of the Chief of Research and Development. It is an investigation of microclimatic, air chemistry, vegetation, soils, microbiological, and macrofaunal conditions at selected sites in the principal tropical environments of the Panama Canal Zone and the Rio Hato Military Reservation. The objective of the project is to assemble quantitative environmental data for RDT&E purposes.

Sites. Data summarized in this report were collected at the Albrook Forest and Chiva Chiva sites. Figure 1 shows the site locations within the Isthmus of Panama. Geographic coordinates are shown below:

Albrook Forest	09° 01'N, 79° 33'W
Chiva Chiva	09° 01'N, 79° 35'W
Fort Kobbe (satellite)	08° 54'N, 79° 34'W
Fort Sherman (satellite)	09° 16'N, 79° 59'W
Albrook (satellite)	09 00'N, 79° 33'W

The Chiva Chiva open site and the Albrook Forest site are paired for comparative study of environmental conditions in a tropical semideciduous forest and in a large clearing. Both are located in a region where the annual precipitation is approximately 80 inches and there is a pronounced dry season. The other satellite sites were located primarily for soil studies purposes. Albrook and Fort Kobbe have climatic regimes similar to the principal sites.

The Albrook and Chiva Chiva main sites are approximately four kilometers apart. Each has a 46-meter walk-up tower and an air-conditioned building to house the recording equipment and observers. Both sites are approximately 30 meters above sea level. The top of the forest canopy at the Albrook site is about 26.5 meters above the ground.

Instrumentation. A wide range of climatic elements are measured at the Albrook and Chiva Chiva sites. Types of observations and frequencies are shown on Figure 2. The towers at the Albrook and Chiva Chiva sites are similarly oriented. Sensing equipment is mounted at several levels on the towers to provide measurements through the vertical profile. Additional instruments are emplaced in the immediate vicinity on or near the ground.

All instrument exposures are duplicated at each site. Figures 3, 4, and 5 show the instrument array at these sites.

Data Reduction and Storage. All data, as applicable, are recorded at or reduced to each full hour and transposed to punch cards. These punch cards, together with all raw data, are stored in the Tropic Test Center Technical Library Annex.

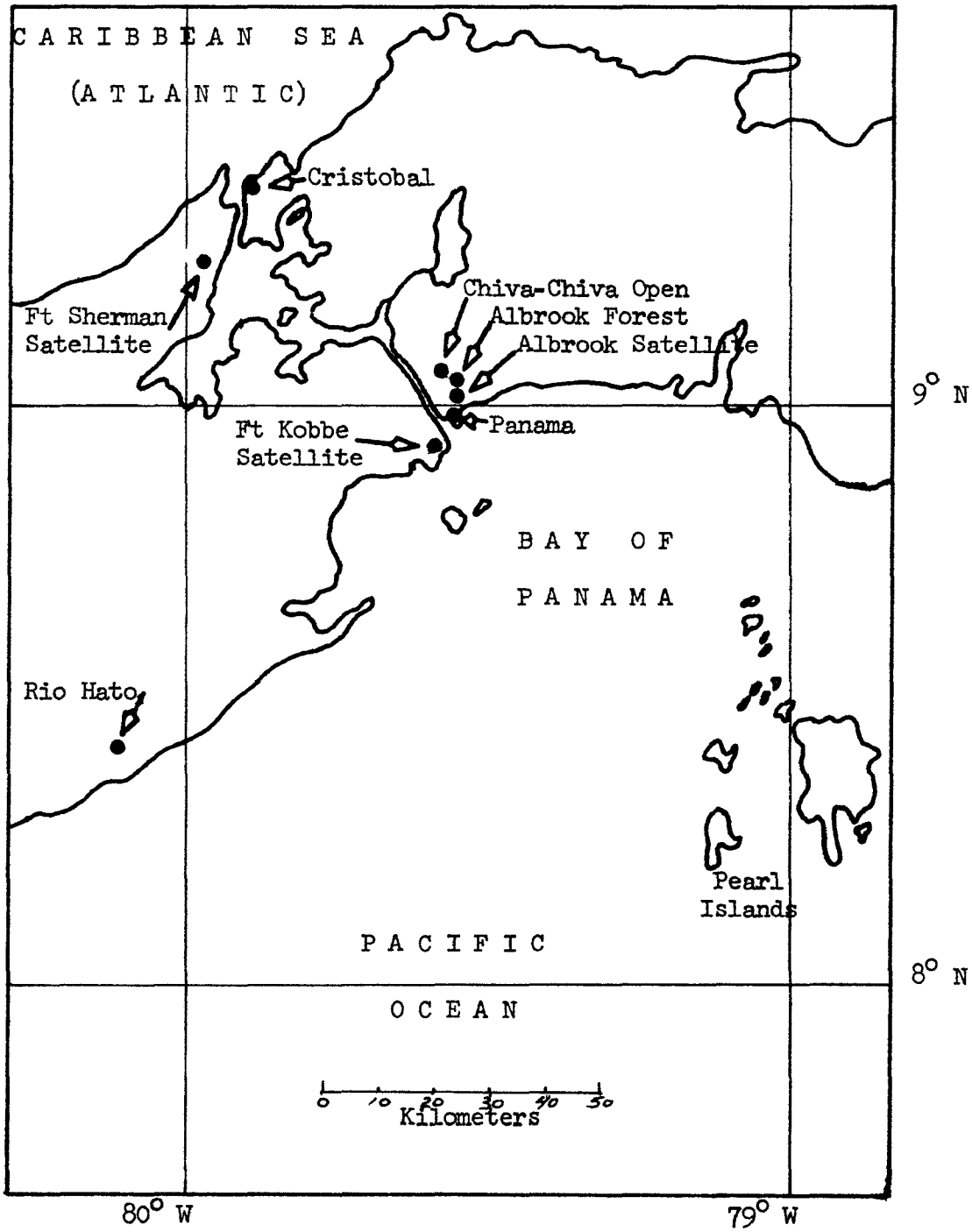

FIGURE 1.

LOCATION MAP, ISTHMUS OF PANAMA

FIGURE 2. FREQUENCY OF OBSERVATIONS

# Element	Height (meters) Sfc	0.5	1.0	2.0	4.0	8.0	13.5	26.5	46.0	Frequency
Temperature:										
Dry Bulb	2	2	1	2	2	2	2	2	2	Hourly*/Continuously
Wet Bulb	-	2	-	2	2	-	-	-	-	Hourly*/Continuously
Grass Minimum	4	-	-	-	-	-	-	-	-	Once Daily
WBGT Index	-	-	2	-	-	-	-	-	-	Hourly(0600-1900 EST)
Relative Humidity	-	2	1	2	2	2	2	2	2	Hourly*/Continuously
Barometric Pressure	-	-	2	-	-	-	-	-	-	Continuously
Evaporation	2	-	-	-	-	-	-	3	3	Once Daily
Precipitation:										
Recording Gage	-	-	1	-	-	-	-	-	3	Continuously
Manual Gage	-	-	3	-	-	-	-	-	-	4 Times Daily
Stem Flow	-	-	3	-	-	-	-	-	-	4 Times Daily
Wind:										
Direction	-	-	-	-	5	-	-	-	2	Continuously
Speed	-	-	-	2**	5	-	2**	2**	2	Hourly**/Continuously

1. All sites
2. Albrook and Chiva Chiva
3. Albrook only
4. Chiva Chiva only
5. Main sites

* Observation made with sling psychrometer when recorders are inoperative.

** Hourly.

\# Instrument descriptions are contained in the Environmental Data Base semiannual reports.

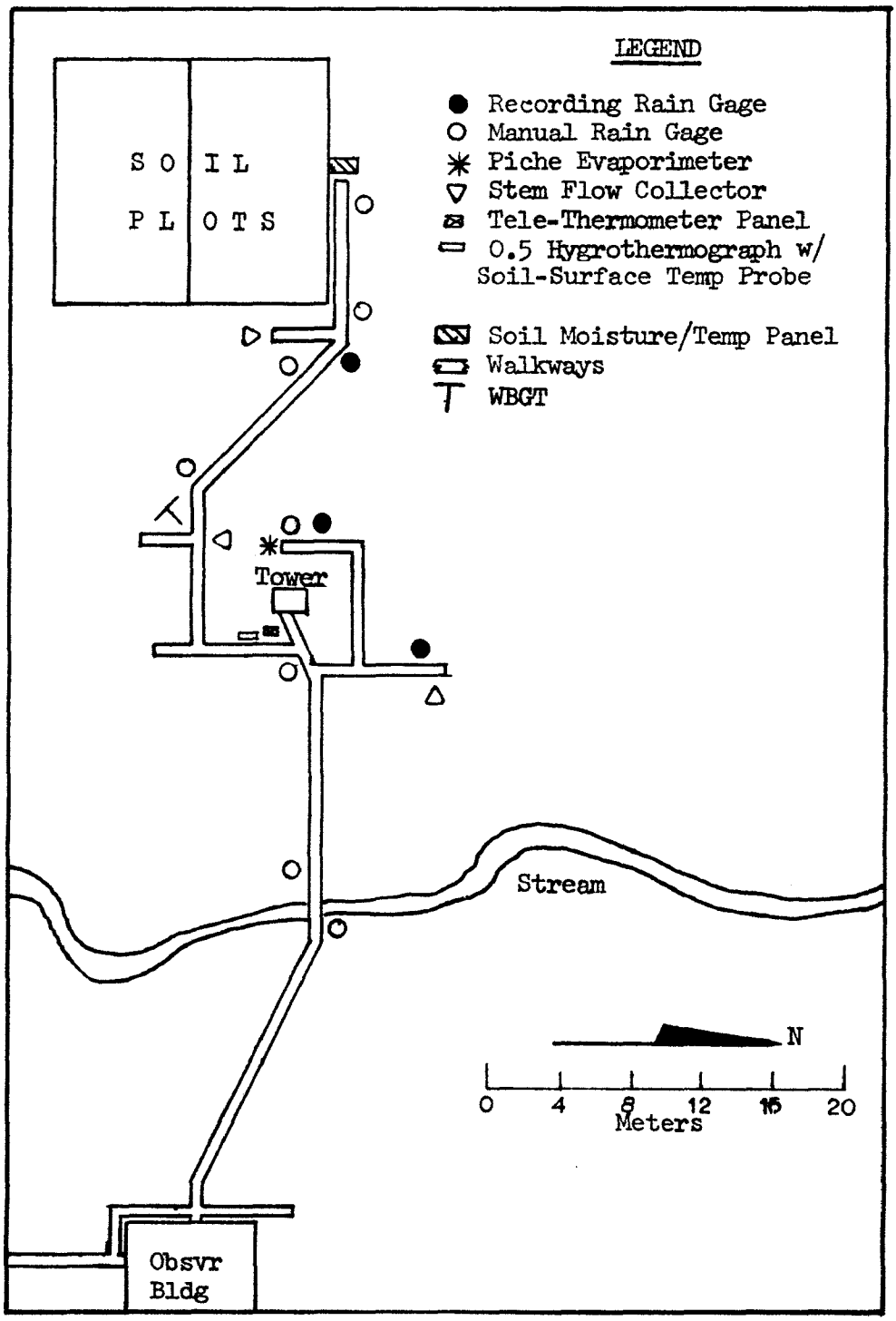

FIGURE 3.

ALBROOK FOREST SITE, GENERALIZED PLOT

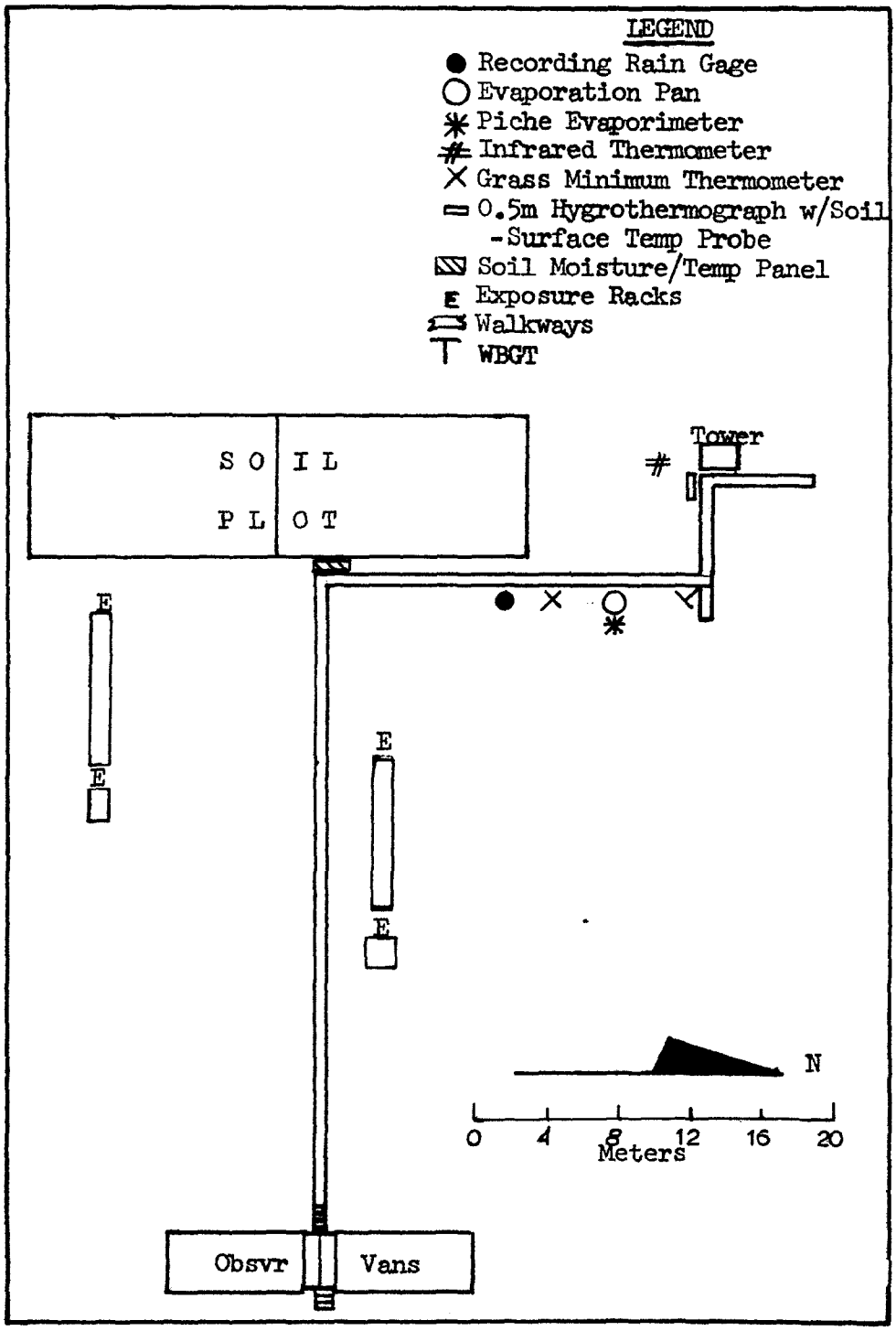

FIGURE 4.

CHIVA CHIVA OPEN, GENERALIZED PLOT

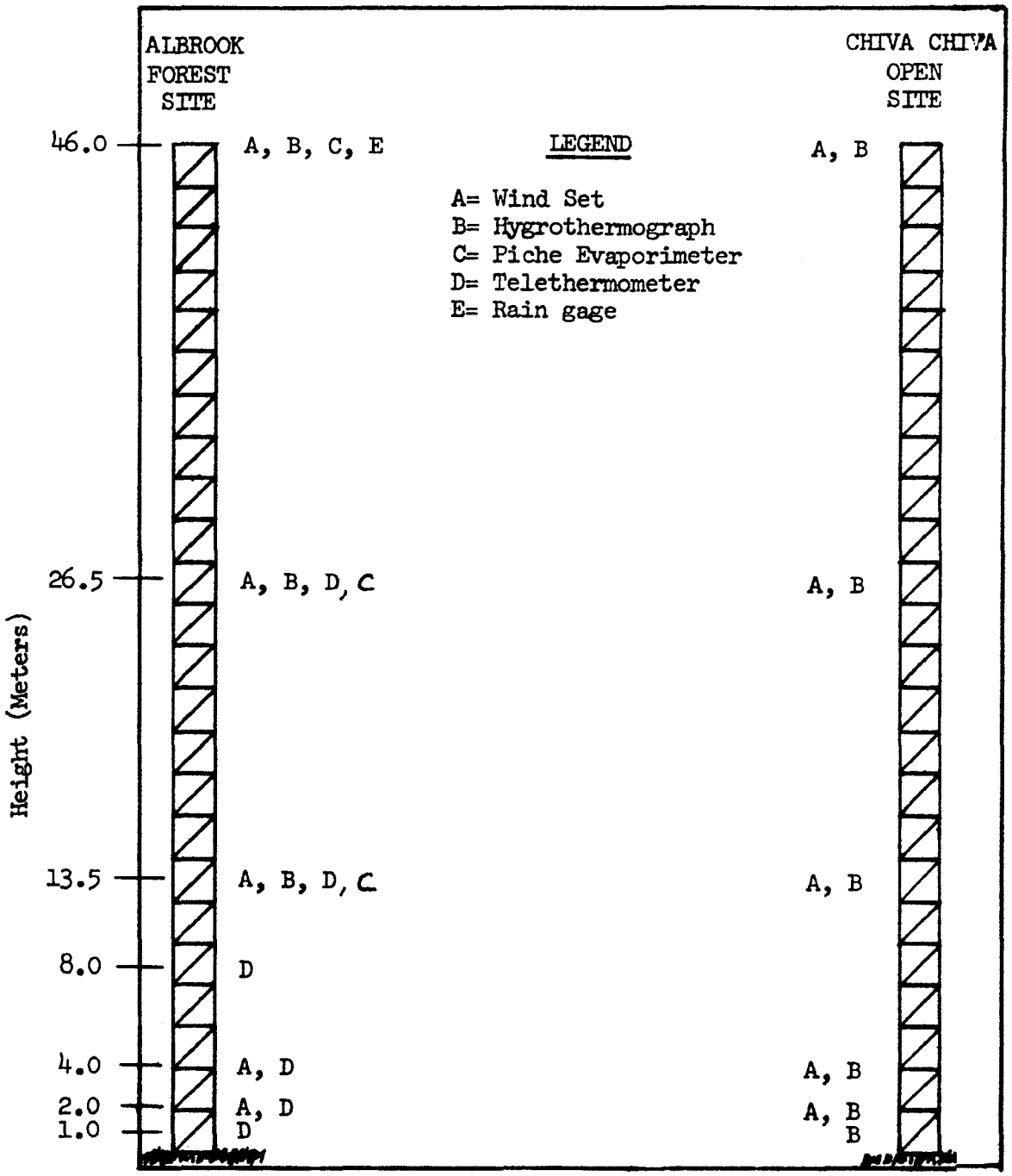

FIGURE 5.

INSTRUMENT LOCATION ON TOWERS

SUMMARY OF METEOROLOGICAL OBSERVATIONS

HOURLY DATA

APRIL 1967

Exposure		Monthly Means of Air Temperature by Hour (° F)																								Monthly Summary			
Site	Level	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	No of obs.	Min.	Mean	Max.
Albrook (Forest site)	46.0 m	75.6	75.3	75.1	74.7	74.6	74.5	75.8	78.6	82.4	84.7	84.8	85.3	85.9	85.1	84.0	83.3	81.6	79.6	78.1	77.5	77.0	76.6	76.3	76.0	677	70.1	79.0	91.4
	28.5 m	This level was not instrumented for air temperature at this time																											
	26.5 m	74.9	74.7	74.3	74.1	73.8	73.8	75.6	78.7	82.9	84.9	85.2	85.8	86.3	85.8	84.4	83.5	81.9	79.7	77.5	76.9	76.3	75.9	75.5	75.2	715	69.0	79.0	92.0
	13.5 m	74.6	74.4	74.2	73.8	73.5	73.3	74.0	76.6	79.9	82.2	83.4	84.1	84.3	84.5	83.0	82.3	81.7	79.7	78.0	77.0	76.5	75.9	75.5	75.0	719	68.2	78.2	91.9
	8.0 m	74.4	74.3	74.0	73.6	73.3	73.1	73.9	77.0	80.0	82.5	83.6	84.0	84.5	84.0	82.7	82.3	80.9	79.1	77.7	76.7	76.1	75.6	75.1	74.7	716	68.1	78.0	92.6
	4.0 m	74.0	73.7	73.5	73.2	72.8	72.6	73.9	77.2	80.1	82.4	83.2	84.2	84.8	84.2	82.5	82.8	80.9	79.0	77.4	76.4	75.8	75.2	74.7	74.3	704	67.2	77.8	92.4
	2.0 m	73.9	73.6	73.5	73.1	72.9	72.6	73.8	77.0	79.7	82.2	83.2	84.4	84.8	84.3	82.5	82.5	80.9	79.0	77.3	76.4	75.7	75.2	74.6	74.2	706	67.2	77.8	92.7
	1.0 m	74.3	74.2	73.9	73.7	73.4	72.6	73.6	77.0	79.8	82.6	83.7	84.3	85.1	84.5	82.2	82.4	81.1	79.2	77.4	76.8	76.0	75.5	75.0	74.6	697	68.2	77.9	92.5
	0.5 m	74.4	74.3	74.0	73.7	73.5	73.0	73.7	76.6	79.3	81.6	83.5	84.7	85.0	84.6	82.9	82.7	81.1	79.5	77.8	76.8	76.3	75.6	75.1	74.6	720	67.7	78.1	93.3
Chiva Chiva (Open site)	46.0 m	75.8	75.7	75.3	75.2	75.0	74.8	76.3	79.3	81.9	83.4	84.3	85.2	84.7	84.5	83.7	82.9	81.3	79.9	78.6	78.0	77.3	76.9	76.6	76.1	712	70.7	79.2	89.8
	28.5 m	This level was not instrumented for air temperature at this time																											
	26.5 m	75.8	75.6	75.2	75.0	74.6	74.6	76.0	78.9	81.7	83.3	84.3	85.3	84.9	84.8	84.2	83.4	81.6	80.4	79.0	78.3	77.6	77.1	76.7	76.3	720	70.0	79.4	90.3
	13.5 m	75.5	75.2	75.0	74.8	74.4	74.3	75.8	78.7	81.9	83.5	84.6	85.5	85.1	85.0	84.3	83.5	81.6	80.4	78.8	78.1	77.4	77.0	76.4	76.0	720	69.1	79.3	90.2
	8.0 m	This level was not instrumented for air temperature at this time																											
	4.0 m	75.2	74.9	74.5	74.1	73.9	73.7	76.0	80.2	83.3	85.3	86.5	87.0	86.6	86.5	86.5	85.4	82.6	80.7	79.0	78.1	77.3	76.7	76.1	75.6	716	68.1	79.8	93.9
	2.0 m	75.0	74.7	74.3	73.9	73.7	73.5	76.0	80.4	83.4	85.5	86.6	87.2	86.6	86.7	86.6	85.6	82.6	80.6	78.7	77.9	77.1	76.4	75.8	75.4	716	67.7	79.7	93.7
	1.0 m	74.8	74.6	74.2	74.0	73.6	73.4	76.6	81.8	84.5	87.3	88.8	88.9	88.2	88.1	87.2	86.1	83.1	80.8	78.9	77.9	76.9	76.3	75.8	75.3	712	67.5	80.2	97.0
	0.5 m	74.9	74.8	74.4	74.1	73.7	73.6	75.4	80.1	83.3	86.3	88.0	89.1	88.0	87.6	86.9	85.5	82.8	80.5	78.4	77.5	76.7	76.1	75.6	75.2	719	68.6	79.9	97.5

SUMMARY OF METEOROLOGICAL OBSERVATIONS

HOURLY DATA

APRIL 1967

Exposure		Monthly Ranges of Air Temperature by Hour (° F)																								Monthly Summary*			
Site	Level	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24				
Albrook (Forest site)	46.0 m	6.6	6.9	7.1	7.6	7.9	8.0	6.7	DTF	DTF	DTF	DTF	DTF	DTF	16.6	15.2	17.8	13.4	9.7	8.2	6.1	5.8	6.3	6.5	6.8				
	28.5 m	This level was not instrumented for air temperature at this time																											
	26.5 m	8.3	7.5	8.0	8.2	9.5	8.4	8.8	9.0	12.6	14.1	13.5	13.4	15.5	18.0	17.7	17.0	16.4	11.5	6.4	6.9	7.9	8.3	8.3	8.4				
	13.5 m	7.0	7.0	7.4	7.7	8.2	8.7	8.7	7.5	10.2	12.4	13.1	13.6	15.3	17.0	15.0	16.0	14.7	10.4	7.9	7.0	6.9	7.2	7.3	7.1				
	8.0 m	7.1	7.2	7.9	8.6	8.4	9.5	8.6	7.2	10.6	14.7	13.2	13.8	15.1	18.5	16.8	16.3	13.9	10.8	8.8	6.8	7.5	6.6	6.2	7.4				
	4.0 m	6.8	7.7	8.7	8.9	8.8	10.1	8.9	8.0	10.5	12.4	13.4	12.9	16.5	18.6	16.6	17.6	13.6	10.7	8.4	7.6	7.8	7.5	6.2	7.0				
	2.0 m	6.8	7.2	8.5	8.8	8.6	9.8	8.9	7.7	10.4	13.3	12.9	12.7	16.0	18.3	16.5	17.5	13.7	10.7	8.4	7.6	7.7	7.3	6.4	6.8				
	1.0 m	6.7	7.3	7.3	8.0	8.2	8.5	8.8	7.6	10.7	13.8	13.9	15.0	16.8	17.5	17.1	15.7	14.2	11.0	8.8	7.0	7.1	6.7	6.4	5.8				
	0.5 m	7.4	7.9	7.7	8.6	8.9	9.0	8.9	7.9	10.3	14.0	13.3	14.7	15.6	18.4	16.4	16.9	13.4	10.1	8.2	8.2	7.7	7.0	6.3	6.1				
Chiva Chiva (Open site)	46.0 m	6.1	6.3	6.1	6.4	6.8	6.7	6.9	8.5	11.2	12.5	14.4	14.1	15.9	15.7	15.0	15.5	12.3	9.3	6.9	5.8	6.5	6.9	6.6	5.9				
	28.5 m	This level was not instrumented for air temperature at this time																											
	26.5 m	7.5	8.0	8.2	7.6	7.8	7.3	6.8	8.8	11.7	12.1	14.0	13.4	16.4	15.1	15.0	15.6	12.6	10.2	7.9	6.4	6.7	7.7	6.9	7.0				
	13.5 m	7.6	7.6	7.8	7.8	8.4	8.6	6.9	8.0	10.8	12.2	14.0	13.8	16.0	15.9	15.1	17.5	13.4	10.8	7.4	7.6	6.7	7.1	7.5	7.3				
	8.0 m	This level was not instrumented for air temperature at this time																											
	4.0 m	8.1	8.6	9.4	9.4	9.6	9.8	8.7	9.8	13.1	12.7	15.8	15.8	17.6	19.7	16.5	15.6	14.9	9.4	7.1	5.8	7.0	7.4	7.6	8.3				
	2.0 m	7.8	8.2	8.9	9.1	9.2	10.5	7.9	9.7	12.9	13.2	15.7	15.9	18.2	19.2	16.8	16.1	14.7	9.7	7.0	5.6	6.5	6.6	7.2	7.5				
	1.0 m	8.4	8.7	9.7	9.5	10.0	10.0	8.7	11.8	15.1	16.7	19.0	19.2	19.8	22.2	20.0	20.6	17.4	10.3	7.7	7.1	6.5	7.5	8.0	7.6				
	0.5 m	6.8	6.5	7.7	8.3	8.7	8.7	8.0	10.3	13.5	17.2	19.2	20.3	21.8	20.0	18.1	18.9	15.0	9.6	6.0	5.1	5.2	6.5	6.2	6.2				

* No monthly summary was computed for the ranges.

SUMMARY OF METEOROLOGICAL OBSERVATIONS

HOURLY DATA

APRIL 1967

Exposure		Monthly Means of Relative Humidity by Hour (%)																								Monthly Summary			
Site	Level	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	No of obs.	Min.	Mean	Max.
Albrook (Forest site)	46.0 m	87	88	90	90	90	91	88	80	69	65	64	64	64	67	69	70	73	77	81	82	85	86	86	87	692	49	79	97
	28.5 m	This level was not instrumented for relative humidity at this time																											
	26.5 m	90	91	91	92	92	92	89	82	72	67	65	66	65	66	70	71	74	78	83	85	87	87	88	88	717	49	80	98
	13.5 m	91	91	92	93	93	93	93	88	79	73	71	69	68	69	73	74	75	78	82	84	87	88	89	89	719	53	83	99
	8.0 m	This level was not instrumented for relative humidity at this time																											
	4.0 m	94	94	94	95	96	96	95	90	80	74	73	71	69	70	77	76	80	83	86	89	90	91	92	93	711	48	85	100
	2.0 m	94	95	95	95	96	96	96	91	82	76	74	71	70	70	78	77	80	84	87	90	90	91	93	94	712	44	86	100
	1.0 m	94	94	95	95	95	95	96	93	84	78	74	71	72	73	77	77	80	84	87	89	90	91	93	93	701	51	86	100
	0.5 m	93	94	94	94	95	95	95	92	86	81	76	72	72	72	78	78	81	84	87	89	90	91	93	93	719	48	86	100
Chiva Chiva (Open site)	46.0 m	87	88	88	89	90	89	87	80	74	68	65	63	64	64	66	68	72	76	80	82	84	85	86	87	720	46	78	97
	28.5 m	This level was not instrumented for relative humidity at this time																											
	26.5 m	88	88	89	90	90	90	87	79	72	67	63	61	64	64	65	67	72	76	79	82	83	85	86	87	720	43	78	98
	13.5 m	88	89	90	91	91	91	88	79	72	66	62	61	63	63	64	66	71	76	79	82	84	85	86	87	720	41	78	99
	8.0 m	This level was not instrumented for relative humidity at this time																											
	4.0 m	89	90	91	92	92	92	88	78	70	65	61	61	62	62	62	64	71	75	79	82	84	86	87	88	717	44	78	100
	2.0 m	90	91	92	93	93	93	89	78	70	64	62	61	62	62	62	64	72	77	81	83	85	87	88	89	716	44	79	100
	1.0 m	90	91	91	92	92	92	90	80	71	64	61	60	62	62	63	66	72	78	82	85	87	88	89	90	720	43	79	99
	0.5 m	90	91	91	92	92	92	91	81	72	65	61	60	63	63	65	67	73	78	83	85	87	88	89	90	719	42	80	100

SUMMARY OF METEOROLOGICAL OBSERVATIONS

HOURLY DATA

APRIL 1967

Exposure		Monthly Ranges of Relative Humidity by Hour (%)																								Monthly Summary*			
Site	Level	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24				
Albrook (Forest site)	46.0 m	19	15	16	17	14	17	17	26	38	37	39	45	46	43	44	46	37	39	31	34	26	23	21	19				
	28.5 m	This level was not instrumented for relative humidity at this time																											
	26.5 m	16	16	14	15	13	17	18	26	36	37	40	46	47	44	45	49	41	36	23	22	20	19	17	16				
	13.5 m	16	16	13	12	12	13	15	20	27	35	37	42	45	44	44	46	41	37	30	29	26	24	21	20				
	8.0 m	This level was not instrumented for relative humidity at this time																											
	4.0 m	16	14	14	16	14	16	15	22	30	38	42	46	49	51	49	49	40	35	28	26	23	20	15	17				
	2.0 m	14	14	15	15	13	15	12	20	29	37	39	47	48	52	49	48	41	36	28	24	23	20	15	15				
	1.0 m	12	11	11	10	12	12	10	17	29	33	39	45	47	48	47	46	39	33	25	20	18	15	11	11				
	0.5 m	17	19	17	15	16	16	17	19	28	34	38	46	45	51	47	44	40	33	27	25	22	17	15	18				
Chiva Chiva (Open site)	46.0 m	16	14	16	13	14	20	14	22	30	36	41	43	48	50	46	45	44	38	30	24	20	19	20	18				
	28.5 m	This level was not instrumented for relative humidity at this time																											
	26.5 m	16	15	16	14	16	20	15	26	31	33	37	44	48	54	48	47	49	37	30	26	21	20	22	18				
	13.5 m	16	15	18	15	17	21	15	25	32	36	39	47	52	57	51	50	50	39	31	27	22	22	23	19				
	8.0 m	This level was not instrumented for relative humidity at this time																											
	4.0 m	17	17	19	17	20	19	20	29	39	38	42	47	53	55	52	50	48	39	32	28	22	24	27	22				
	2.0 m	16	17	18	15	19	18	18	28	36	39	43	49	52	55	50	50	44	35	27	26	21	21	22	19				
	1.0 m	13	14	14	13	14	14	14	27	34	38	44	49	52	55	50	52	47	41	31	24	21	18	19	14				
	0.5 m	14	12	16	11	19	13	17	30	34	44	53	57	57	52	49	49	42	34	28	23	21	19	20	16				

* No monthly summary was computed for the ranges.

SUMMARY OF METEOROLOGICAL OBSERVATIONS

HOURLY DATA

APRIL 1967

Exposure		Monthly Means[2] of other Elements by Hour																								Monthly Summary			
Site	Code[1]	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	No of obs.	Min.	Mean	Max.
Albrook (Forest site)	WB (4.0 m)	72.7	72.5	72.4	72.1	72.0	71.8	72.8	75.0	75.4	76.0	76.0	76.4	76.3	76.0	76.4	76.3	75.4	74.8	74.2	73.8	73.4	73.2	73.1	72.8	718	67.2	74.2	79.5
	WB (2.0 m)	72.6	72.6	72.4	72.2	72.0	71.8	72.8	75.0	75.4	76.1	76.3	76.6	76.7	76.2	76.5	76.4	75.5	75.0	74.3	74.0	73.5	73.3	73.1	72.8	719	67.2	74.2	79.5
	WB (0.5 m)	73.0	72.9	72.8	72.5	72.4	72.1	72.6	74.9	76.0	76.8	77.4	77.3	77.3	77.0	76.9	76.8	76.1	75.6	74.8	74.3	74.0	73.7	73.5	73.2	719	67.7	74.7	82.0
	BP	.763	.750	.736	.731	.733	.744	.765	.782	.794	.798	.791	.774	.748	.723	.699	.690	.690	.702	.724	.742	.760	.779	.786	.779	720	.600	.749	.885
	P1	0.00	0.00	0.00	0.00	0.05	0.10	0.02	0.03	0.27	0.18	0.04	0.08	0.12	0.24	0.11	0.33	0.13	0.00	0.09	0.00	0.01	0.00	0.00	0.00	44	0.01	6.12	1.21
	P2	0.00	0.00	0.00	0.00	0.00	0.04	0.03	0.00	0.16	0.06	0.10	0.05	0.07	0.28	0.08	0.23	0.13	0.00	0.07	0.00	0.00	0.00	0.00	0.00	28	0.01	3.44	0.83
	P3	0.00	0.00	0.00	0.00	0.03	0.08	0.00	0.00	0.33	0.09	0.05	0.06	0.11	0.28	0.11	0.32	0.15	0.01	0.08	0.00	0.00	0.00	0.00	0.00	30	0.01	4.41	1.02
	P4	0.00	0.00	0.00	0.00	0.02	0.09	0.00	0.01	0.36	0.14	0.10	0.06	0.17	0.34	0.09	0.41	0.15	0.01	0.07	0.00	0.00	0.00	0.00	0.00	33	0.01	5.81	1.75
Chiva Chiva (Open site)	WB (4.0 m)	72.9	72.7	72.5	72.4	72.2	72.0	73.5	74.9	75.4	75.7	75.8	75.8	75.6	75.5	75.7	75.5	75.1	74.6	74.0	73.9	73.7	73.5	73.2	73.0	717	67.5	74.1	79.7
	WB (2.0 m)	72.8	72.7	72.5	72.4	72.2	72.1	73.5	75.1	75.6	75.7	75.9	75.9	75.7	75.7	75.9	75.6	75.2	74.8	74.1	73.9	73.7	73.5	73.2	73.0	716	67.7	74.2	78.8
	WB (0.5 m)	72.9	72.9	72.5	72.4	72.1	72.0	73.5	75.6	76.1	76.5	76.9	77.2	77.0	76.6	76.5	76.3	75.6	75.1	74.4	74.1	73.8	73.5	73.3	73.0	719	67.5	74.6	79.6
	BP	.860	.845	.831	.826	.830	.843	.859	.879	.893	.896	.890	.871	.847	.819	.798	.789	.791	.803	.826	.839	.861	.877	.884	.873	719	.720	.847	.985
	PS	0.00	0.00	0.00	0.00	0.10	0.06	0.05	0.05	0.39	0.06	0.06	0.08	0.06	0.16	0.02	0.42	0.19	0.03	0.00	0.00	0.00	0.00	0.00	0.00	36	0.01	4.60	1.09

SUMMARY OF METEOROLOGICAL OBSERVATIONS

HOURLY DATA

APRIL 1967

Exposure		Monthly Ranges[2] of other Elements by Hour																								Monthly Summary*			
Site	Code[1]	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24				
Albrook (Forest site)	WB (4.0 m)	4.9	5.2	5.7	6.5	6.7	7.6	7.3	4.4	3.8	4.6	5.9	5.3	5.4	5.8	5.9	6.3	5.0	5.2	4.0	4.6	5.4	5.0	4.1	4.1				
	WB (2.0 m)	4.9	4.9	5.7	6.5	6.9	7.8	7.2	4.2	3.6	4.0	5.4	5.6	5.2	4.8	5.0	5.7	4.8	5.2	4.2	4.3	4.9	5.0	3.6	4.0				
	WB (0.5 m)	4.6	4.9	5.5	6.1	6.9	7.3	7.8	5.4	3.9	4.4	4.3	5.6	6.3	7.3	7.5	7.2	4.4	4.8	4.2	4.1	4.0	3.6	3.4	3.9				
	BP	.175	.160	.165	.160	.165	.170	.170	.180	.145	.155	.185	.180	.175	.170	.170	1.85	.180	.190	.175	.165	.175	.170	.175	.185				
	P1	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.03	0.00	0.00	0.07	0.08	0.44	1.02	0.33	1.20	0.45	0.00	0.15	0.00	0.00	0.00	0.00	0.00				
	P2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.05	0.80	0.17	0.82	0.41	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
	P3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.11	0.74	0.28	1.00	0.46	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
	P4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.36	0.90	0.24	1.74	0.54	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Chiva Chiva (Open site)	WB (4.0 m)	5.0	5.1	5.0	5.9	5.7	6.8	5.2	4.6	4.1	4.1	6.0	5.7	6.6	4.6	5.7	4.9	7.0	4.7	3.8	4.2	3.9	3.3	3.7	4.0				
	WB (2.0 m)	4.8	4.8	5.0	6.1	5.9	6.5	5.0	4.3	3.9	3.5	4.8	4.4	4.7	4.8	4.7	4.4	5.2	4.4	3.3	3.7	3.5	3.0	3.8	4.1				
	WB (0.5 m)	5.1	5.0	5.0	6.1	6.8	7.1	6.1	4.7	3.8	4.4	4.7	4.5	4.1	4.5	4.5	5.1	4.2	4.3	4.6	3.9	3.7	3.7	3.3	4.0				
	BP	.165	.165	.155	.160	.175	.175	.170	.180	.155	.160	.160	.175	.170	.160	.180	.185	.175	.168	.170	.160	.170	.165	.175	.170				
	PS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.10	0.15	0.03	0.34	0.03	1.03	0.79	0.04	0.00	0.00	0.00	0.00	0.00	0.00				

* No monthly summary was computed for the ranges.

WB - Wet bulb temperature (°F)
BP - Barometric pressure (in. of Hg minus 29.0)

PS - Precipitation at 1.0 m. in open area (in.)
P1 - Precipitation at 46.0 m. above canopy (in.)
P2 - Precipitation under full canopy (in.)
P3 - Precipitation under drip canopy (in.)
P4 - Precipitation under open canopy (in.)

[2]Monthly ranges of precipitation are computed for precipitation days.

SUMMARY OF METEOROLOGICAL OBSERVATIONS

HOURLY DATA

APRIL 1967

Exposure		Monthly Means of Wind Speed by Hour (miles/hr.)																								Monthly Summary			
Site	Level	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	No of obs.	Min.	Mean	Max.
Albrook (Forest site)	46.0 m	4	4	4	4	4	4	4	3	5	5	6	8	7	7	7	8	8	6	5	5	5	5	4	5	718	0	5	18
	28.5 m	This level was not instrumented for wind speed at this time																											
	26.5 m	2	2	2	2	1	1	2	2	2	3	3	4	3	4	3	3	3	3	2	2	2	2	2	2	718	0	2	10
	13.5 m	This level was not instrumented for wind speed at this time																											
	8.0 m	This level was not instrumented for wind speed at this time																											
	4.0 m	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	0	0	0	0	0	1	0	718	0	1	5
	2.0 m	This level was not instrumented for wind speed at this time																											
	1.0 m	This level was not instrumented for wind speed at this time																											
	0.5 m	This level was not instrumented for wind speed at this time																											
Chiva Chiva (Open site)	46.0 m	7	7	7	6	6	5	6	7	8	9	10	12	12	11	11	11	12	10	9	10	8	7	8	7	699	0	9	21
	28.5 m	This level was not instrumented for wind speed at this time																											
	26.5 m	5	5	5	5	4	4	4	6	7	8	9	11	11	10	11	10	11	9	8	8	6	6	6	5	587	0	7	21
	13.5 m	2	2	3	3	2	2	2	4	6	5	7	9	9	7	8	9	6	6	6	6	4	4	3	3	674	0	5	20
	8.0 m	This level was not instrumented for wind speed at this time																											
	4.0 m	3	3	3	3	2	2	2	4	5	6	6	8	8	7	8	8	8	6	5	5	4	3	4	3	699	0	5	16
	2.0 m	1	1	1	1	1	1	1	2	4	4	5	6	6	5	6	6	5	4	3	3	2	2	2	1	719	0	3	16
	1.0 m	This level was not instrumented for wind speed at this time																											
	0.5 m	This level was not instrumented for wind speed at this time																											

SUMMARY OF METEOROLOGICAL OBSERVATIONS

HOURLY DATA

APRIL 1967

Exposure		Monthly Ranges of Wind Speed by Hour (miles/hr.)																								Monthly Summary*			
Site	Level	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24				
Albrook (Forest site)	46.0 m	8	8	8	10	8	8	8	8	12	15	13	12	13	18	15	17	16	13	12	12	10	8	9	8				
	28.5 m	This level was not instrumented for wind speed at this time																											
	26.5 m	5	6	5	5	5	4	4	6	6	8	8	7	8	9	10	9	8	7	6	5	5	5	6	5				
	13.5 m	This level was not instrumented for wind speed at this time																											
	8.0 m	This level was not instrumented for wind speed at this time																											
	4.0 m	3	3	3	3	4	3	1	1	3	2	3	5	3	4	3	2	3	2	3	2	1	2	3	2				
	2.0 m	This level was not instrumented for wind speed at this time																											
	1.0 m	This level was not instrumented for wind speed at this time																											
	0.5 m	This level was not instrumented for wind speed at this time																											
Chiva Chiva (Open site)	46.0 m	11	10	13	12	11	12	12	11	12	16	15	17	16	15	18	16	20	20	14	16	12	15	11	13				
	28.5 m	This level was not instrumented for wind speed at this time																											
	26.5 m	11	9	11	13	9	9	11	11	12	14	15	16	16	18	18	18	17	19	14	14	12	15	12	11				
	13.5 m	11	8	12	14	8	9	9	12	13	20	16	18	14	16	18	18	19	16	19	17	13	13	12	8				
	8.0 m	This level was not instrumented for wind speed at this time																											
	4.0 m	7	6	9	9	5	6	7	7	7	11	12	14	13	15	14	13	14	13	9	9	7	9	8	8				
	2.0 m	4	9	5	7	3	4	5	8	9	13	12	12	12	16	15	11	15	13	8	9	6	6	5	9				
	1.0 m	This level was not instrumented for wind speed at this time																											
	0.5 m	This level was not instrumented for wind speed at this time																											

* No monthly summary was computed for the ranges.

ALBROOK (Forest site) APRIL 1967

Relative Frequencies * of Wind Directions by Hour at 46.0 m.
(%)

Dir. \ Hr.	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
N	6.7			3.3			3.3		20.0	26.7	10.0	16.7	17.2	17.2	13.3	3.3	10.0		6.7		3.3	3.3	3.3	
NNE					3.3	3.3			3.3		10.0			3.4	6.7		3.3	3.3				3.3		
NE			3.3		3.3		3.3		3.3	6.7		3.3	3.4	6.9	3.3	3.3					3.3		3.3	
ENE									3.3	3.3	3.3	6.7						3.3				3.3		
E										3.3			10.3	6.9	3.3									
ESE				3.3						6.7	3.3		3.4	3.4	3.3									
SE								3.3	10.0		3.3	16.7	10.3		3.3	6.7	3.3							
SSE									6.7		13.3	6.7	10.3	6.9	6.7	3.3		3.3						
S							3.3		3.3	10.0	3.3	6.7	3.4	10.3	10.0		6.7	3.3	3.3					
SSW									3.3	3.3						3.3	3.3							
SW											3.3		3.4	3.4										
WSW	6.7	10.0	20.0	20.0	10.0	16.7	16.7	26.7	3.3	6.7	6.7	3.3	6.9	3.4	3.3	3.3		13.3	3.3	3.3	3.3	10.0	6.7	16.7
W	33.3	53.3	43.3	40.0	46.7	36.7	43.3	33.3	10.0	3.3	3.3	13.3			3.3	3.3	13.3	10.0	40.0	53.3	43.3	46.7	36.7	36.7
WNW	23.3	10.0	10.0	13.3	10.0	3.3	6.7	6.7	3.3	10.0	10.0	6.7	3.4	3.4	6.7		3.3	16.7	13.3	6.7	26.7	16.7	20.0	6.7
NW	6.7	6.7			6.7		3.3	6.7	10.0	10.0	10.0	3.3	10.3	24.0	20.0	23.3	20.0	26.7	16.7	23.3	3.3	3.3	6.7	23.3
NNW	3.3					6.7	3.3		13.3	3.3	16.7	16.7	17.2	6.9	10.0	36.7	16.7	13.3			6.7	3.3	6.7	
CALM	20.0	20.0	23.3	20.0	20.0	33.3	16.7	26.7	6.7	6.7	3.3			3.4	6.7	13.3	20.0	6.7	16.7	13.3	10.0	10.0	16.7	16.7

* Note: Due to rounding, percentage totals do not equal 100%.

ALBROOK (Forest site) APRIL 1967

Relative Frequencies * of Wind Directions by Hour at 26.5 m.
(%)

Dir. \ Hr.	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
N		6.7				6.7		3.3	6.7	10.0	13.3	10.0	3.4	10.3	13.3	20.0	13.3	3.3	6.7	3.3	3.3	6.7		
NNE								3.3	10.0	3.3	3.3	10.0	6.9		6.7	6.7	3.3	3.3	6.7					
NE										3.3		10.0	6.9	10.3	6.7	3.3	3.3	3.3	3.3					
ENE									3.3	13.3	3.3			6.9	6.7	3.3		3.3						
E									6.7	10.0	13.3	3.3	20.6	3.4	10.0		10.0							
ESE										3.3		3.3				3.3	3.3			3.3				
SE									3.3		3.3	10.0	6.9		3.3	3.3		3.3						
SSE											10.0	3.3	10.3	3.4	3.3	3.3								
S									10.0	10.0	3.3	10.0	10.3	17.2	13.3	10.0	13.3		3.3					
SSW									3.3	13.3	3.3	3.3					3.3							
SW			3.3					3.3	3.3			6.7	3.4					3.3		6.7				
WSW			3.3			3.3	3.3	6.7	3.3	3.3	3.3	6.7	3.4					3.3	3.3				6.7	
W	16.7	20.0	13.3	20.0	16.7	3.3	13.3	16.7		6.7	6.7	6.7	3.4	6.9		6.7	3.3	6.7	6.7	3.3	13.3	6.7	20.0	20.0
WNW	20.0	20.0	16.7	13.3	6.7	30.0	20.0	30.0	6.7	6.7	10.0	6.7	6.9			3.3	6.7	16.7	16.7	23.3	26.7	33.3	36.7	30.0
NW	40.0	26.7	23.3	23.3	26.7	6.7	23.3	10.0	30.0	3.3	10.0	3.3	10.3	20.6	13.3	10.0	16.7	30.0	30.0	26.7	33.3	20.0	16.7	26.7
NNW	3.3	3.3	3.3		3.3	3.3		3.3	3.3	3.3	10.0	6.7	6.9	10.3	6.7	13.3	10.0	10.0	6.7	10.0	6.7	10.0		
CALM	20.0	23.3	36.7	43.3	46.7	46.7	40.0	23.3	10.0	10.0	6.7		23.3	10.3	16.7	13.3	13.3	13.3	16.7	23.3	16.7	23.3	20.0	23.3

* Note: Due to rounding, percentage totals do not equal 100%.

ALBROOK (Forest site) APRIL 1967

Relative Frequencies * of Wind Directions by Hour at 4.0 m.
(%)

Dir. \ Hr.	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
N	6.7	3.3		3.3		10.0		3.3		3.3	3.3				3.3	6.7	13.3	6.7	3.3	3.3	3.3			6.7
NNE							3.3		3.3		3.3	6.7	6.9	10.3					3.3	3.3		3.3	6.7	
NE	3.3		3.3					3.3		3.3	3.3		6.9		6.7	3.3	3.3					3.3		
ENE									6.7	3.3	3.3		3.4						6.7					
E									6.7	16.7	3.3	10.0	10.3	6.9	3.3	10.0								
ESE											3.3	16.7	6.9		6.7		3.3							
SE								3.3		3.3	3.3	3.3	13.7	3.4					3.3					
SSE								3.3	3.3	3.3	3.3		3.4	6.9		3.3						3.3		
S								13.3	6.7	13.3	20.0	23.3	17.2	10.3	10.0	10.0	13.3	6.7			3.3			
SSW								3.3		3.3	3.3	3.3					6.7							
SW									6.7	6.7	3.3	3.3	3.4	3.4						6.7	6.7	3.3	3.3	3.3
WSW						3.3			3.3	3.3	3.3		3.4	3.4					3.3	3.3	3.3			
W	3.3				3.3				6.7				3.4		3.3	3.3	3.3	3.3	3.3		6.7	3.3	10.0	
WNW	6.7	3.3	3.3	10.0	3.3	6.7	6.7				3.3			6.9	6.7			13.3	6.7	6.7		6.7	3.3	13.3
NW	10.0	10.0	13.3	6.7	6.7		10.0	3.3	3.3	3.3	3.3	3.3		3.4	3.3	6.7			3.3		6.7	3.3	10.0	10.0
NNW		3.3	3.3			3.3			3.3					3.4	6.7		6.7							3.3
CALM	70.0	80.0	76.7	80.0	86.7	76.7	80.0	66.7	50.0	36.7	36.7	30.0	20.6	41.2	50.0	56.7	50.0	70.0	66.7	76.7	70.0	73.3	66.7	63.3

* Note: Due to rounding, percentage totals do not equal 100%.

CHIVA CHIVA (Open site) APRIL 1967

Relative Frequencies * of Wind Directions by Hour at 46.0 m.
(%)

Dir. \ Hr.	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
N	3.3	6.9		6.3	10.3	10.0	6.9	10.7	13.7	24.0	30.9	17.2	14.2	13.7	3.5	20.0	13.7	6.7	17.2	6.9	6.9	3.4	3.3	
NNE	6.7		6.7							10.3	13.7	10.3	7.2	3.4	10.7	3.3	3.4	6.7						
NE												3.4					3.4	3.3						
ENE					3.4				10.3	3.4		3.4		3.4	3.5			3.3	3.4	3.4	6.9			
E	3.3						3.4		3.4	3.4	3.4		7.2		3.5	3.3		3.3				3.4	3.3	
ESE									6.9	3.4	3.4	6.9	3.5											
SE				3.3					10.3	3.4	6.9		10.7	10.3	3.5	6.7	6.9			3.4				
SSE									3.4		6.9	7.2	6.9			3.3	3.4		3.4					
S						6.7		3.5	6.9	3.4	6.9	10.3	3.5	6.9	10.7			3.3	10.3					
SSW										6.9		3.4		3.4	3.5		6.9							
SW			3.3								3.4			3.4		3.3								6.9
WSW		6.9		6.7			3.4			6.9							3.4							
W	3.3	3.4	3.3	3.3	3.4	10.0	6.9	3.5		3.4	3.4		7.2						6.9		6.9	6.9	6.7	3.4
WNW	13.3	17.2	20.0	13.3	20.6	16.7	20.6	10.7	3.4	3.4	3.4	3.4	3.5	3.4		3.3	6.9	6.7		13.7	3.4		16.7	13.7
NW	40.0	37.8	40.0	50.0	54.9	33.3	48.1	50.0	13.7	13.7	10.3	17.2	14.2	6.9	21.4	30.0	13.7	13.3	20.6	30.9	34.3	44.6	33.3	58.4
NNW	30.0	27.5	26.7	20.0	6.9	23.3	10.3	21.4	27.5	13.7	13.7	17.2	21.4	37.8	39.3	26.7	37.8	50.0	37.8	41.2	41.2	41.2	36.7	17.2
CALM																		3.3						

* Note: Due to rounding, percentage totals do not equal 100%.

CHIVA CHIVA (Open site) APRIL 1967

Relative Frequencies * of Wind Directions by Hour at 26.5 m.
(%)

Dir. \ Hr.	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
N	13.7	24.9	6.9	13.7	10.7	21.4	7.2	22.2	28.6	29.6	28.6	21.4	25.9	35.6	22.2	24.0	21.4	34.3	42.8	35.6	28.6	17.9	34.3	14.2
NNE	3.4	3.5	6.9	3.4	7.2	7.2	3.5	3.7	7.2	11.1	21.4	10.7		10.7	11.1	13.7	14.2	6.9	3.5	7.2	3.5	3.5		
NE	3.4			3.4			3.5		3.5	3.7	7.2	10.7	14.8	7.2	3.7	3.4	7.2	3.4	3.5	3.5				
ENE									7.2				3.7		7.4			6.9					3.4	
E	3.4		3.4							7.4	3.5	3.5	7.4	3.5				3.4	3.5		7.2	3.5		
ESE									3.5		3.5	7.2			3.7	6.9				3.5				
SE			6.9	3.4		3.5			14.2	3.7	10.7		11.1	10.7		3.4								
SSE										7.4	3.5	3.5	3.7	3.5	7.4		10.7							
S	3.4	3.5							3.5		3.5	10.7	3.7	10.7	7.4	3.4		3.4	7.2					
SSW						3.5				3.7	3.5	3.5												
SW				3.4				3.7		7.4	3.5	3.5			3.7	3.4	3.5							3.5
WSW		3.5		3.4		3.5	3.5				3.5													
W				3.4		3.5	7.2	3.7		7.4			3.7		3.7		3.5		3.5			7.2	10.3	3.5
WNW	10.3	3.5	3.4	13.7	7.2	3.5	17.9	3.7	3.5		3.5		3.7				7.2	6.9	3.5		3.5			7.2
NW	20.6	17.9	17.2	20.6	46.3	21.4	17.9	25.9	14.2				3.7	7.2	3.7	10.3	7.2	3.4		17.9	21.4	14.2	13.7	28.6
NNW	37.8	32.1	41.2	27.5	21.4	24.9	28.6	29.6	14.2	18.5	3.5	24.9	18.5	10.7	25.9	27.5	24.9	24.0	28.6	28.6	32.1	50.0	37.8	42.8
CALM	3.4	10.7	13.7	3.4	7.2	7.2	10.7	7.4								3.4		6.9	3.5	3.5	3.5	3.5		

* Note: Due to rounding, percentage totals do not equal 100%.

CHIVA CHIVA (Open site) APRIL 1967

Relative Frequencies * of Wind Directions by Hour at 4.0 m.
(%)

Dir. \ Hr.	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
N		6.9	6.7	6.7	17.2	6.7	6.9	10.7	24.0	6.9	30.9	20.6	17.9	13.7	10.7	16.7	13.7	13.3	6.9	6.9	10.3	13.7	13.3	13.7
NNE	3.3	13.7	13.3		3.4	13.3		3.5	3.4	3.4	13.7	10.3	3.5	3.4	3.5	6.7	13.7	6.7	3.4		3.4		3.3	3.4
NE	6.7			13.3		13.3		7.2	6.9	10.3	3.4	6.9	3.5	10.3	10.7	3.3	3.4	10.0	3.4	6.9	3.4		3.3	3.4
ENE	6.7	3.4	6.7	3.3	6.9		3.4		3.4	3.4				3.4		3.3		3.3			3.4			
E		3.4		3.3		3.3	3.4		3.4		3.4		7.2					3.3	3.4					
ESE									3.4		3.4	6.9	3.5		3.5	3.3								
SE			3.3	3.3						6.9	3.4			13.7		6.7		3.3						
SSE									10.3		3.4		14.2		3.5		6.9		3.4					
S							6.9	3.5	10.3	6.9	13.7	17.2	7.2	10.3	14.2	3.3	6.9		3.4					
SSW								3.5		13.7	3.4	3.4			3.5	3.3						3.4	3.3	3.4
SW				3.3			3.4			6.9	3.4						6.9					3.4		
WSW				3.3						3.4				3.4		3.3		3.3				3.4	3.3	3.4
W	3.3	3.4				3.3	10.3	7.2	3.4		3.4		7.2						6.9	3.4			3.3	
WNW	10.0	6.9	13.3	16.7	17.2	3.3	13.7	10.7	3.4					6.9		3.3	10.3	6.7		6.9	10.3	17.2	6.7	17.2
NW	50.0	34.3	43.3	36.7	27.5	16.7	30.9	32.1	17.2	20.6	3.4	24.0	21.4	17.2	14.2	20.0	10.3	10.0	20.6	30.9	34.3	17.2	40.0	37.8
NNW	16.7	20.6	10.0	3.3	13.7	26.7	6.9	17.9	10.3	17.2	10.3	10.3	14.2	17.2	35.6	26.7	27.5	36.7	48.1	41.2	34.3	41.2	20.0	10.3
CALM	3.3	6.9	3.3	6.7	13.7	13.3	13.7	3.5										3.3		3.4			3.3	6.9

* Note: Due to rounding, percentage totals do not equal 100%.

SUMMARY OF NON HOURLY DATA

APRIL 1967

Summary of Elements with Non-hourly Frequencies of Observation

Site	Element, Units and Exposure	Description	Number of Obs.	Minimum Value	Mean or Total Value	Maximum Value
Albrook (Forest site)	WBGT Index[1] (at 1.5 meters)	Index value	402	68.1	77.4	83.1
		Dry bulb temp.	402	68.2	80.3	92.5
		Wet bulb temp.	402	68.0	75.8	81.0
		Black bulb temp.	402	68.2	81.5	95.1
	Evaporation[3] (in. at 4 levels)	Piche (46.0 m)	29	0.024	14.660*	0.909
		Piche (26.5 m)	29	0.024	9.253*	0.586
		Piche (13.5 m)	28	0.012	4.613*	0.293
		Piche (0.5 m)	26	0.006	3.123*	0.244
	Precipitation from Raingauge Network[2] (in. at 1.0 meters)	Gauge # 1	20	0.01	6.09*	2.25
		Gauge # 2	20	0.01	5.97*	1.41
		Gauge # 3	19	0.01	6.28*	1.67
		Gauge # 4	19	0.01	5.04*	1.20
		Gauge # 5	19	0.01	5.93*	1.47
		Gauge # 6	18	0.01	5.44*	1.39
		Gauge # 7	20	0.01	4.72*	0.96
		Gauge # 8	18	0.01	4.98*	1.09
	Stem Flow[2] (in. at 2.0 meters)	Small tree	16	0.01	5.70*	1.37
		Medium tree	16	0.01	4.76*	1.00
		Large tree	12	0.01	46.96*	19.75
Chiva Chiva (Open site)	WBGT Index[1] (at 1.5 meters)	Index value	412	67.0	80.1	88.5
		Dry bulb temp.	412	67.5	83.8	97.0
		Wet bulb temp.	412	67.0	76.0	80.1
		Black bulb temp.	412	66.7	92.6	120.8
	Evaporation[3] (in. at 0.5 meters)	Piche	30	0.024	12.673*	0.744
		Pan	27	0.037	5.711*	0.349
	Minimum Grass temp[3] (°F at grass tips)	None	27	65.3	70.0	73.8

1 - Hourly observations between 0600 and 1900 hours inclusive

2 - Six hourly observations

3 - Daily observations

*Total Values

DISTRIBUTION LIST

Address	No. of Copies
Director Advanced Research Projects Agency Washington, DC 20301	6
Advanced Research Projects Agency R&D Field Unit APO San Francisco, California 96346	1
Defense Documentation Center for Scientific and Technical Information Cameron Station Alexandria, Virginia 22314	20
Director of Defense Research and Engineering ATTN: Technical Library Washington, DC 20301	1
Chief of Research and Development Department of the Army ATTN: CRD/M Washington, DC 20310	10
Assistant Chief of Staff for Intelligence Department of the Army ATTN: ACSI-DSRSI Washington, DC 20310	1
Commanding General US Army Materiel Command ATTN: AMCRD-SE Washington, DC 20315	1
Commanding General US Army Materiel Command ATTN: AMCRD-EV-A Washington, DC 20315	1
Commanding General US Army Test and Evaluation Command ATTN: AMSTE-NB Aberdeen Proving Ground, Maryland 21005	1
Commanding General US Army Test and Evaluation Command ATTN: AMSTE-TA-A Aberdeen Proving Ground, Maryland 21005	1
Commanding General US Army Test and Evaluation Command ATTN: AMSTE-EL Aberdeen Proving Ground, Maryland 21005	1
Commanding General US Army CDC Combined Arms Group Fort Leavenworth, Kansas 66027	1
Commanding General US Continental Army Command ATTN: Reconnaissance Branch ODCS for Intelligence Fort Monroe, Virginia 23351	1
Commanding General US Army Missile Command ATTN: AMSMI-RRA, Bldg 5422 Physical Sciences Laboratory Research and Development Directorate Redstone Arsenal, Alabama 35809	1
Commanding General US Army Munitions Command ATTN: AMSMU-RE-R Dover, New Jersey 07801	1
Commanding Officer US Army CDC CBR Agency ATTN: Mr. N. W. Bush Fort McClellan,Alabama 36205	1
US Army Munitions Command Operation Research Group Edgewood Arsenal, Maryland 21010	1
Commanding General US Army Natick Laboratories ATTN: Earth Sciences Laboratory Geography Division Natick, Massachusetts 01762	1
Commanding General US Army Natick Laboratories ATTN: Pioneering Research Division Natick, Massachusetts 01762	1
Project TREND Applied Scientific Research Corporation of Thailand APO San Francisco, California 96346	1
Commanding Officer US Army Cold Regions Research and Engineering Laboratories ATTN: Photographic Interpretation Research Division Hanover, New Hampshire 03755	1

DISTRIBUTION LIST (cont'd)

Address	No. of Copies
Commanding Officer US Army Ballistics Research Laboratories ATTN: AMXBR-B Aberdeen Proving Ground, Maryland 21005	1
Commanding Officer US Army Ballistics Research Laboratories ATTN: AMXBR-IA Aberdeen Proving Ground, Maryland 21005	1
Director US Army Engineer Waterways Experiment Station ATTN: Mobility and Environmental Division Vicksburg, Mississippi 39180	1
Commanding Officer US Army Dugway Proving Ground ATTN: Chief, Meteorological Division Dugway, Utah 84022	1
President US Army Artillery Board Fort Sill, Oklahoma 73504	1
Commanding Officer US Army CDC Artillery Agency Fort Sill, Oklahoma 73504	1
Commanding Officer US Army Picatinny Arsenal ATTN: SMUPA-TV-3 Dover, New Jersey 07801	1
Commanding Officer US Army Frankford Arsenal ATTN: SMUFA-L-8000 Philadelphia, Pennsylvania 19137	1
Commandant US Army Artillery & Missile School ATTN: Meteorology Division (Target Acquisition Department) Fort Sill, Oklahoma 73503	1
Commandant Special Warfare School Fort Bragg, N.C. 28307	1
Commanding General US Army Electronics Command ATTN: AMSEL-EW Fort Monmouth, New Jersey 07703	1
Commanding General Deseret Test Center Bldg 103, Soldier's Circle Fort Douglas, Utah 84113	1
Commandant US Army CBR School,Micrometeorological Section Fort McClellan, Alabama 36205	1
Commandant US Army Signal School ATTN: Meteorological Department Fort Monmouth, New Jersey 07703	1
Commanding General US Army Electronics Proving Ground ATTN: Field Test Department Fort Huachuca, Arizona 85613	1
Chief, Atmospheric Science Research Division Atmospheric Science Laboratory US Army Electronics Command Fort Huachuca, Arizona 85613	1
Chief, Atmospheric Science Office Atmospheric Science Laboratory US Army Electronics Command ATTN: AMSEL-BL-WS-M White Sands Missile Range, New Mexico 88002	1
Chief of Naval Operations ATTN: Code 427 Department of the Navy Washington, DC 20350	1
Officer in Charge US Naval Weather Research Facility US Naval Air Station, Bldg R-28 Norfolk, Virginia 23511	1
Commander USAF Air Weather Service ATTN: AWSES/TIFD Scott Air Force Base, Illinois 62225	1
Commander Air Force Cambridge Research Laboratories ATTN: CREW 1065 Main Street Waltham, Massachusetts 02154	1

DISTRIBUTION LIST (cont'd)

Address	No. of Copies
Director Bureau of Research and Development Federal Aviation Agency Washington, DC 20553	1
Chief Fallout Studies Branch Atomic Energy Commission Washington, DC 20545	1
US Department of Agriculture Forest Service Forest Fire Laboratory Missoula, Montana 59801	1
US Department of Agriculture Forest Service Lake States Forest Experiment Station ATTN: E. P. Van Arsdel St. Paul Campus, University of Minnesota St. Paul, Minnesota 55101	1
Director Atmospheric Physics and Chemistry Laboratory ESSA- Department of Commerce Boulder, Colorado 80302	
Director Atmospheric Sciences Library Environmental Science Service Administration Silver Spring, Maryland 20910	1
National Center for Atmospheric Research ATTN: NCAR Library Acquisitions Boulder, Colorado 80302	1
Remote Area Conflict Information Center Battelle Memorial Institute 505 King Avenue Columbus, Ohio 43201	1
Commander Operational Test and Evaluation Force US Naval Base Norfolk, Virginia 23511	1
Panama Canal Company Meteorological and Hydrographic Branch ATTN: Chief Hydrographer Box "M" Balboa Heights, Canal Zone	1
Commander Detachment 5, 5th Weather Wing Bldg 235, Howard Air Force Base Canal Zone	1
Director Data Processing Division Environmental Technical Applications Center (MAC) US Air Force Federal Building Asheville, North Carolina 28801	1
Commander Air Force Cambridge Research Laboratories ATTN: CROA Laurence G. Hanscom Field Bedford, Massachusetts 01730	1
Commandant US Army Infantry School Fort Benning, Georgia	1
Commandant US Army Armor School Fort Knox, Kentucky	1
Commandant US Army Air Defense School Fort Bliss, Texas	1
Commandant US Army Aviation School Fort Rucker, Alabama	1
Commandant US Army Engineer School Fort Belvoir, Virginia 22060	1

UNCLASSIFIED
Security Classification

DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY *(Corporate author)*

US Army Tropic Test Center
Fort Clayton, Canal Zone

2a. REPORT SECURITY CLASSIFICATION

UNCLASSIFIED

2b. GROUP

3. REPORT TITLE

Monthly Microclimatic Summary, April 1967: Environmental Data Base for Regional Studies in the Humid Tropics

4. DESCRIPTIVE NOTES *(Type of report and inclusive dates)*

Data Summary, April 1967

5. AUTHOR(S) *(First name, middle initial, last name)*

6. REPORT DATE

September 1967

7a. TOTAL NO. OF PAGES

28

7b. NO. OF REFS

8a. CONTRACT OR GRANT NO.

b. PROJECT NO. 2M025001A724-01

c. USATECOM No. 9-4-0013-01

d. Work Unit: USATTC #001

9a. ORIGINATOR'S REPORT NUMBER(S)

9b. OTHER REPORT NO(S) *(Any other numbers that may be assigned this report)*

10. DISTRIBUTION STATEMENT

Distribution of this document is unlimited

11. SUPPLEMENTARY NOTES

12. SPONSORING MILITARY ACTIVITY

Advanced Research Projects Agency
Army Research Projects Office, OCRD

13. ABSTRACT

This report contains detailed microclimatic data for April 1967 from specific sites in the Panama Canal Zone and vicinity. The data are presented in tabular form, summarized for hourly and/or daily observations from surface to 46-meter levels. Elements listed are: temperature, pressure, precipitation, wind speed and direction, relative humidity, and evaporation.

DD FORM 1 NOV 65 1473 REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

UNCLASSIFIED
Security Classification

144 859

UNCLASSIFIED

Security Classification

14. KEY WORDS	LINK A ROLE	LINK A WT	LINK B ROLE	LINK B WT	LINK C ROLE	LINK C WT
Climate						
Microclimatology						
Tropic Environment						
Humid Tropics						
Panama Canal Zone Microclimatology						
Data Base						

12-2346

UNCLASSIFIED

Security Classification

ENVIRONMENTAL DATA BASE
FOR REGIONAL STUDIES IN THE HUMID TROPICS

MONTHLY
MICROCLIMATIC SUMMARY

MAY 1967

Prepared by

Michael A. Fradel, Project Officer
and
Dr. Wilfried H. Portig, Meteorologist

USATECOM Project No. 9-4-0013-01

This research was supported by the Advanced Research Projects Agency of the Department of Defense and by the Army Research Office, OCRD, Department of Army

Conducted by

US Army
Tropic Test Center
Fort Clayton, Canal Zone
with contractual services provided by
Weather Engineers of Panama Corp.

~~144 860~~

M06.1/728.8
U58/8ew
may 1967

Distribution of this document is unlimited

TABLE OF CONTENTS

Page

Introduction. 1
Sites. 1
Instrumentation 1
Data Reduction and Storage. 1

Figures
1. Location Map, Isthmus of Panama. 2
2. Frequency of Observations. 3
3. Albrook Forest Site Generalized Plot 4
4. Chiva Chiva Open Site, Generalized Plot. 5
5. Instrument Location on Towers. 6

Data Summary Sheets
Monthly Means of Air Temperature by Hour. 7
Monthly Ranges of Air Temperature by Hour 8
Monthly Means of Relative Humidity by Hour 9
Monthly Ranges of Relative Humidity by Hour 10
Monthly Means of Other Elements by Hour. 11
Monthly Means of Wet Bulb Temperature by Hour
Monthly Means of Barometric Pressure by Hour
Monthly Means of Precipitation by Hour
Monthly Totals of Precipitation
Monthly Ranges of Other Elements by Hour. 12
Monthly Ranges of Wet Bulb Temperature by Hour
Monthly Ranges of Barometric Pressure by Hour
Monthly Ranges of Precipitation by Hour
Monthly Means of Wind Speed by Hour. 13
Monthly Ranges of Wind Speed by Hour 14
Relative Frequencies of Wind Directions (46 meters, Albrook). . . 15
Relative Frequencies of Wind Directions (26.5 meters, Albrook). . 16
Relative Frequencies of Wind Directions (4 meters, Albrook). . . 17
Relative Frequencies of Wind Directions (46 meters, Chiva Chiva). 18
Relative Frequencies of Wind Directions (26.5 meters, Chiva Chiva). 19
Relative Frequencies of Wind Directions (4 meters, Chiva Chiva). 20
Summary of Elements with Non-Hourly Frequencies of Observation 21
WBGT (Albrook)
Evaporation (Albrook)
Precipitation (Manual gauge network, Albrook)
Precipitation (Stem Flow, Albrook)
WBGT (Chiva Chiva)
Minimum Grass Temperature (Chiva Chiva)

MONTHLY MICROCLIMATIC SUMMARY

Introduction

Monthly microclimatic data summarized in this series of reports were collected by the US Army Tropic Test Center and the Weather Engineers of Panama Corporation under the project, Environmental Data Base for Regional Studies in the Humid Tropics. The project is sponsored by the Advanced Research Projects Agency of the Department of Defense and by the Army Research Office, Office of the Chief of Research and Development. It is an investigation of microclimatic, air chemistry, vegetation, soils, microbiological, and macrofaunal conditions at selected sites in the principal tropical environments of the Panama Canal Zone and the Rio Hato Military Reservation. The objective of the project is to assemble quantitative environmental data for RDT&E purposes.

Sites. Data summarized in this report were collected at the Albrook Forest and Chiva Chiva sites. Figure 1 shows the site locations within the Isthmus of Panama. Geographic coordinates are shown below:

Albrook Forest	09° 01'N, 79° 33'W
Chiva Chiva	09° 01'N, 79° 35'W

The Chiva Chiva open site and the Albrook Forest site are paired for comparative study of environmental conditions in a tropical semideciduous forest and in a large clearing. Both are located in a region where the annual precipitation is approximately 80 inches and there is a pronounced dry season.

The Albrook and Chiva Chiva main sites are approximately four kilometers apart. Each has a 46-meter walk-up tower and an air-conditioned building to house the recording equipment and observers. Both sites are approximately 30 meters above sea level. The top of the forest canopy at the Albrook site is about 26.5 meters above the ground.

Instrumentation. A wide range of climatic elements are measured at the Albrook and Chiva Chiva sites. Types of observations and frequencies are shown on Figure 2. The towers at the Albrook and Chiva Chiva sites are similarly oriented. Sensing equipment is mounted at several levels on the towers to provide measurements through the vertical profile. Additional instruments are emplaced in the immediate vicinity on or near the ground. All instrument exposures are duplicated at each site. Figures 3, 4, and 5 show the instrument array at these sites.

Data Reduction and Storage. All data, as applicable, are recorded at or reduced to each full hour and transposed to punch cards. These punch cards, together with all raw data, are stored in the Tropic Test Center Technical Library Annex.

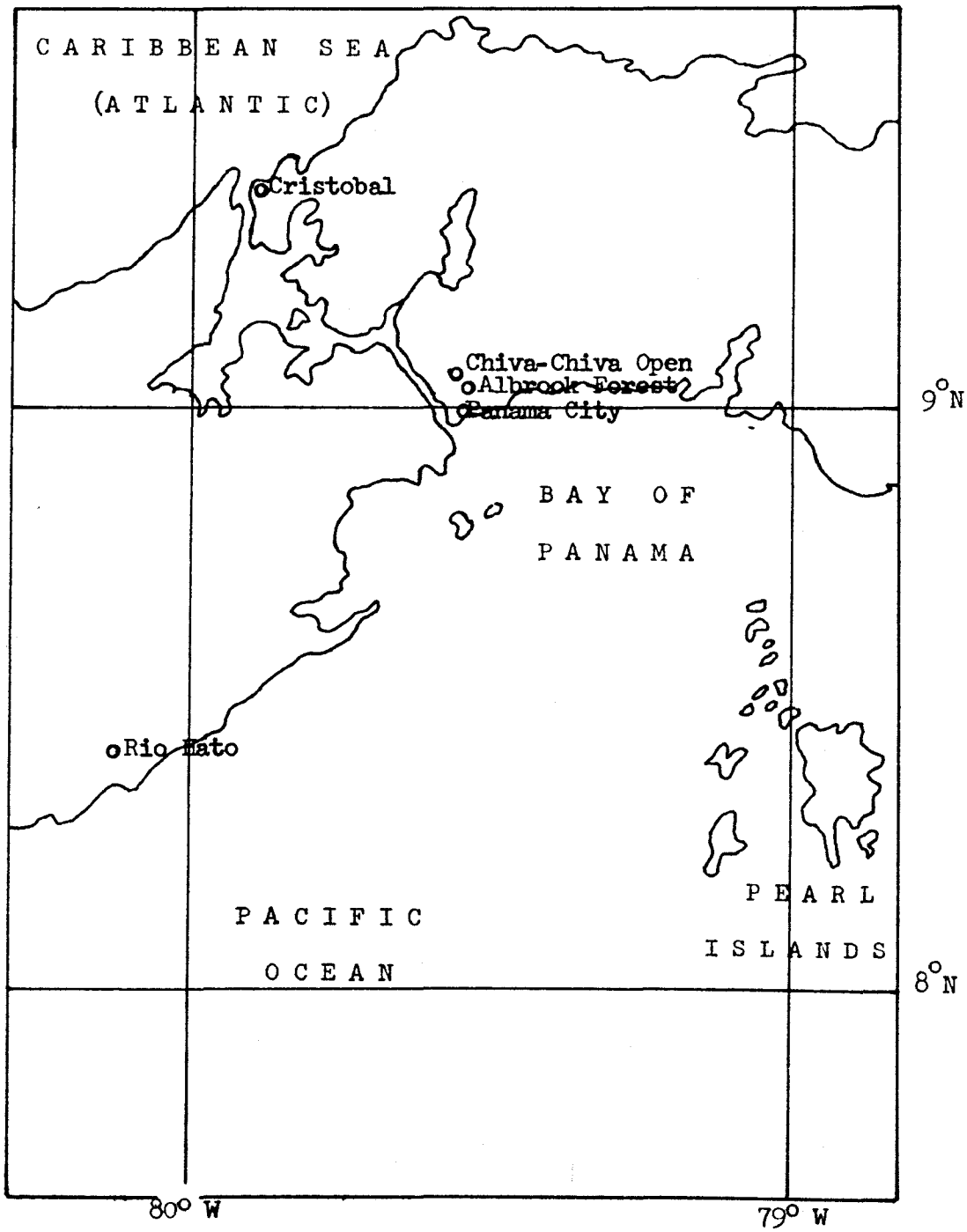

FIGURE 1. LOCATION MAP, ISTHMUS OF PANAMA

FIGURE 2. FREQUENCY OF OBSERVATIONS

# Element	Height (meters) Sfc	0.5	1.0	2.0	4.0	8.0	13.5	26.5	46.0	Frequency
Temperature:										
Dry Bulb	1	1	1	1	1	-	1	1	1	Hourly*/Continuously
Wet Bulb	-	1	-	1	1	-	-	-	-	Hourly*/Continuously
Grass Minimum	3	-	-	-	-	-	-	-	-	Once Daily
WBGT Index	-	-	1	-	-	-	-	-	-	Hourly (0600-1900 EST)
Relative Humidity	-	1	1	1	1	-	1	1	1	Hourly*/Continuously
Barometric Pressure	-	-	1	-	-	-	-	-	-	Continuously
Evaporation	1	-	-	-	-	-	-	2	2	Once Daily
Precipitation:										
Recording Gage	-	-	1	-	-	-	-	-	2	Continuously
Manual Gage	-	-	2	-	-	-	-	-	-	4 Times Daily
Stem Flow	-	-	2	-	-	-	-	-	-	4 Times Daily
Wind:										
Direction	-	-	-	-	1	-	-	1	1	Continuously
Speed	-	-	-	3**	1	-	3**	1**	1	Hourly**/Continuously

1. Albrook and Chiva Chiva
2. Albrook only
3. Chiva Chiva only

* Observations made with sling psychrometer when recorders are inoperative.

** Hourly

\# Instrument descriptions are contained in the Environmental Data Base semiannual reports.

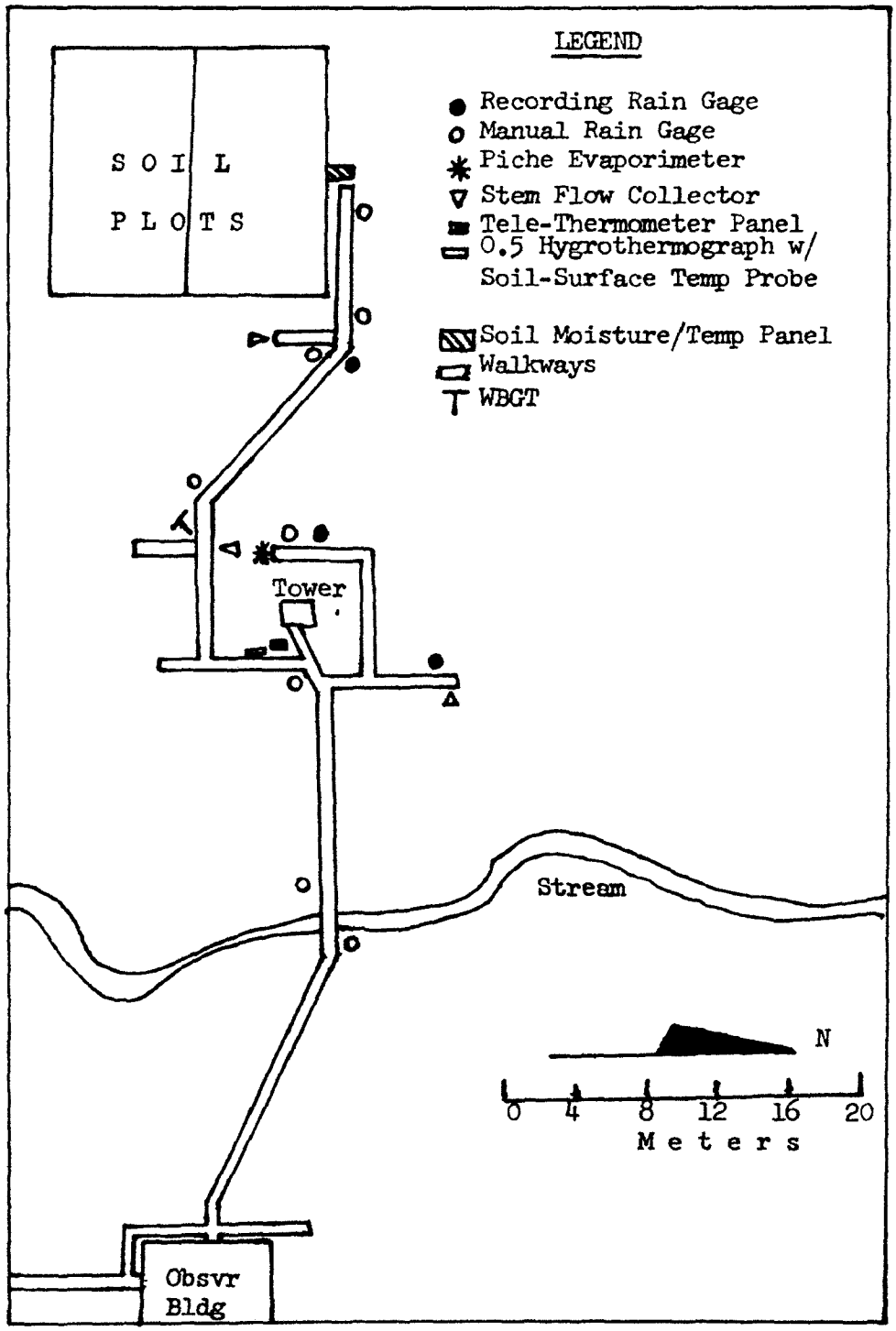

FIGURE 3. ALBROOK FOREST SITE, GENERALIZED PLOT

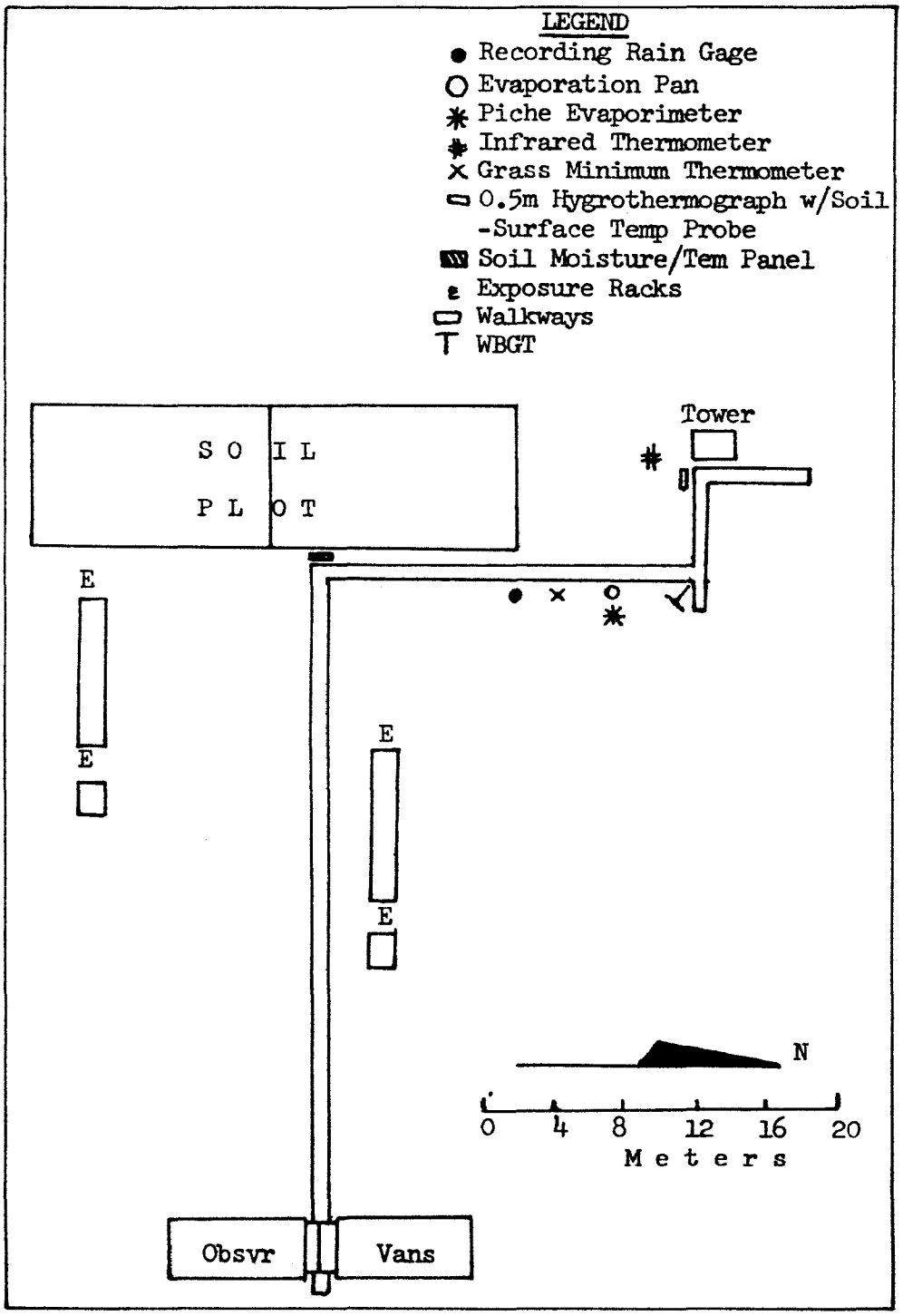

FIGURE 4. CHIVA CHIVA OPEN, GENERALIZED PLOT

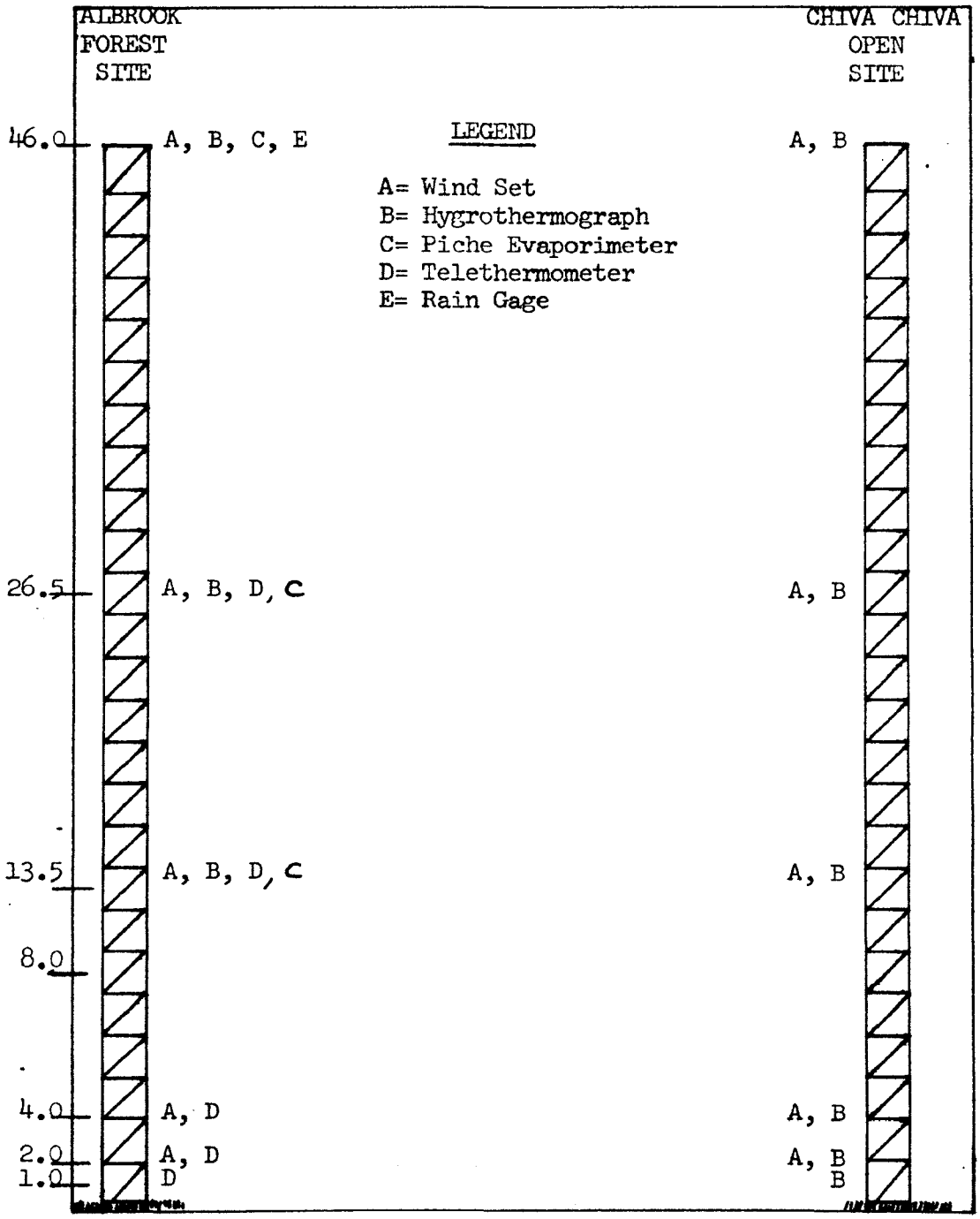

FIGURE 5. INSTRUMENT LOCATION ON TOWERS

SUMMARY OF METEOROLOGICAL OBSERVATIONS

HOURLY DATA

MAY 1967

Exposure		Monthly Means of Air Temperature by Hour (° F)																								Monthly Summary			
Site	Level	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	No. of obs.	Min.	Mean	Max.
Albrook (Forest site)	46.0 m	76.4	76.3	76.3	76.0	75.9	76.0	76.9	79.0	82.6	85.0	85.9	85.5	84.7	83.2	82.2	81.5	81.6	80.2	78.6	77.8	77.5	77.4	77.2	76.8	469	73.0	79.6	90.1
	28.5 m	This level was not instrumented for air temperature at this time																											
	26.5 m	75.8	75.6	75.5	75.2	75.1	75.0	76.5	78.8	82.1	84.2	85.1	85.0	84.7	83.7	82.6	81.6	80.9	79.3	77.6	77.0	76.7	76.5	76.3	76.0	740	72.3	79.0	89.7
	13.5 m	75.3	75.1	74.8	74.5	74.4	74.3	75.2	77.5	79.7	81.5	82.9	83.3	83.3	82.2	81.5	80.9	80.3	79.0	77.7	76.9	76.6	76.3	75.9	75.6	741	70.9	78.1	87.9
	8.0 m	This level was not instrumented for air temperature at this time																											
	4.0 m	74.8	74.6	74.3	74.3	74.0	73.9	75.1	77.5	80.0	81.7	82.7	83.1	82.6	81.9	81.5	80.5	79.9	78.6	77.1	76.5	76.1	75.8	75.6	75.2	744	70.5	77.8	89.5
	2.0 m	74.7	74.6	74.3	74.2	74.0	73.9	75.0	77.2	79.6	81.3	82.3	82.9	82.5	81.7	81.4	80.3	79.7	78.3	76.9	76.4	75.9	75.7	75.5	75.1	744	70.3	77.6	89.0
	1.0 m	75.0	74.9	74.7	74.5	74.4	74.0	74.9	77.3	79.2	81.2	82.1	83.1	82.5	81.3	81.2	80.4	79.8	78.4	77.0	76.7	76.4	75.9	75.7	75.3	738	70.6	77.8	88.9
	0.5 m	75.0	74.9	74.7	74.5	74.4	74.3	75.0	76.9	78.8	80.6	81.8	82.4	82.0	81.3	81.3	80.6	79.7	78.9	77.6	76.9	76.5	76.2	75.7	75.4	730	70.9	77.7	87.0
Chiva Chiva (Open site)	46.0 m	76.5	76.3	76.0	75.9	75.8	75.9	77.5	80.0	82.1	83.7	84.4	84.0	83.5	82.4	81.3	81.0	80.3	79.6	78.3	77.9	77.5	77.3	77.1	76.9	744	72.2	79.2	90.0
	28.5 m	This level was not instrumented for air temperature at this time																											
	26.5 m	76.4	76.2	75.9	75.8	75.6	75.5	77.4	80.0	81.8	83.4	84.1	84.0	83.6	82.6	81.8	81.4	80.6	79.8	78.5	77.9	77.5	77.3	77.0	76.8	744	72.3	79.2	89.5
	13.5 m	76.2	76.0	75.7	75.6	75.4	75.3	77.4	80.2	82.1	83.9	84.7	84.4	84.1	83.0	82.0	81.6	80.7	79.8	78.4	77.9	77.4	77.2	76.9	76.6	744	71.5	79.3	90.3
	8.0 m	This level was not instrumented for air temperature at this time																											
	4.0 m	75.8	75.5	75.1	75.0	74.8	74.7	77.7	80.5	82.6	84.9	85.7	86.1	85.0	84.3	83.0	82.6	81.6	80.0	78.3	77.5	77.0	76.6	76.6	76.3	741	70.4	79.5	90.9
	2.0 m	75.4	75.1	74.8	74.6	74.5	74.5	77.7	80.6	82.7	85.0	85.8	86.0	85.1	84.2	83.0	82.5	81.5	79.9	78.1	77.3	76.8	76.3	76.3	76.0	741	70.4	79.3	90.7
	1.0 m	75.5	75.3	75.0	74.8	74.6	74.4	77.8	81.0	83.2	85.5	86.1	86.0	85.3	84.3	83.5	83.4	82.2	80.4	78.6	77.7	77.1	76.6	76.3	76.0	744	70.0	79.6	92.2
	0.5 m	75.5	75.2	74.9	74.8	74.6	74.6	76.7	80.2	83.0	85.3	86.1	86.6	85.5	84.6	83.8	83.3	82.2	80.5	78.4	77.5	76.9	76.5	76.1	75.9	737	70.3	79.5	93.5

SUMMARY OF METEOROLOGICAL OBSERVATIONS

HOURLY DATA

MAY 1967

Exposure		Monthly Ranges of Air Temperature by Hour (°F)																								Monthly Summary*			
Site	Level	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24				
Allcock (Forest site)	46.0 m	DTF	DTF	DTF	DTF	DTF	DTF	DTF	DTF	DTF	DTF	DTF	DTF	DTF	DTF	DTF	DTF	DTF	DTF	DTF	DTF	DTF	DTF	DTF	DTF				
	28.5 m	This level was not instrumented for air temperature at this time																											
	26.5 m	4.1	3.7	3.8	4.8	4.2	4.9	5.4	7.2	11.7	11.1	11.4	15.0	13.7	14.0	14.9	14.5	13.8	10.1	5.6	5.5	4.0	4.1	5.2	4.7				
	13.5 m	5.7	5.5	5.2	6.1	6.8	7.3	8.0	8.5	9.8	11.5	12.5	12.5	11.1	12.0	12.9	13.0	12.7	9.8	6.9	5.0	4.2	5.1	5.9	5.7				
	8.0 m	This level was not instrumented for air temperature at this time																											
	4.0 m	5.7	7.2	6.6	6.5	6.5	5.8	4.8	4.4	9.1	9.5	11.9	13.7	11.5	11.2	15.2	11.8	11.8	9.1	6.3	5.4	6.2	5.5	5.7	4.9				
	2.0 m	4.8	6.4	6.4	6.5	6.7	5.9	5.0	5.7	8.8	9.0	10.7	13.1	11.3	11.2	14.7	11.5	11.5	8.2	6.0	5.4	6.0	5.5	5.7	4.8				
	1.0 m	5.0	5.7	6.1	6.3	6.6	5.8	4.7	6.6	7.5	10.6	9.9	12.8	12.8	10.8	14.4	12.5	11.2	8.3	6.0	4.8	5.5	5.2	5.0	4.7				
	0.5 m	5.0	5.8	5.5	6.3	6.6	6.1	5.1	5.9	7.2	8.7	9.9	9.7	10.1	10.7	11.8	11.2	DTF	8.5	6.4	4.7	4.6	4.6	4.8	5.3				

Note: DTF indicates data of doubtful validity.

* No monthly summary was computed for the ranges.

Chiva Chiva (Open site)	46.0 m	4.7	4.4	5.1	5.8	6.1	6.9	7.1	7.5	9.1	9.3	10.4	16.2	14.4	12.4	13.0	11.3	10.2	7.9	5.8	4.5	3.5	3.3	3.1	2.9				
	28.5 m	This level was not instrumented for air temperature at this time																											
	26.5 m	5.2	5.4	5.9	5.9	6.3	6.1	7.4	7.5	9.3	9.5	10.4	14.6	13.7	12.4	11.9	10.8	10.5	7.4	5.0	4.3	3.4	3.2	3.7	4.4				
	13.5 m	6.5	5.5	5.9	6.3	6.8	7.0	7.8	7.1	9.2	10.3	10.3	14.6	15.1	13.5	12.0	11.0	10.7	8.0	5.8	4.5	3.6	3.3	3.7	4.1				
	8.0 m	This level was not instrumented for air temperature at this time																											
	4.0 m	7.5	7.5	6.6	7.0	7.7	8.0	7.0	6.5	9.1	10.0	11.2	15.8	14.1	14.4	13.3	12.8	13.1	9.0	7.2	5.2	4.5	4.5	5.2	5.6				
	2.0 m	7.9	7.6	6.9	7.1	7.4	7.8	7.3	6.4	9.1	9.1	11.1	15.2	14.3	14.3	13.7	12.9	12.8	8.8	6.3	5.1	3.6	4.2	4.1	5.2				
	1.0 m	8.3	8.5	7.4	7.6	8.0	8.1	7.9	8.0	11.9	13.6	13.3	17.2	16.0	16.5	16.8	15.9	13.3	9.2	6.5	5.1	4.7	4.3	4.5	4.9				
	0.5 m	7.7	7.3	7.0	7.6	7.7	7.6	8.4	7.1	11.1	14.4	15.5	17.2	15.2	14.8	15.1	13.5	13.7	9.4	6.7	4.0	3.9	4.1	5.7	5.2				

SUMMARY OF METEOROLOGICAL OBSERVATIONS

HOURLY DATA

MAY 1967

Exposure		Monthly Means of Relative Humidity by Hour (%)																								Monthly Summary			
Site	Level	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	No of obs.	Min.	Mean	Max.
Albrook (Forest site)	46.0 m	91	92	92	92	92	92	89	84	76	69	68	69	73	75	79	81	81	83	86	87	89	90	90	90	614	53	85	97
	28.5 m	This level was not instrumented for relative humidity at this time																											
	26.5 m	93	93	94	93	93	94	91	85	77	72	71	71	74	77	79	81	81	84	88	89	91	91	92	92	742	54	85	99
	13.5 m	95	95	95	95	95	96	94	90	84	78	76	76	77	80	81	83	83	85	87	89	90	92	94	94	741	54	88	99
	8.0 m	This level was not instrumented for relative humidity at this time																											
	4.0 m	96	97	97	97	97	98	95	93	85	81	80	79	81	85	84	86	86	89	91	93	94	95	95	96	744	58	90	100
	2.0 m	97	97	97	97	97	98	96	94	87	84	82	80	81	85	85	87	88	91	92	93	94	95	95	96	744	52	91	100
	1.0 m	97	97	97	97	97	98	97	96	91	87	83	81	82	85	86	87	88	90	92	93	94	96	96	96	733	60	92	100
	0.5 m	97	97	97	97	97	98	97	96	92	90	87	84	86	88	88	89	92	91	92	94	94	96	96	96	728	62	93	100
Chiva Chiva (Open site)	46.0 m	90	91	91	92	92	92	87	81	76	71	70	69	72	74	77	78	79	81	84	86	87	88	88	89	742	56	83	98
	28.5 m	This level was not instrumented for relative humidity at this time																											
	26.5 m	91	91	92	92	92	92	87	81	76	71	70	70	72	75	77	77	79	82	85	87	88	88	89	90	742	53	83	99
	13.5 m	91	92	93	93	93	93	88	81	76	70	69	69	71	75	76	77	79	82	85	87	89	90	90	91	742	52	83	100
	8.0 m	This level was not instrumented for relative humidity at this time																											
	4.0 m	92	93	93	93	94	94	89	82	77	71	69	68	72	74	76	76	78	81	84	87	88	89	90	91	741	50	83	100
	2.0 m	93	94	94	95	95	95	89	82	77	71	69	69	72	74	76	77	79	82	85	88	89	91	91	92	741	51	84	100
	1.0 m	94	94	94	95	95	95	90	82	77	71	70	69	72	74	76	77	79	83	87	89	91	92	92	93	732	49	85	99
	0.5 m	94	94	95	95	95	95	92	85	78	72	70	70	73	75	77	79	79	82	86	89	90	91	93	93	737	52	85	100

SUMMARY OF METEOROLOGICAL OBSERVATIONS

HOURLY DATA

MAY 1967

Exposure		Monthly Ranges of Relative Humidity by Hour (%)																								Monthly Summary*			
Site	Level	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24				
Albrook (Forest site)	46.0 m	DTF	DTF	DTF	DTF	DTF	DTF	DTF	DTF	DTF	DTF	DTF	DTF	DTF	DTF	DTF	DTF	DTF	DTF	DTF	DTF	DTF	DTF	DTF	DTF				
	28.5 m	This level was not instrumented for relative humidity at this time																											
	26.5 m	10	10	9	10	12	10	18	22	26	33	35	36	42	41	44	43	38	34	21	16	16	12	10	16				
	13.5 m	12	11	11	9	7	8	13	20	29	31	33	38	41	43	40	45	45	31	25	19	18	13	12	11				
	8.0 m	This level was not instrumented for relative humidity at this time																											
	4.0 m	14	16	13	10	10	8	13	17	27	30	38	41	39	40	41	42	36	28	25	21	16	14	15	15				
	2.0 m	14	13	13	10	10	8	13	14	24	27	48	41	38	40	40	34	34	24	26	17	16	13	14	12				
	1.0 m	10	11	9	8	8	6	10	12	23	27	39	37	38	38	39	39	38	25	24	18	14	13	11	13				
	0.5 m	9	9	12	9	6	6	9	14	19	24	28	29	31	30	32	28	26	37	19	16	13	12	10	12				

Note: DTF indicates data of doubtful validity.

* No monthly summary was computed for the ranges.

Chiva Chiva (Open site)	46.0 m	13	15	14	14	12	15	17	20	20	24	29	36	38	38	41	35	37	30	26	18	15	15	15	13				
	28.5 m	This level was not instrumented for relative humidity at this time																											
	26.5 m	16	16	15	15	14	16	18	19	19	24	32	38	42	42	44	38	38	30	24	18	14	15	15	13				
	13.5 m	15	16	15	15	15	16	20	21	23	26	35	41	44	43	47	40	41	33	27	19	14	15	15	13				
	8.0 m	This level was not instrumented for relative humidity at this time																											
	4.0 m	18	20	16	14	14	15	19	21	23	28	35	42	49	46	50	42	42	33	27	21	17	18	17	16				
	2.0 m	18	16	15	14	13	13	19	21	23	28	34	41	44	43	47	40	38	30	24	17	16	17	13	13				
	1.0 m	14	13	13	12	13	12	20	24	27	30	36	42	44	47	49	42	37	30	22	12	13	12	11	12				
	0.5 m	18	16	16	16	16	16	21	25	25	30	38	44	42	46	46	40	33	30	24	17	16	16	18	15				

SUMMARY OF METEOROLOGICAL OBSERVATIONS

HOURLY DATA

MAY 1967

Exposure		Monthly Means[2] of other Elements by Hour																								Monthly Summary			
Site	Code[1]	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	No of obs.	Min.	Mean	Max.
Albrook (Forest site)	WB (4.0 m)	74.0	73.9	73.7	73.7	73.5	73.5	74.2	75.8	76.5	77.0	77.6	77.6	77.5	77.9	77.4	76.9	76.6	75.9	75.0	74.9	74.7	74.7	74.5	74.3	744	70.3	75.5	82.0
	WB (2.0 m)	74.0	73.9	73.8	73.7	73.5	73.5	74.3	76.0	76.7	77.4	77.7	77.8	77.7	78.0	77.6	77.1	76.8	76.1	75.2	75.0	74.7	74.7	74.5	74.4	744	70.1	75.6	81.8
	WB (0.5 m)	74.4	74.2	74.1	73.9	73.9	73.8	74.3	76.1	77.2	78.2	78.6	78.6	78.5	78.5	78.4	77.9	77.7	76.8	76.0	75.6	75.3	75.2	74.8	74.7	731	70.5	76.1	81.8
	BP	.747	.731	.719	.716	.718	.726	.745	.764	.773	.777	.771	.761	.740	.719	.697	.688	.683	.695	.707	.726	.746	.758	.764	.760	744	.620	.735	.860
	P1	0.03	0.08	0.07	0.16	0.02	0.00	0.00	0.01	0.01	0.04	0.06	0.49	0.23	0.20	0.16	0.12	0.21	0.04	0.00	0.01	0.00	0.00	0.02	0.02	56	0.01	8.82	1.22
	P2	0.03	0.04	0.04	0.06	0.02	0.00	0.00	0.00	0.00	0.00	0.03	0.57	0.09	0.09	0.17	0.09	0.08	0.01	0.00	0.00	0.00	0.00	0.00	0.00	40	0.01	5.60	1.09
	P3	0.05	0.04	0.07	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.92	0.15	0.11	0.24	0.15	0.09	0.01	0.00	0.00	0.00	0.00	0.00	0.00	40	0.01	8.31	1.57
	P4	0.05	0.04	0.11	0.14	0.04	0.01	0.00	0.00	0.00	0.00	0.07	1.07	0.15	0.13	0.15	0.16	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36	0.01	8.38	1.70
Chiva Chiva (Open site)	WB (4.0 m)	74.1	73.9	73.6	73.6	73.5	73.4	75.2	76.1	76.7	77.2	77.4	77.4	77.4	77.4	76.6	76.4	76.0	75.5	74.6	74.5	74.4	74.2	74.4	74.3	742	70.4	75.3	80.7
	WB (2.0 m)	74.0	73.8	73.5	73.5	73.5	73.4	75.2	76.4	76.8	77.3	77.6	77.6	77.4	77.3	76.8	76.6	76.1	75.5	74.7	74.6	74.5	74.4	74.4	74.3	742	70.3	75.4	80.3
	WB (0.5 m)	74.1	73.9	73.8	73.7	73.6	73.5	75.0	76.6	77.4	78.0	78.0	78.3	78.1	77.9	77.7	77.4	76.9	76.1	75.2	74.9	74.9	74.6	74.5	74.5	737	70.1	75.8	83.8
	BP	.842	.830	.814	.807	.809	.817	.839	.858	.868	.871	.865	.851	.829	.809	.791	.780	.776	.786	.802	.820	.839	.851	.856	.855	744	.705	.828	.960
	PS	0.05	0.10	0.10	0.12	0.07	0.00	0.00	0.02	0.03	0.05	0.22	0.18	0.18	0.12	0.10	0.19	0.06	0.02	0.02	0.01	0.01	0.00	0.00	0.00	57	0.01	6.09	0.51

WB - Wet bulb temperature (°F)
BP - Barometric pressure (in. of Hg minus 29.0)

PS - Precipitation at 1.0 m. in open area (in.)
P1 - Precipitation at 46.0 m. above canopy (in.)
P2 - Precipitation under full canopy (in.)

P3 - Precipitation under drip canopy (in.)
P4 - Precipitation under open canopy (in.)

[2] Monthly means of precipitation are computed for precipitation days.

Precipitation totals are substituted for the mean in the monthly summary.

SUMMARY OF METEOROLOGICAL OBSERVATIONS

HOURLY DATA

MAY 1967

Exposure		Monthly Ranges[2] of other Elements by Hour																								Monthy Summary*			
Site	Code[1]	01	02	03	04	05	06	07	08	09	.10	11	12	13	14	15	16	17	18	19	20	21	22	23	24				
Albrook (Forest site)	WB (4.0 m)	4.0	4.9	4.8	5.2	5.2	5.0	4.9	4.2	4.6	4.7	6.6	6.3	5.8	5.5	7.8	6.7	8.1	5.6	4.7	5.0	3.6	3.6	3.5	4.2				
	WB (2.0 m)	4.1	4.8	4.7	5.3	5.5	5.0	5.1	4.1	4.8	5.1	8.8	6.5	5.4	5.3	7.3	5.7	7.8	6.0	5.3	4.9	3.7	3.4	3.5	4.1				
	WB (0.5 m)	3.9	4.4	4.8	4.9	5.5	5.2	4.6	5.0	4.5	5.2	5.8	5.2	4.8	6.4	5.7	5.6	6.5	7.3	5.9	4.3	3.6	3.8	3.2	4.0				
	BP	.160	.155	.150	.152	.160	.155	.135	.140	.140	.145	.145	.130	.150	.135	.160	.155	.170	.175	.160	.150	.145	.160	.168	.163				
	P1	0.03	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.09	1.20	0.87	0.55	0.71	0.23	0.51	0.05	0.00	0.00	0.00	0.00	0.00	0.02				
	P2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.96	0.31	0.18	0.73	0.20	0.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
	P3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	1.41	0.53	0.24	0.90	0.43	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
	P4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	1.48	0.52	0.27	0.69	0.52	0.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Chiva Chiva (Open site)	WB (4.0 m)	4.7	5.2	4.5	5.0	4.6	4.9	3.3	3.7	4.8	5.3	5.4	6.0	4.9	5.3	6.4	7.0	5.5	4.6	4.3	4.1	3.7	3.4	3.2	3.6				
	WB (2.0 m)	4.6	5.0	4.1	4.6	4.5	4.8	3.3	3.5	4.3	4.4	5.2	6.1	4.3	4.7	5.5	5.9	5.5	4.4	4.3	4.1	3.5	3.2	3.3	3.5				
	WB (0.5 m)	4.4	4.7	4.9	5.0	5.2	5.1	4.4	4.1	6.3	7.8	7.4	5.5	6.1	4.6	6.7	6.0	10.0	5.5	4.7	3.9	3.9	3.2	3.7	3.7				
	BP	.160	.160	.160	.155	.160	.155	.145	.160	.145	.150	.150	.140	.125	.125	.150	.135	.175	.185	.165	.165	.140	.150	.155	.155				
	PS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.28	0.42	0.40	0.19	0.50	0.27	0.03	0.03	0.00	0.00	0.00	0.00	0.00				

* No monthly summary was computed for the ranges.

WB - Wet bulb temperature (°F)
BP - Barometric pressure (in. of Hg minus 29.0)

PS - Precipitation at 1.0 m. in open area (in.)
P1 - Precipitation at 46.0 m. above canopy (in.)
P2 - Precipitation under full canopy (in.)

P3 - Precipitation under drip canopy (in.)
P4 - Precipitation under open canopy (in.)

[2] Monthly ranges of precipitation are computed for precipitation days.

SUMMARY OF METEOROLOGICAL OBSERVATIONS

HOURLY DATA

MAY 1967

Exposure		Monthly Means of Wind Speed by Hour (miles/hr.)																								Monthly Summary			
Site	Level	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	No of obs.	Min.	Mean	Max.
Albrook (Forest site)	46.0 m	3	4	3	3	3	3	3	3	3	4	5	6	5	6	6	6	6	5	5	5	5	5	4	4	744	0	4	15
	28.5 m	This level was not instrumented for wind speed at this time																											
	26.5 m	1	2	1	1	1	1	2	1	2	2	2	3	2	3	3	3	3	2	2	3	2	2	2	2	744	0	2	10
	13.5 m	This level was not instrumented for wind speed at this time																											
	8.0 m	This level was not instrumented for wind speed at this time																											
	4.0 m	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	744	0	0	2
	2.0 m	This level was not instrumented for wind speed at this time																											
	1.0 m	This level was not instrumented for wind speed at this time																											
	0.5 m	This level was not instrumented for wind speed at this time																											
Chiva Chiva (Open site)	46.0 m	8	7	6	6	6	6	6	7	8	8	9	10	10	12	10	10	11	9	10	8	9	8	8	7	739	1	8	22
	28.5 m	This level was not instrumented for wind speed at this time																											
	26.5 m	5	5	4	4	4	4	4	6	7	7	8	8	8	9	8	9	9	7	7	6	6	6	6	5	568	0	6	21
	13.5 m	2	2	2	1	2	1	2	3	5	5	6	6	7	8	5	5	5	5	4	3	3	2	2	2	734	0	4	20
	8.0 m	This level was not instrumented for wind speed at this time																											
	4.0 m	3	2	2	2	2	2	3	4	5	5	6	6	6	7	6	6	6	5	5	4	4	3	3	3	669	0	4	15
	2.0 m	1	1	1	1	1	1	1	2	3	3	4	4	5	5	3	3	3	2	2	1	1	1	1	1	735	0	2	13
	1.0 m	This level was not instrumented for wind speed at this time																											
	0.5 m	This level was not instrumented for wind speed at this time																											

SUMMARY OF METEOROLOGICAL OBSERVATIONS

HOURLY DATA

MAY 1967

Exposure		Monthly Ranges of Wind Speed by Hour (miles/hr.)																								Monthly Summary*			
Site	Level	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24				
Albrook (Forest site)	46.0 m	8	8	9	7	8	8	8	8	10	9	13	15	13	12	13	15	13	13	12	13	11	10	8	9				
	28.5 m	This level was not instrumented for wind speed at this time																											
	26.5 m	4	5	4	5	5	4	5	4	6	6	7	10	6	7	8	9	10	6	8	7	6	5	4	5				
	13.5 m	This level was not instrumented for wind speed at this time																											
	8.0 m	This level was not instrumented for wind speed at this time																											
	4.0 m	1	1	0	0	1	0	0	0	1	1	2	2	2	2	2	2	1	1	1	1	1	0	0	1				
	2.0 m	This level was not instrumented for wind speed at this time																											
	1.0 m	This level was not instrumented for wind speed at this time																											
	0.5 m	This level was not instrumented for wind speed at this time																											
Chiva Chiva (Open site)	46.0 m	11	14	12	10	13	10	14	14	15	15	15	14	15	20	17	21	16	15	12	14	13	11	12	11				
	28.5 m	This level was not instrumented for wind speed at this time																											
	26.5 m	DTF	DTF	DTF	DTF	DTF	DTF	DTF	DTF	DTF	DTF	DTF	DTF	DTF	DTF	DTF	DTF	DTF	DTF	DTF	DTF	DTF	DTF	DTF	DTF				
	13.5 m	6	11	5	5	10	7	9	10	12	13	14	16	15	16	15	16	12	14	13	11	9	9	8	7				
	8.0 m	This level was not instrumented for wind speed at this time																											
	4.0 m	6	10	7	6	8	7	11	9	12	11	12	11	13	13	15	14	11	11	6	8	8	8	6	6				
	2.0 m	3	6	3	3	6	4	6	6	10	8	12	12	13	11	7	10	10	10	7	4	5	6	3	4				
	1.0 m	This level was not instrumented for wind speed at this time																											
	0.5 m	This level was not instrumented for wind speed at this time																											

Note: DTF indicates data of doubtful validity

* No monthly summary was computed for the ranges.

ALBROOK (Forest site) MAY 1967

Relative Frequencies* of Wind Directions by Hour at 46.0 m.
(%)

Dir. \ Hr.	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
N	3.2		3.2					6.4	16.1	16.6	13.3	10.0	3.3	6.4	6.4	3.2	3.2	19.4	6.4	3.2	3.2	6.4	3.2	3.2
NNE										3.3	13.3	3.3	10.0	6.4	6.4	3.2	6.4							
NE										6.6	3.3	6.4	3.3	3.3				3.3						
ENE								3.2	6.4				3.3		3.2									
E									3.2	6.6				3.2										
ESE										3.3						3.2								
SE												6.6												
SSE													3.3	3.2	3.2									
S											10.0	6.6	13.3	12.9										
SSW									6.4					3.2		3.2								
SW								3.2		3.3				6.4	6.4	9.7	6.4							
WSW	9.7	19.4	22.6	6.4	12.9	9.7	3.2	6.4	6.4	6.6	3.3	6.6	3.3	6.4	6.4	9.7	9.7	9.7	9.7	9.7	16.3	9.7	19.4	25.8
W	38.7	41.9	25.8	41.9	25.8	38.7	32.2	25.8	16.1		10.0	16.6	16.6	6.4	22.6	12.9	25.8	19.4	29.0	16.1	25.8	41.9	25.8	32.2
WNW	6.4	12.9	6.4	6.4	6.4	9.7	3.2	6.4	3.2	10.0	6.6	10.0	3.3	16.1	6.4	9.7	16.1	19.4	12.9	22.6	25.8	19.4	16.1	9.7
NW	6.4	6.4	6.4	9.7	12.9	6.4	12.9	9.7	3.2	3.3	3.3	25.3	3.3	6.4	19.4	16.1	16.1	3.2	12.9	16.1	3.2	3.2	9.7	3.2
NNW	3.2		3.2	3.2		3.2	6.4	3.2	6.4	3.3	6.6	3.3	13.3	3.2		3.2		6.4	6.4	6.4	9.7		6.4	3.2
CALM	3.2	19.4	32.2	32.2	41.9	32.2	41.9	35.5	32.2	33.2	33.2	13.3	23.3	12.9	16.1	22.6	16.1	19.4	22.6	25.8	16.1	19.4	19.4	22.6

* Note: Due to rounding, percentage totals do not equal 100%.

ALBROOK (Forest site) MAY 1967

Relative Frequencies* of Wind Directions by Hour at 26.5 m.
(%)

Dir. \ Hr.	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
N						3.2			3.2	3.2	16.1	3.2		6.4	3.2			6.4		6.4	3.2			3.2
NNE									6.4	3.2					3.2								3.2	
NE													3.2	3.2		6.4	6.4				3.2			
ENE												3.2												
E										3.2		6.4	3.2	3.2		3.2								
ESE														3.2	3.2									
SE									3.2							3.2								
SSE																								
S								3.2	6.4	22.6	12.9	19.4	16.1	19.4	3.2			3.2						
SSW						3.2		3.2						3.2										
SW			6.4	3.2					3.2					12.9	9.7		3.2		6.4	3.2		3.2		
WSW		6.4	3.2	3.2	3.2	3.2			3.2	6.4			3.2		3.2	12.9	3.2	3.2			3.2		3.2	
W	9.7	19.4	16.1	3.2	16.1	6.4		12.9	6.4		6.4	3.2	3.2	6.4	12.9	9.7	29.0	9.7	9.7	19.4	16.1	9.7	16.1	9.7
WNW	38.7	19.4	12.9	25.8	25.8	25.8	29.0	22.6	6.4	16.1	6.4	12.9	12.9	6.4	12.9	3.2	9.7	32.2	16.1	16.1	32.2	25.8	19.4	25.8
NW	6.4	16.1	12.9	19.4	6.4	12.9	19.4	16.1	6.4	12.9	9.7	25.8	12.9	12.9	9.7	16.1	19.4	12.9	41.9	22.6	12.9	35.5	25.8	22.6
NNW		6.4					6.4	6.4	6.4		3.2	3.2	3.2		9.7	16.1	9.7	6.4	3.2	3.2	9.7	3.2		6.4
CALM	45.2	32.2	48.4	45.2	48.4	45.2	45.2	35.5	48.4	32.2	45.2	22.6	41.9	22.6	29.0	29.0	19.4	25.8	22.6	29.0	19.4	22.6	33.2	33.2

* Note: Due to rounding, percentage totals do not equal 100%.

ALBROOK (Forest site) MAY 1967

Relative Frequencies* of Wind Directions by Hour at 4.0 m.
(%)

Dir. \ Hr.	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
N	3.2																3.2							
NNE													3.2											
NE															3.2		3.2							
ENE																	3.2							
E										3.2														
ESE																								
SE												3.2				3.2								
SSE																			3.2					
S									3.2	6.4	6.4	9.7	3.2	3.2										
SSW																		3.2						
SW																								
WSW																	6.4							
W		3.2									3.2							3.2		3.2				
WNW											6.4					3.2								
NW	3.2				3.2	3.2									3.2	3.2					3.2			3.2
NNW																3.2				3.2				
CALM	93.5	96.8	100.0	100.0	96.8	96.8	100.0	100.0	96.8	90.3	83.9	87.1	93.5	96.8	93.5	87.1	83.9	93.5	96.8	93.5	96.8	100.0	100.0	96.8

* Note: Due to rounding, percentage totals do not equal 100%.

CHIVA CHIVA (Open site) MAY 1967

Relative Frequencies* of Wind Directions by Hour at 46.0 m.
(%)

Dir. \ Hr.	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
N	3.2	3.2	3.3		3.3		6.6		9.7	9.7	9.7	9.7	12.9	3.2	9.7	9.7	6.4		6.4	3.2	3.2	3.2	3.2	6.4
NNE						3.3	3.3			6.4	6.4	6.4	3.2	3.2	6.4			3.2		3.2			3.2	
NE					6.6			3.2			3.2	3.2	12.9	6.4	3.2			3.2						
ENE					3.3																			
E				3.3										6.4	3.2									
ESE									3.2		3.2		3.2	3.2	3.2									
SE											3.2	6.4	3.2	6.4		3.2								
SSE																								
S			3.3	3.3				3.2		3.2		3.2	9.7	3.2			3.2							
SSW	6.4								3.2	3.2	9.7			3.2		6.4				3.2	3.2			
SW	3.2	3.2	6.6	3.3	3.3					6.4		6.4	3.2	6.4	6.4									
WSW	3.2	6.4	6.6		10.0				3.2	3.2	3.2	6.4			6.4	3.2					3.2			
W	6.4	12.9	6.6	13.3		3.3	6.6	9.7	6.4	9.7	12.9	9.7	3.2	9.7	6.4	9.7	3.2		3.2			6.4		3.2
WNW	12.9	9.7	16.6	13.3	16.6	26.6	23.3	16.1	19.4	9.7	9.7	16.1	19.4	3.2	16.1	22.6	22.6	16.1	12.9	3.2	3.2	9.7	16.1	22.6
NW	48.4	51.6	43.2	46.6	46.3	43.2	39.9	48.4	35.5	32.2	25.8	22.6	3.2	25.8	16.1	29.0	58.1	61.3	61.3	61.3	58.1	61.3	48.4	51.6
NNW	16.1	12.9	13.3	16.6	10.0	23.3	20.0	19.4	19.4	16.1	12.9	9.7	25.8	19.4	22.6	16.1	6.4	16.1	16.1	25.8	29.0	19.4	29.0	16.1
CALM																								

* Note: Due to rounding, percentage totals do not equal 100%.

CHIVA CHIVA (Open site) MAY 1967

Relative Frequencies* of Wind Directions by Hour at 26.5 m.
(%)

Dir. \ Hr.	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
N	3.3	16.6		6.6	16.6	16.6	23.3	6.8	20.0	19.4	19.4	16.6	10.0	16.6	20.0	16.6	20.0	20.0	33.2	23.3	23.3	20.0	29.9	16.6
NNE								6.8	10.0	3.2	6.4	10.0	6.6	6.6	10.0	3.3	3.3	6.6	3.3		3.3	6.6		6.6
NE		3.3			3.3	3.3	3.3	3.4	3.3	9.7	9.7	3.3	16.6	6.6	10.0	3.3	3.3	3.3		3.3	6.6			
ENE					10.0							3.3	3.3	3.3										
E											3.2			3.3	3.3									
ESE				3.3							3.2		3.3	3.3									6.6	
SE											6.4	10.0		6.6	3.3									3.3
SSE		3.3			3.3								3.3			3.3								
S					3.3		3.3			6.4	3.2		10.0	3.3		3.3	3.3	6.6						
SSW		3.3			3.3						3.2								3.3			3.3		
SW	6.6		6.6	3.3	6.6	3.3	3.3			3.2			3.2	3.3						3.3	3.3			
WSW	6.6		3.3		3.3			3.4				6.6		3.3	6.6	3.3					3.3			
W	6.6	6.6	3.3	16.6	3.3	3.3	6.6	3.4	6.6	3.2	6.4		3.3	6.6	3.3	10.0	3.3		3.3	3.3		3.3	10.0	6.6
WNW	10.0	13.3	16.6	13.3	6.6	10.0	6.6	3.4	16.6	9.7	6.4	16.6	10.0	6.6	3.3	3.3	6.6		6.6	3.3	3.3	3.3	6.6	
NW	23.3	26.6	13.3	20.0	16.6	33.2	29.9	37.6	10.0	6.4	9.7	10.0	10.0	13.3	20.0	36.6	26.6	16.6	3.3	23.3	23.3	23.3	13.3	20.0
NNW	43.2	26.6	49.8	36.6	20.0	23.3	20.0	34.1	33.2	38.7	22.6	23.3	20.0	16.6	20.0	16.6	33.2	46.6	46.6	39.9	33.2	39.9	33.2	46.6
CALM			6.6		3.3	6.6	3.3																	

* Note: Due to rounding, percentage totals do not equal 100%.

CHIVA CHIVA (Open site) MAY 1967

Relative Frequencies* of Wind Directions by Hour at 4.0 m.
(%)

Dir. \ Hr.	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
N	6.4	3.2	3.2	6.4	6.4	9.7	6.6	9.7	9.7	9.7	10.0	3.3	6.6	9.7	12.9	3.2	3.2	12.9	9.7	12.9	16.1	9.7	6.4	3.2
NNE	3.2		6.4	3.2		3.2	3.3		3.2	6.4		3.3	10.0	3.2	12.9	3.2			3.2		3.2			6.4
NE			6.4	6.4	6.4					6.4	10.0	6.6	10.0	6.4	3.2	3.2	3.2			3.2		3.2		
ENE		6.4						3.2			3.3	3.3		3.2										
E											3.3	3.3											3.2	
ESE				3.2							3.3		3.3	6.4										
SE		3.2			6.4	3.2			3.2			6.6		3.2		3.2	3.2							3.2
SSE	3.2					3.2							3.3											
S	6.4				6.4				3.2	9.7		3.3	10.0	6.4		3.2		3.2		3.2	3.2			
SSW	6.4		3.2		3.2	3.2		3.2	3.2		3.3				3.2							3.2		3.2
SW			12.9	9.7	6.4	6.4	3.3	3.2		3.2	10.0	3.3	6.6		6.4	6.4					3.2	3.2		3.2
WSW		3.2					10.0	3.2	6.4	9.7	6.6	6.6		9.7	6.4	6.4	3.2		6.4	3.2	3.2	3.2	3.2	3.2
W	6.4	6.4	6.4	12.9	3.2	3.2	3.3		12.9		10.0	10.0	6.6		3.2	9.7	3.2	9.7	3.2	6.4		3.2	9.7	3.2
WNW	12.9	9.7	9.7	12.9	6.4	3.2	20.0	25.8	6.4	6.4	6.6	13.3	6.6	16.1	16.1	16.1	19.4	9.7	9.7	16.1	9.7	9.7	12.9	9.7
NW	32.2	32.2	32.2	22.6	19.4	38.7	16.6	29.0	32.2	38.7	16.6	23.3	20.0	12.9	12.9	22.6	32.2	45.2	41.9	32.2	41.9	48.4	32.2	41.9
NNW	19.4	19.4	6.4	12.9	12.9	6.4	20.0	22.6	19.4	9.7	16.6	13.3	16.6	19.4	19.4	19.4	32.2	19.4	25.8	19.4	16.1	12.9	25.8	19.4
CALM	3.2	16.1	12.9	9.7	22.6	19.4	16.6							3.2	3.2	3.2				3.2		3.2	6.4	3.2

* Note: Due to rounding, percentage totals do not equal 100%.

SUMMARY OF NON HOURLY DATA

MAY 1967

Summary of Elements with Non-hourly Frequencies of Observation						
Site	Element, Units and Exposure	Description	Number of Obs.	Minimum Value	Mean or Total Value	Maximum Value
Albrook (Forest site)	WBGT Index[1] (at 1.0 meters)	Index value	426	70.7	78.0	84.6
		Dry bulb temp.	426	71.0	79.6	91.5
		Wet bulb temp.	426	70.5	77.1	84.5
		Black bulb temp.	426	71.1	80.5	91.5
	Evaporation[3] (in. at 4 levels)	Piche (46.0 m)	31	0.079	10.370*	0.659
		Piche (26.5 m)	31	0.049	7.606*	0.573
		Piche (13.5 m)	29	0.006	3.087*	0.232
		Piche (0.5 m)	29	0.006	1.521*	0.159
	Precipitation from Raingauge Network[2] (in. at 1.0 meters)	Gauge # 1	21	0.01	8.27*	1.55
		Gauge # 2	23	0.01	9.33*	1.55
		Gauge # 3	24	0.01	11.07*	1.75
		Gauge # 4	23	0.01	12.05*	2.36
		Gauge # 5	23	0.01	9.33*	1.25
		Gauge # 6	23	0.01	10.22*	1.60
		Gauge # 7	24	0.01	8.84*	1.61
		Gauge # 8	22	0.01	8.53*	1.45
	Stem Flow[2]	Small tree	20	0.01	8.60*	1.47
		Medium tree	19	0.01	8.83*	1.54
		Large tree	17	0.01	238.29*	154.37
Chiva Chiva (Open site)	WBGT Index[1] (at 1.0 meters)	Index value	419	69.7	80.4	90.1
		Dry bulb temp.	419	70.0	82.3	94.6
		Wet bulb temp.	419	69.7	77.2	82.0
		Black bulb temp.	419	69.1	90.8	121.3
	Evaporation[3] (in. at 0.5 meters)	Piche	31	0.049	6.901*	0.518
		Pan	31	0.013	5.331*	0.363
	Minimum Grass temp[3] (°F at grass tips)	None	23	68.1	72.8	75.7

1 - Hourly observations between 0600 and 1900 hours inclusive

2 - Six hourly observations

3 - Daily observations

* Total Values

DISTRIBUTION LIST

Address	No. of Copies
Director Advanced Research Projects Agency Washington, DC 20301	6
Advanced Research Projects Agency R&D Field Unit APO San Francisco, California 96346	1
Defense Documentation Center for Scientific and Technical Information Cameron Station Alexandria, Virginia 22314	20
Director of Defense Research and Engineering ATTN: Technical Library Washington, DC 20301	1
Chief of Research and Development Department of the Army ATTN: CRD/M Washington, DC 20310	10
Assistant Chief of Staff for Intelligence Department of the Army ATTN: ACSI-DSRSI Washington, DC 20310	1
Commanding General US Army Materiel Command ATTN: AMCRD-SE Washington, DC 20315	1
Commanding General US Army Materiel Command ATTN: AMCRD-RV-A Washington, DC 20315	1
Commanding General US Army Test and Evaluation Command ATTN: AMSTE-NB Aberdeen Proving Ground, Maryland 21005	1
Commanding General US Army Test and Evaluation Command ATTN: AMSTE-TA-A Aberdeen Proving Ground, Maryland 21005	1
Commanding General US Army Test and Evaluation Command ATTN: AMSTE-EL Aberdeen Proving Ground, Maryland 21005	1
Commanding General US Army CDC Combined Arms Group Fort Leavenworth, Kansas 66027	1
Commanding General US Army Missile Command ATTN: AMSMI-RRA, Bldg. 5422 Physical Sciences Laboratory Research and Development Directorate Redstone Arsenal, Alabama 35809	1
Commanding Officer US Army CDC CBR Agency ATTN: Mr. N. W. Bush Fort McClellan, Alabama 36205	1

Address	No. of Copies
US Army Munitions Command Operation Research Group Edgewood Arsenal, Maryland 21010	1
Commanding General US Army Natick Laboratories ATTN: Earth Sciences Laboratory Geography Division Natick, Massachusetts 01762	1
Commanding General US Army Natick Laboratories ATTN: Pioneering Research Laboratory Natick, Massachusetts 01762	1
Project TREND Applied Scientific Research Corporation of Thailand APO San Francisco, California 96346	1
Commanding Officer US Army Cold Regions Research and Engineering Laboratories ATTN: Photographic Interpretation Research Division Hanover, New Hampshire 03755	1
Commanding Officer US Army Ballistics Research Laboratories ATTN: AMXBR-B Aberdeen Proving Ground, Maryland 21005	1
Commanding Officer US Army Ballistics Research Laboratories ATTN: AMXBR-IA Aberdeen Proving Ground, Maryland 21005	1
Director US Army Engineer Waterways Experiment Station ATTN: Mobility and Environmental Division Vicksburg, Mississippi 39180	1
Commanding Officer US Army Dugway Proving Ground ATTN: Chief, Meteorological Division Dugway, Utah 84022	1
Commanding Officer US Army CDC Artillery Agency Fort Sill, Oklahoma 73504	1
Commanding Officer US Army Picatinny Arsenal ATTN: SMUPA-TV-3 Dover, New Jersey 07801	1
Commanding Officer US Army Frankford Arsenal ATTN: SMUFA-L-8000 Philadelphia, Pennsylvania 19137	1
Commandant US Army Artillery & Missile School ATTN: Meteorology Division (Target Acquisition Department) Fort Sill, Oklahoma 73503	1
Commandant Special Warfare School Fort Bragg, N.C. 28307	1
Commanding General US Army Electronics Command ATTN: AMSEL-EW Fort Monmouth, New Jersey 07703	1

Address	No. of Copies
Commandant US Army CBR School, Micrometeorological Section Fort McClellan, Alabama 36205	1
Commandant US Army Signal School ATTN: Meteorological Department Fort Monmouth, New Jersey 07703	1
Chief, Atmospheric Science Research Division Atmospheric Science Laboratory US Army Electronics Command Fort Huachuca, Arizona 85613	1
Chief, Atmospheric Science Office Atmospheric Science Laboratory US Army Electronics Command ATTN: AMSEL-BL-WS-M White Sands Missile Range, New Mexico 88002	1
Officer in Charge US Naval Weather Research Facility US Naval Air Station, Bldg R-28 Norfolk, Virginia 23511	1
Commander USAF Air Weather Service ATTN: AWSES/TIPD Scott Air Force Base, Illinois 62225	1
Commander Air Force Cambridge Research Laboratories ATTN: CREW 1065 Main Street Waltham, Massachusetts 02154	1
Director Bureau of Research and Development Federal Aviation Agency Washington, DC 20553	1
Chief Fallout Studies Branch Atomic Energy Commission Washington, DC 20545	1
US Department of Agriculture Forest Service North Central Forest Experiment Station Folwell Avenue St. Paul, Minnesota 55101	1
Director Atmospheric Physics and Chemistry Laboratory ESSA - Department of Commerce Boulder, Colorado 80302	1
Director Atmospheric Sciences Library Environmental Science Service Administration Silver Spring, Maryland 20910	1
National Center for Atmospheric Research ATTN: NCAR Library Acquisitions Boulder, Colorado 80302	1
Remote Area Conflict Information Center Battelle Memorial Institute 505 King Avenue Columbus, Ohio 43201	1

DISTRIBUTION LIST (cont'd)

Address	No. of Copies
Commander Operational Test and Evaluation Force US Naval Base Norfolk, Virginia 23511	1
Panama Canal Company Meteorological and Hydrographic Branch ATTN: Chief Hydrographer Box "M" Balboa Heights, Canal Zone	1
Commander Detachment 5, 5th Weather Wing Bldg. 235, Howard Air Force Base Canal Zone	1
Director Data Processing Division Environmental Technical Applications Center (MAC) US Air Force Federal Building Asheville, North Carolina 28801	1
Commander Air Force Cambridge Research Laboratories ATTN: CROA Laurence G. Hanscom Field Bedford, Massachusetts 01730	1
Commandant US Army Infantry School Fort Benning, Georgia	1
Commandant US Army Aviation School Fort Rucker, Alabama	1

UNCLASSIFIED
Security Classification

DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY *(Corporate author)* US Army Tropic Test Center Fort Clayton, Canal Zone	2a. REPORT SECURITY CLASSIFICATION UNCLASSIFIED 2b. GROUP

3. REPORT TITLE

Monthly Microclimatic Summary, May 1967: Environmental Data Base for Regional Studies in the Humid Tropics

4. DESCRIPTIVE NOTES *(Type of report and inclusive dates)*

Data Summary, May 1967

5. AUTHOR(S) *(First name, middle initial, last name)*

6. REPORT DATE September 1967	7a. TOTAL NO. OF PAGES 27	7b. NO. OF REFS
8a. CONTRACT OR GRANT NO. b. PROJECT NO. 2M025001A724-01 c. USATECOM No. 9-4-0013-01 d. Work Unit: USATTC #001	9a. ORIGINATOR'S REPORT NUMBER(S) 9b. OTHER REPORT NO(S) *(Any other numbers that may be assigned this report)*	

10. DISTRIBUTION STATEMENT

Distribution of this document is unlimited

11. SUPPLEMENTARY NOTES	12. SPONSORING MILITARY ACTIVITY Advanced Research Projects Agency Army Research Projects Office, OCRD

13. ABSTRACT

This report contains detailed microclimatic data for May 1967 from specific sites in the Panama Canal Zone and vicinity. The data are presented in tabular form, summarized for hourly and/or daily observations from surface to 46-meter levels. Elements listed are: temperature, pressure, precipitation, wind speed and direction, relative humidity, and evaporation.

DD FORM 1 NOV 65 1473 REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

UNCLASSIFIED
Security Classification

144 860

UNCLASSIFIED
Security Classification

14. KEY WORDS	LINK A ROLE	LINK A WT	LINK B ROLE	LINK B WT	LINK C ROLE	LINK C WT
Climate						
Microclimatology						
Tropic Environment						
Humid Tropics						
Panama Canal Zone Microclimatology						
Data Base						

12-2346

UNCLASSIFIED
Security Classification

ENVIRONMENTAL DATA BASE
FOR REGIONAL STUDIES IN THE HUMID TROPICS

MONTHLY
MICROCLIMATIC SUMMARY

JUNE 1967

Prepared by

Michael A. Fradel, Project Officer
and
Dr. Wilfried H. Portig, Meteorologist

USATECOM Project No. 9-4-0013-01

This research was supported by the Advanced Research Projects Agency of the Department of Defense and by the Army Research Office, OCRD, Department of Army

Conducted by

US Army
Tropic Test Center
Fort Clayton, Canal Zone
with contractual services provided by
Weather Engineers of Panama Corp.

~~144 861~~

M06.1/728.8
U5818en
June 1967

Distribution of this document is unlimited

TABLE OF CONTENTS

	Page
Introduction	1
Sites	1
Instrumentation	1
Data Reduction and Storage	2
Figures	
1. Location Map, Isthmus of Panama	3
2. Frequency of Observations	4
3. Albrook Forest Site, Generalized Plot	5
4. Chiva Chiva Open Site, Generalized Plot	6
5. Instrument Location on Towers	7
Data Summary Sheets	
Monthly Means of Air Temperature by Hour	8
Monthly Ranges of Air Temperature by Hour	9
Monthly Means of Relative Humidity by Hour	10
Monthly Ranges of Relative Humidity by Hour	11
Monthly Means of Other Elements by Hour	12
Monthly Means of Wet Bulb Temperature by Hour	
Monthly Means of Barometric Pressure by Hour	
Monthly Means of Precipitation by Hour	
Monthly Totals of Precipitation by Hour	
Monthly Ranges of Other Elements by Hour	13
Monthly Ranges of Wet Bulb Temperature by Hour	
Monthly Ranges of Barometric Pressure by Hour	
Monthly Ranges of Precipitation by Hour	
Monthly Means of Wind Speed by Hour	14
Monthly Ranges of Wind Speed by Hour	15
Relative Frequencies of Wind Directions (46 meters, Albrook)	16
Relative Frequencies of Wind Directions (26.5 meters, Albrook)	17
Relative Frequencies of Wind Directions (4 meters, Albrook)	18
Relative Frequencies of Wind Directions (46 meters, Chiva Chiva)	19
Relative Frequencies of Wind Directions (26.5 meters, Chiva Chiva)	20
Relative Frequencies of Wind Directions (4 meters, Chiva Chiva)	21
Summary of Elements with Non-Hourly Frequencies of Observation	22
WBGT (Albrook)	
Evaporation (Albrook)	
Precipitation (Manual gauge network, Albrook)	
Precipitation (Stem Flow, Albrook)	
WBGT (Chiva Chiva)	
Evaporation (Chiva Chiva)	
Minimum Grass Temperature (Chiva Chiva)	

MONTHLY MICROCLIMATIC SUMMARY

Introduction

Monthly microclimatic data summarized in this series of reports were collected by the US Army Tropic Test Center and the Weather Engineers of Panama Corporation under the project, Environmental Data Base for Regional Studies in the Humid Tropics. The project is sponsored by the Advanced Research Projects Agency of the Department of Defense and by the Army Research Office, Office of the Chief of Research and Development. It is an investigation of microclimatic, air chemistry, vegetation. soils, microbiological, and macrofaunal conditions at selected sites in the principal tropical environments of the Panama Canal Zone and the Rio Hato Military Reservation. The objective of the project is to assemble quantitative environmental data for RDT&E purposes.

Sites. Data summarized in this report were collected at the Albrook Forest and Chiva Chiva sites. Figure 1 shows the site locations within the Isthmus of Panama. Geographic coordinates are shown below:

Albrook Forest	09° 01'N,	79° 33'W
Chiva Chiva	09° 01'N	79° 35'W

The Chiva Chiva open site and the Albrook Forest site are paired for comparative study of environmental conditions in a tropical semideciduous forest and in a large clearing. Both are located in a region where the annual precipitation is approximately 80 inches and there is a pronounced dry season. The other satellite sites were located primarily for soil studies purposes. Albrook and Fort Kobbe have climatic regimes similar to the principal sites.

The Albrook and Chiva Chiva main sites are approximately four kilometers apart. Each has a 46 meter walk-up tower and an air-conditioned building to house the recording equipment and observers. Both sites are approximately 30 meters above sea level. The top of the forest canopy at the Albrook site is about 26.5 meters above the ground.

Instrumentation. A wide range of climatic elements are measured at the Albrook and Chiva Chiva sites. Types of observations and frequencies are shown on Figure 2. The towers at the Albrook and Chiva Chiva sites are similarly oriented. Sensing equipment is mounted at several levels on the towers to provide measurements through the vertical profile. Additional instruments are emplaced in the immediate vicinity on or near the ground. All instrument exposures are duplicated at each site. Figures 3, 4, and 5 show the instrument array at these sites.

Data Reduction and Storage. All data, as applicable, are recorded at or reduced to each full hour and transposed to punch cards. These punch cards, together with all raw data, are stored in the Tropic Test Center Technical Library Annex.

The relative humidity data contained in this report required some adjustment due to the difficult problems in maintaining hair hygrometers in the humid tropics. The hygrometers show saturation at a time when the psychrometer shows a relative humidity well below 100%. For this reason the hourly measurements made by means of a hair hygrometer have been modified on the basis of simultaneous psychrometer readings of other levels. Details will be given in the fourth Semiannual Report. It can be assumed that the means of relative humidity presented in this volume are very close to the true means.

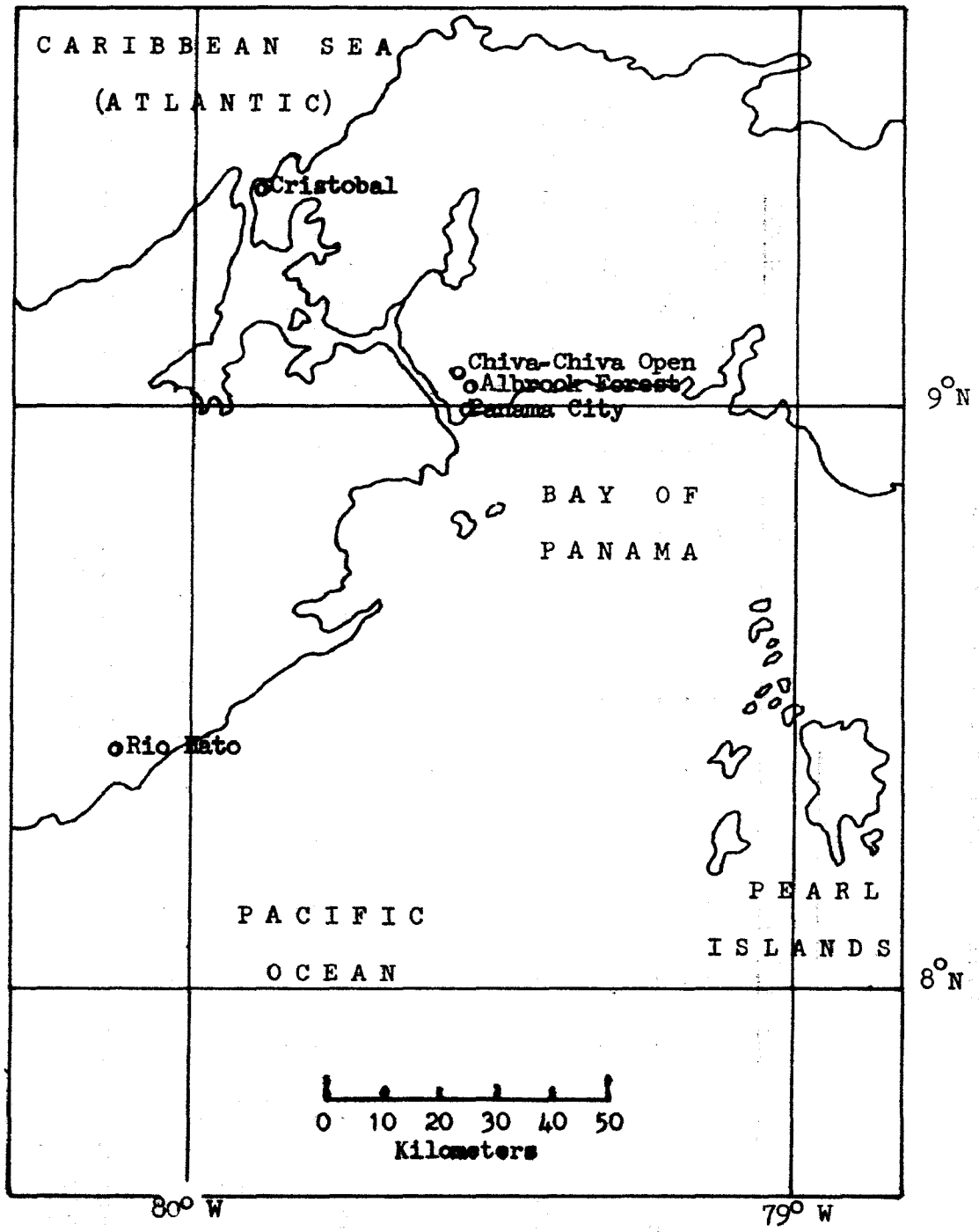

FIGURE 1. LOCATION MAP, ISTHMUS OF PANAMA

FIGURE 2. FREQUENCY OF OBSERVATIONS

# Element	Height (meters) Sfc	0.5	1.0	2.0	4.0	8.0	13.5	26.5	28.5	46.0	Frequency
Temperature:											
Dry Bulb	-	1	1	1	1	2	1	1	-	1	Hourly*/Continuously
Wet Bulb	-	1	-	1	1	-	-	-	-	-	Hourly*/Continuously
Grass Minimum	3	-	-	-	-	-	-	-	-	-	Once Daily
WBGT Index	-	-	1	-	-	-	-	-	-	-	Hourly (0600-1900 EST)
Relative Humidity	-	1	1	1	1	-	1	1	-	1	Hourly*/Continuously
Barometric Pressure	-	-	1	-	-	-	-	-	-	-	Continuously
Evaporation	-	1	-	-	-	-	2	2	-	2	Once Daily
Precipitation:											
Recording Gage	-	-	1	-	-	-	-	-	-	2	Continuously
Manual Gage	-	-	2	-	-	-	-	-	-	-	4 Times Daily
Stem Flow	-	-	-	2	-	-	-	-	-	-	4 Times Daily
Wind:											
Direction	-	-	-	-	1	-	-	1	-	1	Continuously
Speed	-	-	-	3**	1	-	3**	1**	-	1	Hourly**/Continuously

1. Albrook and Chiva Chiva
2. Albrook only
3. Chiva Chiva only

* Observations made with sling psychrometer when recorders are inoperative.

** Hourly

\# Instrument descriptions are contained in the Environmental Data Base semiannual reports.

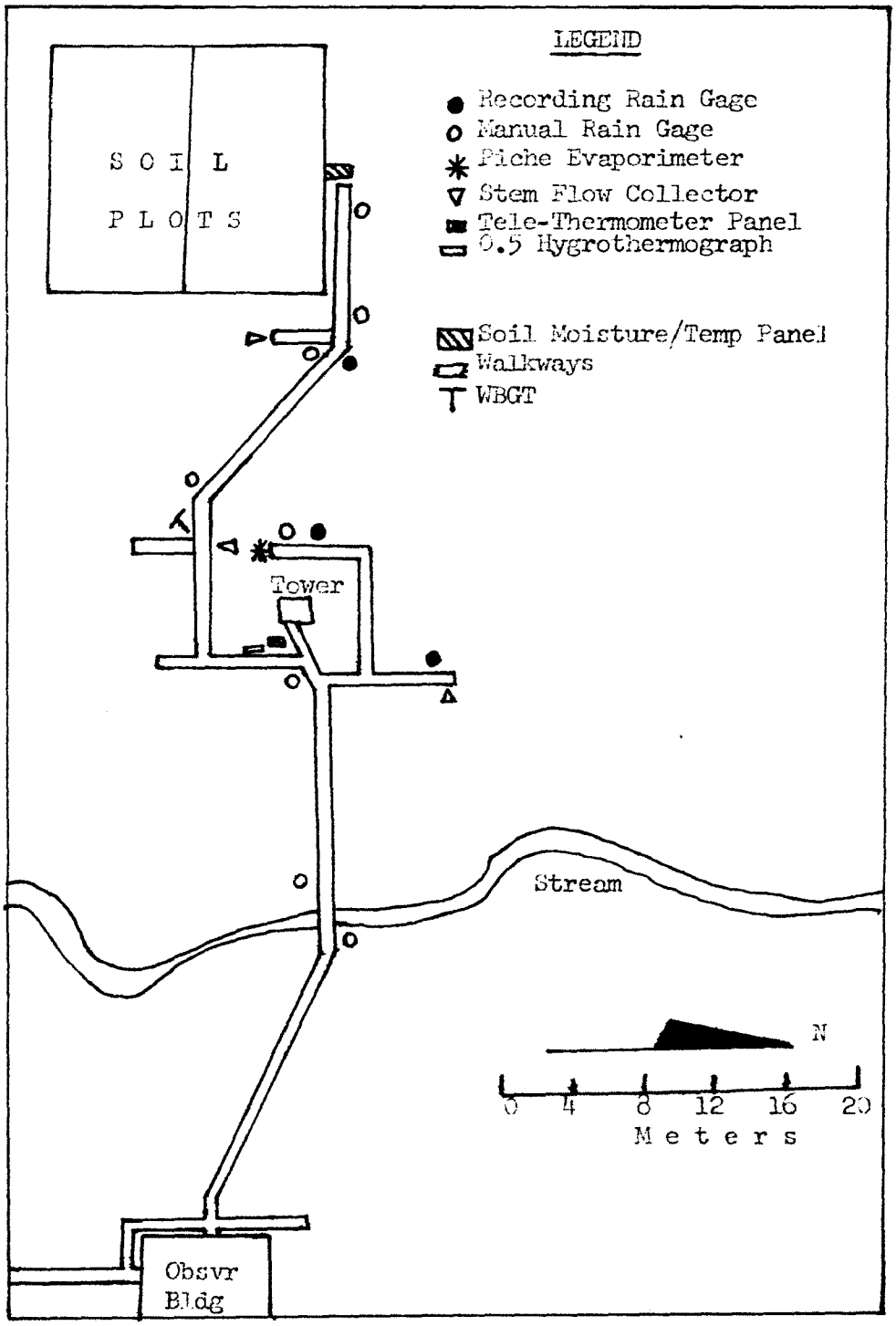

FIGURE 3. ALBROOK FOREST SITE, GENERALIZED PLOT

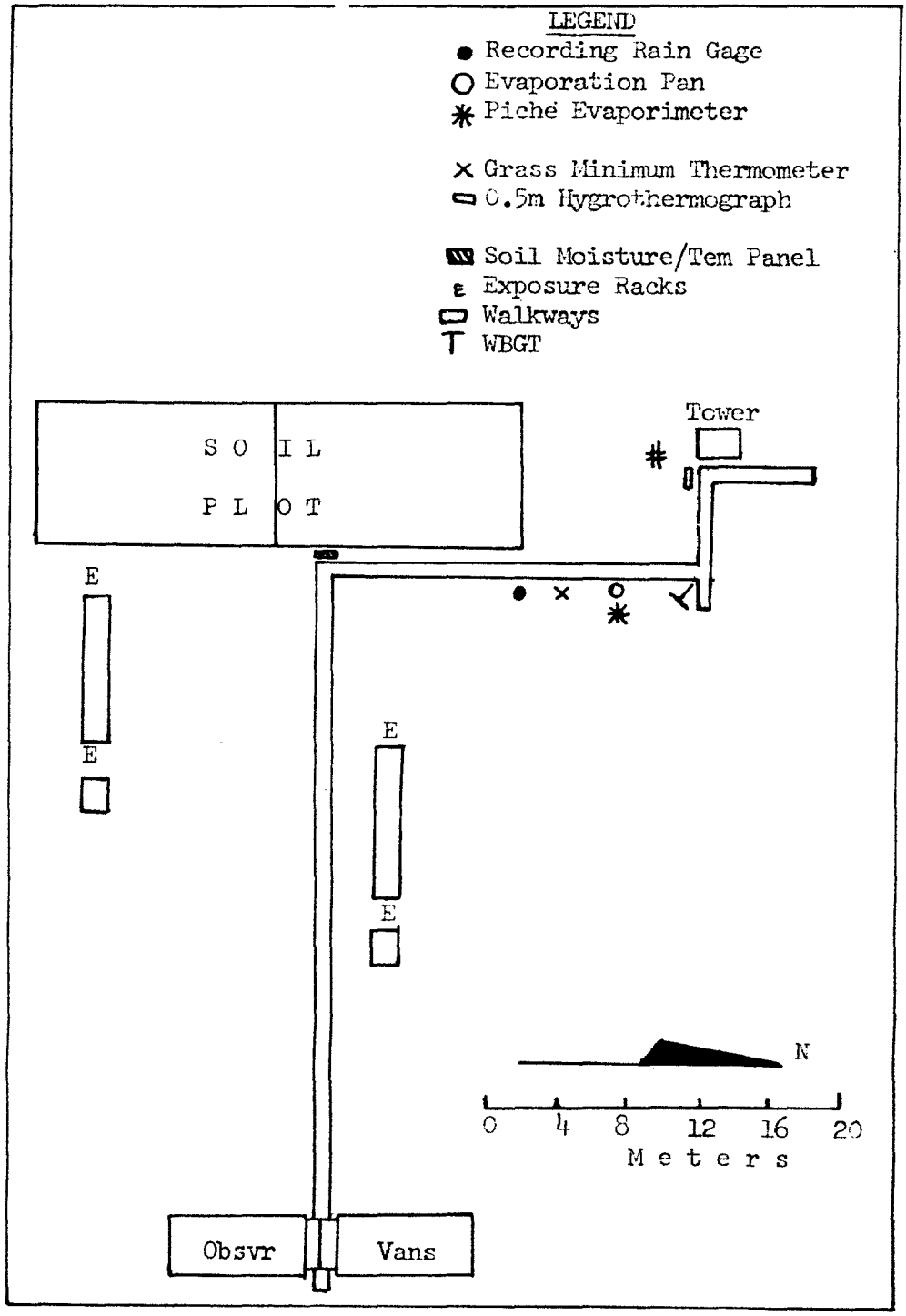

FIGURE 4. CHIVA CHIVA OPEN, GENERALIZED PLOT

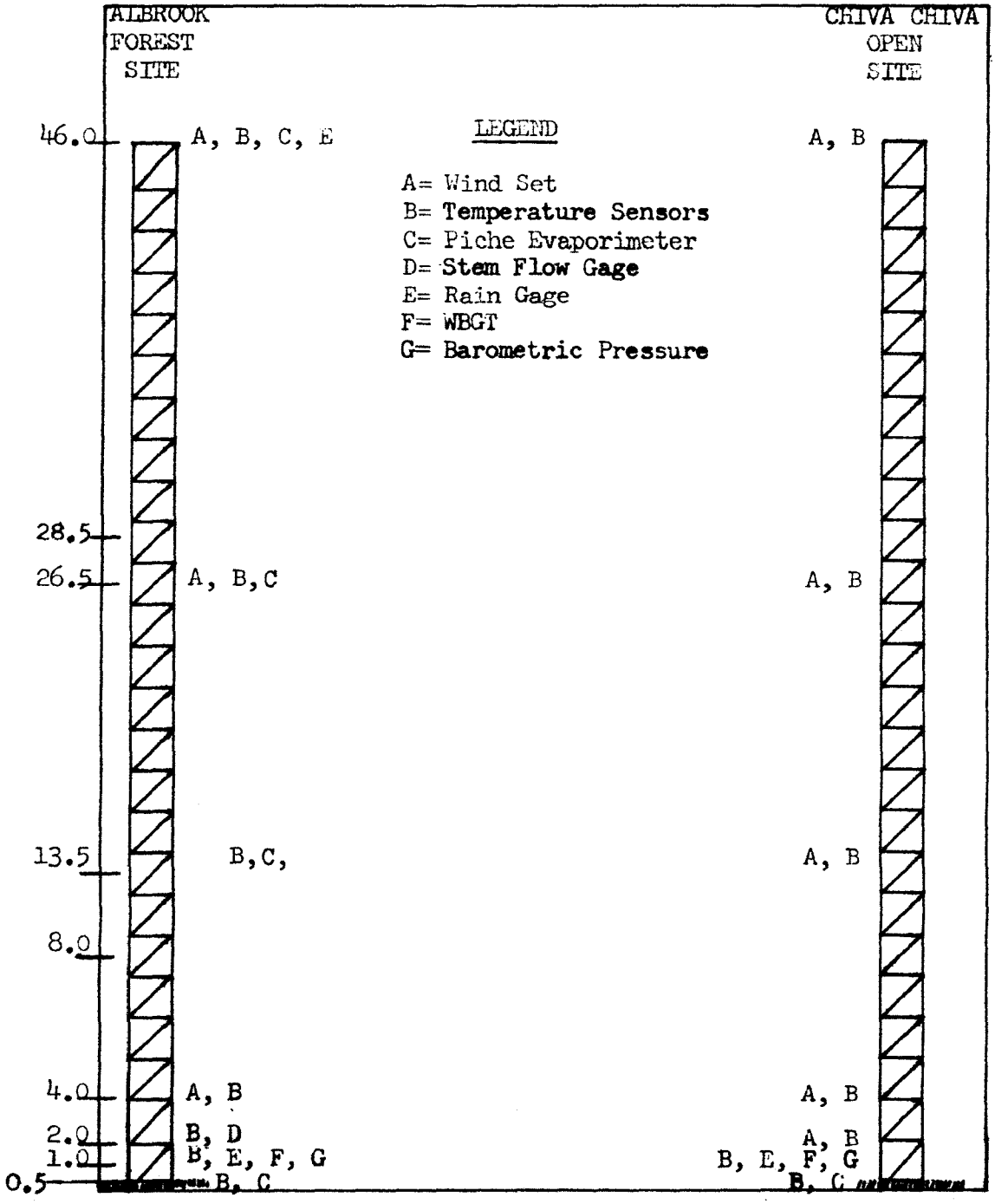

FIGURE 5. INSTRUMENT LOCATION ON TOWERS

SUMMARY OF METEOROLOGICAL OBSERVATIONS

HOURLY DATA

JUNE 1967

Exposure		Monthly Means of Air Temperature by Hour (°F)																								Monthly Summary			
Site	Level	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	No of obs.	Min.	Mean	Max.
Albrook (Forest site)	46.0 m	74.2	74.1	74.0	74.0	73.8	73.9	74.8	76.8	78.4	80.1	80.9	81.9	81.4	80.7	79.2	78.2	77.3	76.2	75.5	75.1	75.2	74.9	74.8	74.5	624	71.2	76.7	88.2
	28.5 m	This level was not instrumented for air temperature at this time																											
	26.5 m	74.3	74.3	74.2	74.2	74.2	74.2	75.1	77.0	79.0	80.6	81.5	82.2	81.9	81.7	80.3	79.4	78.2	76.9	75.7	75.3	75.1	74.9	74.8	74.6	624	71.8	77.1	88.9
	13.5 m	74.1	74.1	73.9	73.9	73.7	73.7	74.1	75.7	77.1	78.7	80.0	81.0	81.1	80.7	79.5	78.4	77.6	76.6	75.7	75.4	75.1	74.8	74.7	74.5	687	71.0	76.4	86.2
	8.0 m	This level was not instrumented for air temperature at this time																											
	4.0 m	73.8	73.8	73.7	73.7	73.6	73.5	74.1	76.0	77.6	79.1	80.1	80.9	81.1	80.3	79.1	77.8	76.9	76.0	75.5	75.1	74.7	74.6	74.4	74.1	719	69.7	76.2	86.2
	2.0 m	73.8	73.7	73.8	73.7	73.6	73.5	74.2	76.0	77.5	78.7	79.8	80.6	80.8	80.2	79.0	77.7	76.9	76.0	75.4	75.1	74.8	74.6	74.4	74.1	719	69.9	76.2	85.9
	1.0 m	73.9	73.9	73.9	73.8	73.7	73.6	74.2	75.9	77.3	78.6	79.7	80.4	80.7	80.2	79.0	77.6	76.9	75.9	75.5	75.1	74.8	74.6	74.5	74.2	719	70.0	76.2	86.1
	0.5 m	74.6	74.4	74.3	74.3	74.2	74.2	74.3	75.6	77.1	78.2	79.2	79.9	80.4	80.1	79.2	78.2	77.6	76.8	76.2	75.9	75.5	75.3	75.1	74.8	713	71.0	76.5	84.1
Chiva Chiva (Open site)	46.0 m	74.9	74.9	74.8	74.7	74.6	74.6	75.7	78.6	80.2	81.4	82.1	82.5	82.4	81.0	79.6	78.2	77.4	76.7	76.0	75.8	75.6	75.4	75.3	75.1	720	72.0	77.4	88.8
	28.5 m	This level was not instrumented for air temperature at this time																											
	26.5 m	74.5	74.4	74.3	74.2	74.0	74.0	75.4	78.5	80.1	81.3	82.2	82.5	82.6	81.3	80.0	78.6	77.7	76.9	76.0	75.8	75.5	75.2	75.0	74.9	720	71.4	77.3	89.2
	13.5 m	74.5	74.4	74.3	74.3	74.2	74.2	75.4	78.5	80.2	81.6	82.3	82.7	82.7	81.5	80.0	78.6	77.6	77.0	76.1	75.7	75.4	75.2	75.0	74.8	714	71.3	77.3	89.9
	8.0 m	This level was not instrumented for air temperature at this time																											
	4.0 m	74.0	74.0	73.8	73.8	73.8	73.8	76.1	79.0	80.9	83.0	83.8	84.2	84.2	82.6	80.9	79.1	78.2	77.3	76.0	75.6	75.2	74.9	74.9	74.4	717	70.2	77.7	89.2
	2.0 m	73.9	73.9	73.7	73.7	73.6	73.7	76.1	78.9	81.0	83.0	83.9	84.3	84.2	82.8	81.0	79.2	78.1	77.1	75.9	75.4	75.0	74.7	74.7	74.2	717	70.4	77.6	89.1
	1.0 m	73.9	73.9	73.8	73.7	73.6	73.4	75.6	78.6	80.7	82.8	83.9	84.3	84.2	82.6	81.3	79.6	78.4	77.0	76.0	75.5	75.0	74.8	74.6	74.1	717	70.1	77.6	89.7
	0.5 m	73.7	73.8	73.6	73.6	73.5	73.5	75.6	78.8	80.8	83.0	84.2	84.8	84.3	83.0	81.7	79.7	78.7	77.1	75.9	75.5	74.9	74.7	74.6	74.1	717	69.7	77.6	90.2

SUMMARY OF METEOROLOGICAL OBSERVATIONS

HOURLY DATA

JUNE 1967

Exposure		Monthly Ranges of Air Temperature by Hour (°F)																								Monthly Summary*			
Site	Level	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	No of obs.	Min.	Mean	Max.
Albrook (Forest site)	46.0 m	4.9	4.5	4.5	4.5	4.1	4.3	5.5	7.7	8.9	10.8	11.0	10.9	15.6	14.3	16.9	13.4	10.2	9.0	8.2	7.0	7.6	7.0	6.5	5.7				
	28.5 m	This level was not instrumented for air temperature at this time																											
	26.5 m	3.9	3.5	3.9	4.1	3.6	3.2	3.7	8.3	8.3	8.8	10.3	9.3	12.8	15.3	15.6	12.7	12.7	9.3	6.7	6.1	5.3	4.7	4.6	4.8				
	13.5 m	5.4	5.4	5.1	5.3	5.3	5.2	4.7	5.8	5.8	7.9	7.7	10.0	9.7	12.3	13.1	10.7	10.0	8.9	8.1	6.9	5.9	5.9	5.9	5.9				
	8.0 m	This level was not instrumented for air temperature at this time																											
	4.0 m	5.7	6.1	6.7	6.2	6.4	6.2	5.0	5.5	6.7	9.5	10.0	10.2	9.4	12.0	12.7	10.9	9.0	8.0	6.7	6.7	5.8	6.1	5.4	5.5				
	2.0 m	5.5	5.9	6.6	6.3	6.0	6.3	5.3	5.8	6.5	9.2	9.7	10.0	8.9	11.5	12.0	10.8	7.7	7.4	6.0	6.3	5.5	6.0	5.0	5.5				
	1.0 m	6.0	6.6	6.9	6.4	5.9	6.4	5.2	5.8	6.3	9.0	9.8	10.2	8.5	11.5	10.5	10.5	8.0	7.3	6.2	6.0	5.5	6.2	5.0	5.3				
	0.5 m	5.7	5.1	5.9	5.2	5.5	5.5	4.8	6.0	5.4	6.8	7.7	7.8	7.4	8.8	9.6	9.1	8.0	7.3	6.6	5.7	5.6	5.8	5.3	5.8				
Chiva Chiva (Open site)	46.0 m	4.2	4.2	4.2	4.2	4.1	3.9	5.2	10.8	14.8	13.3	13.6	12.5	10.4	15.7	15.9	11.7	9.4	8.7	7.4	6.9	6.5	6.0	4.6	4.3				
	28.5 m	This level was not instrumented for air temperature at this time																											
	26.5 m	4.7	4.5	5.0	4.8	4.5	4.5	7.4	11.5	13.4	13.4	13.0	12.1	10.3	15.6	16.5	11.0	9.2	8.8	7.8	7.2	6.4	5.9	4.4	4.3				
	13.5 m	4.5	4.2	4.8	4.8	4.5	4.5	6.5	11.9	12.7	13.3	11.6	11.8	9.2	13.6	16.9	11.5	9.2	8.4	7.1	5.9	5.5	4.9	4.4	4.4				
	8.0 m	This level was not instrumented for air temperature at this time																											
	4.0 m	5.6	6.6	7.1	6.3	5.9	6.1	7.4	10.4	12.6	13.2	13.1	10.5	10.9	15.8	16.9	12.1	10.9	9.6	8.1	6.9	6.3	6.2	5.5	6.6				
	2.0 m	5.5	6.2	5.9	5.7	5.7	5.5	6.6	10.5	12.6	12.5	13.2	10.3	10.8	15.9	15.9	13.0	11.2	9.1	7.6	6.8	6.1	5.6	5.7	5.9				
	1.0 m	5.8	6.3	6.5	6.2	6.5	5.8	6.5	12.3	11.6	11.2	13.2	12.5	11.2	17.7	16.3	14.3	12.2	9.3	8.3	7.0	6.3	5.7	5.4	5.7				
	0.5 m	5.8	7.2	7.0	6.1	6.1	5.8	6.3	12.8	10.5	11.9	13.3	13.7	10.5	17.6	16.0	14.3	13.4	9.3	8.0	7.6	6.2	5.7	5.2	5.3				

* No monthly summary was computed for the ranges.

SUMMARY OF METEOROLOGICAL OBSERVATIONS

HOURLY DATA

JUNE 1967

Exposure		Monthly Means of Relative Humidity by Hour (%)																								Monthly Summary			
Site	Level	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	No of obs.	Min.	Mean	Max.
Albrook (Forest site)	46.0 m	95	95	95	95	95	95	95	93	88	82	80	78	79	80	82	85	88	90	93	93	94	94	95	95	623	62	90	97
	28.5 m	This level was not instrumented for relative humidity at this time																											
	26.5 m	97	96	97	96	97	97	96	93	88	83	81	79	79	81	83	87	90	93	96	96	96	96	97	96	622	63	91	98
	13.5 m	97	97	97	97	97	97	97	96	94	90	87	84	83	85	86	89	91	93	95	95	96	97	97	97	689	70	93	99
	8.0 m	This level was not instrumented for relative humidity at this time																											
	4.0 m	98	98	98	98	98	98	97	96	94	90	88	86	85	87	89	90	93	95	96	97	98	97	97	98	719	70	94	100
	2.0 m	98	98	98	98	98	98	97	97	95	91	90	88	86	87	89	91	94	96	96	97	97	97	98	98	719	73	95	100
	1.0 m	98	98	98	98	98	98	98	97	96	93	91	90	88	89	90	93	94	96	96	97	98	97	97	98	719	74	95	100
	0.5 m	98	98	98	98	98	98	98	97	97	95	94	93	91	91	92	93	94	96	97	97	98	97	97	98	713	78	96	100
Chiva Chiva (Open site)	46.0 m	95	94	95	94	94	95	93	87	84	79	77	76	75	78	81	85	87	90	92	93	93	94	94	94	717	57	88	97
	28.5 m	This level was not instrumented for relative humidity at this time																											
	26.5 m	96	96	96	96	95	96	94	87	83	79	76	75	75	77	81	85	88	91	94	94	95	95	95	96	716	53	89	98
	13.5 m	97	97	97	97	97	97	95	88	84	79	77	76	76	78	82	86	89	92	95	96	96	96	96	97	717	58	90	99
	8.0 m	This level was not instrumented for relative humidity at this time																											
	4.0 m	97	97	96	97	96	97	94	88	84	78	77	75	75	77	80	84	87	90	93	94	95	95	95	96	717	58	89	100
	2.0 m	97	97	97	97	97	97	94	87	84	78	77	75	75	77	80	84	87	90	93	94	95	96	96	97	717	59	89	100
	1.0 m	97	97	97	97	97	97	94	87	84	80	77	77	76	78	81	86	89	92	95	95	96	96	96	97	712	56	90	99
	0.5 m	98	98	98	98	98	98	95	89	84	79	77	76	76	78	81	85	87	91	94	95	97	97	97	97	717	61	90	100

SUMMARY OF METEOROLOGICAL OBSERVATIONS

HOURLY DATA

JUNE 1967

Exposure		Monthly Ranges of Relative Humidity by Hour (%)																								Monthly Summary*			
Site	Level	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24				
Albrook (Forest site)	46.0 m	4	9	8	8	6	3	5	11	24	27	30	29	30	32	35	27	23	22	10	9	7	6	4	5				
	28.5 m	This level was not instrumented for relative humidity at this time																											
	26.5 m	3	5	6	6	3	2	10	12	23	26	28	29	32	32	35	30	30	23	8	5	3	4	3	3				
	13.5 m	4	4	4	4	4	4	4	9	15	21	26	27	27	29	27	26	24	17	11	13	8	8	6	5				
	8.0 m	This level was not instrumented for relative humidity at this time																											
	4.0 m	5	6	6	9	8	5	7	16	15	26	27	29	28	30	26	26	19	16	12	10	8	8	11	7				
	2.0 m	6	5	7	8	8	5	7	14	15	24	26	27	24	27	26	22	17	14	9	8	7	8	9	6				
	1.0 m	6	5	7	8	8	6	8	14	10	23	22	25	23	26	21	19	16	14	9	8	8	8	10	6				
	0.5 m	7	5	4	5	4	6	6	6	8	14	15	21	16	19	21	19	18	7	8	6	6	5	6	8				
Chiva Chiva (Open site)	46.0 m	5	9	10	9	9	5	12	20	27	30	29	30	30	35	40	28	27	20	10	7	8	8	12	12				
	28.5 m	This level was not instrumented for relative humidity at this time																											
	26.5 m	5	11	11	11	9	5	12	25	30	29	34	34	33	41	45	30	28	21	10	8	8	8	13	8				
	13.5 m	5	8	7	6	6	5	12	24	32	33	34	35	30	38	41	29	29	19	10	8	8	7	8	6				
	8.0 m	This level was not instrumented for relative humidity at this time																											
	4.0 m	8	14	15	12	10	6	15	21	27	32	30	30	26	38	42	31	27	23	15	12	14	11	10	10				
	2.0 m	5	12	14	11	7	5	12	22	27	33	31	30	23	38	39	31	26	20	14	10	9	9	9	6				
	1.0 m	4	8	8	6	6	5	10	26	37	35	34	32	27	39	42	29	27	20	8	9	7	7	7	5				
	0.5 m	6	11	10	8	9	5	13	25	25	31	34	37	27	38	35	31	30	21	13	12	9	8	7	6				

* No monthly summary was computed for the ranges.

SUMMARY OF METEOROLOGICAL OBSERVATIONS

HOURLY DATA

JUNE 1967

Exposure		Monthly Means[2] of other Elements by Hour																								Monthly Summary			
Site	Code[1]	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	No of obs.	Min.	Mean	Max.
Albrook (Forest site)	WB (4.0 m)	73.4	73.4	73.3	73.3	73.2	73.1	73.7	75.2	76.3	76.7	77.2	77.5	77.3	77.0	76.4	75.6	75.3	75.0	74.7	74.5	74.2	74.0	73.9	73.7	719	69.6	74.9	79.7
	WB (2.0 m)	73.4	73.4	73.4	73.3	73.2	73.1	73.7	75.3	76.3	76.8	77.4	77.6	77.5	77.2	76.4	75.7	75.5	75.1	74.7	74.5	74.2	74.0	73.9	73.7	719	69.8	75.0	79.9
	WB (0.5 m)	74.1	74.0	73.9	73.9	73.8	73.7	73.8	75.0	76.4	77.1	77.9	78.2	78.2	77.9	77.3	76.6	76.3	75.9	75.5	75.2	74.9	74.7	74.5	74.3	713	70.7	75.5	80.7
	BP	.748	.736	.726	.722	.723	.729	.742	.756	.768	.772	.770	.758	.741	.724	.707	.700	.699	.708	.720	.737	.749	.758	.764	.761	720	.640	.738	.825
	P1	0.05	0.09	0.01	0.00	0.50	0.00	0.16	0.01	0.16	0.08	0.04	0.03	0.17	0.43	0.13	0.11	0.05	0.12	0.16	0.02	0.03	0.01	0.03	0.01	71	0.01	6.99	0.85
	P2	0.04	0.04	0.01	0.00	0.13	0.01	0.02	0.02	0.17	0.06	0.08	0.02	0.08	0.22	0.09	0.06	0.02	0.11	0.11	0.02	0.02	0.00	0.03	0.00	49	0.01	3.56	0.41
	P3	0.05	0.05	0.03	0.00	0.40	0.00	0.00	0.00	0.25	0.12	0.05	0.01	0.05	0.45	0.22	0.07	0.02	0.08	0.22	0.02	0.02	0.00	0.00	0.00	36	0.01	4.05	0.80
	P4	0.05	0.15	0.03	0.01	0.18	0.05	0.30	0.05	0.32	0.11	0.03	0.02	0.11	0.75	0.28	0.14	0.02	0.08	0.06	0.01	0.01	0.00	0.00	0.00	46	0.01	5.31	0.75
Chiva Chiva (Open site)	WB (4.0 m)	73.4	73.3	73.1	73.1	73.1	73.2	74.7	76.0	76.9	77.4	77.7	77.5	77.5	76.6	75.9	75.4	75.1	75.0	74.4	74.2	74.1	73.8	73.9	73.6	717	70.2	75.0	79.8
	WB (2.0 m)	73.4	73.3	73.1	73.1	73.0	73.1	74.8	76.0	77.0	77.4	77.8	77.7	77.6	76.8	76.1	75.4	75.1	74.9	74.4	74.2	74.1	73.8	73.8	73.6	717	69.8	75.0	79.4
	WB (0.5 m)	73.2	73.3	73.1	73.2	73.0	73.0	74.4	76.1	77.0	77.8	78.1	78.4	78.0	77.3	76.9	76.0	75.6	75.1	74.7	74.4	74.2	74.0	73.9	73.5	717	69.5	75.2	82.0
	BP	.840	.826	.815	.813	.813	.820	.835	.850	.862	.866	.861	.850	.832	.815	.796	.792	.793	.801	.815	.828	.840	.850	.856	.851	720	.730	.830	.920
	PS	0.05	0.10	0.02	0.01	0.25	0.14	0.12	0.03	0.05	0.09	0.06	0.02	0.23	0.50	0.15	0.11	0.05	0.08	0.09	0.08	0.04	0.03	0.01	0.00	69	0.01	6.21	0.65

WB - Wet bulb temperature (°F)
BP - Barometric pressure (in. of Hg minus 29.0)

PS - Precipitation at 1.0 m. in open area (in.)
P1 - Precipitation at 46.0 m. above canopy (in.)
P2 - Precipitation under full canopy (in.)

P3 - Precipitation under drip canopy (in.)
P4 - Precipitation under open canopy (in.)

[2] Monthly means of precipitation are computed for precipitation days. Precipitation totals are substituted for the mean in the monthly summary.

SUMMARY OF METEOROLOGICAL OBSERVATIONS

HOURLY DATA

JUNE 1967

Exposure		Monthly Ranges[2] of other Elements by Hour																								Monthly Summary*			
Site	Code[1]	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24				
Albrook (Forest site)	WB (4.0 m)	4.9	5.4	5.7	5.5	5.3	5.5	4.1	6.1	4.2	4.7	4.5	4.2	7.2	7.7	8.0	7.2	5.1	6.0	5.0	5.5	4.6	5.0	4.8	4.7				
	WB (2.0 m)	4.9	5.2	5.6	5.3	5.3	5.6	4.3	6.3	4.4	5.0	4.6	4.3	6.8	7.4	8.0	6.8	5.8	5.8	5.0	5.5	4.6	5.0	4.8	4.5				
	WB (0.5 m)	4.9	4.9	5.1	5.0	5.1	5.0	4.4	5.6	4.7	4.0	5.6	5.0	4.2	6.1	6.4	6.6	6.2	6.2	5.8	5.4	5.3	5.0	4.7	4.8				
	BP	.120	.095	.100	.100	.100	.100	.085	.095	.103	.115	.130	.130	.095	.090	.100	.120	.135	.140	.105	.105	.105	.105	.110	.095				
	P1	0.07	0.05	0.01	0.00	0.00	0.00	0.29	0.00	0.51	0.30	0.05	0.04	0.25	0.84	0.14	0.26	0.06	0.28	0.80	0.05	0.04	0.01	0.00	0.00				
	P2	0.00	0.04	0.00	0.00	0.23	0.00	0.00	0.00	0.27	0.08	0.11	0.00	0.13	0.39	0.13	0.15	0.02	0.29	0.34	0.02	0.01	0.00	0.00	0.00				
	P3	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.41	0.22	0.00	0.00	0.00	0.00	0.43	0.07	0.03	0.14	0.79	0.03	0.01	0.00	0.00	0.00				
	P4	0.00	0.00	0.02	0.00	0.51	0.00	0.00	0.00	0.56	0.27	0.07	0.01	0.19	0.00	0.45	0.21	0.01	0.18	0.06	0.00	0.00	0.00	0.00	0.00				
Chiva Chiva (Open site)	WB (4.0 m)	4.6	5.1	4.9	5.1	4.9	5.3	4.7	5.1	5.3	5.4	4.4	4.0	5.4	9.0	8.6	6.6	4.8	5.5	4.9	5.5	4.8	4.4	4.7	5.0				
	WB (2.0 m)	4.8	5.0	5.3	4.6	4.6	4.5	4.8	5.2	5.1	4.8	4.3	3.5	5.9	7.8	7.8	6.5	5.0	5.2	4.5	5.0	4.5	4.1	4.4	4.8				
	WB (0.5 m)	4.8	5.9	5.7	5.3	5.5	5.3	4.8	6.2	4.8	5.2	4.9	5.2	8.7	9.7	10.1	7.7	5.5	5.2	5.2	5.5	5 4	4.9	5.0	4.3				
	BP	.110	.095	.090	.100	.100	.095	.080	.090	.100	.120	.120	.100	.090	.085	.105	.105	.130	.140	.120	.110	.100	.100	.090	.095				
	PS	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.03	0.09	0.12	0.09	0.01	0.64	0.00	0.25	0.35	0.07	0.19	0.54	0.13	0.06	0.03	0.00	0.00				

* No monthly summary was computed for the ranges.

WB - Wet bulb temperature (°F)
BP - Barometric pressure (in. of Hg minus 29.0)

PS - Precipitation at 1.0 m. in open area (in.)
P1 - Precipitation at 46.0 m. above canopy (in.)
P2 - Precipitation under full canopy (in.)
P3 - Precipitation under drip canopy (in.)
P4 - Precipitation under open canopy (in.)

[2] Monthly ranges of precipitation are computed for precipitation days.

SUMMARY OF METEOROLOGICAL OBSERVATIONS

HOURLY DATA

JUNE 1967

Exposure		Monthly Means of Wind Speed by Hour (miles/hr.)																								Monthly Summary			
Site	Level	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	No. of obs.	Min.	Mean	Max.
Albrook (Forest site)	46.0 m	3	3	3	3	3	4	4	5	6	6	7	8	7	9	8	6	6	5	6	5	5	5	4	4	689	0	5	20
	28.5 m	This level was not instrumented for wind speed at this time																											
	26.5 m	1	1	1	1	1	1	1	2	2	3	3	3	3	4	3	3	3	2	2	2	2	2	1	1	667	0	2	13
	13.5 m	This level was not instrumented for wind speed at this time																											
	8.0 m	This level was not instrumented for wind speed at this time																											
	4.0 m	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	692	0	0	3
	2.0 m	This level was not instrumented for wind speed at this time																											
	1.0 m	This level was not instrumented for wind speed at this time																											
	0.5 m	This level was not instrumented for wind speed at this time																											
Chiva Chiva (Open site)	46.0 m	4	4	4	4	4	4	4	4	5	6	6	7	7	9	9	7	6	5	6	5	5	4	5	4	675	0	5	18
	28.5 m	This level was not instrumented for wind speed at this time																											
	26.5 m	2	2	2	2	2	2	3	3	4	4	5	6	6	7	6	6	5	4	4	3	3	3	2	2	632	0	4	17
	13.5 m	1	1	1	1	1	1	2	2	3	4	4	5	5	6	3	3	2	1	1	2	1	1	1	1	720	0	2	16
	8.0 m	This level was not instrumented for wind speed at this time																											
	4.0 m	1	2	2	2	2	2	2	3	3	4	4	5	5	6	5	4	4	3	3	3	2	2	2	2	708	0	3	13
	2.0 m	0	1	0	0	0	0	1	1	1	2	2	3	3	4	2	1	1	0	0	1	0	0	0	0	720	0	1	10
	1.0 m	This level was not instrumented for wind speed at this time																											
	0.5 m	This level was not instrumented for wind speed at this time																											

SUMMARY OF METEOROLOGICAL OBSERVATIONS

HOURLY DATA

JUNE 1967

Exposure		Monthly Ranges of Wind Speed by Hour (miles/hr.)																								Monthly Summary*			
Site	Level	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24				
Albrook (Forest site)	46.0 m	8	10	11	12	8	12	12	14	17	17	14	20	17	20	18	13	13	14	16	15	10	13	10	9				
	28.5 m	This level was not instrumented for wind speed at this time																											
	26.5 m	6	9	5	8	5	9	7	9	8	12	8	11	10	10	10	9	9	11	13	11	7	8	8	8				
	13.5 m	This level was not instrumented for wind speed at this time																											
	8.0 m	This level was not instrumented for wind speed at this time																											
	4.0 m	0	1	1	1	1	1	1	1	2	2	2	3	2	2	2	2	1	1	2	1	1	1	1	1				
	2.0 m	This level was not instrumented for wind speed at this time																											
	1.0 m	This level was not instrumented for wind speed at this time																											
	0.5 m	This level was not instrumented for wind speed at this time																											
Chiva Chiva (Open site)	46.0 m	7	13	10	10	10	9	13	11	12	10	17	11	16	10	14	13	10	8	11	12	13	10	10	8				
	28.5 m	This level was not instrumented for wind speed at this time																											
	26.5 m	6	7	8	8	7	7	10	10	9	8	13	10	15	12	15	13	10	7	8	9	9	8	7	5				
	13.5 m	4	7	7	6	7	6	9	6	9	10	13	10	16	11	10	9	6	5	6	10	5	8	6	4				
	8.0 m	This level was not instrumented for wind speed at this time																											
	4.0 m	4	7	7	5	6	5	8	7	8	8	12	8	12	8	12	10	7	7	6	6	7	7	5	4				
	2.0 m	2	3	4	3	4	2	5	5	5	6	8	6	10	7	6	4	3	3	3	5	3	4	3	2				
	1.0 m	This level was not instrumented for wind speed at this time																											
	0.5 m	This level was not instrumented for wind speed at this time																											

* No monthly summary was computed for the ranges.

ALBROOK (Forest site) JUNE 1967

Relative Frequencies* of Wind Directions by Hour at 46.0 m.
(%)

Dir. \ Hr.	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
N	6.9					3.4	3.5	3.5	3.5	3.4	3.4	3.7				3.4		3.4	3.4	3.4	6.9	13.7		6.9
NNE					10.3	6.9	3.5				3.4	7.4				6.9			3.4		3.4			
NE	3.4	3.4	6.9	3.4	13.7	6.9	7.2	3.5	3.5		3.4		3.7	3.4					3.4	3.4	6.9		3.4	6.9
ENE	6.9	3.4		6.9		10.3		7.2	10.7	6.9		3.7	3.7		3.4	3.4					6.9	3.4	6.9	6.9
E	3.4		10.3	3.4		3.4	7.2	7.2		3.4	3.4		3.7	3.4	3.4									3.4
ESE		3.4	6.9	3.4					3.5				3.7						3.4			3.4	3.4	
SE									7.2	6.9	6.9	7.4		10.3	6.9		6.9	6.9				3.4		
SSE									10.7	3.4	3.4		7.4	3.4				3.4	3.4				6.9	
S								10.7	17.9	20.6	41.2	55.5	51.8	41.2	27.5	27.5	20.6	6.9	3.4	6.9	3.4			
SSW			3.4		3.4							3.7	3.7			3.4		3.4		3.4	3.4	6.9		
SW				3.4									3.7		10.3		3.4	3.4				3.4		
WSW			3.4	3.4							3.4			3.4			3.4	13.7	3.4					
W	6.9	20.6	13.7	13.7	13.7	10.3				3.4	3.4	7.4		10.3	17.2	6.9	13.7	10.3	10.3		10.3	3.4	3.4	10.3
WNW	20.6	3.4	17.2	20.6	10.3	17.2	3.5	21.4	10.7	24.0	6.9	3.7		3.4	10.3	13.7	10.3	13.7	6.9	24.0	10.3	20.6	27.5	20.6
NW	17.2	17.2	10.3		20.6	20.6	17.9	7.2	17.9	6.9	6.9	3.7	7.4	6.9	6.9	13.7	24.0	13.7	27.5	17.2	24.0	10.3	27.5	13.7
NNW	6.9	6.9		3.4			14.2	3.5			3.4		3.7	3.4	3.4		3.4		6.9	17.2		3.4		6.9
CALM	27.5	41.2	27.5	37.8	27.5	20.6	42.8	35.6	14.2	20.6	10.3	3.7	7.4	10.3	10.3	20.6	13.7	20.6	24.0	24.0	24.0	27.5	20.6	24.0

* Note: Due to rounding, percentage totals do not equal 100%.

IMPRESORA, S. A. 45888

ALBROOK (Forest site) JUNE 1967

Relative Frequencies* of Wind Directions by Hour at 26.5 m.
(%)

Dir. \ Hr.	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
N	3.5	3.5	3.5	7.2												3.5	3.5		7.2	3.5	3.5	3.5	3.5	
NNE						3.5									3.5	7.2								
NE						3.5			3.7	3.5	7.2	3.7	3.7			3.5								
ENE										3.5														
E		3.5							7.4		3.5	11.1	7.4		10.7	3.5			3.5	3.5		3.5	3.5	
ESE										3.5	10.7			10.7	3.5	7.2	3.5		3.5		3.5			
SE									3.7	3.5			3.7		3.5					3.5				
SSE				3.5								3.7				3.5	3.5		3.5					
S		7.2	3.5	3.5				18.5	29.6	28.6	39.3	59.2	51.8	39.3	17.9	14.2	14.2	14.2	3.5		3.5	3.5	3.5	
SSW																		3.5	3.5	7.2				
SW					3.5						3.5		3.7		14.2	3.5	3.5	3.5				3.5	3.5	
WSW					7.2	7.2				3.5	3.5	3.7		3.5	3.5	3.5	3.5	3.5		3.5			3.5	
W	7.2	7.2		3 5	3.5	3.5				3.5				10.7		7.2	3.5	7.2	7.2	7.2	3.5			
WNW			7.2	3.5	7.2	7.2	3.7	14.8	3.7	7.2	7.2	3.7		7.2	3.5		7.2	10.7	7.2	3.5	7.2		10.7	3.5
NW	14.2	7.2	7.2	10.7	17.9	10.7	14.8		18.5	7.2	7.2	3.7	7.4	3.5	17.9	10.7	14.2	14.2	14.2	14.2	10.7	14.2	17.9	14.2
NNW	10.7	21.4	14.2	3.5	7.2	7.2	11.1	11.1	3.7	3.5				3.5		7.2	10.7	7.2	3.5	10.7	17.9	7.2	7.2	21.4
CALM	64.2	50.0	64.2	64.2	53.5	57.0	70.3	55.5	29.6	32.1	17.9	11.1	22.2	21.4	21.4	24.9	32.1	35.6	42.8	42.8	50.0	64.2	46.3	60.7

* Note: Due to rounding, percentage totals do not equal 100%.

IMPRESORA, S. A. 45555

ALBROOK (Forest site) JUNE 1967

Relative Frequencies* of Wind Directions by Hour at 4.0 m.

Dir. \ Hr.	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
N		3.4						3.5	3.4		3.4						3.4							
NNE						3.4								3.4		3.4		6.9	3.4					3.4
NE								3.5	3.4	3.4				3.4	3.4		3.4							
ENE			3.4												3.4									
E											3.4	10.7		6.9										
ESE			3.4																			3.4		
SE														3.4	3.4	6.9	3.4							
SSE													7.2		3.4									
S			3.4	3.4			3.5		17.2	24.0	20.6	35.6	35.6	34.3	10.3	3.4								
SSW								3.5				7.2												
SW						3.4				3.4	3.4			3.4	3.4								3.4	
WSW									3.4		3.4		3.5											
W				3.4		3.4	3.5		3.4		3.4				3.4									
WNW					3.4			3.5				3.5			3.4		6.9	6.9		3.4	3.4			
NW		3.4											3.5	6.9	3.4			3.4	3.4			3.4	3.4	
NNW									3.4							3.4	3.4		3.4					
CALM	100.0	92.7	89.3	92.7	96.1	89.3	92.8	85.6	65.2	68.7	61.9	42.8	50.0	37.8	61.9	82.4	79.0	82.4	89.3	96.1	96.1	92.7	92.7	96.1

* Note: Due to rounding, percentage totals do not equal 100%.

IMPRESORA, S. A. 45895

CHIVA CHIVA (Open site) JUNE 1967

Relative Frequencies* of Wind Directions by Hour at 46.0 m.
(%)

Dir. \ Hr.	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
N	10.0	10.0	10.0	6.7	3.3			6.7	6.7	6.7	3.5		3.3	6.7		10.0	6.7	10.0		3.3	10.0	13.3	3.3	3.3
NNE				3.3		6.7	3.3	6.7								3.3				6.7	6.7	3.3		3.3
NE		3.3		3.3	10.0	6.7	13.3	3.3		3.3	7.2	10.0	3.3	3.3							3.3		6.7	10.0
ENE	13.3	3.3	10.0	3.3	3.3	6.7	6.7	3.3	6.7			6.7	3.3	3.3	6.7	3.3	3.3		3.3					6.7
E	3.3		3.3	10.0	3.3	3.3	6.7	6.7	6.7	13.3	7.2		3.3	10.0	10.0	6.7			10.0	6.7	3.3	3.3	13.3	6.7
ESE	3.3	6.7				3.3		3.3	6.7		3.5	3.3		6.7	3.3	3.3	6.7	10.0	6.7	3.3	3.3	3.3	3.3	3.3
SE	3.3		3.3			3.3		6.7	6.7	20.0	14.2	20.0	23.3	10.0	16.7	20.0	13.3	10.0	6.7	3.3				
SSE					3.3					6.7	10.7	10.0	6.7	10.0	6.7	3.3	3.3	3.3		3.3	3.3	3.3		
S		3.3	6.7		6.7			3.3	6.7	6.7	7.2	20.0	23.3	20.0	10.0	3.3	6.7	6.7	3.3		3.3	3.3		
SSW				3.3	3.3	3.3	3.3				7.2	3.3	3.3				6.7	10.0	3.3			3.3		
SW	3.3	3.3	3.3	6.7			3.3			6.7			3.3		6.7		3.3	3.3			3.3	3.3	3.3	
WSW		6.7				3.3	3.3		3.3		3.5	10.0				3.3	3.3					3.3	3.3	
W		6.7	16.7	6.7	10.0	6.7	3.3	13.3	6.7	6.7	7.2	3.3	3.3	6.7	3.3	6.7	3.3	13.3	16.7		10.0	3.3	3.3	10.0
WNW	16.7	6.7	6.7	23.3	20.0	3.3	6.7	6.7	3.3	6.7	10.7	3.3	6.7	6.7	13.3	3.3	10.0	10.0	3.3	16.7	10.0	20.0	13.3	13.3
NW	40.0	36.7	30.0	20.0	26.7	33.3	30.0	30.0	33.3	20.0	14.2	6.7	13.3	13.3	13.3	20.0	26.7	23.3	36.7	23.3	23.3	26.7	40.0	30.0
NNW	6.7	10.0	6.7	10.0	10.0	20.0	20.0	10.0	10.0	3.3	3.5	3.3	3.3	3.3	10.0	13.3	6.7		6.7	30.0	20.0	6.7	10.0	13.3
CALM		3.3	3.3	3.3					3.3										3.3	3.3		3.3		

* Note: Due to rounding, percentage totals do not equal 100%.

IMPRESORA, S. A. 45555

CHIVA CHIVA (Open site) JUNE 1967

Relative Frequencies* of Wind Directions by Hour at 26.5 m.

(%)

Dir. \ Hr.	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
N	6.7	10.0	10.0	10.0	16.7	6.7	10.0	6.7		3.3				3.3		13.3	6.7	3.3	6.7	16.7	16.7	13.3	3.3	3.3
NNE	3.3	3.3		3.3		3.3		6.7	10.0	6.7	3.4			3.3		6.7	3.3	3.3			3.3		3.3	3.3
NE	10.0	10.0	6.7	6.7	6.7	3.3	10.0	3.3			6.9	6.7				3.3				6.7			6.7	3.3
ENE	3.3		3.3		6.7	6.7	16.7	3.3	3.3	6.7	6.9	3.3	6.7		3.3				3.3		3.3			6.7
E	3.3	3.3	3.3	10.0	3.3	3.3		13.3	16.7	10.0		16.7		6.7	10.0	6.7	3.3		6.7	3.3	6.7		3.3	13.3
ESE	3.3	6.7	10.0			3.3			3.3	3.3	6.9		13.3	16.7	10.0	6.7		6.7	6.7		3.3	3.3	3.3	
SE			10.0	3.3		3.3	3.3	10.0	3.3	16.7	6.9	16.7	6.7	6.7	10.0	6.7	20.0	10.0	13.3	3.3	3.3		3.3	3.3
SSE	3.3				3.3			3.3	6.7	13.3	17.2	10.0	20.0	10.0	10.0	13.3	6.7	6.7		3.3		6.7		
S					3.3	3.3			3.3	3.3	6.9	10.0	16.7	20.0	13.3	6.7	6.7	13.3		3.3	3.3	3.3		
SSW				3.3			3.3			3.3	6.9	6.7						3.3						
SW		3.3	3.3	6.7		10.0	3.3		3.3	3.3		6.7	6.7		3.3		6.7	3.3	3.3			13.3		10.0
WSW	3.3				3.3	3.3					6.9	3.3	3.3		3.3	3.3		3.3	3.3		3.3		3.3	6.7
W	10.0	10.0		10.0	6.7		6.7	6.7	3.3		13.7	6.7		10.0	10.0	10.0	3.3	13.3	6.7	3.3	13.3	10.0	13.3	3.3
WNW	16.7	6.7	16.7	16.7	10.0	6.7	13.3	3.3	13.3	13.3	3.4		10.0			3.3	6.7	10.0	20.0	10.0	6.7	13.3	13.3	20.0
NW	30.0	30.0	20.0	20.0	20.0	26.7	6.7	20.0	30.0	10.0	3.4	10.0	16.7	13.3	16.7	3.3	30.0	13.3	16.7	23.3	20.0	20.0	30.0	6.7
NNW	6.7	6.7	10.0	6.7	13.3	13.3	20.0	23.3		6.7	6.9	3.3		6.7	10.0	16.7	3.3	10.0	13.3	20.0	16.7	10.0	13.3	16.7
CALM		10.0	6.7	3.3	6.7	6.7	6.7		3.3		3.4			3.3			3.3			6.7		6.7	3.3	3.3

* Note: Due to rounding, percentage totals do not equal 100%.

IMPRESORA, S. A. 45695

CHIVA CHIVA (Open site) JUNE 1967

Relative Frequencies* of Wind Directions by Hour at 4.0 m.
(%)

Dir. \ Hr.	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
N	13.3	13.3		3.3	10.0	6.7	6.7	13.3	6.7	13.3				3.3	6.7	26.7	3.3	3.3	3.3	16.7	13.3	6.7		
NNE	10.0	3.3	23.3	10.0	10.0		3.3	3.3	3.3		3.4	3.3		3.3		3.3	3.3	3.3		6.7	3.3	3.3	3.3	3.3
NE	6.7	10.0	6.7	6.7	10.0	3.3	16.7	6.7	3.3	3.3	10.3	3.3	6.7			3.3			10.0	6.7	6.7	3.3	3.3	10.0
ENE		6.7	6.7	3.3	3.3		10.0	13.3	3.3	3.3		10.0			3.3					3.3	3.3	3.3	6.7	13.3
E	10.0	6.7	3.3			3.3			23.3	6.7	6.9	3.3	10.0	16.7	13.3	3.3	3.3		13.3			6.7		6.7
ESE			3.3	3.3				13.3	3.3			3.3	6.7	3.3	13.3	6.7	10.0	10.0	3.3	3.3	6.7		6.7	3.3
SE			6.7	3.3				3.3		20.0	10.3	13.3	10.0	20.0	13.3	13.3	10.0	6.7	3.3	6.7	3.3	3.3		3.3
SSE			3.3	3.3	3.3	10.0	3.3		3.3	3.3	13.7	13.3	13.3	6.7	10.0	6.7	3.3	6.7			6.7		3.3	3.3
S		3.3		3.3	3.3	3.3	6.7		3.3	10.0	13.7	20.0	16.7	16.7	3.3	3.3	10.0	23.3	3.3	3.3	3.3	3.3		3.3
SSW				6.7	3.3		6.7	3.3				3.3	10.0		6.7		3.3					3.3		
SW			3.3			6.7			3.3	10.0			3.3		3.3		6.7	3.3	3.3		6.7	3.3	10.0	6.7
WSW	3.3				10.0	3.3		3.3	6.7	3.3	6.9	10.0		6.7	3.3	6.7	6.7	6.7		3.3	6.7	3.3	3.3	6.7
W	10.0	10.0		10.0	6.7	10.0	10.0	3.3	10.0	3.3	10.3	3.3	3.3	6.7	6.7	6.7	6.7	10.0	20.0	16.7	10.0	10.0	10.0	
WNW	16.7	10.0	10,0	13.3	13.3	10.0	10.0	3.3	6.7	6.7		3.3	10.0				13.3	16.7	6.7	10.0	6.7	20.0	13.3	10.0
NW	13.3	16.7	23.3	16.7	6.7	23.3	10.0	6.7	20.0	13.3	10.3	10.0		10.0	10.0	10.0	6.7	10.0	6.7	10.0	6.7	16.7	33.3	10.0
NNW	6.7	6.7	3.3	6.7	13.3	13.3	16.7	26.7			10.3		10.0	6.7	6.7	10.0	13.3		20.0	10.0	13.3	10.0	3.3	13.3
CALM	10.0	13.3	6.7	10.0	6.7	6.7			3.3	3.3	3.4								6.7	3.3	3.3	3.3	3.3	6.7

* Note: Due to rounding, percentage totals do not equal 100%.

IMPRESORA. S. A. 45895

SUMMARY OF NON HOURLY DATA

JUNE 1967

Summary of Elements with Non-hourly Frequencies of Observation

Site	Element, Units and Exposure	Description	Number of Obs.	Minimum Value	Mean or Total Value	Maximum Value
Albrook (Forest site)	WBGT Index[1] (at 1.0 meters)	Index value	419	70.1	76.7	82.4
		Dry bulb temp.	419	70.0	77.6	90.0
		Wet bulb temp.	419	70.0	76.2	81.0
		Black bulb temp.	419	70.4	78.3	86.0
	Evaporation[3] (in. at 4 levels)	Piche (46.0 m)	27	0.024	4.848*	0.409
		Piche (26.5 m)	29	0.030	3.960*	0.317
		Piche (13.5 m)	22	0.006	1.182*	0.110
		Piche (0.5 m)	23	0.006	0.660*	0.140
	Precipitation from Raingauge Network[2] (in. at 1.0 meters)	Gauge # 1	23	0.01	2.36*	0.56
		Gauge # 2	28	0.01	4.16*	0.98
		Gauge # 3	30	0.01	5.33*	1.07
		Gauge # 4	28	0.01	7.30*	2.05
		Gauge # 5	30	0.01	4.29*	1.00
		Gauge # 6	31	0.01	5.32*	1.07
		Gauge # 7	29	0.01	4.20*	1.00
		Gauge # 8	28	0.01	4.44*	0.94
	Stem Flow[2] (in. at 2.0 meters)	Small tree	24	0.01	4.42*	1.05
		Medium tree	21	0.01	3.67*	1.33
		Large tree	14	0.01	98.72*	45.38
Chiva Chiva (Open site)	WBGT Index[1] (at 1.0 meters)	Index value	421	70.1	79.6	93.1
		Dry bulb temp.	421	70.2	80.4	92.0
		Wet bulb temp.	421	70.2	76.8	83.0
		Black bulb temp.	421	69.7	89.0	122.0
	Evaporation[3] (in. at 0.5 meters)	Piche	30	0.006	3.810*	0.451
		Pan	27	0.004	5.596*	1.091
	Minimum Grass temp[3] (°F at grass tips)	None	22	69.3	72.2	75.0

1 - Hourly observations between 0600 and 1900 hours inclusive

2 - Six hourly observations

3 - Daily observations

* Total Values

DISTRIBUTION LIST

Address	No. of Copies
Director Advanced Research Projects Agency Washington, DC 20301	6
Advanced Research Projects Agency R&D Field Unit APO San Francisco, California 96346	1
Defense Documentation Center for Scientific and Technical Information Cameron Station Alexandria, Virginia 22314	20
Director of Defense Research and Engineering ATTN: Technical Library Washington, DC 20301	1
Chief of Research and Development Department of the Army ATTN: CRD/M Washington, DC 20310	10
Assistant Chief of Staff for Intelligence Department of the Army ATTN: ACSI-DSRSI Washington, DC 20310	1
Commanding General US Army Materiel Command ATTN: AMCRD-SE Washington, DC 20315	1
Commanding General US Army Materiel Command ATTN: AMCRD-RV-A Washington, DC 20315	1
Commanding General US Army Test and Evaluation Command ATTN: AMSTE-NB Aberdeen Proving Ground, Maryland 21005	1
Commanding General US Army Test and Evaluation Command ATTN: AMSTE-TA-A Aberdeen Proving Ground, Maryland 21005	1
Commanding General US Army Test and Evaluation Command ATTN: AMSTE-EL Aberdeen Proving Ground, Maryland 21005	1
Commanding General US Army CDC Combined Arms Group Fort Leavenworth, Kansas 66027	1
Atmospheric Sciences Library Environmental Science Services Administration Silver Spring, Maryland 20910	1
Commanding General US Army Missile Command ATTN: AMSMI-RRA Bldg. 5422 Physical Sciences Laboratory Research and Development Directorate Redstone Arsenal, Alabama 35809	1

DISTRIBUTION LIST (cont'd)

Address	No. of Copies
Commanding Officer US Army CDC CBR Agency ATTN: Mr. N. W. Bush Fort McClellan, Alabama 36205	1
US Army Munitions Command Operations Research Group Edgewood Arsenal, Maryland 21010	1
Commanding General US Army Natick Laboratories ATTN: Earth Sciences Division Geography Branch Natick, Massachusetts 01762	1
Commanding General US Army Natick Laboratories ATTN: Pioneering Research Laboratory Natick, Massachusetts 01762	1
Project TREND Applied Scientific Research Corporation of Thailand APO San Francisco, California 96346	1
Commanding Officer US Army Cold Regions Research and Enginnering Laboratories ATTN: Photographic Interpretation Research Division Hanover, New Hampshire 03755	1
Commanding Officer US Army Ballistics Research Laboratories ATTN: AMXBR-B Aberdeen Proving Ground, Maryland 21005	1
Commanding Officer US Army Ballistics Research Laboratories ATTN: AMXBR-IA Aberdeen Proving Ground, Maryland 21005	1
Director US Army Engineer Waterways Experiment Station ATTN: Mobility and Environmental Division Vicksburg, Mississippi 39181	1
Commanding Officer US Army Dugway Proving Ground ATTN: Chief, Meteorology Division Dugway, Utah 84022	1
Commanding Officer US Army CDC Artillery Agency Fort Sill, Oklahoma 73504	1
Commanding Officer US Army Picatinny Arsenal ATTN: SMUPA-TV-3 Dover, New Jersey 07801	1
Commanding Officer US Army Frankford Arsenal ATTN: SMUFA-L-8000 Philadelphia, Pennsylvania 19137	1
Commandant US Army Artillery & Missile School ATTN: Meteorology Division (Target Acquisition Dpt.) Fort Sill, Oklahoma 73504	1

DISTRIBUTION LIST (cont'd)

Address	No. of Copies
Commandant Special Warfare School Fort Bragg, N. C. 28307	1
Commanding General US Army Electronics Command ATTN: AMSEL-EW Fort Monmouth, New Jersey 07703	1
Commanding General Deseret Test Center Bldg. 103, Soldier's Circle Fort Douglas, Utah 84113	1
Commandant US Army CBR School, Micrometeorological Section Fort McClellan, Alabama 36205	1
Commandant US Army Signal School ATTN: Meteorological Department Fort Monmouth, New Jersey 07703	1
Chief, Atmospheric Science Research Division Atmospheric Science Laboratory US Army Electronics Command Fort Huachuca, Arizona 85613	1
Commanding Officer US Army Electronics Command Meteorological Support Activity Fort Huachuca, Arizona 85613	1
Officer in Charge US Naval Weather Research Facility US Naval Air Station, Bldg. R-28 Norfolk, Virginia 23511	1
Commander USAF Air Weather Service ATTN: AWSES/TIPD Scott Air Force Base, Illinois 62225	1
Commander Air Force Cambridge Research Laboratories ATTN: CREW 1065 Main Street Waltham, Massachusetts 02154	1
Director Bureau of Research and Development Federal Aviation Agency Washington, DC 20553	1
Chief Fallout Studies Branch Atomic Energy Commission Washington, DC 20545	1
US Department of Agriculture Forest Service North Central Forest Experiment Station Folvell Avenue St. Paul, Minnesota 55101	1
Director Atmospheric Physics & Chemistry Laboratory ESSA, Department of Commerce PSRB Bldg. No. 2 Boulder, Colorado 80302	1

144 861

DISTRIBUTION LIST (cont'd)

Address	No. of Copies
Remote Area Conflict Information Center Battelle Memorial Institute 505 King Avenue Columbus, Ohio 43201	1
Commander Operational Test and Evaluation Force US Naval Base Norfolk, Virginia 23511	1
Commanding Officer US Army Electronics Command Meteorological Support Activity Fort Huachuca, Arizona 85613	1
Commander Detachment 5, 5th Weather Wing Bldg. 235, Howard Air Force Base Canal Zone	1
Director Data Processing Division Environmental Technical Applications Center (MAC) US Air Force Federal Building Asheville, North Carolina 28801	1
Commander Air Force Cambridge Research Laboratories ATTN: CREW Laurence G. Hanscom Field Bedford, Massachusetts 01760	1
Chief, Atmospheric Science Research Laboratory Atmospheric Science Laboratory US Army Electronics Command ATTN: AMSEL-BL-WS-M White Sands, Missile Range, New Mexico 88002	1
Commanding General US Army Electronics Command ATTN: AMSEL-BL-AP Fort Monmouth, New Jersey 07703	1
National Center for Atmospheric Research ATTN: NCAR Library Acquisitions Boulder, Colorado 80302	1
Commanding General US Army CDC Combat Support Group Fort Belvoir, Virginia 22060	1
Panama Canal Company Meteorological and Hydrographic Branch ATTN: Chief Hydrographer Box "M" Balboa Heights, Canal Zone	1
Commanding General US Army Munitions Command ATTN: AMSMU-RE-R Dover, New Jersey 07703	1

UNCLASSIFIED
Security Classification

DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY *(Corporate author)*

US Army Tropic Test Center
Fort Clayton, Canal Zone

2a. REPORT SECURITY CLASSIFICATION

UNCLASSIFIED

2b. GROUP

3. REPORT TITLE

Monthly Microclimatic Summary, June 1967: Environmental Data Base for Regional Studies in the Humid Tropics

4. DESCRIPTIVE NOTES *(Type of report and inclusive dates)*

Data Summary, June 1967

5. AUTHOR(S) *(First name, middle initial, last name)*

6. REPORT DATE

April 1968

7a. TOTAL NO. OF PAGES

28

7b. NO. OF REFS

8a. CONTRACT OR GRANT NO.

b. PROJECT NO. 2M025001A724-01

c. USATECOM No. 9-4-0013-01

d. Work Unit: USATTC # 001

9a. ORIGINATOR'S REPORT NUMBER(S)

9b. OTHER REPORT NO(S) *(Any other numbers that may be assigned this report)*

10. DISTRIBUTION STATEMENT

Distribution of this document is unlimited.

11. SUPPLEMENTARY NOTES

12. SPONSORING MILITARY ACTIVITY

Advanced Research Projects Agency
Army Research Projects Office, OCRD

13. ABSTRACT

This report contains detailed microclimatic data for June 1967 from specific sites in the Panama Canal Zone and vicinity. The data are presented in tabular form, summarized for hourly and/or daily observations from surface to 46-meter levels. Elements listed are: temperature, pressure, precipitation, wind speed and direction, relative humidity, and evaporation.

DD FORM 1 NOV 65 1473 REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

UNCLASSIFIED
Security Classification

UNCLASSIFIED
Security Classification

14. KEY WORDS	LINK A ROLE	LINK A WT	LINK B ROLE	LINK B WT	LINK C ROLE	LINK C WT
Climate						
Microclimatology						
Tropic Environment						
Humid Tropics						
Panama Canal Zone Microclimatology						
Data Base						

12-2346

UNCLASSIFIED
Security Classification