Appendix F

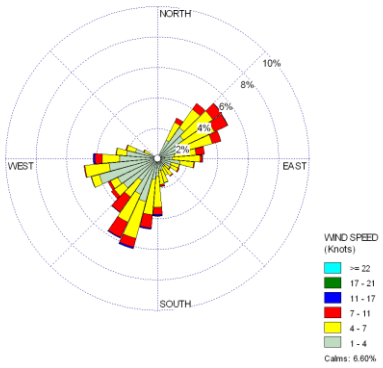
Northwest Indiana, Wind and Pollution Rose Analysis

Meteorological Analysis for Lake, Porter and Jasper Counties, Indiana

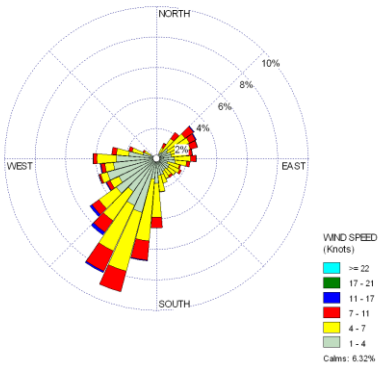
Wind Rose Analysis

Meteorological conditions are one of the most important factors that influence ozone development and transport. Wind roses help to determine the variation in wind direction and speed throughout a period of time, and for purposes of an air quality analysis, show the direction in which emissions travel downwind. Wind direction and wind speed information was collected at the Northern Indiana Public Service Company R. M. Schahfer Generating Station (NIPSCO - Schahfer) (monitor ID 18-073-0004), near Wheatfield, Jasper County, Indiana. Scalar measurements were retrieved for every hour from January 1, 2009 through December 31, 2011. Wind data was collected from the Gary Automated Surface Observing Station (ASOS). This information was formatted and input in order to be analyzed by the Lake Environmental WRPLOT View Wind Rose Plots for Meteorological Data, Version 6.5.1. The resulting wind roses shown below from the three years of ozone season wind roses that include wind directions and speeds from May, June, July, August, and September from 2009, 2010, and 2011. The frequency distribution from each year is listed in Tables 1 and 2

Jasper Co. - 2009



Jasper Co. - 2010



Jasper Co. - 2011

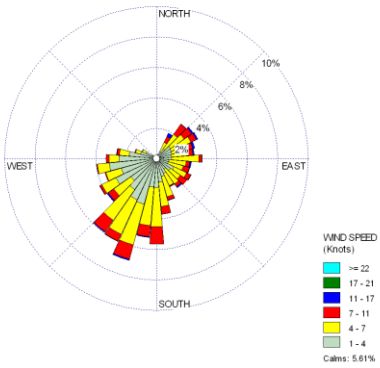


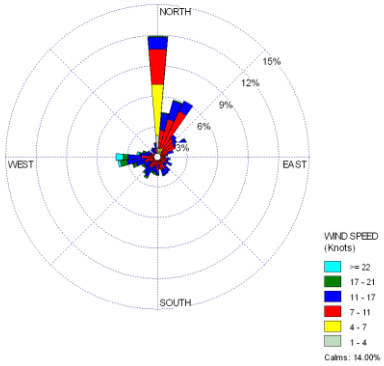
Table 1 – Jasper County Wind Rose Frequency Distribution for the Ozone Season

Year	North 337.5º-22.5º	Northeast 22.5º-67.5º	East 67.5º-112.5º	Southeast 112.5º-157.5º	South 157.5º-202.5º	Southwest 202.5º-247.5º	West 247.5º-292.5º	Northwest 292.5º-337.5º
2009	0.0%	19.4%	12.6%	6.2%	16.6%	20.2%	16.7%	1.7%
2010	0.1%	10.2%	10.6%	7.4%	22.2%	26.4%	15.2%	1.6%
2011	0.3%	11.3%	11.7%	10.7%	22.0%	22.4%	13.8%	1.9%

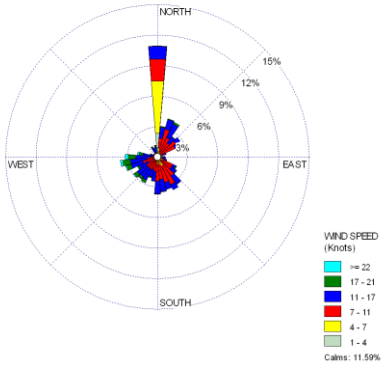
The ozone season (May – September) frequency distribution from each year shows winds recorded at the NIPSCO - Schahfer meteorological station in Jasper

County, Indiana are predominately from the south and southwest. It can be reasoned that emissions from NIPSCO - Schahfer would be blown downwind to the north and northeast of Jasper County, Indiana and not directly impact the Lake Michigan area a majority of the time. The lake breeze effect is quite evident at the Gary ASOS station with the Gary ASOS wind roses below showing a predominately north and northeast wind direction. It should be noted that the Gary ASOS station only collects meteorological information from 4 AM to 9 PM daily.

Gary ASOS- 2009



Gary ASOS- 2010



Gary ASOS- 2011

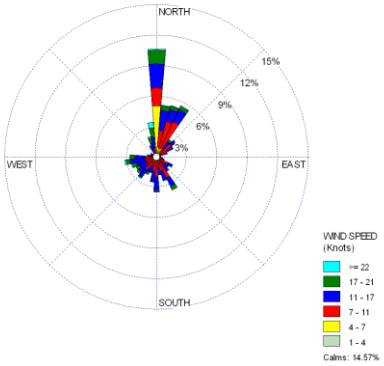


Table 2 - Lake County Wind Rose Frequency Distribution for the Ozone Season

Year	North 337.5º-22.5º	Northeast 22.5º-67.5º	East 67.5º-112.5º	Southeast 112.5º-157.5º	South 157.5º-202.5º	Southwest 202.5º-247.5º	West 247.5º-292.5º	Northwest 292.5º-337.5º
2009	23.3%	16.3%	5.2%	7.0%	7.9%	9.3%	13.1%	3.9%
2010	19.0%	12.6%	3.2%	13.0%	13.6%	11.9%	12.0%	3.1%
2011	25.1%	13.6%	3.1%	9.6%	10.9%	10.5%	9.2%	3.5%

Highest Ozone Day Analysis

Daily wind roses and pollution roses were created, as well as forward and backward trajectories, as part of this analysis. Pollution roses are wind roses in which the wind speeds are substituted with the hourly ozone concentrations. The pollution rose shows the wind directions with the highest ozone concentrations, thus indicating whether a lake breeze developed during the day. Lake breezes were evident with higher ozone from surface winds from the southeast. Lake breezes form during sunny days when the sun heats land surfaces at a quicker pace than large bodies of water, such as Lake Michigan. This contrast in air temperature between land and water produces rising, less dense air over the land and creates winds off the lake. This lake breeze phenomenon occurs in the early afternoon and can last for several hours, pulling ozone and ozone precursors inland until the land begins to cool in the evening and the lake breeze diminishes.

Trajectories were created using the National Oceanic and Atmospheric Administration (NOAA) Air Resources Laboratory - Hybrid Single Particle Lagrangian

Integrated Trajectory Model (HYSPLIT). Forty km gridded meteorological data was input to determine the trajectory directions and heights. The backward trajectories were run from the Chicago area and show from where the air came from two days prior to an 8-hour ozone exceedance day at the Zion, Illinois monitor. The forward trajectories were created from the nearest surface weather station to Jasper County, Indiana, which was the Valparaiso ASOS (approximately 20 miles north of Wheatfield, Jasper County, Indiana) and Gary ASOS station located in Lake County, Indiana. Both stations' wind data show the direction that air over Northwest Indiana travels the day before an 8-hour ozone exceedance day at Zion, Illinois occurred. The four highest monitored ozone days at the Zion, Illinois ozone monitor from 2009 to 2011 are listed in Table 3.

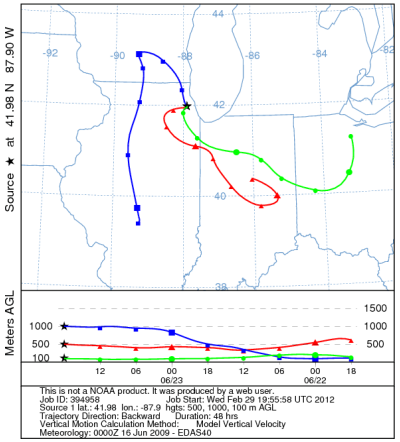
Table 3 – Annual Four Highest Monitor Value Dates

Year	1st High	2nd High	3rd High	4th High
2009	June 23	June 24	May 21	August 15
2010	May 30	July 3	May 24	August 19
2011	September 1	July 9	June 30	July 10

Four Highest Ozone Days at Zion, Illinois Monitor in 2009
June 23, 2009: Zion, Illinois => 86 ppb

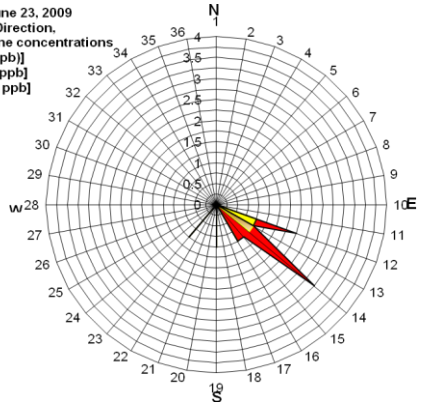
Back Trajectory to Chicago

NOAA HYSPLIT MODEL
Backward trajectories ending at 1800 UTC 23 Jun 09
EDAS Meteorological Data

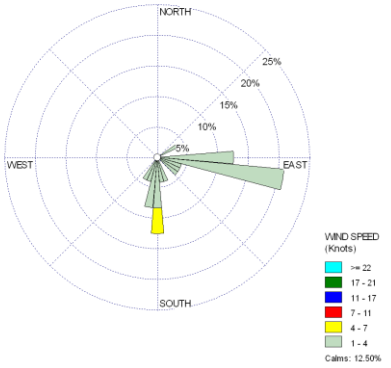


Pollution Rose at Zion Monitor

Zion, Lake County, IL -- June 23, 2009
Concentrations vs. Wind Direction.
Colored according to Ozone concentrations
[green (>=0 ppb and <65 ppb)]
[yellow >=65 ppb and <75 ppb]
[orange >=75 ppb and <85 ppb]
[red (>=85 ppb]

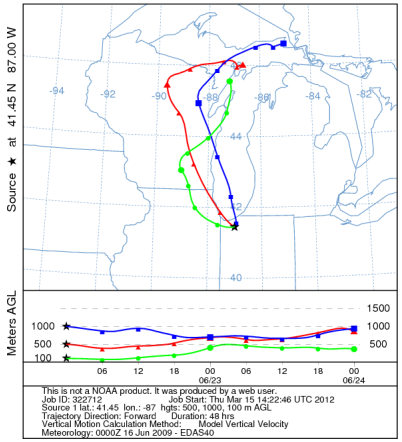


Daily Wind Rose – Schahfer Met. Tower

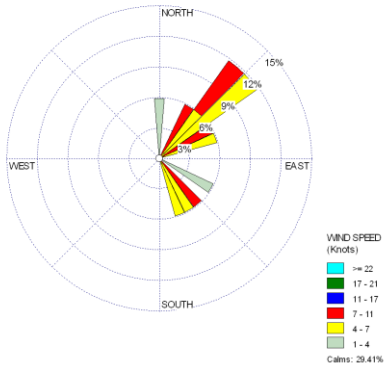


Forward Trajectory from Valparaiso

NOAA HYSPLIT MODEL
Forward trajectories starting at 0000 UTC 22 Jun 09
EDAS Meteorological Data

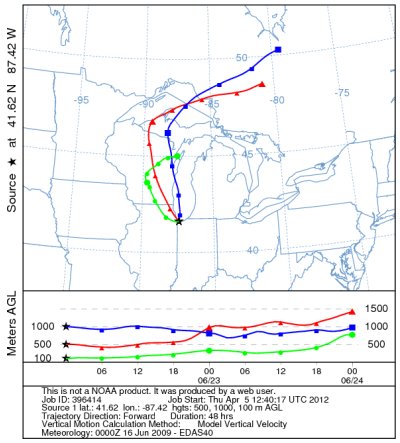


Daily Wind Rose – Gary ASOS Station



Forward Trajectory from Gary

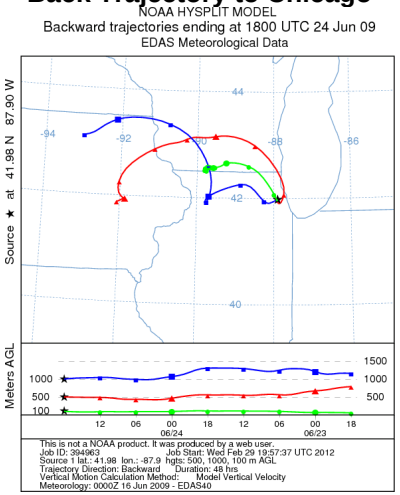
NOAA HYSPLIT MODEL
Forward trajectories starting at 0000 UTC 22 Jun 09
EDAS Meteorological Data



Four Highest Ozone Days at Zion, Illinois Monitor in 2009

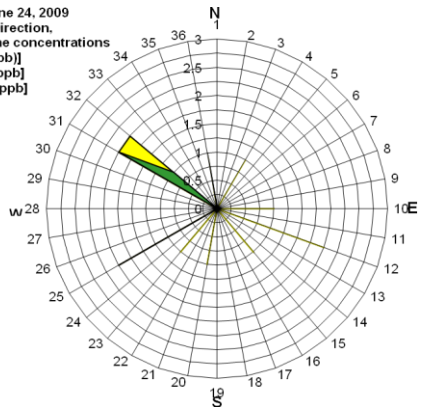
June 24, 2009: Zion, Illinois => 78 ppb

Back Trajectory to Chicago

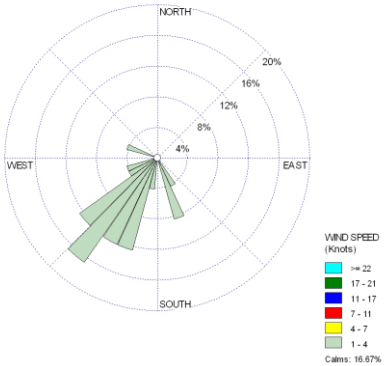


Pollution Rose at Zion Monitor

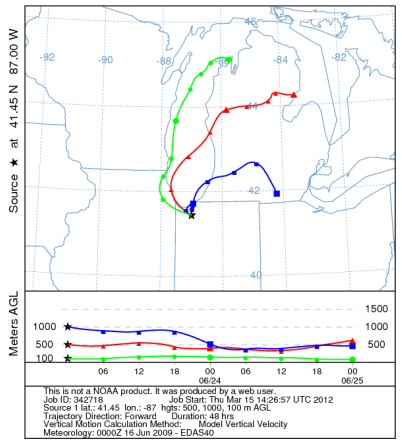
Zion, Lake County, IL -- June 24, 2009
Concentrations vs. Wind Direction,
Colored according to Ozone concentrations
[green (>=0 ppb and <65 ppb)]
[yellow >=65 ppb and <75 ppb]
[orange >=75 ppb and <85 ppb]
[red (>=85 ppb]



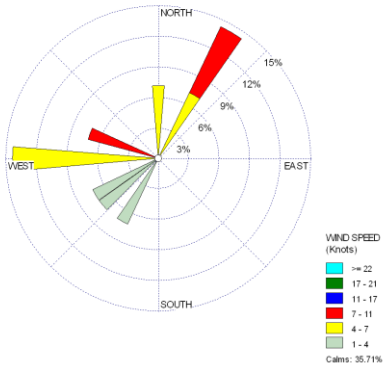
Daily Wind Rose – Schahfer Met. Tower



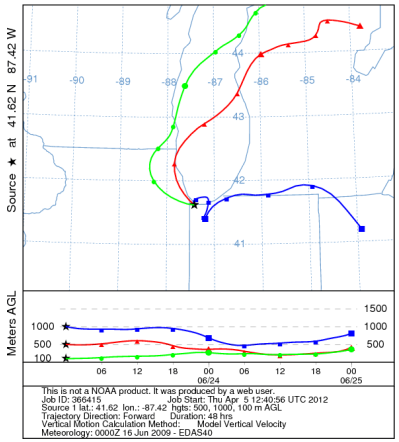
Forward Trajectory from Valparaiso



Daily Wind Rose – Gary ASOS Station

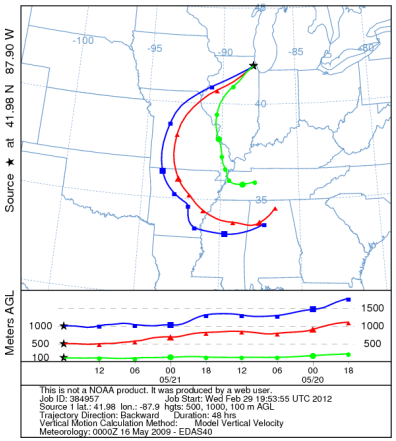


Forward Trajectory from Gary



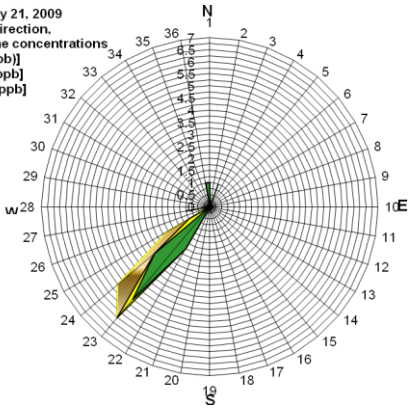
Four Highest Ozone Days at Zion, Illinois Monitor in 2009
May 21, 2009: Zion, Illinois => 75 ppb

Back Trajectory to Chicago

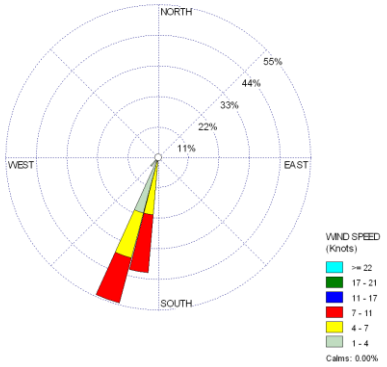


Pollution Rose at Zion Monitor

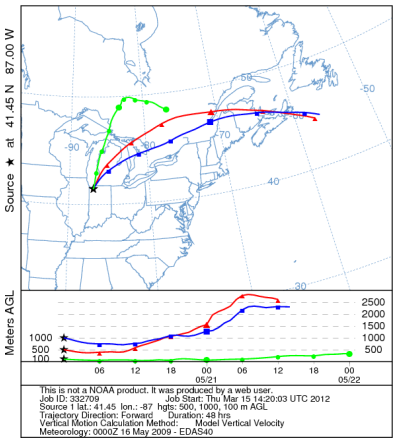
Zion, Lake County, IL -- May 21, 2009
Concentrations vs. Wind Direction,
Colored according to Ozone concentrations
[green (>=0 ppb and <65 ppb)]
[yellow >=65 ppb and <75 ppb]
[orange >=75 ppb and <85 ppb]
[red (>=85 ppb]



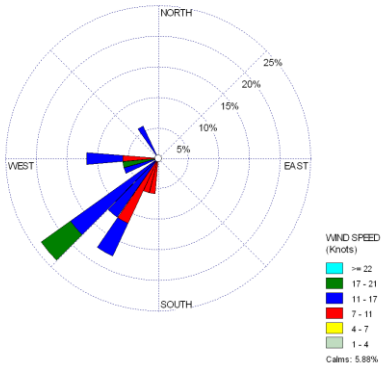
Daily Wind Rose – Schahfer Met. Tower



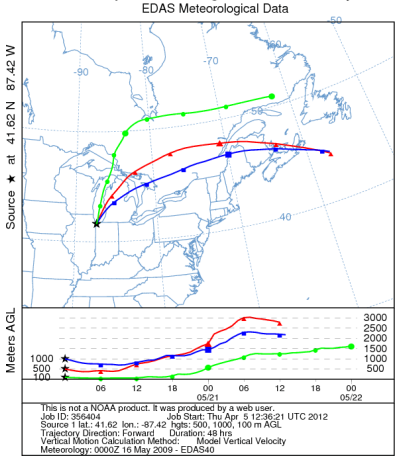
Forward Trajectory from Valparaiso



Daily Wind Rose – Gary ASOS Station

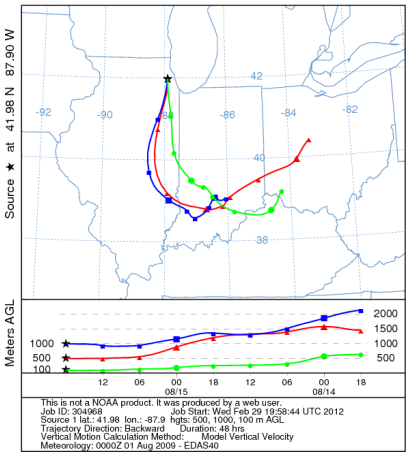


Forward Trajectory from Gary

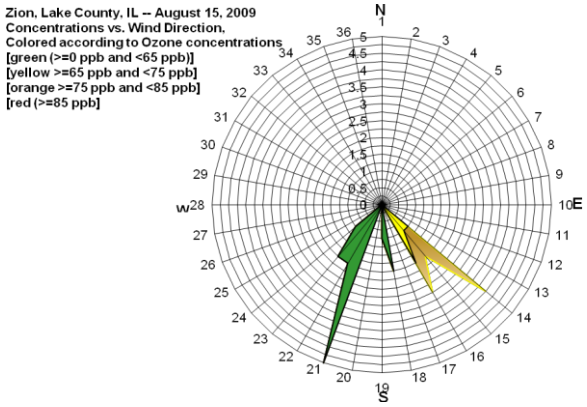


Four Highest Ozone Days at Zion, Illinois Monitor in 2009
August 15, 2009: Zion, Illinois => 75 ppb

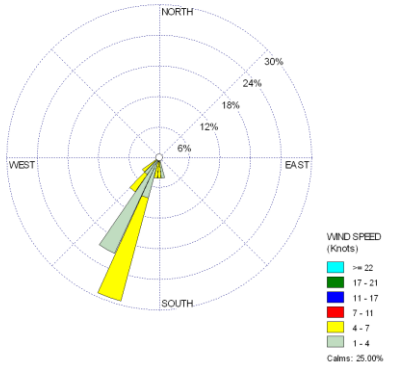
Back Trajectory to Chicago



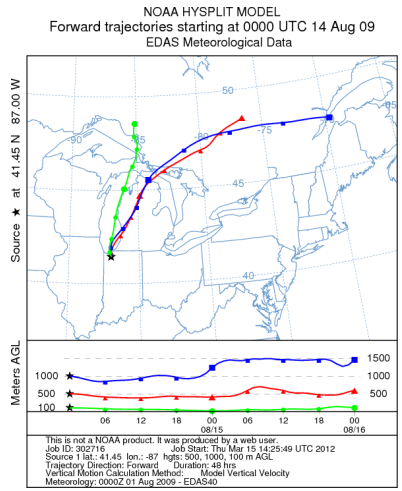
Pollution Rose at Zion Monitor



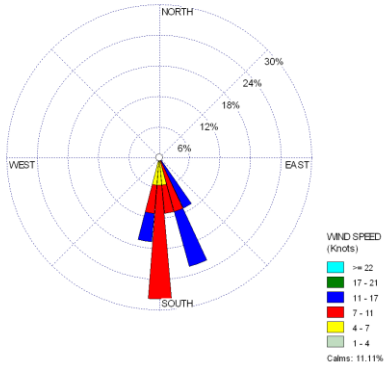
Daily Wind Rose – Schahfer Met. Tower



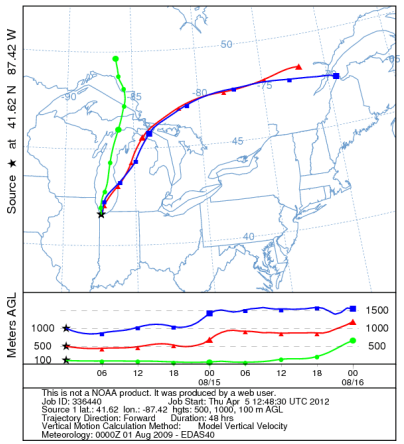
Forward Trajectory from Valparaiso



Daily Wind Rose – Gary ASOS Station

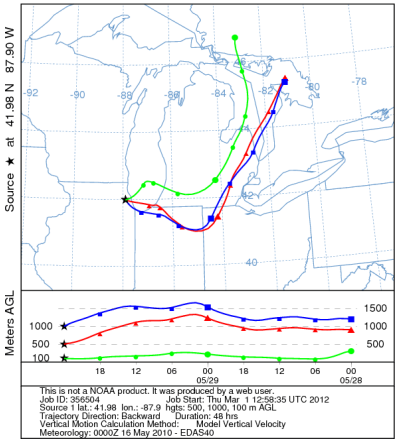


Forward Trajectory from Gary



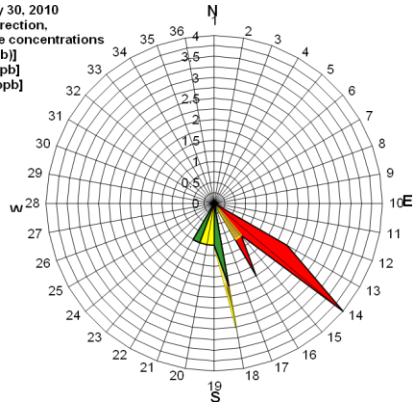
Four Highest Ozone Days at Zion, Illinois Monitor in 2010
May 30, 2010: Zion => 88 ppb

Back Trajectory to Chicago

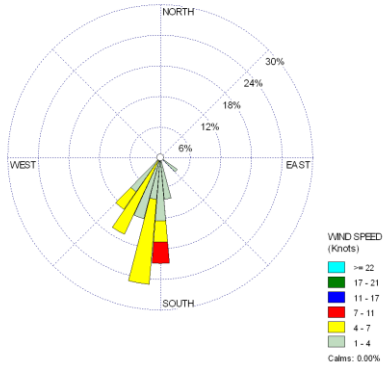


Pollution Rose at Zion Monitor

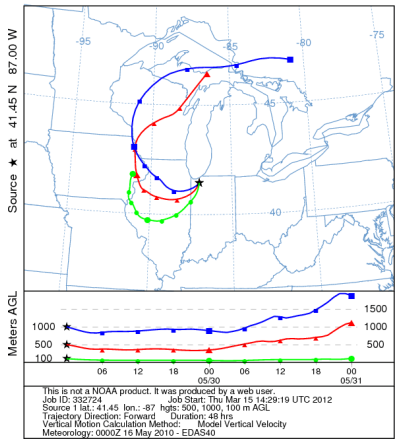
Zion, Lake County, IL -- May 30, 2010
Concentrations vs. Wind Direction,
Colored according to Ozone concentrations
[green (>=0 ppb and <65 ppb)]
[yellow >=65 ppb and <75 ppb]
[orange >=75 ppb and <85 ppb]
[red (>=85 ppb)]



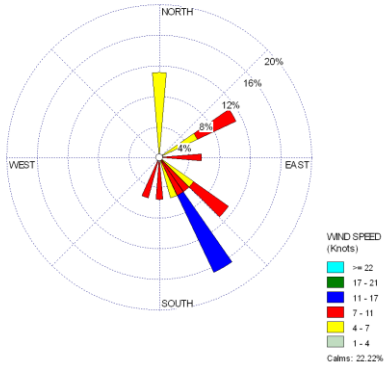
Daily Wind Rose – Schahfer Met. Tower



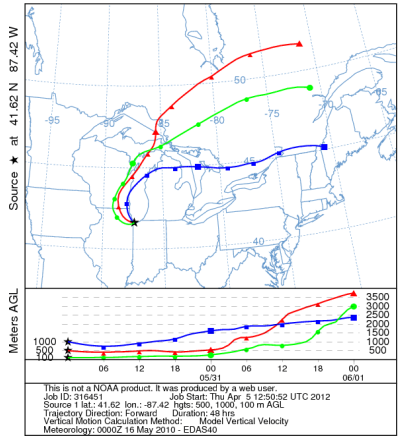
Forward Trajectory from Valparaiso



Daily Wind Rose – Gary ASOS Station

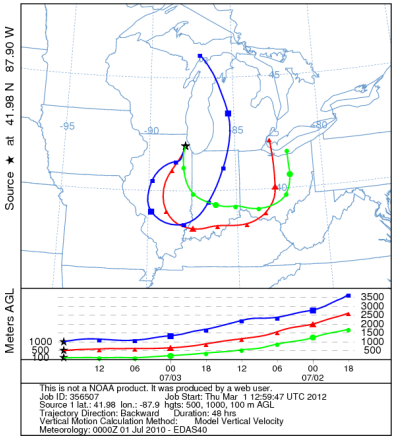


Forward Trajectory from Gary

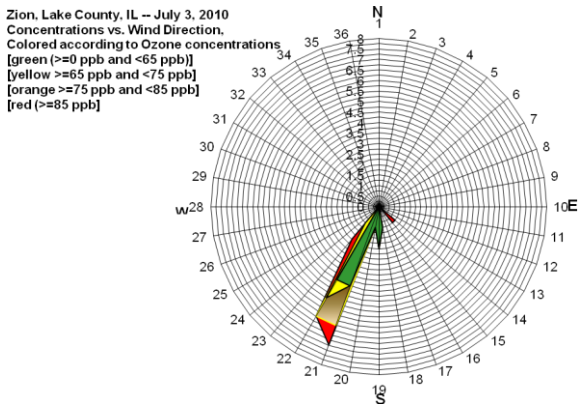


Four Highest Ozone Days at Zion, Illinois Monitor in 2010
July 3, 2010: Zion, Illinois => 84 ppb

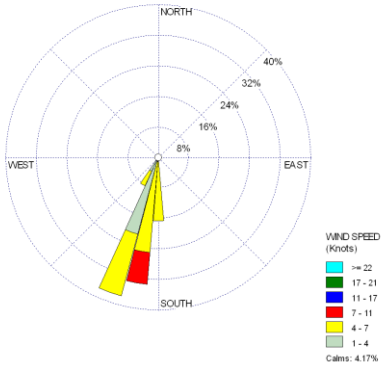
Back Trajectory to Chicago



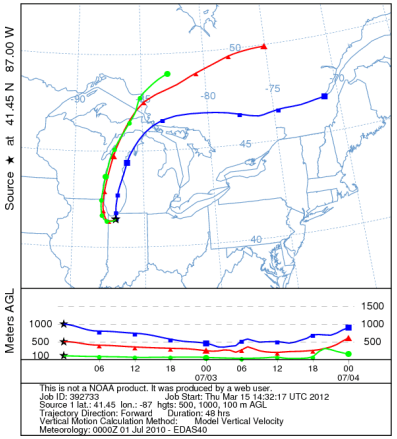
Pollution Rose at Zion Monitor



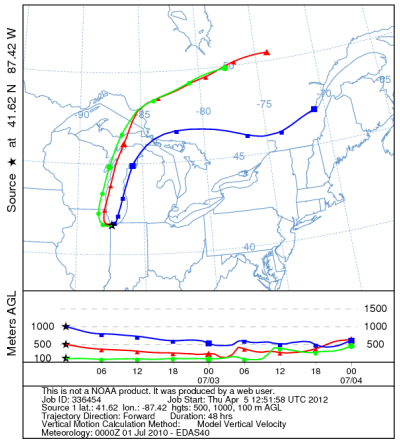
Daily Wind Rose – Schahfer Met. Tower



Forward Trajectory from Valparaiso

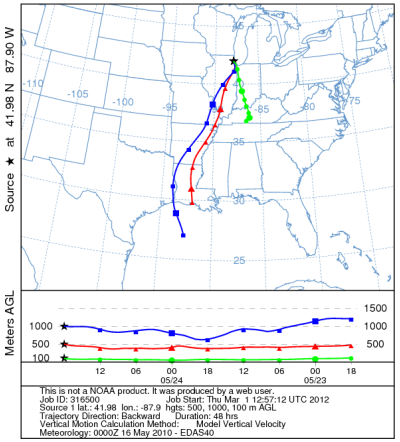


Forward Trajectory from Gary



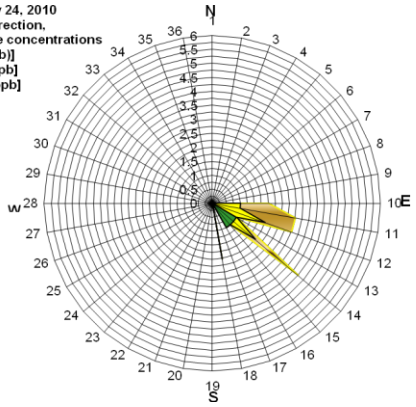
Four Highest Ozone Days at Zion, Illinois Monitor in 2010
May 24, 2010: Zion, Illinois => 78 ppb

Back Trajectory to Chicago

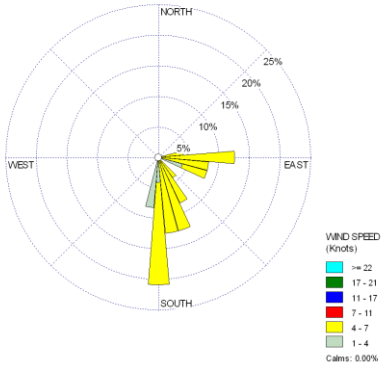


Pollution Rose at Zion Monitor

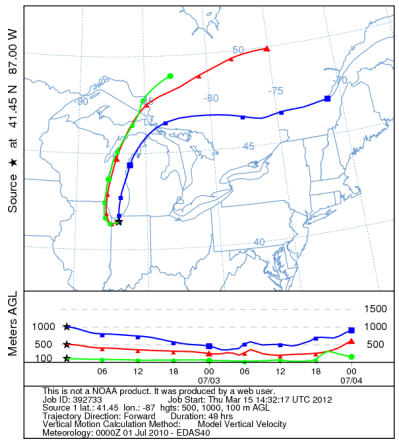
Zion, Lake County, IL -- May 24, 2010
Concentrations vs. Wind Direction,
Colored according to Ozone concentrations
[green (>=0 ppb and <65 ppb)]
[yellow >=65 ppb and <75 ppb]
[orange >=75 ppb and <85 ppb]
[red (>=85 ppb)]



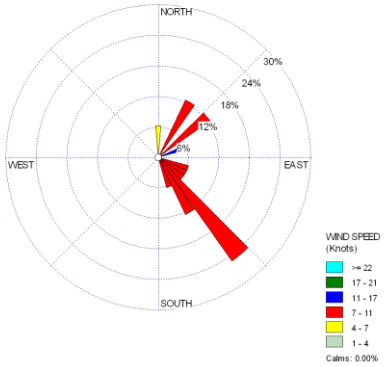
Daily Wind Rose – Schahfer Met. Tower



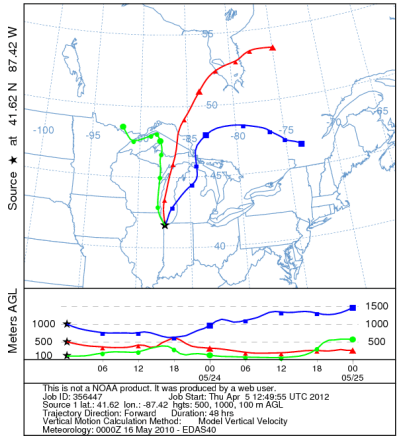
Forward Trajectory from Valparaiso



Daily Wind Rose – Gary ASOS Station

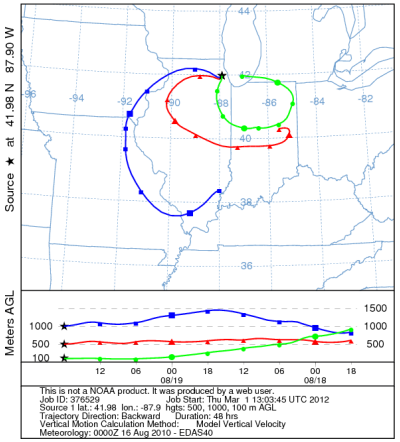


Forward Trajectory from Gary

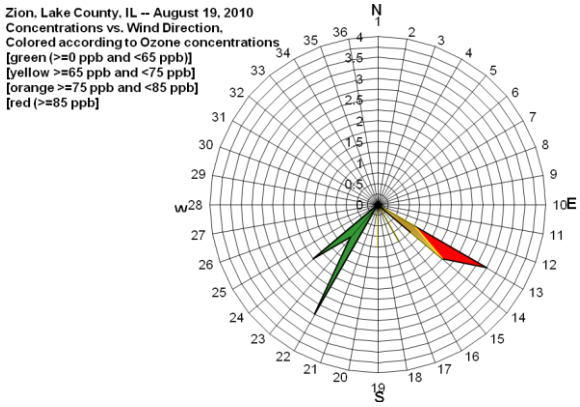


Four Highest Ozone Days at Zion, Illinois Monitor in 2010
August 19, 2010: Zion, Illinois => 78 ppb

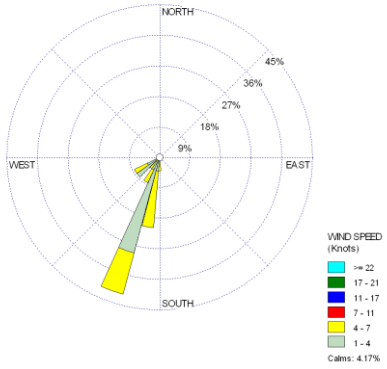
Back Trajectory to Chicago



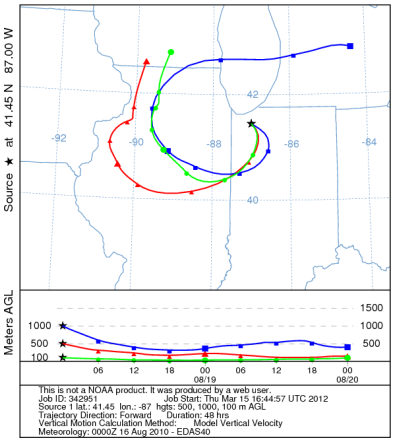
Pollution Rose at Zion Monitor



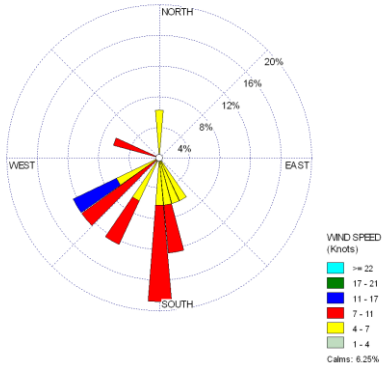
Daily Wind Rose – Schahfer Met. Tower



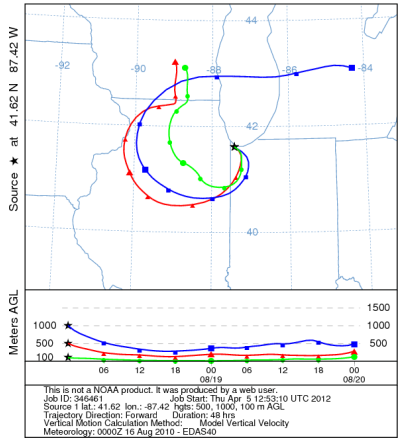
Forward Trajectory from Valparaiso



Daily Wind Rose – Gary ASOS Station

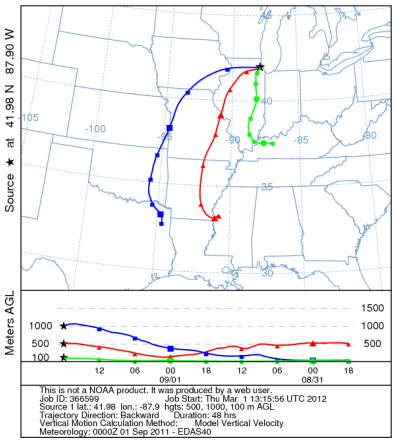


Forward Trajectory from Gary



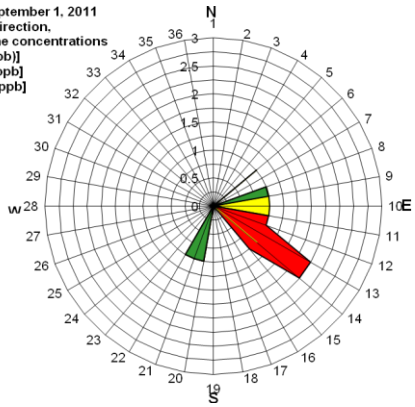
Four Highest Ozone Days at Zion, Illinois Monitor in 2011
September 1, 2011: Zion, Illinois => 95 ppb

Back Trajectory to Chicago

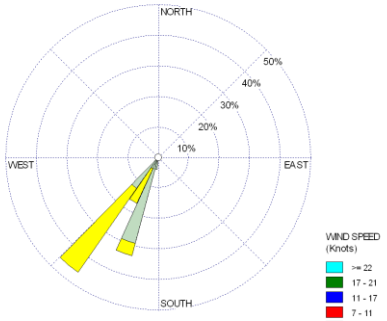


Pollution Rose at Zion Monitor

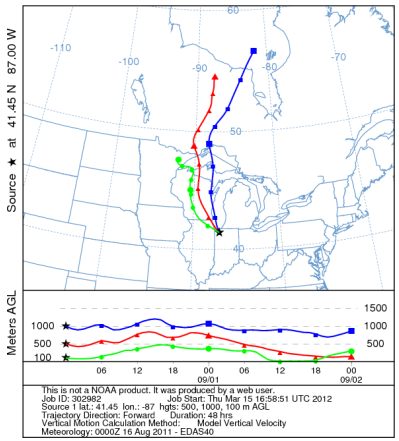
Zion, Lake County, IL -- September 1, 2011
Concentrations vs. Wind Direction,
Colored according to Ozone concentrations
[green (>=0 ppb and <65 ppb)]
[yellow >=65 ppb and <75 ppb]
[orange >=75 ppb and <85 ppb]
[red (>=85 ppb]



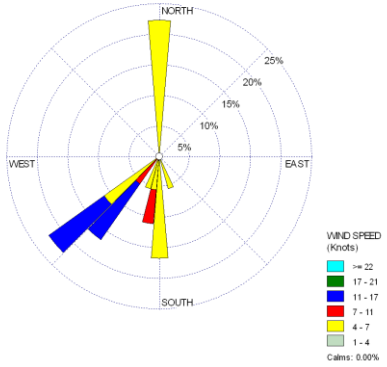
Daily Wind Rose – Schahfer Met. Tower



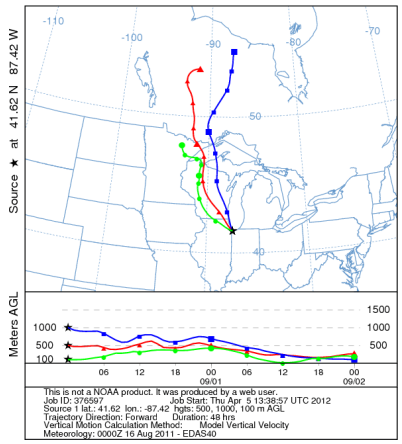
Forward Trajectory from Valparaiso



Daily Wind Rose – Gary ASOS Station

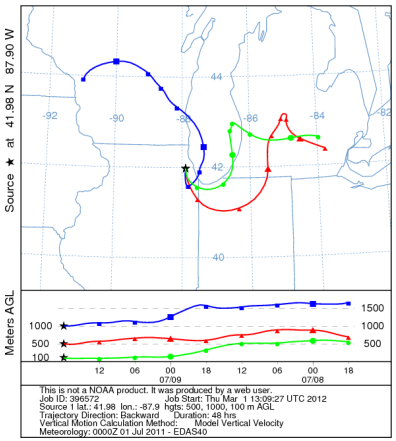


Forward Trajectory from Gary



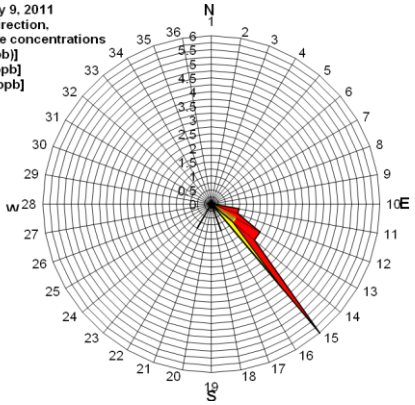
Four Highest Ozone Days at Zion, Illinois Monitor in 2011
July 9, 2011: Zion, Illinois => 85 ppb

Back Trajectory to Chicago

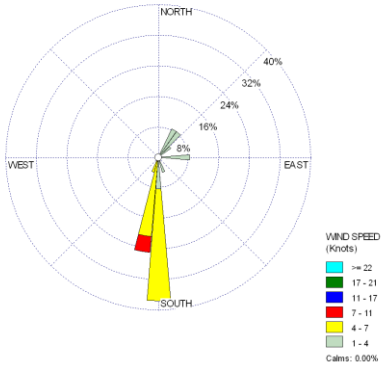


Pollution Rose at Zion Monitor

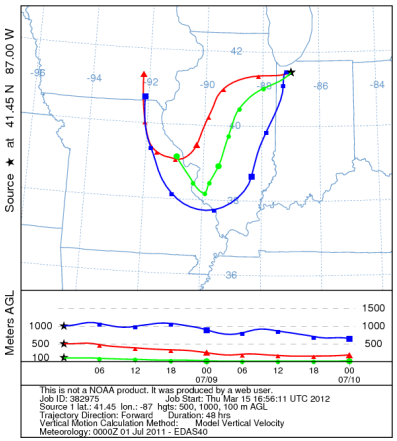
Zion, Lake County, IL -- July 9, 2011
Concentrations vs. Wind Direction,
Colored according to Ozone concentrations
[green (>=0 ppb and <65 ppb)]
[yellow >=65 ppb and <75 ppb]
[orange >=75 ppb and <85 ppb]
[red (>=85 ppb]



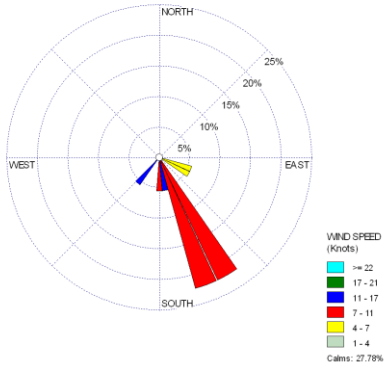
Daily Wind Rose – Schahfer Met. Tower



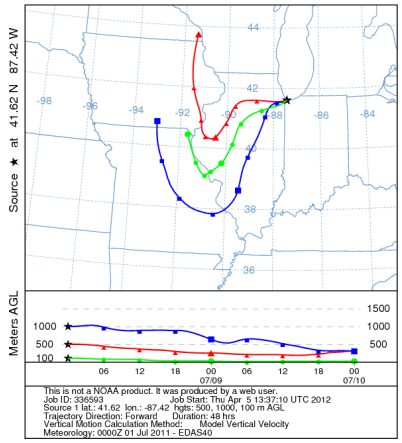
Forward Trajectory from Valparaiso



Daily Wind Rose – Gary ASOS Station

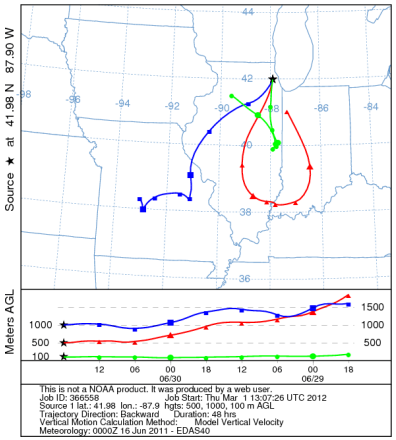


Forward Trajectory from Gary



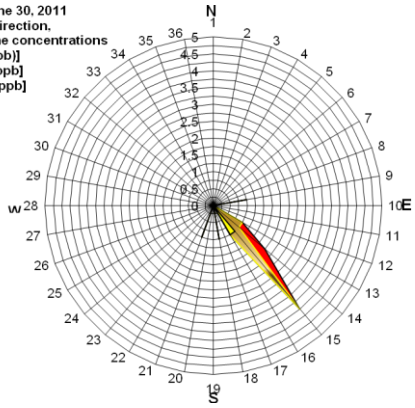
Four Highest Ozone Days at Zion, Illinois Monitor in 2011
June 30, 2011: Zion, Illinois => 83 ppb

Back Trajectory to Chicago

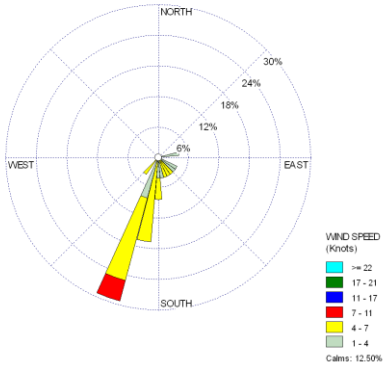


Pollution Rose at Zion Monitor

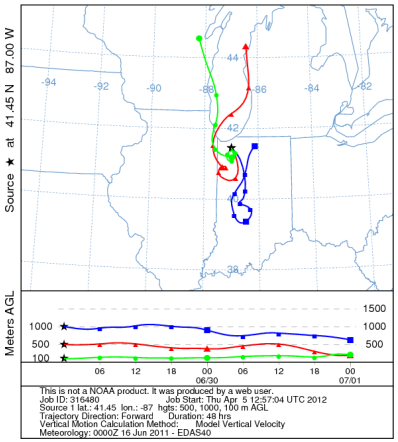
Zion, Lake County, IL -- June 30, 2011
Concentrations vs. Wind Direction,
Colored according to Ozone concentrations
[green (>=0 ppb and <65 ppb)]
[yellow >=65 ppb and <75 ppb]
[orange >=75 ppb and <85 ppb]
[red (>=85 ppb]



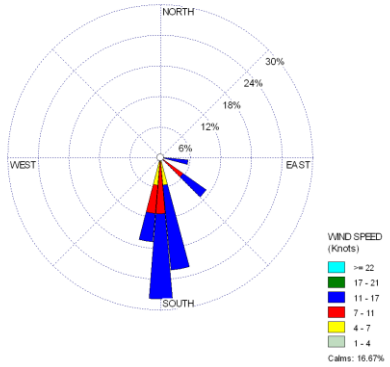
Daily Wind Rose – Schahfer Met. Tower



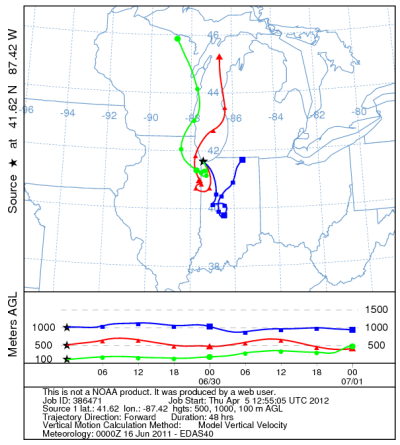
Forward Trajectory from Valparaiso



Daily Wind Rose – Gary ASOS Station

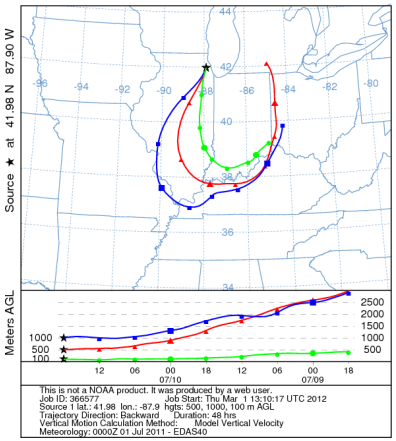


Forward Trajectory from Gary



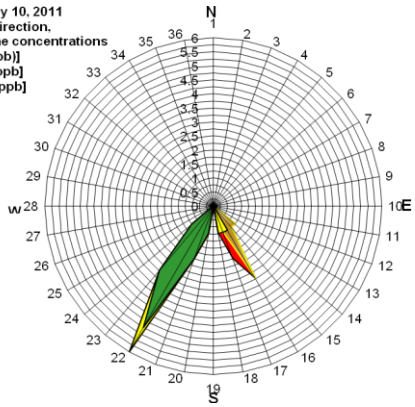
Four Highest Ozone Days at Zion, Illinois Monitor in 2011
July 10, 2011: Zion, Illinois => 76 ppb

Back Trajectory to Chicago

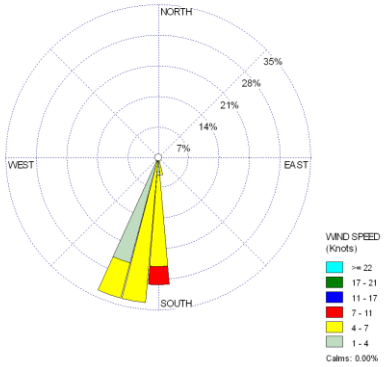


Pollution Rose at Zion Monitor

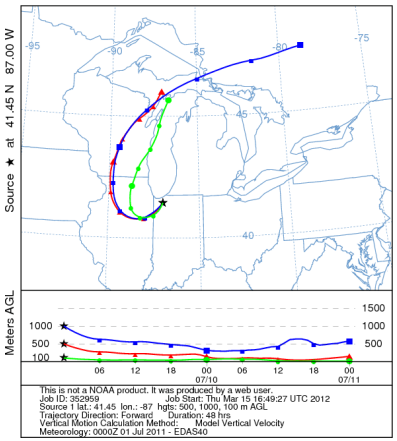
Zion, Lake County, IL -- July 10, 2011
Concentrations vs. Wind Direction,
Colored according to Ozone concentrations
[green (>=0 ppb and <65 ppb)]
[yellow >=65 ppb and <75 ppb]
[orange >=75 ppb and <85 ppb]
[red (>=85 ppb]



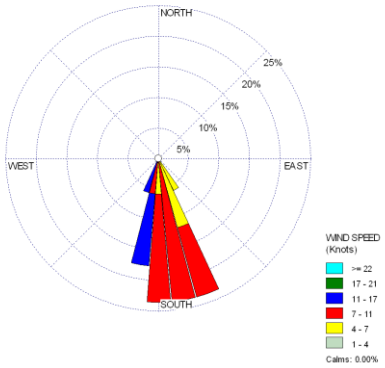
Daily Wind Rose – Schahfer Met. Tower



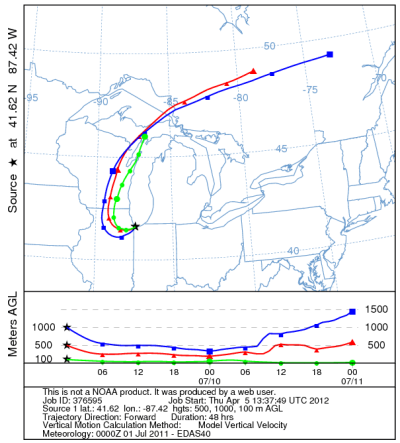
Forward Trajectory from Valparaiso



Daily Wind Rose – Gary ASOS Station



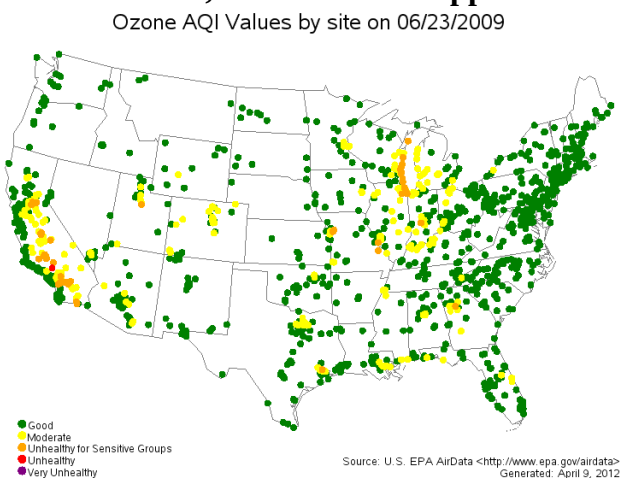
Forward Trajectory from Gary



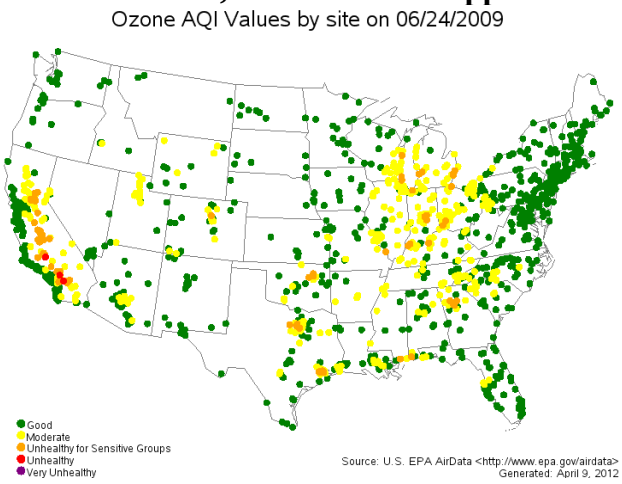
Charts 1 - 3 are AIRNOW depictions of the four highest days for the Zion, Illinois, monitor site in 2009, 2010 and 2011, respectively. These charts demonstrate a clear "lake effect" for these key days in all three years, and further support that the impact of total NO_x and VOC emissions to the Lake Michigan airshed plays a significant role in the monitor readings at the Zion, Illinois, monitor site.

Chart 1 – 2009 AIRNOW Depiction of Four Highest Monitor Value Days

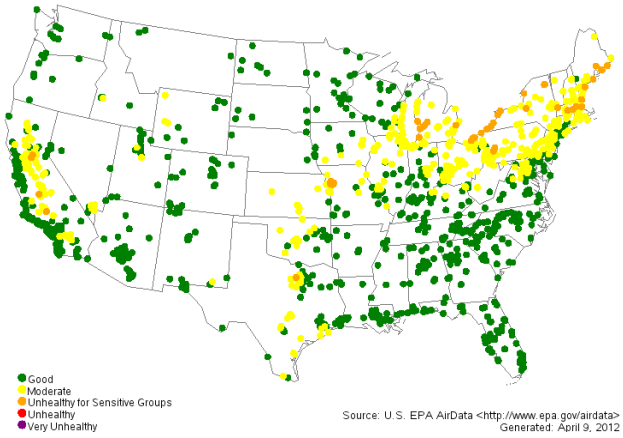
June 23, 2009 Zion => 86 ppb



June 24, 2009 Zion => 78 ppb



May 23, 2009 Zion => 75 ppb



August 15, 2009 Zion => 75 ppb

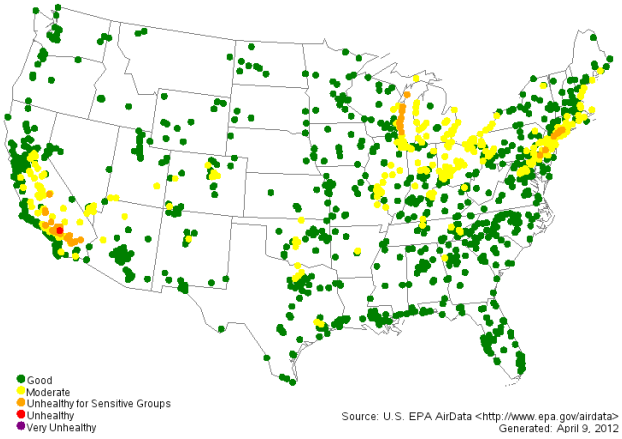
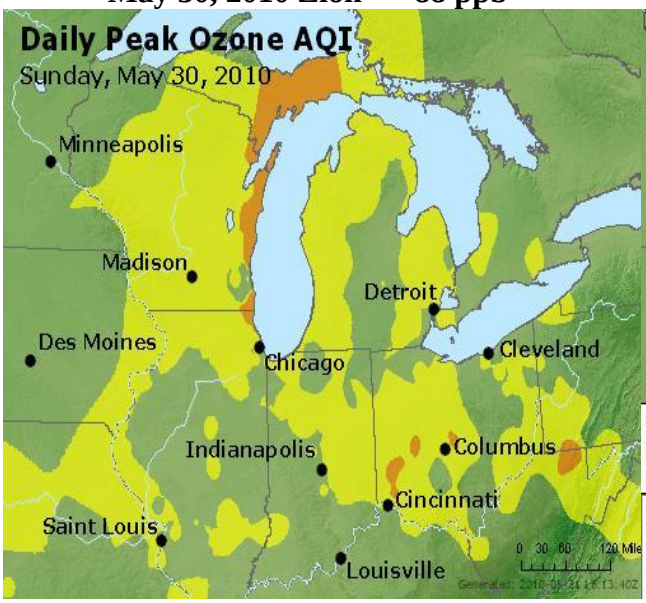
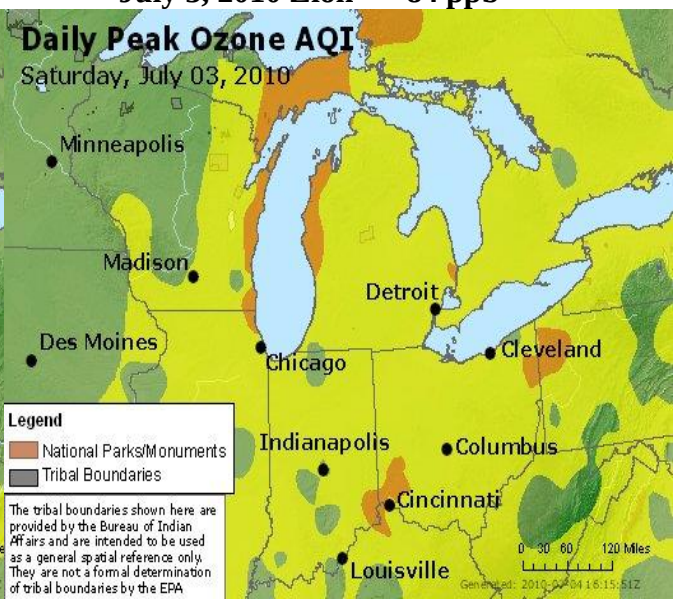


Chart 2 – 2010 AIRNOW Depiction of Four Highest Monitor Value Days

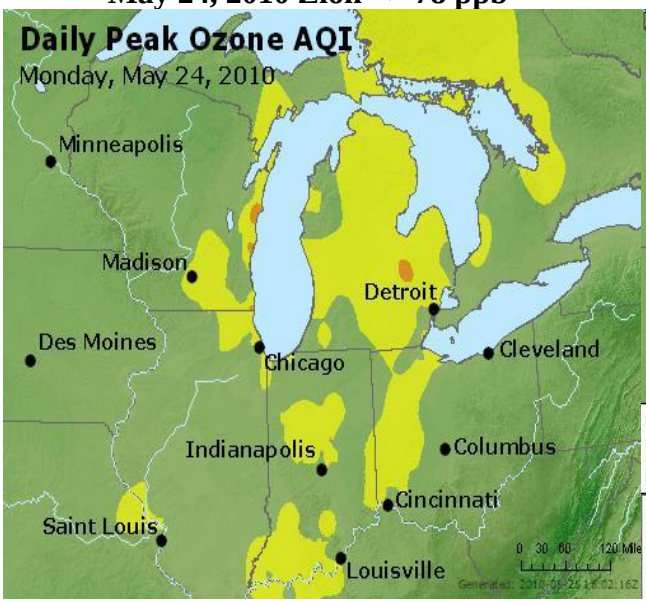
May 30, 2010 Zion => 88 ppb



July 3, 2010 Zion => 84 ppb



May 24, 2010 Zion => 78 ppb



August 19, 2010 Zion => 78 ppb

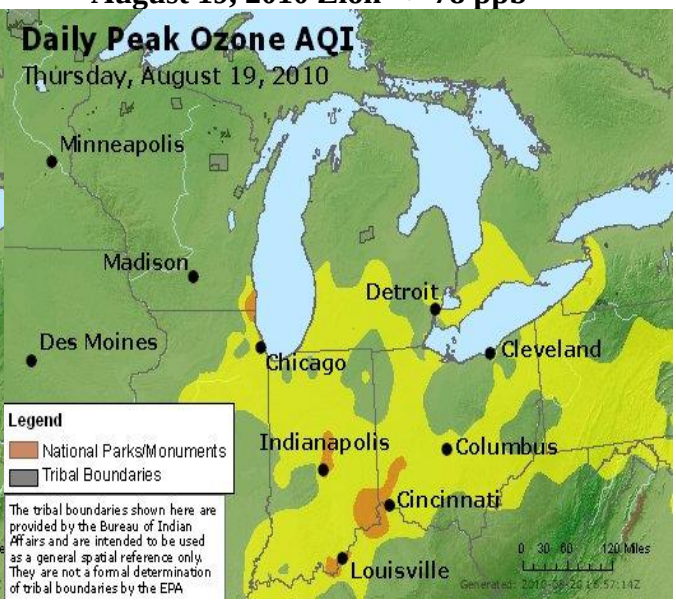
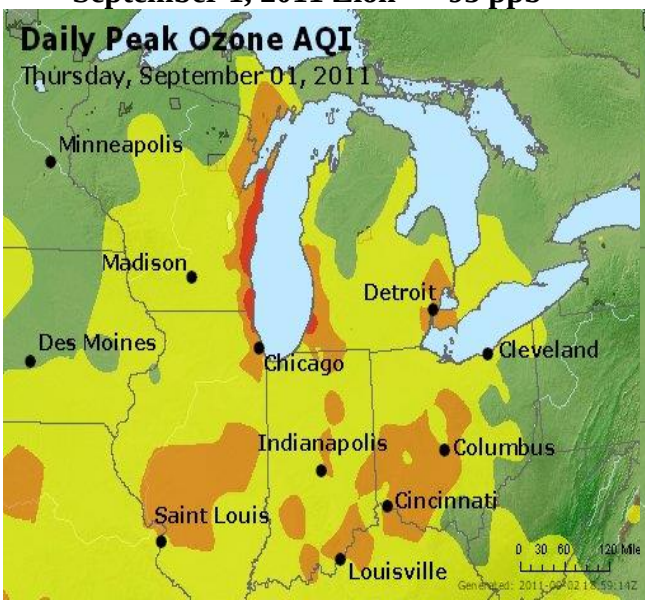
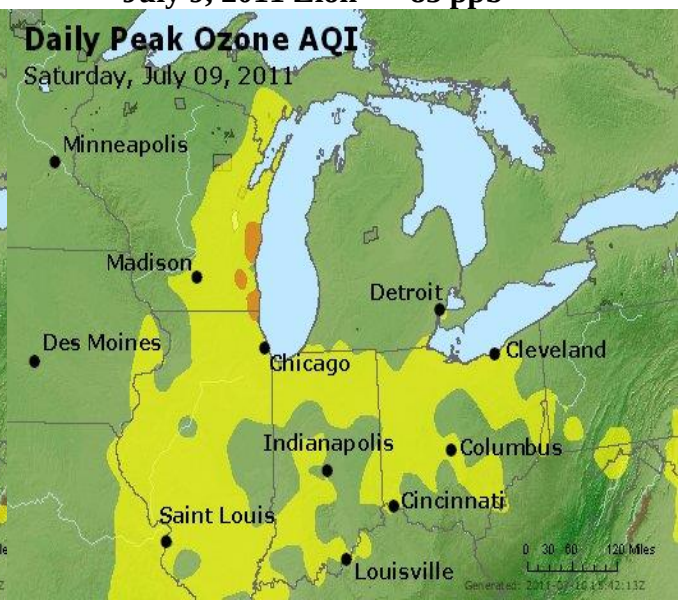


Chart 3 – 2011 AIRNOW Depiction of Four Highest Monitor Value Days

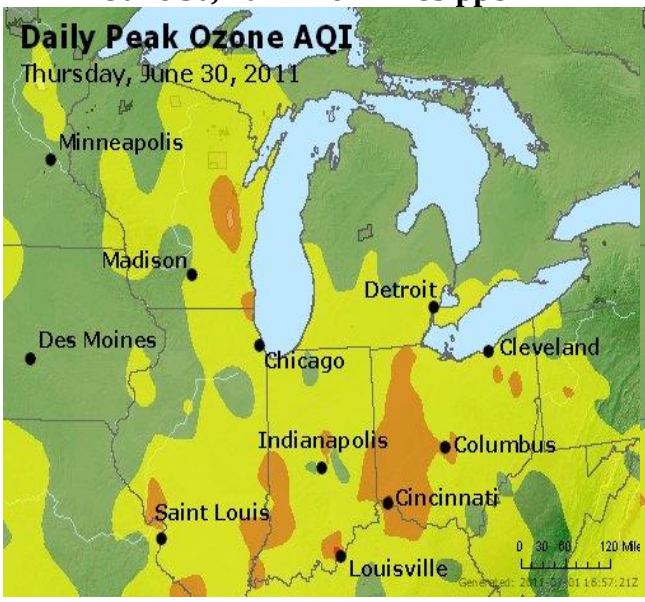
September 1, 2011 Zion => 95 ppb



July 9, 2011 Zion => 85 ppb



June 30, 2011 Zion => 85 ppb



July 10, 2011 Zion => 76 ppb

Summary of Meteorological Conditions for Northwest Indiana

The wind roses, pollution roses, and forward and backward trajectory analyses indicate that a clear majority of the wind direction was from the south and southwest. Under these predominant wind conditions, emissions from Lake, Porter and Jasper Counties, Indiana would be blown north and northeast, away from the Lake Michigan airshed and would not impact ozone concentrations in the Chicago nonattainment area.

On the days when high ozone concentrations occurred at the Zion, Illinois ozone monitor, there was a definite signature of a lake breeze, pulling ozone and ozone precursors from off the lake to the ozone monitor. While Lake, Porter Jasper Counties, Indiana emissions may impact the area on certain days, the percentage of emissions compared to the rest of the Lake Michigan airshed is small, as shown in LADCO's OSAT modeling results for each of the Northwest Indiana counties. Therefore, IDEM contends that Lake, Porter and Jasper Counties should not be considered a significant contributor to ozone concentrations at the Zion ozone monitor in Lake County, Illinois.

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Enclosure 2

Indiana Ozone Monitoring Data Summary

(January 1, 2000 through December 31, 2011)

Note: Prior to 2008, the 8-hour ozone standard was 0.08 parts per million (ppm). Attainment was determined by the average of the 4th highest ozone values over a three-year period. A value of 0.085 ppm or above was in violation of the standard. Beginning in 2008, the ozone standard was lowered to 0.075 ppm. Attainment is determined by the average of the 4th highest ozone values over a three-year period. A value of 0.076 ppm or above is a violation of the standard.

			4th Highest Ozone Value (ppm)												Three-Year Design Value (ppm)									
County	Site #	Site Name	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	00-02	01-03	02-04	03-05	04-06	05-07	06-08	07-09	08-10	09-11
Allen	180030002	Leo	0.091	0.082	0.093	0.090	0.073	0.086	0.073	0.077	0.066	0.065	0.065	0.070	0.088	0.088	0.085	0.083	0.077	0.078	0.072	0.069	0.065	0.066
Allen	180030004	Beacon St	0.081	0.074	0.097	0.084	0.069	0.076	0.071	0.080	0.069	0.065	0.068	0.072	0.084	0.085	0.083	0.076	0.072	0.075	0.073	0.071	0.067	0.068
Boone	180110001	Whitestown	0.082	0.084	0.099	0.088	0.072	0.082	0.080	0.083	0.073	0.069	0.072	0.071	0.088	0.090	0.086	0.080	0.078	0.081	0.078	0.075	0.071	0.070
Carroll	180150002	Flora		0.079	0.096	0.079	0.071	0.075	0.073	0.078	0.065	0.063	0.072	0.068	0.087 [2]	0.084	0.082	0.075	0.073	0.075	0.072	0.068	0.066	0.067
Clark *	180190003/8	Charlestown / State Park	0.085	0.086	0.100	0.090	0.074	0.080	0.079	0.090	0.075	0.067	0.077	0.082	0.090	0.092	0.088	0.081	0.077	0.083	0.081	0.077	0.073	0.075
Delaware	180350010	Albany		0.084	0.095	0.085	0.070	0.081	0.072	0.079	0.062	0.068	0.067	0.070	0.089 [2]	0.088	0.083	0.078	0.074	0.077	0.071	0.069	0.065	0.068
Elkhart	180390007	Bristol			0.099	0.087	0.077	0.086	0.067	0.082	0.068	0.061	0.065	0.072	0.099 [1]	0.093 [2]	0.087	0.083	0.076	0.078	0.072	0.070	0.064	0.066
Floyd	180431004	New Albany	0.077	0.076	0.097	0.086	0.071	0.080	0.076	0.082	0.075	0.063	0.072	0.080	0.083	0.086	0.084	0.079	0.075	0.079	0.077	0.073	0.070	0.071
Greene	180550001	Plummer	0.090	0.085	0.093	0.088	0.073	0.079	0.076	0.084	0.072	0.068	0.074	0.080	0.089	0.088	0.084	0.080	0.076	0.079	0.077	0.074	0.071	0.074
Hamilton **	180570005/6	Noblesville	0.090	0.088	0.101	0.101	0.075	0.087	0.077	0.084	0.073	0.071	0.072	0.071	0.093	0.096	0.092	0.087	0.079	0.082	0.078	0.076	0.072	0.071
Hancock	180590003	Fortville	0.086	0.089	0.101	0.092	0.072	0.080	0.075	0.081	0.074	0.068	0.071	0.068	0.092	0.094	0.088	0.081	0.075	0.078	0.076	0.074	0.071	0.069
Hendricks	180630004	Avon	0.087	0.083	0.095	0.079	0.071	0.078	0.073	0.079	0.068	0.070	0.067	0.068	0.088	0.085	0.081	0.076	0.074	0.076	0.073	0.072	0.068	0.068
Huntington	180690002	Roanoke	0.087	0.082	0.089	0.083	0.069	0.078	0.072	0.078	0.060	0.062	0.062	0.069	0.086	0.084	0.080	0.076	0.073	0.076	0.070	0.066	0.061	0.064
Jackson	180710001	Brownstown	0.082	0.084	0.090	0.082	0.068	0.077	0.075	0.078	0.070	0.063	0.069	0.067	0.085	0.085	0.080	0.075	0.073	0.076	0.074	0.070	0.067	0.066
Johnson	180810002	Trafalgar	0.084	0.082	0.097	0.080	0.073	0.077	0.078	0.080	0.069	0.071	0.070	0.068	0.087	0.086	0.083	0.076	0.076	0.078	0.075	0.073	0.070	0.069
Lake	180890022	Gary IITRI	0.075	0.083	0.094	0.076	0.064	0.089	0.073	0.085	0.062	0.058	0.064	0.066	0.084	0.084	0.078	0.076	0.075	0.082	0.073	0.068	0.061	0.062
Lake	180890024	Lowell	0.075	0.077	0.086	0.081									0.079	0.081								
Lake	180890030	Whiting					0.064	0.088	0.081	0.088	0.062	0.062	0.069	0.069			0.064 [1]	0.076 [2]	0.077	0.085	0.077	0.070	0.064	0.066
Lake	180892006	Hammond	0.086	0.090	0.101	0.081	0.067	0.087	0.075	0.077	0.068	0.065	0.069	0.072	0.092	0.090	0.083	0.078	0.076	0.079	0.073	0.070	0.067	0.068
LaPorte	180910005	Michigan City	0.080	0.090	0.107	0.082	0.070	0.084	0.075	0.073	0.059	0.066	0.070	0.080	0.092	0.093	0.086	0.078	0.076	0.077	0.069	0.066	0.065	0.072
LaPorte	180910010	LaPorte	0.074	0.079	0.100	0.084	0.068	0.089	0.069	0.078	0.065	0.063	0.067	0.070	0.084	0.087	0.084	0.080	0.075	0.078	0.070	0.068	0.065	0.066
Madison	180950010	Emporia	0.080	0.090	0.104	0.091	0.072	0.078	0.072	0.078	0.065	0.064	0.065	0.071	0.091	0.095	0.089	0.080	0.074	0.076	0.072	0.069	0.064	0.066
Marion	180970042	Mann Road		0.078	0.093	0.074	0.065	0.076	0.074	0.080					0.084	0.082	0.077	0.072	0.072	0.077				
Marion	180970050	Fort Harrison	0.083	0.087	0.100	0.091	0.073	0.080	0.076	0.083	0.075	0.073	0.072	0.077	0.090	0.092	0.088	0.081	0.076	0.079	0.078	0.077	0.073	0.074
Marion	180970057	Harding Street	0.078	0.081	0.099	0.075	0.066	0.081	0.076	0.076	0.067	0.067	0.068	0.068	0.086	0.085	0.080	0.074	0.074	0.077	0.073	0.070	0.067	0.067
Marion	180970073	E 16th St	0.082	0.081	0.106	0.082	0.071	0.080	0.072	0.080	0.066	0.065	0.066	0.075	0.089	0.089	0.086	0.077	0.074	0.077	0.072	0.070	0.065	0.068
Marion	180970078	Washington Park										0.067	0.064	0.072								0.067 [1]	0.065 [2]	0.067
Morgan	181090005	Monrovia	0.088	0.082	0.094	0.081	0.072	0.078	0.077	0.084	0.069	0.069	0.063	0.072	0.088	0.085	0.082	0.077	0.075	0.079	0.076	0.074	0.067	0.068
Perry	181230009	Leopold					0.078	0.086	0.079	0.080	0.073	0.065	0.072	0.074			0.078 [1]	0.082 [2]	0.081	0.081	0.077	0.072	0.070	0.070
Porter	181270020	Dunes National Lakeshore	0.071	0.082	0.097	0.079									0.083	0.086								
Porter	181270024	Ogden Dunes	0.085	0.085	0.101	0.077	0.069	0.090	0.070	0.084	0.069	0.067	0.067	0.068	0.090	0.087	0.082	0.078	0.076	0.081	0.074	0.073	0.067	0.067
Porter	181270026	Valparaiso	0.082	0.077	0.100	0.082	0.072	0.078	0.071	0.080	0.061	0.064	0.061	0.063	0.086	0.086	0.084	0.077	0.073	0.076	0.070	0.068	0.062	0.062
Posey	181290003	St. Phillips	0.085	0.079	0.097	0.077	0.071	0.077	0.058	0.080	0.069	0.067	0.069	0.076	0.087	0.084	0.081	0.075	0.068	0.071	0.069	0.072	0.068	0.070
St Joseph	181410010	Potato Creek	0.079	0.078	0.092	0.081	0.073	0.078	0.069	0.075	0.063	0.060	0.060	0.064	0.083	0.083	0.082	0.077	0.073	0.074	0.069	0.066	0.061	0.061
St Joseph ***	181411008/15	Angela & Eddy / Shields Dr	0.081	0.082	0.100	0.082	0.072	0.084	0.063	0.067	0.058	0.059	0.061	0.073	0.087	0.088	0.084	0.079	0.073	0.071	0.062	0.061	0.059	0.064
St Joseph	181411007	Granger	0.078	0.089	0.104	0.086	0.076	0.086	0.070	0.082	0.069	0.062	0.060	0.071	0.090	0.093	0.088	0.082	0.077	0.079	0.073	0.071	0.063	0.064
Shelby	181450001	Fairland	0.087	0.093	0.101	0.089	0.071	0.080	0.073	0.082	0.070	0.075	0.067	0.075	0.093	0.094	0.087	0.080	0.074	0.078	0.075	0.075	0.070	0.072
Vanderburgh ****	181630012/21	Buena Vista	0.081	0.073	0.095	0.081	0.072	0.080	0.075	0.085	0.074	0.061	0.064	0.077	0.083	0.083	0.082	0.077	0.075	0.080	0.078	0.073	0.066	0.067
Vanderburgh	181630013	Inglefield	0.075	0.072	0.086	0.075	0.058	0.056	0.081	0.088	0.072	0.068	0.071	0.072	0.077	0.077	0.073	0.063	0.065	0.075	0.080	0.076	0.070	0.070
Vigo	181670018	Terre Haute	0.075	0.082	0.082	0.066	0.057	0.064	0.060	0.077	0.059	0.058	0.063	0.067	0.079	0.076	0.068	0.062	0.060	0.067	0.065	0.064	0.060	0.062
Vigo	181670024	Sandcut		0.083	0.099	0.080	0.072	0.076	0.072	0.073	0.066	0.061	0.063	0.070	0.091 [2]	0.087	0.083	0.076	0.073	0.073	0.070	0.066	0.063	0.064
Warrick	181730002	Yankeetown	0.077	0.081	0.094	0.082	0.074								0.084	0.085	0.083							
Warrick	181730008	Boonville	0.073	0.078	0.091	0.076	0.073	0.080	0.078	0.083	0.071	0.064	0.071	0.075	0.080	0.081	0.080	0.076	0.077	0.080	0.077	0.072	0.068	0.070
Warrick	181730009	Lynville	0.077	0.075	0.090	0.078	0.066	0.076	0.070	0.080	0.064	0.064	0.070	0.072	0.080	0.081	0.078	0.073	0.070	0.075	0.071	0.069	0.066	0.068
Warrick	181730011	Dayville						0.077	0.078	0.076	0.060	0.057	0.070	0.072				0.077 [1]	0.077 [2]	0.077	0.071	0.064	0.062	0.066

Prior to 2008, Red Numbers are 4th High Values >= 0.085 ppm
Beginning 2008, Red Numbers are 4th High Values >= 0.076 ppm

[1] **One year of Data**
[2] **Two Years of Data**

Prior to 2008 Design Value Above 0.085 ppm
Beginning 2008 Design Value Above 0.076 ppm

* Clark County ozone monitor was moved from Charlestown to Charlestown State Park in 2007. The 2005-2007 and 2006-2008 Design Values are calculated from both monitoring sites.

**Hamilton County - Noblesville ozone monitor was moved from Field Drive to 10th Street in April 2007 and then moved from 10th Street to 191st Street on May 13, 2010. The 2008-2010 Design Value is calculated from both the 10th Street and 191st Street monitoring sites.

***St Joseph ozone monitor was moved from Angela & Eddy to Shields Drive on June 1, 2006. The 2004-2006 and 2005-2007 Design Values are calculated from both monitoring sites. 2006-2008 Design Value is calculated from Shields Dr only.

****Vanderburgh County - Evansville ozone monitor was moved from Mill Road to Buena Vista on July 10, 2010. The 2008-2010 Design Value is calculated from both monitoring sites.

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Enclosure 3
List of Indiana Counties with Final Ozone Designation Recommendations

County (Monitor ID)	2009-2011 Design Value (ppm)	Attainment Status for 1997 Ozone NAAQS	Indiana's Initial Recommendation for 2008 Ozone NAAQS	U.S. EPA's Proposed Designations for 2008 Ozone NAAQS	Indiana's Updated Recommendations for 2008 Ozone NAAQS
Allen (180030002)	0.066	Attainment with a Maintenance Plan (Redesignation effective 2-12-07)	Attainment	Attainment	Attainment
Allen (180030004)	0.068				
Boone (180110001)	0.070	Attainment with a Maintenance Plan (Redesignation effective 10-19-07)	Nonattainment	Attainment	Attainment
Carroll (180150002)	0.067	Attainment/Unclassifiable	Attainment	Attainment	Attainment
Clark (180190003/8)	0.075	Attainment with a Maintenance Plan (Redesignation effective 7-19-07)	Nonattainment	Attainment	Attainment
Dearborn (No monitor)	N/A	Attainment with a Maitenance Plan (Redesignation effective 5-11-10)	Attainment/Unclassifiable	Nonattainment	Nonattainment (Lawrenceburg Township)
Delaware (180350010)	0.068	Attainment with a Maitenance Plan (Redesignation effective 1-3-06)	Attainment	Attainment	Attainment
Elkhart (180390007)	0.066	Attainment with a Maintenance Plan (Redesignation effective 7-19-07)	Attainment	Attainment	Attainment
Floyd (180431004)	0.071	Attainment with a Maintenance Plan (Redesignation effective 7-19-07)	Nonattainment	Attainment	Attainment
Greene (180550001)	0.074	Attainment with a Maintenance Plan (Redesignation effective 12-29-05)	Nonattainment	Attainment	Attainment
Hamilton (180570005/6)	0.071	Attainment with a Maintenance Plan (Redesignation effective 10-19-07)	Nonattainment	Attainment	Attainment
Hancock (180590003)	0.069	Attainment with a Maintenance Plan (Redesignation effective 10-19-07)	Nonattainment	Attainment	Attainment
Hendricks (180630004)	0.068	Attainment with a Maintenance Plan (Redesignation effective 10-19-07)	Attainment	Attainment	Attainment
Huntington (180690002)	0.064	Attainment/Unclassifiable	Attainment	Attainment	Attainment
Jackson (180710001)	0.066	Attainment with a Maintenance Plan (Redesignation effective 12-29-05)	Attainment	Attainment	Attainment
Jasper (No monitor)	N/A	Attainment/Unclassifiable	Attainment/Unclassifiable	Nonattainment	Attainment
Johnson (180810002)	0.069	Attainment with a Maintenance Plan (Redesignation effective 10-19-07)	Attainment	Attainment	Attainment
Lake (180890022)	0.062	Attainment with a Maintenance Plan (Redesignation effective 5-11-10)	Nonattainment	Nonattainment	Attainment
Lake (180890030)	0.066				
Lake (180892006)	0.068				
LaPorte (180910005)	0.072	Attainment with a Maintenance Plan (Redesignation effective 7-19-07)	Attainment	Attainment	Attainment
LaPorte (180910010)	0.066				
Madison (180950010)	0.066	Attainment with a Maintenance Plan (Redesignation effective 10-19-07)	Attainment	Attainment	Attainment

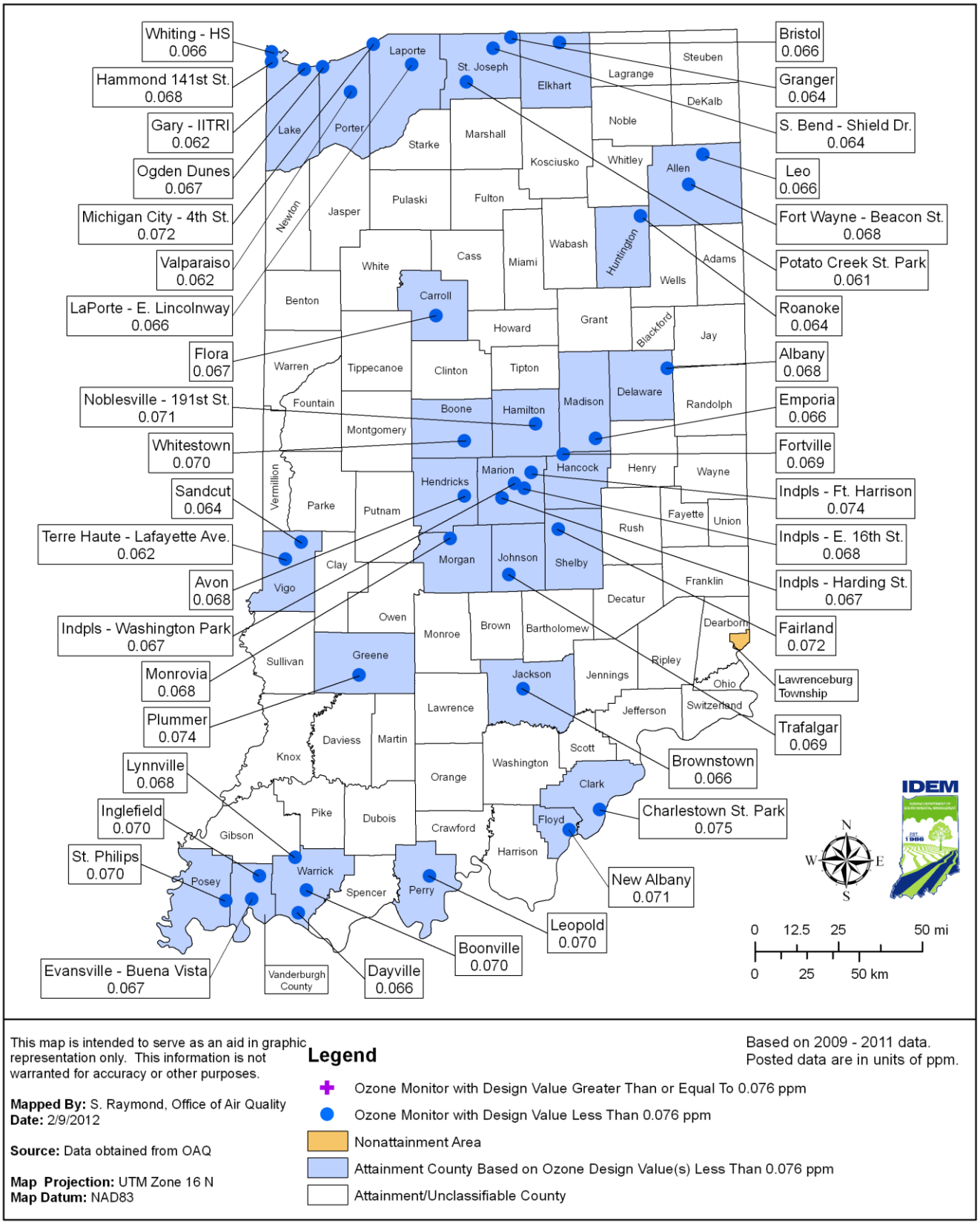
Enclosure 3
List of Indiana Counties with Final Ozone Designation Recommendations

County (Monitor ID)	2009-2011 Design Value (ppm)	Attainment Status for 1997 Ozone NAAQS	Indiana's Initial Recommendation for 2008 Ozone NAAQS	U.S. EPA's Propsoed Designations for 2008 Ozone NAAQS	Indiana's Updated Recommendations for 2008 Ozone NAAQS
Marion (180970050)	0.074	Attainment with a Maintenance Plan (Redesignation effective 10-19-07)	Nonattainment	Attainment	Attainment
Marion (180970057)	0.067				
Marion (180970073)	0.068				
Marion (180970078)	0.067				
Morgan (181090005)	0.068	Attainment with a Maintenance Plan (Redesignation effective 10-19-07)	Nonattainment	Attainment	Attainment
Perry (181230009)	0.070	Attainment/Unclassifiable	Nonattainment	Attainment	Attainment
Porter (181270024)	0.067	Attainment with a Maintenance Plan (Redesignation effective 5-11-10)	Attainment	Nonattainment	Attainment
Porter (181270026)	0.062				
Posey (181290003)	0.070	Attainment/Unclassifiable	Attainment	Attainment	Attainment
St Joseph (181410010)	0.061	Attainment with a Maintenance Plan (Redesignation effective 7-19-07)	Attainment	Attainment	Attainment
St Joseph (181410008/15)	0.064				
St Joseph (181411007)	0.064				
Shelby (181450001)	0.072	Attainment with a Maintenance Plan (Redesignation effective 10-19-07)	Attainment	Attainment	Attainment
Vanderburgh (181630012/21)	0.067	Attainment with a Maintenance Plan (Redesignation effective 1-30-06)	Nonattainment	Attainment	Attainment
Vanderburgh (181630013)	0.070				
Vigo (181670018)	0.062	Attainment with a Maintenance Plan (Redesignation effective 2-6-06)	Attainment	Attainment	Attainment
Vigo (181670024)	0.064				
Warrick (181730008)	0.070	Attainment with a Maintenance Plan (Redesignation effective 1-30-06)	Nonattainment	Attainment	Attainment
Warrick (181730009)	0.068				
Warrick (181730011)	0.066				

Note: Indiana's initial recommendation for the 2008 8-hour ozone NAAQS was sent to U.S. EPA on March 11, 2009. The March 11, 2009 recommendations for nonattainment areas were based on quality assured 2006 through 2008 monitor values. Indiana's updated recommendations for the 2008 8-hour ozone NAAQS are based on 2009 through 2011 monitor values.

Enclosure 4

Map of Indiana Counties with Final Ozone Designation Recommendations



This map is intended to serve as an aid in graphic representation only. This information is not warranted for accuracy or other purposes.

Mapped By: S. Raymond, Office of Air Quality
Date: 2/9/2012

Source: Data obtained from OAQ

Map Projection: UTM Zone 16 N
Map Datum: NAD83

Legend

- Ozone Monitor with Design Value Greater Than or Equal To 0.076 ppm
- Ozone Monitor with Design Value Less Than 0.076 ppm
- Nonattainment Area
- Attainment County Based on Ozone Design Value(s) Less Than 0.076 ppm
- Attainment/Unclassifiable County

Based on 2009 - 2011 data.
Posted data are in units of ppm.