NATIONAL BUREAU OF STANDARDS REPORT

10201

CLIMATOLOGICAL DATA AT THE ELEVEN PROTOTYPE SITES IN THE UNITED STATES FOR THE EVALUATION OF HUD OPERATION BREAKTHROUGH EXPERIMENTAL HOUSING SYSTEMS

Sponsored by
DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT

NBS

U.S. DEPARTMENT OF COMMERCE

NATIONAL BUREAU OF STANDARDS

NATIONAL BUREAU OF STANDARDS

The National Bureau of Standards [1] was established by an act of Congress March 3, 1901. Today, in addition to serving as the Nation's central measurement laboratory, the Bureau is a principal focal point in the Federal Government for assuring maximum application of the physical and engineering sciences to the advancement of technology in industry and commerce. To this end the Bureau conducts research and provides central national services in four broad program areas. These are: (1) basic measurements and standards, (2) materials measurements and standards, (3) technological measurements and standards, and (4) transfer of technology.

The Bureau comprises the Institute for Basic Standards, the Institute for Materials Research, the Institute for Applied Technology, the Center for Radiation Research, the Center for Computer Sciences and Technology, and the Office for Information Programs.

THE INSTITUTE FOR BASIC STANDARDS provides the central basis within the United States of a complete and consistent system of physical measurement; coordinates that system with measurement systems of other nations; and furnishes essential services leading to accurate and uniform physical measurements throughout the Nation's scientific community, industry, and commerce. The Institute consists of an Office of Measurement Services and the following technical divisions:

> Applied Mathematics—Electricity—Metrology—Mechanics—Heat—Atomic and Molecular Physics—Radio Physics [2]—Radio Engineering [2]—Time and Frequency [2]—Astrophysics [2]—Cryogenics.[2]

THE INSTITUTE FOR MATERIALS RESEARCH conducts materials research leading to improved methods of measurement standards, and data on the properties of well-characterized materials needed by industry, commerce, educational institutions, and Government; develops, produces, and distributes standard reference materials; relates the physical and chemical properties of materials to their behavior and their interaction with their environments; and provides advisory and research services to other Government agencies. The Institute consists of an Office of Standard Reference Materials and the following divisions:

> Analytical Chemistry—Polymers—Metallurgy—Inorganic Materials—Physical Chemistry.

THE INSTITUTE FOR APPLIED TECHNOLOGY provides technical services to promote the use of available technology and to facilitate technological innovation in industry and Government; cooperates with public and private organizations in the development of technological standards, and test methodologies; and provides advisory and research services for Federal, state, and local government agencies. The Institute consists of the following technical divisions and offices:

> Engineering Standards—Weights and Measures — Invention and Innovation — Vehicle Systems Research—Product Evaluation—Building Research—Instrument Shops—Measurement Engineering—Electronic Technology—Technical Analysis.

THE CENTER FOR RADIATION RESEARCH engages in research, measurement, and application of radiation to the solution of Bureau mission problems and the problems of other agencies and institutions. The Center consists of the following divisions:

> Reactor Radiation—Linac Radiation—Nuclear Radiation—Applied Radiation.

THE CENTER FOR COMPUTER SCIENCES AND TECHNOLOGY conducts research and provides technical services designed to aid Government agencies in the selection, acquisition, and effective use of automatic data processing equipment; and serves as the principal focus for the development of Federal standards for automatic data processing equipment, techniques, and computer languages. The Center consists of the following offices and divisions:

> Information Processing Standards—Computer Information — Computer Services — Systems Development—Information Processing Technology.

THE OFFICE FOR INFORMATION PROGRAMS promotes optimum dissemination and accessibility of scientific information generated within NBS and other agencies of the Federal Government; promotes the development of the National Standard Reference Data System and a system of information analysis centers dealing with the broader aspects of the National Measurement System, and provides appropriate services to ensure that the NBS staff has optimum accessibility to the scientific information of the world. The Office consists of the following organizational units:

> Office of Standard Reference Data—Clearinghouse for Federal Scientific and Technical Information [3]—Office of Technical Information and Publications—Library—Office of Public Information—Office of International Relations.

[1] Headquarters and Laboratories at Gaithersburg, Maryland, unless otherwise noted; mailing address Washington, D.C. 20234.
[2] Located at Boulder, Colorado 80302.
[3] Located at 5285 Port Royal Road, Springfield, Virginia 22151.

NATIONAL BUREAU OF STANDARDS REPORT

NBS PROJECT
42100-4213400

FEBRUARY 25, 1970

NBS REPORT
10201

CLIMATOLOGICAL DATA AT THE ELEVEN PROTOTYPE SITES IN THE UNITED STATES FOR THE EVALUATION OF HUD OPERATION BREAKTHROUGH EXPERIMENTAL HOUSING SYSTEMS

by
T. Kusuda
BUILDING RESEARCH DIVISION
INSTITUTE FOR APPLIED TECHNOLOGY

Prepared for
DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT

NBS

U.S. DEPARTMENT OF COMMERCE

NATIONAL BUREAU OF STANDARDS

The following team was appointed on January 26, 1970, by Dr. J. R. Wright, Chief, Building Research Division to prepare this report.

T. Kusuda, Chairman, Environmental Engineering Section - heating and cooling design data.

H. C. S. Thom, ESSA - weather parameters.

D. R. Flynn and G. E. Winzer, Sensory Environment Branch - background noise levels.

B. C. Cadoff, Environmental Engineering Section and D. H. Fair, NAPCA, Cincinnati - air contamination.

R. D. Marshall, Structures Section - wind and earthquake data.

Review: F. J. Powell, Chief, Environmental Engineering Section.

P. R. Achenbach, Chief, Sensory Environment Branch.

E. O. Pfrang, NBS-HUD Breakthrough Program Manager.

TABLE OF CONTENTS

Introduction

The purpose of this report is to provide preliminary information on site climatology useful for the design and evaluation of HUD Operation Breakthrough experimental building systems. In order to evaluate the design as well as the performance of building systems, the following environmental parameters are considered essential.

Temperature

Humidity

Wind speed and direction

Precipitation (snow and rain)

Solar radiation (direct and diffuse)

Ground temperature (depth of frost)

Background noise level

Air contamination

Earthquake risk

Climatological data for Breakthrough sites that pertain to the above parameters are scattered throughout the scientific literature. The bulk of the information presented, however, comes from the publications of the Environmental Science Services Administration (ESSA). The charge to the task group for this particular undertaking was to rapidly assemble all available climatological data pertaining to the above parameters for the Breakthrough localities, which actually contain a total of eleven building sites. This report was prepared in one month. The localities are:

1. Sacramento, California (suburban site)
2. Wilmington, Delaware (suburban site)
3. Macon, Georgia (suburban site)
4. Indianapolis, Indiana (city perimeter site)
5. Kalamazoo, Michigan (suburban site)
6. St. Louis, Missouri (inner-city site)
7. Jersey City, New Jersey (inner-city site)
8. Memphis, Tennessee (inner-city site)
9. Houston, Texas (suburban site)
10. Seattle, Washington (suburban and inner-city sites)

Except for a few localities, most of the weather data reported in the literature are recorded at airport weather stations. This fact, however, is not too critical for the evaluation of Breakthrough building systems located in the suburbs. For the inner-city sites, most of the weather data recorded at the weather bureau city office should be appropriate. Only the city office data for St. Louis and Seattle are available, however, for the in-city sites listed above. Data for the Jersey City and Memphis sites are, therefore, to be corrected from those obtained at the airport weather stations. City maps shown in the Appendix indicate relative locations of Breakthrough prototype sites with respect to the downtown area and to the airports. These maps should be useful in evaluating the correction factors for the airport weather data as well as the background noise and air contamination of the prototype sites.

Climatological data required for the design of safe building systems are usually the extreme values of parameters such as the highest recorded wind velocity, the deepest snow fall, earthquake data and temperature extremes. The building systems are expected to resist these natural forces and to provide protection for the occupants. On the other hand, the data required for the evaluation of the building performance over a period of time are those data associated with the frequency and the sequential nature of occurrences. This latter type of data are used to predict the comfort of the occupants, energy requirements for heating and cooling the building, and weatherability of building materials. Data compiled herein are, therefore, assembled with a view toward fulfilling the need for two requirements: one for the design evaluation and a second for the performance evaluation.

It is most unusual in the planning of buildings and similar engineering structures to have sufficient meteorological data available at the site which can be used directly for design purposes. Regarding wind data, for example, it is usually necessary to make use of detailed records obtained at the nearest Weather Bureau Station. Because of changes in terrain, a conversion may be required. This conversion can take the form of a regression equation which requires that extensive (approximately 4 years) simultaneous records be established for the station and for the site; or the conversion may be based upon an evaluation of the terrain roughness and on assumptions concerning the nature of the atmospheric boundary layer. It is believed that the latter approach is the only reasonable one here because of the limited time available. However, for evaluating performance, sufficient time would be available to allow the use of regression equations.

A. Data for the Design of Heating and Cooling Systems

There are several calculation procedures available today for determining the heating and cooling loads for buildings. The method as described in the 1967 American Society of Heating, Refrigerating and Air-Conditioning Engineers Book of Fundamentals[1/] is considered to be the state-of-the-art and is used by a majority of practicing engineers as the most accurate and comprehensive available to the profession. The ASHRAE procedure requires selection of the following design values: outdoor air temperature and wind velocity for use in calculating the heating load; an hourly profile of the Sol-air temperature and solar heat gain factors for calculation of the cooling load; and a set of dry- and wet-bulb temperature data for sizing of the mechanical equipment. The sets of outdoor temperatures for summer and winter are given by ASHRAE in the form of a percentile of the number of hours in the season; such as 1%, 2½%, and 5% for summer dry- and wet-bulb temperatures and 99% and 97½% for winter dry-bulb temperatures[2/]. The value for the 1% summer percentile temperature is that temperature which is exceeded by only 29 hourly observations during an average summer out of a total number of 2928 hourly observations for four summer months. Similarly, winter design temperature data are represented by 99 and 97½ percentile values which mean that the 99 and 97½% of the winter hourly observations exceed these designated temperatures during the 2160 winter hours occurring in December, January, and February. In addition to the ASHRAE summer percentile values for 1, $2\frac{1}{2}$ and 5, the U. S. Air Force Publication AFM-88-8[3/] lists 10% data. Temperature data for design purposes at all of these percentiles are given in Table A for each of the eleven Operation Breakthrough prototype sites. Table A also includes the annual average air temperature as well as the recorded extreme values, which may be useful for some critical design problems.

Also transcribed from AFM-88-8 and listed in Table A are the number of total annual hours at or above 67 °F wet-bulb temperature. This data is sometimes used as an approximate criteria for determining whether air conditioning is necessary.

It should be noted that there is a basic difference in determining the heating load and air-conditioning cooling load. The former is usually calculated for extremely cold days where the outdoor temperature remains low and at a relatively constant level, whereas the latter is evaluated for a condition of strong solar radiation effect. Consequently, for the cooling load calculation, the outdoor temperature alone is not a good indicator. Thus, while the calculation method based upon steady temperature conditions may be a good approximation for a winter heating load determination, it usually results in a large error, if applied directly to the summer design problem. The Sol-air temperature concept should be used for summer to improve the accuracy of the cooling load calculations.

According to the 1967 ASHRAE Handbook of Fundamentals the Sol-air temperatures (SAT) are calculated by the following formula:

$$SAT = \frac{\alpha I}{h} + DB - 7a \qquad (1)$$

where α, I, h and DB represent surface absorptivity of the solar radiation, solar radiation per unit surface, surface heat transfer coefficient and outdoor air dry-bulb temperature, respectively. The negative term, -7a, represents the long wavelength radiation of the building surface with respect to the sky. The direction cosine, "a", of the surface is unity for a roof surface and zero for a vertical wall surface. Theoretically, the Sol-air temperature can be considered to be the maximum surface temperature when there is no heat conducted from the exterior surface of the building to the interior surface. Surface temperatures become very high when the surface is solar absorptive (e.g., black-colored surface with a value of α near unity), when the wind speed is low (very small value of h), when the sun is high in a cloudless sky (a larger value of I) and when the coincident air temperature (DB) is also high.

The ASHRAE cooling load calculation procedure requires the use of Sol-air temperature profiles. Profiles for a variety of locations are not published in the 1967 ASHRAE Handbook of Fundamentals, nor are they available from other literature sources. Each geographic location must be separately calculated. This may be one of the reasons that some engineers still prefer to use simplified or short-cut cooling load calculation methods, similar to those used for the heating load. Since many of the Breakthrough building systems may be different in design from conventional buildings (for which most of the simplified or short-cut methods have been developed in the past), it is recommended that the ASHRAE cooling load calculation be followed rigorously. Upon this premise, Sol-air temperature profiles for the ten cities have, therefore, been developed here and are given in Table C. The values for solar radiation for a cloudless sky for July 21 were first calculated using the same procedure described in the 1967 ASHRAE Book of Fundamentals. These are given in Table B for all eleven sites. Since it is also required to have the design day dry-bulb temperature profiles, these were also developed on the assumption that the dry-bulb temperature follows a simple harmonic profile in a manner to achieve a maximum value of 99% at 1600 hours and a minimum value at 0500 hours. The minimum value was calculated by subtracting the daily range value listed in the ASHRAE weather data table from the 1% data.

The profile thus synthesized for Houston, Texas, for example, compares well with the ten year mean daily profile representing the hottest days of each year, as shown in Figure 1[4/]. Similarly good comparisons were obtained for five other cities, Phoenix, (Ariz.), Washington, (D. C.), Lake Charles, (La.), Minneapolis, (Minn.), and Medford, (Oreg.), as shown in a dimensionless scheme of Fig. 2. On this basis it is believed that the dry-bulb temperature profile data given for ten Breakthrough localities as listed in Table C are accurate.

The values of 0.15 and 0.3 were used for α/h of eq. (1) to be consistent with the sample Sol-air temperature tables illustrated in the Handbook of Fundamentals[1/]. Table C shows the Sol-air temperature profiles developed for the ten cities of Breakthrough building sites.

B. Data for Energy Estimates

Accurate estimation of heating and cooling energy requirements is important for evaluating the Breakthrough building systems. This is particularly important because of the many varieties of heating and cooling systems available today which depend upon different energy sources, types of heating and cooling processes, and types of energy distribution systems. Thus, a difference in energy requirements between systems may become a significant factor in the selection of a system. The energy calculation, therefore, should utilize the most precise and reliable up-to-date procedures. The most accurate procedures available are based upon a computer simulation of the hour by hour operation of the heating and cooling system as it responds to the dynamic thermal behavior of the building. This calculation procedure requires coincident hourly observations of most of the parameters mentioned above for a period of at least one year, when the annual energy usage is of primary concern. Such hourly data are available on magnetic tapes from the U. S. Weather Record Center, Ashville, North Carolina. The list of tape reel numbers for ten Breakthrough localities is given in Table D.

Although several computer programs are currently available to perform this comprehensive hourly analysis for the energy requirements, the cost for such a calculation may not be warranted in some cases, particularly during early planning stages.

In lieu of the hourly calculation method because of time, cost, availability, and accuracy requirement factors, three simplified methods such as the degree-day method, equivalent full-load hour method, or the "bin" method may be selected. The degree-day concept was designed for residential applications based upon average conditions experienced by several hundred homes in the Northern United States. The seasonal total of the degree days based upon the reference temperature of 65 °F for heating and cooling are given in Table A, although the degree-day data for the cooling energy estimate have not been as widely accepted as that for the heating. The second method commonly used for estimating cooling energy requirements has been the equivalent full-load hour method. For this method the energy consumption for each of several buildings of a given type is measured and expressed as the number of hours of operation at full load which would produce the same energy consumption. These figures are then averaged to arrive at the equivalent full-load hours for a given type of building in a given climatic region. Annual cooling energy requirements are then estimated for a specific building by multiplying the peak cooling load by the equivalent load hours. The equivalent full-load hour data for conventional buildings for the ten Breakthrough localities selected are not available. A third technique which has been gaining acceptance is application of the "bin" method. Each temperature "bin" contains hourly frequency of occurrence of temperature specified for the range of the "bin" (usually in 5 °F increments). Heat gain or heat loss of the building is calculated and expressed as a function of ambient dry-bulb temperature (not necessarily a linear function). The total energy requirements are then calculated from the sum of the product of the heat load and the frequency of the "bin". By making the width of the temperature "bin" smaller, the accuracy of the energy estimate obtained by this method can be increased. For the benefit of engineers who might want to use the "bin" method, "bin" data from Air Force Manual (AFM) 88-8 for the ten Breakthrough localities ... are shown in Table E. A detailed account of the use of the "bin" method is given in Reference (5).

C. Solar Radiation

Table A shows the maximum daily total solar radiation upon a horizontal surface; it was calculated for the cloudless day of July 21 using the method described in Reference (1). The average percent of probable sunshine for the months of July and January may be important for the design of lighting and this data is obtained from Reference (11).

More detailed data for the solar radiation levels are given in Table B.

D. Coincident Wind Velocity for the Heating and Cooling Load Calculation

Coincident wind velocity designated as VL, L, M and H in Table A as associated with the temperature data refers to the following classification[2/]:

VL: Very light where 70% or more of the cold extreme hours are coincident with wind speeds less than or equal to 7 mph

L: Light, 50 to 69 percent of cold extreme hours are less than or equal to 7 mph wind speed

M: Moderate, where 50 to 74 percent cold extreme hours are coincident with wind speeds of more than 7 mph

H: High, where 75 percent or more of the cold extreme hours are coincident with wind speeds of 7 mph and 50 percent of the cold extreme hours are coincident with wind speeds of more than 12 mph.

Figures 3 through 22 show pictorially the annual frequency of the occurrences of coincident wind speeds and dry-bulb temperatures for the ten Breakthrough localities while Figures 23 through 32 indicate the annual coincident wind speed profiles with respect to the wind direction. Indicated in the latter figures are the direction of the prevailing winds during summer and winter.

E. Ground Temperature

Ground temperature data are needed for calculations to the estimate heat gained or lost from the basement floors and walls. These data are also needed for the design of underground heat distribution systems and to evaluate the probabilities for a freeze-up of water mains and sewage disposal lines. It should be noted that underground temperature at depths greater than 30 ft remain relatively unchanged throughout the year at the annual average air temperatures listed in Table A. The well-water temperature is also equal to the annual average air temperature. However, most underground installations require heat transfer calculations because they are usually installed at depths less than 10 ft from the surface. Listed in Table A are the integrated average earth temperatures from the surface to the ten foot depth for summer and winter conditions. These values are derived by a method similar to that described in Reference (7) assuming the thermal diffusivity of soil to be 0.025 ft^2/hr. Unless the soil is extremely dry or unless there are strong underground heat sources nearby, data shown in Table A should be a good approximation of the undisturbed soil temperature for the evaluation of underground installations. The freezing depth indicated in Table A was approximated from the earth temperature data compiled in Reference (7).

F. Background Noise

The following qualitative estimates of ambient noise levels at the various Breakthrough sites were made by inspection of maps (Appendix) showing locations of nearby highways, airports, or other noise sources. Without field inspection and measurement, sufficient data are not available to enable quantitative estimates of the noise environments at these sites. It should be noted that the increased density of building and people accompanying Operation Breakthrough will result in further increases in ambient noise levels.

Site	Estimated Ambient Noise Level	Comments
Sacramento, Calif.	Medium-to-High	Local traffic, airport
New Castle County, Del.	Medium-to-High	Rural but near highways
Macon, Ga.	Low-to-Medium	Assuming minimal highway noise
Indianapolis, Ind.	High	Highway, adjacent airport, Indianapolis Speedway
Kalamazoo, Mich.	Medium-to-High	Two miles from airport

Jersey City, N. J.	High	High density urban areas
Memphis, Tenn.	Medium-to-High	Urban area but strong enforcement of anti-noise ordinances
St. Louis, Mo.	High	High density urban area
Houston, Tex.	Medium-to-High	Local traffic, highway, airports
Seattle, Wash.	Medium-to-High	Local traffic, highway, airports
Seattle, Wash. (King Co.)	Medium	Highway

Pending availability of more quantitative data, it is recommended that particular attention be given to noise control measures at all sites where the estimated ambient noise level is high or medium-to-high.

G. Wind Data for Structural Design

Table F gives tabulated wind data for the stations nearest the ten selected sites. These stations, in every case, are airport locations with open exposures. References or data sources are indicated in the column headings. Extreme mile wind speeds corresponding to a mean recurrence interval of 50 years have been presented by Thom (15) in the form of isotachs and are suggested as basic design speeds, provided the appropriate terrain corrections are made. These corrections can be most conveniently applied by use of the power law and the average parameters suggested by Davenport (16, 17). Under most strong wind (neutral) conditions, the mean velocity profile can be described by the expression

$$\frac{V_Z}{V_G} = \left(\frac{Z}{Z_G}\right)^{\alpha} \qquad (2)$$

where V_Z = wind speed at height Z

V_G = gradient wind speed first attained at height Z_G

α = power law exponent

The gradient speed is assumed to be independent of local terrain and therefore equal at station and site. This then allows the calculation of wind speeds at the site if the parameters α and Z_G are known. The following average values have been suggested by Davenport (17).

Type of Terrain	α	Z_G (ft)
Flat open country	.16	900
Rough wooded country, city suburbs	.28	1300
Heavily built up urban centers	.40	1400

Because of their low probability of occurrence, extreme speeds are not usually a satisfactory basis for evaluating structural performance. For this purpose, mean wind speeds for January and July as the mean annual wind speeds are presented in Table F. These data indicate the relative windiness of the 10 localities and also indicate the relative contribution of extratropical cyclones and thunderstorms being associated with the winter months. Also included in Table F are the average number of storms per year which resulted in wind speeds of 47 mph or greater. It will be noted that this speed corresponds to a loading of approximately one-half the design load and would produce up to 250 loading cycles during the 50-year design life of the structure if wind gusts were neglected. The effect of high intensity gusts would be primarily to increase the number of loading cycles, say to 1000 or more during the 50-year life of the structure. Therefore, the data listed in Table F, coupled with known properties of atmospheric boundary layers, can be used to establish the mean wind climate at the 10 localities. Information sufficient for design and evaluation of performance can be developed once the estimates of the terrain roughness become available. It is recommended that an inspection of the surrounding terrain or the sites be made by qualified personnel for the purpose of estimating the effective roughness parameters.

H. Earthquake Data

In the design of buildings to resist lateral seismic forces, the minimum total lateral shear is usually based on the expression

$$V = ZKCW \qquad (3)$$

where V = total lateral shear at the base

Z = numerical coefficient which depends on the seismic zone in which the building is to be situated

K = numerical coefficient which depends upon the structural frame characteristics

C = numerical coefficient for the base shear which depends upon the fundamental period of the structure

W = total dead load.

Of the above factors, only Z has a regional variation. Since no reliable method of predicting the time, place and intensity of earthquakes exists, maps have been constructed indicating the areas which have experienced destructive earthquakes in the past. These maps are the only means available at this time by which the location of future destructive earthquakes may be anticipated. Zones range from 0 to 3 and are characterized by the following expected degrees of damage.

Zone	Degree of Damage	Z Value
0	None	0
1	Minor	0.25
2	Moderate	0.50
3	Major	1.0

A number of different seismic maps are in use, their zone boundaries differing only slightly in most cases. Based on the most recent edition of ANSI-A58-Sec. 6, the following seismic zones are suggested for arriving at design loads:

Selected Site	Seismic Zone
Sacramento, California	2
Wilmington, Delaware	1
Macon, Georgia	1
Indianapolis, Indiana	1
Kalamazoo, Michigan	1
St. Louis, Missouri	1
Jersey City, New Jersey	1
Memphis, Tennessee	2
Houston, Texas	1
Seattle, Washington	3

I. Air Contamination Data

Air pollution data for the ten Operation Breakthrough localities are given in Table G. Included are the locations of the sampling sites and the concentrations of suspended particulates, sulfur dioxide, nitrogen dioxide and ammonia. The geometric mean (which gives a better indication of the central tendency of the values than the arithmetic mean), the 90% frequency distribution value (90% of the readings are equal to or less than this value) and the period of years that these averages represent are given in Table G. Blank spaces indicate data is not available. These concentrations represent averages at the sampling sites; the values at the particular Breakthrough site will vary and will depend on pollutant sources, and meteorological and topographical factors (19).

Little information is available in the literature concerning application of these data in the design of housing systems. The following statements, taken from reference (20), are given to illustrate a correlation between exposure to sulfur dioxide and particulates and the effects on health.

a. At concentrations ranging from 300-500 of sulfur dioxide (24-hour mean), with low particulate levels, increased hospital admissions of older persons for respiratory disease may occur; absenteeism from work, particularly with older persons, may also occur.

b. A decrease from 140 to 60 (annual mean) in particulate concentrations may be accompanied by decrease in mean spectrum volume in industrial workers.

c. Where concentrations range from 100-130 and above for particulates (annual mean) with sulfur dioxide concentrations (annual mean) greater than 120, children residing in such areas are likely to experience increased incidence of certain respiratory diseases.

These statements apply to outdoor pollutants, but pollutant levels indoors have not received adequate attention. Considering the fact that people spend most of their lives indoors, the matter of the quality of indoor air becomes very important. Further efforts are recommended to measure indoor and outdoor pollution levels simultaneously to relate them to the various sources of air contaminations, both indoors and outdoors and to other climatic parameters. With this type of information it should be possible to specify air cleaning devices to maintain indoor air at a healthful level of purity.

J. Precipitation Data

Extreme values in 24 hours and normals (1931-1960) of annual totals for rain - and snowfall were obtained from reference (14) and listed in Table A, which also shows the snow load in lbs/sq. ft. on the ground as transcribed from reference (12).

K. Summary and Recommendations

Outdoor environmental data required for the design and the evaluation of Breakthrough building systems have been assembled herein from various sources. The parameters included are temperature, humidity, wind, precipitation, solar radiation, ground temperature, soil conditions, background noise level, air contamination and earthquake risk. It is believed that the data presented in this report can be used to prepare preliminary designs for the Breakthrough building programs. However, more detailed and specific information should be prepared as the Breakthrough program progresses, especially for use in the test and evaluation phase.

The following recommendations are made:

1. After review and approval by HUD this report should be made available to Breakthrough contractors for use in their design work.
2. Continue efforts to add to and refine the data given with special priority to be given to (a) conduct field inspections and measurements of the background noise levels and terrain roughness at the Breakthrough sites, and (b) measure coincident hourly data for air contamination with reference to temperature, humidity and wind data. These coincident data are essential for predicting the indoor environment of a Breakthrough building especially with respect to the design of the indoor environmental control systems.

References

1. Chapters 27 and 28, Heating Load and Air-Conditioning Cooling Load, ASHRAE Handbook of Fundamentals, 1967, pp. 457-512.
2. Chapter 22, Weather Data and Design Conditions, ASHRAE Handbook of Fundamentals, 1967, pp. 371-392.
3. AFM-88-8, Engineering Weather Data, Air Force, Army, and Navy Manual, Chapter 6, NAVFAC, p. 89, July, 1967.
4. NBS Report 9483, Simultaneous Weather Characteristics in Six Selected Cities in the United States, January, 1968.
5. Chapter 54, Estimating Fuel or Energy Consumption, 1968 ASHRAE Guide and Data Book, Application Volume, pp. 645-656.
6. Chapter 50, Applied Heat Pump Systems, 1967 ASHRAE Guide and Data Book, Systems and Equipment Volume, pp. 607-622.
7. NBS Report 9493, Least Squares Analysis of Annual Earth Temperature Cycles for Selected Stations in the Contiguous United States, January, 1968.
8. Fluor Product Company, Evaluated Weather Data for Cooling Equipment Design, Fluor Product Company Publication, 1958.
9. Climatography of the United States, No. 82--Decennial Census of United States--Climate Summary of Hourly Observations, 1951-1960.
10. Key to Meteorological Records, Documentation No. 4.11.
11. Climatological Data, National Summary, Vol. 19, No. 13, 1968.
12. Selected Climatic Maps of the United States, 1966.

13. Seismic Maps of ESSA, "Earthquake", 1969 ESSA/PI 69005.

14. "Normals, Means and Extremes", reprinted from U. S. Dept. of Commerce, ESSA's Climatological Data, National Summary, Vol. 19, No. 13, 1968.

15. Thom, H. C. S., "New Distributions of Extreme Winds in the United States", Journal of the Structural Division, ASCE, Vol. 94, No. ST7, July, 1968.

16. Davenport, A. G., "The Relationship of Wind Structure to Wind Loading", Proc. of Conf. on Wind Effects on Structures, NPL, 1965, HMSO.

17. Davenport, A. G., "The Dependence of Wind Loads on Meteorological Parameters", Wind Effects on Buildings and Structures, Vol. 1, Univ. of Toronto Press, 1968.

18. Data obtained from the Air Quality and Emission Data Division, National Air Pollution Control Administration, HEW.

19. Air Pollution, Vol. 2, A. C. Stern, ed., Chapter 24, "Meteorological Measurements", E. W. Hewson, Academic Press, New York, (1968).

20. "Guidelines for the Development of Air Quality Standards and Implementation Plans", National Air Pollution Control Administration, HEW, (May, 1969).

Table A

Data for Heating and Cooling Load Calculations

Table A

Site Localities (Weather Station)	Air Temperatures, °F: Summer DB/WB 1%	2½%	5%	10%	DB Range °F	Winter DB 99%	97½%	Coincident wind	Annual Temperature, °F 14/* Recorded Highest	Recorded Lowest	Average	Ground Temp. °F Upper 10 Ft Average Summer	Winter	Frost depth in.
Sacramento, Calif. (Airport)	100/72	97/70	94/69	88/67	36	30	32	VL**	115	23	60	76	57	1
Wilmington, Del. (Airport)	93/99	90/77	87/76	84/74	20	12	15	M	102	-4	54	66	44	6
Macon, Ga. (Airport)	98/80	96/79	94/78	92/77	22	23	27	L	104	3	66	75	57	4
Indianapolis, Ind. (Airport)	93/78	91/77	88/76	86/74	22	0	4	M	99	-18	52	66	43	12
Kalamazoo, Mich. (Grand Rapids AP)	92/76	89/75	86/74	83/71	23	1	5	M	100	-16	48	63	41	12
St. Louis, Mo. (City Office)	96/79	94/78	92/77	89/75	18	7	11	M	106	-11	55	65	43	12
Jersey City, N. J. (Corrected from data of Newark AP)	92/77	89/76	86/75	82/73	20	11	15	M	105	1	53	62	44	6
Memphis, Tenn. (Airport)	98/80	96/79	94/78	91/77	21	17	21	L	106	-13	62	69	50	12
Houston, Tex. (Airport)	96/80	94/80	92/79	90/78	18	28	39	M	106	9	69	81	60	1
Seattle, Wash. (Sea/Tac AP)	85/66	81/64	77/63	72/61	22	20	24	L	99	6	51	59	46	5
Seattle, Wash. (City Office)	81/67	79/65	76/64	-	19	28	32	L	100	11	53	60	47	5

* 14/ and similar nomenclature are numbers for reference citation.

** VL, very light; L, light; M, moderate; H, high. See text, p. 10.

Table A - Continued

Site Localities (Weather Station)	Precipitation Data (1931-1960)					Solar Radiation		
	Rain, In.[14/]		Snow, In.[14/]				% Sunshine[14/]	
	Max. 24 hrs.	Mean annual	Max. 24 hrs.	Mean annual	Snow Load[12/] (psf)	Max. Daily Total	Jan.	July
Sacramento, Calif. Airport	5.6	16.3	-	-	5 ~ 10	3620	45	97
Wilmington, Del. Airport	6.2	44.5	15.6	22.5	20	3615	44	66
Macon, Ga. Airport	5.0	44.1	3.7	0.4	5 ~ 10	2130	56	64
Indianapolis, Ind. Airport	3.9	12.7	12.5	20.3	10 ~ 20	3615	43	66
Kalamazoo, Mich. Grand Rapids AP	2.7	31.2	12.6	78.7	20	3600	-	-
St. Louis, Mo. (City Office)	3.3	35.3	11.2	17.2	20	3620	52	71
Jersey City, N. J. (Corrected from the data of Newark AP)	4.7	43.5	26	29.8	20	3610		
Memphis, Tenn. airport	4.9	49.7	16.1	6.6	5 ~ 10	3624	48	73
Houston, Tex. airport	15.7	46.0	4.4	0.4	less than 5	3612	47	74
Seattle, Wash. Sea/Tac AP	3.4	39.0	21.4	14.7	10	3561	14	68
Seattle, Wash. (City Office)	3.3	34.1	11.5	8.1	10	3561	28	63

Table A - Continued

Site Localities (Weather Station)	Seasonal Degree-Days Seasonal Heating	Seasonal Degree-Days Seasonal Cooling	No. of annual hrs at or above 67 °F WB[3/]
Sacramento, Calif. (Airport)	2773	1411	351
Wilmington, Del. (Airport)	4930	1002	1191
Macon, Ga. (Airport)	2130	2367	3069
Indianapolis, Ind. (Airport)	5699	1033	1462
Kalamazoo, Mich. (Grand Rapids AP)	6998	730	833
St. Louis, Mo. (City Office)	4900	1558	1866
Jersey, City, N. J. (Corrected from data of Newark AP)	5067	965	1290
Memphis, Tenn. (Airport)	3233	2078	2631
Houston, Tex. (Airport)	1400	3175	3695
Seattle, Wash. (Sea/Tac AP)	5145	170	17
Seattle, Wash. (City Office)	4424	-	17

Table B

Solar Radiation

ET:	Equation of time, min.
R:	Solar constant modifier
HO:	Daily total radiation upon horizontal surface, Btu/hr ft^2
BETA:	Solar altitude angle, degree
AZIMUTH:	Solar azimuth angle, measured from north, degree
IDN:	Direct normal radiation, Btu/hr ft^2
DIFF:	Diffuse sky radiation, Btu/hr ft^2

Total solar radiation values (for the clearness number of unity) expected to fall upon vertical wall surfaces from eight compass directions and upon a horizontal surface are tabulated in these tables.

LOCATION: SACRAMENTO, CALIFORNIA

MONTH= 7 DAY=21 FOR LATITUDE= 38.5 LONGITUDE= 121.5

ET= -6.2000 R= .9690 SUNRZ= 5.0626 HO= 3619.11

CALCULATED SOLAR RADIATION DATA, BTU/HR (SQ. FT.)

TIME HR	AIR TEMP	BETA (DEG)	AZI-MUTH	IDN	DIFF	SOUTH	SW	WEST	NW	NORTH	NE	EAST	SE	HORIZ
1.	71.	0.	13.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2.	68.	0.	28.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3.	65.	0.	42.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4.	64.	0.	53.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
5.	64.	0.	63.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6.	65.	10.	72.	107.	15.	13.	13.	13.	13.	45.	106.	113.	60.	33.
7.	68.	22.	81.	196.	27.	30.	30.	30.	30.	59.	178.	210.	136.	99.
8.	71.	33.	90.	236.	32.	44.	44.	44.	44.	46.	185.	242.	183.	161.
9.	75.	45.	100.	257.	35.	88.	57.	57.	57.	57.	162.	236.	205.	216.
10.	80.	56.	113.	268.	36.	126.	67.	67.	67.	67.	123.	204.	206.	259.
11.	84.	66.	134.	274.	37.	152.	74.	74.	74.	74.	75.	154.	185.	288.
12.	89.	72.	171.	277.	38.	163.	128.	77.	77.	77.	77.	91.	148.	300.
13.	93.	69.	213.	276.	37.	158.	172.	129.	76.	76.	76.	76.	96.	295.
14.	96.	60.	240.	271.	37.	138.	200.	186.	104.	70.	70.	70.	70.	273.
15.	99.	50.	255.	262.	36.	104.	208.	226.	147.	61.	61.	61.	61.	235.
16.	100.	38.	267.	246.	33.	61.	195.	243.	178.	50.	50.	50.	50.	185.
17.	100.	26.	276.	216.	29.	36.	158.	228.	186.	56.	36.	36.	36.	125.
18.	99.	15.	284.	153.	21.	20.	95.	163.	147.	57.	20.	20.	20.	60.
19.	96.	4.	293.	14.	2.	1.	6.	14.	14.	7.	1.	1.	1.	3.
20.	93.	0.	303.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
21.	89.	0.	313.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
22.	84.	0.	326.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
23.	80.	0.	341.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
24.	75.	0.	357.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

LOCATION: WILMINGTON, DELAWARE

MONTH= 7 DAY=21 FOR LATITUDE= 39.7 LONGITUDE= 75.6

ET= -6.2000 R= .9690 SUNRZ= 4.9532 HO= 3615.22

CALCULATED SOLAR RADIATION DATA, BTU/HR (SQ. FT.)

TIME HR	AIR TEMP	BETA (DEG)	AZI- MUTH	IDN	DIFF	SOUTH	SW	WEST	NW	NORTH	NE	EAST	SE	HORIZ
1.	77.	0.	14.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2.	75.	0.	29.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3.	74.	0.	42.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4.	73.	0.	54.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
5.	73.	.	64.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6.	74.	11.	73.	119.	16.	14.	14.	14.	14.	49.	117.	125.	69.	39.
7.	75.	22.	82.	200.	27.	31.	31.	31.	31.	58.	179.	214.	142.	104.
8.	77.	34.	91.	237.	32.	48.	45.	45.	45.	45.	182.	242.	187.	165.
9.	79.	45.	102.	257.	35.	94.	58.	58.	58.	58.	157.	234.	208.	218.
10.	82.	56.	116.	268.	36.	132.	67.	67.	67.	67.	116.	201.	207.	260.
11.	84.	66.	138.	274.	37.	157.	79.	74.	74.	74.	74.	150.	186.	287.
12.	87.	71.	174.	276.	38.	168.	134.	76.	76.	76.	76.	86.	148.	298.
13.	89.	68.	213.	275.	37.	162.	177.	132.	75.	75.	75.	75.	96.	292.
14.	91.	59.	239.	270.	37.	140.	203.	188.	103.	69.	69.	69.	69.	269.
15.	92.	49.	255.	261.	36.	106.	210.	227.	147.	61.	61.	61.	61.	232.
16.	93.	37.	266.	244.	33.	62.	195.	243.	177.	49.	49.	49.	49.	181.
17.	93.	26.	276.	214.	29.	35.	157.	227.	184.	55.	35.	35.	35.	122.
18.	92.	14.	285.	150.	20.	20.	93.	160.	144.	56.	20.	20.	20.	57.
19.	91.	3.	294.	11.	2.	1.	5.	12.	12.	6.	1.	1.	1.	2.
20.	89.	0.	303.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
21.	87.	0.	314.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
22.	84.	0.	327.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
23.	82.	0.	342.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
24.	79.	0.	358.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

LOCATION: MACON, GEORGIA

MONTH= 7 DAY=21 FOR LATITUDE= 32.7 LONGITUDE= 83.6

ET= -6.2000 R= .9690 SUNRZ= 5.7647 HO= 3621.78

CALCULATED SOLAR RADIATION DATA, BTU/HR (SQ. FT.)

TIME HR	AIR TEMP	BETA (DEG)	AZI- MUTH	IDN	DIFF	SOUTH	SW	WEST	NW	NORTH	NE	EAST	SE	HORIZ
1.	80.	0.	6.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2.	78.	0.	22.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3.	77.	0.	37.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4.	76.	0.	49.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
5.	76.	0.	59.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6.	77.	3.	68.	4.	1.	0.	0.	0.	0.	2.	5.	5.	2.	1.
7.	78.	15.	75.	152.	21.	20.	20.	20.	20.	58.	147.	162.	94.	59.
8.	80.	27.	82.	218.	30.	37.	37.	37.	37.	63.	192.	230.	155.	129.
9.	83.	40.	90.	249.	34.	52.	52.	52.	52.	52.	187.	243.	187.	192.
10.	86.	52.	99.	265.	36.	89.	64.	64.	64.	64.	159.	224.	195.	245.
11.	88.	64.	113.	273.	37.	119.	73.	73.	73.	73.	118.	182.	182.	284.
12.	91.	75.	141.	278.	38.	136.	86.	78.	78.	78.	78.	124.	151.	305.
13.	94.	77.	160.	278.	38.	138.	105.	79.	79.	79.	79.	101.	136.	309.
14.	96.	68.	240.	275.	37.	126.	173.	163.	101.	75.	75.	75.	75.	294.
15.	97.	57.	257.	269.	37.	101.	193.	211.	146.	67.	67.	67.	67.	261.
16.	98.	44.	267.	256.	35.	65.	192.	239.	179.	56.	56.	56.	56.	213.
17.	98.	32.	275.	232.	32.	43.	169.	239.	194.	60.	43.	43.	43.	153.
18.	97.	19.	282.	183.	25.	27.	120.	195.	172.	63.	27.	27.	27.	65.
19.	96.	7.	290.	62.	8.	7.	33.	65.	63.	28.	7.	7.	7.	16.
20.	94.	0.	298.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
21.	91.	0.	307.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
22.	88.	0.	318.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
23.	86.	0.	332.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
24.	83.	0.	348.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

LOCATION: INDIANAPOLIS, INDIANA

MONTH= 7 DAY=21 FOR LATITUDE= 39.7 LONGITUDE= 86.3

ET= -6.2000 R= .9690 SUNRZ= 5.6614 HO= 3614.96

CALCULATED SOLAR RADIATION DATA, BTU/HR (SQ. FT.)

TIME HR	AIR TEMP	BETA (DEG)	AZI-MUTH	IDN	DIFF	SOUTH	SW	WEST	NW	NORTH	NE	EAST	SE	HORIZ
1.	75.	0.	2.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2.	73.	0.	18.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3.	72.	0.	33.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4.	71.	0.	46.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
5.	71.	0.	57.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6.	72.	4.	66.	12.	2.	1.	1.	1.	1.	6.	12.	12.	6.	2.
7.	73.	14.	75.	150.	20.	20.	20.	20.	20.	56.	145.	160.	93.	58.
8.	75.	26.	84.	214.	29.	35.	35.	35.	35.	55.	184.	227.	157.	122.
9.	78.	37.	94.	244.	33.	62.	49.	49.	49.	49.	177.	243.	195.	181.
10.	81.	49.	105.	261.	36.	106.	61.	61.	61.	61.	146.	227.	210.	232.
11.	83.	59.	121.	270.	37.	141.	69.	69.	69.	69.	103.	188.	204.	269.
12.	86.	68.	147.	275.	37.	162.	96.	75.	75.	75.	75.	132.	177.	292.
13.	89.	70.	174.	276.	38.	168.	134.	76.	76.	76.	76.	86.	148.	298.
14.	91.	66.	222.	274.	37.	158.	187.	150.	74.	74.	74.	74.	79.	287.
15.	92.	56.	244.	268.	36.	132.	208.	201.	116.	67.	67.	67.	67.	260.
16.	93.	45.	258.	257.	35.	94.	208.	234.	157.	57.	57.	57.	57.	218.
17.	93.	34.	269.	237.	32.	48.	187.	242.	182.	45.	45.	45.	45.	165.
18.	92.	22.	278.	200.	27.	31.	142.	214.	179.	58.	31.	31.	31.	104.
19.	91.	11.	287.	118.	16.	14.	69.	125.	117.	49.	14.	14.	14.	39.
20.	89.	.	296.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
21.	86.	0.	306.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
22.	83.	0.	318.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
23.	81.	0.	331.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
24.	78.	0.	346.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

LOCATION: KALAMAZOO, MICHIGAN

MONTH= 7 DAY=21 FOR LATITUDE= 42.2 LONGITUDE= 84.5

ET= -6.2000 R= .9690 SUNRZ= 5.4304 HO= 3603.10

CALCULATED SOLAR RADIATION DATA, BTU/HR (SQ. FT.)

TIME HR	AIR TEMP	BETA (DEG)	AZI- MUTH	IDN	DIFF	SOUTH	SW	WEST	NW	NORTH	NE	EAST	SE	HORIZ
1.	73.	0.	4.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2.	71.	0.	20.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3.	70.	0.	34.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4.	69.	0.	47.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
5.	69.	0.	58.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6.	70.	6.	68.	43.	6.	5.	5.	5.	5.	21.	44.	44.	21.	10.
7.	71.	16.	77.	165.	22.	22.	22.	22.	22.	58.	156.	177.	107.	69.
8.	73.	27.	87.	219.	30.	37.	37.	37.	37.	49.	183.	232.	167.	130.
9.	76.	38.	97.	247.	34.	74.	50.	50.	50.	50.	169.	242.	202.	187.
10.	79.	49.	110.	262.	36.	118.	61.	61.	61.	61.	135.	222.	215.	234.
11.	82.	59.	127.	270.	37.	153.	69.	69.	69.	69.	89.	180.	207.	268.
12.	85.	66.	154.	274.	37.	173.	109.	74.	74.	74.	74.	123.	179.	288.
13.	88.	68.	170.	275.	37.	177.	135.	75.	75.	75.	75.	93.	160.	292.
14.	90.	63.	222.	273.	37.	164.	196.	155.	72.	72.	72.	72.	78.	280.
15.	91.	54.	243.	266.	36.	136.	214.	205.	114.	65.	65.	65.	65.	252.
16.	92.	44.	258.	255.	35.	95.	211.	236.	155.	56.	56.	56.	56.	210.
17.	92.	33.	269.	234.	32.	48.	186.	241.	180.	44.	44.	44.	44.	158.
18.	91.	21.	278.	195.	27.	30.	138.	210.	176.	56.	30.	30.	30.	98.
19.	90.	11.	288.	112.	15.	13.	64.	118.	111.	47.	13.	13.	13.	36.
20.	88.	.	298.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
21.	85.	0.	308.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
22.	82.	0.	320.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
23.	79.	0.	333.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
24.	76.	0.	348.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

LOCATION: ST. LOUIS, MISSOURI

MONTH= 7 DAY=21 FOR LATITUDE= 38.6 LONGITUDE= 90.2

ET= -6.2000 R= .9690 SUNRZ= 4.9710 HO= 3618.77

CALCULATED SOLAR RADIATION DATA, BTU/HR (SQ. FT.)

TIME HR	AIR TEMP	BETA (DEG)	AZI-MUTH	IDN	DIFF	SOUTH	SW	WEST	NW	NORTH	NE	EAST	SE	HORIZ
1.	81.	0.	14.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2.	80.	0.	29.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3.	79.	0.	43.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4.	78.	0.	54.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
5.	78.	.	64.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6.	79.	11.	73.	118.	16.	14.	14.	14.	14.	49.	117.	125.	69.	39.
7.	80.	23.	81.	201.	27.	31.	31.	31.	31.	59.	180.	215.	142.	104.
8.	81.	34.	90.	238.	32.	47.	46.	46.	46.	46.	184.	242.	186.	167.
9.	84.	46.	101.	258.	35.	92.	58.	58.	58.	58.	159.	234.	206.	220.
10.	86.	57.	115.	269.	37.	129.	68.	68.	68.	68.	118.	200.	205.	262.
11.	88.	67.	137.	275.	37.	154.	78.	74.	74.	74.	74.	149.	183.	289.
12.	90.	72.	175.	277.	38.	164.	133.	77.	77.	77.	77.	85.	144.	300.
13.	93.	68.	216.	275.	37.	158.	175.	134.	75.	75.	75.	75.	92.	293.
14.	94.	60.	241.	271.	37.	136.	201.	190.	108.	70.	70.	70.	70.	270.
15.	95.	49.	256.	261.	36.	101.	208.	228.	150.	61.	61.	61.	61.	231.
16.	96.	37.	267.	244.	33.	58.	193.	243.	180.	49.	49.	49.	49.	180.
17.	96.	25.	276.	212.	29.	35.	154.	225.	185.	56.	35.	35.	35.	119.
18.	95.	14.	285.	145.	20.	19.	89.	154.	140.	55.	19.	19.	19.	54.
19.	94.	3.	294.	5.	1.	0.	2.	5.	5.	2.	.	.	.	1.
20.	93.	0.	304.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
21.	90.	0.	315.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
22.	88.	0.	327.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
23.	86.	0.	342.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
24.	84.	0.	358.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

LOCATION: JERSEY CITY, NEW JERSEY

MONTH= 7 DAY=21 FOR LATITUDE= 40.7 LONGITUDE= 74.2

ET= -6.2000 R= .9690 SUNRZ= 4.8117 HO= 3610.80

CALCULATED SOLAR RADIATION DATA, BTU/HR (SQ. FT.)

TIME HR	AIR TEMP	BETA (DEG)	AZI-MUTH	IDN	DIFF	SOUTH	SW	WEST	NW	NORTH	NE	EAST	SE	HORIZ
1.	76.	0.	15.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2.	74.	0.	30.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3.	73.	0.	43.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4.	72.	0.	54.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
5.	72.	2.	65.	1.	0.	0.	0.	0.	0.	0.	1.	1.	0.	0.
6.	73.	13.	74.	133.	18.	17.	17.	17.	17.	52.	130.	141.	79.	47.
7.	74.	24.	83.	205.	28.	33.	33.	33.	33.	56.	181.	219.	148.	110.
8.	76.	35.	93.	240.	33.	55.	47.	47.	47.	47.	179.	243.	191.	170.
9.	78.	46.	104.	258.	35.	101.	58.	58.	58.	58.	151.	232.	211.	222.
10.	81.	57.	119.	269.	37.	138.	68.	68.	68.	68.	109.	196.	209.	262.
11.	83.	66.	142.	274.	37.	163.	88.	74.	74.	74.	74.	143.	186.	287.
12.	86.	70.	178.	276.	38.	172.	142.	76.	76.	76.	76.	79.	146.	296.
13.	88.	66.	215.	274.	37.	165.	183.	138.	74.	74.	74.	74.	93.	288.
14.	90.	58.	239.	269.	37.	141.	207.	192.	104.	68.	68.	68.	68.	265.
15.	91.	47.	255.	260.	35.	105.	212.	229.	147.	59.	59.	59.	59.	226.
16.	92.	36.	266.	242.	33.	60.	194.	243.	177.	48.	48.	48.	48.	176.
17.	92.	25.	276.	210.	29.	34.	154.	224.	183.	55.	34.	34.	34.	116.
18.	91.	14.	285.	143.	19.	18.	87.	152.	139.	55.	18.	18.	18.	53.
19.	90.	3.	294.	6.	1.	1.	3.	6.	6.	3.	1.	1.	1.	1.
20.	88.	0.	304.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
21.	86.	0.	316.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
22.	83.	0.	329.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
23.	81.	0.	343.	0.	0.	0.	0.	0	0.	0.	0.	0.	0.	0.
24.	78.	0.	359.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

LOCATION: MEMPHIS, TENNESSEE

MONTH= 7 DAY=21 FOR LATITUDE= 35.1 LONGITUDE= 90.0

ET= -6.2000 R= .9690 SUNRZ= 5.1008 HO= 3624.19

CALCULATED SOLAR RADIATION DATA, BTU/HR (SQ. FT.)

TIME HR	AIR TEMP	BETA (DEG)	AZI- MUTH	IDN	DIFF	SOUTH	SW	WEST	NW	NORTH	NE	EAST	SE	HORIZ
1.	81.	0.	15.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2.	79.	0.	30.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3.	78.	0.	44.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4.	77.	0.	55.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
5.	77.	0.	64.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6.	78.	10.	72.	108.	15.	13.	13.	13.	13.	45.	107.	114.	61.	34.
7.	79.	22.	80.	199.	27.	31.	31.	31.	31.	62.	181.	212.	137.	102.
8.	81.	34.	88.	238.	32.	46.	46.	46.	46.	52.	189.	242.	180.	167.
9.	83.	47.	97.	259.	35.	81.	59.	59.	59.	59.	167.	235.	199.	223.
10.	86.	59.	110.	270.	37.	117.	69.	69.	69.	69.	129.	202.	196.	267.
11.	89.	69.	131.	276.	37.	140.	76.	76.	76.	76.	82.	150.	174.	295.
12.	92.	75.	174.	278.	38.	150.	124.	78.	78.	78.	78.	86.	134.	306.
13.	94.	71.	222.	276.	38.	143.	166.	137.	77.	77.	77.	77.	81.	299.
14.	96.	61.	247.	271.	37.	123.	193.	192.	120.	71.	71.	71.	71.	274.
15.	97.	49.	260.	262.	36.	90.	200.	230.	160.	61.	61.	61.	61.	234.
16.	98.	37.	270.	244.	33.	49.	186.	243.	187.	49.	49.	49.	49.	180.
17.	98.	25.	278.	210.	29.	34.	148.	223.	187.	61.	34.	34.	34.	116.
18.	97.	13.	286.	135.	18.	17.	81.	143.	132.	53.	17.	17.	17.	48.
19.	96.	1.	294.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
20.	94.	0.	303.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
21.	92.	0.	314.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
22.	89.	0.	327.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
23.	86.	0.	342.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
24.	83.	0.	358.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

LOCATION: HOUSTON, TEXAS

MONTH= 7 DAY=21 FOR LATITUDE= 29.6 LONGITUDE= 95.3

ET= -6.2000 R= .9690 SUNRZ= 5.6457 HO= 3611.36

CALCULATED SOLAR RADIATION DATA, BTU/HR (SQ. FT.)

TIME HR	AIR TEMP	BETA (DEG)	AZI-MUTH	IDN	DIFF	SOUTH	SW	WEST	NW	NORTH	NE	EAST	SE	HORIZ
1.	81.	0.	10.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2.	80.	0.	27.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3.	79.	0.	41.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4.	78.	0.	52.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
5.	78.	0.	61.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6.	79.	4.	69.	21.	3.	2.	2.	2.	2.	10.	22.	22.	11.	5.
7.	80.	17.	76.	167.	23.	23.	23.	23.	23.	62.	161.	178.	105.	71.
8.	81.	29.	82.	226.	31.	40.	40.	40.	40.	67.	197.	235.	159.	142.
9.	84.	42.	89.	253.	34.	55.	55.	55.	55.	58.	189.	241.	184.	205.
10.	86.	55.	97.	268.	36.	85.	67.	67.	67.	67.	160.	217.	186.	257.
11.	88.	68.	110.	275.	37.	111.	75.	75.	75.	75.	118.	171.	168.	293.
12.	90.	79.	145.	279.	38.	124.	89.	80.	80.	80.	80.	111.	133.	311.
13.	93.	78.	220.	278.	38.	123.	137.	116.	79.	79.	79.	79.	84.	310.
14.	94.	67.	251.	275.	37.	109.	171.	176.	122.	75.	75.	75.	75.	290.
15.	95.	54.	264.	267.	36.	83.	187.	220.	163.	66.	66.	66.	66.	253.
16.	96.	41.	272.	251.	34.	53.	183.	242.	191.	59.	53.	53.	53.	200.
17.	96.	28.	278.	222.	30.	39.	155.	232.	196.	67.	39.	39.	39.	136.
18.	95.	16.	285.	159.	22.	21.	98.	170.	154.	61.	21.	21.	21.	64.
19.	94.	3.	292.	8.	1.	1.	4.	9.	9.	4.	1.	1.	1.	2.
20.	93.	0.	299.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
21.	90.	0.	309.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
22.	88.	0.	320.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
23.	86.	0.	335.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
24.	84.	0.	352.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

LOCATION: SEATTLE, WASHINGTON (AIRPORT)

MONTH= 7 DAY=21 FOR LATITUDE= 47.4 LONGITUDE= 122.3

ET= -6.2000 R= .9690 SUNRZ= 4.6734 HO= 3562.21

CALCULATED SOLAR RADIATION DATA, BTU/HR (SQ. FT.)

TIME HR	AIR TEMP	BETA (DEG)	AZI- MUTH	IDN	DIFF	SOUTH	SW	WEST	NW	NORTH	NE	EAST	SE	HORIZ
1.	67.	0.	11.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2.	65.	0.	26.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3.	64.	0.	39.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4.	63.	0.	52.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
5.	63.	3.	63.	6.	1.	1.	1.	1.	1.	3.	6.	6.	2.	1.
6.	64.	12.	73.	130.	18.	16.	16.	16.	16.	53.	128.	138.	76.	45.
7.	65.	22.	84.	199.	27.	31.	31.	31.	31.	51.	174.	214.	146.	102.
8.	67.	32.	95.	234.	32.	60.	43.	43.	43.	43.	171.	240.	194.	157.
9.	70.	42.	107.	253.	34.	110.	54.	54.	54.	54.	141.	233.	220.	205.
10.	73.	51.	123.	264.	36.	153.	63.	63.	63.	63.	97.	201.	224.	242.
11.	75.	59.	144.	270.	37.	182.	91.	69.	69.	69.	69.	151.	207.	268.
12.	78.	63.	172.	272.	37.	196.	147.	72.	72.	72.	72.	89.	172.	279.
13.	81.	61.	202.	272.	37.	191.	191.	120.	71.	71.	71.	71.	121.	275.
14.	83.	56.	227.	268.	36.	170.	218.	177.	72.	67.	67.	67.	67.	257.
15.	84.	47.	245.	259.	35.	133.	225.	219.	120.	59.	59.	59.	59.	225.
16.	85.	37.	259.	245.	33.	86.	210.	240.	158.	49.	49.	49.	49.	182.
17.	85.	27.	271.	219.	30.	37.	173.	232.	177.	40.	37.	37.	37.	131.
18.	84.	17.	281.	172.	23.	24.	115.	185.	160.	56.	24.	24.	24.	75.
19.	83.	8.	292.	72.	10.	8.	36.	75.	74.	35.	8.	8.	8.	19.
20.	81.	0.	303.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
21.	78.	0.	314.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
22.	75.	0.	327.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
23.	73.	0.	341.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
24.	70.	0.	356.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

LOCATION: SEATTLE, WASHINGTON (CITY)

MONTH= 7 DAY=21 FOR LATITUDE= 47.6 LONGITUDE= 122.3

ET= -6.2000 R= .9690 SUNRZ= 4.6668 HO= 3560.77

CALCULATED SOLAR RADIATION DATA, BTU/HR (SQ. FT.)

TIME HR	AIR TEMP	BETA (DEG)	AZI- MUTH	IDN	DIFF	SOUTH	SW	WEST	NW	NORTH	NE	EAST	SE	HORIZ
1.	66.	0.	11.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2.	64.	0.	26.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3.	63.	0.	39.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4.	62.	0.	51.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
5.	62.	3.	63.	6.	1.	1.	1.	1.	1.	3.	6.	6.	2.	1.
6.	63.	12.	73.	130.	18.	16.	16.	16.	16.	53.	128.	138.	77.	46.
7.	64.	22.	84.	199.	27.	31.	31.	31.	31.	51.	174.	214.	146.	102.
8.	66.	32.	95.	234.	32.	60.	43.	43.	43.	43.	171.	240.	194.	157.
9.	68.	42.	107.	253.	34.	110.	54.	54.	54.	54.	141.	233.	220.	204.
10.	70.	51.	123.	264.	36.	153.	63.	63.	63.	63.	97.	201.	224.	242.
11.	73.	59.	144.	270.	37.	183.	92.	69.	69.	69.	69.	151.	207.	267.
12.	75.	63.	172.	272.	37.	196.	148.	72.	72.	72.	72.	89.	172.	279.
13.	77.	61.	202.	272.	37.	192.	191.	120.	71.	71.	71.	71.	122.	275.
14.	79.	55.	227.	268.	36.	170.	218.	177.	71.	67.	67.	67.	67.	257.
15.	80.	47.	245.	259.	35.	134.	225.	219.	119.	59.	59.	59.	59.	225.
16.	81.	37.	259.	245.	33.	87.	210.	240.	158.	49.	49.	49.	49.	182.
17.	81.	27.	271.	220.	30.	38.	174.	232.	177.	40.	38.	38.	38.	131.
18.	80.	17.	281.	172.	23.	24.	115.	185.	161.	56.	24.	24.	24.	75.
19.	79.	8.	292.	73.	10.	8.	37.	76.	75.	35.	8.	8.	8.	20.
20.	77.	0.	303.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
21.	75.	0.	314.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
22.	73.	0.	327.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
23.	70.	0.	341.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
24.	68.	0.	356.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

Table C

Sol-air Temperatures

Sol-air temperature values tabulated in these tables are obtained from the solar radiation values of Table B and estimated outdoor air temperature profiles of a design day using equation (1) of the text.

LOCATION: SACRAMENTO, CALIFORNIA

MONTH= 7 DAY=21 FOR LATITUDE= 38.5 LONGITUDE= 121.5

ALPHA/H= .150

SOL-AIR TEMPERATURES (DEG. F)

TIME (HR)	AIR TEMP	SOUTH	SW	WEST	NW	NORTH	NE	EAST	SE	HORIZ
1.	71.	71.	71.	71.	71.	71.	71.	71.	71.	64.
2.	68.	68.	68.	68.	68.	68.	68.	68.	68.	61.
3.	65.	65.	65.	65.	65.	65.	65.	65.	65.	58.
4.	64.	64.	64.	64.	64.	64.	64.	64.	64.	57.
5.	64.	64.	64.	64.	64.	64.	64.	64.	64.	57.
6.	65.	67.	67.	67.	67.	72.	81.	82.	74.	63.
7.	68.	72.	72.	72.	72.	77.	94.	99.	88.	75.
8.	71.	78.	78.	78.	78.	78.	99.	107.	98.	88.
9.	75.	88.	84.	84.	84.	84.	99.	110.	106.	100.
10.	80.	98.	90.	90.	90.	90.	98.	110.	110.	112.
11.	84.	107.	95.	95.	95.	95.	96.	107.	112.	121.
12.	89.	113.	108.	100.	100.	100.	100.	103.	111.	127.
13.	93.	117.	119.	112.	104.	104.	104.	104.	107.	130.
14.	96.	117.	126.	124.	112.	107.	107.	107.	107.	130.
15.	99.	114.	130.	133.	121.	108.	108.	108.	108.	127.
16.	100.	109.	129.	136.	127.	107.	107.	107.	107.	121.
17.	100.	105.	124.	134.	128.	108.	105.	105.	105.	112.
18.	99.	102.	113.	123.	121.	107.	102.	102.	102.	101.
19.	96.	97.	97.	98.	98.	97.	97.	97.	97.	90.
20.	93.	93.	93.	93.	93.	93.	93.	93.	93.	86.
21.	89.	89.	89.	89.	89.	89.	89.	89.	89.	82.
22.	84.	84.	84.	84.	84.	84.	84.	84.	84.	77.
23.	80.	80.	80.	80.	80.	80.	80.	80.	80.	73.
24.	75.	75.	75.	75.	75.	75.	75.	75.	75.	68.

LOCATION: SACRAMENTO, CALIFORNIA

MONTH= 7 DAY=21 FOR LATITUDE= 38.5 LONGITUDE= 121.5

ALPHA/H= .300

SOL-AIR TEMPERATURES (DEG. F)

TIME (HR)	AIR TEMP	SOUTH	SW	WEST	NW	NORTH	NE	EAST	SE	HORIZ
1.	71.	71.	71.	71.	71.	71.	71.	71.	71.	64.
2.	68.	68.	68.	68.	68.	68.	68.	68.	68.	61.
3.	65.	65.	65.	65.	65.	65.	65.	65.	65.	58.
4.	64.	64.	64.	64.	64.	64.	64.	64.	64.	57.
5.	64.	64.	64.	64.	64.	64.	64.	64.	64.	57.
6.	65.	69.	69.	69.	69.	79.	97.	99.	83.	68.
7.	68.	77.	77.	77.	77.	85.	121.	131.	108.	90.
8.	71.	84.	84.	84.	84.	85.	126.	143.	126.	112.
9.	75.	101.	92.	92.	92.	92.	124.	146.	137.	133.
10.	80.	117.	100.	100.	100.	100.	116.	141.	141.	150.
11.	84.	130.	107.	107.	107.	107.	107.	130.	140.	164.
12.	89.	138.	127.	112.	112.	112.	112.	116.	133.	172.
13.	93.	141.	145.	132.	116.	116.	116.	116.	122.	175.
14.	96.	138.	156.	152.	128.	118.	118.	118.	118.	171.
15.	99.	130.	161.	167.	143.	117.	117.	117.	117.	162.
16.	100.	118.	158.	173.	153.	115.	115.	115.	115.	148.
17.	100.	111.	148.	169.	156.	117.	111.	111.	111.	130.
18.	99.	105.	127.	148.	143.	116.	105.	105.	105.	110.
19.	96.	97.	98.	101.	101.	98.	97.	97.	97.	90.
20.	93.	93.	93.	93.	93.	93.	93.	93.	93.	86.
21.	89.	89.	89.	89.	89.	89.	89.	89.	89.	82.
22.	84.	84.	84.	84.	84.	84.	84.	84.	84.	77.
23.	80.	80.	80.	80.	80.	80.	80.	80.	80.	73.
24.	75.	75.	75.	75.	75.	75.	75.	75.	75.	68.

LOCATION: WILMINGTON, DELAWARE

MONTH= 7 DAY=21 FOR LATITUDE= 39.7 LONGITUDE= 75.6

ALPHA/H= .150

SOL-AIR TEMPERATURES (DEG. F)

TIME (HR)	AIR TEMP	SOUTH	SW	WEST	NW	NORTH	NE	EAST	SE	HORIZ
1.	77.	77.	77.	77.	77.	77.	77.	77.	77.	70.
2.	75.	75.	75.	75.	75.	75.	75.	75.	75.	68.
3.	74.	74.	74.	74.	74.	74.	74.	74.	74.	67.
4.	73.	73.	73.	73.	73.	73.	73.	73.	73.	66.
5.	73.	73.	73.	73.	73.	73.	73.	73.	73.	66.
6.	74.	76.	76.	76.	76.	81.	91.	92.	84.	73.
7.	75.	80.	80.	80.	80.	84.	102.	107.	96.	84.
8.	77.	84.	84.	84.	84.	84.	104.	113.	105.	95.
9.	79.	93.	88.	88.	88.	88.	103.	114.	110.	105.
10.	82.	101.	92.	92.	92.	92.	99.	112.	113.	114.
11.	84.	108.	96.	95.	95.	95.	95.	107.	112.	120.
12.	87.	112.	107.	98.	98.	98.	98.	100.	109.	125.
13.	89.	113.	116.	109.	100.	100.	100.	100.	104.	126.
14.	91.	112.	122.	119.	106.	101.	101.	101.	101.	124.
15.	92.	108.	124.	126.	114.	101.	101.	101.	101.	120.
16.	93.	102.	122.	129.	120.	100.	100.	100.	100.	113.
17.	93.	98.	117.	127.	121.	101.	98.	98.	98.	104.
18.	92.	95.	106.	116.	114.	101.	95.	95.	95.	94.
19.	91.	91.	92.	93.	93.	92.	91.	91.	91.	84.
20.	89.	89.	89.	89.	89.	89.	89.	89.	89.	82.
21.	87.	87.	87.	87.	87.	87.	87.	87.	87.	80.
22.	84.	84.	84.	84.	84.	84.	84.	84.	84.	77.
23.	82.	82.	82.	82.	82.	82.	82.	82.	82.	75.
24.	79.	79.	79.	79.	79.	79.	79.	79.	79.	72.

LOCATION: WILMINGTON, DELAWARE

MONTH= 7 DAY=21 FOR LATITUDE= 39.7 LONGITUDE= 75.6

ALPHA/H= .300

SOL-AIR TEMPERATURES (DEG. F)

TIME (HR)	AIR TEMP	SOUTH	SW	WEST	NW	NORTH	NE	EAST	SE	HORIZ
1.	77.	77.	77.	77.	77.	77.	77.	77.	77.	70.
2.	75.	75.	75.	75.	75.	75.	75.	75.	75.	68.
3.	74.	74.	74.	74.	74.	74.	74.	74.	74.	67.
4.	73.	73.	73.	73.	73.	73.	73.	73.	73.	66.
5.	73.	73.	73.	73.	73.	73.	73.	73.	73.	66.
6.	74.	78.	78.	78.	78.	88.	109.	111.	94.	78.
7.	75.	84.	84.	84.	84.	92.	129.	139.	117.	99.
8.	77.	91.	90.	90.	90.	90.	132.	150.	133.	119.
9.	79.	107.	96.	96.	96.	96.	126.	149.	142.	138.
10.	82.	121.	102.	102.	102.	102.	117.	142.	144.	153.
11.	84.	132.	108.	106.	106.	106.	106.	129.	140.	163.
12.	87.	137.	127.	110.	110.	110.	110.	113.	131.	169.
13.	89.	138.	142.	129.	112.	112.	112.	112.	118.	170.
14.	91.	133.	152.	147.	122.	112.	112.	112.	112.	165.
15.	92.	124.	155.	160.	136.	110.	110.	110.	110.	155.
16.	93.	111.	152.	166.	146.	108.	108.	108.	108.	140.
17.	93.	104.	140.	161.	148.	109.	104.	104.	104.	123.
18.	92.	98.	120.	140.	136.	109.	98.	98.	98.	103.
19.	91.	91.	93.	94.	95.	93.	91.	91.	91.	85.
20.	89.	89.	89.	89.	89.	89.	89.	89.	89.	82.
21.	87.	87.	87.	87.	87.	87.	87.	87.	87.	80.
22.	84.	84.	84.	84.	84.	84.	84.	84.	84.	77.
23.	82.	82.	82.	82.	82.	82.	82.	82.	82.	75.
24.	79.	79.	79.	79.	79.	79.	79.	79.	79.	72.

LOCATION: MACON, GEORGIA

MONTH= 7 DAY=21 FOR LATITUDE= 32.7 LONGITUDE= 83.6

ALPHA/H= .150

SOL-AIR TEMPERATURES (DEG. F)

TIME (HR)	AIR TEMP	SOUTH	SW	WEST	NW	NORTH	NE	EAST	SE	HORIZ
1.	80.	80.	80.	80.	80.	80.	80.	80.	80.	73.
2.	78.	78.	78.	78.	78.	78.	78.	78.	78.	71.
3.	77.	77.	77.	77.	77.	77.	77.	77.	77.	70.
4.	76.	76.	76.	76.	76.	76.	76.	76.	76.	69.
5.	76.	76.	76.	76.	76.	76.	76.	76.	76.	69.
6.	77.	77.	77.	77.	77.	77.	77.	77.	77.	70.
7.	78.	81.	81.	81.	81.	87.	100.	103.	92.	80.
8.	80.	86.	86.	86.	86.	90.	109.	115.	103.	93.
9.	83.	90.	90.	90.	90.	91.	111.	119.	111.	105.
10.	86.	99.	95.	95.	95.	95.	109.	119.	115.	115.
11.	88.	106.	99.	99.	99.	99.	106.	116.	116.	124.
12.	91.	112.	104.	103.	103.	103.	103.	110.	114.	130.
13.	94.	114.	110.	106.	106.	106.	106.	109.	114.	133.
14.	96.	115.	122.	120.	111.	107.	107.	107.	107.	133.
15.	97.	112.	126.	129.	119.	107.	107.	107.	107.	129.
16.	98.	108.	127.	134.	125.	106.	106.	106.	106.	123.
17.	98.	104.	123.	134.	127.	107.	104.	104.	104.	114.
18.	97.	101.	115.	127.	123.	107.	101.	101.	101.	103.
19.	96.	97.	101.	106.	105.	100.	97.	97.	97.	91.
20.	94.	94.	94.	94.	94.	94.	94.	94.	94.	87.
21.	91.	91.	91.	91.	91.	91.	91.	91.	91.	84.
22.	88.	88.	88.	88.	88.	88.	88.	88.	88.	81.
23.	86.	86.	86.	86.	86.	86.	86.	86.	86.	79.
24.	83.	83.	83.	83.	83.	83.	83.	83.	83.	76.

LOCATION: MACON, GEORGIA

MONTH= 7 DAY=21 FOR LATITUDE= 32.7 LONGITUDE= 83.6

ALPHA/H= .300

SOL-AIR TEMPERATURES (DEG. F)

TIME (HR)	AIR TEMP	SOUTH	SW	WEST	NW	NORTH	NE	EAST	SE	HORIZ
1.	80.	80.	80.	80.	80.	80.	80.	80.	80.	73.
2.	78.	78.	78.	78.	78.	78.	78.	78.	78.	71.
3.	77.	77.	77.	77.	77.	77.	77.	77.	77.	70.
4.	76.	76.	76.	76.	76.	76.	76.	76.	76.	69.
5.	76.	76.	76.	76.	76.	76.	76.	76.	76.	69.
6.	77.	77.	77.	77.	77.	77.	78.	78.	77.	70.
7.	78.	84.	84.	84.	84.	96.	122.	127.	106.	89.
8.	80.	91.	91.	91.	91.	99.	138.	149.	127.	112.
9.	83.	98.	98.	98.	98.	98.	139.	156.	139.	133.
10.	86.	112.	105.	105.	105.	105.	133.	153.	144.	152.
11.	88.	124.	110.	110.	110.	110.	124.	143.	143.	167.
12.	91.	132.	117.	115.	115.	115.	115.	129.	137.	176.
13.	94.	135.	125.	117.	117.	117.	117.	124.	135.	179.
14.	96.	134.	148.	145.	126.	118.	118.	118.	118.	177.
15.	97.	128.	155.	161.	141.	117.	117.	117.	117.	169.
16.	98.	118.	156.	170.	152.	115.	115.	115.	115.	155.
17.	98.	111.	149.	170.	156.	116.	111.	111.	111.	137.
18.	97.	105.	133.	156.	149.	116.	105.	105.	105.	116.
19.	96.	98.	106.	115.	115.	104.	98.	98.	98.	94.
20.	94.	94.	94.	94.	94.	94.	94.	94.	94.	87.
21.	91.	91.	91.	91.	91.	91.	91.	91.	91.	84.
22.	88.	88.	88.	88.	88.	88.	88.	88.	88.	81.
23.	86.	86.	86.	86.	86.	86.	86.	86.	86.	79.
24.	83.	83.	83.	83.	83.	83.	83.	83.	83.	76.

LOCATION: INDIANAPOLIS, INDIANA

MONTH= 7 DAY=21 FOR LATITUDE= 39.7 LONGITUDE= 86.3

ALPHA/H= .150

SOL-AIR TEMPERATURES (DEG. F)

TIME (HR)	AIR TEMP	SOUTH	SW	WEST	NW	NORTH	NE	EAST	SE	HORIZ
1.	75.	75.	75.	75.	75.	75.	75.	75.	75.	68.
2.	73.	73.	73.	73.	73.	73.	73.	73.	73.	66.
3.	72.	72.	72.	72.	72.	72.	72.	72.	72.	65.
4.	71.	71.	71.	71.	71.	71.	71.	71.	71.	64.
5.	71.	71.	71.	71.	71.	71.	71.	71.	71.	64.
6.	72.	72.	72.	72.	72.	73.	74.	74.	73.	65.
7.	73.	76.	76.	76.	76.	82.	95.	97.	87.	75.
8.	75.	81.	81.	81.	81.	83.	103.	109.	99.	87.
9.	78.	87.	85.	85.	85.	85.	104.	114.	107.	98.
10.	81.	96.	90.	90.	90.	90.	103.	115.	112.	108.
11.	83.	105.	94.	94.	94.	94.	99.	112.	114.	117.
12.	86.	111.	101.	97.	97.	97.	97.	106.	113.	123.
13.	89.	114.	109.	100.	100.	100.	100.	102.	111.	126.
14.	91.	114.	119.	113.	102.	102.	102.	102.	103.	127.
15.	92.	112.	123.	122.	110.	102.	102.	102.	102.	124.
16.	93.	107.	124.	128.	117.	102.	102.	102.	102.	119.
17.	93.	100.	121.	129.	120.	100.	100.	100.	100.	111.
18.	92.	97.	113.	124.	119.	101.	97.	97.	97.	101.
19.	91.	93.	101.	110.	108.	98.	93.	93.	93.	90.
20.	89.	89.	89.	89.	89.	89.	89.	89.	89.	82.
21.	86.	86.	86.	86.	86.	86.	86.	86.	86.	79.
22.	83.	83.	83.	83.	83.	83.	83.	83.	83.	76.
23.	81.	81.	81.	81.	81.	81.	81.	81.	81.	74.
24.	78.	78.	78.	78.	78.	78.	78.	78.	78.	71.

LOCATION: INDIANAPOLIS, INDIANA

MONTH= 7 DAY=21 FOR LATITUDE= 39.7 LONGITUDE= 86.3

ALPHA/H= .300

SOL-AIR TEMPERATURES (DEG. F)

TIME (HR)	AIR TEMP	SOUTH	SW	WEST	NW	NORTH	NE	EAST	SE	HORIZ
1.	75.	75.	75.	75.	75.	75.	75.	75.	75.	68.
2.	73.	73.	73.	73.	73.	73.	73.	73.	73.	66.
3.	72.	72.	72.	72.	72.	72.	72.	72.	72.	65.
4.	71.	71.	71.	71.	71.	71.	71.	71.	71.	64.
5.	71.	71.	71.	71.	71.	71.	71.	71.	71.	64.
6.	72.	72.	72.	72.	72.	74.	75.	75.	73.	65.
7.	73.	79.	79.	79.	79.	90.	117.	121.	101.	84.
8.	75.	86.	86.	86.	86.	92.	131.	143.	122.	105.
9.	78.	96.	92.	92.	92.	92.	131.	151.	136.	125.
10.	81.	112.	99.	99.	99.	99.	124.	149.	144.	143.
11.	83.	126.	104.	104.	104.	104.	114.	140.	145.	157.
12.	86.	135.	115.	109.	109.	109.	109.	126.	139.	167.
13.	89.	139.	129.	112.	112.	112.	112.	115.	133.	171.
14.	91.	138.	147.	136.	113.	113.	113.	113.	115.	170.
15.	92.	132.	155.	153.	127.	112.	112.	112.	112.	163.
16.	93.	121.	155.	163.	140.	110.	110.	110.	110.	151.
17.	93.	108.	149.	166.	148.	107.	107.	107.	107.	135.
18.	92.	102.	135.	156.	146.	110.	102.	102.	102.	116.
19.	91.	95.	111.	128.	126.	105.	95.	95.	95.	96.
20.	89.	89.	89.	89.	89.	89.	89.	89.	89.	82.
21.	86.	86.	86.	86.	86.	86.	86.	86.	86.	79.
22.	83.	83.	83.	83.	83.	83.	83.	83.	83.	76.
23.	81.	81.	81.	81.	81.	81.	81.	81.	81.	74.
24.	78.	78.	78.	78.	78.	78.	78.	78.	78.	71.

LOCATION: KALAMAZOO, MICHIGAN

MONTH= 7 DAY=21 FOR LATITUDE= 42.2 LONGITUDE= 84.5

ALPHA/H= .150

SOL-AIR TEMPERATURES (DEG. F)

TIME (HR)	AIR TEMP	SOUTH	SW	WEST	NW	NORTH	NE	EAST	SE	HORIZ
1.	73.	73.	73.	73.	73.	73.	73.	73.	73.	66.
2.	71.	71.	71.	71.	71.	71.	71.	71.	71.	64.
3.	70.	70.	70.	70.	70.	70.	70.	70.	70.	63.
4.	69.	69.	69.	69.	69.	69.	69.	69.	69.	62.
5.	69.	69.	69.	69.	69.	69.	69.	69.	69.	62.
6.	70.	70.	70.	70.	70.	73.	76.	76.	73.	64.
7.	71.	75.	75.	75.	75.	80.	95.	98.	87.	75.
8.	73.	79.	79.	79.	79.	81.	101.	108.	98.	86.
9.	76.	87.	84.	84.	84.	84.	101.	112.	106.	97.
10.	79.	97.	88.	88.	88.	88.	99.	112.	111.	107.
11.	82.	105.	92.	92.	92.	92.	95.	109.	113.	115.
12.	85.	111.	101.	96.	96.	96.	96.	103.	112.	121.
13.	88.	114.	108.	99.	99.	99.	99.	101.	112.	124.
14.	90.	114.	119.	113.	101.	101.	101.	101.	101.	125.
15.	91.	112.	123.	122.	108.	101.	101.	101.	101.	122.
16.	92.	106.	124.	127.	115.	100.	100.	100.	100.	117.
17.	92.	99.	120.	128.	119.	99.	99.	99.	99.	109.
18.	91.	96.	112.	123.	118.	100.	96.	96.	96.	99.
19.	90.	92.	99.	107.	106.	97.	92.	92.	92.	88.
20.	88.	88.	88.	88.	88.	88.	88.	88.	88.	81.
21.	85.	85.	85.	85.	85.	85.	85.	85.	85.	78.
22.	82.	82.	82.	82.	82.	82.	82.	82.	82.	75.
23.	79.	79.	79.	79.	79.	79.	79.	79.	79.	72.
24.	76.	76.	76.	76.	76.	76.	76.	76.	76.	69.

LOCATION: KALAMAZOO, MICHIGAN

MONTH= 7 DAY=21 FOR LATITUDE= 42.2 LONGITUDE= 84.5

ALPHA/H= .300

SOL-AIR TEMPERATURES (DEG. F)

TIME (HR)	AIR TEMP	SOUTH	SW	WEST	NW	NORTH	NE	EAST	SE	HORIZ
1.	73.	73.	73.	73.	73.	73.	73.	73.	73.	66.
2.	71.	71.	71.	71.	71.	71.	71.	71.	71.	64.
3.	70.	70.	70.	70.	70.	70.	70.	70.	70.	63.
4.	69.	69.	69.	69.	69.	69.	69.	69.	69.	62.
5.	69.	69.	69.	69.	69.	69.	69.	69.	69.	62.
6.	70.	71.	71.	71.	71.	76.	83.	83.	76.	66.
7.	71.	78.	78.	78.	78.	89.	118.	124.	103.	85.
8.	73.	85.	85.	85.	85.	88.	128.	143.	123.	106.
9.	76.	98.	91.	91.	91.	91.	127.	149.	137.	125.
10.	79.	114.	97.	97.	97.	97.	119.	146.	144.	142.
11.	82.	128.	103.	103.	103.	103.	109.	136.	144.	156.
12.	85.	137.	118.	107.	107.	107.	107.	122.	139.	164.
13.	88.	141.	128.	110.	110.	110.	110.	115.	136.	168.
14.	90.	139.	149.	136.	111.	111.	111.	111.	113.	167.
15.	91.	132.	155.	153.	125.	111.	111.	111.	111.	160.
16.	92.	121.	155.	163.	138.	109.	109.	109.	109.	148.
17.	92.	106.	148.	164.	146.	105.	105.	105.	105.	132.
18.	91.	100.	133.	154.	144.	108.	100.	100.	100.	114.
19.	90.	94.	109.	125.	123.	104.	94.	94.	94.	93.
20.	88.	88.	88.	88.	88.	88.	88.	88.	88.	81.
21.	85.	85.	85.	85.	85.	85.	85.	85.	85.	78.
22.	82.	82.	82.	82.	82.	82.	82.	82.	82.	75.
23.	79.	79.	79.	79.	79.	79.	79.	79.	79.	72.
24.	76.	76.	76.	76.	76.	76.	76.	76.	76.	69.

LOCATION: ST. LOUIS, MISSOURI

MONTH= 7 DAY=21 FOR LATITUDE= 38.6 LONGITUDE= 90.2

ALPHA/H= .150

SOL-AIR TEMPERATURES (DEG. F)

TIME (HR)	AIR TEMP	SOUTH	SW	WEST	NW	NORTH	NE	EAST	SE	HORIZ
1.	81.	81.	81.	81.	81.	81.	81.	81.	81.	74.
2.	80.	80.	80.	80.	80.	80.	80.	80.	80.	73.
3.	79.	79.	79.	79.	79.	79.	79.	79.	79.	72.
4.	78.	78.	78.	78.	78.	78.	78.	78.	78.	71.
5.	78.	78.	78.	78.	78.	78.	78.	78.	78.	71.
6.	79.	81.	81.	81.	81.	86.	96.	97.	89.	77.
7.	80.	84.	84.	84.	84.	89.	107.	112.	101.	88.
8.	81.	89.	88.	88.	88.	88.	109.	118.	109.	99.
9.	84.	97.	92.	92.	92.	92.	107.	119.	114.	110.
10.	86.	105.	96.	96.	96.	96.	104.	116.	117.	118.
11.	88.	111.	100.	99.	99.	99.	99.	110.	116.	125.
12.	90.	115.	110.	102.	102.	102.	102.	103.	112.	128.
13.	93.	116.	119.	113.	104.	104.	104.	104.	106.	130.
14.	94.	115.	124.	123.	110.	105.	105.	105.	105.	128.
15.	95.	111.	127.	130.	118.	104.	104.	104.	104.	123.
16.	96.	105.	125.	132.	123.	103.	103.	103.	103.	116.
17.	96.	101.	119.	130.	124.	104.	101.	101.	101.	107.
18.	95.	98.	109.	119.	116.	104.	98.	98.	98.	97.
19.	94.	94.	95.	95.	95.	95.	94.	94.	94.	87.
20.	93.	93.	93.	93.	93.	93.	93.	93.	93.	86.
21.	90.	90.	90.	90.	90.	90.	90.	90.	90.	83.
22.	88.	88.	88.	88.	88.	88.	88.	88.	88.	81.
23.	86.	86.	86.	86.	86.	86.	86.	86.	86.	79.
24.	84.	84.	84.	84.	84.	84.	84.	84.	84.	77.

LOCATION: ST. LOUIS, MISSOURI

MONTH= 7 DAY=21 FOR LATITUDE= 38.6 LONGITUDE= 90.2

ALPHA/H= .300

SOL-AIR TEMPERATURES (DEG. F)

TIME (HR)	AIR TEMP	SOUTH	SW	WEST	NW	NORTH	NE	EAST	SE	HORIZ
1.	81.	81.	81.	81.	81.	81.	81.	81.	81.	74.
2.	80.	80.	80.	80.	80.	80.	80.	80.	80.	73.
3.	79.	79.	79.	79.	79.	79.	79.	79.	79.	72.
4.	78.	78.	78.	78.	78.	78.	78.	78.	78.	71.
5.	78.	78.	78.	78.	78.	78.	78.	78.	78.	71.
6.	79.	83.	83.	83.	83.	93.	114.	116.	99.	83.
7.	80.	89.	89.	89.	89.	97.	134.	144.	122.	104.
8.	81.	96.	95.	95.	95.	95.	137.	154.	137.	124.
9.	84.	111.	101.	101.	101.	101.	131.	154.	145.	143.
10.	86.	124.	106.	106.	106.	106.	121.	146.	147.	157.
11.	88.	134.	112.	110.	110.	110.	110.	133.	143.	168.
12.	90.	140.	130.	114.	114.	114.	114.	116.	134.	173.
13.	93.	140.	145.	133.	115.	115.	115.	115.	120.	174.
14.	94.	135.	155.	151.	127.	115.	115.	115.	115.	168.
15.	95.	126.	158.	164.	141.	114.	114.	114.	114.	158.
16.	96.	113.	154.	169.	150.	111.	111.	111.	111.	143.
17.	96.	106.	142.	164.	151.	113.	106.	106.	106.	125.
18.	95.	101.	122.	142.	137.	112.	101.	101.	101.	105.
19.	94.	94.	95.	96.	96.	95.	94.	94.	94.	87.
20.	93.	93.	93.	93.	93.	93.	93.	93.	93.	86.
21.	90.	90.	90.	90.	90.	90.	90.	90.	90.	83.
22.	88.	88.	88.	88.	88.	88.	88.	88.	88.	81.
23.	86.	86.	86.	86.	86.	86.	86.	86.	86.	79.
24.	84.	84.	84.	84.	84.	84.	84.	84.	84.	77.

LOCATION: JERSEY CITY, NEW JERSEY

MONTH= 7 DAY=21 FOR LATITUDE= 40.7 LONGITUDE= 74.2

ALPHA/H= .150

SOL-AIR TEMPERATURES (DEG. F)

TIME (HR)	AIR TEMP	SOUTH	SW	WEST	NW	NORTH	NE	EAST	SE	HORIZ
1.	76.	76.	76.	76.	76.	76.	76.	76.	76.	69.
2.	74.	74.	74.	74.	74.	74.	74.	74.	74.	67.
3.	73.	73.	73.	73.	73.	73.	73.	73.	73.	66.
4.	72.	72.	72.	72.	72.	72.	72.	72.	72.	65.
5.	72.	72.	72.	72.	72.	72.	72.	72.	72.	65.
6.	73.	75.	75.	75.	75.	81.	92.	94.	85.	73.
7.	74.	79.	79.	79.	79.	82.	101.	107.	96.	84.
8.	76.	84.	83.	83.	83.	83.	103.	112.	105.	94.
9.	78.	93.	87.	87.	87.	87.	101.	113.	110.	104.
10.	81.	101.	91.	91.	91.	91.	97.	110.	112.	113.
11.	83.	108.	96.	94.	94.	94.	94.	105.	111.	119.
12.	86.	112.	107.	97.	97.	97.	97.	98.	108.	123.
13.	88.	113.	116.	109.	99.	99.	99.	99.	102.	124.
14.	90.	111.	121.	119.	106.	100.	100.	100.	100.	123.
15.	91.	107.	123.	126.	113.	100.	100.	100.	100.	118.
16.	92.	101.	121.	128.	119.	99.	99.	99.	99.	111.
17.	92.	97.	115.	126.	119.	100.	97.	97.	97.	102.
18.	91.	94.	104.	114.	112.	100.	94.	94.	94.	92.
19.	90.	90.	90.	91.	91.	90.	90.	90.	90.	83.
20.	88.	88.	88.	88.	88.	88.	88.	88.	88.	81.
21.	86.	86.	86.	86.	86.	86.	86.	86.	86.	79.
22.	83.	83.	83.	83.	83.	83.	83.	83.	83.	76.
23.	81.	81.	81.	81.	81.	81.	81.	81.	81.	74.
24.	78.	78.	78.	78.	78.	78.	78.	78.	78.	71.

LOCATION: JERSEY CITY, NEW JERSEY

MONTH= 7 DAY=21 FOR LATITUDE= 40.7 LONGITUDE= 74.2

ALPHA/H= .300

SOL-AIR TEMPERATURES (DEG. F)

TIME (HR)	AIR TEMP	SOUTH	SW	WEST	NW	NORTH	NE	EAST	SE	HORIZ
1.	76.	76.	76.	76.	76.	76.	76.	76.	76.	69.
2.	74.	74.	74.	74.	74.	74.	74.	74.	74.	67.
3.	73.	73.	73.	73.	73.	73.	73.	73.	73.	66.
4.	72.	72.	72.	72.	72.	72.	72.	72.	72.	65.
5.	72.	72.	72.	72.	72.	72.	72.	72.	72.	65.
6.	73.	78.	78.	78.	78.	88.	112.	115.	96.	80.
7.	74.	84.	84.	84.	84.	91.	128.	140.	119.	100.
8.	76.	92.	90.	90.	90.	90.	130.	149.	133.	120.
9.	78.	108.	96.	96.	96.	96.	123.	148.	141.	138.
10.	81.	122.	101.	101.	101.	101.	113.	140.	143.	152.
11.	83.	132.	110.	105.	105.	105.	105.	126.	139.	162.
12.	86.	137.	128.	109.	109.	109.	109.	110.	130.	168.
13.	88.	138.	143.	129.	110.	110.	110.	110.	116.	168.
14.	90.	132.	152.	148.	121.	111.	111.	111.	111.	162.
15.	91.	123.	155.	160.	136.	109.	109.	109.	109.	152.
16.	92.	110.	150.	165.	145.	106.	106.	106.	106.	138.
17.	92.	102.	138.	159.	147.	108.	102.	102.	102.	120.
18.	91.	97.	117.	137.	133.	108.	97.	97.	97.	100.
19.	90.	90.	91.	92.	92.	91.	90.	90.	90.	83.
20.	88.	88.	88.	88.	88.	88.	88.	88.	88.	81.
21.	86.	86.	86.	86.	86.	86.	86.	86.	86.	79.
22.	83.	83.	83.	83.	83.	83.	83.	83.	83.	76.
23.	81.	81.	81.	81.	81.	81.	81.	81.	81.	74.
24.	78.	78.	78.	78.	78.	78.	78.	78.	78.	71.

LOCATION: MEMPHIS, TENNESSEE

MONTH= 7 DAY=21 FOR LATITUDE= 35.1 LONGITUDE= 90.0

ALPHA/H= .150

SOL-AIR TEMPERATURES (DEG. F)

TIME (HR)	AIR TEMP	SOUTH	SW	WEST	NW	NORTH	NE	EAST	SE	HORIZ
1.	81.	81.	81.	81.	81.	81.	81.	81.	81.	74.
2.	79.	79.	79.	79.	79.	79.	79.	79.	79.	72.
3.	78.	78.	78.	78.	78.	78.	78.	78.	78.	71.
4.	77.	77.	77.	77.	77.	77.	77.	77.	77.	70.
5.	77.	77.	77.	77.	77.	77.	77.	77.	77.	70.
6.	78.	80.	80.	80.	80.	84.	94.	95.	87.	76.
7.	79.	84.	84.	84.	84.	88.	106.	111.	100.	87.
8.	81.	88.	88.	88.	88.	89.	109.	117.	108.	99.
9.	83.	96.	92.	92.	92.	92.	109.	119.	113.	110.
10.	86.	104.	96.	96.	96.	96.	105.	116.	116.	119.
11.	89.	110.	100.	100.	100.	100.	101.	111.	115.	126.
12.	92.	114.	110.	103.	103.	103.	103.	104.	112.	130.
13.	94.	115.	119.	114.	105.	105.	105.	105.	106.	132.
14.	96.	114.	125.	125.	114.	107.	107.	107.	107.	130.
15.	97.	111.	127.	132.	121.	106.	106.	106.	106.	125.
16.	98.	105.	126.	135.	126.	105.	105.	105.	105.	118.
17.	98.	103.	120.	131.	126.	107.	103.	103.	103.	108.
18.	97.	100.	109.	119.	117.	105.	100.	100.	100.	98.
19.	96.	96.	96.	96.	96.	96.	96.	96.	96.	89.
20.	94.	94.	94.	94.	94.	94.	94.	94.	94.	87.
21.	92.	92.	92.	92.	92.	92.	92.	92.	92.	85.
22.	89.	89.	89.	89.	89.	89.	89.	89.	89.	82.
23.	86.	86.	86.	86.	86.	86.	86.	86.	86.	79.
24.	83.	83.	83.	83.	83.	83.	83.	83.	83.	76.

LOCATION: MEMPHIS, TENNESSEE

MONTH= 7 DAY=21 FOR LATITUDE= 35.1 LONGITUDE= 90.0

ALPHA/H= .300

SOL-AIR TEMPERATURES (DEG. F)

TIME (HR)	AIR TEMP	SOUTH	SW	WEST	NW	NORTH	NE	EAST	SE	HORIZ
1.	81.	81.	81.	81.	81.	81.	81.	81.	81.	74.
2.	79.	79.	79.	79.	79.	79.	79.	79.	79.	72.
3.	78.	78.	78.	78.	78.	78.	78.	78.	78.	71.
4.	77.	77.	77.	77.	77.	77.	77.	77.	77.	70.
5.	77.	77.	77.	77.	77.	77.	77.	77.	77.	70.
6.	78.	82.	82.	82.	82.	91.	110.	112.	96.	81.
7.	79.	88.	88.	88.	88.	98.	133.	143.	120.	103.
8.	81.	95.	95.	95.	95.	97.	138.	154.	135.	124.
9.	83.	108.	101.	101.	101.	101.	134.	154.	143.	143.
10.	86.	121.	107.	107.	107.	107.	125.	147.	145.	159.
11.	89.	131.	112.	112.	112.	112.	114.	134.	141.	170.
12.	92.	136.	129.	115.	115.	115.	115.	117.	132.	176.
13.	94.	137.	144.	135.	117.	117.	117.	117.	118.	177.
14.	96.	133.	154.	153.	132.	117.	117.	117.	117.	171.
15.	97.	124.	157.	166.	145.	116.	116.	116.	116.	160.
16.	98.	113.	154.	171.	154.	113.	113.	113.	113.	145.
17.	98.	108.	142.	165.	154.	116.	108.	108.	108.	126.
18.	97.	102.	122.	140.	137.	113.	102.	102.	102.	105.
19.	96.	96.	96.	96.	96.	96.	96.	96.	96.	89.
20.	94.	94.	94.	94.	94.	94.	94.	94.	94.	87.
21.	92.	92.	92.	92.	92.	92.	92.	92.	92.	85.
22.	89.	89.	89.	89.	89.	89.	89.	89.	89.	82.
23.	86.	86.	86.	86.	86.	86.	86.	86.	86.	79.
24.	83.	83.	83.	83.	83.	83.	83.	83.	83.	76.

LOCATION: HOUSTON, TEXAS

MONTH= 7 DAY=21 FOR LATITUDE= 29.6 LONGITUDE= 95.3

ALPHA/H= .300

SOL-AIR TEMPERATURES (DEG. F)

TIME (HR)	AIR TEMP	SOUTH	SW	WEST	NW	NORTH	NE	EAST	SE	HORIZ
1.	81.	81.	81.	81.	81.	81.	81.	81.	81.	74.
2.	80.	80.	80.	80.	80.	80.	80.	80.	80.	73.
3.	79.	79.	79.	79.	79.	79.	79.	79.	79.	72.
4.	78.	78.	78.	78.	78.	78.	78.	78.	78.	71.
5.	78.	78.	78.	78.	78.	78.	78.	78.	78.	71.
6.	79.	79.	79.	79.	79.	82.	85.	85.	82.	73.
7.	80.	87.	87.	87.	87.	99.	128.	133.	111.	94.
8.	81.	93.	93.	93.	93.	102.	140.	152.	129.	117.
9.	84.	100.	100.	100.	100.	101.	140.	156.	139.	138.
10.	86.	111.	106.	106.	106.	106.	134.	151.	142.	156.
11.	88.	121.	111.	111.	111.	111.	124.	140.	139.	169.
12.	90.	128.	117.	114.	114.	114.	114.	124.	130.	177.
13.	93.	130.	134.	127.	116.	116.	116.	116.	118.	179.
14.	94.	127.	145.	147.	131.	117.	117.	117.	117.	174.
15.	95.	120.	151.	161.	144.	115.	115.	115.	115.	164.
16.	96.	112.	151.	169.	153.	114.	112.	112.	112.	149.
17.	96.	108.	143.	166.	155.	116.	108.	108.	108.	130.
18.	95.	102.	125.	146.	142.	114.	102.	102.	102.	108.
19.	94.	94.	95.	97.	97.	95.	94.	94.	94.	88.
20.	93.	93.	93.	93.	93.	93.	93.	93.	93.	86.
21.	90.	90.	90.	90.	90.	90.	90.	90.	90.	83.
22.	88.	88.	88.	88.	88.	88.	88.	88.	88.	81.
23.	86.	86.	86.	86.	86.	86.	86.	86.	86.	79.
24.	84.	84.	84.	84.	84.	84.	84.	84.	84.	77.

LOCATION: HOUSTON, TEXAS

MONTH= 7 DAY=21 FOR LATITUDE= 29.6 LONGITUDE= 95.3

ALPHA/H= .150

SOL-AIR TEMPERATURES (DEG. F)

TIME (HR)	AIR TEMP	SOUTH	SW	WEST	NW	NORTH	NE	EAST	SE	HORIZ
1.	81.	81.	81.	81.	81.	81.	81.	81.	81.	74.
2.	80.	80.	80.	80.	80.	80.	80.	80.	80.	73.
3.	79.	79.	79.	79.	79.	79.	79.	79.	79.	72.
4.	78.	78.	78.	78.	78.	78.	78.	78.	78.	71.
5.	78.	78.	78.	78.	78.	78.	78.	78.	78.	71.
6.	79.	79.	79.	79.	79.	80.	82.	82.	80.	72.
7.	80.	83.	83.	83.	83.	89.	104.	107.	96.	83.
8.	81.	87.	87.	87.	87.	92.	111.	117.	105.	96.
9.	84.	92.	92.	92.	92.	92.	112.	120.	111.	107.
10.	86.	99.	96.	96.	96.	96.	110.	118.	114.	117.
11.	88.	105.	99.	99.	99.	99.	106.	114.	113.	125.
12.	90.	109.	104.	102.	102.	102.	102.	107.	110.	130.
13.	93.	111.	113.	110.	104.	104.	104.	104.	105.	132.
14.	94.	111.	120.	121.	112.	105.	105.	105.	105.	131.
15.	95.	108.	123.	128.	120.	105.	105.	105.	105.	126.
16.	96.	104.	123.	132.	125.	105.	104.	104.	104.	119.
17.	96.	102.	119.	131.	125.	106.	102.	102.	102.	109.
18.	95.	99.	110.	121.	118.	104.	99.	99.	99.	98.
19.	94.	94.	95.	95.	95.	95.	94.	94.	94.	87.
20.	93.	93.	93.	93.	93.	93.	93.	93.	93.	86.
21.	90.	90.	90.	90.	90.	90.	90.	90.	90.	83.
22.	88.	88.	88.	88.	88.	88.	88.	88.	88.	81.
23.	86.	86.	86.	86.	86.	86.	86.	86.	86.	79.
24.	84.	84.	84.	84.	84.	84.	84.	84.	84.	77.

LOCATION: SEATTLE, WASHINGTON (CITY)

MONTH= 7 DAY=21 FOR LATITUDE= 47.6 LONGITUDE= 122.3

ALPHA/H= .150

SOL-AIR TEMPERATURES (DEG. F)

TIME (HR)	AIR TEMP	SOUTH	SW	WEST	NW	NORTH	NE	EAST	SE	HORIZ
1.	66.	66.	66.	66.	66.	66.	66.	66.	66.	59.
2.	64.	64.	64.	64.	64.	64.	64.	64.	64.	57.
3.	63.	63.	63.	63.	63.	63.	63.	63.	63.	56.
4.	62.	62.	62.	62.	62.	62.	62.	62.	62.	55.
5.	62.	62.	62.	62.	62.	63.	63.	63.	62.	55.
6.	63.	65.	65.	65.	65.	71.	82.	83.	74.	62.
7.	64.	69.	69.	69.	69.	72.	90.	96.	86.	72.
8.	66.	75.	72.	72.	72.	72.	91.	102.	95.	82.
9.	68.	84.	76.	76.	76.	76.	89.	103.	101.	91.
10.	70.	93.	80.	80.	80.	80.	85.	100.	104.	100.
11.	73.	100.	86.	83.	83.	83.	83.	95.	104.	106.
12.	75.	105.	97.	86.	86.	86.	86.	89.	101.	110.
13.	77.	106.	106.	95.	88.	88.	88.	88.	96.	112.
14.	79.	105.	112.	106.	90.	89.	89.	89.	89.	111.
15.	80.	100.	114.	113.	98.	89.	89.	89.	89.	107.
16.	81.	94.	113.	117.	105.	88.	88.	88.	88.	101.
17.	81.	87.	107.	116.	108.	87.	87.	87.	87.	94.
18.	80.	84.	98.	108.	104.	89.	84.	84.	84.	85.
19.	79.	80.	85.	90.	90.	84.	80.	80.	80.	75.
20.	77.	77.	77.	77.	77.	77.	77.	77.	77.	70.
21.	75.	75.	75.	75.	75.	75.	75.	75.	75.	68.
22.	73.	73.	73.	73.	73.	73.	73.	73.	73.	66.
23.	70.	70.	70.	70.	70.	70.	70.	70.	70.	63.
24.	68.	68.	68.	68.	68.	68.	68.	68.	68.	61.

LOCATION: SEATTLE, WASHINGTON (AIRPORT)

MONTH= 7 DAY=21 FOR LATITUDE= 47.4 LONGITUDE= 122.3

ALPHA/H= .300

SOL-AIR TEMPERATURES (DEG. F)

TIME (HR)	AIR TEMP	SOUTH	SW	WEST	NW	NORTH	NE	EAST	SE	HORIZ
1.	67.	67.	67.	67.	67.	67.	67.	67.	67.	60.
2.	65.	65.	65.	65.	65.	65.	65.	65.	65.	58.
3.	64.	64.	64.	64.	64.	64.	64.	64.	64.	57.
4.	63.	63.	63.	63.	63.	63.	63.	63.	63.	56.
5.	63.	63.	63.	63.	63.	64.	65.	65.	64.	56.
6.	64.	69.	69.	69.	69.	80.	102.	105.	87.	70.
7.	65.	74.	74.	74.	74.	80.	118.	129.	109.	89.
8.	67.	85.	80.	80.	80.	80.	119.	139.	125.	107.
9.	70.	103.	86.	86.	86.	86.	112.	140.	136.	124.
10.	73.	118.	91.	91.	91.	91.	102.	133.	140.	138.
11.	75.	130.	103.	96.	96.	96.	96.	121.	138.	149.
12.	78.	137.	122.	100.	100.	100.	100.	105.	130.	155.
13.	81.	138.	138.	117.	102.	102.	102.	102.	117.	156.
14.	83.	134.	148.	136.	104.	103.	103.	103.	103.	153.
15.	84.	124.	152.	150.	120.	102.	102.	102.	102.	145.
16.	85.	111.	148.	157.	132.	100.	100.	100.	100.	133.
17.	85.	96.	137.	155.	138.	97.	96.	96.	96.	117.
18.	84.	91.	119.	140.	132.	101.	91.	91.	91.	100.
19.	83.	85.	94.	105.	105.	93.	85.	85.	85.	82.
20.	81.	81.	81.	81.	81.	81.	81.	81.	81.	74.
21.	78.	78.	78.	78.	78.	78.	78.	78.	78.	71.
22.	75.	75.	75.	75.	75.	75.	75.	75.	75.	68.
23.	73.	73.	73.	73.	73.	73.	73.	73.	73.	66.
24.	70.	70.	70.	70.	70.	70.	70.	70.	70.	63.

LOCATION: SEATTLE, WASHINGTON (AIRPORT)

MONTH= 7 DAY=21 FOR LATITUDE= 47.4 LONGITUDE= 122.3

ALPHA/H= .150

SOL-AIR TEMPERATURES (DEG. F)

TIME (HR)	AIR TEMP	SOUTH	SW	WEST	NW	NORTH	NE	EAST	SE	HORIZ
1.	67.	67.	67.	67.	67.	67.	67.	67.	67.	60.
2.	65.	65.	65.	65.	65.	65.	65.	65.	65.	58.
3.	64.	64.	64.	64.	64.	64.	64.	64.	64.	57.
4.	63.	63.	63.	63.	63.	63.	63.	63.	63.	56.
5.	63.	63.	63.	63.	63.	63.	64.	64.	63.	56.
6.	64.	66.	66.	66.	66.	72.	83.	84.	75.	64.
7.	65.	70.	70.	70.	70.	73.	91.	97.	87.	74.
8.	67.	76.	74.	74.	74.	74.	93.	103.	96.	84.
9.	70.	86.	78.	78.	78.	78.	91.	105.	103.	93.
10.	73.	95.	82.	82.	82.	82.	87.	103.	106.	102.
11.	75.	103.	89.	86.	86.	86.	86.	98.	107.	109.
12.	78.	108.	100.	89.	89.	89.	89.	92.	104.	113.
13.	81.	109.	109.	99.	91.	91.	91.	91.	99.	115.
14.	83.	108.	115.	109.	94.	93.	93.	93.	93.	114.
15.	84.	104.	118.	117.	102.	93.	93.	93.	93.	111.
16.	85.	98.	117.	121.	109.	92.	92.	92.	92.	105.
17.	85.	91.	111.	120.	112.	91.	91.	91.	91.	98.
18.	84.	88.	101.	112.	108.	93.	88.	88.	88.	88.
19.	83.	84.	88.	94.	94.	88.	84.	84.	84.	79.
20.	81.	81.	81.	81.	81.	81.	81.	81.	81.	74.
21.	78.	78.	78.	78.	78.	78.	78.	78.	78.	71.
22.	75.	75.	75.	75.	75.	75.	75.	75.	75.	68.
23.	73.	73.	73.	73.	73.	73.	73.	73.	73.	66.
24.	70.	70.	70.	70.	70.	70.	70.	70.	70.	63.

LOCATION: SEATTLE, WASHINGTON (CITY)

MONTH= 7 DAY=21 FOR LATITUDE= 47.6 LONGITUDE= 122.3

ALPHA/H= .300

SOL-AIR TEMPERATURES (DEG. F)

TIME (HR)	AIR TEMP	SOUTH	SW	WEST	NW	NORTH	NE	EAST	SE	HORIZ
1.	66.	66.	66.	66.	66.	66.	66.	66.	66.	59.
2.	64.	64.	64.	64.	64.	64.	64.	64.	64.	57.
3.	63.	63.	63.	63.	63.	63.	63.	63.	63.	56.
4.	62.	62.	62.	62.	62.	62.	62.	62.	62.	55.
5.	62.	62.	62.	62.	62.	63.	64.	64.	63.	55.
6.	63.	68.	68.	68.	68.	78.	101.	104.	86.	69.
7.	64.	73.	73.	73.	73.	79.	116.	128.	108.	88.
8.	66.	84.	79.	79.	79.	79.	117.	138.	124.	106.
9.	68.	101.	84.	84.	84.	84.	110.	138.	134.	122.
10.	70.	116.	89.	89.	89.	89.	99.	131.	138.	136.
11.	73.	128.	100.	93.	93.	93.	93.	118.	135.	146.
12.	75.	134.	119.	97.	97.	97.	97.	102.	127.	152.
13.	77.	135.	135.	113.	99.	99.	99.	99.	114.	153.
14.	79.	130.	145.	132.	100.	99.	99.	99.	99.	149.
15.	80.	120.	148.	146.	116.	98.	98.	98.	98.	141.
16.	81.	107.	144.	153.	128.	96.	96.	96.	96.	129.
17.	81.	92.	133.	151.	134.	93.	92.	92.	92.	113.
18.	80.	88.	115.	136.	129.	97.	88.	88.	88.	96.
19.	79.	82.	90.	102.	102.	90.	82.	82.	82.	78.
20.	77.	77.	77.	77.	77.	77.	77.	77.	77.	70.
21.	75.	75.	75.	75.	75.	75.	75.	75.	75.	68.
22.	73.	73.	73.	73.	73.	73.	73.	73.	73.	66.
23.	70.	70.	70.	70.	70.	70.	70.	70.	70.	63.
24.	68.	68.	68.	68.	68.	68.	68.	68.	68.	61.

Table D

Magnetic Tape TDF 14 for Breakthrough Localities

Localities	Station No.	Record Period	Reel No.
Sacramento, Calif.	23232	Jan. '49 - Dec. '58	069
Wilmington, Del. (Phila., Pa.)	13739	Jan. '49 - Dec. '58	268
Macon, Ga.	03813	Jan. '55 - Dec. '64	527
Indianapolis, Ind.	93819	Jan. '49 - Dec. '58	550
Kalamazoo, Mich. (Battle Creek)	14815	Jan. '49 - Dec. '54	073
St. Louis, Mo.	13984	Jan. '49 - Dec. '58	261
Jersey City, N. J. (Newark, N. J.)	14734	Jan. '49 - Dec. '58	205
Memphis Tennessee	93839	Jan. '49 - Dec. '58	173
Houston, Tex.	12918	Jan. '49 - Dec. '58	259
Seattle, Wash. Sea/Tac airport	24233	Jan. '49 - Dec. '58	088
Downtown Seattle	24244		302, 86, 326

Table E

AFM 88-8 Data for Coincident

Dry- and Wet-Bulb Temperature Frequencies

These tables show the frequency of the hourly dry-bulb temperature observations for a temperature range of 5 degrees F for three daily time periods; from 02 to 09 hours, from 10 to 17 hours and from 18 to 01 hours. Also listed are total frequencies of hourly observations for each month at 5 ° temperature "bin" and average wet-bulb temperature that occurs coincident with the same temperature level specified in the "bin".

BEALE AFB CALIFORNIA (Substitute Station for Sacramento)

Mean Frequency of Occurrence of Dry Bulb Temperature (°F) With Mean Coincident Wet Bulb Temperature (°F) For Each Dry Bulb Temperature Range

COOLING SEASON

Temperature Range (°F)	MAY Obsn/Hour Gp 02 to 09	MAY Obsn/Hour Gp 10 to 17	MAY Obsn/Hour Gp 18 to 01	MAY Total Obsn	MAY Mean Coincident Wet Bulb (°F)	JUNE Obsn/Hour Gp 02 to 09	JUNE Obsn/Hour Gp 10 to 17	JUNE Obsn/Hour Gp 18 to 01	JUNE Total Obsn	JUNE Mean Coincident Wet Bulb (°F)
110/114							1		1	73
105/109							5	1	6	71
100/104							14	4	18	69
95/99		1	0	1	68		19	6	25	59
90/94		3	1	4	66	2	32	10	44	56
85/89		18	4	22	63	5	85	20	61	64
80/84		37	9	46	61	7	48	28	83	62
75/79	1	47	16	64	60	15	40	34	89	61
70/74	6	54	24	84	57	29	29	38	96	59
65/69	17	49	44	110	56	38	12	44	94	57
60/64	42	25	58	125	54	58	2	84	94	55
55/59	80	9	55	144	51	62	1	15	78	52
50/54	73	4	28	105	48	23	1	6	30	49
45/49	19	0	7	26	44	1			1	46
40/44	9		2	11	39					
35/39	1		0	1	37					

Temperature Range (°F)	JULY Obsn/Hour Gp 02 to 09	JULY Obsn/Hour Gp 10 to 17	JULY Obsn/Hour Gp 18 to 01	JULY Total Obsn	JULY Mean Coincident Wet Bulb (°F)	AUGUST Obsn/Hour Gp 02 to 09	AUGUST Obsn/Hour Gp 10 to 17	AUGUST Obsn/Hour Gp 18 to 01	AUGUST Total Obsn	AUGUST Mean Coincident Wet Bulb (°F)
110/114										
105/109		7	2	9	70					
100/104		25	7	82	68		11	1	12	69
95/99		49	14	63	58		87	7	44	67
90/94	1	63	24	88	66		65	20	85	66
85/89	8	47	33	88	64	1	53	25	79	65
80/84	14	34	42	90	52	10	42	89	91	63
75/79	81	16	44	91	51	23	25	50	99	61
70/74	51	6	42	99	59	45	11	53	109	59
65/69	67	1	26	94	57	67	2	85	104	57
60/64	52	0	11	53	55	72	1	16	89	55
55/59	22		3	25	52	27		2	29	53
50/54	2			2	50	3			3	50
45/49										
40/44										
35/39										

Temperature Range (°F)	SEPTEMBER Obsn/Hour Gp 02 to 09	SEPTEMBER Obsn/Hour Gp 10 to 17	SEPTEMBER Obsn/Hour Gp 18 to 01	SEPTEMBER Total Obsn	SEPTEMBER Mean Coincident Wet Bulb (°F)	OCTOBER Obsn/Hour Gp 02 to 09	OCTOBER Obsn/Hour Gp 10 to 17	OCTOBER Obsn/Hour Gp 18 to 01	OCTOBER Total Obsn	OCTOBER Mean Coincident Wet Bulb (°F)
110/114										
105/109		0	0	0	70					
100/104		3	0	3	69					
95/99		12	1	13	67		2		2	68
90/94		37	4	41	65		9	0	9	65
85/89	0	46	10	56	64		26	1	27	63
80/84	8	52	21	76	62	0	26	4	30	61
75/79	9	43	85	87	60	2	37	9	48	59
70/74	23	29	50	102	58	5	60	24	90	57
65/69	46	16	61	123	56	18	50	45	114	56
60/64	74	2	41	117	55	51	30	74	155	54
55/59	68		16	84	52	86	8	61	155	51
50/54	17		1	18	49	61	0	22	83	47
45/49	0			0	47	18		6	24	43
40/44						5		1	6	39
35/39						1			1	36

HEATING SEASON

Temperature Range (°F)	NOVEMBER Obsn/Hour Gp 02 to 09	NOVEMBER Obsn/Hour Gp 10 to 17	NOVEMBER Obsn/Hour Gp 18 to 01	NOVEMBER Total Obsn	NOVEMBER Mean Coincident Wet Bulb (°F)	DECEMBER Obsn/Hour Gp 02 to 09	DECEMBER Obsn/Hour Gp 10 to 17	DECEMBER Obsn/Hour Gp 18 to 01	DECEMBER Total Obsn	DECEMBER Mean Coincident Wet Bulb (°F)	JANUARY Obsn/Hour Gp 02 to 09	JANUARY Obsn/Hour Gp 10 to 17	JANUARY Obsn/Hour Gp 18 to 01	JANUARY Total Obsn	JANUARY Mean Coincident Wet Bulb (°F)	FEBRUARY Obsn/Hour Gp 02 to 09	FEBRUARY Obsn/Hour Gp 10 to 17	FEBRUARY Obsn/Hour Gp 18 to 01	FEBRUARY Total Obsn	FEBRUARY Mean Coincident Wet Bulb (°F)
110/114																				
105/109																				
100/104																				
95/99																				
90/94																				
85/89																				
80/84		0		0	58															
75/79		4		4	55												1		1	53
70/74		17	0	17	54		1		1	55		1		1	56		2		2	53
65/69	0	33	2	35	53	1	4	1	6	53		1	0	1	53		14	0	14	54
60/64	2	51	9	62	53	5	22	7	34	55	0	10	1	11	54	0	49	7	56	53
55/59	27	68	48	143	51	11	40	16	67	52	2	26	6	34	51	12	81	30	123	51
50/54	57	49	76	182	48	22	51	32	105	48	17	60	25	102	48	41	47	65	153	48
45/49	59	14	62	135	43	29	60	46	135	43	33	71	54	158	44	51	20	62	133	44
40/44	63	4	34	101	39	65	48	69	182	40	52	49	73	174	40	62	9	46	117	40
35/39	26		9	35	34	76	22	60	158	36	66	20	54	140	36	45	1	13	59	35
30/34	6		0	6	31	31	0	16	47	31	51	9	31	91	31	13		1	14	30
25/29	0			0	24	8		1	9	27	24	1	4	29	26	0			0	25
20/24						0			0	23	3	0		3	22					

Temperature Range (°F)	MARCH Obsn/Hour Gp 02 to 09	MARCH Obsn/Hour Gp 10 to 17	MARCH Obsn/Hour Gp 18 to 01	MARCH Total Obsn	MARCH Mean Coincident Wet Bulb (°F)	APRIL Obsn/Hour Gp 02 to 09	APRIL Obsn/Hour Gp 10 to 17	APRIL Obsn/Hour Gp 18 to 01	APRIL Total Obsn	APRIL Mean Coincident Wet Bulb (°F)	ANNUAL (TOTAL—ALL MONTHS) Obsn/Hour Gp 02 to 09	ANNUAL (TOTAL—ALL MONTHS) Obsn/Hour Gp 10 to 17	ANNUAL (TOTAL—ALL MONTHS) Obsn/Hour Gp 18 to 01	ANNUAL (TOTAL—ALL MONTHS) Total Obsn	ANNUAL (TOTAL—ALL MONTHS) Mean Coincident Wet Bulb (°F)
110/114												1		1	73
105/109												12	3	15	70
100/104												53	12	65	69
95/99												120	29	149	66
90/94											3	208	59	270	64
85/89							3		3	64	14	229	95	338	64
80/84		1	0	1	61		19	1	20	62	35	257	144	436	61
75/79		5	0	5	58		27	6	33	60	82	247	195	524	59
70/74		14	1	15	56	1	41	12	54	57	161	265	243	669	57
65/69	0	22	5	27	54	5	43	21	79	55	259	247	285	791	54
60/64	'	60	12	73	52	17	41	39	97	53	375	294	309	978	54
55/59	13	77	41	131	50	48	39	55	142	51	456	350	349	1155	51
50/54	54	53	83	190	48	67	21	61	149	48	437	288	396	1121	48
45/49	90	14	75	179	44	63	6	33	102	44	362	183	344	889	44
40/44	63	2	25	90	40	31	0	11	42	40	350	112	260	722	40
35/39	22		5	27	36	8		1	9	36	243	44	143	430	36
30/34	4		1	5	31	0			0	33	105	9	49	163	31
25/29	1			1	27						35	1	5	41	26
20/24											3	0		3	22

* WILMINGTON DELAWARE

Mean Frequency of Occurrence of Dry Bulb Temperature (°F) With Mean Coincident Wet Bulb Temperature (°F) For Each Dry Bulb Temperature Range

COOLING SEASON

Temperature Range (°F)	MAY Obsn/Hour Gp 02 to 09	MAY Obsn/Hour Gp 10 to 17	MAY Obsn/Hour Gp 18 to 01	MAY Total Obsn	MAY Mean Coincident Wet Bulb (°F)	JUNE Obsn/Hour Gp 02 to 09	JUNE Obsn/Hour Gp 10 to 17	JUNE Obsn/Hour Gp 18 to 01	JUNE Total Obsn	JUNE Mean Coincident Wet Bulb (°F)	JULY Obsn/Hour Gp 02 to 09	JULY Obsn/Hour Gp 10 to 17	JULY Obsn/Hour Gp 18 to 01	JULY Total Obsn	JULY Mean Coincident Wet Bulb (°F)
100/104												1		1	74
95/99							1	0	1	78		7	0	7	74
90/94		3		3	71	0	12	1	13	74	0	22	2	24	74
85/89		10	1	11	70	1	39	3	43	72	3	58	9	70	73
80/84	1	20	3	24	68	6	54	17	77	69	12	81	30	123	70
75/79	4	35	10	49	65	19	52	37	108	67	44	53	69	166	69
70/74	12	49	23	84	62	49	43	56	148	65	87	23	82	192	68
65/69	31	54	42	127	60	64	25	62	151	62	61	3	43	107	64
60/64	50	39	60	149	56	54	9	43	106	58	33	0	12	45	59
55/59	57	28	50	130	52	34	8	16	58	54	8		1	9	55
50/54	49	13	37	99	48	12	2	5	19	50	0			0	50
45/49	30	2	18	50	44	1			1	45					
40/44	11		4	15	39										
35/39	3		0	3	35										
30/34															

Temperature Range (°F)	AUGUST Obsn/Hour Gp 02 to 09	AUGUST Obsn/Hour Gp 10 to 17	AUGUST Obsn/Hour Gp 18 to 01	AUGUST Total Obsn	AUGUST Mean Coincident Wet Bulb (°F)	SEPTEMBER Obsn/Hour Gp 02 to 09	SEPTEMBER Obsn/Hour Gp 10 to 17	SEPTEMBER Obsn/Hour Gp 18 to 01	SEPTEMBER Total Obsn	SEPTEMBER Mean Coincident Wet Bulb (°F)	OCTOBER Obsn/Hour Gp 02 to 09	OCTOBER Obsn/Hour Gp 10 to 17	OCTOBER Obsn/Hour Gp 18 to 01	OCTOBER Total Obsn	OCTOBER Mean Coincident Wet Bulb (°F)
100/104		1		1	73		0		0	79					
95/99	0	3		3	74		1		1	79					
90/94	0	13	0	13	75		5	0	5	75					
85/89	1	47	4	52	73	0	21	1	22	74		2		2	71
80/84	7	68	20	95	71	2	39	6	47	72	0	9		9	71
75/79	32	72	60	164	69	13	49	28	90	69	1	19	3	23	66
70/74	84	35	90	209	68	40	50	49	139	66	6	33	10	49	64
65/69	74	8	54	136	64	57	47	59	163	62	14	53	20	87	60
60/64	33	1	17	51	60	43	22	43	108	58	30	48	43	121	57
55/59	16		3	19	55	38	6	31	75	53	43	43	52	138	53
50/54	1			1	51	28	0	17	45	49	51	28	55	134	48
45/49						13		5	18	45	49	10	36	95	44
40/44						5		1	6	40	32	3	20	55	39
35/39						1			1	36	18	0	7	25	35
30/34											4		2	6	31

HEATING SEASON

Temperature Range (°F)	NOVEMBER					DECEMBER					JANUARY					FEBRUARY					MARCH					APRIL					ANNUAL (TOTAL—ALL MONTHS)				
	Obsn/Hour Gp			Total Obsn	Mean Coincident Wet Bulb (°F)	Obsn/Hour Gp			Total Obsn	Mean Coincident Wet Bulb (°F)	Obsn/Hour Gp			Total Obsn	Mean Coincident Wet Bulb (°F)	Obsn/Hour Gp			Total Obsn	Mean Coincident Wet Bulb (°F)	Obsn/Hour Gp			Total Obsn	Mean Coincident Wet Bulb (°F)	Obsn/Hour Gp			Total Obsn	Mean Coincident Wet Bulb (°F)	Obsn/Hour Gp			Total Obsn	Mean Coincident Wet Bulb (°F)
	02 to 09	10 to 17	18 to 01			02 to 09	10 to 17	18 to 01			02 to 09	10 to 17	18 to 01			02 to 09	10 to 17	18 to 01			02 to 09	10 to 17	18 to 01			02 to 09	10 to 17	18 to 01			02 to 09	10 to 17	18 to 01		
100/104																																2		2	74
95/99																															0	13	0	13	75
90/94																															0	54	3	57	74
85/89																											3		3	68	6	180	18	204	72
80/84		0		0	68																					0	9	0	9	65	28	231	75	384	69
75/79		0		0	66																	1		1	59	0	16	3	19	63	113	299	209	621	66
70/74		5		5	63												1		1	59		4	0	4	57	3	20	7	30	60	279	264	317	860	63
65/69	2	12	1	15	59		1	0	1	59			0	0	62		2	0	2	59	0	6	1	7	55	7	25	11	43	57	311	232	294	837	60
60/64	6	25	8	39	57	0	3	1	4	53	1	0	0	1	58	0	3	1	4	55	1	15	3	19	52	18	31	27	76	56	270	197	259	276	57
55/59	19	36	22	77	53	2	10	3	15	51	1	4	0	5	52	2	8	1	11	51	5	23	10	38	49	31	50	36	117	51	255	204	225	684	52
50/54	21	45	26	92	47	6	21	7	34	47	2	8	2	12	48	5	20	6	31	46	9	36	17	62	45	38	40	47	125	47	222	218	218	658	48
45/49	29	52	45	126	42	16	33	18	67	43	4	21	8	33	43	10	30	17	57	43	23	45	35	108	42	53	29	53	135	43	227	221	286	684	43
40/44	47	39	48	134	38	26	47	37	110	39	15	36	20	71	33	19	46	31	96	33	43	48	57	148	38	45	13	34	92	38	243	232	252	727	39
35/39	49	18	53	120	34	40	47	45	132	34	38	73	52	163	34	44	52	51	147	34	64	41	57	162	34	32	4	18	54	34	288	236	284	808	34
30/34	47	6	28	81	30	55	41	53	149	30	63	50	69	182	29	63	32	64	159	30	52	17	40	109	29	11	0	4	15	30	293	147	256	696	30
25/29	15	2	7	24	25	35	26	39	100	25	48	29	45	122	25	39	13	23	30	25	29	9	19	57	24	2		0	2	25	168	79	133	335	25
20/24	3	0	2	5	20	33	15	29	77	20	32	17	24	73	20	19	9	10	38	20	15	3	8	26	20						104	44	74	222	20
15/19	2		0	2	15	25	3	13	41	15	24	9	16	49	15	11	5	9	25	15	5		1	6	15						67	17	40	124	15
10/14						9	1	3	13	11	12	1	8	21	11	8	2	4	14	11	2			2	11						31	4	15	50	11
5/9						1	0	0	1	6	2	0	3	9	6	3	1	2	6	6											10	1	6	17	6
0/4						0			0	2	2		1	3	2	1			1	1											4		1	5	2
−5/−1											0			0	−3	0			0	−3											1			1	−3

ROBINS AFB GEORGIA (Substitute Station for Macon)

Mean Frequency of Occurrence of Dry Bulb Temperature (°F) With Mean Coincident Wet Bulb Temperature (°F) For Each Dry Bulb Temperature Range

COOLING SEASON

Temperature Range (°F)	MAY Obsn/Hour Gp 02 to 09	MAY Obsn/Hour Gp 10 to 17	MAY Obsn/Hour Gp 18 to 01	MAY Total Obsn	MAY Mean Coincident Wet Bulb (°F)	JUNE Obsn/Hour Gp 02 to 09	JUNE Obsn/Hour Gp 10 to 17	JUNE Obsn/Hour Gp 18 to 01	JUNE Total Obsn	JUNE Mean Coincident Wet Bulb (°F)
100/104		0		0	71		2	0	2	76
95/99		7	1	8	78		18	2	15	75
90/94		35	6	41	72		45	10	55	74
85/89	1	60	19	80	71	2	68	26	96	73
80/84	5	56	33	94	69	13	57	46	116	72
75/79	18	43	49	110	68	53	36	68	157	71
70/74	61	24	63	148	66	107	14	70	191	69
65/69	79	13	43	185	63	50	3	15	68	65
60/64	38	7	20	65	58	13	2	8	18	60
55/59	27	8	11	41	54	2	0	0	2	56
50/54	14	0	3	17	49	0			0	50
45/49	5			5	45					
40/44										
35/39										
30/34										

Temperature Range (°F)	JULY Obsn/Hour Gp 02 to 09	JULY Obsn/Hour Gp 10 to 17	JULY Obsn/Hour Gp 18 to 01	JULY Total Obsn	JULY Mean Coincident Wet Bulb (°F)	AUGUST Obsn/Hour Gp 02 to 09	AUGUST Obsn/Hour Gp 10 to 17	AUGUST Obsn/Hour Gp 18 to 01	AUGUST Total Obsn	AUGUST Mean Coincident Wet Bulb (°F)
100/104		0		0	79		0		0	79
95/99		13	1	14	77		17	0	17	77
90/94		53	9	62	76		72	12	84	76
85/89	1	89	30	120	75	1	82	34	117	75
80/84	16	58	51	125	74	12	46	53	111	74
75/79	74	29	92	195	73	74	25	90	189	73
70/74	141	6	62	209	71	126	6	55	187	70
65/69	15	0	3	18	66	32	0	4	36	66
60/64	1			1	62	3		0	3	61
55/59						0			0	58
50/54										
45/49										
40/44										
35/39										
30/34										

Temperature Range (°F)	SEPTEMBER Obsn/Hour Gp 02 to 09	SEPTEMBER Obsn/Hour Gp 10 to 17	SEPTEMBER Obsn/Hour Gp 18 to 01	SEPTEMBER Total Obsn	SEPTEMBER Mean Coincident Wet Bulb (°F)	OCTOBER Obsn/Hour Gp 02 to 09	OCTOBER Obsn/Hour Gp 10 to 17	OCTOBER Obsn/Hour Gp 18 to 01	OCTOBER Total Obsn	OCTOBER Mean Coincident Wet Bulb (°F)
100/104										
95/99		4	0	4	76					
90/94		29	2	31	74		1		1	72
85/89		62	14	76	74		15	1	16	70
80/84	2	60	29	91	72		42	4	46	67
75/79	25	40	66	181	71	1	54	18	73	66
70/74	95	23	74	192	69	16	50	41	107	65
65/69	64	15	35	114	64	86	43	53	132	61
60/64	32	5	14	51	59	52	25	51	128	58
55/59	15	2	5	22	55	49	14	43	106	54
50/54	6		1	7	50	44	4	24	72	49
45/49	1			1	47	28	0	9	37	45
40/44						14		4	18	40
35/39						7		0	7	36
30/34						1			1	32

HEATING SEASON

Temperature Range (°F)	NOVEMBER Obsn/Hour Gp 02 to 09	NOVEMBER Obsn/Hour Gp 10 to 17	NOVEMBER Obsn/Hour Gp 18 to 01	NOVEMBER Total Obsn	NOVEMBER Mean Coincident Wet Bulb (°F)	DECEMBER Obsn/Hour Gp 02 to 09	DECEMBER Obsn/Hour Gp 10 to 17	DECEMBER Obsn/Hour Gp 18 to 01	DECEMBER Total Obsn	DECEMBER Mean Coincident Wet Bulb (°F)	JANUARY Obsn/Hour Gp 02 to 09	JANUARY Obsn/Hour Gp 10 to 17	JANUARY Obsn/Hour Gp 18 to 01	JANUARY Total Obsn	JANUARY Mean Coincident Wet Bulb (°F)
100/104															
95/99															
90/94															
85/89		1		1	69										
80/84		8	0	8	68		0		0	69					
75/79		25	3	29	64		5	0	5	65		3	0	3	55
70/74	1	37	15	53	52	2	17	2	21	62	0	10	3	13	62
65/59	17	48	31	95	50	4	25	13	42	50	4	20	10	34	60
60/64	30	45	40	115	56	15	34	25	74	56	10	31	17	58	55
55/59	32	30	43	105	52	15	39	30	85	51	18	35	27	80	51
50/54	33	25	39	97	47	23	41	44	108	46	21	39	35	95	45
45/49	31	13	34	78	43	32	35	36	103	42	28	35	44	107	42
40/44	42	5	20	57	39	39	28	43	110	38	33	35	42	110	38
35/39	35	2	10	48	34	46	15	31	92	34	50	21	32	103	34
30/34	18	0	4	17	30	37	7	17	51	29	42	13	25	80	29
35/29	4		1	5	25	25	1	6	32	25	28	5	10	43	25
20/24	1			1	21	7	1	1	9	20	11	1	3	15	20
15/19						1	0	0	1	15	3	0	0	3	15
10/14						1	0	0	1	11	0	0		0	9
5/9						0			0	8	0	0		0	5

Temperature Range (°F)	FEBRUARY Obsn/Hour Gp 02 to 09	FEBRUARY Obsn/Hour Gp 10 to 17	FEBRUARY Obsn/Hour Gp 18 to 01	FEBRUARY Total Obsn	FEBRUARY Mean Coincident Wet Bulb (°F)	MARCH Obsn/Hour Gp 02 to 09	MARCH Obsn/Hour Gp 10 to 17	MARCH Obsn/Hour Gp 18 to 01	MARCH Total Obsn	MARCH Mean Coincident Wet Bulb (°F)	APRIL Obsn/Hour Gp 02 to 09	APRIL Obsn/Hour Gp 10 to 17	APRIL Obsn/Hour Gp 18 to 01	APRIL Total Obsn	APRIL Mean Coincident Wet Bulb (°F)
100/104															
95/99															
90/94												1		1	71
85/89		0		0	59		1	0	1	67		15	2	17	69
80/84		3	0	3	66		6	1	7	65		38	12	50	65
75/79		10	2	12	55		20	5	26	63	0	50	25	75	64
70/74	1	16	8	25	52	2	29	17	48	51	12	50	44	106	62
65/59	6	25	19	50	50	10	37	26	73	58	42	86	53	131	60
60/64	17	30	27	74	56	23	45	44	112	55	52	29	46	137	57
55/59	24	37	35	95	51	34	43	48	125	51	42	13	28	83	52
50/54	25	34	35	95	46	51	29	45	125	47	35	7	21	64	48
45/49	35	30	34	99	42	44	19	27	90	42	29	1	8	38	44
40/44	39	21	31	91	38	43	12	21	75	38	15	0	1	16	39
35/39	32	12	18	52	34	25	5	9	40	34	2			2	35
30/34	23	4	10	37	29	11	2	4	17	30					
35/29	16	2	3	21	24	3	0	0	3	25					
20/24	3	0	1	4	19	1			1	20					
15/19	1	0	1	2	14										
10/14	1			1	10										
5/9															

Temperature Range (°F)	ANNUAL (TOTAL—ALL MONTHS) Obsn/Hour Gp 02 to 09	ANNUAL Obsn/Hour Gp 10 to 17	ANNUAL Obsn/Hour Gp 18 to 01	ANNUAL Total Obsn	ANNUAL Mean Coincident Wet Bulb (°F)
100/104		3		3	76
95/99		54	5	59	76
90/94		234	40	274	74
85/89	5	394	125	524	71
80/84	48	374	229	651	59
75/79	245	340	418	1003	57
70/74	555	281	454	1300	65
65/59	360	257	305	932	62
60/64	295	252	288	835	58
55/59	259	215	258	742	53
50/54	254	180	245	680	48
45/49	232	134	192	558	44
40/44	224	101	153	488	39
35/39	197	54	101	352	35
30/34	128	26	50	214	30
35/29	75	8	20	104	25
20/24	23	2	5	30	20
15/19	6	1	1	8	15
10/14	2			2	10
5/9	1			1	7

SCOTT AFB ILLINOIS (Substitute Station for St. Louis)

Mean Frequency of Occurrence of Dry Bulb Temperature (°F) With Mean Coincident Wet Bulb Temperature (°F) For Each Dry Bulb Temperature Range

COOLING SEASON

Temperature Range (°F)	MAY Obsn/Hour Gp 02 to 09	MAY Obsn/Hour Gp 10 to 17	MAY Obsn/Hour Gp 18 to 01	MAY Total Obsn	MAY Mean Coincident Wet Bulb (°F)	JUNE Obsn/Hour Gp 02 to 09	JUNE Obsn/Hour Gp 10 to 17	JUNE Obsn/Hour Gp 18 to 01	JUNE Total Obsn	JUNE Mean Coincident Wet Bulb (°F)	JULY Obsn/Hour Gp 02 to 09	JULY Obsn/Hour Gp 10 to 17	JULY Obsn/Hour Gp 18 to 01	JULY Total Obsn	JULY Mean Coincident Wet Bulb (°F)
100/104															
96/99							1		1	77		8		8	79
90/94		3		3	71		27	2	29	75	0	40	4	44	77
86/89		26	2	28	71	3	62	10	65	73	5	76	19	100	74
80/84	2	42	10	64	69	11	64	29	104	70	19	71	49	139	72
75/79	9	49	27	86	66	81	54	66	140	68	58	36	76	169	71
70/74	27	49	47	123	64	68	26	66	160	66	86	14	69	169	68
65/69	66	33	66	146	61	68	11	46	126	63	63	3	23	79	64
60/64	66	23	47	126	57	40	4	23	67	68	19		8	27	59
66/59	38	16	30	83	62	21	1	7	29	64	7		1	8	54
60/54	29	6	16	50	48	7		2	9	60	1			1	61
45/49	18	2	9	29	43	1			1	46					
40/44	11	1	4	16	39										
36/39	3		0	3	36										
30/34	0			0	32										
26/29															

Temperature Range (°F)	AUGUST Obsn/Hour Gp 02 to 09	AUGUST Obsn/Hour Gp 10 to 17	AUGUST Obsn/Hour Gp 18 to 01	AUGUST Total Obsn	AUGUST Mean Coincident Wet Bulb (°F)	SEPTEMBER Obsn/Hour Gp 02 to 09	SEPTEMBER Obsn/Hour Gp 10 to 17	SEPTEMBER Obsn/Hour Gp 18 to 01	SEPTEMBER Total Obsn	SEPTEMBER Mean Coincident Wet Bulb (°F)	OCTOBER Obsn/Hour Gp 02 to 09	OCTOBER Obsn/Hour Gp 10 to 17	OCTOBER Obsn/Hour Gp 18 to 01	OCTOBER Total Obsn	OCTOBER Mean Coincident Wet Bulb (°F)
100/104		2		2	75										
96/99		9	0	9	77		3		3	71					
90/94	1	46	3	50	75		19	0	19	72		1		1	64
86/89	4	73	17	94	74	1	37	2	40	72		6		6	66
80/84	17	62	43	122	72	5	46	14	65	69	0	22	0	22	66
75/79	47	36	69	161	70	12	47	32	91	67	0	38	4	42	63
70/74	82	16	66	163	68	39	48	54	141	66	7	41	16	63	61
65/69	49	4	32	86	63	52	26	51	129	61	17	38	34	89	59
60/64	84	0	15	49	59	49	11	37	97	67	32	40	46	117	55
66/59	12	1	4	17	56	33	2	28	63	53	47	29	48	124	51
60/54	2		0	2	61	26	1	17	44	49	41	20	41	102	47
45/49	0			0	46	18		6	23	46	47	8	35	90	43
40/44						5		0	6	41	31	6	17	63	39
36/39											18	0	7	26	35
30/34											7		2	9	30
26/29											1			1	27

HEATING SEASON

Temperature Range (°F)	NOVEMBER Obsn/Hour Gp 02 to 09	NOVEMBER Obsn/Hour Gp 10 to 17	NOVEMBER Obsn/Hour Gp 18 to 01	NOVEMBER Total Obsn	NOVEMBER Mean Coincident Wet Bulb (°F)	DECEMBER Obsn/Hour Gp 02 to 09	DECEMBER Obsn/Hour Gp 10 to 17	DECEMBER Obsn/Hour Gp 18 to 01	DECEMBER Total Obsn	DECEMBER Mean Coincident Wet Bulb (°F)	JANUARY Obsn/Hour Gp 02 to 09	JANUARY Obsn/Hour Gp 10 to 17	JANUARY Obsn/Hour Gp 18 to 01	JANUARY Total Obsn	JANUARY Mean Coincident Wet Bulb (°F)
100/104															
95/99															
90/94															
85/89															
80/84		1		1	69										
75/79		4		4	65										
70/74	1	11	1	18	60		0		0	61					
65/69	3	16	5	24	58		3		3	56		1		1	59
60/64	9	26	18	53	55	1	6	2	9	55	1	5	1	7	55
55/59	14	29	20	63	50	3	12	5	20	51	2	9	4	15	52
50/54	24	36	30	90	46	7	21	10	38	47	4	14	6	24	46
45/49	32	35	35	102	42	12	24	18	54	42	6	19	9	34	42
40/44	35	32	35	102	38	23	32	27	82	38	13	23	19	55	37
35/39	38	24	37	99	33	36	43	38	117	34	23	37	34	94	33
30/34	39	13	29	81	29	49	47	53	149	30	51	48	55	154	30
25/29	27	8	17	52	25	45	24	44	113	25	42	32	36	110	25
20/24	10	3	6	19	21	29	16	22	67	20	28	24	32	84	20
15/19	5	1	5	11	16	16	8	12	36	15	33	19	21	73	15
10/14	2	1	2	5	11	11	6	9	26	10	18	8	14	40	11
5/9	1	0	0	1	7	9	5	5	19	6	11	5	8	24	6
0/4						5	1	2	8	2	8	3	5	16	1
−5/−1						2		1	3	−4	5	1	3	9	−4
−10/−6						0			0	−8	3	0	1	4	−9
−15/−11											0			0	−13

Temperature Range (°F)	FEBRUARY Obsn/Hour Gp 02 to 09	FEBRUARY Obsn/Hour Gp 10 to 17	FEBRUARY Obsn/Hour Gp 18 to 01	FEBRUARY Total Obsn	FEBRUARY Mean Coincident Wet Bulb (°F)	MARCH Obsn/Hour Gp 02 to 09	MARCH Obsn/Hour Gp 10 to 17	MARCH Obsn/Hour Gp 18 to 01	MARCH Total Obsn	MARCH Mean Coincident Wet Bulb (°F)	APRIL Obsn/Hour Gp 02 to 09	APRIL Obsn/Hour Gp 10 to 17	APRIL Obsn/Hour Gp 18 to 01	APRIL Total Obsn	APRIL Mean Coincident Wet Bulb (°F)
100/104															
95/99															
90/94															
85/89												4	0	4	66
80/84		0		0	62		1		1	65		14	1	15	65
75/79		0		0	59		3	0	3	62	1	22	7	30	64
70/74		1	0	1	59	0	7	1	8	59	7	31	15	53	62
65/69		2	1	3	57	0	13	4	17	56	18	30	32	80	58
60/64	0	7	2	9	52	4	16	10	30	53	26	33	35	94	55
55/59	4	11	6	21	51	11	21	19	51	50	33	35	30	98	50
50/54	5	19	10	34	46	13	29	23	65	46	36	30	35	101	46
45/49	7	24	13	44	42	19	34	27	80	41	40	25	39	104	42
40/44	15	28	27	70	38	37	47	43	127	38	41	12	30	83	38
35/39	34	45	39	118	34	58	41	49	148	34	26	4	13	43	34
30/34	57	39	53	149	30	53	19	37	109	30	9	0	3	12	30
25/29	41	20	30	91	25	24	10	19	53	25	3		0	3	26
20/24	24	14	20	58	20	19	5	11	35	21					
15/19	13	9	12	34	15	6	1	3	10	16					
10/14	12	4	7	23	11	2	1	1	4	11					
5/9	7	1	3	11	6	1		1	2	6					
0/4	4	0	1	5	1	1		0	1	2					
−5/−1	1		0	1	−2	0			0	−2					
−10/−6															
−15/−11															

Temperature Range (°F)	ANNUAL (TOTAL—ALL MONTHS) Obsn/Hour Gp 02 to 09	ANNUAL Obsn/Hour Gp 10 to 17	ANNUAL Obsn/Hour Gp 18 to 01	ANNUAL Total Obsn	ANNUAL Mean Coincident Wet Bulb (°F)
100/104		2		2	75
95/99		22	0	22	77
90/94	1	135	9	145	75
85/89	13	273	50	336	71
80/84	54	323	146	523	68
75/79	159	292	270	721	66
70/74	307	248	333	888	63
65/69	316	178	283	777	60
60/64	272	171	244	687	56
55/59	226	164	203	593	52
50/54	196	175	190	561	48
45/49	197	170	190	557	43
40/44	210	178	201	589	38
35/39	234	193	220	647	34
30/34	264	164	231	659	30
25/29	182	95	146	423	25
20/24	111	63	91	265	20
15/19	75	38	52	165	15
10/14	45	19	32	96	11
5/9	29	12	16	57	6
0/4	18	4	8	30	1
−5/−1	8	1	4	13	−4
−10/−6	3	0	1	4	−9
−15/−11	0			0	−13

* INDIANAPOLIS INDIANA

Mean Frequency of Occurrence of Dry Bulb Temperature (°F) With Mean Coincident Wet Bulb Temperature (°F) For Each Dry Bulb Temperature Range

COOLING SEASON

Temperature Range (°F)	MAY Obsn/Hour Gp 02 to 09	MAY 10 to 17	MAY 18 to 01	MAY Total Obsn	MAY Mean Coincident Wet Bulb (°F)	JUNE Obsn/Hour Gp 02 to 09	JUNE 10 to 17	JUNE 18 to 01	JUNE Total Obsn	JUNE Mean Coincident Wet Bulb (°F)
100/104							0		0	75
95/99							3	0	3	76
90/94		1		1	69	0	24	1	25	74
85/89	0	7	0	7	69	4	37	6	47	72
80/84	1	22	2	25	67	11	51	22	84	70
75/79	4	42	12	58	65	28	54	42	124	68
70/74	15	48	26	89	63	47	37	61	145	66
65/69	35	47	45	127	60	56	20	52	128	62
60/64	48	39	54	141	57	48	8	32	88	58
55/59	43	16	42	101	52	29	5	16	50	54
50/54	42	14	30	86	48	14	1	7	22	50
45/49	30	8	21	59	44	3		1	4	46
40/44	19	3	12	34	39	0		0	0	41
35/39	9	1	4	14	36	0			0	38
30/34	2		0	2	31					
25/29										
20/24										

Temperature Range (°F)	JULY Obsn/Hour Gp 02 to 09	JULY 10 to 17	JULY 18 to 01	JULY Total Obsn	JULY Mean Coincident Wet Bulb (°F)	AUGUST Obsn/Hour Gp 02 to 09	AUGUST 10 to 17	AUGUST 18 to 01	AUGUST Total Obsn	AUGUST Mean Coincident Wet Bulb (°F)
100/104		0		0	78					
95/99		4	0	4	76		2		2	72
90/94	1	22	1	24	75		19	0	19	74
85/89	4	58	9	71	73	2	52	4	58	73
80/84	14	80	31	125	71	10	80	21	111	71
75/79	39	57	63	159	69	27	60	55	142	69
70/74	77	22	81	180	68	70	27	80	177	68
65/69	68	5	46	119	64	69	8	55	132	64
60/64	34	0	15	49	59	49	0	26	75	59
55/59	9		2	11	55	17		7	24	55
50/54	2			2	52	4		0	4	51
45/49										
40/44										
35/39										
30/34										
25/29										
20/24										

Temperature Range (°F)	SEPTEMBER Obsn/Hour Gp 02 to 09	SEPTEMBER 10 to 17	SEPTEMBER 18 to 01	SEPTEMBER Total Obsn	SEPTEMBER Mean Coincident Wet Bulb (°F)	OCTOBER Obsn/Hour Gp 02 to 09	OCTOBER 10 to 17	OCTOBER 18 to 01	OCTOBER Total Obsn	OCTOBER Mean Coincident Wet Bulb (°F)
100/104		0		0	71					
95/99		3		3	69					
90/94	0	11	0	11	71					
85/89	1	31	2	34	71		3		3	68
80/84	3	39	8	50	68	0	12	0	12	65
75/79	10	45	23	78	66	1	24	2	27	63
70/74	35	48	48	131	64	5	35	7	47	61
65/69	48	40	49	137	61	14	40	21	75	59
60/64	47	17	45	109	57	20	40	34	94	55
55/59	39	4	34	77	53	33	35	41	109	51
50/54	30	1	22	53	49	41	30	47	118	47
45/49	20	1	8	29	45	48	18	42	108	43
40/44	7		1	8	41	44	8	32	84	40
35/39	0		0	0	37	27	3	16	46	35
30/34						12	0	5	17	30
25/29						3		1	4	26
20/24						0			0	22

HEATING SEASON

Temperature Range (°F)	NOVEMBER Obsn/Hour Gp 02 to 09	10 to 17	18 to 01	Total Obsn	Mean Coincident Wet Bulb (°F)	DECEMBER Obsn/Hour Gp 02 to 09	10 to 17	18 to 01	Total Obsn	Mean Coincident Wet Bulb (°F)	JANUARY Obsn/Hour Gp 02 to 09	10 to 17	18 to 01	Total Obsn	Mean Coincident Wet Bulb (°F)
100/104															
95/99															
90/94															
85/89															
80/84															
75/79		1		1	68										
70/74		5	1	6	61										
55/59	1	13	2	15	58		2	1	3	59		1	0	1	61
50/54	5	20	8	33	55	0	3	1	4	56	1	2	1	4	58
55/59	13	25	17	55	52	3	7	4	14	52	2	2	3	7	54
50/54	18	29	22	59	47	8	17	9	34	48	5	9	5	19	49
45/49	22	38	25	81	42	14	20	15	50	43	5	15	7	28	43
40/44	30	34	34	98	38	20	31	20	71	39	8	24	12	44	38
35/39	86	25	44	106	84	30	51	42	123	34	22	42	29	93	34
30/34	48	27	38	113	30	53	48	52	153	80	51	58	52	171	30
25/29	85	17	27	79	25	44	33	45	122	25	54	40	48	142	25
20/24	21	8	13	42	21	31	17	28	76	21	85	23	29	87	21
15/19	5	1	4	11	16	16	10	12	38	16	22	15	23	60	15
10/14	3	1	3	7	11	13	4	8	25	11	16	9	14	39	11
5/9	1		1	2	5	5	3	5	14	5	13	5	8	25	6
0/4	1			1	1	5	2	3	10	2	9	2	4	15	2
−5/−1						3	0	2	5	−1	4	0	2	6	−3
−10/−5						1		0	1	−8	1		1	2	−8
−15/−11						1		0	1	−13	0			0	−11

Temperature Range (°F)	FEBRUARY Obsn/Hour Gp 02 to 09	10 to 17	18 to 01	Total Obsn	Mean Coincident Wet Bulb (°F)	MARCH Obsn/Hour Gp 02 to 09	10 to 17	18 to 01	Total Obsn	Mean Coincident Wet Bulb (°F)
100/104										
95/99										
90/94										
85/89										
80/84										
75/79							0		0	50
70/74		0		0	51		4	0	4	58
55/59	0	1	1	2	58	0	8	3	11	58
50/54	1	6	2	9	55	4	14	5	23	54
55/59	2	9	2	13	52	6	24	9	39	50
50/54	5	13	5	24	47	12	26	19	57	46
45/49	8	28	13	49	42	21	29	29	79	42
40/44	14	32	24	70	38	30	44	39	113	38
35/39	33	46	42	121	34	42	47	43	132	34
30/34	55	41	50	157	30	55	28	52	135	30
25/29	45	25	34	105	25	43	13	28	84	25
20/24	25	9	17	52	20	17	6	11	34	21
15/19	13	7	10	30	15	8	3	6	17	15
10/14	7	4	5	15	10	6	2	2	10	11
5/9	5	2	5	13	6	2	0	1	3	6
0/4	5	1	3	9	1	1		1	2	1
−5/−1	2	0	0	2	−3	1			1	−2
−10/−5						0			0	−6
−15/−11										

Temperature Range (°F)	APRIL Obsn/Hour Gp 02 to 09	10 to 17	18 to 01	Total Obsn	Mean Coincident Wet Bulb (°F)	ANNUAL (TOTAL—ALL MONTHS) Obsn/Hour Gp 02 to 09	10 to 17	18 to 01	Total Obsn	Mean Coincident Wet Bulb (°F)
100/104							1		1	76
95/99							11	0	11	73
90/94						1	77	2	80	74
85/89		1		1	57	12	190	21	223	70
80/84		8	0	8	64	39	292	84	415	58
75/79	1	20	2	23	63	110	304	198	512	55
70/74	4	25	10	40	60	254	252	315	821	63
55/59	13	27	21	51	58	305	211	296	812	50
50/54	27	30	33	90	56	285	179	257	721	57
55/59	25	28	29	82	50	221	155	207	584	53
50/54	33	31	34	98	47	215	171	199	585	48
45/49	33	30	33	96	42	202	183	195	581	43
40/44	36	24	35	95	38	207	201	209	617	39
35/39	37	10	27	74	35	235	225	245	707	35
30/34	22	5	14	41	30	299	204	285	788	30
25/29	8		2	10	25	232	128	184	544	25
20/24	1		0	1	21	132	53	98	293	21
15/19						64	35	55	156	15
10/14						45	19	33	97	11
5/9						30	10	19	59	5
0/4						20	5	11	35	2
−5/−1						9	1	3	13	−2
−10/−5						2		1	3	−8
−15/−11						1		0	1	−12

* BATTLE CREEK MICHIGAN (Substitute Station for Kalamazoo)

Mean Frequency of Occurrence of Dry Bulb Temperature (°F) With Mean Coincident Wet Bulb Temperature (°F) For Each Dry Bulb Temperature Range

COOLING SEASON

Temperature Range (°F)	MAY Obsn/Hour Gp 02 to 09	MAY Obsn/Hour Gp 10 to 17	MAY Obsn/Hour Gp 18 to 01	MAY Total Obsn	MAY Mean Coincident Wet Bulb (°F)	JUNE Obsn/Hour Gp 02 to 09	JUNE Obsn/Hour Gp 10 to 17	JUNE Obsn/Hour Gp 18 to 01	JUNE Total Obsn	JUNE Mean Coincident Wet Bulb (°F)	JULY Obsn/Hour Gp 02 to 09	JULY Obsn/Hour Gp 10 to 17	JULY Obsn/Hour Gp 18 to 01	JULY Total Obsn	JULY Mean Coincident Wet Bulb (°F)
95/99							2	0	2	76		2		2	75
90/94		0		0	73		9	1	10	75		16	1	17	73
35/89		5	0	5	70	1	86	6	43	72	1	45	9	55	70
80/84	0	22	3	25	66	4	51	13	73	70	7	73	27	107	69
75/79	2	29	9	40	64	21	43	33	107	68	21	53	47	126	67
70/74	7	84	19	60	60	43	39	50	132	65	60	85	63	168	65
65/69	21	42	84	97	58	60	27	51	138	62	62	13	50	125	62
60/64	80	40	36	106	55	45	17	87	99	57	55	6	31	92	58
55/59	43	31	44	113	52	86	3	22	66	54	29	0	13	42	55
50/54	49	24	47	120	48	20	3	13	86	49	10		2	12	50
45/49	45	13	82	90	44	7	0	3	10	45	3		0	3	46
40/44	31	6	15	52	89	3		1	4	41					
35/39	15	2	7	24	35	0			0	88					
30/34	5	0	2	7	31										
25/29	0			0	27										
20/24															

Temperature Range (°F)	AUGUST Obsn/Hour Gp 02 to 09	AUGUST Obsn/Hour Gp 10 to 17	AUGUST Obsn/Hour Gp 18 to 01	AUGUST Total Obsn	AUGUST Mean Coincident Wet Bulb (°F)	SEPTEMBER Obsn/Hour Gp 02 to 09	SEPTEMBER Obsn/Hour Gp 10 to 17	SEPTEMBER Obsn/Hour Gp 18 to 01	SEPTEMBER Total Obsn	SEPTEMBER Mean Coincident Wet Bulb (°F)	OCTOBER Obsn/Hour Gp 02 to 09	OCTOBER Obsn/Hour Gp 10 to 17	OCTOBER Obsn/Hour Gp 18 to 01	OCTOBER Total Obsn	OCTOBER Mean Coincident Wet Bulb (°F)
95/99		4		4	71		1		1	71					
90/94		15	2	17	71	0	5	0	5	70					
35/89	1	25	4	30	70	0	6	1	7	69		1		1	70
80/84	4	54	16	74	68	0	17	3	20	66		9		9	64
75/79	12	61	31	104	66	3	31	10	44	64	0	14	2	16	64
70/74	40	54	63	157	65	13	44	21	73	62	2	23	7	32	61
65/69	61	25	54	140	62	21	50	36	107	60	9	34	16	59	59
60/64	61	9	52	122	59	44	45	46	185	57	19	32	22	73	56
55/59	44	1	19	64	55	51	28	50	129	53	20	33	34	92	51
50/54	17		6	23	50	45	10	37	92	49	83	35	36	104	47
45/49	7		1	8	46	39	3	25	67	45	50	36	49	135	43
40/44	1			1	42	17	0	9	26	41	43	13	40	106	40
35/39						5		2	7	37	37	7	23	72	35
30/34						2		0	2	32	25	1	10	36	31
25/29											4		8	7	26
20/24											1		1	2	22

HEATING SEASON

Temperature Range (°F)	NOVEMBER Obsn/Hour Gp 02 to 09			Total Obsn	Mean Coincident Wet Bulb (°F)	DECEMBER Obsn/Hour Gp 02 to 09			Total Obsn	Mean Coincident Wet Bulb (°F)	JANUARY Obsn/Hour Gp 02 to 09			Total Obsn	Mean Coincident Wet Bulb (°F)
	02 to 09	10 to 17	18 to 01			02 to 09	10 to 17	18 to 01			02 to 09	10 to 17	18 to 01		
95/99															
90/94															
85/89															
80/84															
75/79		1		1	64										
70/74		1	0	1	60										
55/59	0	6	1	7	55								0	0	50
60/64	2	11	3	15	54		0	1	1	58	0	1	0	1	57
55/59	5	15	10	31	51	1	3	2	6	52	1	2	1	4	55
50/54	13	17	15	45	47	2	5	3	11	49	2	4	5	12	50
45/49	15	29	18	62	43	4	8	5	17	44	7	6	3	15	45
40/44	28	38	39	105	38	9	16	9	34	39	8	12	9	29	39
35/39	43	48	45	137	35	26	37	30	93	35	19	31	22	72	35
30/34	54	41	50	155	31	45	51	52	159	30	36	57	46	139	30
25/29	38	22	34	94	25	50	51	54	155	25	48	54	51	153	26
20/24	19	9	15	43	22	43	34	37	114	21	48	38	43	129	21
15/19	5	1	6	12	17	31	20	24	75	16	35	23	34	93	16
10/14	3	0	2	5	12	20	9	17	45	12	25	15	20	50	11
5/9	1	1	0	2	7	10	2	10	22	7	11	4	8	23	7
0/4	1	0	0	1	2	5	1	3	9	2	4	1	4	9	2
−5/−1	2		1	3	−3	1	0	1	2	−4	2		1	3	−2
−10/−5						0		0	0	−7	1			1	−8
−15/−11											0			0	−12

Temperature Range (°F)	FEBRUARY Obsn/Hour Gp 02 to 09			Total Obsn	Mean Coincident Wet Bulb (°F)	MARCH Obsn/Hour Gp 02 to 09			Total Obsn	Mean Coincident Wet Bulb (°F)	APRIL Obsn/Hour Gp 02 to 09			Total Obsn	Mean Coincident Wet Bulb (°F)
	02 to 09	10 to 17	18 to 01			02 to 09	10 to 17	18 to 01			02 to 09	10 to 17	18 to 01		
95/99															
90/94															
85/89															
80/84											0	1		1	51
75/79							2		2	60		7	1	8	51
70/74							3	1	4	58	0	13	3	15	58
55/59						1	7	2	10	57	2	19	7	28	56
60/64		1		1	55	2	7	4	13	54	7	24	14	45	53
55/59	1	2	0	3	51	6	11	8	25	51	14	23	22	59	50
50/54	0	4	2	5	47	8	15	12	35	47	22	35	27	85	45
45/49	3	11	4	18	42	10	22	14	46	42	26	35	37	99	42
40/44	8	14	11	33	38	18	27	23	68	38	43	30	40	113	38
35/39	19	41	25	85	34	30	50	33	113	34	48	28	39	115	34
30/34	43	58	57	158	30	49	44	54	147	30	45	17	30	93	31
25/29	51	43	52	145	25	41	32	42	115	25	20	5	13	38	25
20/24	35	24	28	87	21	41	15	30	87	21	9	1	7	17	21
15/19	28	15	23	55	15	27	9	14	50	16	3		0	3	17
10/14	18	8	11	37	12	10	2	7	19	11	0			0	12
5/9	8	2	7	17	5	4	1	3	8	7					
0/4	5	1	3	10	2	0		0	0	2					
−5/−1	3	0	0	3	−2	1		1	2	−3					
−10/−5	1	0		1	−7	0			0	−7					
−15/−11	0			0	−12	0			0	−11					

Temperature Range (°F)	ANNUAL (TOTAL—ALL MONTHS) Obsn/Hour Gp 02 to 09			Total Obsn	Mean Coincident Wet Bulb (°F)
	02 to 09	10 to 17	18 to 01		
95/99		10	0	10	73
90/94	0	45	5	51	72
85/89	3	118	21	142	71
80/84	15	227	55	309	55
75/79	59	253	137	449	54
70/74	154	246	231	541	52
55/59	235	219	250	705	59
60/64	267	194	245	707	55
55/59	251	161	225	638	53
50/54	221	154	205	580	48
45/49	215	155	192	573	44
40/44	214	152	195	571	39
35/39	241	244	232	717	35
30/34	313	279	304	896	31
25/29	252	207	249	708	25
20/24	198	121	150	479	21
15/19	132	59	101	302	16
10/14	75	33	57	155	12
5/9	33	9	30	72	7
0/4	17	3	10	30	2
−5/−1	9	0	3	12	−3
−10/−5	2	0	0	2	−7
−15/−11	0			0	−12

MITCHELL AFB NEW YORK (Substitute Station for Jersey City)

Mean Frequency of Occurrence of Dry Bulb Temperature (°F) With Mean Coincident Wet Bulb Temperature (°F) For Each Dry Bulb Temperature Range

COOLING SEASON

Temperature Range (°F)	MAY Obsn/Hour Gp 02 to 09	MAY Obsn/Hour Gp 10 to 17	MAY Obsn/Hour Gp 18 to 01	MAY Total Obsn	MAY Mean Coincident Wet Bulb (°F)	JUNE Obsn/Hour Gp 02 to 09	JUNE Obsn/Hour Gp 10 to 17	JUNE Obsn/Hour Gp 18 to 01	JUNE Total Obsn	JUNE Mean Coincident Wet Bulb (°F)
100/104							0		0	80
95/99							2	0	2	78
90/94		0		0	74	0	7	1	8	75
85/89		4		4	70	2	22	3	27	72
80/84	0	11	1	12	67	6	41	8	55	69
75/79	2	24	3	29	64	17	58	26	101	67
70/74	8	41	13	62	61	40	51	50	141	64
65/69	22	59	28	109	59	59	36	68	163	62
60/64	43	51	52	146	56	66	17	54	137	58
55/59	62	36	69	167	52	36	6	23	65	54
50/54	61	15	56	132	48	13	0	7	20	50
45/49	35	7	22	64	44	1			1	46
40/44	15	0	4	19	40					
35/39	0			0	33					
30/34										

Temperature Range (°F)	JULY Obsn/Hour Gp 02 to 09	JULY Obsn/Hour Gp 10 to 17	JULY Obsn/Hour Gp 18 to 01	JULY Total Obsn	JULY Mean Coincident Wet Bulb (°F)	AUGUST Obsn/Hour Gp 02 to 09	AUGUST Obsn/Hour Gp 10 to 17	AUGUST Obsn/Hour Gp 18 to 01	AUGUST Total Obsn	AUGUST Mean Coincident Wet Bulb (°F)
100/104		1		1	77					
95/99		4		4	75		3		3	75
90/94	1	16	1	18	74	0	8	0	8	74
85/89	3	45	5	53	72	2	35	2	39	73
80/84	14	74	22	110	70	9	66	15	90	71
75/79	43	73	66	182	68	39	73	61	173	69
70/74	92	28	101	221	67	75	44	85	204	67
65/69	63	5	42	110	63	69	16	59	144	63
60/64	27	1	10	38	59	39	3	22	64	59
55/59	5	1	1	7	55	15		4	19	55
50/54						0			0	51
45/49										
40/44										
35/39										
30/34										

Temperature Range (°F)	SEPTEMBER Obsn/Hour Gp 02 to 09	SEPTEMBER Obsn/Hour Gp 10 to 17	SEPTEMBER Obsn/Hour Gp 18 to 01	SEPTEMBER Total Obsn	SEPTEMBER Mean Coincident Wet Bulb (°F)	OCTOBER Obsn/Hour Gp 02 to 09	OCTOBER Obsn/Hour Gp 10 to 17	OCTOBER Obsn/Hour Gp 18 to 01	OCTOBER Total Obsn	OCTOBER Mean Coincident Wet Bulb (°F)
100/104										
95/99		0		0	77					
90/94	0	2		2	74					
85/89	0	7	0	7	73					
80/84	1	29	2	32	71		5	0	5	71
75/79	12	58	17	87	68	1	15	1	17	66
70/74	41	58	52	151	66	7	26	9	42	65
65/69	50	49	57	156	61	16	50	21	87	60
60/64	52	28	60	140	58	36	61	47	144	57
55/59	48	8	32	88	53	46	47	55	148	52
50/54	23	1	16	40	49	52	28	50	130	48
45/49	10		4	14	44	46	12	40	98	43
40/44	3		0	3	39	30	4	19	53	39
35/39	0			0	37	13	0	6	19	35
30/34						1	0	0	1	30

HEATING SEASON

Temperature Range (°F)	NOVEMBER Obsn/Hour Gp 02 to 09	NOVEMBER Obsn/Hour Gp 10 to 17	NOVEMBER Obsn/Hour Gp 18 to 01	NOVEMBER Total Obsn	NOVEMBER Mean Coincident Wet Bulb (°F)	DECEMBER Obsn/Hour Gp 02 to 09	DECEMBER Obsn/Hour Gp 10 to 17	DECEMBER Obsn/Hour Gp 18 to 01	DECEMBER Total Obsn	DECEMBER Mean Coincident Wet Bulb (°F)	JANUARY Obsn/Hour Gp 02 to 09	JANUARY Obsn/Hour Gp 10 to 17	JANUARY Obsn/Hour Gp 18 to 01	JANUARY Total Obsn	JANUARY Mean Coincident Wet Bulb (°F)
100/104															
95/99															
90/94															
85/89															
80/84															
75/79															
70/74		1		1	55										
65/69	1	9	0	10	58		0		0	58					
60/64	8	23	9	40	57	0	2	1	8	55					
55/59	21	48	28	97	53	5	13	6	24	53		1		1	52
50/54	34	45	44	124	47	11	23	10	44	48	4	5	2	12	49
45/49	42	48	47	137	42	15	32	22	59	43	8	23	8	39	44
40/44	47	35	45	128	38	33	51	43	127	38	19	35	25	80	38
35/39	46	19	39	104	34	53	50	54	157	34	40	55	55	150	34
30/34	27	9	20	55	29	48	34	45	127	29	52	52	59	173	29
25/29	9	1	6	16	24	34	23	32	89	24	50	32	48	130	24
20/24	4	1	1	5	19	25	13	19	57	19	33	21	25	79	19
15/19	1			1	15	16	5	13	35	15	25	10	17	52	15
10/14						7	1	2	10	10	11	2	8	21	11
5/9						1		1	2	5	5	0	1	5	5
0/4						0			0	1	1			1	2
—5/—1															

Temperature Range (°F)	FEBRUARY Obsn/Hour Gp 02 to 09	FEBRUARY Obsn/Hour Gp 10 to 17	FEBRUARY Obsn/Hour Gp 18 to 01	FEBRUARY Total Obsn	FEBRUARY Mean Coincident Wet Bulb (°F)	MARCH Obsn/Hour Gp 02 to 09	MARCH Obsn/Hour Gp 10 to 17	MARCH Obsn/Hour Gp 18 to 01	MARCH Total Obsn	MARCH Mean Coincident Wet Bulb (°F)	APRIL Obsn/Hour Gp 02 to 09	APRIL Obsn/Hour Gp 10 to 17	APRIL Obsn/Hour Gp 18 to 01	APRIL Total Obsn	APRIL Mean Coincident Wet Bulb (°F)	ANNUAL (TOTAL—ALL MONTHS) Obsn/Hour Gp 02 to 09	ANNUAL Obsn/Hour Gp 10 to 17	ANNUAL Obsn/Hour Gp 18 to 01	ANNUAL Total Obsn	ANNUAL Mean Coincident Wet Bulb (°F)
100/104																	1		1	78
95/99																	9	0	9	76
90/94																1	33	2	35	74
85/89												0		0	66	6	111	11	128	71
80/84												3	0	3	64	31	230	49	310	69
75/79											0	7	1	8	59	114	305	175	595	66
70/74							1		1	52	1	14	2	17	58	264	264	312	840	52
65/69		0		0	57		3	0	3	53	2	20	6	28	55	284	247	280	811	59
60/64		1	0	1	53	0	7	0	7	51	9	33	14	55	53	280	227	255	773	55
55/59		5	1	7	50	2	15	2	20	47	22	40	32	94	51	258	218	251	727	52
50/54	3	15	5	23	47	7	29	15	51	45	53	48	54	155	47	259	211	257	727	48
45/49	12	32	15	59	42	18	50	31	99	41	59	51	63	173	43	244	255	248	747	43
40/44	25	50	35	112	38	43	50	55	149	37	52	18	48	118	38	269	249	278	795	38
35/39	49	53	59	151	33	59	50	72	191	34	31	4	15	51	34	304	233	304	841	34
30/34	52	35	55	142	29	57	27	44	128	29	10	2	4	15	30	247	159	230	545	29
25/29	38	15	25	80	24	31	13	19	53	24	0		0	0	23	153	85	133	382	24
20/24	22	8	13	43	20	15	2	8	26	19	1		0	1	20	102	44	57	213	19
15/19	12	5	7	24	15	5	0	1	5	15						59	21	38	118	15
10/14	6	2	5	13	10	0			0	11						24	4	15	43	11
5/9	3	1	2	5	5											9	2	4	15	6
0/4	1	0	0	1	1											2	0	0	2	1
—5/—1	0			0	—4															—4

MEMPHIS NAS TENNESSEE

Mean Frequency of Occurrence of Dry Bulb Temperature (°F) With Mean Coincident Wet Bulb Temperature (°F) For Each Dry Bulb Temperature Range

COOLING SEASON

Temperature Range (°F)	MAY Obsn/Hour Gp 02 to 09	MAY 10 to 17	MAY 18 to 01	MAY Total Obsn	MAY Mean Coincident Wet Bulb (°F)	JUNE Obsn/Hour Gp 02 to 09	JUNE 10 to 17	JUNE 18 to 01	JUNE Total Obsn	JUNE Mean Coincident Wet Bulb (°F)	JULY Obsn/Hour Gp 02 to 09	JULY 10 to 17	JULY 18 to 01	JULY Total Obsn	JULY Mean Coincident Wet Bulb (°F)
105/109							0		0	76					
100/104							2	0	2	76		4	0	4	77
95/99						0	7	1	8	75		18	1	19	78
90/94		11	1	12	73	0	44	6	50	75	1	77	12	90	77
85/89	0	48	6	54	72	6	66	20	92	73	11	78	34	123	76
80/84	7	62	24	93	70	25	60	43	128	72	41	47	67	155	74
75/79	23	47	47	117	68	51	37	73	161	70	88	19	87	194	72
70/74	51	33	63	147	66	88	19	63	170	68	85	5	48	188	70
65/69	72	25	50	147	62	44	3	25	72	63	18	0	4	22	64
60/64	45	13	30	88	57	20	2	7	29	59	4		0	4	58
55/59	25	7	15	47	52	5		2	7	55	0			0	57
50/54	13	2	10	25	47	1			1	51					
45/49	11	0	2	13	43										
40/44	1		0	1	40										
35/39															
30/34															

Temperature Range (°F)	AUGUST Obsn/Hour Gp 02 to 09	AUGUST 10 to 17	AUGUST 18 to 01	AUGUST Total Obsn	AUGUST Mean Coincident Wet Bulb (°F)	SEPTEMBER Obsn/Hour Gp 02 to 09	SEPTEMBER 10 to 17	SEPTEMBER 18 to 01	SEPTEMBER Total Obsn	SEPTEMBER Mean Coincident Wet Bulb (°F)	OCTOBER Obsn/Hour Gp 02 to 09	OCTOBER 10 to 17	OCTOBER 18 to 01	OCTOBER Total Obsn	OCTOBER Mean Coincident Wet Bulb (°F)
105/109															
100/104		4	0	4	78		2		2	74					
95/99		24	2	26	77		6	0	6	74					
90/94	1	76	10	87	77	0	25	1	26	74		3		3	73
85/89	10	77	33	120	75	2	56	8	66	78	0	13	0	13	70
80/84	33	43	64	140	74	9	59	22	90	71	1	37	3	41	68
75/79	81	18	82	181	72	32	45	58	135	70	7	50	14	71	66
70/74	85	5	46	136	69	69	30	69	168	67	18	47	31	96	64
65/69	30	1	9	40	64	55	12	46	113	62	85	87	44	116	61
60/64	7		2	9	59	43	4	26	73	58	41	31	50	122	57
55/59	1			1	56	22	1	8	31	58	42	17	41	100	52
50/54						7		2	9	49	41	9	34	84	48
45/49						1			1	44	35	4	20	59	44
40/44											20	0	8	28	40
35/39											6		3	9	35
30/34											2		0	2	31

HEATING SEASON

Temperature Range (°F)	NOVEMBER Obsn/Hour Gp 02 to 09	NOVEMBER Obsn/Hour Gp 10 to 17	NOVEMBER Obsn/Hour Gp 18 to 01	NOVEMBER Total Obsn	NOVEMBER Mean Coincident Wet Bulb (°F)	DECEMBER Obsn/Hour Gp 02 to 09	DECEMBER Obsn/Hour Gp 10 to 17	DECEMBER Obsn/Hour Gp 18 to 01	DECEMBER Total Obsn	DECEMBER Mean Coincident Wet Bulb (°F)
105/109										
100/104										
95/99										
90/94										
85/89										
80/84		2	0	2	69					
75/79		10	1	11	55		0		0	69
70/74	5	25	8	39	53		3	0	3	53
65/69	7	25	11	44	59	2	9	3	14	50
60/64	14	34	22	70	55	6	20	9	35	57
55/59	25	38	29	92	51	15	31	22	58	53
50/54	28	37	38	103	47	19	37	27	83	48
45/49	38	32	42	112	43	22	39	29	90	43
40/44	43	18	41	102	38	44	45	48	137	39
35/39	37	11	28	75	34	48	35	48	131	34
30/34	27	5	14	45	30	44	17	34	95	30
25/29	10	1	5	15	25	29	8	20	57	25
20/24	5	0	1	5	20	10	2	5	18	21
15/19	1			1	18	6	1	1	8	15
10/14						2	1	0	3	11
5/9						1	0	1	2	5
0/4						0		0	0	4
—5/—1										

Temperature Range (°F)	JANUARY Obsn/Hour Gp 02 to 09	JANUARY Obsn/Hour Gp 10 to 17	JANUARY Obsn/Hour Gp 18 to 01	JANUARY Total Obsn	JANUARY Mean Coincident Wet Bulb (°F)	FEBRUARY Obsn/Hour Gp 02 to 09	FEBRUARY Obsn/Hour Gp 10 to 17	FEBRUARY Obsn/Hour Gp 18 to 01	FEBRUARY Total Obsn	FEBRUARY Mean Coincident Wet Bulb (°F)
105/109										
100/104										
95/99										
90/94										
85/89										
80/84							0		0	63
75/79							2	0	2	54
70/74	0	1	0	1	65	1	9	2	12	62
65/69	2	6	2	10	52	4	13	8	25	51
60/64	5	13	8	25	58	8	25	11	44	56
55/59	8	22	12	42	53	15	25	23	53	52
50/54	9	22	14	45	47	22	31	27	80	47
45/49	15	34	25	74	43	25	27	33	85	43
40/44	29	38	38	105	39	34	37	31	102	39
35/39	44	45	47	137	35	35	22	35	93	35
30/34	57	34	54	145	30	35	17	27	79	30
25/29	39	15	25	80	25	20	11	15	45	24
20/24	18	8	11	87	20	14	4	8	26	20
15/19	10	4	7	21	15	4	1	2	7	15
10/14	7	3	3	13	11	3	0	2	5	11
5/9	2	1	1	4	7	2		0	2	5
0/4	2	0	1	3	2					
—5/—1	1		0	1	—2					

Temperature Range (°F)	MARCH Obsn/Hour Gp 02 to 09	MARCH Obsn/Hour Gp 10 to 17	MARCH Obsn/Hour Gp 18 to 01	MARCH Total Obsn	MARCH Mean Coincident Wet Bulb (°F)	APRIL Obsn/Hour Gp 02 to 09	APRIL Obsn/Hour Gp 10 to 17	APRIL Obsn/Hour Gp 18 to 01	APRIL Total Obsn	APRIL Mean Coincident Wet Bulb (°F)
105/109										
100/104										
95/99										
90/94										
85/89							5	0	5	70
80/84		2	0	2	60		35	5	40	58
75/79		10	2	12	54	6	39	18	63	55
70/74	3	21	9	33	62	20	42	35	97	53
65/69	10	24	14	48	58	33	34	41	108	50
60/64	16	32	25	73	54	43	32	43	118	56
55/59	24	30	29	83	50	41	27	37	105	51
50/54	27	43	37	107	46	35	17	32	85	47
45/49	42	38	44	124	43	35	8	19	52	43
40/44	44	25	42	112	38	18	1	8	27	39
35/39	39	12	28	79	34	7	0	1	8	35
30/34	30	7	13	50	30	1	0	1	2	32
25/29	10	2	4	15	25					
20/24	2	1	1	4	20					
15/19	1		0	1	15					
10/14	0			0	10					
5/9										
0/4										
—5/—1										

Temperature Range (°F)	ANNUAL (TOTAL—ALL MONTHS) Obsn/Hour Gp 02 to 09	ANNUAL Obsn/Hour Gp 10 to 17	ANNUAL Obsn/Hour Gp 18 to 01	ANNUAL Total Obsn	ANNUAL Mean Coincident Wet Bulb (°F)
105/109		0		0	75
100/104		11	0	11	77
95/99	0	55	4	59	77
90/94	3	237	31	271	75
85/89	29	343	103	475	73
80/84	115	347	228	641	69
75/79	288	278	382	948	58
70/74	425	240	359	1034	65
65/69	311	190	257	758	51
60/64	252	205	233	590	57
55/59	224	197	219	640	53
50/54	203	198	222	523	48
45/49	224	182	212	518	43
40/44	231	155	215	611	39
35/39	217	127	189	533	35
30/34	195	81	141	417	30
25/29	108	38	58	214	25
20/24	51	15	29	95	20
15/19	22	5	10	38	16
10/14	12	4	5	21	11
5/9	5	1	2	8	6
0/4	3	0	1	4	2
—5/—1	1		0	1	—2

ELLINGTON AFB TEXAS (Substitute Station for Houston)

Mean Frequency of Occurrence of Dry Bulb Temperature (°F) With Mean Coincident Wet Bulb Temperature (°F) For Each Dry Bulb Temperature Range

COOLING SEASON

Temperature Range (°F)	MAY Obsn/Hour Gp 02 to 09	MAY Obsn/Hour Gp 10 to 17	MAY Obsn/Hour Gp 18 to 01	MAY Total Obsn	MAY Mean Coincident Wet Bulb (°F)	JUNE Obsn/Hour Gp 02 to 09	JUNE Obsn/Hour Gp 10 to 17	JUNE Obsn/Hour Gp 18 to 01	JUNE Total Obsn	JUNE Mean Coincident Wet Bulb (°F)	JULY Obsn/Hour Gp 02 to 09	JULY Obsn/Hour Gp 10 to 17	JULY Obsn/Hour Gp 18 to 01	JULY Total Obsn	JULY Mean Coincident Wet Bulb (°F)
100/104												1		1	77
95/99		0		0	78		6	0	6	77		23	1	24	79
90/94		8	0	8	75	1	69	3	73	77	1	114	8	123	78
85/89	1	74	3	78	74	17	105	23	145	76	29	75	35	139	77
80/84	20	108	23	151	72	40	36	62	138	75	47	21	85	153	76
75/79	64	41	90	195	71	97	16	109	222	73	138	11	108	257	74
70/74	82	13	85	180	69	67	7	36	110	70	32	3	11	46	71
65/69	49	4	33	86	64	15	1	6	22	65	1		0	1	67
60/64	21	0	13	34	58	2		1	3	56					
55/59	10		1	11	54	1			1	53					
50/54	1			1	50										
45/49															
40/44															
35/39															

Temperature Range (°F)	AUGUST Obsn/Hour Gp 02 to 09	AUGUST Obsn/Hour Gp 10 to 17	AUGUST Obsn/Hour Gp 18 to 01	AUGUST Total Obsn	AUGUST Mean Coincident Wet Bulb (°F)	SEPTEMBER Obsn/Hour Gp 02 to 09	SEPTEMBER Obsn/Hour Gp 10 to 17	SEPTEMBER Obsn/Hour Gp 18 to 01	SEPTEMBER Total Obsn	SEPTEMBER Mean Coincident Wet Bulb (°F)	OCTOBER Obsn/Hour Gp 02 to 09	OCTOBER Obsn/Hour Gp 10 to 17	OCTOBER Obsn/Hour Gp 18 to 01	OCTOBER Total Obsn	OCTOBER Mean Coincident Wet Bulb (°F)
100/104		2		2	77		0		0	76					
95/99		24	0	24	79		5		5	77		0		0	78
90/94	1	102	7	110	78	0	43	1	44	77		4		4	76
85/89	24	74	29	127	77	8	99	10	117	76	1	41	0	42	74
80/84	42	31	90	163	76	29	51	51	131	75	6	78	7	91	71
75/79	141	12	109	262	74	96	29	112	237	73	22	63	37	122	69
70/74	37	3	13	53	71	65	11	48	124	69	50	34	71	155	67
65/69	3		0	3	67	30	2	16	48	64	63	16	60	139	63
60/64						10		2	12	59	47	6	38	91	58
55/59						2			2	56	30	3	22	55	53
50/54											19	3	11	33	49
45/49											8	0	2	10	44
40/44											1		0	1	39
35/39											1			1	37

HEATING SEASON

Temperature Range (°F)	NOVEMBER Obsn/Hour Gp			NOVEMBER		DECEMBER Obsn/Hour Gp			DECEMBER		JANUARY Obsn/Hour Gp			JANUARY		FEBRUARY Obsn/Hour Gp			FEBRUARY		MARCH Obsn/Hour Gp			MARCH		APRIL Obsn/Hour Gp			APRIL		ANNUAL (TOTAL—ALL MONTHS) Obsn/Hour Gp			ANNUAL (TOTAL—ALL MONTHS)	
	02 to 09	10 to 17	18 to 01	Total Obsn	Mean Coincident Wet Bulb (°F)	02 to 09	10 to 17	18 to 01	Total Obsn	Mean Coincident Wet Bulb (°F)	02 to 09	10 to 17	18 to 01	Total Obsn	Mean Coincident Wet Bulb (°F)	02 to 09	10 to 17	18 to 01	Total Obsn	Mean Coincident Wet Bulb (°F)	02 to 09	10 to 17	18 to 01	Total Obsn	Mean Coincident Wet Bulb (°F)	02 to 09	10 to 17	18 to 01	Total Obsn	Mean Coincident Wet Bulb (°F)	02 to 09	10 to 17	18 to 01	Total Obsn	Mean Coincident Wet Bulb (°F)
100/104																																3		3	77
95/99																																60	1	61	78
90/94																											0		0	74	3	340	13	361	76
85/89		3		8	72												0		0	66		1		1	70		6	0	6	72	81	481	100	661	74
80/84	0	26		26	72		4		4	71		2		2	71		6		6	69		10	0	10	63	1	57	1	59	71	186	427	320	933	72
75/79	10	42	11	63	70	0	17		17	63		12		12	67	0	18	0	13	63	1	42	2	45	66	16	33	25	124	69	535	335	603	1573	70
70/74	24	42	32	98	67	5	30	7	42	65	3	29	7	39	65	7	34	14	55	65	15	59	24	98	65	70	49	79	198	67	457	312	427	1196	68
65/69	31	40	33	104	62	16	41	22	79	62	17	30	20	67	62	26	35	26	87	62	38	52	51	141	62	50	28	61	139	63	340	249	327	916	64
60/64	31	33	40	104	57	30	45	37	112	58	24	35	25	84	57	20	28	28	76	58	44	36	55	135	57	39	14	40	93	58	267	196	278	741	58
55/59	31	25	40	96	52	33	42	41	116	53	25	41	37	103	53	25	34	39	98	53	46	24	46	116	52	33	3	24	60	53	237	171	250	658	53
50/54	36	16	38	90	47	40	30	44	114	48	33	36	50	119	43	39	30	41	110	43	37	11	36	84	43	19	0	8	27	49	221	128	229	578	48
45/49	36	8	25	69	43	39	21	48	108	44	37	27	39	103	43	41	18	37	96	44	31	8	21	60	43	10		2	12	44	199	83	174	456	44
40/44	24	4	15	43	39	38	10	28	76	39	40	16	31	87	39	32	12	23	67	40	23	4	10	37	39	2			2	39	161	47	107	315	39
35/39	12	1	5	18	34	28	6	15	49	34	32	11	22	65	34	21	7	12	40	35	10	1	3	14	35	0			0	37	104	26	57	187	35
30/34	5		1	6	30	15	2	4	21	30	22	5	10	37	29	9	2	4	15	31	3	0		3	30						55	9	20	84	30
25/29	0			0	26	3	0	2	5	24	9	3	3	15	24	4		0	4	26											17	3	5	25	25
20/24						1			1	21	3	1	3	7	20																4	1	3	8	20
15/19											3	0	1	4	15																3	0	1	4	15

GRAY AAF, FORT LEWIS WASHINGTON (Substitute Station for Seattle)

Mean Frequency of Occurrence of Dry Bulb Temperature (°F) With Mean Coincident Wet Bulb Temperature (°F) For Each Dry Bulb Temperature Range

COOLING SEASON

Temperature Range (°F)	MAY Obsn/Hour Gp 02 to 09	MAY Obsn/Hour Gp 10 to 17	MAY Obsn/Hour Gp 18 to 01	MAY Total Obsn	MAY Mean Coincident Wet Bulb (°F)	JUNE Obsn/Hour Gp 02 to 09	JUNE Obsn/Hour Gp 10 to 17	JUNE Obsn/Hour Gp 18 to 01	JUNE Total Obsn	JUNE Mean Coincident Wet Bulb (°F)
95/99										
90/94		1		1	65		0		0	68
85/89		8	0	8	64		4	1	5	65
80/84		4	1	5	62		11	3	14	62
75/79	0	10	2	12	60	0	23	9	32	61
70/74	1	15	5	21	58	8	40	14	57	59
65/69	3	35	10	48	55	7	52	22	81	57
60/64	7	54	23	84	53	22	58	42	122	54
55/59	26	62	46	134	50	57	43	66	166	52
50/54	60	48	71	179	48	95	9	64	168	49
45/49	78	13	56	147	44	47	0	18	65	45
40/44	48	8	25	76	40	8		1	9	42
35/39	18		8	26	35	1			1	38
30/34	7		1	8	32					
25/29										

Temperature Range (°F)	JULY Obsn/Hour Gp 02 to 09	JULY Obsn/Hour Gp 10 to 17	JULY Obsn/Hour Gp 18 to 01	JULY Total Obsn	JULY Mean Coincident Wet Bulb (°F)	AUGUST Obsn/Hour Gp 02 to 09	AUGUST Obsn/Hour Gp 10 to 17	AUGUST Obsn/Hour Gp 18 to 01	AUGUST Total Obsn	AUGUST Mean Coincident Wet Bulb (°F)
95/99		1		1	73		1		1	66
90/94		4	1	5	69		3	1	4	67
85/89		13	3	16	67	0	10	1	11	65
80/84	0	23	7	30	65	0	19	5	24	64
75/79	2	42	14	58	62	1	36	11	48	63
70/74	6	53	28	87	60	4	53	22	79	61
65/69	17	58	39	114	58	13	68	41	122	59
60/64	44	43	64	151	56	49	46	72	167	57
55/59	94	11	64	169	54	104	12	70	186	54
50/54	67	0	25	92	50	58	0	22	80	50
45/49	15		3	18	46	16		3	19	46
40/44	3		0	3	42	3		0	3	42
35/39										
30/34										
25/29										

Temperature Range (°F)	SEPTEMBER Obsn/Hour Gp 02 to 09	SEPTEMBER Obsn/Hour Gp 10 to 17	SEPTEMBER Obsn/Hour Gp 18 to 01	SEPTEMBER Total Obsn	SEPTEMBER Mean Coincident Wet Bulb (°F)	OCTOBER Obsn/Hour Gp 02 to 09	OCTOBER Obsn/Hour Gp 10 to 17	OCTOBER Obsn/Hour Gp 18 to 01	OCTOBER Total Obsn	OCTOBER Mean Coincident Wet Bulb (°F)
95/99										
90/94										
85/89		1		1	66					
80/84		7	1	8	63					
75/79		14	2	16	61		0		0	63
70/74		35	7	42	59		6	0	6	59
65/69	2	66	19	87	58		22	1	23	58
60/64	21	74	51	146	56	5	50	14	69	55
55/59	69	39	83	191	53	80	71	46	147	53
50/54	73	4	49	126	50	66	68	70	204	50
45/49	47	0	22	69	46	65	26	72	163	45
40/44	24		6	80	41	46	5	32	83	41
35/39	4			4	38	28	0	13	41	36
30/34						8		0	8	33
25/29						0			0	28

HEATING SEASON

Temperature Range (°F)	NOVEMBER Obsn/Hour Gp 02 to 09	NOVEMBER Obsn/Hour Gp 10 to 17	NOVEMBER Obsn/Hour Gp 18 to 01	NOVEMBER Total Obsn	NOVEMBER Mean Coincident Wet Bulb (°F)	DECEMBER Obsn/Hour Gp 02 to 09	DECEMBER Obsn/Hour Gp 10 to 17	DECEMBER Obsn/Hour Gp 18 to 01	DECEMBER Total Obsn	DECEMBER Mean Coincident Wet Bulb (°F)	JANUARY Obsn/Hour Gp 02 to 09	JANUARY Obsn/Hour Gp 10 to 17	JANUARY Obsn/Hour Gp 18 to 01	JANUARY Total Obsn	JANUARY Mean Coincident Wet Bulb (°F)	FEBRUARY Obsn/Hour Gp 02 to 09	FEBRUARY Obsn/Hour Gp 10 to 17	FEBRUARY Obsn/Hour Gp 18 to 01	FEBRUARY Total Obsn	FEBRUARY Mean Coincident Wet Bulb (°F)
95/99																				
90/94																				
86/89																				
80/84																				
76/79																				
70/74																				
66/69																	1		1	57
60/64		3		3	53		1	0	1	64		1		1	51		4	0	4	62
66/69	8	21	5	29	61	4	7	4	15	60	2	8	2	12	51	2	14	3	19	61
50/64	21	71	27	119	49	15	32	14	61	49	12	23	14	49	48	10	48	20	78	47
46/49	61	69	63	183	45	88	64	54	166	46	28	65	36	119	44	41	78	63	172	44
40/44	61	45	63	169	41	66	66	68	180	41	43	71	69	173	40	72	66	78	206	40
35/39	62	24	61	127	36	61	46	67	164	36	67	60	66	193	36	47	18	44	109	36
30/34	88	7	26	70	82	42	25	40	107	81	67	19	47	123	31	82	6	20	67	31
25/29	14		6	20	27	22	4	16	42	27	22	8	16	46	26	15	0	6	20	27
20/24	0			0	24	8	2	3	13	21	9	2	4	15	21	3		1	4	21
16/19						0	1	1	2	16	4	1	8	8	15	2		0	2	16
10/14						1	0	1	2	10	3		1	4	11					
6/9						1		0	1	6	1			1	9					

Temperature Range (°F)	MARCH Obsn/Hour Gp 02 to 09	MARCH Obsn/Hour Gp 10 to 17	MARCH Obsn/Hour Gp 18 to 01	MARCH Total Obsn	MARCH Mean Coincident Wet Bulb (°F)	APRIL Obsn/Hour Gp 02 to 09	APRIL Obsn/Hour Gp 10 to 17	APRIL Obsn/Hour Gp 18 to 01	APRIL Total Obsn	APRIL Mean Coincident Wet Bulb (°F)	ANNUAL (TOTAL—ALL MONTHS) Obsn/Hour Gp 02 to 09	ANNUAL (TOTAL—ALL MONTHS) Obsn/Hour Gp 10 to 17	ANNUAL (TOTAL—ALL MONTHS) Obsn/Hour Gp 18 to 01	ANNUAL (TOTAL—ALL MONTHS) Total Obsn	ANNUAL (TOTAL—ALL MONTHS) Mean Coincident Wet Bulb (°F)
95/99												2		2	68
90/94												8	1	9	68
86/89											0	31	6	37	66
80/84							1		1	59	0	66	17	82	63
76/79							2		2	60	4	129	39	172	61
70/74		0		0	64		7	0	7	66	14	211	76	301	68
66/69		2	0	2	50	0	12	2	14	64	42	316	136	493	56
60/64		15	1	16	49	1	25	6	32	51	149	379	273	801	53
66/69	0	36	6	42	48	4	60	18	82	49	391	390	415	1196	61
50/64	5	60	21	86	46	32	81	65	168	47	622	447	461	1430	49
46/49	37	76	67	180	43	74	40	80	194	44	643	417	526	1486	46
40/44	76	45	79	199	40	78	11	64	143	40	616	295	463	1264	41
35/39	63	12	51	126	36	82	1	22	65	36	369	157	307	833	36
30/34	64	2	21	77	81	18		3	21	32	252	66	153	461	32
25/29	12		2	14	27	1			1	28	84	12	43	139	27
20/24	2		0	2	20						22	4	8	34	21
16/19	0			0	17						6	2	4	12	16
10/14											4	0	2	6	11
6/9											2		0	2	7

Table F Mean Wind Climate Airport Exposure for the Structural Design

Site localities and U. S. W. B. Station Location	Ref. (14) Station Elevation Above MSL (ft)	Ref. (14) Observed Fastest Mile Wind Speed (mph)	Ref. (11) Annual Extreme Mile Speed 50-year Mean Recurrence Interval (mph)	Ref. (14, 9) Mean Wind Speed and Direction (mph) January	July	Annual	Ref. (9) Average Annual Number of Storms with Winds of 47 mph or over
Sacramento, Calif. Municipal AP	17	70	65	8.3 SE	9.4 SSW	9.3 SSE	5
Wilmington, Del. New Castle County AP	78	58	75	9.7 WNW	7.6 S	8.8 NW	2
Macon, Georgia Cochran Field	354	70	80	8.5 NW	7.2 WSW	8.9 WNW	1
Indianapolis, Ind. Weir Cook AP	792	90	90	11.3 NW	7.4 SW	10.8 SW	5
Kalamazoo, Mich. Grand Rapids, Mich. Kent County AP	784	58	75	11.5 W	8.3 W	9.8 W	4
St. Louis, Mo. Lambert Field	535	60	70	10.1 NW	7.6 S	9.3 S	2
Jersey City, N. J. Newark, N. J. Newark AP	7	82	75	11.3 WNW	8.9 SW	9.8 SW	1
Memphis, Tenn. Municipal AP	258	56	70	10.7 S	7.7 S	9.4 S	1
Houston, Texas International AP	50	54	80	11.9 SSE	8.8 SSE	11.8 SSE	5
Seattle, Wash. Seattle-Tacoma AP	400	55	80	10.4 SSW	8.7 SW	10.7 SW	1

Table G Air Contamination Data

Air Pollution Sampling Sites	Suspended Particulates (Micrograms per cubic meter)				Sulfur Dioxide (Micrograms per cubic meter)				Nitrogen Dioxide (Micrograms per cubic meter)				Ammonia (Micrograms per cubic meter)			
	Geometic Mean	Maximum	90% Freq. Dist.	Years Covered	Geometic Mean	Maximum	90% Freq. Dist.	Years Covered	Geometic Mean	Maximum	90% Freq. Dist.	Years Covered	Geometic Mean	Maximum	90% Freq. Dist.	Years Covered
Sacramento, California Health Center 2221 Stockton Boulevard Sacramento County Health Dept.	68	403	132	1958-1966												
Wilmington, Delaware Public Building 1000 King Street City Dept. of Health	144	743	262	1957-1968	58	492	168	1964-1968	133	384	276	1964-1968	46	79	71	1968
Macon, Georgia W. T. Grant Co. 418 3rd Street Georgia Dept. of Public Health	96	861	235	1958-1968												
Indianapolis, Indiana Fire Station No. 301 East New York Street City Bureau of Air Pollution	147	367	237	1958-1968	34	249	115	1964-1968	105	405	190	1964-1968	48	113	65	1968
Kalamazoo, Michigan 241 West South Street City County Health Dept.	79	258	151	1957-1962												
St. Louis, Missouri P. O. Bldg. - 18th & Market St. Div. Air Pollution Cont. City Dept. Public Safety	142	658	236	1957-1967	70	294	169	1964-1968	136	405	263	1964-1968	50	82	70	1968
Jersey City, New Jersey Medical Center Garage Bldg. Corneilson Ave. City Board of Health	126	336	201	1959-1968	34	323	221	1967-1968	217	473	429	1967				
Memphis, Tennessee Health Dept. Bldg. 814 Jefferson Street Memphis-Shelby Co. Health Dept.	94	281	149	1958-1968	9	23	18	1968	157	404	238	1968	57	96	87	1968
Houston, Texas Sam Houston Coliseum 810 Bagby Street City Health Dept.	97	385	168	1957-1968												
Seattle, Washington Public Safety Bldg. 604 Third Ave. Puget Sound Air Pollution Control Agency	70	446	127	1957-1968	22	122	58	1964-1968	89	315	199	1964-1968	48	74	61	1968

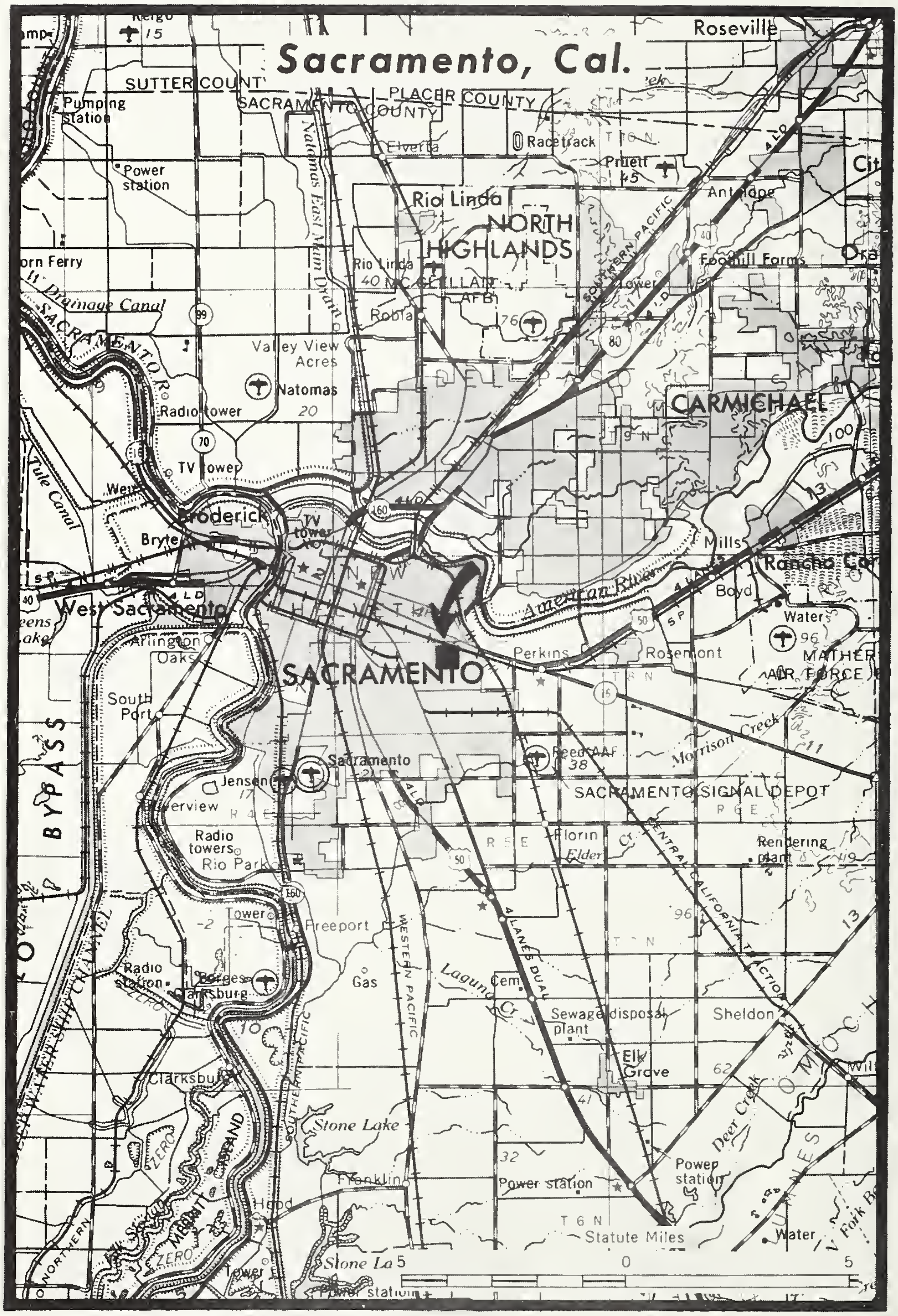
Appendix

City Maps for the Breakthrough Sites

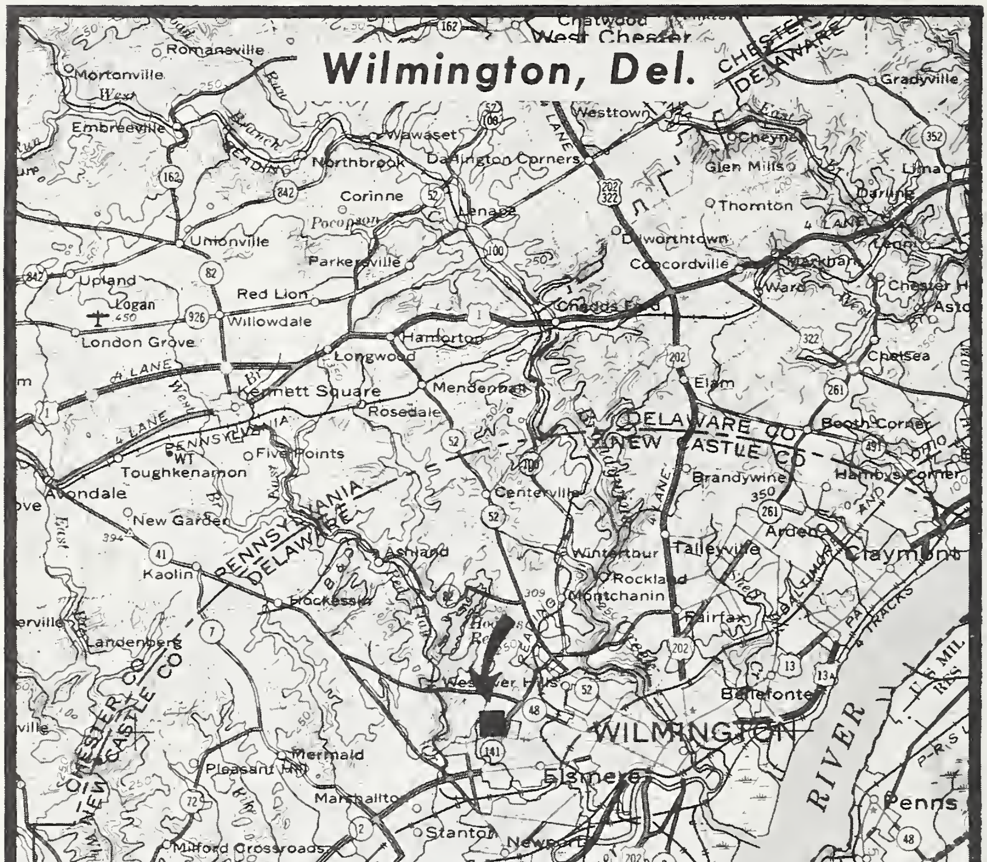
Breakthrough Site

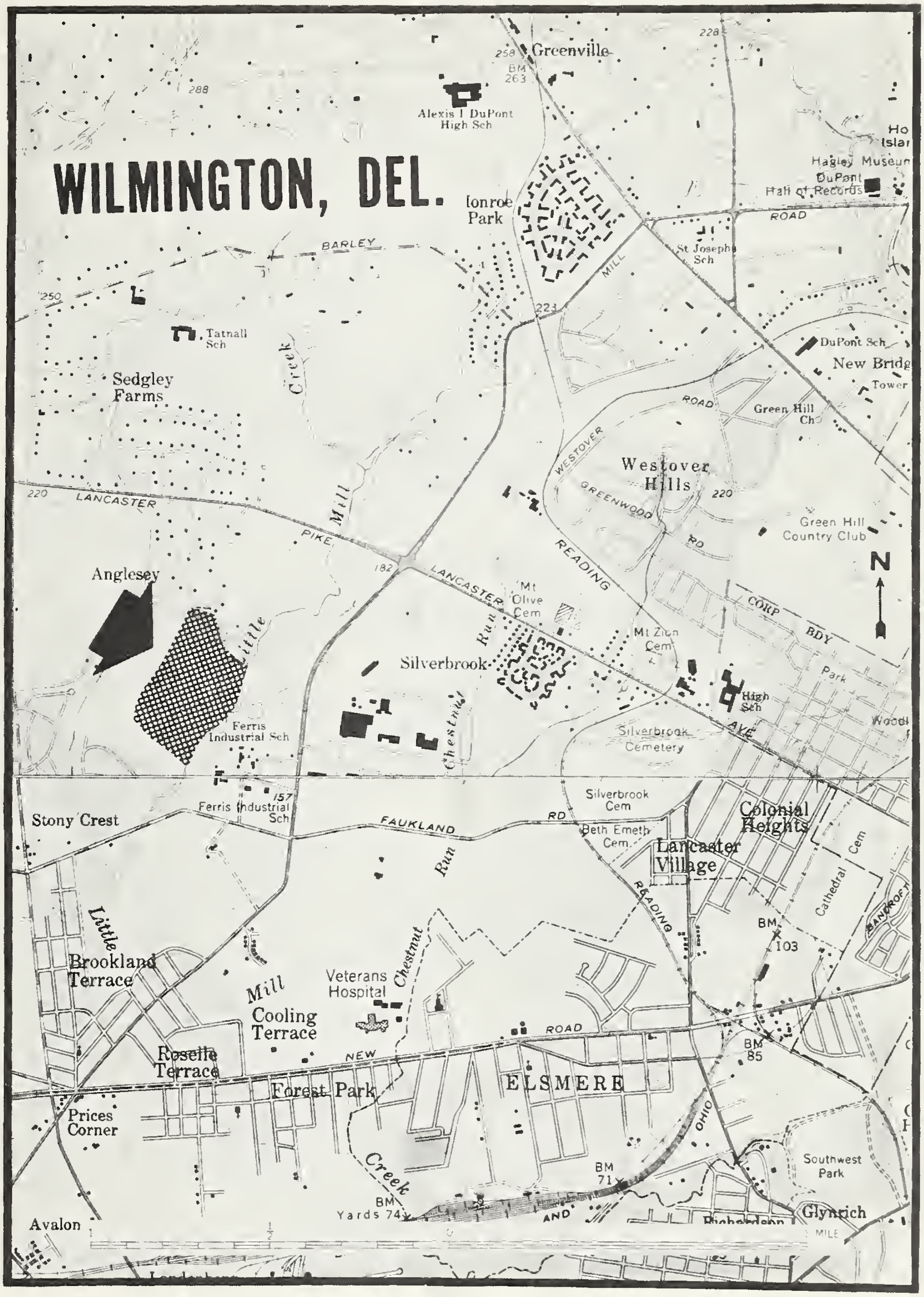
Airport

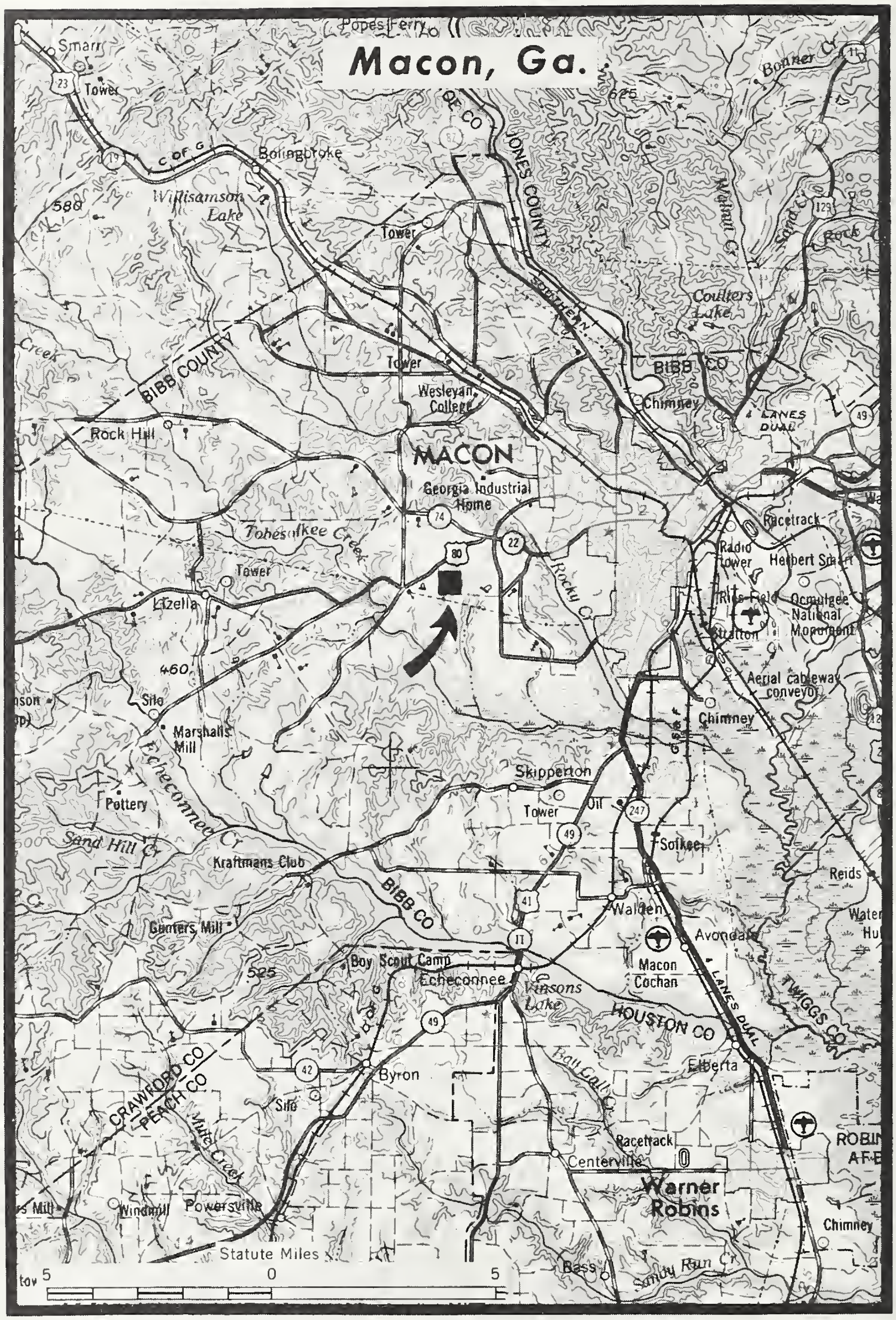
Weather Data Station

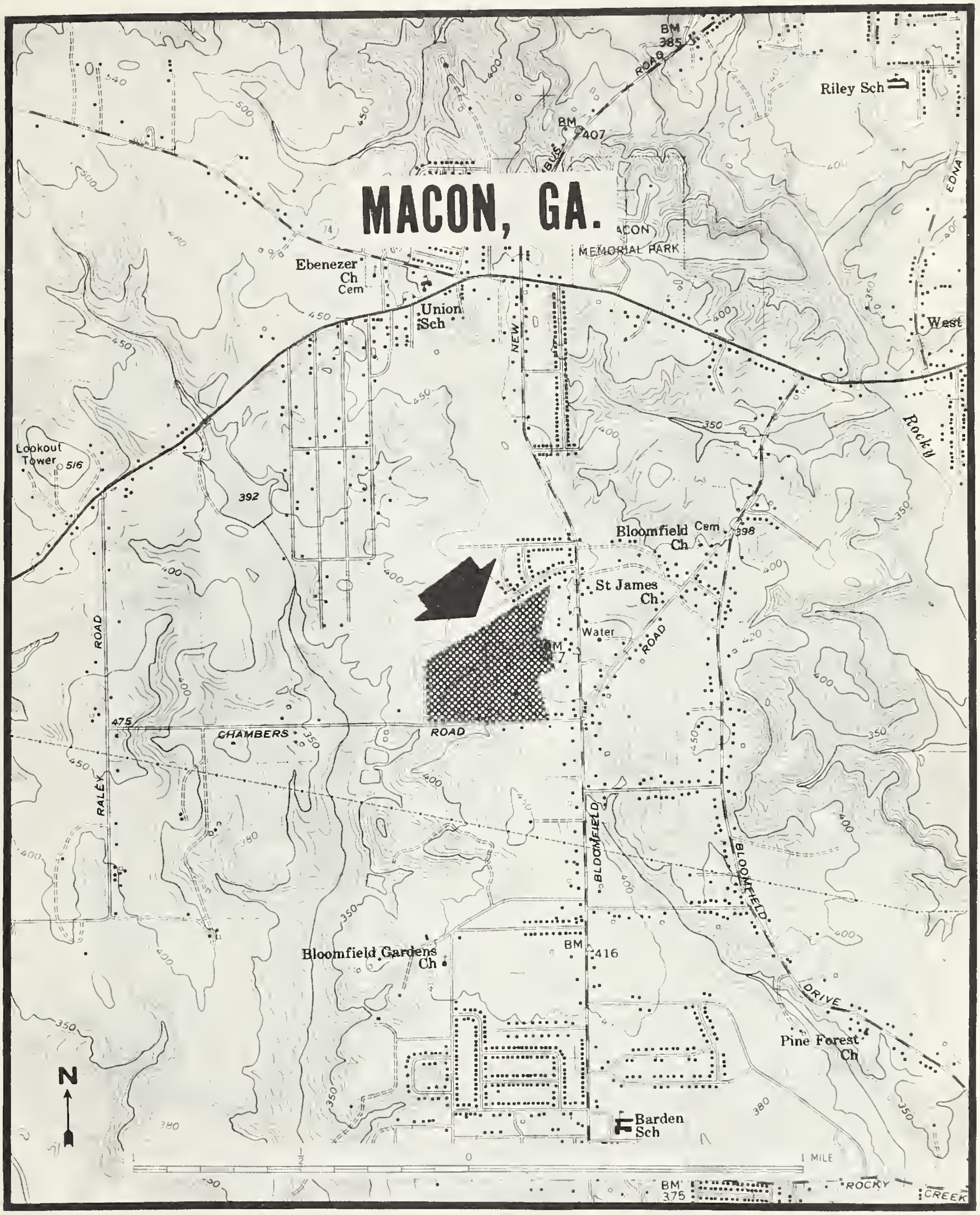

Sacramento, Cal.
SUTTER COUNTY
PLACER COUNTY
SACRAMENTO COUNTY
Roseville
Pumping station
Power station
Racetrack
Elverta
Rio Linda
NORTH HIGHLANDS
Antelope
Foothill Farms
McCLELLAN AFB
Robla
Valley View Acres
Natomas
Radio tower
TV tower
CARMICHAEL
Broderick
Bryte
West Sacramento
Arlington Oaks
SACRAMENTO
American River
Mills
Rancho Cordova
Boyd
Waters
Perkins
Rosemont
MATHER AIR FORCE
South Port
Sacramento
Jensen
Riverview
Reed AAF
SACRAMENTO SIGNAL DEPOT
Morrison Creek
Radio towers
Rio Park
Florin
Rendering plant
Freeport
Gas
Sewage disposal plant
Sheldon
Elk Grove
Clarksburg
Stone Lake
Deer Creek
Franklin
Power station
Hood
Statute Miles
5 0 5
BYPASS
Drainage Canal
Tule Canal
SOUTHERN PACIFIC
WESTERN PACIFIC
CENTRAL CALIFORNIA TRACTION
4 LANES DUAL

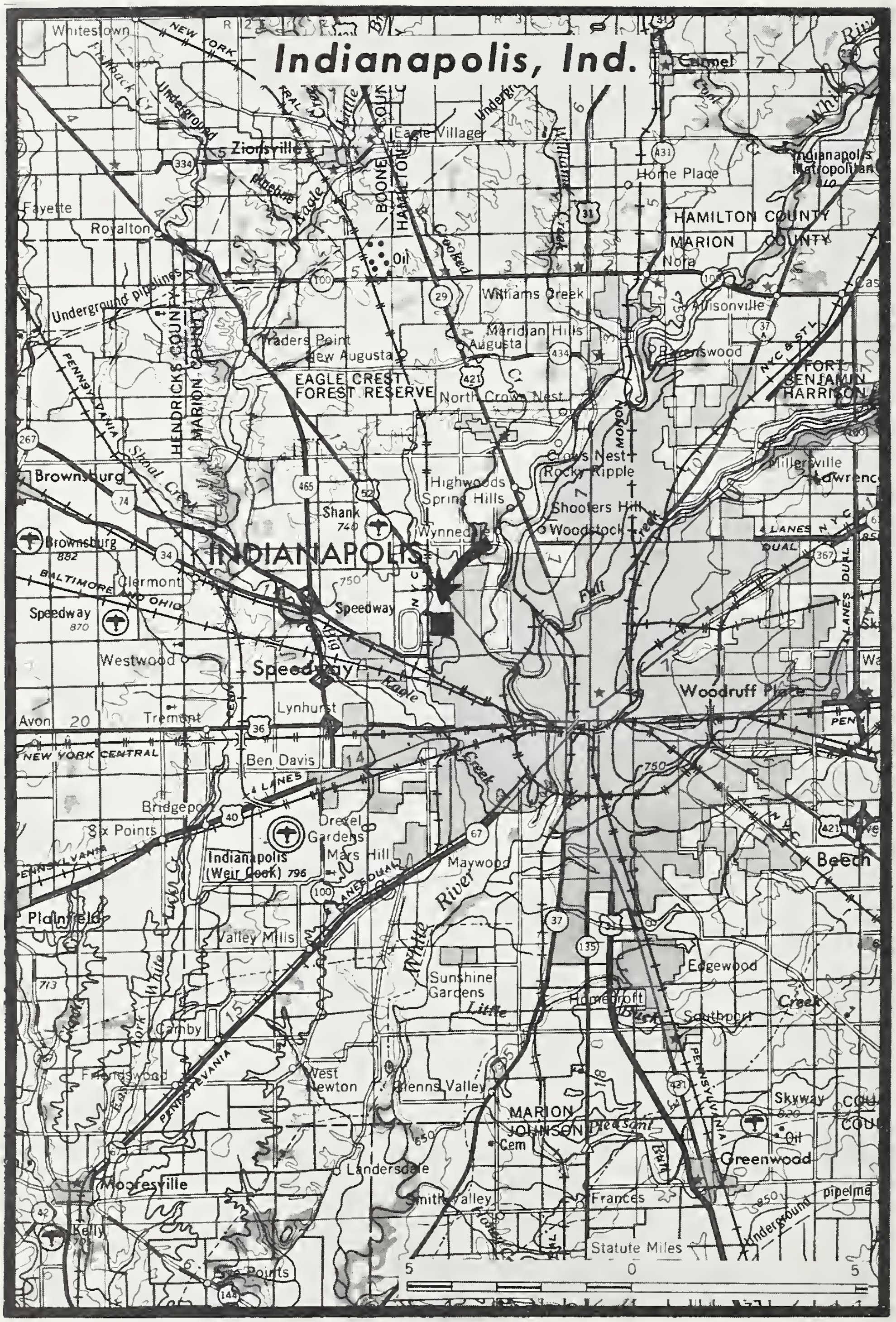

SACRAMENTO, CAL.
Judah Sch
Henschel Park
Greenwood Sch
MC KINLEY PARK
Sutter Jr High Sch
Sutter Memorial
PACIFIC
CARLSON
MESSINA DR
Pump
Fire Sta
David Lubin Sch
El Dorado Sch
SACRAMENTO STATE COLLEGE
UNIVERSITY
FOLSOM
East Portal Park
Kit Carson Jr High Sch
Armory
EAST LAWN CEM
BM 35
BLVD
ELVAS
St Francis High Sch
St Marys Sch
STOCKTON
Sacramento High Sch
Coloma Sch
Phoebe Hearst Sch
Fire Sta
COUNTY HOSPITAL
MILLER WAY
WT
FAIRGROUNDS
Flood Gate
BM 50
American Legion Sch
Oak Park Playground
BROADWAY
Fire Sta
Tahoe Sch
Tahoe Park
Radio Tower (KROY)
SAN JOAQUIN
REDDING
Donner Sch
Hiram Johnson High Sch
N
All Hallows Sch
Bishop Armstrong High Sch
Fairhaven Home for Girls
PARKER AVE
Fire Sta
Colonial Playground
Oak Ridge Sch
ROOSEVELT AVE
Fruit Ridge Sch
SACRAMENTO
PERRY AVE
Mark Twain Sch
BM 31
21ST AVE
John Muir Sch
Lassen Jr High Sch
26TH

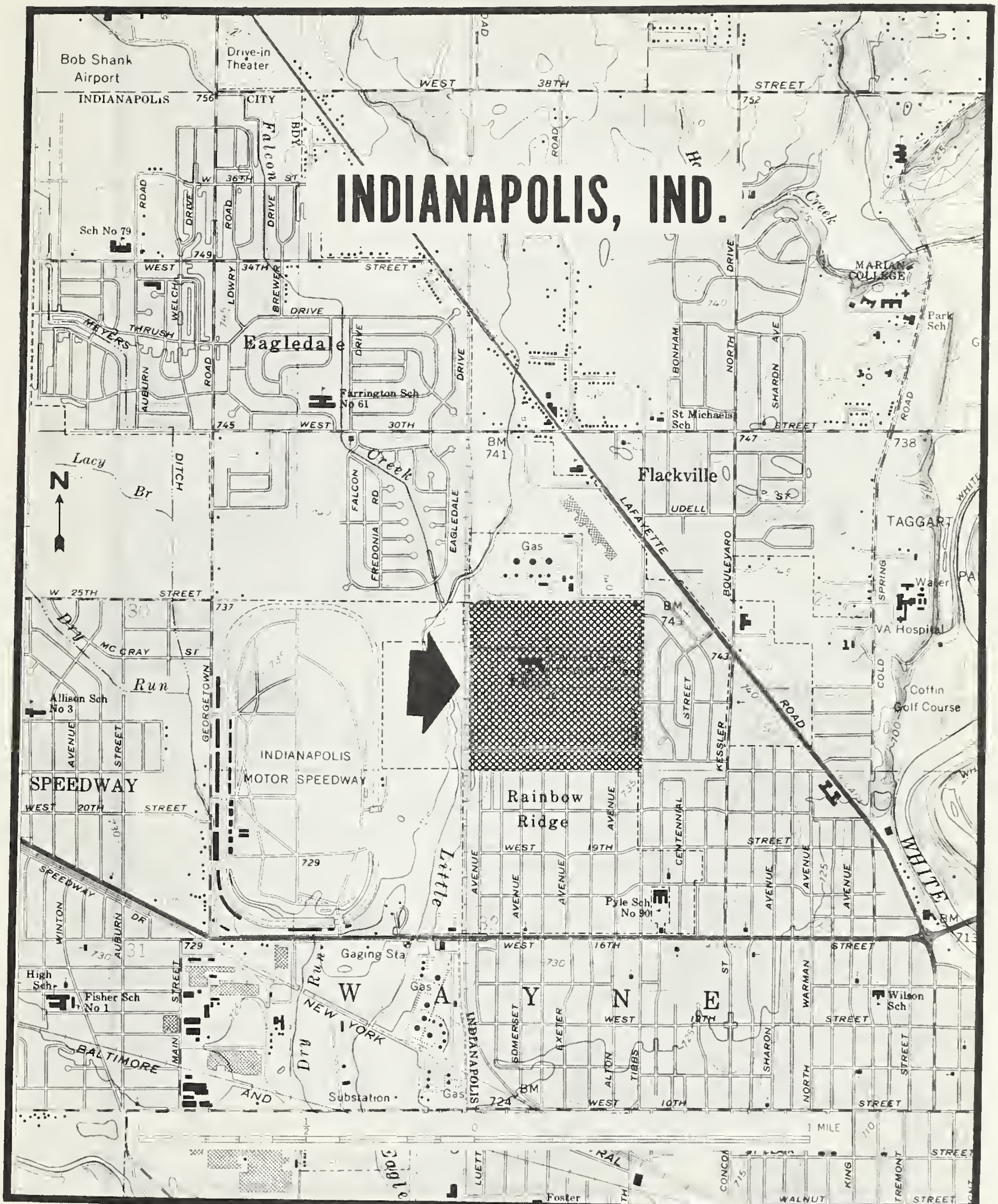

Wilmington, Del.
West Chester
Romansville
Mortonville
Embreeville
Unionville
Upland
Logan
London Grove
Wawaset
Northbrook
Dalington Corners
Corinne
Lenape
Parkersville
Red Lion
Willowdale
Westtown
Cheyney
Glen Mills
Thornton
Dilworthtown
Concordville
Gradyville
Chadds Ford
Hamorton
Longwood
Kennett Square
Mendenhall
Rosedale
Elam
Chelsea
Booth Corner
DELAWARE CO
NEW CASTLE CO
Five Points
Toughkenamon
Avondale
New Garden
Centerville
Brandywine
Kaolin
PENNSYLVANIA
DELAWARE
Ashland
Hockessin
Winterthur
Rockland
Montchanin
Talleyville
Arden
Claymont
Fairfax
Landenberg
CHESTER CO
NEW CASTLE CO
Bellefonte
WILMINGTON
Mermaid
Pleasant Hill
Elsmere
Marshallton
Stanton
Newport
Milford Crossroads
Roseville Park
Newark
Collins Park
Wilmington Manor
Greater Wilmington
Christiana
New Castle
Brookside
Midvale
RIVER
Penns
Carneys Point
Deepwater
Central Park
Pennsville
IRON HILL
Cooches Bridge
Bear
Red Lion
Glasgow
Porter
Abandoned
KILLCOHOOK
NAT WILDLIFE REFUGE
Pointers
Salem
Kirkwood
Delaware City
Sinnickson Landing
STATUTE MILES
5
0
5
NEW CASTLE CO
CECIL CO
4 LANE
TOLL BRIDGE


WILMINGTON, DEL.
Greenville
Alexis I DuPont High Sch
Hagley Museum
DuPont Hall of Records
St Joseph Sch
Tatnall Sch
Sedgley Farms
DuPont Sch
New Bridg
Green Hill Ch
Westover Hills
Green Hill Country Club
Anglesey
Mt Olive Cem
Mt Zion Cem
Silverbrook
High Sch
Ferris Industrial Sch
Silverbrook Cemetery
Silverbrook Cem
Stony Crest
Colonial Heights
Beth Emeth Cem
Lancaster Village
Cathedral Cem
Brookland Terrace
Veterans Hospital
Cooling Terrace
Roselle Terrace
Forest Park
ELSMERE
Prices Corner
Southwest Park
Avalon
Glynrich
LANCASTER PIKE
FAUKLAND RD
NEW ROAD
BARLEY MILL ROAD
READING
WESTOVER ROAD
GREENWOOD RD
LANCASTER AVE
CORP BDY
Little Mill Creek
Chestnut Run
N

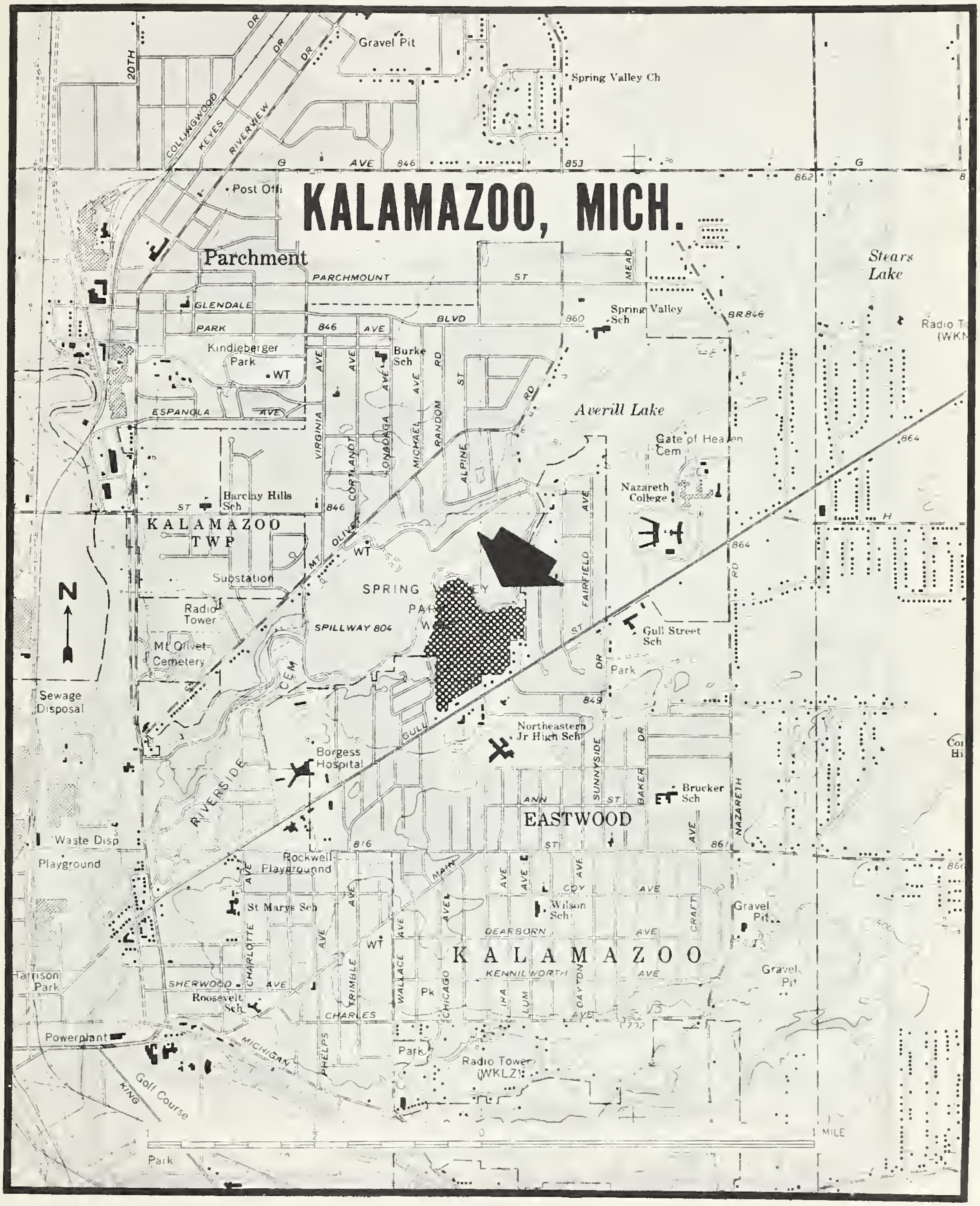

Macon, Ga.
Popes Ferry
Smarr
Tower
Bolingbroke
C OF G
Williamson Lake
580
JONES COUNTY
SOUTHERN
Walnut Cr
Sand Cr
Bonner Cr
Coulters Lake
BIBB COUNTY
BIBB CO
Tower
Wesleyan College
Chimney
LANES DUAL
Rock Hill
MACON
Georgia Industrial Home
Tobesofkee Creek
Tower
Lizella
Racetrack
Radio Tower
Herbert Smart
Rocky Cr
Ocmulgee National Monument
Stratton
Aerial cableway conveyor
460
Silo
Marshalls Mill
Chimney
Echeconnee Cr
Skipperton
Pottery
Tower
Sofkee
Sand Hill Cr
Kraftmans Club
Reids
BIBB CO
Walden
Gunters Mill
Avondale
Macon Cochan
525
Boy Scout Camp
Echeconnee
Vinsons Lake
HOUSTON CO
TWIGGS CO
Elberta
Byron
CRAWFORD CO
PEACH CO
Silo
Racetrack
Centerville
Warner Robins
Windmill
Powersville
Chimney
Statute Miles
5
0
5
Bass
Sandy Run Cr


MACON, GA.
Riley Sch
Ebenezer Ch
Cem
Union Sch
MACON MEMORIAL PARK
Lookout Tower
Bloomfield Ch
St James Ch
Water
CHAMBERS ROAD
RALEY ROAD
NEW
BLOOMFIELD
BLOOMFIELD DRIVE
Bloomfield Gardens Ch
Pine Forest Ch
Barden Sch
West
Rocky
ROCKY CREEK
EDNA
N
1 MILE


Indianapolis, Ind.


INDIANAPOLIS, IND.
Bob Shank Airport
Drive-in Theater
INDIANAPOLIS CITY BDY
WEST 38TH STREET
Falcon
Sch No 79
WEST 34TH STREET
Eagledale
Farrington Sch No 61
MARIAN COLLEGE
Park Sch
St Michaels Sch
WEST 30TH STREET
Flackville
LAFAYETTE ROAD
TAGGART
VA Hospital
Coffin Golf Course
Gas
Lacy Br
DITCH
W 25TH STREET
Dry Run
MC CRAY ST
Allison Sch No 3
SPEEDWAY
INDIANAPOLIS MOTOR SPEEDWAY
Rainbow Ridge
WEST 19TH STREET
Pyle Sch No 90
WEST 20TH STREET
SPEEDWAY DR
Little Eagle Creek
WEST 16TH STREET
High Sch
Fisher Sch No 1
Gaging Sta
W A Y N E
Wilson Sch
WEST 12TH STREET
BALTIMORE
NEW YORK
Substation
WEST 10TH STREET
WHITE
1 MILE
Foster
WALNUT
STREET

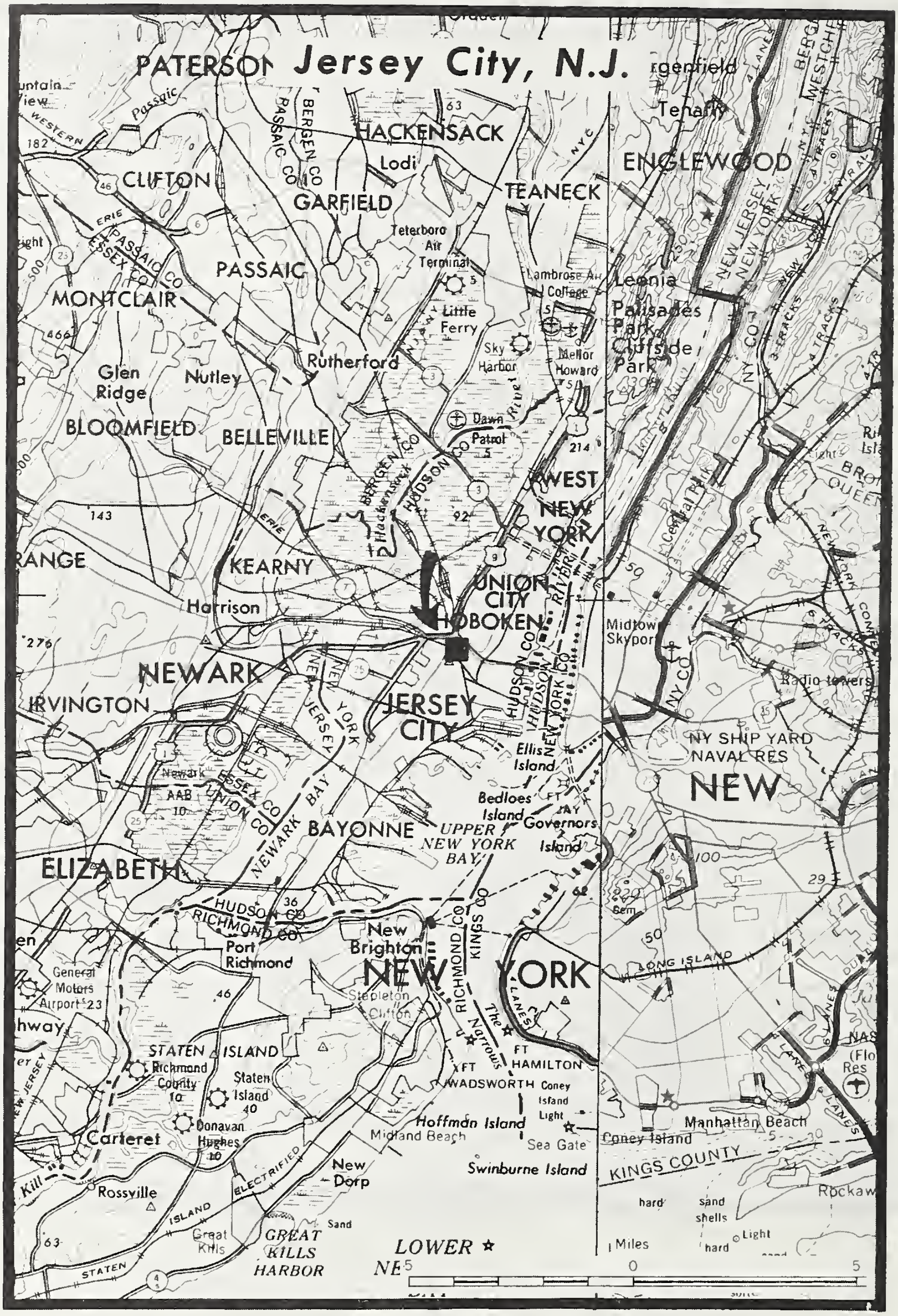

Kalamazoo, Mich.
Martin
Cloverdale
Hooper
Neeley
ALLEGAN COUNTY
BARRY COUNTY
Prairieville
Delton
Wall Lake
Shelp Lake
Crooked Lake
Otsego
GUN PLAINS
Doster
Milo
Plainwell Dam
Tower
Hickory Corners
Argenta
Cressey
Richland Junction
Gull Lake
Highland Park
Midland Park
Island Park
Stony Lake
Cooper Center
Cooper
Richland
Yorkville
Jug Corners
Towers
East Cooper
Augusta
Twin Lake
Parchment
Howlandsburg
Brownell
Nazareth
Long Lake
KALAMAZOO
Sherwood Park
Galesburg
NEW YORK CENTRAL
PENNSYLVANIA
East Comstock
Comstock
Portage Lake
Oakwood
Milwood
Climax
Carpenter Corners
Kalamazoo
East Lake
Cooks Mill
GRAND TRUNK
Texas Corners
Portage
Pomeroy
Collins Corner
Scotts
Austin Lake
McKain Corners
Hogset Lake
Adams Park
Statute Miles



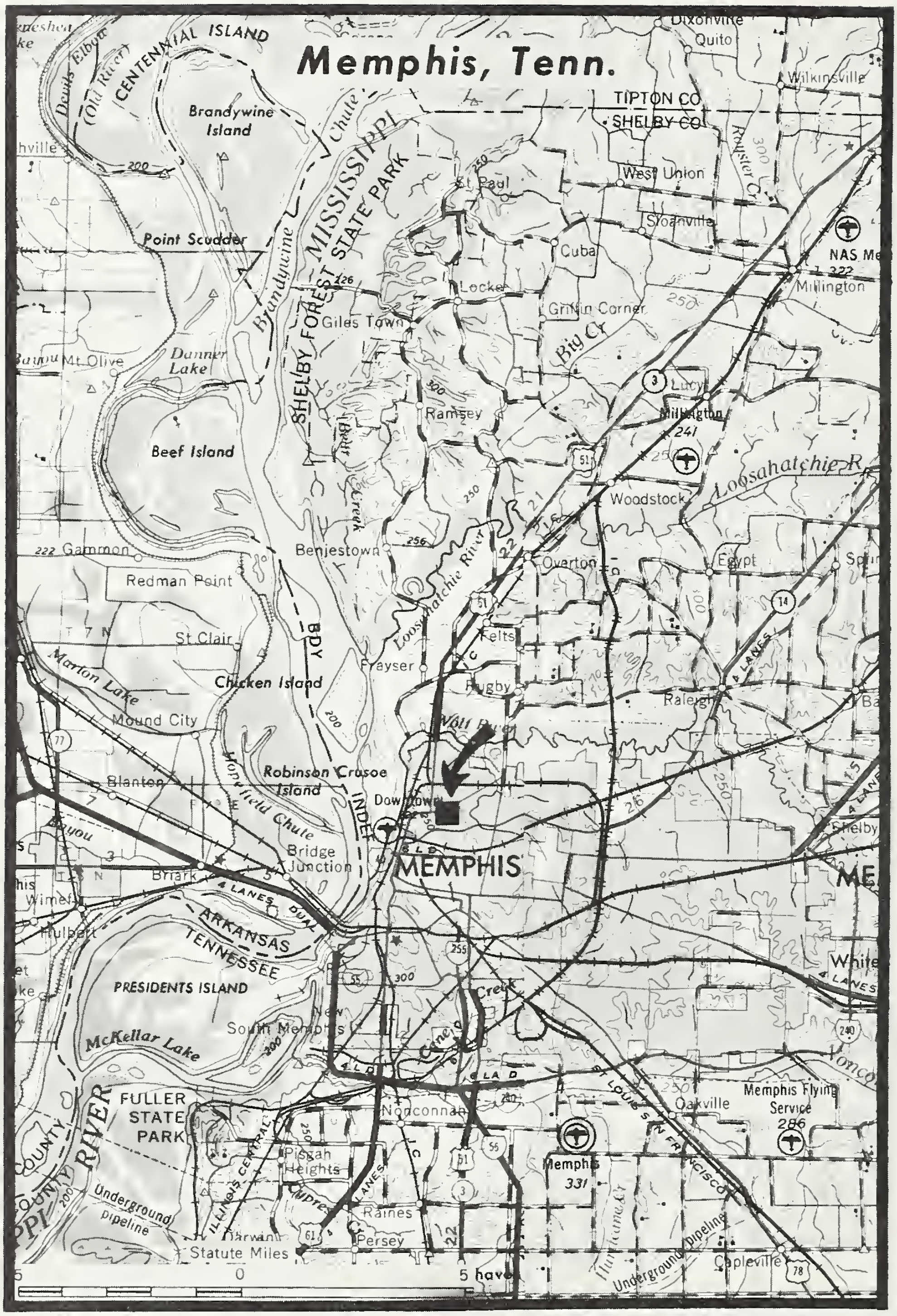
KALAMAZOO, MICH.
Parchment
Gravel Pit
Spring Valley Ch
Post Offi
Stears Lake
Spring Valley Sch
Radio Tower
Kindleberger Park
Burke Sch
Averill Lake
Gate of Heaven Cem
Nazareth College
Barclay Hills Sch
KALAMAZOO TWP
Substation
SPRING VALLEY PARK
SPILLWAY 804
Radio Tower
Mt Olivet Cemetery
Gull Street Sch
Sewage Disposal
Borgess Hospital
Northeastern Jr High Sch
Brucker Sch
EASTWOOD
Waste Disp
Playground
Rockwell Playground
St Marys Sch
Wilson Sch
Gravel Pit
KALAMAZOO
Harrison Park
Roosevelt Sch
Powerplant
Radio Tower (WKLZ)
Golf Course
Park
MILE

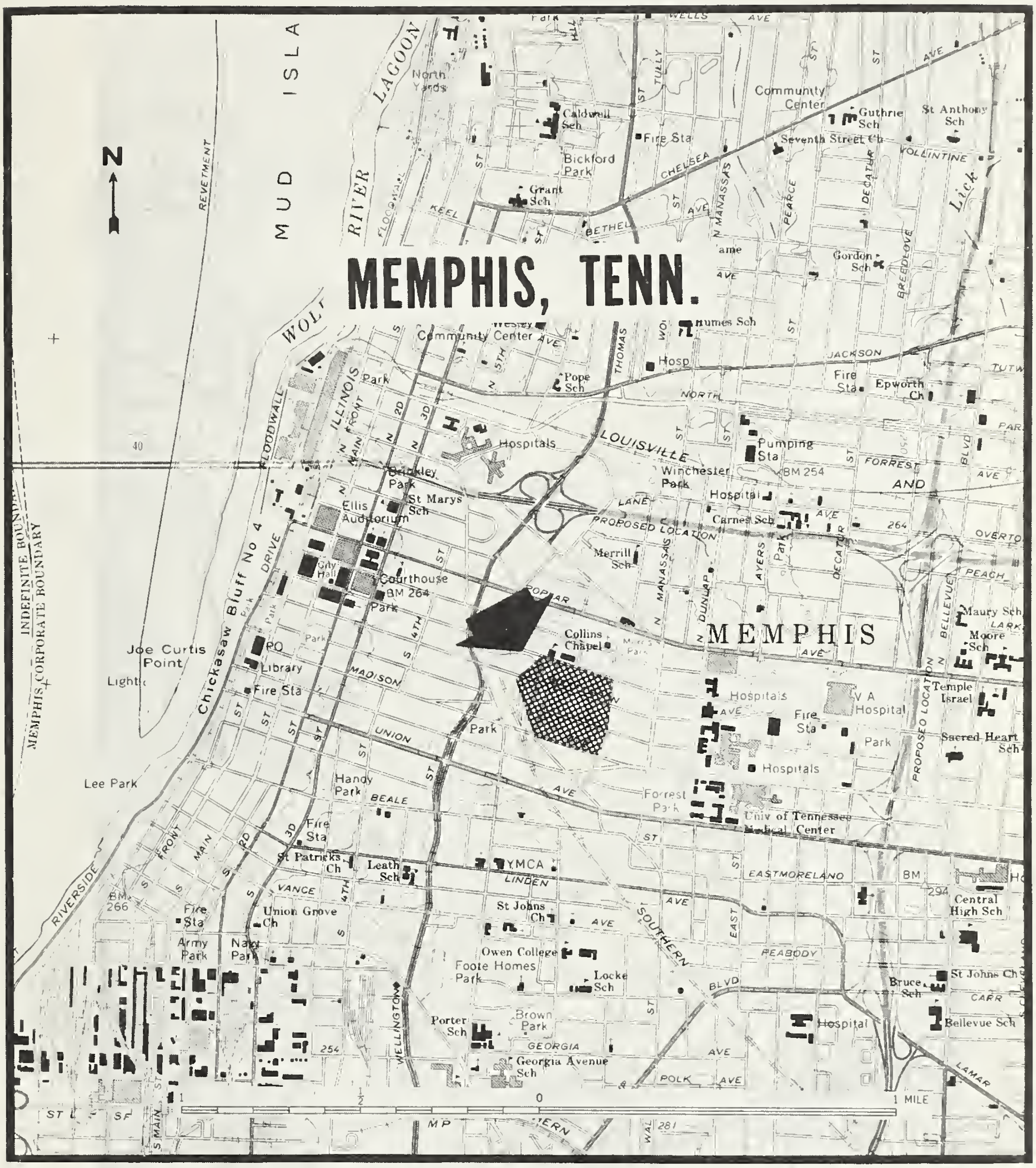

St. Louis, Mo.
FLORISSANT
Ferguson
Berkeley
Kinloch
Jennings
Bellfontaine Neighbors
Riverview
Black Jack
Radio tower
Spanish Lake
Larimore
Columbia Bottom
Radio station
Mobile Island
Hartford
Oldenburg
St Thomas
Mitchell
Pontoon Beach
Maryland Place
GRANITE CITY
Horseshoe Lake
Madison
Venice
Lakeside
St John
Bel-Ridge
Normandy
Northwoods
Arbor Terrace
Pine Lawn
Velda Village Hills
Hillsdale
Pagedale
Wellston
Overland
UNIVERSITY CITY
Olivette
Clayton
Ladue
ST LOUIS
FOREST PARK
Radio tower
Radio relay station
Richmond Heights
Brentwood
Maplewood
Rock Hill
WEBSTER GROVES
Shrewsbury
Crestwood
Grantwood
Affton
Lakeshire
Luxemburg
Radio tower
JEFFERSON BARRACKS
Mehlville
Mattese
Oakville
Cliff Cave
Arnold
Ten Brook
EAST ST LOUIS
Washington Park
Fairmount City
Radio tower
Golden Gardens
Fireworks
Signal Hill
Monsanto
Cahokia
Maplewood Park
Parks College
Centreville
East Carondelet
Stolle
Radio tower
Falling Spring
Dupo
Numerous small depressions
Sugarloaf
Oil field
Phelps
Cam
Millstadt
Strip mines
BELLE
Flying Dutchmen
Columbia
MISSOURI
ILLINOIS
RIVER
BOTTOMS
AMERICAN BOTTOMS
GULF MOBILE AND OHIO
Statute Miles
5 0 5


ST. LOUIS, MO.
ST LOUIS
Ashland Sch
Bryan Hill Sch
Water Tower
Water Tower
FAIRGROUND PARK
Beaumont High Sch
Central High Sch
Sumner High Sch
Homer G Phillips
Curtis Sch
Hadley Technical High Sch
Masonic Temple
St Louis University
Vashon High Sch
Murphy Park
Union Station
Post Office
NATURAL BRIDGE AVE
ST LOUIS AVE
FERDINAND
NEWSTEAD
TAYLOR
PAGE
EASTON AVE
FINNEY
SARAH
VANDEVENTER AVE
DELMAR BLVD
OLIVE
LINDELL BLVD
LACLEDE
FOREST PARK BLVD
GRAND
GARRISON AVE
JEFFERSON AVE
NORTH FLORISSANT
ANGELICA
SALISBURY
HEBERT
N MARKET
CASS
O'FALLON
CARR
FRANKLIN
DELMAR
OLIVE
WASHINGTON
MARKET
20TH
21ST
ASSOC
N
1 MILE

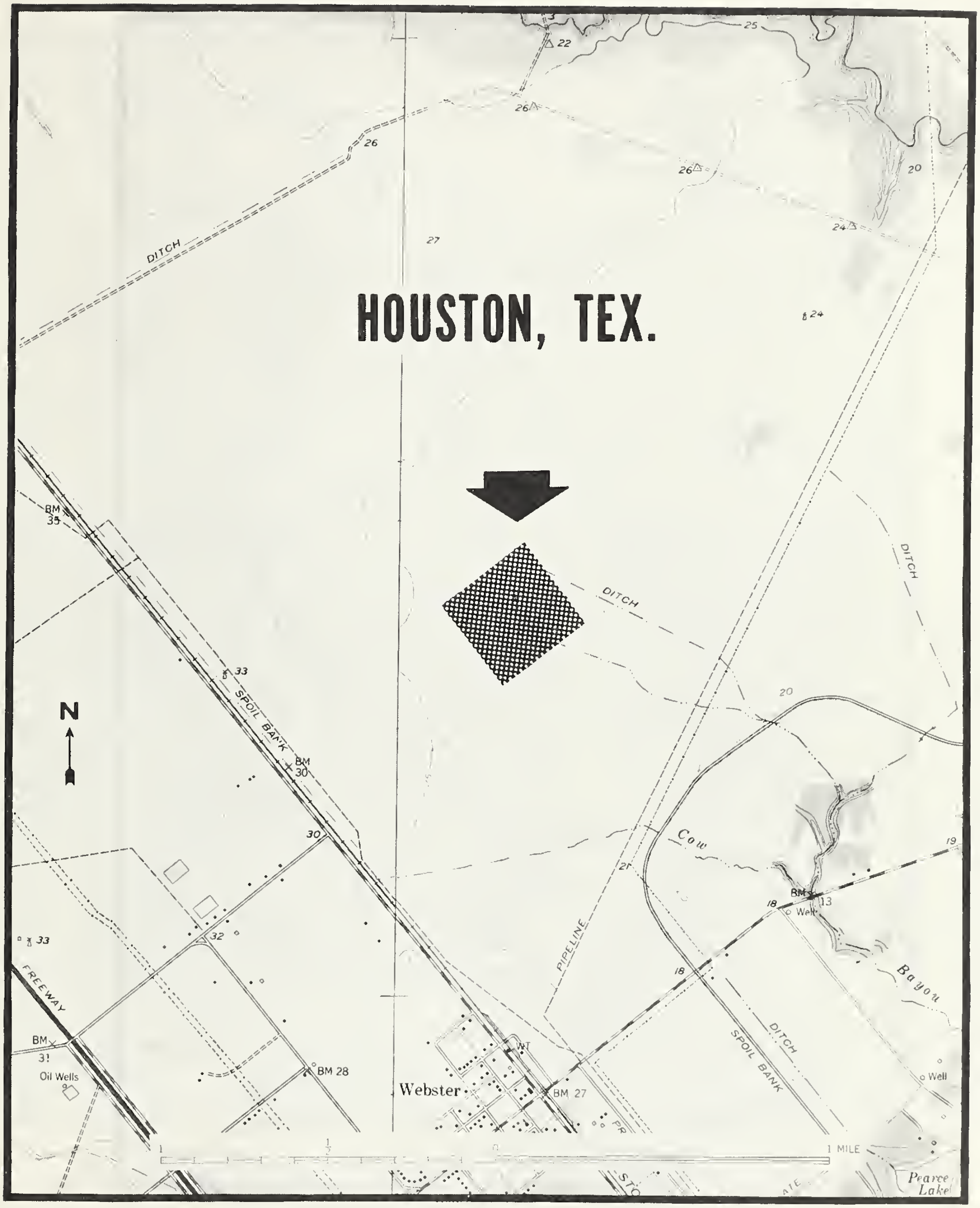

Jersey City, N.J.
PATERSON
HACKENSACK
Lodi
CLIFTON
GARFIELD
TEANECK
ENGLEWOOD
PASSAIC
MONTCLAIR
Teterboro Air Terminal
Little Ferry
Leonia
Palisades Park
Cliffside Park
Rutherford
Glen Ridge
Nutley
BLOOMFIELD
BELLEVILLE
WEST NEW YORK
KEARNY
UNION CITY
HOBOKEN
Harrison
NEWARK
IRVINGTON
JERSEY CITY
Ellis Island
Bedloes Island
Governors Island
BAYONNE
UPPER NEW YORK BAY
ELIZABETH
NY SHIP YARD NAVAL RES
NEW
New Brighton
Port Richmond
NEW YORK
STATEN ISLAND
Carteret
Rossyville
New Dorp
GREAT KILLS HARBOR
FT HAMILTON
FT WADSWORTH
Hoffman Island
Swinburne Island
Coney Island
Manhattan Beach
KINGS COUNTY
LOWER
Miles

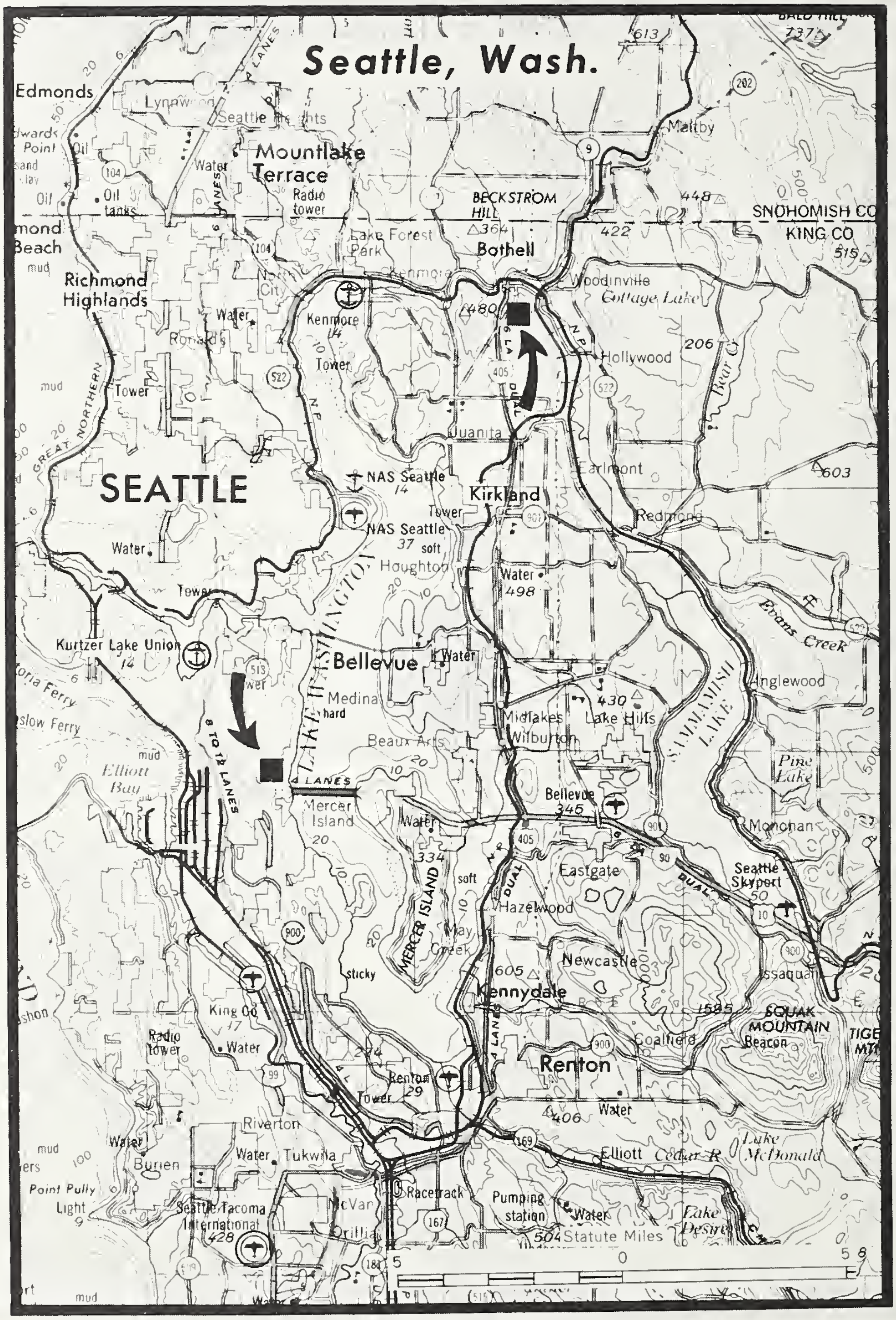

JERSEY CITY, N.J.
N
Marion
HOLY NAME CEMETERY
PARK
JERSEY CITY
Bergen
Communipaw
Morris Canal
ERIE-LACKAWANNA
PENN CENTRAL
LEHIGH VALLEY
C RR OF N J
TRANS-HUDSON
Res No 2
Res No 3
Pershing Field
Christ Hospital
County Courthouse
Dickinson HS
Journal Square
Rogosin HS
St Peters College
Medical Center
Montgomery Park
Fairmount Hospital
Lincoln High Sch
Lafayette Park
Arlington Park
Hamilton Park
City Hall
Sewage Disposal
Tollgate
1 MILE

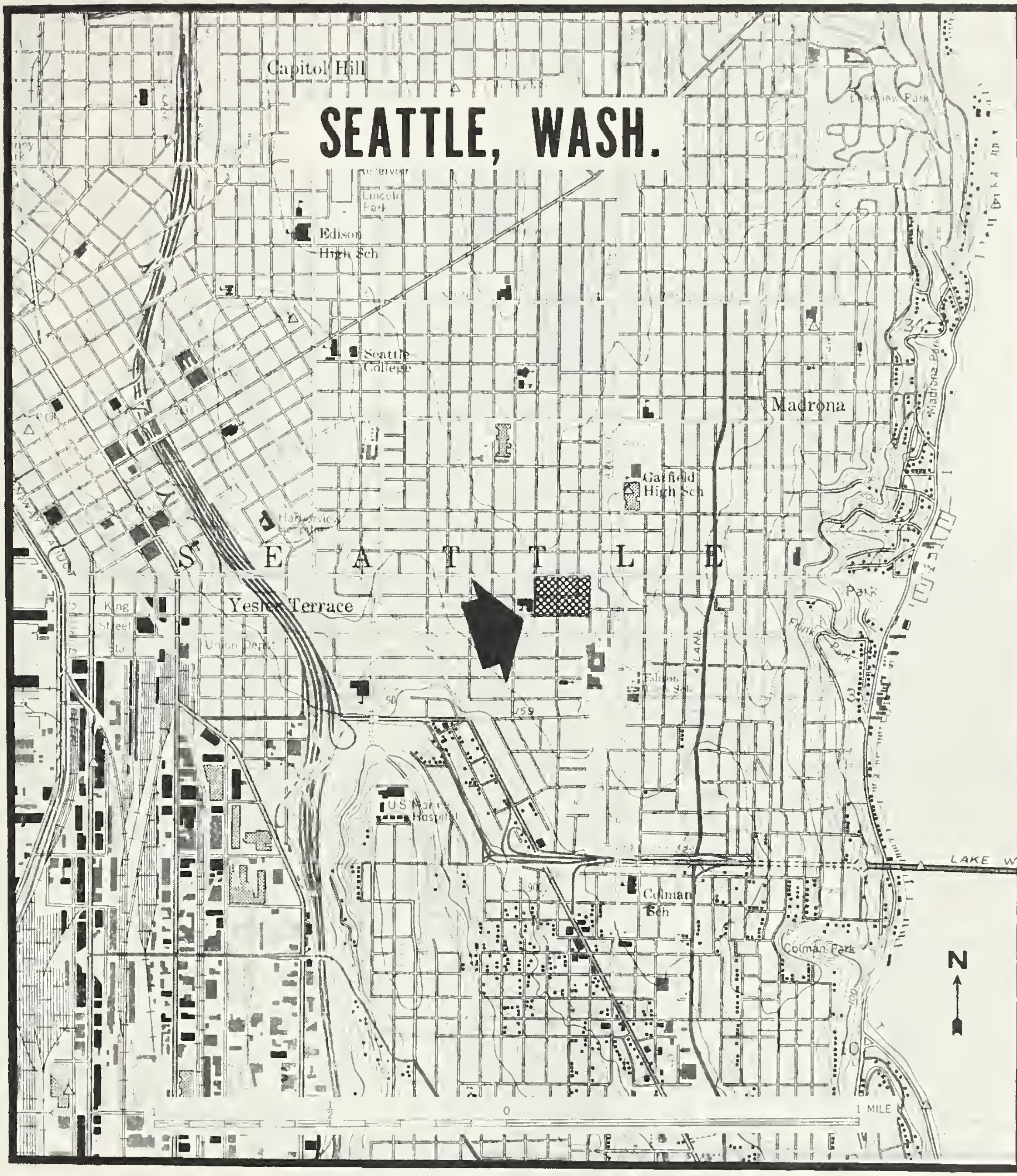

Memphis, Tenn.
CENTENNIAL ISLAND
Brandywine Island
MISSISSIPPI
SHELBY FOREST STATE PARK
TIPTON CO
SHELBY CO
Dixonville
Quito
Wilkinsville
West Union
Sloanville
St Paul
Cuba
NAS
Millington
Point Scudder
Locke
Griffin Corner
Giles Town
Big Cr
Mt Olive
Danner Lake
Lucy
Ramsey
Beef Island
Loosahatchie R
Woodstock
Gammon
Benjestown
Redman Point
Overton
Egypt
Loosahatchie River
St Clair
BDY
Felts
Frayser
Rugby
Chicken Island
Raleigh
Mound City
Blanton
Robinson Crusoe Island
Downtown
MEMPHIS
Bridge Junction
ARKANSAS
TENNESSEE
PRESIDENTS ISLAND
South Memphis
McKellar Lake
FULLER STATE PARK
RIVER
Nonconnah
Pisgah Heights
Raines
Persey
Darwin
Oakville
Memphis Flying Service
Memphis
Underground Pipeline
Capleville
Statute Miles

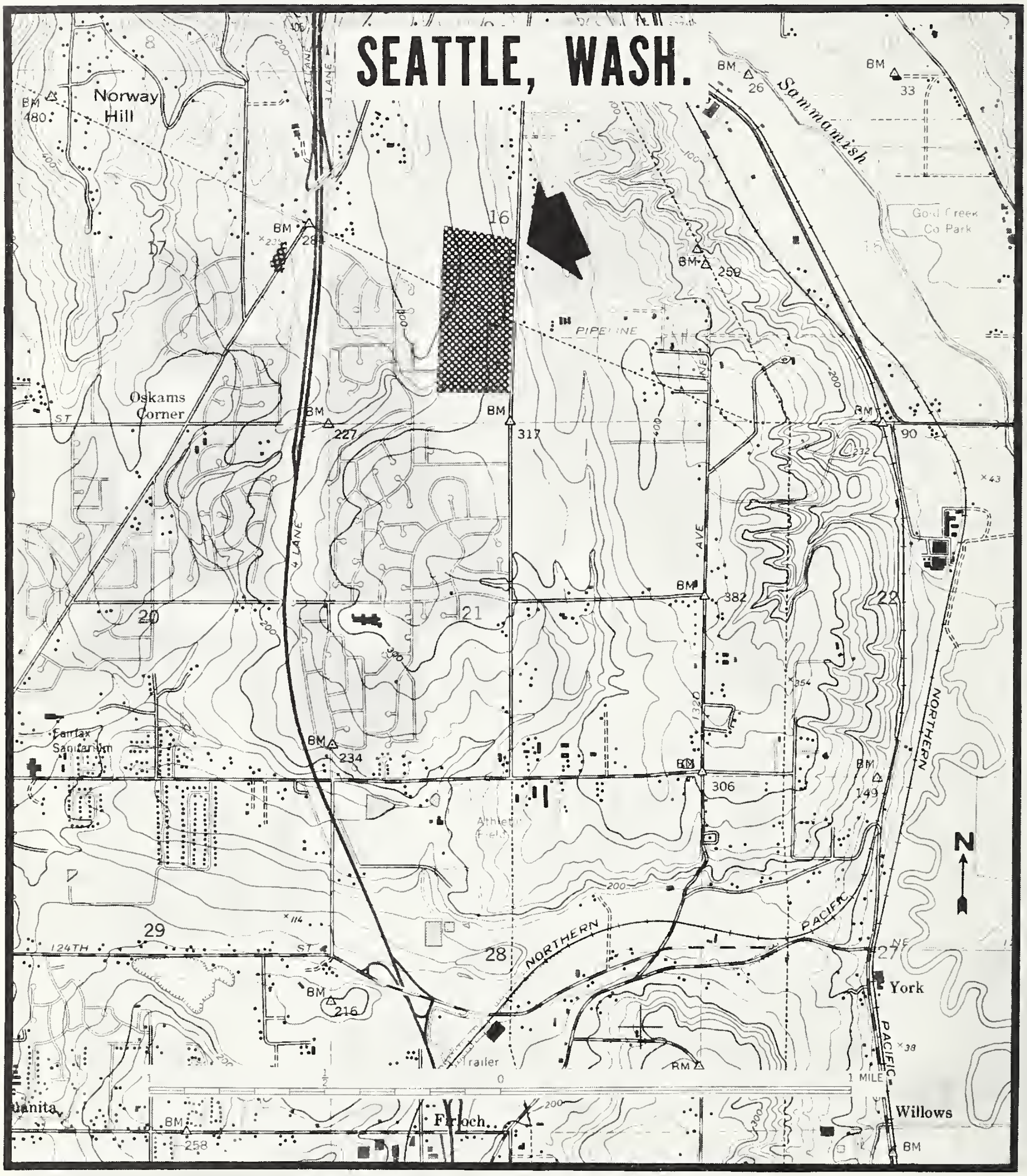

MEMPHIS, TENN.
N
MEMPHIS
MUD ISLA
WOLF RIVER LAGOON
Chickasaw Bluff No 4
Joe Curtis Point
Lee Park
Ellis Auditorium
City Hall
Courthouse
Hospitals
Union Grove Ch
Army Park
Navy Park
Foote Homes Park
Owen College
Forrest Park
Univ of Tennessee Medical Center
Central High Sch
1 MILE

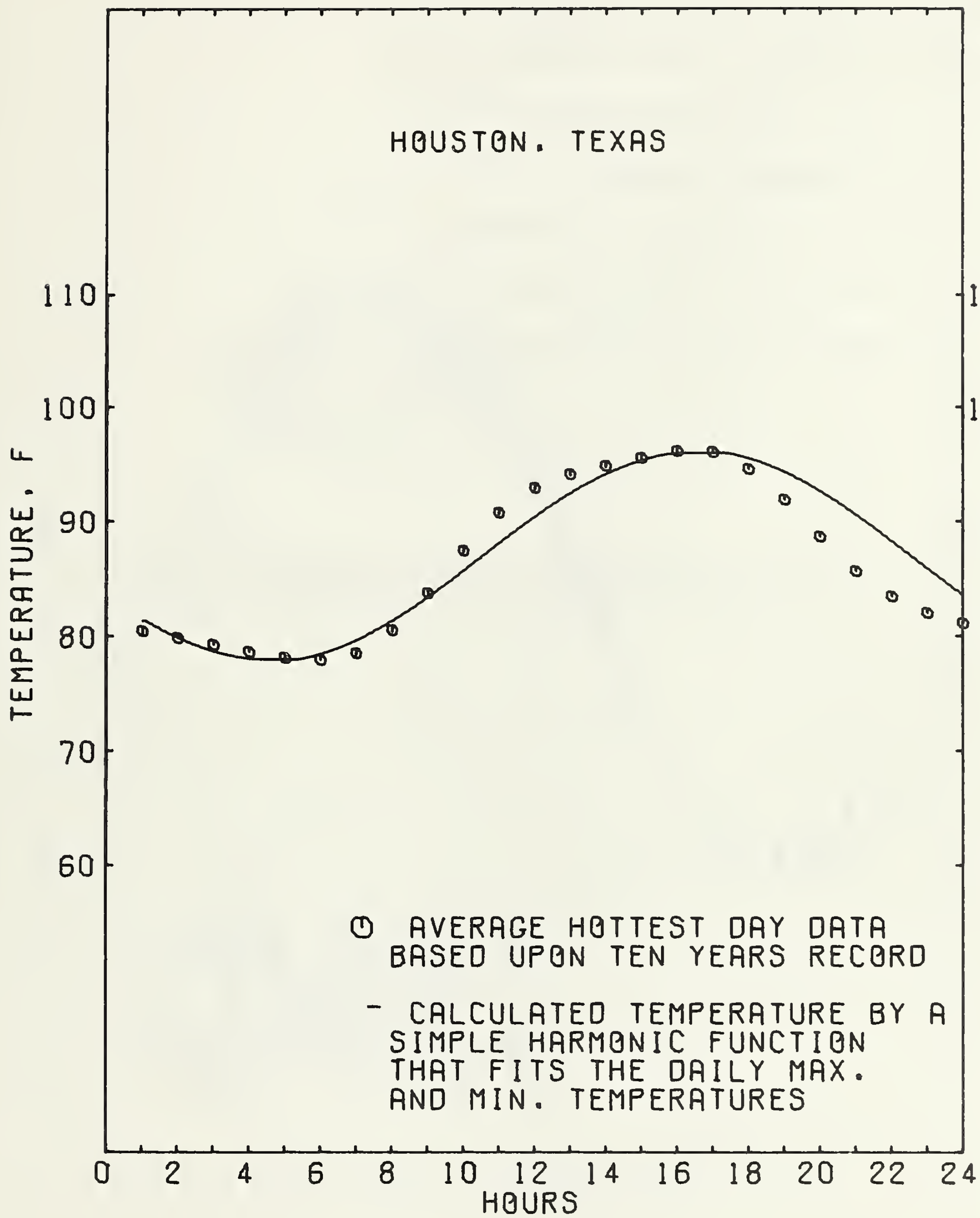

Houston, Tex.
Galena Park
Pasadena
Baytown
Deer Park
South Houston
La Porte
Ellington AFB
Hobby
East Haven
Genoa
Golden Acres
Alta Vista
South Houston Service Center
Radio Tower
Windmill
Park Place
Harrisburg
Water tower
Oil tanks
Scott Bay
Goat Island
Beacon
Busch Island
Baytown Tunnel
San Jacinto Bay
San Jacinto Ordnance Depot
Buffalo Bayou
Washburn Tunnel
Southern Pacific
Deepwater
Morgan Point
Oil pumping station
Pump
Atkinson
Sylvan Beach
Bayside
Water tower
Big Island Slough
Taylor Bayou
Pine Gully
Harris Co
Chambers Co
Taylor Lake
Seabrook
Todville
Kilkare
Mud Lake
Clear Lake
Lakeside
Clear Lake Shores
Kemah
Webster
Power plant
Windmill
Spaceland
League City
Water
Missouri Pacific
Galveston Houston and Henderson
6 Lanes
Dual
Harris Co
Galveston Co
Clear Creek
Oil Field
Substation
Oil wells
Harris County
Pearland
Elevator
Friendswood
Clover
Hastings
S. & S. Patrol
Oil Field
Dickinson
Oil wells
Windmill
Alvin
Water tower
Algoa
Arcadia
Alta Loma
La Marque
Atchison
Statute Miles
5
0
5

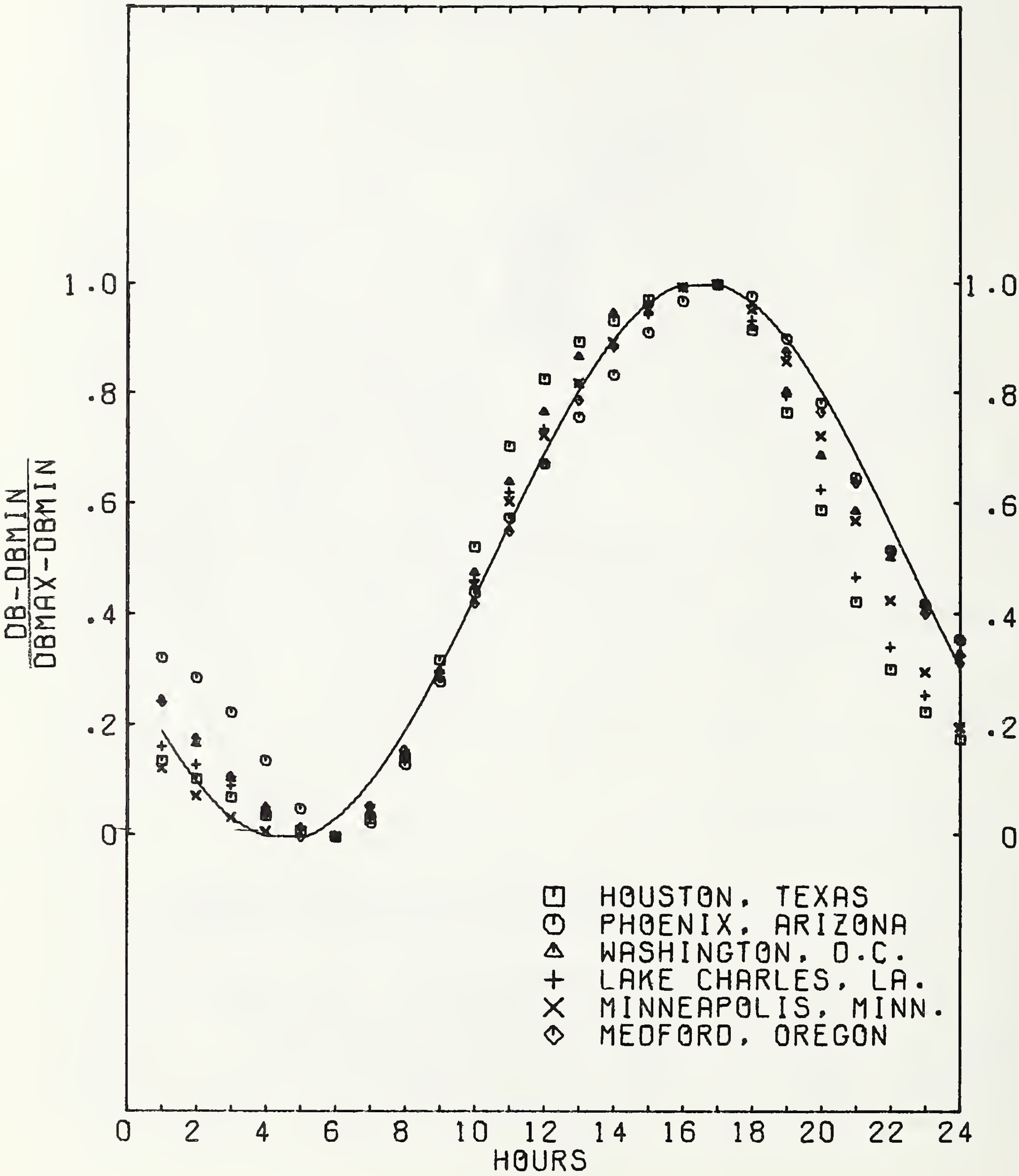

HOUSTON, TEX.
N
DITCH
SPOIL BANK
PIPELINE
Cow
Bayou
FREEWAY
Oil Wells
Webster
Well
BM 28
BM 27
1 MILE
Pearce Lake


Seattle, Wash.
SEATTLE
Bellevue
Kirkland
Bothell
Renton
Statute Miles


SEATTLE, WASH.
Capitol Hill
Edison High Sch
Seattle College
Madrona
Garfield High Sch
S E A T T L E
Yesler Terrace
King Street Sta
Union Depot
U.S. Marine Hospital
Colman Sch
Colman Park
Madrona Park
LAKE W
N
1 MILE


SEATTLE, WASH.
Norway Hill
Oskams Corner
Sammamish
Fairfax Sanitarium
NORTHERN PACIFIC
York
Willows
Athletic Field
PIPELINE
1 MILE


HOUSTON, TEXAS
TEMPERATURE, F
110
100
90
80
70
60
0 2 4 6 8 10 12 14 16 18 20 22 24
HOURS
AVERAGE HOTTEST DAY DATA BASED UPON TEN YEARS RECORD
CALCULATED TEMPERATURE BY A SIMPLE HARMONIC FUNCTION THAT FITS THE DAILY MAX. AND MIN. TEMPERATURES


1.0
.8
.6
.4
.2
0
DB-DBMIN / DBMAX-DBMIN
0 2 4 6 8 10 12 14 16 18 20 22 24
HOURS
HOUSTON, TEXAS
PHOENIX, ARIZONA
WASHINGTON, D.C.
LAKE CHARLES, LA.
MINNEAPOLIS, MINN.
MEDFORD, OREGON

Figures 3 through 22 - Coincident frequency profiles for the dry-bulb temperature and wind speed, and those for this relative humidity and wind speed. The height of the profile represents relative frequency of the coincident occurrences. All ten localities show the highest frequency profile at the wind speed in the vicinity of 5 mph. But the coincident dry-bulb temperature and relative humidity widely vary from locality to locality.

SACRAMENTO, CALIFORNIA

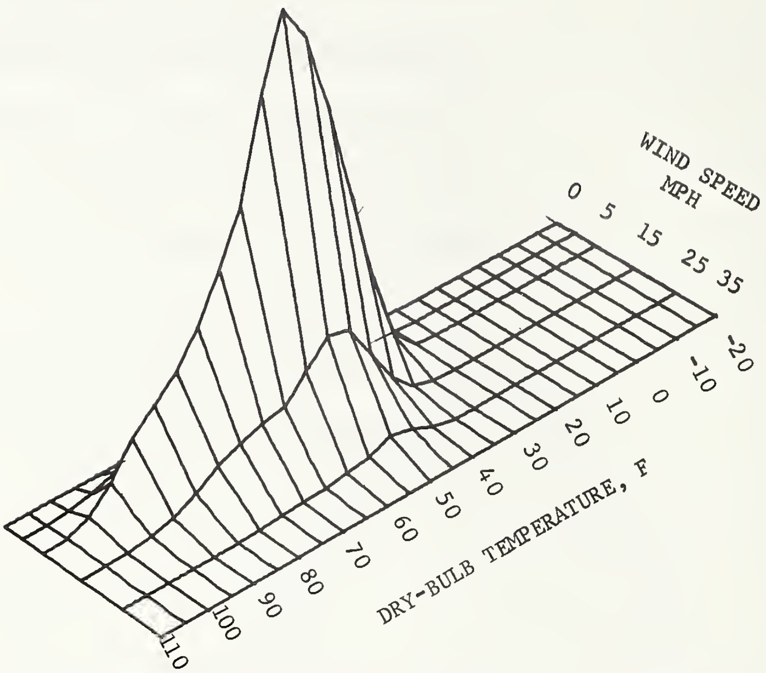


Fig. 3 COINCIDENT PROFILE FOR WIND SPEED AND DRY BULB TEMPERATURE

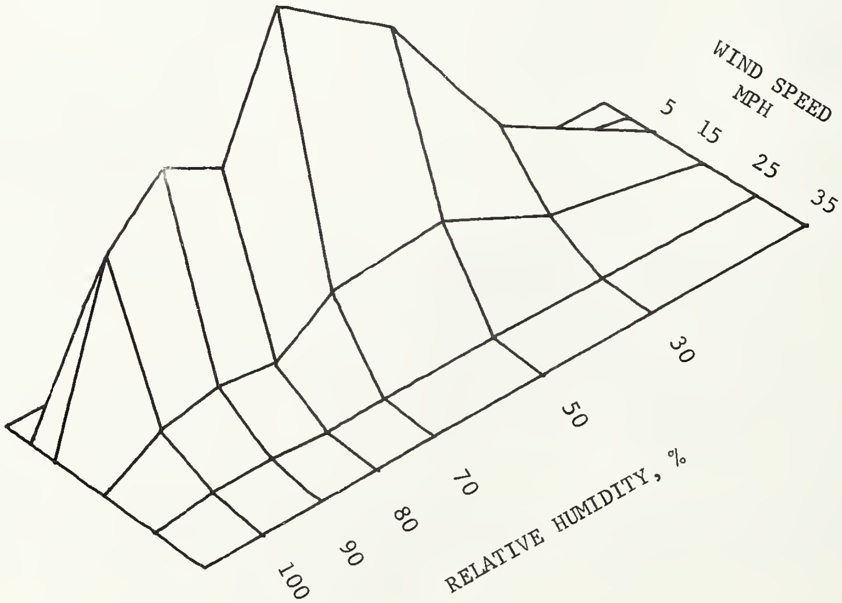


Fig. 4 COINCIDENT PROFILE FOR WIND SPEED AND RELATIVE HUMIDITY

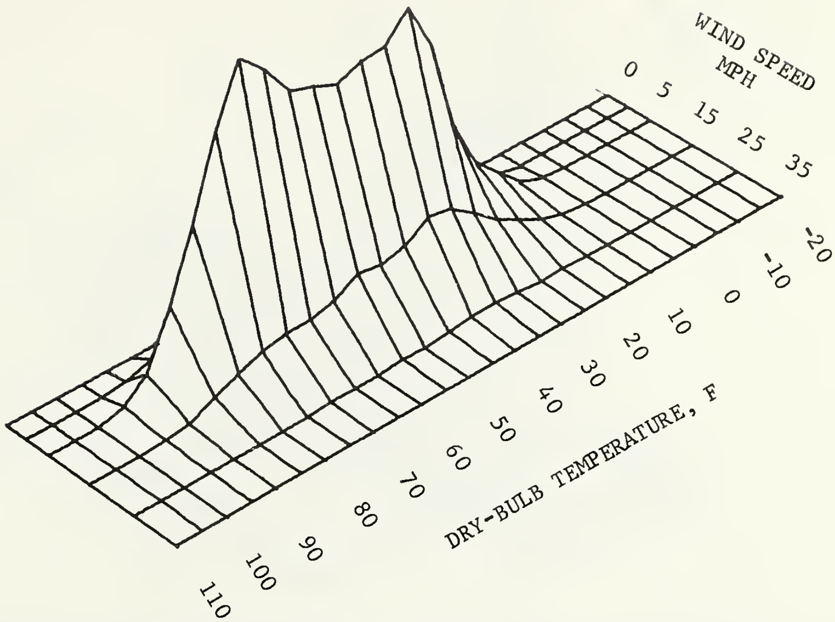


Fig. 5. COINCIDENT PROFILE FOR WIND SPEED AND DRY BULB TEMPERATURE

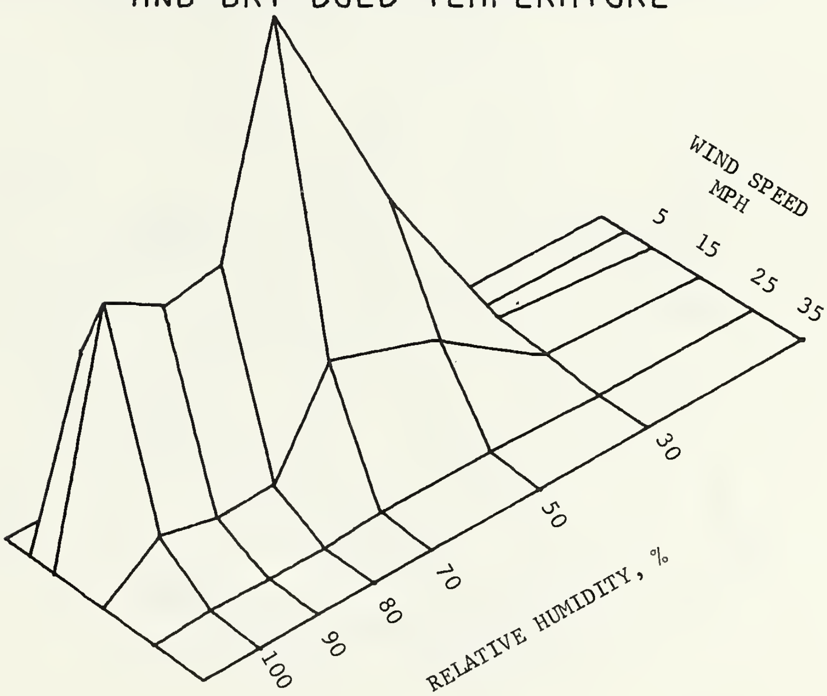


Fig. 6 COINCIDENT PROFILE FOR WIND SPEED AND RELATIVE HUMIDITY

MACON, GEORGIA

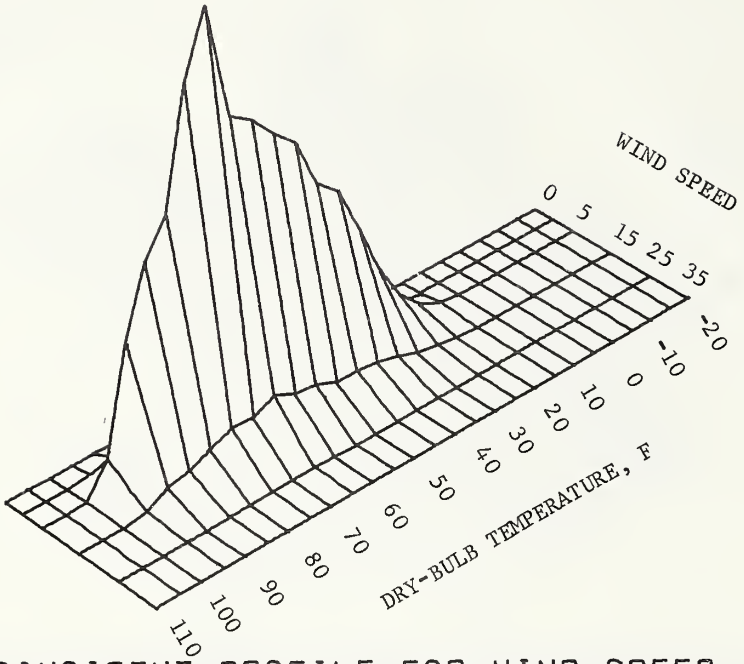


Fig. 7 COINCIDENT PROFILE FOR WIND SPEED AND DRY BULB TEMPERATURE

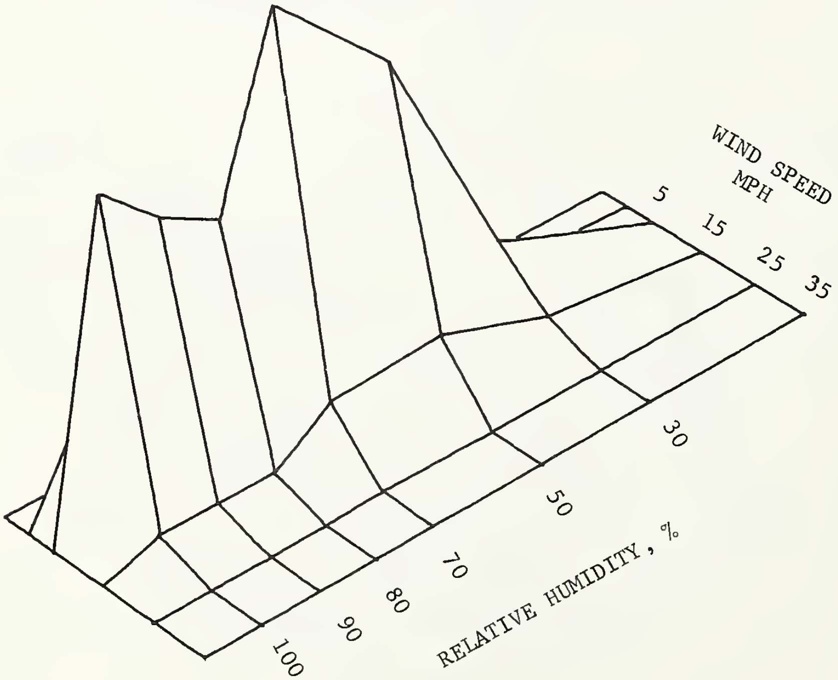


Fig. 8 COINCIDENT PROFILE FOR WIND SPEED AND RELATIVE HUMIDITY

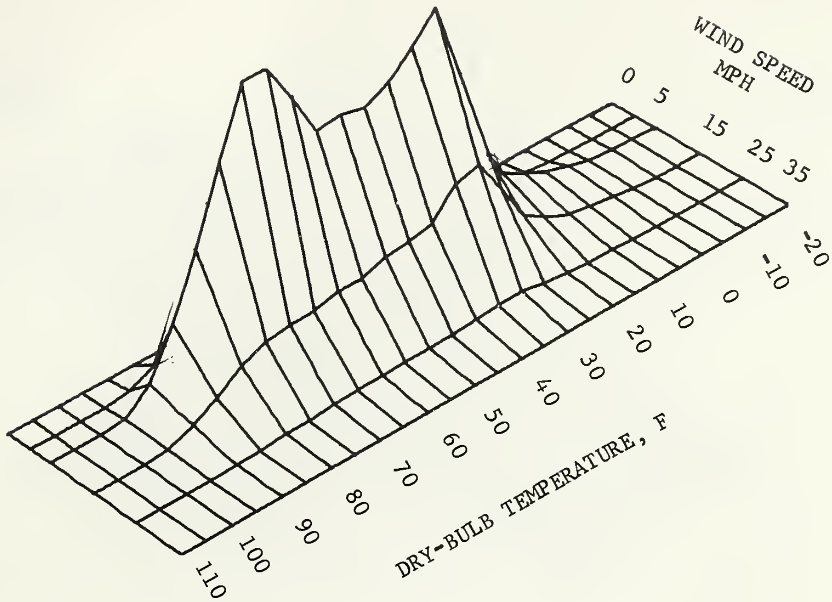


Fig. 9 COINCIDENT PROFILE FOR WIND SPEED AND DRY BULB TEMPERATURE

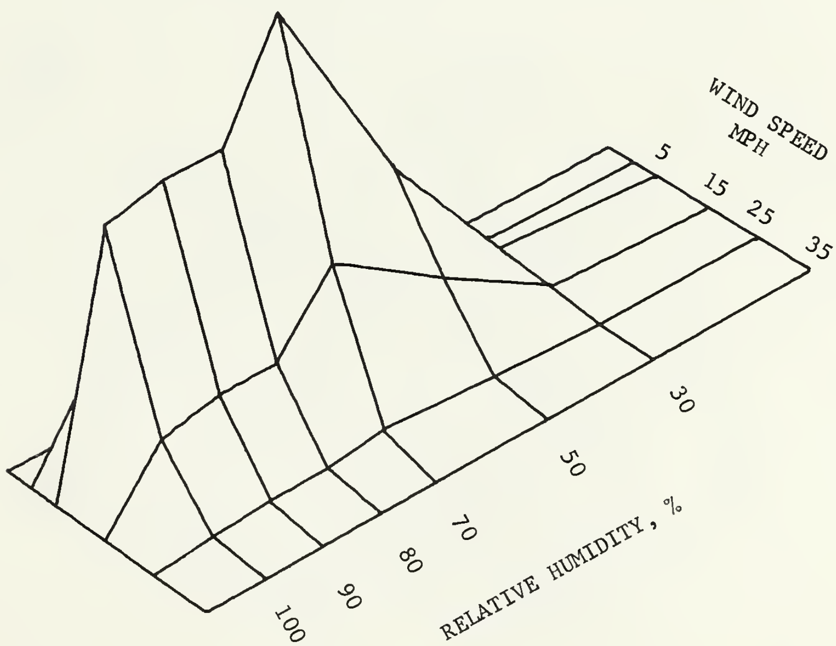


Fig. 10 COINCIDENT PROFILE FOR WIND SPEED AND RELATIVE HUMIDITY

GRAND RAPIDS, MICHIGAN

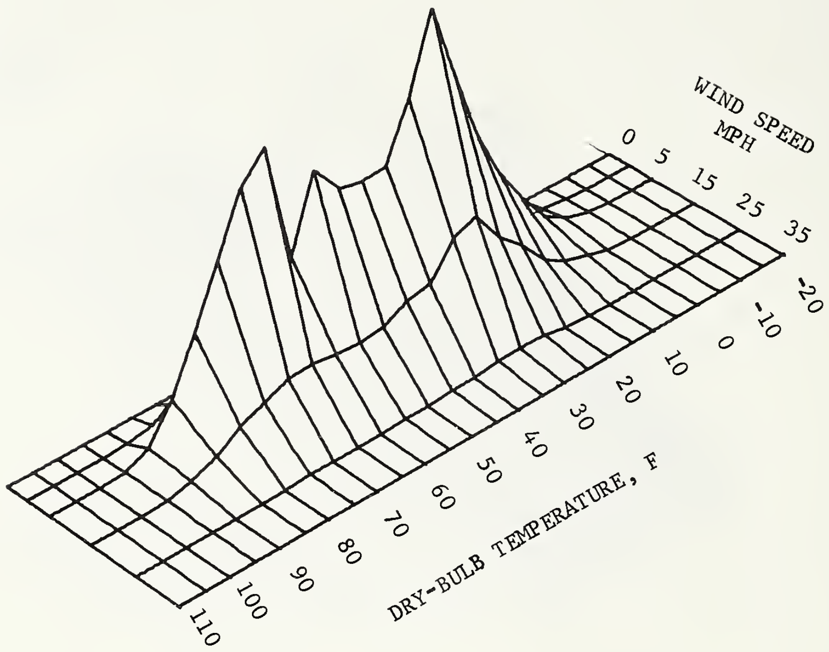


Fig. 11 COINCIDENT PROFILE FOR WIND SPEED AND DRY BULB TEMPERATURE

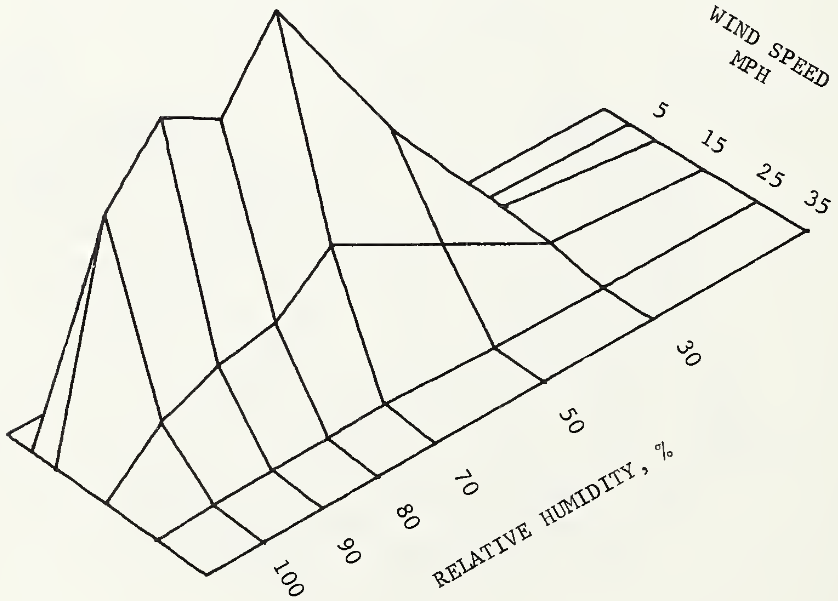


Fig. 12 COINCIDENT PROFILE FOR WIND SPEED AND RELATIVE HUMIDITY

NEWARK, NEW JERSEY

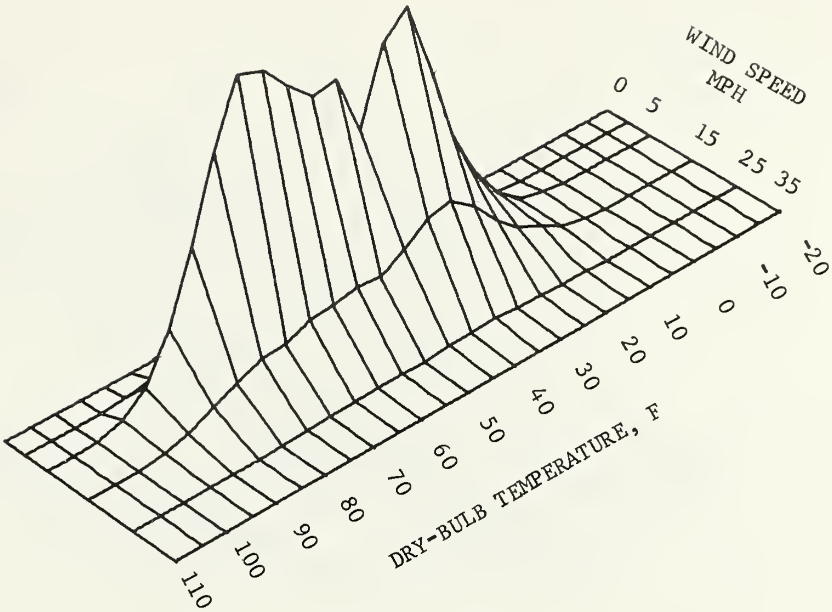


Fig. 13 COINCIDENT PROFILE FOR WIND SPEED AND DRY BULB TEMPERATURE

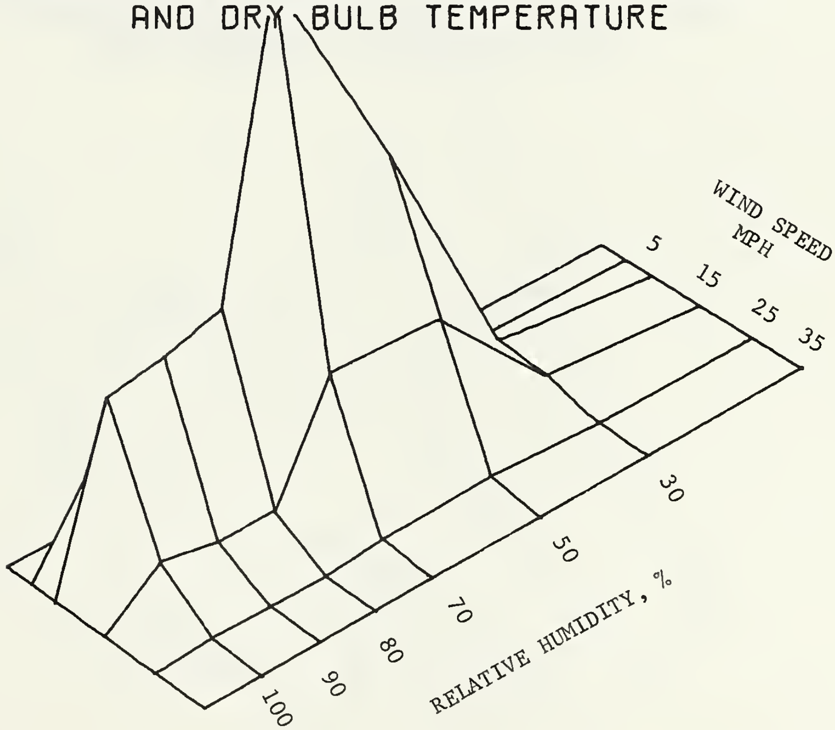


Fig. 14 COINCIDENT PROFILE FOR WIND SPEED AND RELATIVE HUMIDITY

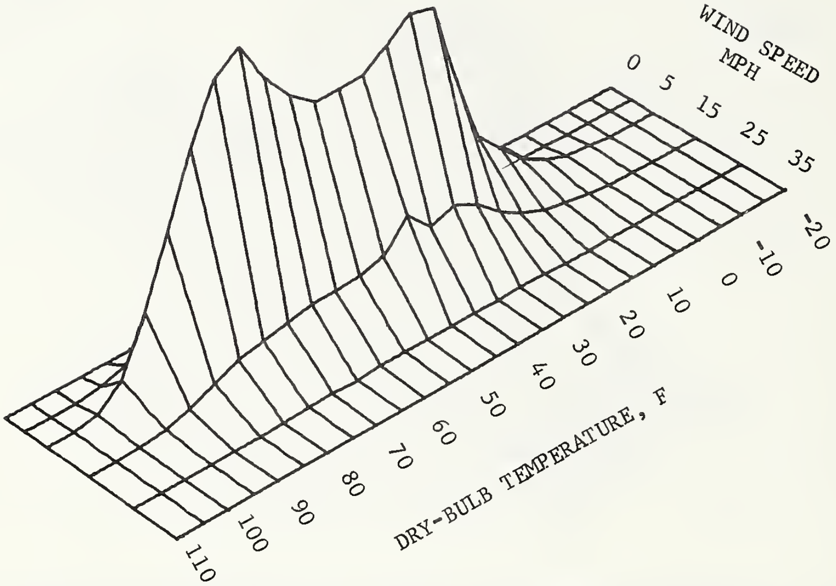


Fig. 15 COINCIDENT PROFILE FOR WIND SPEED AND DRY BULB TEMPERATURE

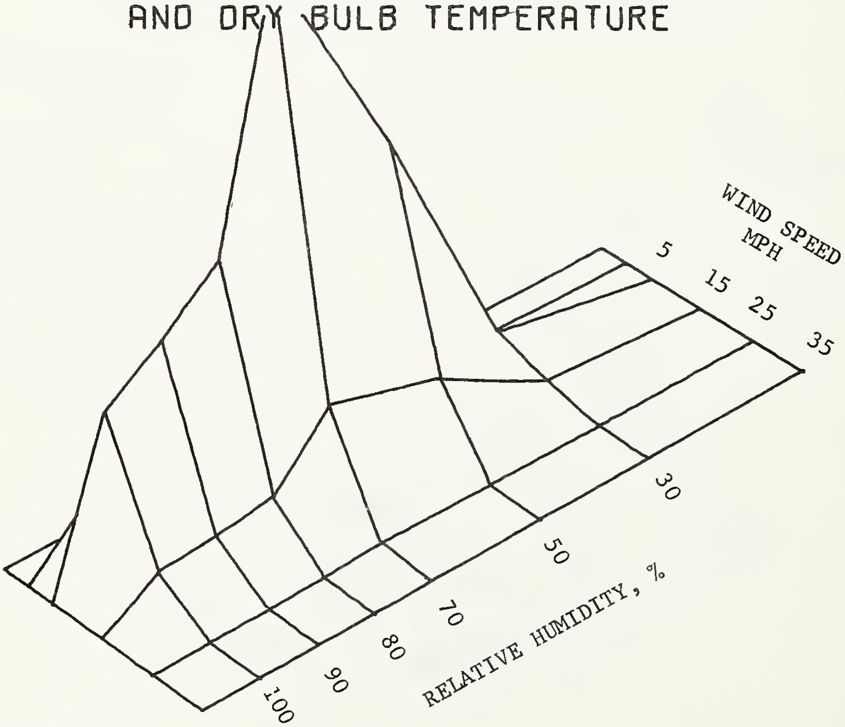


Fig. 16 COINCIDENT PROFILE FOR WIND SPEED AND RELATIVE HUMIDITY

MEMPHIS, TENNESSEE

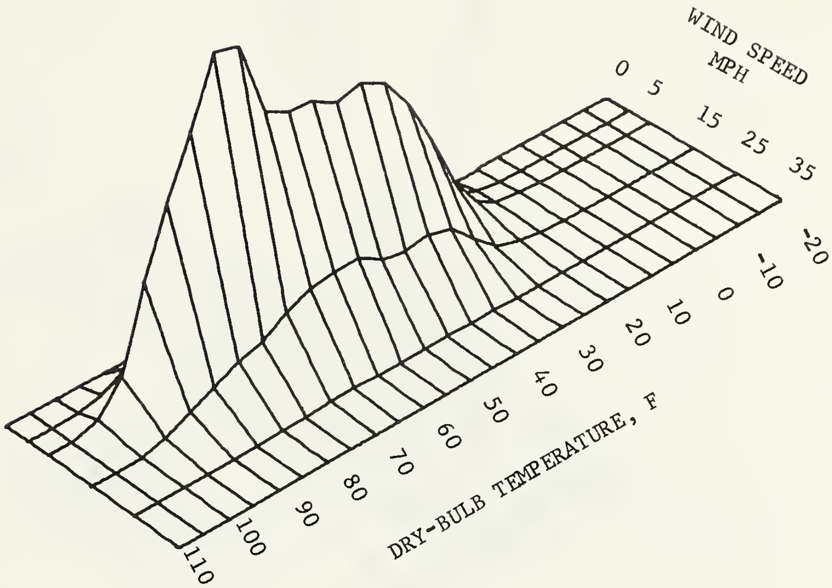


Fig. 17 COINCIDENT PROFILE FOR WIND SPEED AND DRY BULB TEMPERATURE

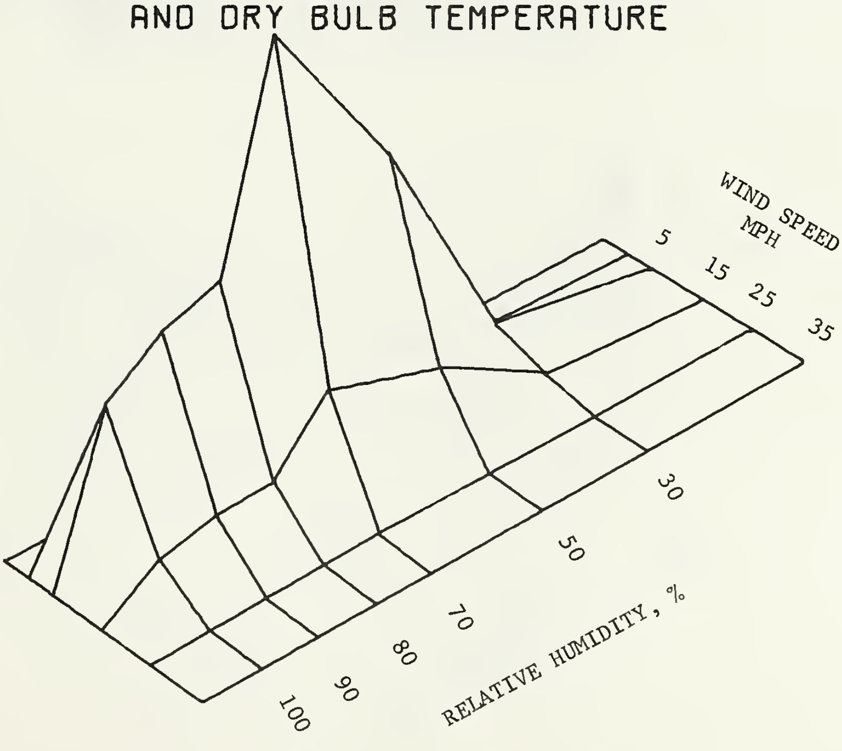


Fig. 18 COINCIDENT PROFILE FOR WIND SPEED AND RELATIVE HUMIDITY

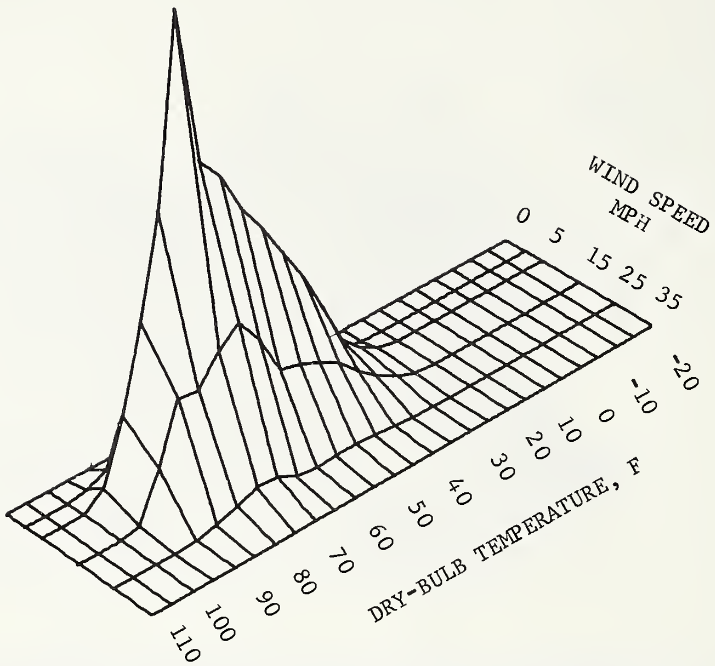


Fig. 19 COINCIDENT PROFILE FOR WIND SPEED AND DRY BULB TEMPERATURE

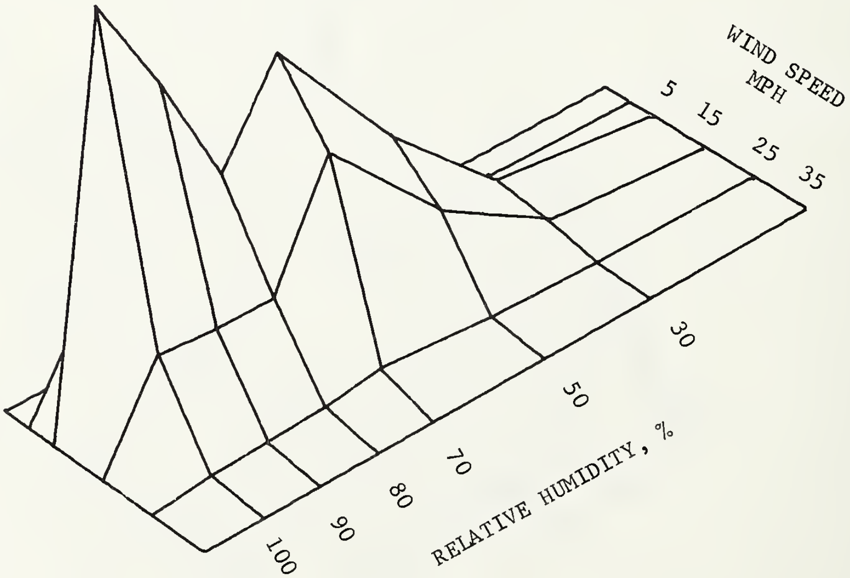


Fig. 20 COINCIDENT PROFILE FOR WIND SPEED AND RELATIVE HUMIDITY

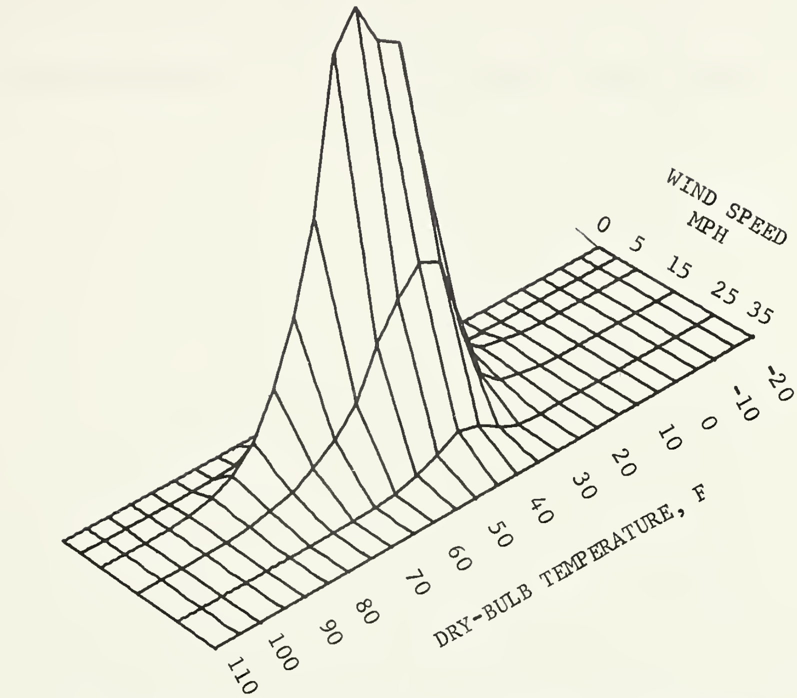


Fig. 21 COINCIDENT PROFILE FOR WIND SPEED AND DRY BULB TEMPERATURE

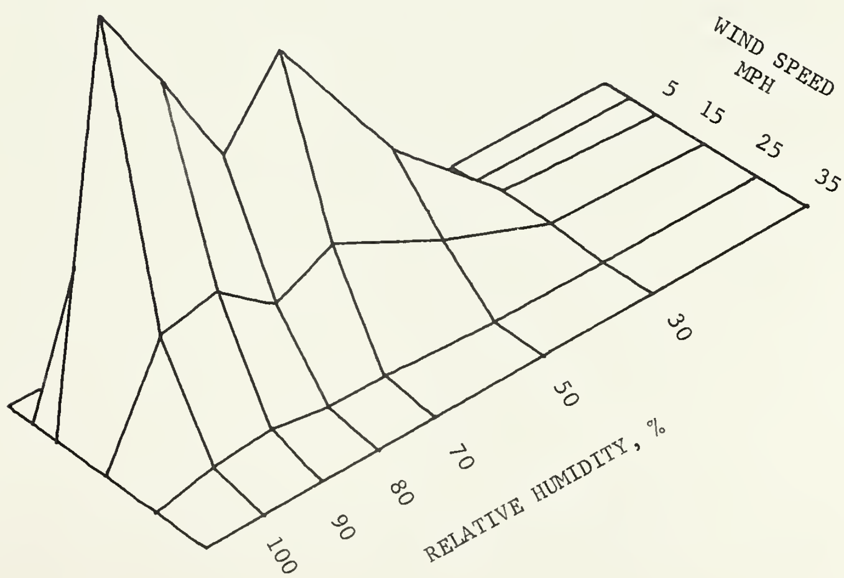


Fig. 22 COINCIDENT PROFILE FOR WIND SPEED AND RELATIVE HUMIDITY

Figures 23 through 32 present wind flow patterns by plotting the annual average wind speed in a polar form with respect to the direction of wind. Indicated on the polar diagram of the wind speed are the directions of prevailing wind during summer and winter seasons.

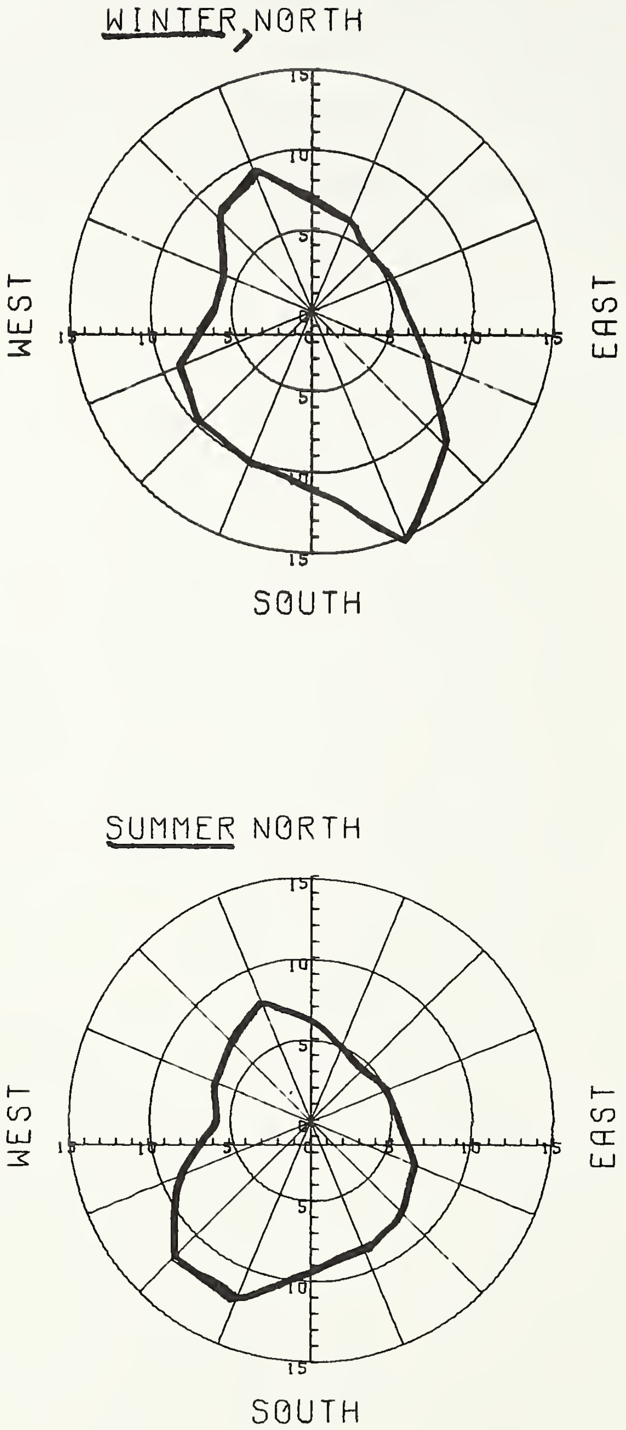
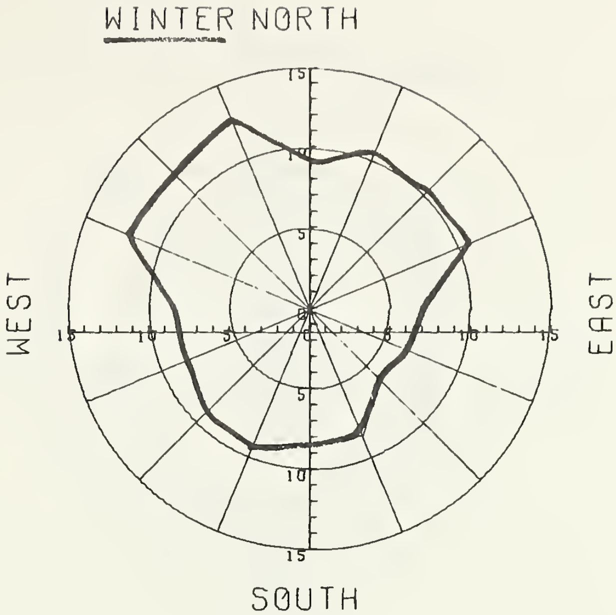


Fig. 23 SACRAMENTO, CALIFORNIA



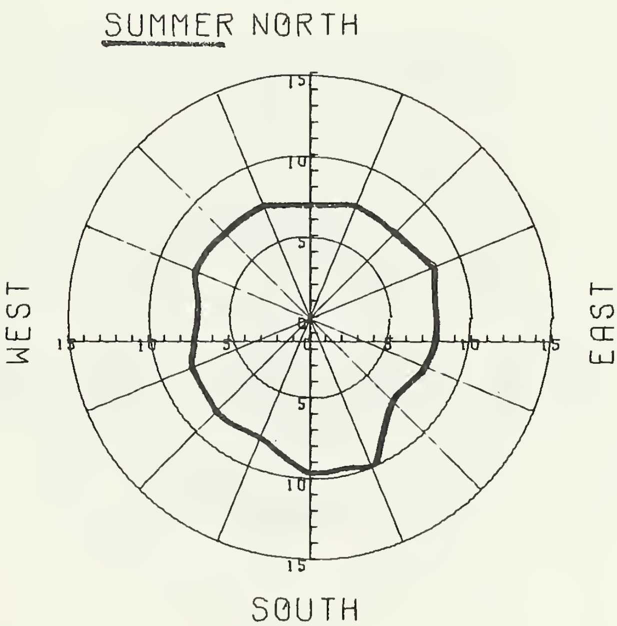
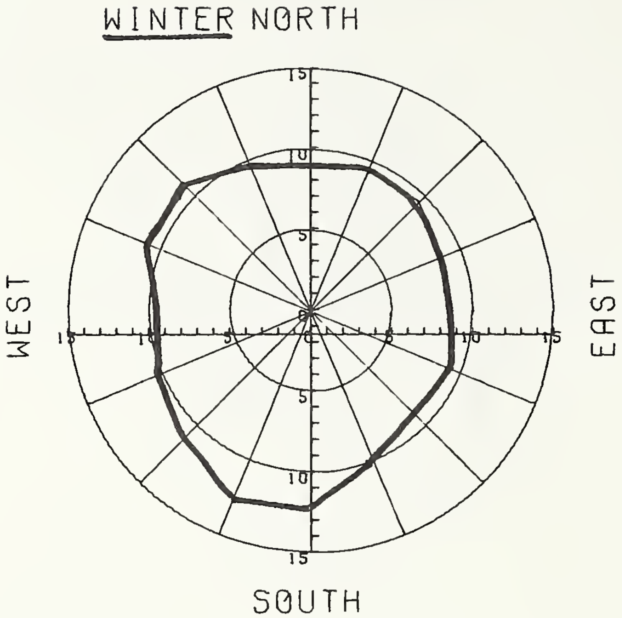


Fig. 24 WILMINGTON, DELAWARE



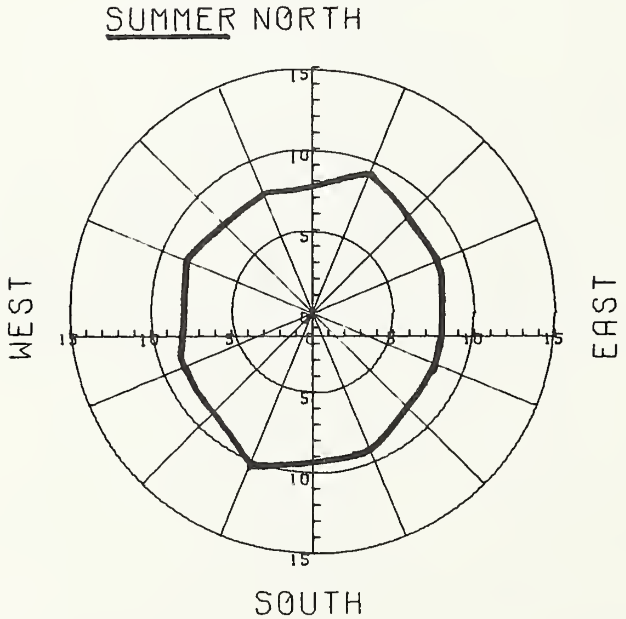
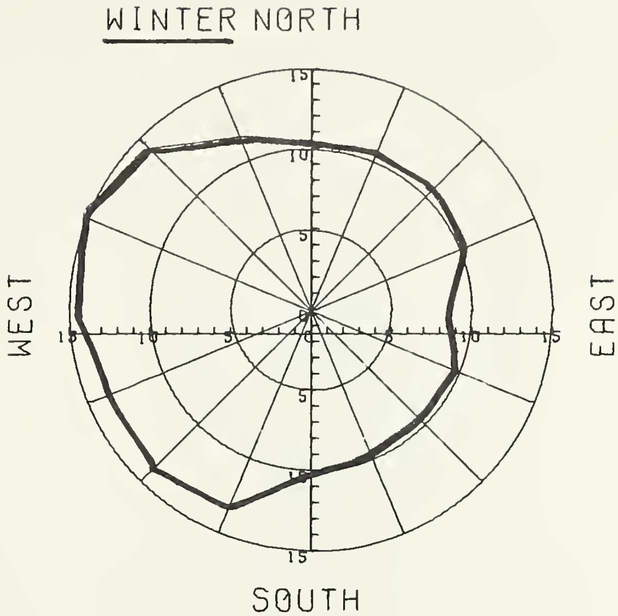


Fig. 25 MACON, GEORGIA



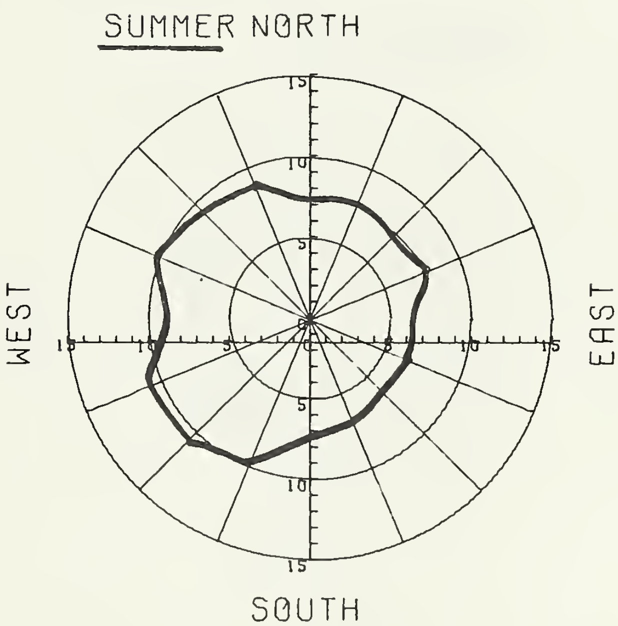
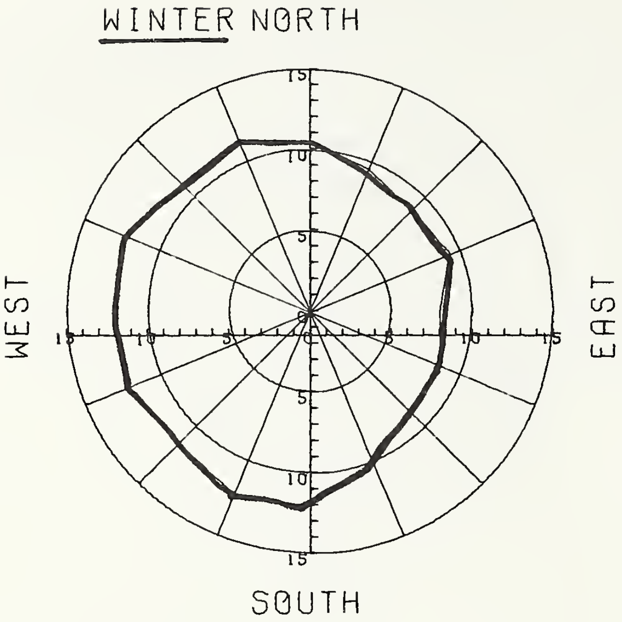


Fig. 26 INDIANAPOLIS, INDIANA



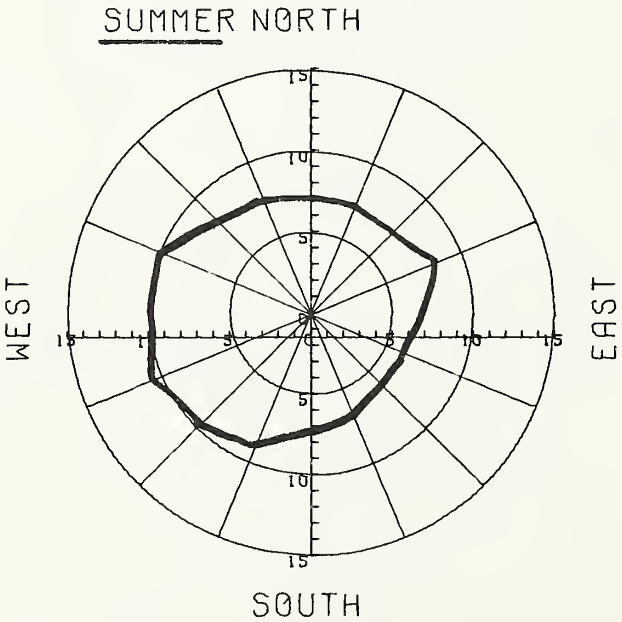
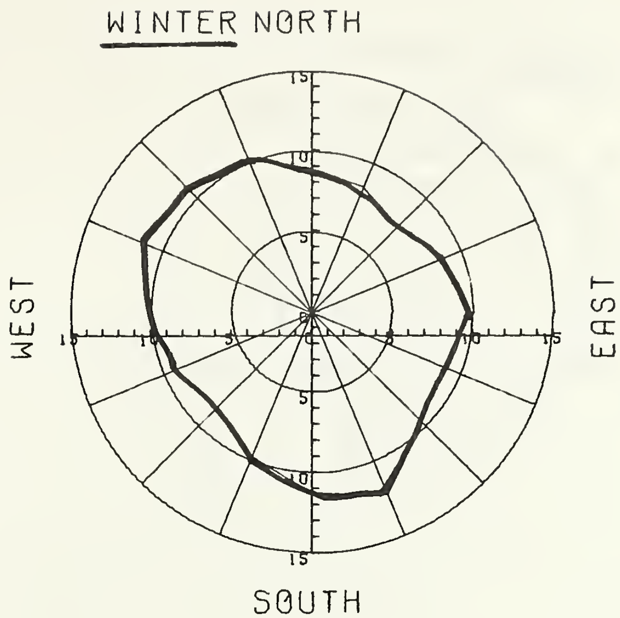


Fig. 27 GRAND RAPIDS, MICHIGAN



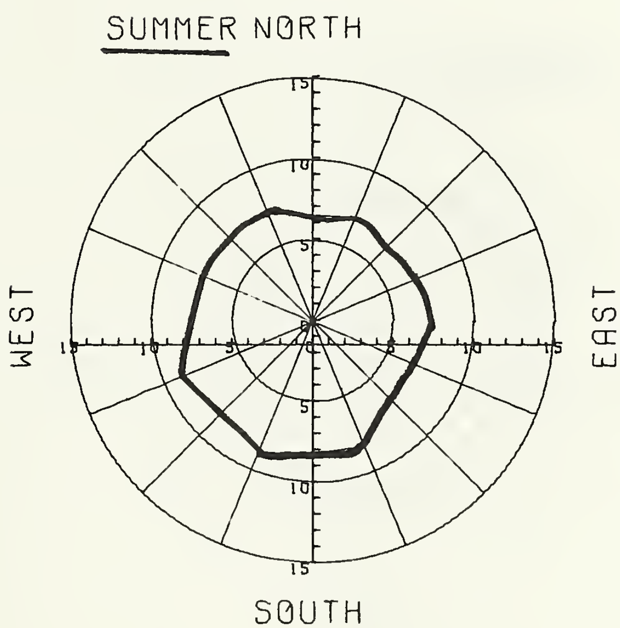
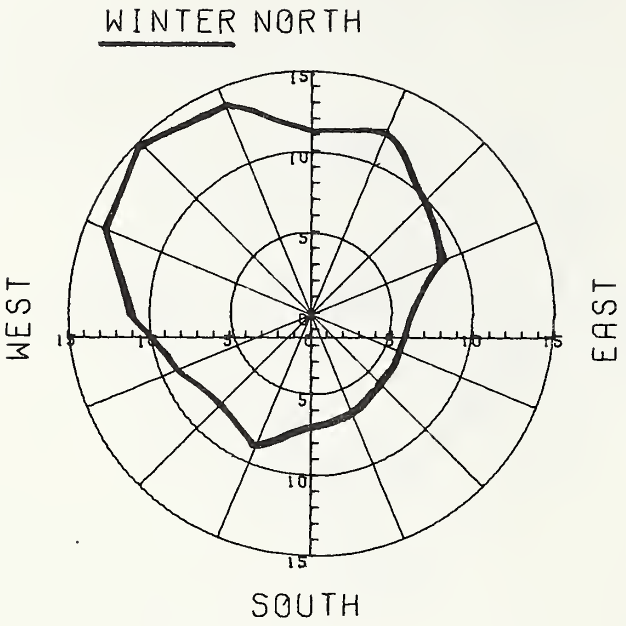


Fig. 28 ST. LOUIS, MISSOURI



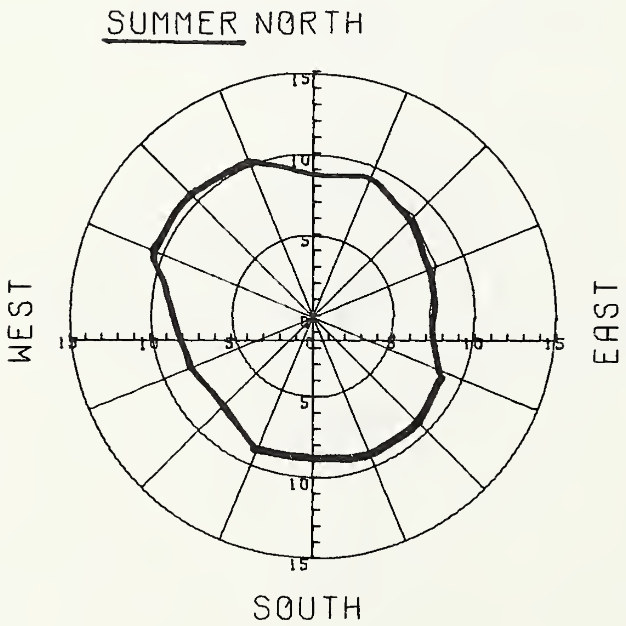
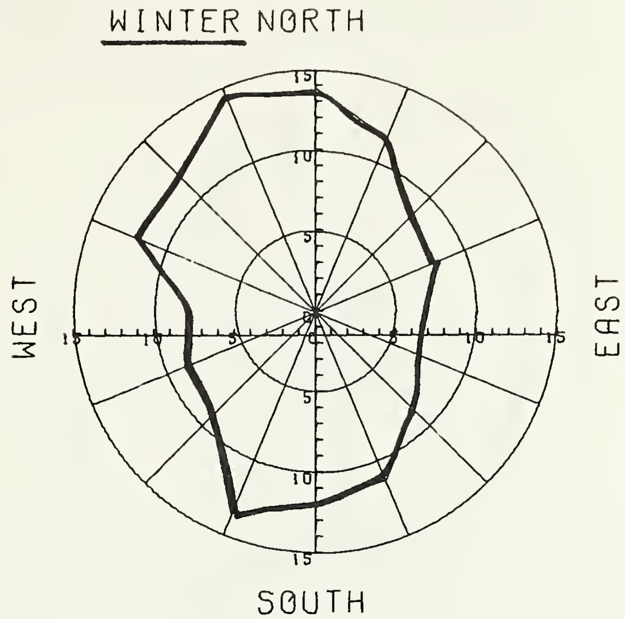


Fig. 29 NEWARK, NEW JERSEY



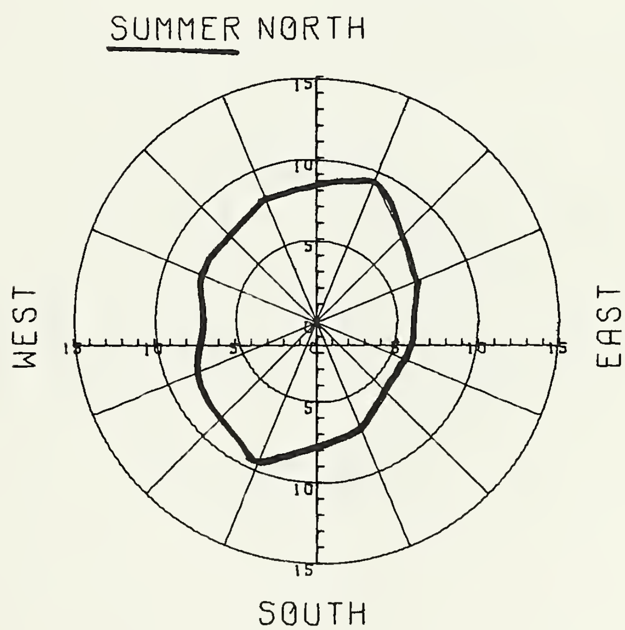
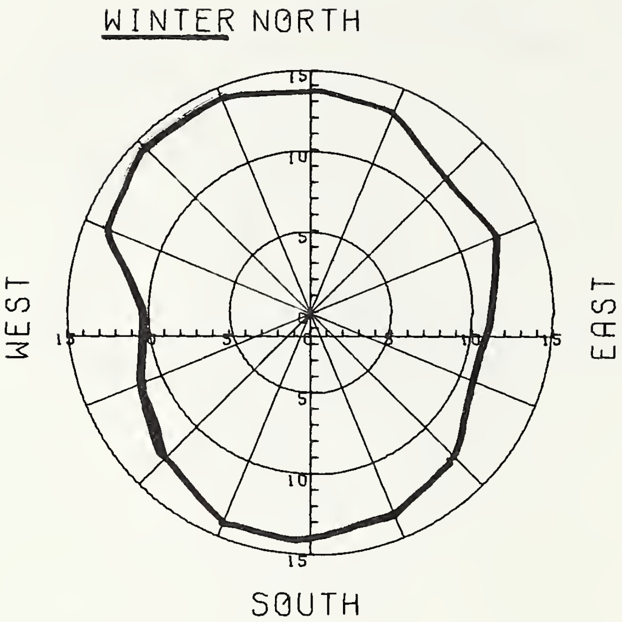


Fig. 30 MEMPHIS, TENNESSEE



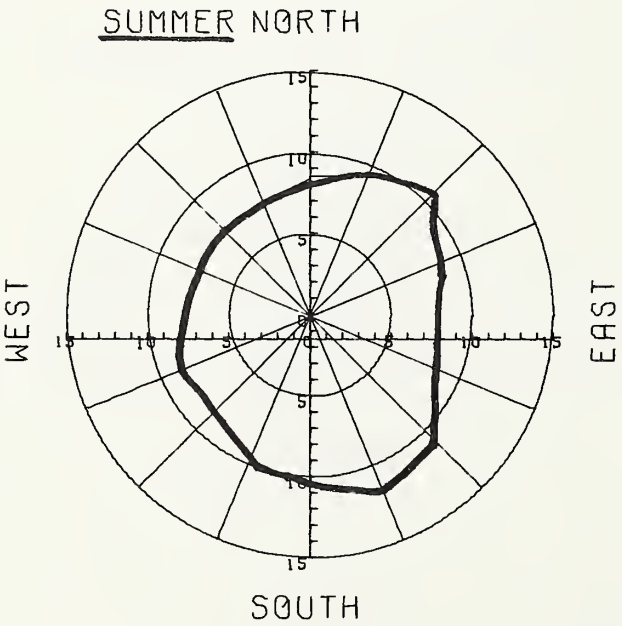
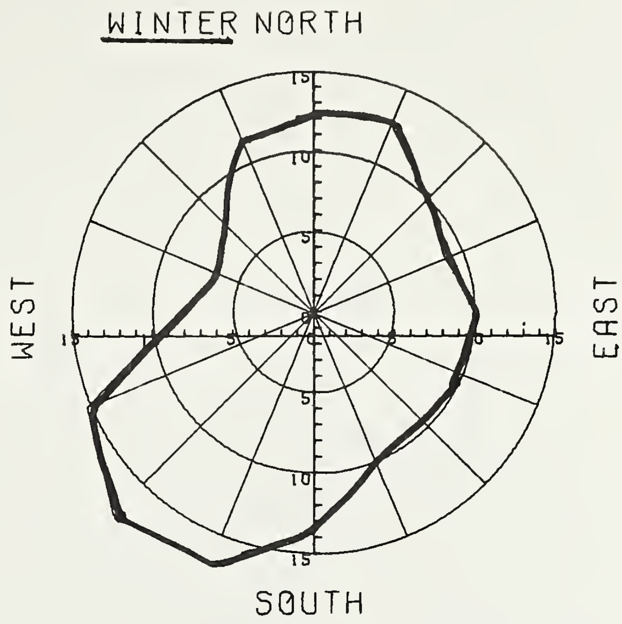


Fig. 31 HOUSTON, TEXAS



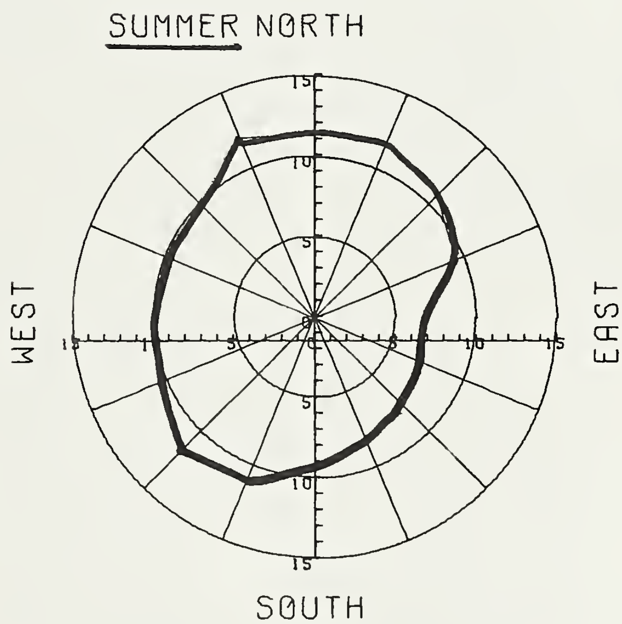


Fig. 32 SEATTLE, WASHINGTON