

(6)

ACADIA NATIONAL PARK
RESOURCE MANAGEMENT DIVISION

VISIBILITY DATA SUMMARY REPORT

FOR

ACADIA NATIONAL PARK

WINTER 1981 - FALL 1982

prepared for

U.S. Department of Interior

NATIONAL PARK SERVICE

VISIBILITY MONITORING AND DATA ANALYSIS PROJECT

Contract No. CX-001-3-0057

by

Air Resource Specialists, Inc.

634 South Mason Street

Fort Collins, CO 80524

November 11, 1983



Environmental Consultants

Air Quality Modeling,
Remote Sensing

Fort Collins, Colorado

TABLE OF CONTENTS

1.0	INTRODUCTION -----	1
2.0	SITE LOCATION AND EQUIPMENT -----	2
3.0	DATA COLLECTION AND ANALYSIS -----	3
4.0	SUMMARY -----	66

LIST OF TABLES

TABLE 1	ACADIA NP TARGET SPECIFICATIONS -----	2
TABLE 2	SUMMARY STANDARD VISUAL RANGE (KM) STATISTICS FOR ACADIA NATIONAL PARK -----	13
TABLE 3	ACADIA NATIONAL PARK CHRONOLOGICAL HISTORY OF STATION OPERATIONS -----	64

LIST OF FIGURES

FIGURE 1	WINTER 1981 VISIBILITY REPORT FOR ACADIA NATIONAL PARK -----	4
FIGURE 2	SPRING 1981 VISIBILITY REPORT FOR ACADIA NATIONAL PARK -----	5
FIGURE 3	SUMMER 1981 VISIBILITY REPORT FOR ACADIA NATIONAL PARK -----	6
FIGURE 4	FALL 1981 VISIBILITY REPORT FOR ACADIA NATIONAL PARK -----	7
FIGURE 5	WINTER 1982 VISIBILITY REPORT FOR ACADIA NATIONAL PARK -----	8
FIGURE 6	SPRING 1982 VISIBILITY REPORT FOR ACADIA NATIONAL PARK -----	9
FIGURE 7	SUMMER 1982 VISIBILITY REPORT FOR ACADIA NATIONAL PARK -----	10
FIGURE 8	FALL 1982 VISIBILITY REPORT FOR ACADIA NATIONAL PARK -----	11
FIGURE 9-32	MONTHLY TEMPORAL WIND SPEED, WIND DIRECTION PLOTS AND WIND ROSE PLOTS FOR ACADIA NATIONAL PARK DECEMBER 1980 THROUGH NOVEMBER 1982 -----	14
FIGURE 33-56	MONTHLY TEMPORAL TEMPERATURE AND RELATIVE HUMIDITY PLOTS AND CUMULATIVE FREQUENCY DISTRIBUTIONS PLOTS FOR ACADIA NATIONAL PARK DECEMBER 1980 THROUGH NOVEMBER 1982 -----	39

1.0 INTRODUCTION

In October 1979, an automatic visibility monitoring station was installed at Acadia National Park. The station was coupled to a Memodyne cassette data acquisition system that enabled the site to operate continuously, requiring only occasional service visits by park personnel. The purpose of this automatic system was to investigate methods of remote visibility monitoring with automatic teleradiometers, and to define and remedy problems associated with data retrieval from cassette tapes.

The visibility site was equipped and serviced by the John Muir Institute for the National Park Service until April, 1983, at which time, management of the site was transferred to Air Resource Specialists, Inc.

2.0 SITE LOCATION AND EQUIPMENT

The Acadia observation site was located at the maintenance area on Mount Desert Island (long 68°16'W, lat 44°22'N).

Monitoring equipment included:

- o 2 MRI model 30/30 multi-wavelength teleradiometers.
- o Memodyne cassette data logger.
- o 2 Olympus OM2 automatic cameras.
- o Integrating Nephelometer.
- o Sun Radiometer
- o Anemometer
- o Temperature/Relative Humidity Sensors

Target specifications are presented in Table 1.

TABLE 1

ACADIA NP TARGET SPECIFICATIONS

Target Location	Latitude	Longitude	Distance (km)	Azimuth (°T)	Inherent Contrast
Blue Hill	44°14'N	68°02'W	27	285	-0.87
Mount Battie	44°26'N	68°32'W	67	256	-0.87

3.0 DATA COLLECTION AND ANALYSIS

Although the 30/30 multi-wavelength teleradiometer is capable of measuring apparent spectral radiance of a target against the sky at 4 wavelengths, only 550nm (green) wavelength measurements currently are used to compute standard visual range (SVR). The monitoring site was equipped with 2 teleradiometers, however, data is presented only for Blue Hill due to a misalignment of the other teleradiometer. The target and sky apparent spectral radiance and meteorological conditions were sampled every 2.5 minutes. These measurements were recorded on cassette tapes which were mailed to OPTEC, INC., in Michigan for preprocessing.

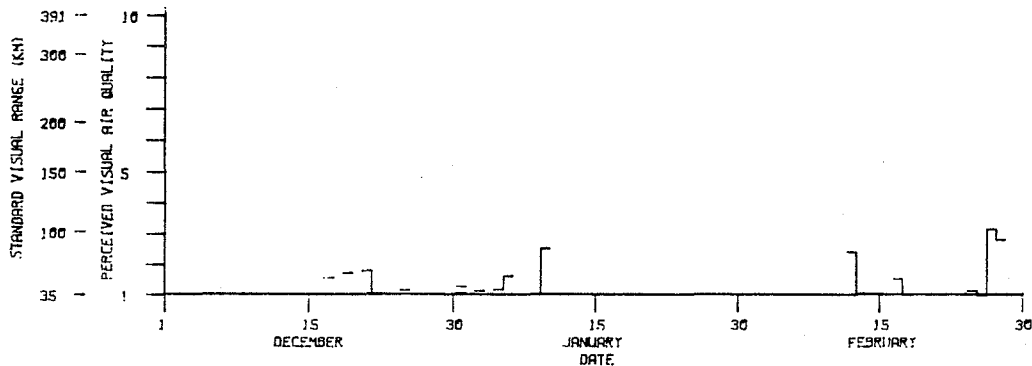
All data were archived to 9-track tape and mailed to the John Muir Institute in Fort Collins, Colorado for processing. Quality control edits were performed on the data to ensure that only valid data were collected. Data that passed the quality control edits were then used to calculate visibility and meteorological variables. Teleradiometer radiance values were used to calculate standard visual range (SVR). Seasonal statistics were computed on the daily SVR values to provide insight into seasonal visual air quality changes. Plots of daily variation of standard visual range and frequency of occurrence were used to summarize the results. Copies of the seasonal reports for Acadia NP are presented in Figures 1 through 8.

WINTER 1981 VISIBILITY REPORT FOR

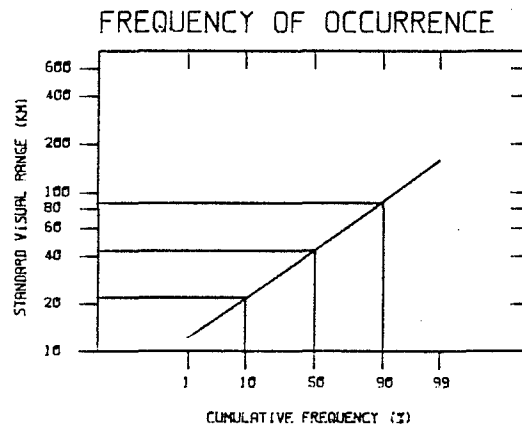
ACADIA MAINE

FIGURE 1

DAILY VARIATION OF STANDARD VISUAL AIR QUALITY



EACH BAR IN THE DAILY VISUAL AIR QUALITY TIME PLOT ABOVE IS THE GEOMETRIC MEAN OF THE TELERADIOMETER MEASUREMENTS MADE ON VEGETATED TARGETS DURING THE DAY. ANY GAPS IN THE TIME PLOT MEAN THAT DATA WAS MISSING. THE Y AXIS IS REPRESENTED BY STANDARD VISUAL RANGE AS WELL AS PERCEIVED VISUAL AIR QUALITY. THE DATA ARE PLOTTED IN SUCH A WAY THAT A CHANGE IN VISUAL AIR QUALITY WOULD BE PERCEIVED TO BE THE SAME WHETHER THAT CHANGE TOOK PLACE AT THE BOTTOM (DIRTY AIR) OR TOP (CLEAN AIR) OF THE SCALE.



FOR ANY POINT ON THE SLOPING LINE IN THE CUMULATIVE FREQUENCY OF OCCURRENCE PLOT ABOVE "X" PERCENT OF THE TIME THE STANDARD VISUAL RANGE (SVR) WAS "Y" OR LESS. THE SVR VALUES FOR THE 10% 50% AND 90% FREQUENCY OF OCCURRENCE ARE:

PERCENT	SVR (KM)
10.	21
50.	43
90.	86

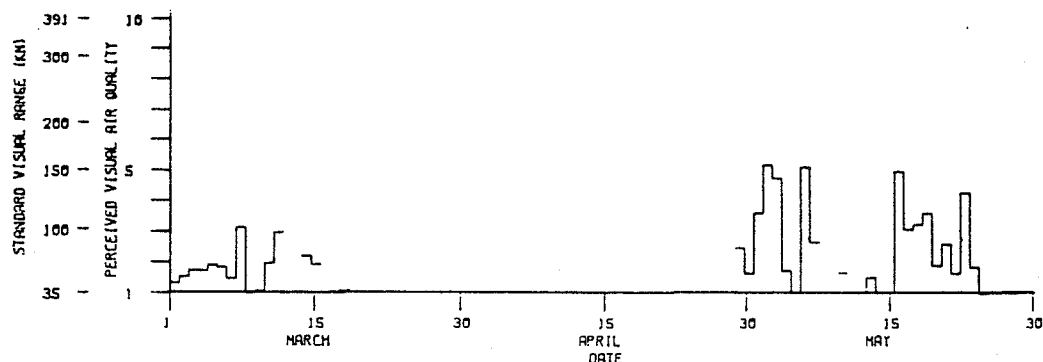
PREPARED BY:
AIR RESOURCE SPECIALISTS, INC.
10/28/83

SPRING 1981 VISIBILITY REPORT FOR

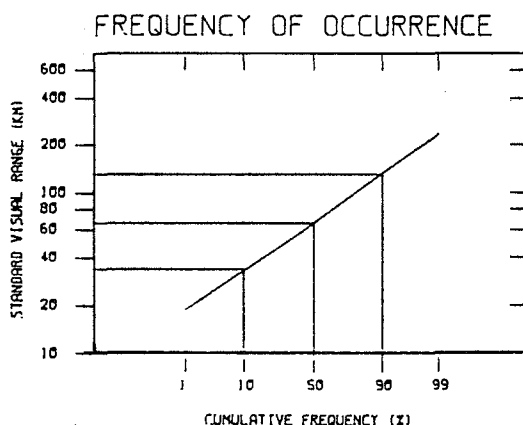
ACADIA MAINE

FIGURE 2

DAILY VARIATION OF STANDARD VISUAL AIR QUALITY



EACH BAR IN THE DAILY VISUAL AIR QUALITY TIME PLOT ABOVE IS THE GEOMETRIC MEAN OF THE TELERADIOMETER MEASUREMENTS MADE ON VEGETATED TARGETS DURING THE DAY. ANY GAPS IN THE TIME PLOT MEAN THAT DATA WAS MISSING. THE Y AXIS IS REPRESENTED BY STANDARD VISUAL RANGE AS WELL AS PERCEIVED VISUAL AIR QUALITY. THE DATA ARE PLOTTED IN SUCH A WAY THAT A CHANGE IN VISUAL AIR QUALITY WOULD BE PERCEIVED TO BE THE SAME WHETHER THAT CHANGE TOOK PLACE AT THE BOTTOM (DIRTY AIR) OR TOP (CLEAN AIR) OF THE SCALE.



FOR ANY POINT ON THE SLOPING LINE IN THE CUMULATIVE FREQUENCY OF OCCURRENCE PLOT ABOVE "X" PERCENT OF THE TIME THE STANDARD VISUAL RANGE (SVR) WAS "Y" OR LESS. THE SVR VALUES FOR THE 10% 50% AND 90% FREQUENCY OF OCCURRENCE ARE:

PERCENT	SVR (KM)
10.	33
50.	66
90.	130

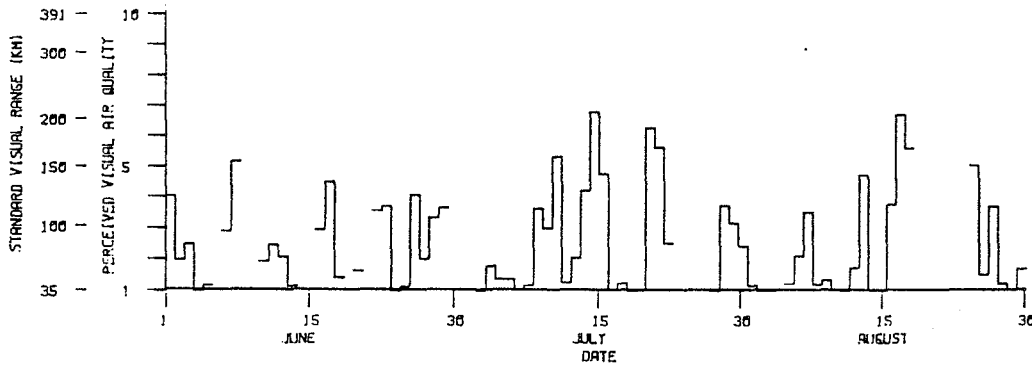
PREPARED BY:
AIR RESOURCE SPECIALISTS, INC.

SUMMER 1981 VISIBILITY REPORT FOR

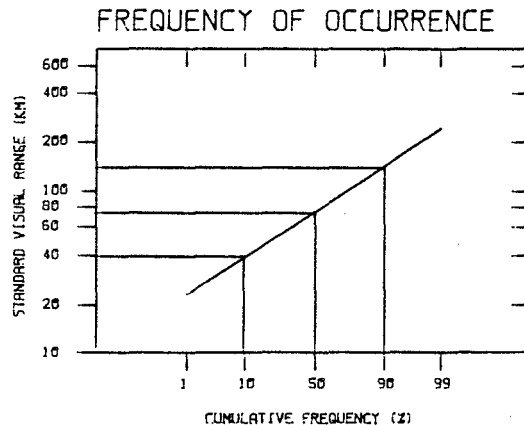
ACADIA MAINE

FIGURE 3

DAILY VARIATION OF STANDARD VISUAL AIR QUALITY



EACH BAR IN THE DAILY VISUAL AIR QUALITY TIME PLOT ABOVE IS THE GEOMETRIC MEAN OF THE TELERRADIOMETER MEASUREMENTS MADE ON VEGETATED TARGETS DURING THE DAY. ANY GAPS IN THE TIME PLOT MEAN THAT DATA WAS MISSING. THE Y AXIS IS REPRESENTED BY STANDARD VISUAL RANGE AS WELL AS PERCEIVED VISUAL AIR QUALITY. THE DATA ARE PLOTTED IN SUCH A WAY THAT A CHANGE IN VISUAL AIR QUALITY WOULD BE PERCEIVED TO BE THE SAME WHETHER THAT CHANGE TOOK PLACE AT THE BOTTOM (DIRTY AIR) OR TOP (CLEAN AIR) OF THE SCALE.



FOR ANY POINT ON THE SLOPING LINE IN THE CUMULATIVE FREQUENCY OF OCCURRENCE PLOT ABOVE "X" PERCENT OF THE TIME THE STANDARD VISUAL RANGE (SVR) WAS "Y" OR LESS. THE SVR VALUES FOR THE 10% 50% AND 90% FREQUENCY OF OCCURRENCE ARE:

PERCENT	SVR (KM)
10.	39
50.	73
90.	140

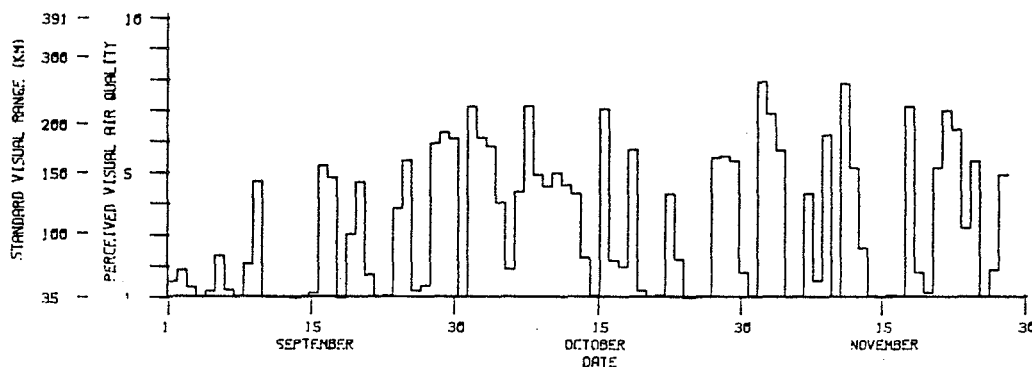
PREPARED BY:
AIR RESOURCE SPECIALISTS, INC.
10/28/83

FALL 1981 VISIBILITY REPORT FOR

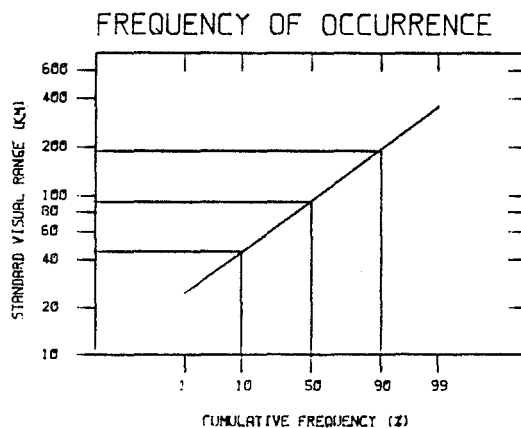
ACADIA MAINE

FIGURE 4

DAILY VARIATION OF STANDARD VISUAL AIR QUALITY



EACH BAR IN THE DAILY VISUAL AIR QUALITY TIME PLOT ABOVE IS THE GEOMETRIC MEAN OF THE TELERADIOMETER MEASUREMENTS MADE ON VEGETATED TARGETS DURING THE DAY. ANY GAPS IN THE TIME PLOT MEAN THAT DATA WAS MISSING. THE Y AXIS IS REPRESENTED BY STANDARD VISUAL RANGE AS WELL AS PERCEIVED VISUAL AIR QUALITY. THE DATA ARE PLOTTED IN SUCH A WAY THAT A CHANGE IN VISUAL AIR QUALITY WOULD BE PERCEIVED TO BE THE SAME WHETHER THAT CHANGE TOOK PLACE AT THE BOTTOM (DIRTY AIR) OR TOP (CLEAN AIR) OF THE SCALE.



FOR ANY POINT ON THE SLOPING LINE IN THE CUMULATIVE FREQUENCY OF OCCURRENCE PLOT ABOVE "X" PERCENT OF THE TIME THE STANDARD VISUAL RANGE (SVR) WAS "Y" OR LESS. THE SVR VALUES FOR THE 10% 50% AND 90% FREQUENCY OF OCCURRENCE ARE:

PERCENT	SVR (KM)
10.	44
50.	92
90.	190

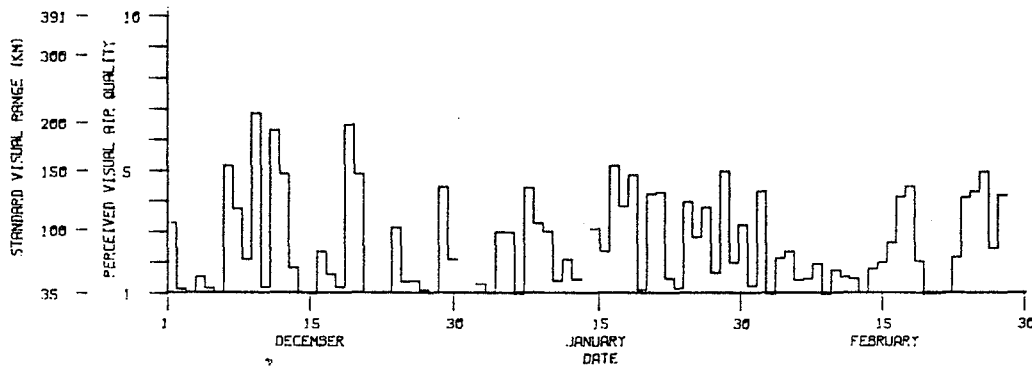
PREPARED BY:
AIR RESOURCE SPECIALISTS, INC.
10/28/83

WINTER 1982 VISIBILITY REPORT FOR

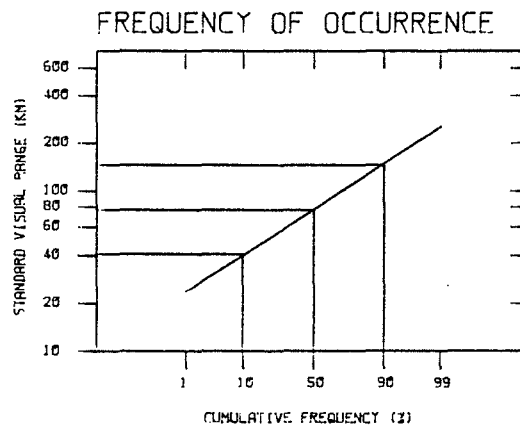
ACADIA MAINE

FIGURE 5

DAILY VARIATION OF STANDARD VISUAL AIR QUALITY



EACH BAR IN THE DAILY VISUAL AIR QUALITY TIME PLOT ABOVE IS THE GEOMETRIC MEAN OF THE TELERADIOMETER MEASUREMENTS MADE ON VEGETATED TARGETS DURING THE DAY. ANY GAPS IN THE TIME PLOT MEAN THAT DATA WAS MISSING. THE Y AXIS IS REPRESENTED BY STANDARD VISUAL RANGE AS WELL AS PERCEIVED VISUAL AIR QUALITY. THE DATA ARE PLOTTED IN SUCH A WAY THAT A CHANGE IN VISUAL AIR QUALITY WOULD BE PERCEIVED TO BE THE SAME WHETHER THAT CHANGE TOOK PLACE AT THE BOTTOM (DIRTY AIR) OR TOP (CLEAN AIR) OF THE SCALE.



FOR ANY POINT ON THE SLOPING LINE IN THE CUMULATIVE FREQUENCY OF OCCURRENCE PLOT ABOVE "X" PERCENT OF THE TIME THE STANDARD VISUAL RANGE (SVR) WAS "Y" OR LESS. THE SVR VALUES FOR THE 10% 50% AND 90% FREQUENCY OF OCCURRENCE ARE.

PERCENT	SVR (KM)
10.	40
50.	76
90.	146

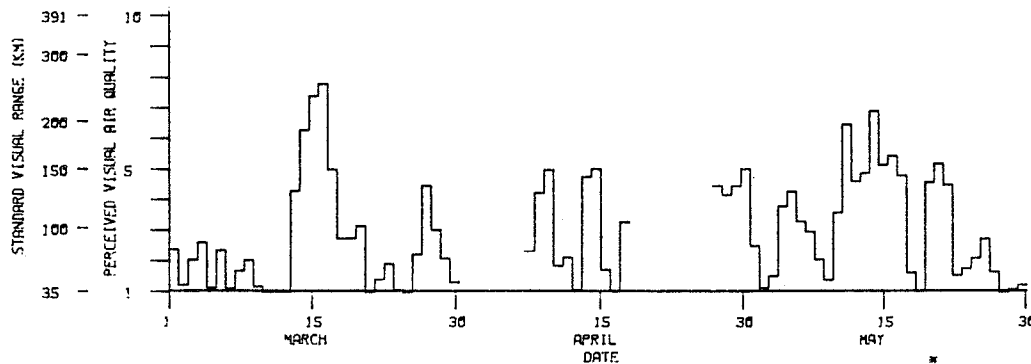
PREPARED BY:
AIP RESOURCE SPECIALISTS, INC.
10/28/83

SPRING 1982 VISIBILITY REPORT FOR

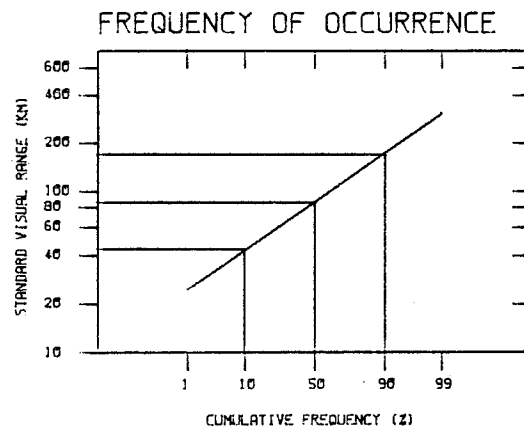
ACADIA MAINE

FIGURE 6

DAILY VARIATION OF STANDARD VISUAL AIR QUALITY



EACH BAR IN THE DAILY VISUAL AIR QUALITY TIME PLOT ABOVE IS THE GEOMETRIC MEAN OF THE TELERADIOMETER MEASUREMENTS MADE ON VEGETATED TARGETS DURING THE DAY. ANY GAPS IN THE TIME PLOT MEAN THAT DATA WAS MISSING. THE Y AXIS IS REPRESENTED BY STANDARD VISUAL RANGE AS WELL AS PERCEIVED VISUAL AIR QUALITY. THE DATA ARE PLOTTED IN SUCH A WAY THAT A CHANGE IN VISUAL AIR QUALITY WOULD BE PERCEIVED TO BE THE SAME WHETHER THAT CHANGE TOOK PLACE AT THE BOTTOM (DIRTY AIR) OR TOP (CLEAN AIR) OF THE SCALE.



FOR ANY POINT ON THE SLOPING LINE IN THE CUMULATIVE FREQUENCY OF OCCURRENCE PLOT ABOVE "X" PERCENT OF THE TIME THE STANDARD VISUAL RANGE (SVR) WAS "Y" OR LESS. THE SVR VALUES FOR THE 10% 50% AND 90% FREQUENCY OF OCCURRENCE ARE:

PERCENT	SVR (KM)
10.	43
50.	86
90.	170

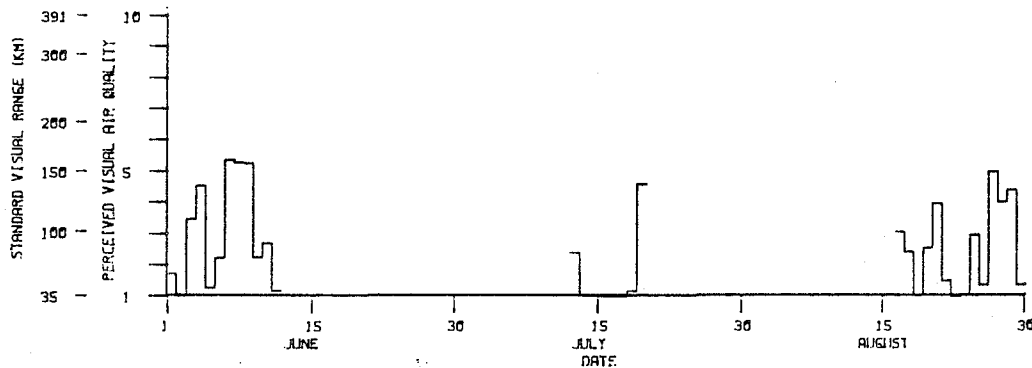
PREPARED BY:
AIR RESOURCE SPECIALISTS, INC.
10/28/83

SUMMER 1982 VISIBILITY REPORT FOR

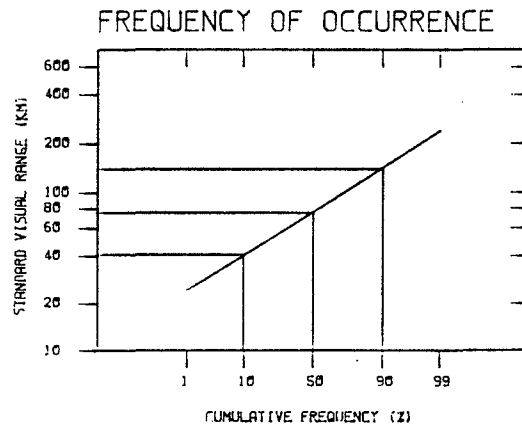
ACADIA MAINE

FIGURE 7

DAILY VARIATION OF STANDARD VISUAL AIR QUALITY



EACH BAR IN THE DAILY VISUAL AIR QUALITY TIME PLOT ABOVE IS THE GEOMETRIC MEAN OF THE TELERADIOMETER MEASUREMENTS MADE ON VEGETATED TARGETS DURING THE DAY. ANY GAPS IN THE TIME PLOT MEAN THAT DATA WAS MISSING. THE Y AXIS IS REPRESENTED BY STANDARD VISUAL RANGE AS WELL AS PERCEIVED VISUAL AIR QUALITY. THE DATA ARE PLOTTED IN SUCH A WAY THAT A CHANGE IN VISUAL AIR QUALITY WOULD BE PERCEIVED TO BE THE SAME WHETHER THAT CHANGE TOOK PLACE AT THE BOTTOM (DIRTY AIR) OR TOP (CLEAN AIR) OF THE SCALE.



FOR ANY POINT ON THE SLOPING LINE IN THE CUMULATIVE FREQUENCY OF OCCURRENCE PLOT ABOVE "X" PERCENT OF THE TIME THE STANDARD VISUAL RANGE (SVR) WAS "Y" OR LESS. THE SVR VALUES FOR THE 10% 50% AND 90% FREQUENCY OF OCCURRENCE ARE:

PERCENT	SVR (KM)
10.	40
50.	75
90.	140

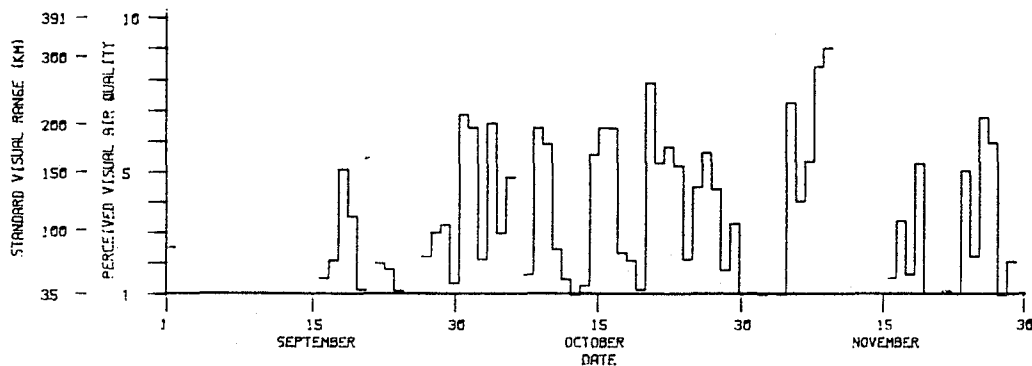
PREPARED BY:
AIR RESOURCE SPECIALISTS, INC.
8/28/83

FALL 1982 VISIBILITY REPORT FOR

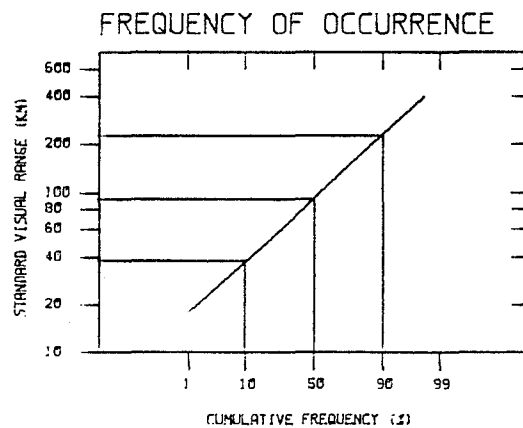
ACADIA MAINE

FIGURE 8

DAILY VARIATION OF STANDARD VISUAL AIR QUALITY



EACH BAR IN THE DAILY VISUAL AIR QUALITY TIME PLOT ABOVE IS THE GEOMETRIC MEAN OF THE TELERADIOMETER MEASUREMENTS MADE ON VEGETATED TARGETS DURING THE DAY. ANY GAPS IN THE TIME PLOT MEAN THAT DATA WAS MISSING. THE Y AXIS IS REPRESENTED BY STANDARD VISUAL RANGE AS WELL AS PERCEIVED VISUAL AIR QUALITY. THE DATA ARE PLOTTED IN SUCH A WAY THAT A CHANGE IN VISUAL AIR QUALITY WOULD BE PERCEIVED TO BE THE SAME WHETHER THAT CHANGE TOOK PLACE AT THE BOTTOM (DIRTY AIR) OR TOP (CLEAN AIR) OF THE SCALE.



FOR ANY POINT ON THE SLOPING LINE IN THE CUMULATIVE FREQUENCY OF OCCURRENCE PLOT ABOVE "X" PERCENT OF THE TIME THE STANDARD VISUAL RANGE (SVR) WAS "Y" OR LESS. THE SVR VALUES FOR THE 10% 50% AND 90% FREQUENCY OF OCCURRENCE ARE:

PERCENT	SVR (KM)
10.	37
50.	92
90.	227

PREPARED BY:
AIR RESOURCE SPECIALISTS, INC.
10/28/83

Descriptions of the plots are provided below.

*Daily variation of standard visual range (SVR). This plot includes geometric mean standard visual range values for each day of the reported season. A standard visual range is calculated for each hour of the day, (hours 0800 - 1600 local time). Each bar represents the daily geometric mean of these hourly standard visual ranges. Gaps in the time line indicated that data were missing or did not meet quality control edits.

*Frequency of occurrence. This plot is a frequency distribution of SVR values for which the 10, 50, and 90 percentiles are tabulated. The Y axis is the standard visual range on a logarithmic scale. The X axis is the cumulative percent frequency of occurrence. A straight line indicates that the standard visual range has a log-normal distribution. Included in the data were observations when the target could not be seen. In these cases, the target distance was used to set an upper limit of the standard visual range. The median value corresponds to a cumulative frequency of 50 percent and is an approximation of the geometric mean.

It is important to note that the teleradiometer data for the Summer 1981 through the Fall 1982 seasons are questionable due to a malfunctioning of the filter turret. An attempt was made to salvage this data so that trends in visibility might be observed.

Table 2 lists the arithmetic mean, geometric mean, the 90% confidence interval about the arithmetic mean, and the maximum and minimum standard visual ranges for each season.

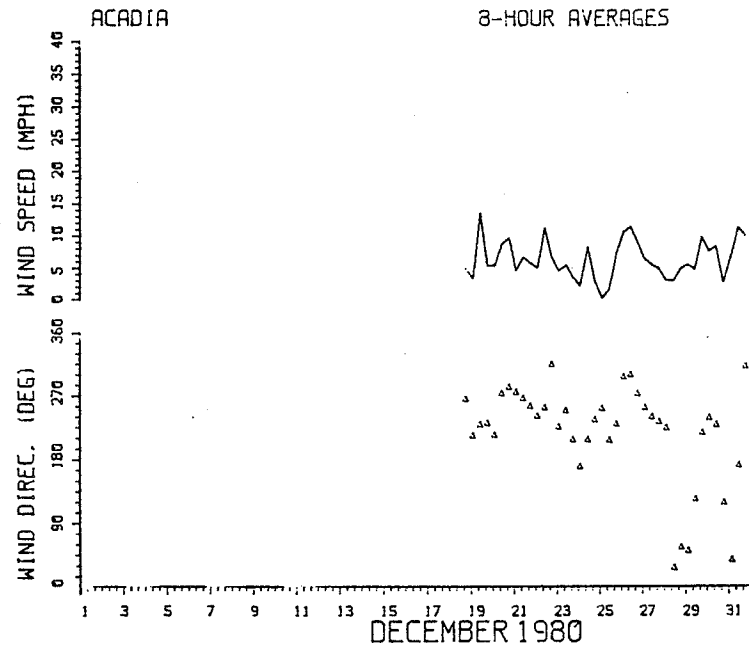
Wind measurements are useful in determining the source and of movement an air mass that impacts visibility. Figures 9-32 present monthly time plots of wind speed and direction and the resultant wind roses. An explanation of these plots is provided following the figures.

TABLE 2

SUMMARY STANDARD VISUAL AND (KM) STATISTICS
FOR ACADIA NATIONAL PARK

Season	Arithmetic Mean	Geom. Mean	Arith.90% Confidence Interval	Maximum SVR	Minimum SVR
WINTER 1981	65	57	53-62	278	28
SPRING 1981	86	75	64-89	380	28
SUMMER 1981	94	80	77-83	391	28
FALL 1981	114	90	86-94	391	29
WINTER 1982	94	80	77-83	391	28
SPRING 1982	104	88	85-92	391	28
SUMMER 1982	92	79	74-84	312	28
FALL 1982	126	101	96-106	391	28

FIGURE 9



ACADIA

DECEMBER 1980

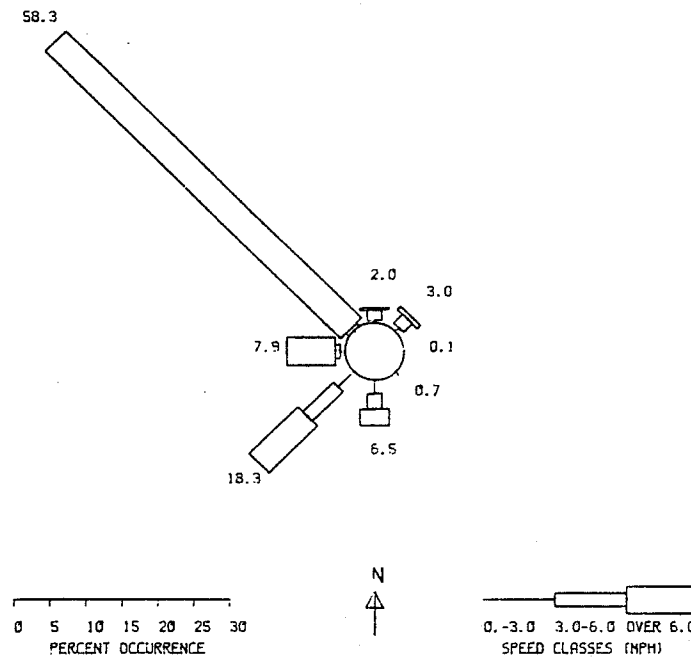
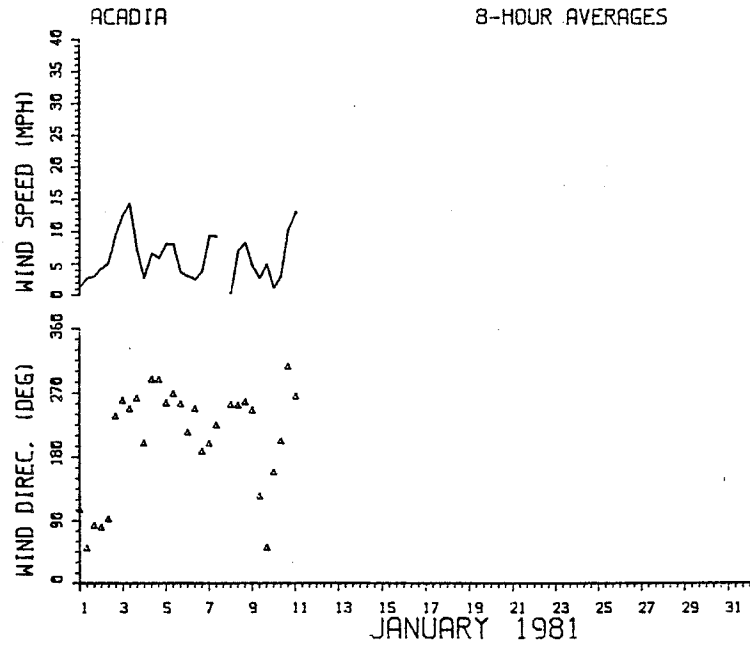


FIGURE 10



ACADIA JANUARY 1981

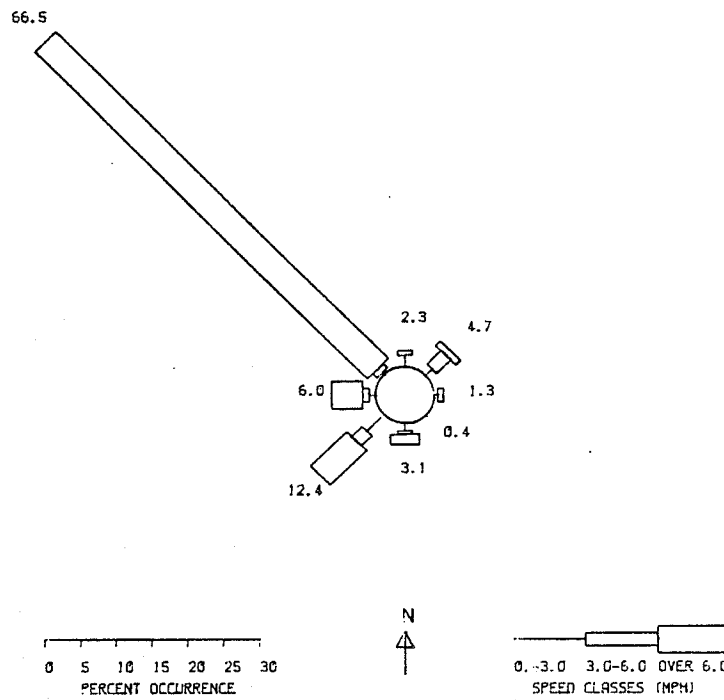
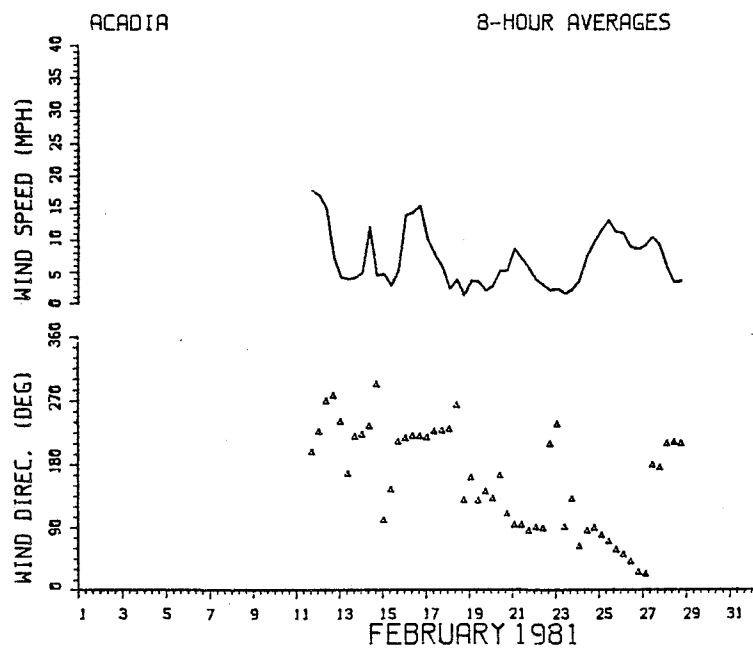


FIGURE 11



ACADIA

FEBRUARY 1981

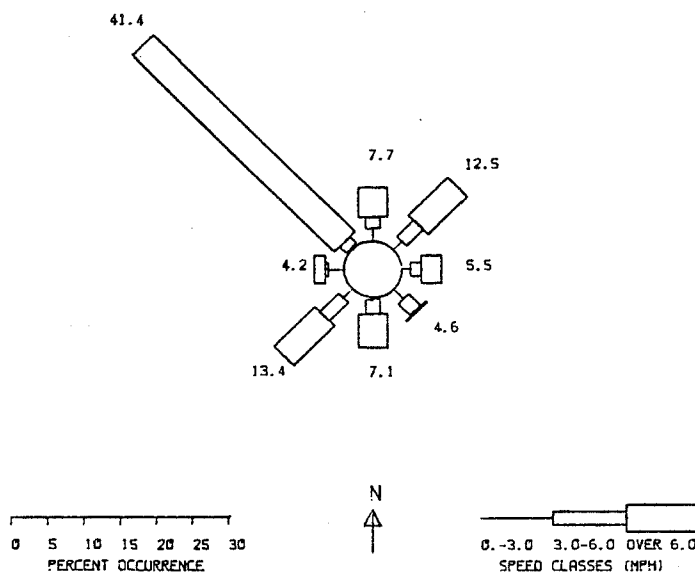


FIGURE 12

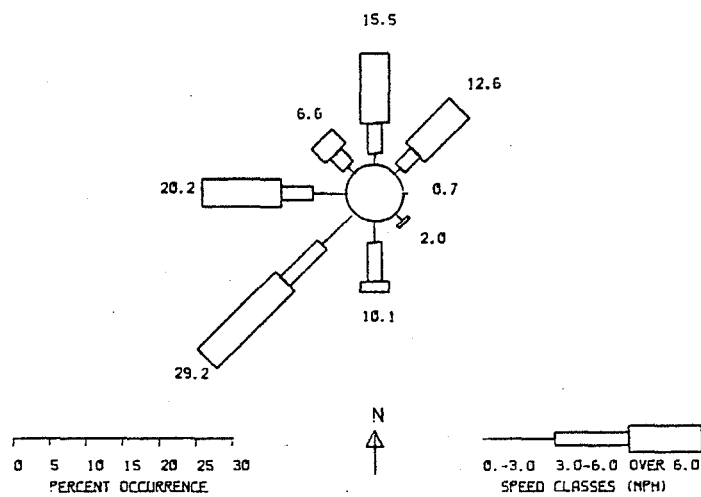
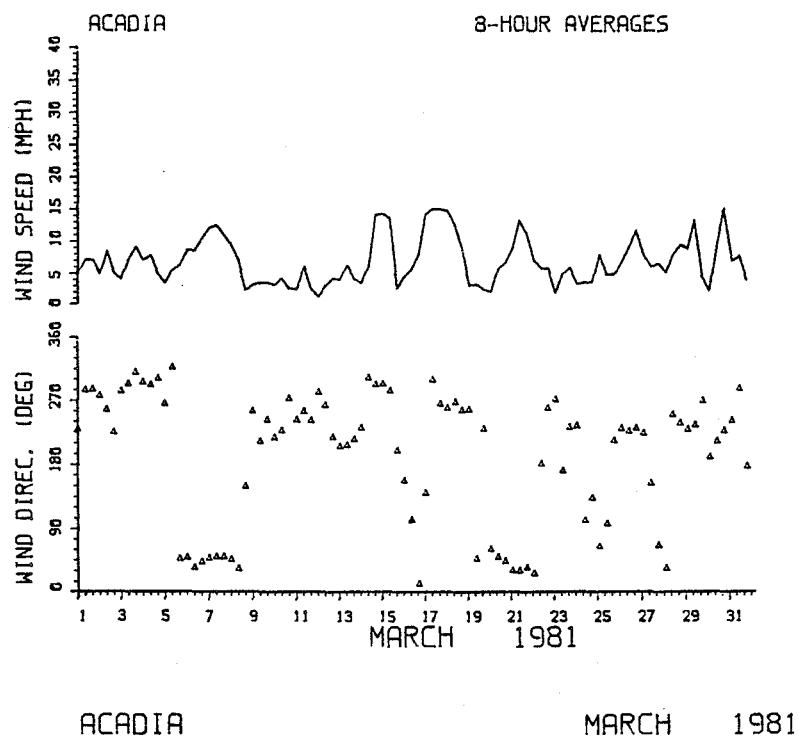
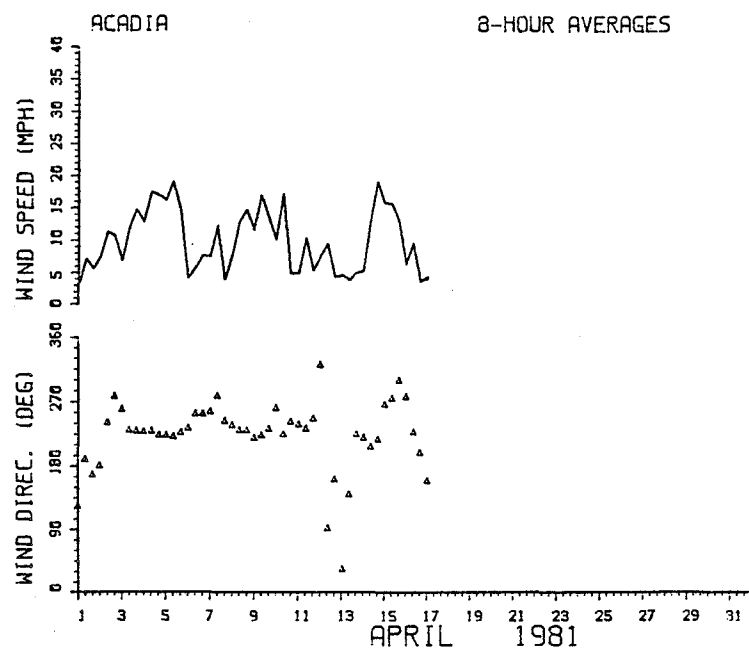


FIGURE 13



ACADIA

APRIL 1981

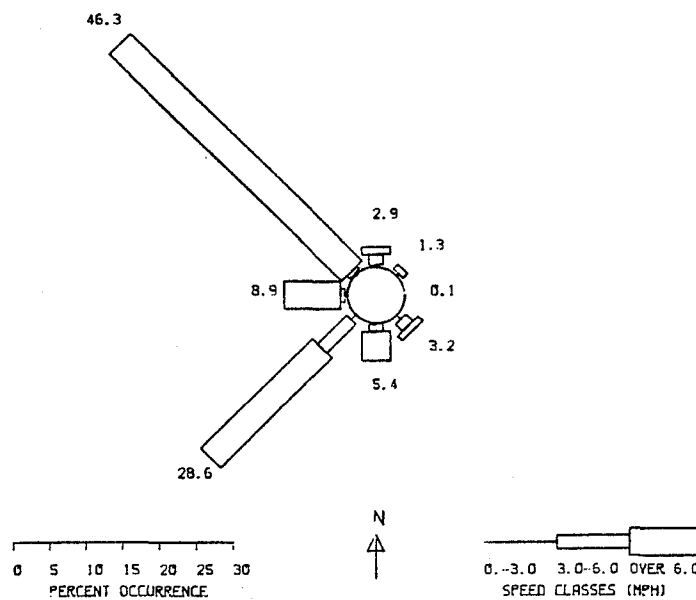
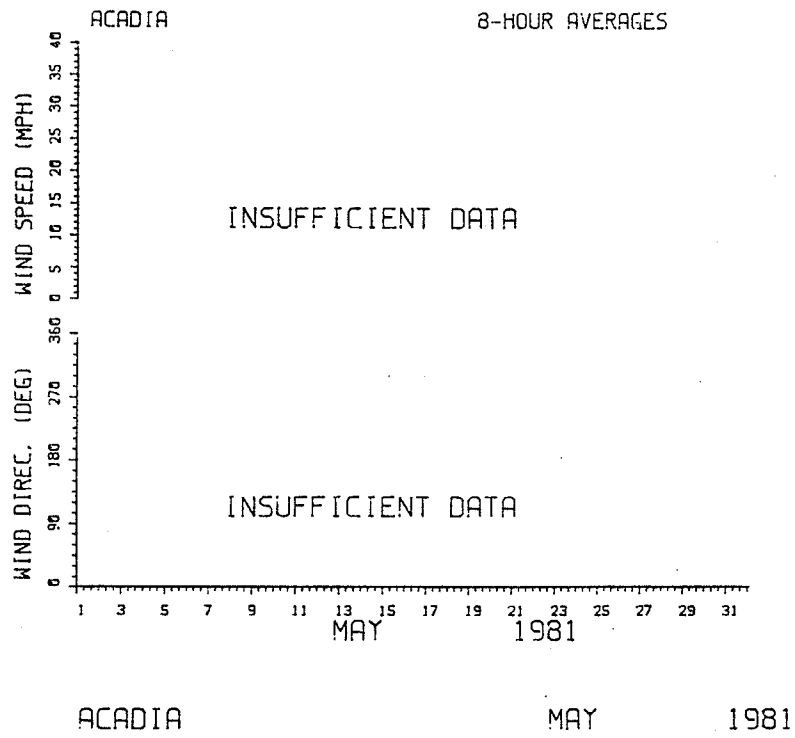
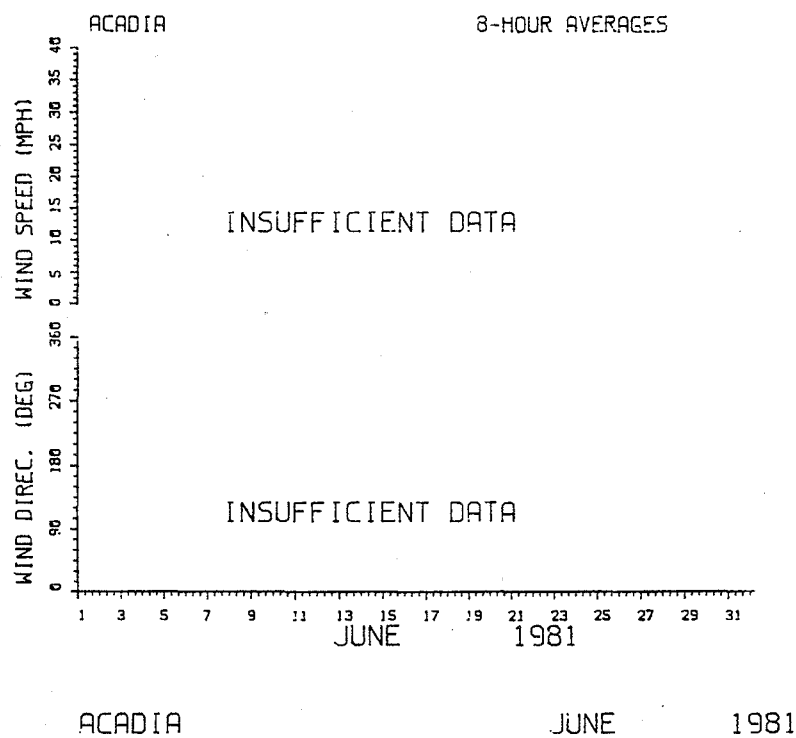


FIGURE 14



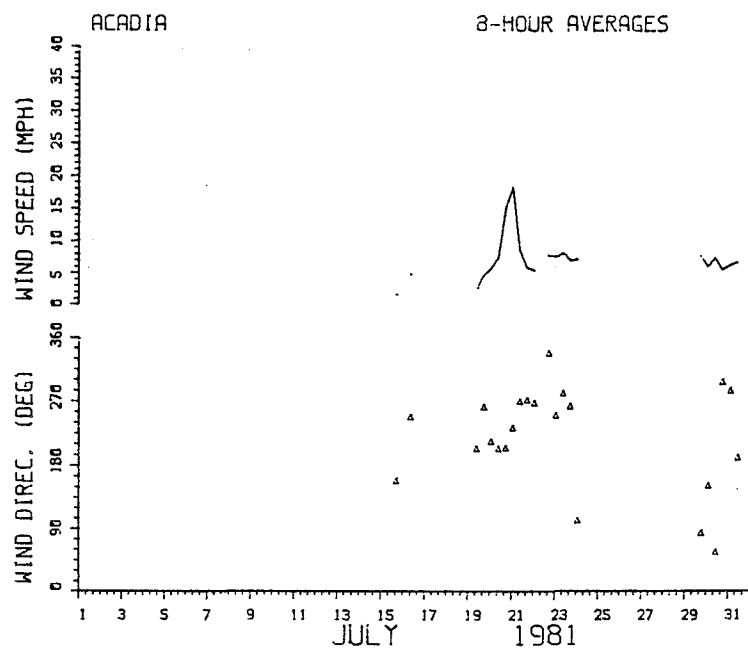
INSUFFICIENT DATA

FIGURE 15

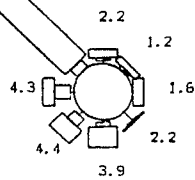


INSUFFICIENT DATA

FIGURE 16



77.0 ACADIA JULY 1981

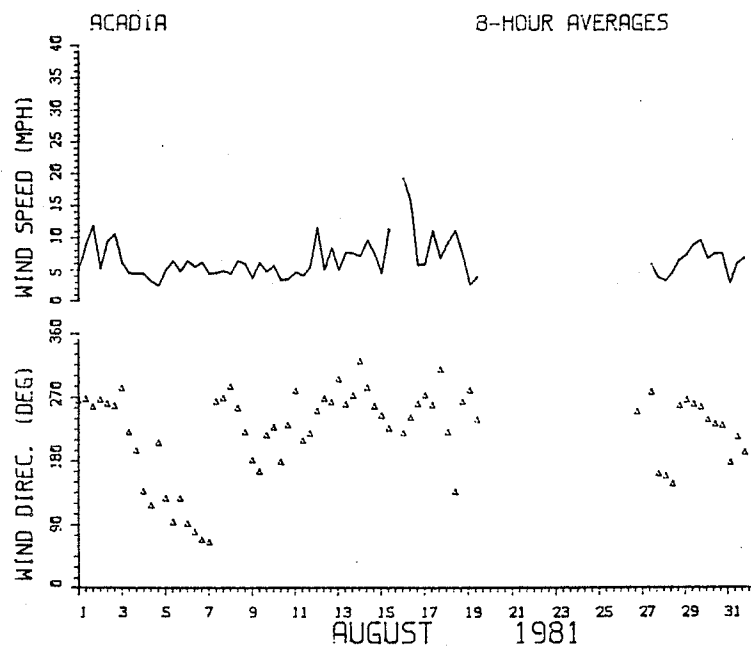


0 5 10 15 20 25 30
PERCENT OCCURRENCE

N
↑

0.-3.0 3.0-6.0 OVER 6.0
SPEED CLASSES (MPH)

FIGURE 17



ACADIA AUGUST 1981

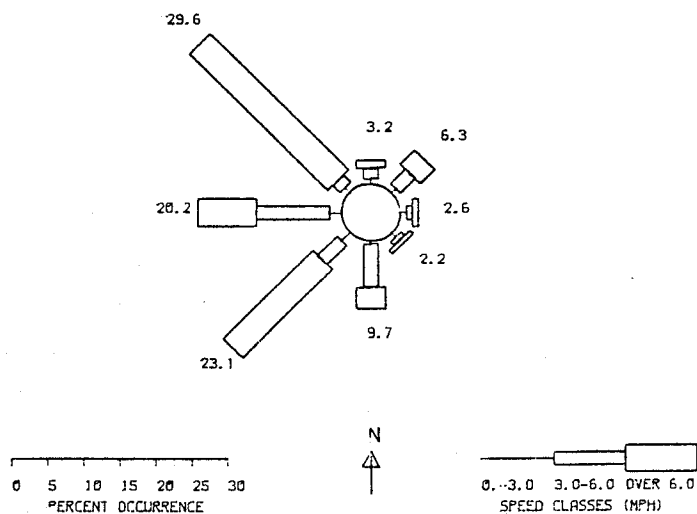
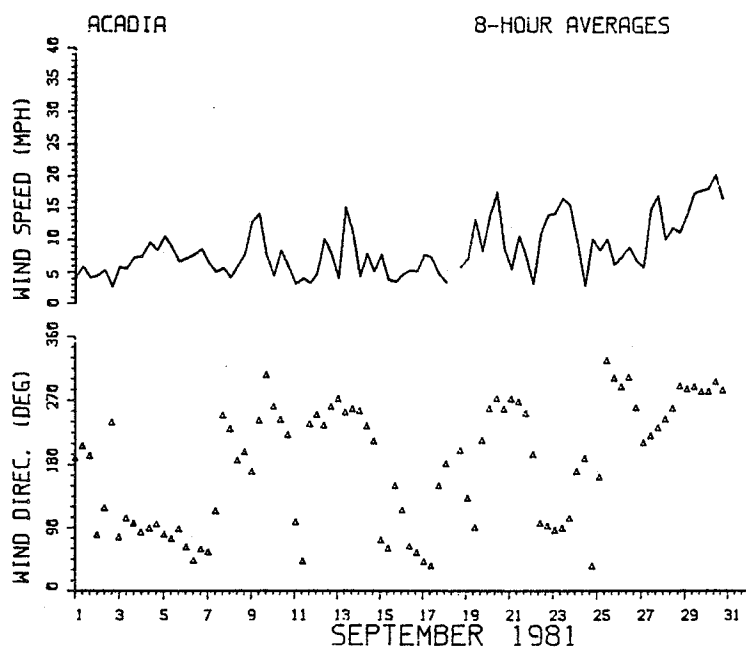


FIGURE 18



ACADIA

SEPTEMBER 1981

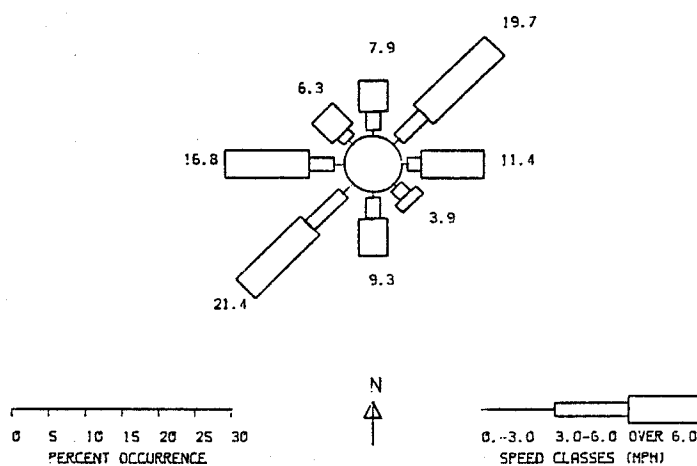


FIGURE 19

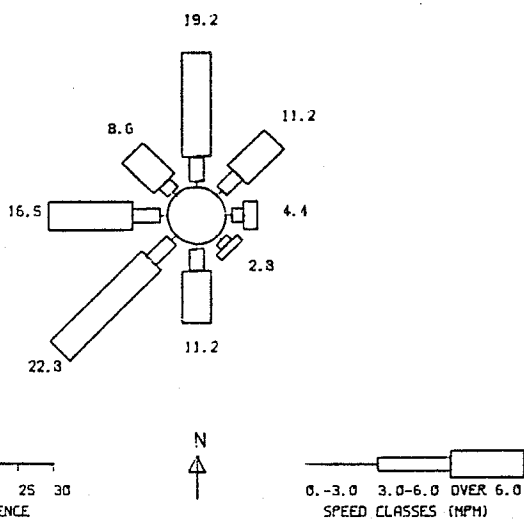
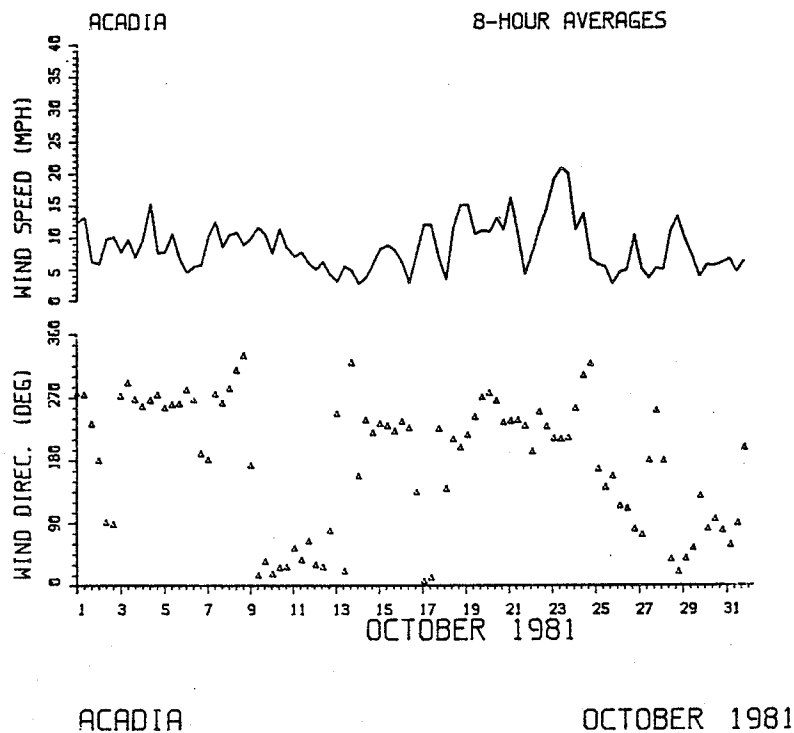
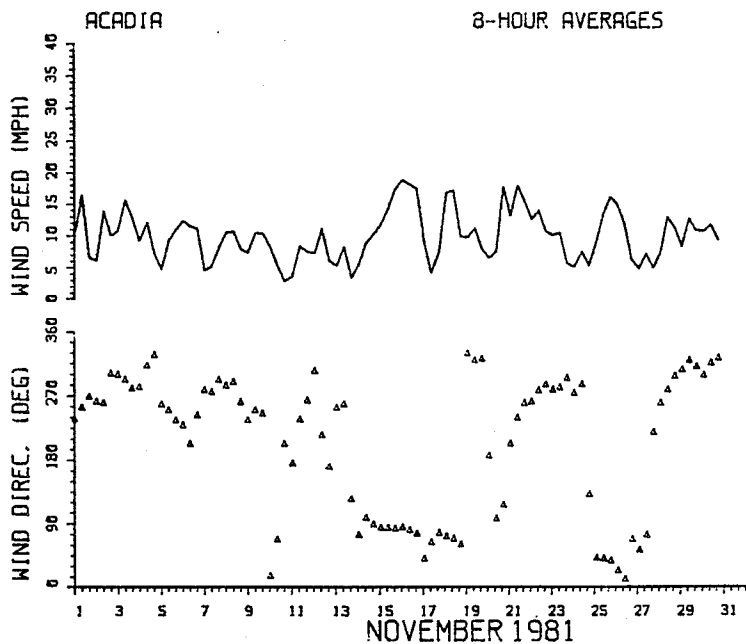


FIGURE 20



ACADIA

NOVEMBER 1981

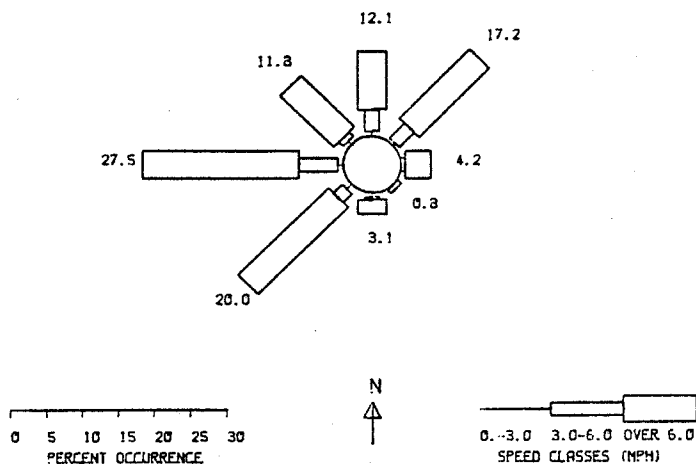
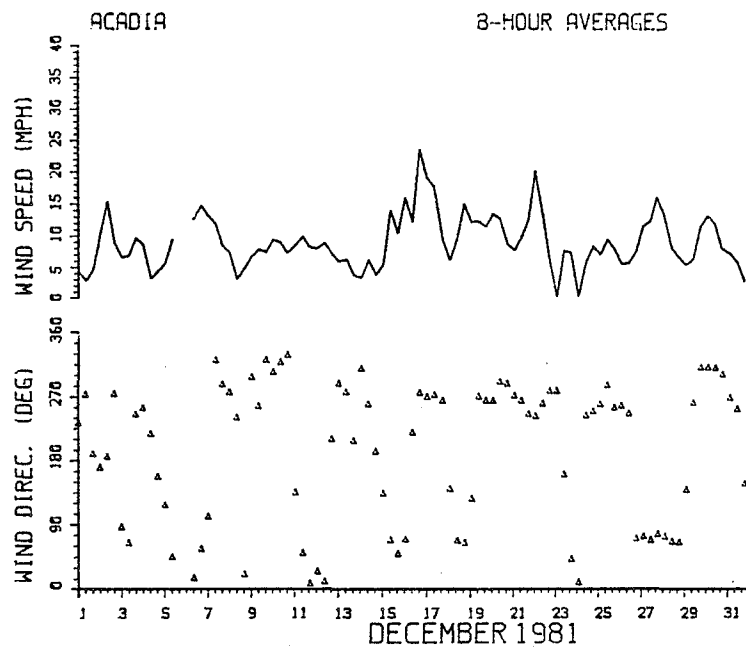


FIGURE 21



ACADIA

DECEMBER 1981

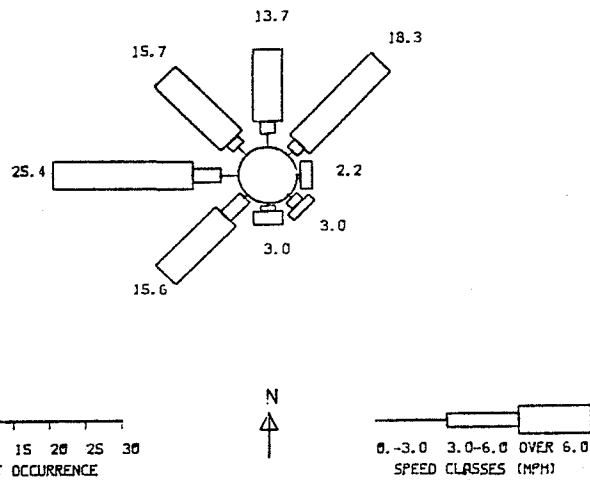
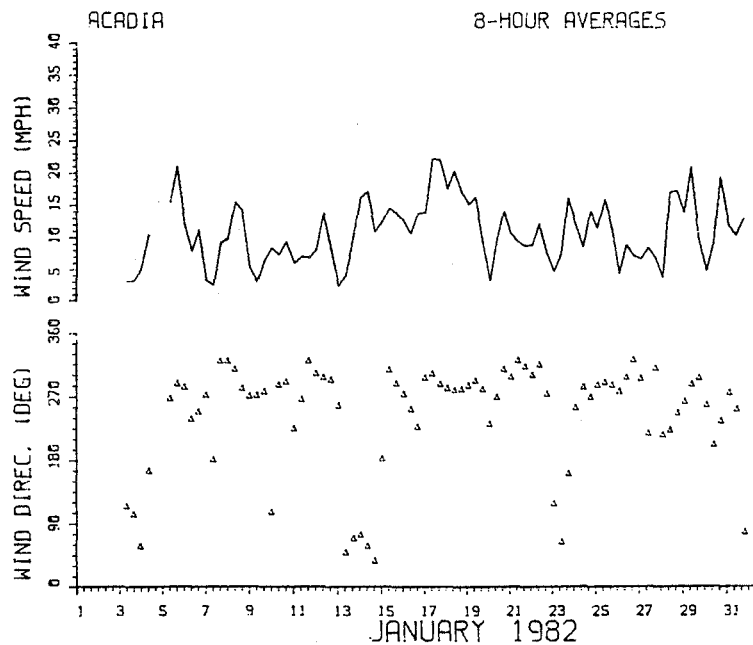


FIGURE 22



ACADIA

JANUARY 1982

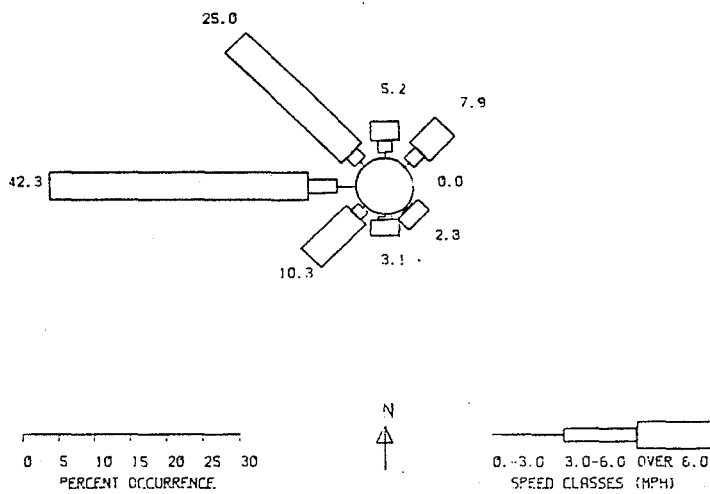
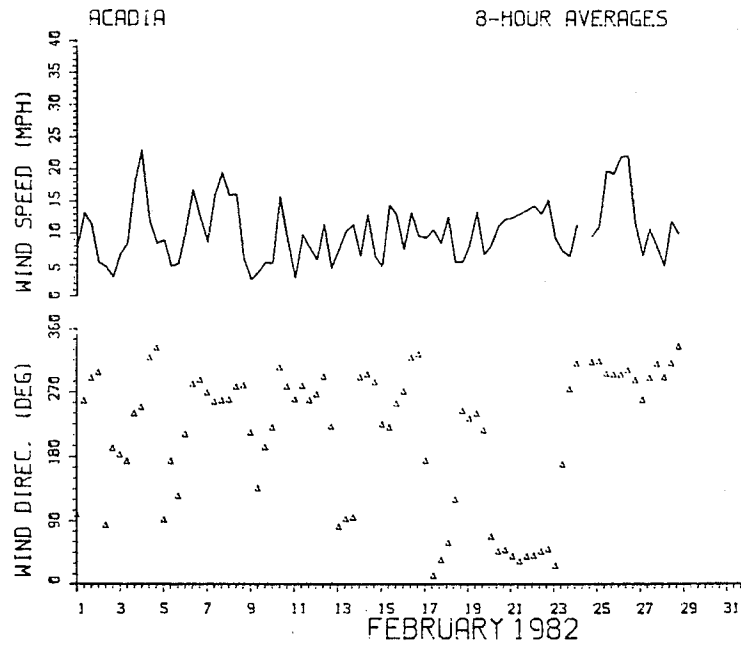


FIGURE 23



ACADIA

FEBRUARY 1982

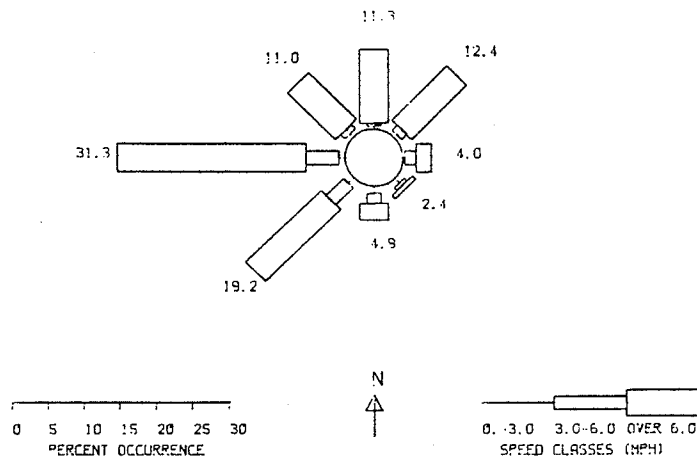
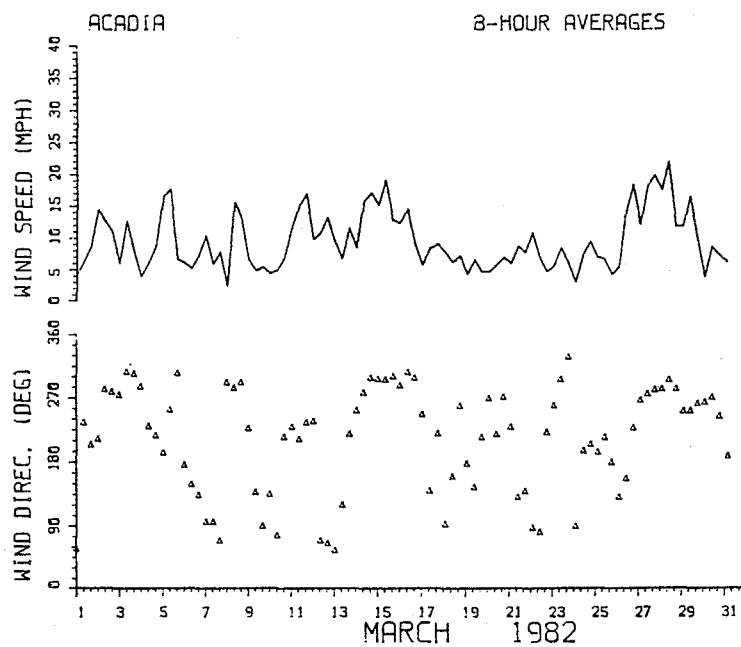


FIGURE 24



ACADIA

MARCH 1982

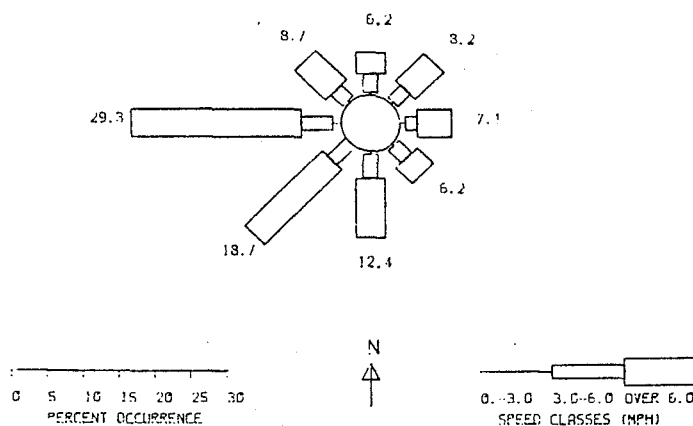
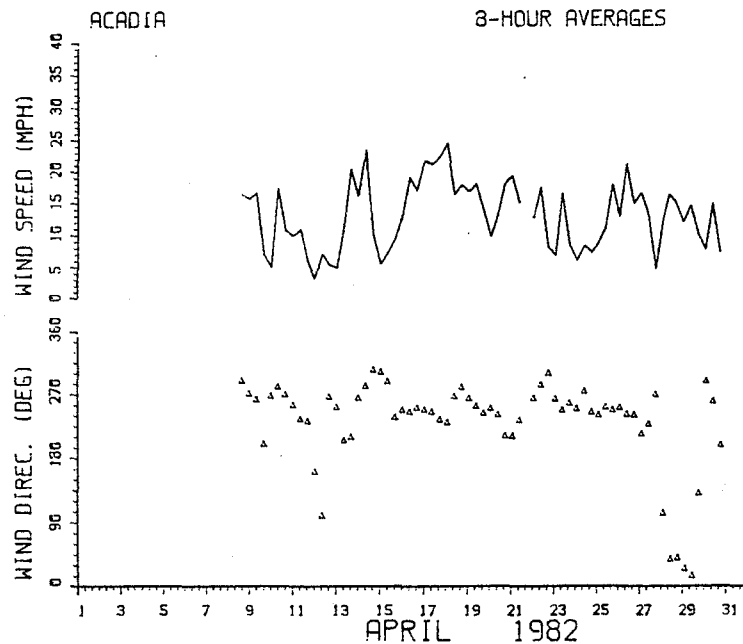


FIGURE 25



ACADIA APRIL 1982

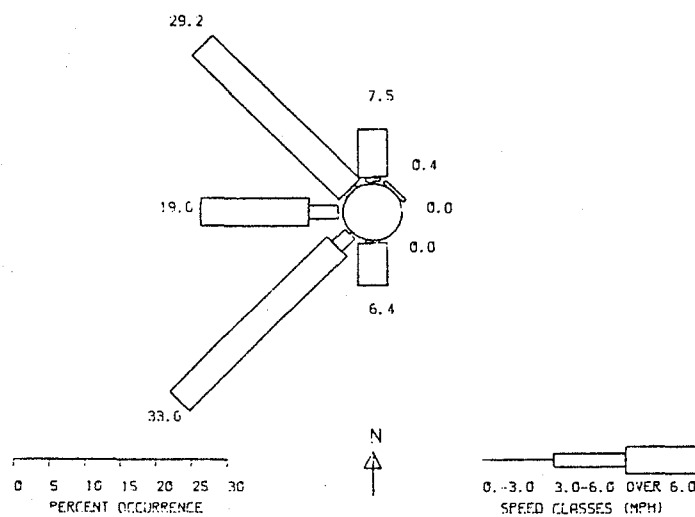
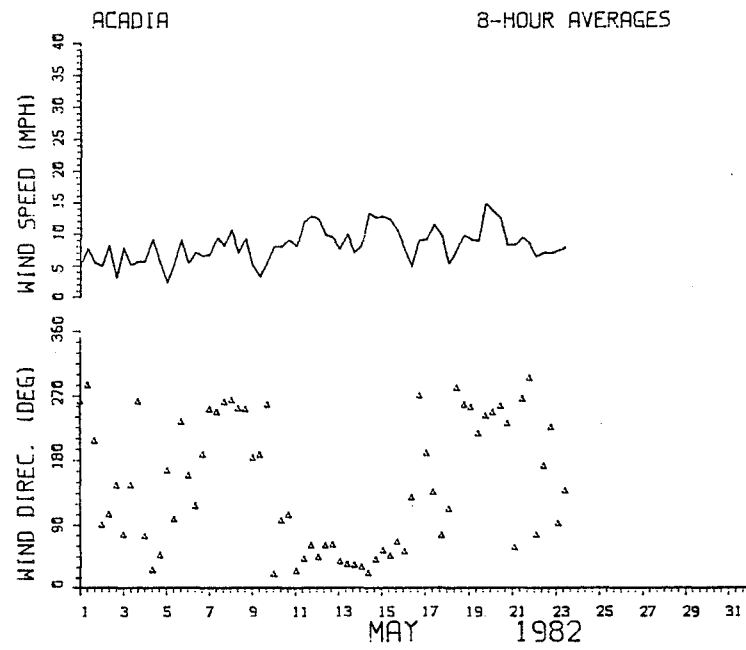


FIGURE 26



ACADIA MAY 1982

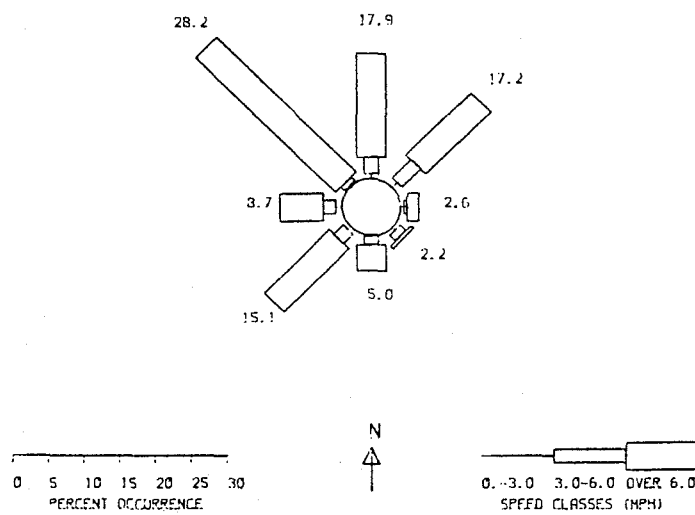
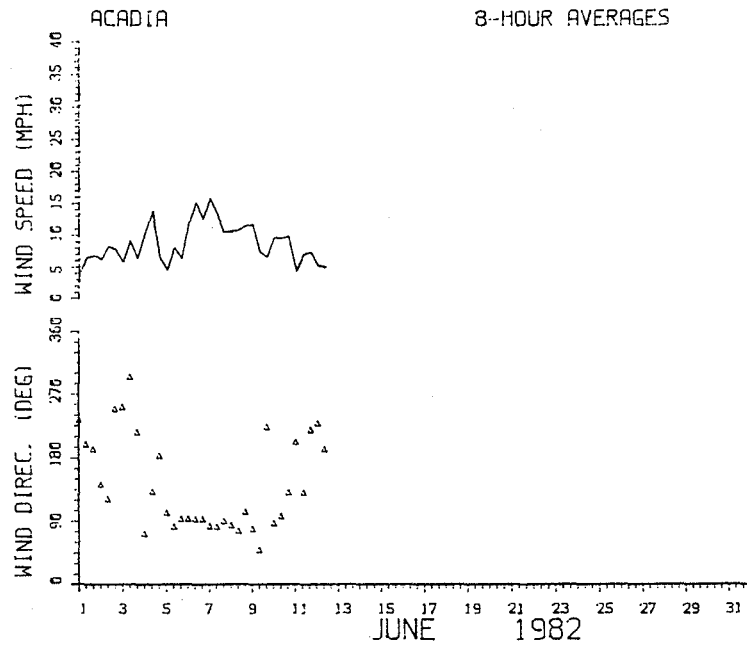


FIGURE 27



ACADIA JUNE 1982

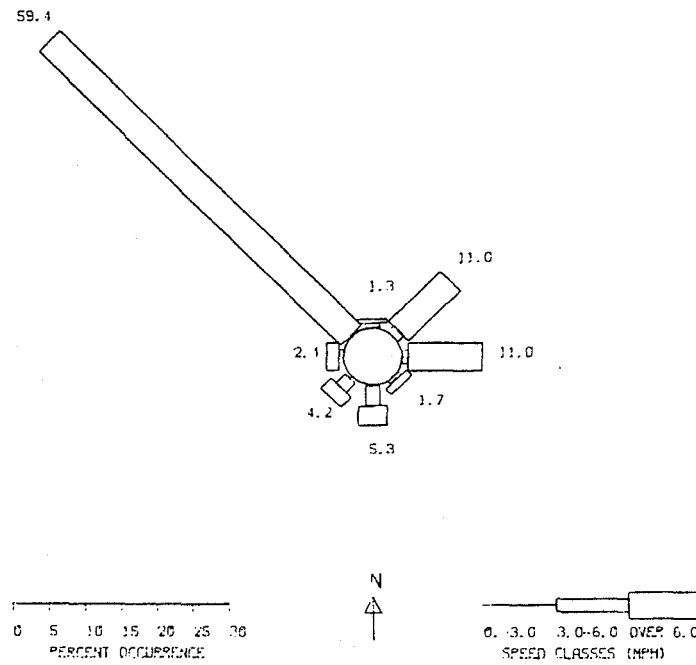


FIGURE 28

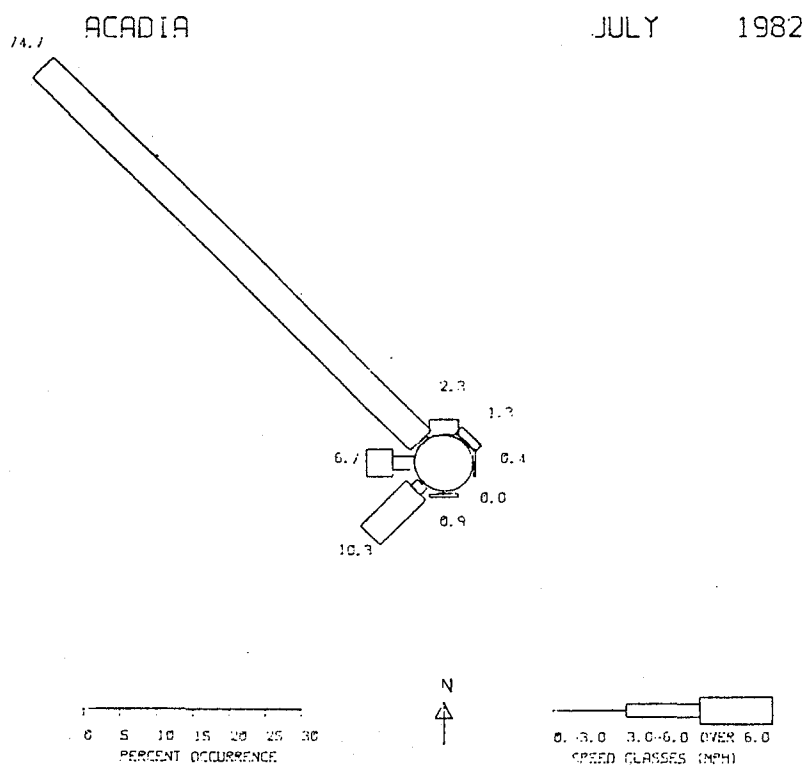
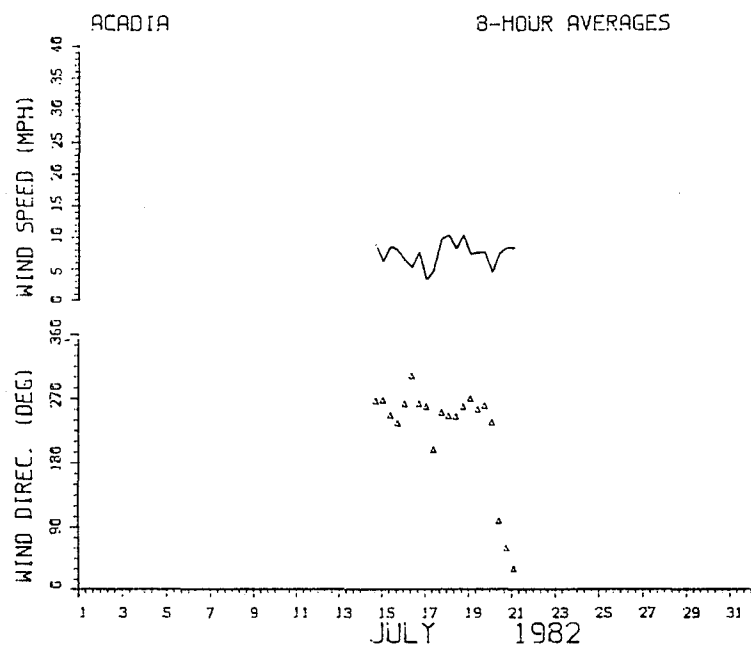
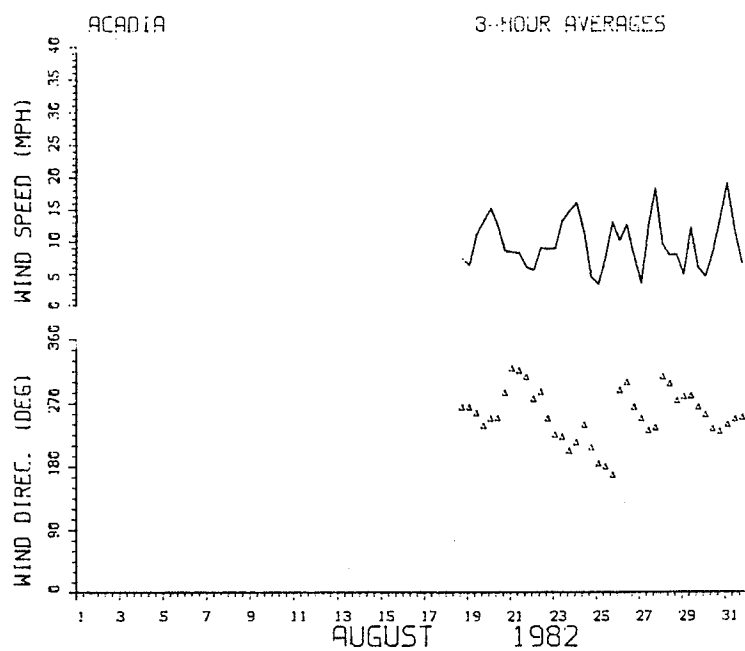


FIGURE 29



ACADIA AUGUST 1982

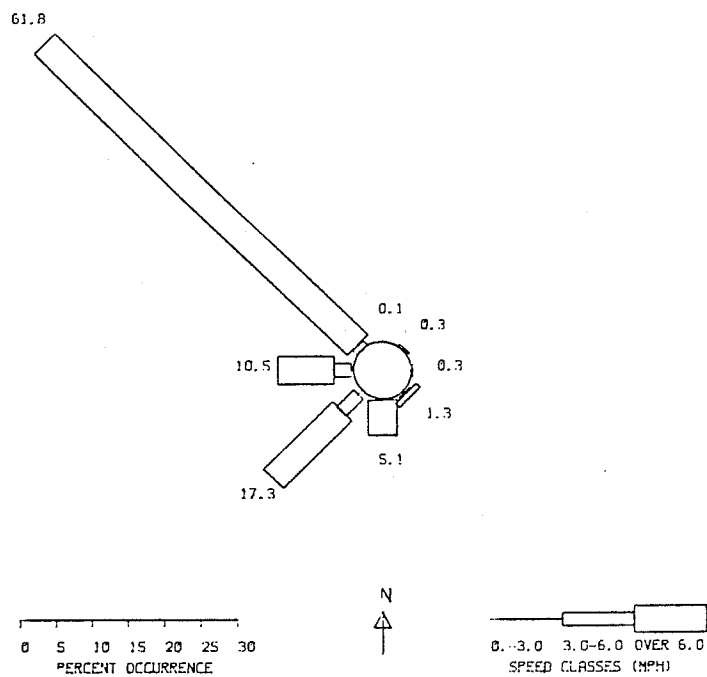
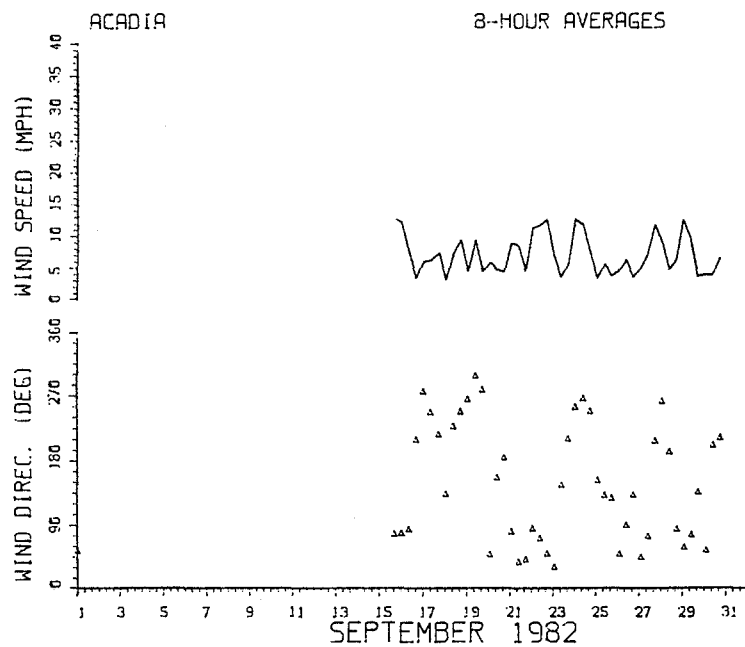


FIGURE 30



ACADIA SEPTEMBER 1982

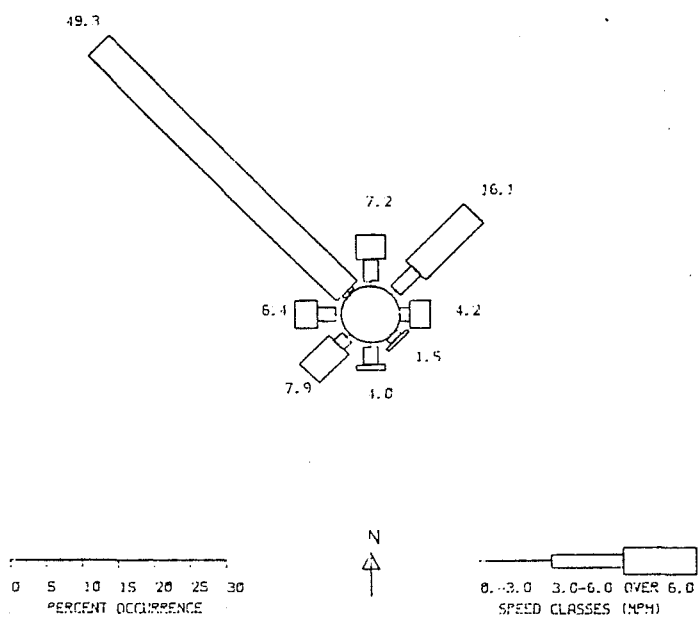


FIGURE 31

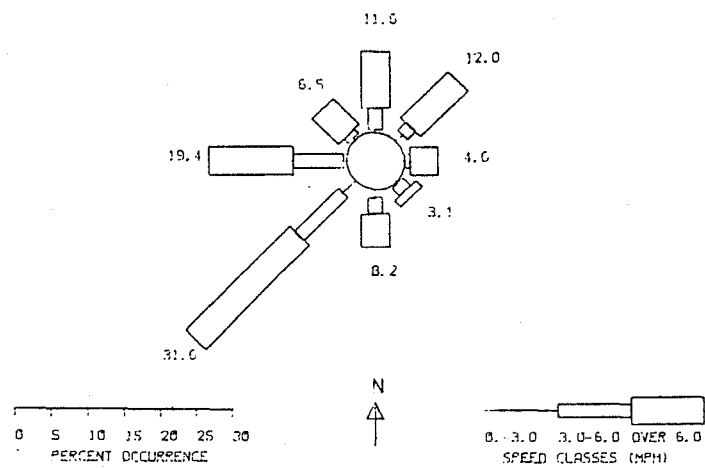
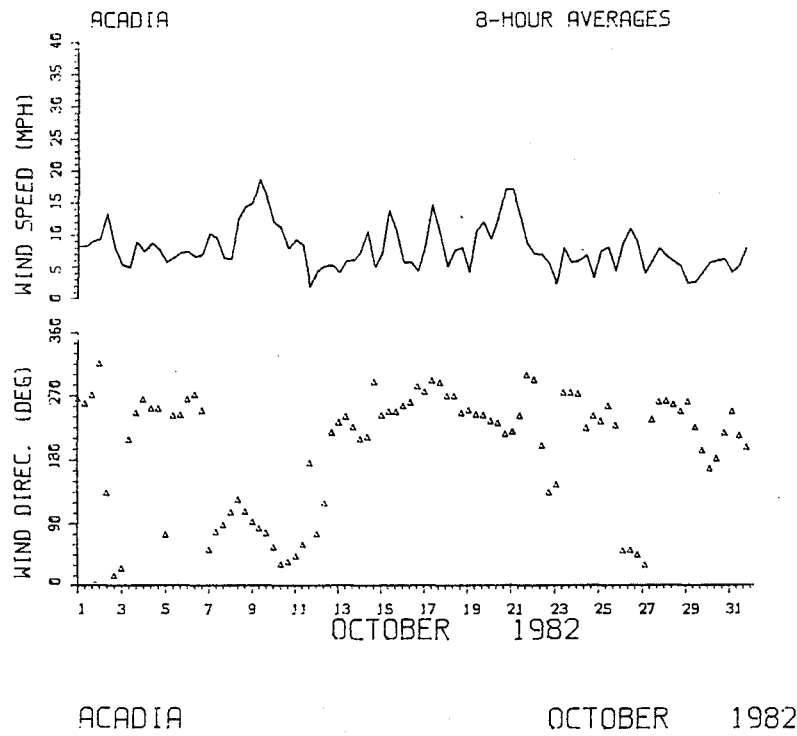
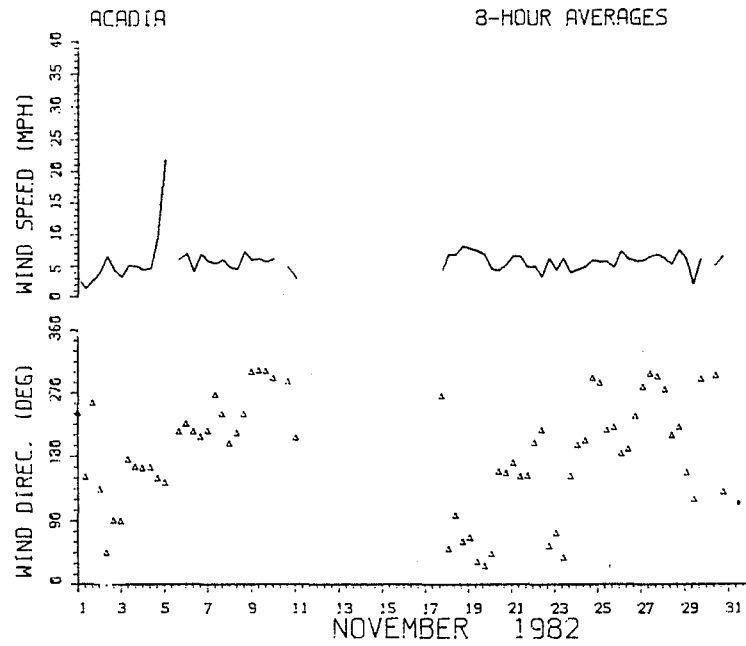
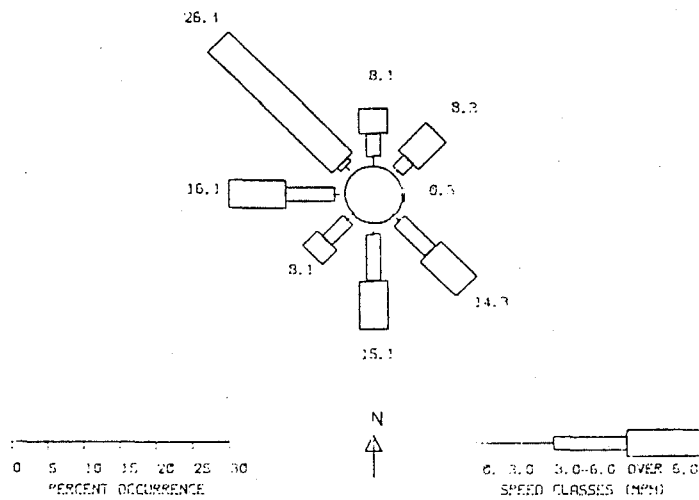


FIGURE 3 2



ACADIA

NOVEMBER 1982



*Temporal plot of wind speed and wind direction. This plot includes eight hour arithmetic means of wind speed in mph and eight hour vector averages of wind direction in degrees for each day of the reported month. Gaps in the time line indicate that data were missing or did not meet quality control edits.

*Wind rose. A frequency of occurrence plot of wind direction versus wind speed. The varying width of each bar indicates a wind speed range in mph and its position corresponds to a direction of the compass from which the wind was blowing. The length of each bar represents the percentage of the time that particular wind condition occurred.

Temperature and relative humidity measurements were also made to help characterize visibility at Acadia National Park. Figures 33-56 present monthly cumulative frequency distribution plots and temporal temperature and relative humidity plots for December 1980 through November 1982.

*Temporal plot of temperature and relative humidity. This plot presents the daily 8-hour averages of temperature and relative humidity for the reported month. Gaps in the time line represent that data were missing or did not meet quality control standards.

*Cumulative frequency plot of temperature and relative humidity. This plot is a frequency distribution of temperature values and relative humidity. The left hand Y axis is the temperature in degrees celsius and the right hand Y axis is the relative humidity in percent. The X axis is the cumulative percent frequency of occurrence. The median value corresponds to a cumulative frequency of 50 percent and is an approximation of the mean.

The major data losses during this reporting period were due to instrument malfunctions, some of which are listed below:

- o data logger malfunctions
- o teleradiometer misalignment
- o filter turret malfunction
- o meteorological sensors malfunction

FIGURE 33

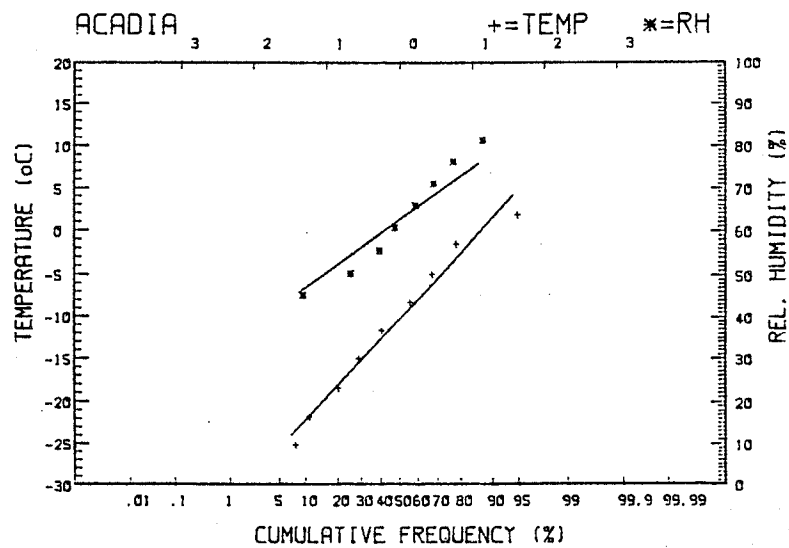
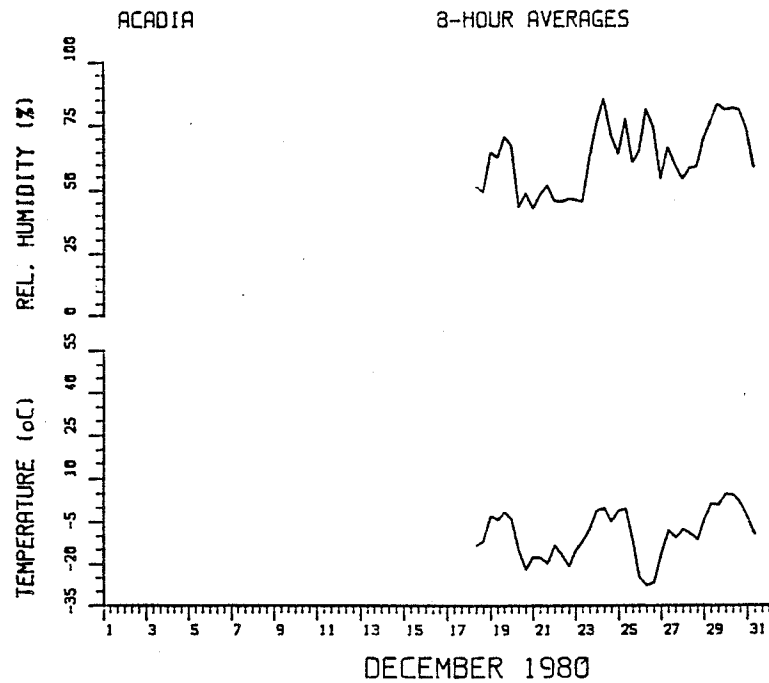


FIGURE 34

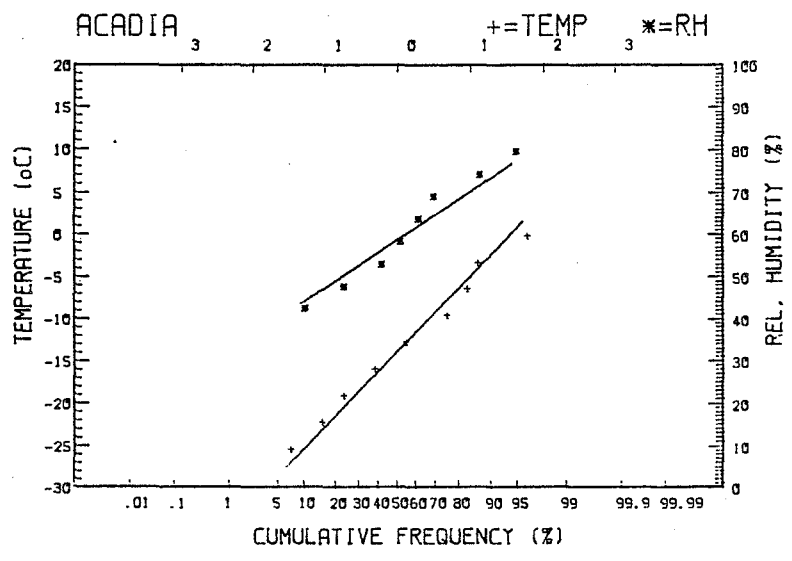
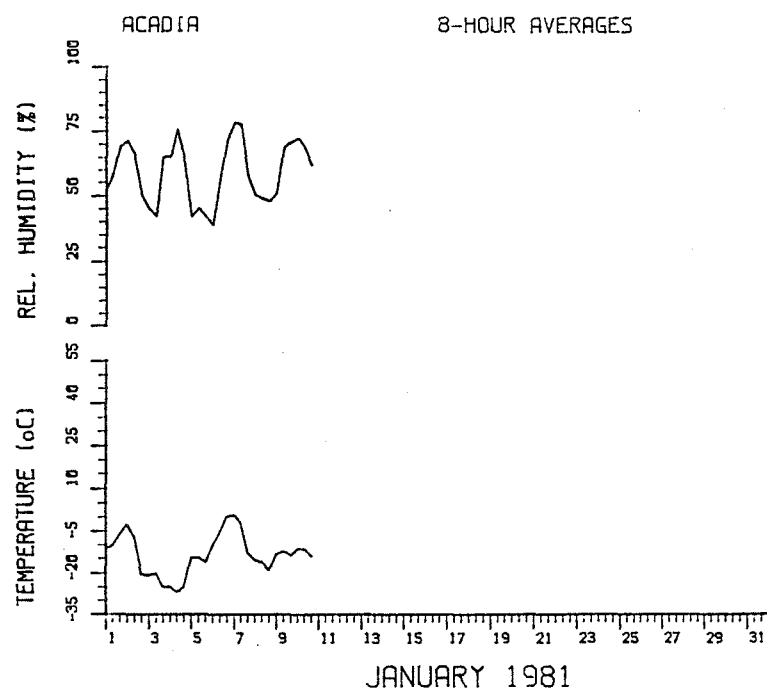


FIGURE 35

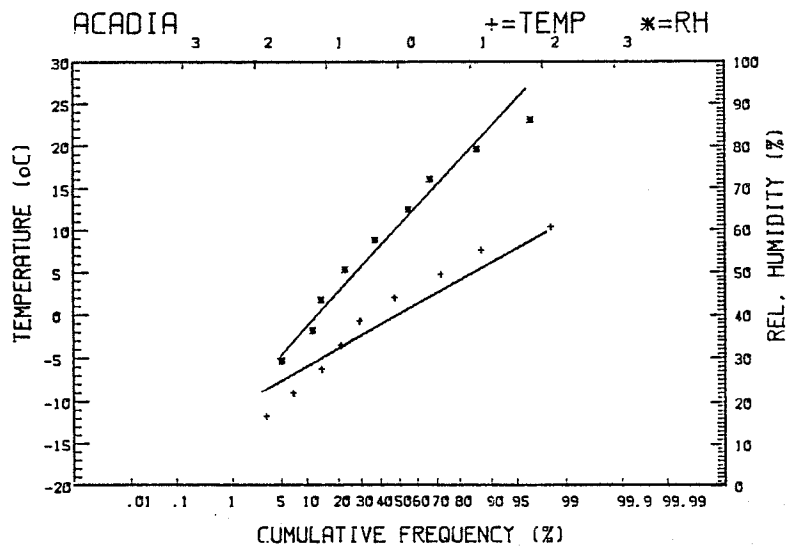
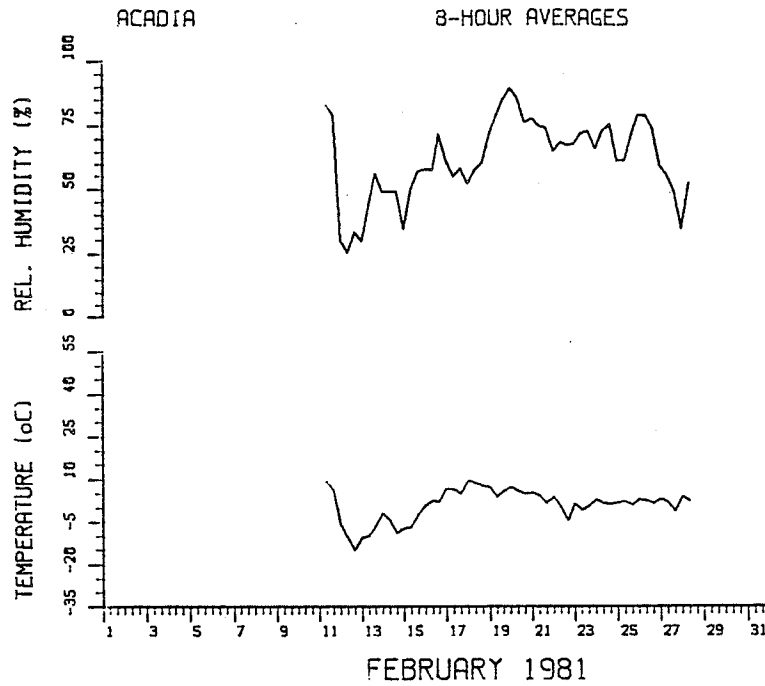


FIGURE 36

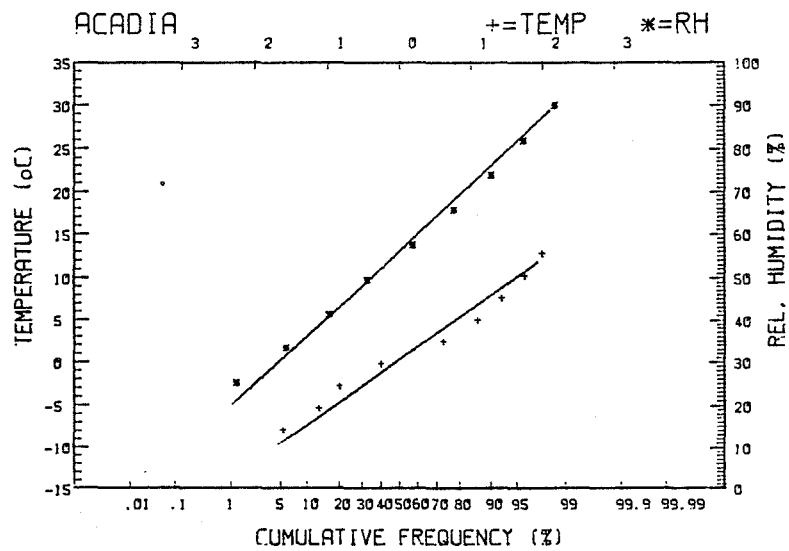
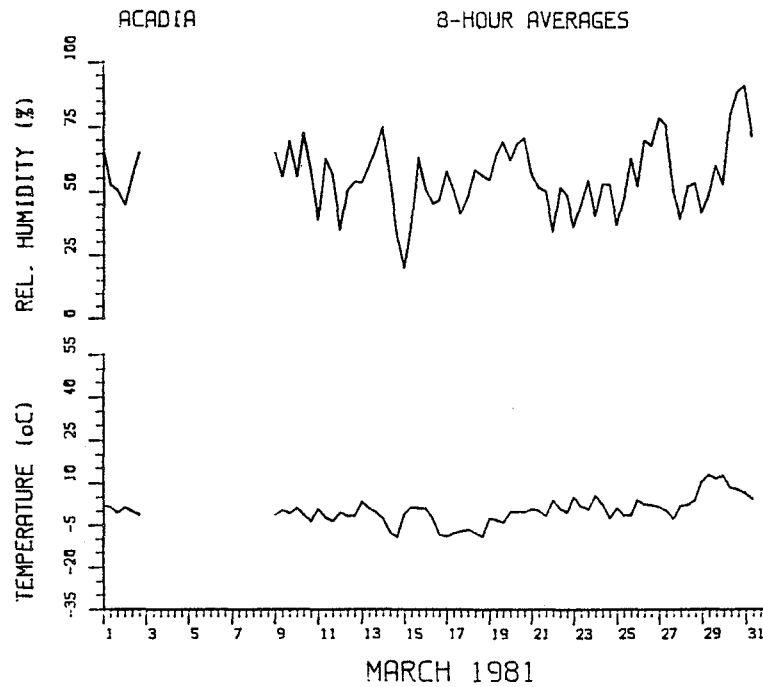


FIGURE 37

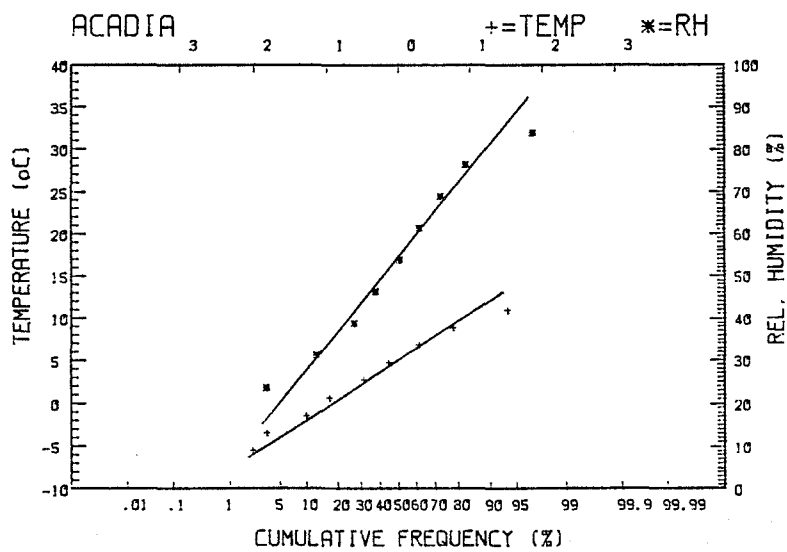
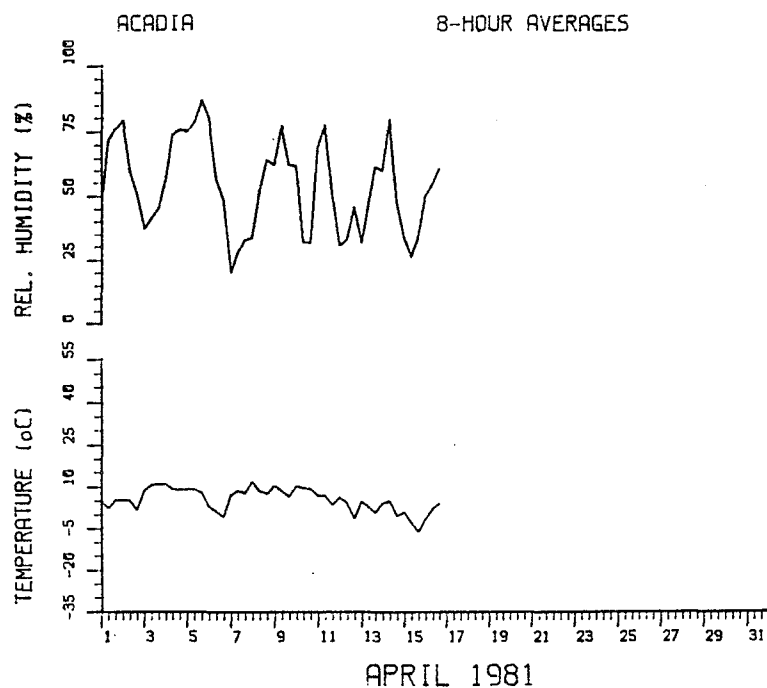


FIGURE 38

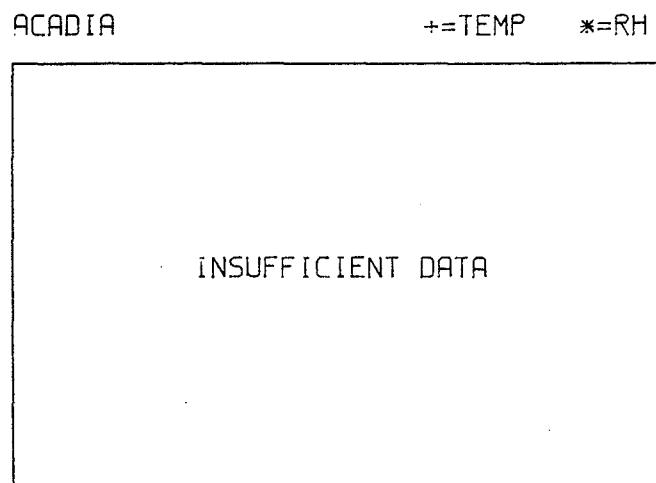
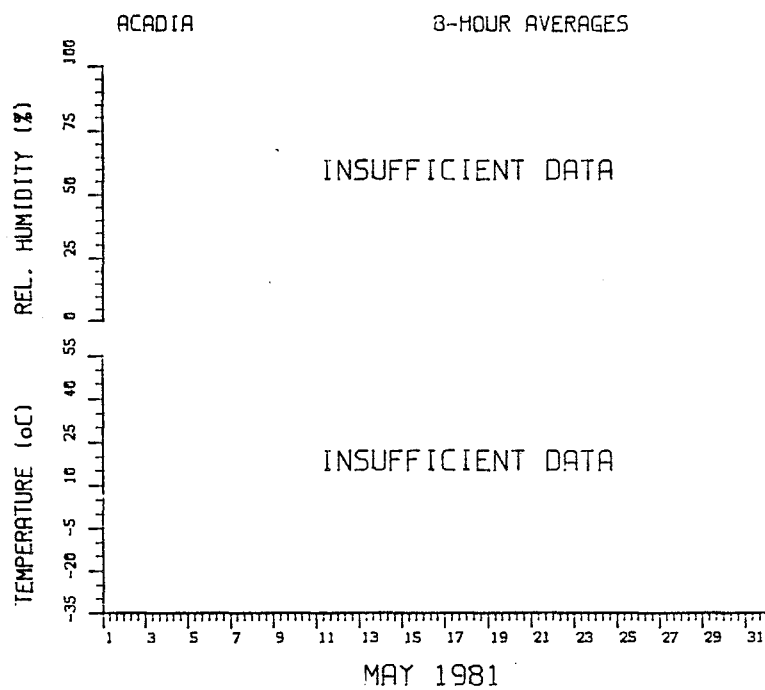
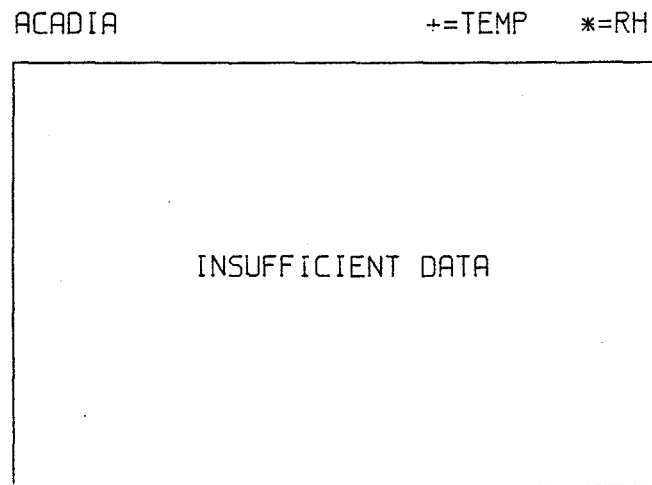
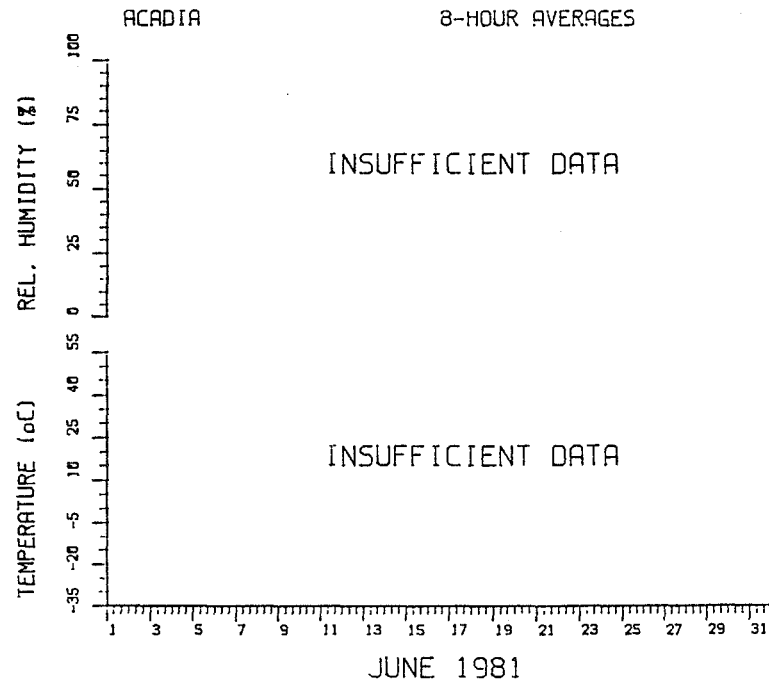


FIGURE 39



FIGUER 40

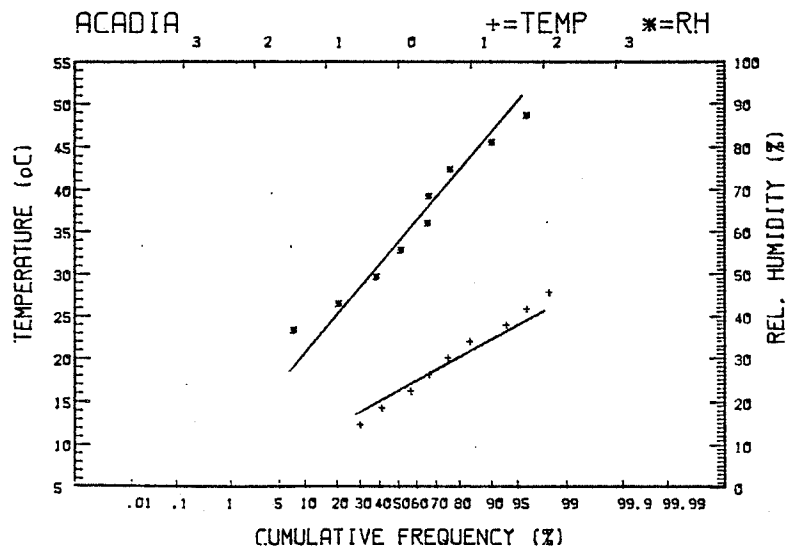
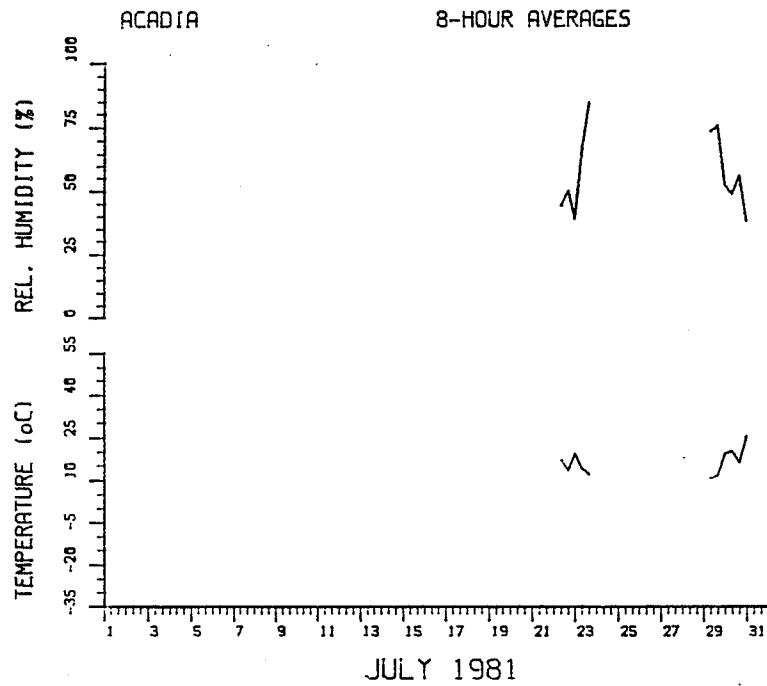


FIGURE 41

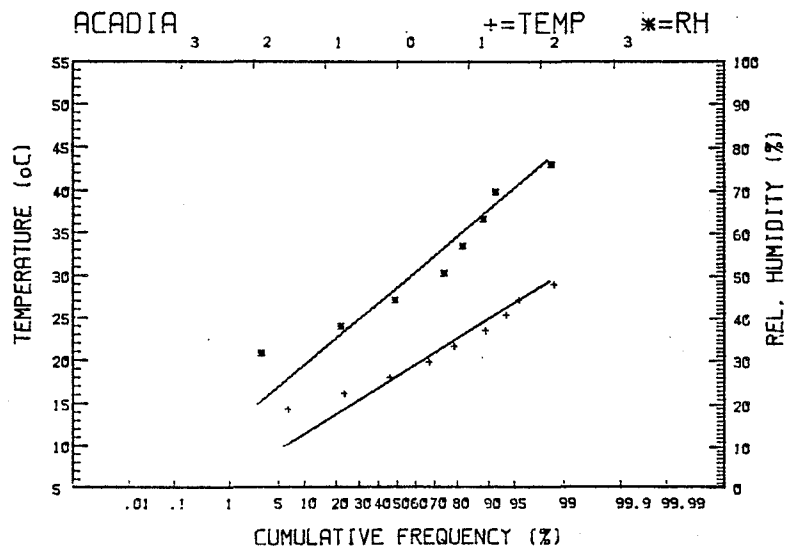
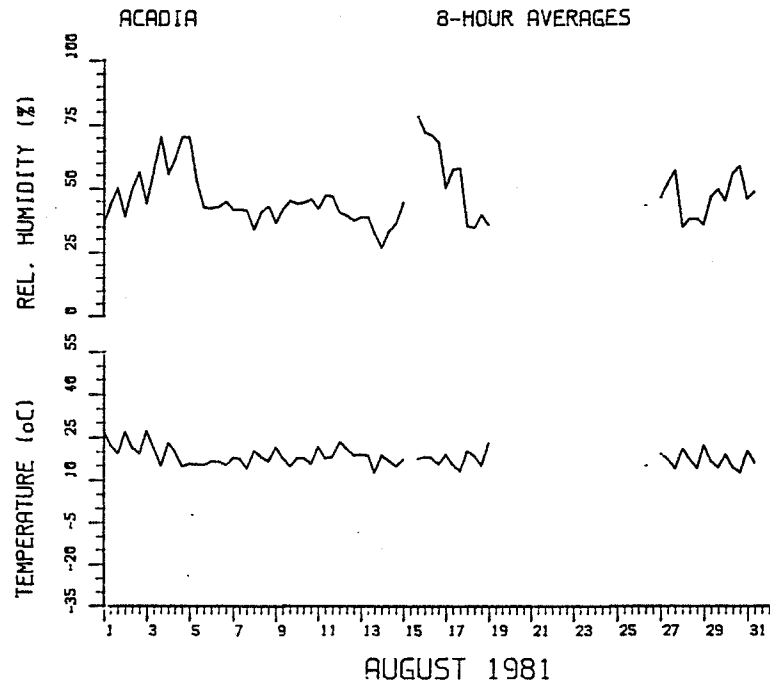


FIGURE 42

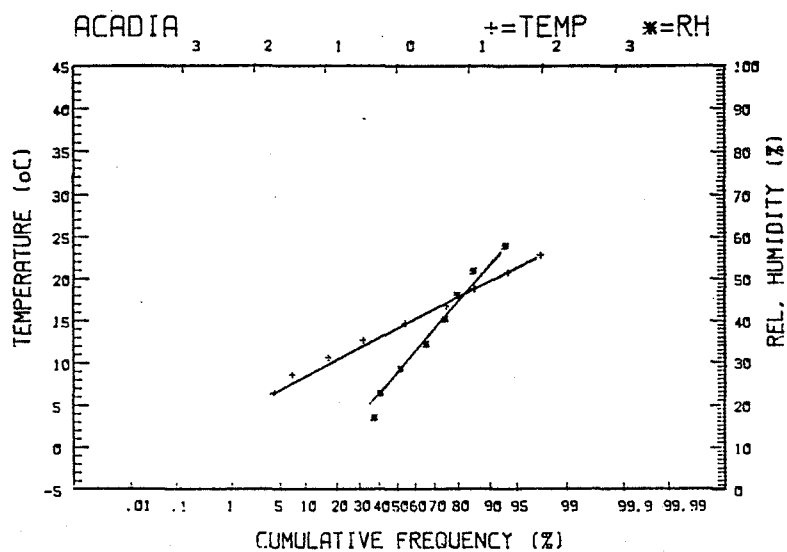
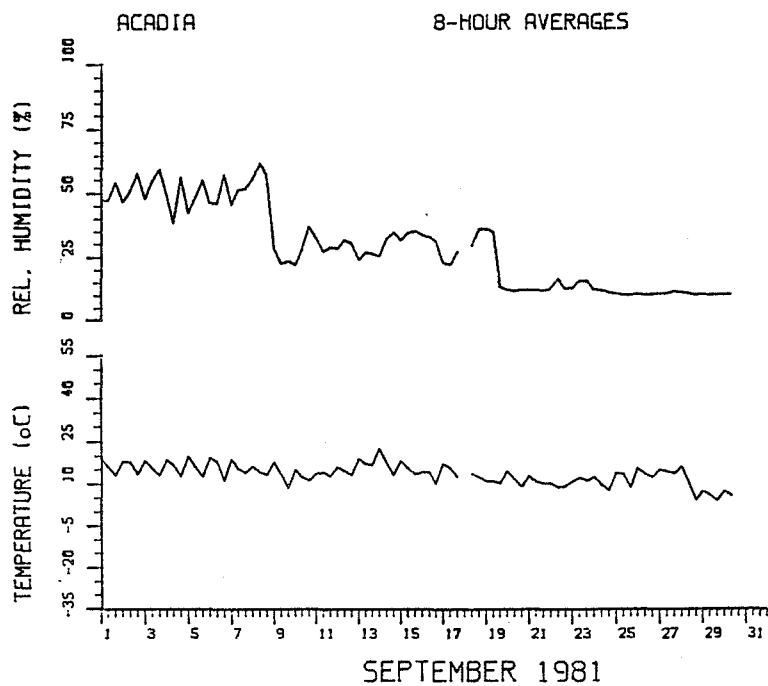


FIGURE 43

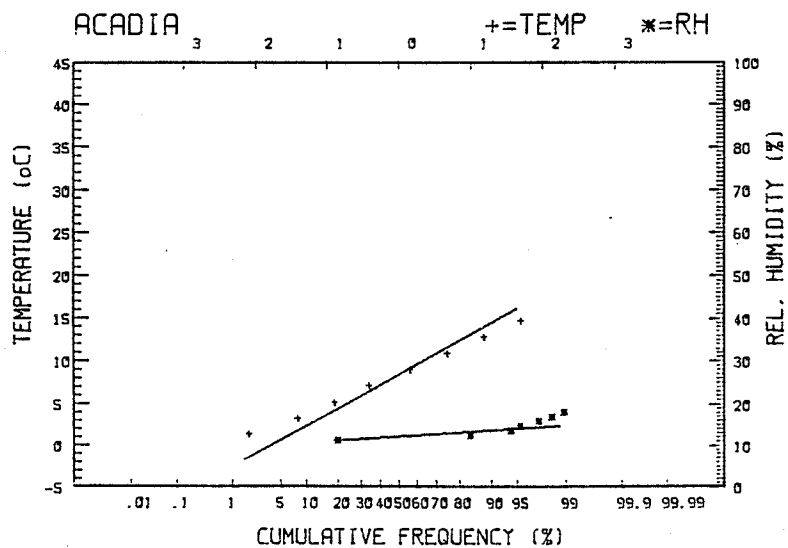
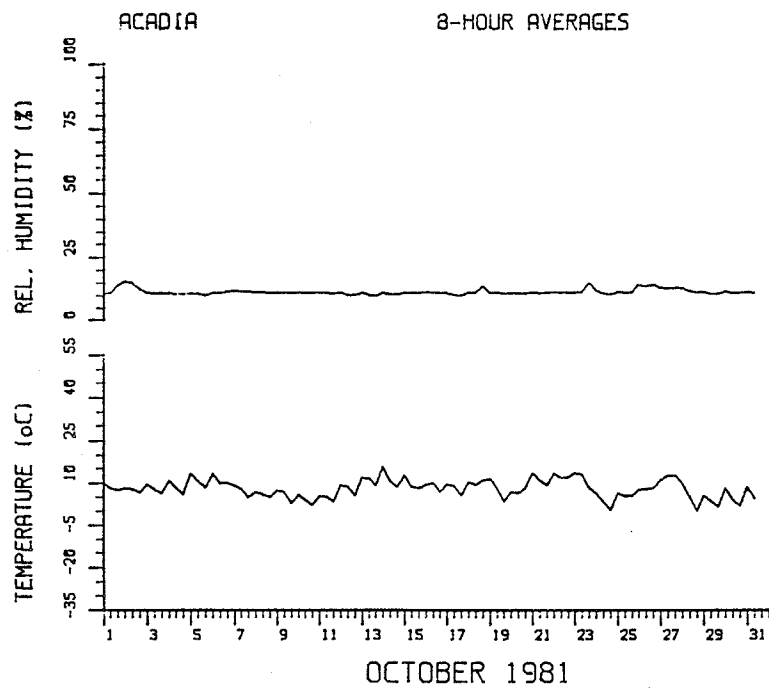


FIGURE 44

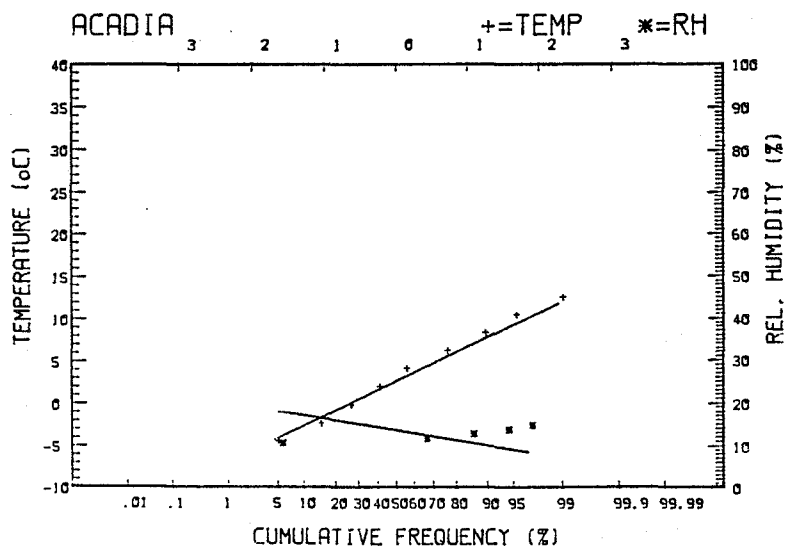
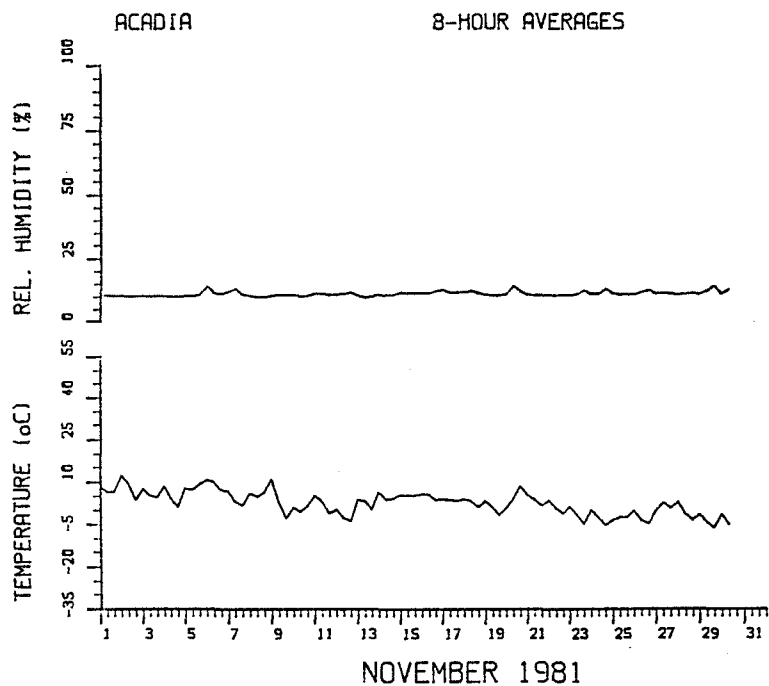


FIGURE 45

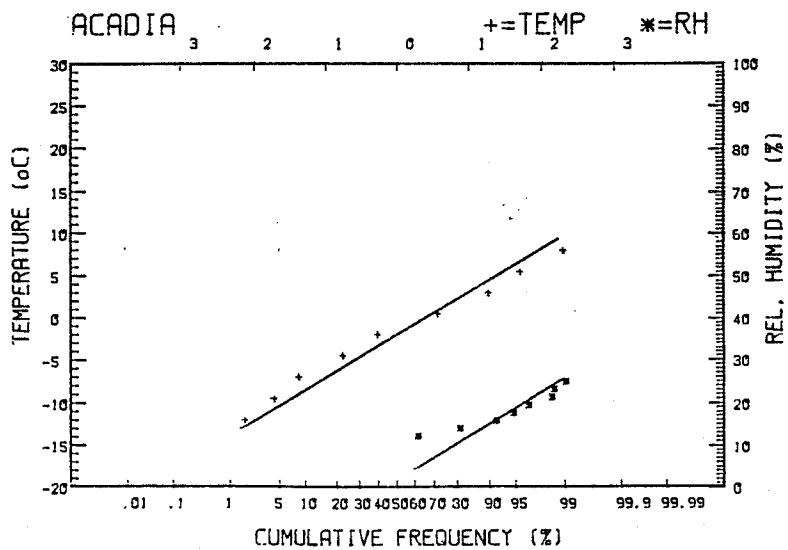
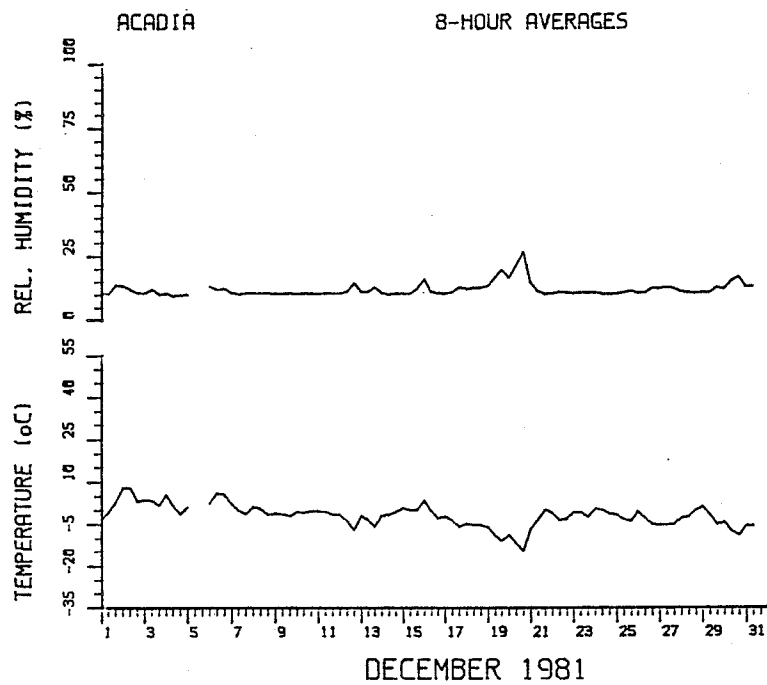


FIGURE 46

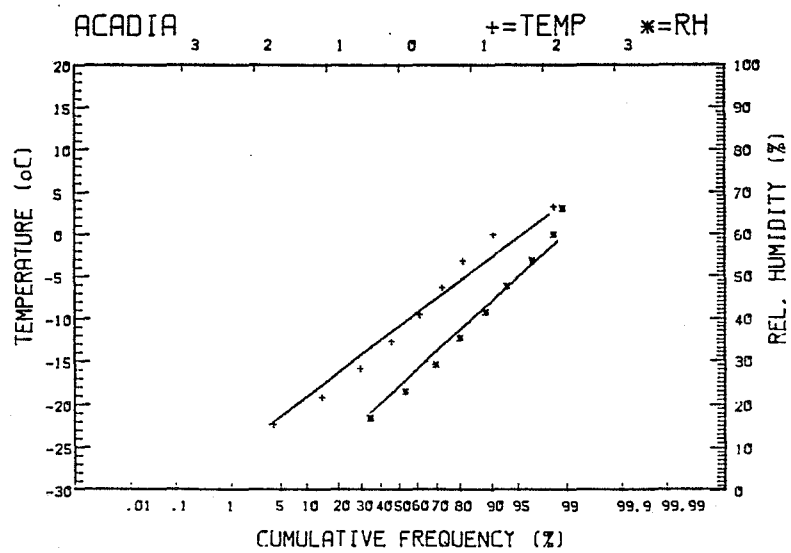
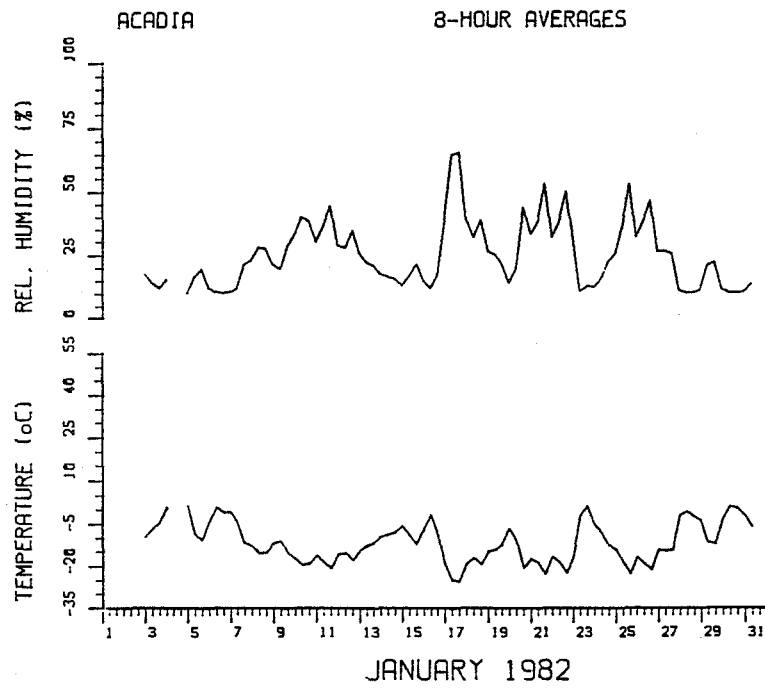


FIGURE 47

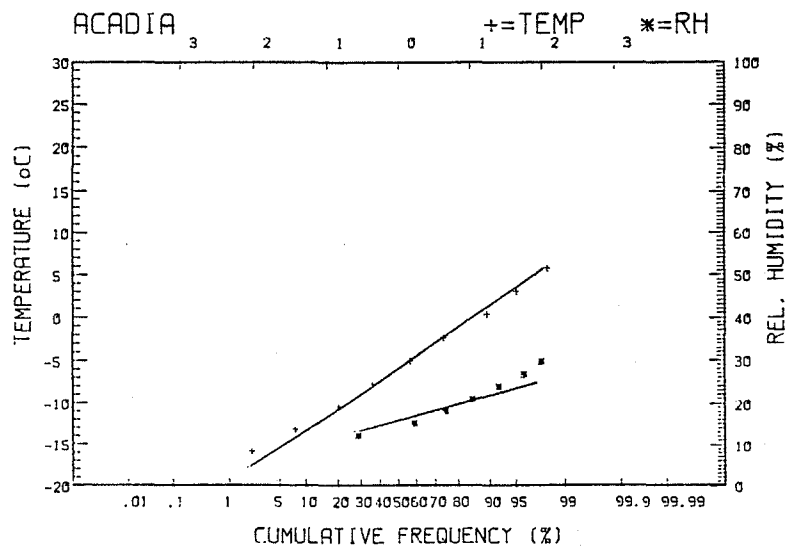
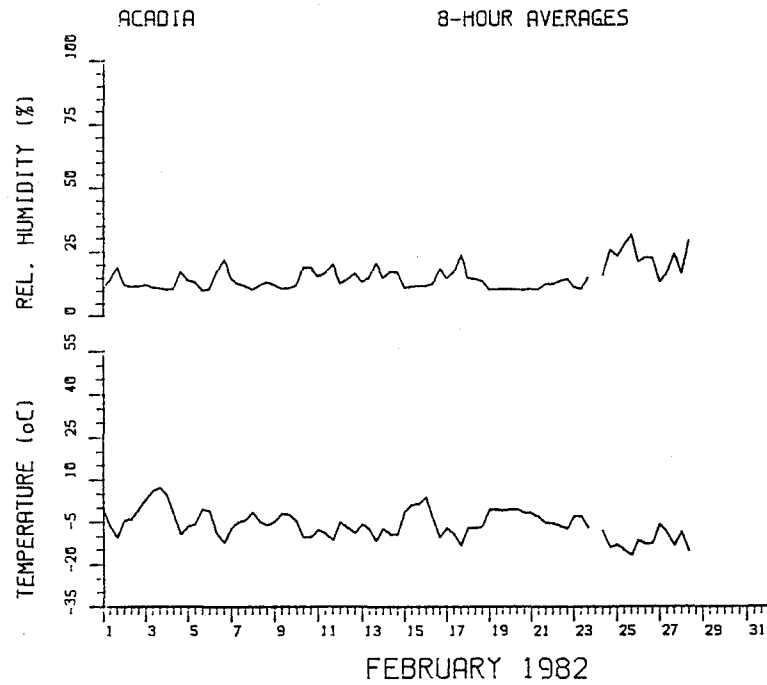


FIGURE 48

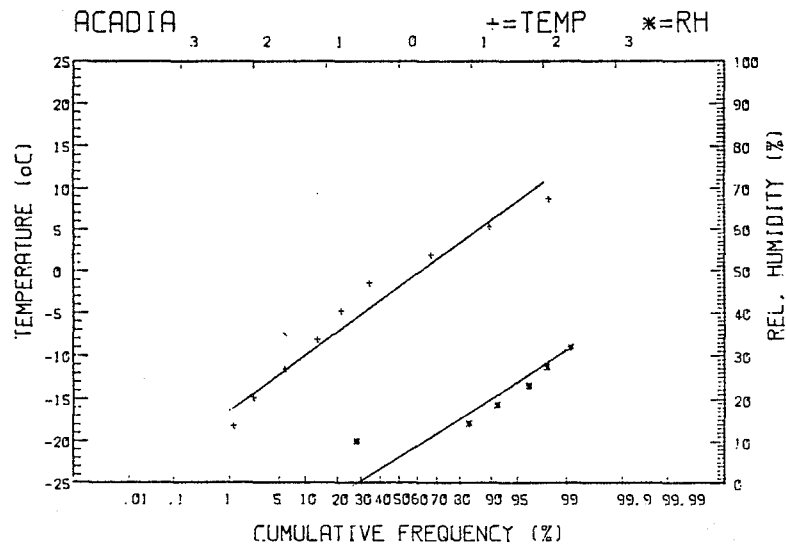
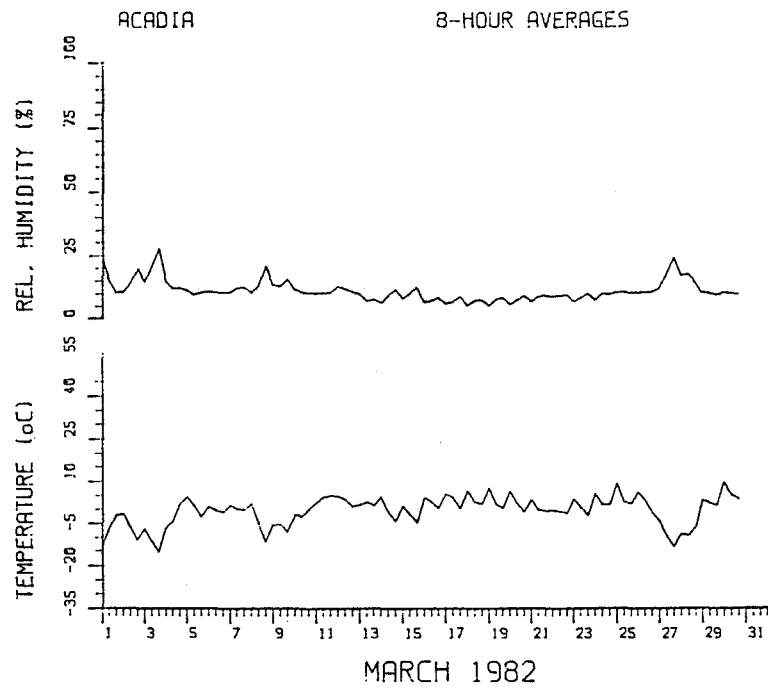


FIGURE 49

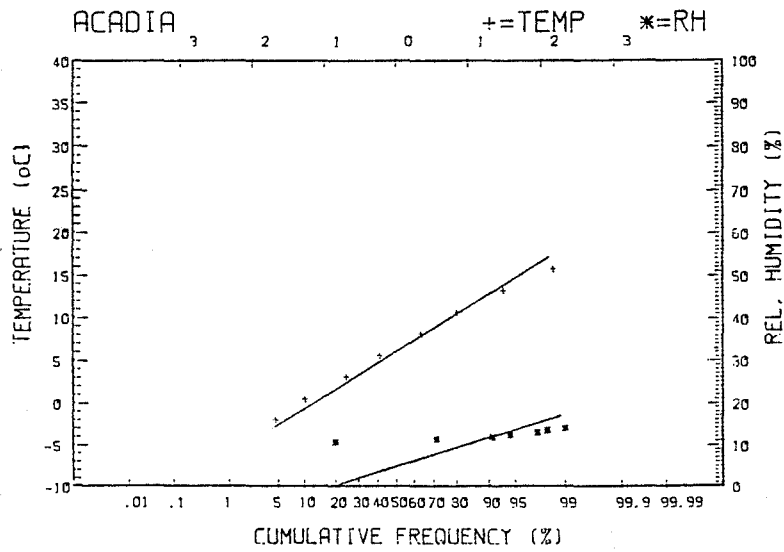
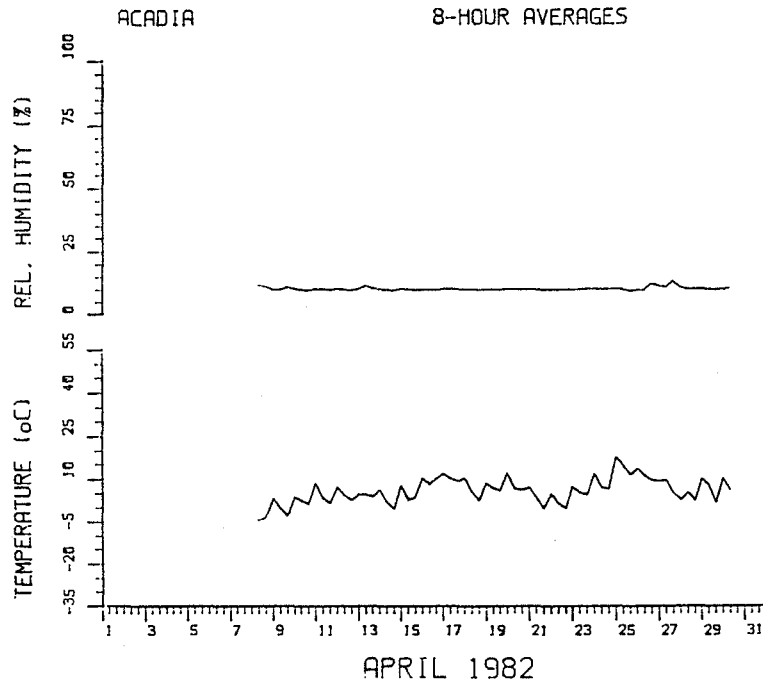


FIGURE 50

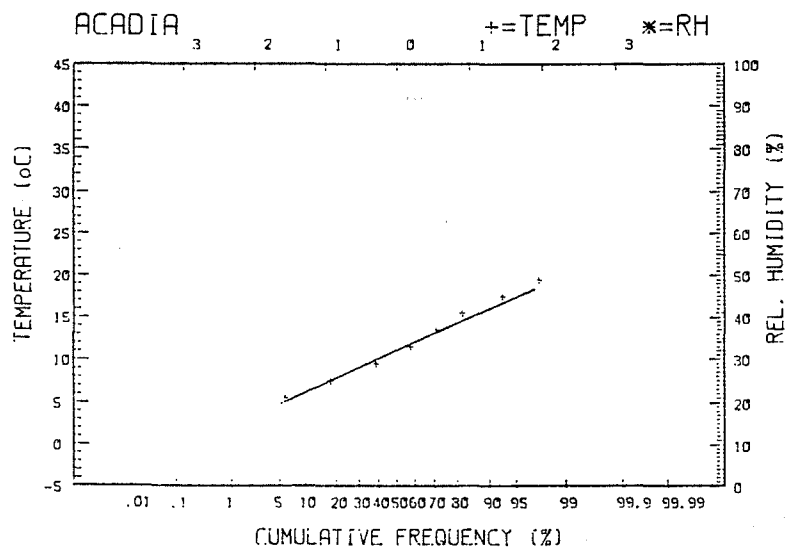
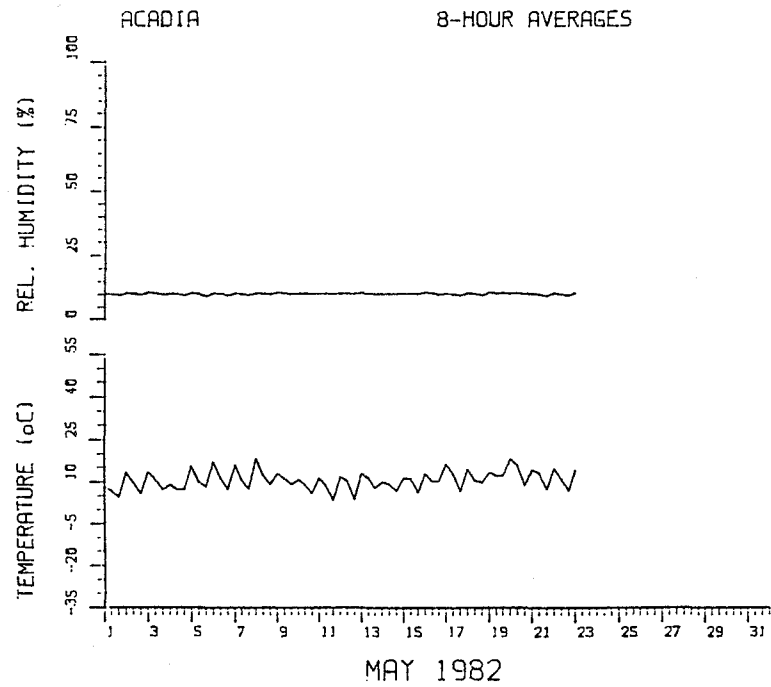


FIGURE 51

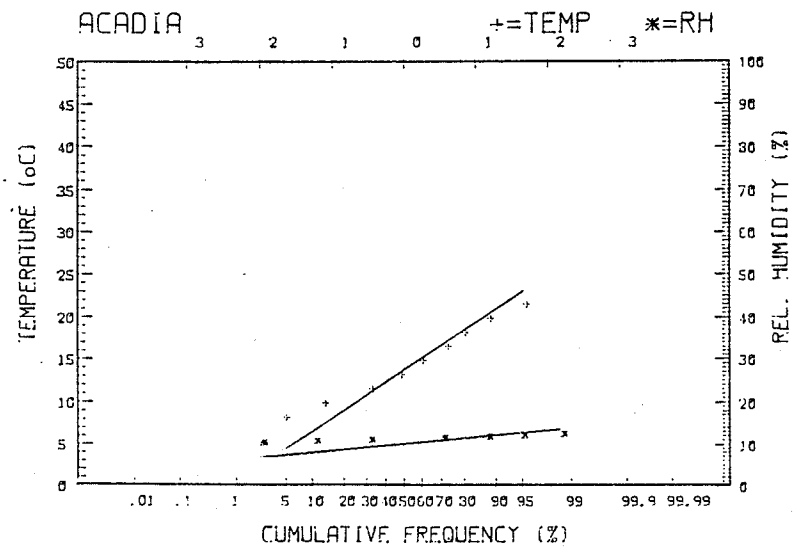
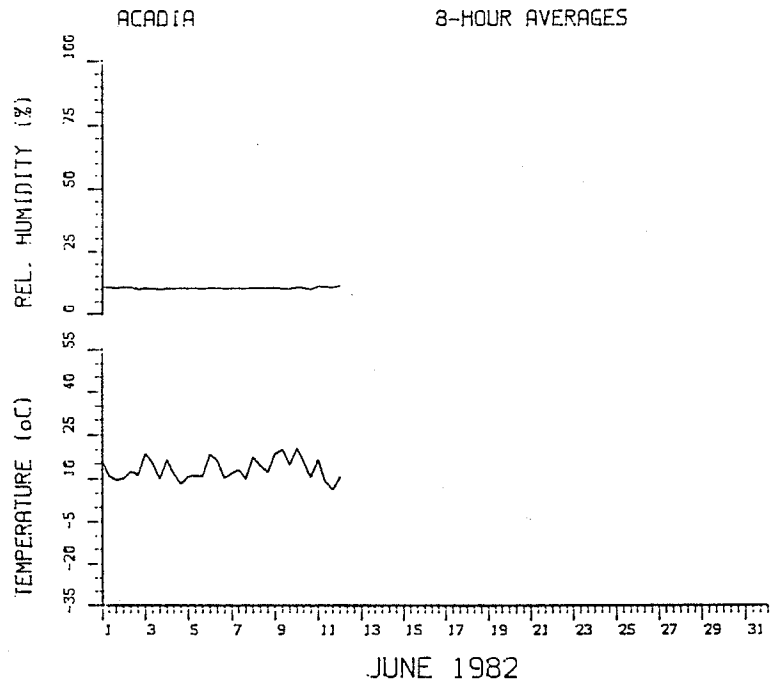


FIGURE 52

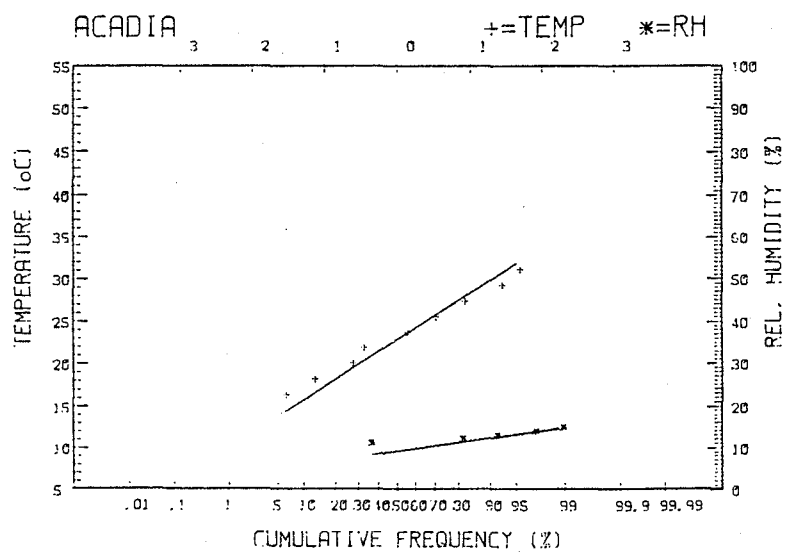
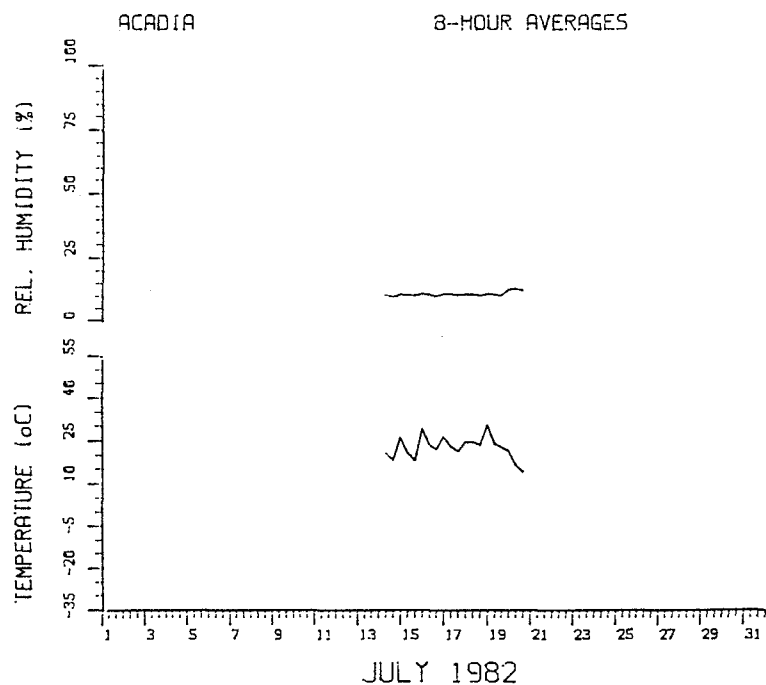


FIGURE 53

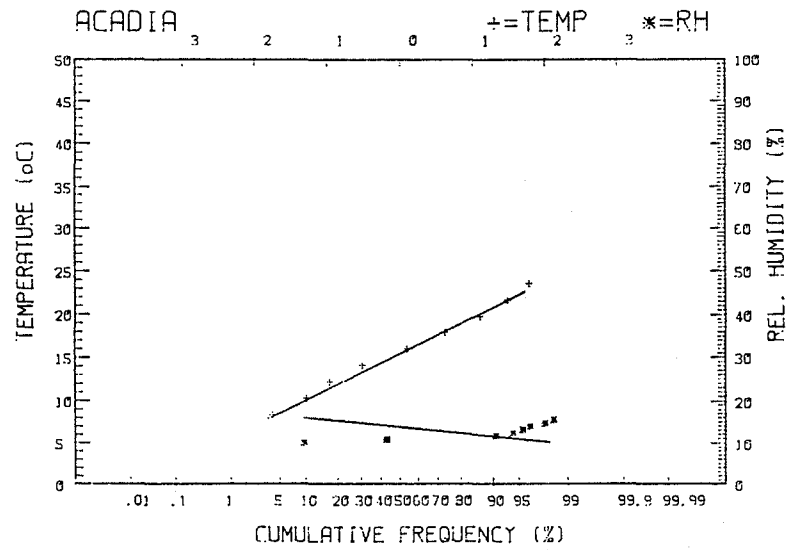
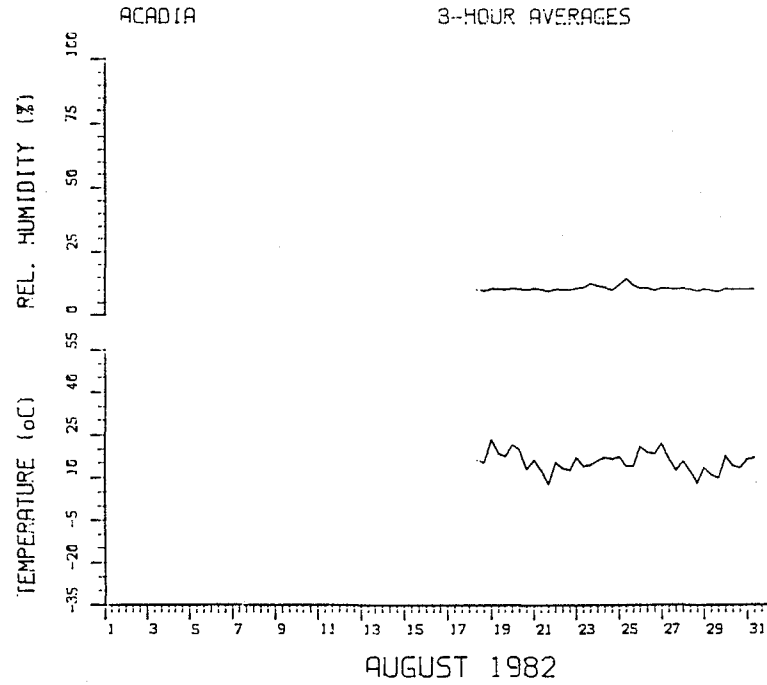


FIGURE 54

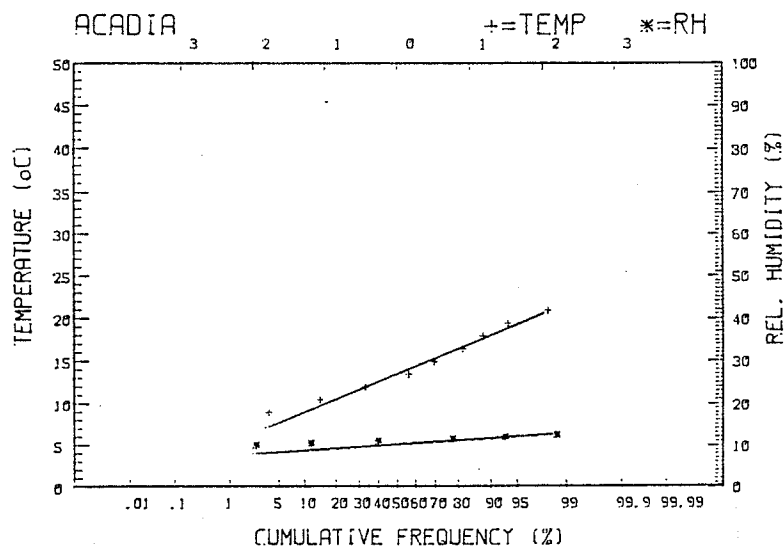
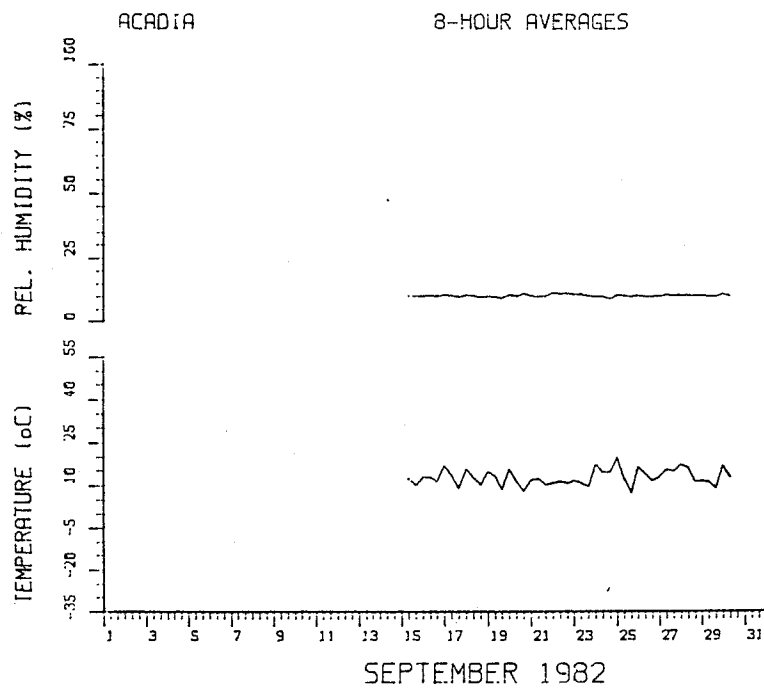


FIGURE 55

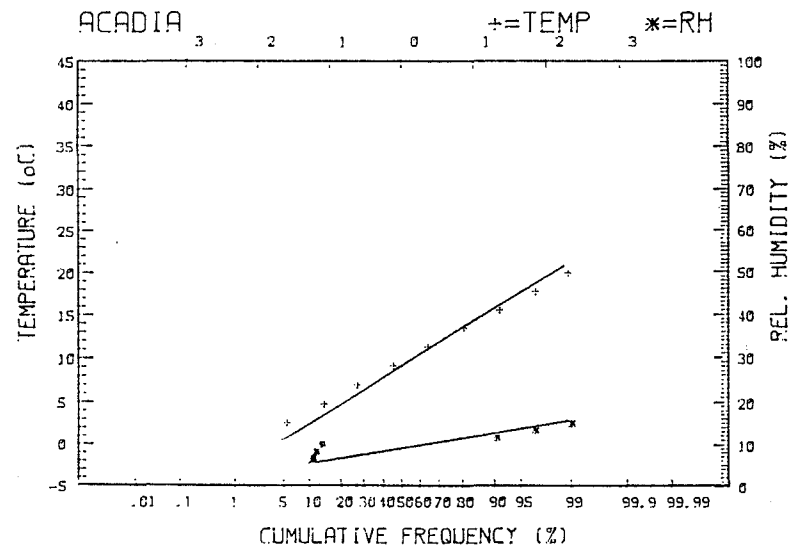
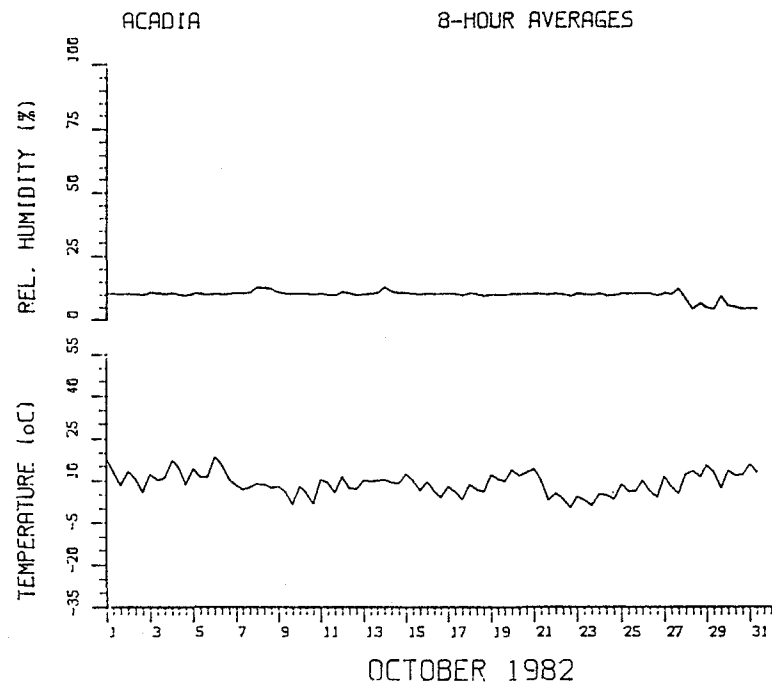
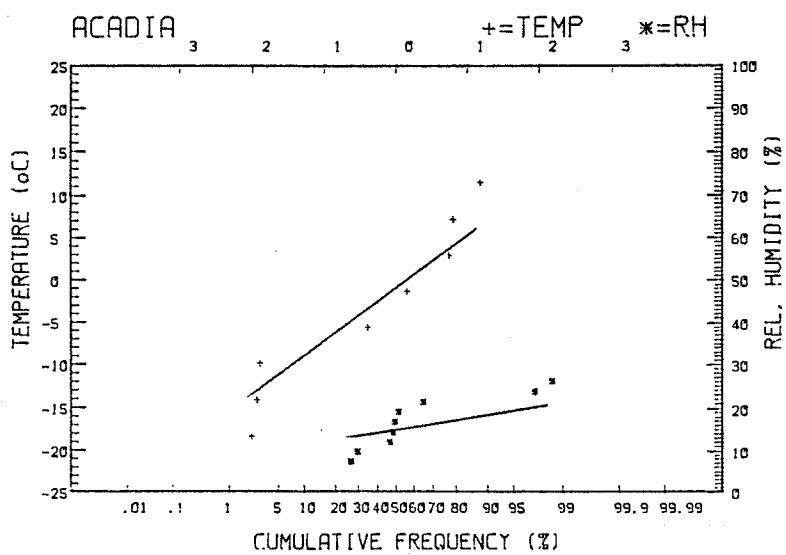
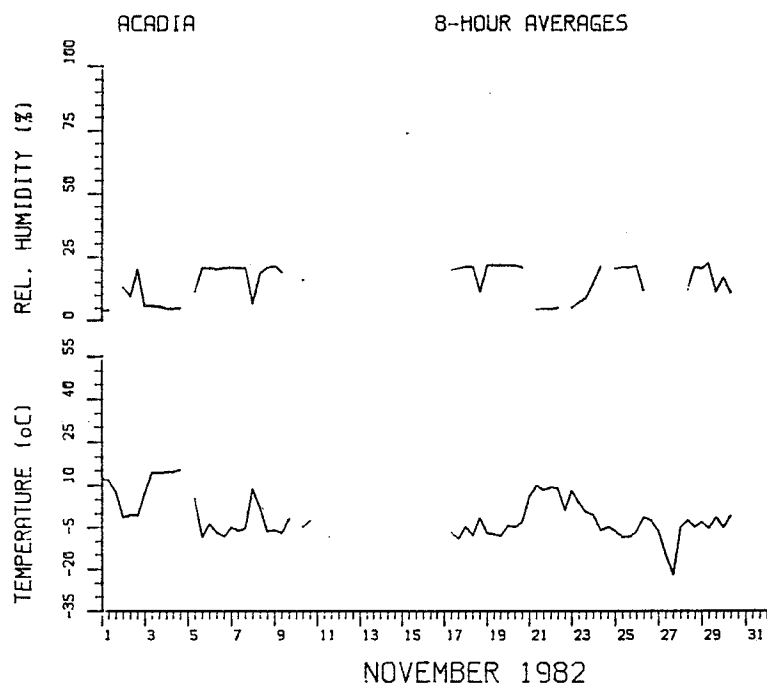


FIGURE 56



Data for the period December 1982 through June 1983 could not be recovered even though several attempts were made to read each cassette. There were long intervals on the data tapes where apparently nothing was recorded.

Table 3 provides a chronological history of the events that influenced station operation and data recovery from October 1979 through May 31, 1983.

TABLE 3

ACADIA NATIONAL PARK CHRONOLOGICAL HISTORY
OF STATION OPERATIONS

10/4/79	2 automatic teleradiometers and a Memodyne recording unit were installed at Acadia National Park. SN#139 - Mount Battie (Chan 0-2) SN#119 - Blue Hill (Chan 3-5)
10/79 - 11/79	Data discarded, suspect that teleradiometers were misaligned.
11/79	Channel input order changed from filter, sky, target to sky, target, filter for both teleradiometers.
4/80	The 2 teleradiometers were interchanged. SN#119 - Blue Hill (Chan 0-2) SN#139 - Mount Battie (Chan 3-5)
10/4/79 - 11/30/80	Data summarized in "Visibility at Acadia National Park" report.
12/1/80 - 12/17/80	No data collected.
12/17/80	Blue Hill teleradiometer operating in green only.
1/10/81 - 2/7/81	No data collected, data logger down.
2/18/81 - 3/11/81	Blue Hill teleradiometer possibly misaligned due to construction below site.
3/19/81	No data collected in green filter through 4/29/81.
4/17/81	All instruments down except teleradiometer.
4/29/81	Mount Battie teleradiometer removed. Blue Hill on green filter only.
6/1/81	The teleradiometer filter turret was to be locked on green. However, from this time on we see voltage readings indicating the turret is stuck for long periods of time on UV and red. The decision was made to process the non-green data to SVR rather than discard all data from June 1981 through November 1982.

7/20/81	Wind speed, wind direction, relative humidity and solar radiation sensors all brought on-line.
8/19/81 - 8/26/81	No data - Data logger destroyed tape.
1/26/82	Teleradiometer not aligned properly.
4/17/82	Mirror down on teleradiometer, data not recorded.
6/18/82 - 7/15/82	No data collected in green filter.
7/20/82 - 8/17/82	No data collected.
9/2/82 - 9/15/82	No data collected.
9/22/82	Teleradiometer misaligned.
11/11/82 - 11/16/82	No data collected.
11/82 - 6/83	Cassette tapes deemed unreadable. Data lost for this period.
5/1/83	End of monitoring period for Acadia automatic cassette data collection system.
6/14/83	Installation of new Handar 540A data collection platform to collect data via satellite. (ID = FA42914E)

4.0 SUMMARY

In summary, the automatic visibility monitoring station at Acadia National Park operated from October, 1979 through May, 1983. Station hardware operated reliably until December 1981. From December 1981 until May 1983, data losses can be attributed to malfunctions of the Memodyne data logger and the teleradiometer filter turrets. Data were also lost when cassettes were not changed for long periods of time. Data from Mount Battie indicate that this teleradiometer had alignment problems. Being unreliable, the teleradiometer was removed April 29, 1981. Data collection using cassette tapes presented two problems:

- o Data transfer to 9-track tape could not be handled in house resulting in long data turn around time.
- o Instrument malfunctions could not be identified for long periods of time after the instrument went down.

The automatic visibility monitoring station at Acadia National Park was reconfigured and coupled to a satellite data acquisition system in June of 1983, by Air Resource Specialists, Inc., of Fort Collins. With more reliable equipment data recovery will be greatly improved. Telemetered data will be closely monitored to insure the quality and reliability of data collected under this new configuration.