STATE OF KANSAS

BILL GRAVES, *Governor*
State Capitol, 2nd Floor
Topeka, Kansas 66612-1590

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OFFICE OF THE GOVERNOR

July 7, 2000

OPTIONAL FORM 99 (7-90)

FAX TRANSMITTAL

To Sharon Reinders	# of pages ▶ 3
Dept./Agency OAQPS	From Rajan Teker
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GENERAL SERVICES ADMINISTRATION

Mr. Dennis Grams
Region VII Administrator
U.S. Environmental Protection Agency
901 N. 5th Street
Kansas City, KS 66101

Dear Mr. Grams:

This letter is in response to your letter dated May 2, 2000 regarding area designations for the remanded 8-hour National Ambient Air Quality Standard for ozone. It is my understanding that while the federal Court of Appeals for the District of Columbia remanded the 8-hour ozone standard to the United States Environmental Protection Agency (EPA) and barred EPA from enforcing the standard, EPA was authorized to designate areas. It is also my understanding that the Supreme Court has agreed to review the Court of Appeals decision.

EPA's March 28, 2000 document, "Boundary Guidance on Air Quality Designations for the 8-hour Ozone National Ambient Air Quality Standards," states that the presumptive boundary for 8-hour ozone nonattainment area is the Metropolitan Statistical Area. However, the guidance also recognizes that the recommendation be consistent with the definition of nonattainment in Section 107(d)(1) of the federal Clean Air Act. Section 107(d)(1) defines nonattainment as any area that does not meet (or that contributes to ambient air quality in a nearby area that does not meet) the relevant standard. Though no areas within Kansas have recorded violations of the 8-hour standard, only Johnson and Wyandotte counties in Kansas have been shown to cause or contribute to violations recorded in a nearby area. The recommendations in this letter are consistent with Section 107(d)(1) of the federal Clean Air Act and EPA's March 28, 2000 guidance.

The following recommendations are being made regarding designation of areas within Kansas as nonattainment or attainment/unclassifiable for purposes of the remanded 8-hour standard for ozone:

<u>Nonattainment</u>: Johnson County and Wyandotte County

<u>Attainment/unclassifiable</u>: The remaining counties of the states.

Recommendations regarding Johnson and Wyandotte counties (which are the Kansas counties currently included in the five-county Kansas City metropolitan area subject to a maintenance plan in regard to the 1-hour ozone standard) are based upon the analysis of population, ozone precursor emissions, meteorological data, vehicle miles traveled and ozone monitoring data from 1997 through 1999 in the five-county Kansas City maintenance area. Attached is a table of the fourth high 8-hour reading for each monitor in the Kansas City metropolitan area for 1997 through 1999, and the three-year average for each monitor. The Liberty, Watkins Mill and KCI monitors recorded violations of the remanded 8-hour standard for the three year period. The design value for the recommended Kansas City nonattainment area in relation to the 8-hour ozone standard is .091 parts per million, recorded at the Liberty site, 29-047-0005, in Clay County, Missouri.

Designation of only Johnson and Wyandotte counties within the Kansas portion of the Kansas City metropolitan statistical area (MSA) is consistent with the recommendation of all Kansas counties within that MSA, all Kansas counties outside the MSA which were reviewed for possible inclusion in the nonattainment designation, and the Kansas City metropolitan planning organization. Based upon the factors specified in EPA's March 28, 2000 guidance, no counties outside the recommended five-county nonattainment area cause or contribute to ozone violations within the recommended Kansas City nonattainment area.

The recommendation to designate the remainder of the state as attainment/unclassifiable is based upon the fact that no reference method monitoring of sufficient duration has been conducted in the counties designated attainment/unclassifiable except in Sedgwick County. Ozone monitoring data collected at monitoring sites located in Sedgwick County demonstrate that the county meets the 8-hour ozone standard.

This recommendation does not include the following tribal lands: the Prairie Band of the Potawatomi Indian Reservation in Jackson County and the Kickapoo Nation Indian Reservation, the Sac and Fox Tribe Indian Reservation and the Iowa Tribe Indian Reservation in Brown County.

Documentation supporting these recommendations is being submitted under separate cover and electronically by the Department of Health and Environment. The documentation justifies exclusion of Leavenworth and Miami counties, which are located within the Kansas City MSA, from the recommended nonattainment designation. Please contact Jan Sides, Director of the Bureau of Air and Radiation, at 785/296-1551 if you have any questions regarding these recommendations or the analyses upon which the recommendations are made.

Sincerely,

BILL GRAVES
Governor

Attachment

8-Hour Ozone Monitoring Data for Kansas City

	4th High 8-Hour Values (ppb) 1997	1998	1999	97-99 Average
Liberty, Clay Co., MO	98	95	82	91
Watkins Mill, Clay Co., MO	95	91	84	90
KCI, Platte Co., MO	90	90	76	85
Worlds of Fun, Clay Co., MO	82	86	82	83
Wyandotte Co., KS	81	87	78	82
Richards Gebaur, Jackson Co., MO	72	73	81	75

June 8, 2000

Honorable Bill Graves
Governor, State of Kansas
State Capitol
Topeka, Kansas 66612

Dear Governor Graves:

The U.S. Environmental Protection Agency (EPA) will expand the current 5-county Kansas City KS-MO air quality control area to the 11-county Kansas City, KS-MO Metropolitan Statistical Area (MSA) that would include Leavenworth County and result in Leavenworth County becoming an EPA designated air quality non-attainment area. This is not based on air quality measurements in nor contributions from Leavenworth County.

Per the requirements of Section 107(d)(1) of the Clean Air Act of 1990 it is the responsibility of the governor of each state to submit a recommendation for all areas of the state for designation of attainment/unclassifiable or non-attainment air quality control zones. Based on the most recent change in the air quality standards, each governor must respond by June 30, 2000. Given that EPA has predetermined that all counties with MSA's should be included in air quality control zones an appeal may be necessary during the statutory 120 days following an decision by EPA that is different than that of each governor.

Thus, it is the request of the County Commissioners of Leavenworth County that Leavenworth County not be included in the Kansas City, KS/MO Air Quality Control Area and thus, be designated an air quality non-attainment area.

Attached is a resolution with attached documentation in support of our request.

Wayne Eldridge, Commissioner, Chair

Robert Adams, Commissioner

Don Navinsky, Commissioner

cc: Clyde Graeber, Secretary, Kansas Dept. of Health and Environment
U.S. Senators Sam Brownback and Pat Roberts
U.S. Representative Jim Ryan
Kansas Senators Don Biggs and Mark Gilstrap
Kansas Representatives Ray Cox, Marti Crow, Candy Ruff, and Kenny Wilk
Mayor John Pfannenstiel, City of Basehor
Mayor Kenneth Bernard, City of Lansing
Mayor Kenneth Ken Bower, City of Leavenworth,
Mayor John Franiuk, City of Tonganoxie

RESOLUTION NO.

A RESOLUTION REQUESTING THE GOVERNOR OF THE STATE OF KANSAS TO RECOMMEND DESIGNATION OF LEAVENWORTH COUNTY AS ATTAINMENT/UNCLASSIFIABLE AND NOT A PART OF THE KANSAS CITY AIR QUALITY CONTROL REGION AS PROPOSED BY THE U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA).

WHEREAS, Leavenworth County is not now nor ever been part of the Air Quality Control Region of Kansas City, KS-MO ; and,

WHEREAS, the Leavenworth County has no air quality monitoring sites nor existing monitoring sites closest to Leavenworth County have shown a violation of the current one-hour or proposed 8-hour air quality standards; and

WHEREAS, as proposed by the U. S. Environmental Protection Agency (EPA) the current 5-county air quality control area would be expanded to the 11-county Kansas City, KS-MO Metropolitan Statistical Area that would include Leavenworth County and result in Leavenworth County becoming an EPA designated air quality non-attainment area not based on air quality measurements in nor contributions from Leavenworth County; and

WHEREAS, the attached technical information supports a designation of attainment/unclassifiable and not non-attainment by proximity of Leavenworth County to the Kansas City Area; and

WHEREAS, the only the Governor of the state can recommend designations following any new or revised change in standards in air quality; and

WHEREAS, the Governor must make such recommendations to the EPA on Air Quality attainment/unclassifiable and non-attainment areas by June 30, 2000.

THEREFORE, BE IT RESOLVED THAT the Leavenworth County Commissioners request that Governor Graves, Governor of the State of Kansas recommend designation of Leavenworth County as attainment/unclassifiable area and not a part of the Kansas City Air Quality Control Area as proposed by the U. S. Environmental Protection Agency (EPA).

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Passed and approved this 8th day of June, 2000.

_____
Wayne Eldridge, Commissioner, Chair

_____
Robert Adams, Commissioner

_____
Don Navinsky, Commissioner

ATTEST:

_____

Linda A. Scheer, County Clerk

Leavenworth County, Kansas

Factors Supporting Designation As Attainment/Unclassifiable
under the
National Ambient Air Quality Standards (NAAQS)
of the Clean Air Act (CAA)

prepared by
Leavenworth Area Development Corporation

The Environmental Protection Agency (EPA) has made an assumption that all counties that meet the requirement for a Metropolitan Statistical Area (MSA) are equally related for air quality control boundaries. However, in the case of the Kansas City, KS-MO MSA this would enlarge the air quality boundary from 5 counties to 11 counties, including Leavenworth County in Kansas.

Based on the factors established by the Office of Air Quality Planning and Standards, in accordance with the guidelines in Section 107(d)(1) of the CAA, some counties should not be included in the Kansas City, KS-MO MSA air quality boundary. The following is a review of the factors to be considered in designation which should conclude that Leavenworth County does not significantly contribute to nor should be included as part of the Kansas City, KS/MO MSA for air quality designation.

1. Leavenworth County compared to the population and urbanization of the 5 county Kansas City urban core, is a rural county with a 1999 population of 71,766 representing only four percent (4%) of the MSA population. In terms of employment, Leavenworth County accounts for only 2.75 percent of the total MSA employment. Leavenworth is also a large area county (463 square miles) representing more than 9 percent of the land area in the Kansas City MSA. This equates to a population density of just 155 persons per square mile compared to a population density of more than 640 for Jackson County (Kansas City, MO).

2. With the change in the air quality standard from 0.12 ppm of ozone in a 1-hour period to 0.08 ppm of ozone in an 8-hour period, the greatest concentration of ozone was recorded in Liberty, Missouri, northeast of the Kansas City urban core with a '97-'99 average reading of 91 exceeding the NAAQS standard of 85. No violations were recorded in the Kansas side of the current 5-county air quality boundary.

3. The largest concentration of population is in the extreme northern portion of the county farthest (35 miles) from the Kansas City urban core. This includes Fort Leavenworth (a U.S. Army Post) and the cities of Leavenworth and Lansing.

4. Based on the 1990 Census, the traffic and commuting patterns show less than 200 daily trips to work in Kansas City, MO from Leavenworth County. The largest portion (73.8 %) of daily trips were within Leavenworth County, thus no significant contribution to the traffic and related emissions comes from Leavenworth County.

Factors Supporting Designation As Attainment/Unclassifiable (continued)

5. Leavenworth County has since 1980 and is expected to experience population growth in the future of approximately 1.0 to 1.5 percent per year. However, in actual numbers this increase represents less than four percent (4%) of the growth in Johnson County, KS and less than two percent (2%) of the growth in the Kansas City MSA.

6. Ozone is produced by and high temperatures (above 85 degrees) during dry conditions and carried by surface and upper level winds for which no one has control. Given the rural nature of Leavenworth County and given that the greatest portion of the population in the far northern portion of the county, any sources when produced by atmospheric conditions, would be carried north and northeast of the Kansas City MSA by the prevailing winds during the times when the atmospheric conditions are conducive to the formation of surface ozone.

7. Leavenworth County, except for the far eastern portion, is hilly terrain. Thus, the majority of Leavenworth County is not a part of the Kansas City MSA air basin. Given the predominate southerly winds, even the eastern most portions of Leavenworth County are not a part of the Kansas City MSA air basin.

8. Leavenworth County was not a part of the Kansas City, MSA until 1990 and met only the basic threshold criteria. It is likely at least two additional counties will be added the MSA boundary as a result of the 2000 Census. Given the predominately rural nature of Leavenworth County additional counties will also likely be predominately rural.

9. Given the prevailing winds, Leavenworth County is not effected by the outside sources of ozone pollution. Equally, Leavenworth County is not a source of volatile organic compounds (VOC's) or Nitrogen Oxides (Nox's). Since there are no measuring devices in Leavenworth County, the EPA air quality computer modeling estimates for 1996 for Leavenworth County are 0.88 t/d point source emissions of VOC's compared to the highest in Clay County, MO in 1996 were 9.68 t/d. Also, the point source emission of Nox's for Leavenworth County was 0.01 t/d compared to the highest in Jackson County, MO at 78.46 t/d.

10. The largest source of VOC's in Leavenworth County was from vegetation (trees) at 18.20 t/d which represents 63 percent of all sources of VOC's in Leavenworth County. Thus, short of cutting down all the trees in Leavenworth County the level of VOC's can be considered very stable and not a serious threat to the health of residents in Leavenworth County.

11. With a point source of Nox's near zero even the total sources of Nox is only 14.6 t/d compared to the worst in Jackson, county, MO of 169.4 t/d.

BOARD OF COUNTY COMMISSIONERS
DOUGLAS COUNTY, KANSAS

1100 Massachusetts
2nd Floor
Lawrence, KS 66044
785-832-5268
785-832-5148 (Fax)

June 14, 2000

The Honorable Bill Graves
Governor of Kansas
State Capitol
Second Floor
Topeka, KS 66612

RE: EPA's consideration of revising the Kansas City Air Quality Attainment Area to include Douglas County, KS

Dear Governor Graves:

Douglas County has become aware of a study being conducted by the U.S. Environmental Protection Agency (EPA) of the air quality attainment area for Kansas City. The interest of Douglas County in this issue is that possible expansion of the air quality boundary could encompass Douglas County. This expansion of the currently adopted air quality area boundary for Kansas City is in response, we believe, to the EPA's desire to include the entire Kansas City Metropolitan Statistical Area (MSA) in the attainment area boundary. Three other counties adjacent to the Kansas City MSA, which may contribute to the air quality problems of the Kansas City area, are also being reviewed for inclusion in this attainment area. Although Douglas County is not in the Kansas City MSA (it is an MSA all to it's own), it is our understanding from the Kansas Department of Health and Environment (KDHE), that the Director of the Missouri Department of Natural Resources (MDNR) has proposed the attainment area boundary be expanded to include Douglas County. Mid-America Regional Council (MARC) is hosting meetings on this subject. Staff attended the May 31st meeting, which was an informational meeting, and will be in attendance at the June 16th meeting. At this meeting, Counties will be given the opportunity to present their positions and findings on inclusion in the attainment area. Our staff will make a brief presentation with findings which support the position stated in this letter.

Our staff has studied the eleven factors used by EPA for determining inclusion in an air quality attainment area. It is our determination, based on a preliminary review of the findings for these eleven factors, that Douglas County is not a major contributor to Kansas City's air quality problem. We believe it would be inappropriate at this time to include Douglas County in the air quality attainment area for Kansas City. We urge you to forward a recommendation to EPA to not include Douglas County in the revision to the Kansas City Air Quality Attainment Area Boundary.

As a Commission, we are mindful of the need to be pro-active in addressing air quality issues in our community. We feel it would be appropriate to take responsible actions to

A REVIEW OF DOUGLAS COUNTY & THE ELEVEN CRITERA FOR BOUNDARY ASSESSMENT

The following report has been prepared by the Lawrence / Douglas County Metropolitan Planning Department. This analysis addresses the 11 criteria established by the EPA for determining changes to a metropolitan air quality boundary. Although Douglas County is not in the Kansas City MSA (it is an MSA all to its' own), it is our understanding that the attainment boundary has been proposed to be expanded to include Douglas County.

The 11 EPA Criteria:

1. Emissions and air quality in adjacent areas
2. Population density and degree of urbanization
3. Monitoring data
4. Location of emission sources
5. Traffic and commuting patterns
6. Expected growth
7. Meteorological Data
8. Geographical/Topographic Data
9. Jurisdictional Boundaries
10. Level of emission control
11. Regional emission reductions

Several of the criteria overlap in their relationship to each other and all influence air quality directly or indirectly. Air quality problems are dynamic and complex issues that require a careful review of all eleven criteria before any conclusions can be made. After reviewing all of the data provided at the Information Briefing on May 31, 2000, it is our conclusion that it would be inappropriate to revise the air quality boundary of Kansas City based upon the available data.

are every bit as important as counties that attract more trips in creating a commuter pattern.

Douglas County has traffic patterns significantly different from any of the other 15 counties being analyzed. 81% of the trips that originate in Douglas County are destined to locations in Douglas County. Inversely 19% of the trips produced here are to locations outside of the county. Douglas County has the lowest percentage of commuter trips of the 15 counties considered.

The previous table includes both trips to or from "everywhere." The total number of trips to and from "counties not represented" were calculated by adding the origins and destinations of the 15 counties and subtracting the trips to or from "everywhere."

In the case of Douglas County, 40% of inter-county trips are to destinations not represented by the 15 counties. This means that 40% of the commuter trips are headed for destinations that are not considered. It is likely that Franklin, Jefferson, and Shawnee counties make up a significant portion of the remaining 40% inter-county trips. The other 15 counties reflect much higher percentages of inter-county trips to the 15 counties represented.

Net contribution of trips were calculated by subtracting the total number of trips originating in Douglas County less the total number of trips destined to Douglas County. In some cases such as Jackson, MO, and Wyandotte, KS, more trips are attracted to the counties than are produced from the counties. This is likely due to the large industrial bases of each county. Douglas County is a contributing county. However, Douglas County produces <u>only</u> 3% of the inter-county trips for the 15 counties as a whole. See the table and pie chart on the next page.

Vehicle Miles Traveled

Vehicles Miles Traveled is an excellent indicator of mobility. VMT has been increasing on a national average as ownership of automobiles and single vehicle occupancy rates have increased.

ESTIMATED 1998 DAILY VEHICLE MILES OF TRAVEL BY COUNTY

Name	1990 Million/DVMT	1998 Million/DVMT	Net Change	% Change
Johnson, KS	8,908,242	11,845,793	2,937,551	33%
Jackson, MO	7,941,181	9,827,140	1,885,959	24%
Clay, MO	2,986,021	4,270,656	1,284,635	43%
Douglas, KS	**1,706,376**	**2,325,018**	**618,642**	36%
Platte, MO	1,843,411	2,451,397	607,986	33%
Cass, MO	1,269,985	1,848,112	578,127	46%
Buchanan, MO	1,127,257	1,446,297	319,040	28%
Miami, KS	711,993	1,030,401	318,408	45%
Wyandotte, KS	4,261,690	4,564,794	303,104	7%
Leavenworth	1,110,169	1,399,471	289,302	26%
Clinton, MO	457,644	680,263	222,619	49%
Johnson, MO	881,399	1,045,974	164,575	19%
Lafayette, MO	1,202,918	1,360,578	157,660	13%
Linn, KS	236,705	320,516	83,811	35%
Ray, MO	296,229	375,572	79,343	27%

Source: Kansas Counties, KDOT Mileage and Travel Tables 1998 and 1990
Source: Missouri Counties MoDOT Vehicle Miles of Travel &
Monthly Variations of Traffic 1990 and 1998

Daily VMT is estimated to have increased for all the counties concerned. The rate of increase averaged a 31% net change for all counties. Douglas County is estimated to have increased 36%.

from Jackson, Johnson, and Wyandotte Counties that are represented in the current air quality boundary.

In the case of Douglas County, "Area" and "Biogenic" sources are thought to contribute a majority of the VOC.

NO x Pollutants

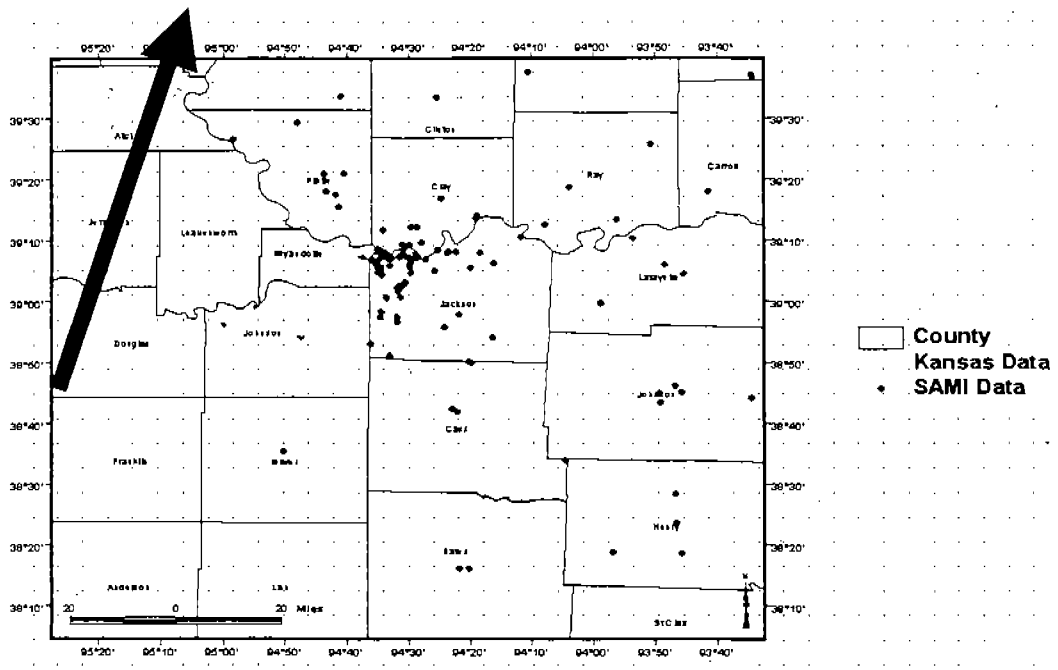
Version 3 EPA NET 1996 KC Area Ozone Season Day Season Day Emissions (tons/day)
Source: EPA ne96p301, ne96a311, ne96m300, bg20096b

	NO x					**Total**	
State	County	Point	Area	Mobile	Biogenic		% Total
MO	**Jackson**	78.5	33.24	53.4	4.28	**169.38**	25%
KS	**Johnson**	3.42	80.4	34.46	0.98	**119.26**	17%
MO	**Linn**	107	2.37	1.74	1.83	**113.2**	17%
KS	**Wyandotte**	29.9	46.54	14.04	0.17	**90.69**	13%
KS	**Douglas**	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
MO	**Platte**	14.3	7.3	5.87	2.98	**30.44**	4%
MO	**Clay**	0.45	8.75	13.04	4.12	**26.36**	4%
KS	**Miami**	8.56	4.11	3.09	1.93	**17.69**	3%
KS	**Leavenworth**	0.01	8.18	4.49	1.92	**14.6**	2%
MO	**Lafayette**	0.01	4.59	3.25	3.51	**11.36**	2%
MO	**Johnson**	0.04	4.24	4.22	2.76	**11.26**	2%
KS	**Franklin**	0	4.39	2.51	2.21	**9.11**	1%
MO	**Ray**	0.01	2.62	2.87	1.79	**7.29**	1%
MO	**Clinton**	0	2	2.28	1.6	**5.88**	1%
	TOTALS	275	223.7	151.01	32.12	**682**	
	%	40%	33%	22%	5%		

The table above lists NOx emissions for the 15 counties. In this case, the majority of NO x emissions come from Jackson, Johnson, and Linn Counties. Only Linn is not included in the current air quality boundary. Douglas County's total NOx emission represent 8% of the NOx emissions. A majority of the NO x emissions from Douglas County come from Point and Area sources. Total VOC and NOx emissions are important but equally important, are the weather conditions and prevailing wind patterns that carry the ozone precursors.

Based upon an inventory of the Point Sources with VOC and NOx, Emissions one can reasonably conclude that the prevailing winds do not carry emissions from Douglas County into the current air quality boundary of Kansas City.

Point Sources with VOC or NOx Emissions



Findings

1. The Douglas County Board of Commissioners feel that it is inappropriate to include Douglas County in the Kansas City Metropolitan Air Quality Boundary based on a review of the 11 criteria.
2. The Board of Commissioners are mindful of air quality preservation and recognize that proactive governmental initiatives may be required to prevent future air quality problems.
3. Air quality problems are dynamic and complex issues that require coordination with surrounding counties and planning organizations. A collaborative planning process is welcomed and requested with or without any changes to the current Kansas City Air Quality Boundary.

Recommendation

1. Based upon a cursory examination of the existing data we <u>do not</u> recommend that Douglas County be added to the Kansas City Air Quality Boundary.

State Name: Kansas

Nonattainment Areas:

- Kansas City nonattainment area
  - Johnson County
  - Wyandotte County

Attainment/Unclassifiable Areas:

- Allen County
- Anderson County
- Atchison County
- Barber County
- Barton County
- Bourbon County
- Brown County
- Butler County
- Chase County
- Chautauqua County
- Cherokee County
- Cheyenne County
- Clark County
- Clay County
- Cloud County
- Coffey County
- Comanche County
- Cowley County
- Crawford County
- Decatur County
- Dickinson County
- Doniphan County
- Douglas County
- Edwards County
- Elk County
- Ellis County
- Ellsworth County
- Finney County
- Ford County
- Franklin County
- Geary County
- Gove County
- Graham County
- Grant County
- Gray County
- Greeley County

Greenwood County
Hamilton County
Harper County
Harvey County
Haskell County
Hodgeman County
Jackson County
Jefferson County
Jewell County
Kearny County
Kingman County
Kiowa County
Labette County
Lane County
Leavenworth County
Lincoln County
Linn County
Logan County
Lyon County
Marion County
Marshall County
McPherson County
Meade County
Miami County
Mitchell County
Montgomery County
Morris County
Morton County
Nemaha County
Neosho County
Ness County
Norton County
Osage County
Osborne County
Ottawa County
Pawnee County
Phillips County
Pottawatomie County
Pratt County
Rawlins County
Reno County
Republic County
Rice County

Riley County
Rooks County
Rush County
Russell County
Saline County
Scott County
Sedgwick County
Seward County
Shawnee County
Sheridan County
Sherman County
Smith County
Stafford County
Stanton County
Stevens County
Sumner County
Thomas County
Trego County
Wabaunsee County
Wallace County
Washington County
Wichita County
Wilson County
Woodson County

300 Rivergate Center
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www.marc.org

MARC
Mid-America Regional Council

June 27, 2000

RECEIVED
JUN 28 2000
SECRETARY OF
DEPT. OF HEALTH & ENVIRONMENT

Honorable Mel Carnahan
Governor
216 State Capitol
Jefferson City, MO 65101

Honorable Bill Graves
Governor
Second Floor, State Capitol
Topeka, KS 66612-1590

Dear Governor Carnahan and Governor Graves:

This letter is to transmit information and recommendations regarding the potential expansion of the air quality planning boundary for the Kansas City region. Although the new national ozone standard that was adopted in 1997 is being litigated, the U.S. Environmental Protection Agency is nevertheless required to proceed with designations of areas that are not expected to be able to meet that standard. As you know, as part of that process, EPA has asked the governors of each state to make recommendations concerning what the boundaries of any expected non-attainment area should be by June 30. The Mid-America Regional Council's Board of Directors respectfully recommends that the current 5-county air quality planning boundary for the metropolitan Kansas City region should be retained.

In late March, EPA issued guidance concerning the designation process in which it stated that the Metropolitan Statistical Area (MSA) will be the presumptive boundary for any non-attainment area, unless another boundary is demonstrated to be more appropriate. The MSA in Kansas City region consists of 11 counties -- the current 5-county air quality planning area (Clay, Jackson, Johnson, Platte and Wyandotte), plus Leavenworth and Miami counties in Kansas and Cass, Clinton, Lafayette and Ray counties in Missouri.

In early May, the Kansas Department of Health and Environment and the Missouri Department of Natural Resources requested that MARC notify the counties within the MSA and a number of other outlying counties, of the pending designation and convene meetings to discuss the implications of a boundary expansion. On May 5, MARC sent a letter to the 11 counties as well as Douglas and Linn Counties in Kansas and Johnson County, Missouri, informing them of the pending boundary determination and notifying them of two meetings at which this issue would be discussed.

On May 31, representatives of many of the outlying counties attended a meeting in Kansas City, Kansas at which a general overview of Clean Air Act requirements and the region's air quality status were provided. There were also presentations by the state air quality agencies, MARC staff and EPA of data relevant to the boundary designation. A second meeting was held on June 16 to hear the responses and comments of the outlying counties.

Chair
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Presiding Commissioner
Platte County, MO

1st Vice Chair
Annabeth Surbaugh
Commissioner
Johnson County, KS

2nd Vice Chair
Irene B. French
Mayor
Merriam, KS

Secretary
Gene A. Molendorp
Presiding Commissioner
Cass County, MO

Treasurer
Tom Bruns
Commissioner
Unified Government
Wyandotte County/
Kansas City, KS

Executive Director
David A. Warm

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Mid-America Regional Council Recommendation
Concerning the Regional Air Quality Planning Area Boundary
June 27, 2000

Background

The Mid-America Regional Council (MARC) serves as the council of governments and planning organization for metropolitan Kansas City. MARC has been designated by the states of Kansas and Missouri as the regional air quality planning agency for the Kansas City area.

The Kansas City air quality planning region has historically included five counties: Clay, Jackson and Platte counties in Missouri and Johnson and Wyandotte counties in Kansas. The U.S Environmental Protection Agency has issued guidance indicating that planning areas under the new ozone standard adopted in 1997 should be based on the Metropolitan Statistical Area (MSA). The Kansas City MSA includes the five counties currently in the planning area plus six additional counties: Leavenworth and Miami counties in Kansas; and Cass, Clinton, Ray and Lafayette in Missouri.

MARC coordinated an open process to discuss issues regarding the pending nonattainment designation and boundary determination with the potentially affected counties, the state and local air and transportation agencies, the EPA and the MARC standing air quality and transportation policy committees.

Recommendation

Based on these discussions and the attached analysis of available data related to the factors listed in EPA's boundary guidance, the MARC Board recommends that the existing five-county air quality planning area be retained for the present time. The MARC Board recognizes that the Kansas City region's air quality planning area boundary may need to be modified in the future and recommends waiting for the following information in order to make a more informed decision about what changes would be appropriate:

- **Decision on the eight-hour ozone standard**. At this time it is not known if the EPA will be allowed to implement the eight-hour ozone standard. It makes sense to wait for the Supreme Court's decision on the standard, which is anticipated in early 2001, before making any changes to the region's air quality boundary.

- **Census 2000 data**. Data from the Census 2000 will be available within the next few years. The results will provide more accurate and updated information on commuting patterns, population and employment and growth trends in the region.

- **Regional airshed modeling results**. The modeling analysis of the Kansas City area's ozone problem currently being conducted by the Kansas Department of Health and Environment (KDHE) and Missouri Department of Natural Resources (MDNR) is expected to provide a greater understanding of the emissions sources and meteorological factors that contribute to the region's ozone problem. The regional airshed modeling is scheduled for completion within the next year.

Based on feedback from the outlying counties in the MSA, it appears that all of the counties not currently inside the air quality planning boundary will also recommend to the governors that they not be included.

Mid-America Regional Council
Supporting Analysis of Factors Listed in EPA's Boundary Guidance

Emissions and Air Quality in Adjacent Areas / Location of Emission Sources (Combined Factors)

Sources located within the existing five-county air quality area contribute the majority (a total of 88 percent) of the MSA's manmade emissions of volatile organic compounds (VOC) and nitrogen oxides (NOx). In terms of the types of VOC and NOx emission sources, the five counties generate 93 percent of the MSA's point source emissions, 87 percent of the MSA's area source emissions, and 86 percent of the MSA's mobile source emissions. (Source: EPA National Emission Trend Inventory, 1996.)

A few major point sources of VOC and NOx emissions (i.e., sources emitting greater than 100 tons per year) are located outside the MSA in Henry, Buchanan, Linn and Douglas counties. If these sources are determined to adversely impact air quality in the current five county area, they may be more appropriately controlled through state regulations on point sources rather than by bringing larger geographic areas into the air quality boundary. The regional airshed modeling results will help determine the extent to which major sources outside the MSA are contributing to the Kansas City region's ozone problem.

Ozone monitoring data outside the five-county area are insufficient to draw conclusions about air quality in the outlying counties within the MSA.

Population Density and Degree of Urbanization Including Commercial Development

The current five-county area incorporates the portion of the MSA with the greatest population density and the most urbanization. It currently contains 85 percent of the MSA's population and 91 percent of the MSA's employment. Very little of the significant commercial development occurring within the MSA is taking place outside the five-county area. (Sources: U.S. Bureau of the Census, Population Estimates, 1990-1999. State of Kansas, The Governor's Economic and Demographic Report – 1999-2000. State of Missouri, Office of Administration, Budget and Planning – 1994. Dodge Local Construction Potentials, 1999. Bureau of Economic Analysis.)

Monitoring Data Representing Ozone Concentrations in Local Areas and Larger Areas

The Kansas City region's ozone monitoring network consists of six monitors located at the following sites within the five-county area: Richards Gebaur airport; downtown Kansas City, Kansas; Kansas City International (KCI) airport; Worlds of Fun; Liberty, Missouri; and Watkins Mill State Park. Based on data averaged over the 1997-1999 period, the monitors at Liberty, Watkins Mill, and KCI are out of compliance with the eight-hour ozone standard. Ozone monitoring data outside the five-county area are insufficient to draw conclusions about air quality in the outlying counties within the MSA. (Source: EPA AIRS*Data*.)

Traffic and Commuting Patterns

Based on 1998 estimates, the existing five-county air quality area contributes 84 percent of the MSA's daily average vehicle miles traveled (VMT). The counties in the MSA with the greatest increase in average daily VMT from 1990 to 1998 (approximately 3,000,000) are Jackson and Johnson, both of which are already included in the five-county air quality area. (Sources: KDOT Mileage and Travel Tables 1998 and 1990. MoDOT State System Vehicle Miles of Travel & Monthly Variations of Traffic – 1990 and 1998. MoDOT Estimated Non-State System VMT-1990.) The five-county area generates 87 percent of the MSA's daily work trips. The majority of

these work trips begin and end within the five-county area. (Source: U.S. Census Journey to Work Trip Data, 1990.)

Expected Growth

The five-county air quality area captured the vast majority of the MSA's growth during the 1990s, with 79 percent of the population growth and 90 percent of the employment growth. According to the most recent projections available, these growth rates are not expected to change significantly over the next 20 years. (Sources: U.S. Bureau of the Census, Population Estimates, 1990-1999. State of Kansas, The Governor's Economic and Demographic Report – 1999-2000. State of Missouri, Office of Administration, Budget and Planning – 1994. Bureau of Economic Analysis. MARC's 1997 Long-Range Forecasts.)

Meteorology

Most days on which the eight-hour ozone standard is exceeded in the Kansas City area are characterized by winds from the south to southwest. Therefore, emissions from Douglas, Leavenworth, Clinton, Ray and Lafayette Counties likely have a minor role in ozone formation in the region. Back-trajectory analyses for eight-hour standard exceedances in the region suggest that emissions generated within the five-county area contribute significantly to the region's ozone problem. The regional airshed modeling results should provide a greater understanding of how meteorology influences the region's ozone problem and whether counties outside of the current planning area contribute to ozone problems in the five counties. (Source: MDNR Air Pollution Control Program.)

Geography/Topography

There are no geographic or topographic features that would impact the determination of the air quality boundary.

Jurisdictional Boundaries

The bi-state five-county area is the current maintenance area for the one-hour ozone standard. The recommendation to keep the existing air quality area would not split the current maintenance area or any air districts or counties.

Level of Control of Emission Sources

As discussed above, the majority of the MSA's emissions are generated within the five-county area. Reasonably Available Control Technology (RACT) has already been implemented on virtually all major sources within the five counties. Applying RACT controls to sources outside the five-county area would likely achieve a relatively small amount of emissions reduction.

Regional Emission Reductions

On May 25, 2000, Missouri adopted a rule that will require NOx emissions reductions from electric utilities across the state. The implementation of this rule could have a positive impact on air quality in the Kansas City region by reducing NOx emissions from electric utilities within and outside the five-county area that may contribute to the area's ozone problem.

ARTD
cc: RA/DRA

KANSAS
DEPARTMENT OF HEALTH & ENVIRONMENT
BILL GRAVES, GOVERNOR
Clyde D. Graeber, Secretary

July 6, 2000

Mr. Dennis Grams
Regional Administrator
US EPA Region VII
901 North 5th Street
Kansas City, KS 66101

Dear Mr. Grams:

Enclosed is the support document justifying the Governor's recommendations regarding designating areas in Kansas relative to the remanded 8-hour ozone standard. Electronic copies of this document have been e-mailed to Wayne Leidwanger and Royan Teter in the Air Planning and Development Branch.

Feel free to contact me if you have any questions.

Sincerely,

Jan O. Sides, Director
Bureau of Air and Radiation

CL:jw

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SUPPORT DOCUMENT
FOR
KANSAS CITY, KANSAS
8-HOUR OZONE NONATTAINMENT
RECOMMENDATION

Kansas Department of Health and Environment
Bureau of Air and Radiation

June, 2000

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KANSAS CITY AREA GROUND LEVEL OZONE BACKGROUND

The Kansas City metropolitan statistical area (MSA) is comprised of 11 counties. Four of the counties are in Kansas and 7 are in Missouri. (See Tab 1.)

Five counties within the Kansas City metropolitan area were designated nonattainment for the 1-hour ozone standard until 1992, at which time the Kansas City area was redesignated as being in attainment with the 1-hour standard. This region will be referred to as the Kansas City maintenance area throughout the remainder of this document. The Kansas City maintenance area consists of two counties on the Kansas side and three counties on the Missouri side. (See Tab 1.) The five counties which make up the Kansas City maintenance area are located within the Kansas City MSA.

The vast majority of anthropogenic emissions in the Kansas City MSA occur in the five county maintenance area. (See Tab 3.) Population in the Kansas City area is primarily situated in the center of the five county maintenance area. (See Tab 2.) Point source emissions are also primarily situated in the five county maintenance area. (See Tabs 4 and 5.) Vehicle miles traveled are primarily associated with the five county area. (See Tabs 6 and 7.)

The ozone monitoring network for the Kansas City area consists of: one monitor in Wyandotte County, Kansas; one monitor in Platte County, Missouri; three monitors in Clay County, Missouri; and one monitor in Jackson County, Missouri. (See Tab 1.)

The annual 4th high 8-hour ozone average for each monitor for the years 1997 through 1999 are shown at Tab 8. Violations of the 8-hour standard occurred at the Liberty, Watkins Mill and KCI monitors for the three year period. (See Tab 8.) Exceedences recorded by all monitors for the 1997 through 1999 period are shown at Tab 9. A review of the exceedences reveals a general pattern. Exceedences can generally be grouped into those that correspond to the Liberty, Watkins Mill and Worlds of Fun monitors and those that correspond to the Wyandotte County and KCI monitors. Wind roses for the days during which exceedences occurred show that the wind direction is from the south to south/south west on days that the Liberty/Watkins Mill/Worlds of Fun monitors exceed the standard. On days the Kansas City/KCI monitors exceed the standard, wind direction is typically from the south/south east. (See Tab 10.) The design value for the recommended Kansas City nonattainment area in relation to the 8-hour ozone standard is .091 parts per million, recorded at the Liberty site, 29-047-0005, in Clay County, Missouri. (See Tab 8.)

RECOMMENDATION

It is recommended that the boundary for the Kansas City 8-hour ozone nonattainment area be limited to Wyandotte and Johnson counties on the Kansas side. It is recommended that the other two counties on the Kansas side of the Kansas City MSA be excluded from the remanded 8-hour ozone standard nonattainment designation. No counties outside the Kansas City MSA are

recommended for inclusion in the Kansas City nonattainment designation.

An evaluation of the two excluded counties, Leavenworth and Miami counties, in relation to the eleven criteria specified in EPA's March 28, 2000 boundary guidance clearly demonstrate that controlling point, area and mobile source emissions in those two counties will have no impact on reducing ozone violations in the Kansas City area. Future commercial and residential growth of the Kansas City area is not expected to advance into these counties in the foreseeable future. Future commercial and residential growth within the two counties for the foreseeable future is expected to be primarily near urban areas within the counties. Due to the location of the urban areas within these counties, additional ozone precursor emissions will have negligible effect on ozone formation in the Kansas City area. Finally, there is no credible evidence to suggest that air quality in either of these counties exceeds the remanded 8-hour ozone standard.

JUSTIFICATION FOR EXCLUSION OF MIAMI COUNTY

Recommendation. It is recommended that Miami County be excluded from the area designated nonattainment in and around Kansas City for the remanded 8-hour standard. An evaluation of the eleven factors specified in EPA's March 28, 2000 memo provided no basis for including Miami County in the Kansas City nonattainment area. Furthermore, there is no demonstration that controlling ozone precursor emissions, either current or projected, in Miami County will contribute to the goal of attaining the remanded 8-hour standard in Kansas City.

General description.

Miami County is a rural county located directly south of the recommended five county nonattainment area. (See Tabs 11 and 1.) The high density population area of metropolitan Kansas City is sufficiently north of the Miami County border to provide a significant buffer between Miami County and the urban growth areas of Kansas City. (See Tab 2.) Miami County contains only four major sources of ozone precursor emissions. (See Tab 3.) Of these, only one, a pipeline compressor station, has precursor emissions of more than one ton per day. (See Tabs 3 and 4.)

Application of eleven factors.

1. *Emissions and air quality in Miami County.* Anthropogenic VOC and NOx emissions in Miami County are only 2 percent and 5 percent, respectively, of what the VOC and NOx emissions are in the recommended five county Kansas City nonattainment area. (See Tab 5.) There is no evidence that reducing, or even completely eliminating, anthropogenic VOC and NOx emissions in Miami County would significantly affect ozone formation in those areas of the Kansas City region which have recorded violations of the remanded 8-hour ozone standard.

   There are no ozone monitors in Miami County. However, air quality in Miami County

would not be expected to violate the remanded 8-hour ozone standard. (See evaluation presented in paragraph 3 below.)

2. *Population density and degree of urbanization including commercial development in Miami County.* Population density, degree of urbanization and commercial development through the foreseeable future is not expected to contribute to, or exacerbate, ozone violations in the Kansas city area.

   Gross population density in Miami County for 1997 is .29 persons per acre. This compares to 2.13 persons per acre for the recommended five county Kansas City nonattainment area. The .29 persons per acre figure did not change for Miami County between 1992 and 1997. (See Tab 11.)

   More than 75% of Miami County land was in farms in 1997. (See Tab 12.) Commercial development in Miami County is primarily agriculturally and services related, with little heavy industrialization. Only four major air emissions sources are located in Miami County. (See Tab 3.)

3. *Monitoring data representing ozone concentrations in local areas and larger areas.* There are no ozone monitors in Miami County. However, Miami County is upwind from the monitors which recorded violations during the 1997 through 1999 time period. (See Tab 10.) The ozone monitor in the Kansas City network which would most represent ozone concentrations in Miami County would be the Richards Gebaur background monitor located in Jackson County, Missouri. The design value for the Richards Gebaur monitor for the 1997 through 1999 time period is 75 ppb, significantly under the 8-hour standard. (See Tab 8.) Ozone concentrations in Miami County would not be expected to exceed those monitored by the Richards Gebaur monitor due to location, wind direction, population, VMT and point source location. (See Tabs 1, 10, 11, 6 and 4.)

4. *Location of emission sources.* Miami County has only four major sources of VOCs or NOx. (See Tabs 3 and 4) These sources are a significant distance from the population centers of the Kansas City metropolitan area and even more remote from the areas recording violations of the 8-hour standard. (See Tabs 3, 2 and 1.)

5. *Traffic and commuting patterns.* Daily VMT for Miami County during 1998 was approximately 1,030,000 miles compared to approximately 41,700,000 daily VMT for the recommended five county Kansas City nonattainment area. (See Tab 6.) VMT in Miami County is about 2.5 percent of the VMT in the five county area. Even though a significant percentage of the Miami County population commutes to the recommended five county Kansas City nonattainment area, this represents approximately 4400 people, which is less than 0.7 percent of the approximately 661,000 who work in the proposed five county Kansas City nonattainment area. (See Tab 7.) Mobile source controls in Miami County would have little effect in reducing ozone violations in the recommended

five county Kansas City nonattainment area.

6. *Expected growth.* Between 2000 and 2020, the population of Miami County is projected to increase by 9,475 persons, which is less than 3 percent of the projected growth of the recommended five county nonattainment area. (See Tab 2.) Industrial and manufacturing growth from the Kansas City metropolitan area is not expected to expand into Miami County for the foreseeable future. (See Tab 15.)

7. *Meteorology.* Miami County is upwind from those areas of the Kansas City MSA experiencing ozone violations. (See Tabs 1 and 10.) However, precursor emissions attributable to Miami County are insignificant in relation to precursor emissions within the recommended five county Kansas City nonattainment area. (See Tab 5.)

8. *Geography/topography.* The terrain in the Miami County area is relatively flat and should have no discernable effect on ozone formation or transport of precursor emissions. (See Tab 13.)

9. *Jurisdictional boundaries.* The proposal to exclude Miami County does not impact any traditional jurisdictional boundaries other than the MSA and, in fact, will maintain the integrity of the existing Kansas City 1-hour ozone maintenance area.

10. *Level of control of emissions.* The emissions sources in Miami County are subject to state SIP rules and federal rules of general applicability, such as NSPS, NESHAPS, MACT and PSD.

11. *Regional emission reductions.* The emission sources in Miami County are not subject to the NOx SIP call or other enforceable regional strategies.

JUSTIFICATION FOR EXCLUSION OF LEAVENWORTH COUNTY

Recommendation. It is recommended that Leavenworth County be excluded from the area designated nonattainment in and around Kansas City for the remanded 8-hour standard. An evaluation of the eleven factors specified in EPA's March 28, 2000 memo provided no basis for including Leavenworth County in the Kansas City nonattainment area. Furthermore, there is no demonstration that controlling ozone precursor emissions, either current or projected, in Leavenworth County will contribute to the goal of attaining the remanded 8-hour standard in Kansas City.

General description.

Leavenworth County is primarily a rural county located west of the recommended five county nonattainment area. (See Tabs 1 and 11.) Population and emissions sources are primarily situated in the Northeast corner of Leavenworth County, directly west of the monitors in Platte

and Clay counties in Missouri that have recorded violations of the remanded 8-hour standard. (See Tabs 2, 3 and 1.) The high density population area of metropolitan Kansas City is sufficiently southeast of the Leavenworth County border to provide a significant buffer between Leavenworth County and the urban growth areas of Kansas City. (See Tab 2.)

Application of eleven factors.

1. *Emissions and air quality in Leavenworth County.* Anthropogenic VOC and NOx emissions in Leavenworth County are only 3.3 percent and 4 percent, respectively, of what the VOC and NOx emissions are in the recommended five county Kansas City nonattainment area. (See Tab 5.) There is no evidence that reducing, or even completely eliminating, anthropogenic VOC and NOx emissions in Leavenworth County would reduce ozone violations in those areas of the Kansas City region which have recorded violations of the remanded 8-hour ozone standard.

   There are no ozone monitors in Leavenworth County. Though modeling conducted by EPA suggests that the 4th daily maximum 8-hour average in Leavenworth County would have exceeded the 8-hour standard based upon model inputs simulating June/July/August, 1995 episodes, monitoring data from that period indicates the model skewed the high ozone predictions to the west. (See Tabs 14 and 8.) Wind directions (Tab 10) and actual monitor readings (Tab 8) demonstrate that the majority and the highest readings during this period were in Clay County, Missouri, which had a modeled a 4th daily maximum 8-hour average below the standard. (See Tab 14.) In addition, the large grid cells used in the modeling extended over jurisdictional boundaries, resulting in entire counties being labeled with a modeled ozone concentration though only a small portion of the county may have been within the grid cell. With no monitoring data demonstrating a violation in Leavenworth county, with historical data demonstrating the highest readings normally occur over central Clay County and diffuse outwardly from there, and with wind direction (Tab 10), population (Tab 2), source location (Tab 3), VMT (Tab 6) and terrain (Tab 13) taken into account, ozone levels in Leavenworth County can not be established in violation of the remanded 8-hour ozone standard.

2. *Population density and degree of urbanization including commercial development in Leavenworth County.* Population density, degree of urbanization and commercial development through the foreseeable future is not expected to contribute to, or exacerbate, ozone violations in the Kansas city area.

   Gross population density in Leavenworth County for 1997 is .75 persons per acre. This compares to 2.13 persons per acre for the recommended five county Kansas City nonattainment area. The .75 persons per acre figure increased only .01 persons per acre for Leavenworth County between 1992 and 1997. (See Tab 11.)

   More than 68% of Leavenworth County land was in farms in 1997. (See Tab 12.) Urban

and commercial development in Leavenworth County is primarily in the northeast portion, centered primarily around the towns of Leavenworth and Lansing, independent of the Kansas City metropolitan area. (See Tab 2, 3 and 4.) Though commercial development is expected to continue in Leavenworth County, the development is expected to remain associated with the towns of Leavenworth and Lansing. Industrial and manufacturing growth associated with the Kansas City metropolitan area is not expected to expand into Leavenworth County for the foreseeable future. (See Tab 15.)

3. *Monitoring data representing ozone concentrations in local areas and larger areas.* There are no ozone monitors in Leavenworth County. However, Leavenworth County is directly west of the monitors which recorded violations during the 1997 through 1999 time period. (See Tabs 1 and 8.) See paragraph 1. above for additional discussion regarding expected ozone concentrations in Leavenworth County.

4. *Location of emission sources.* Emission sources in Leavenworth County are primarily located in the northeastern quadrant, northwest of the majority of population, sources and VMT in the recommended Kansas City ozone nonattainment area. (See Tabs 2, 3 and 6.) The emission sources are also primarily located due west of the monitors in Platte and Clay County, Missouri, which have recorded violations of the remanded 8-hour standard. (See Tabs 1 and 3.) Since winds are usually from the south/southeast, south, or south/southwest when exceedences are recorded, emissions from sources in Leavenworth County would not contribute to the exceedences recorded. (See Tab 10.)

5. *Traffic and commuting patterns.* Daily VMT for Leavenworth County during 1998 was approximately 1,400,000 miles compared to approximately 41,700,000 daily VMT for the recommended five county Kansas City nonattainment area. (See Tab 6.) VMT in Leavenworth County is about 3.4 percent of the VMT in the five county area. The vast majority of workers living in Leavenworth County work in Leavenworth County. Approximately 5,700 workers commute to the recommended five county Kansas City nonattainment area, which is less than 0.9 percent of the approximately 661,000 who work there. (See Tab 7.) Mobile source controls in Leavenworth County would have little effect in reducing ozone formation in the recommended five county Kansas City nonattainment area.

6. *Expected growth.* Between 2000 and 2020, the population of Leavenworth County is projected to increase by 18,642 persons, which is approximately 6 percent of the projected growth in the recommended five county nonattainment area. (See Tab 2.) The majority of the expected growth will be associated with the cities of Leavenworth and Lansing, not the Kansas City metropolitan area. Industrial and manufacturing growth from the Kansas City metropolitan area is not expected to expand into Leavenworth County for the foreseeable future. (See Tab 15.)

7. *Meteorology.* The majority of the population and emission sources in Leavenworth

County are directly west of those areas of the Kansas City MSA experiencing ozone violations. (See Tabs 1 and 2.) Since the winds during ozone episodes in Kansas City are predominantly from the south, precursor emissions attributable to Leavenworth County have little, if any, impact on ozone violations in the recommended five county Kansas City nonattainment area. (See Tab 10.)

8. *Geography/topography.* The terrain in the Leavenworth County area is relatively flat and should have no discernable effect on ozone formation or transport of precursor emissions, though the somewhat higher elevation with the river boundary on the east may have some effect on transport of ozone into Leavenworth County. (See Tab 13.)

9. *Jurisdictional boundaries.* The proposal to exclude Leavenworth County does not impact any traditional jurisdictional boundaries other than the MSA and, in fact, will maintain the integrity of the existing Kansas City 1-hour ozone maintenance area.

10. *Level of control of emissions.* The emissions sources in Leavenworth County are subject to state SIP rules and federal rules of general applicability, such as NSPS, NESHAPS, MACT and PSD.

11. *Regional emission reductions.* The emission sources in Leavenworth County are not subject to the NOx SIP call or other enforceable regional strategies.

NO COUNTIES OUTSIDE THE KANSAS CITY MSA SHOULD BE INCLUDED

No counties outside the Kansas City MSA should be included within the boundary of the Kansas City nonattainment area. Two additional counties were discussed and included in public meetings held regarding ascertaining the appropriate boundary for the recommended Kansas City nonattainment area - Douglas County and Linn County.

DOUGLAS COUNTY

Douglas County, designated a separate MSA by the U.S. Department of Commerce, is west of the Kansas City MSA. (See Tabs 1 and 14.) The population and point sources within Douglas County are primarily located near the city of Lawrence in the north central portion of the county. (See Tabs 2 and 3.) The vast majority of workers residing in Douglas County work in Douglas County, though approximately 4000 work in the recommended five county 8-hour ozone nonattainment area. (See Tab 7.) Commercial expansion in Douglas County is expected to be primarily in the Lawrence area. Industrial and manufacturing growth from the Kansas City metropolitan area is not expected to expand into Douglas County for the foreseeable future. (See Tab 15.) No ozone monitoring has occurred during the 1997 though 1999 period in Douglas County and no modeling has inferred a violation in Douglas County. (See Tab 1.)

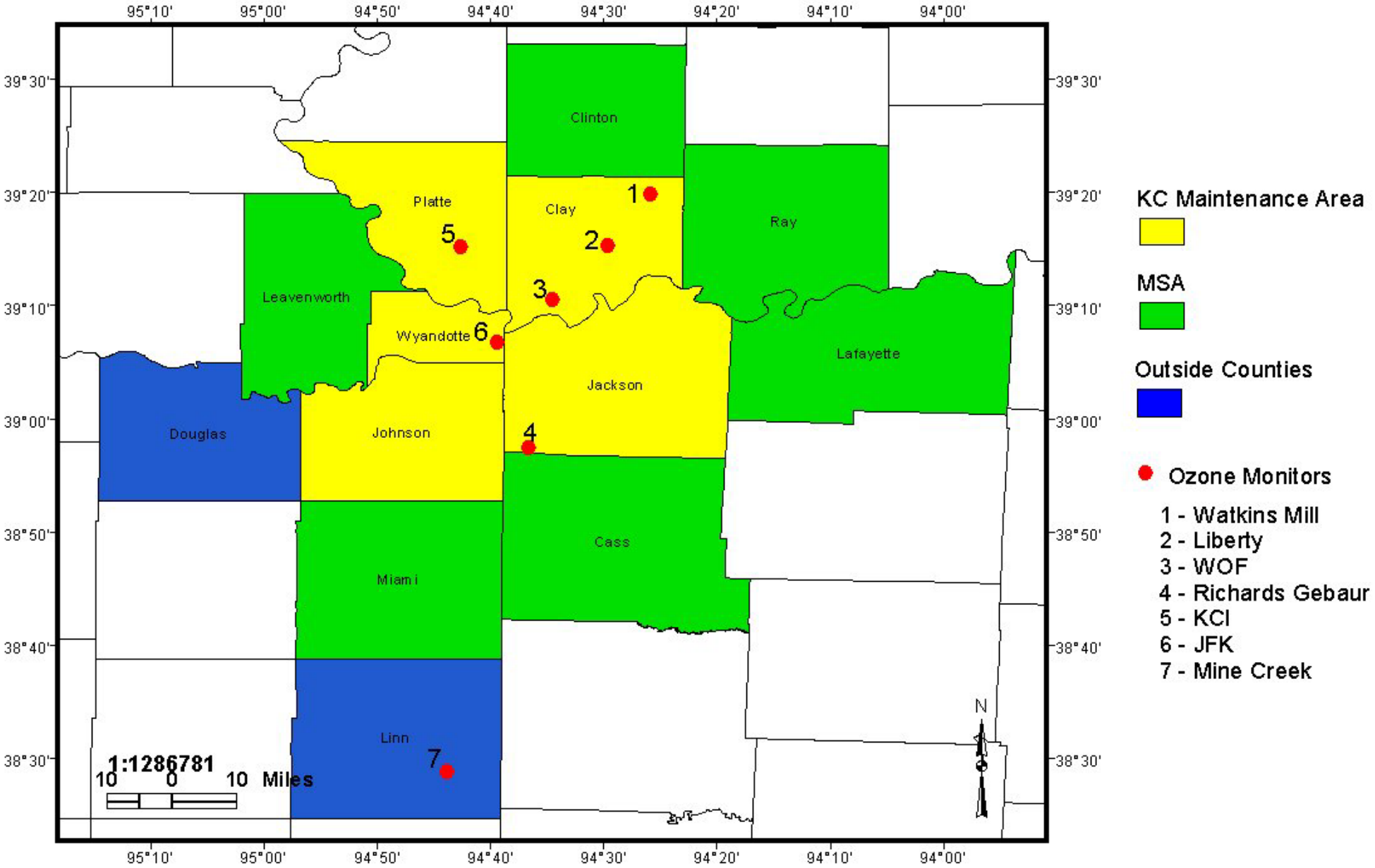
There is no evidence to support inclusion of Douglas County in the Kansas City

nonattainment area. Controlling ozone precursor emissions in Douglas County would not contribute to reducing ozone violations in the recommended five county Kansas City 8-hour ozone nonattainment area.

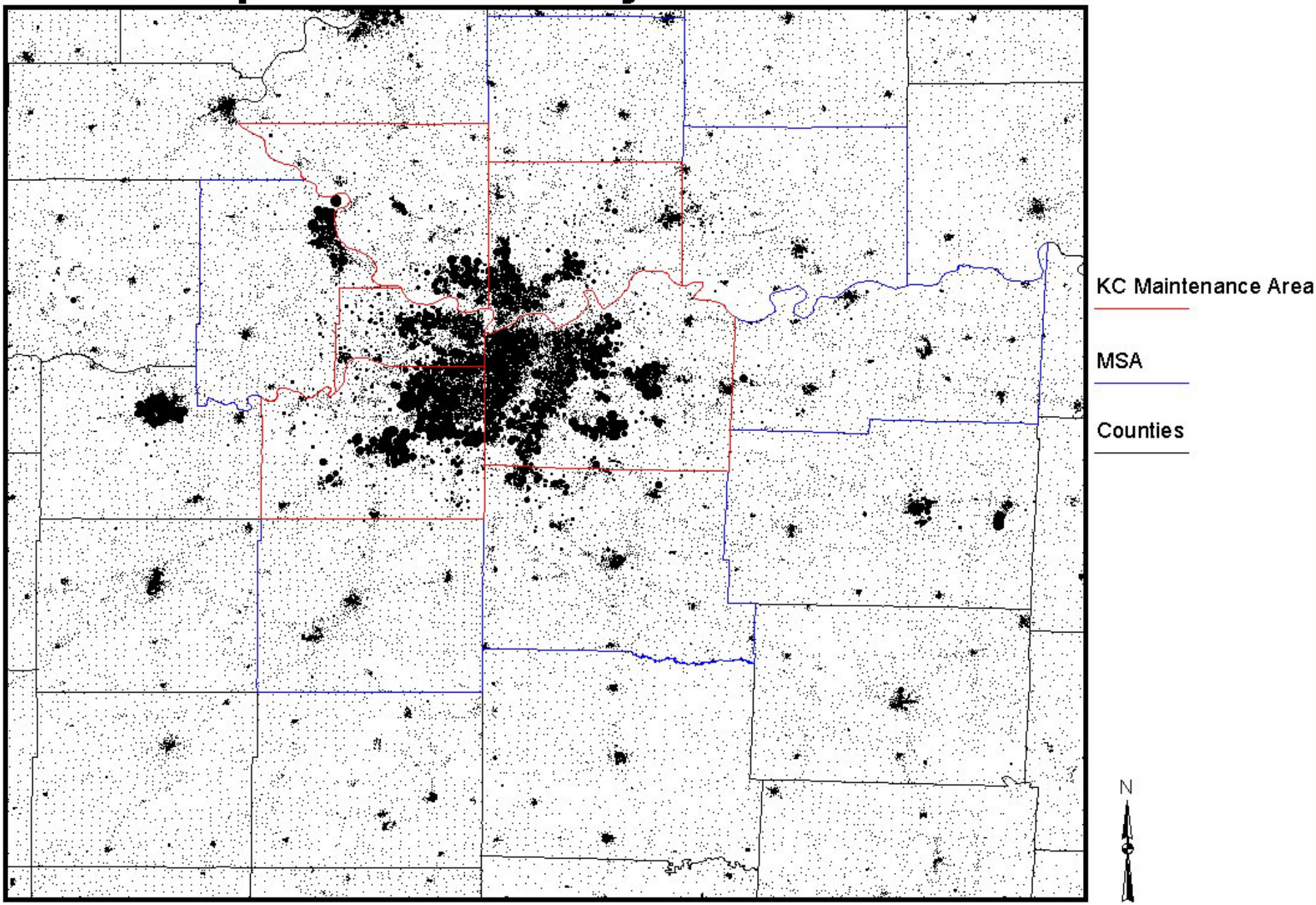
LINN COUNTY

Linn County is a rural county well to the south of the Kansas City MSA. (See Tabs 1 and 11.) The sole reason for considering inclusion of Linn County within the Kansas City nonattainment area is due to the emissions from a major NOx source located within Linn County. (See Tab 4.) However, if it is determined that emissions from the source are contributing to ozone formation in the Kansas City area, those emissions can be addressed without designating the county nonattainment. A regional photochemical modeling study is currently underway for the Kansas City area to determine contribution to ozone formation in Kansas City and to develop effective regional control strategies if appropriate.

MSA for 8-hour Ozone Designation
Kansas - Missouri



Population Density from 1990 Census



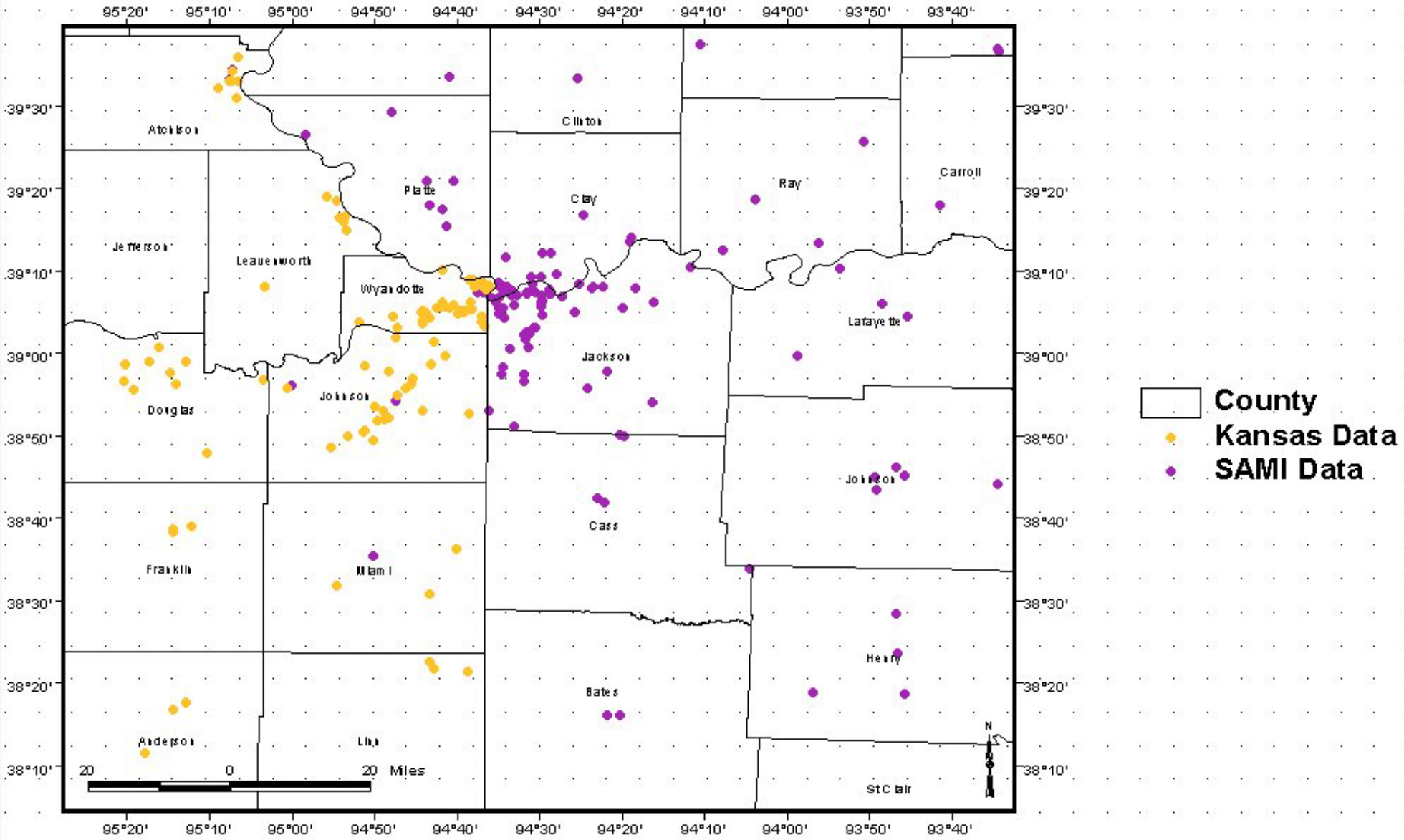
Population By County

		Estimates			Forecasts				
		1990	1999	Change	2000	2010	2020	Change	Source:
Kansas	Douglas	81,798	98,343	16,545	101,459	121,377	141,294	39,835	KS
	Johnson	355,021	440,198	85,177	446,092	531,321	633,110	187,018	MARC
	Leavenworth	64,371	71,766	7,395	73,749	83,061	92,373	18,624	KS
	Linn	8,254	9,296	1,042	9,495	9,832	10,624	1,129	KS
	Miami	23,466	27,083	3,617	28,190	32,928	37,665	9,475	KS
	Wyandotte	162,026	151,379	(10,647)	151,577	146,095	143,914	(7,663)	MARC
Missouri	Cass	63,808	83,099	19,291	81,248	97,637	117,351	36,103	MARC
	Clay	153,411	180,111	26,700	178,167	201,287	228,717	50,550	MARC
	Clinton	16,595	19,522	2,927	18,205	19,555	20,545	2,340	MO
	Jackson	633,234	654,484	21,250	653,264	672,813	697,954	44,690	MARC
	Johnson	42,514	48,053	5,539	50,787	58,115	64,748	13,961	MO
	Lafayette	31,107	32,810	1,703	31,753	32,770	34,000	2,247	MO
	Platte	57,867	71,688	13,821	71,603	84,461	99,778	28,175	MARC
	Ray	21,968	23,759	1,791	22,993	23,958	25,125	2,132	MARC
	Total	1,715,440	1,911,591	196,151	1,918,582	2,115,210	2,347,198	428,616	
	MSA	1,582,874	1,755,899	173,025	1,756,841	1,925,886	2,130,532	373,691	
	5-Co	1,361,559	1,497,860	136,301	1,500,703	1,635,977	1,803,473	302,770	
	5-Co % of Total	79%	78%	69%	78%	77%	77%	71%	
	5-Co % of MSA	86%	85%	79%	85%	85%	85%	81%	

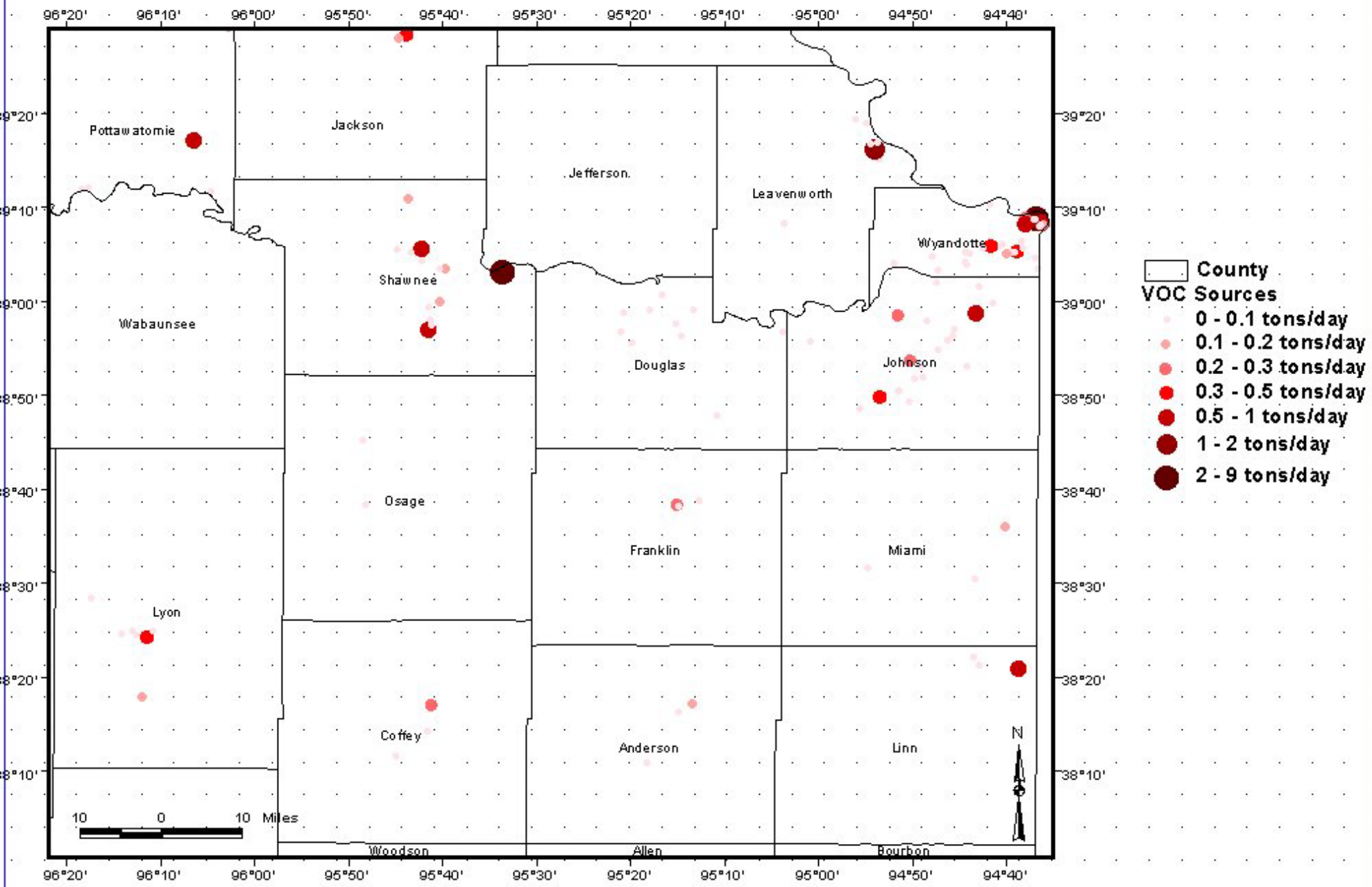
Sources:
U.S. Bureau of the Census, Population Estimates, 1990 - 1999
MARC: Mid-America Regional Council, 1997 Long-Range Forecasts, 1990 - 2020
KS: State of Kansas, The Governor's Economic and Demographic Report - 1999-2000
MO: State of Missouri, Office of Administration, Budget and Planning - 1994 (Recent Migration Scenario)

Where more than one forecast existed for a county, the highest forecast is displayed above.

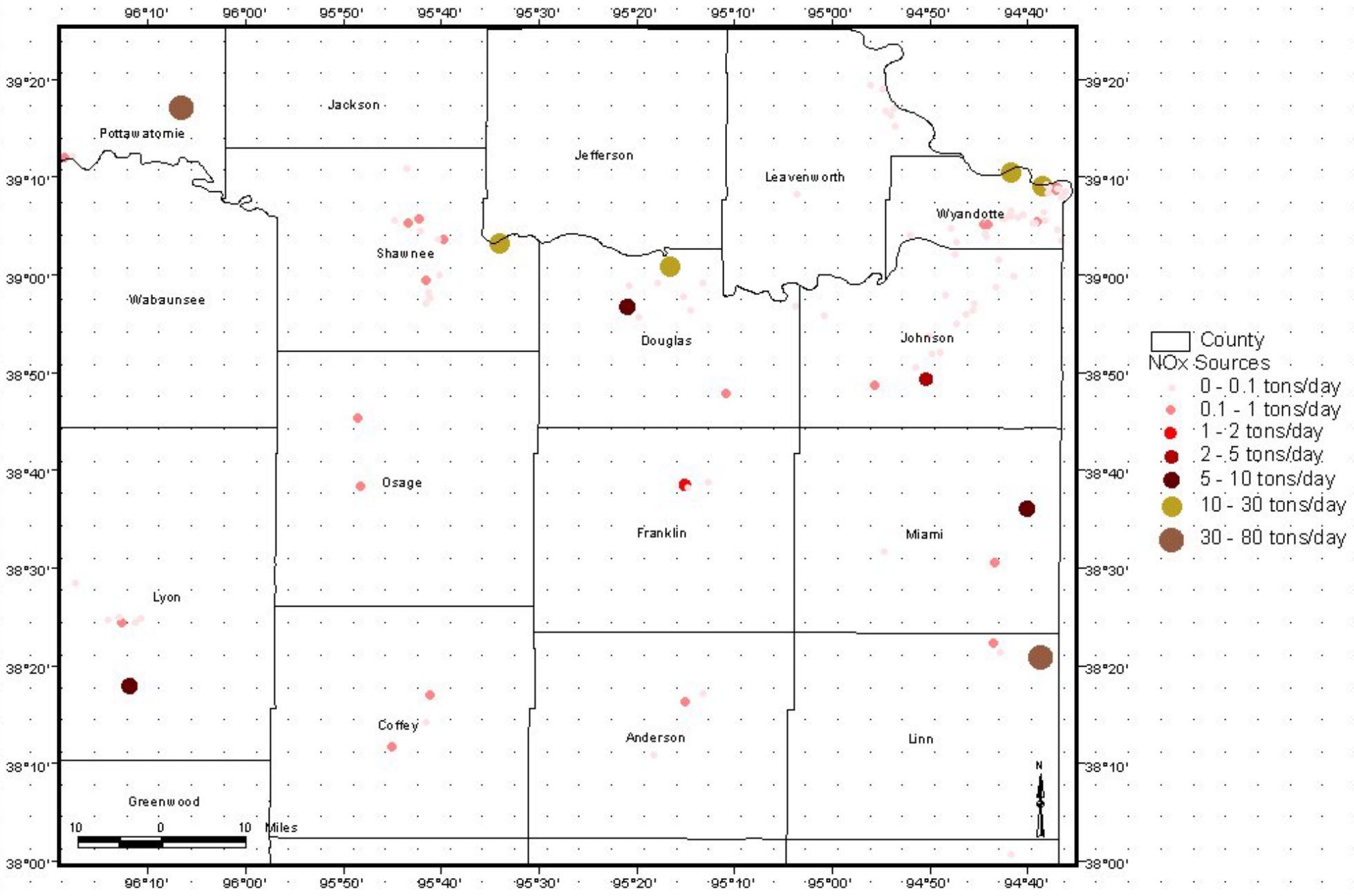
Point Sources with VOC or NOx Emissions



Kansas VOC Sources



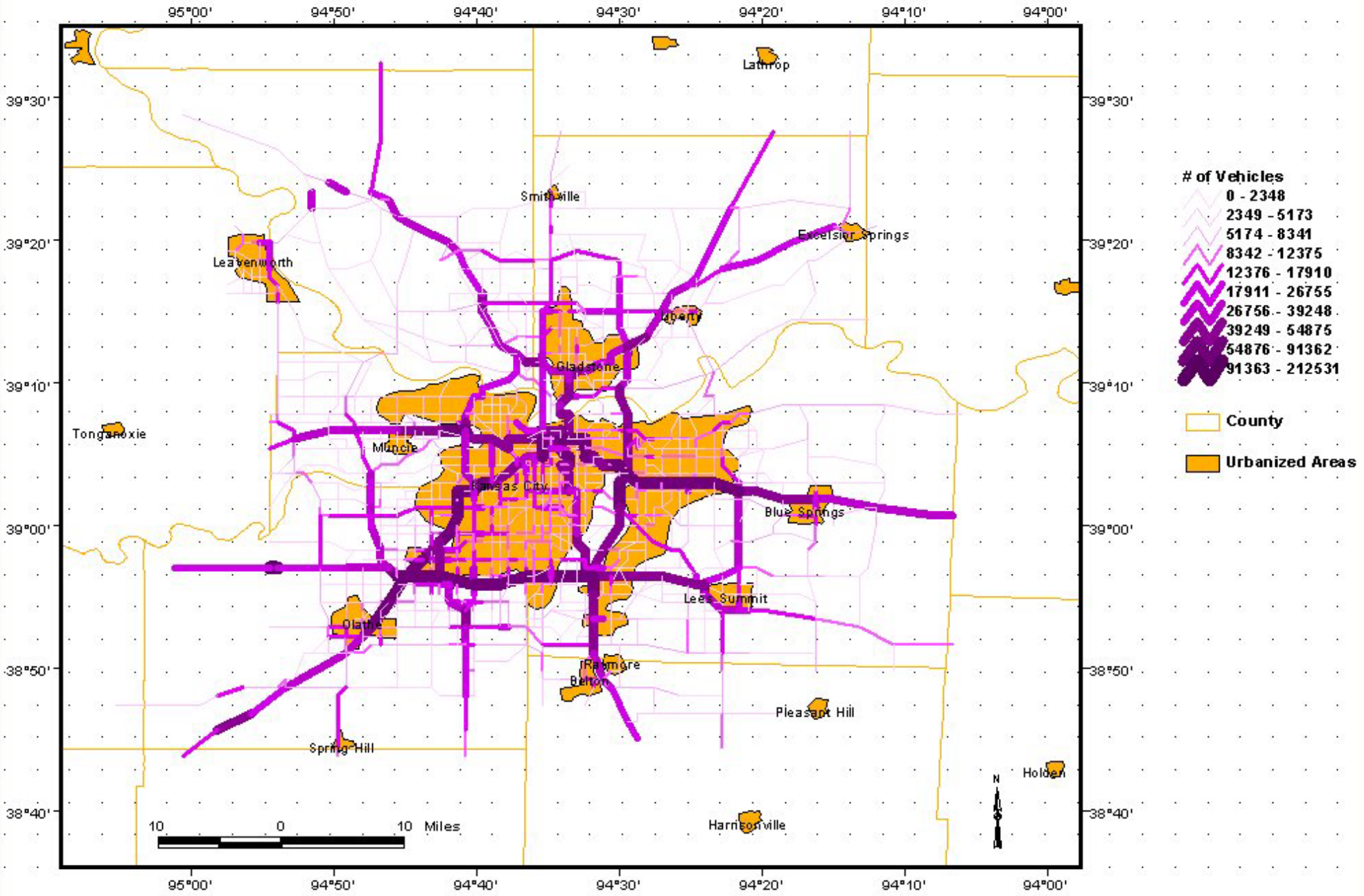
Kansas NOx Sources



Version 3 E[illegible]NET1996 KC Area Ozone Season Day Emissions (tons/day)
Biogenic data from EPA web site

	Point			Area			Mobile			Total (Point+Area+Mobile)			Biogenic
Kansas Counties													
Wyandotte	Total	% MSA	% 5 County	Total	% MSA	% 5 County	Total	% MSA	% 5 County	Total	% MSA	% 5 County	Total
VOC	4.37	20.0%	21.8%	23.53	10.2%	11.8%	12.70	11.7%	13.1%	**41.2**	11.5%	13.0%	11.92
NOx	29.94	22.1%	23.7%	46.54	23.0%	26.4%	14.07	9.8%	11.6%	**91.5**	25.4%	28.9%	0.17
Johnson													
VOC	0.69	3.1%	3.4%	53.10	23.1%	26.6%	29.58	27.2%	30.5%	**83.9**	23.3%	26.5%	13.46
NOx	3.42	2.5%	2.7%	80.40	39.8%	45.6%	34.46	24.0%	28.5%	**119.2**	33.1%	37.7%	0.98
Leavenworth													
VOC	0.88	4.0%	4.4%	6.99	3.0%	3.5%	2.55	2.3%	2.6%	**10.6**	2.9%	3.3%	18.20
NOx	0.01	0.0%	0.0%	8.18	4.0%	4.6%	4.49	3.1%	3.7%	**12.8**	3.5%	4.0%	1.92
Miami													
VOC	0.47	2.2%	2.4%	4.03	1.8%	2.0%	1.60	1.5%	1.6%	**6.2**	1.7%	2.0%	16.40
NOx	8.56	6.3%	6.8%	4.11	2.0%	2.3%	3.09	2.1%	2.6%	**15.9**	4.4%	5.0%	1.93
Missouri Counties													
Platte													
VOC	0.80	3.7%	4.0%	9.26	4.0%	4.6%	3.78	3.5%	3.9%	**14.0**	3.9%	4.4%	1.78
NOx	14.29	10.6%	11.3%	7.30	3.6%	4.1%	5.87	4.1%	4.9%	**27.8**	7.7%	8.8%	2.98
Jackson													
VOC	4.46	20.5%	22.3%	92.58	40.3%	46.4%	41.28	38.0%	42.6%	**139.6**	38.8%	44.1%	5.78
NOx	78.46	58.0%	62.0%	33.24	16.5%	18.9%	53.40	37.1%	44.2%	**166.7**	46.3%	52.7%	4.28
Clay													
VOC	9.68	44.4%	48.4%	20.99	9.1%	10.5%	9.48	8.7%	9.8%	**41.3**	11.5%	13.1%	11.76
NOx	0.45	0.3%	0.4%	8.75	4.3%	5.0%	13.04	9.1%	10.8%	**22.3**	6.2%	7.1%	4.12
Cass													
VOC	0.01	0.1%	0.1%	7.81	3.4%	3.9%	3.82	3.5%	4.0%	**11.7**	3.3%	3.7%	17.83
NOx	0.16	0.1%	0.1%	4.21	2.1%	2.4%	6.99	4.9%	5.8%	**11.4**	3.2%	3.6%	2.20
Lafayette													
VOC	0.43	2.0%	2.2%	4.71	2.0%	2.4%	1.47	1.4%	1.5%	**6.7**	1.9%	2.1%	6.66
NOx	0.01	0.0%	0.0%	4.59	2.3%	2.6%	3.25	2.3%	2.7%	**7.9**	2.2%	2.5%	3.51
Ray													
VOC	0.02	0.1%	0.1%	3.94	1.7%	2.0%	1.28	1.2%	1.3%	**5.3**	1.5%	1.7%	11.03
NOx	0.01	0.0%	0.0%	2.62	1.3%	1.5%	2.87	2.0%	2.4%	**5.5**	1.5%	1.8%	1.79
Clinton													
VOC	0.00	0.0%	0.0%	2.66	1.2%	1.3%	1.01	0.9%	1.0%	**3.7**	1.0%	1.2%	5.47
NOx	0.00	0.0%	0.0%	2.00	1.0%	1.1%	2.28	1.6%	1.9%	**4.3**	1.2%	1.4%	1.60
VOC MSA Total	**21.8**			**229.6**			**108.5**			**359.9**			**120.3**
VOC 5 County Total	**20.0**	**91.7%**		**199.4**	**86.9%**		**96.8**	**89.2%**		**316.3**			**44.7**
NOx MSA Total	**135.3**			**201.9**			**143.8**			**481.1**			**25.5**
NOx 5 County Total	**126.6**	**93.5%**		**176.2**	**87.3%**		**120.8**	**84.0%**		**423.6**			**12.5**
Outside Counties													
Linn													
VOC	0.73	3.4%	3.7%	1.86	0.8%	0.9%	0.86	0.8%	0.9%	**3.5**	1.0%	1.1%	22.84
NOx	107.26	79.3%	84.8%	2.37	1.2%	1.3%	1.74	1.2%	1.4%	**113.0**	31.4%	35.7%	1.83
Douglas													
VOC	0.49	2.3%	2.5%	11.25	4.9%	5.6%	5.14	4.7%	5.3%	**17.0**	4.7%	5.4%	10.47
NOx	32.73	24.2%	25.9%	14.96	7.4%	8.5%	5.75	4.0%	4.8%	**54.1**	15.0%	17.1%	2.04

MARC Traffic Network



ESTIMATED 1998 DAILY VEHICLE MILES OF TRAVEL BY COUNTY IN KANSAS

NAME	1998 MILLION/DVMT	1990 MILLION/DVMT	% CHANGE
Douglas	2,325,018	1,706,376	36.25%
Johnson	11,845,793	8,908,242	32.98%
Leavenworth	1,399,471	1,110,169	26.06%
Linn	320,516	236,705	35.41%
Miami	1,030,401	711,993	44.72%
Wyandotte	4,564,794	4,261,690	7.11%

Source: KDOT Mileage and Travel Tables 1998 and 1990

ESTIMATED DAILY VEHICLE MILES OF TRAVEL BY COUNTY IN MISSOURI

NAME	STATE 1990 ADVMT	STATE 1998 ADVMT	OFF-STATE 1990 AAVMT	OFF-STATE 1990 ADVMT	TOTAL 1990 ADVMT	OFF-STATE 1998 ADVMT	TOTAL 1998 ADVMT	% CHANGE
Buchanan	1,127,257	1,466,297	248,789,000	681,614	1,808,871	886,620	2,352,917	30.08%
Cass	1,269,985	1,848,112	153,708,000	421,118	1,691,103	612,821	2,460,933	45.52%
Clay	2,986,021	4,270,656	436,612,000	1,196,197	4,182,218	1,710,821	5,981,477	43.02%
Clinton	457,644	680,263	32,183,000	88,173	545,817	131,064	811,327	48.64%
Jackson	7,941,181	9,827,140	1,884,927,000	5,164,184	13,105,365	6,390,631	16,217,771	23.75%
Johnson	881,399	1,045,974	79,103,000	216,721	1,098,120	257,187	1,303,161	18.67%
Lafayette	1,202,918	1,360,578	60,800,000	166,575	1,369,493	188,407	1,548,985	13.11%
Platte	1,843,411	2,451,397	180,441,000	494,359	2,337,770	657,406	3,108,803	32.98%
Ray	296,229	375,572	59,285,000	162,425	458,654	205,929	581,501	26.78%

Source:

MoDOT State System Vehicles Miles of Travel & Monthly Variations of Traffic- 1990 and 1998
MoDOT Estimated Non-State System VMT- 1990

	1998	1990	% Change
TOTAL VMT (5-Counties)	41,718,638	32,795,285	27.21%
TOTAL VMT (15-Counties)	55,852,867	43,532,584	28.30%
PERCENT 5 CO of 15 CO	74.69%	75.34%	

ESTIMATED 1998 DAILY VEHICLE MILES OF TRAVEL BY COUNTY IN KANSAS

NAME	1998 MILLION/DVMT	1990 MILLION/DVMT	% CHANGE
Douglas	2,325,018	1,706,376	36.25%
Johnson	11,845,793	8,908,242	32.98%
Leavenworth	1,399,471	1,110,169	26.06%
Linn	320,516	236,705	35.41%
Miami	1,030,401	711,993	44.72%
Wyandotte	4,564,794	4,261,690	7.11%

Source: KDOT Mileage and Travel Tables 1998 and 1990

Where People Work Who Live in Kansas

State	No. of Workers	St/County Pct	Reside In St/County	C/MSA or County Journey To C/MSA or County
Kansas				
	40,660	KS	Douglas C	Lawrence, KS
	33,159	82	KS	Douglas C Lawrence, KS
	2,717	7	KS	Johnson C Kansas City, MO
	2,226	5	KS	Shawnee C Topeka, KS
	871	2	MO	Jackson C Kansas City, MO
	480	1	KS	Wyandotte Kansas City, MO
	193,006	KS	Johnson C	Kansas City, MO
	120,204	62	KS	Johnson C Kansas City, MO
	47,728	25	MO	Jackson C Kansas City, MO
	14,835	8	KS	Wyandotte Kansas City, MO
	2,883	1	MO	Clay Coun Kansas City, MO
	27,757	KS	Leavenwor	Kansas City, MO
	20,713	75	KS	Leavenwor Kansas City, MO
	2,750	10	KS	Wyandotte Kansas City, MO
	1,484	5	KS	Johnson C Kansas City, MO
	1,074	4	MO	Jackson C Kansas City, MO
	656	2	KS	Douglas C Lawrence, KS
	402	1	MO	Platte Cou Kansas City, MO
	3,000	KS	Linn Co	Linn Co, KS
	1,807	60	KS	Linn Count Linn Co, KS
	364	12	KS	Johnson C Kansas City, MO
	264	9	KS	Miami Cou Kansas City, MO
	108	4	MO	Jackson C Kansas City, MO
	102	3	KS	Bourbon C Bourbon Co, KS
	91	3	KS	Wyandotte Kansas City, MO
	62	2	KS	Anderson C Anderson Co, KS
	41	1	MO	Bates Cou Bates Co, MO
	39	1	KS	Allen Coun Allen Co, KS
	10,943	KS	Miami Co	Kansas City, MO
	5,634	51	KS	Miami Cou Kansas City, MO
	3,629	33	KS	Johnson C Kansas City, MO
	686	6	MO	Jackson C Kansas City, MO
	386	4	KS	Wyandotte Kansas City, MO
	133	1	KS	Linn Count Linn Co, KS
	68,966	KS	Wyandotte	Kansas City, MO
	36,867	53	KS	Wyandotte Kansas City, MO
	14,791	21	KS	Johnson C Kansas City, MO
	13,351	19	MO	Jackson C Kansas City, MO
	1,615	2	MO	Clay Coun Kansas City, MO
	878	1	MO	Platte Cou Kansas City, MO

1990 US CENSUS JOURNEY TO WORK INFORMATION

CTPP-Census Transportation Planning Package

Destination

Origin		KS Dougla	KS Johnson	KS Leaven	KS Linn	KS Miami	KS Wyand	MO Buchan	MO Cass	MO Clay	MO Clinto	MO Jackson	MO Johnson	MO Lafaye	MO Platte	MO Ray	Everywher
KS	Douglas	31588	2717	303	0	48	480	0	0	53	0	871	0	0	36	0	39089
KS	Johnson, KS	816	113792	430	26	408	14835	54	387	2883	0	47728	44	15	1437	8	186594
KS	Leavenworth	656	1484	19826	0	17	2750	12	0	208	0	1077.5	0	0	402	0	26870
KS	Linn	4	364	3	1617	264	91	1	2	12	0	65.5	2.5	3.5	9	2	2810
KS	Miami	19	3629	2	133	5101	386	0	68	54	0	686	0	0	13	0	10410
KS	Wyandotte	128	14791	503	12	13	35828	19	60	1615	0	13351	7	8	878	15	67927
MO	Buchanan	5	185	108	0	12	240	30075	10	303	185	776	0	11	545	19	34565
MO	Cass	29	4055	0	9	69	771	2	9560	531	0	13904	203	11	80	0	29837
MO	Clay	20	3953	126	0	7	4403	207	108	34650	89	26353	42	35	6867	258	78221
MO	Clinton	0	202	10	0	0	251	518	3	1519	2469	842	4	0	345	52	6963
MO	Jackson	163	29941	181	23	61	11782	152	1715	10934	27	235708	486	362	2667	45	297651
MO	Johnson, MO	2	237	0	7	0	92	0	243	127	15	2138	14482	423	46	0	18808
MO	Lafayette	0	224	0	0	0	177	0	26	296	0	3809	422	7220	32	132	12897
MO	Platte	19	1975	835	0	0	1972	426	9	5319	23	8179	50	8	11187	3	30734
MO	Ray	1	306	2	0	0	415	4	0	2552	33	1648	13	301	219	3047	8831
	Everywhere	36510	182295	23470	2173	6539	76827	38571	12986	62655	3600	363736	17188	8867	25483	3849	

The information presented above is county level "journey to work" data taken from the census. The "everywhere" column/row at the end of (each direction) the table shows the total number of work trips originating from or destined to anywhere (including areas beyond the 15 counties listed above).

8-Hour Ozone Monitoring Data for Kansas City

	4th High 8-Hour Values (ppb)			97-99 Average	
	1997	1998	1999		
Liberty	98	95	82	91	(KC design value)
Watkins Mill	95	91	84	90	
KCI	90	90	76	85	
Worlds of Fun	82	86	82	83	
Wyandotte Co.	81	87	78	82	
Richards Gebaur	72	73	81	75	

8-hour ozone values >= 0.085 ppm in 1997

KCI

06/14	0.092
06/27	0.089
07/23	0.096
08/01	0.089
08/02	0.094
08/31	0.09

Liberty

07/19	0.097
07/24	0.098
07/26	0.085
08/01	0.111
08/02	0.088
08/03	0.091
08/27	0.099
08/28	0.102
08/29	0.085
09/06	0.088
10/05	0.086

Watkins Mill

04/18	0.085
07/19	0.096
07/24	0.093
07/26	0.085
08/01	0.107
08/27	0.095
08/28	0.098
09/06	0.087
10/05	0.088

Worlds of Fun

08/01	0.097
08/27	0.089
08/28	0.088

Wyandotte County

05/31	0.09
06/01	0.093
06/14	0.089

8-hour ozone values >= 0.085 ppm in 1998

KCI

05/20	0.091
08/15	0.089
08/19	0.091
08/21	0.09
09/05	0.097

Liberty

05/19	0.105
05/20	0.085
07/19	0.085
08/14	0.09
08/15	0.103
08/17	0.086
08/18	0.094
08/22	0.095
09/05	0.095
09/06	0.085
09/11	0.109

Watkins Mill

05/19	0.098
07/20	0.085
08/15	0.091
08/17	0.088
08/18	0.091
08/22	0.093
09/05	0.088
09/06	0.085
09/11	0.102

Worlds of Fun

08/14	0.091
08/15	0.091
08/18	0.085
08/22	0.086
09/05	0.091

Wyandotte County

08/15	0.089
08/19	0.091
08/20	0.087
08/21	0.086
09/05	0.113
09/06	0.085

8-hour ozone values >= 0.085 ppm in 1999

Liberty

07/27	0.087
08/16	0.089
09/01	0.095

Watkins Mill

08/16	0.09
09/01	0.092

Richards Gebaur

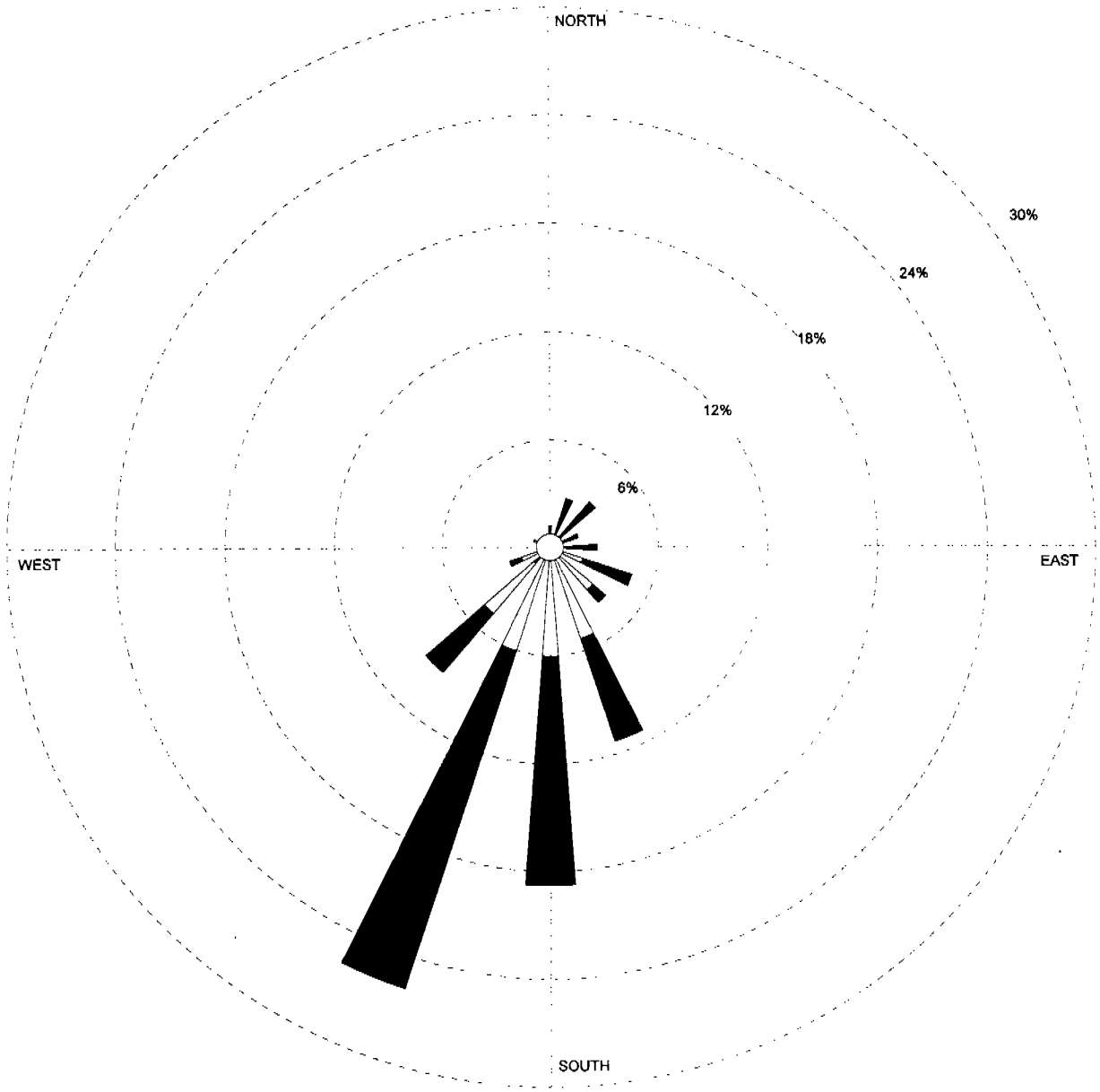
08/04	0.105
08/25	0.087

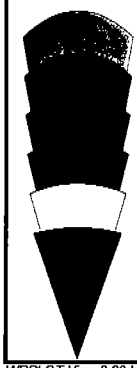
Worlds of Fun

09/01	0.086

WIND ROSE PLOT

STATION #03947 - KANSAS CITY/INT'L ARPT, MO



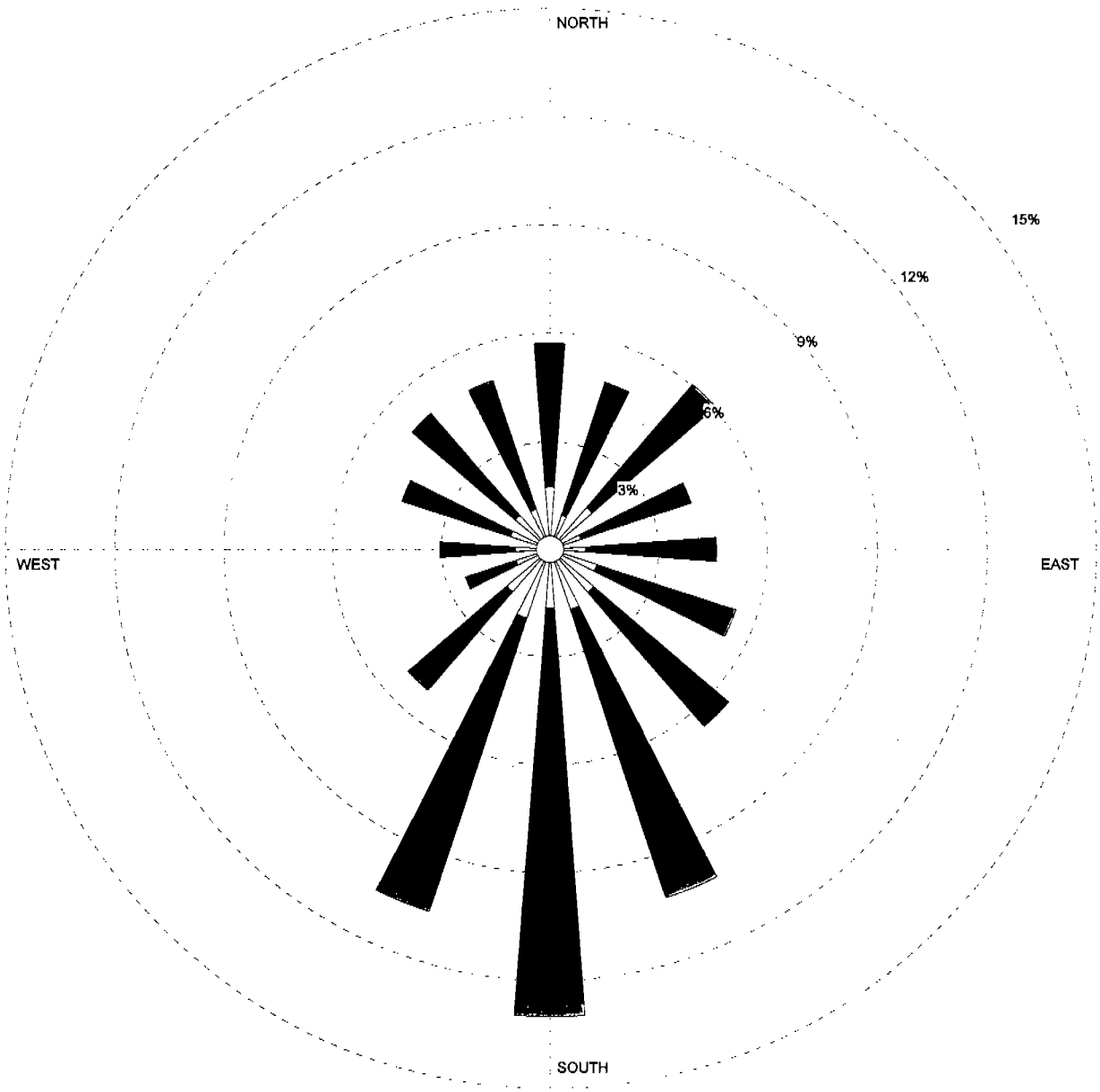


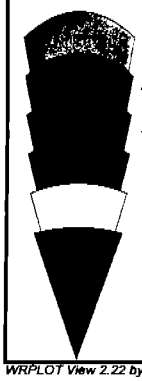
MODELER	DATE	COMPANY NAME
Douglas Watson	**05/18/2000**	**Kansas Department of Health and Environment**
DISPLAY	UNIT	COMMENTS
Wind Speed	**Knots**	**Wind plot of KANSAS CITY/INT'L ARPT, MO 1997, 1998, 1999 8-Hr Ozone Days >= 0.085 ppm**
AVG. WIND SPEED	CALM WINDS	
7.99 Knots	**8.72%**	
ORIENTATION	PLOT YEAR-DATE-TIME	PROJECT/PLOT NO.
Direction (blowing from)	**97 98 99 April 1 - October 31 7 AM - 6 PM**	**5**

WRPLOT View 2.22 by Lakes Environmental Software - www.lakes-environmental.com

WIND ROSE PLOT

STATION #03947 - KANSAS CITY/INT'L ARPT, MO





MODELER **Douglas Watson**	DATE **05/19/2000**	COMPANY NAME **Kansas Department of Health and Environment**
DISPLAY **Wind Speed**	UNIT **Knots**	COMMENTS **Wind plot of KANSAS CITY/INT'L ARPT, MO 1997, 1998, 1999 OZONE SEASON DAYS April 1-October 31**
AVG. WIND SPEED **9.88 Knots**	CALM WINDS **3.16%**	
ORIENTATION **Direction (blowing from)**	PLOT YEAR-DATE-TIME **97 98 99 April 1 - October 31 7 AM - 6 PM**	PROJECT/PLOT NO. **9**

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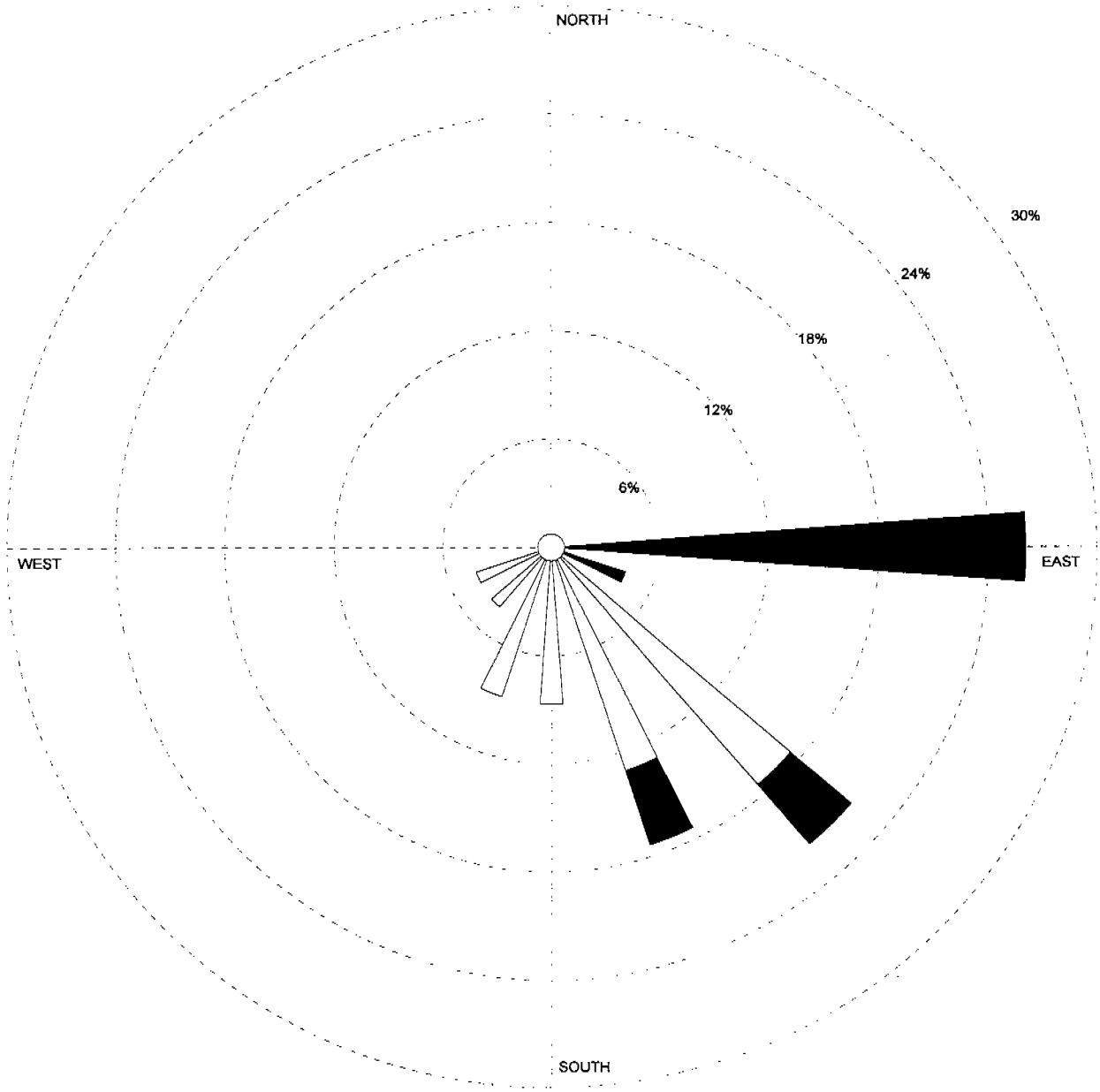
WIND ROSE PLOT

Station #03947 - KANSAS CITY/INT'L ARPT, MO

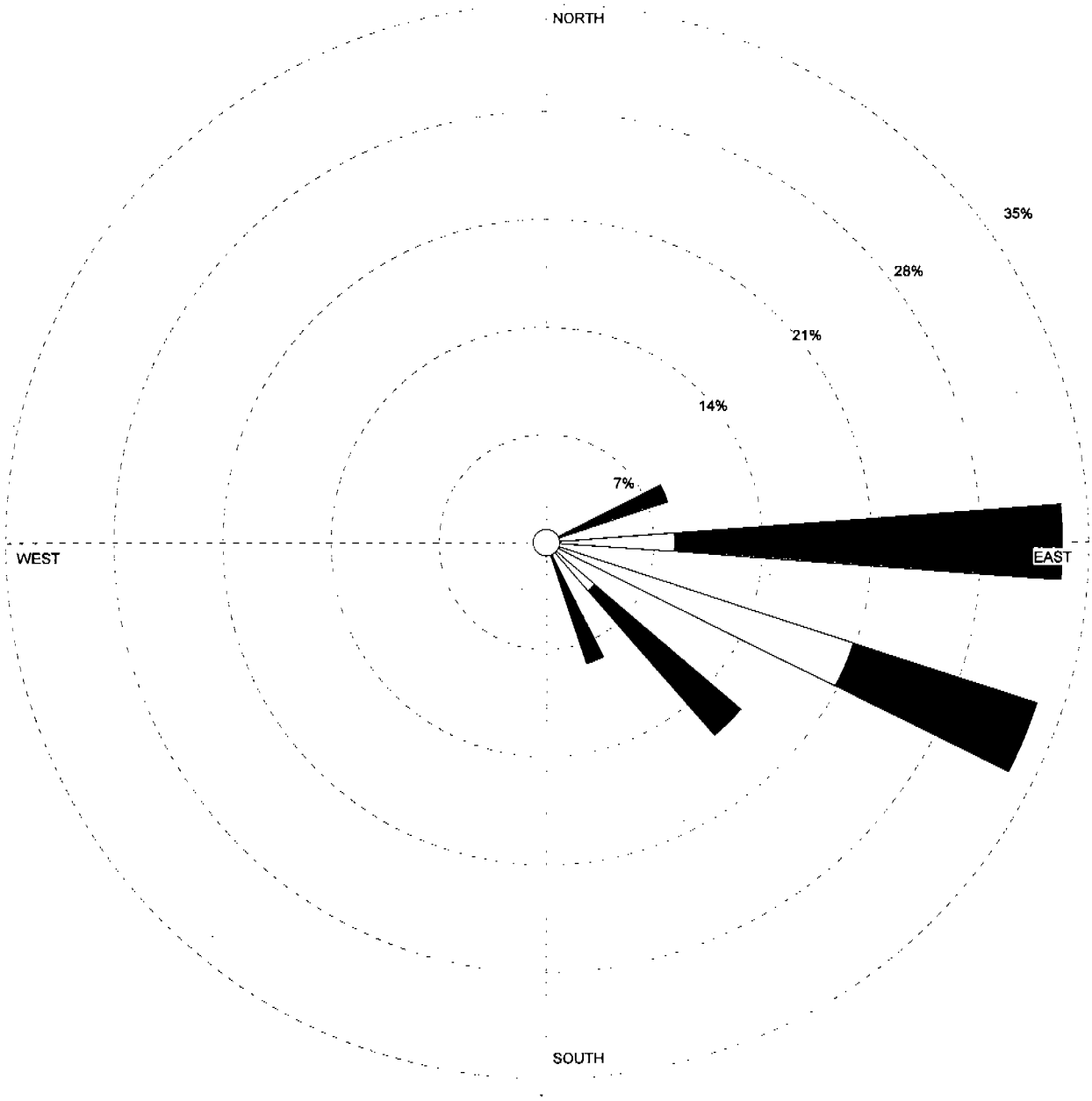


Wind Speed (Knots) > 21 17 - 21 11 - 16 7 - 10 4 - 6 1 - 3	MODELER **Douglas Watson**	DATE **06/15/2000**	ORGANIZATION NAME **Kansas Department of Health and Environment**
	DISPLAY **Wind Speed**	UNIT **Knots**	COMMENTS **Wind plot of KANSAS CITY/INT'L ARPT, MO Ozone Exceedance Day KCI, Wyandotte Co. September 4,1996**
	AVG. WIND SPEED **5.77 Knots**	CALM WINDS **4.35%**	
	ORIENTATION **Direction (blowing from)**	PLOT YEAR-DATE-TIME **1996 Sep 4 - Sep 4 Midnight - 11 PM**	PROJECT/PLOT NO. **1**

WRPLOT View 3.05 by Lakes Environmental Software - www.lakes-environmental.com

WIND ROSE PLOT

Station #03947 - KANSAS CITY/INT'L ARPT, MO



Wind Speed (Knots)

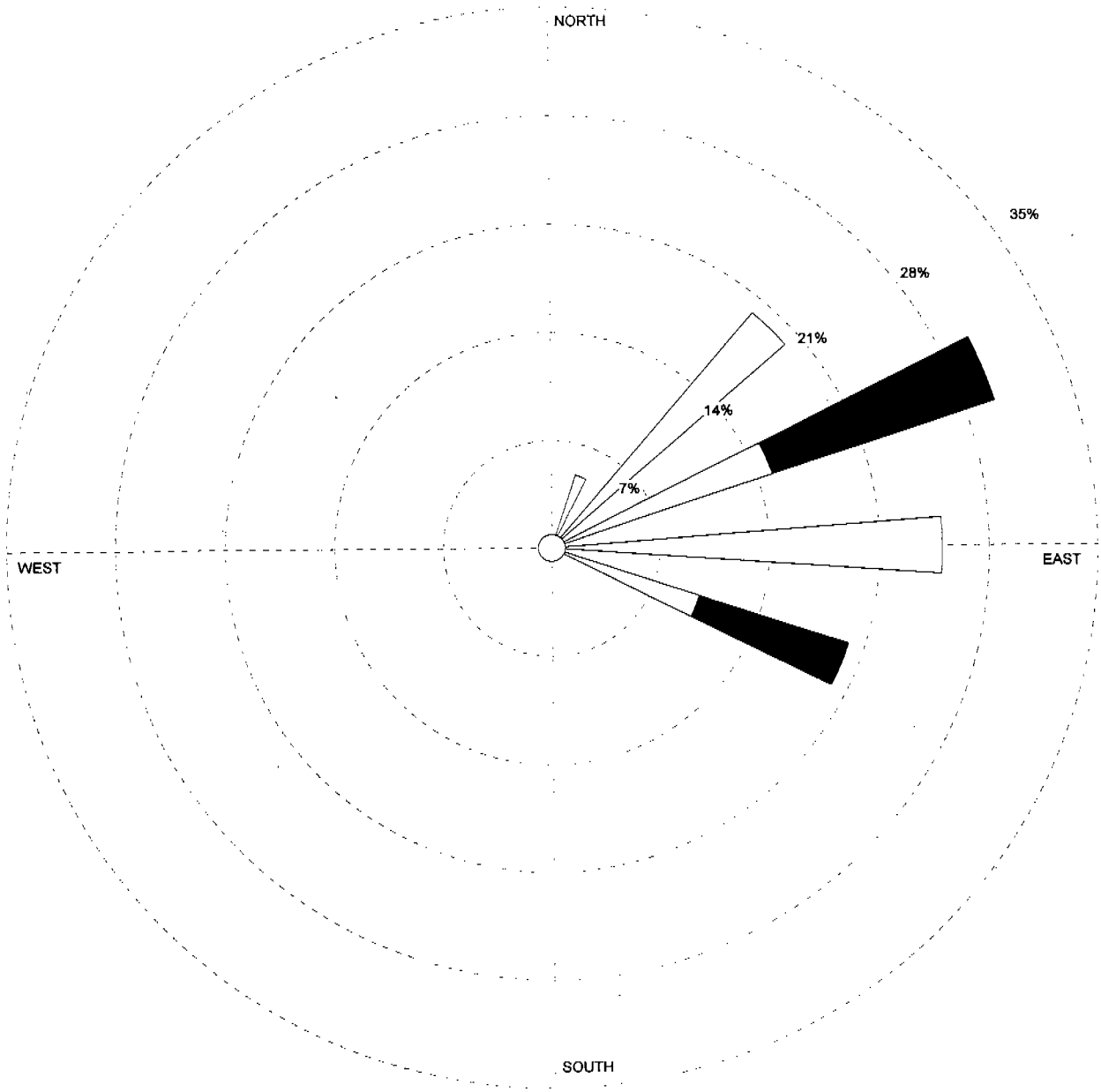
- > 21
- 17 - 21
- 11 - 16
- 7 - 10
- 4 - 6
- 1 - 3

MODELER	DATE	ORGANIZATION NAME
Douglas Watson	06/15/2000	Kansas Department of Health and Environment
DISPLAY: Wind Speed	UNIT: Knots	COMMENTS: Wind plot of KANSAS CITY/INT'L ARPT, MO Ozone Exceedance Day Wyandotte Co. September 5,1996
AVG. WIND SPEED: 7.13 Knots	CALM WINDS: 0.00%	
ORIENTATION: Direction (blowing from)	PLOT YEAR-DATE-TIME: 1996 Sep 5 - Sep 5 Midnight - 11 PM	PROJECT/PLOT NO.: 2

WRPLOT View 3.05 by Lakes Environmental Software - www.lakes-environmental.com

WIND ROSE PLOT

Station #03947 - KANSAS CITY/INT'L ARPT, MO

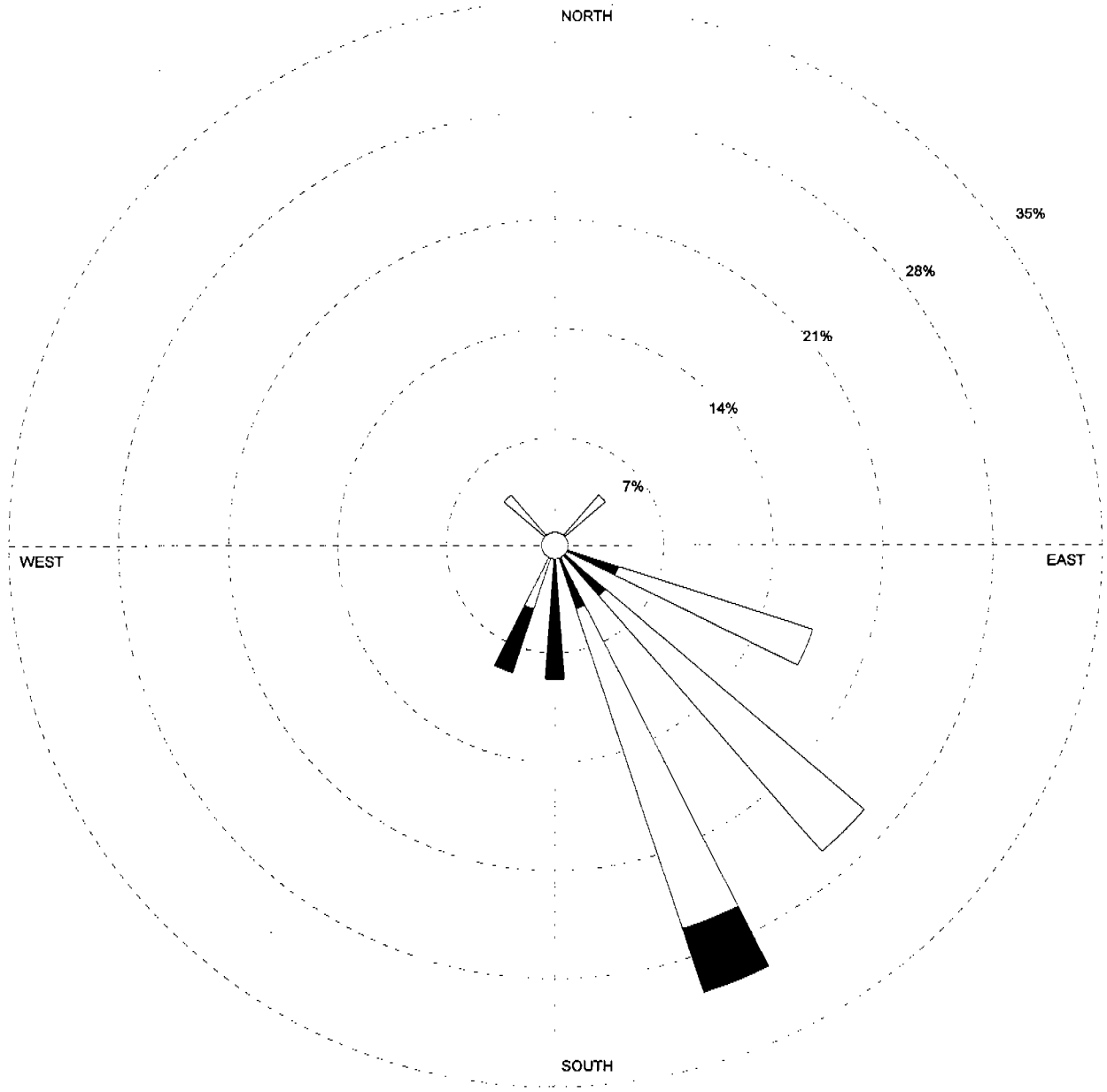


Wind Speed (Knots) > 21 17 - 21 11 - 16 7 - 10 4 - 6 1 - 3	MODELER **Douglas Watson**	DATE **06/15/2000**	ORGANIZATION NAME **Kansas Department of Health and Environment**
	DISPLAY **Wind Speed**	UNIT **Knots**	COMMENTS **Wind plot of KANSAS CITY/INT'L ARPT, MO Ozone Exceedance Day Liberty September 6,1996**
	AVG. WIND SPEED **5.85 Knots**	CALM WINDS **0.00%**	
	ORIENTATION **Direction (blowing from)**	PLOT YEAR-DATE-TIME **1996 Sep 6 - Sep 6 Midnight - 11 PM**	PROJECT/PLOT NO. **3**

WRPLOT View 3.05 by Lakes Environmental Software - www.lakes-environmental.com

WIND ROSE PLOT

Station #03947 - KANSAS CITY/INT'L ARPT, MO

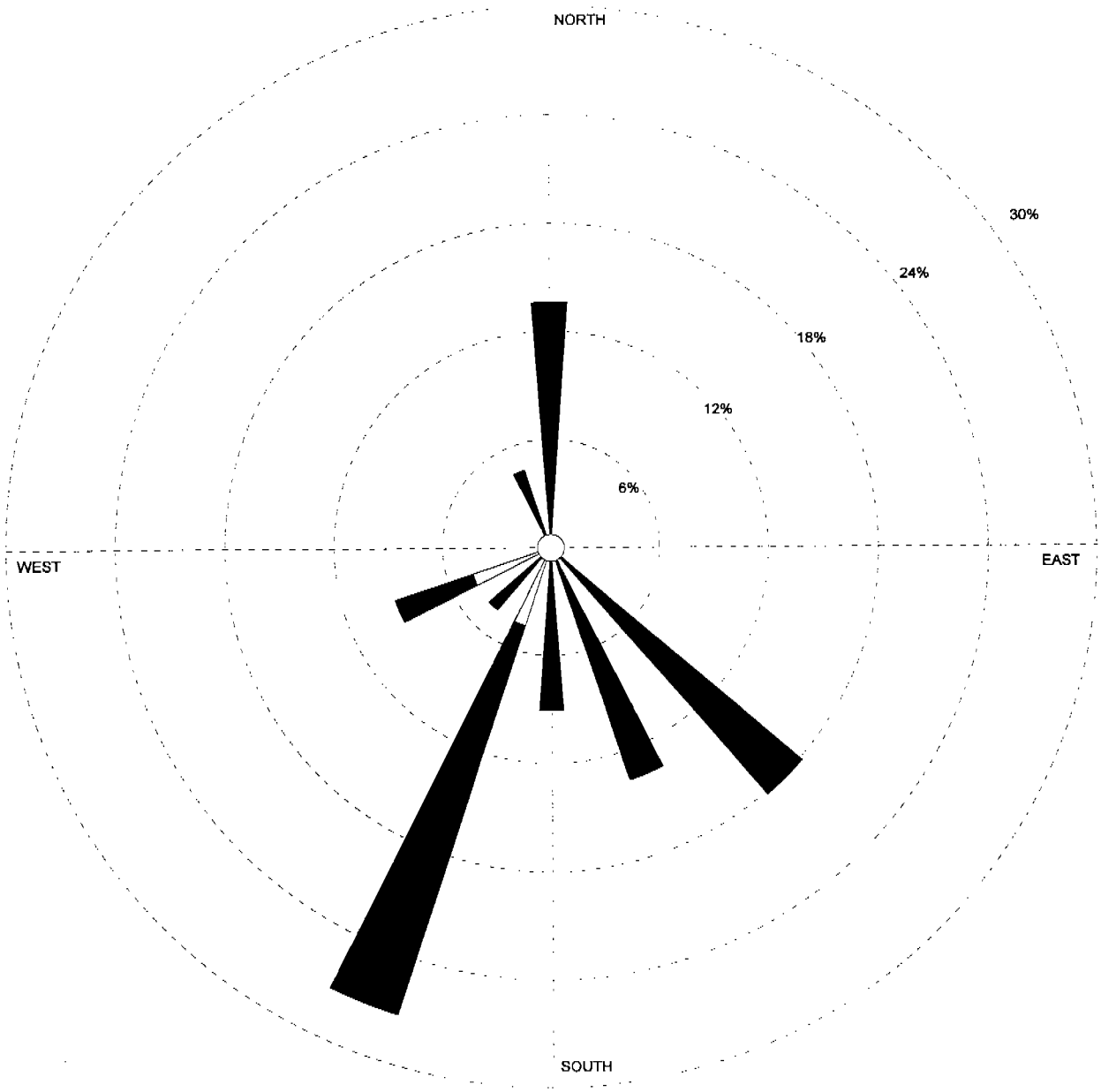


Wind Speed (Knots)	MODELER	DATE	ORGANIZATION NAME
	Douglas Watson	06/15/2000	Kansas Department of Health and Environment
> 21	DISPLAY	UNIT	COMMENTS
17 - 21	Wind Speed	Knots	Wind plot of KANSAS CITY/INT'L ARPT, MO Ozone Exceedance Day Wyandotte Co. September 7,1996
11 - 16	AVG. WIND SPEED	CALM WINDS	
7 - 10	5.00 Knots	0.00%	
4 - 6	ORIENTATION	PLOT YEAR-DATE-TIME	PROJECT/PLOT NO.
1 - 3	Direction (blowing from)	1996 Sep 7 - Sep 7 Midnight - 11 PM	4

WRPLOT View 3.05 by Lakes Environmental Software - www.lakes-environmental.com

WIND ROSE PLOT

Station #03947 - KANSAS CITY/INT'L ARPT, MO



Wind Speed (Knots)	MODELER	DATE	ORGANIZATION NAME
> 21 17 - 21 11 - 16 7 - 10 4 - 6 1 - 3	Douglas Watson	06/15/2000	Kansas Department of Health and Environment
	DISPLAY Wind Speed	UNIT Knots	COMMENTS Wind plot of KANSAS CITY/INT'L ARPT, MO Ozone Exceedance Day Watkins Mills April 18, 1997
	AVG. WIND SPEED 11.14 Knots	CALM WINDS 0.00%	
	ORIENTATION Direction (blowing from)	PLOT YEAR-DATE-TIME 1997 Apr 18 - Apr 18 Midnight - 11 PM	PROJECT/PLOT NO. 5

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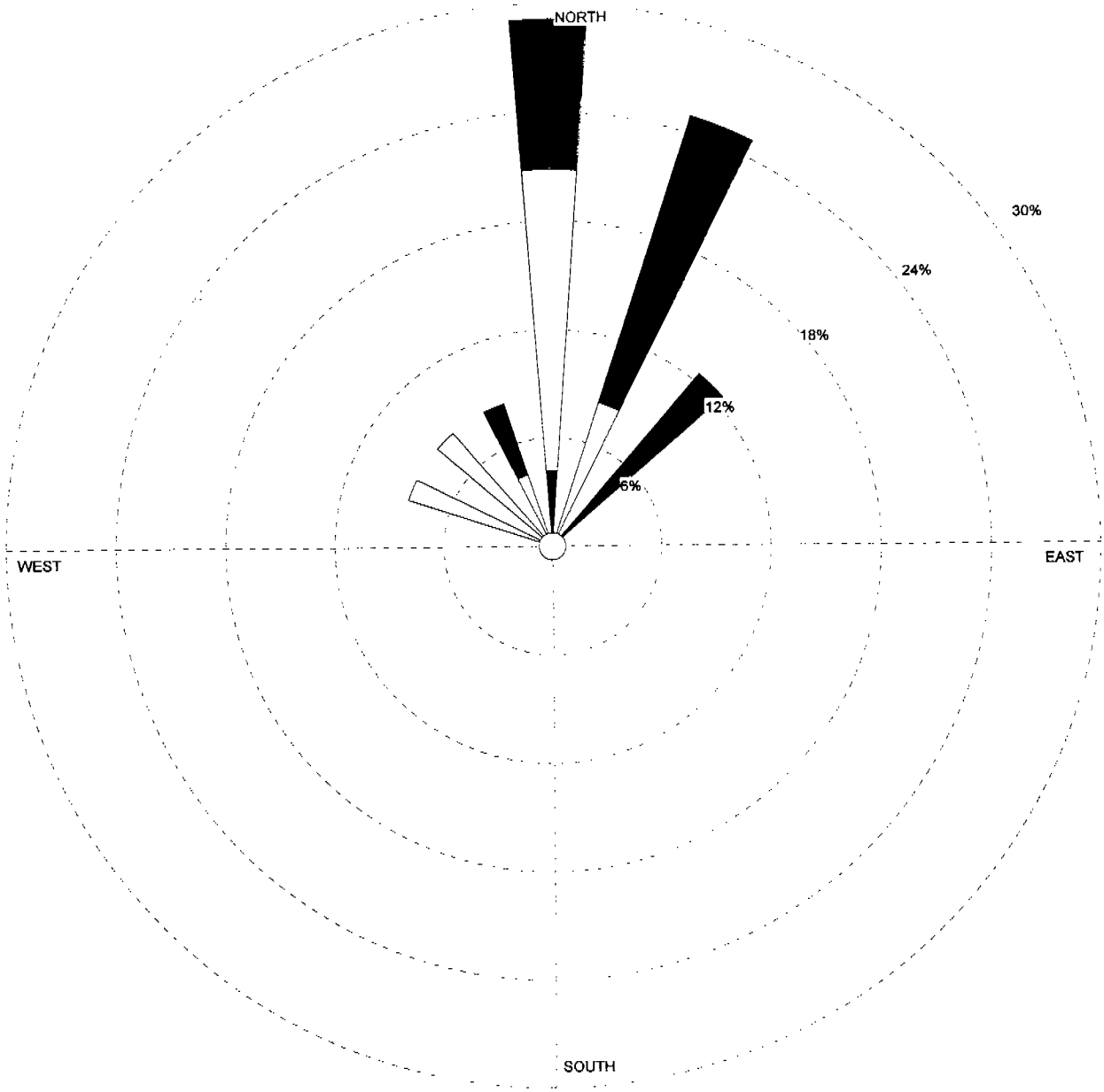
WIND ROSE PLOT

Station #03947 - KANSAS CITY/INT'L ARPT, MO

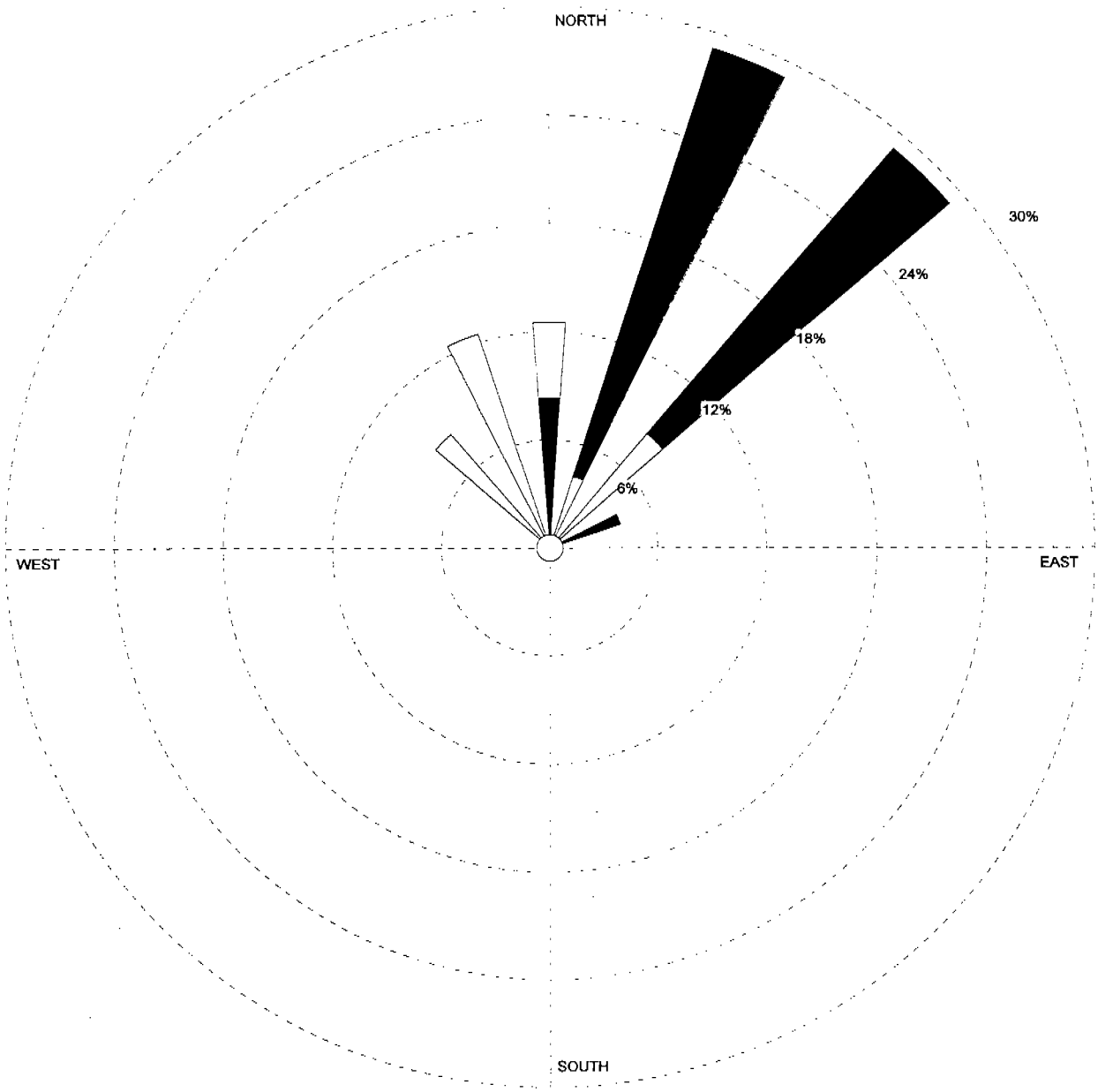


Wind Speed (Knots)	MODELER	DATE	ORGANIZATION NAME
> 21 17 - 21 11 - 16 7 - 10 4 - 6 1 - 3	**Douglas Watson**	**06/15/2000**	**Kansas Department of Health and Environment**
	DISPLAY **Wind Speed**	UNIT **Knots**	COMMENTS **Wind plot of KANSAS CITY/INT'L ARPT, MO Ozone Exceedance Day Wyandotte Co. May 31, 1997**
	AVG. WIND SPEED **6.91 Knots**	CALM WINDS **8.33%**	
	ORIENTATION **Direction (blowing from)**	PLOT YEAR-DATE-TIME **1997 May 31 - May 31 Midnight - 11 PM**	PROJECT/PLOT NO. **6**

WRPLOT View 3.05 by Lakes Environmental Software - www.lakes-environmental.com

WIND ROSE PLOT

Station #03947 - KANSAS CITY/INT'L ARPT, MO



Wind Speed (Knots)

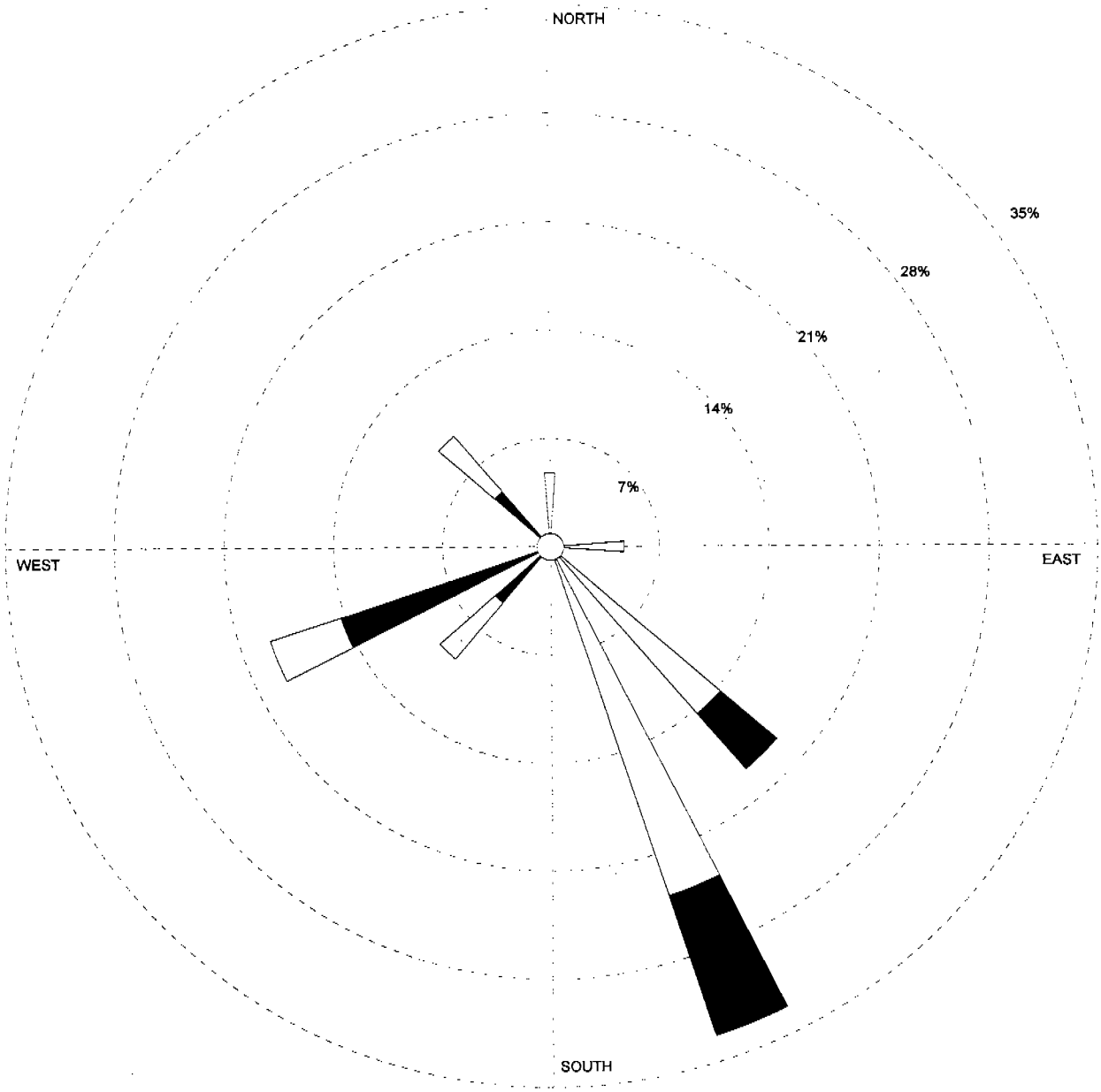
- > 21
- 17 - 21
- 11 - 16
- 7 - 10
- 4 - 6
- 1 - 3

MODELER **Douglas Watson**	DATE **06/15/2000**	ORGANIZATION NAME **Kansas Department of Health and Environment**
DISPLAY **Wind Speed**	UNIT **Knots**	COMMENTS **Wind plot of KANSAS CITY/INT'L ARPT, MO Ozone Exceedance Day Wyandotte Co. June 1, 1997**
AVG. WIND SPEED **7.00 Knots**	CALM WINDS **4.17%**	
ORIENTATION **Direction (blowing from)**	PLOT YEAR-DATE-TIME **1997 Jun 1 - Jun 1 Midnight - 11 PM**	PROJECT/PLOT NO. **7**

WRPLOT View 3.05 by Lakes Environmental Software - www.lakes-environmental.com

WIND ROSE PLOT

Station #03947 - KANSAS CITY/INT'L ARPT, MO

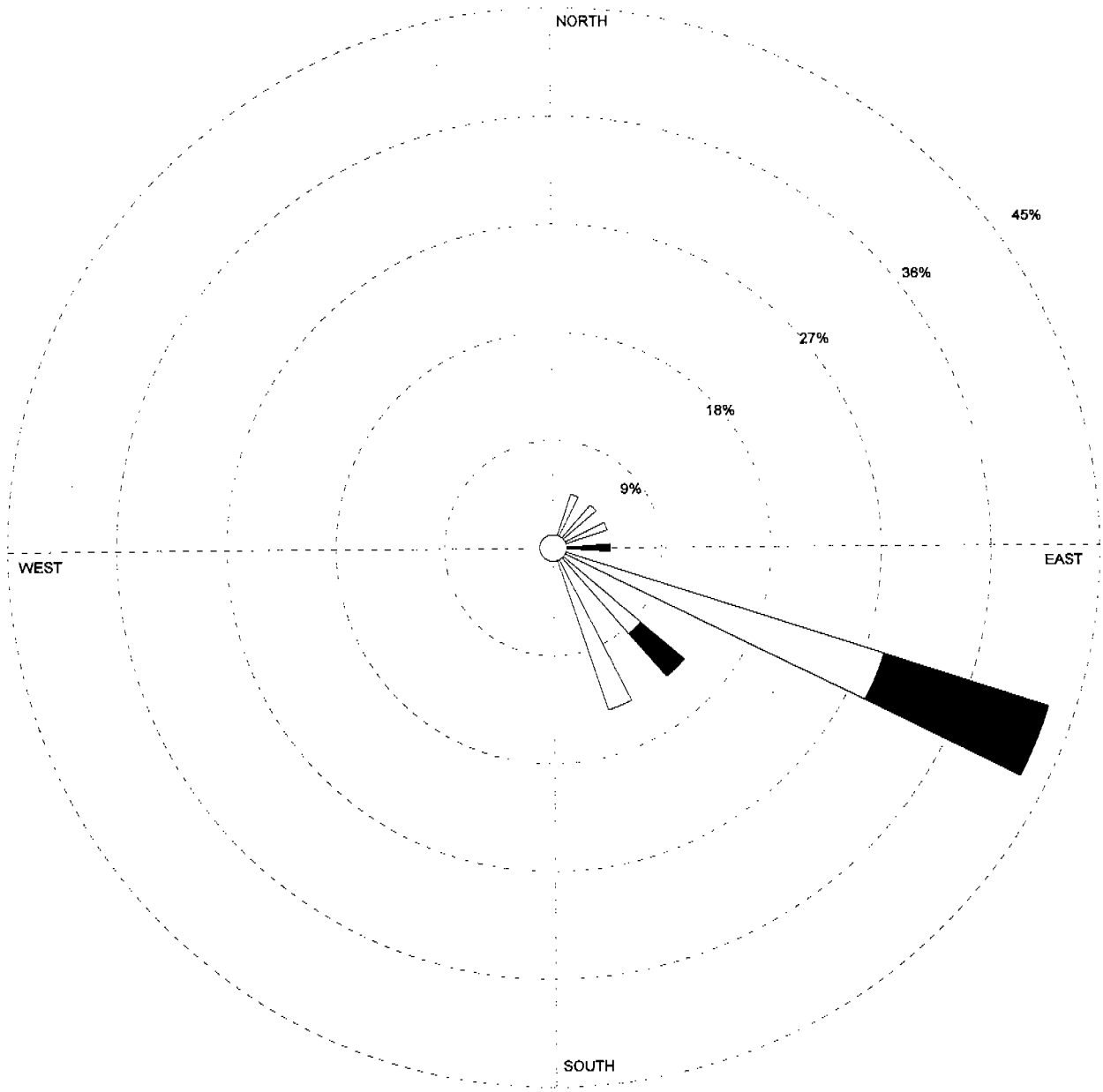


Wind Speed (Knots) > 21 17 - 21 11 - 16 7 - 10 4 - 6 1 - 3	MODELER **Douglas Watson**	DATE **06/15/2000**	ORGANIZATION NAME **Kansas Department of Health and Environment**
	DISPLAY **Wind Speed**	UNIT **Knots**	COMMENTS **Wind plot of KANSAS CITY/INT'L ARPT, MO Ozone Exceedance Day Wyandotte Co., KCI June 14, 1997**
	AVG. WIND SPEED **4.95 Knots**	CALM WINDS **0.00%**	
	ORIENTATION **Direction (blowing from)**	PLOT YEAR-DATE-TIME **1997 Jun 14 - Jun 14 Midnight - 11 PM**	PROJECT/PLOT NO. **8**

WRPLOT View 3.05 by Lakes Environmental Software - www.lakes-environmental.com

WIND ROSE PLOT

Station #03947 - KANSAS CITY/INT'L ARPT, MO



Wind Speed (Knots)	MODELER	DATE	ORGANIZATION NAME
	Douglas Watson	06/15/2000	Kansas Department of Health and Environment
> 21 17 - 21 11 - 16 7 - 10 4 - 6 1 - 3	DISPLAY Wind Speed	UNIT Knots	COMMENTS Wind plot of KANSAS CITY/INT'L ARPT, MO Ozone Exceedance Day KCI June 27, 1997
	AVG. WIND SPEED 5.74 Knots	CALM WINDS 9.52%	
	ORIENTATION Direction (blowing from)	PLOT YEAR-DATE-TIME 1997 Jun 27 - Jun 27 Midnight - 11 PM	PROJECT/PLOT NO. 9

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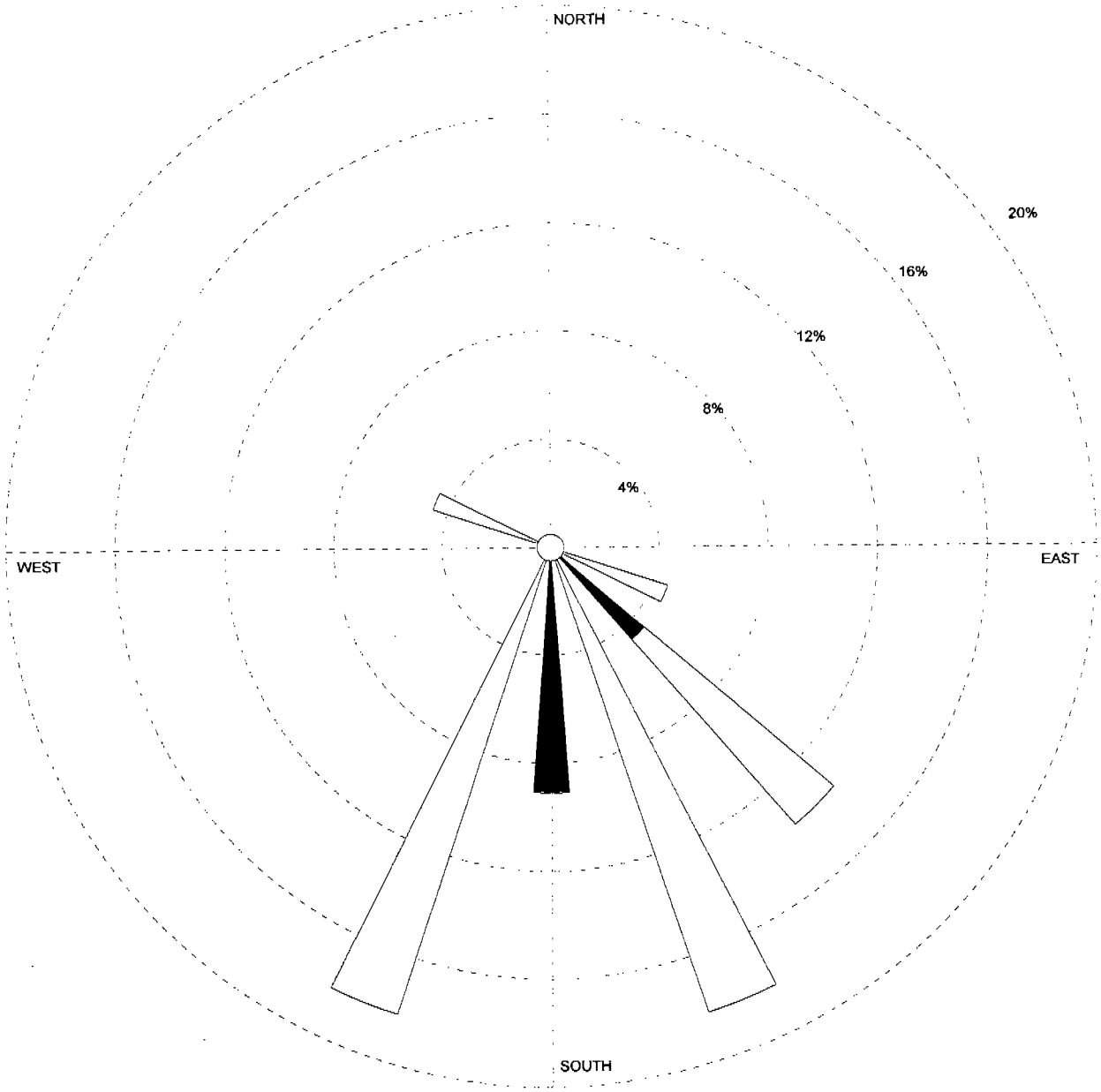
WIND ROSE PLOT

Station #03947 - KANSAS CITY/INT'L ARPT, MO



Wind Speed (Knots)	MODELER	DATE	ORGANIZATION NAME
> 21 17 - 21 11 - 16 7 - 10 4 - 6 1 - 3	**Douglas Watson**	**06/15/2000**	**Kansas Department of Health and Environment**
	DISPLAY **Wind Speed**	UNIT **Knots**	COMMENTS **Wind plot of KANSAS CITY/INT'L ARPT, MO Ozone Exceedance Day Liberty, Watkins Mill July 19, 1997**
	AVG. WIND SPEED **5.13 Knots**	CALM WINDS **31.82%**	
	ORIENTATION **Direction (blowing from)**	PLOT YEAR-DATE-TIME **1997 Jul 19 - Jul 19 Midnight - 11 PM**	PROJECT/PLOT NO. **10**

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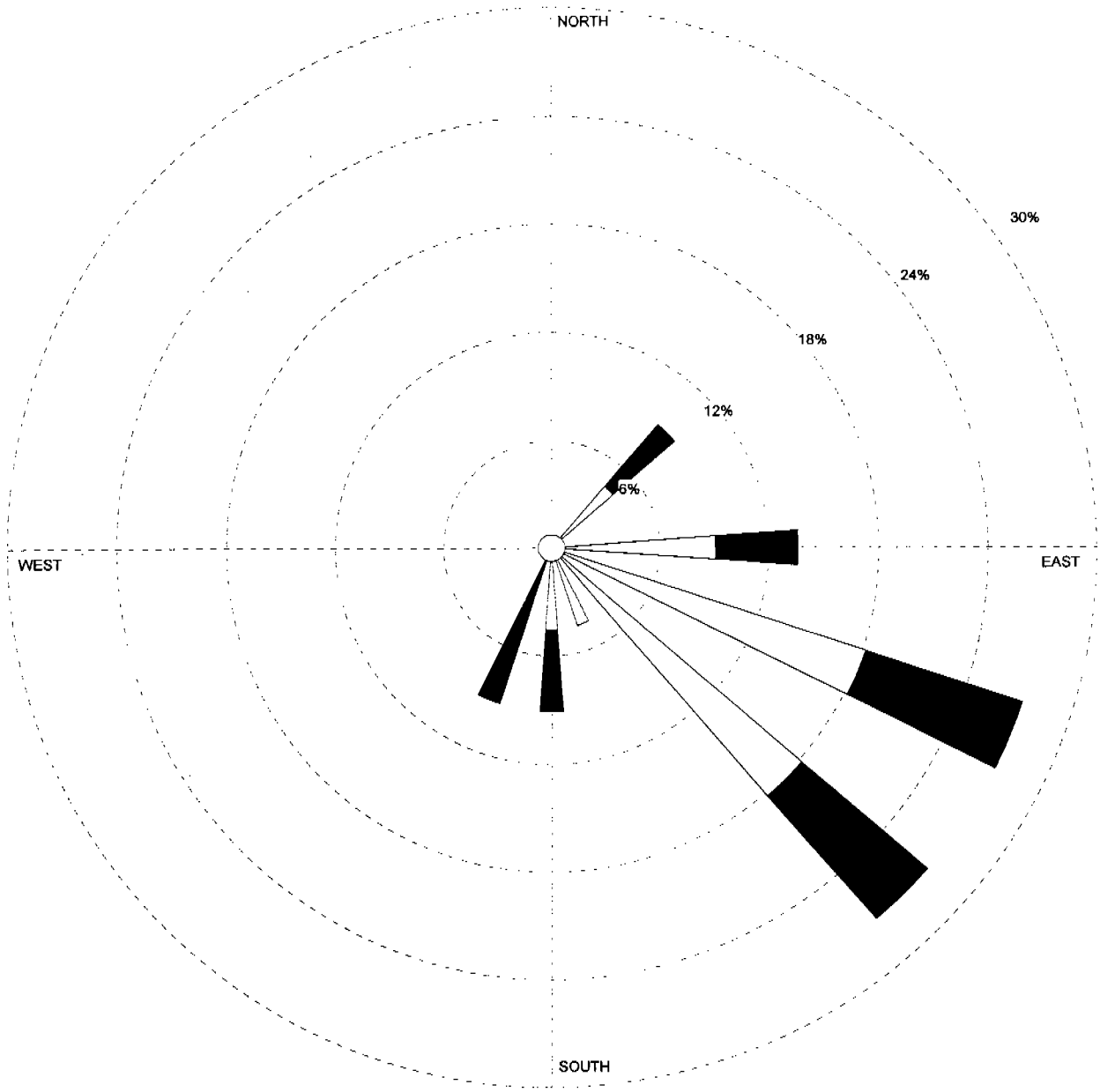
WIND ROSE PLOT

Station #03947 - KANSAS CITY/INT'L ARPT, MO



Wind Speed (Knots) > 21 17 - 21 11 - 16 7 - 10 4 - 6 1 - 3	MODELER **Douglas Watson**	DATE **06/15/2000**	ORGANIZATION NAME **Kansas Department of Health and Environment**
	DISPLAY **Wind Speed**	UNIT **Knots**	COMMENTS **Wind plot of KANSAS CITY/INT'L ARPT, MO Ozone Exceedance Day KCI July 23, 1997**
	AVG. WIND SPEED **5.95 Knots**	CALM WINDS **0.00%**	
	ORIENTATION **Direction (blowing from)**	PLOT YEAR-DATE-TIME **1997 Jul 23 - Jul 23 Midnight - 11 PM**	PROJECT/PLOT NO. **11**

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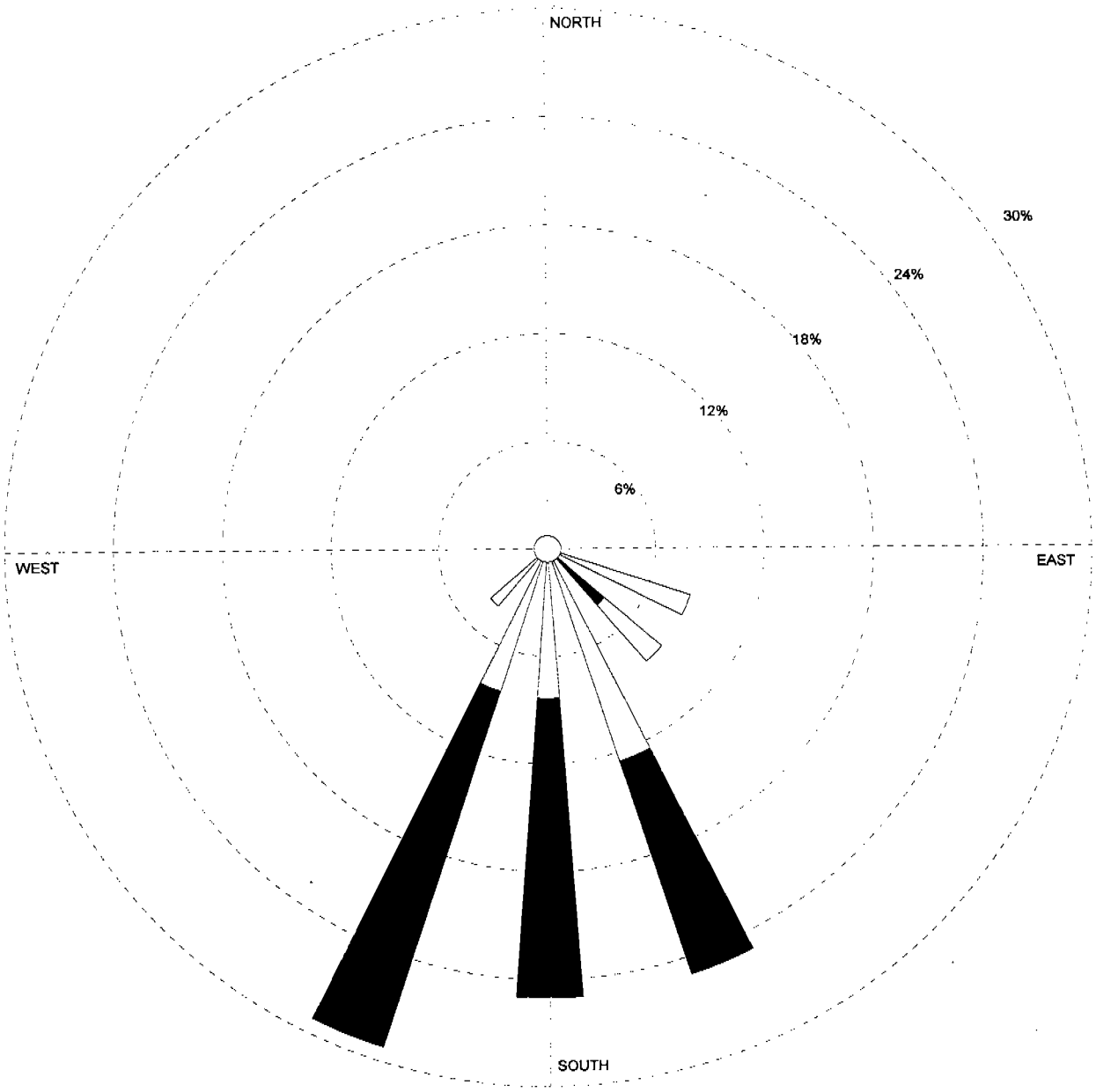
WIND ROSE PLOT

Station #03947 - KANSAS CITY/INT'L ARPT, MO



Wind Speed (Knots)

- > 21
- 17 - 21
- 11 - 16
- 7 - 10
- 4 - 6
- 1 - 3

MODELER **Douglas Watson**	DATE **06/15/2000**	ORGANIZATION NAME **Kansas Department of Health and Environment**
DISPLAY **Wind Speed**	UNIT **Knots**	COMMENTS **Wind plot of KANSAS CITY/INT'L ARPT, MO Ozone Exceedance Day Liberty, Watkins Mill July 24, 1997**
AVG. WIND SPEED **6.25 Knots**	CALM WINDS **0.00%**	
ORIENTATION **Direction (blowing from)**	PLOT YEAR-DATE-TIME **1997 Jul 24 - Jul 24 Midnight - 11 PM**	PROJECT/PLOT NO. **12**

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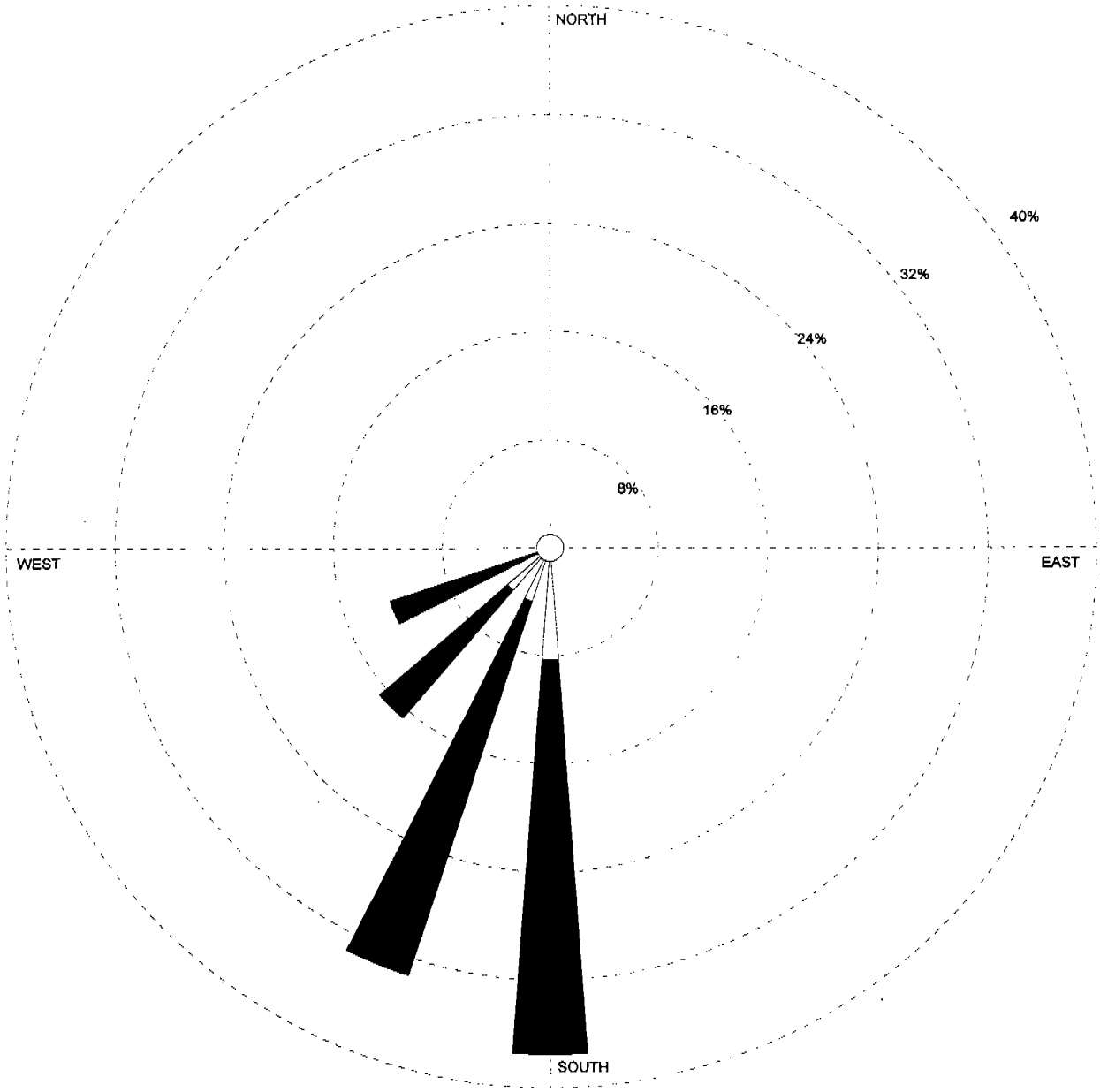
WIND ROSE PLOT

Station #03947 - KANSAS CITY/INT'L ARPT, MO



Wind Speed (Knots)	MODELER	DATE	ORGANIZATION NAME
> 21	**Douglas Watson**	**06/15/2000**	**Kansas Department of Health and Environment**
17 - 21	DISPLAY	UNIT	COMMENTS
11 - 16	**Wind Speed**	**Knots**	**Wind plot of KANSAS CITY/INT'L ARPT, MO Ozone Exceedance Day Liberty, Watkins Mill July 26, 1997**
7 - 10	AVG. WIND SPEED	CALM WINDS	
4 - 6	**8.63 Knots**	**0.00%**	
1 - 3	ORIENTATION	PLOT YEAR-DATE-TIME	PROJECT/PLOT NO.
	Direction (blowing from)	**1997 Jul 26 - Jul 26 Midnight - 11 PM**	**13**

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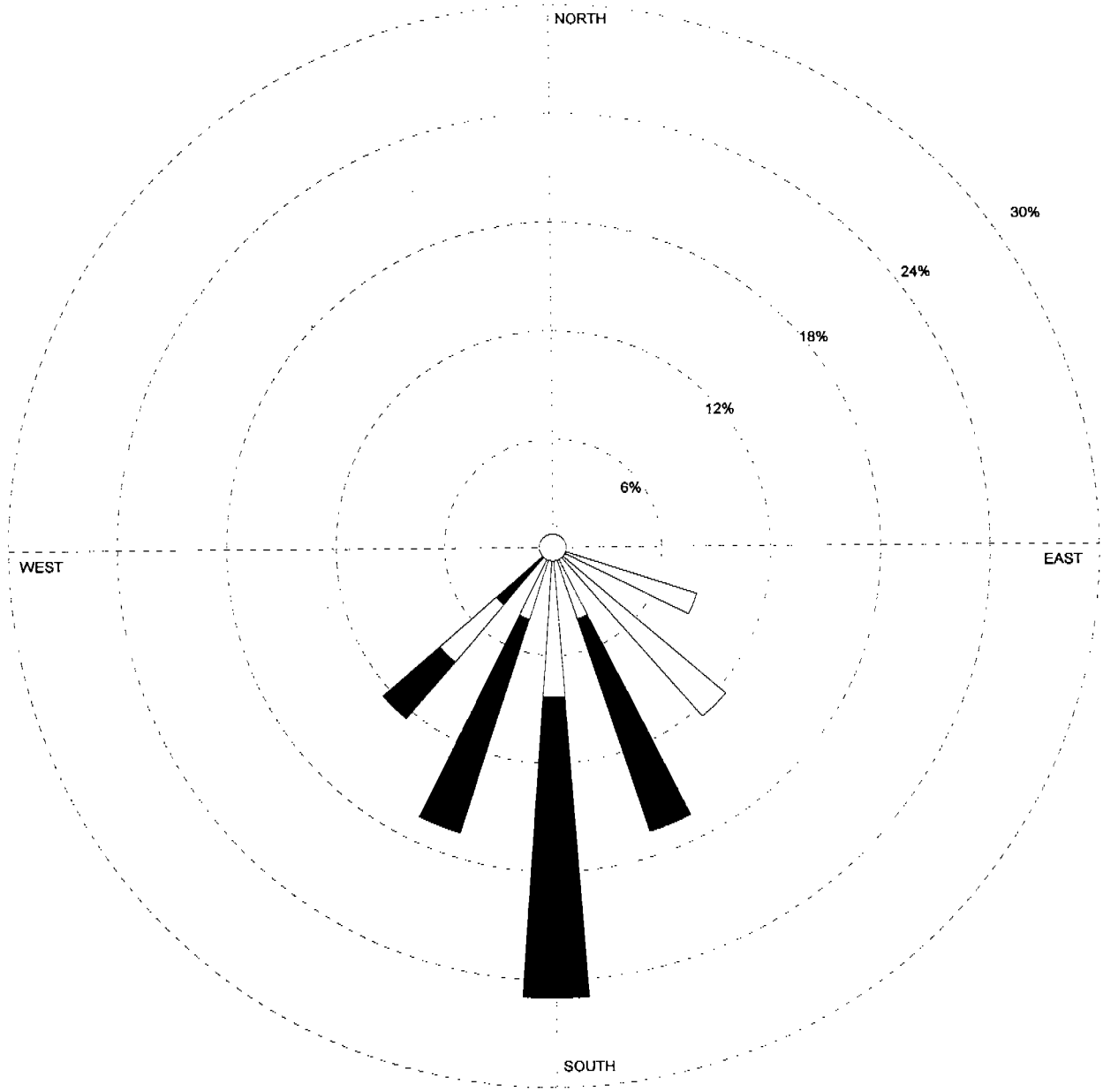
WIND ROSE PLOT

Station #03947 - KANSAS CITY/INT'L ARPT, MO



Wind Speed (Knots) > 21 17 - 21 11 - 16 7 - 10 4 - 6 1 - 3	MODELER **Douglas Watson**	DATE **06/15/2000**	ORGANIZATION NAME **Kansas Department of Health and Environment**
	DISPLAY **Wind Speed**	UNIT **Knots**	COMMENTS **Wind plot of KANSAS CITY/INT'L ARPT, MO Ozone Exceedance Day Liberty, Watkins Mill, WOF, KCI August 1, 1997**
	AVG. WIND SPEED **6.32 Knots**	CALM WINDS **8.33%**	
	ORIENTATION **Direction (blowing from)**	PLOT YEAR-DATE-TIME **1997 Aug 1 - Aug 1 Midnight - 11 PM**	PROJECT/PLOT NO. **14**

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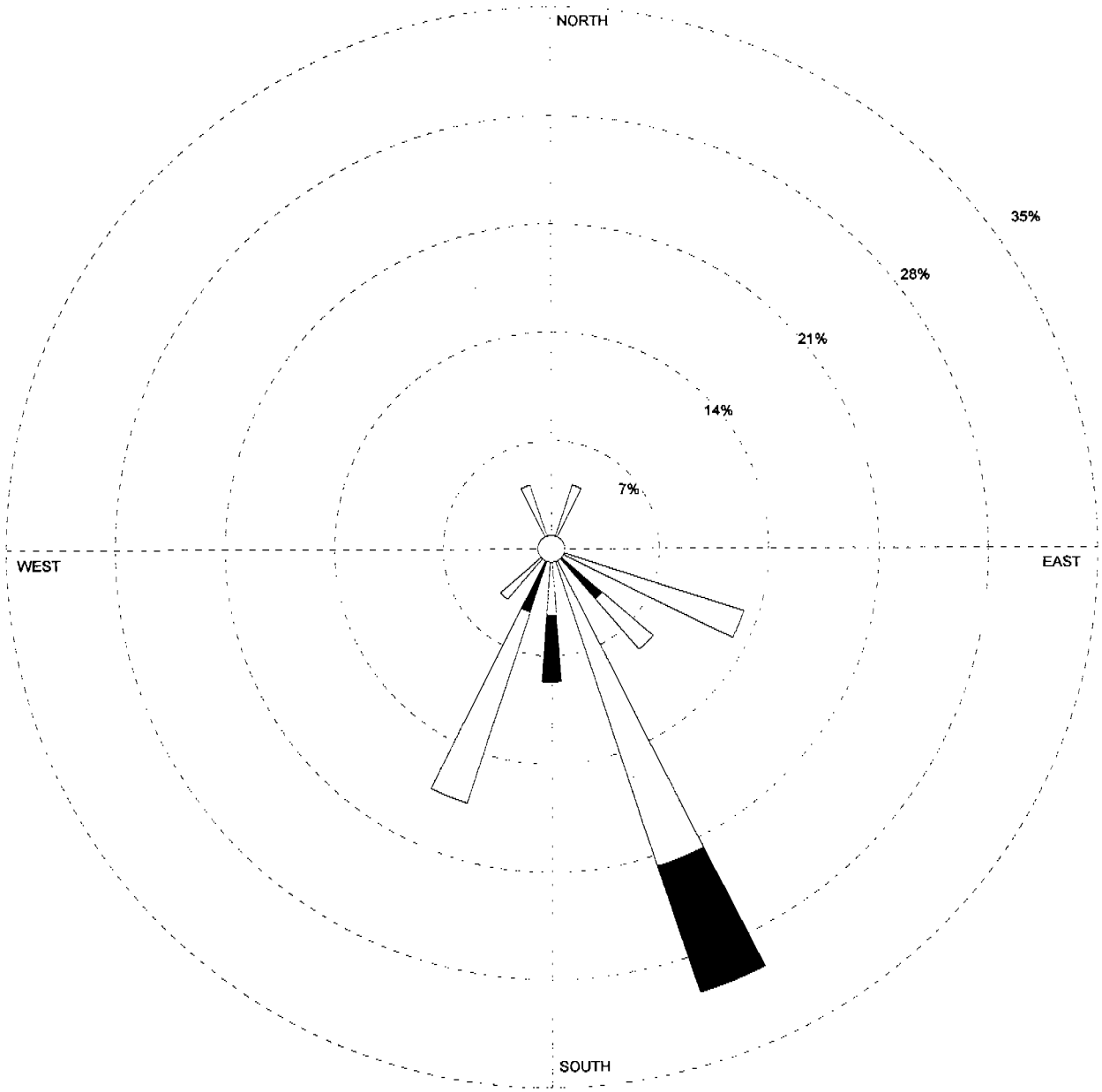
WIND ROSE PLOT

Station #03947 - KANSAS CITY/INT'L ARPT, MO



Wind Speed (Knots)	MODELER	DATE	ORGANIZATION NAME
> 21 17 - 21 11 - 16 7 - 10 4 - 6 1 - 3	Douglas Watson	06/15/2000	Kansas Department of Health and Environment
	DISPLAY Wind Speed	UNIT Knots	COMMENTS Wind plot of KANSAS CITY/INT'L ARPT, MO Ozone Exceedance Day Liberty, KCI August 2, 1997
	AVG. WIND SPEED 4.81 Knots	CALM WINDS 8.70%	
	ORIENTATION Direction (blowing from)	PLOT YEAR-DATE-TIME 1997 Aug 2 - Aug 2 Midnight - 11 PM	PROJECT/PLOT NO. 15

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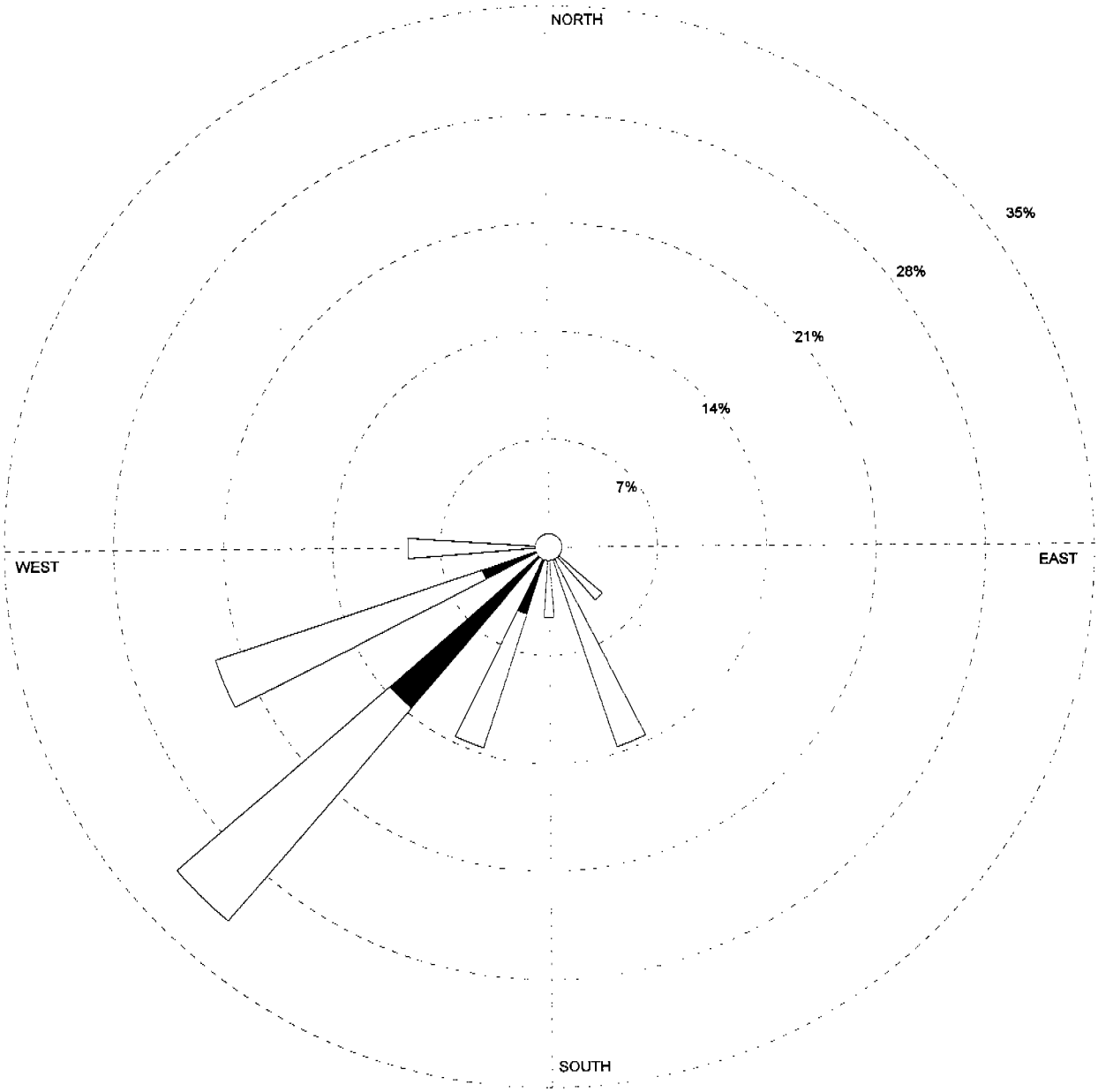
WIND ROSE PLOT

Station #03947 - KANSAS CITY/INT'L ARPT, MO

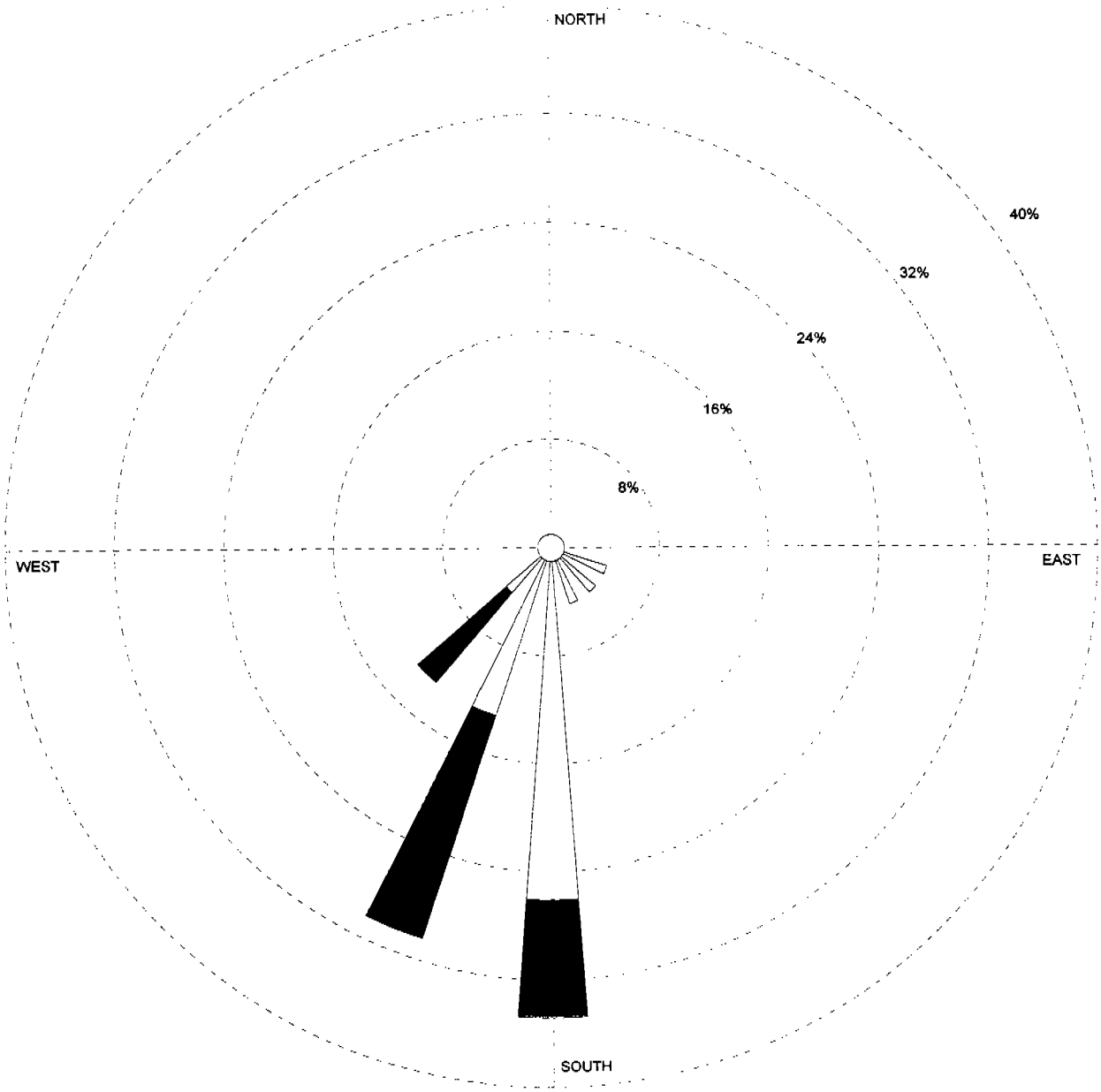


Wind Speed (Knots)	MODELER	DATE	ORGANIZATION NAME
	Douglas Watson	06/15/2000	Kansas Department of Health and Environment
> 21	DISPLAY	UNIT	COMMENTS
17 - 21	Wind Speed	Knots	Wind plot of KANSAS CITY/INT'L ARPT, MO Ozone Exceedance Day Liberty August 3, 1997
11 - 16	AVG. WIND SPEED	CALM WINDS	
7 - 10	4.36 Knots	0.00%	
4 - 6	ORIENTATION	PLOT YEAR-DATE-TIME	PROJECT/PLOT NO.
1 - 3	Direction (blowing from)	1997 Aug 3 - Aug 3 Midnight - 11 PM	16

WRPLOT View 3.05 by Lakes Environmental Software - www.lakes-environmental.com

WIND ROSE PLOT

Station #03947 - KANSAS CITY/INT'L ARPT, MO

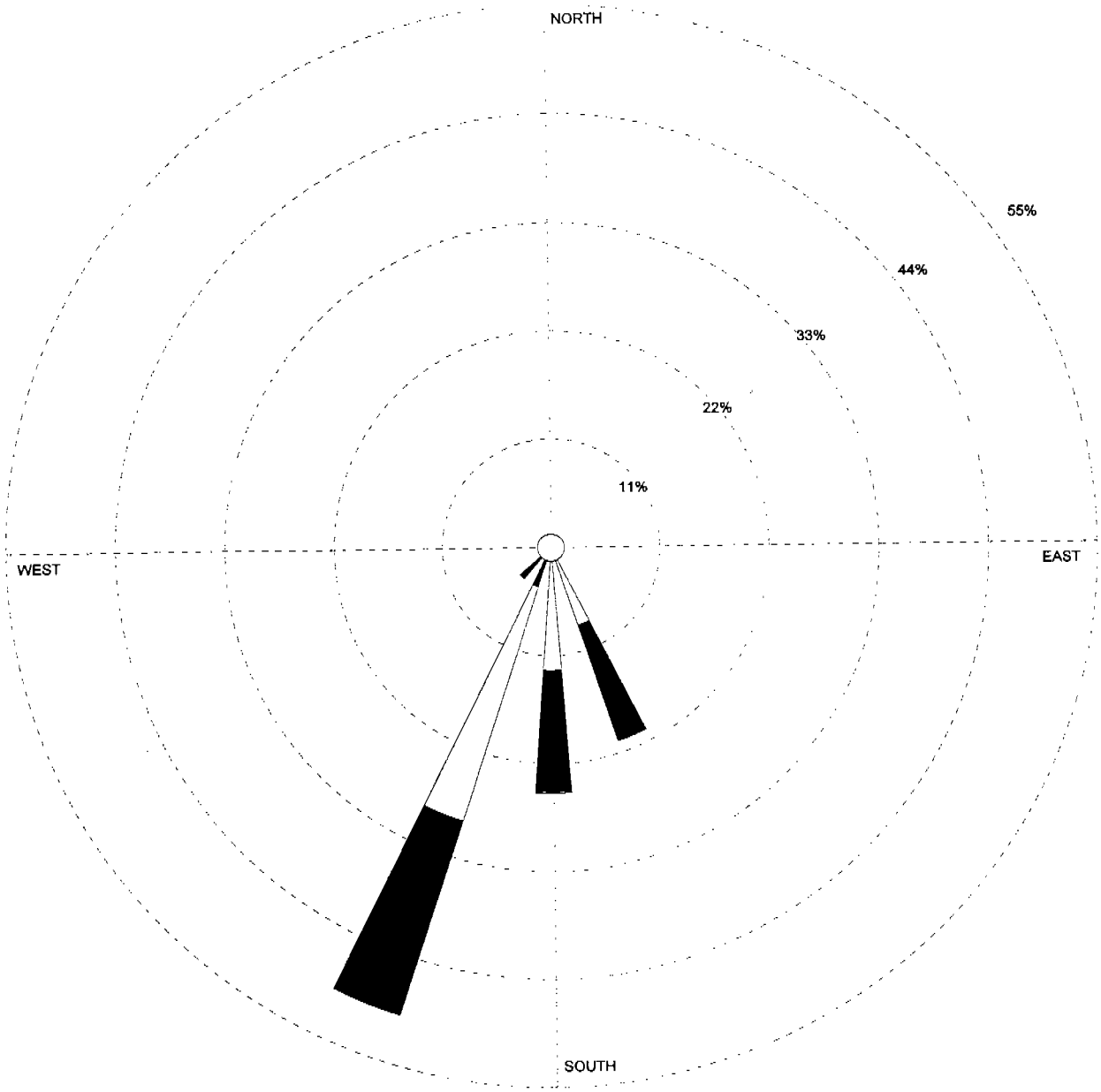


Wind Speed (Knots)	MODELER	DATE	ORGANIZATION NAME
> 21 17 - 21 11 - 16 7 - 10 4 - 6 1 - 3	Douglas Watson	06/15/2000	Kansas Department of Health and Environment
	DISPLAY Wind Speed	UNIT Knots	COMMENTS Wind plot of KANSAS CITY/INT'L ARPT, MO Ozone Exceedance Day Liberty, Watkins Mill, WOF August 27, 1997
	AVG. WIND SPEED 6.29 Knots	CALM WINDS 8.70%	
	ORIENTATION Direction (blowing from)	PLOT YEAR-DATE-TIME 1997 Aug 27 - Aug 27 Midnight - 11 PM	PROJECT/PLOT NO. 17

WRPLOT View 3.05 by Lakes Environmental Software - www.lakes-environmental.com

WIND ROSE PLOT

Station #03947 - KANSAS CITY/INT'L ARPT, MO

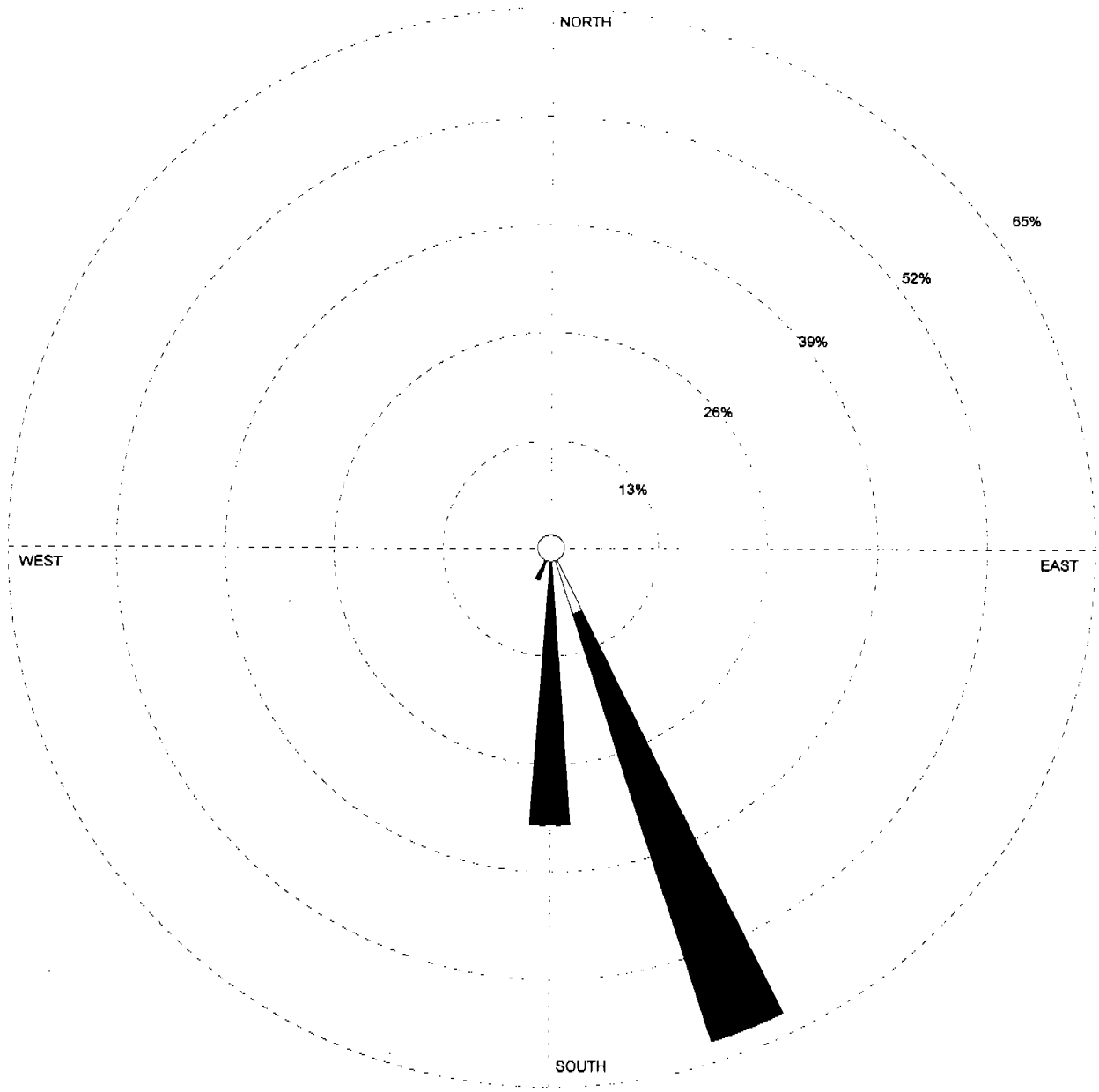


Wind Speed (Knots) > 21 17 - 21 11 - 16 7 - 10 4 - 6 1 - 3	MODELER **Douglas Watson**	DATE **06/15/2000**	ORGANIZATION NAME **Kansas Department of Health and Environment**
	DISPLAY **Wind Speed**	UNIT **Knots**	COMMENTS **Wind plot of KANSAS CITY/INT'L ARPT, MO Ozone Exceedance Day Liberty, Watkins Mill, WOF August 28, 1997**
	AVG. WIND SPEED **6.42 Knots**	CALM WINDS **0.00%**	
	ORIENTATION **Direction (blowing from)**	PLOT YEAR-DATE-TIME **1997 Aug 28 - Aug 28 Midnight - 11 PM**	PROJECT/PLOT NO. **18**

WRPLOT View 3.05 by Lakes Environmental Software - www.lakes-environmental.com

WIND ROSE PLOT

Station #03947 - KANSAS CITY/INT'L ARPT, MO

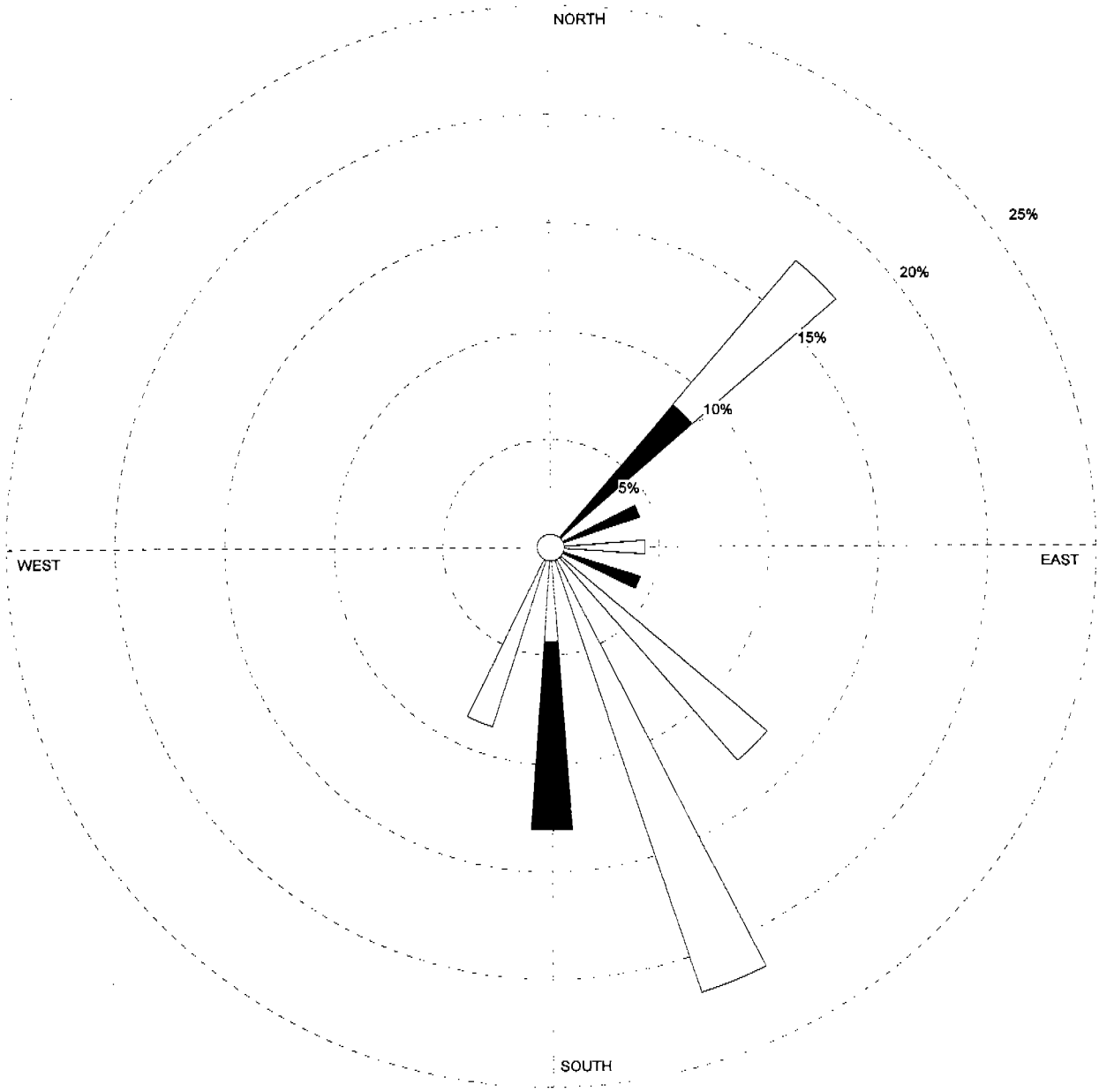


Wind Speed (Knots)	MODELER	DATE	ORGANIZATION NAME
> 21 17 - 21 11 - 16 7 - 10 4 - 6 1 - 3	Douglas Watson	06/15/2000	Kansas Department of Health and Environment
	DISPLAY Wind Speed	UNIT Knots	COMMENTS Wind plot of KANSAS CITY/INT'L ARPT, MO Ozone Exceedance Day Liberty August 29, 1997
	AVG. WIND SPEED 8.63 Knots	CALM WINDS 0.00%	
	ORIENTATION Direction (blowing from)	PLOT YEAR-DATE-TIME 1997 Aug 29 - Aug 29 Midnight - 11 PM	PROJECT/PLOT NO. 19

WRPLOT View 3.05 by Lakes Environmental Software - www.lakes-environmental.com

WIND ROSE PLOT

Station #03947 - KANSAS CITY/INT'L ARPT, MO

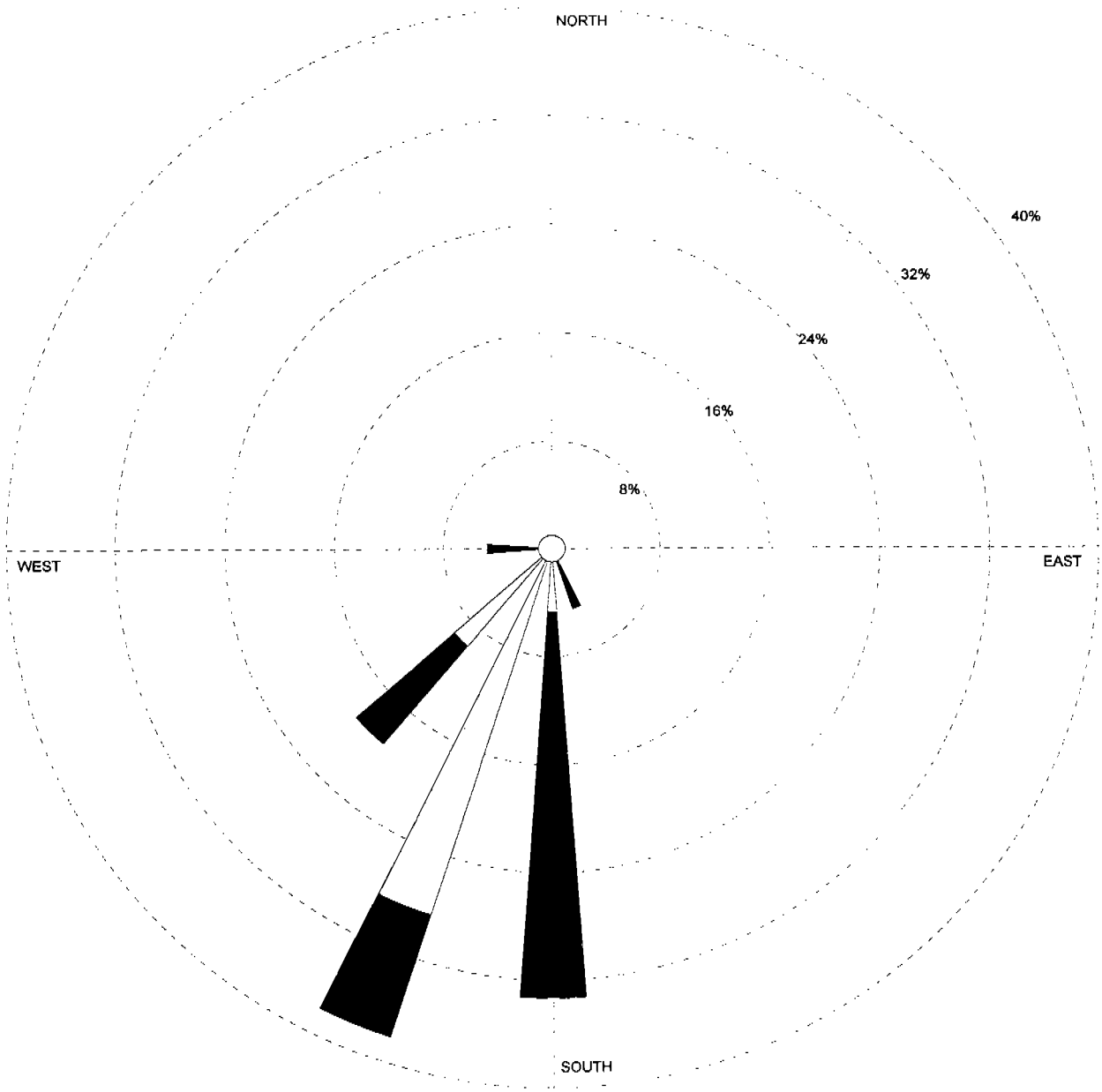


Wind Speed (Knots) > 21 17 - 21 11 - 16 7 - 10 4 - 6 1 - 3	MODELER **Douglas Watson**	DATE **06/15/2000**	ORGANIZATION NAME **Kansas Department of Health and Environment**
	DISPLAY **Wind Speed**	UNIT **Knots**	COMMENTS **Wind plot of KANSAS CITY/INT'L ARPT, MO Ozone Exceedance Day KCI August 31, 1997**
	AVG. WIND SPEED **5.10 Knots**	CALM WINDS **13.04%**	
	ORIENTATION **Direction (blowing from)**	PLOT YEAR-DATE-TIME **1997 Aug 31 - Aug 31 Midnight - 11 PM**	PROJECT/PLOT NO. **20**

WRPLOT View 3.05 by Lakes Environmental Software - www.lakes-environmental.com

WIND ROSE PLOT

Station #03947 - KANSAS CITY/INT'L ARPT, MO



Wind Speed (Knots) > 21 17 - 21 11 - 16 7 - 10 4 - 6 1 - 3	MODELER **Douglas Watson**	DATE **06/15/2000**	ORGANIZATION NAME **Kansas Department of Health and Environment**
	DISPLAY **Wind Speed**	UNIT **Knots**	COMMENTS **Wind plot of KANSAS CITY/INT'L ARPT, MO Ozone Exceedance Day Liberty, Watkins Mill September 6, 1997**
	AVG. WIND SPEED **6.90 Knots**	CALM WINDS **0.00%**	
	ORIENTATION **Direction (blowing from)**	PLOT YEAR-DATE-TIME **1997 Sep 6 - Sep 6 Midnight - 11 PM**	PROJECT/PLOT NO. **21**

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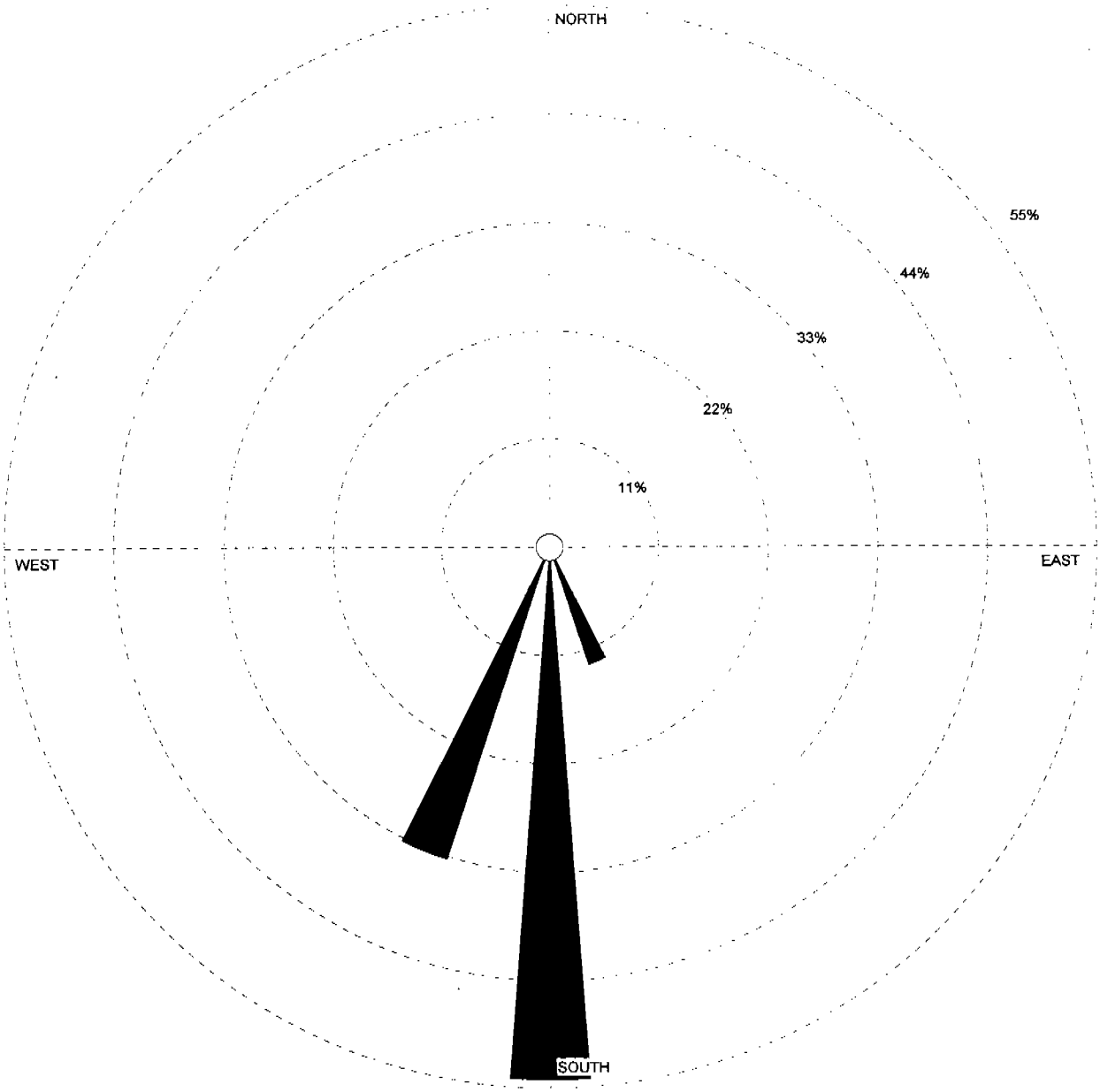
WIND ROSE PLOT

Station #03947 - KANSAS CITY/INT'L ARPT, MO

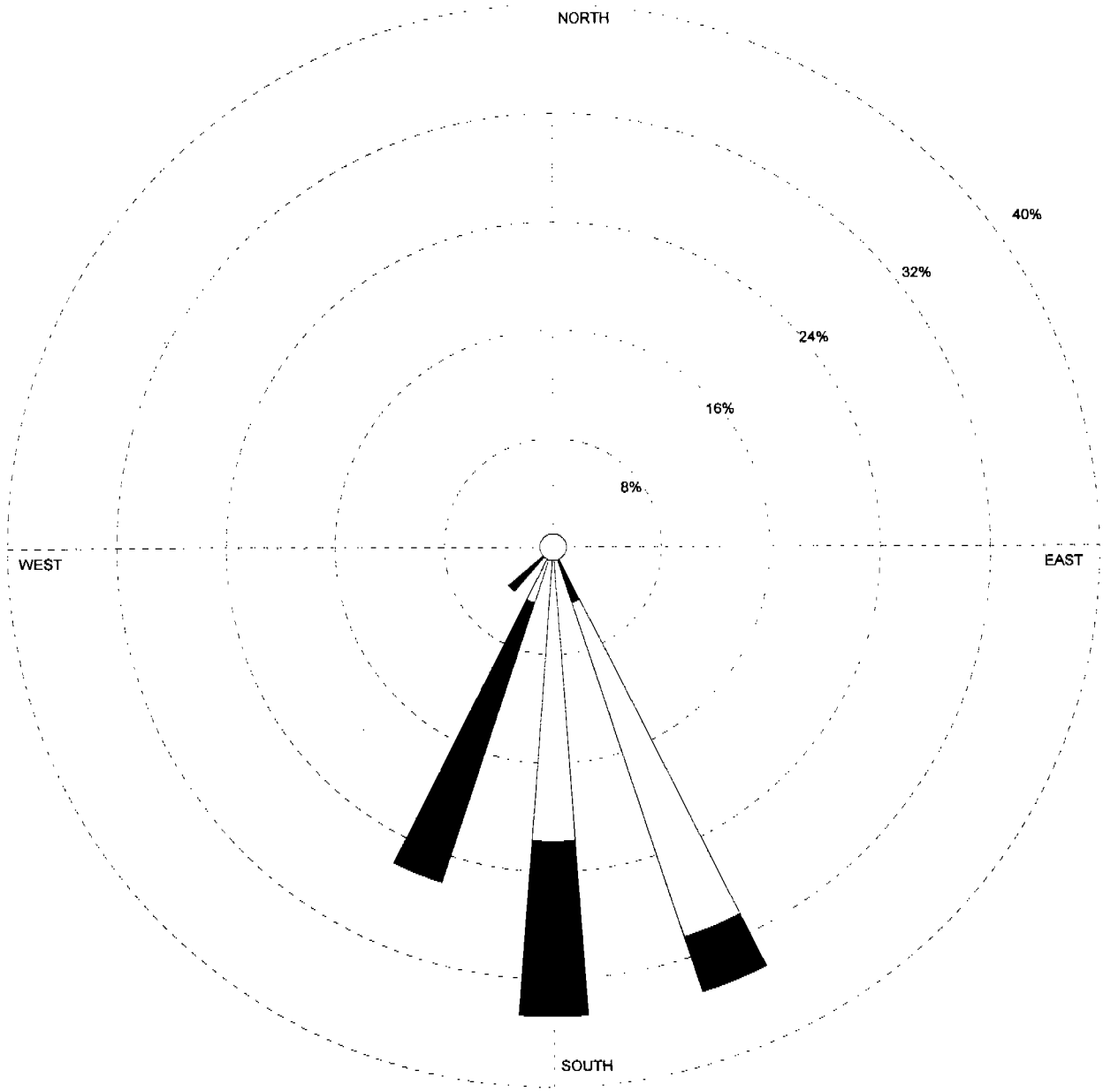


Wind Speed (Knots)	MODELER	DATE	ORGANIZATION NAME
	Douglas Watson	06/15/2000	Kansas Department of Health and Environment
> 21	DISPLAY	UNIT	COMMENTS
17 - 21	Wind Speed	Knots	Wind plot of KANSAS CITY/INT'L ARPT, MO Ozone Exceedance Day Liberty, Watkins Mill October 5, 1997
11 - 16	AVG. WIND SPEED	CALM WINDS	
7 - 10	12.92 Knots	0.00%	
4 - 6	ORIENTATION	PLOT YEAR-DATE-TIME	PROJECT/PLOT NO.
1 - 3	Direction (blowing from)	1997 Oct 5 - Oct 5 Midnight - 11 PM	22

WRPLOT View 3.05 by Lakes Environmental Software - www.lakes-environmental.com

WIND ROSE PLOT

Station #03947 - KANSAS CITY/INT'L ARPT, MO



Wind Speed (Knots)	MODELER	DATE	ORGANIZATION NAME
> 21 17 - 21 11 - 16 7 - 10 4 - 6 1 - 3	**Douglas Watson**	**06/15/2000**	**Kansas Department of Health and Environment**
	DISPLAY **Wind Speed**	UNIT **Knots**	COMMENTS **Wind plot of KANSAS CITY/INT'L ARPT, MO Ozone Exceedance Day Liberty, Watkins Mill May 19, 1998**
	AVG. WIND SPEED **6.48 Knots**	CALM WINDS **0.00%**	
	ORIENTATION **Direction (blowing from)**	PLOT YEAR-DATE-TIME **1998 May 19 - May 19 Midnight - 11 PM**	PROJECT/PLOT NO. **23**

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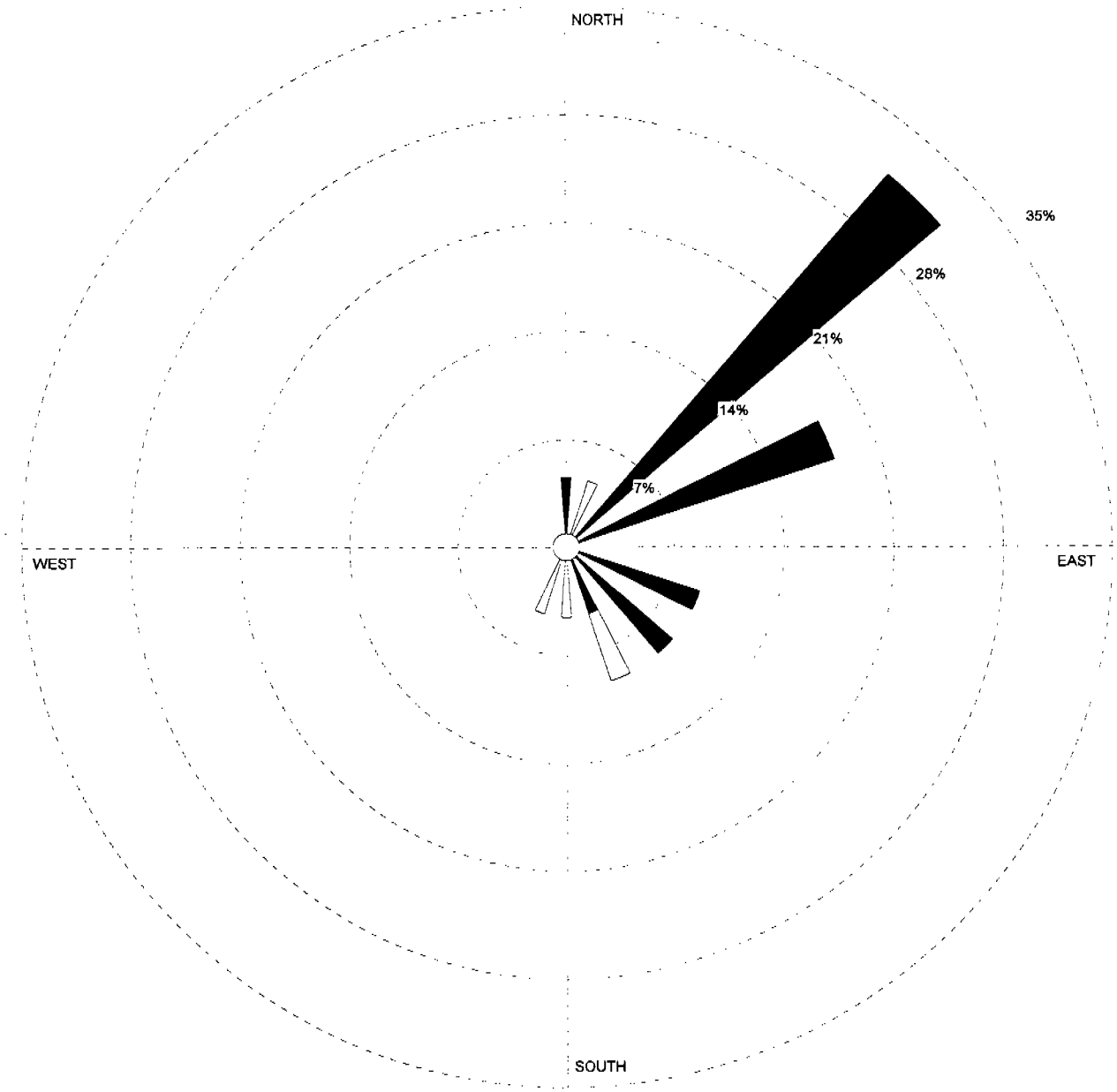
WIND ROSE PLOT

Station #03947 - KANSAS CITY/INT'L ARPT, MO



Wind Speed (Knots)	MODELER	DATE	ORGANIZATION NAME
> 21 17 - 21 11 - 16 7 - 10 4 - 6 1 - 3	**Douglas Watson**	**06/15/2000**	**Kansas Department of Health and Environment**
	DISPLAY **Wind Speed**	UNIT **Knots**	COMMENTS **Wind plot of KANSAS CITY/INT'L ARPT, MO Ozone Exceedance Day Liberty, KCI May 20, 1998**
	AVG. WIND SPEED **8.24 Knots**	CALM WINDS **4.55%**	
	ORIENTATION **Direction (blowing from)**	PLOT YEAR-DATE-TIME **1998 May 20 - May 20 Midnight - 11 PM**	PROJECT/PLOT NO. **24**

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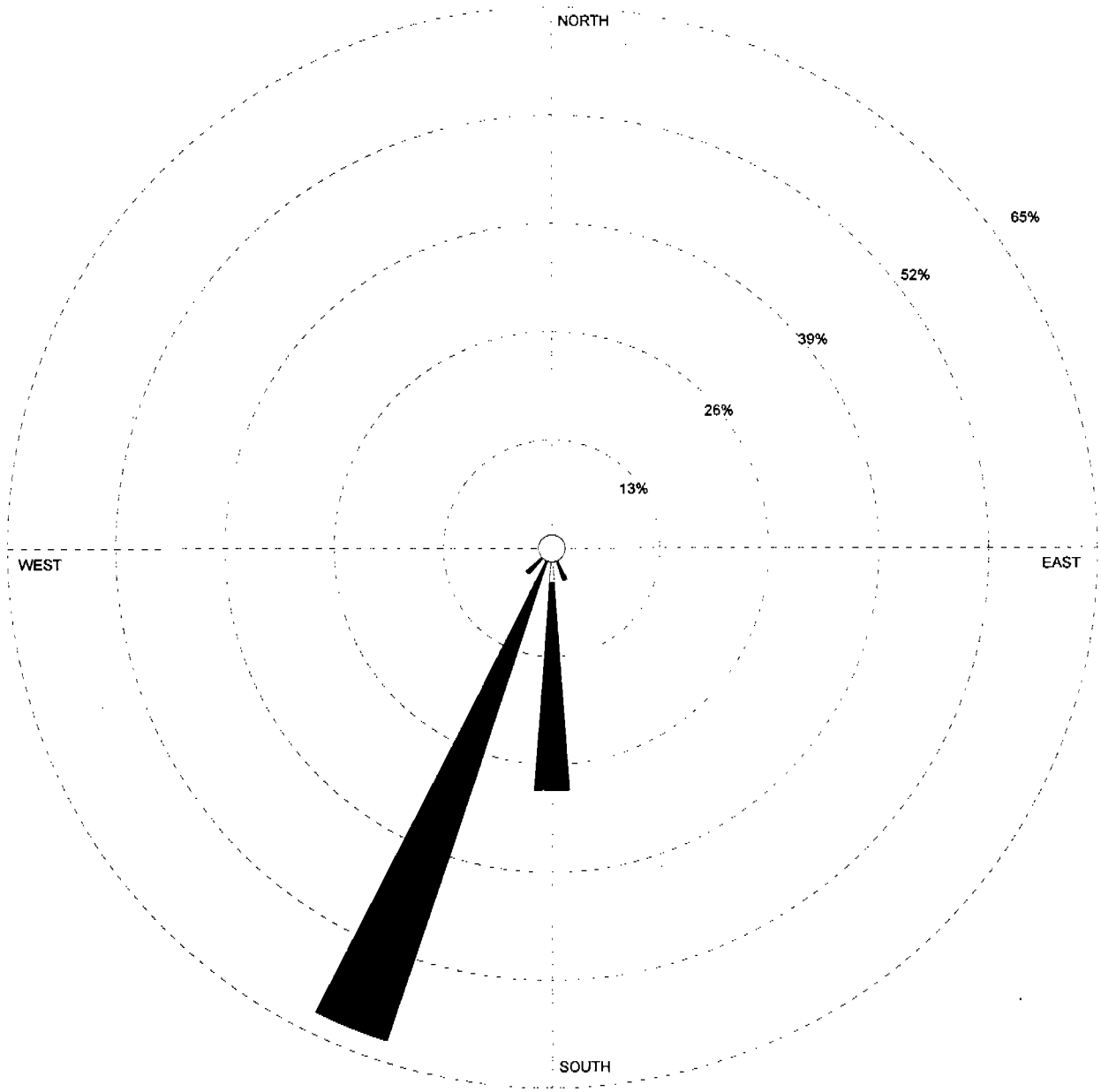
WIND ROSE PLOT

Station #03947 - KANSAS CITY/INT'L ARPT, MO



Wind Speed (Knots)	MODELER	DATE	ORGANIZATION NAME
> 21 17 - 21 11 - 16 7 - 10 4 - 6 1 - 3	**Douglas Watson**	**06/15/2000**	**Kansas Department of Health and Environment**
	DISPLAY **Wind Speed**	UNIT **Knots**	COMMENTS **Wind plot of KANSAS CITY/INT'L ARPT, MO** **Ozone Exceedance Day** **Liberty** **July 19, 1998**
	AVG. WIND SPEED **9.79 Knots**	CALM WINDS **0.00%**	
	ORIENTATION **Direction (blowing from)**	PLOT YEAR-DATE-TIME **1998** **Jul 19 - Jul 19** **Midnight - 11 PM**	PROJECT/PLOT NO. **25**

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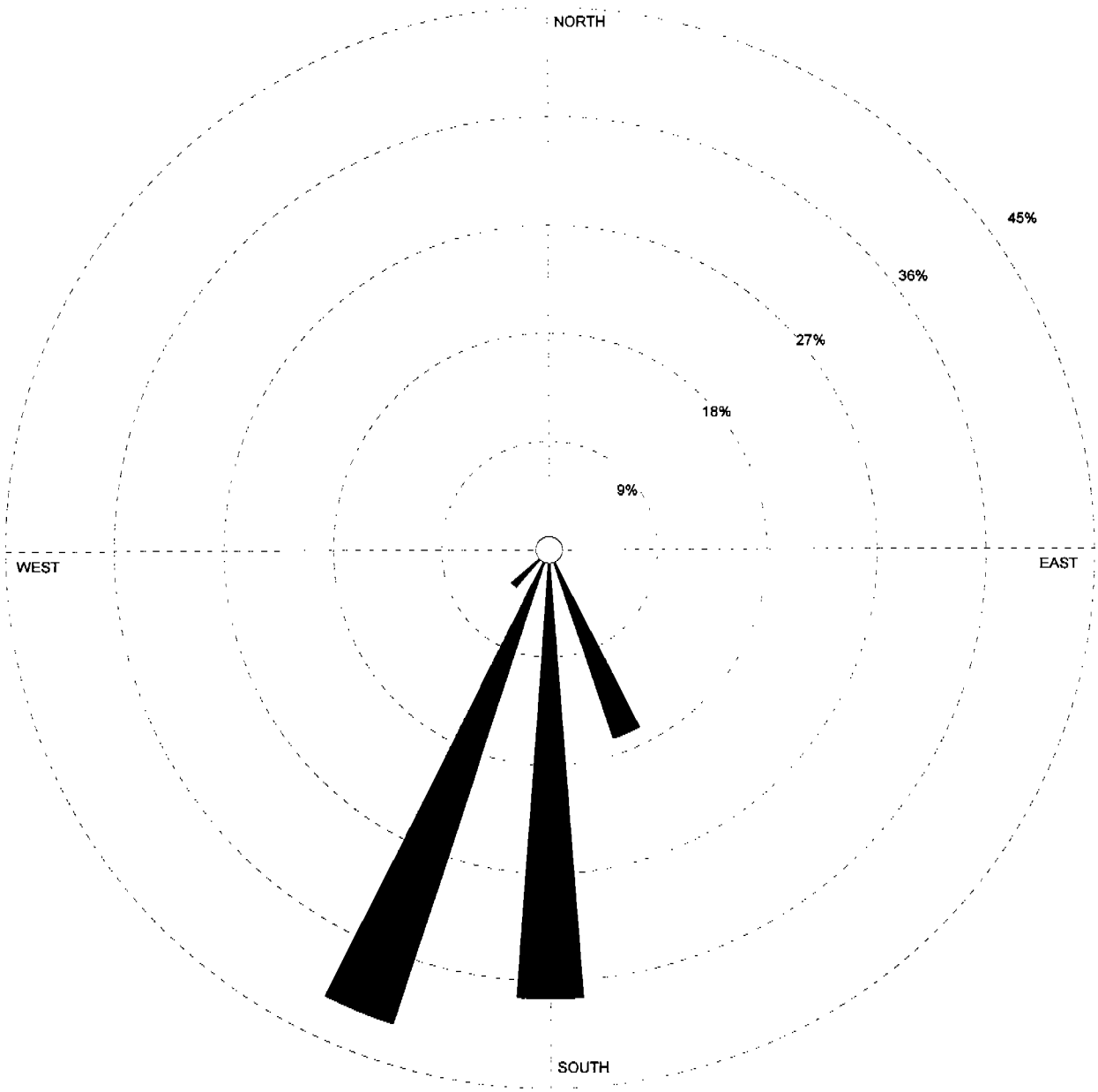
WIND ROSE PLOT

Station #03947 - KANSAS CITY/INT'L ARPT, MO

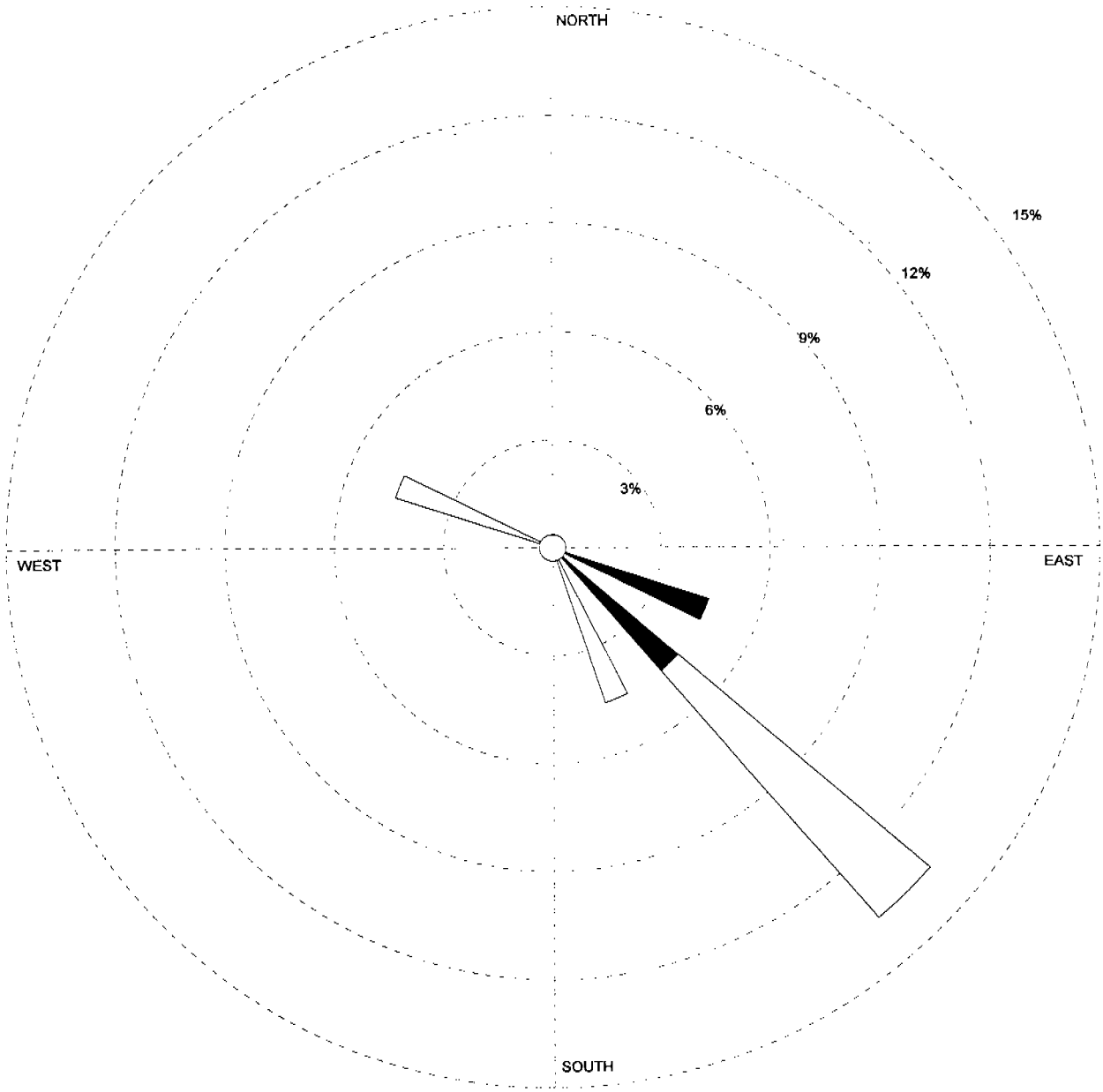


Wind Speed (Knots)	MODELER	DATE	ORGANIZATION NAME
> 21 17 - 21 11 - 16 7 - 10 4 - 6 1 - 3	**Douglas Watson**	**06/15/2000**	**Kansas Department of Health and Environment**
	DISPLAY **Wind Speed**	UNIT **Knots**	COMMENTS **Wind plot of KANSAS CITY/INT'L ARPT, MO Ozone Exceedance Day Watkins Mill July 20, 1998**
	AVG. WIND SPEED **10.04 Knots**	CALM WINDS **0.00%**	
	ORIENTATION **Direction (blowing from)**	PLOT YEAR-DATE-TIME **1998 Jul 20 - Jul 20 Midnight - 11 PM**	PROJECT/PLOT NO. **26**

WRPLOT View 3.05 by Lakes Environmental Software - www.lakes-environmental.com

WIND ROSE PLOT

Station #03947 - KANSAS CITY/INT'L ARPT, MO

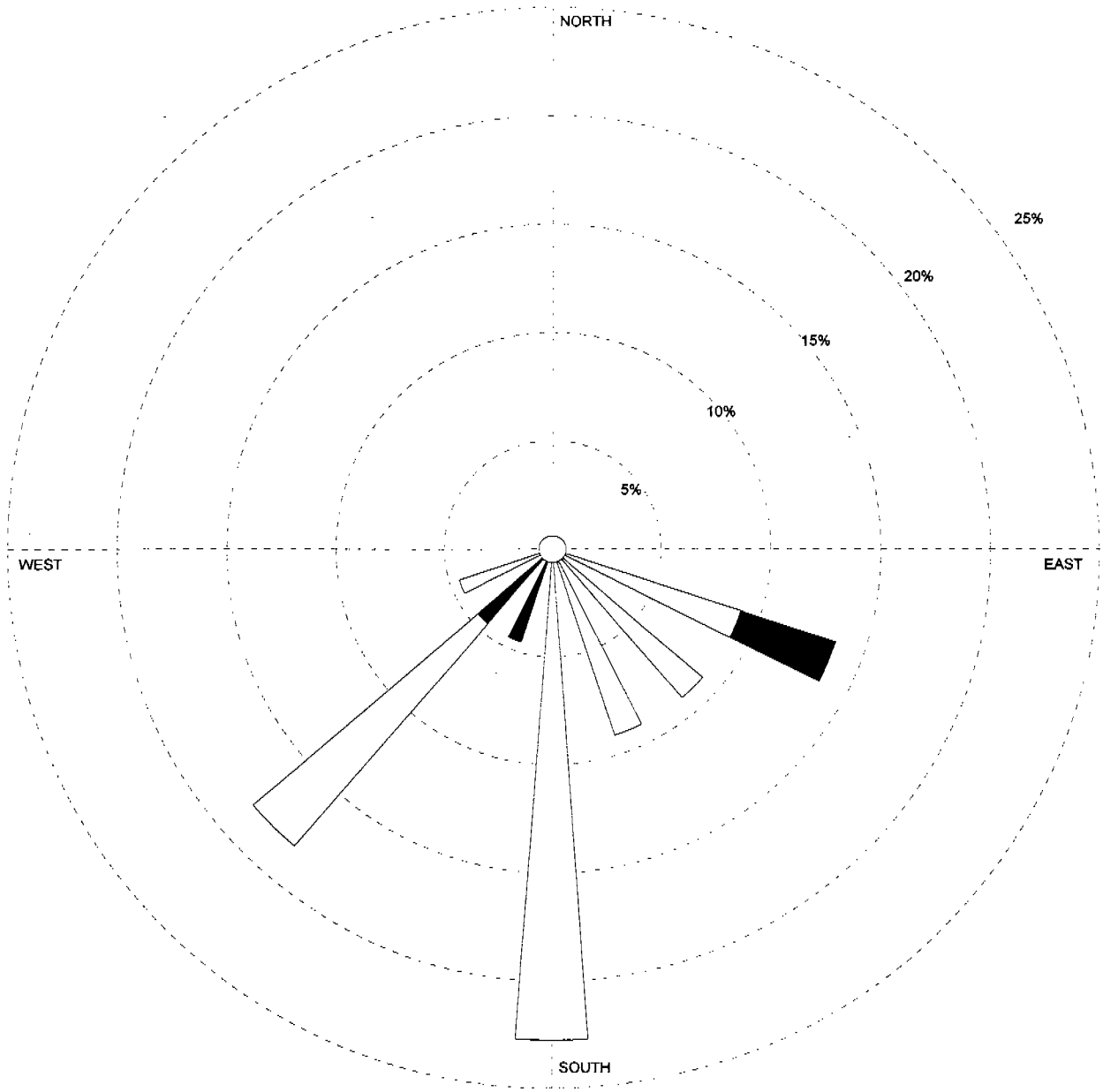


Wind Speed (Knots)	MODELER	DATE	ORGANIZATION NAME
	Douglas Watson	06/15/2000	Kansas Department of Health and Environment
> 21 17 - 21 11 - 16 7 - 10 4 - 6 1 - 3	DISPLAY Wind Speed	UNIT Knots	COMMENTS Wind plot of KANSAS CITY/INT'L ARPT, MO Ozone Exceedance Day Liberty, WOF August 14, 1998
	AVG. WIND SPEED 4.33 Knots	CALM WINDS 72.73%	
	ORIENTATION Direction (blowing from)	PLOT YEAR-DATE-TIME 1998 Aug 14 - Aug 14 Midnight - 11 PM	PROJECT/PLOT NO. 27

WRPLOT View 3.05 by Lakes Environmental Software - www.lakes-environmental.com

WIND ROSE PLOT

Station #03947 - KANSAS CITY/INT'L ARPT, MO

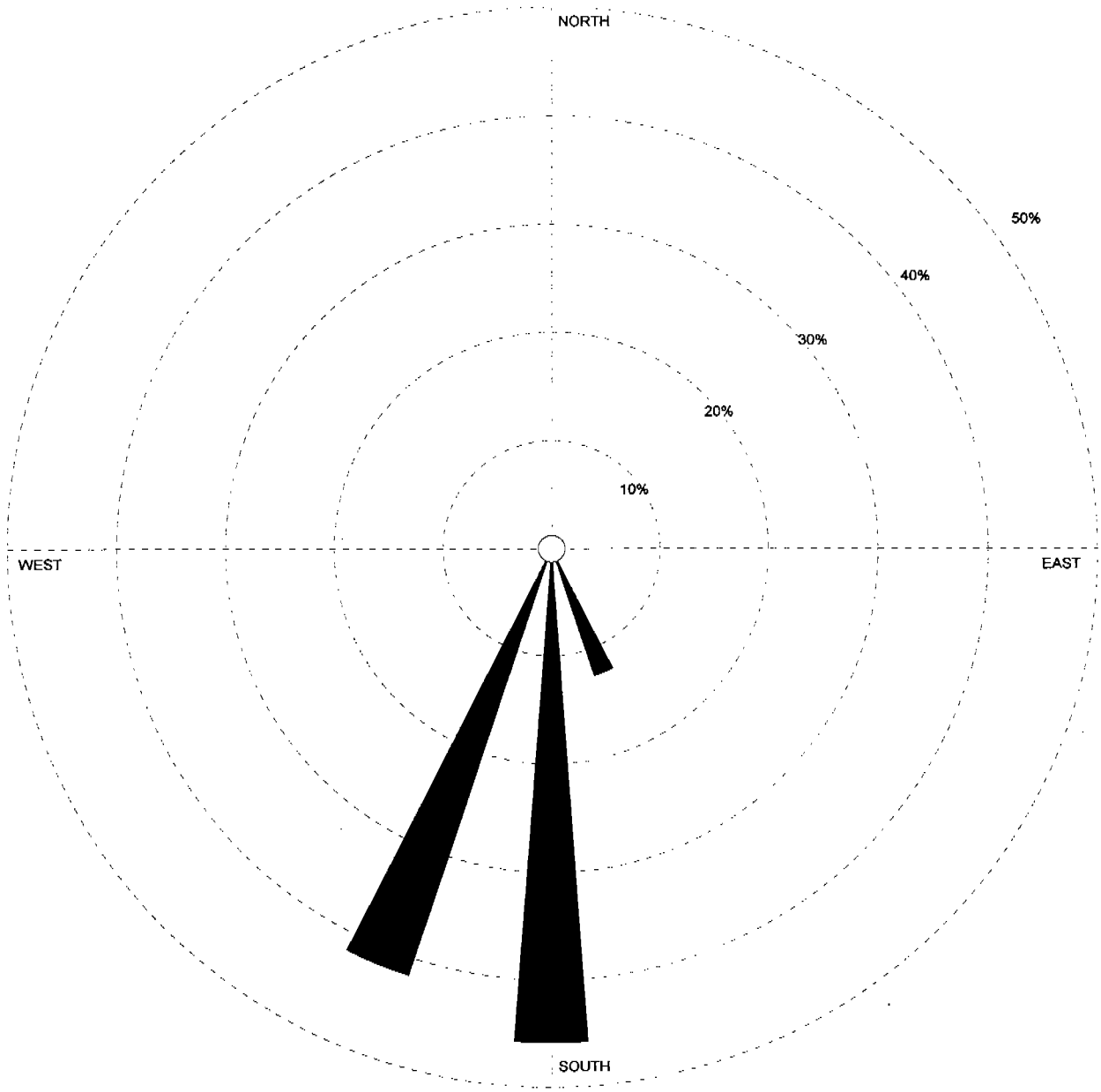


Wind Speed (Knots)	MODELER	DATE	ORGANIZATION NAME
> 21 17 - 21 11 - 16 7 - 10 4 - 6 1 - 3	Douglas Watson	06/15/2000	Kansas Department of Health and Environment
	DISPLAY Wind Speed	UNIT Knots	COMMENTS Wind plot of KANSAS CITY/INT'L ARPT, MO Ozone Exceedance Day Liberty, WOF,Wy. Co.,KCI, Watkins Mills August 15, 1998
	AVG. WIND SPEED 4.78 Knots	CALM WINDS 18.18%	
	ORIENTATION Direction (blowing from)	PLOT YEAR-DATE-TIME 1998 Aug 15 - Aug 15 Midnight - 11 PM	PROJECT/PLOT NO. 28

WRPLOT View 3.05 by Lakes Environmental Software - www.lakes-environmental.com

WIND ROSE PLOT

Station #03947 - KANSAS CITY/INT'L ARPT, MO



Wind Speed (Knots)

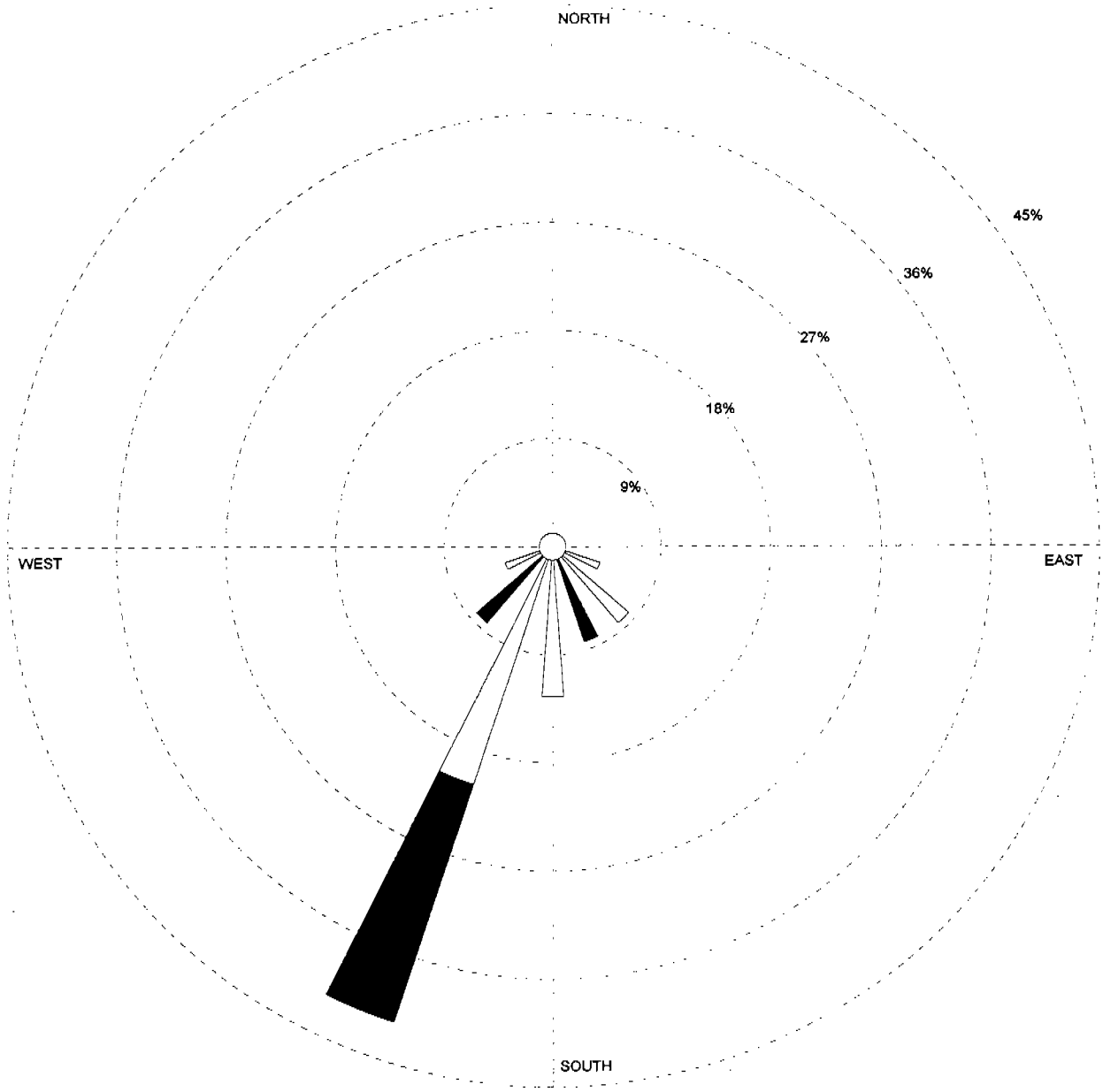
- > 21
- 17 - 21
- 11 - 16
- 7 - 10
- 4 - 6
- 1 - 3

MODELER	DATE	ORGANIZATION NAME
Douglas Watson	06/15/2000	Kansas Department of Health and Environment
DISPLAY: Wind Speed	UNIT: Knots	COMMENTS: Wind plot of KANSAS CITY/INT'L ARPT, MO Ozone Exceedance Day Liberty, Watkins Mill August 17, 1998
AVG. WIND SPEED: 10.92 Knots	CALM WINDS: 0.00%	
ORIENTATION: Direction (blowing from)	PLOT YEAR-DATE-TIME: 1998 Aug 17 - Aug 17 Midnight - 11 PM	PROJECT/PLOT NO.: 29

WRPLOT View 3.05 by Lakes Environmental Software - www.lakes-environmental.com

WIND ROSE PLOT

Station #03947 - KANSAS CITY/INT'L ARPT, MO



Wind Speed (Knots)

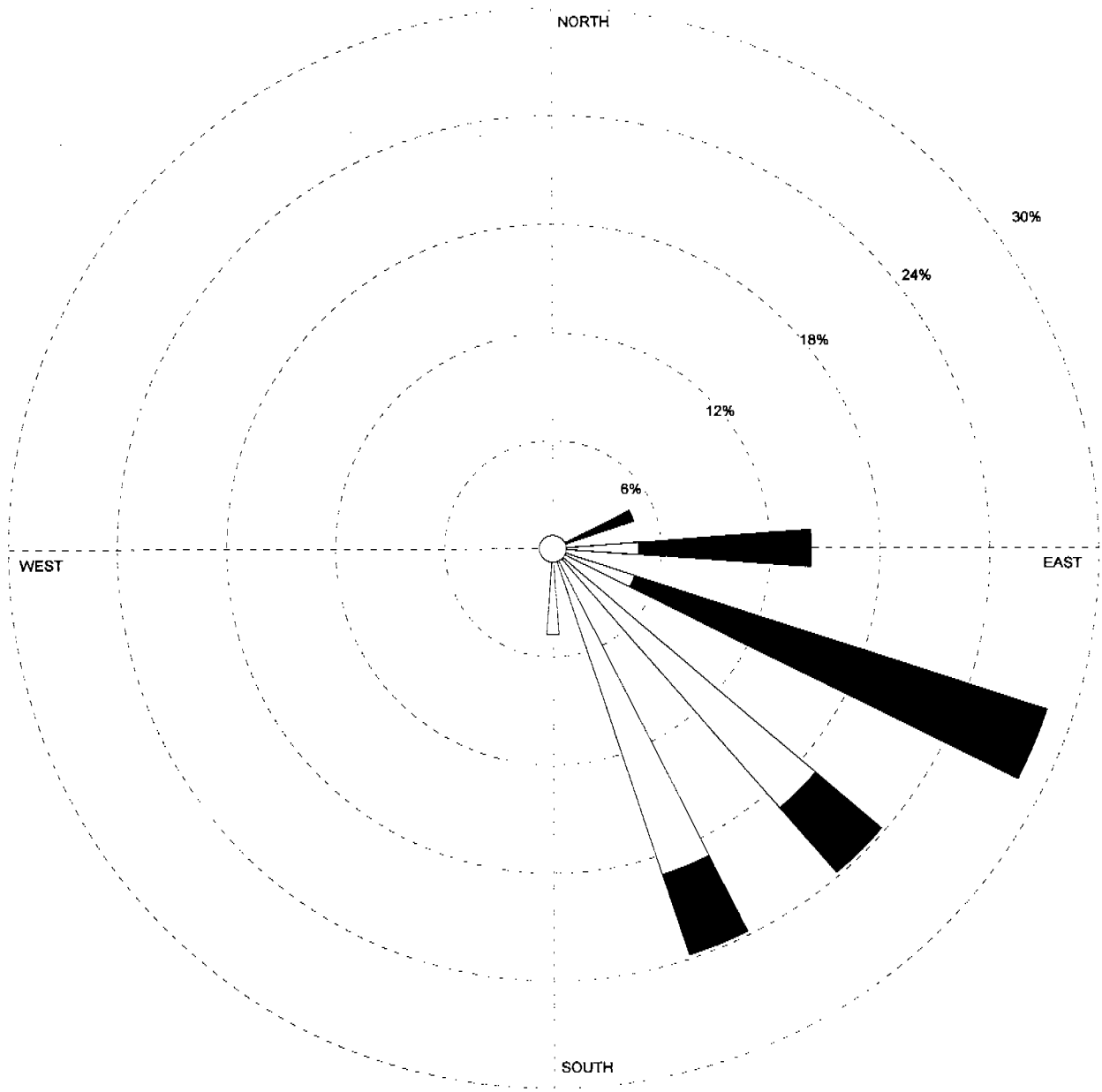
- > 21
- 17 - 21
- 11 - 16
- 7 - 10
- 4 - 6
- 1 - 3

MODELER **Douglas Watson**	DATE **06/15/2000**	ORGANIZATION NAME **Kansas Department of Health and Environment**
DISPLAY **Wind Speed**	UNIT **Knots**	COMMENTS **Wind plot of KANSAS CITY/INT'L ARPT, MO Ozone Exceedance Day Liberty, Watkins Mill, WOF August 18, 1998**
AVG. WIND SPEED **6.10 Knots**	CALM WINDS **12.50%**	
ORIENTATION **Direction (blowing from)**	PLOT YEAR-DATE-TIME **1998 Aug 18 - Aug 18 Midnight - 11 PM**	PROJECT/PLOT NO. **30**

WRPLOT View 3.05 by Lakes Environmental Software - www.lakes-environmental.com

WIND ROSE PLOT

Station #03947 - KANSAS CITY/INT'L ARPT, MO

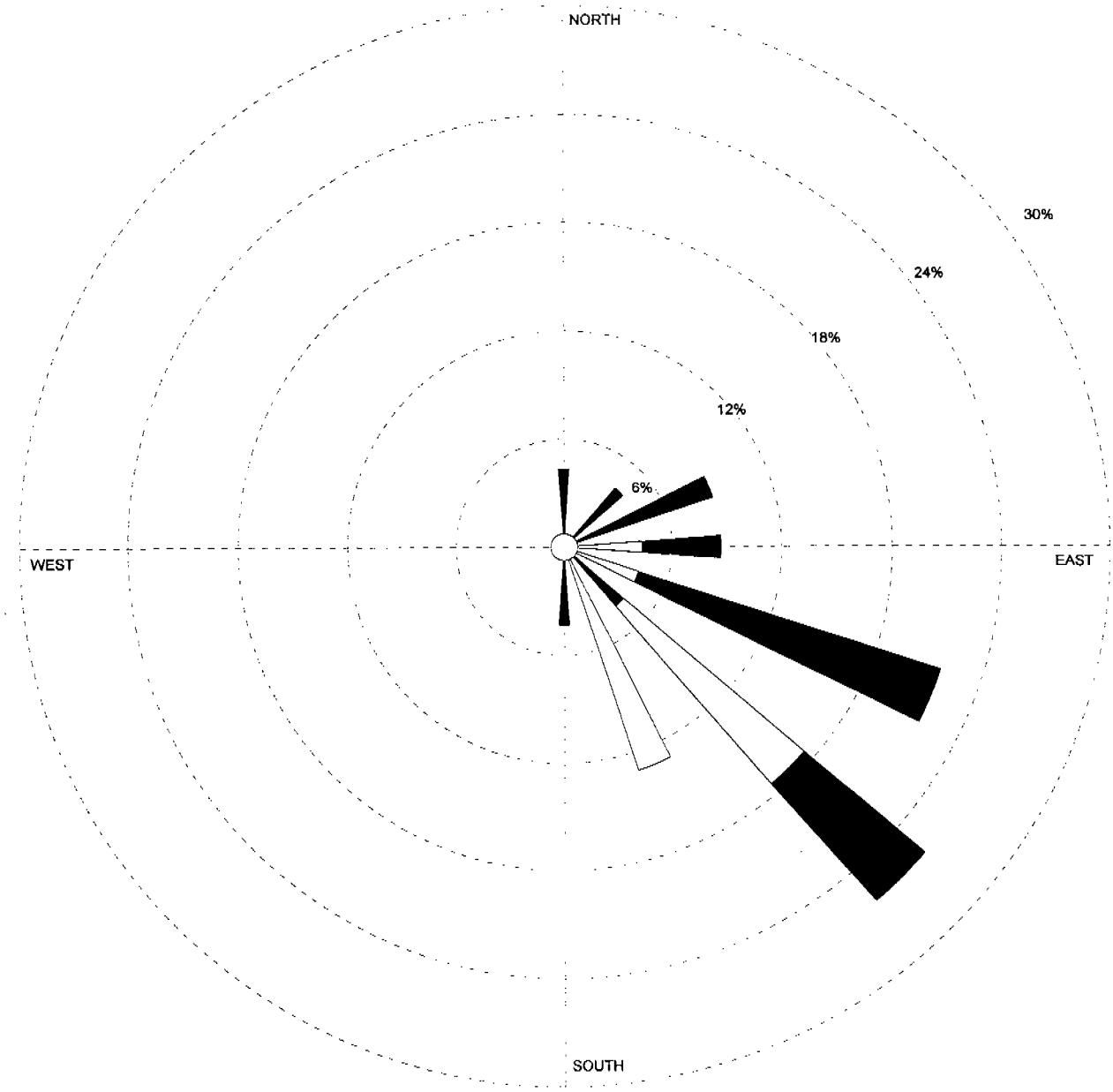


Wind Speed (Knots)	MODELER	DATE	ORGANIZATION NAME
> 21 17 - 21 11 - 16 7 - 10 4 - 6 1 - 3	**Douglas Watson**	**06/15/2000**	**Kansas Department of Health and Environment**
	DISPLAY **Wind Speed**	UNIT **Knots**	COMMENTS **Wind plot of KANSAS CITY/INT'L ARPT, MO Ozone Exceedance Day KCI, Wyandotte Co. August 19, 1998**
	AVG. WIND SPEED **6.52 Knots**	CALM WINDS **0.00%**	
	ORIENTATION **Direction (blowing from)**	PLOT YEAR-DATE-TIME **1998 Aug 19 - Aug 19 Midnight - 11 PM**	PROJECT/PLOT NO. **31**

WRPLOT View 3.05 by Lakes Environmental Software - www.lakes-environmental.com

WIND ROSE PLOT

Station #03947 - KANSAS CITY/INT'L ARPT, MO

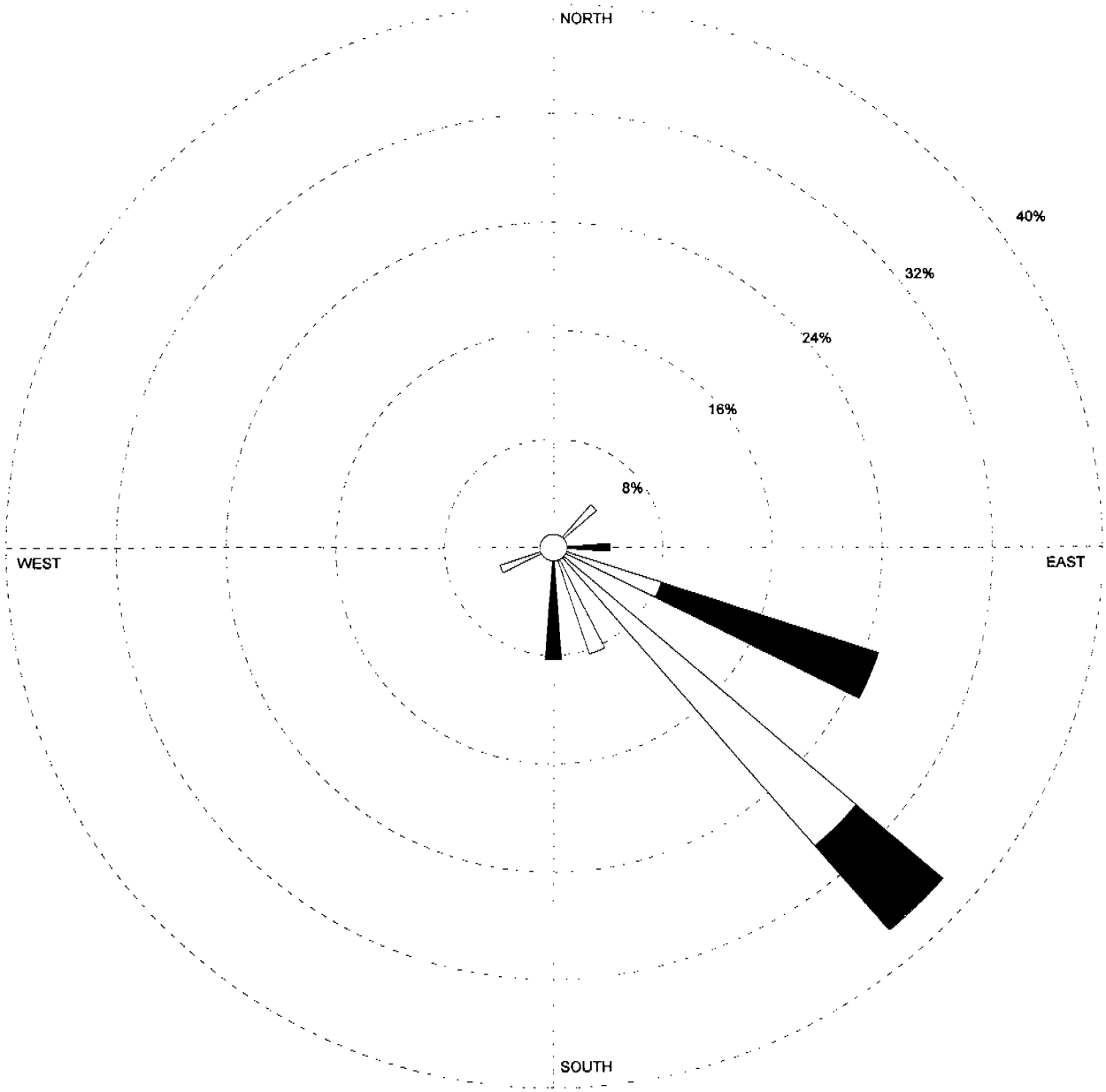


Wind Speed (Knots)	MODELER	DATE	ORGANIZATION NAME
> 21 17 - 21 11 - 16 7 - 10 4 - 6 1 - 3	Douglas Watson	06/15/2000	Kansas Department of Health and Environment
	DISPLAY Wind Speed	UNIT Knots	COMMENTS Wind plot of KANSAS CITY/INT'L ARPT, MO Ozone Exceedance Day Wyandotte Co. August 20, 1998
	AVG. WIND SPEED 6.43 Knots	CALM WINDS 8.70%	
	ORIENTATION Direction (blowing from)	PLOT YEAR-DATE-TIME 1998 Aug 20 - Aug 20 Midnight - 11 PM	PROJECT/PLOT NO. 32

WRPLOT View 3.05 by Lakes Environmental Software - www.lakes-environmental.com

WIND ROSE PLOT

Station #03947 - KANSAS CITY/INT'L ARPT, MO

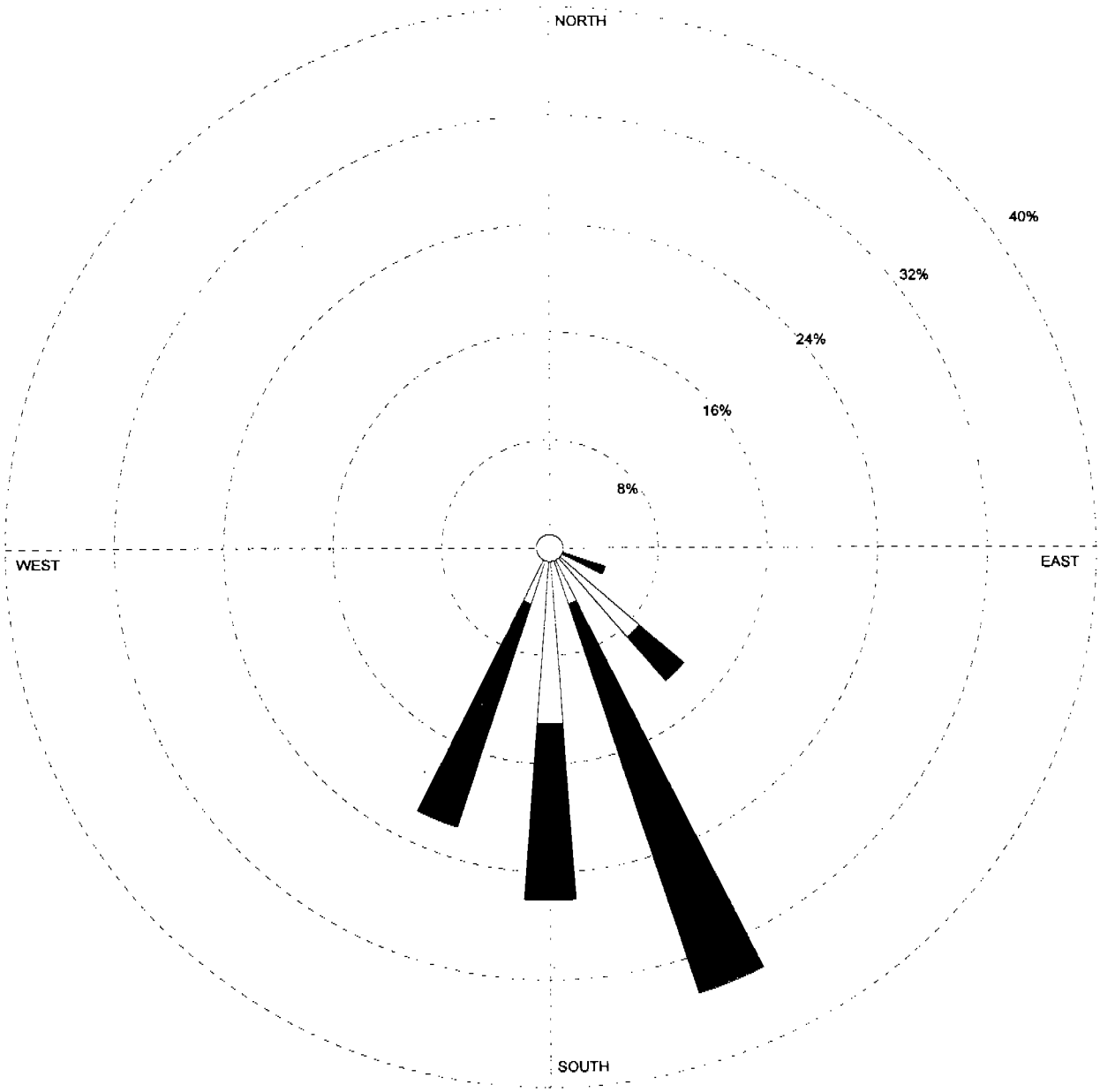


Wind Speed (Knots)	MODELER	DATE	ORGANIZATION NAME
> 21 17 - 21 11 - 16 7 - 10 4 - 6 1 - 3	Douglas Watson	06/15/2000	Kansas Department of Health and Environment
	DISPLAY Wind Speed	UNIT Knots	COMMENTS Wind plot of KANSAS CITY/INT'L ARPT, MO Ozone Exceedance Day Wyandotte Co., KCI August 21, 1998
	AVG. WIND SPEED 6.00 Knots	CALM WINDS 8.33%	
	ORIENTATION Direction (blowing from)	PLOT YEAR-DATE-TIME 1998 Aug 21 - Aug 21 Midnight - 11 PM	PROJECT/PLOT NO. 33

WRPLOT View 3.05 by Lakes Environmental Software - www.lakes-environmental.com

WIND ROSE PLOT

Station #03947 - KANSAS CITY/INT'L ARPT, MO



Wind Speed (Knots)

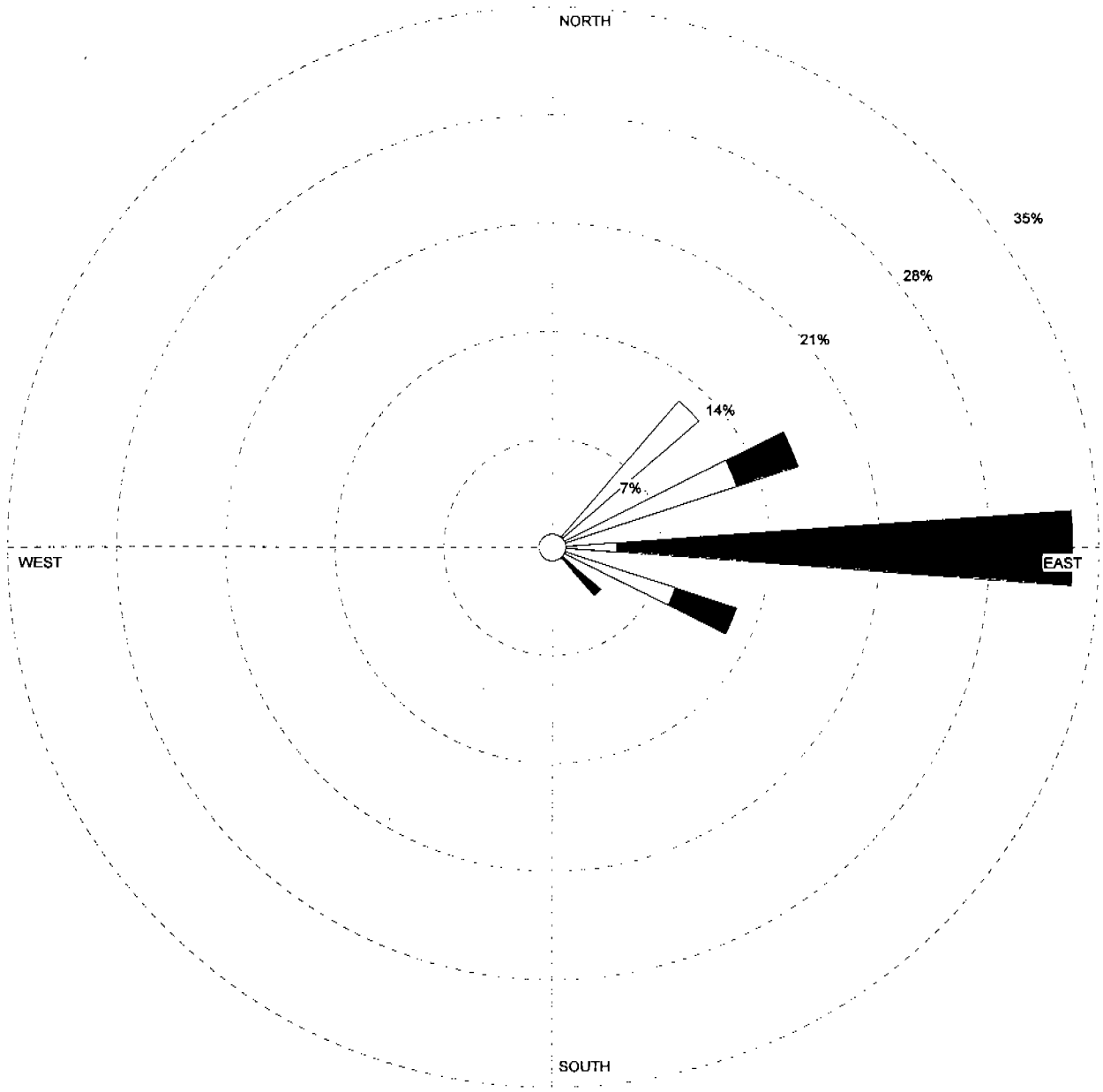
- > 21
- 17 - 21
- 11 - 16
- 7 - 10
- 4 - 6
- 1 - 3

MODELER	DATE	ORGANIZATION NAME
Douglas Watson	06/15/2000	Kansas Department of Health and Environment
DISPLAY: Wind Speed	UNIT: Knots	COMMENTS: Wind plot of KANSAS CITY/INT'L ARPT, MO Ozone Exceedance Day Liberty, Watkins Mill, WOF August 22, 1998
AVG. WIND SPEED: 7.43 Knots	CALM WINDS: 0.00%	
ORIENTATION: Direction (blowing from)	PLOT YEAR-DATE-TIME: 1998 Aug 22 - Aug 22 Midnight - 11 PM	PROJECT/PLOT NO.: 34

WRPLOT View 3.05 by Lakes Environmental Software - www.lakes-environmental.com

WIND ROSE PLOT

Station #03947 - KANSAS CITY/INT'L ARPT, MO



Wind Speed (Knots)

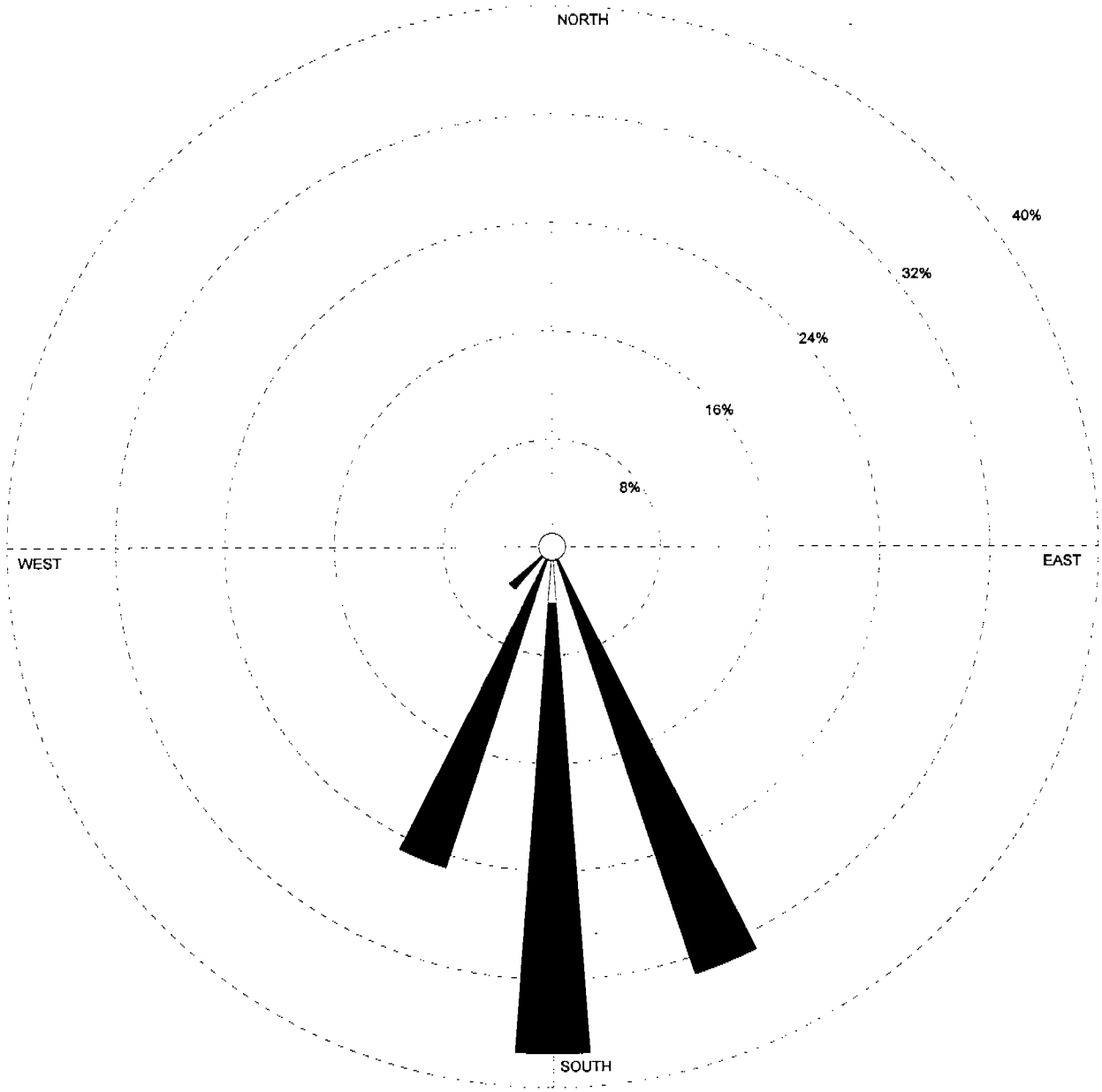
- > 21
- 17 - 21
- 11 - 16
- 7 - 10
- 4 - 6
- 1 - 3

MODELER **Douglas Watson**	DATE **06/15/2000**	ORGANIZATION NAME **Kansas Department of Health and Environment**	
DISPLAY **Wind Speed**	UNIT **Knots**	COMMENTS **Wind plot of KANSAS CITY/INT'L ARPT, MO Ozone Exceedance Day Liberty, Watkins Mill, WOF, Wy. Co., KCI September 5, 1998**	
AVG. WIND SPEED **6.53 Knots**	CALM WINDS **20.83%**		
ORIENTATION **Direction (blowing from)**	PLOT YEAR-DATE-TIME **1998 Sep 5 - Sep 5 Midnight - 11 PM**	PROJECT/PLOT NO. **35**	

WRPLOT View 3.05 by Lakes Environmental Software - www.lakes-environmental.com

WIND ROSE PLOT

Station #03947 - KANSAS CITY/INT'L ARPT, MO

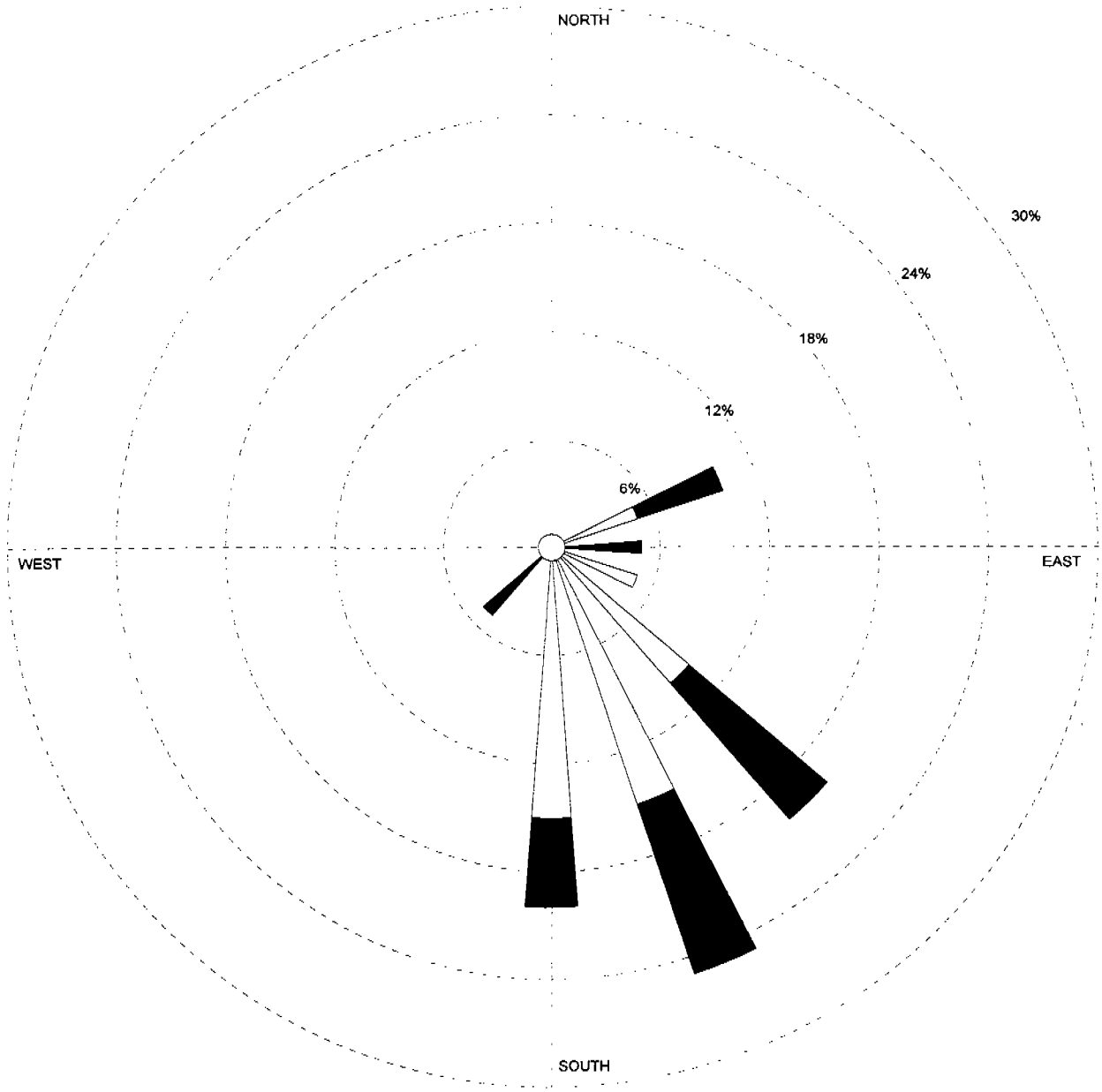


Wind Speed (Knots) > 21 17 - 21 11 - 16 7 - 10 4 - 6 1 - 3	MODELER **Douglas Watson**	DATE **06/15/2000**	ORGANIZATION NAME **Kansas Department of Health and Environment**
	DISPLAY **Wind Speed**	UNIT **Knots**	COMMENTS **Wind plot of KANSAS CITY/INT'L ARPT, MO Ozone Exceedance Day Liberty, Watkins Mills, Wy. Co. September 6, 1998**
	AVG. WIND SPEED **9.13 Knots**	CALM WINDS **0.00%**	
	ORIENTATION **Direction (blowing from)**	PLOT YEAR-DATE-TIME **1998 Sep 6 - Sep 6 Midnight - 11 PM**	PROJECT/PLOT NO. **36**

WRPLOT View 3.05 by Lakes Environmental Software - www.lakes-environmental.com

WIND ROSE PLOT

Station #03947 - KANSAS CITY/INT'L ARPT, MO



Wind Speed (Knots)

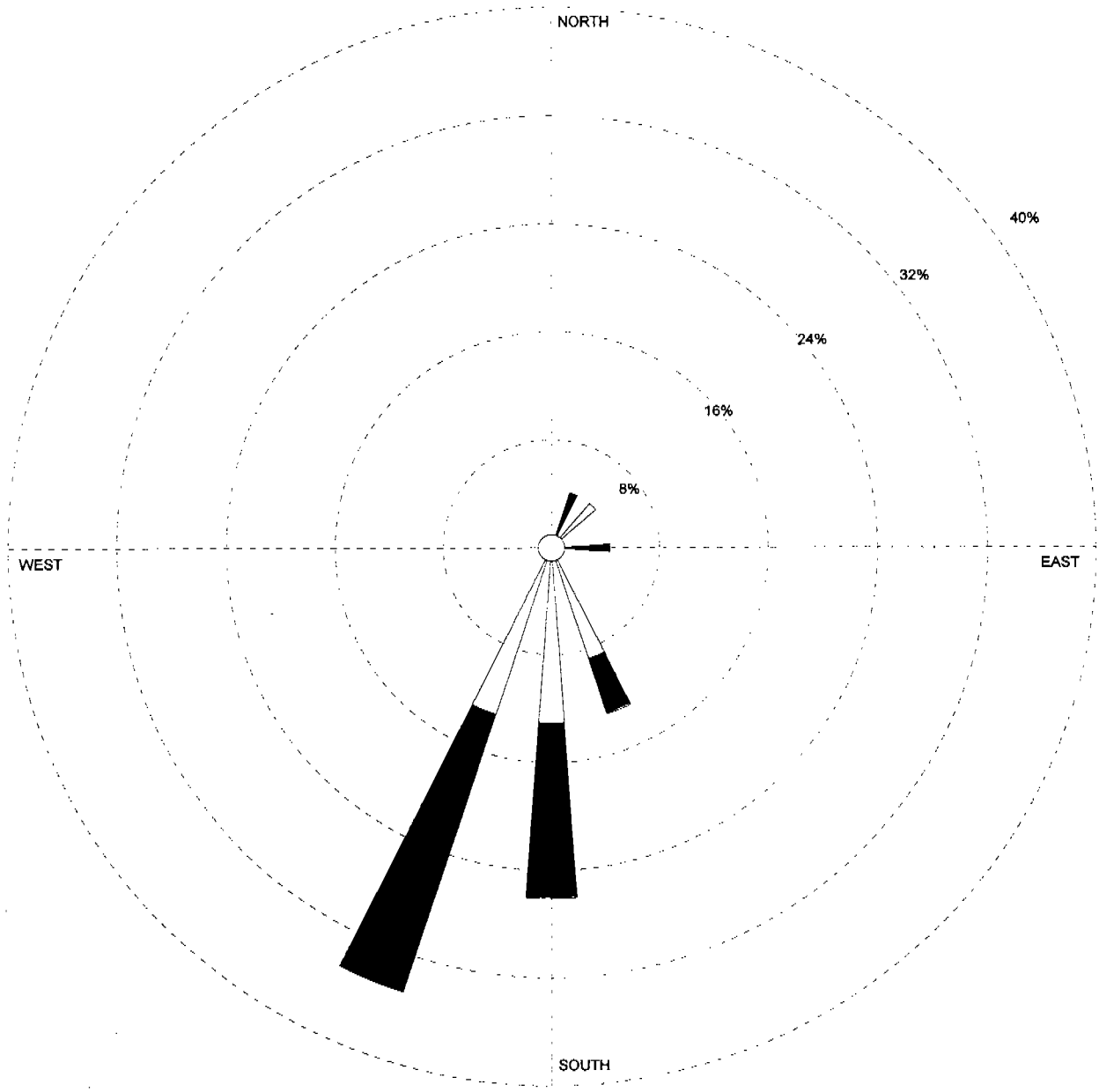
- > 21
- 17 - 21
- 11 - 16
- 7 - 10
- 4 - 6
- 1 - 3

MODELER	DATE	ORGANIZATION NAME
Douglas Watson	06/15/2000	Kansas Department of Health and Environment
DISPLAY: Wind Speed	UNIT: Knots	COMMENTS: Wind plot of KANSAS CITY/INT'L ARPT, MO Ozone Exceedance Day Liberty, Watkins Mills September 11, 1998
AVG. WIND SPEED: 6.39 Knots	CALM WINDS: 10.00%	
ORIENTATION: Direction (blowing from)	PLOT YEAR-DATE-TIME: 1998 Sep 11 - Sep 11 Midnight - 11 PM	PROJECT/PLOT NO.: 37

WRPLOT View 3.05 by Lakes Environmental Software - www.lakes-environmental.com

WIND ROSE PLOT

Station #03947 - KANSAS CITY/INT'L ARPT, MO

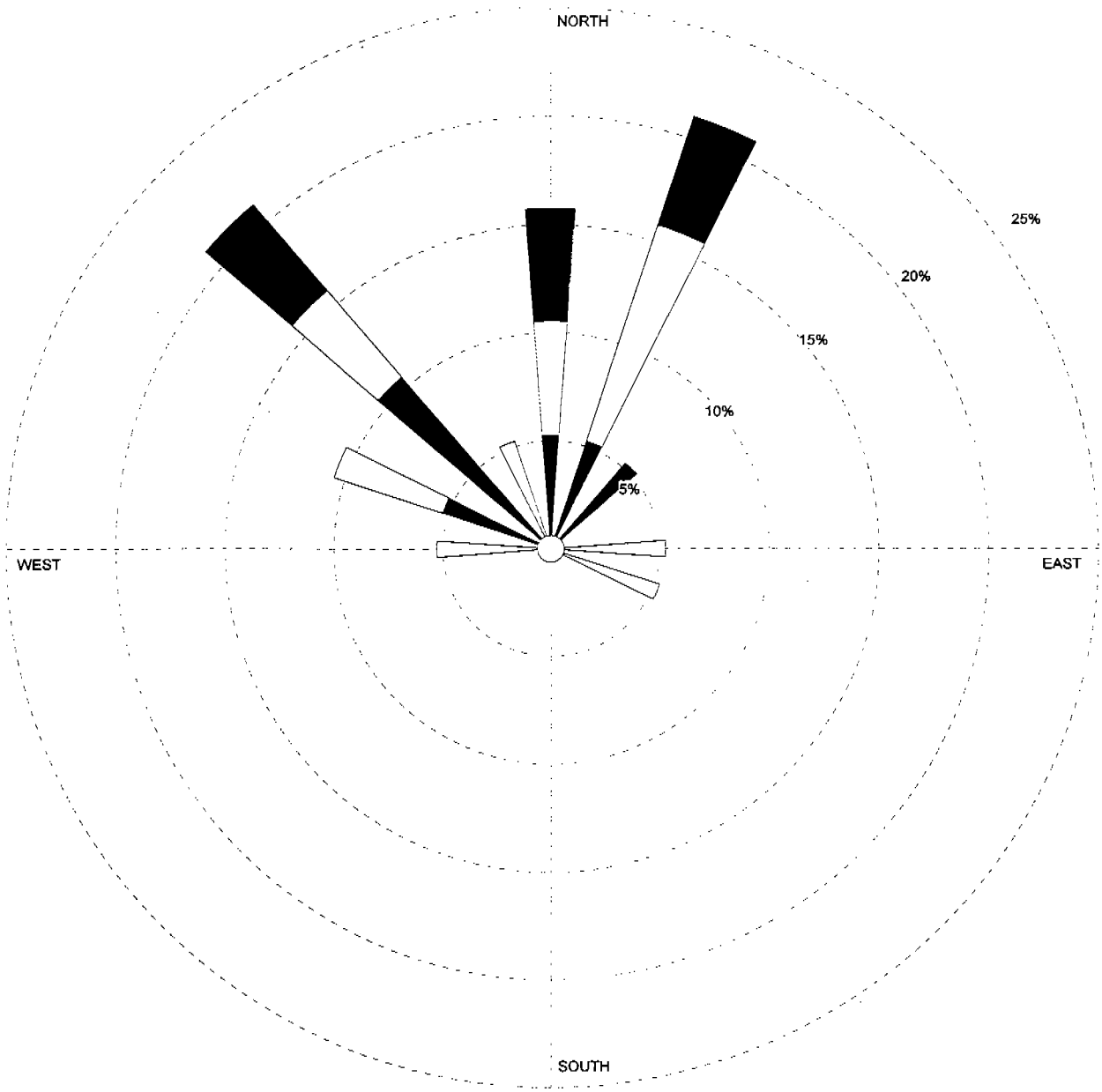


Wind Speed (Knots)	MODELER	DATE	ORGANIZATION NAME
> 21 17 - 21 11 - 16 7 - 10 4 - 6 1 - 3	**Douglas Watson**	**06/15/2000**	**Kansas Department of Health and Environment**
	DISPLAY **Wind Speed**	UNIT **Knots**	COMMENTS **Wind plot of KANSAS CITY/INT'L ARPT, MO Ozone Exceedance Day Liberty July 27, 1999**
	AVG. WIND SPEED **6.10 Knots**	CALM WINDS **13.04%**	
	ORIENTATION **Direction (blowing from)**	PLOT YEAR-DATE-TIME **1999 Jul 27 - Jul 27 Midnight - 11 PM**	PROJECT/PLOT NO. **38**

WRPLOT View 3.05 by Lakes Environmental Software - www.lakes-environmental.com

WIND ROSE PLOT

Station #03947 - KANSAS CITY/INT'L ARPT, MO

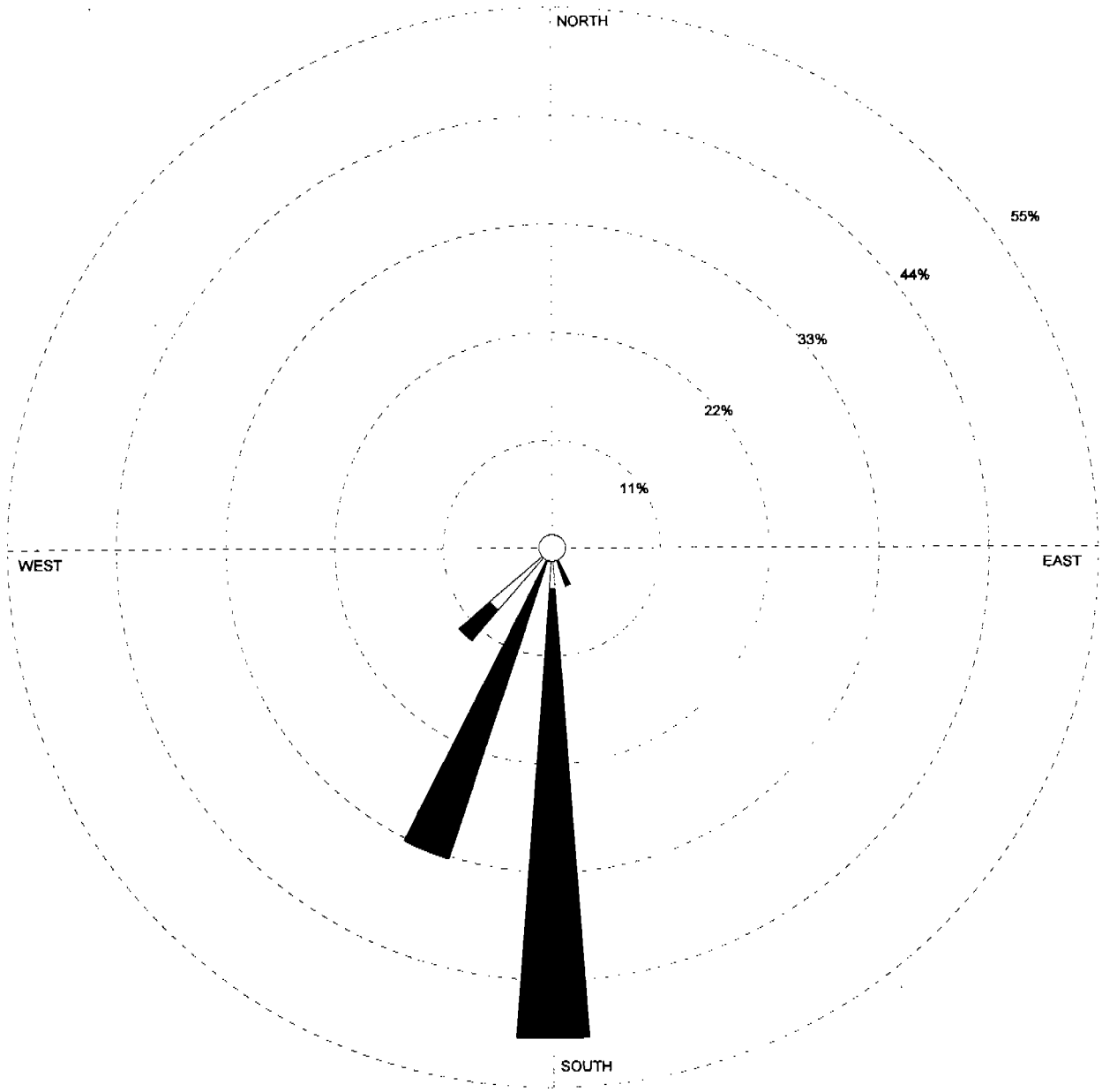


Wind Speed (Knots)	MODELER	DATE	ORGANIZATION NAME
> 21 17 - 21 11 - 16 7 - 10 4 - 6 1 - 3	**Douglas Watson**	**06/15/2000**	**Kansas Department of Health and Environment**
	DISPLAY **Wind Speed**	UNIT **Knots**	COMMENTS **Wind plot of KANSAS CITY/INT'L ARPT, MO Ozone Exceedance Day Richards Gebaur August 4, 1999**
	AVG. WIND SPEED **4.72 Knots**	CALM WINDS **5.26%**	
	ORIENTATION **Direction (blowing from)**	PLOT YEAR-DATE-TIME **1999 Aug 4 - Aug 4 Midnight - 11 PM**	PROJECT/PLOT NO. **39**

WRPLOT View 3.05 by Lakes Environmental Software - www.lakes-environmental.com

WIND ROSE PLOT

Station #03947 - KANSAS CITY/INT'L ARPT, MO

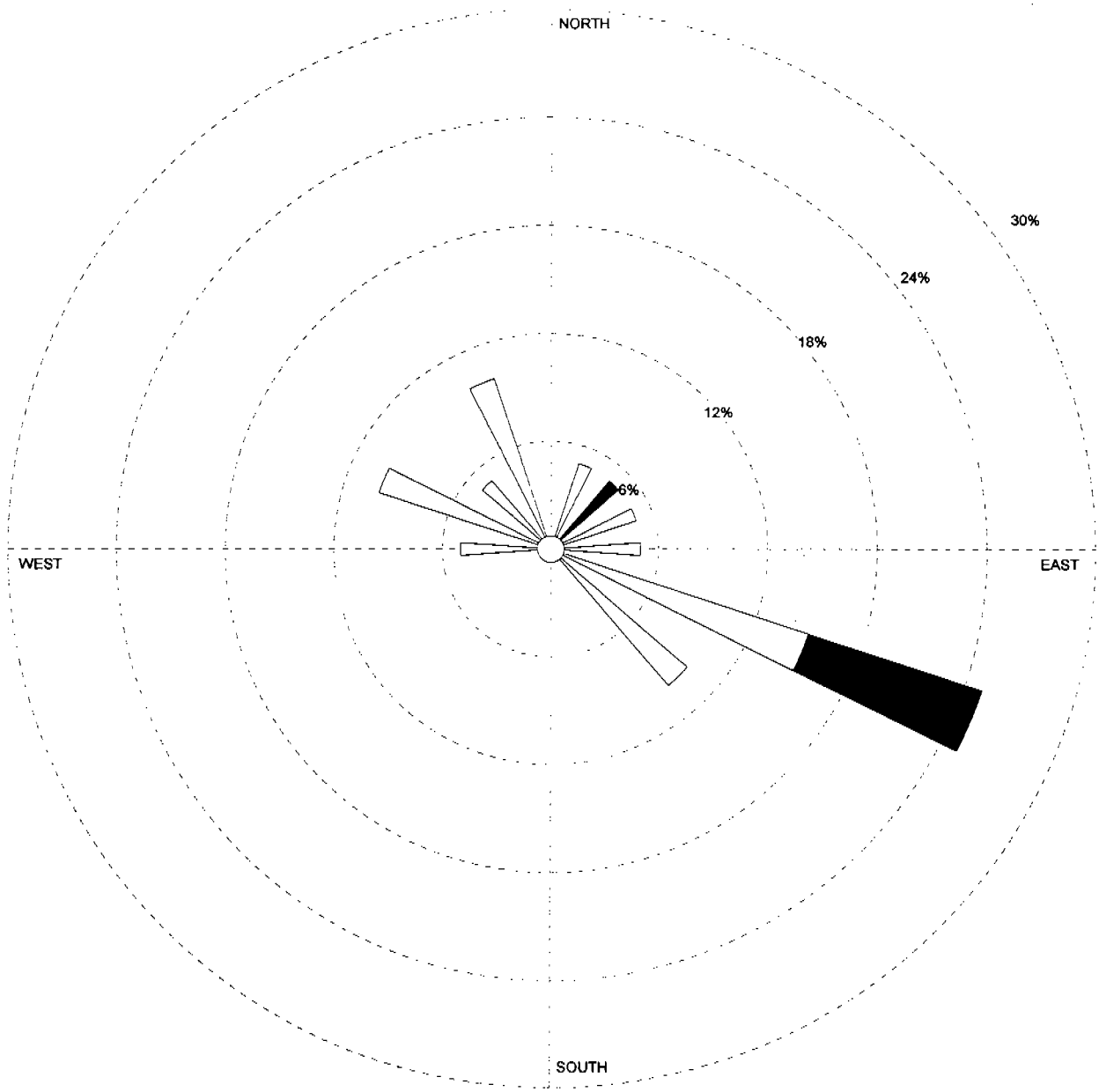


Wind Speed (Knots)	MODELER	DATE	ORGANIZATION NAME
> 21 17 - 21 11 - 16 7 - 10 4 - 6 1 - 3	Douglas Watson	06/15/2000	Kansas Department of Health and Environment
	DISPLAY Wind Speed	UNIT Knots	COMMENTS Wind plot of KANSAS CITY/INT'L ARPT, MO Ozone Exceedance Day Liberty, Watkins Mill August 16, 1999
	AVG. WIND SPEED 10.08 Knots	CALM WINDS 0.00%	
	ORIENTATION Direction (blowing from)	PLOT YEAR-DATE-TIME 1999 Aug 16 - Aug 16 Midnight - 11 PM	PROJECT/PLOT NO. 40

WRPLOT View 3.05 by Lakes Environmental Software - www.lakes-environmental.com

WIND ROSE PLOT

Station #03947 - KANSAS CITY/INT'L ARPT, MO



Wind Speed (Knots)

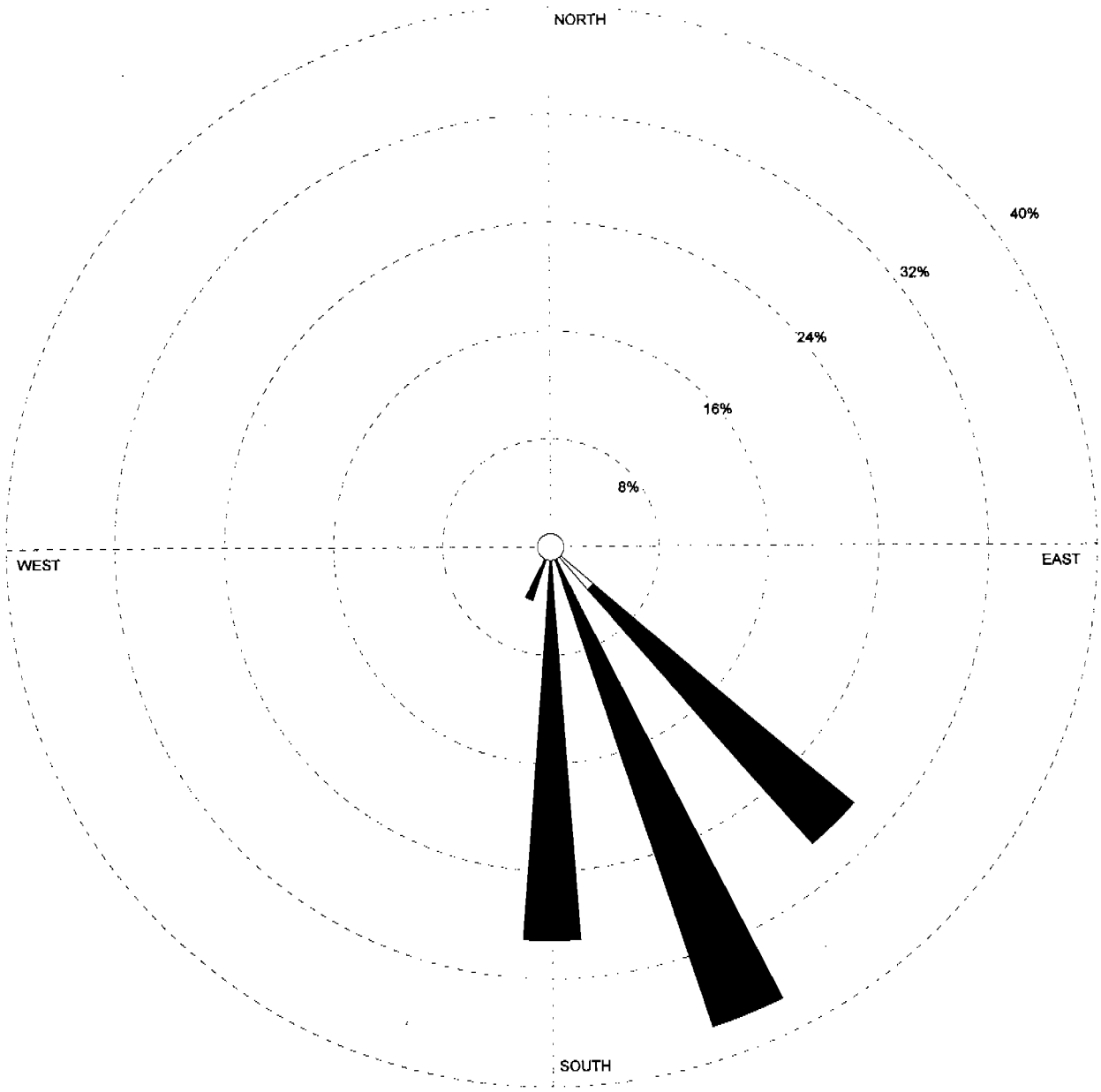
- > 21
- 17 - 21
- 11 - 16
- 7 - 10
- 4 - 6
- 1 - 3

MODELER **Douglas Watson**	DATE **06/15/2000**	ORGANIZATION NAME **Kansas Department of Health and Environment**
DISPLAY **Wind Speed**	UNIT **Knots**	COMMENTS **Wind plot of KANSAS CITY/INT'L ARPT, MO Ozone Exceedance Day Richards Gebaur August 25, 1999**
AVG. WIND SPEED **5.24 Knots**	CALM WINDS **15.00%**	
ORIENTATION **Direction (blowing from)**	PLOT YEAR-DATE-TIME **1999 Aug 25 - Aug 25 Midnight - 11 PM**	PROJECT/PLOT NO. **41**

WRPLOT View 3.05 by Lakes Environmental Software - www.lakes-environmental.com

WIND ROSE PLOT

Station #03947 - KANSAS CITY/INT'L ARPT, MO



Wind Speed (Knots)	MODELER	DATE	ORGANIZATION NAME
> 21	Douglas Watson	06/15/2000	Kansas Department of Health and Environment
17 - 21	DISPLAY: Wind Speed	UNIT: Knots	COMMENTS: Wind plot of KANSAS CITY/INT'L ARPT, MO Ozone Exceedance Day Liberty, Watkins Mill, WOF September 1, 1999
11 - 16	AVG. WIND SPEED: 8.17 Knots	CALM WINDS: 0.00%	
7 - 10			
4 - 6	ORIENTATION: Direction (blowing from)	PLOT YEAR-DATE-TIME: 1999 Sep 1 - Sep 1 Midnight - 11 PM	PROJECT/PLOT NO.: 42
1 - 3			

WRPLOT View 3.05 by Lakes Environmental Software - www.lakes-environmental.com

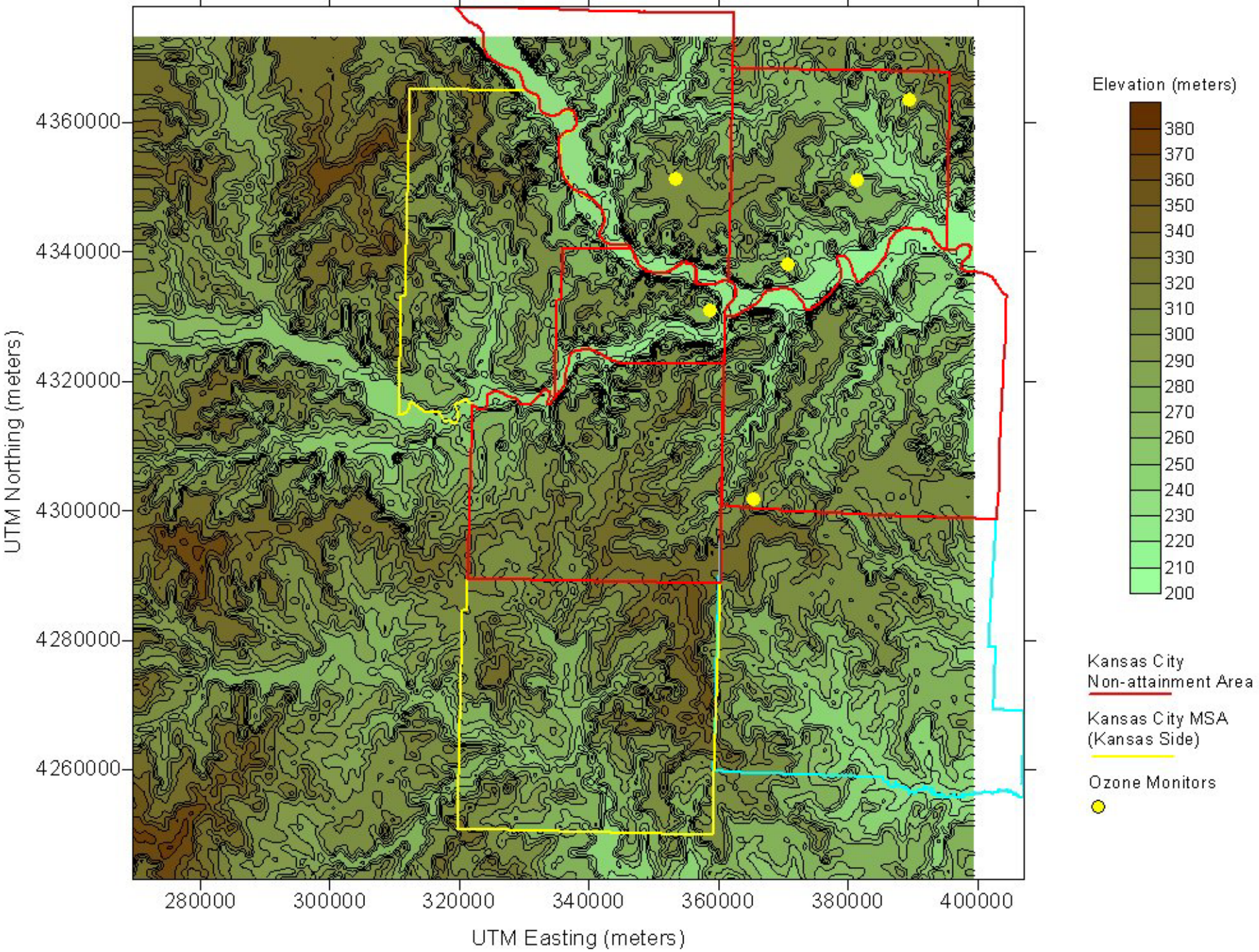
Population Density

		Total Land (acres)	Land in Farms 1992	Land in Farms 1997	Non-Farm ("Urban") Land 1992	Non-Farm ("Urban") Land 1997	Population 1992	Population 1997	Gross Population Density 1992	Gross Population Density 1997
Kansas	Douglas	292,480	222028	218517	70,452	73,963	85,120	94886	1.21	1.28
	Johnson	305,138	141,386	135,787	163,752	169,351	373,988	418,976	2.28	2.47
	Leavenworth	296,517	206,530	201,826	89,987	94,691	66,798	70,545	0.74	0.75
	Linn	383,232	273,841	278,086	109,391	105,146	8,432	9,058	0.08	0.09
	Miami	369125	286,989	279,859	82,136	89,266	24,010	26219	0.29	0.29
	Wyandotte	96,895	22,553	22,351	74,342	74,544	158,619	152,796	2.13	2.05
Missouri	Cass	447,435	325,796	310,479	121,639	136,956	67,429	78,056	0.55	0.57
	Clay	253,733	130,358	134,156	123,375	119,577	159,109	174,033	1.29	1.46
	Clinton	268,032	207,611	216,483	60,421	51,549	17,072	18,669	0.28	0.36
	Jackson	387,083	134,196	150,581	252,887	236,502	638,146	654,152	2.52	2.77
	Johnson	531,584	371,022	399,600	160,562	131,984	43,731	47,171	0.27	0.36
	Lafayette	402,816	356,164	349,265	46,652	53,551	31,140	32,481	0.67	0.61
	Platte	269,037	188,595	180,455	80,442	88,582	61,383	68,801	0.76	0.78
	Ray	364,486	277,322	274,349	87,164	90,137	21,726	23,312	0.25	0.26
	Total	4,667,593	3,144,391	3,151,794	1,523,202	1,515,799	1,756,703	1,869,155	1.15	1.23
	MSA	3,192,265	2,069,889	2,039,108	1,122,376	1,153,157	1,602,348	1,699,371	1.43	1.47
	5-Co	1,311,886	617,088	623,330	694,798	688,556	1,391,245	1,468,758	2.00	2.13

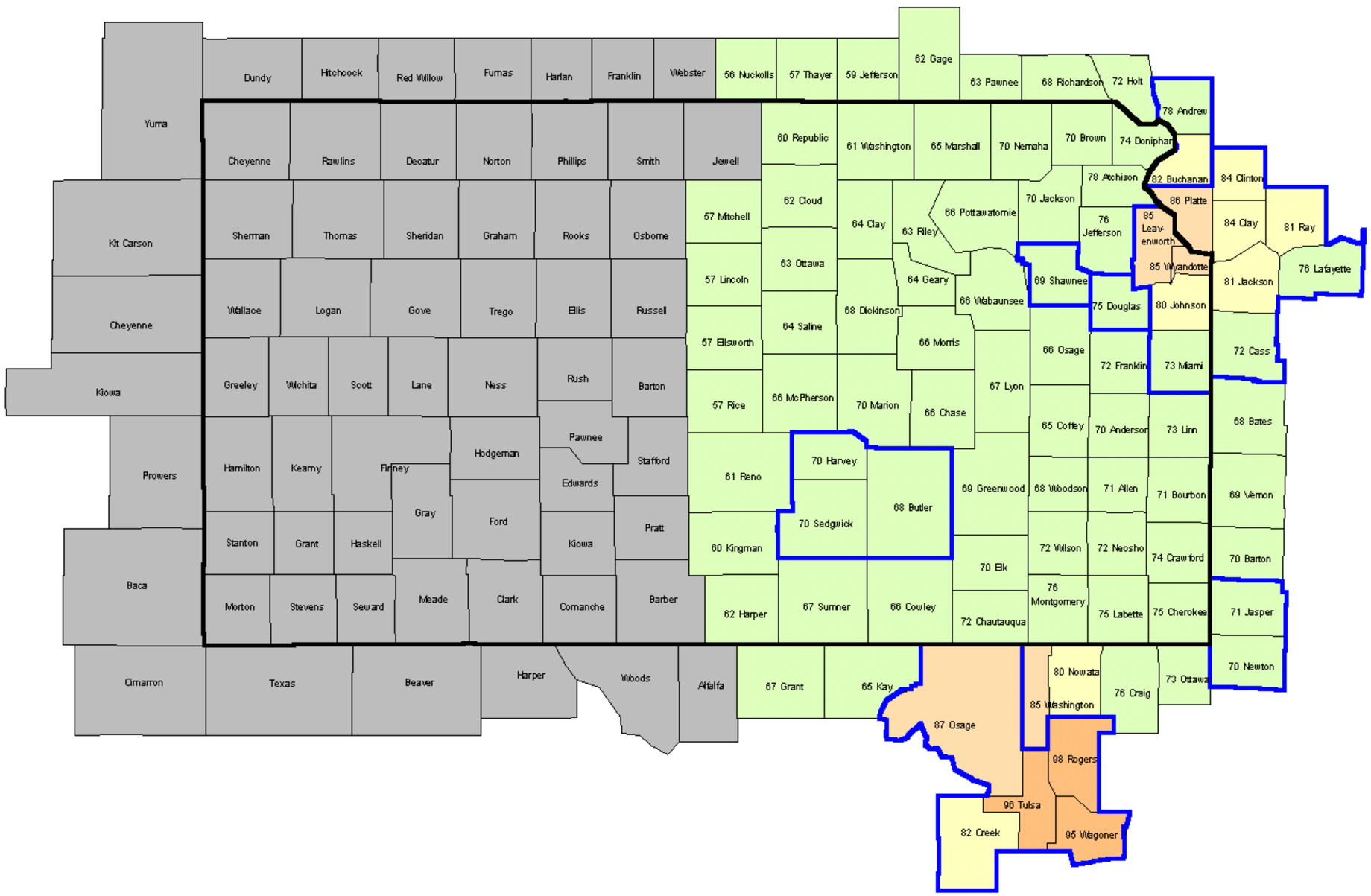
Sources:
Land: 1992 and 1997 Agricultural Censuses
Population: U.S Bureau of the Census

	A	B	C	D	E	F	G
1	**Land in Farms**						
2			**Total Land**	**Land in Farms**		**Non-Farm ("Urban") Land**	
3			**(acres)**	**1992**	**1997**	**1992**	**1997**
4	**Kansas**	**Douglas**	**292,480**	**222,028**	**218,517**	**70,452**	**73,963**
5		**Johnson**	**305,138**	**141,386**	**135,787**	**163,752**	**169,351**
6		**Leavenworth**	**296,517**	**206,530**	**201,826**	**89,987**	**94,691**
7		**Linn**	**383,232**	**273,841**	**278,086**	**109,391**	**105,146**
8		**Miami**	**369,125**	**286,989**	**279,859**	**82,136**	**89,266**
9		**Wyandotte**	**96,895**	**22,553**	**22,351**	**74,342**	**74,544**
10	**Missouri**	**Cass**	**447,435**	**325,796**	**310,479**	**121,639**	**136,956**
11		**Clay**	**253,733**	**130,358**	**134,156**	**123,375**	**119,577**
12		**Clinton**	**268,032**	**207,611**	**216,483**	**60,421**	**51,549**
13		**Jackson**	**387,083**	**134,196**	**150,581**	**252,887**	**236,502**
14		**Johnson**	**531,584**	**371,022**	**399,600**	**160,562**	**131,984**
15		**Lafayette**	**402,816**	**356,164**	**349,265**	**46,652**	**53,551**
16		**Platte**	**269,037**	**188,595**	**180,455**	**80,442**	**88,582**
17		**Ray**	**364,486**	**277,322**	**274,349**	**87,164**	**90,137**
18		**Total**	**4,667,593**	**3,144,391**	**3,151,794**	**1,523,202**	**1,515,799**
19		**MSA**	**3,192,265**	**2,069,889**	**2,039,108**	**1,122,376**	**1,153,157**
20		**5-CO**	**1,311,886**	**617,088**	**623,330**	**694,798**	**688,556**
21							
22	***Sources:***						
23	***Land: 1992 and 1997 Agricultural Censuses***						
24	***Population U.S. Bureau of the Census***						

TOPO Map for Kansas City and Surrounding Areas



Kansas-
Modeled 4th Daily Maximum 8-hr Avg. for Ozone in ppb 30 day period from Episodes in June/July/August 1995

County Modeled 4th Daily Maximum 8-hr Avg. in ppb

- greater than 109
- 100 to 109
- 90 to 99
- 85 to 89
- 80 to 84
- 0 to 79